



ALPINE PIPELINE RIVER CROSSINGS

2011

MONITORING REPORT

Submitted to



Submitted by



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CONTENTS

1.0 Introduction/Objectives 1

 1.1 Monitoring Criteria 1

 1.1.1 Data collected in 2011 2

 1.1.2 Physical Conditions Evaluated..... 2

2.0 Methods..... 5

 2.1 Bank Erosion..... 5

 2.2 VSM Tilt 5

 2.3 VSM Scour 6

 2.4 Foundation Settlement and Jacking (HDD West) 7

 2.5 Polygon Trough Subsidence (HDD East)..... 7

3.0 Results 9

 3.1 HDD West Bank..... 9

 3.1.1 Bank and Pad Erosion (HDD West)..... 9

 3.1.2 VSM Tilt (HDD West)..... 10

 3.1.3 Foundation Pile Cap Survey (HDD West) 12

 3.2 HDD East Bank 12

 3.2.1 Bank and Pad Erosion (HDD East) 12

 3.2.2 Polygon Trough Subsidence (HDD East)..... 13

 3.2.3 VSM Tilt (HDD East) 13

 3.3 Kachemach River 16

 3.3.1 Bank Erosion 16

 3.3.2 VSM Tilt 16

 3.3.3 VSM Scour 19

 3.4 Miluveach River 20

 3.4.1 Bank Erosion 20

 3.4.2 VSM Tilt 20

 3.4.3 VSM Scour 22

4.0 Conclusions 25

 4.1.1 HDD West Bank 25

 4.1.2 HDD East Bank..... 25

 4.1.3 Kachemach River..... 26

 4.1.4 Miluveach River 26

5.0 References..... 27

Appendix A Photographs A.1

Appendix B HDD West B.1

Appendix C HDD East..... C.1

FIGURES

Figure 1 2011 Alpine Pipeline River Crossing Monitoring Sites 3

GRAPHS

Graph 3.1	HDD West VSM Historic Change in Tilt, North/South.....	11
Graph 3.2	HDD West VSM Historic Change in Tilt, East/West	12
Graph 3.3	HDD East VSM Historic Change in Tilt, North/South	15
Graph 3.4	HDD East VSM Historic Change in Tilt, East/West.....	15
Graph 3.5	Kachemach River VSM Historic Change in Tilt, North/South.....	18
Graph 3.6	Kachemach River VSM Historic Change in Tilt, East/West.....	18
Graph 3.7	Miluveach River VSM Historic Change in Tilt, North/South.....	21
Graph 3.8	Miluveach River VSM Historic Change in Tilt, East/West	22

TABLES

Table 1	VSM Tilt Unit Conversion	6
Table 2	VSM Design Scour Limits	6
Table 3	HDD West VSM Tilt Measurement Results (2011).....	10
Table 4	HDD West VSM Change in Tilt from 2010 to 2011	11
Table 5	HDD East VSM Tilt Measurement Results (2011)	14
Table 6	HDD East VSM Change in Tilt from 2010 to 2011.....	14
Table 7	Kachemach River VSM Tilt Measurement Results (2011).....	17
Table 8	Kachemach River VSM Change in Tilt from 2010 to 2011.....	17
Table 9	Kachemach River VSM Scour (2011).....	19
Table 10	Miluveach River VSM Tilt Measurement Results (2011).....	20
Table 11	Miluveach River VSM Tilt Change in Tilt from 2010 to 2011	21
Table 12	Miluveach River VSM Scour (2011).....	23

PHOTOS

Photo A.1	HDD West, May 25, 2011: Five Days Before Peak Stage, Looking Southeast	A.3
Photo A.2	HDD West, May 26, 2011: Four Days Before Peak Stage, Looking Northwest.....	A.3
Photo A.3	HDD West, May 31, 2011: One Day After Peak Stage, Looking East.....	A.4
Photo A.4	HDD West, May 31, 2011: One Day After Peak Stage, Looking West.....	A.4
Photo A.5	HDD West, June 9, 2011: Aerial Photo, Looking Northwest	A.5
Photo A.6	HDD West, July 20, 2011: West Bank, Looking Northeast.....	A.5
Photo A.7	HDD West, July 20, 2011: West Bank, Looking Southwest.....	A.6
Photo A.8	HDD East, May 25, 2011: Five Days Before Peak Stage, Looking Northwest.....	A.6
Photo A.9	HDD East, May 31, 2011: One Day After Peak Stage, Looking Southeast	A.7
Photo A.10	HDD East, June 9, 2011: Aerial Photo, Looking Northwest.....	A.7
Photo A.11	HDD East, June 9, 2011: Aerial Photo of East Bank, Looking East	A.8
Photo A.12	HDD East, July 21, 2011: Aerial Photo of East Bank, Looking West.....	A.8

Photo A.13	HDD East, July 20, 2011: Aerial View of Trough from Water, Looking Northeast.....	A.9
Photo A.14	HDD East, July 20, 2011: Trough From Toe of Bank, Looking Southeast.....	A.9
Photo A.15	HDD East, July 20, 2011: East Bank, Looking North.....	A.10
Photo A.16	HDD East, July 20, 2011: Looking West Through Thermosiphons With Trough in Foreground.....	A.10
Photo A.17	Kachemach River Crossing, May 26, 2011: Four Days Before Peak Stage, Looking Southeast.....	A.11
Photo A.18	Kachemach River Crossing, June 9, 2011: Aerial Photo, Looking Southwest.....	A.11
Photo A.19	Kachemach River Crossing, July 19, 2011: Aerial Photo, Looking North.....	A.12
Photo A.20	Kachemach River Crossing, July 19, 2011: Aerial Photo, Looking Southeast.....	A.12
Photo A.21	Kachemach River Crossing, July 19, 2011: West Floodplain, Looking East.....	A.13
Photo A.22	Kachemach River Crossing, July 19, 2011: East Bank, Looking West.....	A.13
Photo A.23	Kachemach River Crossing, July 19, 2011: East Bank, Looking South.....	A.14
Photo A.24	Kachemach River Crossing, July 19, 2011: East Bank, Looking North.....	A.14
Photo A.25	Miluveach River Crossing, May 26, 2011: Four Days Before Peak Stage, Looking North.....	A.15
Photo A.26	Miluveach River Crossing, June 9, 2011: Aerial Photo, Looking Northeast.....	A.15
Photo A.27	Miluveach River Crossing, July 19, 2011: Aerial Photo, Looking South.....	A.16
Photo A.28	Miluveach River Crossing, July 19, 2011: Aerial Photo, Looking Northwest.....	A.16
Photo A.29	Miluveach River Crossing, July 19, 2011: East Bank, Looking West.....	A.17
Photo A.30	Miluveach River Crossing, July 19, 2011: West Floodplain, Looking East.....	A.17

ACRONYMS AND ABBREVIATIONS

Baker – Michael Baker Jr., Inc.

BPMSL – British Petroleum Mean Sea Level

CPAI – ConocoPhillips Alaska, Inc.

HDD – Horizontal Directional Drilled

LCMF/Umiq - Kuukpik/LCMF, LLC (Umiq)

NPS – Nominal Pipe Size

VSM – Vertical Support Member(s)

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1.0 INTRODUCTION/OBJECTIVES

Originally constructed during the winter of 1998/1999, the Alpine Pipeline System crosses three major rivers between the Alpine Development CD1 facility and the tie-in to the Kuparuk Pipeline. The three river crossings are the above ground crossings of the Kachemach River and the Miluveach River; and the horizontal directionally drilled (HDD) crossing of the Colville River East Channel. Monitoring of the pipeline crossings is required by the Right-of-Way Lease/Grant Stipulations and the Alpine Surveillance and Monitoring Program.

Monitoring allows for a historic comparison between observed conditions and the design criteria. It is conducted to document the condition of the pipeline and channel morphology at each of the river crossings. The primary objective is documentation of the state of the pipeline at each crossing and the pipeline's effect on each channel.

In 2001, initial monitoring of the HDD crossing was conducted (Baker 2002). Between 2003 and 2011 ConocoPhillips Alaska, Inc. (CPAI) has performed annual monitoring at this location (Baker 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010) which includes bank migration surveys since 2003 and pile cap elevation surveys since 2004 provided by LCMF/Umiaq.

In 2003, initial monitoring of the Kachemach River and Miluveach River pipeline crossings was conducted (Baker 2003). Between 2004 and 2006 CPAI has performed annual monitoring at both locations (Baker 2004, 2005, 2006) which includes bank migration and pile cap elevation surveys performed by LCMF/Umiaq. Over the course of these four years of monitoring, no significant scour, erosion, or vertical support member (VSM) tilt were observed at these locations. As a result, in the fall of 2006, a five-year monitoring interval was recommended. No monitoring was conducted at the Kachemach or Miluveach in 2007 (Baker 2007). Monitoring resumed at these locations in 2008 (Baker 2008) which included bank migration and pile cap elevation surveys by LCMF/Umiaq. Annual monitoring has continued at the Kachemach and Miluveach since 2009 (Baker 2009, 2010) without surveys. The next bank erosion and pile cap elevation surveys of the Kachemach and Miluveach Rivers are planned for the 2013 monitoring program.

1.1 MONITORING CRITERIA

The 2011 monitoring activities included visual observations at the three crossings, as well as LCMF/Umiaq bank erosion and pile cap elevation surveys at the HDD crossing. Figure 1 illustrates the location of the crossings.

1.1.1 DATA COLLECTED IN 2011

Data collected were:

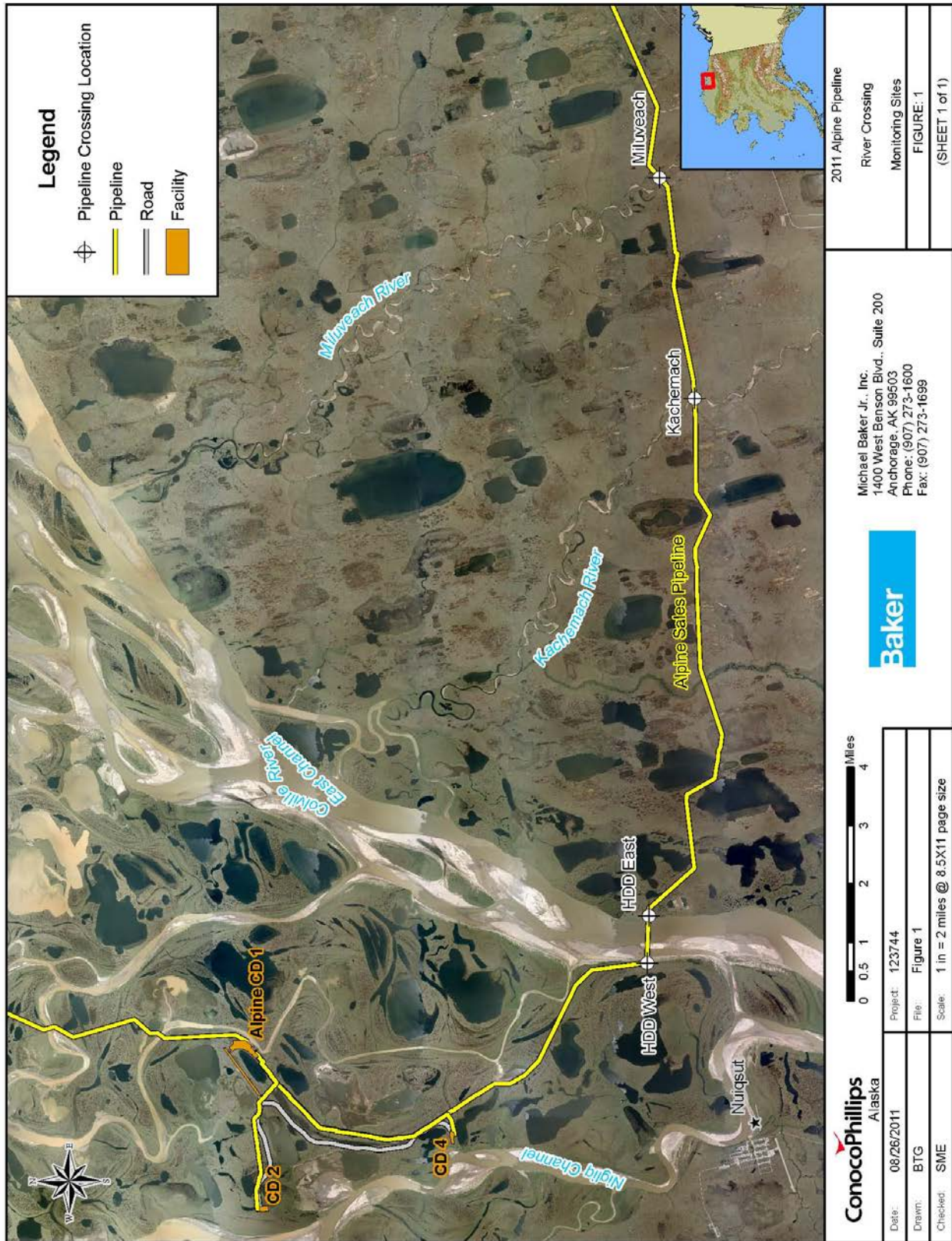
- Photographs at each crossing location
- Evaluation of the condition of VSM, which includes measured tilt as well as observable settling, scouring, or jacking. Particular attention was paid to the following:
 - Miluveach River - VSM Nos. 2047 A/B and 2048 A/B and other VSM within 15 feet of the channel
 - Kachemach River - VSM Nos. 1714 and 1715 A/B and other VSM within 15 feet of the channel
- Evaluation of bank erosion at the HDD crossing at least 50 feet upstream and downstream from the nominal pipe size 14 (NPS 14) oil pipeline
- Survey of the top and bottom bank elevations and identification of locations of bank caving at the HDD crossing (LCMF/Umiaq)
- Topographic survey from the Colville River bank to the HDD east pad to document bank and ground stability (LCMF/Umiaq)
- Measurement of depth and width of scour around VSM in the Kachemach and Miluveach River channels
- Observation of localized scour near all river crossings

1.1.2 PHYSICAL CONDITIONS EVALUATED

The following physical conditions were evaluated during the site visits:

- Obstructions, ice dams, new river channels, or changes in flow in the channels
- Signs of flooding threatening a facility or pipeline, or where water could not be diverted and there was:
 - Evidence of water concentrated longitudinally on or along the pipeline centerline, or
 - Gullying that threatened the buried pipeline at the HDD crossing
- Soil pressure ridges parallel to the pipe axis exceeding one foot in height and 60 feet in length
- Ponding extending over the pipe axis deeper than one foot and more than 100 feet long
- Cracks located within ten feet of the pipeline centerlines at least ten feet long with vertical displacement exceeding six inches, or wider than two inches parallel to the pipe axis and longer than 60 feet
- Depressions occurring longitudinally over the pipe axis deeper than one foot and more than 100 feet long
- Pipeline leaks
- Presence or absence of erosion of the HDD facility gravel pads
- Evidence of any settlement and jacking of the HDD building foundation (LCMF/Umiaq)

FIGURE 1 2011 ALPINE PIPELINE RIVER CROSSING MONITORING SITES



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2.0 METHODS

During the 2011 spring breakup, observations and photographs were collected at the crossing locations on the Kachemach River, Miluveach River, and HDD crossing of the Colville River East Channel. On July 19 and 20, 2011, Baker personnel documented visual observations and VSM tilt measurements at the three river crossings. Channels were clear of ice and snow allowing full access to the channels and pipeline. Visual observations at the HDD crossing began from where the pipeline casings enter the ground and extended to the riverbanks. Observations at the Kachemach and Miluveach Rivers were conducted along the pipeline stream crossings to 15 feet outside the active channel banks on each side. The observations extended upstream and downstream several hundred feet on both banks. In addition to visual observations, aerial and ground photographs were taken and are provided in Appendix A. Observations and measurements were compared to established design criteria.

2.1 BANK EROSION

LCMF/Umiak surveyed the local topography at the HDD crossing in August 2011. LCMF/Umiak incorporated the data into figures and provided a tabulation of historical migration since 2001 for each bank. This is available in Appendix B for HDD West and Appendix C for HDD East. Arbitrary scour control points serve as the origin for the baseline stationing, beginning at 100 feet along each bank, and establish a means of comparing annual measurements.

The HDD West top of bank setback allows for 105 feet of bank erosion and the HDD East top of bank setback allows for 115 feet of bank erosion (Baker 1997). Design setbacks for the Kachemach River allow for 25 feet of bank migration on either bank, while setbacks for the Miluveach River allow for 35 feet of bank migration on either bank (Baker 1999). Setbacks were based on a 30-year design life.

2.2 VSM TILT

A plumb bob and pocket rod tape measure were used to measure the tilt of VSM adjacent to the river crossings. Tilt was measured perpendicular to the oil pipeline (north/south) and parallel to the pipeline (east/west). Tilt of each VSM was documented by measuring the horizontal distance from plumb in feet per vertical foot (ft/ft). The accuracy of this method given the tools used is ± 0.001 ft/ft. The VSM axis was considered plumb if the tilt was measured to be less than or equal to 0.00125 ft/ft. Tilt results per VSM were evaluated with respect to accuracy. If tilt was measurable, the direction of tilt was also recorded (N, S, E, or W). Approximate conversions between ft/ft and inches per vertical foot (in/ft) are provided in Table 1.

TABLE 1 VSM TILT UNIT CONVERSION

ft/ft	in/ft
<0.00125	<1/64
0.00250	1/32
0.00500	1/16
0.00750	3/32
0.01000	1/8
0.01250	5/32
0.01750	27/128

The 1999 Alpine VSM installation specification states that “the plumb of each VSM shall vary no more than +/- 0.5% (1/16 inch per 12 inches) in any direction” (ARCO 1999). The 2004 CPAI North Slope VSM specification states that “the slope of any support beam in the direction parallel to the pipeline centerline shall not exceed 1/2 inch (0.042 feet) in ten feet (0.004 ft/ft or 1/16 inch per foot)” (CPAI 2004). Based on these VSM specifications and for comparison purposes, the plumb (tilt) tolerance was accepted to be 0.005 ft/ft (1/16 in/ft). Bold values in Table 1 indicate the VSM tilt tolerance for the purpose of this study.

2.3 VSM SCOUR

Streambed scour in the Miluveach and Kachemach Rivers was evaluated using visual methods at each in-stream VSM. As presented in the *Mechanical Analysis of Aboveground Pipeline and Aboveground River Crossings* (Baker 1999), the VSM within the floodplain of the Kachemach and Miluveach River crossings were designed to withstand both local pier scour and channel scour during a 200-year flood. Scour limits for VSM located in the floodplain and in the active channel are shown in Table 2. These values include both local pier scour as well as anticipated channel scour.

TABLE 2 VSM DESIGN SCOUR LIMITS

River	Minimum Scour Hole Elevations (feet - BPMSL)	
	Floodplain	Main Channel
Kachemach	9.5	6.9
Miluveach	36.7	35.1

2.4 FOUNDATION SETTLEMENT AND JACKING (HDD WEST)

LCMF/Umiq surveyed the elevation of the HDD building foundation piles (bottom of pile cap) and developed tabulations of historic elevations for each pile. Data presented in the 2008 monitoring report (Baker 2008) reflected an adjustment to the vertical datum at HDD West of -0.35 feet, which was made to reflect actual elevations based on differential levels carried by LCMF/Umiq from CD1 (Alpine) in August of 2007. According to LCMF/Umiq, this adjustment was eliminated to avoid confusion about elevation values. Therefore, the values for each pile cap as presented in Appendix B reflect the original datum.

2.5 POLYGON TROUGH SUBSIDENCE (HDD EAST)

As in past years, a polygon trough located between the Colville River and the HDD East gravel pad was also monitored for subsidence. Historic profiles and tabulated elevations of selected cross sections over the length of the trough are presented in Appendix C.

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3.0 RESULTS

3.1 HDD WEST BANK

The west bank of the Colville River HDD crossing was evaluated by visual observation, review of ground and aerial photography (Photo A.1 through Photo A.7; Appendix A), as well as field and topographic surveys.

The 2011 Colville River spring breakup floodwaters reached but did not overtop the west bank of the channel. Some erosion was evident along the west bank, as discussed in the following Section 3.1.1. Two distinct debris lines, composed of mainly sticks and small timber, were observed on the bank of the HDD West pipeline crossing. One debris line was located at the toe of the HDD West bank and was most likely deposited following peak stage on the Colville River. A second, lower, debris line was noted approximately 25 to 30 feet east of the bottom toe of the bank, between the toe of the bank and the present edge of water. This lower elevation debris line is most likely due to a secondary smaller peak event in the East Channel.

3.1.1 BANK AND PAD EROSION (HDD WEST)

The greatest bank erosion observed between the 2010 and 2011 pipeline monitoring events was 3.0 feet, occurring at Station 3+60, which is approximately 110 feet downstream (north) of the oil pipeline centerline as identified on the LCMF/Umiaq topographic survey. The oil pipeline centerline is located at Station 2+50 on the topographic survey (Appendix B).

A maximum cumulative erosion of 18.6 feet, between April 2002 and August 2011, was measured along the top of bank at Station 3+70, located 120 feet north of the oil pipeline centerline (STA 2+50). The 2011 erosion value has been the first change at Station 3+70 since 2006 which had a value of 18.7 feet for 5 years. The 2011 erosion value yields a maximum average rate of 1.9 ft/yr at this location over the monitoring period.

The average rate of erosion for the 2010-2011 monitoring period along the 440-foot top of bank was measured to be 0.28 ft/yr. This is less than the observed historic average rate of 0.44 ft/yr, and less than the estimated maximum erosion rate used for design of 2.3 ft/yr (Baker 1997). A graphic and tabular summary of the LCMF/Umiaq surveying results for the HDD West Bank crossing is presented in Appendix B.

In 1997, Baker established a scour control point at the centerline of the NPS 14 oil pipeline, as shown on HDD Bank Monitoring HDD Site-West, provided in Appendix B. Comparing the location of the 1997 scour control point to the 2011 LCMF/Umiaq survey data, approximately 9.0 feet of bank erosion has occurred over the 14-year period since 1997 (0.64 ft/yr). No significant erosion occurred at this location between 2010 (Baker 2010) and 2011. This bank erosion comprises approximately 9 percent (%) of the total 105-foot design setback. The west bank erosion has not yet reached the 50% design setback. If in the future, the bank “migrates

50% of the design setback, erosion rates or possible mitigation measures will be evaluated" (Baker 1999).

Based on visual observations, bank erosion between 2010 and 2011 does not appear to be significant, although some erosion was evident. Flow direction is largely unchanged. The pipelines appeared to be in good condition with no apparent leaks.

3.1.2 VSM TILT (HDD WEST)

The VSM investigated near HDD West are adequately supporting the pipeline. Five of the six VSM directly adjacent to the HDD West pad and crossing were plumb according to project tolerance based on tilt measurements and project method accuracy. A summary of the HDD West Bank VSM tilt survey results is presented in Table 3.

TABLE 3 HDD WEST VSM TILT MEASUREMENT RESULTS (2011)

VSM Number	Tilt Measurement Orientation (ft/ft)		Comment
	North/South	East/West	
783	0.0028 N	< 0.00125	
784N (A)	0.0043 N	< 0.00125	
784S (B)	0.0020 N	0.0037 W	
788	< 0.00125	0.0034 E	
789N (A)	<i>0.0051 N</i>	0.0019 W	N/S: exceeded project tolerance; within survey accuracy
789S (B)	<i>0.0067 N</i>	0.0017 W	N/S: exceeded project tolerance and survey accuracy

Notes:

- Italic values* indicate VSM tilt exceeded the project tolerance of 0.005 ft/ft, but not by more than the accuracy of the survey method of 0.001 ft/ft.
- Bold italic values*** indicate the VSM tilt exceeds project tolerance by more than the method accuracy.

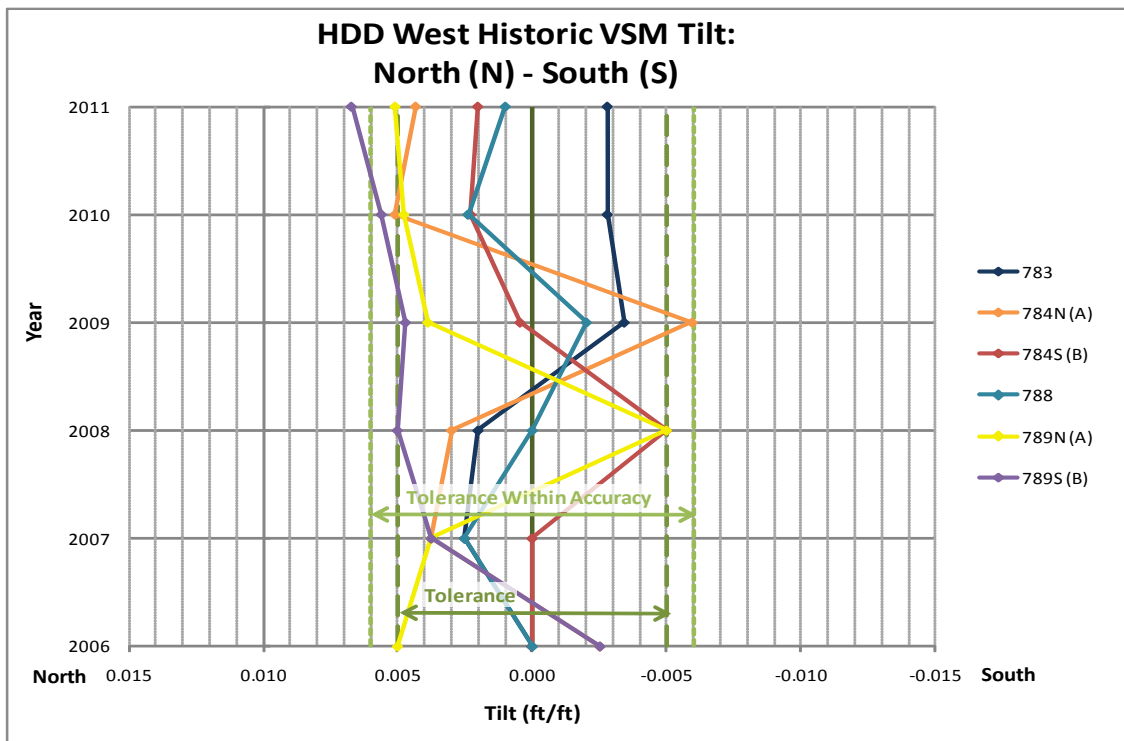
VSM 783, 784N (A), 784S (B) and 788 tilt values were within plumb limits. The tilt of VSM 789N (A) was measured to be 0.0051 N ft/ft. This value exceeded the project tolerance, but was within the survey accuracy. The tilt of VSM 789S (B) was measured to be 0.0067 N ft/ft. This value exceeds the project tolerance and was not within the accuracy of the survey method.

