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April 5, 2017

Geoff Merrell
State On-Scene Coordinator
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, AK 99501

Re: Middle Ground Shoal Platform, Natural Gas Pipeline Release
Middle Ground Shoal Gas Leak Sampling and Monitoring Plan Summary Report
Sampling Period #3 ending 04/04/2017

Dear Mr. Merrell:

Hilcorp Alaska, LLC ("Hilcorp") submitted the Middle Ground Shoal Gas Leak Sampling and Monitoring Plan ("Plan") to the Department of Environmental Conservation ("Department") on March 8. 2017. Preliminary approval to implement the Plan was provided by the Department on March 10, 2017. As described in Section 3.2 of the Plan, Hilcorp is submitting this third weekly summary report to the Department.

In an effort to provide data to the Department as quickly as possible, a complete and thorough quality control evaluation has not been completed at this time. Please note that all data presented in this report is preliminary and should be considered as such until a quality control evaluation is completed. Hilcorp will continue to evaluate data quality and will notify the Department of any significant issues as soon as possible.

Ice Monitoring:

Hilcorp continues to monitor ice conditions in the area of the gas leak using helicopter overflights and platform observations. Observations are compared to the National Oceanic and Atmospheric Administration (NOAA) ice forecasts. Ice conditions are monitored daily as conditions allow and updates are provided to the Department via Situation Reports. Hilcorp anticipates ice conditions to continue to improve with forecasted warmer weather conditions.

Fish and Wildlife Monitoring:

On March 31, one CISPRI protected species observer and one wildlife observer professional from International Bird Rescue conducted an extended overflight of approximately 20 square miles surrounding the gas leak location (within a 5-mile diameter circle). The helicopter was able to fly at approximately 350 feet altitude. To avoid incidental harassment of marine mammals, altitude would have been increased to

1500 feet, but only in the case where marine mammals were actually spotted. Flight conditions and visibility were good during all flights. During the successful monitoring overflights no marine mammals, birds, or fishes were observed within the 20 square mile area. Wildlife observer report is provided in Attachment A.

The next fish and wildlife monitoring events are planned for today (April 5) and Friday (April 7). Wildlife monitoring will continue for two weeks after completion of the pipeline repair.

Water Quality Sampling:

Sampling Periods # 1 and # 2
Preliminary graphical representations for all eight drifts completed during Sampling Periods #1 and #2 are included in Attachment B. Data for Drift #3 from Sampling Period #1 and Drifts #2 and #4 from Sampling Period #2 have been reported previously. In the aggregated data, there are few instances of elevated dissolved methane with no apparent correlation to any material changes in dissolved oxygen. The few instances of noticeable changes in dissolved oxygen have been accompanied by low dissolved methane concentrations. The data indicates that there is no apparent consistent correlation between elevated methane concentration and reduced dissolved oxygen concentrations. The aggregated data also suggest changes in methane and dissolved oxygen concentrations are localized and dissipate quickly. No violations of state water quality standards have been identified.

Sampling Period # 3 ending 4/04/2017
The pipeline pressure was reduced to 65 psi on March 25, 2017. The water quality buoy was successfully deployed two times in the area of the gas leak on March 29, 2017, one day after a spring tide. The buoy was equipped with sensors to monitor temperature, pH, salinity, ORP, conductivity, relative conductivity, and concentrations of dissolved oxygen and methane at depths of 2, 7, and 12.5 meters below the water surface. Due to the short period between the monitoring event and this preliminary report, all of the data collected has not been fully reviewed, analyzed, and compiled for reporting. Drifts #1 and #2 during Sampling Period #3 passed 146 meters and 143 meters from the gas release, respectively.

Water quality sampling during Sampling Period #3 showed limited variability in dissolved oxygen, methane, and carbon dioxide concentrations. The lowest dissolved oxygen reading (11.36 mg/L) was well above the water quality standard specified under 18 AAC 70 for marine waters. The highest methane and carbon dioxide concentrations detected were 0.87 mg/L and 1.26 mg/L, respectively. No violations of state water quality standards were identified.

A summary report and additional safety documentation for the water quality sampling efforts are provided in Attachment B. The next water quality sampling effort is planned to occur today (April 5), conditions permitting

Air/Water Interface Sampling:

Air/Water Interface Sampling was conducted on March 29, 2017. The air/water interface buoy was equipped with sensors to monitor concentrations of carbon dioxide and oxygen at the air/water interface. To further refine our understanding of potential methane concentrations at the air/water interface, a methane sensor capable of quantifying methane concentrations as low as 20 ppm was incorporated onto

the sampling platform. The air/water interface buoy was also equipped with sensors to monitor dissolved methane, temperature, conductivity, dissolved oxygen, and salinity in water at a depth of 1.5 to 1.75 meters below the water surface. The dissolved methane sensor was not responding appropriately during calibration and was returned for a replacement at the manufacturer's recommendation.

Five drifts with the air/water interface buoy were completed at differing tidal stages. GPS coordinates indicate the buoy traversed as close as 17 meters from the reported leak coordinates. The maximum methane concentration detected at the air/water interface was 115 ppm, 17 meters from the gas leak. For reference, a methane concentration of 10,000 ppm has previously been identified as having no toxic effects in mammals.[1] Carbon dioxide was not detected by the sensor at concentrations greater than 1,000 ppm.

Three four-gas meters were used to monitor air conditions continuously to establish a safe work zone during all vessel-based sampling efforts. Lower Explosive Limit (LEL) readings from the meters did not exceed 0%.

A summary report and additional safety documentation for the water quality sampling efforts are provided in Attachment B. The next air/water interface sampling effort is planned to occur April 12, conditions permitting

Acoustic Monitoring:

Acoustic monitoring was conducted on Sunday March, 27, 2017. An Autonomous Multichannel Acoustic Recorder (AMAR) was deployed to collect acoustic recordings. The sound recorder was successfully deployed 4 times and drifted as close as <20 meters to the leak site to collect sound levels emitted by the leak and up to 2.4 kilometers to collect background sound levels. A summary of the acoustic monitoring activities is provided in Attachment C.

If you have any questions or concerns regarding this letter, please feel free to contact either myself or the appropriate Hilcorp staff member as we continue to work with you on our ongoing response to this event.

Sincerely,

William G. Britt, Jr.
Environmental Manager

Attachments:

Attachment A: Fish and Wildlife Monitoring Summary Report
Attachment B: Water Quality Sampling and Air/Water Interface Sampling Summary Report
Attachment C: Acoustic Monitoring Summary Report

[1] Animals exposed to methane at 10,000 ppm showed no toxic effects, and there is no potential for systemic toxicity in mammals [NRC (National Research Council). 1984. a. Emergency and Continuous Exposure Limits for Selected Airborne Contaminants, Vol. 1. Washington, DC: National Academy Press].

ATTACHMENT A

FISH AND WILDLIFE MONITORING SUMMARY REPORT

Hilcorp Cook Inlet Wildlife Survey Narrative

March 31, 2017 Report
By Wildlife Observer, Responder, IBR

I arrived at Ross Aviation at 6:30 am, and took Hilcorp charter from Anchorage to Kenai, landing in Kenai about 7:35 am. I picked up a Hilcorp pool car at the Kenai hangar. Weather was foggy/low clouds with a significant north wind and blowing snow.

I ate breakfast, checked for any recent relevant eBird sightings in the upper Cook Inlet area (none). I visited the Kenai River mouth area about 10:45-11:10 am at outgoing tide, and observed more than 100 gulls (mostly Herring), three bald eagles, and five unidentified ducks (possibly 1 Common Goldeneye and 4 Surf Scoters).

I arrived at OSK helipad about 1:15 pm. I met the PSO from CISPRI who was the marine mammal observer on the same flight. We departed at 2:40 pm although slack tide was at 2:37 pm. We were delayed for takeoff because there was only one helicopter functioning and there was a crew change ahead of us.

We were able to fly at about 350' ASL because the volume of methane leaking has diminished. The sky was completely overcast and the ice has mostly broken into smaller pieces floating on the water. This made bird sighting a little more difficult, but the pilot and Brian spotted a gull and a Common Raven on their side of the aircraft. I sat on the inside circling window as we made clockwise circles. I had to cut short the last circle of the survey so I could catch the Otter flight back to Anchorage. The ending GPS point was Latitude N 60.46.513 Longitude W 151.28.706 (taken by PSO, CISPRI).

I departed Kenai at 4:30 pm and arrived at Ross Aviation hangar in Anchorage about 5 pm.

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Cook Inlet Operations - Protected Species Observer Effort Log

Project ID: PSO

Name: Protected Species Observer **Initial:** PSO **Vessel Name:** Hilcorp Helo

Protected Species Observer PSO **Effort Log Page #:** MMO-007

Date MM/DD/YYYY	Observers' Initials	Start of watch				End of watch				Wind direction	Beaufort sea state	Swell (m)	Visibility (km)	Glare severity
		Time	Latitude	Longitude	Depth (m)	Time	Latitude	Longitude	Depth (m)					
03/09/2017	PSO	1440	60° 46.9682 North	151° 26.0797 west	Altitude 90m	1540	60° 46.0858 North	151° 20.5353 West	Altitude 90m	NE 26 Kph	Ø	Ø	160 Km	
03/17/17	PSO	1430	60° 45.580 North	151° 17.869 WEST	~~500~~ FT.	1530	60° 45.868 North	151° 24.627 WEST	500 FT	NE 6.5 Kn	Ø	Ø	[illegible]	
3/20/17	PSO	1015	60 44 290 NORTH	151 18 699 WEST	500 FT	1115	60 50 287 North	151 28 802 WEST	500 FT.	↓ 5 KTS.	Ø	Ø	UNLIMITED	
3/22/17	PSO	1300	60. 46. 984 North	151. 26 210 West	500 FT		60. 45 349 N	151. 33 405 W	500 FT	↓ 5 Kn	Ø	Ø	UN LIM	
3/31/17	PSO	1445	60.44.600 North	151. 18.444 West	Altitude 105m	1540	60.46. 613 N	151. 28 .706 W	Alt 350		Ø	Ø	160Km	

ATTACHMENT B

WATER QUALITY AND AIR/WATER INTERFACE SAMPLING SUMMARY REPORT

Cook Inlet Methane Pipeline Leak Area

Water Quality and Air/Water Interface Monitoring

Weekly Report #3

Prepared by SLR International Corporation (SLR)

Report Date: 4-5-2017

1.0 OVERVIEW

The third water quality monitoring event and second air/water interface sampling were conducted from aboard the Offshore Service Vessel (OSV) Resolution during this reporting period using the approaches and methods described in the ADEC-approved plans (SLR 2017a and b). Safety of the vessel and crew was top priority during the monitoring activities. For health and safety, air monitoring was performed for potential explosive vapors on board the vessel by a dedicated safety professional. The quantity and location of sampling events were determined by site and weather conditions. The data presented herein is preliminary, subject to further review and verification by SLR International Corporation (SLR).

For the purposes of monitoring reporting a revised location provided by Hilcorp was used for location of the methane leak. The revised location and depth is:

- Latitude 151°26'01.84"W, Longitude 60°46'35.68"N
- Easting1384137.82, Northing: 2478537.39
- Water Depth (MLLW) = 21.18 meters (69.51 feet)

This location is referred to as the Methane Release Point (MRP). Initial estimates of the leak rate ranged from 203 to 300 thousand cubic feet per day (MCFD). On March 13, Hilcorp reduced the pressure in the line and reported the gas flow rate from the leak was 193 to 215 MCFD. On March 25, 2017, the leak rate was further reduced to 85 to 115 MCFD.

As discussed in Section 2.2 of this report, based on the preliminary data review completed to date, the dissolved oxygen (DO) concentrations measured during this event and the previous events did not violate the Alaska Water Quality Standards (AWQS) as established in Title 18 Alaska Administrative Code (AAC), Chapter 75 (18 AAC 70).

2.0 WATER QUALITY MONITORING

2.1 Activities Completed

Water quality monitoring and sampling was conducted on March 29, 2017, one day after a spring tide on March 28. The monitoring period covered portions of a flood and ebb tide. Water sampling was conducted during slack low water, with a projected minus tide of 3.0 meters below mean lower low water (MLLW). The field team consisted of two SLR and two Kinnetic Laboratories, Inc. (KLI) scientists. The field team members (samplers) were Alaska Department of Environmental Conservation (ADEC) qualified samplers, per 18 Alaska Administrative Code 75.

The data collection activities followed the Water Quality Cook Inlet Alaska Methane Pipeline Leak Water Quality Sampling Plan (WQ Plan), (SLR 2017a). The primary data collection method utilized a drifting instrumented buoy to obtain water quality parameters in the area of interest. The drifting buoy had multiple instruments suspended along a line at three depth intervals (2, 7 and 12.5 meters) as depicted on Figure 1.The primary instruments are listed below:

- SeaBird Electronics, SBE 19 plus V2 SeaCAT- conductivity, depth, temperature (CTD), with dissolved oxygen (DO), pH, and turbidity.
- Pro-Oceanus Mini Methane
- Pro-Oceanus Mini Carbon Dioxide
- PME MiniDOT
- Garmin WAAS differential global positioning system (mounted on buoy and used to track the buoy's position during a monitoring transect)

Reported instrument depths below the water surface (bws) are based on length of line from the bottom of the buoy to the instrument(s). The buoy drifted with the current so the instrument string maintained a near vertical position during deployment. This was verified by review of the depth reading obtained by the CTD, which was located at the end of the line. The recorded CTD depths were 12.5m ± 0.1m. A summary of the parameters measured by each instrument and frequency is provided in Attachment A, Table A-1.

During event 3, the site conditions impacted the activities completed and collection of data, as noted below:

- Ice conditions during the third event varied from approximately 5-8 tenths ice cover in the area within 1 km of the MRP during ebb tide, with greater variability across the entire inlet. Ice coverage was considerably less, approximately to 0-2 tenths during the flood tide (around 2-5 pm AKDT). Sampling and monitoring activities were responsive to these dynamic site conditions.
- Air temperatures varied between -2 and +2 ºC with water temperatures typically about -1.3 ºC, and icing of equipment was a concern.
- The DO sensor on the SeaBird CTD system did not operate properly. The magnetic impellor on the water pump for the DO sensor accumulated a substantial amount of black

magnetic iron (magnetite) from the suspended sediment in the water column. The buildup impeded the pump's function, and caused the recording of erratic and fluctuating DO values. Consequently, the data was considered suspect and not retained for reporting purposes. However, as a contingency, a miniDOT sensor had been placed on the SeaBird CTD cage, so DO data from the 12 meter depth was obtained resulting in no significant data gap. The buildup of iron oxide on the DO pumps impellor is not typical, but attributed to the long deployment times used during the buoy drifts (deployment are for hours as opposed to minutes). For future events, the pump will be dismantled and cleaned prior to each event.

Two water quality buoy drifts (monitoring transects) were completed through the area surrounding the MRP on March 29 at differing tidal stages. Water quality buoy drifts were numbered Drift #1 and Drift #2. At the MRP site, the tide changes about 50 minutes after NOAA tidal predictions for the East Forelands area, and drifts were planned accordingly. The duration of each water quality buoy drift varied from approximately 40 to 54 minutes. Drift #1 occurred during the ebb tide. The buoy was deployed approximately 500 meters up current of the MRP was allowed to drift down current approximately 5 km. Drift #2 occurred during the flood tide. The drift began approximately 900 meters up current of the MRP and was allowed to drift approximately 5 km down current. Table A-2 in Attachment A provides a summary of the buoy deployments and indicates the closest distance from the MRP for each drift. Drifts #1 and #2 both passed approximately 145 meters from the MRP.

In addition, water samples for laboratory analysis were collected at slack tide (low tide) directly over the MRP at several depths (surface, middle and deep) using Niskin bottles. The Niskin bottles were deployed directly into the surface expression of the bubble plume over the MRP site. A total of three primary samples, plus one sample duplicate were collected and sent to the analytical laboratory (ALS Environmental in Simi Valley, California) for analysis of CH_4 and CO_2. Results are anticipated on April 7, and will be documented in a subsequent report.

A photograph log documenting the data collection methods and site conditions during week 3 is included in Attachment A.

2.2 Summary of Results

This weekly report provides data for the current and previous water quality sample events. Some buoy tracks from the Week 1 and 2 were not previously reported, due to the short period between the field work and weekly reporting event. Therefore, this report provides data plots of the primary parameters of interest (DO, CH_4 and CO_2) for all water quality buoy drifts completed to date (as listed on Table A-2 in Attachment A), starting with Week 1 and ending with Week 3. Plots showing the travel path of the buoy during each drift are illustrated in Figures A-2a, A-2b, and A-2c in Attachment A.

2.2.1 Buoy Transects-Week 1

During the first monitoring event, one buoy drift was performed on March 18 and three buoy drifts were performed on March 19. Plots of DO, CH_4 and CO_2 recorded during the four drifts are provided on Figures A-4-4.1 to A-4.4 in Attachment A. The lowest DO value was recorded during

Drift #3 which started about 20 minutes prior to slack tide in close proximity to the MRP. During the drift the buoy passed within 9.8 meters of MRP, which was the closest of all the drifts for that week. As the buoy approached and passed the MRP, a noticeable drop in DO concentration was recorded by the sensor deployed at depth of 12.5 meters (Figure A-4.4a in Attachment A). During that period, the DO concentration dropped from approximately 11.8 mg/L to 10.09 mg/L, then rose back to 11.7 mg/L. The DO sensors at 7 and 2 meters depths had minimum detected DO concentrations of 12.03 and 11.78 mg/L, respectively, and did not show a similar drop in DO as the buoy passed the MRP.

During Drift #3, the CH_4 concentration increased slightly down current from the MRP (Figure A-4.4b in Attachment A) rising from approximately 0.1 to 0.15 mg/L at 7 meters, which was the highest CH_4 concentration recorded during the four drifts that week. The CH_4 concentration recorded at 12.5 meters did not show a similar increase. CO_2 concentrations recorded during Drift #3 also did not show any apparent fluctuation as the buoy passed the MRP (Figure A-4.4c in Attachment A).

In general, the DO, CH_4 and CO_2 concentrations recorded during the other three drifts are similar to each other and did not show any significant fluctuations as the buoy passed the MRP. Most of the fluctuation in the recorded data occurred doing the initial 5-15 minutes of deployment, when the sensors were presumably in the initial stages of equilibrating with the water temperature and gas dissolved gas concentrations (the CH_4 and CO_2 sensors have longer response periods than the DO sensors), or there was interference from surface ice. During Drift #1 on March 19, the Seabird DO sensor at 12.5 meters recorded a drop in DO down to 10.27 mg/L two minutes into the drift and 100 meters upcurrent of the MRP (Figure A-4.2a in Attachment A). However, the response and measurements are suspect because the CTD was deployed through a slushy layer of ice and the initial DO readings were anomalously high (up to 16 mg/L) and where followed by a rapid drop. The pH and salinity readings during that period were atypically low (pH 7 versus 8, salinity 20 versus 26 practical salinity units), and all three parameters did not appear to stabilize until several minutes into the drift, potentially as ice cleared from the instrument(s). In addition, this drift started approximately 3 hours into a flood tide so the water up current of the MRP was unlikely to have been impacted by the release. The DO value recorded as the buoy passed the MRP was 11.55 mg/L.

2.2.2 Buoy Transects-Week 2

There were four buoy drifts performed on March 23. Plots of DO, CH_4 and CO_2 for all four drifts are provided on Figures A-4-5.1 to A-5.4 in Attachment A.

The most apparent fluctuation in DO and CH4 concentration occurred during the two drifts that came closest to the MRP: Drift #2 on the flood tide passed 3.3 meters from the MRP and Drift #4 on the ebb tide passed 2.6 meters from the MRP. During both drifts the WQ Buoy was deployed up current of the MRP and retrieved on the down current side.

- Dissolved oxygen: The minimum dissolved oxygen recorded was during Drift #2 (Figure A-5.2a in Attachment A). During this drift the DO sensor at 12 meters recorded a drop in DO concentration from about 11.1 of 8.08 mg/L, reaching the minimum value about 50 meters down current from the MRP. The DO concertation then began to rise, reaching a value of

around 11 mg/L about 1500 meters down current from the MRP. During the same drift, the DO sensors at 7 and 2 meters indicted relatively little variation after passing the MRP. During Drift #4, the recorded DO concentrations were generally slightly higher and the sensors did not record drop in DO after passing the MRP, with the possible exception of miniDOT sensor at 12 m, which indicated a reduction in DO from a high of 12.9 to 11.11 mg/L (Figure A-5.4a in Attachment A). However, the some of this fluctuation may have been due to the sensor stabilizing as it occurred within the first seven minutes of the drift.

- Dissolved Methane: The highest CH_4 concentration recorded during Week 2 was 28.4 mg/L at a depth of 7 meters, which occurred during Drift #4 approximately 750 meters down current of the MRP. The CH_4 concentration steadily declined after that point but was still above 15 mg/L at the end of drift, approximately 3,000 meters down current of the MRP.

Drift #02 passed nearly as close the MRP (3.3 meters east versus 2.9 meters east) but recorded significantly lower concentrations (Figure A-5.2b in Attachment A). The maximum CH_4 recorded during Drift #2 was 0.7 mg/L. Drifts #2 and #4 were both conducted in flowing conditions, approximately 2 hours before and 1 hour after slack tide, respectively. Thus, conditions and the drift pattern were similar. The variability in the measurements suggests the dissolved CH_4 concentrations in close proximity to the release point are highly variable due to the dynamic water conditions. The other two buoy drifts which passed farther laterally from the MRP (71 to 166 meters) recorded much lower maximum CH_4 concentrations (on the order of 0.05 to 0.01 mg/L), suggesting the lateral extent of the elevated CH_4 concentrations was very limited. In addition, the CH_4 concentrations detected in the water samples collected for lab analysis 177 and 257 meters directly down current from the MRP on March 23 were orders of magnitude less than detected by the CH_4 sensors (Table A-2 in Attachment A).

2.2.3 Buoy Transects-Week 3

There were two water quality buoy drifts performed on March 29. Drift #1 and #2 were both started up current of the MRP and passed within 146 and 143 meters of the MRP, respectively. Plots of DO, CH_4 and CO_2 for both drifts are provided on Figures A-6.1 to A-6.2 in Attachment A.

A preliminary review of the data indicates there were little fluctuation in the recorded values for DO, CH_4 and CO_2 once the instrument had 5 to 10 minutes to equilibrate with the water conditions.

Dissolved Oxygen: After the buoy passed the MRP, the lowest DO recorded was 11.23 mg/L during Drift #1 at a depth of 12 meters.

Dissolved Methane: After the buoy passed the MRP, the highest CH_4 recorded was 0.87 mg/L during Drift #2 at a depth of 7 meters.

Dissolved Carbon Dioxide: After the buoy passed the MRP, the highest CO_2 recorded was 1.26 mg/L during Drift #2 at depth of 12.5 meters. The sensor at 7 meters had value about 0.4 mg/L lower than that observed at 12.5 meters.

The lowest measured DO concentration during both drifts on March 29, 2017 was well above the most stringent regulatory limit for DO in marine waters established in 18 AAC 70. The 18 AAC 70

Alaska Water Quality Standards for marine waters state the surface DO concentration in coastal waters may not be less than 6.0 mg/L for a depth of one meter except when natural conditions cause this value to be depressed. DO may not be reduced below 4 mg/L at any point beneath the surface. DO concentrations in estuaries and tidal tributaries may not be less than 5.0 mg/L except where natural conditions cause this value to be depressed.

Total DO concentrations, as a percent of solubility, will be report at a later date; preliminary analysis indicates these do not exceed 110%, per 18 AAC 70.20(b)(A)(15).

There are no 18 AAC 70 water quality standards for dissolved CH_4 or CO_2.

In general, the cumulative data collected during Weeks 1-3, suggest that unless the buoy passed within a few meters of the MRP, there was little to no detected increase in CH_4 or decreased DO.

2.2.4 Laboratory Results

Laboratory sample results for dissolved CH_4 and CO_2 from the second water sampling event on March 23 are provided in Table A-3 in Attachment A. These samples were collected at multiple depths at two locations down current of the MRP on Figure A-5 in Attachment A (distance from the two stations to the MRP was estimated to be 177 and 257 meters).

These samples were submitted to ALS Environmental in Simi Valley, California (ALS) for analysis. ALS maintains National Environmental Laboratory Accreditation Program (NELAP) and Department of Defense Environmental Laboratory Accreditation Program certification for CH_4 and CO_2 analysis (method RSK 175). A preliminary review of the data was performed and according to that review, no data required qualification.

As shown in Table A-3 in Attachment A, the CH_4 concentration ranged from 0.0017 to 0.031 mg/L. The highest detection was in the duplicate sample of CW03S (CW93S), collected at 1 meter below the water surface on the flood tide. Both sample locations had higher concentration in the surface sample than the deep sample. The concentration detected in the surface samples were higher than those collected during week 1 by an order of magnitude, which may be at least partially due to the closer sample distance to the MRP. However, as noted previously, the highest detected laboratory concentrations were several orders of magnitude lower than the highest values recorded by the CH_4 sensor during Drifts #2 and #4 on March 23, at a similar distance from the MRP (Figures A-5.2b and A-5.4b in Attachment A). These variations may be the result of the varied data collection methods, methods of analysis (including instruments response time), and variably in the specific time and place of collection.

