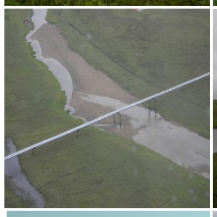
2012

2012 Alpine Pipeline River Crossing Monitoring

128228-MBJ-RPT-001

FINAL



Prepared for

ConocoPhillips Alaska, Inc.

Michael Baker Jr., Inc.

December 4, 2012

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Acronyms and Abbreviations

Baker	Michael Baker Jr., Inc.
BPMSL	British Petroleum Mean Sea Level
CPAI	ConocoPhillips Alaska, Inc.
ft/ft	feet per vertical foot
ft/yr	feet per year
HDD	Horizontal directional drilled
LCMF	UMIAQ, LLC
NPS	Nominal Pipe Size
VSM	Vertical Support Member(s)

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1.0 Introduction

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 horizontal directionally drilled (HDD) crossing of the Colville River East Channel; and the above ground crossings of the Kachemach River and the Miluveach River.

Monitoring of the pipeline crossings is required by the Right-of-Way Lease/Grant Stipulations and the ConocoPhillips Alaska, Inc. (CPAI) Alpine Surveillance and Monitoring Program. It is conducted to document the condition of the pipeline and the pipeline's effect on channel morphology at each river crossing. The record of monitoring allows for an annual comparison between observed conditions and the design criteria.

Michael Baker Jr., Inc. (Baker) conducted initial monitoring of the HDD crossing of the Colville River East Channel in 2001. Annual monitoring of this crossing has been performed since 2003. Bank migration surveys have been conducted annually by UMIAQ, LLC (LCMF) since 2003 and pile cap elevation surveys since 2004. (Baker 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011)

Initial monitoring of the Kachemach River and Miluveach River pipeline crossings was conducted in 2003. Annual monitoring was performed in 2004, 2005, and 2006; bank migration and pile cap elevation surveys were performed by LCMF. Over these four years of monitoring, no significant scour, erosion, or vertical support member (VSM) tilt were observed at these locations. In the fall of 2006, a five-year monitoring interval was recommended. Baker did not conduct pipeline crossing monitoring at the Kachemach or Miluveach sites in 2007; monitoring resumed at these locations in 2008. Annual monitoring has continued at the Kachemach and Miluveach Rivers since 2009. LCMF conducted surveys at the Kachemach and Miluveach river crossing sites in 2002 through 2008 and in 2012. The surveys are planned to be conducted again during the 2017 monitoring program. (Baker 2003b, 2004, 2005, 2006, 2008, 2009, 2010, 2011)

Baker conducted the 2012 Alpine Pipeline river crossing monitoring. The 2012 monitoring activities included visual observations at the three crossings and LCMF bank erosion and pile cap elevation surveys at each of the four monitoring locations. Figure 1 illustrates the locations of the monitoring sites.

1.1 2012 Monitoring Criteria

1.1.1 Data Collection

The following data were collected in 2012:

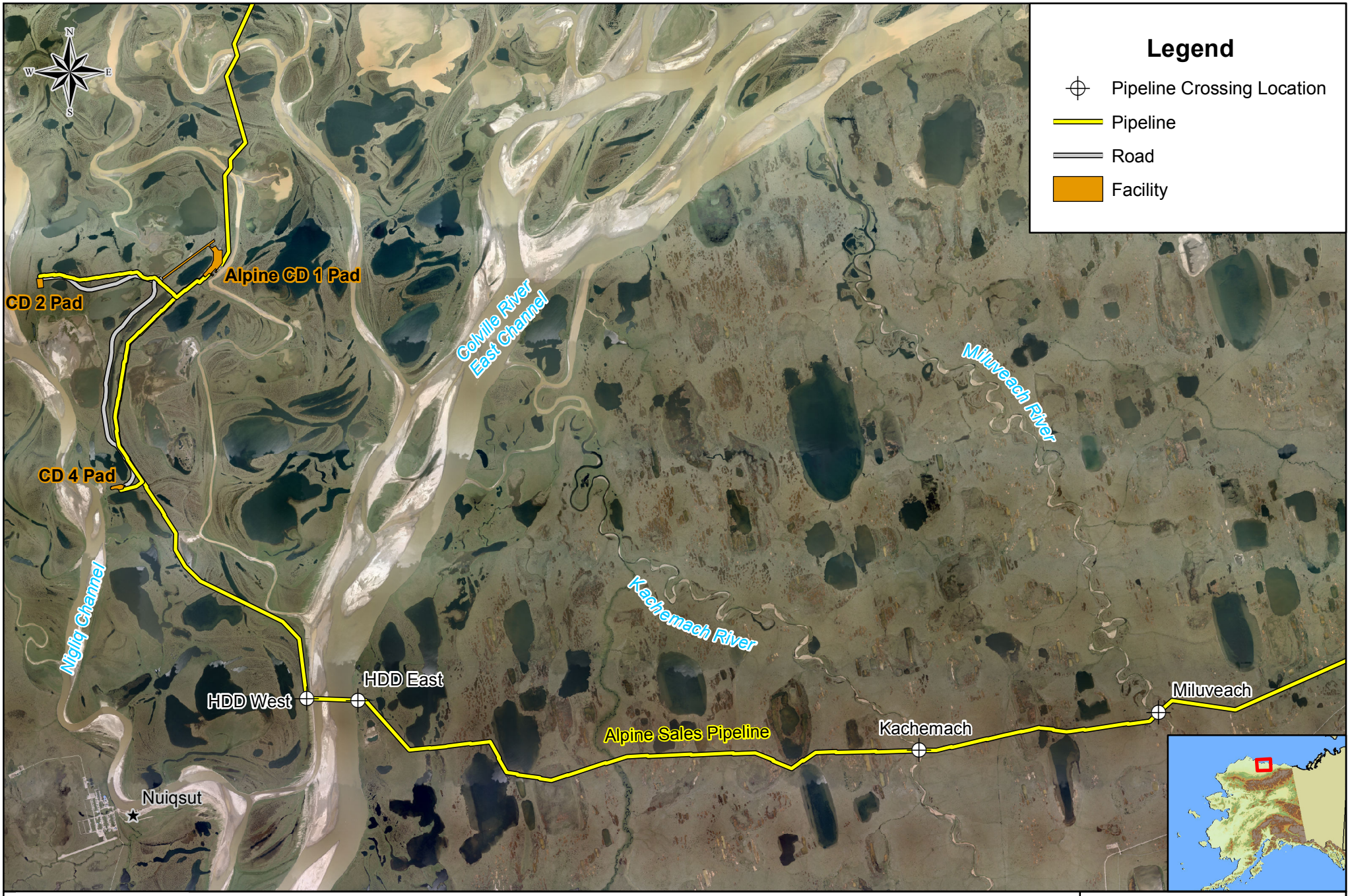
- Photographs of each crossing location
- Evaluation of the condition of VSM, including measured tilt and observable settling, scouring, or jacking with particular attention paid to the following:
    - Miluveach River – VSM Nos. 2047 A/B and 2048 A/B and other VSM within 15 feet of the channel
    - 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 (NPS) 14 oil pipeline
- Survey of the top and bottom bank elevations and identification of locations of bank caving at the HDD crossing (LCMF)
- Topographic survey from the Colville River bank to the HDD east pad to document bank and ground stability (LCMF)
- 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
    - Gullying that threatened the buried pipeline at the HDD crossing
- Soil pressure ridges parallel to the pipe axis exceeding 1 foot in height and 60 feet in length
- Ponding extending over the pipe axis deeper than 1 foot and more than 100 feet in length
- Soil disturbances located within 10 feet of the pipeline centerlines at least 10 feet in length with vertical displacement exceeding 6 inches, or wider than 2 inches parallel to the pipe axis and longer than 60 feet
- Depressions occurring longitudinally over the pipe axis deeper than 1 foot and more than 100 feet in length
- Evidence of potential 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)



ConocoPhillips Alaska

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Drawn:	BTG	File:	Figure 1
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Baker

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2012 Alpine Pipeline

River Crossing

Monitoring Sites

FIGURE: 1

(SHEET 1 of 1)

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2.0 Methods

Observations and photographs were collected at the pipeline crossing locations on the Kachemach River, Miluveach River, and HDD crossing of the Colville River East Channel during the 2012 spring breakup field work. On August 10, 2012, 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 surveyed the local topography at the HDD crossing in July 2012. LCMF 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 survey control points serve as the origin for the baseline stationing, beginning at 100 feet from the pipeline 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 2003a).

The banks of the Kachemach and Miluveach rivers are surveyed on a 5-year basis. Arbitrary control points serve as the origin for the baseline stationing and establish a means of comparing measurements. The control points range from 50 feet to 300 feet from the pipeline along each bank. The survey results are included in Appendix D and Appendix E, respectively. Design setbacks for the Kachemach River allow for 25 feet of bank migration on either bank, and setbacks for the Miluveach River allow for 35 feet of bank migration on either bank (Baker 2003c). 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 pipeline (north [N]/south [S]) and parallel to the pipeline (east [E]/west [W]). 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 0.015 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 are provided in Table 1**.**

The 2010 CPAI North Slope Foundation Design Specification (CPAI 2010) states that under sustained loads, “deflection of the new single piles and VSM pipe supports shall be limited to $\Delta v/l = 0.015$ and Δv = 1-inch max.” Based on these VSM specifications and for comparison purposes, the plumb (tilt) tolerance was accepted to be 0.015 ft/ft. Bold values in Table 1 indicate the VSM tilt tolerance for the purpose of this study.

Table 1 VSM Tilt Unit Conversion (rounded to nearest thousandth)

	Inches deflection per 10 feet	ft/ft	Slope
	1/8	0.001	1:1000
	1/4	0.002	1:500
	1/2	0.004	1:250
	3/4	0.006	1:160
	1	0.008	1:125
	1-1/4	0.010	1:100
	1-1/2	0.013	1:77
Project tolerance	***1-3/4***	***0.015***	***1:66.6***
	2	0.017	1:58

VSM are considered plumb when measured tilt is within the project tolerance adjusted by the accuracy of the survey method, or 0.016 ft/ft.

2.3 VSM Scour

Streambed scour in the Miluveach and Kachemach rivers was evaluated using visual methods at each in-stream VSM. Scour is measured either at the VSM, or if a casing is present, at the outside of the casing. As presented in the *Mechanical Analysis of Aboveground Pipeline and Aboveground River Crossings* (Baker 2003c), 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 and anticipated channel scour. Elevations for scour holes at the Kachemach and Miluveach crossings are provided in Appendix D and Appendix E, respectively.

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 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 from CD1 (Alpine) in August 2007. According to LCMF, 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 2012 Results

3.1 HDD West Bank

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

The 2012 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 Section 3.1.1. One distinct debris line composed of sticks and small pieces of drift wood was observed on the bank of the HDD West pipeline crossing. This debris line was noted approximately 25 feet east of the bottom toe of the bank, between the toe of the bank and the current edge of water.

3.1.1 Bank and Pad Erosion (HDD West)

The greatest bank erosion observed between the 2011 and 2012 pipeline monitoring events was 5.4 feet, occurring at Station 3+15 approximately 65 feet downstream (north) of the oil pipeline centerline as identified on the LCMF topographic survey. The oil pipeline centerline is located at Station (STA) 2+50 on the topographic survey (Appendix B).

A maximum cumulative erosion of 18.8 feet, between April 2002 and August 2012, was measured along the top of the bank at Station 3+70 located 120 feet north of the oil pipeline centerline (STA 2+50). The 2012 erosion value yields a maximum average rate of 1.8 feet per year (ft/yr) at this location over the monitoring period. This is a decrease in the average erosion rate of 2.0 ft/yr in 2011.

The average rate of erosion for the 2011-2012 monitoring period along the 440-foot top of bank was measured to be 0.07 ft/yr. This is less than the observed historic average rate of 0.39 ft/yr, and less than the estimated maximum erosion rate used for design of 2.3 ft/yr (Baker 2003a). A graphic and tabular summary of the LCMF survey results for the HDD West crossing is presented in Appendix B.

In 1997, Baker established a survey control point at the centerline of the NPS 14 oil pipeline, as shown on HDD Bank Monitoring HDD Site-West and provided in Appendix B. Comparing the location of the 1997 survey control point to the 2012 LCMF survey data, approximately 9.0 feet of bank erosion has occurred over the 15-year period since 1997 (0.60 ft/yr). No significant erosion occurred at this location between 2011 and 2012. This bank erosion comprises approximately 9% 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 2003c).

Based on visual observations, bank erosion between 2011 and 2012 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. All six VSM 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 (2012)

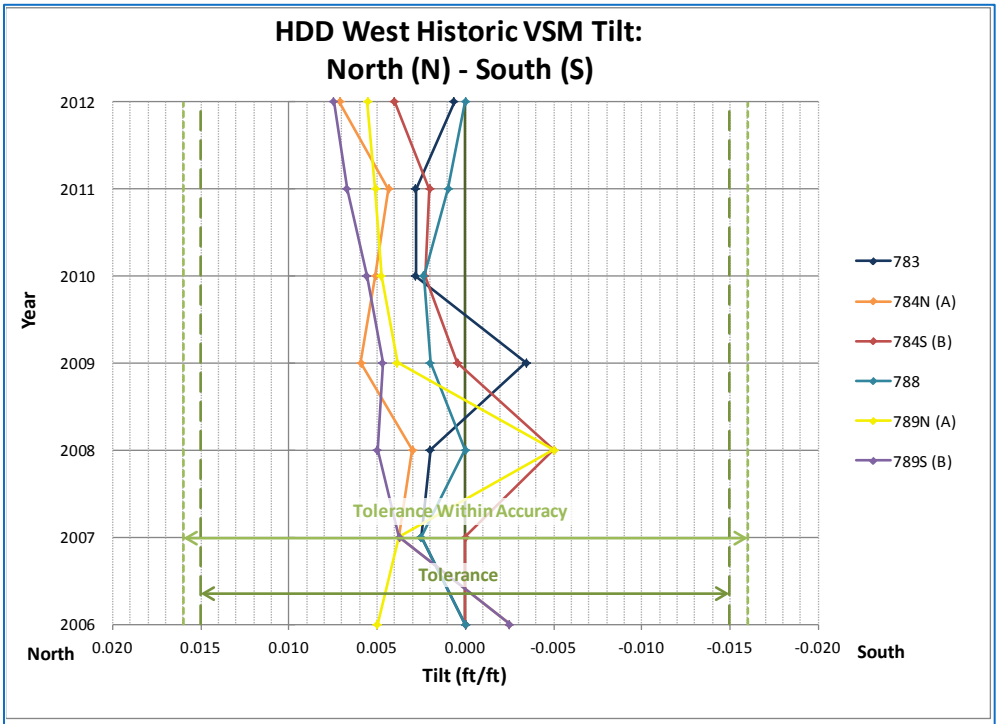
HDD West VSM Number	Tilt Measurement Orientation (ft/ft)		Comment
	North/South	East/West	
783	<0.00125	< 0.00125	**Plumb**
784N (A)	0.0071 N	< 0.00125	**Plumb**
784S (B)	0.0040 N	0.0024 W	**Plumb**
788	<0.00125	<0.00125	**Plumb**
789N (A)	0.0056 N	<0.00125	**Plumb**
789S (B)	0.0075 N	0.0023 W	**Plumb**

Table 4 illustrates the change in tilt measurements collected between the 2011 and 2012 monitoring events.

Table 4 HDD West VSM Change in Tilt, 2011 to 2012

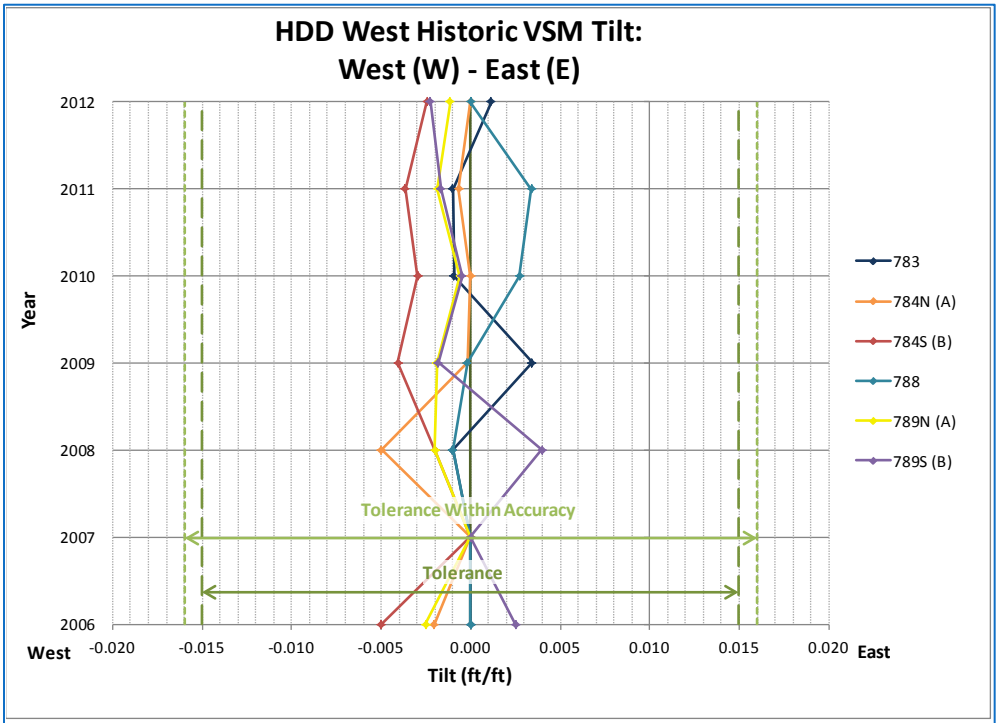
HDD West VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
783	0.0021 S	0.0022 E
784N (A)	0.0028 N	< 0.00125
784S (B)	0.0020 N	< 0.00125
788	< 0.00125	0.0034 W
789N (A)	< 0.00125	< 0.00125
789S (B)	< 0.00125	< 0.00125

Graph 1 and Graph 2 present the historical VSM change in tilt by orientation between 2006 and 2012 (Baker 2006, 2007, 2008, 2009, 2010, 2011).



Notes:
1. Positive tilt indicates north (N), negative tilt indicates south (S)
2. Project tilt tolerance for VSM is +/- 0.015 ft/ft.
3. Survey accuracy of this project is +/-0.001 ft/ft.
4. Historical tilt directions were corrected based on review of all past measurements; the magnitude remains unchanged.

Graph 1 HDD West VSM Historic Change in Tilt, North/South



Notes:
1. Positive tilt indicates east (E), negative tilt indicates west (W)
2. Project tilt tolerance for VSM is +/- 0.015 ft/ft.
3. Survey accuracy of this project is +/-0.001 ft/ft.
4. Historical tilt directions were corrected based on review of all past measurements; the magnitude remains unchanged.

Graph 2 HDD West VSM Historic Change in Tilt, East/West

3.1.3 Foundation Pile Cap Survey (HDD West)

LCMF 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 0.034 feet of movement vertically over the 8-year span. A summary of the LCMF 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 using ground and aerial photography (Photo A.8 through Photo A.16, in Appendix A) and field and topographic surveys. The 2012 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 2011 and 2012 monitoring events was 0.1 feet occurring at Station 0+80, approximately 200 feet south of the NPS 14 oil pipeline centerline (STA 2+80). 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 3.0 ft/yr over the monitoring period at this location.

The average rate of erosion for the 2011-2012 monitoring period, as measured along the entire 450-foot top of bank, is approximately 0.0 ft/yr. This value averages both erosion and deposition. The observed long-term historical average erosion rate is 1.14 ft/yr, and the estimated maximum design erosion rate is 2.5 ft/yr (Baker 2003a). A graphic and tabular summary of the LCMF surveying results for the HDD East Bank crossing is presented in Appendix C**.**

Approximately 11.8 feet of bank erosion near the oil pipeline centerline (STA 2+80) has occurred since 1997. This represents an average of 1.1 ft/yr over the 15-year period, based on a comparison of 2012 survey data and the 1997 survey control point shown on HDD Bank Erosion Topo/Monitoring HDD Site-East (Appendix C). As of 2012, the observed bank erosion at this location equals 10.8% 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 2003c).

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 2012 field visit were similar to those observed during the 2011 field visit.

3.2.2 Polygon Trough Subsidence (HDD East)

In addition to bank erosion surveys, subsidence monitoring has been conducted since 2001 by LCMF 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

3.3 feet. Maximum cumulative subsidence at cross section E was 3.2 feet. The maximum incremental change since 2011 was at cross section B with a decrease of 1.2 feet. A graphic and tabular summary of these cross sections is provided in Appendix C, a photograph of the troughs, Photo A.13, is in Appendix A.

3.2.3 VSM Tilt (HDD East)

The VSM investigated near HDD East are adequately supporting the pipeline. All 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.

Table 5 HDD East VSM Tilt Measurement Results (2012)

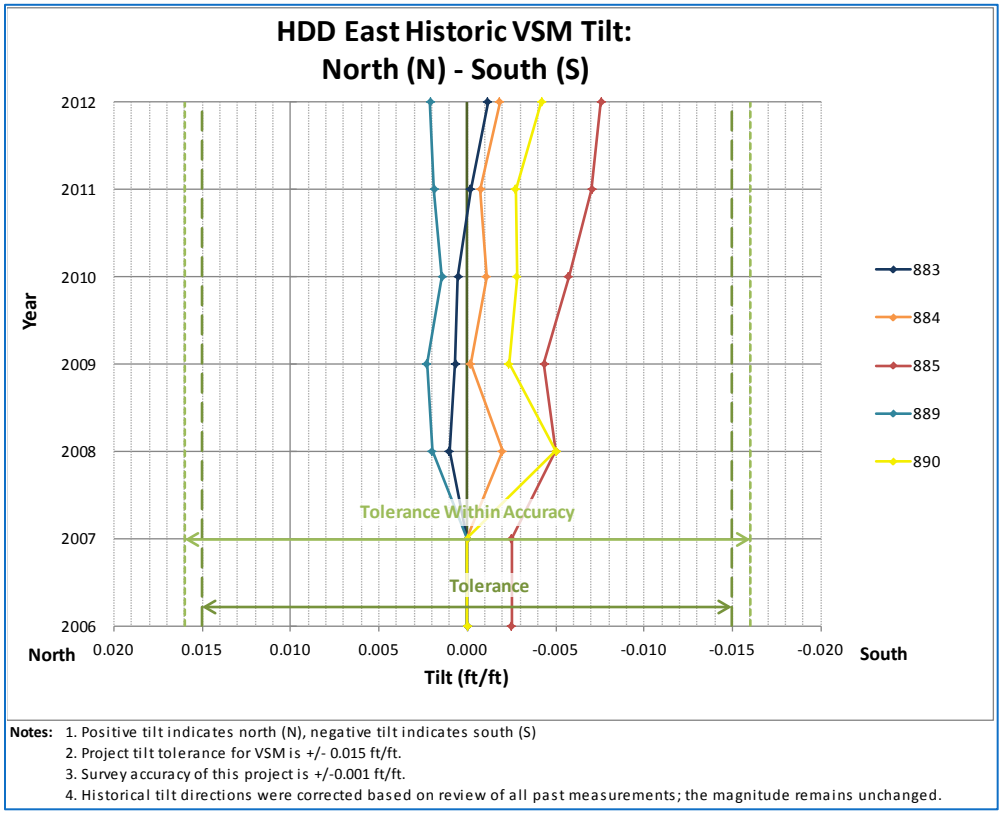
HDD East VSM Number	Tilt Measurement Orientation (ft/ft)		Comment
	North/South	East/West	
883	<0.00125	0.0024 W	**Plumb**
884	0.0018 S	< 0.00125	**Plumb**
885	0.0075 S	0.0040 W	**Plumb**
889	0.0021 N	< 0.00125	**Plumb**
890	0.0042 S	< 0.00125	**Plumb**

Table 6 presents the difference in tilt measurements collected during the 2011 and 2012 monitoring events.

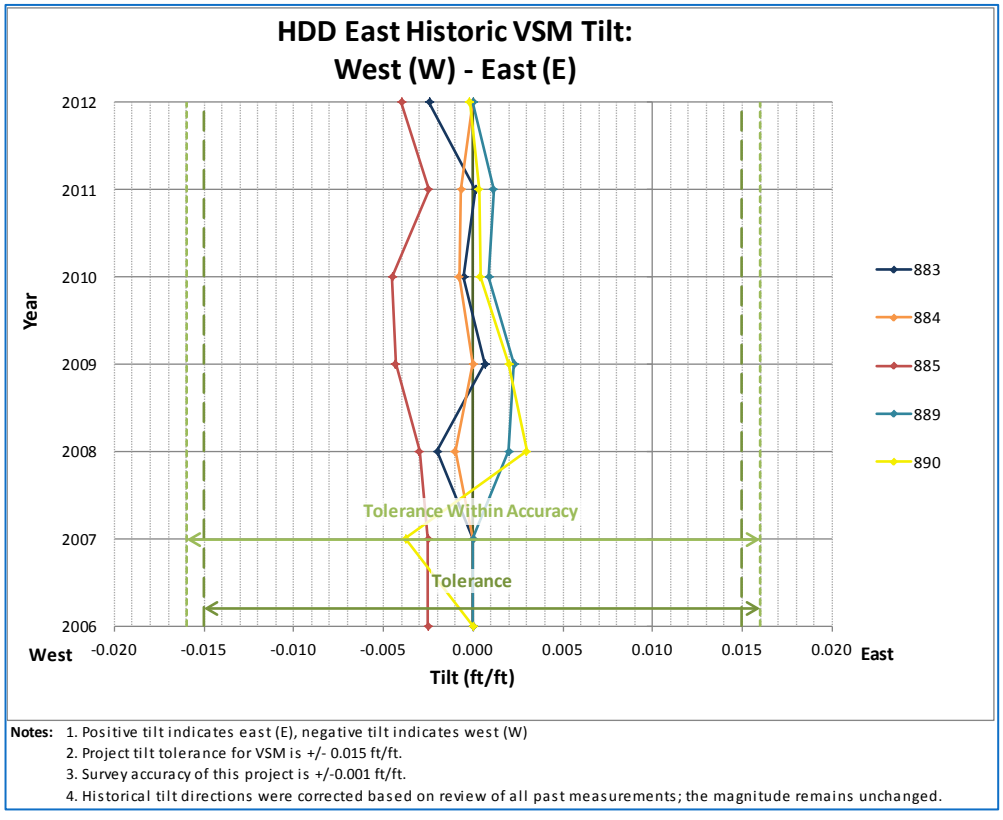
Table 6 HDD East VSM Change in Tilt, 2011 to 2012

HDD East VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
883	< 0.00125	0.0026 W
884	< 0.00125	< 0.00125
885	< 0.00125	0.0015 W
889	< 0.00125	< 0.00125
890	0.0015 S	< 0.00125

Graph 3 and Graph 4 present the historical VSM change in tilt by orientation between 2006 and 2012 (Baker 2006, 2007, 2008, 2009, 2010, 2011).