Table 4 illustrates the change in tilt measurements collected between the 2010 and 2011 monitoring events.

TABLE 4 HDD WEST VSM CHANGE IN TILT FROM 2010 TO 2011

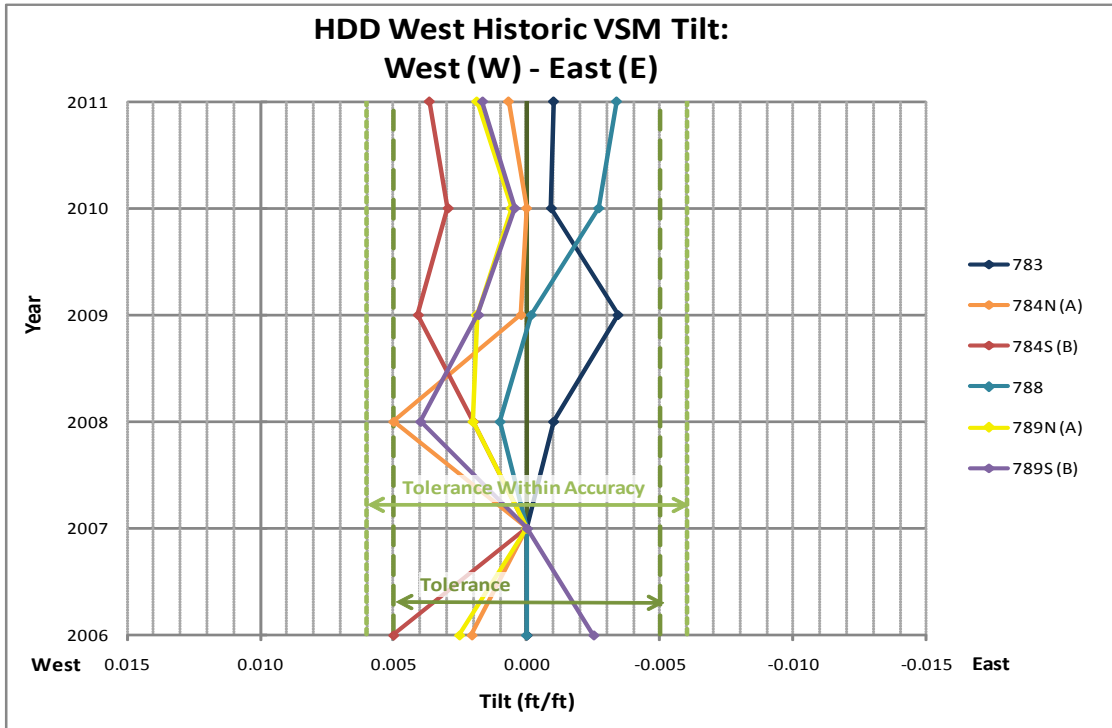
VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
783	No change	< 0.00125
784N (A)	< 0.00125	< 0.00125
784S (B)	< 0.00125	< 0.00125
788	0.0014 S	< 0.00125
789N (A)	< 0.00125	0.0013 W
789S (B)	< 0.00125	0.0012 W

Graph 3.1 and Graph 3.2 presents the historical VSM change in tilt by orientation between 2006 and 2011 (Baker 2006, 2007, 2008, 2009, 2010).



Notes: 1. Positive tilt indicates north (N), negative tilt indicates south (S)
 2. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 3. Survey accuracy of this project is +/-0.001 ft/ft.

GRAPH 3.1 HDD WEST VSM HISTORIC CHANGE IN TILT, NORTH/SOUTH



Notes: 1. Positive tilt indicates west (W), negative tilt indicates east (E)
 2. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 3. Survey accuracy of this project is +/-0.001 ft/ft.

GRAPH 3.2 HDD WEST VSM HISTORIC CHANGE IN TILT, EAST/WEST

3.1.3 FOUNDATION PILE CAP SURVEY (HDD WEST)

LCMF/Umiag has conducted a pile cap elevation survey annually since 2004. Based on the surveys, no single pile cap has experienced a cumulative change of more than 0.027 feet of movement vertically over the span of seven years. A summary of the LCMF/Umiag surveying results for the HDD West Bank crossing is presented in Appendix B.

3.2 HDD EAST BANK

The east bank of the Colville River HDD crossing was evaluated by visual observation, review of ground and aerial photography (Photo A.8 through Photo A.16 in Appendix A), as well as field and topographic surveys. The 2011 Colville River spring breakup floodwaters did not overtop the east bank of the channel.

3.2.1 BANK AND PAD EROSION (HDD EAST)

The greatest bank erosion observed between the 2010 and 2011 monitoring events was 11.9 feet occurring at Station 3+35, approximately 85 feet north of the NPS 14 oil pipeline centerline (STA 2+80). This erosion occurred at an isolated location, in the pipeline crossing area, where a section of bank extends out from the embankment. Appendix C includes a drawing of the bank migration survey in addition to tabular data.

Between August 2001 and August 2011, a maximum erosion of 33.2 feet at the top of bank was measured at Station 4+15. This location is approximately 135 feet north of the oil pipeline centerline (STA 2+80). This value yields a maximum average erosion rate of 3.3 feet/year over the 10-year monitoring period at this location.

The average rate of erosion for the 2010-2011 monitoring period, as measured along the entire 450-foot top of bank, is approximately 1.10 ft/yr. This value averages both erosion and deposition. This is less than both the observed long-term historical average erosion rate of 1.25 ft/yr, and the estimated maximum design erosion rate of 2.5 ft/yr (Baker 1997). A graphic and tabular summary of the LCMF/Umiaq surveying results for the HDD East Bank crossing is presented in Appendix C.

Approximately 13.1 feet of bank erosion near the oil pipeline centerline (STA 2+50) has occurred since 1997. This represents an average of 0.94 ft/yr over the 14-year period, based on a comparison of 2011 survey data and the 1997 scour control point shown on the figure HDD Bank Erosion Topo/Monitoring HDD Site-East, as provided in Appendix C. As of 2011, the observed bank erosion of 13.1 feet at this location equals 11.4% of the 115-foot design setback. The east bank erosion has not yet reached the 50% design setback. If in the future, the bank “migrates 50% of the design setback, erosion rates or possible mitigation measures will be evaluated” (Baker 1999).

As observed in 2010, some erosion and sloughing has occurred along the east bank, with exposed sandbags and Styrofoam evident. While the date of placement is not known, it is understood by Baker that the sandbags and Styrofoam were installed in the bank to combat further erosion. Site conditions encountered during the 2011 field visit were similar to those observed during the 2010 field visit. (Photo A.14 through Photo A.15 in Appendix A).

3.2.2 POLYGON TROUGH SUBSIDENCE (HDD EAST)

In addition to bank erosion surveys, subsidence monitoring has been conducted since 2001 by LCMF/Umiaq at eight cross sections of the polygon trough west of the HDD East gravel pad (cross section A through cross section H). The cumulative subsidence measured at any of the cross sections was less than 3.5 feet. Maximum cumulative subsidence at cross section E was 3.4 feet. The maximum incremental change since 2010 was at cross section E with a drop of 1.9 feet. A graphic and tabular summary of these cross sections is provided in Appendix C, and photographs of the troughs, Photo A.13 through Photo A.16, are in Appendix A.

3.2.3 VSM TILT (HDD EAST)

The VSM investigated near HDD East are adequately supporting the pipeline. Four of the five VSM directly adjacent to the HDD East pad and crossing were found to be plumb according to project tolerance based on tilt measurements and considering method accuracy. A summary of the HDD East Bank VSM tilt survey results is presented in Table 5.

VSM 883, 884, 889 and 890 tilt values were within plumb limits. The tilt was measured to be 0.007 S ft/ft for VSM 885. This value exceeds project tolerance and was not within the accuracy of the survey method.

TABLE 5 HDD EAST VSM TILT MEASUREMENT RESULTS (2011)

VSM Number	Tilt Measurement Orientation (ft/ft)		Comment
	North/South	East/West	
883	< 0.00125	< 0.00125	
884	< 0.00125	< 0.00125	
885	<i>0.007 S</i>	0.0025 W	N/S: exceeded project tolerance and survey accuracy
889	0.0019 N	< 0.00125	
890	0.0027 S	< 0.00125	

Notes:

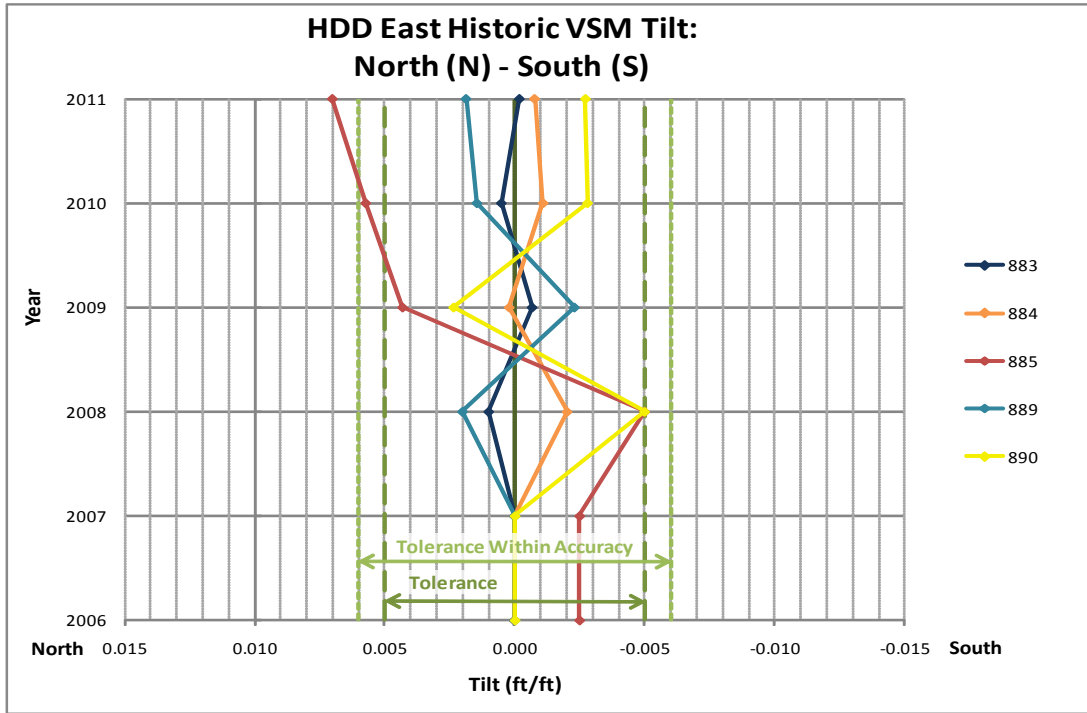
- Italic values* indicate VSM tilt exceeded the project tolerance of 0.005 ft/ft, but not by more than the accuracy of the survey method of 0.001 ft/ft.
- Bold italic values*** indicate the VSM tilt exceeds project tolerance by more than the method accuracy.

Table 6 presents the difference in tilt measurements collected during the 2010 and 2011 monitoring events.

TABLE 6 HDD EAST VSM CHANGE IN TILT FROM 2010 TO 2011

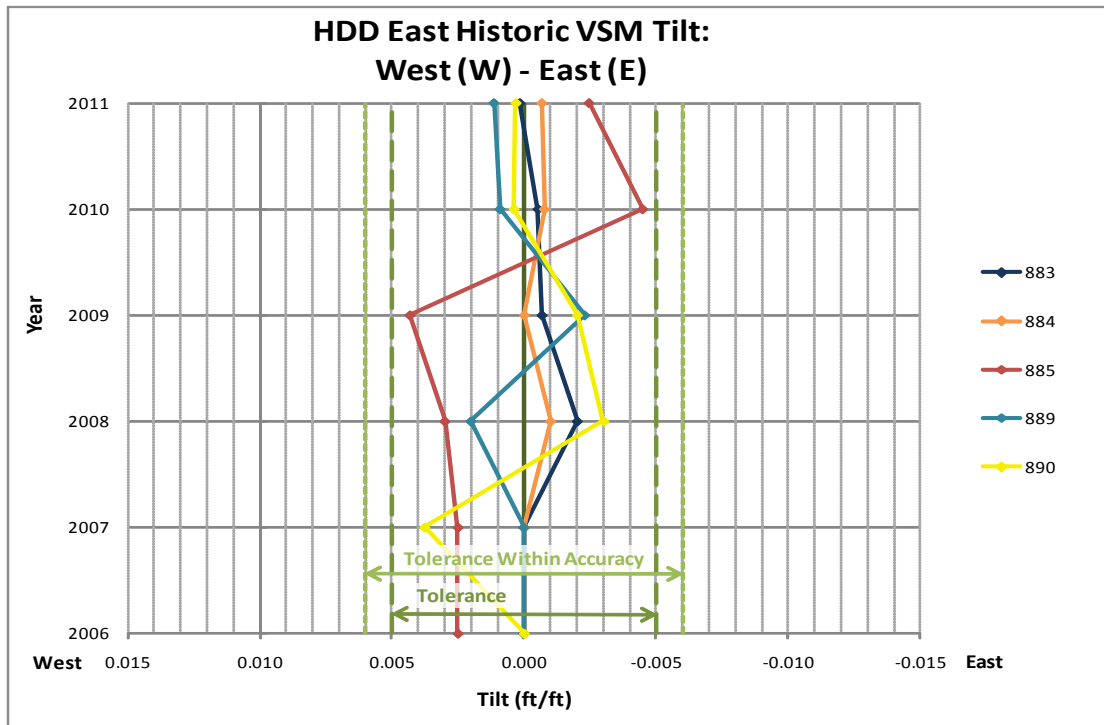
VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
883	< 0.00125	< 0.00125
884	< 0.00125	< 0.00125
885	0.0013 S	0.0020 E
889	< 0.00125	< 0.00125
890	< 0.00125	< 0.00125

Graph 3.3 and Graph 3.4 presents the historical VSM change in tilt by orientation between 2006 and 2011 (Baker 2006, 2007, 2008, 2009, 2010).



Notes:
 1. Positive tilt indicates north (N), negative tilt indicates south (S)
 2. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 3. Survey accuracy of this project is +/-0.001 ft/ft.

GRAPH 3.3 HDD EAST VSM HISTORIC CHANGE IN TILT, NORTH/SOUTH



Notes:
 1. Positive tilt indicates west (W), negative tilt indicates east (E)
 2. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 3. Survey accuracy of this project is +/-0.001 ft/ft.

GRAPH 3.4 HDD EAST VSM HISTORIC CHANGE IN TILT, EAST/WEST

3.3 KACHEMACH RIVER

The Kachemach River crossing was evaluated by visual observation, review of ground and aerial photography (Photo A.17 through Photo A.24; Appendix A), and field surveys. At the time of the field visit, flow was observed across the entire gravel channel, approximately 75 feet wide at a maximum depth of approximately 3 feet. 2011 spring breakup observations suggest flow was confined to the active gravel bed channel and did not reach the overbank regions adjacent to the river crossing.

3.3.1 BANK EROSION

Based on visual observations, no significant bank erosion was evident at the crossing nor immediately upstream or downstream from the pipelines.

3.3.2 VSM TILT

The VSM investigated near the Kachemach River crossing are adequately supporting the pipeline. Two of the eight VSM located within the vicinity of the Kachemach River were found to be plumb according to project tolerance based on tilt measurements; tilt was not measured at two of the VSM (1713 and 1717) due to their location outside of the 15-foot project limits, based on 2011 spring breakup flood and July 2011 flow observations. A summary of the 2011 Kachemach River VSM tilt survey results are presented in Table 7.

VSM 1715A and 1715B were found to be within plumb limits. The tilt of VSM 1714 was measured to be 0.0053 E ft/ft. This value exceeds the project tolerance but was within the survey accuracy. The tilt of VSM 1716 was measured to be 0.0066 S ft/ft and 0.0077 E ft/ft. Both of these values exceed the project tolerance and are not within accuracy of the survey method.

The tilt values of reportedly abandoned VSM 1714A and 1715C exceed the project tolerance by more than the method accuracy. The measured tilt of VSM 1715C was 0.0159 E ft/ft. Tilt at VSM 1714A was 0.0092 S ft/ft and 0.0127 E ft/ft.

TABLE 7 KACHEMACH RIVER VSM TILT MEASUREMENT RESULTS (2011)

VSM Number	Tilt Measurement Orientation (ft/ft)		Comments
	North/South	East/West	
1714	0.0032 N	<i>0.0053 E</i>	E/W: exceeded project tolerance, within survey accuracy
<i>1714A (Abandoned)</i>	<i>0.0092 S</i>	<i>0.0127 E</i>	E/W and N/S: exceeded project tolerance and survey accuracy
1715A	< 0.00125	0.0018 W	
1715B	< 0.00125	0.0031 W	
<i>1715C (Abandoned)</i>	< 0.00125	<i>0.0159 E</i>	E/W: exceeded project tolerance and survey accuracy
1716	<i>0.0066 S</i>	<i>0.0077 E</i>	E/W and N/S: exceeded project tolerance and survey accuracy

Notes:

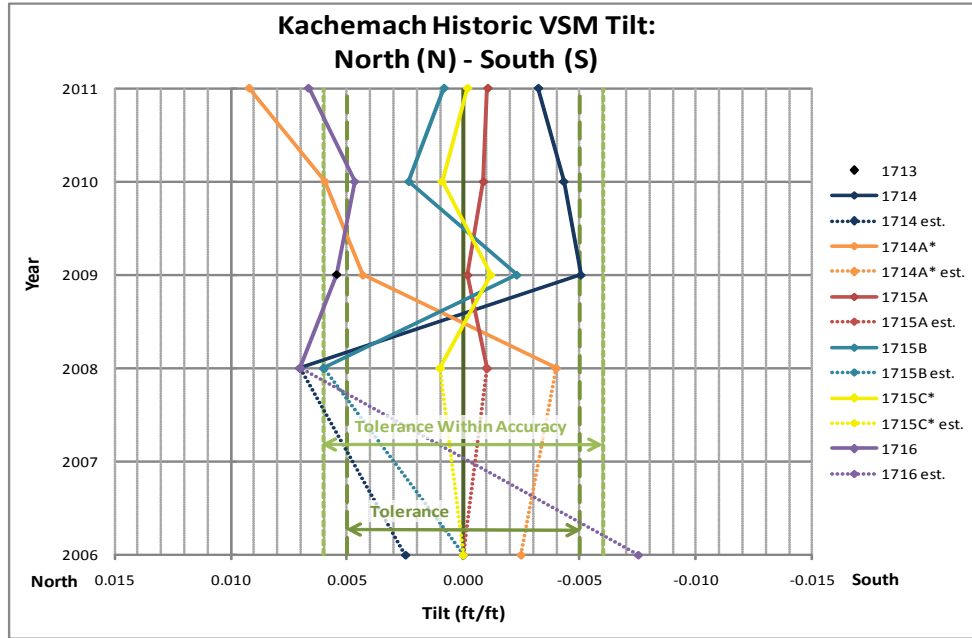
- Italic values* indicate VSM tilt exceeded the project tolerance of 0.005 ft/ft, but not by more than the accuracy of the survey method of 0.001 ft/ft.
- Bold italic values*** indicate the VSM tilt exceeds project tolerance by more than the method accuracy.

Table 8 presents the difference in tilt measurements collected during the 2010 (Baker 2010) and 2011 monitoring events.

TABLE 8 KACHEMACH RIVER VSM CHANGE IN TILT FROM 2010 TO 2011

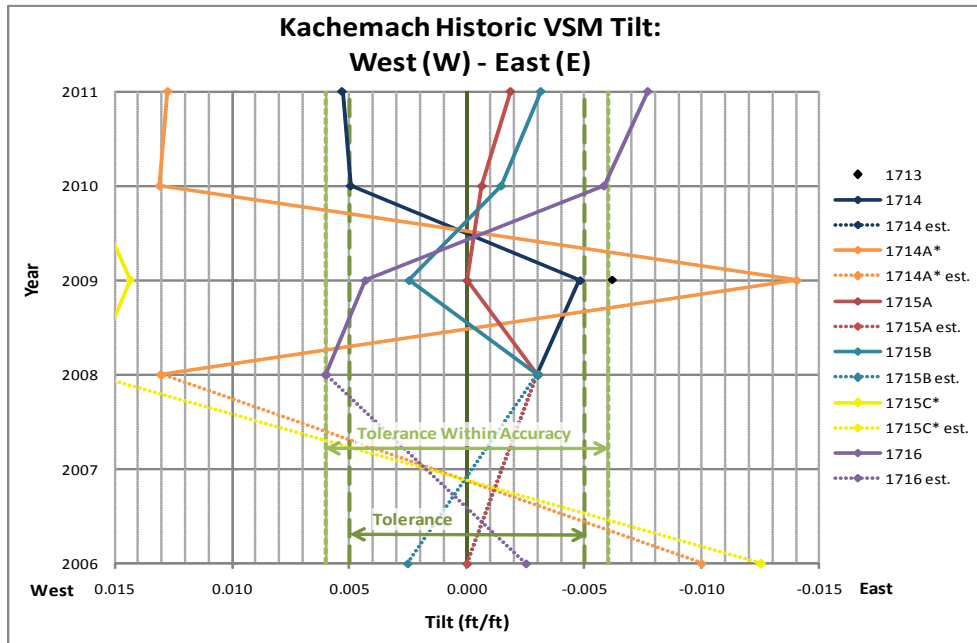
VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
1714	< 0.00125	< 0.00125
<i>1714A (Abandoned)</i>	0.0033 S	< 0.00125
1715A	< 0.00125	< 0.00125
1715B	0.0015 S	0.0017 W
<i>1715C (Abandoned)</i>	< 0.00125	< 0.00125
1716	0.0020 S	0.0019 E

Graph 3.5 and Graph 3.6 presents the historical VSM change in tilt by orientation between 2006 and 2011 (Baker 2006, 2007, 2008, 2009, 2010).



- Notes:
1. Positive tilt indicates north (N), negative tilt indicates south (S)
 2. Tilt measurements were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
 3. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 4. Survey accuracy of this project is +/- 0.001 ft/ft.
 5. Tilt measurements at VSM 1713 were collected only in 2009.
- * VSM 1714A and 1715C are abandoned.

GRAPH 3.5 KACHEMACH RIVER VSM HISTORIC CHANGE IN TILT, NORTH/SOUTH



- Notes:
1. Positive tilt indicates west (W), negative tilt indicates east (E)
 2. Tilt measurements were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
 3. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 4. Survey accuracy of this project is +/- 0.001 ft/ft.
 5. Tilt measurements at VSM 1713 were collected only in 2009.
- * VSM 1714A and 1715C are abandoned.

GRAPH 3.6 KACHEMACH RIVER VSM HISTORIC CHANGE IN TILT, EAST/WEST

3.3.3 VSM SCOUR

Visual observations and measurements were collected to evaluate pier scour for those VSM located within the active Kachemach River channel. No excessive scour was observed at the base of any VSM located within the channel or floodplain. The design scour limit for the main channel of the Kachemach River is 6.9 feet BP mean sea level (BPMSL) (Baker 1999); however, a topographic survey was not conducted this monitoring cycle. Table 9 contains the field scour measurements.

TABLE 9 KACHEMACH RIVER VSM SCOUR (2011)

VSM	Location Description	Depth of Scour, ft	Notes
1714	Grassy floodplain	2.1 ft below existing ground	Approximately 25 feet from edge of water
1714A	Channel	No scour hole	Abandoned VSM
1715A	Channel	2.6 ft below water surface	Approximately 2.5 foot diameter scour casing
1715B	Channel	3.6 ft below water surface	Approximately 2.5 foot diameter scour casing
1715C	Grassy floodplain	1.0 ft below existing ground	Abandoned VSM; Approximately 2.5 feet from edge of water
1716	Grassy floodplain	No scour hole	Approximately 30 feet from edge of water

3.4 MILUVEACH RIVER

The Miluveach River crossing was evaluated by visual observation, review of ground and aerial photography (Photo A.25 through Photo A.30; Appendix A), and field surveys. At the time of the field visit, flow was present in the east side of the channel, approximately 8 feet in width and 0.5 feet deep. 2011 spring breakup observations suggest flow was confined to the active gravel bed channel and did not reach the overbank regions adjacent to the river crossing.

3.4.1 BANK EROSION

Based on visual observations, no bank erosion was evident at the crossing nor immediately upstream or downstream from the pipelines.

3.4.2 VSM TILT

The VSM investigated near the Miluveach River crossing are adequately supporting the pipeline. Two of the six VSM located within the vicinity of the Miluveach River were found to be plumb according to project tolerance based on tilt measurements; tilt was not measured at two of the VSM (2046 and 2049) due to their location outside of the 15-foot project limits, based on 2011 spring breakup flood and July 2011 flow observations. A summary of the 2011 Miluveach River VSM tilt survey results are presented in Table 10.

VSM 2047S (B) and 2048N (A) were found to be within plumb limits. The tilt of VSM 2047N (A) was measured to be 0.0055 N ft/ft, which exceeds the project tolerance but is within the survey accuracy. The tilt of VSM 2048S (B) was measured to be 0.0051 S ft/ft and 0.0089 E ft/ft. The north/south tilt exceeds the project tolerance within the survey accuracy, but the east/west tilt exceeds the project tolerance outside of the accuracy of the survey method.