The laboratory CO2 showed little variation with concentrations ranging from 1.3 to 1.7 mg/L. These values were similar to the concentration detected during the first sample event on March 18, at further distance down current from the MRP (518 and 741 meters). In-situ measurements of CO_2 by the Pro-Oceanus digital probes are of a similar magnitude.

2.3 Activities Planned for the Next Sampling Event

The next water quality sampling event is planned for April 5, 2017. Planned activities include:

- Conducting deployments of the water quality buoy at varied tidal conditions, with one deployment around the slack tide and one or more in flowing conditions.

These planned activities may need to be modified due to site conditions and logistics.

3.0 AIR/WATER INTERFACE MONITORING

3.1 Activities Completed

On March 28, 2017, a more sensitive methane (CH_4) sensor was installed and calibrated and the diffusion membrane on the dissolved CH_4 sensor was replaced. During replacement of the diffusion membrane, damage to the sensor head was observed. The vendor was contacted and suggested that the sensor be realigned in the sensor cage in a vertical position and performance reassessed on the next deployment.

The Air / Water Interface sampling was conducted on March 29, 2017. The field team consisted of one SLR and two Aridea scientists. Prior to sampling the sensor calibration and integrity was assessed to verify acceptable performance. Sensors were found to be responding appropriately with the exception of the dissolved CH_4 sensor. Performance of the dissolved CH_4 was closely monitored throughout the subsequent sampling events and troubleshooting information was provided to the vendor. At the vendor's recommendation the sensor was removed after returning to the dock and prepared for return to the manufacturer for repair/replacement before the next sampling event.

The data collection activities followed the Air / Water Interface Sampling Plan. The primary data collection method utilized a drifting instrumented buoy to obtain Air / Water quality parameters in the area of interest. The primary instruments are listed below and shown on Figure B1: Air / Water Interface Buoy Schematic:

- RKI Instruments S2 LEL Transmitter / Detector – collects data every minute
- RKI Instruments S2 LEL Methane (CH_4) Transmitter / Detector – collects data every minute
- RKI Instruments S2 Carbon Dioxide (CO_2) Transmitter / Detector – collects data every minute
- RKI Instruments S2 Oxygen (O_2) Transmitter / Detector – collects data every minute
- Pro-Oceanus Mini Methane (CH_4) - Submersible pCH_4 sensor and datalogger – collects data every minute
- In-Situ AquaTroll ® 600 Multiparameter Sonde – Water temperature, conductivity, dissolved oxygen, salinity – collects data every minute
- Garmin WAAS differential global positioning system (mounted on buoy and used to track the buoy's position during a monitoring transect) – collects data every minute.

Conditions during the buoy launches were:

- All of the buoy launches were conducted during periods where the launch and transect areas contained zero to two tenths ice.
- Air temperature varied between -2 and 2 ºC.
- Water temperatures were approximately -1.3 ºC.
- Winds ranged from calm to 12 mph primarily out of the southwest (SW).

Five buoy drifts (monitoring transects) were completed through the area surrounding the MRP at differing tidal stages. The duration of each drift varied from approximately 20 to 60 minutes, depending upon the tidal flow. Plots of the drifts are illustrated on Figure B3 Air / Water Interface Sampling Events, Buoy Tracks March 29, 2017 in Attachment B. During the drifts, the closest distance the buoy passed near the MRP varied between approximately 17 and 159 meters. Table B8 Summary of Air / Water Interface Buoy Drifts March 29, 2017 in Attachment B provides a summary of the buoy deployments.

3.2 Preliminary Summary of Results

3.2.1 Event 1 Data Update

Initial dissolved oxygen concentrations reported for Event 1 data considered salinity corrections at 0 ºC, although water temperatures during Event 1 ranged from -1.45 °C to -0.16 °C, as noted in Tables B2 through B7 in Attachment B. Following initial data reporting, a program was authored to provide dissolved oxygen concentrations that reflect water temperatures below 0 ºC. This program uses equations provided by the dissolved oxygen probe manufacturer, InSitu. The reported values for dissolved oxygen in Tables B2 through B7 have been revised to reflect the temperature and salinity correction factor. Following correction for salinity and temperature, the values for dissolved oxygen from Event 1 increased slightly from those initially reported. This result is expected because the actual temperatures were lower than 0 ºC (and dissolved oxygen concentrations increase with decreasing temperature). During Event 2, the dissolved methane sensor was damaged by an apparent ice strike. A replacement unit was ordered. Because it is unknown when the damage to the dissolved methane sensor occurred, the Event 1 dissolved methane data remains un-validated and will be reassessed during a subsequent event.

3.2.2 Event 2 Data

Due to the short period between the monitoring event and initial reporting date, all of the data collected during this sampling event has not been fully reviewed, analyzed and validated for reporting. A brief description of each buoy deployment is provided, followed by a general discussion of the preliminary results.

During Drift #1 the Air / Water Interface buoy was deployed at 12:32 on the ebb tide up current of MRP. It was retrieved approximately 21 minutes later down current of the MRP. During the drift, the buoy passed south of the MRP. At its closest point, the buoy came within 148 meters of the estimated MRP. Throughout the entire drift the buoy remained either upwind or tangential to the MRP. Table B9 in Attachment B provides a summary of measurements obtained during the buoy deployment.

During Drift #2 the Air / Water Interface buoy was deployed at 13:09 on the ebb tide up current of MRP. It was retrieved approximately 18 minutes later down current of the MRP. During the drift, the buoy passed south of the MRP. At its closest point, the buoy came within 78 meters of the estimated MRP. Throughout the entire drift the buoy remained either upwind or tangential to the MRP. Table B10 in Attachment B provides a summary of measurements obtained during the buoy deployment.

During Drift #3 the Air / Water Interface buoy was deployed at 13:47 up current of the MRP at the end of the ebb tide as it was beginning to slack. The buoy was maneuvered by the boat crane to locations where bubbles were observed on the surface. During that time a number of water measurements were recorded that appear anomalous for temperature, dissolved oxygen, specific conductance, and salinity. This is explained by the buoy occasionally being lifted from the water for repositioning as well as impacts from the close proximity of the boat. As a result, data are not representative of actual undisturbed water conditions. The purpose of Drift #3 was to collect data from various points of changing CH_4 and CO_2 concentrations and verify the ability of all sensors (primarily the replacement CH_4 in air sensor) to measure parameters of interest. At its closest point, the buoy came within 17 meters of the estimated MRP. CH_4 was detected at concentrations ranging from <20 ppm to 115 ppm over a range of 17 to 302 meters away from the MRP. Maximum CH_4 concentrations were measured at 115 ppm approximately 17 meters from the MRP. Table B11 in Attachment B provides a summary of measurements obtained during the buoy deployment.

During Drift #4 the Air / Water Interface buoy was deployed at 15:25 at the end of the slack tide as it shifted to flood up current of MRP. It was retrieved approximately 11 minutes later down current of the MRP. During the drift, the buoy passed north of the MRP. At its closest point, the buoy came within 114 meters of the estimated MRP. CH_4 was detected at 33 ppm when the buoy was at its closest point to the MRP. CH_4 was detected 674 meters away from the MRP just prior to recovering the buoy and is suspected to be impacted by boat exhaust while maneuvering into position to recover the buoy. Table B12 in Attachment B provides a summary of measurements obtained during the buoy deployment.

During Drift #5 the Air / Water Interface buoy was deployed at 15:53 on the flood tide up current of MRP. It was retrieved approximately 48 minutes later down current of the MRP. During the drift, the buoy passed north of the MRP. At its closest point, the buoy came within 159 meters of the estimated MRP. Table B13 in Attachment B provides a summary of measurements obtained during the buoy deployment.

3.2.3 Event 2 Data – Discussion of Preliminary Results

The replacement CH_4 in air sensor provided an increase in sensitivity over the previously installed sensor. Previous sampling events were limited to detecting and recording CH_4 concentrations that exceeded 10,000 ppm. With the new configuration, a detectable amount of CH_4 was measured in the immediate area of the MRP as well as approximately 300 meters directly downwind of the

MRP. A detectable CH_4 concentration was recorded 674 meters from the MRP but is believed to be the result of boat engine exhaust while maneuvering to recover the buoy.

During data review, a clear correlation was identified between ambient temperature and CH_4 zero recordings during periods where the sensor was expected to be free from CH_4 impacts. The manufacturer was contacted and confirmed that the replacement CH_4 sensor zero was known to be very sensitive to changes in ambient temperature. The vendor indicated that there was an auto-zero function that would prevent zero drift; however because of the nature of the study, that function had been disabled so that the sensor did not inadvertently re-zero itself during a time when it was measuring real CH_4 concentrations. As a result, a zero drift correction factor was computed and the measured CH_4 concentrations were adjusted accordingly. An identified correction factor was 0.125 ppm drift per minute for every 1°C temperature change after calibration. In future sampling events the CH_4 sensor will be zeroed prior to each launch, not just at the beginning of the day, in order to compensate for sensor drift associated with changing ambient temperatures.

Dissolved CH_4 measurements were obtained despite the damage observed on the sensor head. The dissolved CH_4 sensor recorded 0% dissolved CH_4 throughout the tested area as well as when the buoy was removed from the water. Throughout the deployment the sensor performance was monitored and information was relayed to the vendor. At the vendor's recommendation the sensor was removed upon returning to the dock and prepared for return to the manufacturer. The Event 1 measurements were unable to be validated during the March 29 event. Dissolved CH4 will be re-assessed following installation of a replacement sensor (planned to occur prior to the next Air / Water interface buoy sampling event).

Dissolved oxygen concentrations showed minimal variation over the Drifts 1, 2, 4, and 5, ranging from a low of 12.10 mg/L to a high of 12.72 mg/L. Drift #3, where the buoy was positioned nearest the boat and likely experienced warming conditions from the boat coolant stream, showed dissolved oxygen concentrations ranging from 11.21 mg/L to 12.72 mg/L. The dissolved oxygen concentration of 11.21 mg/L corresponds to a localized water temperature of 3.26 °C, which is considerably greater than the below 0 °C water temperatures observed when the buoy was launched away from the boat.

Actual air measurements obtained for LEL and carbon dioxide (CO_2) revealed results below the sensitivity of the sensors (lower limit of detection, LDL). Sensors for these parameters were originally selected to ensure quantitative measurement of potentially high concentrations associated with sampling directly at the MRP. Consistent with previous sampling, the actual observations were considerably lower than initial expectations even when sampling directly at the MRP. All measurements below the LDL for these parameters are reported as less than the parameter-specific LDL.

- LEL: The LEL sensor was optimized after the March 26, 2017 deployment and the LDL was adjusted to 1%. LEL results indicate methane concentrations are below 1% (equates to 5,000 ppm CH_4), providing evidence of a safe work environment.

- CO_2: The LDL for CO_2 is 0.1% or 1,000 ppm. Established global background CO_2 concentrations are expected to be approximately 400 ppm. The current sensor provides the ability to characterize significant increases in CO_2 concentrations. No adjustment to the CO_2 sensor is planned.

3.3 Activities Planned for the Next Sampling Event

The next air / water interface sampling event is planned for April 12, 2017. Planned activities include conducting deployments of the Air / Water Interface buoy with a new dissolved CH_4 sensor and implementing a procedure to re-zero the CH_4 in air sensor prior to each drift. These planned activities may need to be modified due to site conditions and logistics.

REFERENCES

SLR International Corporation (SLR). 2017a Water Quality Sampling Plan. Cook Inlet Alaska Methane Pipeline Leak, March 2017.

SLR. 2017b. Air/Interface Sampling Plan. Cook Inlet Alaska Methane Pipeline Leak, March 2017

ATTACHMENT A:

PHOTOGRAPH LOG:
Water Quality and Air/Water Interface Photograph Log (March 23 to March 24, 2017)

TABLES:
Table A-1: Water Quality Buoy Instrumentation Summary, March 29, 2017
Table A-2: Summary of Water Quality Buoy Drifts
Table A-3: Water Sample Analytical Results, Pipeline Leak Area, Cook Inlet, Alaska

FIGURES:
Figure A-1: Water Quality Monitoring Buoy Schematic (March 29), 2017
Figure A-2a: Water Quality Monitoring Week 1, Buoy Drift Tracks
Figure A-2b: Water Quality Monitoring Week 2, Buoy Drift Tracks
Figure A-2c: Water Quality Monitoring Week 3, Buoy Drift Tracks
Figure A-3: Water Sample Locations for Laboratory Analysis (Weeks 1-3)
Week 1:
Figure A-4.1a: Buoy Drift #1, March 18, 2017, Dissolved Oxygen
Figure A-4.1b: Buoy Drift #1, March 18, 2017, Dissolved Methane
Figure A-4.1c: Buoy Drift #1, March 18, 2107, Dissolved Carbon Dioxide
Figure A-4.2a: Buoy Drift #1, March 19, 2017, Dissolved Oxygen
Figure A-4.2b: Buoy Drift #1, March 19, 2017, Dissolved Methane
Figure A-4.2c: Buoy Drift #1, March 19, 2017, Dissolved Carbon Dioxide
Figure A-4.3a: Buoy Drift #2, March 19, 2017, Dissolved Oxygen
Figure A-4.3b: Buoy Drift #2, March 19, 2017, Dissolved Methane
Figure A-4.3c: Buoy Drift #2, March 19, 2017, Dissolved Carbon Dioxide
Figure A-4.4a: Buoy Drift #3, March 19, 2017, Dissolved Oxygen
Figure A-4.4b: Buoy Drift #3, March 19, 2017, Dissolved Methane
Figure A-4.4c: Buoy Drift #3, March 19, 2017, Dissolved Carbon Dioxide
Week 2:
Figure A-5.1a: Buoy Drift #1, March 23, 2017, Dissolved Oxygen
Figure A-5.1b: Buoy Drift #1, March 23, 2017, Dissolved Methane
Figure A-5.1c: Buoy Drift #1, March 23, 2107, Dissolved Carbon Dioxide
Figure A-5.2a: Buoy Drift #2, March 23, 2017, Dissolved Oxygen
Figure A-5.2b: Buoy Drift #2, March 23, 2017, Dissolved Methane
Figure A-5.2c: Buoy Drift #2, March 23, 2017, Dissolved Carbon Dioxide
Figure A-5.3a: Buoy Drift #3, March 23, 2017, Dissolved Oxygen
Figure A-5.3b: Buoy Drift #3, March 23, 2017, Dissolved Methane
Figure A-5.3c: Buoy Drift #3, March 23, 2017, Dissolved Carbon Dioxide
Figure A-5.4a: Buoy Drift #4, March 23, 2017, Dissolved Oxygen
Figure A-5.4b: Buoy Drift #4, March 23, 2017, Dissolved Methane
Figure A-5.4c: Buoy Drift #4, March 23, 2017, Dissolved Carbon Dioxide

Week 3

Figure A-6.1a: Buoy Drift #1, March 29, 2017, Dissolved Oxygen
Figure A-6.1b: Buoy Drift #1, March 29, 2017, Dissolved Methane
Figure A-6.1c: Buoy Drift #1, March 29, 2107, Dissolved Carbon Dioxide
Figure A-6.2a: Buoy Drift #2, March 29, 2017, Dissolved Oxygen
Figure A-6.2b: Buoy Drift #2, March 29, 2017, Dissolved Methane
Figure A-6.2c: Buoy Drift #2, March 29, 2017, Dissolved Carbon Dioxide

Cook Inlet Water Quality and Air/Water Interface Sampling Photo Log: Week 3 3-29-17

Photo 1: High ice coverage conditions during drift #1

Date: 3/29/2017

Photo 2: Drift #2 conditions with reduced ice coverage.

Date: 3/29/2017

Photo 3: Preparing Niskin bottles for deployment. Note ice conditions visible in upper right. **Date:** 3/29/2017

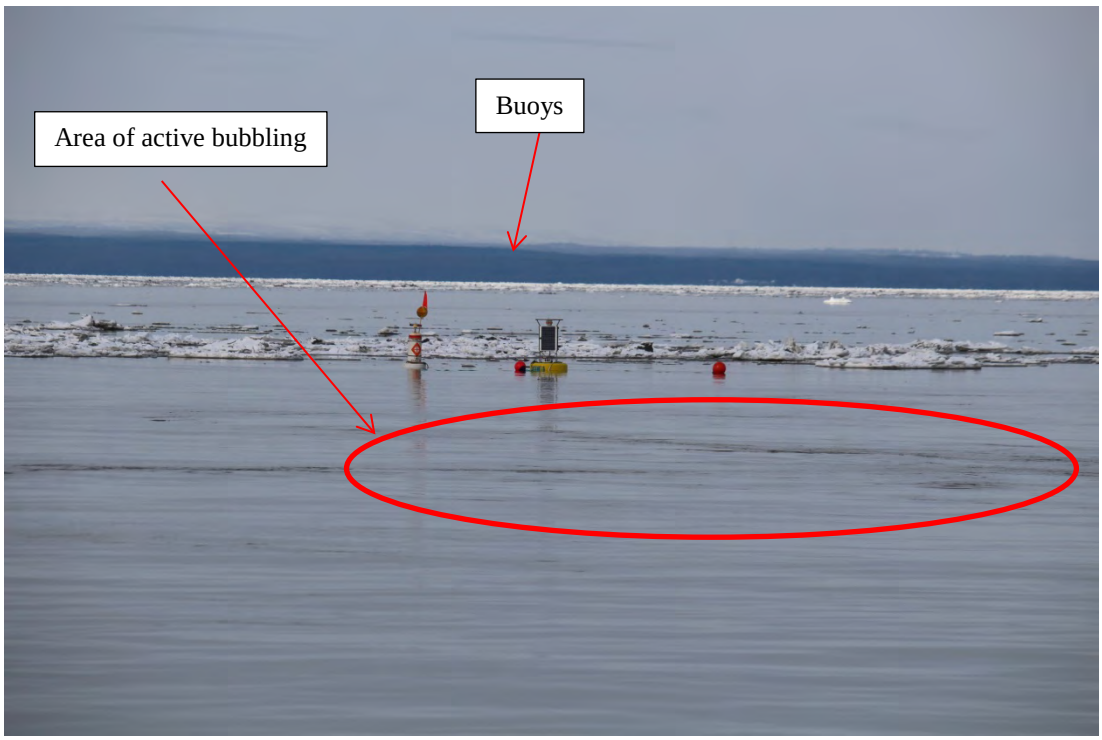


Photo 4: Buoys during Drift #2, showing proximity to methane bubbles (over 100 m) **Date:** 3/29/2017

Table A-1: Water Quality Instrumentation Buoy Summary

Instrument Name	Parameters Measured	Measurement Unit	Measurement Frequency	Frequency Reported Plotted Data Analysis Figures	Notes
PME MiniDOT	Temperature	degrees Celsius (ºC)	Once per minute	Once per minute	Unable to record at higher frequencies
	Dissolved Oxygen	milligrams per liter (mg/L)			
Pro-Oceanus MiniCO2	Partial pressure of CO2 in detector	Parts per million by volume (ppmv)	Once per 2 seconds	Once per 2 seconds	Note this is an gaseous phase concentration, which can be converted to aqueous concentrations.
	Detector total pressure	millibars			
	Detector temperature	degrees Celsius (ºC)			
Pro-Oceanus MiniCH4 (two instruments utilized, with differing ranges 0-1% and 0-100%)	Partial pressure of CH4 in detector	Volume ratio (%)	Once per 2 seconds	Once per 2 seconds	Note this is a gaseous phase concentration, which can be converted to aqueous concentrations.
	Detector total pressure	millibars			
	Detector temperature	degrees Celsius			
Seabird SBE 19plus V3 SeaCat	Depth	meters (M)	4 per second	Data averaged into 5 second intervals	
	Pressure	decibar (dm)			
	Conductivity	Siemens per meter (S/m)			
	Temperature	degrees Celsius (ºC)			
	pH	Negative of the base 10 logarithm of the molar concentration of hydrogen			
	Optical backscatter (OBS)	Nephelometric Turbidity Units (NTU)			
	Dissolved Oxygen	milligrams per liter (mg/L)			
Garmin WAAS	Position	Latitude and longitude	Once per 2 seconds	Once per 2 seconds	

Table A-2: Summary of Water Quality Buoy Drifts

Buoy Type	Instrument(s) Depth (m)		Drift Name	General Tide Description	Proximity to Spring or Neap Tide[1]	Tide Magnitude (m)[1]	Date	Release Time	Release Location			Retrieval Time	Retrieval Location			Drift Duration (hrs:min)	Minimum Distance to MRP (m)	Wind (Knots/direction)	Wave Height (m)	Comments
Water Quality	Surface	2	D01-031817	Ebb	2 days before neap tide event	4.75	3/18/2017	14:50	60	46.622	N	15:20	60	45.356	N	0:30	185	calm	0	CO2 sensor at 12.5 m unintentionally shut off, no data
	Mid	7							151	25.718	W		151	27.877	W					
	Deep	12.5																		
Water Quality	Surface	2	D01-031917	Flood		3.84	3/19/2017	8:15	60	46.37	N	8:40	60	47.2	N	0:25	45	15, SSW	0	
	Mid	7							151	26.239	W		151	25.112	W					
	Deep	12.5																		
Water Quality	Surface	2	D02-031917	Flood			3/19/2017	9:08	60	46.35	N	9:37	60	46.921	N	0:29	170	15, SSW	0	SeaBird DO sensor stopped recording after 5 minutes, potential icing
	Mid	7							151	25.878	W		151	25.878	W					
	Deep	12.5																		
Water Quality	Surface	2	D03-031917	Flood/Slack/Ebb		--	3/19/2017	9:55	60	45.527	N	11:55	60	45.527	N	2:00	9.8	15, SSW	0.2	
	Mid	7							151	23.097	W		151	23.097	W					
	Deep	12.5																		
Water Quality	Surface	2	D01-032317	Flood	3 days after neap tide event	3.08	3/23/2017	12:07	60	46.565	N	12:30	60	47.479	N	0:23	71	0.4 SSW	0	SeaBird DO sensor clogged with ice, no 12.5 meter DO data
	Mid	7							151	25.995	W		151	24.660	W					
	Deep	12.5																		
Water Quality	Surface	2	D02-032317	Flood			3/23/2017	13:10	60	46.393	N	13:57	60	47.755	N	0:47	3.3	Calm	0	SeaBird DO sensor clogged with ice, no 12.5 meter DO data
	Mid	7							151	26.33	W		151	26.248	W					
	Deep	12.5																		
Water Quality	Surface	2	D03-032317	Flood/Slack/Ebb		--	3/23/2017	15:29	60	46.781	N	16:26	60	46.537	N	0:57	166	Calm	0	
	Mid	7							151	25.884	W		151	26.248	W					
	Deep	12.5																		
Water Quality	Surface	2	D04-032317	Ebb		4.33	3/23/2017	16:31	60	46.695	N	17:18	60	45.403	N	0:47	2.6	Calm	0	
	Mid	7							151	25.870	W		151	27.936	W					
	Deep	12.5																		
Water Quality	Surface	2	D01-032917	Ebb	1 day after spring tide event	8.35	3/29/20017	11:07	60	46.725	N	11:47	60	44.322	N	0:40	146	11, SW	0	Water pump for SeaBrid DO sensor clogged, no 12.5 m DO data
	Mid	7							151	25.624	W		151	29.507	W					
	Deep	12.5																		
Water Quality	Surface	2	D01-032917	Flood		7.86	3/29/20017	15:53	60	46.216	N	16:47	60	49.189	N	0:54	143	Calm	0	Water pump for SeaBrid DO sensor clogged, no 12.5 m DO data
	Mid	7							151	26.734	W		151	21.302	W					
	Deep	12.5																		

Notes:

1 - Tidal information is from NOAA Tide Predictions for East Foreland. StationId:TWC1989

Table A-3: Water Sample Analytical Results
Methane Pipeline Leak Area, Cook Inlet, Alaska

Sample ID	Date	Time	Sample Depth (m)	Depth to Bottom (m)	Sample Distance Down Current From MRP (m)[1]	Tide Stage	Analytical Results	
						(ebb,flood, or slack (+/-1hr)	RSK 175 - methane (mg/L)	RSK 175 - carbon dioxide (mg/L)
CW01S	3/18/2017	1131	1	24	518	Ebb	0.0024	1.4
CW01M	3/18/2017	1130	9				0.0026	1.4 MH
Primary: CW01D	3/18/2017	1130	23				0.0019	1.3
Duplicate: CW91D	3/18/2017	1130	23				0.0019	1.4
CW02S	3/18/2017	1613	1	20.6	741	~1hr before slack tide, on the Ebb	ND [0.0013]	1.6
CW02M	3/18/2017	1615	6				ND [0.0013]	1.6
CW02D	3/18/2017	1617	12				0.0027	1.7
Primary: CW03S[2]	3/23/2017	1418	1	24	177	Flood	0.028	1.3
Duplicate: CW93S[2]	3/23/2017	1418	1				0.031	1.6
CW03M[2]	3/23/2017	1418	12				0.0075	1.5
CW04S[2]	3/23/2017	1520	1	24	257	~1hr before slack tide, on the flood	0.014	1.7
CW04M[2]	3/23/2017	1520	9				0.0092	1.5
CW04D[2]	3/23/2017	1520	23.5				0.0017	1.7
CW05S[3]	3/29/2017	1428	1	19.5	0	Slack	pending analysis	
CW05M[3]	3/29/2017	1428	10				pending analysis	
CW05D[3]	3/29/2017	1428	19				pending analysis	

Notes:

1 - All samples collected down current of the MRP unless otherwise noted (including those listed as collected near slack tide

2 - The carbon dioxide trip blank for this collection date was broken prior to sampling due to freezing.