Graph 3 HDD East VSM Historic Change in Tilt, North/South



Graph 4 HDD East VSM Historic Change in Tilt, East/West

3.3 Kachemach River

The Kachemach River crossing was evaluated by visual observation, ground and aerial photography (Photo A.17 through Photo A.20; Appendix A), and field surveys**.** At the time of the field visit, flow was observed across the entire gravel channel. The channel is approximately 75 feet wide with a maximum depth of approximately 4 feet. Spring breakup observations in 2012 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

West Bank

No erosion has occurred on the west bank between the August 2007 and July 2012 surveys. The maximum cumulative erosion since 2002 is 15.6 feet at station 1+10, and the maximum average erosion per year is 1.57 feet.

East Bank

The greatest east bank erosion observed between the 2007 and 2012 survey events was 7.5 feet occurring at Station 2+10, approximately 60 feet south of the VSM centerline (STA 2+70). The maximum cumulative erosion of 22.2 feet was also measured at station 2+10. This value yields a maximum yearly erosion of 2.2 ft/yr. For the 2011-2012 monitoring period, the average rate of erosion was approximately 0.30 ft/yr. This value averages both erosion and deposition. The observed long-term historical average erosion rate is 0.24 ft/yr.

Appendix D includes a drawing of the bank migration survey in addition to tabular data; Photo A.17 through Photo A.20; Appendix A shows site conditions.

3.3.2 VSM Tilt

The VSM investigated near the Kachemach River crossing are adequately supporting the pipeline. Five of the six VSM located within the vicinity of the Kachemach River were plumb according to project tolerance based on tilt measurements. A summary of the 2012 Kachemach River VSM tilt survey results is presented in Table 7.

VSM 1714, 1714A, 1715A, 1715B, and 1716 were plumb. The tilt of VSM 1715C (abandoned) was measured to be east 0.0167 ft/ft, exceeding the project tolerance and survey method accuracy.

Table 7 Kachemach River VSM Tilt Measurement Results (2012)

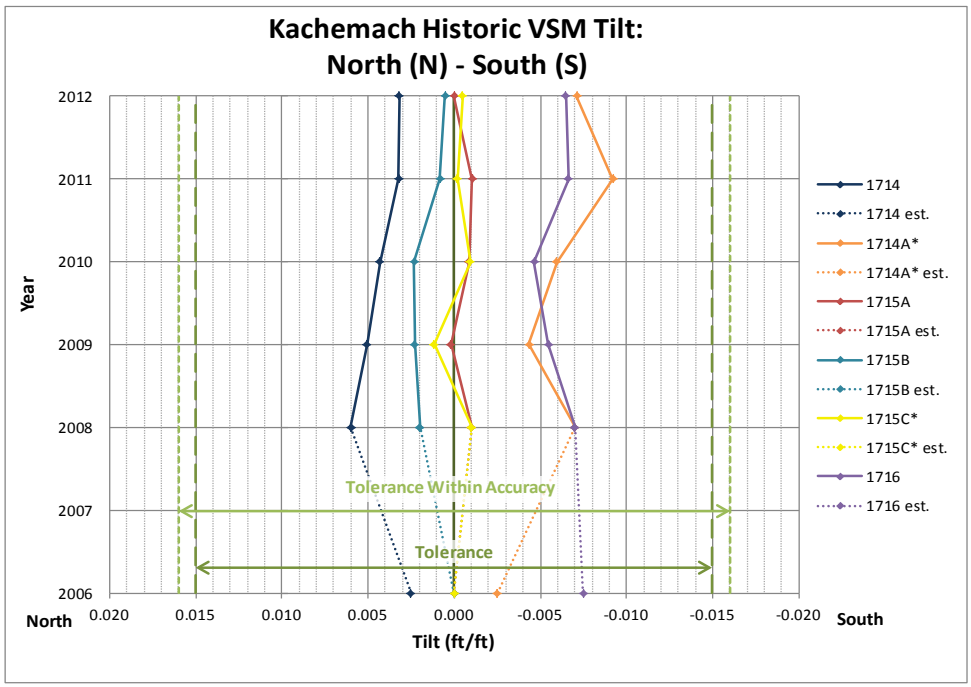
Kachemach VSM Number	Tilt Measurement Orientation (ft/ft)		Comments
	North/South	East/West	
1714	0.0032 N	0.0048 E	**Plumb**
1714A (Abandoned)	0.0071 S	0.0115 E	**Plumb**
1715A	< 0.00125	<0.00125	**Plumb**
1715B	< 0.00125	0.0024 W	**Plumb**
1715C (Abandoned)	< 0.00125	0.0167 E [1]	E/W: exceeded project tolerance and survey accuracy
1716	0.0065 S	0.0054 E	**Plumb**
(1) VSM tilt exceeds project tolerance by more than the method accuracy.			

Table 8 presents the difference in tilt measurements collected during the 2011 (Baker 2011) and 2012 monitoring events.

Table 8 Kachemach River VSM Change in Tilt, 2011 to 2012

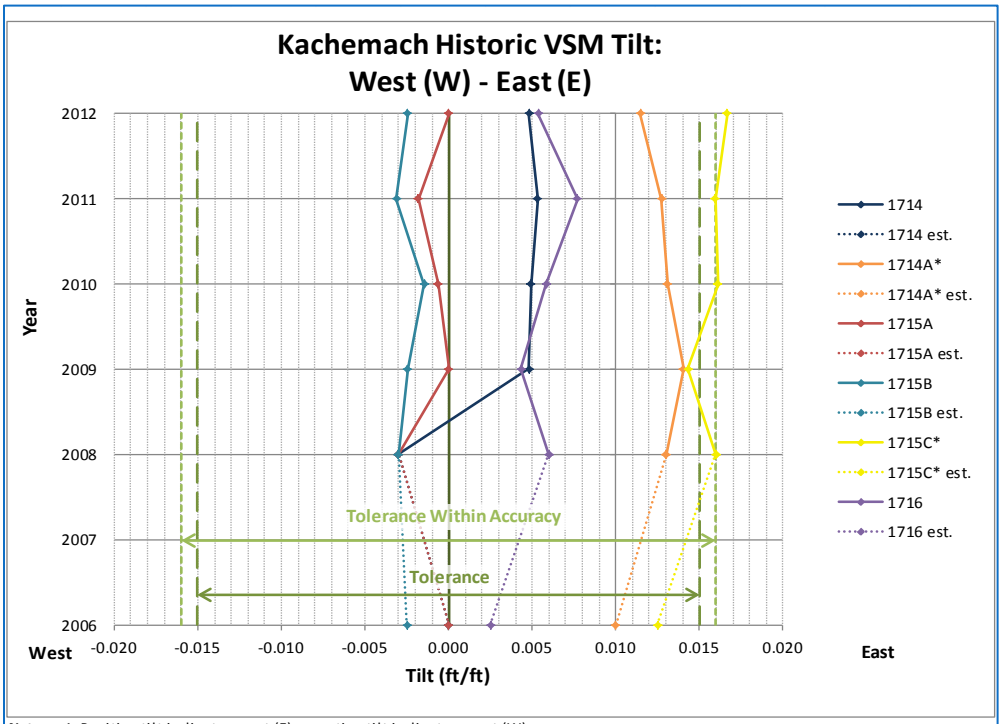
Kachemach VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
1714	<0.00125	< 0.00125
1714A (Abandoned)	0.0021 N	0.0013 W
1715A	< 0.00125	0.0018 E
1715B	< 0.00125	<0.00125
1715C (Abandoned)	< 0.00125	< 0.00125
1716	<0.00125	0.0023 W

Graph 5 and Graph 6 present the historical VSM change in tilt by orientation between 2006 and 2012 (Baker 2006, 2007, 2008, 2009, 2010, 2011).



Notes: 1. Positive tilt indicates north (N), negative tilt indicates south (S)
2. Tilt measurementes were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
3. Project tilt tolerance for VSM is +/- 0.015 ft/ft.
4. Survey accuracy of this project is +/-0.001 ft/ft.
5. Historical tilt directions were corrected based on review of all past measurements; the magnitude remains unchanged.
* VSM 1714A and 1715C are abandoned.

Graph 5 Kachemach River VSM Historic Change in Tilt, North/South



Notes: 1. Positive tilt indicates east (E), negative tilt indicates west (W)
2. Tilt measurementes were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
3. Project tilt tolerance for VSM is +/- 0.015 ft/ft.
4. Survey accuracy of this project is +/-0.001 ft/ft.
5. Historical tilt directions were corrected based review of all past measurements; the magnitude remains unchanged.
*VSMs 1714A and 1715C are abandoned.

Graph 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 2003c). A topographic survey was conducted by LCMF this monitoring cycle and is included in Appendix D. Table 9 contains the field scour measurements.

Table 9 Kachemach River VSM Scour (2012)

VSM	Location Description	Depth of Scour, ft	Notes
1714	Grassy floodplain	2.1 feet below existing ground	Approximately 25 feet from edge of water
1714A	Channel	No scour hole	Abandoned VSM
1715A	Channel	3.5 feet below water surface	Approximately 2.5 feet diameter scour casing
1715B	Channel	4.0 feet below water surface	Approximately 2.5 feet diameter scour casing
1715C	Grassy floodplain	1.0 feet 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

3.3.4 Foundation Pile Cap Survey (Kachemach)

LCMF conducted a pile cap elevation survey of the Kachemach crossing in 2012. LCMF last conducted pile cap elevation surveys in 2008. Based on the historical record, no single pile cap has experienced a cumulative change of more than 0.11 feet of movement vertically. A summary of the LCMF surveying results for the Kachemach crossing is presented in Appendix D.

3.4 Miluveach River

The Miluveach River crossing was evaluated by visual observation, review of ground and aerial photography (Photo A.21 through Photo A.26; Appendix A), and field surveys. At the time of the field visit, flow was present in the east side of the channel, approximately 3 feet in width and 0.5 feet deep. 2012 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

No erosion occurred on either the west or east bank between the August 2007 and July 2012 surveys. The maximum west bank cumulative erosion is 5.0 feet at station 1+80, and the maximum average erosion per year is 0.51 feet. The maximum east bank cumulative erosion is 1.1 feet at station 12+10, and the maximum average erosion per year is 0.11 feet.

Appendix E includes a drawing of the bank migration survey in addition to tabular data; Photo A.21 through Photo A.26 (Appendix A) shows site conditions.

3.4.2 VSM Tilt

The VSM investigated near the Miluveach River crossing are adequately supporting the pipeline. One of the four VSM within the vicinity of the Miluveach River was found to be plumb according to project tolerance based on tilt measurements; tilt was not measured at two VSM (2046 and 2049) because of their location outside of the 15-foot project limits, based on 2012 spring breakup flood and July 2012 flow observations. A summary of the 2012 Miluveach River VSM tilt survey results are presented in Table 10.

All four VSM measured were found to be plumb according to project tolerance.

Table 10 Miluveach River VSM Tilt Measurement Results (2012)

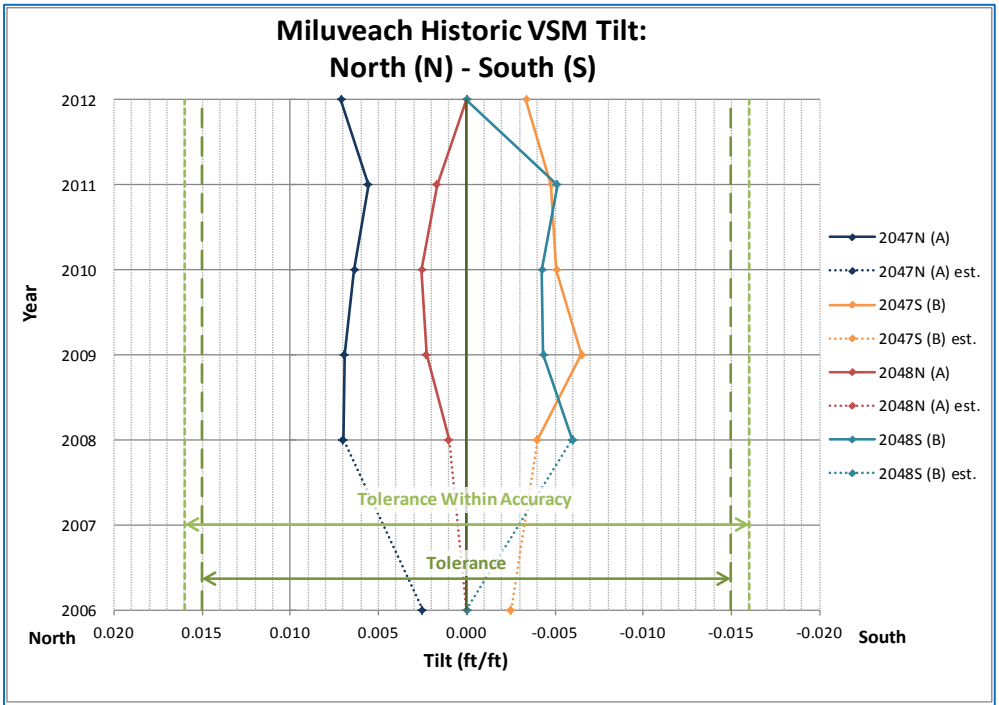
Miluveach VSM Number	Tilt Measurement Orientation (ft/ft)		Comment
	North/South	East/West	
2047N (A)	0.0071 N	0.0031 W	**Plumb**
2047S (B)	0.0034 S	0.0056 E	**Plumb**
2048N (A)	<0.00125	0.0049 W	**Plumb**
2048S (B)	<0.00125	0.0111 E	**Plumb**

Table 11 presents the difference in tilt measurements collected during the 2011 and 2012 monitoring events.

Table 11 Miluveach River VSM Change in Tilt from 2011 to 2012

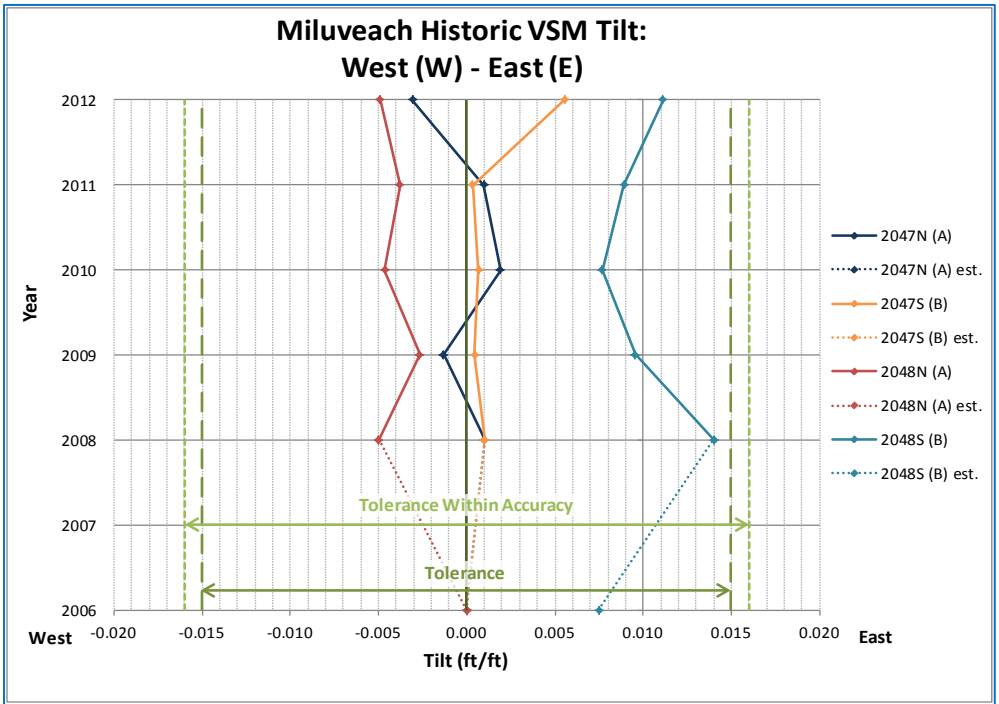
Miluveach VSM Number	Change in Tilt Measurement Orientation (ft/ft)	
	North/South	East/West
2047N (A)	0.0015 N	0.0041 W
2047S (B)	0.0014 N	0.0052 E
2048N (A)	0.0017 S	<0.00125
2048S (B)	0.0051 N	0.0022 E

Graph 7 and Graph 8 present the historical VSM change in tilt by orientation between 2006 and 2012 (Baker 2006, 2007, 2008, 2009, 2010, 2011).



Notes:
1. Positive tilt indicates north (N), negative tilt indicates south (S)
2. Tilt measurementes were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
3. Project tilt tolerance for VSM is +/- 0.015 ft/ft.
4. Survey accuracy of this project is +/-0.001 ft/ft.
5. Historical tilt directions were corrected based on review of all past measurements; the magnitude remains unchanged.

Graph 7 Miluveach River VSM Historic Change in Tilt, North/South



Notes:
1. Positive tilt indicates east (E), negative tilt indicates west (W)
2. Tilt measurementes were not taken at this location in 2007; tilt is estimated between 2006 and 2008.
3. Project tilt tolerance for VSM is +/- 0.015 ft/ft.
4. Survey accuracy of this project is +/-0.001 ft/ft.
5. Historical tilt directions were corrected based on review of all past measurements; the magnitude remains unchanged.

Graph 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 2003c); however, a topographic survey was not conducted this monitoring cycle. Table 12 illustrates the field scour measurements.

Table 12 Miluveach River VSM Scour (2012)

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	No scour hole	Ponded water around VSM, 0.2 feet deep (see Photo A.25)
2048S (B)	Gravel Channel Bed	0.6 feet below water surface	Ponded water in scour hole, 6.5 feet diameter scour hole
2049	Grassy bank above floodplain	No scour hole	Outside channel floodplain

3.4.4 Foundation Pile Cap Survey (Miluveach)

LCMF conducted a pile cap elevation survey of the Miluveach crossing in 2012. LCMF last conducted pile cap elevation surveys in 2008. The largest incremental change since 2008 was observed at VSM 2048N (A) with an increase in elevation by 0.344 feet, the largest cumulative change since 2004 was observed at horizontal support member 2048S (B) with an increase in elevation of 0.459 feet. A summary of the LCMF surveying results for the Miluveach crossing is presented in Appendix E.

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4.0 Conclusions

During the 2012 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 the VSM was not apparent.

One VSM tilt measurement exceeded project tolerance (+/- 0.0015 ft/ft) outside of survey accuracy (+/- 0.001 ft/ft) at the Kachemach River crossing (abandoned VSM 1715C). For all monitored VSM, tilt has fluctuated annually, generally with consistency of direction. Annual fluctuation of VSM tilt measurements are presented in Graph 1 to Graph 8.

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

4.1 HDD West Bank

The HDD West bank gravel pad is largely free from erosion. Since the 2011 monitoring event, the HDD West bank crossing eroded at an average rate of 0.07 ft/yr. This rate is less than both the long-term historic (0.39 ft/yr) and design erosion (2.3 ft/yr) rates. 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 life (constructed 13 years ago) is 43% of the original 30-year design life.

All VSM at HDD West were found to be within project tilt tolerances.

The LCMF survey shows no single pile cap has experienced a cumulative change of more than 0.034 feet of movement vertically over the span of 8 years.

4.2 HDD East Bank

Since the 2011 monitoring event, the HDD East bank crossing had no average erosion; the maximum erosion was 0.08 feet and the maximum deposition was 0.08 feet. The 11-year (2001-2012) average erosion rate of 1.14 ft/yr is less than the design erosion rate of 2.5 ft/yr (Baker 2003a). The observed erosion of the east bank at the NPS 14 oil centerline represents 10.8% of the 115-foot design setback over 43% (13 years) of the original 30-year design life.

The cumulative subsidence measured at any of the cross sections was less than 3.3 feet. Maximum cumulative subsidence at cross section E was 3.2 feet. Cross section B saw the maximum incremental change since 2011 with a drop of 1.2 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

All VSM at HDD East were found to be within project tilt tolerances. Pile caps were not monitored at this location.

4.3 Kachemach River

Based on visual inspection, the VSM do not affect the Kachemach River channel at the crossing location. VSM 1715C (abandoned) exceeded the project tilt tolerance and method accuracy. At the Kachemach River crossing, all VSMs decreased in tilt. All VSM not reported to be abandoned remained plumb according to project limits.

The LCMF survey shows no single pile cap has experienced a cumulative change of more than 0.11 feet of movement vertically over the span of eight years.

4.4 Miluveach River

The 2012 survey of the Miluveach River crossing measured the greatest movement in tilt of VSM 2047S (B), and 2048S (B). VSM 2047S (B) and 2048S (B) both moved in excess of .005 ft/ft, east and north, respectively. All VSM at the Miluveach River remain within project tolerances. The VSM have no apparent effect on the Miluveach River channel at the crossing location.

The LCMF survey shows no single pile cap has experienced a cumulative change of more than 0.50 feet of movement vertically over the span of eight years. This cumulative change was observed at HSM 2048A (N).

5.0 References

ARCO Alaska, Inc. (ARCO). 1999. Vertical Support Member and Module Pile Installation Specification. SPC-CE-AP-10001. February 1999.

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—— 2007. Alpine Pipeline HDD Crossing 2007 Monitoring Report. Prepared for ConocoPhillips Alaska. 111620-MBJ-RPT-001. October 2007.

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—— 2003a. Alpine Development. Colville River Crossing Design Report. Prepared for Arco Alaska Inc. 23100-MBJ-RP-003. June 1997. Rev. 5. 2003.

—— 2003b. 2003 Alpine Pipeline River Crossing Monitoring. Prepared for ConocoPhillips Alaska. 101376-MBJ-001. July 2003.

—— 2003c. Mechanical Analysis of Aboveground Pipeline & Aboveground River Crossings. Prepared for ARCO Alaska Inc. 23100-MBJ-RP-001. October 1997. Rev 7. 2003.

—— 2002. HDD Transition Zones Civil Surveillance Trip Report – 2001. Prepared for Phillips Alaska Inc. 25114-217-MBJ-001. January 2002.

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Appendix A Site Photographs

Photo A.1 HDD West bank during spring breakup, looking south, May 27, 2012

Photo A.2 HDD West bank looking south, June 2, 2012

Photo A.3 HDD West bank, looking south, August 10, 2012

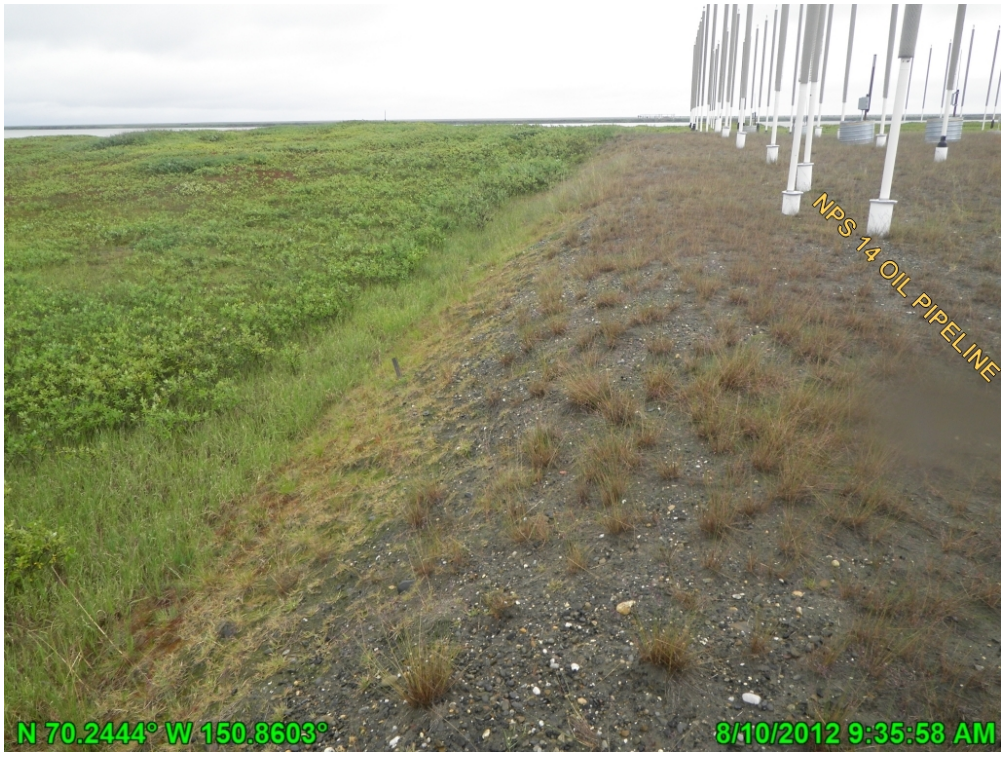

Photo A.4 HDD West north side of gravel pad, looking east, August 10, 2012

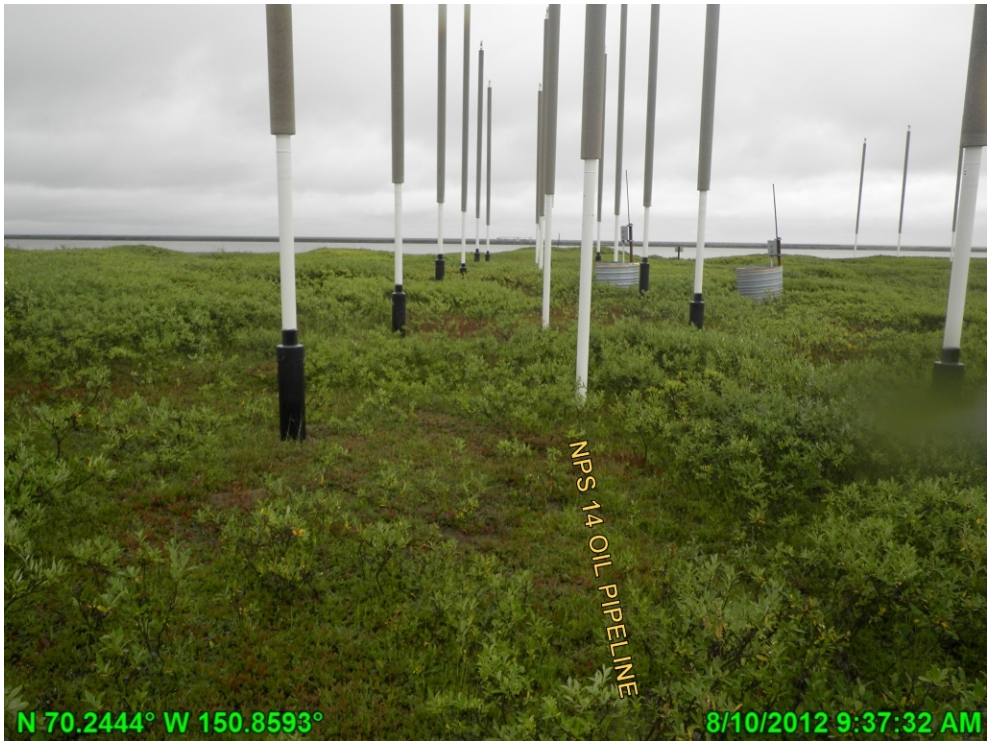

Photo A.5 HDD West, looking through thermo-siphons, August 10, 2012

Photo A.6 HDD West bank, looking south, August 10, 2012

Photo A.7 HDD West depression off NPS 12 Seawater pipeline centerline, August 10, 2012