TABLE 10 MILUVEACH RIVER VSM TILT MEASUREMENT RESULTS (2011)

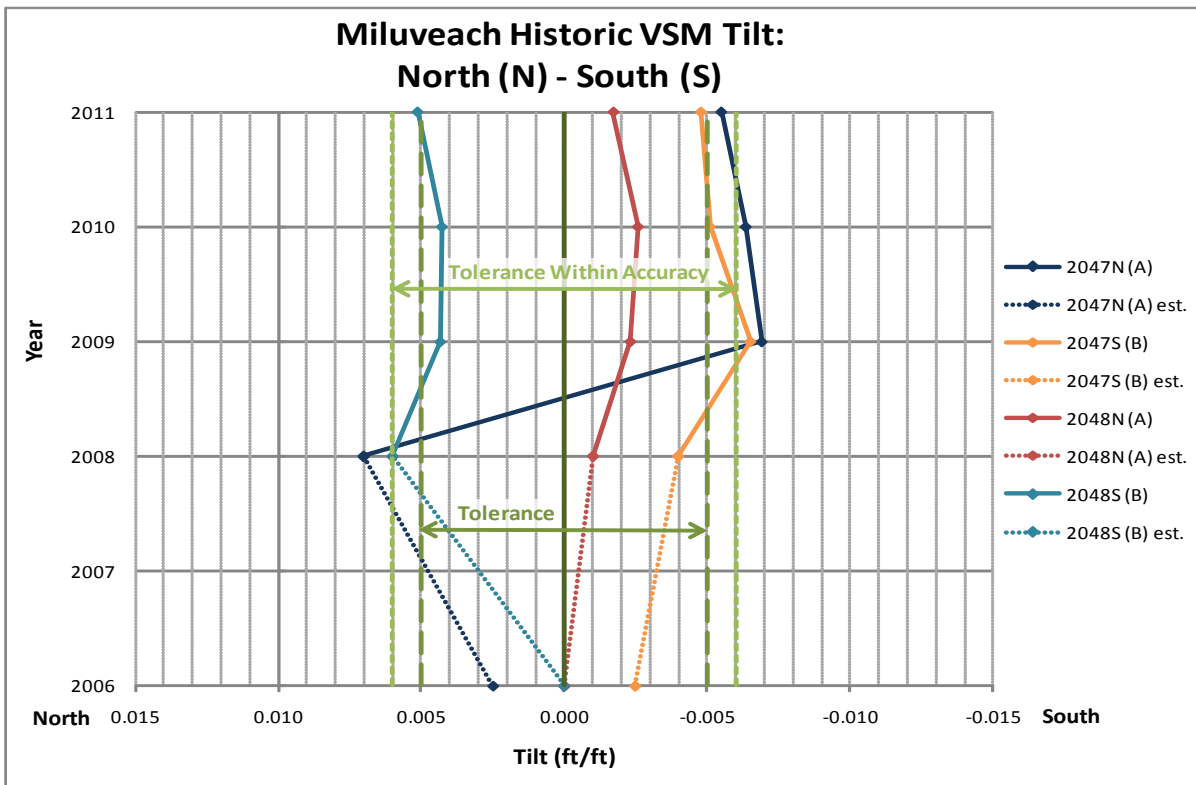
VSM Number	Tilt Measurement Orientation (ft/ft)		Comment
	North/South	East/West	
2047N (A)	<i>0.0055 N</i>	< 0.00125	N/S: exceeded project tolerance, within survey accuracy
2047S (B)	0.0048 S	< 0.00125	
2048N (A)	0.0017 N	0.0038 W	
2048S (B)	<i>0.0051 S</i>	<i>0.0089 E</i>	N/S & E/W: exceeded project tolerance. N/S within survey accuracy. E/W exceeded survey accuracy.
Notes:			
1. <i>Italic values</i> indicate VSM tilt exceeded the project tolerance of 0.005 ft/ft, but not by more than the accuracy of the survey method of 0.001 ft/ft.			
2. <i>Bold italic values</i> indicate the VSM tilt exceeds project tolerance by more than the method accuracy.			

Table 11 presents the difference in tilt measurements collected during the 2010 and 2011 monitoring events.

TABLE 11 MILUVEACH RIVER VSM TILT CHANGE IN TILT FROM 2010 TO 2011

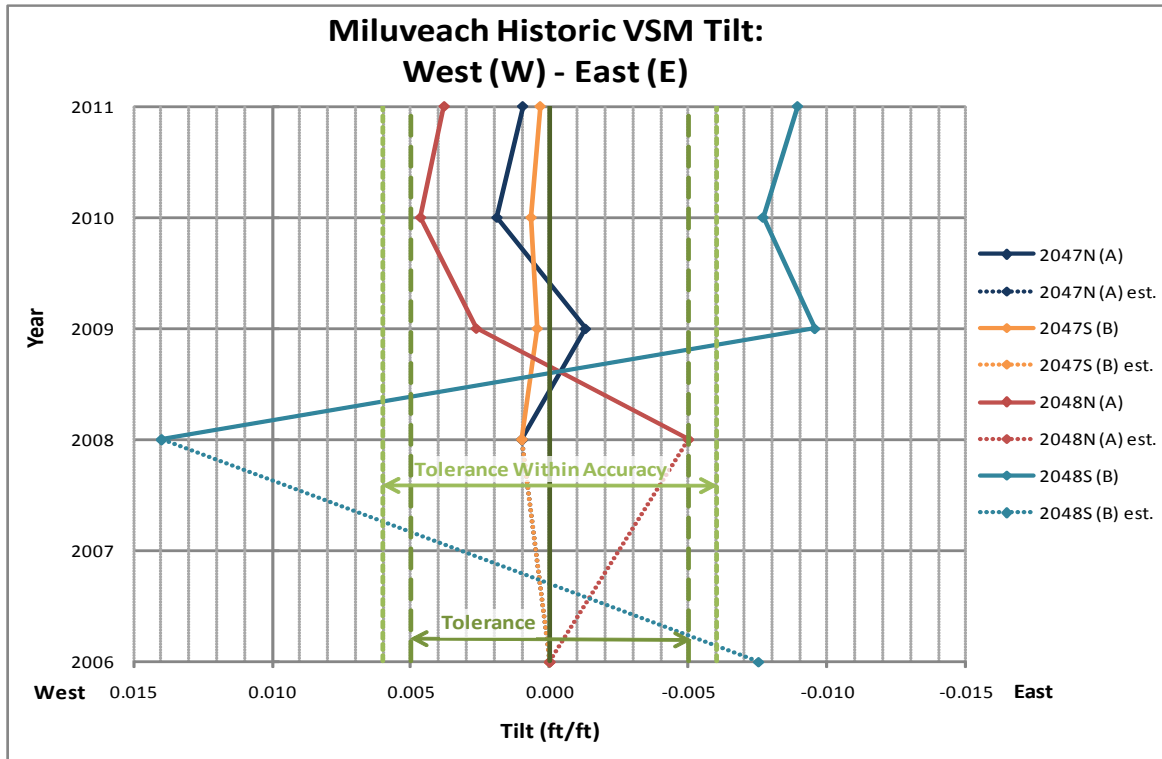
VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
2047N (A)	< 0.00125	< 0.00125
2047S (B)	< 0.00125	< 0.00125
2048N (A)	< 0.00125	< 0.00125
2048S (B)	< 0.00125	< 0.00125

Graph 3.7 and Graph 3.8 presents the historical VSM change in tilt by orientation between 2006 and 2011 (Baker 2006, 2007, 2008, 2009, 2010).



- Notes:
1. Positive tilt indicates north (N), negative tilt indicates south (S)
 2. Tilt measurements were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
 3. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 4. Survey accuracy of this project is +/- 0.001 ft/ft.

GRAPH 3.7 MILUVEACH RIVER VSM HISTORIC CHANGE IN TILT, NORTH/SOUTH



- Notes:**
1. Positive tilt indicates west (W), negative tilt indicates east (E)
 2. Tilt measurements were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
 3. Project tilt tolerance for VSM is +/- 0.005 ft/ft.
 4. Survey accuracy of this project is +/-0.001 ft/ft.

GRAPH 3.8 MILUVEACH RIVER VSM HISTORIC CHANGE IN TILT, EAST/WEST

3.4.3 VSM SCOUR

Visual observations and measurements were collected to evaluate pier scour for the VSM located within the active Miluveach River channel. No excessive scour was observed at the base of any VSM located within the channel or floodplain. The design scour limit for the main channel of the Miluveach River is 35.1 feet BPMSL (Baker 1999); however, a topographic survey was not conducted this monitoring cycle. Table 12 illustrates the field scour measurements.

TABLE 12 MILUVEACH RIVER VSM SCOUR (2011)

VSM	Location Description	Depth of Scour Hole, ft	Notes
2046	Grassy bank above floodplain	No scour hole	Outside channel floodplain
2047N (A)	Dry Gravel Channel Bed	No scour hole	Water in area, no flow
2047S (B)	Dry Gravel Channel Bed	No scour hole	Water in area, no flow
2048N (A)	Dry Gravel Channel Bed	0.9 ft below water surface	Ponded water in scour hole, 4 ft diameter scour hole
2048S (B)	Dry Gravel Channel Bed	1.1 ft below water surface	Ponded water in scour hole, 5.5 ft diameter scour hole
2049	Grassy bank above floodplain	No scour hole	Outside channel floodplain

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4.0 CONCLUSIONS

During the 2011 spring breakup, floodwaters did not overtop any banks and no significant erosion or scour occurred at any of the Alpine Pipeline System river crossing sites based on visual observations. The pipelines appeared to be in good, stable condition with no leaks. No ponding, cracks, depressions, or pressure ridges were evident over the pipeline axis, as defined by the monitoring criteria. Based on visual observations, measurements, and field survey results, settling or jacking of VSM was not apparent.

Some VSM tilt measurements exceeded project tolerance (± 0.005 ft/ft) outside of survey accuracy (± 0.001 ft/ft) at the HDD West, HDD East, and the Kachemach River and Miluveach River crossings. At all locations excluding the Miluveach, maximum 2011 measured tilt values for active (not abandoned) VSM exceeding project tolerance are greater than those previously measured (Baker 2006, 2007, 2008, 2009, 2010). At the Miluveach River crossing, the maximum 2011 measured tilt value for the VSM exceeding project tolerance is less than previously measured (Baker 2008, 2009). In all cases VSM tilt has fluctuated annually, generally without consistency of direction. Annual fluctuation of VSM tilt measurements are presented in Graph 3.1 to Graph 3.8.

At the HDD East and HDD West crossing sites, continuing natural erosion along the banks was noted to be within design estimates and not negatively impacting the safe operation of the pipeline.

4.1.1 HDD WEST BANK

The HDD West bank gravel pad is largely free from erosion. Since the 2010 monitoring event, the HDD West bank crossing eroded at an average rate of 0.28 ft/yr. This rate is less than both the long-term historic (0.44 ft/yr) and design erosion (2.3 ft/yr) rates over the 9-year study period (2002-2011). The observed erosion of the west bank, as measured at the NPS 14 oil centerline (STA 2+50), represents approximately 9% of the 105-foot design setback, while the pipeline construction was in 1999 (12 years ago), or 40% of the original 30-year design life.

Four of the HDD West VSM (783; 784N (A); 784S (B); 788) were within the project tolerances. The tilt of VSM 789N (A) and VSM 789S (B) were measured to be 0.0051 N ft/ft and 0.0067 N ft/ft respectively. VSM 789N (A) exceeded the project tolerance, but not by more than the accuracy of the survey method. VSM 789S (B) exceeded both the project tolerance and survey accuracy.

The LCMF/Umiaq annual survey shows no single pile cap has experienced a cumulative change of more than 0.027 feet of movement vertically over the span of seven years.

4.1.2 HDD EAST BANK

Since the 2010 monitoring event, the HDD East bank crossing eroded at an average rate of 1.10 ft/yr. The 10-year (2001-2011) average erosion rate of 1.25 ft/yr is less than the design

erosion rate of 2.5 ft/yr (Baker 1997). The observed erosion of the east bank at the NPS 14 oil centerline represents approximately 11.4% of the 115-foot design setback, while the pipeline construction was in 1999 (12 years ago), or 40% of the original 30-year design life.

The cumulative subsidence measured at any of the cross sections was less than 3.5 feet. Maximum cumulative subsidence at cross section E was 3.4 feet. The maximum incremental change since 2010 was at cross section E with a drop of 1.9 feet. A polygon trough does pass over the seawater casing axis; however, features of the trough do not meet or exceed the allowable physical conditions listed in the Monitoring Criteria, relative to the pipeline axis.

Four of the HDD East pad VSM (883; 884; 889; 890) were within the project tolerances. The tilt of VSM 885 was measured to be 0.007 S ft/ft, exceeding project tolerance and survey accuracy.

4.1.3 KACHEMACH RIVER

The VSM do not affect the Kachemach River channel at the crossing location, based on visual observation. The tilt of VSM 1714A and 1715C exceeds the project tolerance by more than the accuracy of the survey method. Both of these VSM are reportedly abandoned. VSM 1716 was measured to have a tilt of 0.0077 E ft/ft and 0.0066 S ft/ft, which exceeds the project tolerance and accuracy of the survey method. Of the VSM not reported to be abandoned, VSM 1716 exhibited the largest change in tilt, with a change of 0.0020 S ft/ft and 0.0019 E ft/ft since 2010 (Baker 2010).

4.1.4 MILUVEACH RIVER

The 2011 survey of the Miluveach River crossing measured decreased tilt severity of VSM 2047N (A). It continues to exceed project tolerance, but was within the survey accuracy. VSM 2048S (B) was measured to have a tilt of 0.0051 S ft/ft exceeding the project tolerance, but was within survey accuracy. VSM 2048S (B) tilt was measured at 0.0089 E ft/ft exceeding the project tolerance and survey accuracy. This VSM exhibited the largest change in tilt, with a change of 0.0009 S ft/ft and 0.0012 E ft/ft since 2010. The VSM have no apparent effect on the Miluveach River channel at the crossing location.

5.0 REFERENCES

- ARCO Alaska, Inc. (ARCO). 1999. Vertical Support Member and Module Pile Installation Specification. SPC-CE-AP-10001. February 1999.
- ConocoPhillips Alaska (CPAI). 2004. Vertical Support Member and Module Pile Installation Specification. SPC-CE-NS-80002. May 2004.
- Michael Baker, Jr., Inc. (Baker). 2010. Alpine Pipeline River Crossings 2010 Monitoring Report. Prepared for ConocoPhillips Alaska. 120259-MBJ-RPT-001. September 2010.
- — 2009. Alpine Pipeline River Crossings 2009 Monitoring Report. Prepared for ConocoPhillips Alaska. 117009-MBJ-RPT-001. September 2009.
- — 2008. Alpine Pipeline HDD Crossing 2008 Monitoring Report. Prepared for ConocoPhillips Alaska. 114133-MBJ-RPT-001. October 2008.
- — 2007. Alpine Pipeline HDD Crossing 2007 Monitoring Report. Prepared for ConocoPhillips Alaska. 111620-MBJ-RPT-001. October 2007.
- — 2006. Alpine Pipeline River Crossings 2006 Monitoring Report. Prepared for ConocoPhillips Alaska. 108710-MBJ-RPT-001. October 2006.
- — 2005. 2005 Alpine Pipeline River Crossing Monitoring. Prepared for ConocoPhillips Alaska. 105758-MBJ-001. October 2005.
- — 2004. 2004 Alpine Pipeline River Crossing Monitoring. Prepared for ConocoPhillips Alaska. 103654-MBJ-001. October 2004.
- — 2003. 2003 Alpine Pipeline River Crossing Monitoring. Prepared for ConocoPhillips Alaska. 101376-MBJ-001. July 2003.
- — 2002. HDD Transition Zones Civil Surveillance Trip Report - 2001. Prepared for Phillips Alaska Inc. 25114-217-MBJ-001. January 2002.
- — 1999. Mechanical Analysis of Aboveground Pipeline & Aboveground River Crossings. Prepared for ARCO Alaska Inc. 23100-MBJ-RP-001. May 1999.
- — 1997. Alpine Development. Colville River Crossing Design Report. Prepared for Arco Alaska Inc. 23100-MBJ-RP-003. June 1997. Rev. 4. 2003.

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Appendix A Photographs

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PHOTO A.1 HDD WEST, MAY 25, 2011: FIVE DAYS BEFORE PEAK STAGE, LOOKING SOUTHEAST



PHOTO A.2 HDD WEST, MAY 26, 2011: FOUR DAYS BEFORE PEAK STAGE, LOOKING NORTHWEST



PHOTO A.3 HDD WEST, MAY 31, 2011: ONE DAY AFTER PEAK STAGE, LOOKING EAST



PHOTO A.4 HDD WEST, MAY 31, 2011: ONE DAY AFTER PEAK STAGE, LOOKING WEST



PHOTO A.5 HDD WEST, JUNE 9, 2011: AERIAL PHOTO, LOOKING NORTHWEST



PHOTO A.6 HDD WEST, JULY 20, 2011: WEST BANK, LOOKING NORTHEAST



PHOTO A.7 HDD WEST, JULY 20, 2011: WEST BANK, LOOKING SOUTHWEST



PHOTO A.8 HDD EAST, MAY 25, 2011: FIVE DAYS BEFORE PEAK STAGE, LOOKING NORTHWEST



PHOTO A.9 HDD EAST, MAY 31, 2011: ONE DAY AFTER PEAK STAGE, LOOKING SOUTHEAST



PHOTO A.10 HDD EAST, JUNE 9, 2011: AERIAL PHOTO, LOOKING NORTHWEST



PHOTO A.11 HDD EAST, JUNE 9, 2011: AERIAL PHOTO OF EAST BANK, LOOKING EAST



PHOTO A.12 HDD EAST, JULY 21, 2011: AERIAL PHOTO OF EAST BANK, LOOKING WEST



PHOTO A.13 HDD EAST, JULY 20, 2011: AERIAL VIEW OF TROUGH FROM WATER, LOOKING NORTHEAST



PHOTO A.14 HDD EAST, JULY 20, 2011: TROUGH FROM TOE OF BANK, LOOKING SOUTHEAST



PHOTO A.15 HDD EAST, JULY 20, 2011: EAST BANK, LOOKING NORTH



PHOTO A.16 HDD EAST, JULY 20, 2011: LOOKING WEST THROUGH THERMOSIPHONS WITH TROUGH IN FOREGROUND



PHOTO A.17 KACHEMACH RIVER CROSSING, MAY 26, 2011: FOUR DAYS BEFORE PEAK STAGE, LOOKING SOUTHEAST



PHOTO A.18 KACHEMACH RIVER CROSSING, JUNE 9, 2011: AERIAL PHOTO, LOOKING SOUTHWEST



PHOTO A.19 KACHEMACH RIVER CROSSING, JULY 19, 2011: AERIAL PHOTO, LOOKING NORTH



PHOTO A.20 KACHEMACH RIVER CROSSING, JULY 19, 2011: AERIAL PHOTO, LOOKING SOUTHEAST



PHOTO A.21 KACHEMACH RIVER CROSSING, JULY 19, 2011: WEST FLOODPLAIN, LOOKING EAST



PHOTO A.22 KACHEMACH RIVER CROSSING, JULY 19, 2011: EAST BANK, LOOKING WEST



N 70° 13.957' W 150° 26.872'

07/19/2011 4:46:08 PM

PHOTO A.23 KACHEMACH RIVER CROSSING, JULY 19, 2011: EAST BANK, LOOKING SOUTH



N 70° 13.957' W 150° 26.872'

07/19/2011 4:46:08 PM

PHOTO A.24 KACHEMACH RIVER CROSSING, JULY 19, 2011: EAST BANK, LOOKING NORTH



PHOTO A.25 MILUVEACH RIVER CROSSING, MAY 26, 2011: FOUR DAYS BEFORE PEAK STAGE, LOOKING NORTH



PHOTO A.26 MILUVEACH RIVER CROSSING, JUNE 9, 2011: AERIAL PHOTO, LOOKING NORTHEAST



PHOTO A.27 MILUVEACH RIVER CROSSING, JULY 19, 2011: AERIAL PHOTO, LOOKING SOUTH



PHOTO A.28 MILUVEACH RIVER CROSSING, JULY 19, 2011: AERIAL PHOTO, LOOKING NORTHWEST



PHOTO A.29 MILUVEACH RIVER CROSSING, JULY 19, 2011: EAST BANK, LOOKING WEST

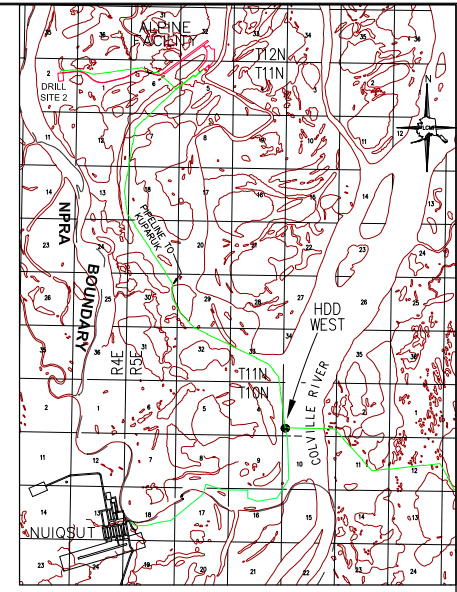
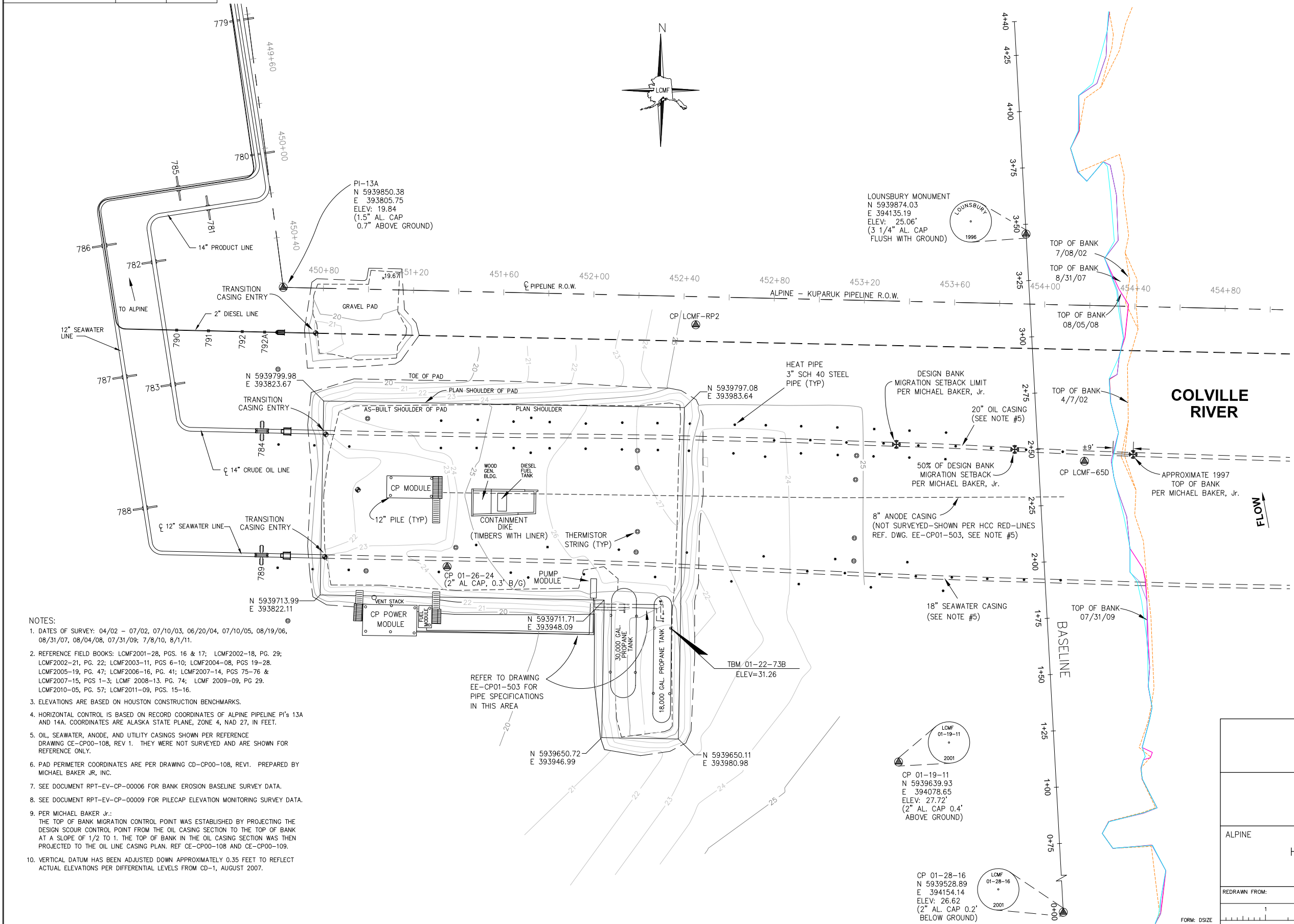


PHOTO A.30 MILUVEACH RIVER CROSSING, JULY 19, 2011: WEST FLOODPLAIN, LOOKING EAST

Appendix B HDD West

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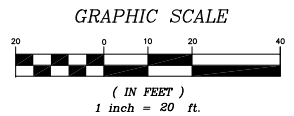
02-205 SUB JOB NO. DRAWING NO. CE-CP00-143




VICINITY MAP
NO SCALE

LEGEND

- HEAT PIPE
- ⊙ THERMISTOR STRING
- ⊕ TRANSITION CASING ENTRY POINT
- - - 1' CONTOUR LINES
- PILE
- ⊙ SURVEY CONTROL
- ⊗ MICHAEL BAKER JR. MIGRATION POINT
- - - TOE OF PAD
- - - SHOULDER OF PAD
- - - TOP OF BANK 7/8/02
- - - TOP OF BANK 8/05/08
- - - TOP OF BANK 7/31/09
- - - TOP OF BANK 7/08/10
- - - TOP OF BANK 8/01/11



- NOTES:
- DATES OF SURVEY: 04/02 - 07/02, 07/10/03, 06/20/04, 07/10/05, 08/19/06, 08/31/07, 08/04/08, 07/31/09; 7/8/10, 8/1/11.
 - REFERENCE FIELD BOOKS: LCMF2001-28, PGS. 16 & 17; LCMF2002-18, PG. 29; LCMF2002-21, PG. 22; LCMF2003-11, PGS 6-10; LCMF2004-08, PGS 19-28; LCMF2005-19, PG. 47; LCMF2006-16, PG. 41; LCMF2007-14, PGS 75-76 & LCMF2007-15, PGS 1-3; LCMF 2008-13, PG. 74; LCMF 2009-09, PG 29; LCMF2010-05, PG. 57; LCMF2011-09, PGS. 15-16.
 - ELEVATIONS ARE BASED ON HOUSTON CONSTRUCTION BENCHMARKS.
 - HORIZONTAL CONTROL IS BASED ON RECORD COORDINATES OF ALPINE PIPELINE PI'S 13A AND 14A. COORDINATES ARE ALASKA STATE PLANE, ZONE 4, NAD 27, IN FEET.
 - OIL, SEAWATER, ANODE, AND UTILITY CASINGS SHOWN PER REFERENCE DRAWING CE-CP00-108, REV 1. THEY WERE NOT SURVEYED AND ARE SHOWN FOR REFERENCE ONLY.
 - PAD PERIMETER COORDINATES ARE PER DRAWING CD-CP00-108, REV1. PREPARED BY MICHAEL BAKER JR., INC.
 - SEE DOCUMENT RPT-EV-CP-00006 FOR BANK EROSION BASELINE SURVEY DATA.
 - SEE DOCUMENT RPT-EV-CP-00009 FOR PILECAP ELEVATION MONITORING SURVEY DATA.
 - PER MICHAEL BAKER JR.: THE TOP OF BANK MIGRATION CONTROL POINT WAS ESTABLISHED BY PROJECTING THE DESIGN SCOUR CONTROL POINT FROM THE OIL CASING SECTION TO THE TOP OF BANK AT A SLOPE OF 1/2 TO 1. THE TOP OF BANK IN THE OIL CASING SECTION WAS THEN PROJECTED TO THE OIL LINE CASING PLAN. REF CE-CP00-108 AND CE-CP00-109.
 - VERTICAL DATUM HAS BEEN ADJUSTED DOWN APPROXIMATELY 0.35 FEET TO REFLECT ACTUAL ELEVATIONS PER DIFFERENTIAL LEVELS FROM CD-1, AUGUST 2007.