3 - Sample was incorrectly identied as CW04 on chain of custody.

Abbreviations:

"--"	parameter was not measured
m	meters
mg/L	miligrams per liter
MRP	Methane Release Point

Analytical Data Flags:

ND	Nondetect, method reporting limit (MRL) in brackets
M (H,L,or N)	Analyte result is considered an estimated value biased (high, low, uncertain)

FIGURE 1: WATER QUALITY MONITORING BUOY SCHEMATIC
(MARCH 23 and 29, 2017)

- PME MiniDOT dissolved oxygen (DO) and temperature logger: S/N 034835

2 Meters
Below Surface

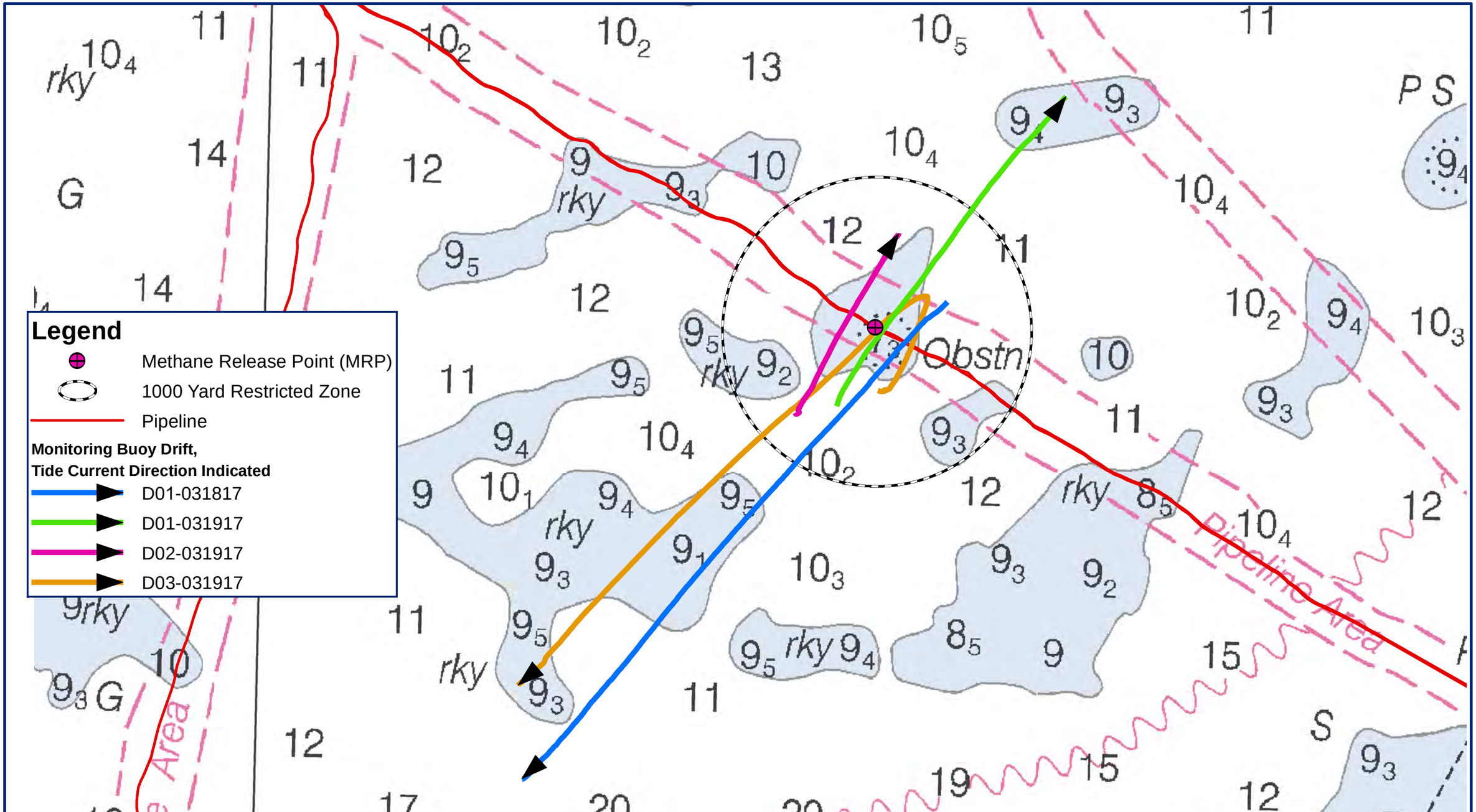
Note: In addition, Air-Interface Buoy will contain a Pro-Oceanus Mini CH_4 sensor Submersible pCH_4 (partial pressure CH_4) sensor and datalogger (0-1% by volume range) for surface water measurements of CH_4.

- PME MiniDOT dissolved oxygen (DO) and temperature logger: S/N 066117
- Pro-Oceanus Mini CH_4 sensor Submersible pCH_4 (partial pressure CH_4) sensor and datalogger (0-100% by volume range): S/N 37-417-25
- Pro-Oceanus Mini CO_2 sensor Submersible pCO_2 sensor and datalogger: S/N 37-414-20

7 Meters
Below Surface

- PME MiniDOT dissolved oxygen (DO) and temperature logger: SPARE
- Seabird SBE 19plus V2 SeaCAT profiling conductivity, temperature, and depth (CTD), with DO, pH, and turbidity.
- Pro-Oceanus Mini CH_4 sensor Submersible pCH_4 (partial pressure CH_4) sensor and datalogger (0-1% by volume measurement range): S/N 37-416-25
- Pro-Oceanus Mini CO_2 sensor Submersible pCO_2 sensor and datalogger: S/N 37-415-20

12.5 Meters
Below Surface



Base map referenced from National Oceanic and Atmospheric Administration (NOAA), Chart 16663, Alaska - South Coast, Cook Inlet, East Foreland to Anchorage (Scale 1:100,000).

Soundings in Fathoms (Fathoms and Feet to Eleven Fathoms at Mean Lower Low Water)

1 Fathom = 6 Feet = 1.8 Meters

0 500 1,000 1,500 2,000 2,500 3,000

Meters

N

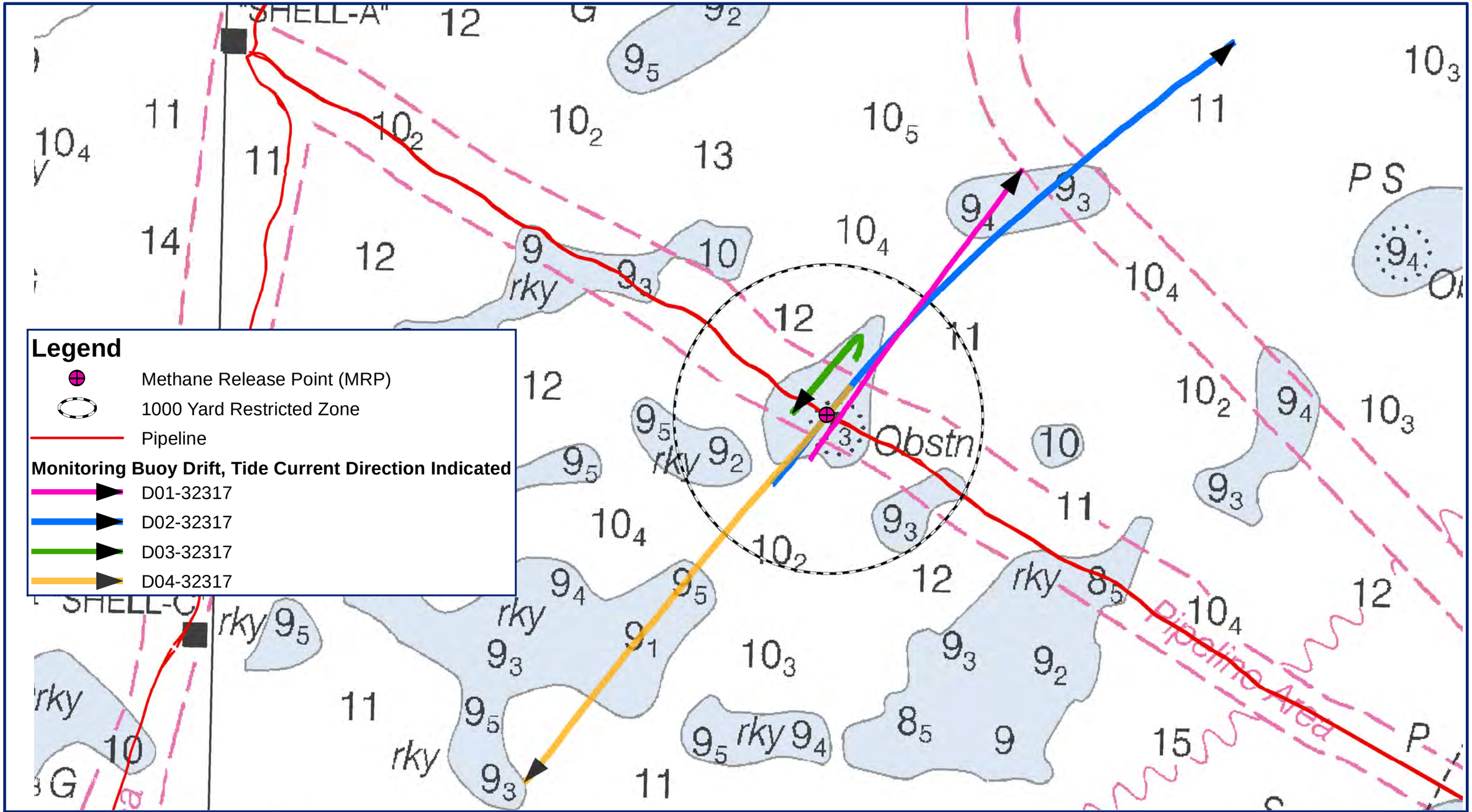
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR

Project: HILCORP ALASKA, LLC
METHANE PIPELINE LEAK
COOK INLET, ALASKA

Drawing: WATER QUALITY MONITORING EVENT1
MARCH 18-19, 2017 BOUY DRIFT TRACKS

Drawing Date April 2017	Scale 1:21,960.49	Fig. No. A-2a
File Name Figure A2a Methane Release_Event1.mxd	Project No. 105.00874.17015	



Base map referenced from National Oceanic and Atmospheric Administration (NOAA), Chart 16663, Alaska - South Coast, Cook Inlet, East Foreland to Anchorage (Scale 1:100,000).

Soundings in Fathoms (Fathoms and Feet to Eleven Fathoms at Mean Lower Low Water)

1 Fathom = 6 Feet = 1.8 Meters

0 500 1,000 1,500 2,000 2,500 3,000

Meters

N

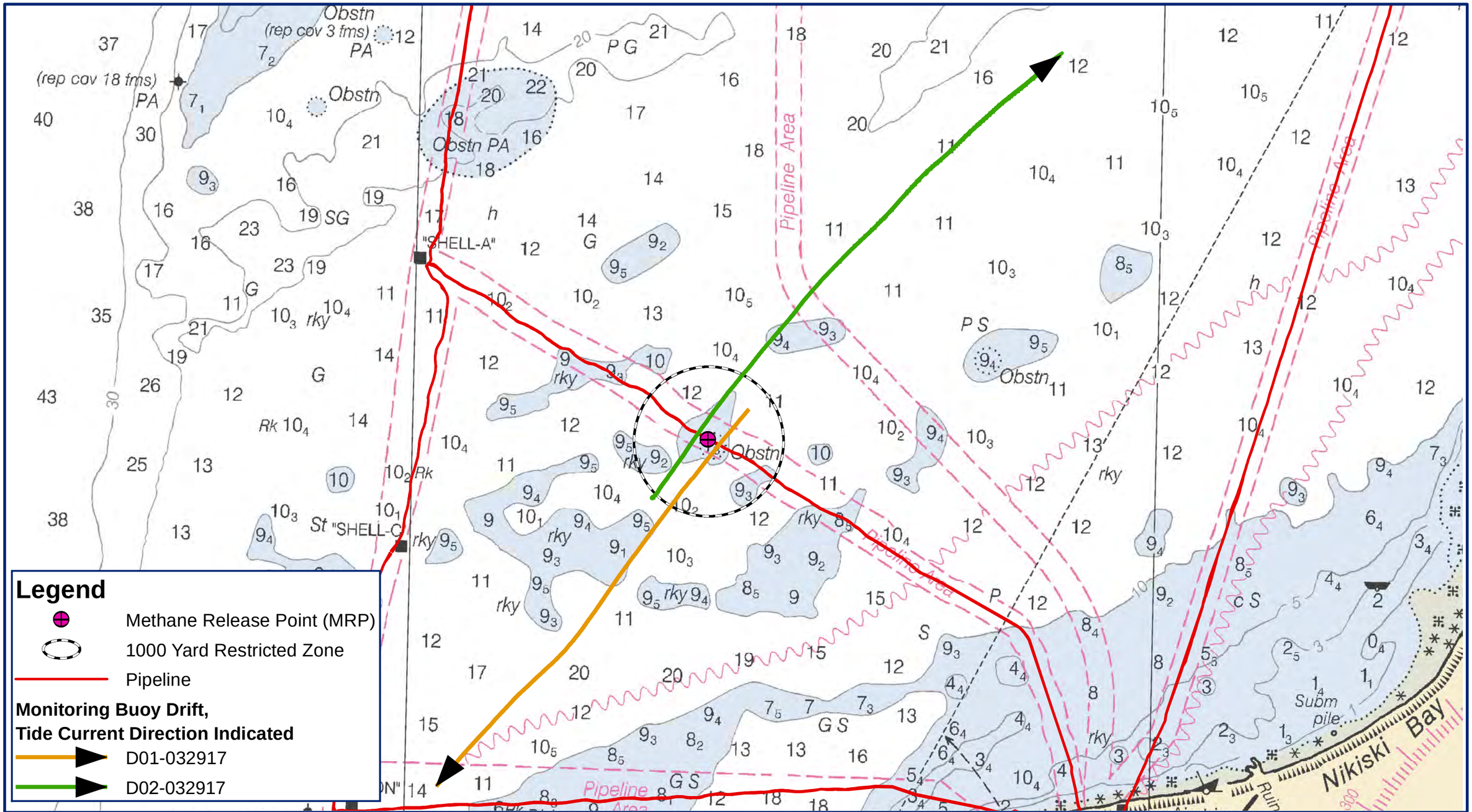
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR

Project: HILCORP ALASKA, LLC
METHANE PIPELINE LEAK
COOK INLET, ALASKA

Drawing: WATER QUALITY MONITORING EVENT 2
MARCH 23, 2017 BOUY DRIFT TRACKS

Drawing Date: April 2017
Scale: 1:21,960.49
Fig. No.: A-2b
File Name: Figure A2b Methane Release_Event2.mxd
Project No.: 105.00874.17015



Base map referenced from National Oceanic and Atmospheric Administration (NOAA), Chart 16663, Alaska - South Coast, Cook Inlet, East Foreland to Anchorage (Scale 1:100,000).

Soundings in Fathoms (Fathoms and Feet to Eleven Fathoms at Mean Lower Low Water)

1 Fathom = 6 Feet = 1.8 Meters

0 1,000 2,000 3,000 4,000 5,000 6,000

Meters

N

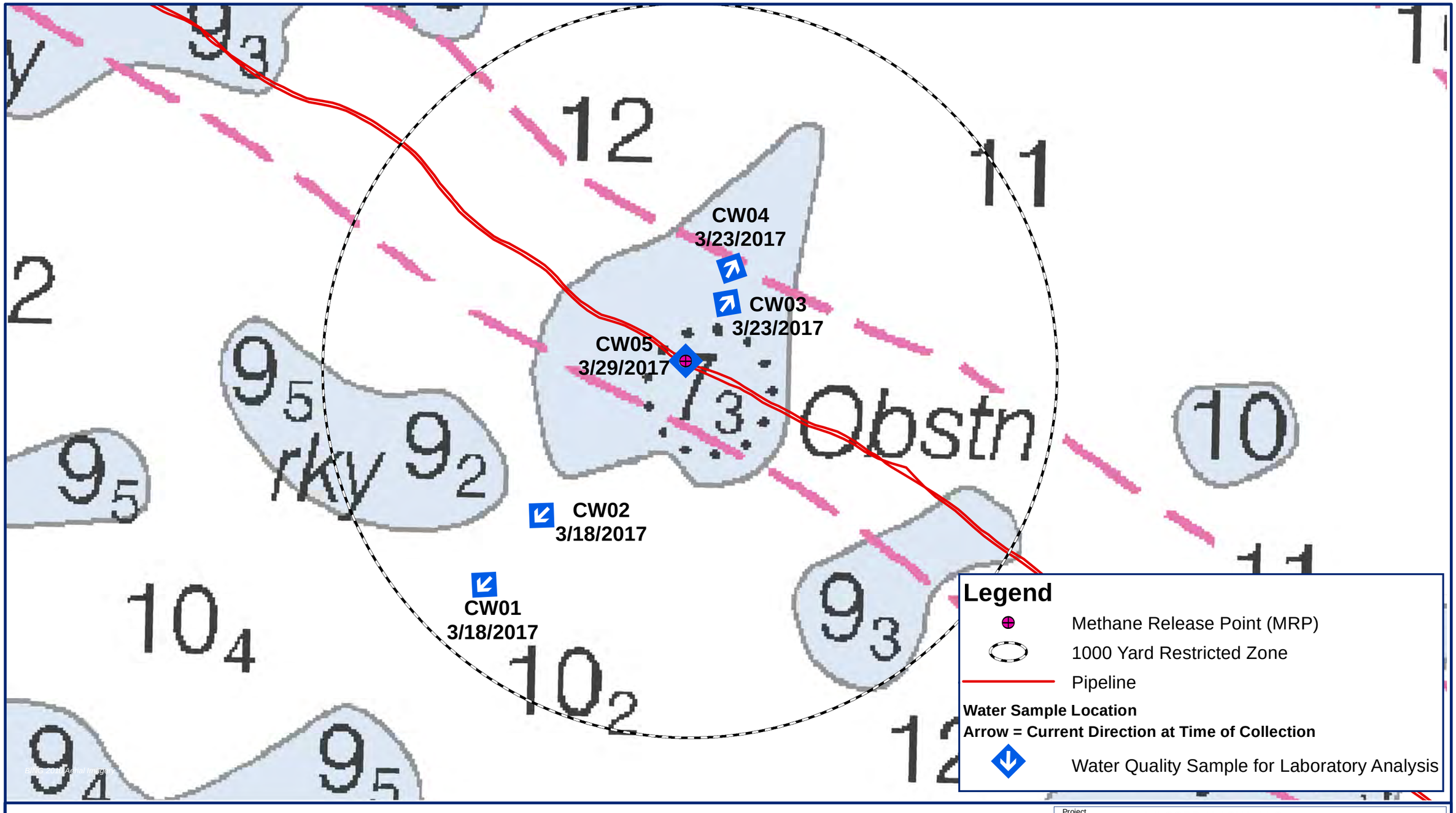
THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR

Project: HILCORP ALASKA, LLC
METHANE PIPELINE LEAK
COOK INLET, ALASKA

Drawing: WATER QUALITY MONITORING EVENT 3
MARCH 29, 2017 BOUY DRIFT TRACKS

Drawing Date: April 2017
Scale: 1:45,270.37
Fig. No.: A-2c
File Name: Figure A2c Methane Release_Event3.mxd
Project No.: 105.00874.17015



Base map referenced from National Oceanic and Atmospheric Administration (NOAA), Chart 16663, Alaska - South Coast, Cook Inlet, East Foreland to Anchorage (Scale 1:100,000).

Soundings in Fathoms (Fathoms and Feet to Eleven Fathoms at Mean Lower Low Water)