Photo A.8 HDD East bank during breakup, looking east, June 2, 2012

Photo A.9 HDD East during breakup, looking southwest, June 7, 2012

Photo A.10 HDD East bank, looking east, August 10, 2012

Photo A.11 Sloughing of the HDD East gravel pad, August 10, 2012

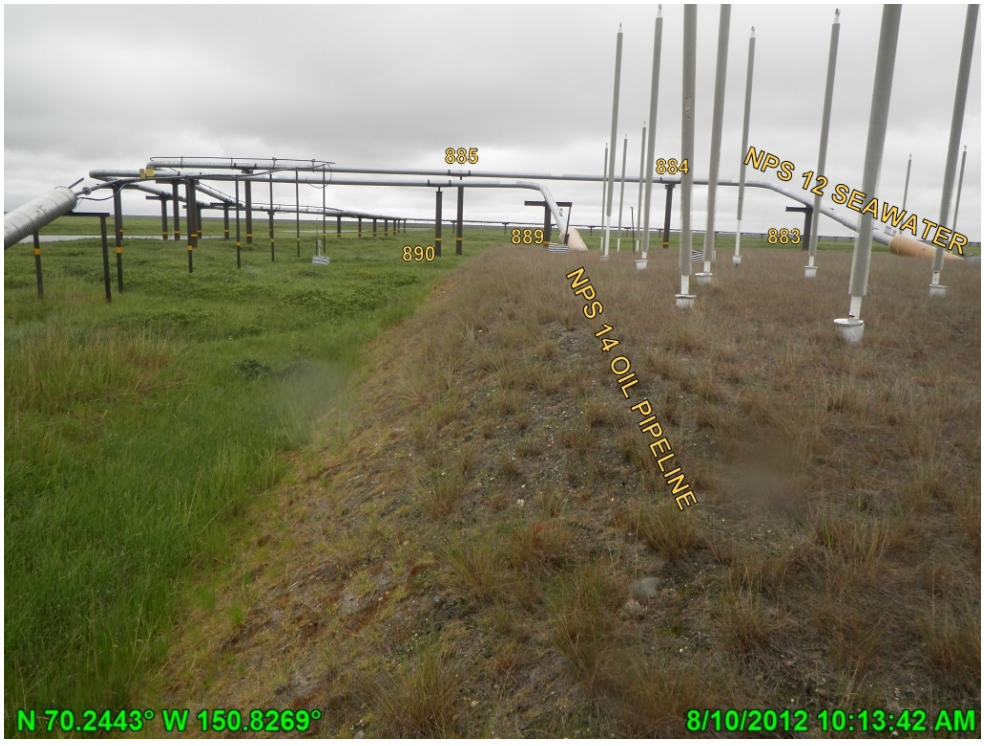

Photo A.12 North side of HDD East gravel pad, looking east, August 10, 2012

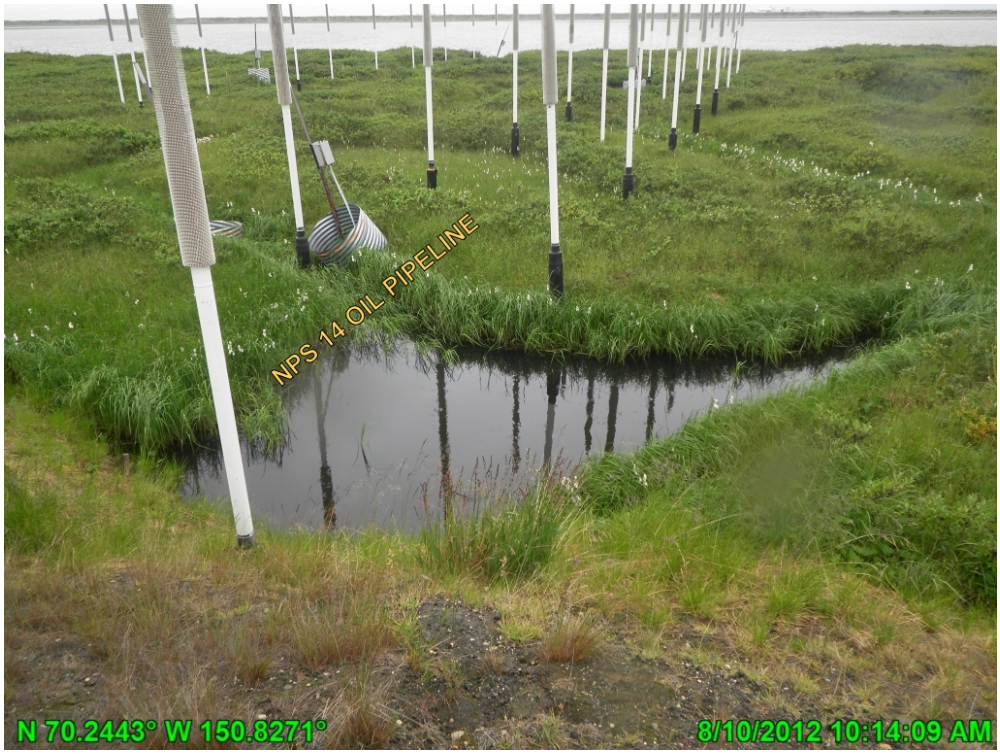

Photo A.13 Polygonal trough over NPS 14 Oil pipeline, August 10, 2012

Photo A.14 HDD East bank looking north, August 10, 2012

Photo A.15 Sloughing of the HDD East gravel pad west slope, August 10, 2012

Photo A.16 HDD East, looking west through thermo-siphons, August 10, 2012

Photo A.17 Kachemach River, looking southwest, June 2, 2012

Photo A.18 Kachemach River, looking north, August 10, 2012

Photo A.19 Kachemach River, looking southwest, August 10, 2012

Photo A.20 Kachemach River looking northeast, August 10, 2012

Photo A.21 Miluveach River, looking northwest, June 2, 2012

Photo A.22 Miluveach River, looking west, August 10, 2012

Photo A.23 Miluveach River, looking southeast, August 10, 2012

Photo A.24 Miluveach River floodplain/overbank, looking northwest, August 10, 2012

Photo A.25 Miluveach River VSM 2048S (B) scour, looking south, August 10, 2012

Photo A.26 Miluveach River east bank, looking north, August 10, 2012

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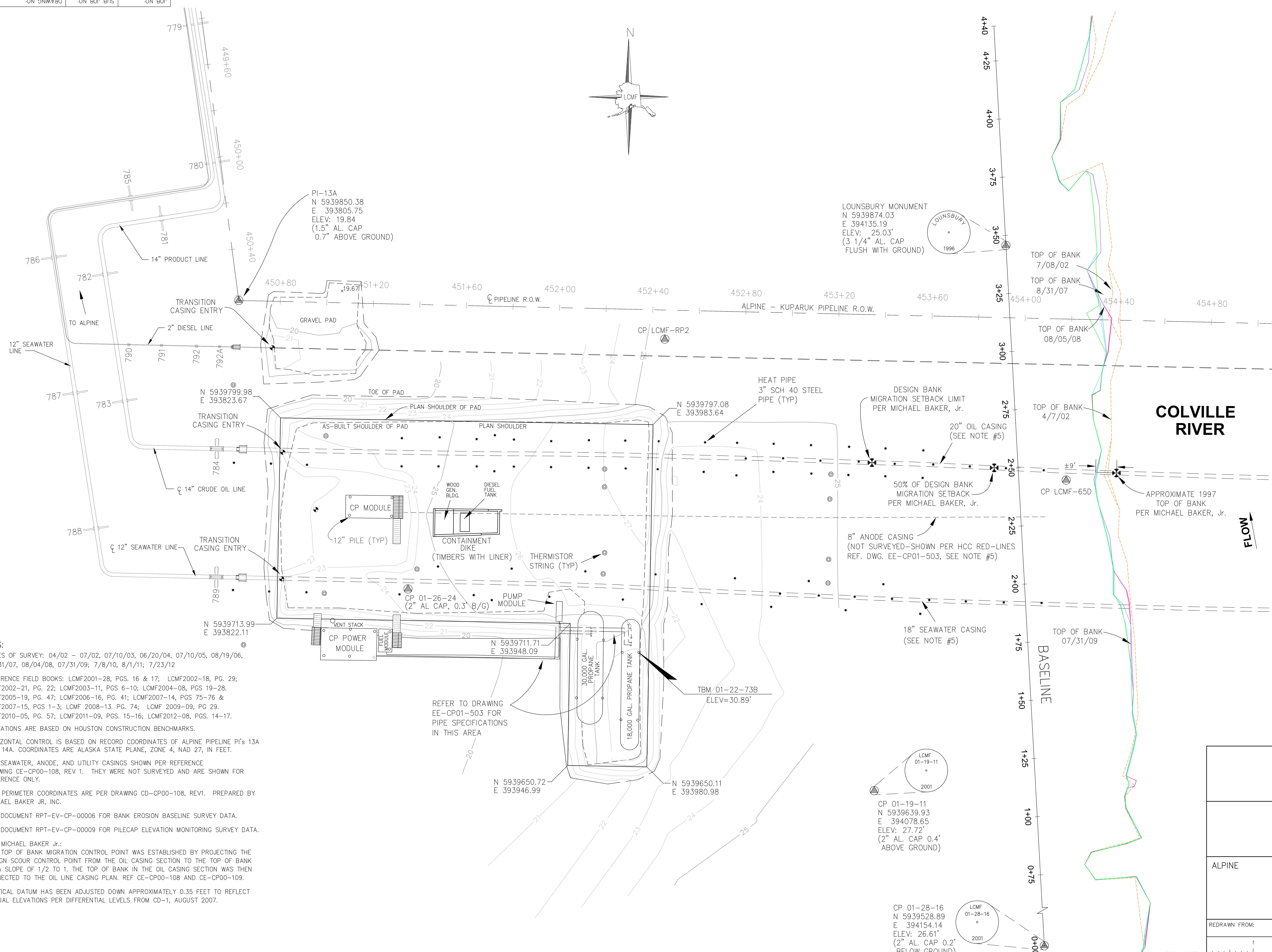
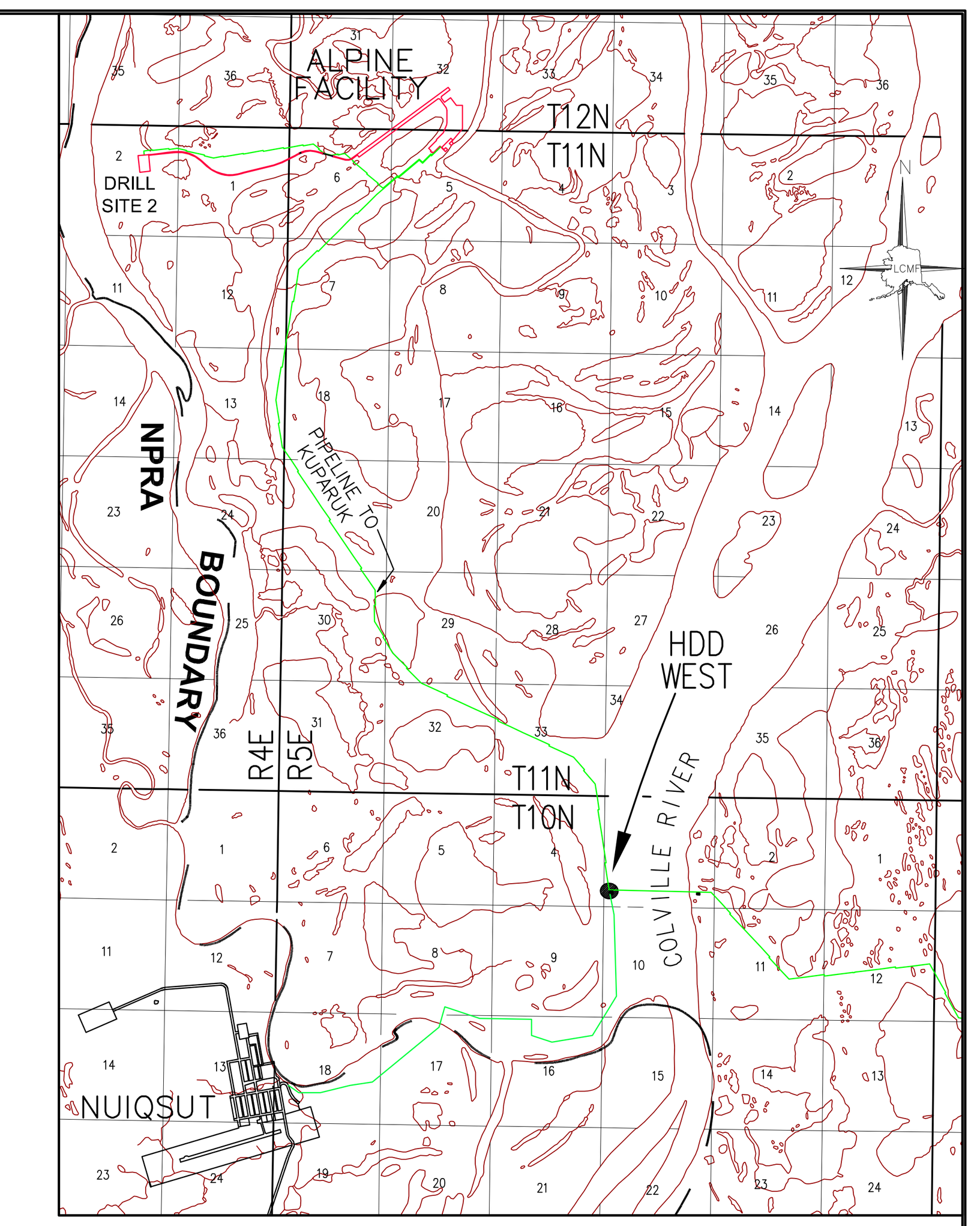
Appendix B HDD West Bank Erosion Survey





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
- TOP OF BANK 7/23/12

GRAPHIC SCALE
20 0 10 20 40
(IN FEET)
1 inch = 20 ft.

NOTES:

1. 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; 7/23/12
2. 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; LCMF2012-08, PGS. 14-17.
3. ELEVATIONS ARE BASED ON HOUSTON CONSTRUCTION BENCHMARKS.
4. 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.
5. 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.
6. PAD PERIMETER COORDINATES ARE PER DRAWING CD-CP00-108, REV1. PREPARED BY MICHAEL BAKER JR, INC.
7. SEE DOCUMENT RPT-EV-CP-00006 FOR BANK EROSION BASELINE SURVEY DATA.
8. SEE DOCUMENT RPT-EV-CP-00009 FOR PILECAP ELEVATION MONITORING SURVEY DATA.
9. 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.
10. VERTICAL DATUM HAS BEEN ADJUSTED DOWN APPROXIMATELY 0.35 FEET TO REFLECT ACTUAL ELEVATIONS PER DIFFERENTIAL LEVELS FROM CD-1, AUGUST 2007.

KUUKPIK LCMF LLC
Alpine Survey Office

ConocoPhillips Alaska, Inc.

ALPINE | MODULE: CP00 | UNIT: CP

HDD BANK EROSION MONITORING
HDD SITE – WEST
ALPINE FACILITY

REFERENCE DWG NO/SHT NO:

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
11	7/23/12	UPDATED PER 9101901ACS	AG	DB			
10	8/3/11	UPDATED PER 8292382ACS	AG	DB			
9	7/10/10	UPDATED PER 7224503ACS	CZ	GD			
8	7/31/09	UPDATED PER 6370813ACS	AG	DB			
7	8/7/08	UPDATED PER 5538034ACS	CZ	GD			
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			

REDRAWN FROM: | CONSTRUCTION SHEET OF

DO NOT SCALE — ABOVE SCALE FOR REFERENCE ONLY

DATE: 11/5/02	DRAWN: CZ	DESIGN:	ECM NO: 1870227ACS
SCALE: 1"=20'	CHECKED: JZ		CC NO:
	APPROVAL: ML		CADD FILE NO. 01-12-05-1WEST
JOB NO: 02-205	SUB JOB NO:	DRAWING NO: CE-CP00-143	PART: 1 OF 1 / REV: 11

FORM: DSIZE

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										Description
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
0+00	39.6										Baseline Offset (In Feet)
	0.2										Incremental Change
	0.1										Cumulative Change
0+05	37.8										Baseline Offset (In Feet)
	0.1										Incremental Change
	-1.5										Cumulative Change
0+10	38.8										Baseline Offset (In Feet)
	0.1										Incremental Change
	-0.5										Cumulative Change
0+20	40.1										Baseline Offset (In Feet)
	0.4										Incremental Change
	-5.6										Cumulative Change
0+25	37.9										Baseline Offset (In Feet)
	0.3										Incremental Change
	-3.7										Cumulative Change
0+30	38.1										Baseline Offset (In Feet)
	0.2										Incremental Change
	0.3										Cumulative Change
0+40	41.8										Baseline Offset (In Feet)
	0.2										Incremental Change
	-0.1										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										Description
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
0+50	44.3										Baseline Offset (In Feet)
	0.3										Incremental Change
	2.3										Cumulative Change
0+60	46.3										Baseline Offset (In Feet)
	0.0										Incremental Change
	4.9										Cumulative Change
0+70	42.1										Baseline Offset (In Feet)
	0.0										Incremental Change
	1.4										Cumulative Change
0+75	21.4										Baseline Offset (In Feet)
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	0.0										Cumulative Change
0+80	20.3										Baseline Offset (In Feet)
	0.0										Incremental Change
	0.1										Cumulative Change
0+85	30.7										Baseline Offset (In Feet)
	0.4										Incremental Change
	1.7										Cumulative Change
0+90	43.6										Baseline Offset (In Feet)
	0.2										Incremental Change
	0.8										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline	Streambank Monitor - Top of Bank Locations										Description
Station	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
1+00	39.1										Baseline Offset (In Feet)
	0.1										Incremental Change
	0.4										Cumulative Change
1+05	38.2										Baseline Offset (In Feet)
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	0.3										Cumulative Change
1+10	39.4										Baseline Offset (In Feet)
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	-2.0										Cumulative Change
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	0.2										Incremental Change
	1.3										Cumulative Change
1+25	42.3										Baseline Offset (In Feet)
	0.2										Incremental Change
	0.9										Cumulative Change
1+30	43.8										Baseline Offset (In Feet)
	0.2										Incremental Change
	0.7										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										Description
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
1+35	44.3										Baseline Offset (In Feet)
	0.2										Incremental Change
	0.1										Cumulative Change
1+40	43.7										Baseline Offset (In Feet)
	0.2										Incremental Change
	-1.6										Cumulative Change
1+45	43.4										Baseline Offset (In Feet)
	0.1										Incremental Change
	-2.3										Cumulative Change
1+50	43.5										Baseline Offset (In Feet)
	0.1										Incremental Change
	-2.2										Cumulative Change
1+60	43.6										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-2.2										Cumulative Change
1+65	43.5										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-2.4										Cumulative Change
1+75	42.8										Baseline Offset (In Feet)
	0.1										Incremental Change
	-3.1										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										Description
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
1+90	40.0										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-5.1										Cumulative Change
1+95	38.2										Baseline Offset (In Feet)
	0.3										Incremental Change
	-6.7										Cumulative Change
2+00	38.6										Baseline Offset (In Feet)
	0.3										Incremental Change
	-6.1										Cumulative Change
2+05	38.6										Baseline Offset (In Feet)
	0.3										Incremental Change
	-5.9										Cumulative Change
2+10	37.9										Baseline Offset (In Feet)
	0.3										Incremental Change
	-5.8										Cumulative Change
2+20	36.3										Baseline Offset (In Feet)
	0.2										Incremental Change
	-5.2										Cumulative Change
2+25	35.2										Baseline Offset (In Feet)
	0.1										Incremental Change
	-6.8										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline	Streambank Monitor - Top of Bank Locations										Description
Station	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
2+30	34.2										Baseline Offset (In Feet)
	0.0										Incremental Change
	-8.2										Cumulative Change
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	0.2										Incremental Change
	-7.7										Cumulative Change
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	0.2										Incremental Change
	-4.8										Cumulative Change
2+50	34.8										Baseline Offset (In Feet)
	0.1										Incremental Change
	-4.3										Cumulative Change
2+55	36.0										Baseline Offset (In Feet)
	0.0										Incremental Change
	-3.8										Cumulative Change
2+60	35.3										Baseline Offset (In Feet)
	0.1										Incremental Change
	-5.4										Cumulative Change
2+65	34.2										Baseline Offset (In Feet)
	0.1										Incremental Change
	-6.7										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline	Streambank Monitor - Top of Bank Locations										Description
Station	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
2+70	33.4										Baseline Offset (In Feet)
	0.1										Incremental Change
	-7.8										Cumulative Change
2+75	33.3										Baseline Offset (In Feet)
	0.0										Incremental Change
	-8.0										Cumulative Change
2+80	34.5										Baseline Offset (In Feet)
	0.9										Incremental Change
	-7.1										Cumulative Change
2+85	37.7										Baseline Offset (In Feet)
	1.6										Incremental Change
	-4.0										Cumulative Change
2+90	38.5										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-5.0										Cumulative Change
3+00	39.3										Baseline Offset (In Feet)
	-1.0										Incremental Change
	-7.7										Cumulative Change
3+10	35.0										Baseline Offset (In Feet)
	-4.2										Incremental Change
	-12.1										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline	Streambank Monitor - Top of Bank Locations										Description
Station	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
3+15	33.5										Baseline Offset (In Feet)
	-5.4										Incremental Change
	-13.9										Cumulative Change
3+25	38.3										Baseline Offset (In Feet)
	1.6										Incremental Change
	-9.0										Cumulative Change
3+30	38.2										Baseline Offset (In Feet)
	3.1										Incremental Change
	-7.1										Cumulative Change
3+35	38.2										Baseline Offset (In Feet)
	2.6										Incremental Change
	-5.3										Cumulative Change
3+40	38.9										Baseline Offset (In Feet)
	0.1										Incremental Change
	-5.9										Cumulative Change
3+45	38.8										Baseline Offset (In Feet)
	0.0										Incremental Change
	-6.4										Cumulative Change
3+50	38.7										Baseline Offset (In Feet)
	0.0										Incremental Change
	-6.2										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline	Streambank Monitor - Top of Bank Locations										Description
Station	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										
	07/23/2012	Future	Future	Future	Future	Future	Future	Future	Future	Future	Date
3+60	38.4										Baseline Offset (In Feet)
	0.0										Incremental Change
	-5.7										Cumulative Change
3+70	26.0										Baseline Offset (In Feet)
	-0.2										Incremental Change
	-18.8										Cumulative Change
3+75	23.6										Baseline Offset (In Feet)
	-0.2										Incremental Change
	0.1										Cumulative Change
3+85	23.0										Baseline Offset (In Feet)
	0.0										Incremental Change
	-0.1										Cumulative Change
4+00	26.4										Baseline Offset (In Feet)
	0.1										Incremental Change
	-1.9										Cumulative Change
4+10	32.1										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-5.3										Cumulative Change
4+25	38.0										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-7.9										Cumulative Change

Alpine CP 00
HDD West Site
Streambank Monitor

Baseline	**Streambank Monitor - Top of Bank Locations**										**Description**
Station	See Drawing CE-CP00-143 Rev 10 for Survey Baseline Location										
	07/23/2012	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Future**	**Date**
4+30	39.5										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-7.8										Cumulative Change
4+35	40.9										Baseline Offset (In Feet)
	-0.1										Incremental Change
	-7.9										Cumulative Change
4+40	41.6										Baseline Offset (In Feet)
	0.0										Incremental Change
	-9.3										Cumulative Change

*****Note:** Survey completed on 4/7/02 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Alpine CP 00
HDD West Site
Pilecap Monitor

Pile Cap Designation	Pile Cap Monitor - Bottom of Pile Cap Locations									Description
	06/20/2004	08/04/2005	08/19/2006	08/31/2007	08/07/2008	08/03/2009	07/08/2010	08/03/2011	07/23/2012	Date
W-01 NE Cor	26.389	26.389	26.391	26.398	26.397	26.401	26.401	26.413	26.420	Bottom of Pile Cap (In Feet)
		0.000	0.002	0.007	-0.001	0.004	0.000	0.012	0.007	Incremental Change
		0.000	0.002	0.009	0.008	0.012	0.012	0.024	0.031	Cumulative Change
W-02 NE Cor	26.391	26.390	26.390	26.400	26.397	26.403	26.401	26.416	26.420	Bottom of Pile Cap (In Feet)
		-0.001	0.000	0.010	-0.003	0.006	-0.002	0.015	0.004	Incremental Change
		-0.001	-0.001	0.009	0.006	0.012	0.010	0.025	0.029	Cumulative Change
W-03 NE Cor	26.391	26.391	26.394	26.400	26.398	26.403	26.401	26.414	26.420	Bottom of Pile Cap (In Feet)
		0.000	0.003	0.006	-0.002	0.005	-0.002	0.013	0.006	Incremental Change
		0.000	0.003	0.009	0.007	0.012	0.010	0.023	0.029	Cumulative Change
W-04 NE Cor	26.389	26.388	26.390	26.394	26.394	26.396	26.397	26.407	26.415	Bottom of Pile Cap (In Feet)
		-0.001	0.002	0.004	0.000	0.002	0.001	0.010	0.008	Incremental Change
		-0.001	0.001	0.005	0.005	0.007	0.008	0.018	0.026	Cumulative Change
W-05 NE Cor	26.383	26.378	26.386	26.390	26.389	26.393	26.393	26.404	26.410	Bottom of Pile Cap (In Feet)
		-0.005	0.008	0.004	-0.001	0.004	0.000	0.011	0.006	Incremental Change
		-0.005	0.003	0.007	0.006	0.010	0.010	0.021	0.027	Cumulative Change
W-06 NE Cor	26.395	26.391	26.394	26.400	26.397	26.401	26.401	26.412	26.416	Bottom of Pile Cap (In Feet)
		-0.004	0.003	0.006	-0.003	0.004	0.000	0.011	0.004	Incremental Change
		-0.004	-0.001	0.005	0.002	0.006	0.006	0.017	0.021	Cumulative Change
W-07 NE Cor	26.397	26.393	26.402	26.406	26.404	26.408	26.405	26.419	26.423	Bottom of Pile Cap (In Feet)
		-0.004	0.009	0.004	-0.002	0.004	-0.003	0.014	0.004	Incremental Change
		-0.004	0.005	0.009	0.007	0.011	0.008	0.022	0.026	Cumulative Change