ConocoPhillips
Alaska, Inc.

ALPINE MODULE: CP00 UNIT: CP

HDD BANK EROSION MONITORING
HDD SITE - WEST
ALPINE FACILITY

REDRAWN FROM:	CONSTRUCTION SHEET
1 2 3 4 5 6	OF
DO NOT SCALE	ABOVE SCALE FOR REFERENCE ONLY
DATE: 11/5/02	DRAWN: CZ DESIGN: JZ
SCALE: 1"=20'	CHECKED: JZ
JOB NO: 02-205	APPROVAL: ML
SUB JOB NO:	DRAWING NO: CE-CP00-143
	CADD FILE NO: 01-12-05-1WEST
	PART: 1 of 1
	REV: 10

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP	REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
								6	8/31/07	UPDATED PER 4810351ACS	CZ	DB			
								5	8/21/06	UPDATED PER 4116808ACS	AG	GD			
								4	7/10/05	UPDATED PER 3391755ACS	CZ	DB			
								3	6/25/04	UPDATED PER 2390460ACS	CZ	BD			
								2	11/15/03	ISSUED PER 2094387ACS	GD	JZ			
								1	11/5/02	ISSUED PER 1870227ACS	CZ	JZ			

**Alpine CP 00
 HDD West Site
 Pilecap Monitor**

123744-MBJ-RPT-001

Appendix B

3 of 16

Pile Cap Designation	Pile Cap Monitor - Bottom of Pile Cap Locations									Description
	6/20/2004	8/4/2005	8/19/2006	8/31/2007	8/7/2008	8/3/2009	7/8/2010	8/3/2011	Future	
W-01 NE Cor	26.389	26.389	26.391	26.398	26.397	26.401	26.401	26.413		Bottom of Pile Cap (In Feet)
		0.000	0.002	0.007	-0.001	0.004	0.000	0.012		Incremental Change
		0.000	0.002	0.009	0.008	0.012	0.012	0.024		Cumulative Change
W-02 NE Cor	26.391	26.390	26.390	26.400	26.397	26.403	26.401	26.416		Bottom of Pile Cap (In Feet)
		-0.001	0.000	0.010	-0.003	0.006	-0.002	0.015		Incremental Change
		-0.001	-0.001	0.009	0.006	0.012	0.010	0.025		Cumulative Change
W-03 NE Cor	26.391	26.391	26.394	26.400	26.398	26.403	26.401	26.414		Bottom of Pile Cap (In Feet)
		0.000	0.003	0.006	-0.002	0.005	-0.002	0.013		Incremental Change
		0.000	0.003	0.009	0.007	0.012	0.010	0.023		Cumulative Change
W-04 NE Cor	26.389	26.388	26.390	26.394	26.394	26.396	26.397	26.407		Bottom of Pile Cap (In Feet)
		-0.001	0.002	0.004	0.000	0.002	0.001	0.010		Incremental Change
		-0.001	0.001	0.005	0.005	0.007	0.008	0.018		Cumulative Change
W-05 NE Cor	26.383	26.378	26.386	26.390	26.389	26.393	26.393	26.404		Bottom of Pile Cap (In Feet)
		-0.005	0.008	0.004	-0.001	0.004	0.000	0.011		Incremental Change
		-0.005	0.003	0.007	0.006	0.010	0.010	0.021		Cumulative Change
W-06 NE Cor	26.395	26.391	26.394	26.400	26.397	26.401	26.401	26.412		Bottom of Pile Cap (In Feet)
		-0.004	0.003	0.006	-0.003	0.004	0.000	0.011		Incremental Change
		-0.004	-0.001	0.005	0.002	0.006	0.006	0.017		Cumulative Change
W-07 NE Cor	26.397	26.393	26.402	26.406	26.404	26.408	26.405	26.419		Bottom of Pile Cap (In Feet)
		-0.004	0.009	0.004	-0.002	0.004	-0.003	0.014		Incremental Change
		-0.004	0.005	0.009	0.007	0.011	0.008	0.022		Cumulative Change

**Alpine CP 00
 HDD West Site
 Pilecap Monitor**

Pile Cap Designation	Pile Cap Monitor - Bottom of Pile Cap Locations									Description
	6/20/2004	8/4/2005	8/19/2006	8/31/2007	8/7/2008	8/3/2009	7/8/2010	8/3/2011	Future	
W-08 NE Cor	26.403	26.401	26.404	26.408	26.406	26.412	26.410	26.423		Bottom of Pile Cap (In Feet)
		-0.002	0.003	0.004	-0.002	0.006	-0.002	0.013		Incremental Change
		-0.002	0.001	0.005	0.003	0.009	0.007	0.020		Cumulative Change
W-09 NE Cor	31.291	31.294	31.292	31.290	31.292	31.294	31.296	31.301		Bottom of Pile Cap (In Feet)
		0.003	-0.002	-0.002	0.002	0.002	0.002	0.005		Incremental Change
		0.003	0.001	-0.001	0.001	0.003	0.005	0.010		Cumulative Change
W-10 NE Cor	31.266	31.261	31.261	31.264	31.263	31.263	31.262	31.264		Bottom of Pile Cap (In Feet)
		-0.005	0.000	0.003	-0.001	0.000	-0.001	0.002		Incremental Change
		-0.005	-0.005	-0.002	-0.003	-0.003	-0.004	-0.002		Cumulative Change
W-11 NE Cor	31.299	31.300	31.288	31.294	31.299	31.304	31.299	31.304		Bottom of Pile Cap (In Feet)
		0.001	-0.012	0.006	0.005	0.005	-0.005	0.005		Incremental Change
		0.001	-0.011	-0.005	0.000	0.005	0.000	0.005		Cumulative Change
W-12 NE Cor	31.301	31.301	31.298	31.294	31.297	31.298	31.296	31.301		Bottom of Pile Cap (In Feet)
		0.000	-0.003	-0.004	0.003	0.001	-0.002	0.005		Incremental Change
		0.000	-0.003	-0.007	-0.004	-0.003	-0.005	0.000		Cumulative Change
W-13 NE Cor	27.377	27.373	27.383	27.393	27.389	27.391	27.394	27.401		Bottom of Pile Cap (In Feet)
		-0.004	0.010	0.010	-0.004	0.002	0.003	0.007		Incremental Change
		-0.004	0.006	0.016	0.012	0.014	0.017	0.024		Cumulative Change
W-14 NE Cor	27.428	27.423	27.433	27.439	27.442	27.442	27.454	27.455		Bottom of Pile Cap (In Feet)
		-0.005	0.010	0.006	0.003	0.000	0.012	0.001		Incremental Change
		-0.005	0.005	0.011	0.014	0.014	0.026	0.027		Cumulative Change

**Alpine CP 00
 HDD West Site
 Pilecap Monitor**

123744-MBJ-RPT-001

Appendix B

5 of 16

Pile Cap Designation	Pile Cap Monitor - Bottom of Pile Cap Locations									Description
	6/20/2004	8/4/2005	8/19/2006	8/31/2007	8/7/2008	8/3/2009	7/8/2010	8/3/2011	Future	
W-15 NE Cor	27.413	27.407	27.407	27.425	27.428	27.425	27.434	27.436		Bottom of Pile Cap (In Feet)
		-0.006	0.000	0.018	0.003	-0.003	0.009	0.002		Incremental Change
		-0.006	-0.006	0.012	0.015	0.012	0.021	0.023		Cumulative Change
W-16 NE Cor	27.389	27.385	27.392	27.416	27.400	27.404	27.410	27.414		Bottom of Pile Cap (In Feet)
		-0.004	0.007	0.024	-0.016	0.004	0.006	0.004		Incremental Change
		-0.004	0.003	0.027	0.011	0.015	0.021	0.025		Cumulative Change
W-17 NE Cor	28.940	28.947	28.944	28.940	28.945	28.946	28.942	28.948		Bottom of Pile Cap (In Feet)
		0.007	-0.003	-0.004	0.005	0.001	-0.004	0.006		Incremental Change
		0.007	0.004	0.000	0.005	0.006	0.002	0.008		Cumulative Change
W-18 NE Cor	28.965	28.972	28.968	28.965	28.970	28.969	28.968	28.968		Bottom of Pile Cap (In Feet)
		0.007	-0.004	-0.003	0.005	-0.001	-0.001	0.000		Incremental Change
		0.007	0.003	0.000	0.005	0.004	0.003	0.003		Cumulative Change
W-19 NE Cor	28.959	28.962	28.960	28.956	28.958	28.958	28.955	28.955		Bottom of Pile Cap (In Feet)
		0.003	-0.002	-0.004	0.002	0.000	-0.003	0.000		Incremental Change
		0.003	0.001	-0.003	-0.001	-0.001	-0.004	-0.004		Cumulative Change
W-20 NE Cor	28.964	28.965	28.965	28.965	28.966	28.964	28.964	28.963		Bottom of Pile Cap (In Feet)
		0.001	0.000	0.000	0.001	-0.002	0.000	-0.001		Incremental Change
		0.001	0.001	0.001	0.002	0.000	0.000	-0.001		Cumulative Change
Note: Survey completed on 6/20/2004 was used to compute Incremental/Cumulative Change. Positive numbers indicate subsidence.										
All Pile Caps are 0.083' Thick. Add Cap thickness to shown elevations for Top of Pile Cap Elevations										

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
0+00	39.5	39.5	39.5	39.5	39.3	39.3	39.3	39.3	39.4	39.3	39.4	Baseline Offset (In Feet)
		0.0	0.0	0.0	-0.2	0.0	0.0	0.0	0.1	-0.1	0.1	Incremental Change
		0.0	0.0	0.0	-0.3	-0.2	-0.2	-0.2	-0.1	-0.2	-0.1	Cumulative Change
0+05	39.3	39.3	39.3	39.3	37.6	37.6	37.6	37.6	37.7	37.6	37.7	Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.7	0.0	0.0	0.0	0.1	-0.1	0.1	Incremental Change
		0.0	0.0	0.0	-1.7	-1.7	-1.7	-1.7	-1.6	-1.7	-1.6	Cumulative Change
0+10	39.4	39.4	39.4	39.4	38.5	38.5	38.5	38.5	38.7	38.5	38.7	Baseline Offset (In Feet)
		0.0	0.0	0.0	-0.9	0.0	0.0	0.0	0.2	-0.2	0.2	Incremental Change
		0.0	0.0	0.0	-0.9	-0.9	-0.9	-0.9	-0.7	-0.9	-0.6	Cumulative Change
0+20	45.8	45.8	45.8	45.8	41.9	41.9	41.9	41.9	39.9	39.9	39.8	Baseline Offset (In Feet)
		0.0	0.0	0.0	-3.8	0.0	0.0	0.0	-2.0	0.0	-0.1	Incremental Change
		0.0	0.0	0.0	-3.8	-3.9	-3.9	-3.9	-5.9	-5.9	-6.0	Cumulative Change
0+25	41.5	41.5	41.5	41.5	39.1	39.1	39.1	39.1	37.6	37.6	37.6	Baseline Offset (In Feet)
		0.0	0.0	0.0	-2.4	0.0	0.0	0.0	-1.5	0.0	0.0	Incremental Change
		0.0	0.0	0.0	-2.4	-2.4	-2.4	-2.4	-3.9	-3.9	-3.9	Cumulative Change
0+30	37.7	37.9	37.9	37.9	37.9	37.9	37.9	37.9	37.8	37.9	37.9	Baseline Offset (In Feet)
		0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.0	Incremental Change
		0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.2	Cumulative Change
0+40	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	42.2	41.9	41.6	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	-0.3	-0.3	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	-0.3	Cumulative Change

6 of 16
Appendix B
123744-MBU-RPT-1001

**Alpine CP 00
 HDD West Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
0+50	42.0	42.0	42.0	42.0	42.0	42.0	44.5	44.5	44.5	44.0	44.0	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	-0.5	0.0	Incremental Change
			0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	2.0	1.9
0+60	41.4	41.4	41.4	41.4	41.4	41.4	46.4	46.4	46.3	46.4	46.3	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	5.0	0.0	-0.1	0.1	-0.1	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.0	4.9	5.0	4.9
0+70	40.7	40.7	40.7	40.7	40.7	40.7	41.9	41.9	41.9	41.9	42.1	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.2	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2	1.2	1.4
0+75	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.3	21.4	21.3	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	-0.1	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
0+80	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.2	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	Cumulative Change
0+85	29.0	29.0	29.0	29.0	29.0	29.0	29.7	29.7	30.3	29.7	30.3	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.6	-0.6	0.6	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.7	0.7	1.3	0.7	1.3	Cumulative Change
0+90	42.8	42.8	42.8	42.8	42.8	42.8	42.8	42.8	43.3	42.8	43.4	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	-0.5	0.6	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	Cumulative Change

274-MB-RPT-001

Appendix B

7 of 16

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
1+00	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.9	38.7	39.0	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	-0.2	0.3	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	Cumulative Change
1+05	37.9	37.9	37.9	37.9	37.9	37.9	37.9	37.9	37.8	37.9	38.0	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.1	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.1	Cumulative Change
1+10	41.4	41.4	41.4	41.4	39.2	39.2	39.2	39.2	39.2	39.2	39.2	Baseline Offset (In Feet)
		0.0	0.0	0.0	-2.2	0.1	0.0	0.0	0.0	0.0	0.0	Incremental Change
		0.0	0.0	0.0	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	Cumulative Change
1+15	38.2	38.2	38.2	38.2	38.2	38.2	39.9	39.9	39.9	39.1	39.3	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	-0.8	0.1	Incremental Change
		0.0	0.0	0.0	0.0	0.0	1.7	1.7	1.7	0.9	1.0	Cumulative Change
1+20	39.4	39.4	39.4	39.4	39.4	39.4	40.4	40.4	40.4	40.4	40.5	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.1	Incremental Change
		0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.1	Cumulative Change
1+25	41.4	41.4	41.4	41.4	41.4	41.4	41.4	41.4	42.1	41.4	42.1	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	-0.7	0.7	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7	Cumulative Change
1+30	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.5	43.0	43.6	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	-0.5	0.6	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	Cumulative Change

8 of 16

Appendix B

123744-MBU-RPT-1001

**Alpine CP 00
 HDD West Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
1+35	44.2	44.2	44.2	44.2	43.8	43.8	43.8	43.8	44.1	43.8	44.1	Baseline Offset (In Feet)
		0.0	0.0	0.0	-0.4	0.0	0.0	0.0	0.3	-0.3	0.3	Incremental Change
			0.0	0.0	0.0	-0.4	-0.4	-0.4	-0.4	-0.1	-0.4	-0.1
1+40	45.3	45.3	45.3	45.3	43.4	43.4	43.4	43.4	43.4	43.4	43.5	Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.9	0.0	0.0	0.0	0.0	0.0	0.1	Incremental Change
		0.0	0.0	0.0	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.8
1+45	45.7	45.7	45.7	45.7	43.4	43.4	43.4	43.4	43.4	43.4	43.3	Baseline Offset (In Feet)
		0.0	0.0	0.0	-2.3	0.0	0.0	0.0	0.0	0.0	-0.1	Incremental Change
		0.0	0.0	0.0	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.4
1+50	45.7	45.7	45.7	45.7	43.9	43.9	43.9	43.9	44.1	43.9	43.4	Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.8	0.0	0.0	0.0	0.2	-0.2	-0.5	Incremental Change
		0.0	0.0	0.0	-1.8	-1.8	-1.8	-1.8	-1.8	-1.6	-1.8	-2.3
1+60	45.8	45.8	45.8	44.9	44.2	44.3	44.3	44.3	44.2	43.7	43.8	Baseline Offset (In Feet)
		0.0	0.0	-1.0	-0.6	0.0	0.0	0.0	-0.1	-0.5	0.0	Incremental Change
		0.0	0.0	-1.0	-1.6	-1.6	-1.5	-1.5	-1.5	-1.6	-2.1	-2.1
1+65	45.9	45.9	45.9	45.0	44.3	44.4	44.4	44.4	44.2	43.8	43.6	Baseline Offset (In Feet)
		0.0	0.0	-0.9	-0.7	0.1	0.0	0.0	-0.2	-0.4	-0.2	Incremental Change
		0.0	0.0	-0.9	-1.6	-1.5	-1.5	-1.5	-1.5	-1.7	-2.1	-2.3
1+75	45.9	45.9	45.9	45.9	44.4	44.4	44.4	44.4	44.4	44.3	42.7	Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.5	0.0	0.0	0.0	0.0	-0.1	-1.6	Incremental Change
		0.0	0.0	0.0	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.6	-3.2

Appendix B

9 of 16

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
1+90	45.0	45.0	44.1	44.1	44.1	44.1	44.1	44.1	44.2	40.9	40.1	Baseline Offset (In Feet)
		0.0	-0.9	0.0	0.0	0.0	0.0	0.0	0.1	-3.3	-0.8	Incremental Change
		0.0	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.8	-4.1	-4.9	Cumulative Change
1+95	44.9	44.9	42.8	42.8	42.8	42.8	42.8	42.8	42.8	37.8	38.0	Baseline Offset (In Feet)
		0.0	-2.1	0.0	0.0	0.0	0.0	0.0	0.0	-5.0	0.2	Incremental Change
		0.0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-7.1	-6.9	Cumulative Change
2+00	44.7	44.7	41.8	41.8	41.1	40.4	40.4	40.4	40.6	38.1	38.3	Baseline Offset (In Feet)
		0.0	-2.9	0.0	-0.8	-0.6	0.0	0.0	0.2	-2.5	0.2	Incremental Change
		0.0	-2.9	-2.9	-3.6	-4.3	-4.3	-4.3	-4.1	-6.6	-6.5	Cumulative Change
2+05	44.6	44.6	40.4	40.4	39.7	38.4	38.4	38.4	38.3	38.4	38.3	Baseline Offset (In Feet)
		0.0	-4.2	0.0	-0.7	-1.4	0.0	0.0	-0.1	0.1	-0.1	Incremental Change
		0.0	-4.2	-4.2	-4.8	-6.2	-6.2	-6.2	-6.3	-6.2	-6.2	Cumulative Change
2+10	43.7	43.7	40.4	40.2	40.2	38.3	38.3	38.3	38.1	38.3	37.6	Baseline Offset (In Feet)
		0.0	-3.2	-0.3	0.0	-1.9	0.0	0.0	-0.2	0.2	-0.7	Incremental Change
		0.0	-3.2	-3.5	-3.5	-5.4	-5.4	-5.4	-5.6	-5.4	-6.0	Cumulative Change
2+20	41.5	41.5	41.5	40.6	40.6	37.5	37.5	37.5	37.2	37.5	36.1	Baseline Offset (In Feet)
		0.0	0.0	-0.9	0.0	-3.1	0.0	0.0	-0.3	0.3	-1.4	Incremental Change
		0.0	0.0	-0.9	-0.9	-3.9	-4.0	-4.0	-4.3	-4.0	-5.4	Cumulative Change
2+25	42.0	42.0	42.0	40.7	40.7	35.9	35.9	35.9	35.7	35.9	35.1	Baseline Offset (In Feet)
		0.0	0.0	-1.3	0.0	-4.8	0.0	0.0	-0.2	0.2	-0.8	Incremental Change
		0.0	0.0	-1.3	-1.3	-6.1	-6.1	-6.1	-6.3	-6.1	-6.9	Cumulative Change

10 of 16
Appendix B
123744-MBU-RPT-1001

Alpine CP 00
HDD West Site
Streambank Monitor

Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
2+30	42.4	42.3	42.2	40.9	40.9	34.2	34.2	34.2	34.2	34.2	34.1	Baseline Offset (In Feet)
		0.0	-0.1	-1.4	0.0	-6.6	0.0	0.0	0.0	0.0	-0.1	Incremental Change
		0.0	-0.1	-1.5	-1.5	-1.5	-8.1	-8.2	-8.2	-8.2	-8.2	-8.2
2+35	41.0	40.4	40.4	40.4	40.4	33.1	33.1	33.1	33.1	33.1	33.1	Baseline Offset (In Feet)
		-0.6	0.0	0.0	0.0	-7.3	0.0	0.0	0.0	0.0	0.0	Incremental Change
		-0.6	-0.6	-0.6	-0.6	-0.6	-7.9	-7.9	-7.9	-7.9	-7.9	-7.9
2+45	38.3	36.8	36.8	36.8	36.8	32.7	32.7	32.7	32.7	32.7	33.3	Baseline Offset (In Feet)
		-1.5	0.0	0.0	0.0	-4.1	0.0	0.0	0.0	0.0	0.6	Incremental Change
		-1.5	-1.5	-1.5	-1.5	-1.5	-5.6	-5.6	-5.6	-5.6	-5.6	-5.0
2+50	39.0	38.1	37.8	37.5	37.1	34.3	34.3	34.3	34.3	34.3	34.7	Baseline Offset (In Feet)
		-1.0	-0.3	-0.3	-0.4	-2.8	0.0	0.0	0.0	0.0	0.4	Incremental Change
		-1.0	-1.2	-1.5	-1.9	-1.9	-4.7	-4.7	-4.7	-4.7	-4.7	-4.4
2+55	39.9	39.3	38.2	38.2	37.4	35.9	35.9	35.9	35.9	35.9	36.0	Baseline Offset (In Feet)
		-0.5	-1.1	0.0	-0.8	-1.5	0.0	0.0	0.0	0.0	0.1	Incremental Change
		-0.5	-1.6	-1.6	-2.4	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-3.8
2+60	40.7	40.7	40.7	40.7	38.3	35.1	35.1	35.1	35.2	35.1	35.2	Baseline Offset (In Feet)
		0.0	0.0	0.0	-2.4	-3.1	0.0	0.0	0.1	-0.1	0.1	Incremental Change
		0.0	0.0	0.0	-2.4	-5.5	-5.6	-5.6	-5.5	-5.6	-5.5	Cumulative Change
2+65	40.9	40.9	40.9	40.6	39.2	34.1	34.1	34.1	34.2	34.1	34.2	Baseline Offset (In Feet)
		0.0	0.0	-0.4	-1.3	-5.1	0.0	0.0	0.1	-0.1	0.1	Incremental Change
		0.0	0.0	-0.4	-1.7	-6.8	-6.8	-6.8	-6.7	-6.8	-6.8	Cumulative Change

Appendix B

11 of 16

**Alpine CP 00
 HDD West Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
2+70	41.1	41.1	41.1	40.3	40.3	33.3	33.3	33.3	33.4	33.3	33.3	Baseline Offset (In Feet)
		0.0	0.0	-0.8	0.0	-7.0	0.0	0.0	0.1	-0.1	0.0	Incremental Change
		0.0	0.0	-0.8	-0.8	-7.8	-7.8	-7.8	-7.7	-7.8	-7.8	Cumulative Change
2+75	41.3	41.3	41.3	39.9	39.9	33.3	33.3	33.3	33.3	33.3	33.3	Baseline Offset (In Feet)
		0.0	0.0	-1.4	0.0	-6.6	0.0	0.0	0.0	0.0	0.0	Incremental Change
		0.0	0.0	-1.4	-1.4	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	Cumulative Change
2+80	41.5	41.5	41.5	39.4	39.4	34.6	34.6	34.6	34.2	34.6	33.5	Baseline Offset (In Feet)
		0.0	0.0	-2.2	0.0	-4.8	0.0	0.0	-0.4	0.4	-1.1	Incremental Change
		0.0	0.0	-2.2	-2.2	-6.9	-6.9	-6.9	-7.3	-6.9	-8.0	Cumulative Change
2+85	41.7	41.7	41.7	39.6	39.6	37.8	37.8	37.8	37.6	37.8	36.1	Baseline Offset (In Feet)
		0.0	0.0	-2.1	0.0	-1.8	0.0	0.0	-0.2	0.2	-1.7	Incremental Change
		0.0	0.0	-2.1	-2.1	-3.9	-3.9	-3.9	-4.1	-3.9	-5.6	Cumulative Change
2+90	43.5	43.5	41.5	40.8	40.8	38.5	38.5	38.5	38.5	38.5	38.6	Baseline Offset (In Feet)
		0.0	-1.9	-0.7	0.0	-2.3	0.0	0.0	0.0	0.0	0.1	Incremental Change
		0.0	-1.9	-2.6	-2.6	-5.0	-5.0	-5.0	-5.0	-5.0	-4.9	Cumulative Change
3+00	47.0	47.0	46.1	46.1	44.8	41.6	41.6	41.6	41.6	40.5	40.3	Baseline Offset (In Feet)
		0.0	-0.9	0.0	-1.3	-3.2	0.0	0.0	0.0	-1.1	-0.3	Incremental Change
		0.0	-0.9	-0.9	-2.2	-5.4	-5.4	-5.4	-5.4	-6.5	-6.7	Cumulative Change
3+10	47.1	43.6	43.6	43.6	43.6	43.2	43.2	43.2	43.2	39.8	39.2	Baseline Offset (In Feet)
		-3.5	0.0	0.0	0.0	-0.4	0.0	0.0	0.0	-3.4	-0.6	Incremental Change
		-3.5	-3.5	-3.5	-3.5	-3.8	-3.8	-3.8	-3.8	-7.3	-7.9	Cumulative Change