1 Fathom = 6 Feet = 1.8 Meters

0 200 400 600 800 1,000

Meters

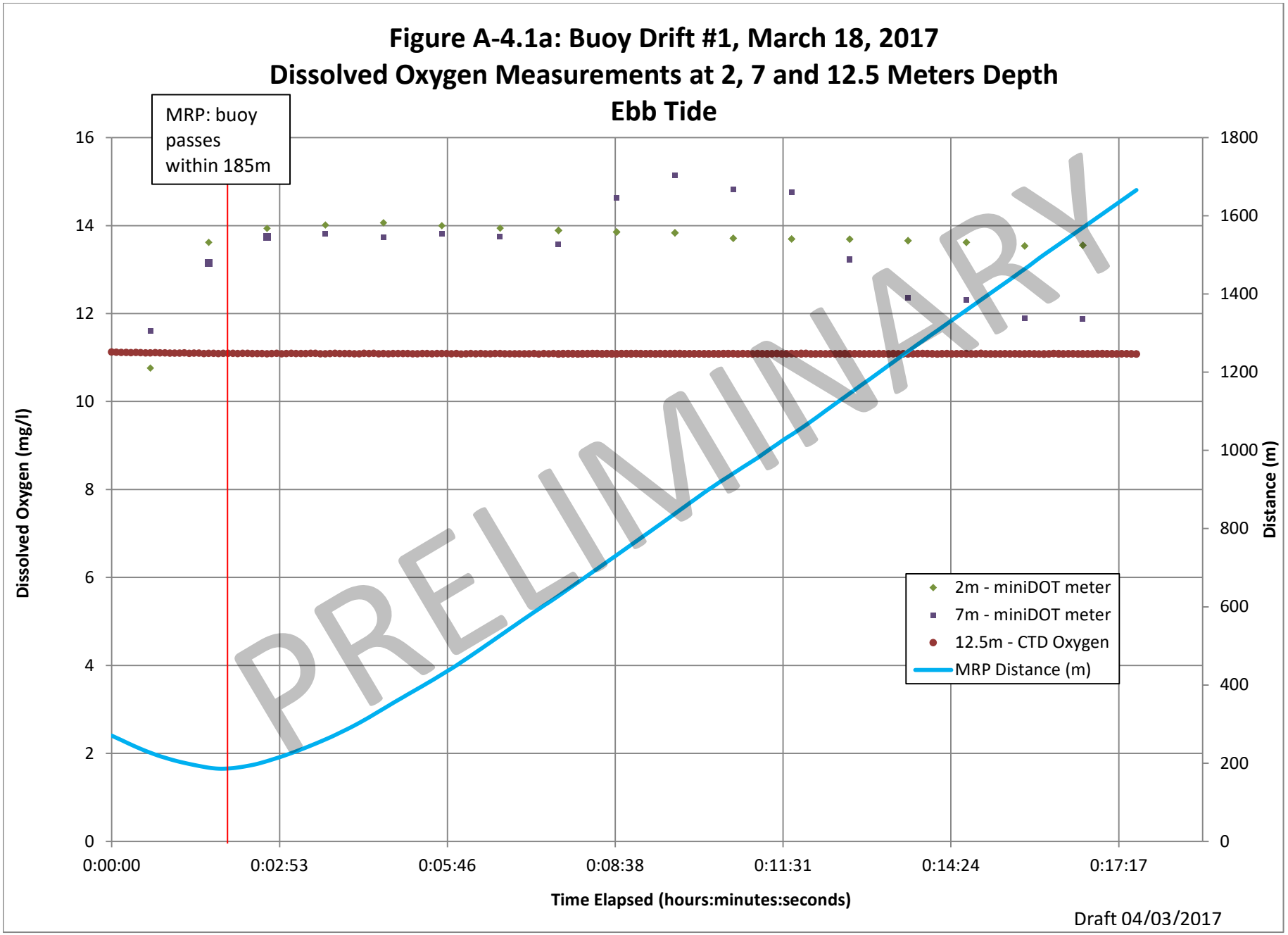
N

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR

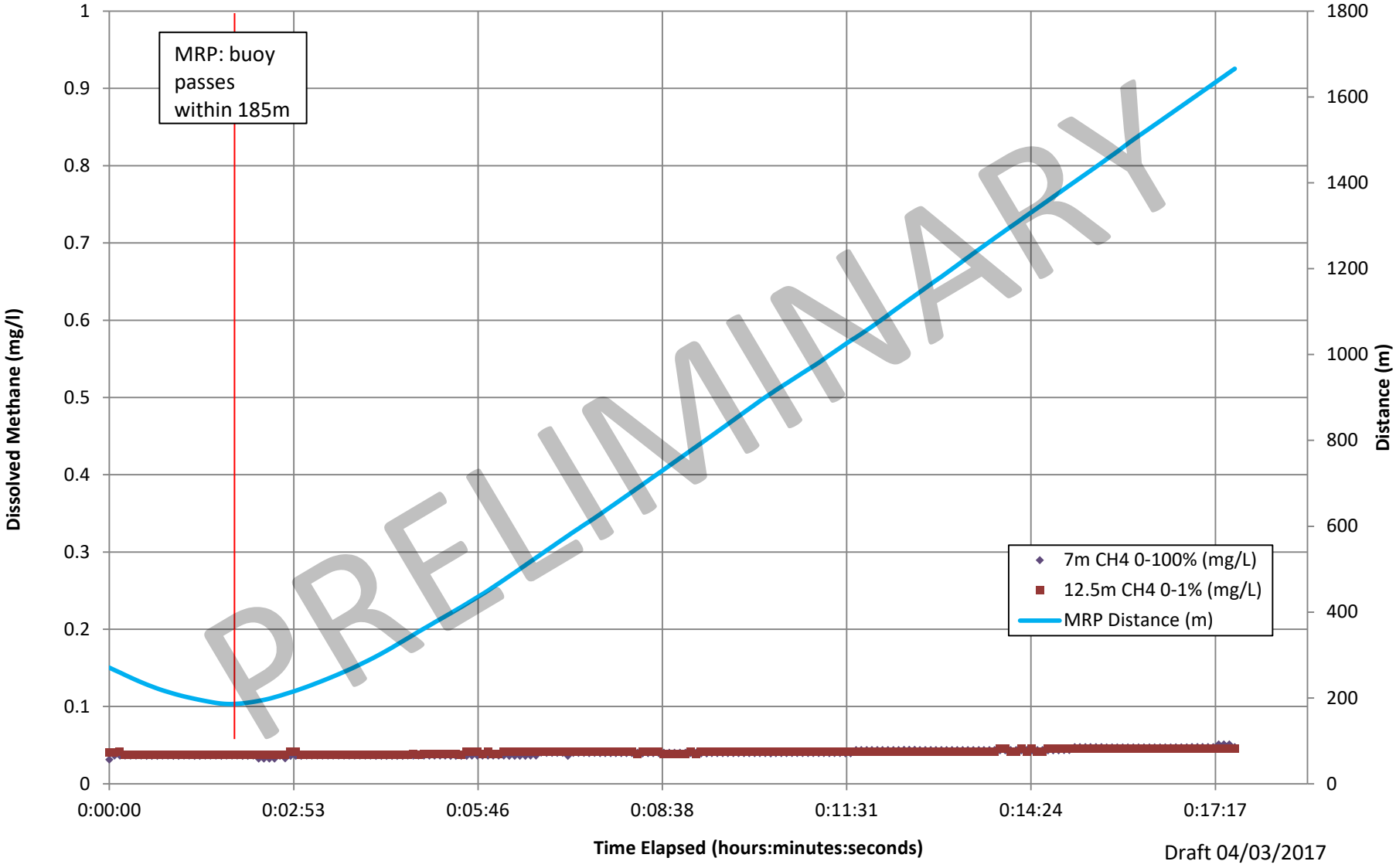
Project	HILCORP ALASKA, LLC METHANE PIPELINE LEAK COOK INLET, ALASKA
Drawing	Water Quality Monitoring, Water Sample Locations for Laboratory Analysis (Weeks 1-3)
Drawing Date April 2017	Scale 1:9,116.37
File Name Figure A3 Methane Release_WQ Samples.mxd	Project No. 105.00874.17015
	Fig. No. A-3

Figure A-4.1a: Buoy Drift #1, March 18, 2017
Dissolved Oxygen Measurements at 2, 7 and 12.5 Meters Depth
Ebb Tide



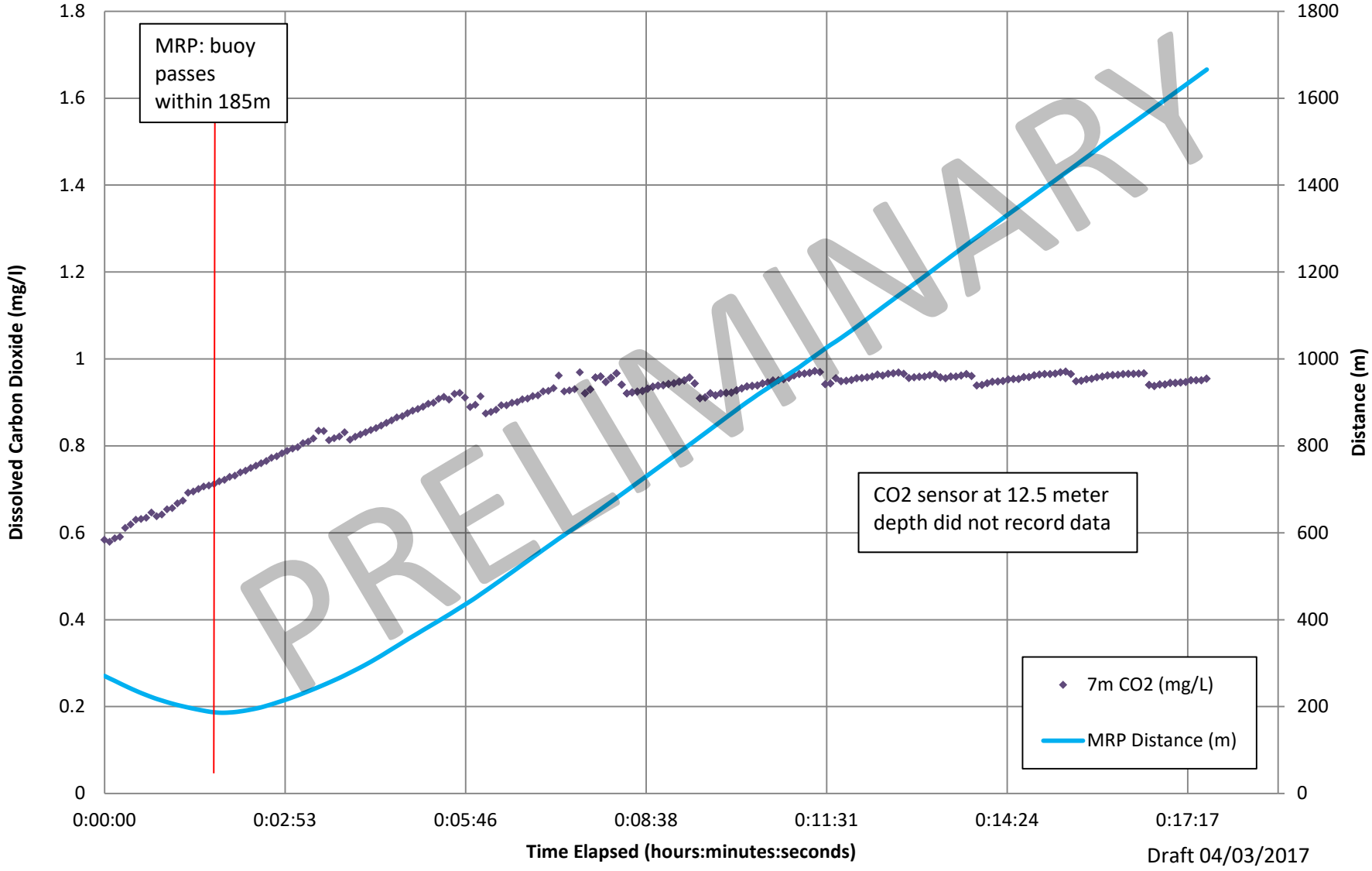
Draft 04/03/2017

Figure A-4.1b: Buoy Drift #1, March 18, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Ebb Tide



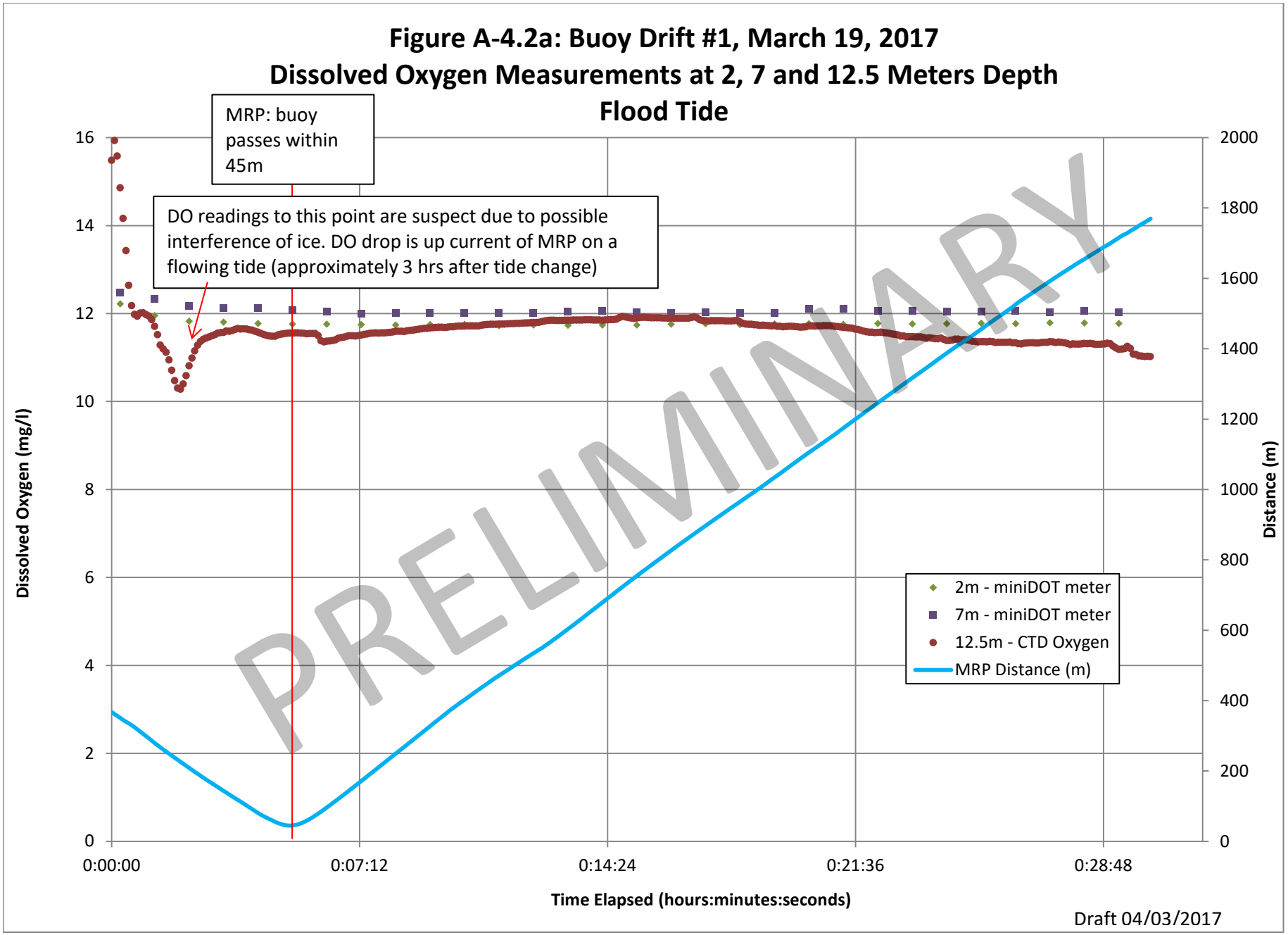
Draft 04/03/2017

Figure A-4.1c: Buoy Drift #1, March 18, 2017
Dissolved Carbon Dioxide Measurements at 7 Meters Depth
Ebb Tide



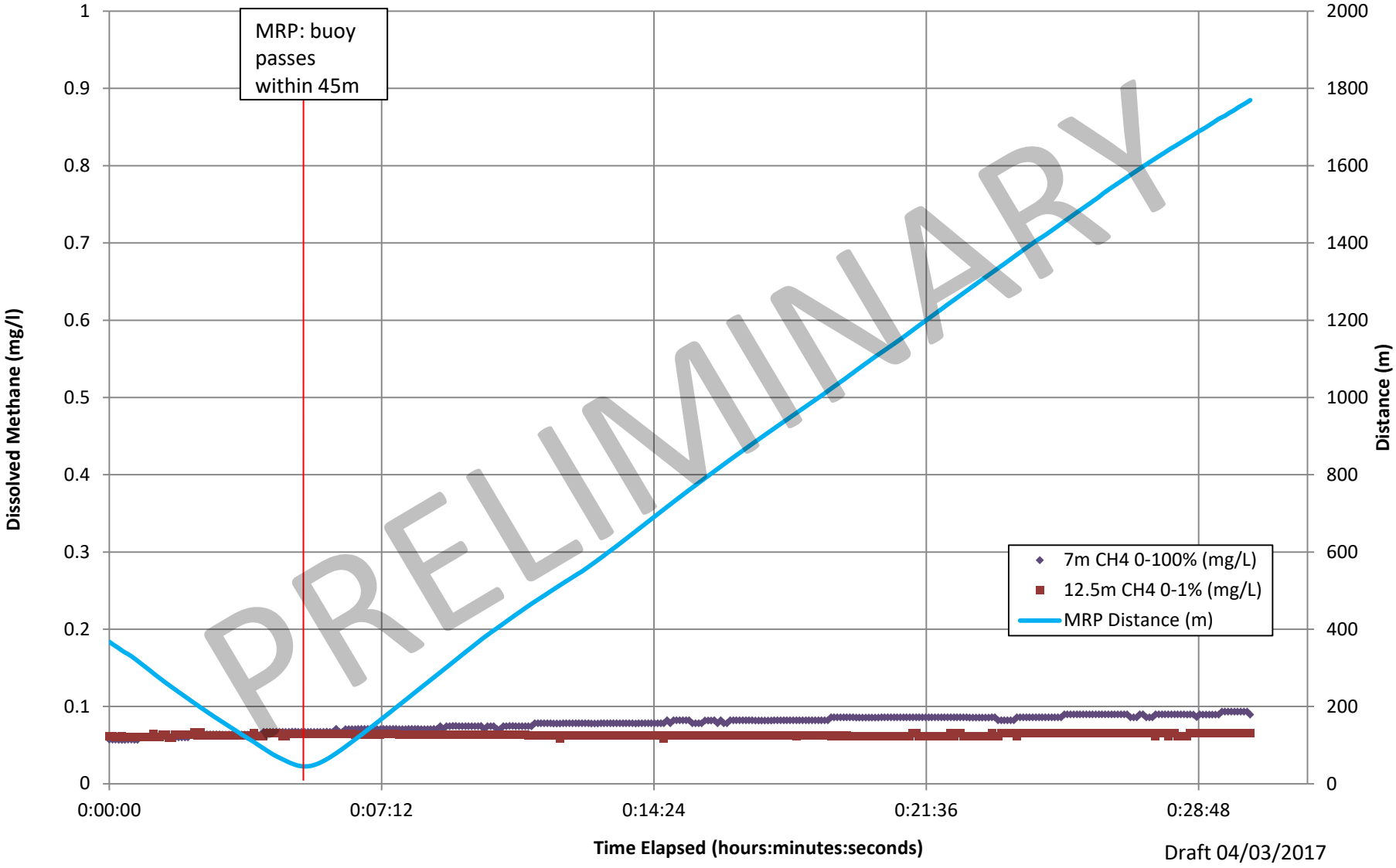
Draft 04/03/2017

Figure A-4.2a: Buoy Drift #1, March 19, 2017
Dissolved Oxygen Measurements at 2, 7 and 12.5 Meters Depth
Flood Tide



Draft 04/03/2017

Figure A-4.2b: Buoy Drift #1, March 19, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Flood Tide



Draft 04/03/2017

Figure A-4.2c: Buoy Drift #1, March 19, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Flood Tide

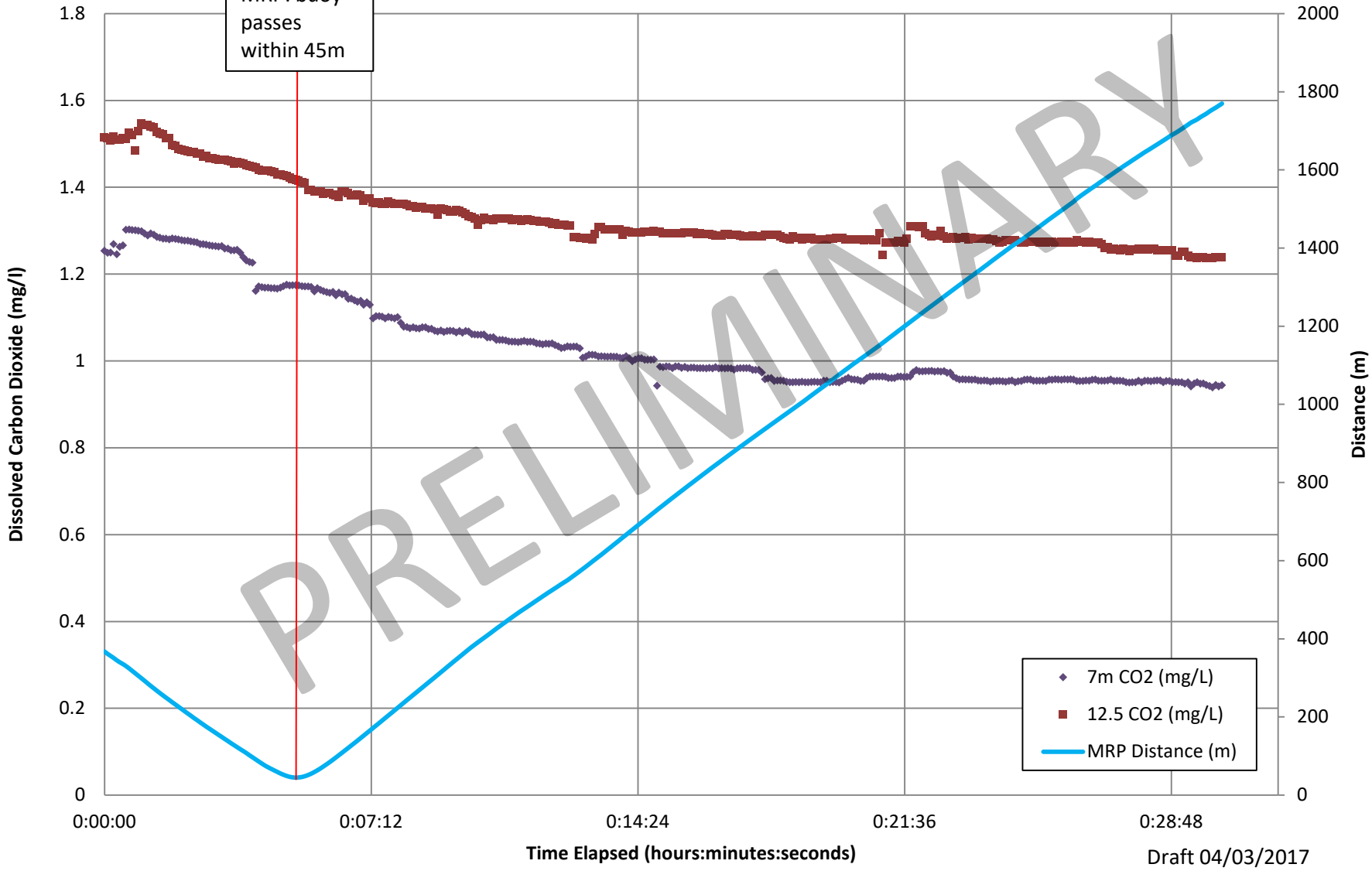
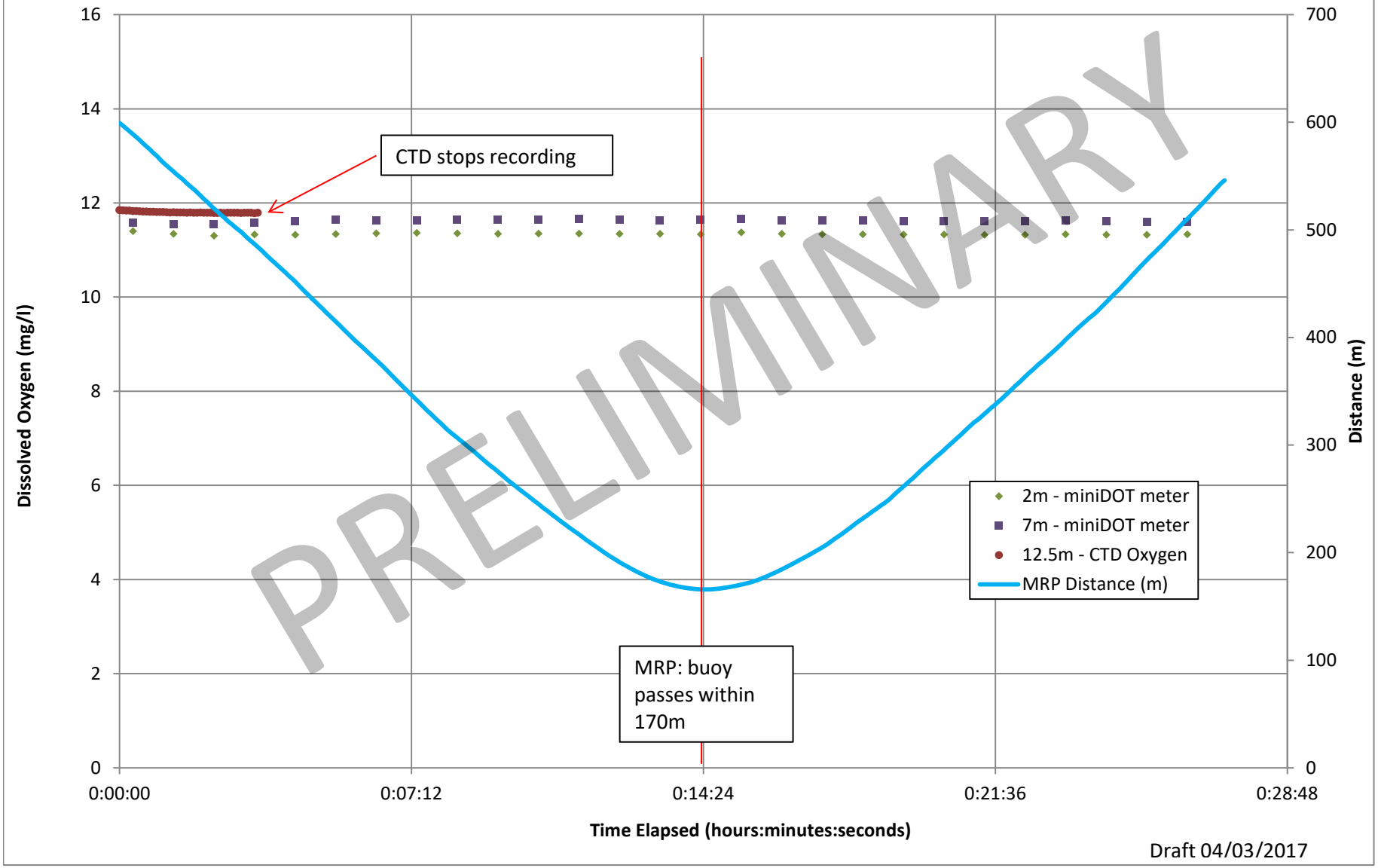
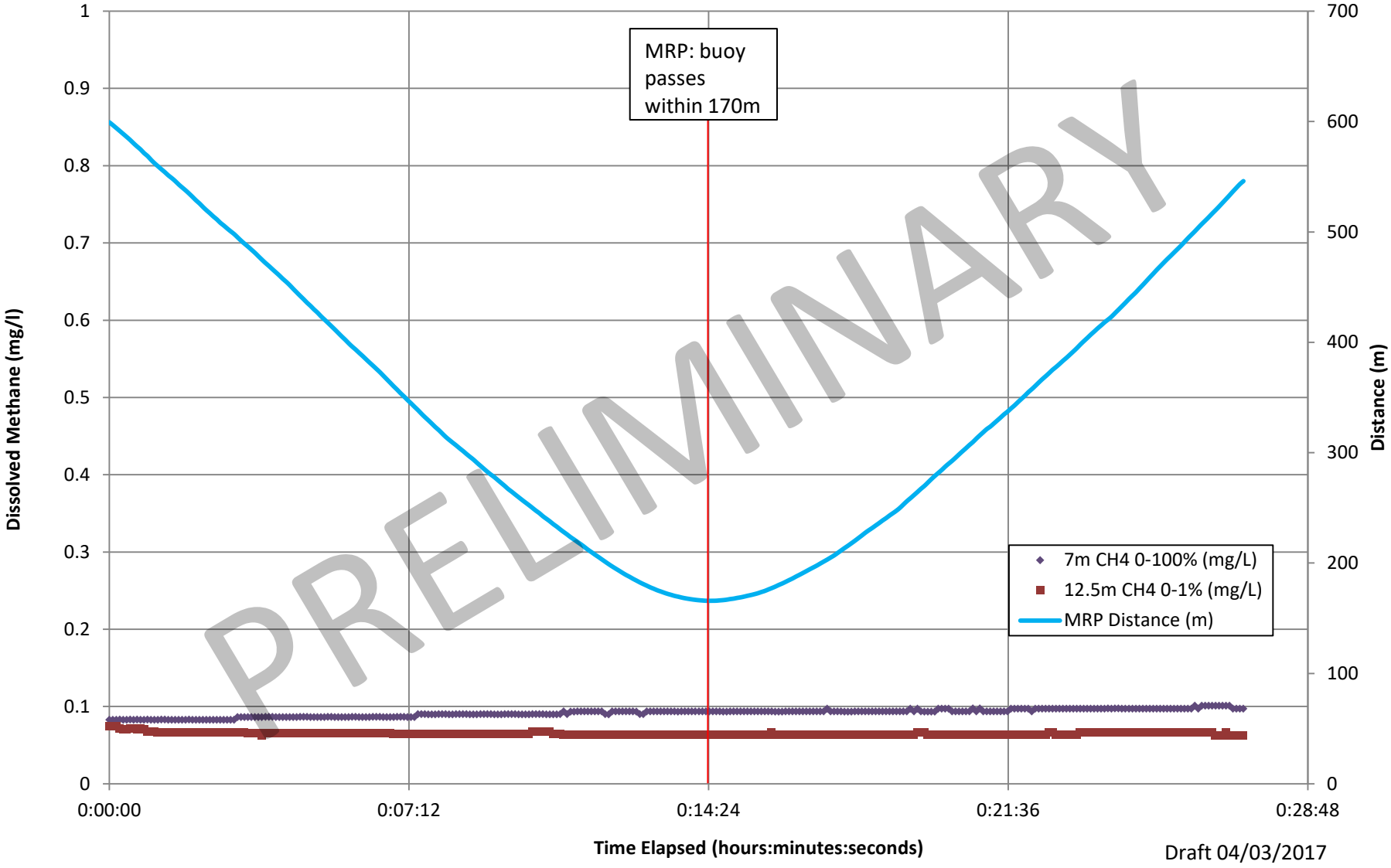