Alpine CP 00
HDD West Site
Pilecap Monitor

Pile Cap Designation	Pile Cap Monitor - Bottom of Pile Cap Locations									Description
	06/20/2004	08/04/2005	08/19/2006	08/31/2007	08/07/2008	08/03/2009	07/08/2010	08/03/2011	07/23/2012	Date
W-08 NE Cor	26.403	26.401	26.404	26.408	26.406	26.412	26.410	26.423	26.422	Bottom of Pile Cap (In Feet)
		-0.002	0.003	0.004	-0.002	0.006	-0.002	0.013	-0.001	Incremental Change
		-0.002	0.001	0.005	0.003	0.009	0.007	0.020	0.019	Cumulative Change
W-09 NE Cor	31.291	31.294	31.292	31.290	31.292	31.294	31.296	31.301	31.297	Bottom of Pile Cap (In Feet)
		0.003	-0.002	-0.002	0.002	0.002	0.002	0.005	-0.004	Incremental Change
		0.003	0.001	-0.001	0.001	0.003	0.005	0.010	0.006	Cumulative Change
W-10 NE Cor	31.266	31.261	31.261	31.264	31.263	31.263	31.262	31.264	31.263	Bottom of Pile Cap (In Feet)
		-0.005	0.000	0.003	-0.001	0.000	-0.001	0.002	-0.001	Incremental Change
		-0.005	-0.005	-0.002	-0.003	-0.003	-0.004	-0.002	-0.003	Cumulative Change
W-11 NE Cor	31.299	31.300	31.288	31.294	31.299	31.304	31.299	31.304	31.302	Bottom of Pile Cap (In Feet)
		0.001	-0.012	0.006	0.005	0.005	-0.005	0.005	-0.002	Incremental Change
		0.001	-0.011	-0.005	0.000	0.005	0.000	0.005	0.003	Cumulative Change
W-12 NE Cor	31.301	31.301	31.298	31.294	31.297	31.298	31.296	31.301	31.298	Bottom of Pile Cap (In Feet)
		0.000	-0.003	-0.004	0.003	0.001	-0.002	0.005	-0.003	Incremental Change
		0.000	-0.003	-0.007	-0.004	-0.003	-0.005	0.000	-0.003	Cumulative Change
W-13 NE Cor	27.377	27.373	27.383	27.393	27.389	27.391	27.394	27.401	27.408	Bottom of Pile Cap (In Feet)
		-0.004	0.010	0.010	-0.004	0.002	0.003	0.007	0.007	Incremental Change
		-0.004	0.006	0.016	0.012	0.014	0.017	0.024	0.031	Cumulative Change
W-14 NE Cor	27.428	27.423	27.433	27.439	27.442	27.442	27.454	27.455	27.462	Bottom of Pile Cap (In Feet)
		-0.005	0.010	0.006	0.003	0.000	0.012	0.001	0.007	Incremental Change
		-0.005	0.005	0.011	0.014	0.014	0.026	0.027	0.034	Cumulative Change

Alpine CP 00
HDD West Site
Pilecap Monitor

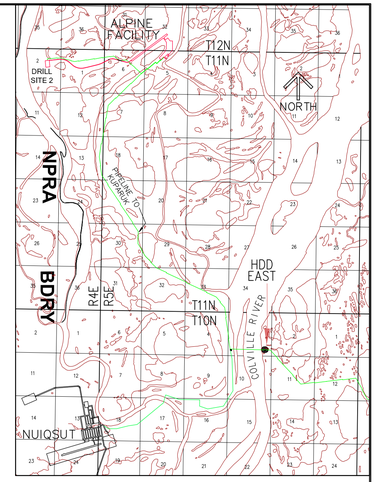
Pile Cap Designation	Pile Cap Monitor - Bottom of Pile Cap Locations									Description
	06/20/2004	08/04/2005	08/19/2006	08/31/2007	08/07/2008	08/03/2009	07/08/2010	08/03/2011	07/23/2012	Date
W-15 NE Cor	27.413	27.407	27.407	27.425	27.428	27.425	27.434	27.436	27.442	Bottom of Pile Cap (In Feet)
		-0.006	0.000	0.018	0.003	-0.003	0.009	0.002	0.006	Incremental Change
		-0.006	-0.006	0.012	0.015	0.012	0.021	0.023	0.029	Cumulative Change
W-16 NE Cor	27.389	27.385	27.392	27.416	27.400	27.404	27.410	27.414	27.421	Bottom of Pile Cap (In Feet)
		-0.004	0.007	0.024	-0.016	0.004	0.006	0.004	0.007	Incremental Change
		-0.004	0.003	0.027	0.011	0.015	0.021	0.025	0.032	Cumulative Change
W-17 NE Cor	28.940	28.947	28.944	28.940	28.945	28.946	28.942	28.948	28.943	Bottom of Pile Cap (In Feet)
		0.007	-0.003	-0.004	0.005	0.001	-0.004	0.006	-0.005	Incremental Change
		0.007	0.004	0.000	0.005	0.006	0.002	0.008	0.003	Cumulative Change
W-18 NE Cor	28.965	28.972	28.968	28.965	28.970	28.969	28.968	28.968	28.972	Bottom of Pile Cap (In Feet)
		0.007	-0.004	-0.003	0.005	-0.001	-0.001	0.000	0.004	Incremental Change
		0.007	0.003	0.000	0.005	0.004	0.003	0.003	0.007	Cumulative Change
W-19 NE Cor	28.959	28.962	28.960	28.956	28.958	28.958	28.955	28.955	28.952	Bottom of Pile Cap (In Feet)
		0.003	-0.002	-0.004	0.002	0.000	-0.003	0.000	-0.003	Incremental Change
		0.003	0.001	-0.003	-0.001	-0.001	-0.004	-0.004	-0.007	Cumulative Change
W-20 NE Cor	28.964	28.965	28.965	28.965	28.966	28.964	28.964	28.963	28.964	Bottom of Pile Cap (In Feet)
		0.001	0.000	0.000	0.001	-0.002	0.000	-0.001	0.001	Incremental Change
		0.001	0.001	0.001	0.002	0.000	0.000	-0.001	0.000	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										

Appendix C HDD East Bank Erosion Survey

JOB NO:	SUB JOB NO:	DRAWING NO:
02-205		CE-CP00-134

NOTES:

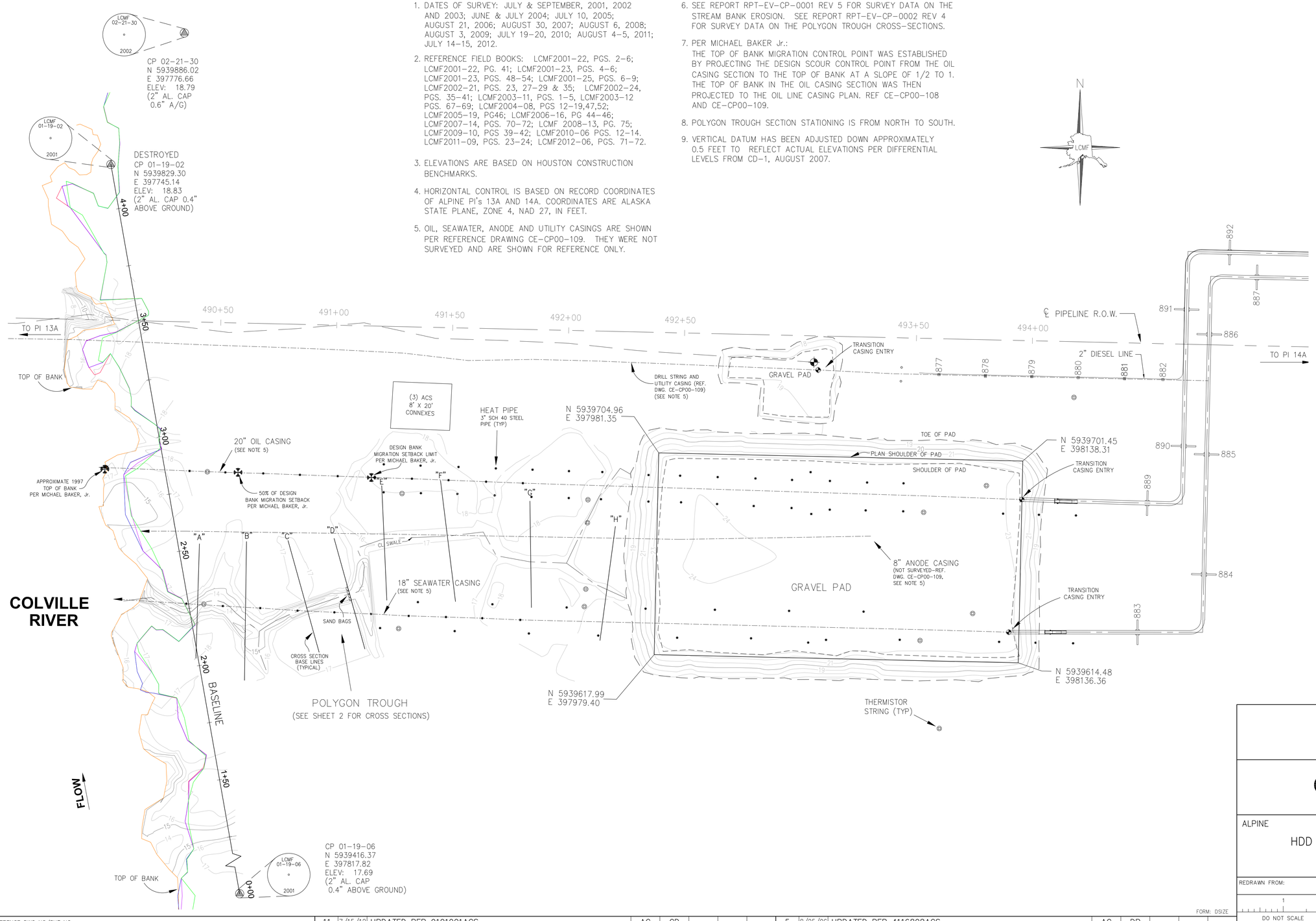
1. DATES OF SURVEY: JULY & SEPTEMBER, 2001, 2002 AND 2003; JUNE & JULY 2004; JULY 10, 2005; AUGUST 21, 2006; AUGUST 30, 2007; AUGUST 6, 2008; AUGUST 3, 2009; JULY 19–20, 2010; AUGUST 4–5, 2011; JULY 14–15, 2012.
2. REFERENCE FIELD BOOKS: LCMF2001–22, PGS. 2–6; LCMF2001–22, PG. 41; LCMF2001–23, PGS. 4–6; 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; LCMF2012–06, PGS. 71–72.
3. ELEVATIONS ARE BASED ON HOUSTON CONSTRUCTION BENCHMARKS.
4. 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.
5. OIL, SEAWATER, ANODE AND UTILITY CASINGS ARE SHOWN PER REFERENCE DRAWING CE–CP00–109. THEY WERE NOT SURVEYED AND ARE SHOWN FOR REFERENCE ONLY.
6. 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.
7. 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.
8. POLYGON TROUGH SECTION STATIONING IS FROM NORTH TO SOUTH.
9. 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
- TOP OF BANK 7/14/12



GRAPHIC SCALE

20 0 10 20 40

(IN FEET)
1 inch = 20 ft.

KUUKPIK LCMF LLC
8102 Edinburgh Ave. Anchorage, Alaska 99518 (907)275-1800
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 OF

1 2 3 4 5 6

DO NOT SCALE | ABOVE SCALE FOR REFERENCE ONLY

DATE:	DRAWN:	DESIGN:	ECM NO:
7/31/01	GD/CZ		A01007ACS
SCALE:	CHECKED:		CC NO:
1"=20'	JZ		
	APPROVAL:		CADD FILE NO.
	CD		01–12–05–1EAST
JOB NO: 02–205	SUB JOB NO:	DRAWING NO: CE–CP00–134	PART: 1 OF 2 / REV: 11

REFERENCE DWG NO/SHT NO:
CE–CP00–109
PD–CP00–130 SHEET 1

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
11	7/15/12	UPDATED PER 9101901ACS	AG	GD			
10	8/5/11	UPDATED PER 8292382ACS	AG	DB			
9	7/21/10	ISSUED PER 7224503ACS	AG	DB			
8	8/5/09	UPDATED PER 6370813ACS	AG	GD			
7	8/6/08	UPDATED PER 5538034ACS	CZ	GD			
6	8/30/07	UPDATED PER 4810351ACS	CZ	DB			
5	8/25/06	UPDATED PER 4116808ACS	AG	DB			
4	7/11/05	UPDATED PER 3391755ACS	CZ	GD			
3	6/27/04	ISSUED PER 2390460ACS	CZ	BD			
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	CZ	JZ			TM
0	7/31/01	ISSUED PER A01007ACS	RLW	JZ			CD

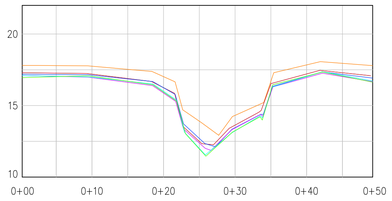
FORM: DSIZE

JOB NO:	SUB JOB NO:	DRAWING NO:
02-205		CE-CP00-134

CROSS SECTIONS, POLYGON TROUGH

HORIZONTAL SCALE = 1"=10' VERTICAL SCALE = 1"=5'

"A"



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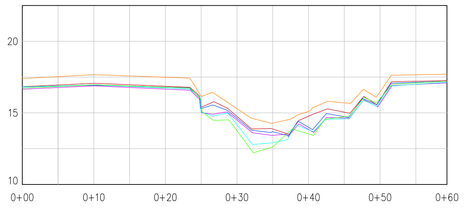

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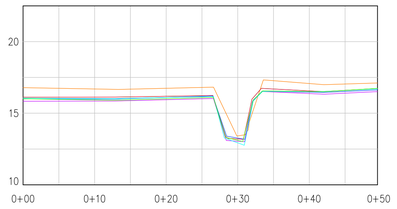

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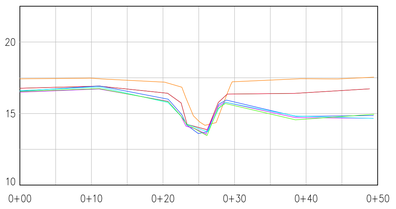

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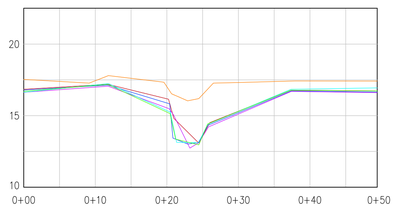

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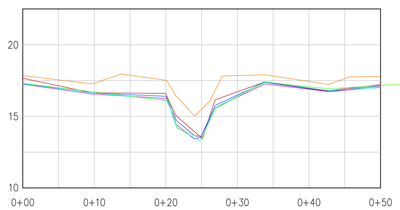

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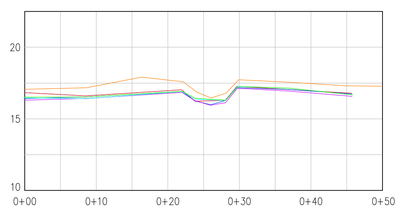
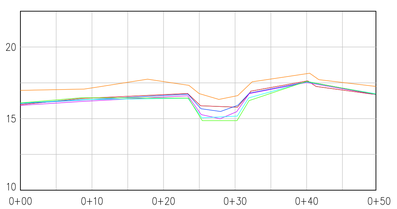


"H"

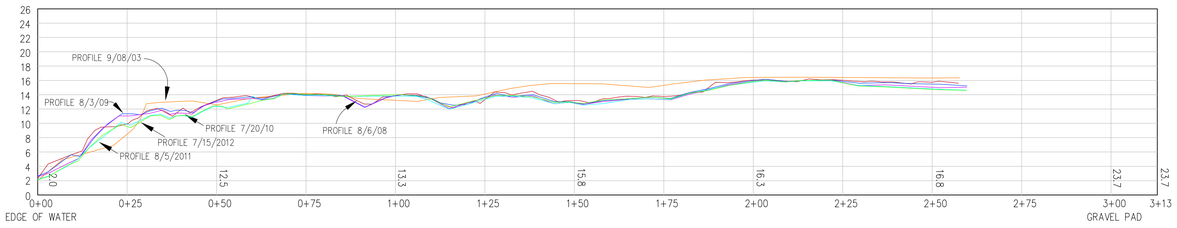


LEGEND

- CROSS SECTION 9/8/03
- CROSS SECTION 8/06/08
- CROSS SECTION 8/03/09
- CROSS SECTION 7/20/10
- CROSS SECTION 8/4/11

CENTERLINE PROFILE, POLYGON TROUGH

HORIZONTAL SCALE = 1"=20' VERTICAL SCALE = 1"=10'



KUUKPIK LCMF LLC
810 E. 82nd Ave. · Anchorage, Alaska 99518 · (907) 273-1830
Alpine Office
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 OF

1 2 3 4 5 6
DO NOT SCALE ABOVE SCALE FOR REFERENCE ONLY

DATE: 12/31/03	DRAWN: GD/CZ	DESIGN:	ECM NO: 2094387ACS	
SCALE: 1"=20'	CHECKED: JZ		CC NO:	
	APPROVAL: COLEGROVE/KANADY		CADD FILE NO. 01-12-05-1EAST	
JOB NO: 02-205	SUB JOB NO:	DRAWING NO: CE-CP00-134	PART: 2 OF 2	REV: 10

FORM: DSIZE

REFERENCE DWG NO/SHT NO:
CE-CP00-109
PD-CP00-130 SHEET 1

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
10	7/16/12	UPDATED PER 9101901ACS	AG	GD			
9	8/5/11	UPDATED PER 8292382ACS	AG	DB			
8	7/21/10	ISSUED PER 7224503ACS	AG	DB			
7	8/6/09	UPDATED PER 6370813ACS	AG	GD			
6	8/6/08	UPDATED PER 5538034ACS	CZ	GD			
5	8/30/07	UPDATED PER 4810351ACS	CZ	DB			
4	8/25/06	UPDATED PER 4116808ACS	AG	DB			
3	7/28/05	UPDATED PER 3391755ACS	CZ	GD			
2	7/9/04	ISSUED PER 2390460ACS	AG	GD			
1	12/31/03	ISSUED PER 2094387ACS	GD	JZ			C/K

Alpine CP 00
HDD East Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations									Description
	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
0+10	-25.3	-25.3	-25.3	-25.3	-25.3	-25.6	-25.6	-23.9	-24.0	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.3	0.0	-1.7	0.1	Incremental Change
	0.0	0.0	0.0	0.0	0.0	0.3	0.3	-1.4	-1.4	Cumulative Change
0+20	-30.9	-30.9	-30.9	-30.9	-30.9	-31.0	-29.1	-29.2	-29.2	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.1	-1.9	0.1	0.0	Incremental Change
	-1.2	-1.2	-1.2	-1.2	-1.2	-1.1	-3.0	-2.9	-2.9	Cumulative Change
0+25	-38.2	-37.0	-37.0	-37.0	-37.0	-34.1	-29.9	-29.2	-29.2	Baseline Offset (In Feet)
	0.0	-1.2	0.0	0.0	0.0	-2.9	-4.2	-0.7	0.0	Incremental Change
	0.0	-1.2	-1.2	-1.2	-1.2	-4.1	-8.3	-9.0	-9.1	Cumulative Change
0+30	-41.1	-36.9	-36.9	-36.9	-36.9	-34.3	-31.4	-29.3	-29.3	Baseline Offset (In Feet)
	0.0	-4.2	0.0	0.0	0.0	-2.6	-2.9	-2.2	0.0	Incremental Change
	0.0	-4.2	-4.2	-4.2	-4.2	-6.8	-9.7	-11.8	-11.8	Cumulative Change
0+40	-37.7	-36.5	-35.1	-35.1	-35.1	-34.8	-34.3	-29.4	-29.4	Baseline Offset (In Feet)
	0.0	-1.2	-1.4	0.0	0.0	-0.3	-0.5	-4.9	0.0	Incremental Change
	0.0	-1.2	-2.6	-2.6	-2.6	-2.9	-3.4	-8.3	-8.2	Cumulative Change
0+50	-30.3	-30.3	-30.3	-30.3	-30.3	-30.3	-30.3	-30.1	-30.1	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	Incremental Change
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	Cumulative Change
0+60	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5	-25.3	-25.4	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.2	0.0	Incremental Change
	-0.5	-0.5	-0.5	-0.5	-0.5	-0.4	-0.5	-2.7	-2.6	Cumulative Change

Alpine CP 00
HDD East Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations									Description
	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
0+65	-23.9	-23.4	-23.4	-23.4	-23.4	-23.4	-23.4	-19.9	-19.9	Baseline Offset (In Feet)
	0.0	-0.5	0.0	0.0	0.0	0.0	0.0	-3.5	0.0	Incremental Change
	-16.0	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-19.9	-19.9	Cumulative Change
0+70	-20.0	-16.2	-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	0.0	Incremental Change
	-12.4	-16.2	-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	-17.8	Baseline Offset (In Feet)
	-0.1	-3.0	0.1	0.0	0.0	0.0	0.0	-0.2	0.0	Incremental Change
	-6.1	-9.1	-9.1	-9.1	-9.1	-9.1	-9.1	-9.3	-9.3	Cumulative Change
0+80	-22.4	-22.4	-22.4	-22.4	-22.4	-22.4	-22.1	-21.7	-21.6	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.4	-0.1	Incremental Change
	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.3	-4.8	-4.8	Cumulative Change
0+90	-27.8	-27.8	-27.2	-27.2	-27.2	-27.2	-26.5	-23.1	-23.1	Baseline Offset (In Feet)
	-1.5	0.0	-0.6	0.0	0.0	0.0	-0.7	-3.4	0.0	Incremental Change
	-1.5	-1.5	-2.0	-2.0	-2.0	-2.0	-2.7	-6.1	-6.1	Cumulative Change
1+00	-26.7	-26.7	-26.7	-26.7	-26.7	-26.7	-25.5	-20.0	-20.0	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-5.5	0.0	Incremental Change
	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-6.7	-6.7	Cumulative Change
1+10	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.7	-23.0	-23.0	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.7	0.0	Incremental Change
	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.9	-2.6	-2.6	Cumulative Change

Alpine CP 00
HDD East Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations									Description
	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
1+15	-20.8	-20.2	-20.2	-20.2	-20.2	-20.2	-20.2	-20.3	-20.3	Baseline Offset (In Feet)
	0.0	-0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	Incremental Change
	-6.8	-7.4	-7.4	-7.4	-7.4	-7.4	-7.4	-7.3	-7.3	Cumulative Change
1+20	-21.4	-18.2	-18.2	-18.2	-18.2	-18.8	-18.5	-18.6	-18.6	Baseline Offset (In Feet)
	0.0	-3.2	0.0	0.0	0.0	0.6	-0.3	0.1	0.0	Incremental Change
	-14.1	-17.3	-17.3	-17.3	-17.3	-16.7	-17.0	-16.9	-16.9	Cumulative Change
1+25	-18.1	-16.4	-16.4	-16.4	-16.4	-16.4	-16.4	-16.1	-16.2	Baseline Offset (In Feet)
	0.0	-1.7	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	Incremental Change
	-20.6	-22.3	-22.3	-22.3	-22.3	-22.3	-22.3	-22.6	-22.6	Cumulative Change
1+30	-17.3	-17.0	-17.0	-17.0	-17.0	-17.0	-17.0	-16.3	-16.3	Baseline Offset (In Feet)
	0.0	-0.3	0.0	0.0	0.0	0.0	0.0	-0.7	0.0	Incremental Change
	-20.5	-20.8	-20.8	-20.8	-20.8	-20.8	-20.8	-21.5	-21.5	Cumulative Change
1+40	-17.1	-15.8	-15.8	-15.8	-15.8	-16.0	-16.0	-15.4	-15.4	Baseline Offset (In Feet)
	0.0	-1.3	0.0	0.0	0.0	0.2	0.0	-0.6	0.0	Incremental Change
	-16.7	-18.1	-18.0	-18.0	-18.0	-17.8	-17.8	-18.5	-18.5	Cumulative Change
1+45	-16.1	-14.3	-14.3	-14.3	-14.3	-14.3	-14.3	-14.1	-14.1	Baseline Offset (In Feet)
	0.0	-1.8	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	Incremental Change
	-12.1	-13.9	-13.9	-13.9	-13.9	-13.9	-13.9	-14.1	-14.1	Cumulative Change
1+50	-13.8	-13.4	-13.4	-13.4	-13.4	-13.4	-13.4	-11.7	-11.7	Baseline Offset (In Feet)
	0.0	-0.4	0.0	0.0	0.0	0.0	0.0	-1.7	0.0	Incremental Change
	-9.9	-10.3	-10.3	-10.3	-10.3	-10.3	-10.3	-12.0	-12.0	Cumulative Change