12 of 16
Appendix B
123744-MBU-RPT-1001

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
3+15	47.4	42.9	42.9	42.9	42.3	42.9	42.9	42.0	42.0	39.4	38.9	Baseline Offset (In Feet)
		-4.5	0.0	0.0	-0.6	0.6	0.0	-0.9	0.0	-2.6	-0.5	Incremental Change
		-4.5	-4.5	-4.5	-4.5	-5.2	-4.6	-4.5	-5.4	-5.4	-8.0	-8.5
3+25	47.3	44.6	44.6	44.4	42.3	38.9	38.9	37.4	37.4	36.9	36.7	Baseline Offset (In Feet)
		-2.7	0.0	-0.2	-2.1	-3.4	0.0	-1.5	0.0	-0.5	-0.2	Incremental Change
		-2.7	-2.7	-2.9	-5.0	-8.4	-8.4	-9.9	-9.9	-10.4	-10.6	Cumulative Change
3+30	45.4	44.0	44.0	43.2	42.7	36.2	36.2	35.4	35.4	35.2	35.1	Baseline Offset (In Feet)
		-1.4	0.0	-0.9	-0.5	-6.5	0.0	-0.8	0.0	-0.2	-0.1	Incremental Change
		-1.4	-1.4	-2.2	-2.7	-9.2	-9.2	-10.0	-10.0	-10.2	-10.2	Cumulative Change
3+35	43.4	43.4	43.4	43.4	42.0	36.4	36.4	35.8	35.8	35.8	35.5	Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.4	-5.6	0.0	-0.6	0.0	0.0	-0.3	Incremental Change
		0.0	0.0	0.0	-1.4	-7.0	-7.0	-7.6	-7.6	-7.6	-7.9	Cumulative Change
3+40	44.8	44.8	44.0	44.0	41.3	41.1	41.1	40.1	40.1	40.1	38.7	Baseline Offset (In Feet)
		0.0	-0.8	0.0	-2.6	-0.3	0.0	-1.0	0.0	0.0	-1.4	Incremental Change
		0.0	-0.8	-0.8	-3.4	-3.7	-3.7	-4.7	-4.7	-4.7	-6.1	Cumulative Change
3+45	45.2	45.2	44.2	44.2	42.8	41.5	41.5	40.7	40.7	40.7	38.8	Baseline Offset (In Feet)
		0.0	-1.0	0.0	-1.5	-1.3	0.0	-0.8	0.0	0.0	-1.9	Incremental Change
		0.0	-1.0	-1.0	-2.5	-3.8	-3.7	-4.5	-4.5	-4.5	-6.4	Cumulative Change
3+50	44.9	44.9	44.2	44.2	42.3	41.4	41.4	40.8	40.8	40.8	38.7	Baseline Offset (In Feet)
		0.0	-0.6	0.0	-1.9	-0.9	0.0	-0.6	0.0	0.0	-2.1	Incremental Change
		0.0	-0.6	-0.6	-2.6	-3.4	-3.5	-4.1	-4.1	-4.1	-6.2	Cumulative Change

Appendix B

13 of 16

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
3+60	44.1	44.1	44.1	44.1	43.4	41.4	41.4	41.4	41.0	41.4	38.4	Baseline Offset (In Feet)
		0.0	0.0	0.0	-0.7	-2.0	0.0	0.0	-0.4	0.4	-3.0	Incremental Change
		0.0	0.0	0.0	-0.7	-2.7	-2.7	-2.7	-3.1	-2.7	-5.7	Cumulative Change
3+70	44.7	44.7	42.8	41.8	41.0	26.0	26.0	26.0	26.0	26.0	26.2	Baseline Offset (In Feet)
		0.0	-1.9	-1.1	-0.8	-15.0	0.0	0.0	0.0	0.0	0.1	Incremental Change
		0.0	-1.9	-2.9	-3.7	-18.7	-18.7	-18.7	-18.7	-18.7	-18.6	Cumulative Change
3+75	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.8	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	Cumulative Change
3+85	23.1	23.1	23.1	23.1	23.1	23.0	23.0	23.0	23.1	23.0	23.0	Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	Incremental Change
		0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	Cumulative Change
4+00	28.4	28.4	28.4	28.4	26.5	26.5	26.5	26.5	26.4	26.5	26.3	Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.8	0.0	0.0	0.0	-0.1	0.1	-0.2	Incremental Change
		0.0	0.0	0.0	-1.8	-1.8	-1.9	-1.9	-2.0	-1.9	-2.0	Cumulative Change
4+10	37.4	37.1	37.1	37.1	33.0	33.0	33.0	33.0	34.0	34.0	32.2	Baseline Offset (In Feet)
		-0.3	0.0	0.0	-4.1	0.0	0.0	0.0	1.0	0.0	-1.8	Incremental Change
		-0.3	-0.3	-0.3	-4.4	-4.4	-4.4	-4.4	-3.4	-3.4	-5.2	Cumulative Change
4+25	45.9	42.2	42.2	42.2	40.4	40.3	40.2	40.0	40.0	40.0	38.1	Baseline Offset (In Feet)
		-3.7	0.0	0.0	-1.9	0.0	-0.1	-0.2	0.0	0.0	-1.9	Incremental Change
		-3.7	-3.7	-3.7	-5.5	-5.6	-5.7	-5.9	-5.9	-5.9	-7.8	Cumulative Change

14 of 16

Appendix B

123744-MBU-RPT-1001

Alpine CP 00
HDD West Site
Streambank Monitor

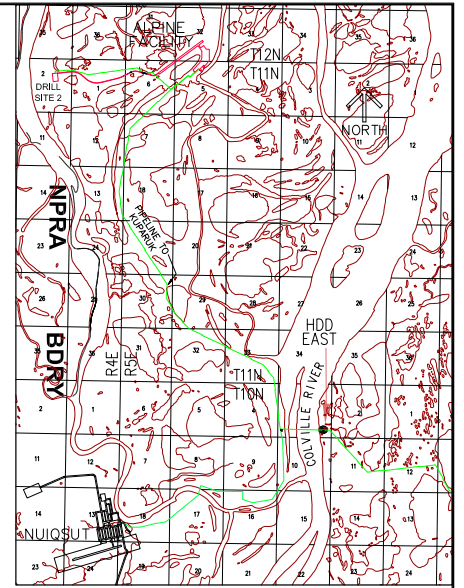
Baseline Station	Streambank Monitor - Top of Bank Locations											Description
	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location											
	4/7/2002	7/8/2002	7/10/2003	6/20/2004	7/10/2005	8/19/2006	8/31/2007	8/5/2008	7/31/2009	7/8/2010	8/1/2011	Date
4+30	47.3	43.2	43.2	42.1	41.2	41.1	41.1	40.5	40.5	40.5	39.7	Baseline Offset (In Feet)
		-4.2	0.0	-1.1	-0.9	-0.1	0.0	-0.6	0.0	0.0	-0.8	Incremental Change
		-4.2	-4.2	-5.2	-6.2	-6.2	-6.2	-6.2	-6.8	-6.8	-6.8	-7.7
4+35	48.8	43.1	43.1	41.9	41.9	41.8	41.8	41.1	41.1	41.1	41.0	Baseline Offset (In Feet)
		-5.7	0.0	-1.3	0.0	-0.1	0.0	-0.7	0.0	0.0	-0.1	Incremental Change
		-5.7	-5.7	-7.0	-7.0	-7.1	-7.0	-7.7	-7.7	-7.7	-7.7	-7.8
4+40	50.9	42.5	42.5	42.1	42.1	42.1	42.1	41.9	41.9	41.9	41.7	Baseline Offset (In Feet)
		-8.4	0.0	-0.4	0.0	0.0	0.1	-0.2	0.0	0.0	-0.2	Incremental Change
		-8.4	-8.4	-8.9	-8.9	-8.9	-8.8	-9.0	-9.0	-9.0	-9.0	-9.3
***Note: Survey completed on 4/7/02 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.												

Appendix C HDD East

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NOTES:

- DATES OF SURVEY: JULY & SEPTEMBER, 2001, 2002 AND 2003; JUNE & JULY 2004; JULY 10, 2005; AUGUST 21, 2006; AUGUST 30, 2007; AUGUST 6, 2008; AUGUST 3, 2009; JULY 19-20, 2010; AUGUST 4-5, 2011.
- REFERENCE FIELD BOOKS: LCMF2001-22, PGS. 2-6; LCMF2001-22, PG. 41; LCMF2001-23, PGS. 4-6; LCMF2001-23, PGS. 48-54; LCMF2001-25, PGS. 6-9; LCMF2002-21, PGS. 23, 27-29 & 35; LCMF2002-24, PGS. 35-41; LCMF2003-11, PGS. 1-5; LCMF2003-12 PGS. 67-69; LCMF2004-08, PGS. 12-19,47,52; LCMF2005-19, PG46; LCMF2006-16, PG 44-46; LCMF2007-14, PGS. 70-72; LCMF 2008-13, PG. 75; LCMF2009-10, PGS 39-42; LCMF2010-06 PGS. 12-14; LCMF2011-09, PGS. 23-24.
- ELEVATIONS ARE BASED ON HOUSTON CONSTRUCTION BENCHMARKS.
- HORIZONTAL CONTROL IS BASED ON RECORD COORDINATES OF ALPINE PI'S 13A AND 14A. COORDINATES ARE ALASKA STATE PLANE, ZONE 4, NAD 27, IN FEET.
- OIL, SEAWATER, ANODE AND UTILITY CASINGS ARE SHOWN PER REFERENCE DRAWING CE-CP00-109. THEY WERE NOT SURVEYED AND ARE SHOWN FOR REFERENCE ONLY.
- SEE REPORT RPT-EV-CP-0001 REV 5 FOR SURVEY DATA ON THE STREAM BANK EROSION. SEE REPORT RPT-EV-CP-0002 REV 4 FOR SURVEY DATA ON THE POLYGON TROUGH CROSS-SECTIONS.
- PER MICHAEL BAKER Jr.: THE TOP OF BANK MIGRATION CONTROL POINT WAS ESTABLISHED BY PROJECTING THE DESIGN SCOUR CONTROL POINT FROM THE OIL CASING SECTION TO THE TOP OF BANK AT A SLOPE OF 1/2 TO 1. THE TOP OF BANK IN THE OIL CASING SECTION WAS THEN PROJECTED TO THE OIL LINE CASING PLAN. REF CE-CP00-108 AND CE-CP00-109.
- POLYGON TROUGH SECTION STATIONING IS FROM NORTH TO SOUTH.
- VERTICAL DATUM HAS BEEN ADJUSTED DOWN APPROXIMATELY 0.5 FEET TO REFLECT ACTUAL ELEVATIONS PER DIFFERENTIAL LEVELS FROM CD-1, AUGUST 2007.

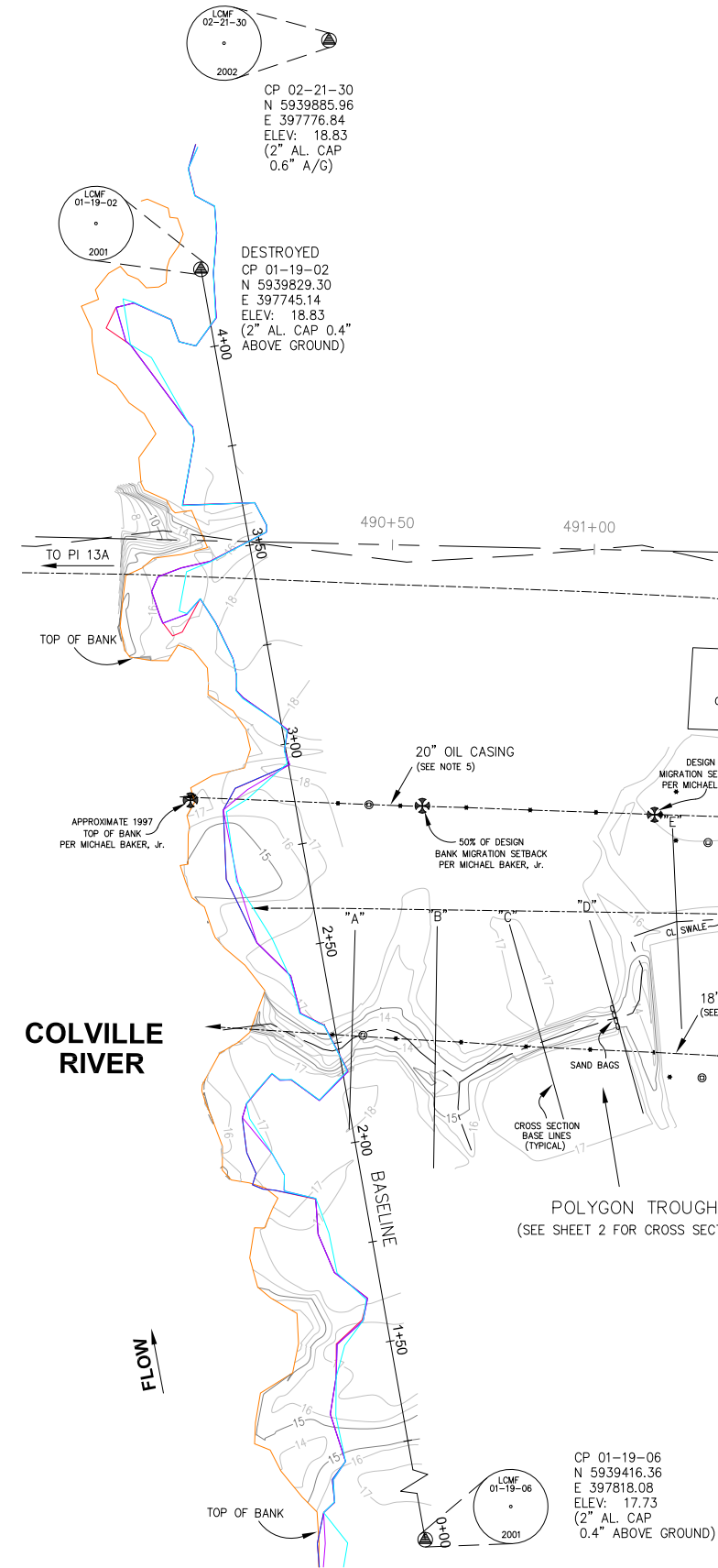
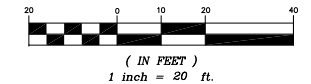


VICINITY MAP
NO SCALE

LEGEND

- HEAT PIPE
- ⊕ THERMISTOR STRING
- ⊕ TRANSITION CASING ENTRY POINT
- - - 1' CONTOUR LINES
- PILE
- ⊙ SURVEY CONTROL
- ⊗ MICHAEL BAKER Jr. MIGRATION POINT
- TOP OF BANK 9/8/01
- TOP OF BANK 8/6/08
- TOP OF BANK 8/3/09
- TOP OF BANK 7/20/10
- TOP OF BANK 8/4/11

GRAPHIC SCALE



KUUKPIK LCMF LLC
ALPINE SURVEY OFFICE

ConocoPhillips
Alaska, Inc.

ALPINE MODULE: CP00 UNIT: CP
HDD BANK EROSION TOPO/MONITORING
HDD SITE - EAST
ALPINE FACILITY

REDRAWN FROM:	CONSTRUCTION SHEET
1	OF 6
DO NOT SCALE	ABOVE SCALE FOR REFERENCE ONLY
DATE: 7/31/01	DRAWN: GD/CZ DESIGN: JZ
SCALE: 1"=20'	CHECKED: JZ
APPROVAL: CD	ECM NO: A01007ACS
JOB NO: 02-205	CADD FILE NO: 01-12-05-1EAST
SUB JOB NO:	PART: 1 OF 2
DRAWING NO: CE-CP00-134	REV: 10

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP	REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
5	8/25/06	UPDATED PER 4116808ACS						5	8/25/06	UPDATED PER 4116808ACS	AG	DB			
4	7/11/05	UPDATED PER 3391755ACS						4	7/11/05	UPDATED PER 3391755ACS	CZ	GD			
3	6/27/04	ISSUED PER 2390460ACS						3	6/27/04	ISSUED PER 2390460ACS	CZ	BD			
2	12/31/03	ISSUED PER 2094387ACS-ADDED SHEET 2 AND 2003 DATA						2	12/31/03	ISSUED PER 2094387ACS-ADDED SHEET 2 AND 2003 DATA	GD/CZ	JZ			C/K
1	11/1/02	ISSUED PER 1870227ACS						1	11/1/02	ISSUED PER 1870227ACS	CZ	JZ			TM
0	7/31/01	ISSUED PER A01007ACS						0	7/31/01	ISSUED PER A01007ACS	RLW	JZ			CD

123744-MBJ-RPT-001

Appendix C

1 of 46

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

3 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
0+10	N/A	N/A	N/A	N/A	N/A	N/A	-25.3	-25.3	-25.3	-25.3	Baseline Offset (In Feet)
								0.0	0.0	0.0	Incremental Change
								0.0	0.0	0.0	Cumulative Change
0+20	N/A	N/A	N/A	N/A	N/A	N/A	-32.1	-30.9	-30.9	-30.9	Baseline Offset (In Feet)
								-1.2	0.0	0.0	Incremental Change
								-1.2	-1.2	-1.2	Cumulative Change
0+25	N/A	N/A	N/A	N/A	N/A	N/A	-38.2	-38.2	-38.2	-38.2	Baseline Offset (In Feet)
								0.0	0.0	0.0	Incremental Change
								0.0	0.0	0.0	Cumulative Change
0+30	N/A	N/A	N/A	N/A	N/A	N/A	-41.1	-41.1	-41.1	-41.1	Baseline Offset (In Feet)
								0.0	0.0	0.0	Incremental Change
								0.0	0.0	0.0	Cumulative Change
0+40	N/A	N/A	N/A	N/A	N/A	N/A	-37.7	-37.7	-37.7	-37.7	Baseline Offset (In Feet)
								0.0	0.0	0.0	Incremental Change
								0.0	0.0	0.0	Cumulative Change
0+50	N/A	N/A	N/A	N/A	N/A	N/A	-30.3	-30.3	-30.3	-30.3	Baseline Offset (In Feet)
								0.0	0.0	0.0	Incremental Change
								0.0	0.0	0.0	Cumulative Change
0+60	N/A	N/A	N/A	N/A	N/A	N/A	-28.0	-27.9	-27.5	-27.5	Baseline Offset (In Feet)
								-0.1	-0.5	0.0	Incremental Change
								-0.1	-0.5	-0.5	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
0+65	N/A	N/A	N/A	N/A	N/A	N/A	-39.8	-39.8	-23.9	-23.9	Baseline Offset (In Feet)
								0.0	-16.0	0.0	Incremental Change
								0.0	-16.0	-16.0	Cumulative Change
0+70	N/A	-32.4	N/A	-31.2	-31.2	-31.5	-27.7	-27.7	-20.0	-20.0	Baseline Offset (In Feet)
				-1.2	0.0	0.3	-3.8	0.0	-7.7	0.0	Incremental Change
				-1.2	-1.2	-0.9	-4.7	-4.7	-12.4	-12.4	Cumulative Change
0+75	N/A	-27.1	-27.0	-27.0	-27.1	-27.0	-27.2	-27.6	-21.1	-21.0	Baseline Offset (In Feet)
			-0.1	0.0	0.1	-0.1	0.2	0.4	-6.5	-0.1	Incremental Change
			-0.1	-0.1	0.0	-0.1	0.1	0.5	-6.0	-6.1	Cumulative Change
0+80	N/A	-26.4	N/A	-26.6	-26.5	-26.5	-27.5	-27.5	-22.4	-22.4	Baseline Offset (In Feet)
				0.2	-0.1	0.0	1.0	0.0	-5.1	0.0	Incremental Change
				0.2	0.1	0.0	1.1	1.1	-4.0	-4.0	Cumulative Change
0+90	N/A	-29.2	N/A	-28.9	-29.2	-29.2	-29.2	-29.2	-29.2	-27.8	Baseline Offset (In Feet)
				-0.3	0.3	0.0	0.0	0.0	0.0	-1.5	Incremental Change
				-0.3	0.0	0.0	0.0	0.0	0.0	-1.5	Cumulative Change
1+00	N/A	-26.7	-26.9	-26.3	-26.8	-26.7	-26.7	-26.7	-26.7	-26.7	Baseline Offset (In Feet)
			0.2	-0.6	0.5	-0.1	0.0	0.0	0.0	0.0	Incremental Change
			0.2	-0.4	0.1	0.0	0.0	0.0	0.0	0.0	Cumulative Change
1+10	N/A	-25.6	N/A	-25.3	-25.4	-25.6	-25.6	-25.6	-23.9	-23.9	Baseline Offset (In Feet)
				-0.3	0.1	0.2	0.0	0.0	-1.7	0.0	Incremental Change
				-0.3	-0.2	0.0	0.0	0.0	-1.7	-1.7	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

5 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
1+15	N/A	-27.6	N/A	-27.5	-27.6	-27.6	-24.5	-24.5	-20.8	-20.8	Baseline Offset (In Feet)
				-0.1	0.1	0.0	-3.1	0.0	-3.7	0.0	Incremental Change
				-0.1	0.0	0.0	-3.1	-3.1	-6.8	-6.8	Cumulative Change
1+20	N/A	-35.5	N/A	-30.5	-30.5	-22.1	-22.6	-22.6	-21.4	-21.4	Baseline Offset (In Feet)
				-5.0	0.0	-8.4	0.4	0.0	-1.2	0.0	Incremental Change
				-5.0	-5.0	-13.4	-12.9	-12.9	-14.0	-14.1	Cumulative Change
1+25	-38.4	-38.7	-39.1	-33.0	-32.8	-22.5	-23.0	-22.9	-18.1	-18.1	Baseline Offset (In Feet)
			0.4	-6.1	-0.2	-10.3	0.5	-0.1	-4.8	0.0	Incremental Change
			0.4	-5.7	-5.9	-16.2	-15.7	-15.8	-20.6	-20.6	Cumulative Change
1+30	N/A	-37.8	N/A	-36.2	-36.1	-27.7	-28.0	-27.9	-17.3	-17.3	Baseline Offset (In Feet)
				-1.6	-0.1	-8.4	0.2	-0.1	-10.6	0.0	Incremental Change
				-1.6	-1.7	-10.1	-9.9	-9.9	-20.5	-20.5	Cumulative Change
1+40	N/A	-33.8	N/A	-35.0	-34.9	-21.3	-20.6	-20.6	-17.1	-17.1	Baseline Offset (In Feet)
				1.2	-0.1	-13.6	-0.8	0.0	-3.5	0.0	Incremental Change
				1.2	1.1	-12.5	-13.3	-13.2	-16.7	-16.7	Cumulative Change
1+45	N/A	-28.2	N/A	-29.5	-28.8	18.6	-16.5	-16.5	-16.1	-16.1	Baseline Offset (In Feet)
				1.3	-0.7	-47.4	35.0	0.0	-0.4	0.0	Incremental Change
				1.3	0.6	-46.8	-11.7	-11.7	-12.1	-12.1	Cumulative Change
1+50	-18.4	-23.7	-23.8	-23.9	-23.8	-20.7	-15.6	-15.6	-13.8	-13.8	Baseline Offset (In Feet)
			0.1	0.1	-0.1	-3.1	-5.1	0.0	-1.8	0.0	Incremental Change
			0.1	0.2	0.1	-3.0	-8.1	-8.1	-9.9	-9.9	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
1+55	N/A	-22.2	N/A	-21.9	-22.2	-21.8	-14.5	-14.5	-11.5	-11.5	Baseline Offset (In Feet)
				-0.2	0.3	-0.4	-7.3	0.0	-3.0	0.0	Incremental Change
				-0.2	0.1	-0.4	-7.7	-7.7	-10.7	-10.7	Cumulative Change
1+60	-17.1	-21.6	-21.8	-21.7	-21.6	-21.4	-15.1	-14.9	-9.0	-9.0	Baseline Offset (In Feet)
			0.2	-0.1	-0.1	-0.2	-6.3	-0.2	-5.9	0.0	Incremental Change
			0.2	0.1	0.0	-0.2	-6.5	-6.7	-12.6	-12.6	Cumulative Change
1+65	N/A	-26.2	N/A	-26.3	-26.5	-25.8	-24.9	-24.6	-11.4	-9.7	Baseline Offset (In Feet)
				0.0	0.2	-0.6	-1.0	-0.2	-13.3	-1.7	Incremental Change
				0.0	0.2	-0.4	-1.4	-1.6	-14.9	-16.6	Cumulative Change
1+70	N/A	-30.1	N/A	-30.1	-30.1	-29.6	-29.7	-29.7	-15.7	-13.0	Baseline Offset (In Feet)
				0.1	0.0	-0.5	0.2	0.0	-14.1	-2.7	Incremental Change
				0.1	0.0	-0.5	-0.3	-0.3	-14.4	-17.1	Cumulative Change
1+75	-30.4	-30.7	-31.1	-30.7	-30.5	-30.0	-29.6	-29.6	-16.1	-14.4	Baseline Offset (In Feet)
			0.4	-0.4	-0.2	-0.5	-0.4	0.0	-13.5	-1.7	Incremental Change
			0.4	0.0	-0.2	-0.7	-1.1	-1.1	-14.6	-16.3	Cumulative Change
1+80	N/A	-30.2	N/A	-30.7	-29.4	-30.2	-24.6	-22.1	-13.9	-13.9	Baseline Offset (In Feet)
				0.5	-1.3	0.8	-5.7	-2.4	-8.3	0.0	Incremental Change
				0.5	-0.8	0.0	-5.7	-8.1	-16.4	-16.4	Cumulative Change
1+85	-27.1	-24.5	-24.4	-24.2	-24.5	-24.5	-20.5	-17.0	-12.7	-12.7	Baseline Offset (In Feet)
			-0.1	-0.2	0.3	0.0	-4.0	-3.5	-4.3	0.0	Incremental Change
			-0.1	-0.3	0.0	0.0	-4.0	-7.5	-11.8	-11.8	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