Figure A-4.3a: Buoy Drift #2, March 19, 2017
Dissolved Oxygen Measurements at 2, 7 and 12.5 Meters Depth
Flood Tide



Draft 04/03/2017

Figure A-4.3b: Buoy Drift #2, March 19, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Flood Tide



Draft 04/03/2017

Figure A-4.3c: Buoy Drift #2, March 19, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Flood Tide

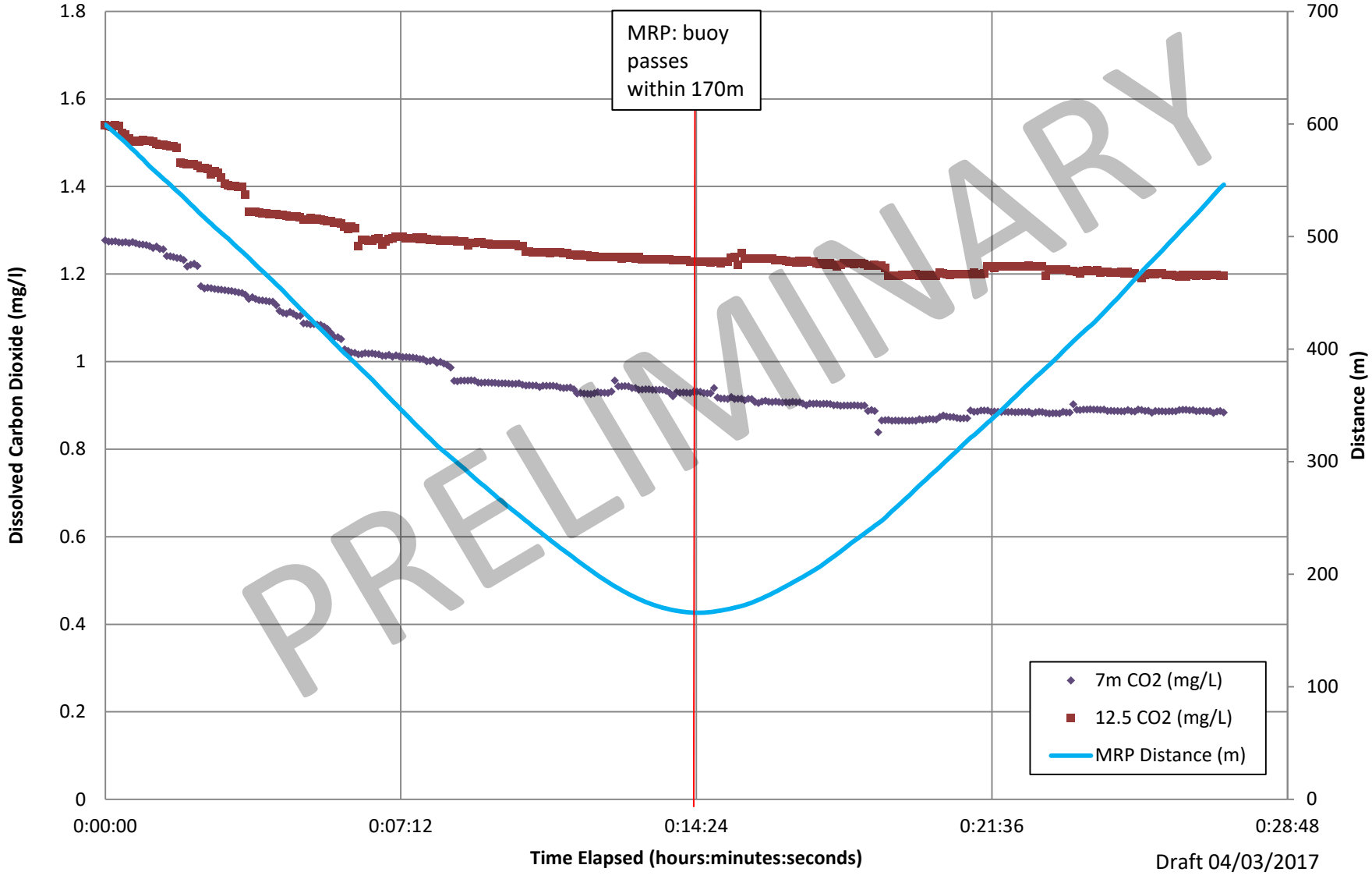
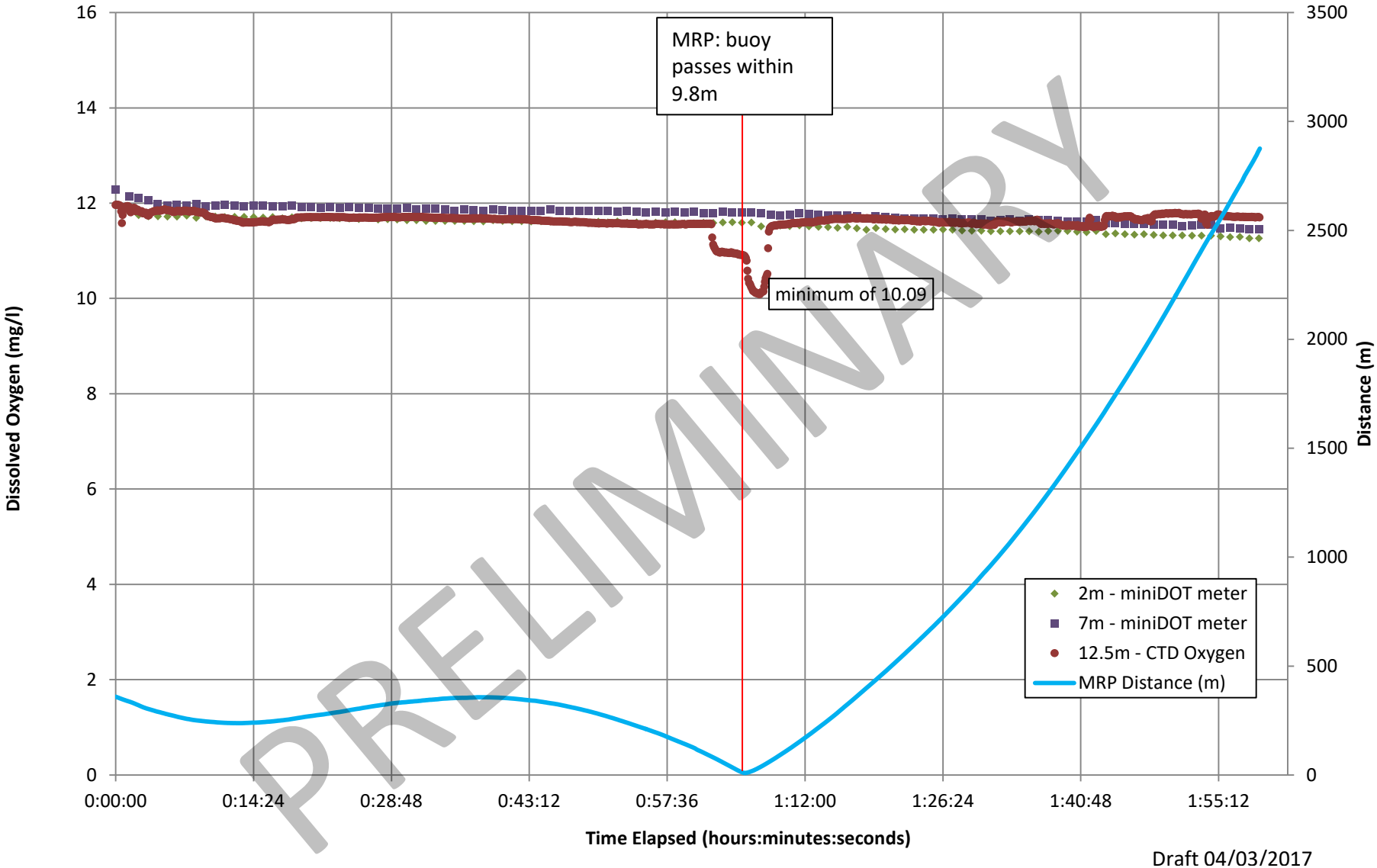
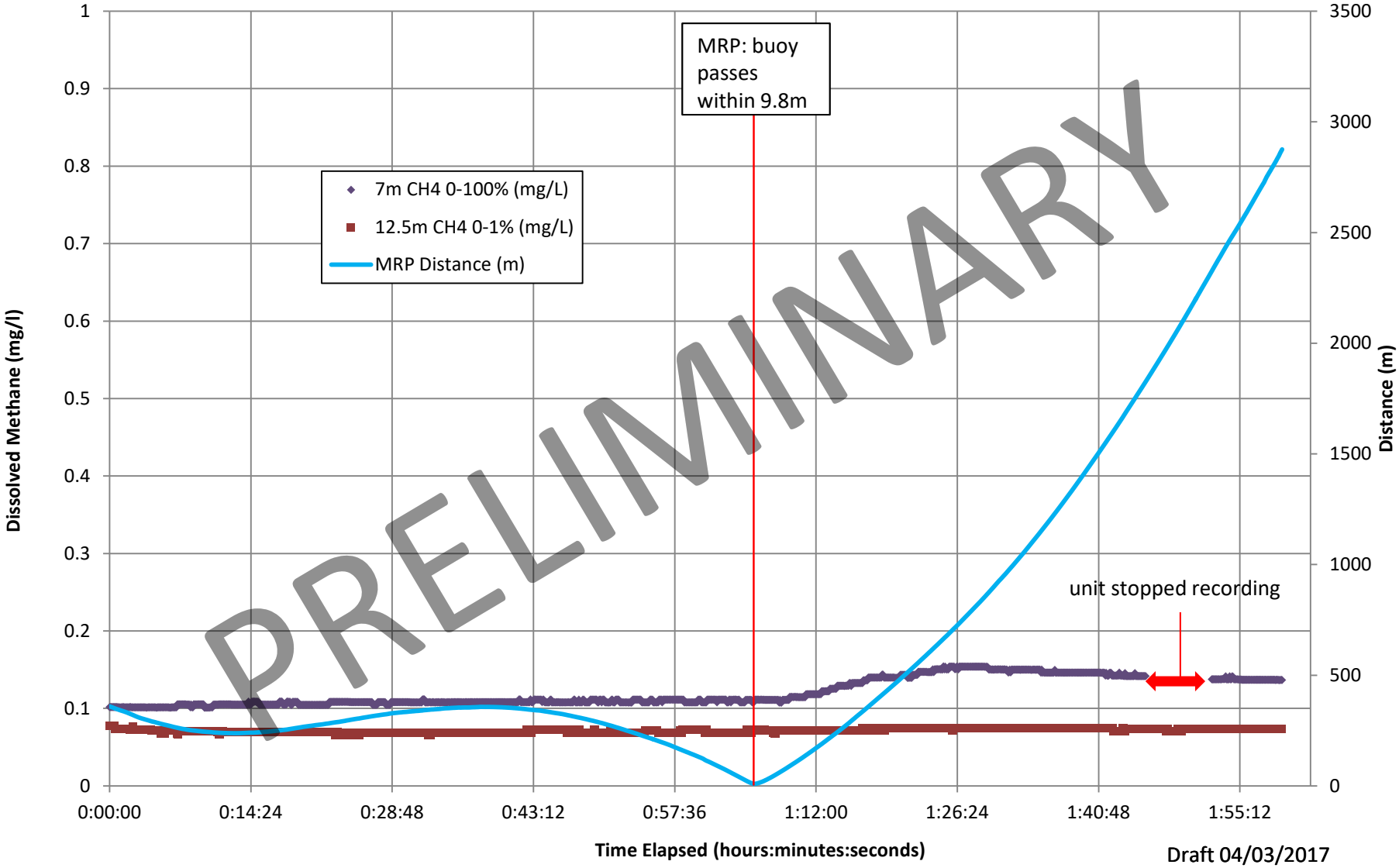


Figure A-4.4a: Buoy Drift #3, March 19, 2017
Dissolved Oxygen Measurements at 2, 7 and 12.5 Meters Depth
Flood/Slack/Ebb



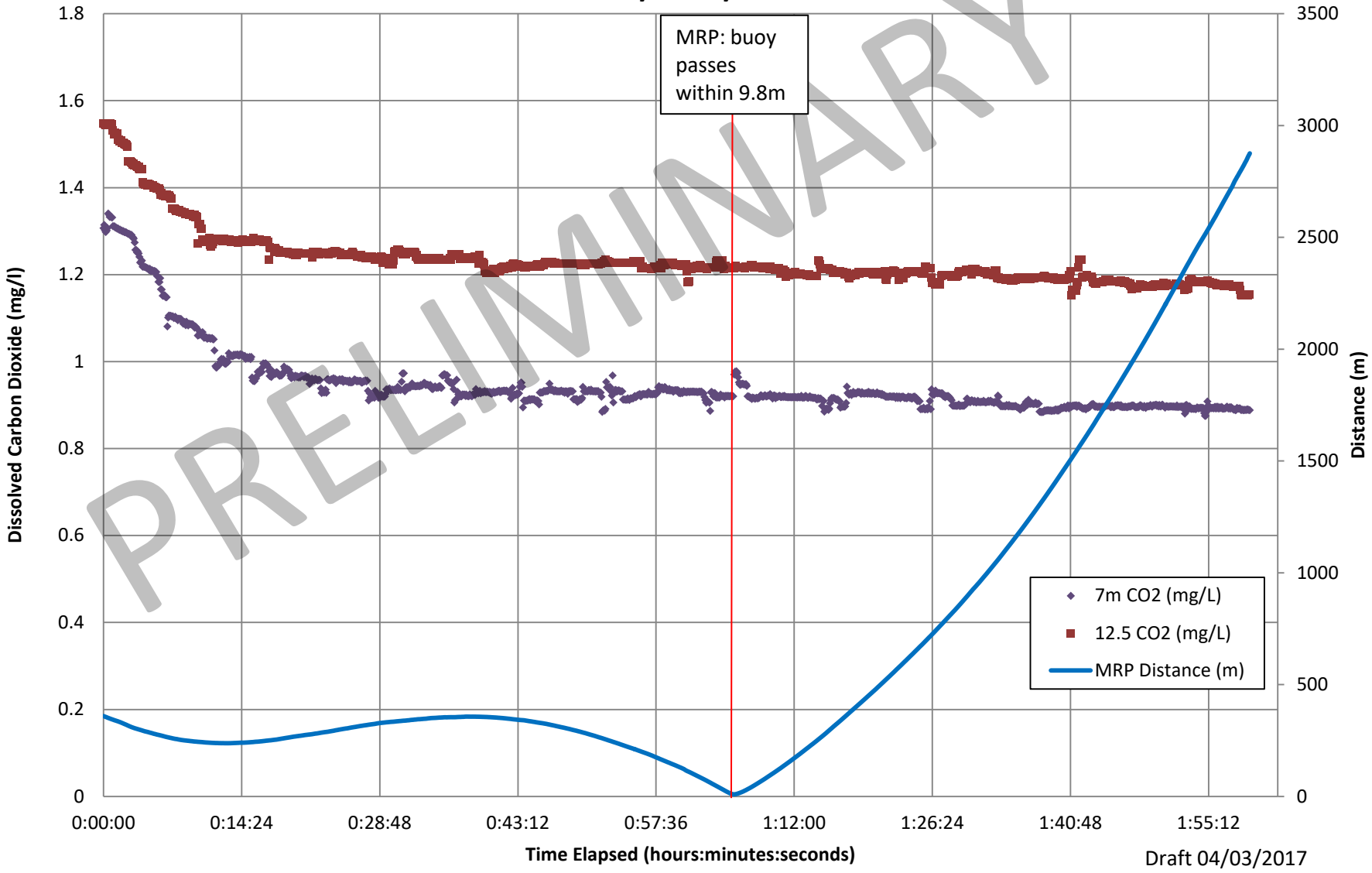
Draft 04/03/2017

Figure A-4.4b: Buoy Drift #3, March 19, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Flood/Slack/Ebb



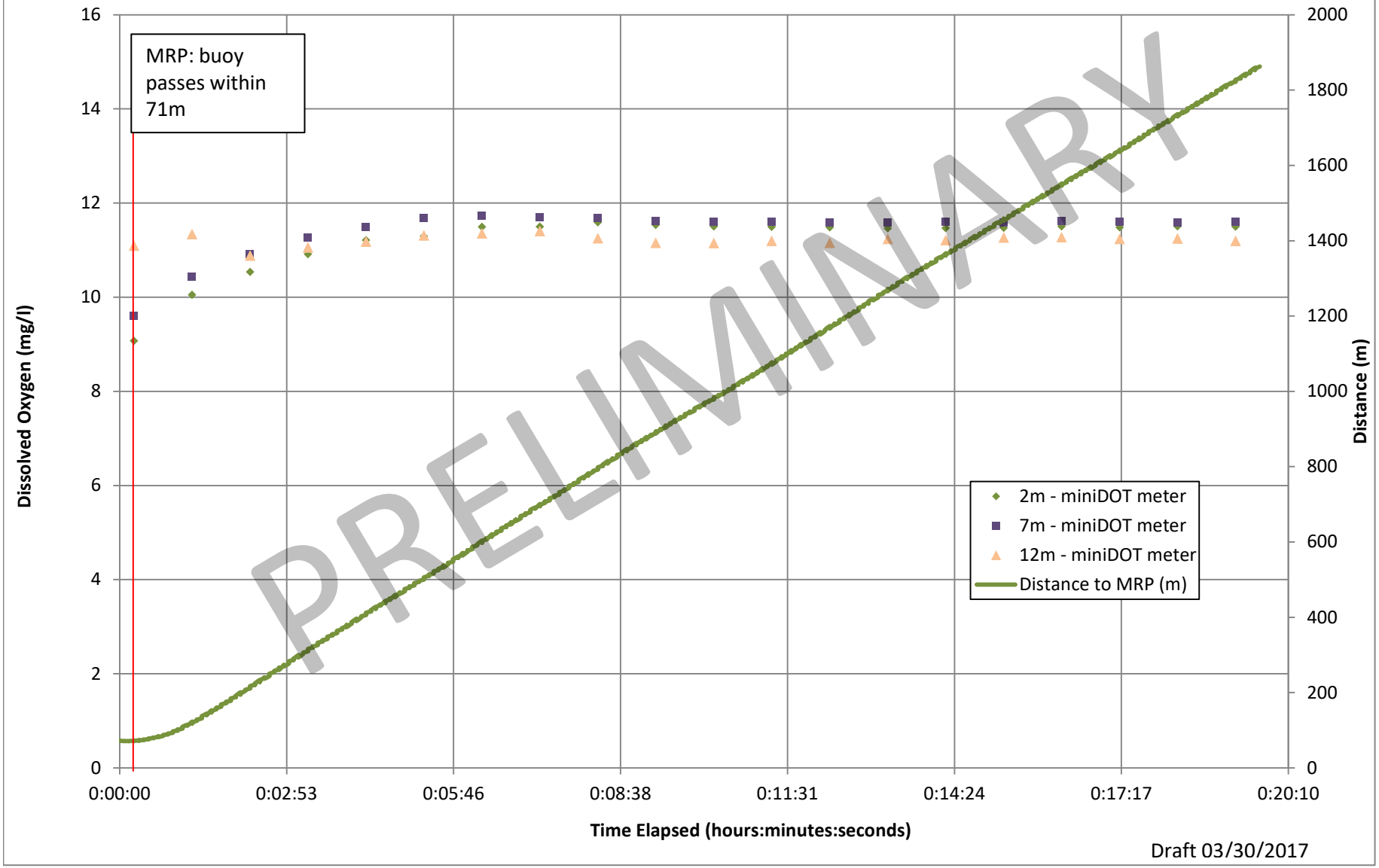
Draft 04/03/2017

Figure A-4.4c: Buoy Drift #3, March 19, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Flood/Slack/Ebb



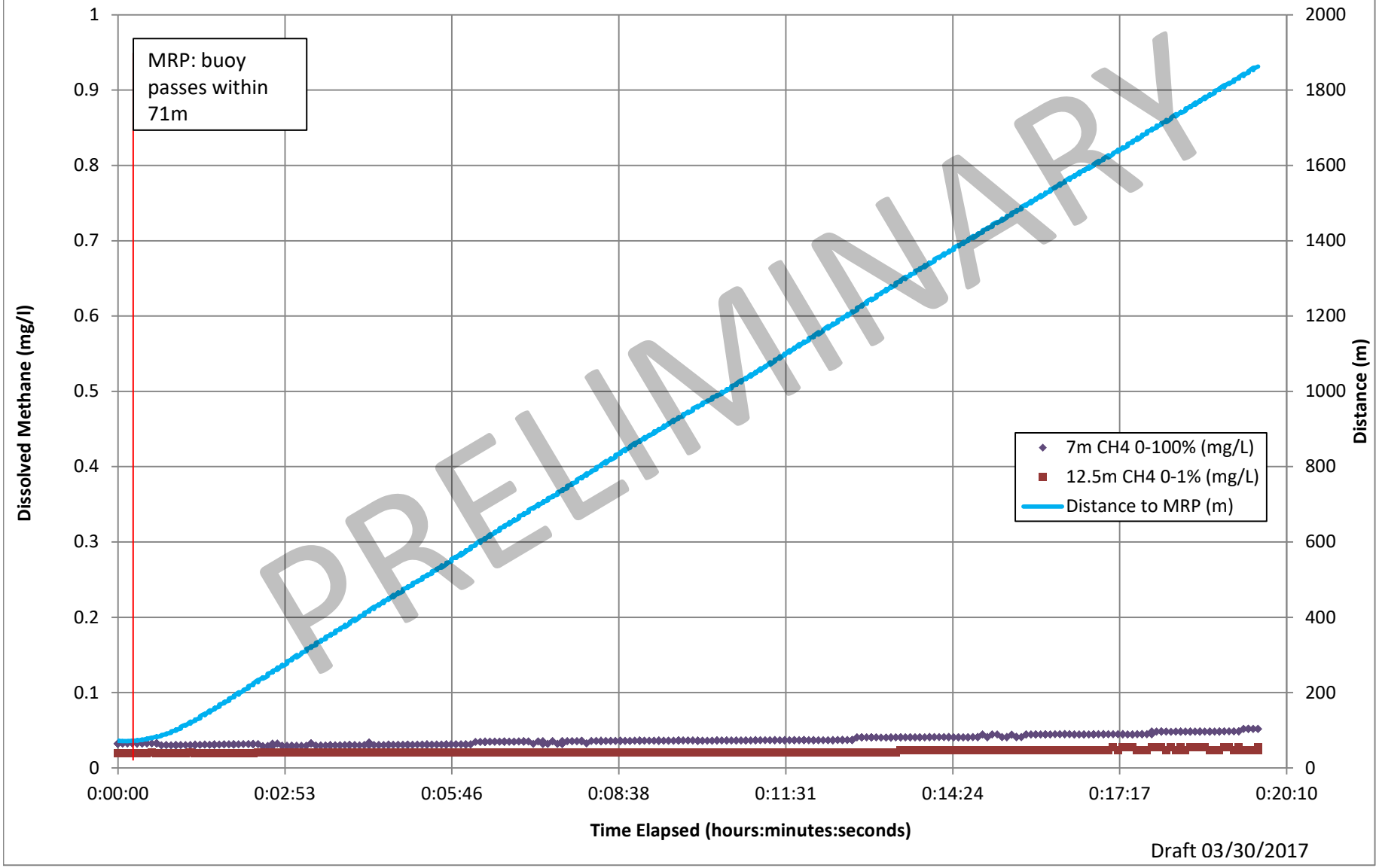
Draft 04/03/2017

Figure A-5.1a: Buoy Drift #1, March 23, 2017
Dissolved Oxygen Measurements at 2, 7 and 12 Meters Depth
Flood Tide