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HDD East Site
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	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
1+55	-11.5	-7.1	-7.1	-7.1	-7.1	-7.5	-7.5	-7.0	-7.0	Baseline Offset (In Feet)
	0.0	-4.4	0.0	0.0	0.0	0.4	0.0	-0.5	0.0	Incremental Change
	-10.7	-15.1	-15.1	-15.1	-15.1	-14.7	-14.7	-15.2	-15.2	Cumulative Change
1+60	-9.0	-4.2	-4.2	-4.2	-4.2	-4.2	-4.2	-4.4	-4.5	Baseline Offset (In Feet)
	0.0	-4.8	0.0	0.0	0.0	0.0	0.0	0.2	0.0	Incremental Change
	-12.6	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.2	-17.2	Cumulative Change
1+65	-9.7	-6.9	-6.9	-6.9	-6.9	-6.9	-6.9	-7.0	-7.0	Baseline Offset (In Feet)
	-1.7	-2.8	0.1	0.0	0.0	0.0	0.0	0.1	0.0	Incremental Change
	-16.6	-19.4	-19.3	-19.3	-19.3	-19.3	-19.3	-19.2	-19.3	Cumulative Change
1+70	-13.0	-10.8	-10.8	-10.8	-10.8	-10.8	-10.8	-10.0	-10.0	Baseline Offset (In Feet)
	-2.7	-2.2	0.0	0.0	0.0	0.0	0.0	-0.8	0.0	Incremental Change
	-17.1	-19.3	-19.3	-19.3	-19.3	-19.3	-19.3	-20.0	-20.0	Cumulative Change
1+75	-14.4	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0	-10.2	-10.2	Baseline Offset (In Feet)
	-1.7	-2.5	0.0	0.0	0.0	0.0	0.0	-1.8	0.0	Incremental Change
	-16.3	-18.7	-18.7	-18.7	-18.7	-18.7	-18.7	-20.5	-20.5	Cumulative Change
1+80	-13.9	-12.8	-12.8	-12.8	-12.8	-12.8	-12.8	-10.5	-10.5	Baseline Offset (In Feet)
	0.0	-1.1	0.0	0.0	0.0	0.0	0.0	-2.3	0.0	Incremental Change
	-16.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-19.7	-19.8	Cumulative Change
1+85	-12.7	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3	-11.4	-11.4	Baseline Offset (In Feet)
	0.0	-0.4	0.0	0.0	0.0	0.0	0.0	-0.9	0.0	Incremental Change
	-11.8	-12.2	-12.2	-12.2	-12.2	-12.2	-12.2	-13.1	-13.1	Cumulative Change

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HDD East Site
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	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
1+90	-16.9	-16.9	-16.9	-16.9	-16.9	-16.9	-16.6	-16.7	-16.8	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.1	0.1	Incremental Change
	4.1	4.1	4.1	4.1	4.1	4.1	3.8	3.9	4.0	Cumulative Change
1+95	-27.7	-27.7	-26.3	-26.3	-26.3	-26.3	-18.7	-18.7	-18.7	Baseline Offset (In Feet)
	0.0	0.0	-1.4	0.0	0.0	0.0	-7.6	0.0	0.0	Incremental Change
	0.1	0.1	-1.3	-1.3	-1.3	-1.3	-8.9	-9.0	-9.0	Cumulative Change
2+00	-27.8	-27.8	-26.4	-26.4	-26.4	-26.4	-20.4	-20.4	-20.4	Baseline Offset (In Feet)
	0.0	0.0	-1.4	0.0	0.0	0.0	-6.0	0.0	0.0	Incremental Change
	-5.9	-5.9	-7.3	-7.3	-7.3	-7.3	-13.3	-13.3	-13.3	Cumulative Change
2+05	-27.3	-27.3	-26.8	-26.8	-26.8	-26.8	-23.1	-22.5	-22.4	Baseline Offset (In Feet)
	0.0	0.0	-0.5	0.0	0.0	0.0	-3.7	-0.6	0.0	Incremental Change
	-5.6	-5.6	-6.1	-6.1	-6.1	-6.1	-9.8	-10.5	-10.5	Cumulative Change
2+10	-26.0	-26.0	-26.0	-26.0	-26.0	-26.5	-26.0	-24.6	-24.6	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.5	-0.5	-1.4	0.0	Incremental Change
	-7.7	-7.7	-7.7	-7.7	-7.7	-7.2	-7.7	-9.2	-9.2	Cumulative Change
2+15	-23.2	-23.2	-23.2	-23.2	-23.7	-23.7	-23.7	-23.8	-23.8	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.0	Incremental Change
	-11.7	-11.7	-11.7	-11.7	-11.2	-11.2	-11.2	-11.1	-11.1	Cumulative Change
2+20	-20.4	-17.4	-17.3	-17.3	-17.3	-18.2	-18.2	-17.5	-17.4	Baseline Offset (In Feet)
	-0.6	-3.0	0.0	0.0	0.0	0.9	0.0	-0.7	0.0	Incremental Change
	-14.0	-17.0	-17.1	-17.1	-17.1	-16.2	-16.2	-16.9	-17.0	Cumulative Change

Alpine CP 00
HDD East Site
Streambank Monitor

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	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
2+25	-5.2	-5.2	-5.2	-1.0	-1.0	-1.0	-1.0	-1.1	-1.1	Baseline Offset (In Feet)
	-2.9	0.0	0.0	-4.2	0.0	0.0	0.0	0.1	0.0	Incremental Change
	-26.8	-26.8	-26.8	-31.0	-31.0	-31.0	-31.0	-31.0	-30.9	Cumulative Change
2+30	-2.4	-2.4	-2.4	-2.4	-2.4	-2.8	-2.8	-3.0	-3.0	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.2	0.0	Incremental Change
	-21.0	-21.0	-21.0	-21.0	-21.0	-20.6	-20.6	-20.5	-20.4	Cumulative Change
2+35	-7.1	-7.1	-7.1	-7.1	-7.1	-7.9	-7.9	-8.1	-8.1	Baseline Offset (In Feet)
	0.1	0.0	0.0	0.0	0.0	0.8	0.0	0.2	0.0	Incremental Change
	-13.5	-13.5	-13.5	-13.5	-13.5	-12.7	-12.7	-12.5	-12.5	Cumulative Change
2+40	-8.3	-8.3	-8.3	-8.3	-8.2	-8.2	-8.2	-8.5	-8.5	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.3	0.0	Incremental Change
	-10.8	-10.8	-10.9	-10.9	-11.0	-11.0	-11.0	-10.6	-10.6	Cumulative Change
2+50	-14.6	-14.6	-13.6	-13.3	-13.3	-13.3	-13.3	-10.6	-10.6	Baseline Offset (In Feet)
	0.0	0.0	-1.0	-0.3	0.0	0.0	0.0	-2.7	0.0	Incremental Change
	-7.2	-7.2	-8.2	-8.5	-8.5	-8.5	-8.5	-11.2	-11.2	Cumulative Change
2+60	-20.5	-19.8	-17.7	-17.7	-17.7	-17.4	-16.3	-14.2	-14.2	Baseline Offset (In Feet)
	-0.1	-0.7	-2.1	0.0	0.0	-0.3	-1.1	-2.1	0.0	Incremental Change
	-6.0	-6.7	-8.8	-8.8	-8.8	-9.1	-10.2	-12.3	-12.3	Cumulative Change
2+70	-20.8	-20.8	-20.6	-20.0	-20.0	-20.0	-17.4	-17.7	-17.6	Baseline Offset (In Feet)
	0.0	0.0	-0.2	-0.6	0.0	0.0	-2.6	0.3	0.0	Incremental Change
	-9.6	-9.6	-9.8	-10.4	-10.4	-10.4	-13.0	-12.8	-12.8	Cumulative Change

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HDD East Site
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	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
2+75	-20.9	-20.8	-19.7	-19.7	-19.7	-19.4	-17.6	-17.5	-17.5	Baseline Offset (In Feet)
	0.0	-0.1	-1.1	0.0	0.0	-0.3	-1.8	-0.1	0.0	Incremental Change
	-10.5	-10.6	-11.7	-11.7	-11.7	-12.0	-13.8	-13.9	-13.9	Cumulative Change
2+85	-22.8	-20.4	-17.9	-17.9	-17.9	-17.9	-17.9	-17.2	-17.2	Baseline Offset (In Feet)
	0.0	-2.4	-2.5	0.0	0.0	0.0	0.0	-0.7	0.0	Incremental Change
	-4.1	-6.5	-9.1	-9.0	-9.0	-9.0	-9.0	-9.7	-9.7	Cumulative Change
2+90	-21.3	-21.3	-17.3	-16.5	-15.1	-15.1	-12.0	-8.7	-8.8	Baseline Offset (In Feet)
	-0.1	0.0	-4.1	-0.8	-1.4	0.0	-3.1	-3.3	0.0	Incremental Change
	-3.2	-3.2	-7.2	-8.0	-9.4	-9.4	-12.5	-15.8	-15.7	Cumulative Change
3+00	-6.0	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1	Baseline Offset (In Feet)
	0.0	-6.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0	Incremental Change
	-3.1	-9.4	-9.4	-9.4	-9.4	-9.4	-9.4	-9.2	-9.2	Cumulative Change
3+10	-11.4	-6.9	-5.2	-5.2	-5.2	-5.0	-5.0	-5.3	-5.2	Baseline Offset (In Feet)
	0.0	-4.4	-1.7	0.0	0.0	-0.2	0.0	0.3	-0.1	Incremental Change
	-0.1	-4.5	-6.2	-6.2	-6.2	-6.4	-6.4	-6.2	-6.2	Cumulative Change
3+15	-15.9	-10.5	-9.6	-9.6	-9.6	-9.6	-9.6	-9.5	-9.6	Baseline Offset (In Feet)
	0.0	-5.4	-0.9	0.0	0.0	0.0	0.0	-0.1	0.0	Incremental Change
	-0.3	-5.7	-6.6	-6.6	-6.6	-6.6	-6.6	-6.7	-6.6	Cumulative Change
3+20	-11.8	-11.8	-8.9	-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	0.0	Incremental Change
	-4.1	-4.1	-7.0	-7.0	-7.0	-7.0	-7.0	-7.1	-7.1	Cumulative Change

Alpine CP 00
HDD East Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations									Description
	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
3+25	-11.1	-10.3	-9.5	-9.5	-9.5	-9.5	-9.5	-9.6	-9.6	Baseline Offset (In Feet)
	0.0	-0.8	-0.8	0.0	0.0	0.0	0.0	0.1	0.0	Incremental Change
	-6.0	-6.8	-7.6	-7.6	-7.6	-7.6	-7.6	-7.5	-7.5	Cumulative Change
3+30	-11.5	-11.2	-11.2	-11.2	-11.2	-11.2	-11.0	-11.0	-11.0	Baseline Offset (In Feet)
	0.0	-0.3	0.0	0.0	0.0	0.0	-0.2	0.0	0.0	Incremental Change
	-23.9	-24.2	-24.2	-24.2	-24.2	-24.2	-24.4	-24.4	-24.4	Cumulative Change
3+35	-23.5	-23.5	-23.5	-23.5	-23.5	-24.6	-24.6	-12.7	-12.7	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	1.1	0.0	-11.9	0.0	Incremental Change
	-12.2	-12.2	-12.2	-12.2	-12.2	-11.1	-11.1	-23.0	-23.0	Cumulative Change
3+40	-25.4	-25.4	-25.4	-25.4	-25.4	-25.4	-25.4	-18.9	-18.9	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.5	0.0	Incremental Change
	-8.8	-8.8	-8.8	-8.8	-8.8	-8.8	-8.8	-15.3	-15.3	Cumulative Change
3+45	-26.4	-24.1	-24.1	-24.1	-24.1	-24.6	-24.6	-17.0	-17.0	Baseline Offset (In Feet)
	-1.0	-2.3	0.0	0.0	0.0	0.5	0.0	-7.6	0.0	Incremental Change
	-6.0	-8.3	-8.3	-8.3	-8.3	-7.8	-7.8	-15.4	-15.4	Cumulative Change
3+52	-8.4	-8.4	2.4	2.4	2.4	3.1	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	0.0	Incremental Change
	-1.7	-1.7	-12.5	-12.5	-12.5	-13.2	-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	3.1	Baseline Offset (In Feet)
	-0.4	0.0	-13.8	0.0	0.0	0.0	0.0	0.1	0.0	Incremental Change
	-1.1	-1.1	-14.9	-14.9	-14.9	-14.9	-14.9	-15.0	-15.0	Cumulative Change

Alpine CP 00
HDD East Site
Streambank Monitor

Baseline Station	Streambank Monitor - Top of Bank Locations See Drawing CE-CP00-134 Rev 10 for Survey Baseline Stations									Description
	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
3+65	-18.4	-18.4	-3.3	-13.8	-13.8	-13.8	-13.8	-13.9	-13.9	Baseline Offset (In Feet)
	-0.3	0.0	-15.1	10.5	0.0	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	-5.0	Cumulative Change
3+70	-24.1	-21.2	-9.6	-11.9	-11.9	-11.9	-11.9	-12.0	-12.0	Baseline Offset (In Feet)
	0.1	-2.9	-11.6	2.3	0.0	0.0	0.0	0.1	0.0	Incremental Change
	0.2	-2.8	-14.3	-12.0	-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	-10.1	Baseline Offset (In Feet)
	0.0	-0.9	-8.0	-1.2	0.0	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	-13.1	Cumulative Change
3+80	-11.6	-11.6	-9.0	-9.0	-9.0	-9.0	-9.0	-8.9	-8.9	Baseline Offset (In Feet)
	-1.3	0.0	-2.6	0.0	0.0	0.0	0.0	-0.1	0.0	Incremental Change
	-8.0	-8.0	-10.6	-10.6	-10.6	-10.6	-10.6	-10.7	-10.7	Cumulative Change
3+85	-12.0	-12.0	-11.1	-11.1	-11.1	-11.1	-11.1	-10.6	-10.6	Baseline Offset (In Feet)
	-0.3	0.0	-0.9	0.0	0.0	0.0	0.0	-0.5	0.0	Incremental Change
	-7.9	-7.9	-8.9	-8.8	-8.8	-8.8	-8.8	-9.4	-9.3	Cumulative Change
3+95	-21.9	-21.9	-16.1	-16.1	-16.1	-16.1	-16.1	-14.1	-14.1	Baseline Offset (In Feet)
	-0.5	0.0	-5.8	0.0	0.0	0.0	0.0	-2.0	0.0	Incremental Change
	-4.2	-4.2	-10.1	-10.0	-10.0	-10.0	-10.0	-12.0	-12.0	Cumulative Change
4+00	-21.9	-21.9	-18.6	-18.6	-18.6	-18.6	-18.6	-15.9	-15.9	Baseline Offset (In Feet)
	0.7	0.0	-3.3	0.0	0.0	0.0	0.0	-2.7	0.0	Incremental Change
	-8.0	-8.0	-11.3	-11.3	-11.3	-11.3	-11.3	-14.0	-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									
	06/19/2004	07/10/2005	08/21/2006	08/30/2007	08/06/2008	08/03/2009	07/20/2010	08/04/2011	07/14/2012	Date
4+05	-19.5	-19.5	-21.7	-21.7	-21.7	-21.3	-21.3	-20.4	-20.5	Baseline Offset (In Feet)
	0.0	0.0	2.2	0.0	0.0	-0.4	0.0	-0.9	0.0	Incremental Change
	-10.3	-10.3	-8.1	-8.1	-8.1	-8.5	-8.5	-9.4	-9.4	Cumulative Change
4+15	2.6	2.6	2.7	2.7	2.5	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	0.0	Incremental Change
	-33.3	-33.3	-33.4	-33.4	-33.2	-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	4.6	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	Incremental Change
	-13.7	-13.7	-13.7	-13.7	-13.7	-13.3	-13.3	-13.3	-13.2	Cumulative Change
4+35	4.5	4.5	4.5	4.5	4.5	4.9	4.9	5.0	4.9	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	-0.4	0.0	0.1	0.0	Incremental Change
	-10.0	-10.0	-10.1	-10.1	-10.1	-10.5	-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	1.6	Baseline Offset (In Feet)
	-0.7	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	Incremental Change
	-7.0	-7.0	-7.0	-7.0	-7.0	-6.7	-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	5.0	Baseline Offset (In Feet)
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	Incremental Change
	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-10.4	-11.3	-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

Baseline Station	Point Description	Subsidence Monitor - Cross-Section A								Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		07/14/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+00	**Tundra**	17.0								Elevation (In Feet)
		-0.1								Incremental Change
		-0.9								Cumulative Change
0+09	**Tundra**	17.1								Elevation (In Feet)
		0.1								Incremental Change
		-0.8								Cumulative Change
0+18	**Tundra**	16.5								Elevation (In Feet)
		-0.1								Incremental Change
		-1.2								Cumulative Change
0+21	**Top Bank**	15.3								Elevation (In Feet)
		-0.1								Incremental Change
		-1.5								Cumulative Change
0+22.5	**Gradebreak**	13.0								Elevation (In Feet)
		-0.1								Incremental Change
		-2.4								Cumulative Change
0+25	**Toe Bank**	11.5								Elevation (In Feet)
		-0.1								Incremental Change
		-2.1								Cumulative Change
0+27	**CL Swale**	11.1								Elevation (In Feet)
		-0.1								Incremental Change
		-2.2								Cumulative Change
0+29	**Toe Bank**	13.1								Elevation (In Feet)
		0.1								Incremental Change
		-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								
		07/14/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+34	**Gradebreak**	14.0								Elevation (In Feet)
		-0.2								Incremental Change
		-1.6								Cumulative Change
0+35	**Top Bank**	16.5								Elevation (In Feet)
		0.2								Incremental Change
		-1.2								Cumulative Change
0+42	**Tundra**	17.3								Elevation (In Feet)
		0.0								Incremental Change
		-1.0								Cumulative Change
0+50	**Tundra**	16.6								Elevation (In Feet)
		-0.1								Incremental Change
		-1.4								Cumulative Change
*****Note: Baseline Stationing Runs from North to South along Cross-Sections.**										
*****Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflet Actual Elevation per Differential Levels from CD-1, ran August 2007**										

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								
		07/14/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+00	Tundra	16.7								Elevation (In Feet)
		-0.1								Incremental Change
		-0.8								Cumulative Change
0+10	Tundra	17.0								Elevation (In Feet)
		0.0								Incremental Change
		-0.9								Cumulative Change
0+23	Tundra	16.7								Elevation (In Feet)
		0.1								Incremental Change
		-0.8								Cumulative Change
0+25	Top of Bank	15.1								Elevation (In Feet)
		0.0								Incremental Change
		-2.1								Cumulative Change
0+27	Gradebreak	14.5								Elevation (In Feet)
		-0.3								Incremental Change
		-2.2								Cumulative Change
0+32	Toe Bank	12.2								Elevation (In Feet)
		-0.6								Incremental Change
		-2.0								Cumulative Change
0+35	CL Swale	12.6								Elevation (In Feet)
		-1.2								Incremental Change
		-1.8								Cumulative Change
0+37	Toe Bank	n/a								Elevation (In Feet)
		#VALUE!								Incremental Change
		#VALUE!								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								
		07/14/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+38	**Gradebreak**	13.9								Elevation (In Feet)
		-0.3								Incremental Change
		-1.3								Cumulative Change
0+40	**Gradebreak**	13.4								Elevation (In Feet)
		-0.3								Incremental Change
		-1.1								Cumulative Change
0+42	**Gradebreak**	14.6								Elevation (In Feet)
		0.0								Incremental Change
		-1.3								Cumulative Change
0+49	**Gradebreak**	15.7								Elevation (In Feet)
		0.2								Incremental Change
		-0.5								Cumulative Change
0+52	**Top Bank**	17.0								Elevation (In Feet)
		0.1								Incremental Change
		-0.3								Cumulative Change
0+60	**Tundra**	17.2								Elevation (In Feet)
		0.1								Incremental Change
		-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 reflet Actual Elevation per Differential Levels from CD-1, ran August 2007**

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								
		07/14/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+00	**Tundra**	16.0								Elevation (In Feet)
		0.0								Incremental Change
		-0.9								Cumulative Change
0+13	**Tundra**	15.9								Elevation (In Feet)
		-0.1								Incremental Change
		-0.9								Cumulative Change
0+27	**Top Bank**	16.1								Elevation (In Feet)
		-0.1								Incremental Change
		-0.9								Cumulative Change
0+29	**Toe Bank**	13.3								Elevation (In Feet)
		0.0								Incremental Change
		0.5								Cumulative Change
0+31	**Toe Bank**	13.0								Elevation (In Feet)
		0.3								Incremental Change
		-0.9								Cumulative Change
0+32	**Gradebreak**	15.9								Elevation (In Feet)
		0.1								Incremental Change
		-0.8								Cumulative Change
0+33	**Top Bank**	16.6								Elevation (In Feet)
		0.0								Incremental Change
		-0.7								Cumulative Change
0+42	**Tundra**	16.5								Elevation (In Feet)
		0.0								Incremental Change
		-0.5								Cumulative Change

Alpine CP 00
HDD East Site
Subsidence Monitor - Seawater Line

Baseline	Point	Subsidence Monitor - Cross-Section C								Description
Station	Description	See Drawing CE-CP00-134 for Survey Cross-Section Locations								
		07/14/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+50	Tundra	16.8								Elevation (In Feet)
		0.0								Incremental Change
		-0.4								Cumulative Change
***Note: Baseline Stationing Runs from North to South along Cross-Sections.										
***Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflet Actual Elevation per Differential Levels from CD-1, ran August 2007										

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								
		07/15/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+00	Tundra	16.5								Elevation (In Feet)
		-0.1								Incremental Change
		-1.1								Cumulative Change
0+10	Tundra	16.7								Elevation (In Feet)
		-0.1								Incremental Change
		-1.0								Cumulative Change
0+20	Gradebreak	15.8								Elevation (In Feet)
		0.1								Incremental Change
		-0.8								Cumulative Change
0+22	Top Bank	14.8								Elevation (In Feet)
		0.0								Incremental Change
		-2.0								Cumulative Change
0+24	Toe Bank	14.3								Elevation (In Feet)
		0.0								Incremental Change
		-0.4								Cumulative Change
0+25	CL Swale	13.5								Elevation (In Feet)
		0.1								Incremental Change
		-0.6								Cumulative Change
0+27	Toe Bank	15.4								Elevation (In Feet)
		0.0								Incremental Change
		1.0								Cumulative Change
0+29	Top Bank	15.7								Elevation (In Feet)
		-0.1								Incremental Change
		-1.6								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								
		07/15/2012	Future	Future	Future	Future	Future	Future	Future	Date
0+38	**Tundra**	14.6								Elevation (In Feet)
		-0.3								Incremental Change
		-3.0								Cumulative Change
0+50	**Tundra**	15.0								Elevation (In Feet)
		0.3								Incremental Change
		-2.8								Cumulative Change
*****Note: Baseline Stationing Runs from North to South along Cross-Sections.**										
*****Note: Vertical Datum Adjusted Down Approximately 0.5 feet to reflet Actual Elevation per Differential Levels from CD-1, ran August 2007**										

Alpine CP 00
HDD East Site
Subsidence Monitor - Seawater Line

Baseline Station	Point Description	Subsidence Monitor - Cross-Section E										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+00	Tundra	17.5	17.5	17.4	17.5	16.8	16.8	16.8	16.6	16.6	16.7	Elevation (In Feet)
			0.0	-0.1	0.1	-0.7	0.0	-0.1	-0.2	0.0	0.1	Incremental Change
			0.0	-0.1	0.0	-0.7	-0.7	-0.7	-0.9	-0.9	-0.8	Cumulative Change
0+9	Tundra	17.3	17.3	17.3	17.8	17.1	N/A	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	17.2	Elevation (In Feet)
			0.0	-0.4	0.5	-0.7	0.1	-0.1	0.0	0.1	-0.1	Incremental Change
			0.0	-0.4	0.1	-0.6	-0.6	-0.7	-0.7	-0.6	-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	15.1	Elevation (In Feet)
			0.0	0.0	0.0	-1.1	-0.4	0.0	-0.3	-0.3	-0.1	Incremental Change
			0.0	0.0	0.0	-1.1	-1.5	-1.5	-1.8	-2.1	-2.2	Cumulative Change
0+21	Toe Bank	16.5	16.5	16.5	16.2	14.8	14.3	13.4	15.0	13.1	13.4	Elevation (In Feet)
			0.0	0.0	-0.3	-1.4	-0.5	-0.9	1.6	-1.9	0.2	Incremental Change
			0.0	0.0	-0.3	-1.7	-2.2	-3.1	-1.5	-3.4	-3.1	Cumulative Change
0+23	CL Swale	16.0	16.0	16.0	14.7	13.8	13.2	13.0	12.7	12.8	12.9	Elevation (In Feet)
			0.0	0.0	-1.3	-0.9	-0.6	-0.2	-0.3	0.1	0.2	Incremental Change
			0.0	0.0	-1.3	-2.2	-2.8	-3.0	-3.3	-3.3	-3.1	Cumulative Change
0+24	Toe Bank	16.2	16.4	16.3	14.8	13.1	13.8	13.1	13.1	13.1	13.0	Elevation (In Feet)
			0.2	-0.1	-1.5	-1.7	0.7	-0.7	0.0	0.0	-0.1	Incremental Change
			0.2	0.1	-1.4	-3.1	-2.4	-3.1	-3.1	-3.1	-3.2	Cumulative Change
0+27	Top Bank	17.3	17.4	17.4	16.3	14.5	14.5	14.3	14.2	14.4	14.4	Elevation (In Feet)
			0.1	0.0	-1.2	-1.8	0.0	-0.2	-0.1	0.2	0.0	Incremental Change
			0.1	0.1	-1.1	-2.8	-2.8	-3.0	-3.1	-2.9	-2.9	Cumulative Change

Alpine CP 00
HDD East Site
Subsidence Monitor - Seawater Line

Baseline Station	Point Description	Subsidence Monitor - Cross-Section E										Description
		See Drawing CE-CP00-134 for Survey Cross-Section Locations										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+38	**Tundra**	17.4	17.4	17.5	17.5	16.8	16.8	16.7	16.7	16.8	16.8	Elevation (In Feet)
			0.0	0.1	0.0	-0.7	0.0	-0.1	0.0	0.1	-0.1	Incremental Change
			0.0	0.1	0.1	-0.6	-0.6	-0.7	-0.7	-0.6	-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	16.7	Elevation (In Feet)
			0.0	0.0	0.0	-0.7	0.1	-0.1	0.0	0.3	-0.2	Incremental Change
			0.0	0.0	0.0	-0.7	-0.6	-0.8	-0.8	-0.5	-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 reflet Actual Elevation per Differential Levels from CD-1, ran August 2007**												