7 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
1+90	N/A	-12.8	N/A	-21.4	-21.5	-21.6	-21.9	-19.5	-16.9	-16.9	Baseline Offset (In Feet)
				8.6	0.0	0.1	0.3	-2.4	-2.6	0.0	Incremental Change
				8.6	8.7	8.8	9.1	6.7	4.1	4.1	Cumulative Change
1+95	N/A	-27.6	N/A	-27.8	-28.5	-27.7	-27.7	-27.7	-27.7	-27.7	Baseline Offset (In Feet)
				0.2	0.7	-0.9	0.0	0.0	0.0	0.0	Incremental Change
				0.2	0.9	0.1	0.1	0.1	0.1	0.1	Cumulative Change
2+00	-32.6	-33.7	-33.8	-33.7	-33.4	-33.7	-27.8	-27.8	-27.8	-27.8	Baseline Offset (In Feet)
			0.1	-0.1	-0.3	0.3	-5.9	0.0	0.0	0.0	Incremental Change
			0.1	0.0	-0.3	0.0	-5.9	-5.9	-5.9	-5.9	Cumulative Change
2+05	N/A	-32.9	N/A	-32.7	-32.6	-32.5	-27.3	-27.3	-27.3	-27.3	Baseline Offset (In Feet)
				-0.3	-0.1	-0.1	-5.2	0.0	0.0	0.0	Incremental Change
				-0.3	-0.4	-0.4	-5.6	-5.6	-5.6	-5.6	Cumulative Change
2+10	N/A	-33.7	N/A	-33.5	-33.5	-29.1	-26.0	-26.0	-26.0	-26.0	Baseline Offset (In Feet)
				-0.2	0.0	-4.4	-3.2	0.0	0.0	0.0	Incremental Change
				-0.2	-0.2	-4.6	-7.8	-7.8	-7.8	-7.7	Cumulative Change
2+15	-32.9	-34.9	-35.4	-34.5	-34.5	-28.8	-23.2	-23.2	-23.2	-23.2	Baseline Offset (In Feet)
			0.5	-0.9	0.0	-5.7	-5.6	0.0	0.0	0.0	Incremental Change
			0.5	-0.4	-0.4	-6.1	-11.7	-11.7	-11.7	-11.7	Cumulative Change
2+20	N/A	-34.4	N/A	-34.4	-34.9	-32.0	-21.0	-21.0	-21.0	-20.4	Baseline Offset (In Feet)
				0.0	0.5	-2.9	-11.0	0.0	0.0	-0.6	Incremental Change
				0.0	0.5	-2.4	-13.4	-13.4	-13.4	-14.0	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
2+25	-30.0	-32.0	-31.5	-31.5	-31.2	-31.1	-18.4	-18.4	-8.0	-5.2	Baseline Offset (In Feet)
			-0.5	0.0	-0.3	-0.1	-12.7	0.0	-10.4	-2.9	Incremental Change
			-0.5	-0.5	-0.8	-0.9	-13.6	-13.6	-24.0	-26.8	Cumulative Change
2+30	-22.0	-23.4	-22.6	-23.5	-23.2	-19.7	-13.7	-13.7	-2.4	-2.4	Baseline Offset (In Feet)
			-0.8	0.9	-0.3	-3.5	-6.0	0.0	-11.3	0.0	Incremental Change
			-0.8	0.1	-0.2	-3.7	-9.7	-9.7	-21.0	-21.0	Cumulative Change
2+35	-21.7	-20.6	-20.1	-20.6	-18.8	-11.7	-8.9	-7.0	-7.0	-7.1	Baseline Offset (In Feet)
			-0.5	0.5	-1.8	-7.1	-2.8	-1.9	0.0	0.1	Incremental Change
			-0.5	0.0	-1.8	-8.9	-11.7	-13.6	-13.6	-13.5	Cumulative Change
2+40	N/A	-19.2	N/A	-20.1	-15.9	-12.0	-8.3	-8.3	-8.3	-8.3	Baseline Offset (In Feet)
				0.9	-4.2	-3.9	-3.6	0.0	0.0	0.0	Incremental Change
				0.9	-3.3	-7.2	-10.8	-10.8	-10.8	-10.8	Cumulative Change
2+50	-21.0	-21.8	-21.3	-21.0	-21.0	-20.7	-14.7	-14.6	-14.6	-14.6	Baseline Offset (In Feet)
			-0.5	-0.3	0.0	-0.3	-6.0	-0.1	0.0	0.0	Incremental Change
			-0.5	-0.8	-0.8	-1.1	-7.1	-7.2	-7.2	-7.2	Cumulative Change
2+60	-26.1	-26.5	-26.7	-26.1	-26.0	-25.9	-20.5	-20.6	-20.6	-20.5	Baseline Offset (In Feet)
			0.2	-0.6	-0.1	-0.1	-5.4	0.1	0.0	-0.1	Incremental Change
			0.2	-0.4	-0.5	-0.6	-6.0	-5.9	-5.9	-6.0	Cumulative Change
2+70	-28.9	-30.4	-30.9	-30.4	-30.0	-30.6	-25.5	-25.4	-20.8	-20.8	Baseline Offset (In Feet)
			0.5	-0.5	-0.4	0.6	-5.1	-0.1	-4.6	0.0	Incremental Change
			0.5	0.0	-0.4	0.2	-4.9	-5.0	-9.6	-9.6	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBJ-RPT-001

Appendix C

9 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
2+75	-28.4	-31.4	-31.4	-31.3	-30.7	-31.2	-26.1	-26.0	-20.9	-20.9	Baseline Offset (In Feet)
			0.0	-0.1	-0.6	0.5	-5.1	-0.1	-5.1	0.0	Incremental Change
			0.0	-0.1	-0.7	-0.2	-5.3	-5.4	-10.5	-10.5	Cumulative Change
2+85	-27.5	-26.9	-27.1	-26.9	-26.8	-26.8	-22.8	-22.8	-22.8	-22.8	Baseline Offset (In Feet)
			0.2	-0.2	-0.1	0.0	-4.0	0.0	0.0	0.0	Incremental Change
			0.2	0.0	-0.1	-0.1	-4.1	-4.1	-4.1	-4.1	Cumulative Change
2+90	-24.5	-24.5	-24.8	-24.2	-24.5	-24.5	-21.4	-21.4	-21.4	-21.3	Baseline Offset (In Feet)
			0.3	-0.6	0.3	0.0	-3.1	0.0	0.0	-0.1	Incremental Change
			0.3	-0.3	0.0	0.0	-3.1	-3.1	-3.1	-3.2	Cumulative Change
3+00	-5.5	-9.1	-9.2	-8.9	-8.7	-9.0	-9.0	-8.9	-6.0	-6.0	Baseline Offset (In Feet)
			0.1	-0.3	-0.2	0.3	0.0	-0.1	-2.9	0.0	Incremental Change
			0.1	-0.2	-0.4	-0.1	-0.1	-0.2	-3.1	-3.1	Cumulative Change
3+10	N/A	-11.4	N/A	-11.3	-11.0	-11.4	-11.4	-11.4	-11.4	-11.4	Baseline Offset (In Feet)
				-0.1	-0.3	0.4	0.0	0.0	0.0	0.0	Incremental Change
				-0.1	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1	Cumulative Change
3+15	N/A	-16.2	N/A	-16.2	-16.2	-16.1	-16.0	-15.9	-15.9	-15.9	Baseline Offset (In Feet)
				0.1	-0.1	0.0	-0.2	-0.1	0.0	0.0	Incremental Change
				0.1	0.0	0.0	-0.2	-0.3	-0.3	-0.3	Cumulative Change
3+20	N/A	-15.9	N/A	-15.6	-15.8	-15.9	-11.9	-11.9	-11.9	-11.8	Baseline Offset (In Feet)
				-0.4	0.2	0.1	-4.1	0.0	0.0	0.0	Incremental Change
				-0.4	-0.1	0.0	-4.1	-4.1	-4.1	-4.1	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
3+25	-18.5	-17.1	-17.7	-17.3	-17.3	-16.6	-11.4	-11.1	-11.1	-11.1	Baseline Offset (In Feet)
			0.6	-0.4	0.0	-0.7	-5.2	-0.3	0.0	0.0	Incremental Change
			0.6	0.2	0.2	-0.5	-5.7	-6.0	-6.0	-6.0	Cumulative Change
3+30	-34.3	-35.4	-35.7	-35.3	-35.0	-35.4	-23.4	-13.9	-11.5	-11.5	Baseline Offset (In Feet)
			0.3	-0.4	-0.3	0.4	-12.0	-9.5	-2.4	0.0	Incremental Change
			0.3	-0.1	-0.4	0.0	-12.0	-21.5	-23.9	-23.9	Cumulative Change
3+35	-35.4	-35.7	-35.7	-35.3	-35.0	-35.0	-23.8	-23.5	-23.5	-23.5	Baseline Offset (In Feet)
			0.0	-0.4	-0.3	0.0	-11.2	-0.3	0.0	0.0	Incremental Change
			0.0	-0.4	-0.7	-0.7	-11.9	-12.2	-12.2	-12.2	Cumulative Change
3+40	-33.8	-34.2	-34.1	-34.0	-33.9	-33.9	-25.4	-25.4	-25.4	-25.4	Baseline Offset (In Feet)
			-0.1	-0.1	-0.1	0.0	-8.5	0.0	0.0	0.0	Incremental Change
			-0.1	-0.2	-0.3	-0.3	-8.8	-8.8	-8.8	-8.8	Cumulative Change
3+45	-32.0	-32.4	-32.5	-32.6	-32.4	-32.5	-27.3	-27.4	-27.4	-26.4	Baseline Offset (In Feet)
			0.1	0.1	-0.2	0.1	-5.2	0.1	0.0	-1.0	Incremental Change
			0.1	0.2	0.0	0.1	-5.1	-5.0	-5.0	-6.0	Cumulative Change
3+52	-9.7	-10.1	-10.2	-10.4	-10.4	-10.1	-9.9	-8.4	-8.4	-8.4	Baseline Offset (In Feet)
			0.1	0.2	0.0	-0.3	-0.2	-1.5	0.0	0.0	Incremental Change
			0.1	0.3	0.3	0.0	-0.2	-1.7	-1.7	-1.7	Cumulative Change
3+60	N/A	-11.9	N/A	-10.8	-12.4	-11.5	-11.3	-11.2	-11.2	-10.8	Baseline Offset (In Feet)
				-1.1	1.7	-0.9	-0.2	-0.1	0.0	-0.4	Incremental Change
				-1.1	0.5	-0.4	-0.6	-0.7	-0.7	-1.1	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

11 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
3+65	N/A	-18.8	N/A	-18.5	-18.9	-18.7	-18.7	-18.7	-18.7	-18.4	Baseline Offset (In Feet)
				-0.3	0.4	-0.2	0.0	0.0	0.0	-0.3	Incremental Change
				-0.3	0.1	-0.1	-0.1	-0.1	-0.1	-0.4	Cumulative Change
3+70	N/A	-23.9	N/A	-24.1	-23.8	-24.2	-24.0	-24.0	-24.0	-24.1	Baseline Offset (In Feet)
				0.2	-0.3	0.4	-0.1	0.0	0.0	0.1	Incremental Change
				0.2	-0.2	0.2	0.1	0.0	0.0	0.2	Cumulative Change
3+75	N/A	-23.2	-23.3	-23.4	-23.3	-23.3	-20.2	-20.2	-20.2	-20.2	Baseline Offset (In Feet)
			0.1	0.1	-0.1	0.0	-3.1	0.0	0.0	0.0	Incremental Change
			0.1	0.2	0.1	0.1	-3.0	-3.0	-3.0	-3.0	Cumulative Change
3+80	N/A	-19.6	N/A	-19.0	-19.3	-19.7	-12.9	-12.9	-12.9	-11.6	Baseline Offset (In Feet)
				-0.6	0.3	0.4	-6.8	0.0	0.0	-1.3	Incremental Change
				-0.6	-0.4	0.1	-6.7	-6.7	-6.7	-8.0	Cumulative Change
3+85	N/A	-19.9	N/A	-19.9	-19.5	-19.3	-13.2	-12.3	-12.3	-12.0	Baseline Offset (In Feet)
				0.0	-0.5	-0.1	-6.1	-1.0	0.0	-0.3	Incremental Change
				0.0	-0.4	-0.6	-6.7	-7.7	-7.7	-7.9	Cumulative Change
3+95	N/A	-26.1	N/A	-25.7	-25.9	-26.3	-22.4	-22.4	-22.4	-21.9	Baseline Offset (In Feet)
				-0.4	0.2	0.4	-3.9	0.0	0.0	-0.5	Incremental Change
				-0.4	-0.2	0.2	-3.7	-3.8	-3.8	-4.2	Cumulative Change
4+00	N/A	-29.9	-30.0	-29.5	-29.7	-30.2	-21.2	-21.2	-21.2	-21.9	Baseline Offset (In Feet)
			0.1	-0.5	0.2	0.5	-9.0	0.0	0.0	0.7	Incremental Change
			0.1	-0.4	-0.2	0.3	-8.7	-8.7	-8.7	-8.0	Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 3 for Survey Baseline Stations										
	7/29/2001	8/7/2001	8/15/2001	8/23/2001	9/8/2001	7/8/2002	9/12/2002	7/9/2003	9/8/2003	6/19/2004	Date
4+05	N/A	-29.8	N/A	-29.4	-29.4	-29.9	-19.5	-19.5	-19.5	-19.5	Baseline Offset (In Feet)
				-0.4	0.0	0.4	-10.4	0.0	0.0	0.0	Incremental Change
				-0.4	-0.4	0.1	-10.3	-10.3	-10.3	-10.3	Cumulative Change
4+15	N/A	N/A	N/A	-30.7	-30.6	-27.3	2.7	2.6	2.6	2.6	Baseline Offset (In Feet)
					-0.1	-3.4	-29.9	0.0	0.0	0.0	Incremental Change
					-0.1	-3.4	-33.4	-33.3	-33.3	-33.3	Cumulative Change
4+25	N/A	N/A	N/A	-8.6	-5.4	-1.0	5.1	5.1	5.1	5.1	Baseline Offset (In Feet)
					-3.2	-4.4	-6.1	0.0	0.0	0.0	Incremental Change
					-3.2	-7.6	-13.7	-13.7	-13.7	-13.7	Cumulative Change
4+35	N/A	N/A	N/A	-5.6	-5.4	-0.7	4.4	4.5	4.5	4.5	Baseline Offset (In Feet)
					-0.2	-4.6	-5.1	0.0	0.0	0.0	Incremental Change
					-0.2	-4.8	-10.0	-10.0	-10.0	-10.0	Cumulative Change
4+45	N/A	N/A	N/A	N/A	N/A	-5.1	1.3	1.2	1.2	1.9	Baseline Offset (In Feet)
							-6.4	0.1	0.0	-0.7	Incremental Change
							-6.4	-6.3	-6.3	-7.0	Cumulative Change
4+50	N/A	N/A	N/A	N/A	N/A	-6.3	1.9	1.8	4.1	4.1	Baseline Offset (In Feet)
							-8.2	0.1	-2.3	0.0	Incremental Change
								-8.1	-10.4	-10.4	Cumulative Change

*****Note:** Field Survey dated 8/7/01 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBJ-RPT-001

Appendix C

13 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
0+10	-25.3	-25.3	-25.3	-25.3	-25.3	-25.6	-25.6	-23.9			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.3	0.0	-1.7			Incremental Change
	0.0	0.0	0.0	0.0	0.0	0.3	0.3	-1.4			Cumulative Change
0+20	-30.9	-30.9	-30.9	-30.9	-30.9	-31.0	-29.1	-29.2			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.1	-1.9	0.1			Incremental Change
	-1.2	-1.2	-1.2	-1.2	-1.2	-1.1	-3.0	-2.9			Cumulative Change
0+25	-38.2	-37.0	-37.0	-37.0	-37.0	-34.1	-29.9	-29.2			Baseline Offset (In Feet)
	0.0	-1.2	0.0	0.0	0.0	-2.9	-4.2	-0.7			Incremental Change
	0.0	-1.2	-1.2	-1.2	-1.2	-4.1	-8.3	-9.0			Cumulative Change
0+30	-41.1	-36.9	-36.9	-36.9	-36.9	-34.3	-31.4	-29.3			Baseline Offset (In Feet)
	0.0	-4.2	0.0	0.0	0.0	-2.6	-2.9	-2.2			Incremental Change
	0.0	-4.2	-4.2	-4.2	-4.2	-6.8	-9.7	-11.8			Cumulative Change
0+40	-37.7	-36.5	-35.1	-35.1	-35.1	-34.8	-34.3	-29.4			Baseline Offset (In Feet)
	0.0	-1.2	-1.4	0.0	0.0	-0.3	-0.5	-4.9			Incremental Change
	0.0	-1.2	-2.6	-2.6	-2.6	-2.9	-3.4	-8.3			Cumulative Change
0+50	-30.3	-30.3	-30.3	-30.3	-30.3	-30.3	-30.3	-30.1			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2			Incremental Change
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2			Cumulative Change
0+60	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5	-25.3			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.2			Incremental Change
	-0.5	-0.5	-0.5	-0.5	-0.5	-0.4	-0.5	-2.7			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
0+65	-23.9	-23.4	-23.4	-23.4	-23.4	-23.4	-23.4	-19.9			Baseline Offset (In Feet)
	0.0	-0.5	0.0	0.0	0.0	0.0	0.0	-3.5			Incremental Change
	-16.0	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-19.9		Cumulative Change
0+70	-20.0	-16.2	-16.2	-16.2	-16.2	-16.2	-16.2	-16.2			Baseline Offset (In Feet)
	0.0	-3.8	0.0	0.0	0.0	0.0	0.0	0.0			Incremental Change
	-12.4	-16.2	-16.2	-16.2	-16.2	-16.2	-16.2	-16.2			Cumulative Change
0+75	-21.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0	-17.8			Baseline Offset (In Feet)
	-0.1	-3.0	0.1	0.0	0.0	0.0	0.0	-0.2			Incremental Change
	-6.1	-9.1	-9.1	-9.1	-9.1	-9.1	-9.1	-9.3			Cumulative Change
0+80	-22.4	-22.4	-22.4	-22.4	-22.4	-22.4	-22.1	-21.7			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.4			Incremental Change
	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.3	-4.8			Cumulative Change
0+90	-27.8	-27.8	-27.2	-27.2	-27.2	-27.2	-26.5	-23.1			Baseline Offset (In Feet)
	-1.5	0.0	-0.6	0.0	0.0	0.0	-0.7	-3.4			Incremental Change
	-1.5	-1.5	-2.0	-2.0	-2.0	-2.0	-2.7	-6.1			Cumulative Change
1+00	-26.7	-26.7	-26.7	-26.7	-26.7	-26.7	-25.5	-20.0			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-5.5			Incremental Change
	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-6.7			Cumulative Change
1+10	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.7	-23.0			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.7			Incremental Change
	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.9	-2.6			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

15 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
1+15	-20.8	-20.2	-20.2	-20.2	-20.2	-20.2	-20.2	-20.3			Baseline Offset (In Feet)
	0.0	-0.7	0.0	0.0	0.0	0.0	0.0	0.1			Incremental Change
	-6.8	-7.4	-7.4	-7.4	-7.4	-7.4	-7.4	-7.3			Cumulative Change
1+20	-21.4	-18.2	-18.2	-18.2	-18.2	-18.8	-18.5	-18.6			Baseline Offset (In Feet)
	0.0	-3.2	0.0	0.0	0.0	0.6	-0.3	0.1			Incremental Change
	-14.1	-17.3	-17.3	-17.3	-17.3	-16.7	-17.0	-16.9			Cumulative Change
1+25	-18.1	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-16.1			Baseline Offset (In Feet)
	0.0	-1.7	0.0	0.0	0.0	0.0	0.0	-0.3			Incremental Change
	-20.6	-22.3	-22.3	-22.3	-22.3	-22.3	-22.3	-22.6			Cumulative Change
1+30	-17.3	-17.0	-17.0	-17.0	-17.0	-17.0	-17.0	-16.3			Baseline Offset (In Feet)
	0.0	-0.3	0.0	0.0	0.0	0.0	0.0	-0.7			Incremental Change
	-20.5	-20.8	-20.8	-20.8	-20.8	-20.8	-20.8	-21.5			Cumulative Change
1+40	-17.1	-15.8	-15.8	-15.8	-15.8	-16.0	-16.0	-15.4			Baseline Offset (In Feet)
	0.0	-1.3	0.0	0.0	0.0	0.2	0.0	-0.6			Incremental Change
	-16.7	-18.1	-18.0	-18.0	-18.0	-17.8	-17.8	-18.5			Cumulative Change
1+45	-16.1	-14.3	-14.3	-14.3	-14.3	-14.3	-14.3	-14.1			Baseline Offset (In Feet)
	0.0	-1.8	0.0	0.0	0.0	0.0	0.0	-0.3			Incremental Change
	-12.1	-13.9	-13.9	-13.9	-13.9	-13.9	-13.9	-14.1			Cumulative Change
1+50	-13.8	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4	-11.7			Baseline Offset (In Feet)
	0.0	-0.4	0.0	0.0	0.0	0.0	0.0	-1.7			Incremental Change
	-9.9	-10.3	-10.3	-10.3	-10.3	-10.3	-10.3	-12.0			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
1+55	-11.5	-7.1	-7.1	-7.1	-7.1	-7.5	-7.5	-7.0			Baseline Offset (In Feet)
	0.0	-4.4	0.0	0.0	0.0	0.4	0.0	-0.5			Incremental Change
	-10.7	-15.1	-15.1	-15.1	-15.1	-14.7	-14.7	-15.2			Cumulative Change
1+60	-9.0	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.4			Baseline Offset (In Feet)
	0.0	-4.8	0.0	0.0	0.0	0.0	0.0	0.2			Incremental Change
	-12.6	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.2			Cumulative Change
1+65	-9.7	-6.9	-6.9	-6.9	-6.9	-6.9	-6.9	-7.0			Baseline Offset (In Feet)
	-1.7	-2.8	0.1	0.0	0.0	0.0	0.0	0.1			Incremental Change
	-16.6	-19.4	-19.3	-19.3	-19.3	-19.3	-19.3	-19.2			Cumulative Change
1+70	-13.0	-10.8	-10.8	-10.8	-10.8	-10.8	-10.8	-10.0			Baseline Offset (In Feet)
	-2.7	-2.2	0.0	0.0	0.0	0.0	0.0	-0.8			Incremental Change
	-17.1	-19.3	-19.3	-19.3	-19.3	-19.3	-19.3	-20.0			Cumulative Change
1+75	-14.4	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-10.2			Baseline Offset (In Feet)
	-1.7	-2.5	0.0	0.0	0.0	0.0	0.0	-1.8			Incremental Change
	-16.3	-18.7	-18.7	-18.7	-18.7	-18.7	-18.7	-20.5			Cumulative Change
1+80	-13.9	-12.8	-12.8	-12.8	-12.8	-12.8	-12.8	-10.5			Baseline Offset (In Feet)
	0.0	-1.1	0.0	0.0	0.0	0.0	0.0	-2.3			Incremental Change
	-16.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-19.7			Cumulative Change
1+85	-12.7	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3	-11.4			Baseline Offset (In Feet)
	0.0	-0.4	0.0	0.0	0.0	0.0	0.0	-0.9			Incremental Change
	-11.8	-12.2	-12.2	-12.2	-12.2	-12.2	-12.2	-13.1			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBJ-RPT-001

Appendix C

17 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
1+90	-16.9	-16.9	-16.9	-16.9	-16.9	-16.9	-16.6	-16.7			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.1			Incremental Change
	4.1	4.1	4.1	4.1	4.1	4.1	3.8	3.9			Cumulative Change
1+95	-27.7	-27.7	-26.3	-26.3	-26.3	-26.3	-18.7	-18.7			Baseline Offset (In Feet)
	0.0	0.0	-1.4	0.0	0.0	0.0	-7.6	0.0			Incremental Change
	0.1	0.1	-1.3	-1.3	-1.3	-1.3	-8.9	-9.0			Cumulative Change
2+00	-27.8	-27.8	-26.4	-26.4	-26.4	-26.4	-20.4	-20.4			Baseline Offset (In Feet)
	0.0	0.0	-1.4	0.0	0.0	0.0	-6.0	0.0			Incremental Change
	-5.9	-5.9	-7.3	-7.3	-7.3	-7.3	-13.3	-13.3			Cumulative Change
2+05	-27.3	-27.3	-26.8	-26.8	-26.8	-26.8	-23.1	-22.5			Baseline Offset (In Feet)
	0.0	0.0	-0.5	0.0	0.0	0.0	-3.7	-0.6			Incremental Change
	-5.6	-5.6	-6.1	-6.1	-6.1	-6.1	-9.8	-10.5			Cumulative Change
2+10	-26.0	-26.0	-26.0	-26.0	-26.0	-26.5	-26.0	-24.6			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.5	-0.5	-1.4			Incremental Change
	-7.7	-7.7	-7.7	-7.7	-7.7	-7.2	-7.7	-9.2			Cumulative Change
2+15	-23.2	-23.2	-23.2	-23.2	-23.7	-23.7	-23.7	-23.8			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1			Incremental Change
	-11.7	-11.7	-11.7	-11.7	-11.2	-11.2	-11.2	-11.1			Cumulative Change
2+20	-20.4	-17.4	-17.3	-17.3	-17.3	-18.2	-18.2	-17.5			Baseline Offset (In Feet)
	-0.6	-3.0	0.0	0.0	0.0	0.9	0.0	-0.7			Incremental Change
	-14.0	-17.0	-17.1	-17.1	-17.1	-16.2	-16.2	-16.9			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations									Description	
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
2+25	-5.2	-5.2	-5.2	-1.0	-1.0	-1.0	-1.0	-1.1			Baseline Offset (In Feet)
	-2.9	0.0	0.0	-4.2	0.0	0.0	0.0	0.1			Incremental Change
	-26.8	-26.8	-26.8	-31.0	-31.0	-31.0	-31.0	-31.0			Cumulative Change
2+30	-2.4	-2.4	-2.4	-2.4	-2.4	-2.8	-2.8	-3.0			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.2			Incremental Change
	-21.0	-21.0	-21.0	-21.0	-21.0	-20.6	-20.6	-20.5			Cumulative Change
2+35	-7.1	-7.1	-7.1	-7.1	-7.1	-7.9	-7.9	-8.1			Baseline Offset (In Feet)
	0.1	0.0	0.0	0.0	0.0	0.8	0.0	0.2			Incremental Change
	-13.5	-13.5	-13.5	-13.5	-13.5	-12.7	-12.7	-12.5			Cumulative Change
2+40	-8.3	-8.3	-8.3	-8.3	-8.2	-8.2	-8.2	-8.5			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.3			Incremental Change
	-10.8	-10.8	-10.9	-10.9	-11.0	-11.0	-11.0	-10.6			Cumulative Change
2+50	-14.6	-14.6	-13.6	-13.3	-13.3	-13.3	-13.3	-10.6			Baseline Offset (In Feet)
	0.0	0.0	-1.0	-0.3	0.0	0.0	0.0	-2.7			Incremental Change
	-7.2	-7.2	-8.2	-8.5	-8.5	-8.5	-8.5	-11.2			Cumulative Change
2+60	-20.5	-19.8	-17.7	-17.7	-17.7	-17.4	-16.3	-14.2			Baseline Offset (In Feet)
	-0.1	-0.7	-2.1	0.0	0.0	-0.3	-1.1	-2.1			Incremental Change
	-6.0	-6.7	-8.8	-8.8	-8.8	-9.1	-10.2	-12.3			Cumulative Change
2+70	-20.8	-20.8	-20.6	-20.0	-20.0	-20.0	-17.4	-17.7			Baseline Offset (In Feet)
	0.0	0.0	-0.2	-0.6	0.0	0.0	-2.6	0.3			Incremental Change
	-9.6	-9.6	-9.8	-10.4	-10.4	-10.4	-13.0	-12.8			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