Draft 03/30/2017

Figure A-5.1b: Buoy Drift 1, March 23, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Flood Tide



Draft 03/30/2017

Figure A-5.1c: Buoy Drift #1, March 23, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Flood Tide

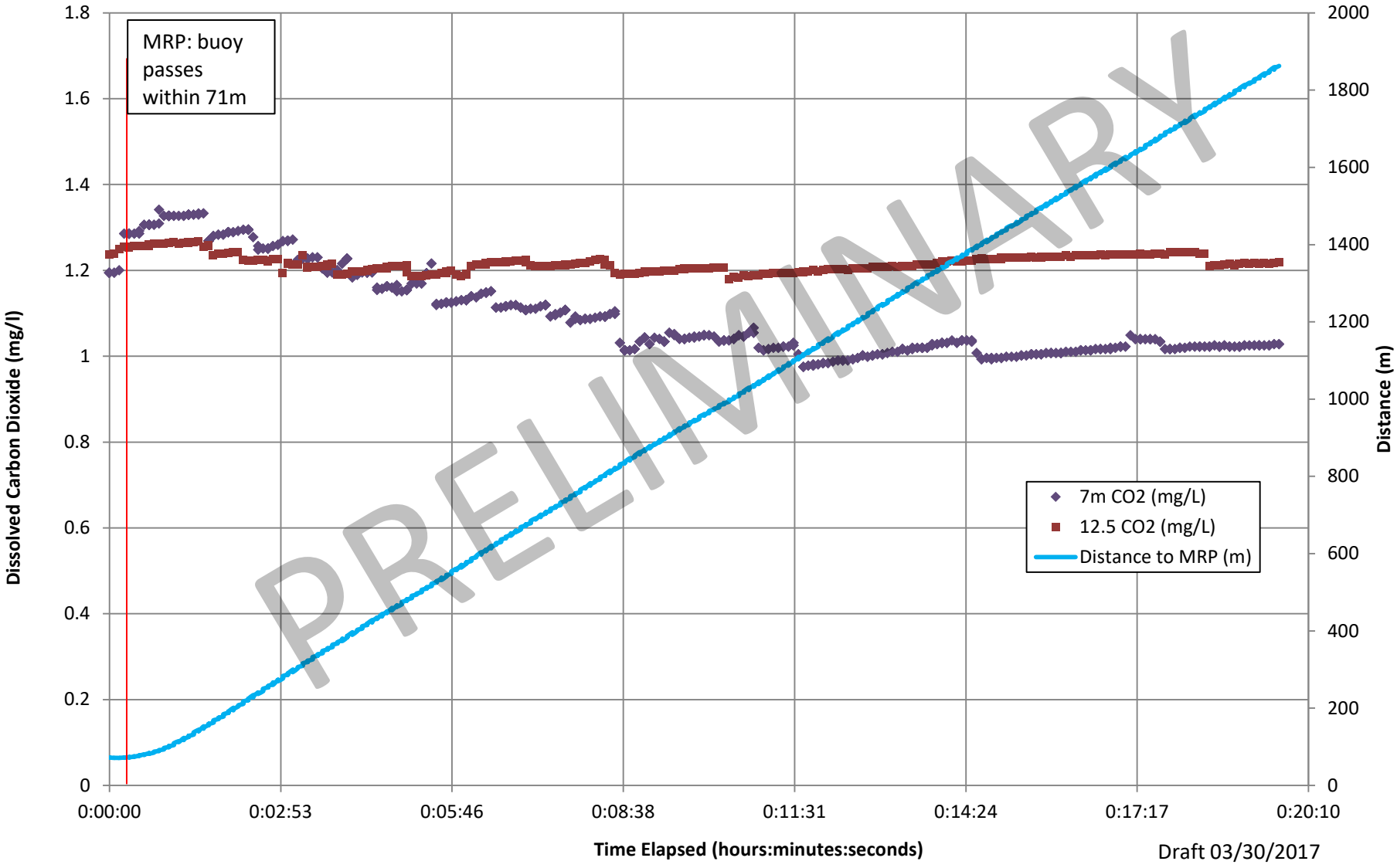
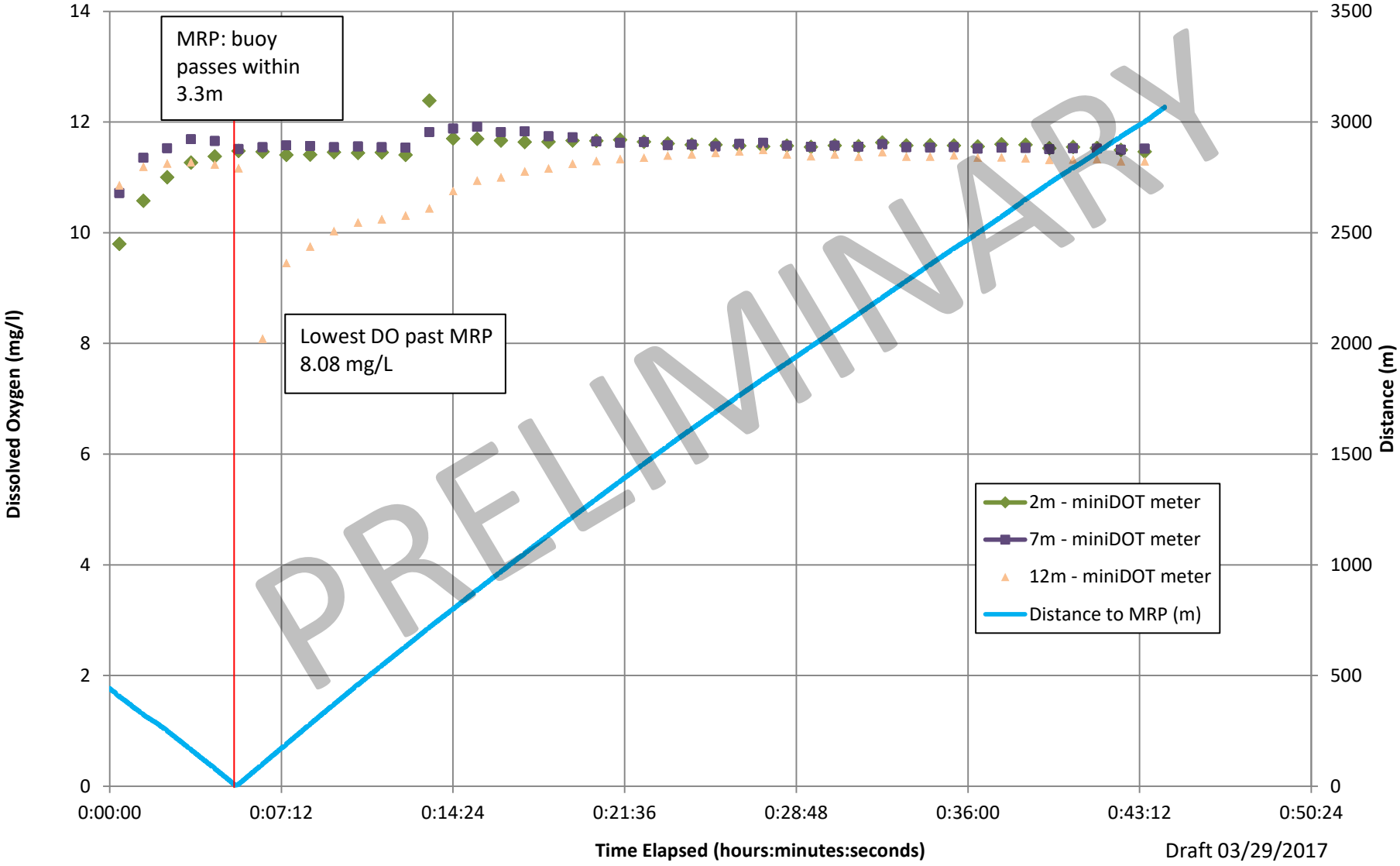
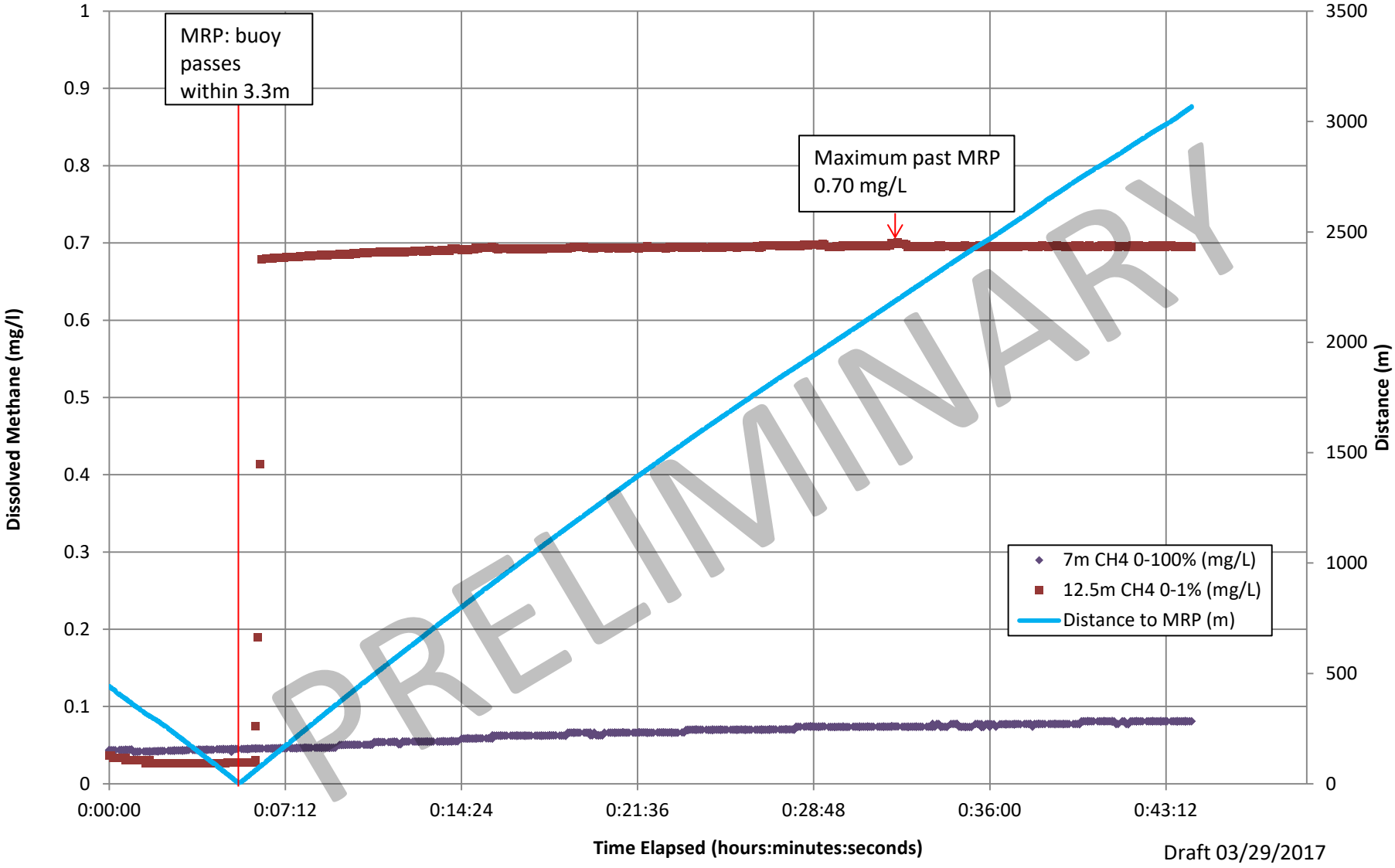


Figure A-5.2a: Buoy Drift #2, March 23, 2017
Dissolved Oxygen Measurements at 2, 7 and 12 Meters Depth
Flood Tide



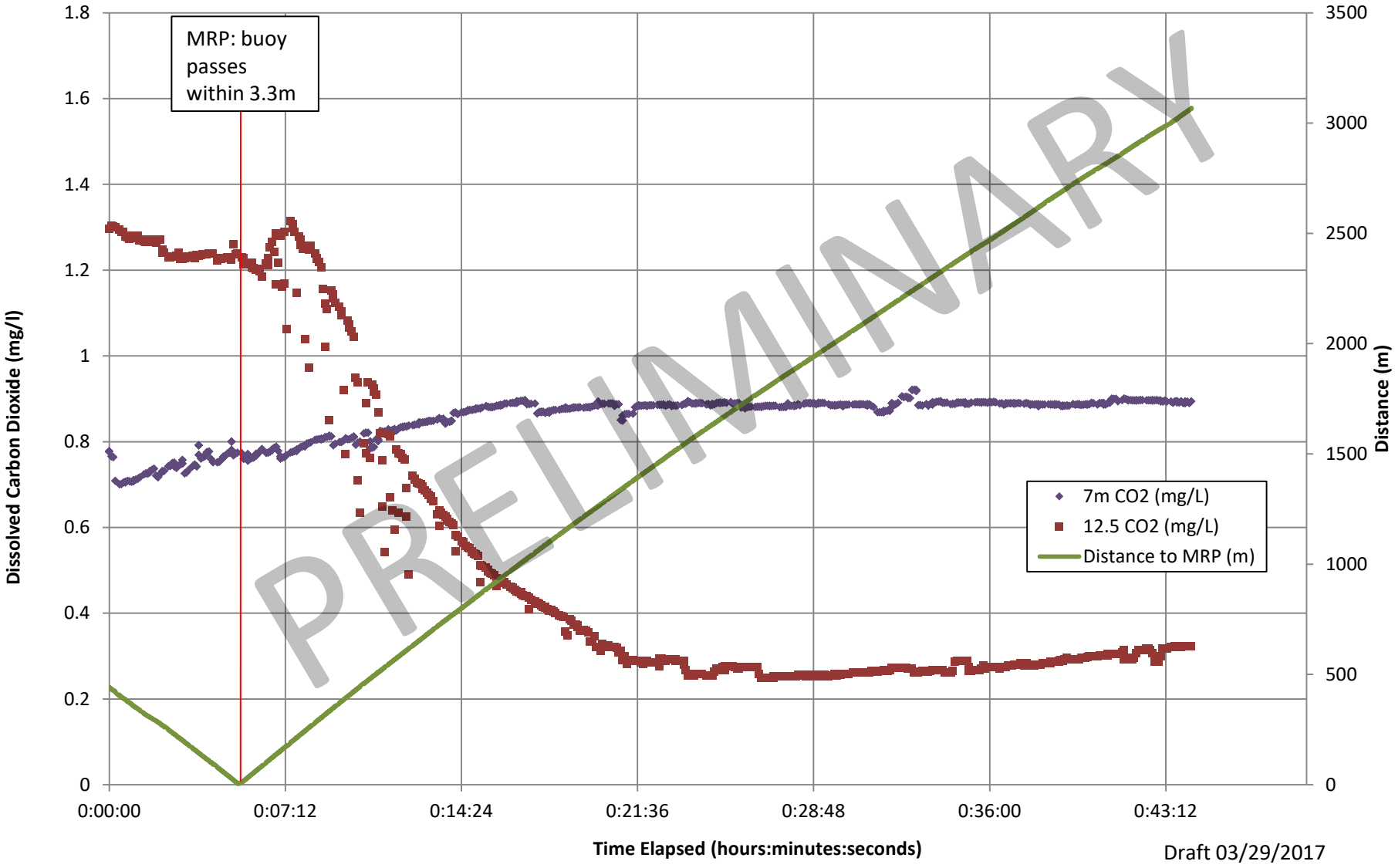
Draft 03/29/2017

Figure A-5.2b: Buoy Drift #2, March 23, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Flood Tide



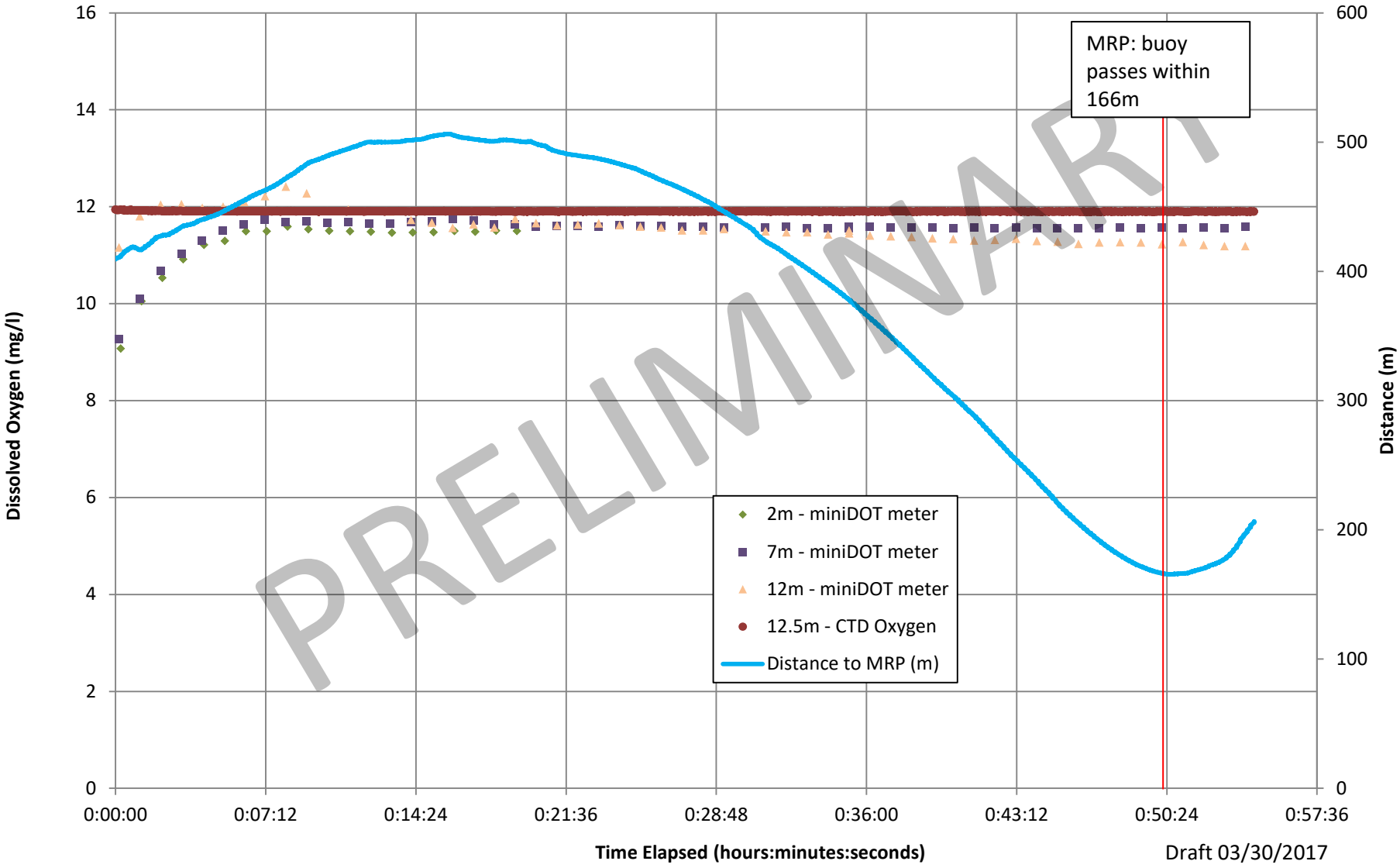
Draft 03/29/2017

Figure A-5.2c: Buoy Drift #2, March 23, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Flood Tide



Draft 03/29/2017

Figure A-5.3a: Buoy Drift #3, March 23, 2017
Dissolved Oxygen Measurements at 2, 7, 12 and 12.5 Meters Depth
Flood/Slack/Ebb Tide



Draft 03/30/2017

Figure A-5.3b: Buoy Drift #3, March 23, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Flood/Slack/Ebb Tide