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										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+00	Tundra	17.9	17.9	18.2	18.3	17.7	17.7	17.3	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	0.0	Incremental Change
			0.0	0.3	0.4	-0.2	-0.2	-0.6	-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	16.7	Elevation (In Feet)
			-0.1	0.0	0.1	-0.7	0.0	0.0	0.0	0.0	0.1	Incremental Change
			-0.1	-0.1	0.0	-0.7	-0.7	-0.7	-0.7	-0.7	-0.6	Cumulative Change
0+14	Gradebreak	18.0	18.0	18.0	18.0	16.6	N/A	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	16.1	Elevation (In Feet)
			0.0	0.1	0.0	-1.0	0.0	-0.2	-0.1	-0.2	0.0	Incremental Change
			0.0	0.1	0.1	-0.9	-0.9	-1.1	-1.2	-1.4	-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	14.2	Elevation (In Feet)
			-0.2	0.0	-0.3	-0.9	-0.1	-0.3	-0.3	-0.2	-0.1	Incremental Change
			-0.2	-0.2	-0.5	-1.4	-1.5	-1.8	-2.1	-2.3	-2.4	Cumulative Change
0+24	CL Swale	15.0	12.5	15.0	13.8	13.4	13.7	13.7	13.4	13.4	13.7	Elevation (In Feet)
			-2.5	2.5	-1.2	-0.4	0.3	0.0	-0.3	0.0	0.3	Incremental Change
			-2.5	0.0	-1.2	-1.6	-1.4	-1.4	-1.6	-1.6	-1.3	Cumulative Change
0+26	Toe Bank	16.1	12.5	13.1	13.6	15.2	13.6	15.8	13.5	13.3	13.4	Elevation (In Feet)
			-3.6	0.6	0.5	1.6	-1.6	2.2	-2.3	-0.2	0.2	Incremental Change
			-3.6	-3.0	-2.5	-0.9	-2.5	-0.3	-2.6	-2.8	-2.7	Cumulative Change
0+28	Top Bank	17.8	17.9	17.9	17.3	16.4	16.1	16.2	15.6	15.6	15.6	Elevation (In Feet)
			0.1	0.0	-0.6	-0.9	-0.3	0.1	-0.6	0.0	0.0	Incremental Change
			0.1	0.1	-0.5	-1.4	-1.7	-1.6	-2.2	-2.2	-2.3	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										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+34	Gradebreak	17.9	17.9	18.0	18.0	17.4	17.5	17.4	17.3	17.4	17.4	Elevation (In Feet)
			0.0	0.1	0.0	-0.6	0.1	-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	-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	16.9	Elevation (In Feet)
			0.1	-0.1	0.2	-0.6	0.0	-0.1	0.0	0.1	0.1	Incremental Change
			0.1	0.0	0.2	-0.4	-0.4	-0.5	-0.5	-0.4	-0.3	Cumulative Change
0+46	Gradebreak	17.8	17.8	17.8	17.6	17.0	N/A	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	17.3	Elevation (In Feet)
			0.1	0.0	0.1	-0.7	0.1	-0.1	-0.2	0.0	0.2	Incremental Change
			0.1	0.1	0.2	-0.5	-0.4	-0.5	-0.7	-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 reflet Actual Elevation per Differential Levels from CD-1, ran August 2007												

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										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+00	Tundra	17.1	17.3	17.4	17.5	16.8	16.9	16.4	16.3	16.5	16.5	Elevation (In Feet)
			0.2	0.1	0.1	-0.7	0.1	-0.5	-0.1	0.2	0.1	Incremental Change
			0.2	0.3	0.4	-0.3	-0.2	-0.7	-0.8	-0.6	-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	16.5	Elevation (In Feet)
			-0.1	0.1	0.1	-0.7	0.3	-0.4	-0.1	0.0	0.1	Incremental Change
			-0.1	0.0	0.1	-0.6	-0.3	-0.7	-0.8	-0.8	-0.7	Cumulative Change
0+16	Gradebreak	17.9	17.9	17.9	17.5	16.8	N/A	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	16.9	Elevation (In Feet)
			0.1	0.0	0.1	-0.8	0.1	-0.1	0.0	0.0	0.0	Incremental Change
			0.1	0.1	0.1	-0.6	-0.5	-0.7	-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	16.4	Elevation (In Feet)
			0.1	0.0	0.0	-0.8	0.1	0.0	0.1	0.1	0.0	Incremental Change
			0.1	0.1	0.1	-0.7	-0.6	-0.7	-0.6	-0.5	-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	16.0	Elevation (In Feet)
			0.0	0.0	0.0	-0.2	-0.2	-0.1	0.0	-0.1	0.1	Incremental Change
			0.0	0.0	0.0	-0.2	-0.4	-0.5	-0.5	-0.6	-0.5	Cumulative Change
0+28	Toe Bank	16.8	16.7	16.9	16.9	16.3	16.3	16.3	16.1	16.3	16.3	Elevation (In Feet)
			-0.1	0.2	0.0	-0.6	-0.1	0.0	-0.2	0.2	0.0	Incremental Change
			-0.1	0.1	0.1	-0.5	-0.6	-0.5	-0.7	-0.5	-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	17.3	Elevation (In Feet)
			0.1	0.0	0.1	-0.6	0.0	-0.1	-0.1	0.2	0.0	Incremental Change
			0.1	0.1	0.2	-0.4	-0.4	-0.5	-0.6	-0.4	-0.4	Cumulative Change

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										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+37	Tundra	17.6	17.6	17.6	17.7	17.0	17.3	17.1	16.9	17.1	17.2	Elevation (In Feet)
			0.0	0.0	0.1	-0.7	0.3	-0.2	-0.2	0.2	0.0	Incremental Change
			0.0	0.0	0.1	-0.6	-0.3	-0.6	-0.7	-0.5	-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	16.7	Elevation (In Feet)
			0.0	0.0	0.1	-0.6	0.0	-0.1	-0.1	0.1	0.0	Incremental Change
			0.0	0.0	0.1	-0.5	-0.5	-0.6	-0.7	-0.6	-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 reflet Actual Elevation per Differential Levels from CD-1, ran August 2007												

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										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+00	Tundra	17.0	16.8	16.6	16.7	16.0	16.0	16.1	15.9	16.1	16.1	Elevation (In Feet)
			-0.2	-0.2	0.1	-0.7	0.0	0.1	-0.2	0.2	0.0	Incremental Change
			-0.2	-0.4	-0.3	-1.0	-1.0	-0.9	-1.1	-0.9	-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	16.5	Elevation (In Feet)
			-0.2	0.0	0.1	-0.6	0.1	-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	-0.6	Cumulative Change
0+18	Gradebreak	17.8	17.8	17.8	17.3	16.6	N/A	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	16.4	Elevation (In Feet)
			0.1	0.0	0.1	-0.6	0.0	-0.1	-0.1	-0.2	0.0	Incremental Change
			0.1	0.1	0.1	-0.5	-0.5	-0.6	-0.7	-0.9	-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	14.9	Elevation (In Feet)
			-0.4	0.2	0.0	-0.7	0.0	-0.3	-0.4	-0.2	-0.2	Incremental Change
			-0.4	-0.2	-0.2	-0.9	-0.9	-1.1	-1.5	-1.7	-1.9	Cumulative Change
0+28	CL Swale	16.3	16.3	16.3	16.3	15.8	15.6	15.5	15.0	14.8	14.7	Elevation (In Feet)
			0.0	0.0	0.0	-0.5	-0.3	-0.1	-0.5	-0.2	-0.1	Incremental Change
			0.0	0.0	0.0	-0.5	-0.8	-0.8	-1.3	-1.5	-1.6	Cumulative Change
0+30	Toe Bank	16.6	16.6	16.4	16.5	15.8	15.9	15.9	15.5	15.2	14.9	Elevation (In Feet)
			0.0	-0.2	0.1	-0.7	0.1	0.0	-0.4	-0.3	-0.3	Incremental Change
			0.0	-0.2	-0.1	-0.8	-0.7	-0.7	-1.1	-1.4	-1.7	Cumulative Change
0+32	Top Bank	17.6	17.7	17.6	17.6	16.9	17.0	16.8	16.8	16.5	16.3	Elevation (In Feet)
			0.1	-0.1	0.0	-0.7	0.1	-0.2	0.0	-0.4	-0.2	Incremental Change
			0.1	0.0	0.0	-0.7	-0.6	-0.8	-0.8	-1.2	-1.3	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										
		09/08/2003	07/09/2004	07/28/2005	08/21/2006	08/30/2007	08/07/2008	08/03/2009	07/19/2010	08/04/2011	07/15/2012	Date
0+40	Gradebreak	18.2	18.2	18.2	18.3	17.6	17.7	17.6	17.5	17.6	17.6	Elevation (In Feet)
			0.0	0.0	0.1	-0.7	0.1	-0.1	-0.1	0.1	0.0	Incremental Change
			0.0	0.0	0.1	-0.6	-0.5	-0.6	-0.7	-0.6	-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	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	16.7	Elevation (In Feet)
			0.0	0.1	0.1	-0.7	0.0	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	-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 reflet Actual Elevation per Differential Levels from CD-1, ran August 2007												

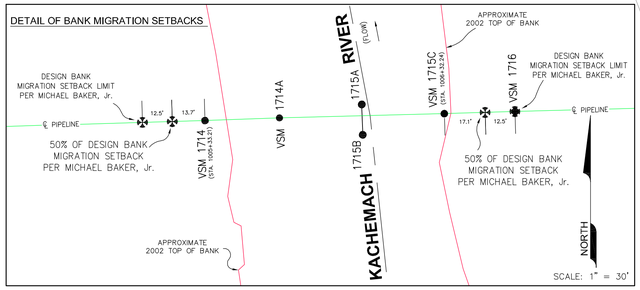
Appendix D Kachemach Bank Erosion Survey

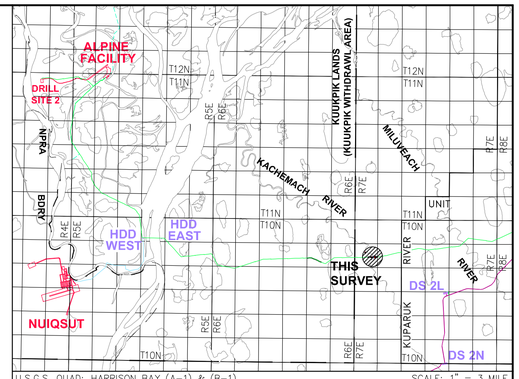
JOB NO:	SUB JOB NO:	DRAWING NO:
02-205		CE-CP00-145

NOTES:

1. DATES OF SURVEY: APRIL 2002 – AUGUST 2002. JULY 11, 2003. JULY 17, 2004; AUGUST 3 & 4, 2005. AUGUST 14, 2006; AUGUST 29, 2007; JULY 22, 2012.
2. REFERENCE FIELD BOOKS: LCMF2002-17, PGS. 37-39, & 44; LCMF2002-23, PG. 22; LCMF2003-11, PGS. 15-17; LCMF2004-08, PGS 56-60; LCMF2005-21, PGS. 13 & 22; LCMF2006-12. PG 58; LCMF2007-14, PG. 67; LCMF2012-08, PGS. 11-13.
3. VERTICAL CONTROL IS BASED ON AS-BUILT TOP OF STEEL ELEVATIONS AT VSM 1712, 1713 AND 1724 PER DRAWING PD-CP00-109, SHEETS 31 AND 32.
4. HORIZONTAL CONTROL IS BASED ON RECORD COORDINATES OF ALPINE PIPELINE PI 13A AND ALPINE MONUMENT No, 19. COORDINATES ARE ALASKA STATE PLANE, ZONE 4, NAD 27, IN FEET.
5. SEE DOCUMENT RPT-EV-CP-00007 FOR STREAM BANK EROSION BASELINE SURVEY DATA.
6. VSM 1714A AND 1715C (identified as 1715A and 1715B during construction) DO NOT HAVE SUFFICIENT DEPTH TO MEET SCOUR DESIGN. THE PIPELINE SADDLES ARE UNBOLTED TO ENSURE NO PIPELINE DAMAGE SHOULD THE VSM FAIL DURING A SCOUR EVENT.

DETAIL OF BANK MIGRATION SETBACKS

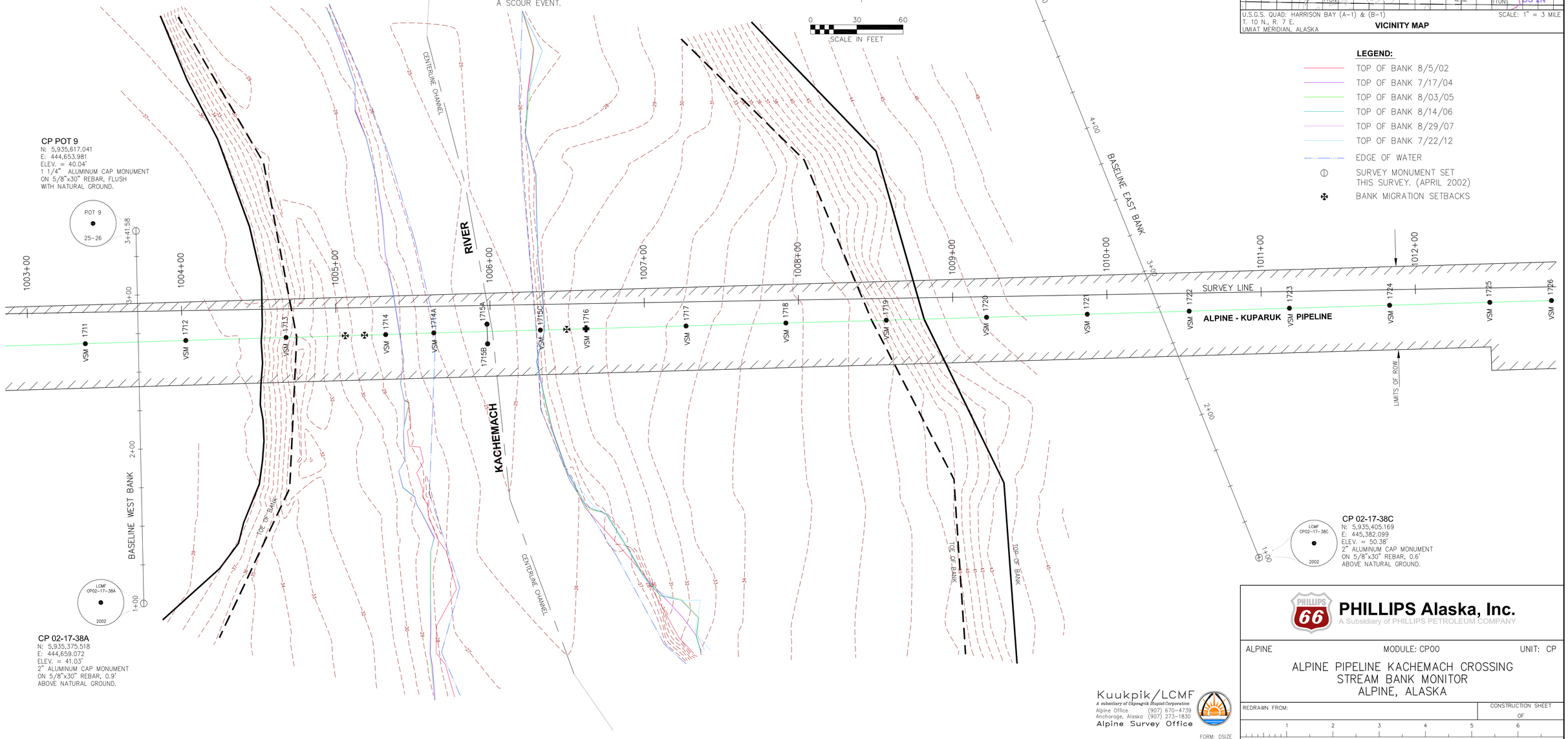




U.S.G.S. QUAD: HARRISON BAY (A-1) & (B-1)
T. 10 N., R. 7 E.,
UMIAT MERIDIAN, ALASKA

SCALE: 1" = 3 MILE

VICINITY MAP



LEGEND:

- TOP OF BANK 8/5/02
- TOP OF BANK 7/17/04
- TOP OF BANK 8/03/05
- TOP OF BANK 8/14/06
- TOP OF BANK 8/29/07
- TOP OF BANK 7/22/12
- EDGE OF WATER
- SURVEY MONUMENT SET THIS SURVEY. (APRIL 2002)
- BANK MIGRATION SETBACKS

Kuukpik/LCMF
A subsidiary of Ukpeagvik Iñupiat Corporation
Alpine Office (907) 670-4739
Anchorage, Alaska (907) 273-1830
Alpine Survey Office

FORM: DSIZE

PHILLIPS Alaska, Inc.
A Subsidiary of PHILLIPS PETROLEUM COMPANY

ALPINE | MODULE: CP00 | UNIT: CP

ALPINE PIPELINE KACHEMACH CROSSING STREAM BANK MONITOR ALPINE, ALASKA

REDRAWN FROM: | CONSTRUCTION SHEET OF

1 2 3 4 5 6

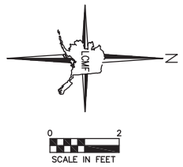
DO NOT SCALE | ABOVE SCALE FOR REFERENCE ONLY

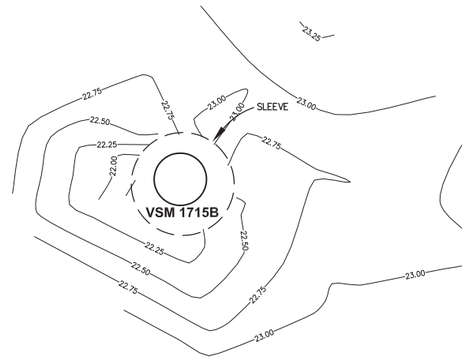
REFERENCE DWG NO/SHT NO:

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
9	11/12/12	UPDATED PER K120003ACS	AG	DB			
8	7/22/12	UPDATED PER 9068830ACS	AG	DB			
7	8/28/07	UPDATED PER 4810412ACS	AG	DB			
6	8/14/2006	UPDATED PER 4083251	CZ	GD			
5	10/23/05	UPDATED PER 3423995ACS – ADD VSM LABELS 1714A&1715C	CZ	GD			
4	8/4/05	UPDATED PER 3423995ACS	CZ	DB			
3	7/17/04	ISSUED PER 2390461ACS	AG	GD			
2	7/11/03	ISSUED PER 2094388ACS TOP OF BANK 2003 – RECONTOURED	GD	JZ			
1	12/16/02	ISSUED PER 1870229ACS	CZ	JZ			

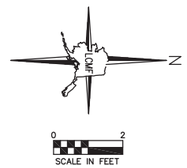
DATE: 12/16/02	DRAWN: CZ	DESIGN:	FCR NO: 1870229ACS
SCALE: 1" = 30'	CHECKED: JZ		AFC/CC NO: 1870229
	APPROVAL:		CADD FILE NO. 02-04-06-2
JOB NO: 02-205	SUB JOB NO:	DRAWING NO: CE-CP00-145	SHEET: 1 OF 2
			REV: 9

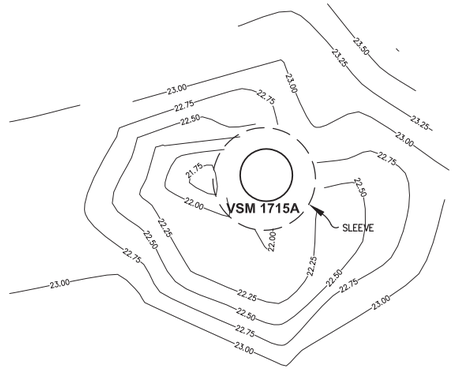
JOB NO:	SUB JOB NO:	DRAWING NO:
02-205		CE-CP00-145



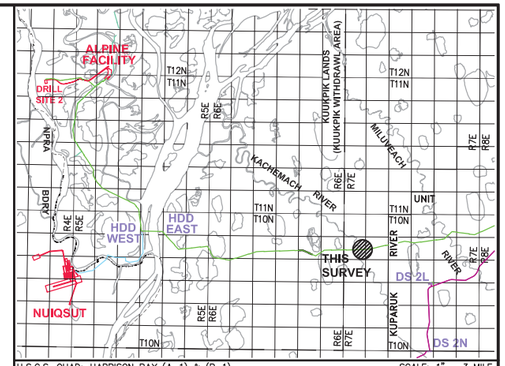


KACHEMACH FLOW





KACHEMACH FLOW



U.S.G.S. QUAD: HARRISON BAY (A-1) & (B-1)
T. 10 N., R. 7 E.
UMIAT MERIDIAN, ALASKA

SCALE: 1" = 3 MILE

VICINITY MAP

NOTES:

1. DATES OF SURVEY: JULY 17, & AUGUST 30, 2004, AUGUST 4, 2005, AUGUST 14, 2006; AUGUST 29 & 31, 2007, SEPTEMBER 2. 2007; AUGUST 26, 2008; JULY 22, 2012.
2. REFERENCE FIELD BOOKS: LCMF 2004-08, PGS 56-60, LCMF 2004-11 PGS 20,21; LCMF2005-21, PGS 13 & 22; LCMF2006-12, PG. 58; LCMF2007-14, PG. 67 & LCMF2007-15, PG. 4 & 12; LCMF2008-15, PGS. 32-35; LCMF2012-08, PGS. 11-13.
3. VERTICAL CONTROL IS BASED ON AS-BUILT TOP OF STEEL ELEVATIONS AT VSM 1712, 1713 AND 1724 PER DRAWING PD-CP00-109, SHEETS 31 AND 32.
4. HORIZONTAL CONTROL IS BASED ON RECORD COORDINATES OF ALPINE PIPELINE PI 13A AND ALPINE MONUMENT No, 19. COORDINATES ARE ALASKA STATE PLANE, ZONE 4, NAD 27, IN FEET.

Kuukpik/LCMF
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Alpine Office (907) 670-4739
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Alpine Survey Office

ConocoPhillips Alaska, Inc.

ALPINE | MODULE: CP00 | UNIT: CP

ALPINE PIPELINE KACHEMACH CROSSING PILE SCOURING MONITOR ALPINE, ALASKA

REDRAWN FROM: | CONSTRUCTION SHEET OF

DO NOT SCALE — ABOVE SCALE FOR REFERENCE ONLY

FORM: DSIZE

REFERENCE DWG NO/SHT NO:

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
6	7/22/12	UPDATED PER 9068830ACS	AG	DB			
5	8/26/08	UPDATED PER 5351457ACS	CZ	DB			
4	8/31/07	UPDATED PER 4810412ACS	CZ	DB			
3	8/14/06	UPDATED PER 4083251ACS	AG	GD			
2	8/4/05	UPDATED PER 3423995ACS	CZ	DB			
1	8/17/04	ISSUED PER 2390461ACS	AG	GD			

DATE:	DRAWN: AG	DESIGN:	ECM NO: 2390461ACS
8/17/04	CHECKED: GD		CC NO: 2390461
SCALE: 1" = 2'	APPROVAL:		CADD FILE NO. 04-06-14-3
JOB NO: 02-205	SUB JOB NO:	DRAWING NO: CE-CP00-145	PART: 2 OF 2 / REV: 6

Alpine CP00

Alpine Pipeline Kachemach Crossing

West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
0+40	199.0	199.0	187.1	187.1	187.1	187.1	187.1		Baseline Offset (In Feet)
		0.0	-11.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-11.9	-11.9	-11.9	-11.9	-11.9		Cumulative Change
0+50	196.3	196.3	186.5	186.5	186.5	186.5	186.5		Baseline Offset (In Feet)
		0.0	-9.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-9.8	-9.8	-9.8	-9.8	-9.8		Cumulative Change
0+60	191.8	191.8	185.5	185.5	185.5	185.5	185.5		Baseline Offset (In Feet)
		0.0	-6.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-6.3	-6.3	-6.3	-6.3	-6.3		Cumulative Change
0+70	189.0	189.0	185.3	185.3	185.3	185.3	185.3		Baseline Offset (In Feet)
		0.0	-3.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.7	-3.7	-3.7	-3.7	-3.7		Cumulative Change
0+80	189.4	189.4	185.7	185.7	185.7	185.7	185.7		Baseline Offset (In Feet)
		0.0	-3.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.7	-3.7	-3.7	-3.7	-3.7		Cumulative Change
0+90	194.4	194.4	185.8	185.8	185.8	185.8	185.8		Baseline Offset (In Feet)
		0.0	-8.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-8.6	-8.6	-8.6	-8.6	-8.6		Cumulative Change
1+00	200.1	200.1	185.9	185.9	185.9	185.9	185.9		Baseline Offset (In Feet)
		0.0	-14.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-14.2	-14.2	-14.2	-14.2	-14.2		Cumulative Change

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
1+10	201.7	201.7	186.1	186.1	186.1	186.1	186.1		Baseline Offset (In Feet)
		0.0	-15.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-15.6	-15.6	-15.6	-15.6	-15.6		Cumulative Change
1+20	199.2	199.2	186.4	186.4	186.4	186.4	186.4		Baseline Offset (In Feet)
		0.0	-12.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-12.8	-12.8	-12.8	-12.8	-12.8		Cumulative Change
1+30	196.4	196.4	186.7	186.7	186.7	186.7	186.7		Baseline Offset (In Feet)
		0.0	-9.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-9.7	-9.7	-9.7	-9.7	-9.7		Cumulative Change
1+40	190.4	190.4	188.6	188.6	188.6	188.6	188.6		Baseline Offset (In Feet)
		0.0	-1.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.8	-1.8	-1.8	-1.8	-1.8		Cumulative Change
1+50	186.8	186.8	183.7	183.7	183.7	183.7	183.7		Baseline Offset (In Feet)
		0.0	-3.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.1	-3.1	-3.1	-3.1	-3.1		Cumulative Change
1+60	185.1	185.1	178.6	178.6	178.6	178.6	178.6		Baseline Offset (In Feet)
		0.0	-6.5	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-6.5	-6.5	-6.5	-6.5	-6.5		Cumulative Change
1+70	182.4	182.4	171.7	171.7	171.7	171.7	171.7		Baseline Offset (In Feet)
		0.0	-10.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-10.7	-10.7	-10.7	-10.7	-10.7		Cumulative Change

Alpine CP00
Alpine Pipeline Kachemach Crossing
West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
1+80	179.1	179.1	167.7	167.7	167.7	167.7	167.7		Baseline Offset (In Feet)
		0.0	-11.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-11.4	-11.4	-11.4	-11.4	-11.4		Cumulative Change
1+90	182.8	182.8	171.2	171.2	171.2	171.2	171.2		Baseline Offset (In Feet)
		0.0	-11.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-11.6	-11.6	-11.6	-11.6	-11.6		Cumulative Change
2+00	174.2	174.2	170.8	170.8	170.8	170.8	170.8		Baseline Offset (In Feet)
		0.0	-3.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.3	-3.3	-3.3	-3.3	-3.3		Cumulative Change
2+10	175.3	175.3	170.9	170.9	170.9	170.9	170.9		Baseline Offset (In Feet)
		0.0	-4.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-4.4	-4.4	-4.4	-4.4	-4.4		Cumulative Change
2+20	175.1	175.1	173.1	173.1	171.5	171.5	171.5		Baseline Offset (In Feet)
		0.0	-2.0	0.0	-1.6	0.0	0.0		Incremental Change
		0.0	-2.0	-2.0	-3.5	-3.5	-3.5		Cumulative Change
2+30	171.2	171.2	171.2	171.2	171.2	171.2	171.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
2+40	169.5	169.5	169.5	169.5	169.5	169.5	169.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP00
Alpine Pipeline Kachemach Crossing
West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
2+50	171.0	171.0	171.0	171.0	171.0	171.0	171.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
2+60	170.9	170.9	170.9	170.9	170.9	170.9	170.9		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
2+71	169.4	169.4	169.4	169.4	169.4	169.4	169.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
2+80	168.2	168.2	168.2	168.2	168.2	168.2	168.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
2+90	166.8	166.8	166.8	166.8	166.8	166.8	166.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+00	165.4	165.4	165.4	165.4	165.4	165.4	165.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+10	163.7	163.7	163.7	163.7	163.7	163.7	163.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP00
Alpine Pipeline Kachemach Crossing
West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
3+20	161.9	161.9	161.9	161.9	161.9	161.9	161.9		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+30	160.9	160.9	160.9	160.9	160.9	160.9	160.9		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+40	160.3	160.3	160.3	160.3	160.3	160.3	160.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+50	159.4	159.4	159.4	159.4	159.4	159.4	159.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+60	158.1	158.1	158.1	158.1	158.1	158.1	158.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+70	156.8	156.8	156.8	156.8	156.8	156.8	156.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+80	154.8	154.8	154.8	154.8	154.8	154.8	154.8		Baseline Offset (In Feet)
		0.0	0.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.1	0.1	0.1	0.1	0.1		Cumulative Change

Alpine Pipeline Kachemach Crossing

West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
3+90	152.5	152.5	152.5	152.5	152.5	152.5	152.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+00	150.1	150.1	150.1	150.1	150.1	150.1	150.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+10	146.5	146.5	146.5	146.5	146.5	146.5	146.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+20	143.8	143.8	143.8	143.8	143.8	143.8	143.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+30	144.0	144.0	144.0	144.0	144.0	144.0	144.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+40	141.8	141.8	141.8	141.8	141.8	141.8	141.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+50	138.7	138.7	138.7	138.7	138.7	138.7	138.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
4+60	135.5	135.5	135.5	135.5	135.5	135.5	135.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+70	131.8	131.8	131.8	131.8	131.8	131.8	131.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+80	128.1	128.1	128.1	128.1	128.1	128.1	128.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
VSM 1714	160.5	160.5	160.5	160.5	160.5	160.5	160.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
***Note:** Survey completed on 8/5/02 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.									