19 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
2+75	-20.9	-20.8	-19.7	-19.7	-19.7	-19.4	-17.6	-17.5			Baseline Offset (In Feet)
	0.0	-0.1	-1.1	0.0	0.0	-0.3	-1.8	-0.1			Incremental Change
	-10.5	-10.6	-11.7	-11.7	-11.7	-12.0	-13.8	-13.9			Cumulative Change
2+85	-22.8	-20.4	-17.9	-17.9	-17.9	-17.9	-17.9	-17.2			Baseline Offset (In Feet)
	0.0	-2.4	-2.5	0.0	0.0	0.0	0.0	-0.7			Incremental Change
	-4.1	-6.5	-9.1	-9.0	-9.0	-9.0	-9.0	-9.7			Cumulative Change
2+90	-21.3	-21.3	-17.3	-16.5	-15.1	-15.1	-12.0	-8.7			Baseline Offset (In Feet)
	-0.1	0.0	-4.1	-0.8	-1.4	0.0	-3.1	-3.3			Incremental Change
	-3.2	-3.2	-7.2	-8.0	-9.4	-9.4	-12.5	-15.8			Cumulative Change
3+00	-6.0	0.3	0.3	0.3	0.3	0.3	0.3	0.1			Baseline Offset (In Feet)
	0.0	-6.3	0.0	0.0	0.0	0.0	0.0	0.2			Incremental Change
	-3.1	-9.4	-9.4	-9.4	-9.4	-9.4	-9.4	-9.2			Cumulative Change
3+10	-11.4	-6.9	-5.2	-5.2	-5.2	-5.0	-5.0	-5.3			Baseline Offset (In Feet)
	0.0	-4.4	-1.7	0.0	0.0	-0.2	0.0	0.3			Incremental Change
	-0.1	-4.5	-6.2	-6.2	-6.2	-6.4	-6.4	-6.2			Cumulative Change
3+15	-15.9	-10.5	-9.6	-9.6	-9.6	-9.6	-9.6	-9.5			Baseline Offset (In Feet)
	0.0	-5.4	-0.9	0.0	0.0	0.0	0.0	-0.1			Incremental Change
	-0.3	-5.7	-6.6	-6.6	-6.6	-6.6	-6.6	-6.7			Cumulative Change
3+20	-11.8	-11.8	-8.9	-8.9	-8.9	-8.9	-8.9	-8.9			Baseline Offset (In Feet)
	0.0	0.0	-2.9	0.0	0.0	0.0	0.0	0.0			Incremental Change
	-4.1	-4.1	-7.0	-7.0	-7.0	-7.0	-7.0	-7.1			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
3+25	-11.1	-10.3	-9.5	-9.5	-9.5	-9.5	-9.5	-9.6			Baseline Offset (In Feet)
	0.0	-0.8	-0.8	0.0	0.0	0.0	0.0	0.1			Incremental Change
	-6.0	-6.8	-7.6	-7.6	-7.6	-7.6	-7.6	-7.5			Cumulative Change
3+30	-11.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.0	-11.0			Baseline Offset (In Feet)
	0.0	-0.3	0.0	0.0	0.0	0.0	-0.2	0.0			Incremental Change
	-23.9	-24.2	-24.2	-24.2	-24.2	-24.2	-24.4	-24.4			Cumulative Change
3+35	-23.5	-23.5	-23.5	-23.5	-23.5	-24.6	-24.6	-12.7			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	1.1	0.0	-11.9			Incremental Change
	-12.2	-12.2	-12.2	-12.2	-12.2	-11.1	-11.1	-23.0			Cumulative Change
3+40	-25.4	-25.4	-25.4	-25.4	-25.4	-25.4	-25.4	-18.9			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.5			Incremental Change
	-8.8	-8.8	-8.8	-8.8	-8.8	-8.8	-8.8	-15.3			Cumulative Change
3+45	-26.4	-24.1	-24.1	-24.1	-24.1	-24.6	-24.6	-17.0			Baseline Offset (In Feet)
	-1.0	-2.3	0.0	0.0	0.0	0.5	0.0	-7.6			Incremental Change
	-6.0	-8.3	-8.3	-8.3	-8.3	-7.8	-7.8	-15.4			Cumulative Change
3+52	-8.4	-8.4	2.4	2.4	2.4	3.1	3.1	3.1			Baseline Offset (In Feet)
	0.0	0.0	-10.8	0.0	0.0	-0.7	0.0	0.0			Incremental Change
	-1.7	-1.7	-12.5	-12.5	-12.5	-13.2	-13.2	-13.2			Cumulative Change
3+60	-10.8	-10.8	3.0	3.0	3.0	3.0	3.0	3.1			Baseline Offset (In Feet)
	-0.4	0.0	-13.8	0.0	0.0	0.0	0.0	0.1			Incremental Change
	-1.1	-1.1	-14.9	-14.9	-14.9	-14.9	-14.9	-15.0			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

123744-MBU-RPT-001

Appendix C

21 of 46

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
3+65	-18.4	-18.4	-3.3	-13.8	-13.8	-13.8	-13.8	-13.9			Baseline Offset (In Feet)
	-0.3	0.0	-15.1	10.5	0.0	0.0	0.0	0.0			Incremental Change
	-0.4	-0.4	-15.5	-5.0	-5.0	-5.0	-5.0	-5.0			Cumulative Change
3+70	-24.1	-21.2	-9.6	-11.9	-11.9	-11.9	-11.9	-12.0			Baseline Offset (In Feet)
	0.1	-2.9	-11.6	2.3	0.0	0.0	0.0	0.1			Incremental Change
	0.2	-2.8	-14.3	-12.0	-12.0	-12.0	-12.0	-12.0			Cumulative Change
3+75	-20.2	-19.3	-11.3	-10.1	-10.1	-10.1	-10.1	-10.1			Baseline Offset (In Feet)
	0.0	-0.9	-8.0	-1.2	0.0	0.0	0.0	0.0			Incremental Change
	-3.0	-3.9	-11.9	-13.1	-13.1	-13.1	-13.1	-13.1			Cumulative Change
3+80	-11.6	-11.6	-9.0	-9.0	-9.0	-9.0	-9.0	-8.9			Baseline Offset (In Feet)
	-1.3	0.0	-2.6	0.0	0.0	0.0	0.0	-0.1			Incremental Change
	-8.0	-8.0	-10.6	-10.6	-10.6	-10.6	-10.6	-10.7			Cumulative Change
3+85	-12.0	-12.0	-11.1	-11.1	-11.1	-11.1	-11.1	-10.6			Baseline Offset (In Feet)
	-0.3	0.0	-0.9	0.0	0.0	0.0	0.0	-0.5			Incremental Change
	-7.9	-7.9	-8.9	-8.8	-8.8	-8.8	-8.8	-9.4			Cumulative Change
3+95	-21.9	-21.9	-16.1	-16.1	-16.1	-16.1	-16.1	-14.1			Baseline Offset (In Feet)
	-0.5	0.0	-5.8	0.0	0.0	0.0	0.0	-2.0			Incremental Change
	-4.2	-4.2	-10.1	-10.0	-10.0	-10.0	-10.0	-12.0			Cumulative Change
4+00	-21.9	-21.9	-18.6	-18.6	-18.6	-18.6	-18.6	-15.9			Baseline Offset (In Feet)
	0.7	0.0	-3.3	0.0	0.0	0.0	0.0	-2.7			Incremental Change
	-8.0	-8.0	-11.3	-11.3	-11.3	-11.3	-11.3	-14.0			Cumulative Change

**Alpine CP 00
 HDD East Site
 Streambank Monitor**

Baseline Station	Streambank Monitor - Top of Bank Locations										Description
	See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations										
	6/19/2004	7/10/2005	8/21/2006	8/30/2007	8/6/2008	8/3/2009	7/20/2010	8/4/2011	Future	Future	Date
4+05	-19.5	-19.5	-21.7	-21.7	-21.7	-21.3	-21.3	-20.4			Baseline Offset (In Feet)
	0.0	0.0	2.2	0.0	0.0	-0.4	0.0	-0.9			Incremental Change
	-10.3	-10.3	-8.1	-8.1	-8.1	-8.5	-8.5	-9.4			Cumulative Change
4+15	2.6	2.6	2.7	2.7	2.5	2.5	2.5	2.5			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0			Incremental Change
	-33.3	-33.3	-33.4	-33.4	-33.2	-33.2	-33.2	-33.2			Cumulative Change
4+25	5.1	5.1	5.1	5.1	5.1	4.7	4.7	4.7			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0			Incremental Change
	-13.7	-13.7	-13.7	-13.7	-13.7	-13.3	-13.3	-13.3			Cumulative Change
4+35	4.5	4.5	4.5	4.5	4.5	4.9	4.9	5.0			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	-0.4	0.0	0.1			Incremental Change
	-10.0	-10.0	-10.1	-10.1	-10.1	-10.5	-10.5	-10.5			Cumulative Change
4+45	1.9	1.9	1.9	1.9	1.9	1.6	1.6	1.6			Baseline Offset (In Feet)
	-0.7	0.0	0.0	0.0	0.0	0.3	0.0	0.0			Incremental Change
	-7.0	-7.0	-7.0	-7.0	-7.0	-6.7	-6.7	-6.7			Cumulative Change
4+50	4.1	4.1	4.1	4.1	4.1	4.1	4.1	5.0			Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9			Incremental Change
	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-11.3			Cumulative Change

***Note: Field Survey dated 8/7/01 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

23 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section A								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+00	Tundra	17.9	18.0	18.0	17.8	17.8	17.8	17.8	17.7	Elevation (In Feet)
			0.1	0.0	-0.2	0.0	0.0	0.0	-0.1	Incremental Change
			0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.2	Cumulative Change
0+09	Tundra		17.9	18.0	17.8	17.8	17.8	17.8	17.7	Elevation (In Feet)
				0.1	-0.2	0.0	0.0	0.0	-0.1	Incremental Change
				0.1	-0.1	-0.1	-0.1	-0.1	-0.2	Cumulative Change
0+18	Tundra	17.6	17.6	17.5	17.3	17.5	17.4	17.4	17.2	Elevation (In Feet)
			0.0	-0.1	-0.2	0.2	-0.1	0.0	-0.2	Incremental Change
			0.0	-0.1	-0.3	-0.1	-0.2	-0.2	-0.4	Cumulative Change
0+21	Top Bank	16.8	16.7	16.7	16.6	16.5	16.8	16.8	16.4	Elevation (In Feet)
			-0.1	0.0	-0.1	-0.1	0.3	0.0	-0.4	Incremental Change
			-0.1	-0.1	-0.2	-0.3	0.0	0.0	-0.4	Cumulative Change
0+22.5	Gradebreak		15.4	15.4	14.9	14.8	14.8	14.8	14.8	Elevation (In Feet)
				0.0	-0.5	-0.1	0.0	0.0	0.0	Incremental Change
				0.0	-0.5	-0.6	-0.6	-0.6	-0.6	Cumulative Change
0+25	Toe Bank	13.6	14.1	13.9	13.6	13.6	13.7	13.7	13.0	Elevation (In Feet)
			0.5	-0.2	-0.3	0.0	0.1	0.0	-0.7	Incremental Change
			0.5	0.3	0.0	0.0	0.1	0.1	-0.6	Cumulative Change
0+27	CL Swale		13.3	13.5	13.3	12.5	13.1	13.1	11.7	Elevation (In Feet)
				0.2	-0.2	-0.8	0.6	0.0	-1.4	Incremental Change
				0.2	0.0	-0.8	-0.2	-0.2	-1.6	Cumulative Change
0+29	Toe Bank	13.3	13.6	13.5	13.5	14.2	14.5	14.5	13.9	Elevation (In Feet)
			0.3	-0.1	0.0	0.7	0.3	0.0	-0.6	Incremental Change
			0.3	0.2	0.2	0.9	1.2	1.2	0.6	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section A								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+34	Gradebreak		15.6	15.6	15.2	15.2	15.5	15.5	14.8	Elevation (In Feet)
				0.0	-0.4	0.0	0.3	0.0	-0.7	Incremental Change
				0.0	-0.4	-0.4	-0.1	-0.1	-0.8	Cumulative Change
0+35	Top Bank	17.6	17.6	17.6	17.4	17.4	17.4	17.4	17.6	Elevation (In Feet)
			0.0	0.0	-0.2	0.0	0.0	0.0	0.2	Incremental Change
			0.0	0.0	-0.2	-0.2	-0.2	-0.2	0.0	Cumulative Change
0+42	Tundra		18.3	18.4	18.1	18.1	18.1	18.1	18.0	Elevation (In Feet)
				0.1	-0.3	0.0	0.0	0.0	-0.1	Incremental Change
				0.1	-0.2	-0.2	-0.2	-0.2	-0.3	Cumulative Change
0+50	Tundra	18.0	18.0	18.1	17.9	17.8	17.8	17.8	17.7	Elevation (In Feet)
			0.0	0.1	-0.2	-0.1	0.0	0.0	-0.1	Incremental Change
			0.0	0.1	-0.1	-0.2	-0.2	-0.2	-0.3	Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

25 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section A								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+00	Tundra	17.7	17.9	18.0	17.3	17.3	17.2	17.1	17.1	Elevation (In Feet)
		-0.1	0.2	0.1	-0.7	0.0	-0.1	-0.1	0.0	Incremental Change
		-0.2	0.0	0.1	-0.6	-0.6	-0.7	-0.8	-0.8	Cumulative Change
0+09	Tundra	17.7	17.8	17.9	17.2	17.3	17.2	17.0	17.0	Elevation (In Feet)
		-0.1	0.1	0.1	-0.7	0.1	-0.1	-0.1	0.0	Incremental Change
		-0.2	-0.1	0.0	-0.7	-0.6	-0.8	-0.9	-0.9	Cumulative Change
0+18	Tundra	17.2	17.4	17.4	16.7	16.7	16.7	16.4	16.5	Elevation (In Feet)
		-0.2	0.2	0.0	-0.7	0.0	0.0	-0.3	0.1	Incremental Change
		-0.4	-0.2	-0.2	-0.9	-0.9	-0.9	-1.2	-1.1	Cumulative Change
0+21	Top Bank	16.4	16.6	16.6	15.8	15.9	15.8	15.3	15.4	Elevation (In Feet)
		-0.4	0.2	0.0	-0.8	0.1	-0.1	-0.5	0.1	Incremental Change
		-0.4	-0.2	-0.2	-1.0	-0.9	-1.0	-1.5	-1.4	Cumulative Change
0+22.5	Gradebreak	14.8	14.6	14.4	13.5	13.6	13.7	13.4	13.1	Elevation (In Feet)
		0.0	-0.2	-0.2	-0.9	0.1	0.2	-0.3	-0.3	Incremental Change
		-0.6	-0.8	-1.0	-1.9	-1.9	-1.7	-2.0	-2.3	Cumulative Change
0+25	Toe Bank	13.0	13.3	13.0	12.3	12.3	12.3	12.0	11.6	Elevation (In Feet)
		-0.7	0.3	-0.3	-0.7	0.0	0.0	-0.3	-0.4	Incremental Change
		-0.6	-0.3	-0.6	-1.3	-1.3	-1.3	-1.6	-2.1	Cumulative Change
0+27	CL Swale	11.7	12.2	12.8	12.3	12.0	12.1	11.9	11.3	Elevation (In Feet)
		-1.4	0.5	0.6	-0.5	-0.3	0.1	-0.2	-0.6	Incremental Change
		-1.6	-1.1	-0.5	-1.0	-1.3	-1.2	-1.4	-2.0	Cumulative Change
0+29	Toe Bank	13.9	14.1	14.0	13.4	13.5	13.3	13.3	13.1	Elevation (In Feet)
		-0.6	0.2	-0.1	-0.6	0.1	-0.2	0.0	-0.2	Incremental Change
		0.6	0.8	0.7	0.1	0.2	0.0	0.0	-0.2	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section A								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+34	Gradebreak	14.8	15.3	15.3	14.6	14.6	14.4	14.3	14.1	Elevation (In Feet)
		-0.7	0.5	0.0	-0.7	0.0	-0.2	-0.1	-0.2	Incremental Change
		-0.8	-0.3	-0.3	-1.0	-1.0	-1.2	-1.3	-1.5	Cumulative Change
0+35	Top Bank	17.6	17.2	17.2	16.5	16.5	16.3	16.3	16.3	Elevation (In Feet)
		0.2	-0.4	0.0	-0.7	0.0	-0.2	0.0	0.0	Incremental Change
		0.0	-0.4	-0.4	-1.1	-1.1	-1.3	-1.3	-1.3	Cumulative Change
0+42	Tundra	18.0	18.1	18.1	17.5	17.5	17.4	17.3	17.4	Elevation (In Feet)
		-0.1	0.1	0.0	-0.6	0.0	-0.1	-0.1	0.1	Incremental Change
		-0.3	-0.2	-0.2	-0.8	-0.8	-0.9	-1.0	-0.9	Cumulative Change
0+50	Tundra	17.7	17.8	17.8	17.1	17.1	16.9	16.6	16.7	Elevation (In Feet)
		-0.1	0.1	0.0	-0.7	-0.1	-0.2	-0.3	0.1	Incremental Change
		-0.3	-0.2	-0.2	-0.9	-0.9	-1.1	-1.4	-1.3	Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007										

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

27 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section B								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+00	Tundra	17.5	17.6	17.6	17.2	17.2	17.4	17.4	17.5	Elevation (In Feet)
			0.1	0.0	-0.4	0.0	0.2	0.0	0.1	Incremental Change
			0.1	0.1	-0.3	-0.3	-0.1	-0.1	0.0	Cumulative Change
0+10	Tundra		17.9	18.0	17.9	17.7	17.7	17.7	17.7	Elevation (In Feet)
				0.1	-0.1	-0.2	0.0	0.0	0.0	Incremental Change
				0.1	0.0	-0.2	-0.2	-0.2	-0.2	Cumulative Change
0+23	Tundra	17.5	17.6	17.6	17.3	17.3	17.4	17.4	17.3	Elevation (In Feet)
			0.1	0.0	-0.3	0.0	0.1	0.0	-0.1	Incremental Change
			0.1	0.1	-0.2	-0.2	-0.1	-0.1	-0.2	Cumulative Change
0+25	Top of Bank	17.2	17.0	17.2	17.0	16.0	16.0	16.0	15.9	Elevation (In Feet)
			-0.2	0.2	-0.2	-1.0	0.0	0.0	-0.1	Incremental Change
			-0.2	0.0	-0.2	-1.2	-1.2	-1.2	-1.3	Cumulative Change
0+27	Gradebreak		16.7	16.6	16.5	16.5	16.5	16.5	16.4	Elevation (In Feet)
				-0.1	-0.1	0.0	0.0	0.0	-0.1	Incremental Change
				-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	Cumulative Change
0+32	Toe Bank	14.2	14.5	14.4	14.6	14.1	14.5	14.5	14.5	Elevation (In Feet)
			0.3	-0.1	0.2	-0.5	0.4	0.0	0.0	Incremental Change
			0.3	0.2	0.4	-0.1	0.3	0.3	0.3	Cumulative Change
0+35	CL Swale		14.4	14.3	14.2	13.7	14.2	14.2	14.2	Elevation (In Feet)
				-0.1	-0.1	-0.5	0.5	0.0	0.0	Incremental Change
				-0.1	-0.2	-0.7	-0.2	-0.2	-0.2	Cumulative Change
0+37	Toe Bank	13.9	13.8	14.2	13.7	13.5	14.4	14.4	13.7	Elevation (In Feet)
			-0.1	0.4	-0.5	-0.2	0.9	0.0	-0.7	Incremental Change
			-0.1	0.3	-0.2	-0.4	0.5	0.5	-0.2	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section B								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+38	Gradebreak		15.2		15.0	14.9	14.9	14.9	14.9	Elevation (In Feet)
					-0.2	-0.1	0.0	0.0	0.0	Incremental Change
					-0.2	-0.3	-0.3	-0.3	-0.3	Cumulative Change
0+40	Gradebreak		14.5		14.2	14.0	15.4	15.4	15.4	Elevation (In Feet)
					-0.3	-0.2	1.4	0.0	0.0	Incremental Change
					-0.3	-0.5	0.9	0.9	0.9	Cumulative Change
0+42	Gradebreak		15.8	16.1	15.6	15.6	15.8	15.8	15.8	Elevation (In Feet)
				0.3	-0.5	0.0	0.2	0.0	0.0	Incremental Change
				0.3	-0.2	-0.2	0.0	0.0	0.0	Cumulative Change
0+49	Gradebreak	16.2	16.2	16.2	16.2	16.0	16.0	16.0	16.0	Elevation (In Feet)
			0.0	0.0	0.0	-0.2	0.0	0.0	0.0	Incremental Change
			0.0	0.0	0.0	-0.2	-0.2	-0.2	-0.2	Cumulative Change
0+52	Top Bank	17.3	17.7	17.6	17.8	17.6	17.7	17.7	17.6	Elevation (In Feet)
			0.4	-0.1	0.2	-0.2	0.1	0.0	-0.1	Incremental Change
			0.4	0.3	0.5	0.3	0.4	0.4	0.3	Cumulative Change
0+60	Tundra	17.8	17.8	17.8	17.6	17.7	17.7	17.7	17.6	Elevation (In Feet)
			0.0	0.0	-0.2	0.1	0.0	0.0	-0.1	Incremental Change
			0.0	0.0	-0.2	-0.1	-0.1	-0.1	-0.2	Cumulative Change

***Note: Baseline Stationing Runs from North to South along Cross-Sections.

28 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

29 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section B								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+00	Tundra	17.5	17.4	17.5	16.8	16.9	16.8	16.7	16.8	Elevation (In Feet)
		0.1	-0.1	0.1	-0.7	0.1	-0.1	-0.1	0.1	Incremental Change
		0.0	-0.1	0.0	-0.7	-0.6	-0.7	-0.8	-0.7	Cumulative Change
0+10	Tundra	17.7	17.7	17.8	17.1	17.1	16.9	16.9	17.0	Elevation (In Feet)
		0.0	0.0	0.1	-0.6	0.0	-0.1	0.0	0.1	Incremental Change
		-0.2	-0.2	-0.1	-0.8	-0.8	-1.0	-1.0	-0.9	Cumulative Change
0+23	Tundra	17.3	17.4	17.5	16.8	16.8	16.8	16.6	16.7	Elevation (In Feet)
		-0.1	0.1	0.1	-0.7	0.0	0.0	-0.1	0.1	Incremental Change
		-0.2	-0.1	0.0	-0.7	-0.7	-0.8	-0.9	-0.8	Cumulative Change
0+25	Top of Bank	15.9	16.0	16.1	15.4	15.4	15.3	15.0	15.1	Elevation (In Feet)
		-0.1	0.1	0.1	-0.7	0.0	-0.1	-0.3	0.1	Incremental Change
		-1.3	-1.2	-1.1	-1.8	-1.8	-1.9	-2.2	-2.1	Cumulative Change
0+27	Gradebreak	16.4	16.4	16.5	15.8	15.7	15.6	14.9	14.8	Elevation (In Feet)
		-0.1	0.0	0.1	-0.7	-0.1	-0.2	-0.7	-0.1	Incremental Change
		-0.3	-0.3	-0.2	-0.9	-1.0	-1.2	-1.8	-1.9	Cumulative Change
0+32	Toe Bank	14.5	14.7	14.6	13.9	13.9	13.8	13.6	12.8	Elevation (In Feet)
		0.0	0.2	-0.1	-0.7	0.0	-0.1	-0.2	-0.8	Incremental Change
		0.3	0.5	0.4	-0.3	-0.3	-0.4	-0.6	-1.4	Cumulative Change
0+35	CL Swale	14.2	14.6	14.6	13.9	13.9	13.7	13.4	13.8	Elevation (In Feet)
		0.0	0.4	0.0	-0.7	0.0	-0.2	-0.3	0.4	Incremental Change
		-0.2	0.2	0.2	-0.5	-0.5	-0.7	-1.0	-0.6	Cumulative Change
0+37	Toe Bank	13.7	14.4	14.5	13.5	13.8	13.4	13.3	13.1	Elevation (In Feet)
		-0.7	0.7	0.0	-0.9	0.3	-0.4	-0.1	-0.2	Incremental Change
		-0.2	0.5	0.5	-0.4	-0.1	-0.5	-0.6	-0.8	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section B								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+38	Gradebreak	14.9	15.0	15.1	14.4	14.5	14.4	14.2	14.2	Elevation (In Feet)
		0.0	0.1	0.1	-0.7	0.1	-0.1	-0.2	0.0	Incremental Change
		-0.3	-0.2	-0.1	-0.8	-0.7	-0.8	-1.0	-1.0	Cumulative Change
0+40	Gradebreak	15.4	15.5	15.5	14.9	14.9	13.8	13.6	13.7	Elevation (In Feet)
		0.0	0.1	0.0	-0.6	0.0	-1.0	-0.2	0.1	Incremental Change
		0.9	1.0	1.0	0.4	0.4	-0.7	-0.9	-0.8	Cumulative Change
0+42	Gradebreak	15.8	15.9	15.9	15.3	15.2	15.0	14.7	14.6	Elevation (In Feet)
		0.0	0.1	0.0	-0.6	-0.1	-0.3	-0.3	-0.1	Incremental Change
		0.0	0.1	0.1	-0.5	-0.6	-0.9	-1.1	-1.3	Cumulative Change
0+49	Gradebreak	16.0	16.2	16.2	15.6	15.6	15.6	15.4	15.5	Elevation (In Feet)
		0.0	0.2	0.0	-0.6	0.0	-0.1	-0.2	0.0	Incremental Change
		-0.2	0.0	0.0	-0.6	-0.6	-0.6	-0.8	-0.8	Cumulative Change
0+52	Top Bank	17.6	17.7	17.8	17.2	17.2	17.1	16.9	16.9	Elevation (In Feet)
		-0.1	0.1	0.1	-0.6	0.0	-0.1	-0.2	0.0	Incremental Change
		0.3	0.4	0.5	-0.1	-0.1	-0.2	-0.4	-0.4	Cumulative Change
0+60	Tundra	17.6	17.8	17.9	17.2	16.9	17.2	17.1	17.2	Elevation (In Feet)
		-0.1	0.2	0.1	-0.7	-0.3	0.3	-0.1	0.0	Incremental Change
		-0.2	0.0	0.1	-0.6	-0.9	-0.6	-0.7	-0.7	Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007										

30 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

31 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section C								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+00	Tundra	16.9	16.9	16.9	16.9	16.8	16.8	16.8	16.7	Elevation (In Feet)
			0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	Incremental Change
			0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.2	Cumulative Change
0+13	Tundra		16.8	16.7	16.7	16.6	16.7	16.7	16.6	Elevation (In Feet)
				-0.1	0.0	-0.1	0.1	0.0	-0.1	Incremental Change
				-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	Cumulative Change
0+27	Top Bank	17.0	17.0	16.8	16.8	16.8	16.8	16.8	16.8	Elevation (In Feet)
			0.0	-0.2	0.0	0.0	0.0	0.0	0.0	Incremental Change
			0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	Cumulative Change
0+29	Toe Bank	12.8	12.8	12.9	12.5	12.4	13.2	13.2	13.5	Elevation (In Feet)
			0.0	0.1	-0.4	-0.1	0.8	0.0	0.3	Incremental Change
			0.0	0.1	-0.3	-0.4	0.4	0.4	0.7	Cumulative Change
0+31	Toe Bank	13.9	13.6	13.9	13.6	13.4	13.6	13.6	13.5	Elevation (In Feet)
			-0.3	0.3	-0.3	-0.2	0.2	0.0	-0.1	Incremental Change
			-0.3	0.0	-0.3	-0.5	-0.3	-0.3	-0.4	Cumulative Change
0+32	Gradebreak	16.7	N/A	16.7	16.6	N/A	16.7	16.7	16.6	Elevation (In Feet)
				0.0	-0.1		0.1	0.0	-0.1	Incremental Change
				0.0	-0.1		0.0	0.0	-0.1	Cumulative Change
0+33	Top Bank	17.3	17.5	17.5	17.1	17.2	17.2	17.2	17.1	Elevation (In Feet)
			0.2	0.0	-0.4	0.1	0.0	0.0	-0.1	Incremental Change
			0.2	0.2	-0.2	-0.1	-0.1	-0.1	-0.2	Cumulative Change
0+42	Tundra		17.0	17.1	17.0	16.9	16.9	16.9	17.0	Elevation (In Feet)
				0.1	-0.1	-0.1	0.0	0.0	0.1	Incremental Change
				0.1	0.0	-0.1	-0.1	-0.1	0.0	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section C								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+50	Tundra	17.2	17.1	17.2	17.1	17.0	17.2	17.2	17.1	Elevation (In Feet)
			-0.1	0.1	-0.1	-0.1	0.2	0.0	-0.1	Incremental Change
			-0.1	0.0	-0.1	-0.2	0.0	0.0	-0.1	Cumulative Change
0+60	Tundra	N/A	N/A	N/A	17.8	N/A	N/A	N/A	N/A	Elevation (In Feet)
										Incremental Change
										Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										