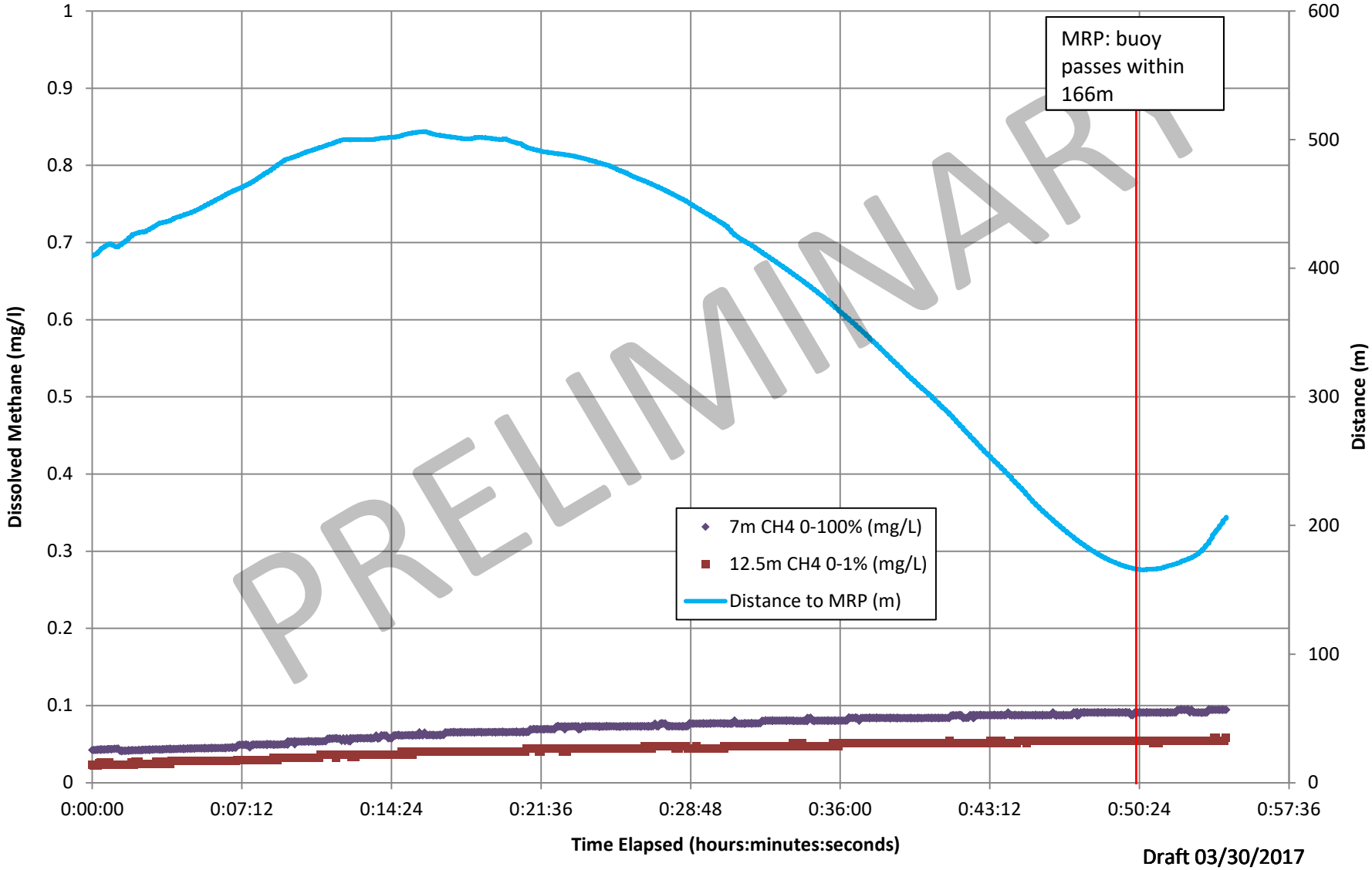
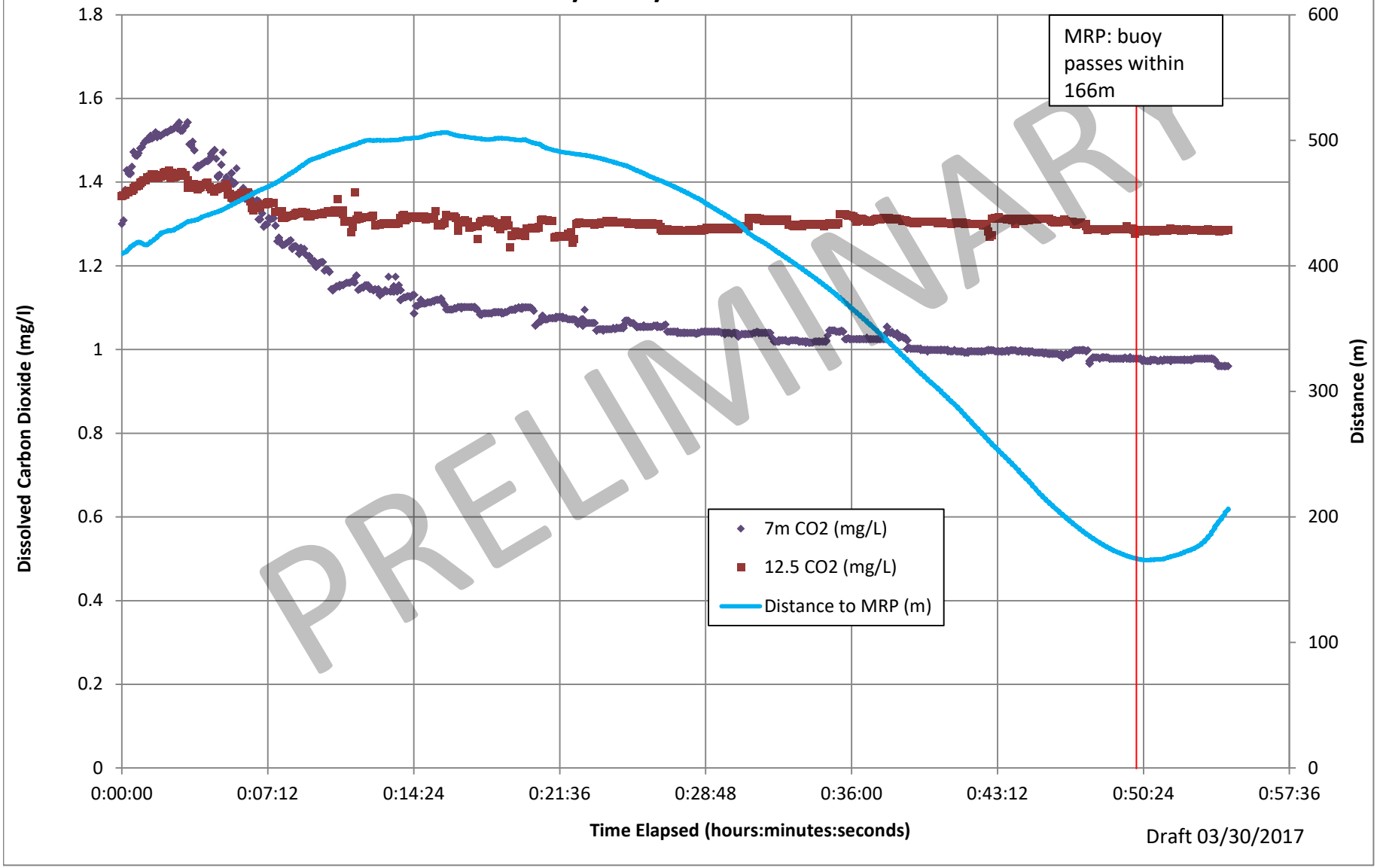
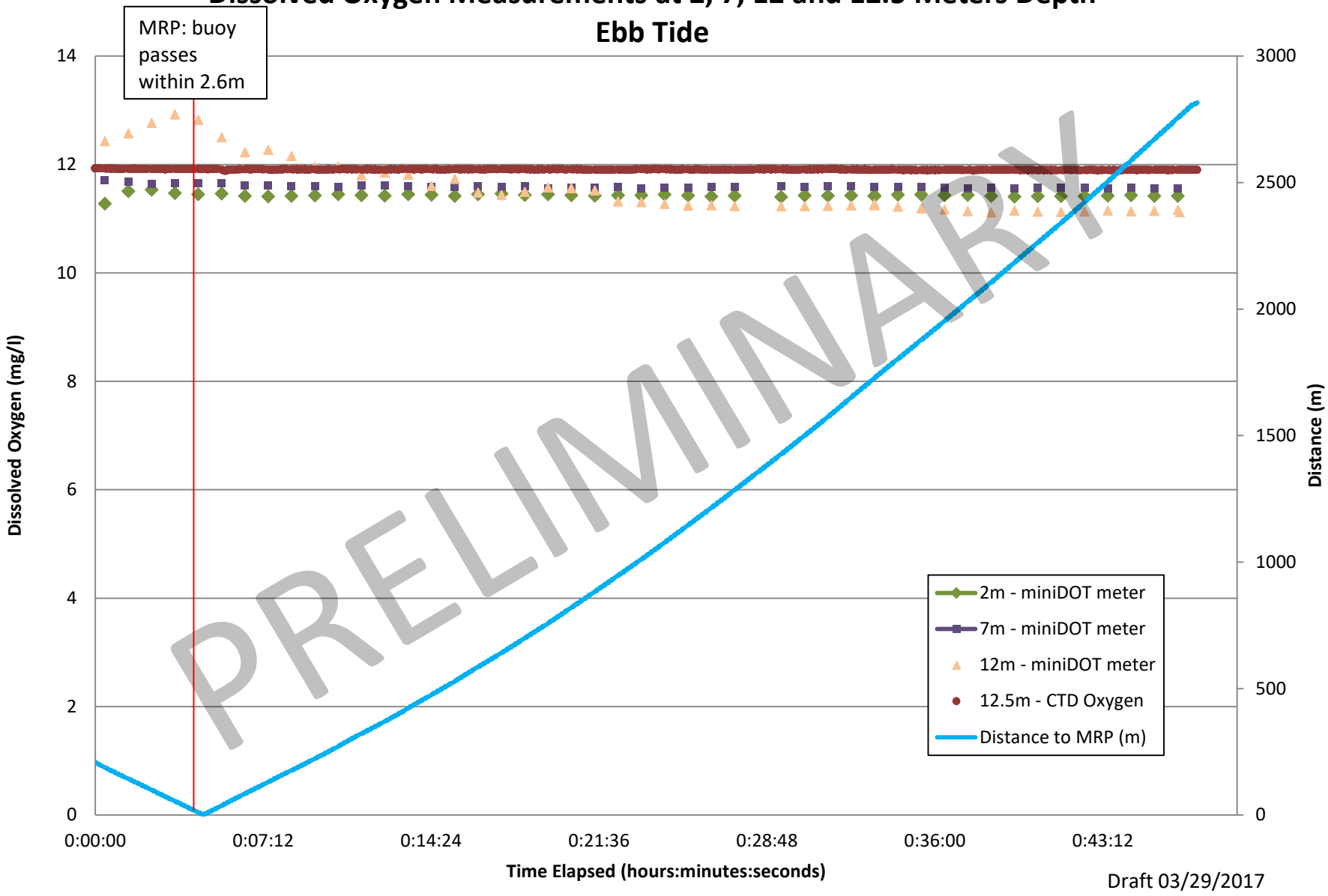


Figure A-5.3c: Buoy Drift #3, March 23, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Flood/Slack/Ebb Tide



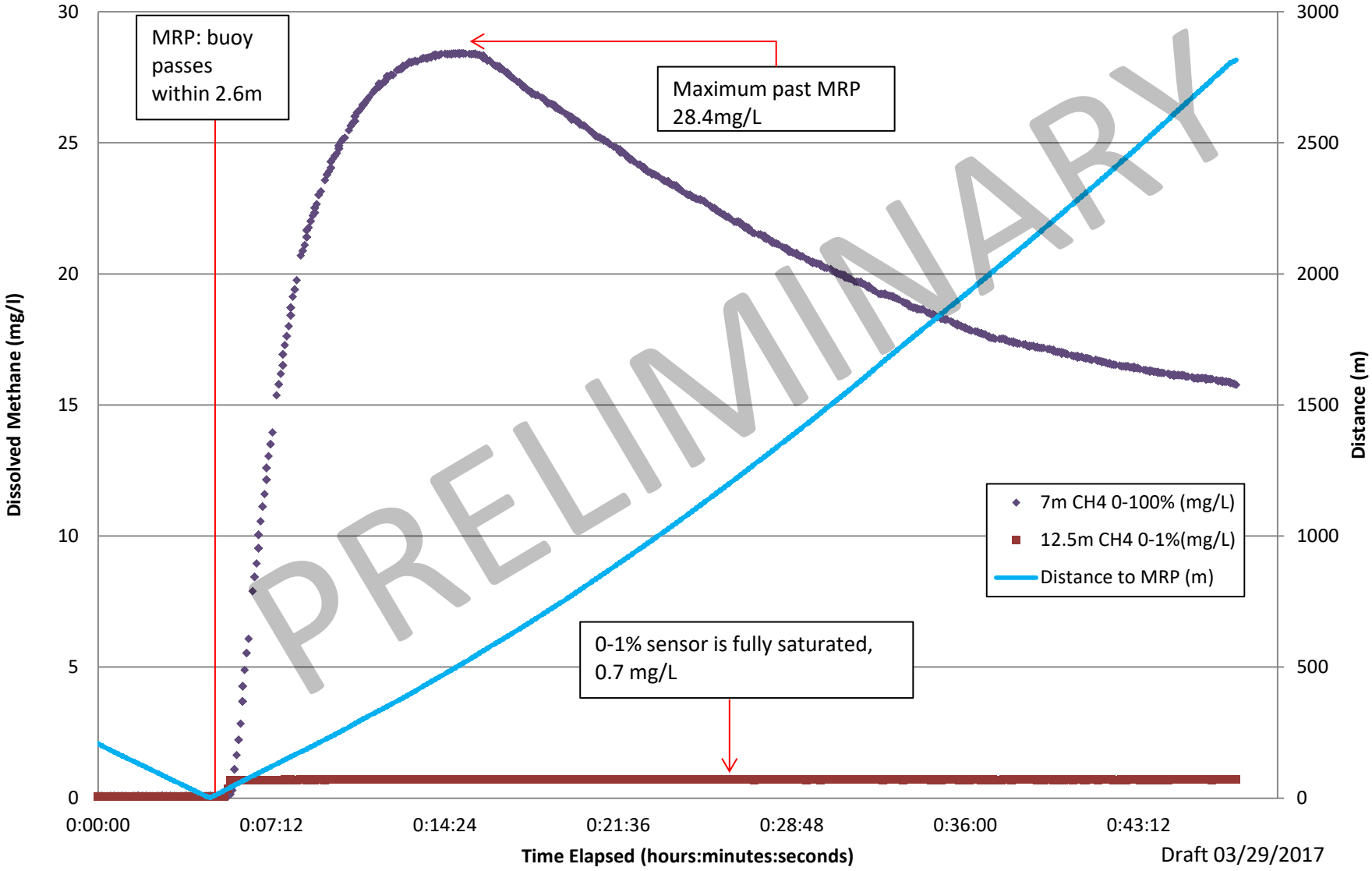
Draft 03/30/2017

Figure A-5.4a: Buoy Drift #4, March 23, 2017
Dissolved Oxygen Measurements at 2, 7, 12 and 12.5 Meters Depth
Ebb Tide



Draft 03/29/2017

Figure A-5.4b: Buoy Drift #4, March 23, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Ebb Tide



Draft 03/29/2017

Figure A-5.4c: Buoy Drift #4, March 23, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Ebb Tide

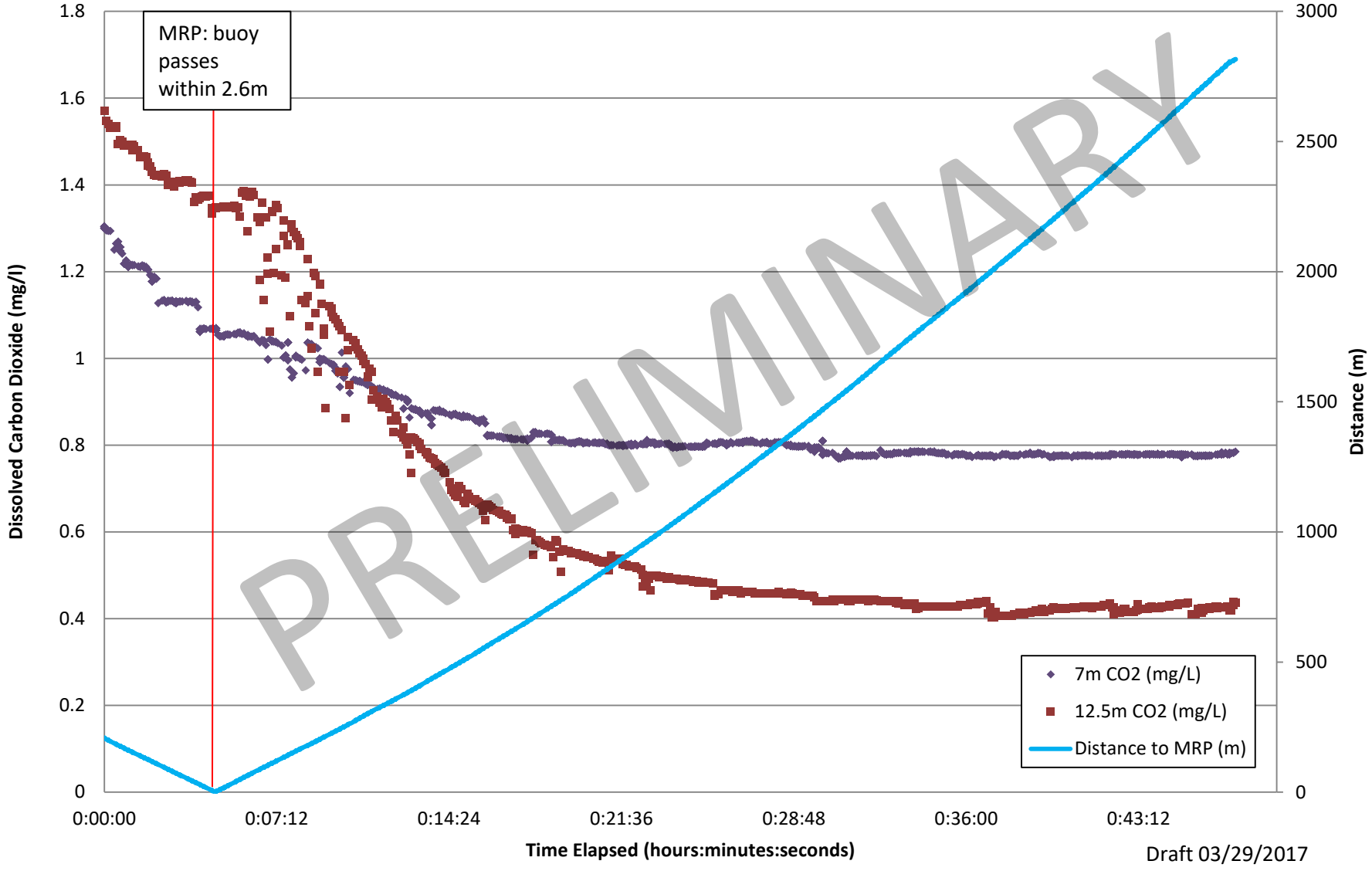
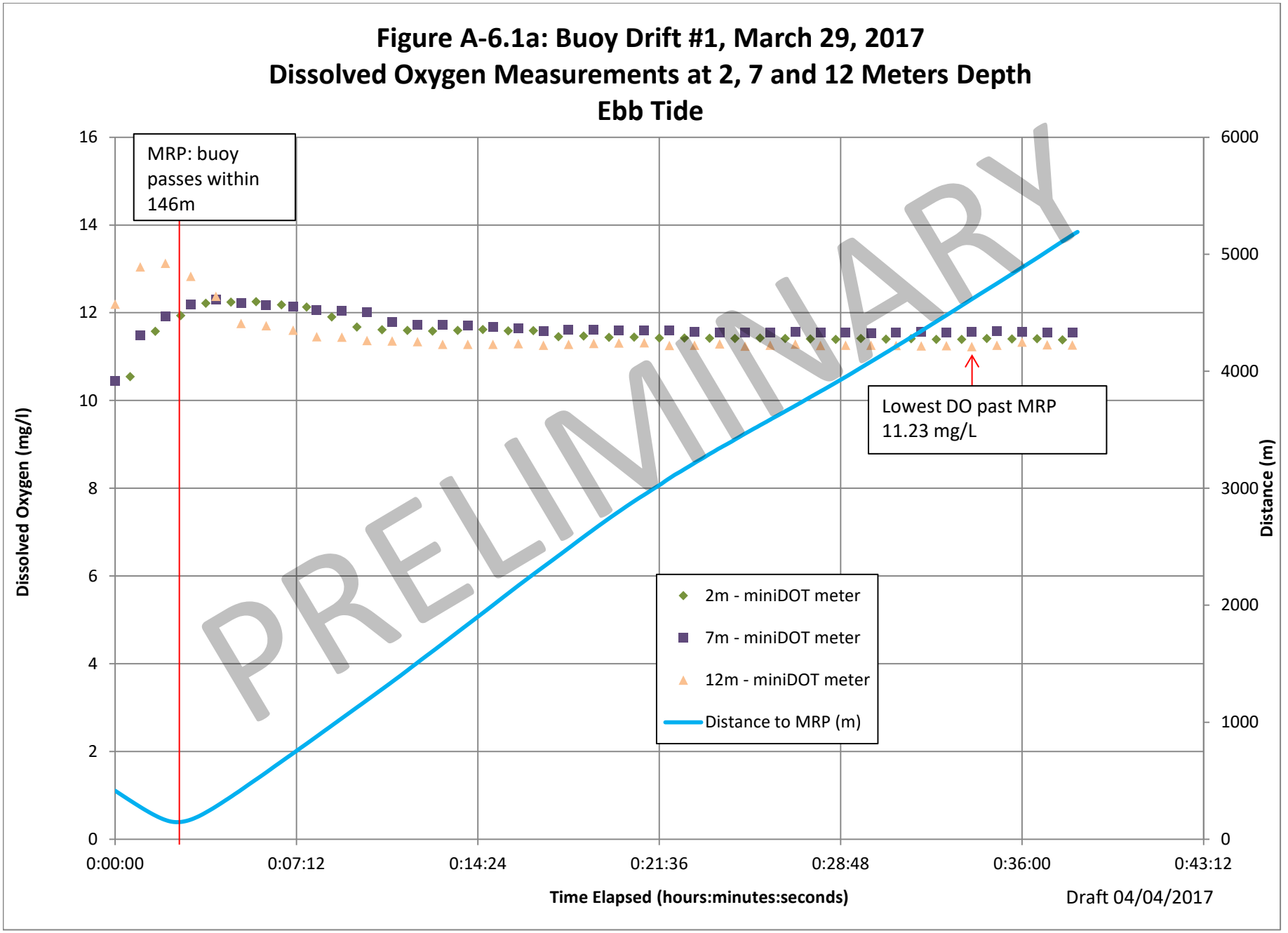
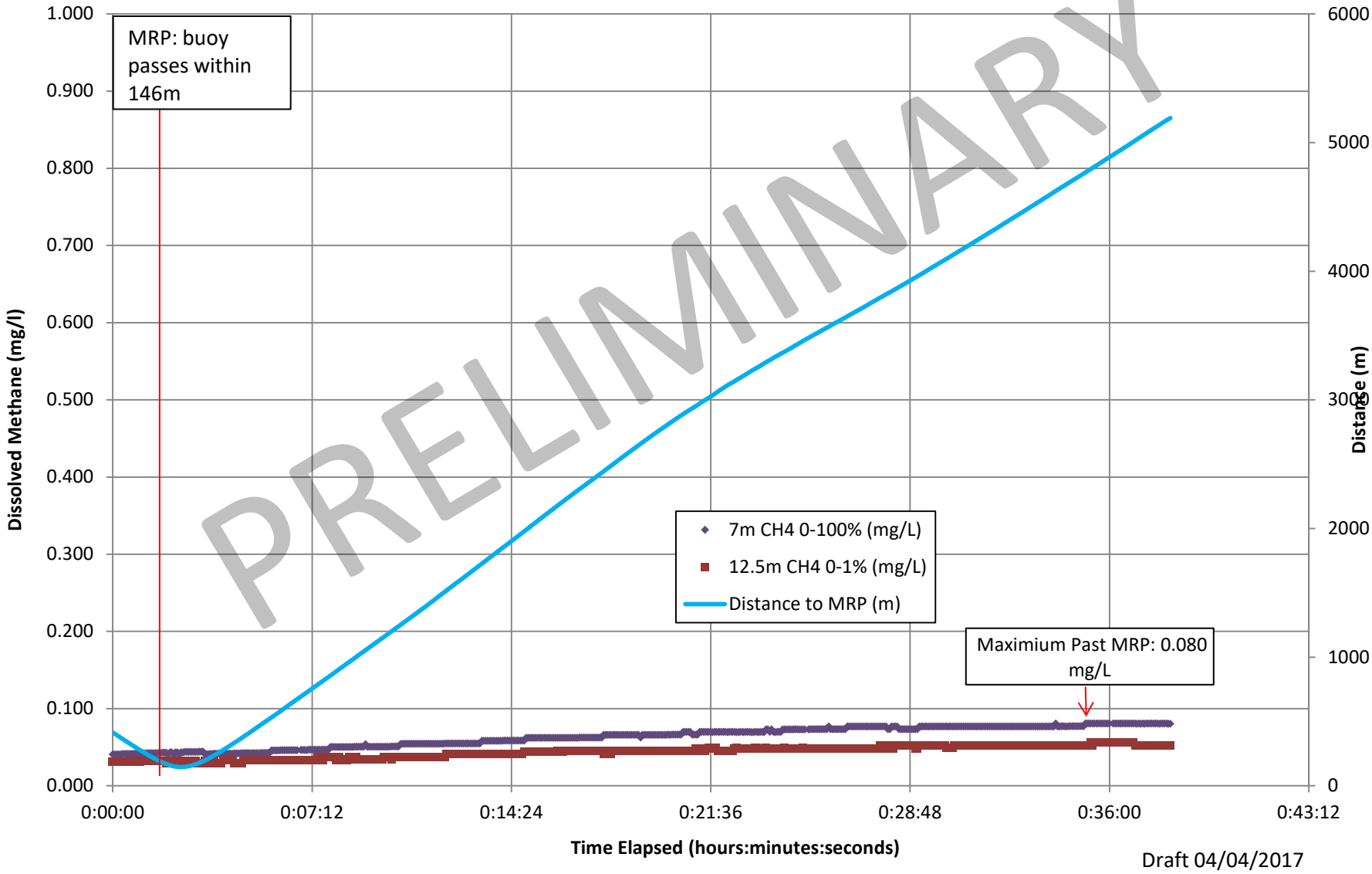


Figure A-6.1a: Buoy Drift #1, March 29, 2017
Dissolved Oxygen Measurements at 2, 7 and 12 Meters Depth
Ebb Tide



Draft 04/04/2017

Figure A-6.1b: Buoy Drift #1, March 29, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Ebb Tide



Draft 04/04/2017

Figure A-6.1c: Buoy Drift #1, March 29, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Ebb Tide