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								Description
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
1+80	363.8	363.8	358.2	358.2	358.2	356.1	353.7		Baseline Offset (In Feet)
		0.0	-5.6	0.0	0.0	-2.1	-2.4		Incremental Change
		0.0	-5.6	-5.6	-5.6	-7.7	-10.1		Cumulative Change
1+90	367.8	367.8	357.7	356.8	356.8	356.0	356.8		Baseline Offset (In Feet)
		0.0	-10.1	-0.9	0.0	-0.8	0.8		Incremental Change
		0.0	-10.1	-10.9	-10.9	-11.8	-11.0		Cumulative Change
2+00	369.4	369.4	360.4	351.9	351.9	351.9	351.6		Baseline Offset (In Feet)
		0.0	-9.0	-8.5	0.0	0.0	-0.3		Incremental Change
		0.0	-9.0	-17.5	-17.5	-17.5	-17.8		Cumulative Change
2+10	370.7	370.7	363.9	356.0	356.0	356.0	348.5		Baseline Offset (In Feet)
		0.0	-6.8	-7.9	0.0	0.0	-7.5		Incremental Change
		0.0	-6.8	-14.7	-14.7	-14.7	-22.2		Cumulative Change
2+20	371.9	371.9	367.7	366.7	366.7	366.7	365.1		Baseline Offset (In Feet)
		0.0	-4.2	-1.0	0.0	0.0	-1.6		Incremental Change
		0.0	-4.2	-5.2	-5.2	-5.2	-6.8		Cumulative Change
2+30	373.0	373.0	371.6	372.1	372.1	371.9	371.9		Baseline Offset (In Feet)
		0.0	-1.4	0.5	0.0	-0.3	0.0		Incremental Change
		0.0	-1.4	-0.9	-0.9	-1.2	-1.1		Cumulative Change
2+40	374.8	374.8	374.8	374.8	374.8	374.8	375.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.8		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.8		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								Description
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
2+50	378.3	378.3	376.3	376.3	376.3	376.3	377.0		Baseline Offset (In Feet)
		0.0	-2.0	0.0	0.0	0.0	0.7		Incremental Change
		0.0	-2.0	-2.0	-2.0	-2.0	-1.3		Cumulative Change
2+60	381.8	381.8	377.9	377.9	377.9	377.9	378.4		Baseline Offset (In Feet)
		0.0	-3.9	0.0	0.0	0.0	0.5		Incremental Change
		0.0	-3.9	-3.9	-3.9	-3.9	-3.3		Cumulative Change
2+70	385.3	385.3	379.7	379.7	379.7	379.7	380.2		Baseline Offset (In Feet)
		0.0	-5.6	0.0	0.0	0.0	0.5		Incremental Change
		0.0	-5.6	-5.6	-5.6	-5.6	-5.1		Cumulative Change
2+80	388.9	388.9	381.4	381.4	381.4	381.4	381.9		Baseline Offset (In Feet)
		0.0	-7.5	0.0	0.0	0.0	0.5		Incremental Change
		0.0	-7.5	-7.5	-7.5	-7.5	-7.0		Cumulative Change
2+90	392.6	392.6	390.4	390.4	389.0	389.0	386.7		Baseline Offset (In Feet)
		0.0	-2.2	0.0	-1.4	0.0	-2.3		Incremental Change
		0.0	-2.2	-2.2	-3.5	-3.5	-5.8		Cumulative Change
3+00	394.0	394.0	394.0	394.0	393.1	393.1	390.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	-0.9	0.0	-2.7		Incremental Change
		0.0	0.0	0.0	-0.9	-0.9	-3.6		Cumulative Change
3+10	394.8	394.8	394.8	394.8	394.4	394.4	393.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	-0.4	0.0	-1.2		Incremental Change
		0.0	0.0	0.0	-0.4	-0.4	-1.5		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								Description
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
3+20	395.5	395.5	395.5	395.5	395.5	395.5	396.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.5		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.5		Cumulative Change
3+30	395.1	395.1	395.1	395.1	395.1	395.1	395.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+40	394.8	394.8	394.8	394.8	394.8	394.8	394.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+50	394.0	394.0	394.0	394.0	394.0	394.0	394.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+60	392.6	392.6	392.6	392.6	392.6	392.6	392.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+70	391.1	391.1	391.1	391.1	391.1	391.1	391.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+80	389.4	389.4	389.4	389.4	389.4	389.4	389.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								Description
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
3+90	387.6	387.6	387.6	387.6	387.6	387.6	387.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+00	381.6	381.6	381.6	381.6	381.6	381.6	381.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+10	375.0	375.0	375.0	375.0	375.0	375.0	375.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+20	371.3	371.3	371.3	371.3	371.3	371.3	371.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+30	368.0	368.0	368.0	368.0	368.0	368.0	368.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+40	365.4	365.4	365.4	365.4	365.4	365.4	365.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+50	362.7	362.7	362.7	362.7	362.7	362.7	362.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								Description
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
4+60	358.5	358.5	358.5	358.5	359.5	359.5	359.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	1.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	1.0	1.0	1.0		Cumulative Change
4+70	356.0	356.0	356.0	356.0	356.0	356.0	356.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+80	352.4	352.4	352.4	352.4	352.4	352.4	352.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
4+90	348.6	348.6	348.6	348.6	348.6	348.6	348.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
5+00	344.8	344.8	344.8	344.8	344.8	344.8	344.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
5+10	342.3	342.3	342.3	342.3	342.3	342.3	342.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
5+20	341.0	341.0	341.0	341.0	341.0	341.0	341.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								Description
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
5+30	339.8	339.8	339.8	339.8	339.8	339.8	339.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
5+40	335.5	335.5	335.5	335.5	335.5	335.5	335.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
5+50	330.7	330.7	330.7	330.7	330.7	330.7	330.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
5+60	325.6	325.6	325.6	325.6	324.3	324.3	324.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.3	0.0	0.0		Incremental Change
		0.0	0.0	0.0	-1.3	-1.3	-1.3		Cumulative Change
5+70	320.1	320.1	320.1	320.1	315.7	315.7	315.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	-4.4	0.0	0.0		Incremental Change
		0.0	0.0	0.0	-4.4	-4.4	-4.4		Cumulative Change
5+80	314.6	314.6	314.6	314.6	309.1	309.1	309.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	-5.5	0.0	0.0		Incremental Change
		0.0	0.0	0.0	-5.5	-5.5	-5.5		Cumulative Change
5+90	313.0	313.0	313.0	313.0	310.0	310.0	310.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	-3.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	-3.0	-3.0	-3.0		Cumulative Change

Alpine CP00

Alpine Pipeline Kachemach Crossing

East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations								Description
	See Drawing CE-CP00-145 Rev 7 for Survey Baseline Location								
	08/05/2002	07/11/2003	07/17/2004	08/03/2005	08/14/2006	08/29/2007	07/22/2012	Future	Date
6+00	312.1	312.1	312.1	312.1	310.9	310.9	310.9		Baseline Offset (In Feet)
		0.0	0.0	0.0	-1.2	0.0	0.0		Incremental Change
		0.0	0.0	0.0	-1.2	-1.2	-1.2		Cumulative Change
VSM 1716	349.7	349.7	349.7	349.7	349.7	349.7	349.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

*****Note:** Survey completed on 8/5/02 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Alpine CP00

Alpine Pipeline Kachemach Crossing

Pilecap Monitor

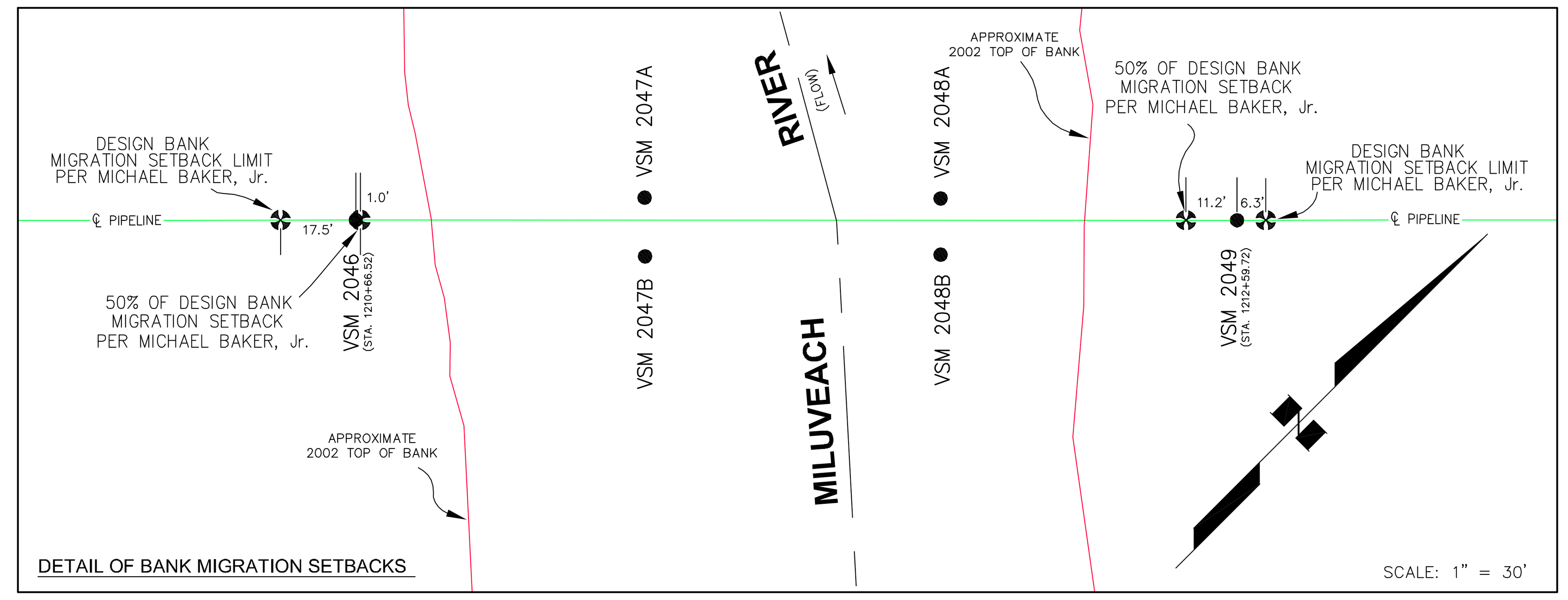
Location	07/16/2004	08/03/2005	08/03/2006	08/29/2007	08/26/2008	07/22/2012	Future	Description
VSM 1713	N/A	43.812	43.840	43.830	43.835	43.840		Monitor Point Elev. at Bottom NE Cor Pile Cap
			0.028	-0.010	0.005	0.005		Incremental Change
			0.028	0.018	0.023	0.028		Cumulative Change
VSM 1714	N/A	42.812	42.815	42.810	42.808	42.810		Monitor Point Elev. at Bottom NE Cor Pile Cap
			0.003	-0.005	-0.002	0.002		Incremental Change
			0.003	-0.002	-0.004	-0.002		Cumulative Change
VSM 1714A	N/A	N/A	42.720	42.790	42.768	42.610		Monitor Point Elev. at Bottom NE Cor Pile Cap
				0.070	-0.022	-0.158		Incremental Change
				0.070	0.048	-0.110		Cumulative Change
VSM 1715A	42.272	42.268	42.285	42.320	42.323	42.370		Monitor Point Elev. at Bottom NE Cor Pile Cap
		-0.004	0.017	0.035	0.003	0.047		Incremental Change
		-0.004	0.013	0.048	0.051	0.098		Cumulative Change
VSM 1715B	42.263	42.272	42.285	42.300	42.294	42.300		Monitor Point Elev. at Bottom NE Cor Pile Cap
		0.009	0.013	0.015	-0.006	0.006		Incremental Change
		0.009	0.022	0.037	0.031	0.037		Cumulative Change
VSM 1715C	N/A	42.612	42.520	42.520	42.516	42.510		Monitor Point Elev. at Bottom NE Cor Pile Cap
			-0.092	0.000	-0.004	-0.006		Incremental Change
			-0.092	-0.092	-0.096	-0.102		Cumulative Change

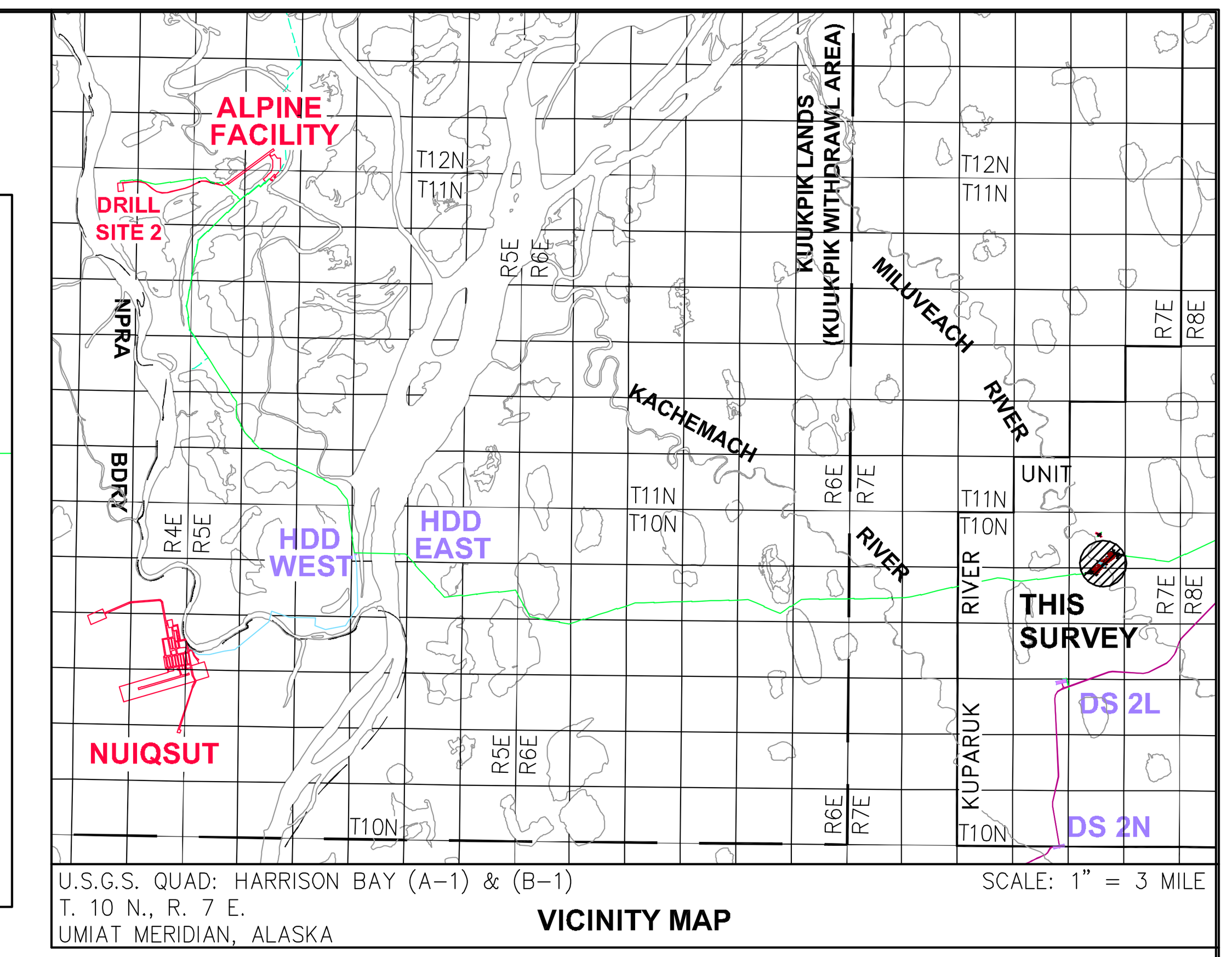
Appendix E Miluveach Bank Erosion Survey

JOB NO:	SUB JOB NO:	DRAWING NO:
02-205		CE-CP00-144

LEGEND:

- TOP OF BANK 8/4/02 & 7/12/03
- TOP OF BANK 6/18/04
- TOP OF BANK 8/04/05
- TOP OF BANK 8/17/06
- TOP OF BANK 8/28/07
- TOP OF BANK 7/21/12
- EDGE OF WATER 6/18/04
- GRADE BREAK 6/18/04
- TOE OF SLOPE 6/18/04
- SURVEY MONUMENT SET THIS SURVEY. (APRIL 2002)
- BANK MIGRATION SETBACKS





NOTES:

1. DATES OF SURVEY: MAY 2002 – AUGUST 2002. JULY 12, 2003. JUNE 18, 2004; AUGUST 4, 2005, AUGUST 17, 2006; AUGUST 28, 2007; JULY, 21, 2012.
2. REFERENCE FIELD BOOKS: LCMF2002-17, PGS. 41, 66-46; LCMF2002-18, PGS. 2 & 3; LCMF2002-23, PG. 18-20 & 25. LCMF2003-11, PGS. 18-21; LCMF2004-8, PGS 1-11; LCMF2005-21, PGS. 17-21; LCMF 2006-12 PG. 72; LCMF 2007-14 PGS.61-64; LCMF 2012-08, PGS 8-10.
3. VERTICAL CONTROL BASED ON AS-BUILT TOP OF STEEL ELEVATIONS AT VSM 2049 AND 2059 PER DRAWING PD-CP00-109, SHEETS 38 AND 39.
4. HORIZONTAL CONTROL IS BASED ON RECORD COORDINATES OF ALPINE PIPELINE PI 13A AND ALPINE MONUMENT No, 19. COORDINATES ARE ALASKA STATE PLANE, ZONE 4, NAD 27, IN FEET.
5. SEE DOCUMENT RPT-EV-CP-00008 FOR STREAM BANK EROSION BASELINE SURVEY DATA.

Kuukpik/LCMF
A subsidiary of Ukpeagvik Iñupiat Corporation
Alpine Office (907) 670-4739
Anchorage, Alaska (907) 273-1830
Alpine Survey Office

FORM: DSIZE

ConocoPhillips Alaska, Inc.

ALPINE — MODULE: CP00 — UNIT: CP

ALPINE PIPELINE MILUVEACH CROSSING
STREAM BANK MONITOR
ALPINE, ALASKA

REDRAWN FROM: | CONSTRUCTION SHEET OF

DO NOT SCALE — ABOVE SCALE FOR REFERENCE ONLY

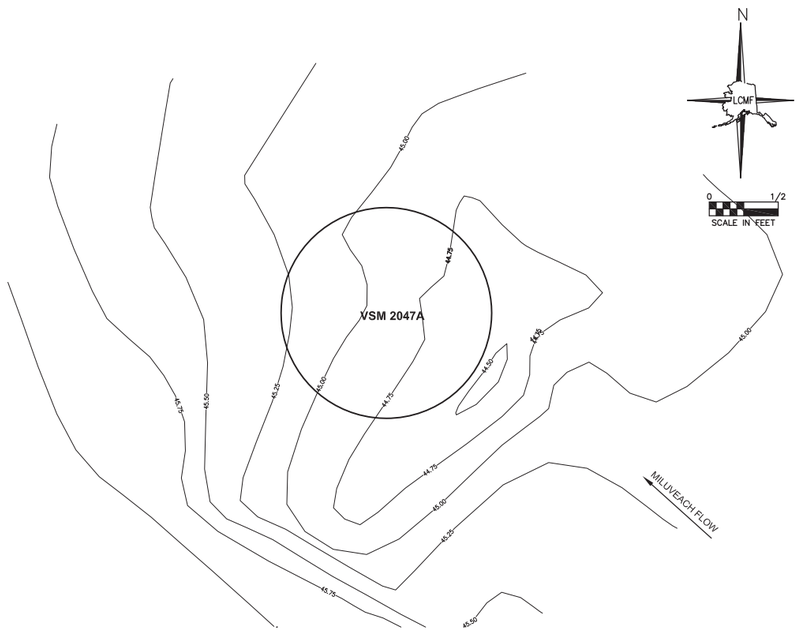
DATE:	DRAWN:	DESIGN:	ECM NO:
12/19/02	CZ		1870228ACS
SCALE:	CHECKED: JZ		CC NO: 1870228
1" = 100'	APPROVAL:		CADD FILE NO. 02-04-06-1
JOB NO: 02-205	SUB JOB NO:	DRAWING NO: CE-CP00-144	PART: 1 OF 2 — REV: 8

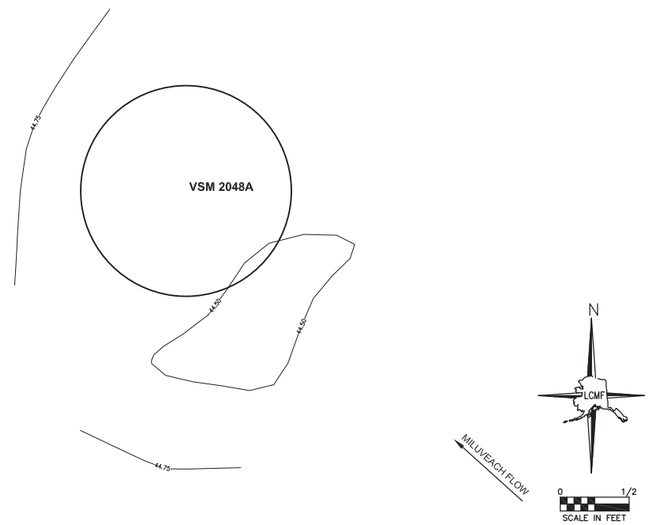
REFERENCE DWG NO/SHT NO:

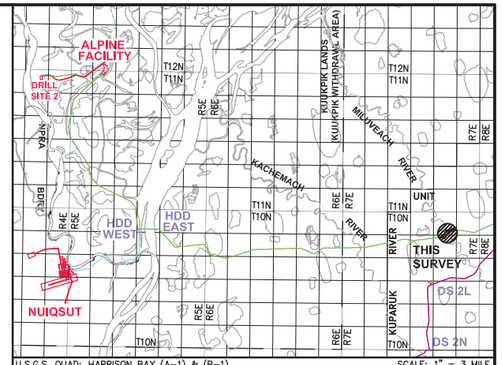
REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
8	11/12/12	UPDATED PER K120003ACS	AG	DB			
7	7/21/12	UPDATED PER 9068831ACS	AG	DB			

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
6	8/28/07	UPDATED PER 4810413ACS	AG	DB			
5	8/19/06	UPDATED PER 4083252ACS	AG	GD			
4	8/5/05	UPDATED PER 3423996ACS	CZ	DB			
3	6/??/04	REVISED PER 2390462ACS	CZ	BD			
2	7/11/03	ISSUED PER 2094389ACS CHECKED SUBSIDENCE-RECONTOURED	GD	JZ			
1	12/19/02	ISSUED PER 1870228ACS	CZ	JZ			

JOB NO:	SUB JOB NO:	DRAWING NO:
02-205		CE-CP00-144







U.S.G.S. QUAD: HARRISON BAY (A-1) & (B-1)
T. 10 N., R. 7 E.
UMIAT MERIDIAN, ALASKA

SCALE: 1" = 3 MILE

VICINITY MAP

NOTES:

1. DATE OF SURVEY: JUNE 18, 2004; AUGUST 4, 2005, AUGUST 17, 2006; AUGUST 28, 2007; AUGUST 25, 2008; JULY 21, 2012.
2. REFERENCE FIELD BOOK: LCMF2004-8, PGS 1-11; LCMF2005-21, PGS. 17-21; LCMF2006-12, PG. 72; LMCF2007-14 PGS. 61-64. LCMF 2008-15, PGS. 30-31; LCMF 2012-08, PGS. 8-10.
3. VERTICAL CONTROL BASED ON AS-BUILT TOP OF STEEL ELEVATIONS AT VSM 2049 AND 2059 PER DRAWING PD-CP00-109, SHEETS 38 AND 39.
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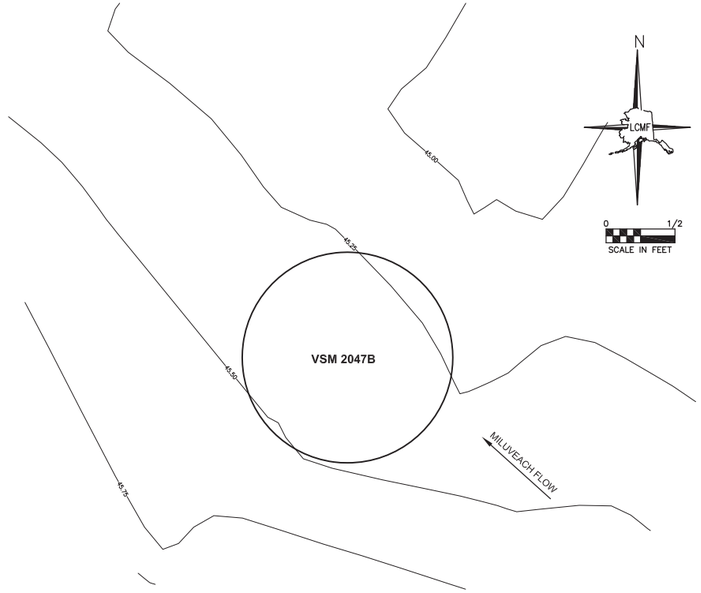

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Alpine Survey Office

ConocoPhillips Alaska, Inc.