32 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

33 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section C								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+00	Tundra	16.7	16.7	16.8	16.1	16.1	16.0	15.8	16.1	Elevation (In Feet)
		-0.1	0.0	0.1	-0.7	0.0	-0.1	-0.2	0.3	Incremental Change
		-0.2	-0.2	-0.1	-0.8	-0.8	-0.9	-1.1	-0.8	Cumulative Change
0+13	Tundra	16.6	16.7	16.8	16.1	16.2	16.0	15.9	16.0	Elevation (In Feet)
		-0.1	0.1	0.1	-0.7	0.0	-0.2	-0.1	0.1	Incremental Change
		-0.2	-0.1	0.0	-0.7	-0.7	-0.8	-0.9	-0.8	Cumulative Change
0+27	Top Bank	16.8	16.8	16.9	16.2	16.2	16.2	16.0	16.2	Elevation (In Feet)
		0.0	0.0	0.1	-0.7	0.0	0.0	-0.2	0.2	Incremental Change
		-0.2	-0.2	-0.1	-0.8	-0.8	-0.8	-1.0	-0.8	Cumulative Change
0+29	Toe Bank	13.5	13.7	13.8	13.2	13.5	13.4	13.1	13.3	Elevation (In Feet)
		0.3	0.2	0.1	-0.6	0.3	-0.1	-0.3	0.2	Incremental Change
		0.7	0.9	1.0	0.4	0.7	0.6	0.3	0.5	Cumulative Change
0+31	Toe Bank	13.5	13.6	13.9	13.2	13.3	13.2	13.0	12.8	Elevation (In Feet)
		-0.1	0.1	0.3	-0.7	0.1	-0.1	-0.2	-0.2	Incremental Change
		-0.4	-0.3	0.0	-0.7	-0.6	-0.7	-0.9	-1.1	Cumulative Change
0+32	Gradebreak	16.6	16.7	16.7	16.0	16.0	15.8	15.9	15.9	Elevation (In Feet)
		-0.1	0.1	0.0	-0.7	0.0	-0.2	0.1	-0.1	Incremental Change
		-0.1	0.0	0.0	-0.7	-0.7	-0.9	-0.8	-0.9	Cumulative Change
0+33	Top Bank	17.1	17.1	17.5	16.7	16.7	16.5	16.5	16.5	Elevation (In Feet)
		-0.1	0.0	0.4	-0.8	0.0	-0.1	0.0	0.0	Incremental Change
		-0.2	-0.2	0.2	-0.6	-0.6	-0.8	-0.8	-0.8	Cumulative Change
0+42	Tundra	17.0	17.0	17.1	16.5	16.7	16.5	16.3	16.5	Elevation (In Feet)
		0.1	0.0	0.1	-0.6	0.2	-0.2	-0.1	0.2	Incremental Change
		0.0	0.0	0.1	-0.5	-0.3	-0.6	-0.7	-0.5	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section C								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+50	Tundra	17.1	17.2	17.3	16.7	16.8	16.6	16.5	16.7	Elevation (In Feet)
		-0.1	0.1	0.1	-0.6	0.1	-0.1	-0.1	0.2	Incremental Change
		-0.1	0.0	0.1	-0.5	-0.4	-0.6	-0.7	-0.5	Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007										

34 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

35 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section D								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+00	Tundra	17.6	17.6	17.6	17.6	17.3	17.5	17.5	17.5	Elevation (In Feet)
			0.0	0.0	0.0	-0.3	0.2	0.0	0.0	Incremental Change
			0.0	0.0	0.0	-0.3	-0.1	-0.1	-0.1	Cumulative Change
0+10	Tundra		17.7	17.9	17.9	17.6	17.6	17.6	17.6	Elevation (In Feet)
				0.2	0.0	-0.3	0.0	0.0	0.0	Incremental Change
				0.2	0.2	-0.1	-0.1	-0.1	-0.1	Cumulative Change
0+20	Gradebreak		17.4	17.6	17.5	16.6	NA	NA	NA	Elevation (In Feet)
				0.2	-0.1	-0.9				Incremental Change
				0.2	0.1	-0.8				Cumulative Change
0+22	Top Bank		16.8	16.7	16.8	16.6	16.8	16.8	16.8	Elevation (In Feet)
				-0.1	0.1	-0.2	0.2	0.0	0.0	Incremental Change
				-0.1	0.0	-0.2	0.0	0.0	0.0	Cumulative Change
0+24	Toe Bank	14.7	14.6	14.7	14.8	14.3	14.8	14.8	14.8	Elevation (In Feet)
			-0.1	0.1	0.1	-0.5	0.5	0.0	0.0	Incremental Change
			-0.1	0.0	0.1	-0.4	0.1	0.1	0.1	Cumulative Change
0+25	CL Swale		14.1	14.2	14.1	13.7	14.1	14.1	14.1	Elevation (In Feet)
				0.1	-0.1	-0.4	0.4	0.0	0.0	Incremental Change
				0.1	0.0	-0.4	0.0	0.0	0.0	Cumulative Change
0+27	Toe Bank	14.4	14.6	14.6	14.3	14.0	14.2	14.2	14.2	Elevation (In Feet)
			0.2	0.0	-0.3	-0.3	0.2	0.0	0.0	Incremental Change
			0.2	0.2	-0.1	-0.4	-0.2	-0.2	-0.2	Cumulative Change
0+29	Top Bank	17.3	17.3	17.4	17.1	16.9	17.1	17.1	17.0	Elevation (In Feet)
				0.1	-0.3	-0.2	0.2	0.0	-0.1	Incremental Change
				0.1	-0.2	-0.4	-0.2	-0.2	-0.3	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section D								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		8/15/2001	8/23/2001	9/8/2001	7/9/2002	9/14/2002	7/9/2003	9/8/2003	7/9/2004	Date
0+38	Tundra		17.6	17.7	17.5	17.3	17.3	17.3	17.2	Elevation (In Feet)
				0.1	-0.2	-0.2	0.0	0.0	-0.1	Incremental Change
				0.1	-0.1	-0.3	-0.3	-0.3	-0.4	Cumulative Change
0+50	Tundra	17.7	17.6	17.6	17.5	17.3	16.8	16.8	17.4	Elevation (In Feet)
			-0.1	0.0	-0.1	-0.2	-0.5	0.0	0.6	Incremental Change
			-0.1	-0.1	-0.2	-0.4	-0.9	-0.9	-0.3	Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										

36 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

37 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section D								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+00	Tundra	17.5	17.4	17.5	16.8	16.9	16.6	16.5	16.6	Elevation (In Feet)
		0.0	-0.1	0.1	-0.7	0.1	-0.4	-0.1	0.1	Incremental Change
		-0.1	-0.2	-0.1	-0.8	-0.4	-0.9	-1.0	-0.9	Cumulative Change
0+10	Tundra	17.6	17.6	17.6	16.9	16.9	16.9	16.7	16.9	Elevation (In Feet)
		0.0	0.0	0.0	-0.7	0.0	0.0	-0.2	0.2	Incremental Change
		-0.1	-0.3	-0.3	-0.7	-0.7	-0.7	-0.9	-0.8	Cumulative Change
0+20	Gradebreak	N/A	17.2	17.2	16.4	16.5	16.0	15.9	15.8	Elevation (In Feet)
		N/A	0.6	-0.1	-0.8	0.1	-0.5	-0.1	-0.1	Incremental Change
		-0.8	-0.2	-0.5	-1.1	-0.9	-1.4	-1.7	-1.7	Cumulative Change
0+22	Top Bank	16.8	16.5	16.5	15.7	15.7	14.9	14.9	14.8	Elevation (In Feet)
		0.0	-0.3	-0.1	-0.8	0.0	-0.8	0.0	-0.1	Incremental Change
		0.0	-0.2	-0.4	-0.9	-1.1	-1.9	-1.9	-2.0	Cumulative Change
0+24	Toe Bank	14.8	13.9	14.9	14.2	14.5	14.2	13.9	14.3	Elevation (In Feet)
		0.0	-0.9	1.0	-0.7	0.3	-0.3	-0.3	0.4	Incremental Change
		0.1	-0.7	0.2	-0.6	0.2	-0.6	-0.9	-0.5	Cumulative Change
0+25	CL Swale	14.1	13.7	14.0	13.4	13.9	13.6	13.9	13.4	Elevation (In Feet)
		0.0	-0.4	0.3	-0.6	0.4	-0.3	0.3	-0.5	Incremental Change
		0.0	-0.5	-0.1	-0.3	-0.3	-0.5	-0.2	-0.7	Cumulative Change
0+27	Toe Bank	14.2	16.2	16.5	15.8	15.8	15.6	15.5	15.3	Elevation (In Feet)
		0.0	2.0	0.3	-0.7	0.0	-0.1	-0.1	-0.2	Incremental Change
		-0.2	1.6	1.9	1.5	1.8	1.4	1.3	1.1	Cumulative Change
0+29	Top Bank	17.0	17.0	17.0	16.4	16.5	15.9	15.8	15.8	Elevation (In Feet)
		-0.1	0.0	0.0	-0.6	0.1	-0.5	-0.1	0.0	Incremental Change
		-0.3	-0.3	-0.4	-0.7	-0.4	-1.2	-1.3	-1.2	Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section D								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Date
0+38	Tundra	17.2	17.2	17.1	16.4	16.4	14.8	14.7	14.8	Elevation (In Feet)
		-0.1	0.0	-0.1	-0.7	0.0	-1.6	-0.1	0.1	Incremental Change
		-0.4	-0.5	-0.4	-0.9	-0.9	-2.5	-2.5	-2.4	Cumulative Change
0+50	Tundra	17.4	17.4	17.4	16.7	16.8	14.9	14.7	14.7	Elevation (In Feet)
		0.6	0.0	0.0	-0.7	0.1	-1.9	-0.2	0.0	Incremental Change
		-0.3	-0.2	-0.2	-0.8	-0.5	-1.9	-2.1	-2.7	Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007										

38 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

39 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section E										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+00	Tundra	17.5	17.5	17.4	17.5	16.8	16.8	16.8	16.6	16.6		Elevation (In Feet)
			0.0	-0.1	0.1	-0.7	0.0	-0.1	-0.2	0.0		Incremental Change
			0.0	-0.1	0.0	-0.7	-0.7	-0.7	-0.9	-0.9		Cumulative Change
0+9	Tundra	17.3	17.3	17.3	17.8	17.1	N/A	N/A	N/A	N/A		Elevation (In Feet)
			0.0	0.0	0.5	-0.7						Incremental Change
			0.0	0.0	0.5	-0.2						Cumulative Change
0+12	Gradebreak	17.8	17.8	17.4	17.9	17.2	17.3	17.1	17.1	17.2		Elevation (In Feet)
			0.0	-0.4	0.5	-0.7	0.1	-0.1	0.0	0.1		Incremental Change
			0.0	-0.4	0.1	-0.6	-0.6	-0.7	-0.7	-0.6		Cumulative Change
0+20	Top Bank	17.3	17.3	17.3	17.3	16.2	15.8	15.8	15.5	15.2		Elevation (In Feet)
			0.0	0.0	0.0	-1.1	-0.4	0.0	-0.3	-0.3		Incremental Change
			0.0	0.0	0.0	-1.1	-1.5	-1.5	-1.8	-2.1		Cumulative Change
0+21	Toe Bank	16.5	16.5	16.5	16.2	14.8	14.3	13.4	15.0	13.1		Elevation (In Feet)
			0.0	0.0	-0.3	-1.4	-0.5	-0.9	1.6	-1.9		Incremental Change
			0.0	0.0	-0.3	-1.7	-2.2	-3.1	-1.5	-3.4		Cumulative Change
0+23	CL Swale	16.0	16.0	16.0	14.7	13.8	13.2	13.0	12.7	12.8		Elevation (In Feet)
			0.0	0.0	-1.3	-0.9	-0.6	-0.2	-0.3	0.1		Incremental Change
			0.0	0.0	-1.3	-2.2	-2.8	-3.0	-3.3	-3.3		Cumulative Change
0+24	Toe Bank	16.2	16.4	16.3	14.8	13.1	13.8	13.1	13.1	13.1		Elevation (In Feet)
			0.2	-0.1	-1.5	-1.7	0.7	-0.7	0.0	0.0		Incremental Change
			0.2	0.1	-1.4	-3.1	-2.4	-3.1	-3.1	-3.1		Cumulative Change
0+27	Top Bank	17.3	17.4	17.4	16.3	14.5	14.5	14.3	14.2	14.4		Elevation (In Feet)
			0.1	0.0	-1.2	-1.8	0.0	-0.2	-0.1	0.2		Incremental Change
			0.1	0.1	-1.1	-2.8	-2.8	-3.0	-3.1	-2.9		Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline	Point	Subsidence Monitor - Cross-Section E										Description
Station	Description	See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+38	Tundra	17.4	17.4	17.5	17.5	16.8	16.8	16.7	16.7	16.8		Elevation (In Feet)
			0.0	0.1	0.0	-0.7	0.0	-0.1	0.0	0.1		Incremental Change
			0.0	0.1	0.1	-0.6	-0.6	-0.7	-0.7	-0.6		Cumulative Change
0+49	Tundra	17.4	17.4	17.4	17.4	16.7	16.8	16.7	16.6	16.9		Elevation (In Feet)
			0.0	0.0	0.0	-0.7	0.1	-0.1	0.0	0.3		Incremental Change
			0.0	0.0	0.0	-0.7	-0.6	-0.8	-0.8	-0.5		Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.												
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007												

40 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

41 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section F										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+00	Tundra	17.9	17.9	18.2	18.3	17.7	17.7	17.3	17.3	17.3		Elevation (In Feet)
			0.0	0.3	0.1	-0.6	0.0	-0.4	0.0	0.0		Incremental Change
			0.0	0.3	0.4	-0.2	-0.2	-0.6	-0.6	-0.6		Cumulative Change
0+10	Tundra	17.3	17.2	17.2	17.3	16.6	16.6	16.6	16.6	16.6		Elevation (In Feet)
			-0.1	0.0	0.1	-0.7	0.0	0.0	0.0	0.0		Incremental Change
			-0.1	-0.1	0.0	-0.7	-0.7	-0.7	-0.7	-0.7		Cumulative Change
0+14	Gradebreak	18.0	18.0	18.0	18.0	16.6	N/A	N/A	N/A	N/A		Elevation (In Feet)
			0.0	0.0	0.0	-1.4						Incremental Change
			0.0	0.0	0.0	-1.4						Cumulative Change
0+20	Top Bank	17.5	17.5	17.6	17.6	16.6	16.6	16.4	16.3	16.1		Elevation (In Feet)
			0.0	0.1	0.0	-1.0	0.0	-0.2	-0.1	-0.2		Incremental Change
			0.0	0.1	0.1	-0.9	-0.9	-1.1	-1.2	-1.4		Cumulative Change
0+21	Toe Bank	16.5	16.3	16.3	16.0	15.1	15.0	14.7	14.4	14.3		Elevation (In Feet)
			-0.2	0.0	-0.3	-0.9	-0.1	-0.3	-0.3	-0.2		Incremental Change
			-0.2	-0.2	-0.5	-1.4	-1.5	-1.8	-2.1	-2.3		Cumulative Change
0+24	CL Swale	15.0	12.5	15.0	13.8	13.4	13.7	13.7	13.4	13.4		Elevation (In Feet)
			-2.5	2.5	-1.2	-0.4	0.3	0.0	-0.3	0.0		Incremental Change
			-2.5	0.0	-1.2	-1.6	-1.4	-1.4	-1.6	-1.6		Cumulative Change
0+26	Toe Bank	16.1	12.5	13.1	13.6	15.2	13.6	15.8	13.5	13.3		Elevation (In Feet)
			-3.6	0.6	0.5	1.6	-1.6	2.2	-2.3	-0.2		Incremental Change
			-3.6	-3.0	-2.5	-0.9	-2.5	-0.3	-2.6	-2.8		Cumulative Change
0+28	Top Bank	17.8	17.9	17.9	17.3	16.4	16.1	16.2	15.6	15.6		Elevation (In Feet)
			0.1	0.0	-0.6	-0.9	-0.3	0.1	-0.6	0.0		Incremental Change
			0.1	0.1	-0.5	-1.4	-1.7	-1.6	-2.2	-2.2		Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section F										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+34	Gradebreak	17.9	17.9	18.0	18.0	17.4	17.5	17.4	17.3	17.4		Elevation (In Feet)
			0.0	0.1	0.0	-0.6	0.1	-0.1	-0.1	0.1		Incremental Change
			0.0	0.1	0.1	-0.5	-0.4	-0.5	-0.6	-0.5		Cumulative Change
0+43	Gradebreak	17.2	17.3	17.2	17.4	16.8	16.8	16.7	16.7	16.8		Elevation (In Feet)
			0.1	-0.1	0.2	-0.6	0.0	-0.1	0.0	0.1		Incremental Change
			0.1	0.0	0.2	-0.4	-0.4	-0.5	-0.5	-0.4		Cumulative Change
0+46	Gradebreak	17.8	17.8	17.8	17.6	17.0	N/A	N/A	N/A	N/A		Elevation (In Feet)
			0.0	0.0	-0.2	-0.6						Incremental Change
			0.0	0.0	-0.2	-0.8						Cumulative Change
0+52	Tundra	17.8	17.9	17.9	18.0	17.3	17.4	17.3	17.1	17.1		Elevation (In Feet)
			0.1	0.0	0.1	-0.7	0.1	-0.1	-0.2	0.0		Incremental Change
			0.1	0.1	0.2	-0.5	-0.4	-0.5	-0.7	-0.7		Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.												
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007												

42 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section G										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+00	Tundra	17.1	17.3	17.4	17.5	16.8	16.9	16.4	16.3	16.5		Elevation (In Feet)
			0.2	0.1	0.1	-0.7	0.1	-0.5	-0.1	0.2		Incremental Change
			0.2	0.3	0.4	-0.3	-0.2	-0.7	-0.8	-0.6		Cumulative Change
0+09	Tundra	17.2	17.1	17.2	17.3	16.6	16.9	16.5	16.4	16.4		Elevation (In Feet)
			-0.1	0.1	0.1	-0.7	0.3	-0.4	-0.1	0.0		Incremental Change
			-0.1	0.0	0.1	-0.6	-0.3	-0.7	-0.8	-0.8		Cumulative Change
0+16	Gradebreak	17.9	17.9	17.9	17.5	16.8	N/A	N/A	N/A	N/A		Elevation (In Feet)
			0.0	0.0	-0.4	-0.7						Incremental Change
			0.0	0.0	-0.4	-1.1						Cumulative Change
0+22	Top Bank	17.6	17.7	17.7	17.8	17.0	17.1	16.9	16.9	16.9		Elevation (In Feet)
			0.1	0.0	0.1	-0.8	0.1	-0.1	0.0	0.0		Incremental Change
			0.1	0.1	0.1	-0.6	-0.5	-0.7	-0.7	-0.7		Cumulative Change
0+24	Toe Bank	16.9	17.0	17.0	17.0	16.2	16.3	16.2	16.3	16.4		Elevation (In Feet)
			0.1	0.0	0.0	-0.8	0.1	0.0	0.1	0.1		Incremental Change
			0.1	0.1	0.1	-0.7	-0.6	-0.7	-0.6	-0.5		Cumulative Change
0+26	CL Swale	16.5	16.5	16.5	16.5	16.3	16.1	16.0	16.0	15.9		Elevation (In Feet)
			0.0	0.0	0.0	-0.2	-0.2	-0.1	0.0	-0.1		Incremental Change
			0.0	0.0	0.0	-0.2	-0.4	-0.5	-0.5	-0.6		Cumulative Change
0+28	Toe Bank	16.8	16.7	16.9	16.9	16.3	16.3	16.3	16.1	16.3		Elevation (In Feet)
			-0.1	0.2	0.0	-0.6	-0.1	0.0	-0.2	0.2		Incremental Change
			-0.1	0.1	0.1	-0.5	-0.6	-0.5	-0.7	-0.5		Cumulative Change
0+30	Top Bank	17.7	17.8	17.8	17.9	17.3	17.3	17.2	17.1	17.3		Elevation (In Feet)
			0.1	0.0	0.1	-0.6	0.0	-0.1	-0.1	0.2		Incremental Change
			0.1	0.1	0.2	-0.4	-0.4	-0.5	-0.6	-0.4		Cumulative Change

123744-WB-CP-1-001

Appendix C

43 of 46

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section G										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+37	Tundra	17.6	17.6	17.6	17.7	17.0	17.3	17.1	16.9	17.1		Elevation (In Feet)
			0.0	0.0	0.1	-0.7	0.3	-0.2	-0.2	0.2		Incremental Change
			0.0	0.0	0.1	-0.6	-0.3	-0.6	-0.7	-0.5		Cumulative Change
0+46	Tundra	17.3	17.3	17.3	17.4	16.8	16.8	16.7	16.6	16.7		Elevation (In Feet)
			0.0	0.0	0.1	-0.6	0.0	-0.1	-0.1	0.1		Incremental Change
			0.0	0.0	0.1	-0.5	-0.5	-0.6	-0.7	-0.6		Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.												
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007.												

44 of 46

Appendix C

123744-MBJ-RPT-001

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

123744-MBU-RPT-001

Appendix C

45 of 46

Baseline Station	Point Description	Subsidence Monitor - Cross-Section H										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+00	Tundra	17.0	16.8	16.6	16.7	16.0	16.0	16.1	15.9	16.1		Elevation (In Feet)
			-0.2	-0.2	0.1	-0.7	0.0	0.1	-0.2	0.2		Incremental Change
			-0.2	-0.4	-0.3	-1.0	-1.0	-0.9	-1.1	-0.9		Cumulative Change
0+09	Tundra	17.1	16.9	16.9	17.0	16.4	16.5	16.3	16.2	16.3		Elevation (In Feet)
			-0.2	0.0	0.1	-0.6	0.1	-0.1	-0.1	0.1		Incremental Change
			-0.2	-0.2	-0.1	-0.7	-0.7	-0.8	-0.9	-0.8		Cumulative Change
0+18	Gradebreak	17.8	17.8	17.8	17.3	16.6	N/A	N/A	N/A	N/A		Elevation (In Feet)
			0.0	0.0	-0.5	-0.7						Incremental Change
			0.0	0.0	-0.5	-1.2						Cumulative Change
0+24	Top Bank	17.3	17.4	17.4	17.5	16.8	16.8	16.7	16.6	16.4		Elevation (In Feet)
			0.1	0.0	0.1	-0.6	0.0	-0.1	-0.1	-0.2		Incremental Change
			0.1	0.1	0.1	-0.5	-0.5	-0.6	-0.7	-0.9		Cumulative Change
0+25	Toe Bank	16.8	16.4	16.6	16.6	15.9	15.9	15.7	15.3	15.1		Elevation (In Feet)
			-0.4	0.2	0.0	-0.7	0.0	-0.3	-0.4	-0.2		Incremental Change
			-0.4	-0.2	-0.2	-0.9	-0.9	-1.1	-1.5	-1.7		Cumulative Change
0+28	CL Swale	16.3	16.3	16.3	16.3	15.8	15.6	15.5	15.0	14.8		Elevation (In Feet)
			0.0	0.0	0.0	-0.5	-0.3	-0.1	-0.5	-0.2		Incremental Change
			0.0	0.0	0.0	-0.5	-0.8	-0.8	-1.3	-1.5		Cumulative Change
0+30	Toe Bank	16.6	16.6	16.4	16.5	15.8	15.9	15.9	15.5	15.2		Elevation (In Feet)
			0.0	-0.2	0.1	-0.7	0.1	0.0	-0.4	-0.3		Incremental Change
			0.0	-0.2	-0.1	-0.8	-0.7	-0.7	-1.1	-1.4		Cumulative Change
0+32	Top Bank	17.6	17.7	17.6	17.6	16.9	17.0	16.8	16.8	16.5		Elevation (In Feet)
			0.1	-0.1	0.0	-0.7	0.1	-0.2	0.0	-0.4		Incremental Change
			0.1	0.0	0.0	-0.7	-0.6	-0.8	-0.8	-1.2		Cumulative Change

**Alpine CP 00
 HDD East Site
 Subsidence Monitor - Seawater Line**

Baseline Station	Point Description	Subsidence Monitor - Cross-Section H										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		9/8/2003	7/9/2004	7/28/2005	8/21/2006	8/30/2007	8/7/2008	8/3/2009	7/19/2010	8/4/2011	Future	Date
0+40	Gradebreak	18.2	18.2	18.2	18.3	17.6	17.7	17.6	17.5	17.6		Elevation (In Feet)
			0.0	0.0	0.1	-0.7	0.1	-0.1	-0.1	0.1		Incremental Change
			0.0	0.0	0.1	-0.6	-0.5	-0.6	-0.7	-0.6		Cumulative Change
0+42	Gradebreak	17.7	17.7	17.8	17.9	17.2	N/A	N/A	N/A	N/A		Elevation (In Feet)
			0.0	0.1	0.1	-0.7						Incremental Change
			0.0	0.1	0.2	-0.5						Cumulative Change
0+50	Tundra	17.2	17.2	17.3	17.4	16.7	16.7	16.7	16.7	16.7		Elevation (In Feet)
			0.0	0.1	0.1	-0.7	0.0	0.0	0.0	0.0		Incremental Change
			0.0	0.1	0.2	-0.5	-0.5	-0.5	-0.5	-0.5		Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.												
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflect Actual Elevation per Differential Levels from CD-1, ran August 2007												

46 of 46

Appendix C

123744-MBJ-RPT-001