ALPINE | MODULE: CP00 | UNIT: CP

ALPINE PIPELINE MILUVEACH CROSSING
PILE SCOURING MONITOR
ALPINE, ALASKA

REDRAWN FROM: | CONSTRUCTION SHEET OF

1 2 3 4 5 6

DO NOT SCALE — ABOVE SCALE FOR REFERENCE ONLY

DATE: 6/22/04	DRAWN: CZ	DESIGN:	ECM NO: 2390462ACS
SCALE: 1" = 1/2'	CHECKED: BD		CC NO:
	APPROVAL:		CADD FILE NO. 04-06-16-4
JOB NO: 02-205	SUB JOB NO:	DRAWING NO: CE-CP00-144	PART: 2 OF 2
			REV: 6

REFERENCE DWG NO/SHT NO:

FORM: DSIZE

REV	DATE	REVISIONS	BY	CHK	JOB ENGR	PROJ ENGR	CUST APP
6	7/21/12	UPADTED PER 9068831ACS	AG	DB			
5	8/26/08	UPDATED PER 5351457ACS	CZ	DB			
4	8/28/07	UPDATED PER 4810413ACS	AG	DB			
3	8/19/06	UPDATED PER 4083252ACS	AG	GD			
2	8/5/05	UPDATED PER 3423996ACS	CZ	DB			
1	6/21/04	ISSUED PER 2390462ACS	CZ	BD			

Alpine CP 00
Alpine Pipeline Miluveach Crossing
West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
0+50	859.5	859.5	858.0	858.0	858.0	858.0	858.0		Baseline Offset (In Feet)
		0.0	-1.5	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.5	-1.5	-1.5	-1.5	-1.5		Cumulative Change
0+60	859.7	859.7	856.9	856.9	856.9	856.9	856.9		Baseline Offset (In Feet)
		0.0	-2.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.8	-2.8	-2.8	-2.8	-2.8		Cumulative Change
0+70	859.0	859.0	856.2	856.2	856.2	856.2	856.2		Baseline Offset (In Feet)
		0.0	-2.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.7	-2.7	-2.7	-2.7	-2.7		Cumulative Change
0+80	859.2	859.2	855.6	855.6	855.6	855.6	855.6		Baseline Offset (In Feet)
		0.0	-3.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.7	-3.7	-3.7	-3.7	-3.7		Cumulative Change
0+90	858.7	858.7	855.9	855.9	855.9	855.9	855.9		Baseline Offset (In Feet)
		0.0	-2.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.9	-2.9	-2.9	-2.9	-2.9		Cumulative Change
1+00	858.1	858.1	856.1	856.1	856.1	856.1	856.1		Baseline Offset (In Feet)
		0.0	-2.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.0	-2.0	-2.0	-2.0	-2.0		Cumulative Change
1+10	857.4	857.4	855.8	855.8	855.8	855.8	855.8		Baseline Offset (In Feet)
		0.0	-1.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.6	-1.6	-1.6	-1.6	-1.6		Cumulative Change

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Baseline Station	Streambank Monitor - Top of West Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
1+20	856.5	856.5	854.8	854.8	854.8	854.8	854.8		Baseline Offset (In Feet)
		0.0	-1.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.7	-1.7	-1.7	-1.7	-1.7		Cumulative Change
1+30	854.6	854.6	852.5	852.5	852.5	852.5	852.5		Baseline Offset (In Feet)
		0.0	-2.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.2	-2.1	-2.1	-2.1	-2.1		Cumulative Change
1+40	854.4	854.4	851.1	851.1	851.1	851.1	851.1		Baseline Offset (In Feet)
		0.0	-3.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.3	-3.3	-3.3	-3.3	-3.3		Cumulative Change
1+50	854.0	854.0	849.7	849.7	849.7	849.7	849.7		Baseline Offset (In Feet)
		0.0	-4.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-4.3	-4.3	-4.3	-4.3	-4.3		Cumulative Change
1+60	851.8	851.8	847.9	847.9	847.9	847.9	847.9		Baseline Offset (In Feet)
		0.0	-3.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-3.9	-3.9	-3.9	-3.9	-3.9		Cumulative Change
1+70	850.3	850.3	845.9	845.9	845.9	845.9	845.9		Baseline Offset (In Feet)
		0.0	-4.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-4.4	-4.4	-4.4	-4.4	-4.4		Cumulative Change
1+80	848.8	848.8	843.8	843.8	843.8	843.8	843.8		Baseline Offset (In Feet)
		0.0	-5.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-5.1	-5.1	-5.1	-5.1	-5.1		Cumulative Change

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West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
1+90	846.4	846.4	841.7	841.7	841.7	841.7	841.7		Baseline Offset (In Feet)
		0.0	-4.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-4.7	-4.7	-4.7	-4.7	-4.7		Cumulative Change
2+00	842.2	842.2	839.4	839.4	839.4	839.4	839.4		Baseline Offset (In Feet)
		0.0	-2.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.7	-2.7	-2.7	-2.7	-2.7		Cumulative Change
2+10	838.1	838.1	837.2	837.2	837.2	837.2	837.2		Baseline Offset (In Feet)
		0.0	-0.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.9	-0.9	-0.9	-0.9	-0.9		Cumulative Change
2+20	837.1	837.1	835.7	835.7	835.7	835.7	835.7		Baseline Offset (In Feet)
		0.0	-1.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.4	-1.4	-1.4	-1.4	-1.4		Cumulative Change
2+30	836.1	836.1	834.1	834.1	834.1	834.1	834.1		Baseline Offset (In Feet)
		0.0	-2.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.0	-2.0	-2.0	-2.0	-2.0		Cumulative Change
2+40	834.7	834.7	832.4	832.4	832.4	832.4	832.4		Baseline Offset (In Feet)
		0.0	-2.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.3	-2.3	-2.3	-2.3	-2.3		Cumulative Change
2+50	830.5	830.5	829.3	829.3	829.3	829.3	829.3		Baseline Offset (In Feet)
		0.0	-1.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.1	-1.1	-1.1	-1.1	-1.1		Cumulative Change

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	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
2+60	827.7	827.7	827.1	827.1	827.1	827.1	827.1		Baseline Offset (In Feet)
		0.0	-0.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.6	-0.6	-0.6	-0.6	-0.6		Cumulative Change
2+70	826.0	826.0	825.5	825.5	825.5	825.5	825.5		Baseline Offset (In Feet)
		0.0	-0.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.6	-0.6	-0.6	-0.6	-0.6		Cumulative Change
2+80	824.6	824.6	823.8	823.8	823.8	823.8	823.8		Baseline Offset (In Feet)
		0.0	-0.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.8	-0.8	-0.8	-0.8	-0.8		Cumulative Change
2+90	823.5	823.5	822.1	822.1	822.1	822.1	822.1		Baseline Offset (In Feet)
		0.0	-1.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.4	-1.4	-1.4	-1.4	-1.4		Cumulative Change
3+00	822.3	822.3	820.4	820.4	820.4	820.4	820.4		Baseline Offset (In Feet)
		0.0	-1.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.9	-1.9	-1.9	-1.9	-1.9		Cumulative Change
3+10	821.1	821.1	818.8	818.8	818.8	818.8	818.8		Baseline Offset (In Feet)
		0.0	-2.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.3	-2.3	-2.3	-2.3	-2.3		Cumulative Change
3+20	818.9	818.9	816.8	816.8	816.8	816.8	816.8		Baseline Offset (In Feet)
		0.0	-2.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.2	-2.2	-2.2	-2.2	-2.2		Cumulative Change

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	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
3+30	816.4	816.4	814.8	814.8	814.8	814.8	814.8		Baseline Offset (In Feet)
		0.0	-1.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.6	-1.6	-1.6	-1.6	-1.6		Cumulative Change
3+40	814.9	814.9	812.7	812.7	812.7	812.7	812.7		Baseline Offset (In Feet)
		0.0	-2.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-2.3	-2.3	-2.3	-2.3	-2.3		Cumulative Change
3+50	812.0	812.0	810.7	810.7	810.7	810.7	810.7		Baseline Offset (In Feet)
		0.0	-1.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.3	-1.3	-1.3	-1.3	-1.3		Cumulative Change
VSM 2046	793.8	793.8	793.8	793.8	793.8	793.8	793.8		Baseline Offset (In Feet)
{3+59.23}		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
3+60	810.3	810.3	809.1	809.1	809.1	809.1	809.1		Baseline Offset (In Feet)
{Pipeline		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
Crossing}		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change
3+70	807.8	807.8	805.9	805.9	805.9	805.9	805.9		Baseline Offset (In Feet)
		0.0	-1.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.9	-1.9	-1.9	-1.9	-1.9		Cumulative Change
3+80	805.2	805.2	804.3	804.3	804.3	804.3	804.3		Baseline Offset (In Feet)
		0.0	-0.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.9	-0.9	-0.9	-0.9	-0.9		Cumulative Change

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	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
3+90	802.7	802.7	801.4	801.4	801.4	801.4	801.4		Baseline Offset (In Feet)
		0.0	-1.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.3	-1.3	-1.3	-1.3	-1.3		Cumulative Change
4+00	801.7	801.7	800.4	800.4	800.4	800.4	800.4		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change
4+10	799.2	799.2	798.4	798.4	798.4	798.4	798.4		Baseline Offset (In Feet)
		0.0	-0.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.8	-0.8	-0.8	-0.8	-0.8		Cumulative Change
4+20	797.0	797.0	796.3	796.3	796.3	796.3	796.3		Baseline Offset (In Feet)
		0.0	-0.7	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.7	-0.7	-0.7	-0.7	-0.7		Cumulative Change
4+30	794.9	794.9	793.8	793.8	793.8	793.8	793.8		Baseline Offset (In Feet)
		0.0	-1.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.1	-1.1	-1.1	-1.1	-1.1		Cumulative Change
4+40	792.2	792.2	791.3	791.3	791.3	791.3	791.3		Baseline Offset (In Feet)
		0.0	-0.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.9	-0.9	-0.9	-0.9	-0.9		Cumulative Change
4+50	789.9	789.9	789.1	789.1	789.1	789.1	789.1		Baseline Offset (In Feet)
		0.0	-0.8	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.8	-0.8	-0.8	-0.8	-0.8		Cumulative Change

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Alpine Pipeline Miluveach Crossing
West Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
4+60	788.7	788.7	787.3	787.3	787.3	787.3	787.3		Baseline Offset (In Feet)
		0.0	-1.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.4	-1.4	-1.4	-1.4	-1.4		Cumulative Change
4+70	786.3	786.3	784.8	784.8	784.8	784.8	784.8		Baseline Offset (In Feet)
		0.0	-1.5	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.5	-1.5	-1.5	-1.5	-1.5		Cumulative Change
4+80	783.1	783.1	781.7	781.7	781.7	781.7	781.7		Baseline Offset (In Feet)
		0.0	-1.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.4	-1.4	-1.4	-1.4	-1.4		Cumulative Change
4+90	780.0	780.0	778.6	778.6	778.6	778.6	778.6		Baseline Offset (In Feet)
		0.0	-1.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.3	-1.3	-1.3	-1.3	-1.3		Cumulative Change
5+00	776.3	776.3	775.1	775.1	775.1	775.1	775.1		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change
5+10	772.4	772.4	771.3	771.3	771.3	771.3	771.3		Baseline Offset (In Feet)
		0.0	-1.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.1	-1.1	-1.1	-1.1	-1.1		Cumulative Change
5+20	768.7	768.7	767.5	767.5	767.5	767.5	767.5		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change

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Baseline Station	Streambank Monitor - Top of West Bank Locations								Description
	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
5+30	765.1	765.1	763.7	763.7	763.7	763.7	763.7		Baseline Offset (In Feet)
		0.0	-1.4	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.4	-1.4	-1.4	-1.4	-1.4		Cumulative Change
5+40	761.4	761.4	759.8	759.8	759.8	759.8	759.8		Baseline Offset (In Feet)
		0.0	-1.6	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.6	-1.6	-1.6	-1.6	-1.6		Cumulative Change
5+50	757.0	757.0	755.8	755.8	755.8	755.8	755.8		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change
5+60	752.6	752.6	751.6	751.6	751.6	751.6	751.6		Baseline Offset (In Feet)
		0.0	-0.9	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-0.9	-0.9	-0.9	-0.9	-0.9		Cumulative Change
5+70	748.0	748.0	747.0	747.0	747.0	747.0	747.0		Baseline Offset (In Feet)
		0.0	-1.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.0	-1.0	-1.0	-1.0	-1.0		Cumulative Change
5+80	743.5	743.5	742.4	742.4	742.4	742.4	742.4		Baseline Offset (In Feet)
		0.0	-1.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.1	-1.1	-1.1	-1.1	-1.1		Cumulative Change
5+90	739.4	739.4	738.4	738.4	738.4	738.4	738.4		Baseline Offset (In Feet)
		0.0	-1.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.1	-1.1	-1.1	-1.1	-1.1		Cumulative Change

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Baseline	**Streambank Monitor - Top of West Bank Locations**								**Description**
Station	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	**07/12/2003**	**06/18/2004**	**08/04/2005**	**08/17/2006**	**08/28/2007**	**07/21/2012**	**Future**	**Date**
6+00	735.5	735.5	734.2	734.2	734.2	734.2	734.2		Baseline Offset (In Feet)
		0.0	-1.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.3	-1.3	-1.3	-1.3	-1.3		Cumulative Change
6+10	731.5	731.5	730.0	730.0	730.0	730.0	730.0		Baseline Offset (In Feet)
		0.0	-1.5	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.5	-1.5	-1.5	-1.5	-1.5		Cumulative Change
6+20	726.6	726.6	725.3	725.3	725.3	725.3	725.3		Baseline Offset (In Feet)
		0.0	-1.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.3	-1.3	-1.3	-1.3	-1.3		Cumulative Change
6+30	721.7	721.7	720.5	720.5	720.5	720.5	720.5		Baseline Offset (In Feet)
		0.0	-1.3	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.3	-1.3	-1.3	-1.3	-1.3		Cumulative Change
6+40	716.9	716.9	715.6	715.6	715.6	715.6	715.6		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change
6+50	712.0	712.0	710.8	710.8	710.8	710.8	710.8		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change
6+60	707.1	707.1	705.9	705.9	705.9	705.9	705.9		Baseline Offset (In Feet)
		0.0	-1.2	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.2	-1.2	-1.2	-1.2	-1.2		Cumulative Change

*****Note:** Survey completed on 8/4/02 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
8+80	1196.2	1196.2	1196.2	1196.2	1196.2	1196.2	1196.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
8+90	1190.3	1190.3	1190.3	1190.3	1190.3	1190.3	1190.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+00	1184.3	1184.3	1184.3	1184.3	1184.3	1184.3	1184.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+10	1178.3	1178.3	1178.3	1178.3	1178.3	1178.3	1178.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+20	1172.4	1172.4	1172.4	1172.4	1172.4	1172.4	1172.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+30	1166.4	1166.4	1166.4	1166.4	1166.4	1166.4	1166.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+40	1160.3	1160.3	1160.3	1160.3	1160.3	1160.3	1160.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
9+50	1154.3	1154.3	1154.3	1154.3	1154.3	1154.3	1154.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+60	1148.2	1148.2	1148.2	1148.2	1148.2	1148.2	1148.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+70	1142.0	1142.0	1142.0	1142.0	1142.0	1142.0	1142.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+80	1135.5	1135.5	1135.5	1135.5	1135.5	1135.5	1135.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
9+90	1129.0	1129.0	1129.0	1129.0	1129.0	1129.0	1129.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+00	1122.5	1122.5	1122.5	1122.5	1122.5	1122.5	1122.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+10	1116.0	1116.0	1116.0	1116.0	1116.0	1116.0	1116.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations								Description
	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
10+20	1110.7	1110.7	1110.7	1110.7	1110.7	1110.7	1110.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+30	1105.7	1105.7	1105.7	1105.7	1105.7	1105.7	1105.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+40	1100.6	1100.6	1100.6	1100.6	1100.6	1100.6	1100.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+50	1095.5	1095.5	1095.5	1095.5	1095.5	1095.5	1095.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+60	1090.5	1090.5	1090.5	1090.5	1090.5	1090.5	1090.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+70	1086.2	1086.2	1086.2	1086.2	1086.2	1086.2	1086.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
10+80	1082.3	1082.3	1082.3	1082.3	1082.3	1082.3	1082.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
10+90	1078.4	1078.4	1078.4	1078.4	1078.4	1078.4	1078.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+00	1074.4	1074.4	1074.4	1074.4	1074.4	1074.4	1074.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+10	1070.5	1070.5	1070.5	1070.5	1070.5	1070.5	1070.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+20	1065.1	1065.1	1065.1	1065.1	1065.1	1065.1	1065.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+30	1058.3	1058.3	1058.3	1058.3	1058.3	1058.3	1058.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
VSM 2049	1013.8	1013.8	1013.8	1013.8	1013.8	1013.8	1013.8		Baseline Offset (In Feet)
{11+38.57}		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+40	1051.6	1051.6	1051.6	1051.6	1051.6	1051.6	1051.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations								Description
	See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
11+55	1042.9	1042.9	1042.9	1042.9	1042.9	1042.9	1042.9		Baseline Offset (In Feet)
{Pipeline		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
Crossing}		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+70	1033.0	1033.0	1033.0	1033.0	1033.0	1033.0	1033.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+80	1027.5	1027.5	1027.5	1027.5	1027.5	1027.5	1027.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
11+90	1024.0	1024.0	1024.0	1024.0	1024.0	1024.0	1024.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+00	1017.6	1017.6	1017.6	1017.6	1017.6	1017.6	1017.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+10	1012.1	1012.1	1010.9	1010.9	1010.9	1010.9	1010.9		Baseline Offset (In Feet)
		0.0	-1.1	0.0	0.0	0.0	0.0		Incremental Change
		0.0	-1.1	-1.1	-1.1	-1.1	-1.1		Cumulative Change
12+20	1007.1	1007.1	1004.8	1007.1	1007.1	1007.1	1007.1		Baseline Offset (In Feet)
		0.0	-2.3	2.2	0.0	0.0	0.0		Incremental Change
		0.0	-2.3	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
12+30	1001.8	1001.8	999.4	1001.8	1001.8	1001.8	1001.8		Baseline Offset (In Feet)
		0.0	-2.4	2.3	0.0	0.0	0.0		Incremental Change
		0.0	-2.4	0.0	0.0	0.0	0.0		Cumulative Change
12+40	994.5	994.5	994.5	994.5	994.5	994.5	994.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+50	993.8	993.8	993.8	993.8	993.8	993.8	993.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+60	993.2	993.2	993.2	993.2	993.2	993.2	993.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+70	998.0	998.0	998.0	998.0	998.0	998.0	998.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+80	1001.9	1001.9	1001.9	1001.9	1001.9	1001.9	1001.9		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
12+90	1001.1	1001.1	1001.1	1001.1	1001.1	1001.1	1001.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
13+00	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3	1000.3		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+10	999.4	999.4	999.4	999.4	999.4	999.4	999.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+20	998.8	998.8	998.8	998.8	998.8	998.8	998.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+30	997.8	997.8	997.8	997.8	997.8	997.8	997.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+40	996.8	996.8	996.8	996.8	996.8	996.8	996.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+50	995.8	995.8	995.8	995.8	995.8	995.8	995.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+60	994.7	994.7	994.7	994.7	994.7	994.7	994.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
13+70	993.7	993.7	993.7	993.7	993.7	993.7	993.7		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+80	992.6	992.6	992.6	992.6	992.6	992.6	992.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
13+90	991.4	991.4	991.4	991.4	991.4	991.4	991.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+00	988.1	988.1	988.1	988.1	988.1	988.1	988.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+10	984.8	984.8	984.8	984.8	984.8	984.8	984.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+20	981.5	981.5	981.5	981.5	981.5	981.5	981.5		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+30	978.2	978.2	978.2	978.2	978.2	978.2	978.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
East Streambank Erosion Monitor

Baseline Station	Streambank Monitor - Top of East Bank Locations See Drawing CE-CP00-144 Rev 6 for Survey Baseline Location								Description
	08/04/2002	07/12/2003	06/18/2004	08/04/2005	08/17/2006	08/28/2007	07/21/2012	Future	Date
14+40	976.2	976.2	976.2	976.2	976.2	976.2	976.2		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+50	975.6	975.6	975.6	975.6	975.6	975.6	975.6		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+60	975.0	975.0	975.0	975.0	975.0	975.0	975.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+70	974.4	974.4	974.4	974.4	974.4	974.4	974.4		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+80	973.8	973.8	973.8	973.8	973.8	973.8	973.8		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
14+90	973.0	973.0	973.0	973.0	973.0	973.0	973.0		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change
15+00	972.1	972.1	972.1	972.1	972.1	972.1	972.1		Baseline Offset (In Feet)
		0.0	0.0	0.0	0.0	0.0	0.0		Incremental Change
		0.0	0.0	0.0	0.0	0.0	0.0		Cumulative Change

*****Note:** Survey completed on 8/5/02 was used for baseline data to compute Incremental/Cumulative Change. Negative numbers indicate erosion.

Alpine CP 00
Alpine Pipeline Miluveach Crossing
Pile Monitor

Location	06/18/2004	08/03/2005	08/17/2006	08/28/2007	08/25/2008	07/21/2012	Description
VSM 2046	57.611	57.595	57.590	57.510	57.527	57.675	Monitor Point Elev. at Bottom SE Cor Pile Cap
		-0.016	-0.005	-0.080	0.017	0.148	Incremental Change
		-0.016	-0.021	-0.101	-0.084	0.064	Cumulative Change
HSM 2046 (North)	57.791	57.785	57.780	57.700	57.686	57.860	Monitor Point Elev. at North End, Bottom NE Cor.
		-0.006	-0.005	-0.080	-0.014	0.174	Incremental Change
		-0.006	-0.011	-0.091	-0.105	0.069	Cumulative Change
HSM 2046 (South)	57.631	57.620	57.610	57.530	57.521	57.695	Monitor Point Elev. at South End, Bottom SE Cor.
		-0.011	-0.010	-0.080	-0.009	0.174	Incremental Change
		-0.011	-0.021	-0.101	-0.110	0.064	Cumulative Change
VSM 2047A	57.528	57.465	57.480	57.430	57.464	57.790	Monitor Point Elev. at Bottom SE Cor Pile Cap
		-0.063	0.015	-0.050	0.034	0.326	Incremental Change
		-0.063	-0.048	-0.098	-0.064	0.262	Cumulative Change
HSM 2047A (North)	57.449	57.540	57.560	57.520	57.556	57.870	Monitor Point Elev. at North End, Bottom NE Cor.
		0.091	0.020	-0.040	0.036	0.314	Incremental Change
		0.091	0.111	0.071	0.107	0.421	Cumulative Change
VSM 2047B	57.433	57.450	57.460	57.420	57.459	57.780	Monitor Point Elev. at Bottom SE Cor Pile Cap
		0.018	0.010	-0.040	0.039	0.321	Incremental Change
		0.018	0.028	-0.012	0.027	0.348	Cumulative Change
HSM 2047B (South)	57.527	57.540	57.560	57.520	57.556	57.860	Monitor Point Elev. at South End, Bottom SE Cor.
		0.013	0.020	-0.040	0.036	0.304	Incremental Change
		0.013	0.033	-0.007	0.029	0.333	Cumulative Change

Alpine CP 00
Alpine Pipeline Miluveach Crossing
Pile Monitor

Location	06/18/2004	08/03/2005	08/17/2006	08/28/2007	08/25/2008	07/21/2012	Description
VSM 2048A	57.635	57.665	57.740	57.740	57.776	58.120	Monitor Point Elev. at Bottom SE Cor Pile Cap
		0.030	0.075	0.000	0.036	0.344	Incremental Change
		0.030	0.105	0.105	0.142	0.485	Cumulative Change
HSM 2048A (North)	57.725	57.760	57.830	57.830	57.885	58.220	Monitor Point Elev. at North End, Bottom NE Cor.
		0.035	0.070	0.000	0.055	0.335	Incremental Change
		0.035	0.105	0.105	0.160	0.495	Cumulative Change
VSM 2048B	57.591	57.615	57.680	57.680	57.727	58.060	Monitor Point Elev. at Bottom SE Cor Pile Cap
		0.024	0.065	0.000	0.047	0.333	Incremental Change
		0.024	0.089	0.089	0.136	0.469	Cumulative Change
HSM 2048B (South)	57.691	57.710	57.770	57.770	57.824	58.150	Monitor Point Elev. at South End, Bottom SE Cor.
		0.019	0.060	0.000	0.054	0.326	Incremental Change
		0.019	0.079	0.079	0.133	0.459	Cumulative Change
VSM 2049	57.494	57.475	57.470	57.400	57.398	57.570	Monitor Point Elev. at Bottom SE Cor Pile Cap
		-0.019	-0.005	-0.070	-0.002	0.172	Incremental Change
		-0.019	-0.024	-0.094	-0.096	0.076	Cumulative Change
HSM 2049 (North)	57.564	57.550	57.540	57.470	57.465	57.640	Monitor Point Elev. at North End, Bottom NE Cor.
		-0.014	-0.010	-0.070	-0.005	0.175	Incremental Change
		-0.014	-0.024	-0.094	-0.099	0.076	Cumulative Change
HSM 2049 (South)	57.587	57.565	57.560	57.490	57.487	57.665	Monitor Point Elev. at South End, Bottom SE Cor.
		-0.022	-0.005	-0.070	-0.003	0.178	Incremental Change
		-0.022	-0.027	-0.097	-0.100	0.078	Cumulative Change