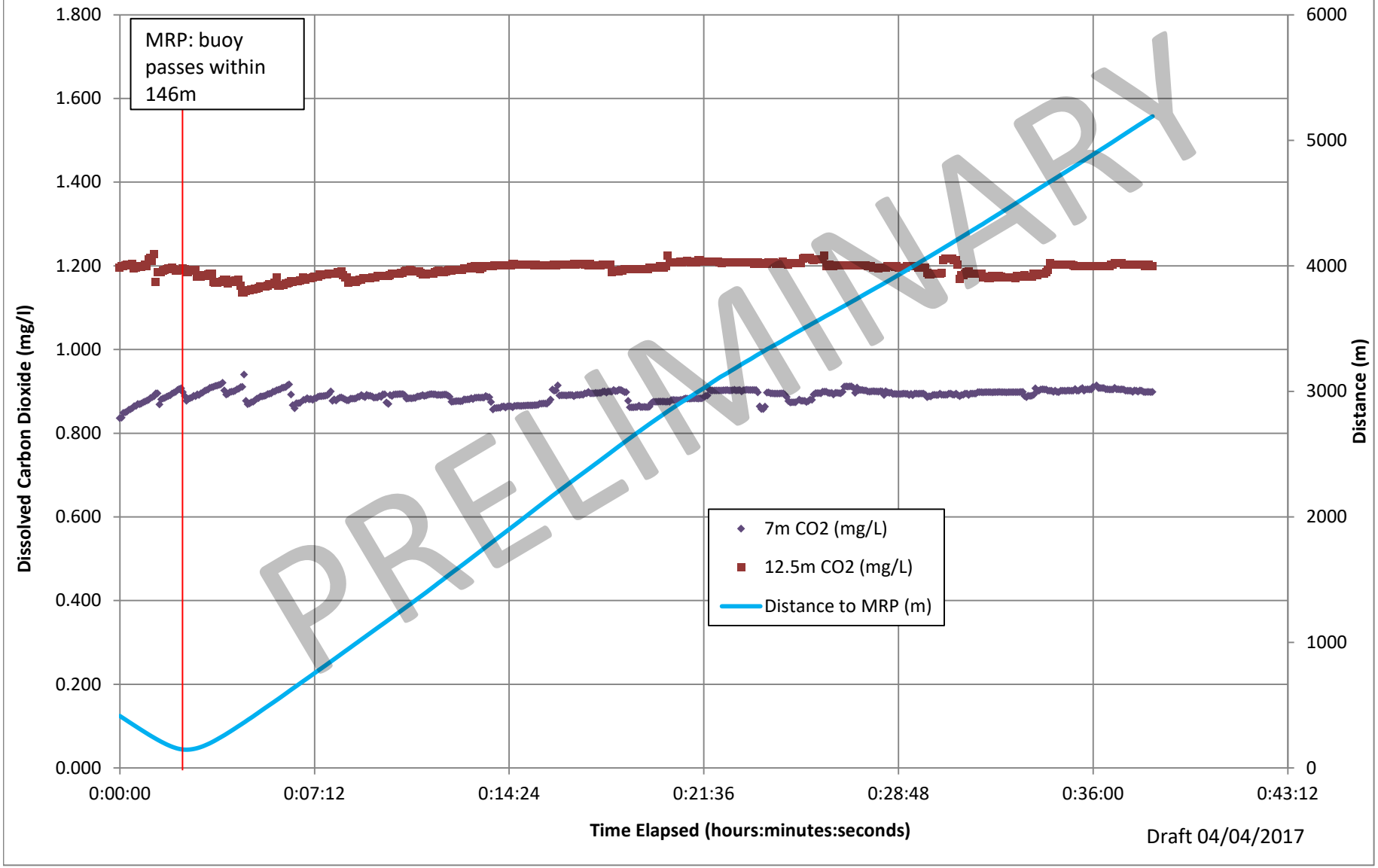
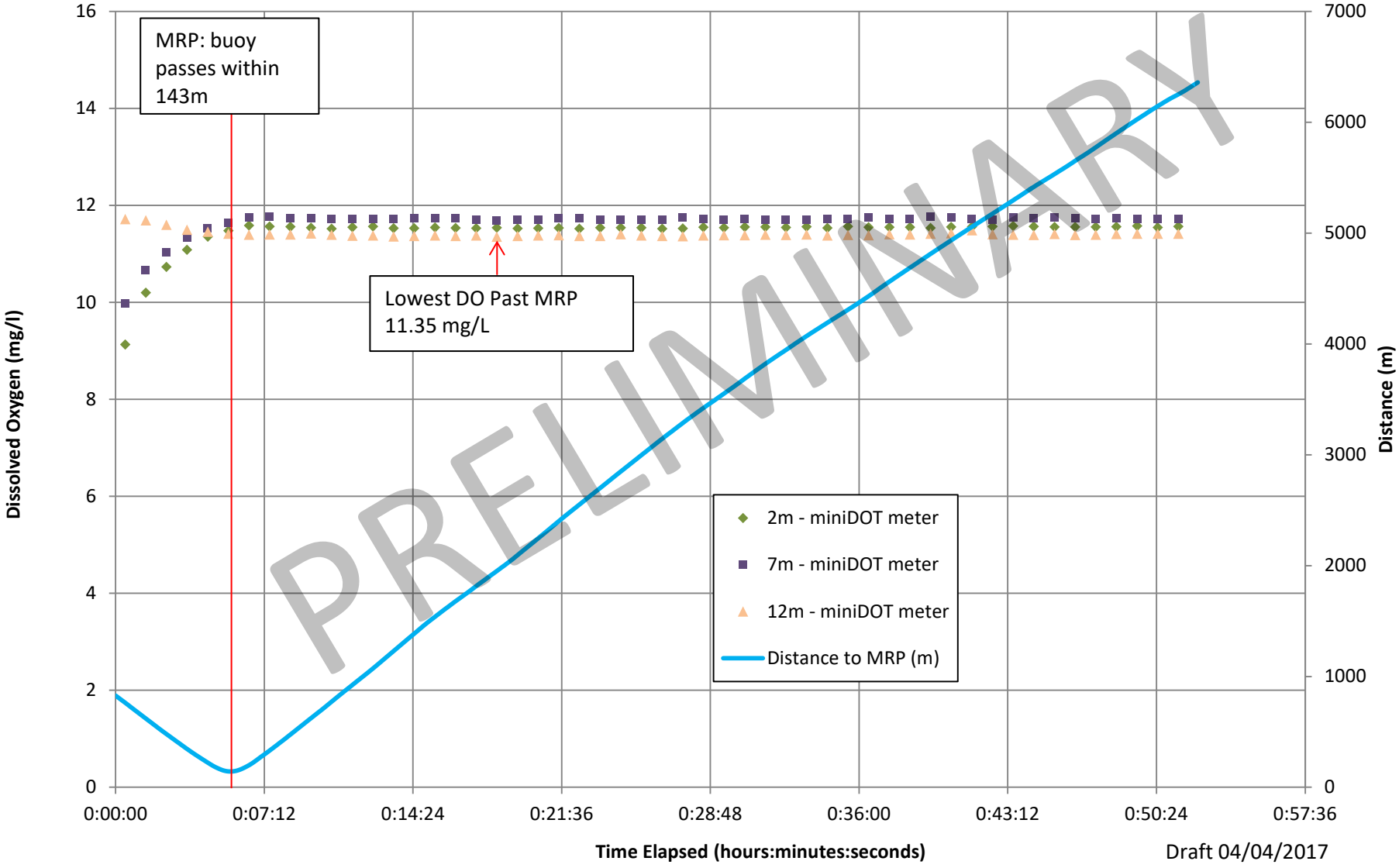
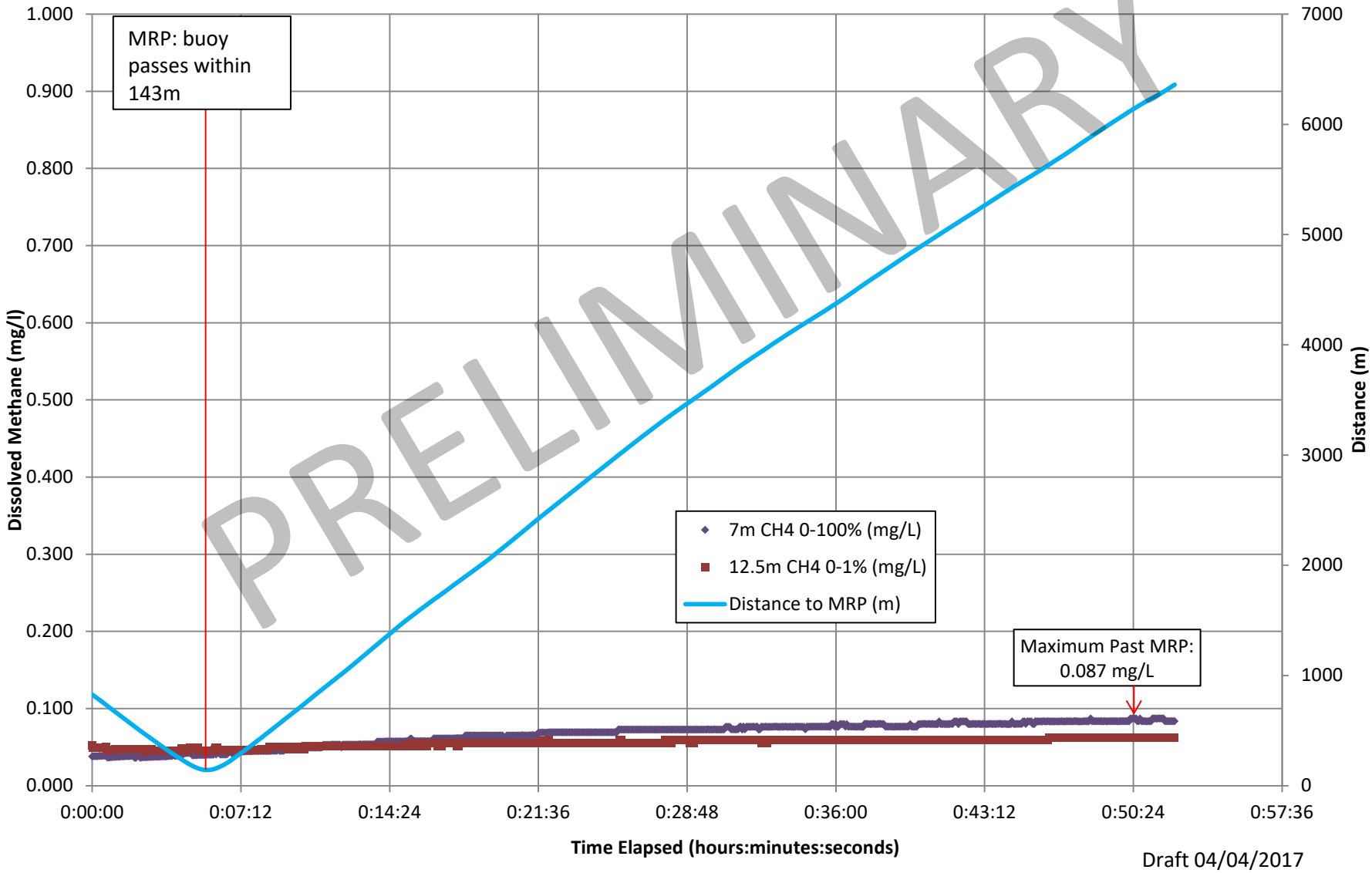


Figure A-6.2a: Buoy Drift #2, March 29, 2017
Dissolved Oxygen Measurements at 2, 7 and 12 Meters Depth
Ebb Tide



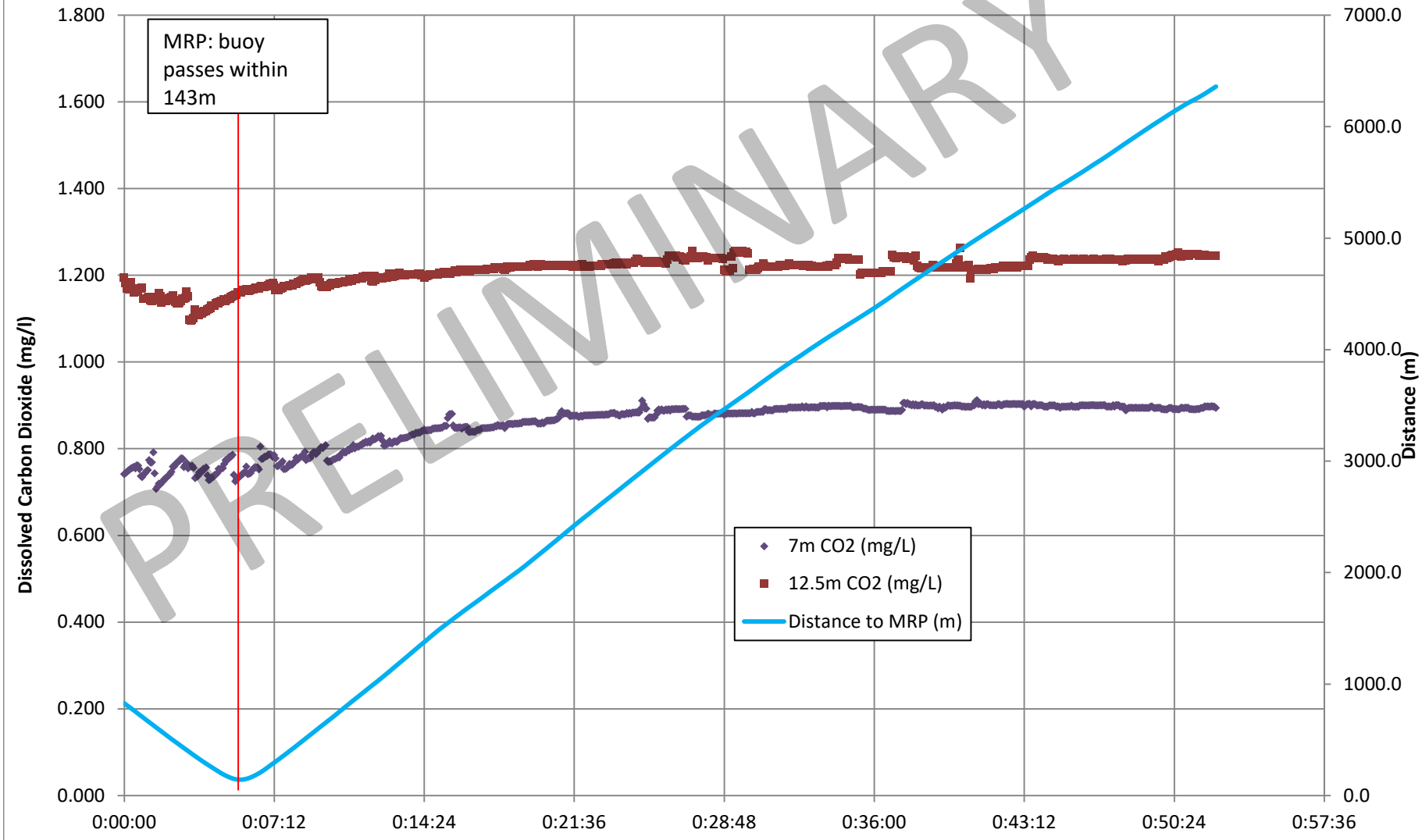
Draft 04/04/2017

Figure A-6.2b: Buoy Drift #2, March 29, 2017
Dissolved Methane Measurements at 7 and 12.5 Meters Depth
Ebb Tide



Draft 04/04/2017

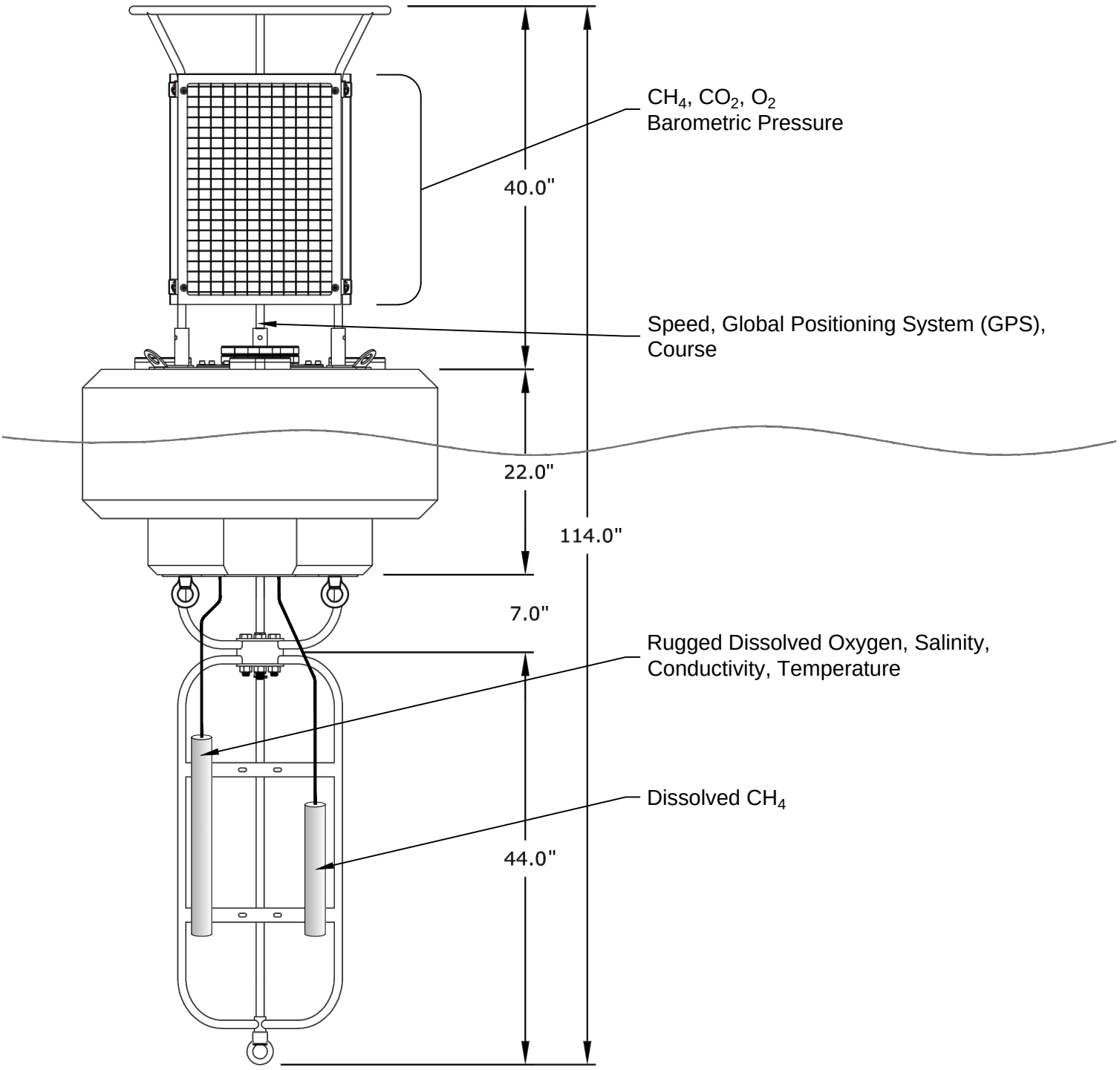
Figure A-6.2c: Buoy Drift #2, March 29, 2017
Dissolved Carbon Dioxide Measurements at 7 and 12.5 Meters Depth
Ebb Tide



Draft 04/04/2017

ATTACHMENT B:

FIGURE B1: AIR / WATER INTERFACE BUOY SCHEMATIC



Base map referenced from National Oceanic and Atmospheric Administration (NOAA), Chart 16663, Alaska - South Coast, Cook Inlet, East Foreland to Anchorage (Scale 1:100,000).

Soundings in Fathoms (Fathoms and Feet to Eleven Fathoms at Mean Lower Low Water)

1 Fathom = 6 Feet = 1.8 Meters

Legend

- Methane Release Point
- 1000 Yard Restricted Zone
- Pipeline

Buoy Track, Arrow Indicates Current Direction at Retrieval

- 3/24/17 Launch#1
- 3/24/17 Launch#2
- 3/24/17 Launch#3
- 3/24/17 Launch#4
- 3/24/17 Launch#5
- 3/26/17 Launch#1

Obstn

"SHELL-C"

Pipeline Area

N

0 500 1,000 1,500 2,000 2,500 3,000

Meters

SLR

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

Site	HILCORP ALASKA, LLC METHANE PIPELINE LEAK COOK INLET, ALASKA
Drawing	Air / Water Interface Sample Event 1 Air / Water Interface Buoy Tracks
Drawing	April 2017
Scale	1:20,000
Fig. No.	B2
File Name	Figure B2 AirInterface_Event1 .mxd
Project No.	105.00874.17015

Base map referenced from National Oceanic and Atmospheric Administration (NOAA), Chart 16663, Alaska - South Coast, Cook Inlet, East Foreland to Anchorage (Scale 1:100,000).

Soundings in Fathoms (Fathoms and Feet to Eleven Fathoms at Mean Lower Low Water)

1 Fathom = 6 Feet = 1.8 Meters

Legend

- Methane Release Point (MRP)
- 3/29/2017 Drift #1
- 3/29/2017 Drift #2
- 3/29/2017 Drift #3
- 3/29/2017 Drift #4
- 3/29/2017 Drift #5
- 1000 Yard Restricted Zone
- Pipeline

N

0 250 500 750 1,000 1,250

Meters

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY.
ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

Project	HILCORP ALASKA, LLC METHANE PIPELINE LEAK COOK INLET, ALASKA
Drawing	AIR / WATER INTERFACE SAMPLE EVENT 2 AIR / WATER INTERFACE BUOY TRACKS
Drawing Date: April 2017	Scale: 1:9,000
File Name: Figure B3 AirInterface_Event2 .mxd	Project No.: 105.00874.17015
Fig. No.	B3

Table B1: Summary for Air / Water Interface Buoy Drifts

Buoy Type	Drift Name	General Tide Description	Date	Release Time	Release Location	Retrieval Time	Retrieval Location	Drift Duration	Minimum Distance to MRP (m)	Wind (Knots/direction)	Wave Height (m)
Air / Water	D01-032417	Flood	3/24/2017	13:21	60 46.176 N 151 26.504 W	13:41	60 47.032 N 151 25.496 W	0:20	61	calm	0
Air / Water	D02-032417	Flood	3/24/2017	14:05	60 46.169 N 151 26.435 W	14:26	60 47.23 N 151 25.214 W	0:21	138	calm	0
Air / Water	D03-032417	Flood	3/24/2017	14:48	60 46.22 N 151 26.41 W	15:15	60 47.024 N 151 25.243 W	0:27	89	calm	0
Air / Water	D04-032417	End of flood/Slack	3/24/2017	15:30	60 46.64 N 151 25.971 W	16:22	60 46.893 N 151 25.738 W	0:52	15	calm	0
Air / Water	D05-032417	Slack/Start of Ebb	3/24/2017	16:50	60 46.734 N 151 25.848 W	17:47	60 45.756 N 151 27.71 W	0:57	74	calm	0
Air / Water	D01-032617	Ebb	3/26/2017	10:35	60 47.099 N 151 25.169 W	11:24	60 44.995 N 151 28.954 W	0:49	100	5, SSW	0

Table B2: Revised Buoy Drift 1 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 1: Friday, 3/24/2017													
3/24/2017 13:21	60.769603, -151.444732	-0.96	12.34	41404	24.45	<0.1	<10,000	<0.1%	20.910	<2%	30.98	5.98	975.2
3/24/2017 13:22	60.770301, -151.443923	-1.06	12.32	41655	24.58	<0.1	<10,000	<0.1%	20.910	<2%	31.33	5.33	886.9
3/24/2017 13:23	60.771038, -151.443038	-1.24	12.38	41932	24.72	<0.1	<10,000	<0.1%	20.910	<2%	32.77	5.42	792.9
3/24/2017 13:24	60.771747, -151.442138	-1.25	12.36	41916	24.70	<0.1	<10,000	<0.1%	20.910	<2%	33.22	5.72	701.0
3/24/2017 13:25	60.772468, -151.441192	-1.27	12.35	41977	24.74	<0.1	<10,000	<0.1%	20.910	<2%	34.17	6.00	606.6
3/24/2017 13:26	60.773155, -151.440216	-1.28	12.36	41991	24.74	<0.1	<10,000	<0.1%	20.880	<2%	33.54	5.74	514.3
3/24/2017 13:27	60.773845, -151.439239	-1.3	12.35	42020	24.76	<0.1	<10,000	<0.1%	20.910	<2%	34.04	5.96	422.1
3/24/2017 13:28	60.774551, -151.438217	-1.31	12.35	42072	24.79	<0.1	<10,000	<0.1%	20.910	<2%	36.19	6.05	327.3
3/24/2017 13:29	60.775253, -151.437179	-1.34	12.36	42118	24.81	<0.1	<10,000	<0.1%	20.880	<2%	37.67	6.07	233.4
3/24/2017 13:30	60.775989, -151.436035	-1.33	12.36	42123	24.82	<0.1	<10,000	<0.1%	20.941	<2%	37.02	6.31	135.8
3/24/2017 13:31	60.776744, -151.434921	-1.33	12.35	42099	24.80	<0.1	<10,000	<0.1%	20.910	<2%	34.27	6.57	61.3
3/24/2017 13:32	60.777519, -151.433837	-1.36	NR	42112	24.80	<0.1	<10,000	<0.1%	20.880	<2%	33.11	6.05	104.7
3/24/2017 13:33	60.778244, -151.432861	-1.37	12.36	42114	24.80	<0.1	<10,000	<0.1%	20.941	<2%	35.78	5.88	192.8
3/24/2017 13:34	60.77898, -151.431808	-1.37	12.36	42115	24.80	<0.1	<10,000	<0.1%	20.910	<2%	34.83	6.13	289.1
3/24/2017 13:35	60.779731, -151.430786	-1.39	12.37	42138	24.81	<0.1	<10,000	<0.1%	20.880	<2%	NR	NR	388.0
3/24/2017 13:36	60.780475, -151.429779	-1.37	12.37	42082	24.78	<0.1	<10,000	<0.1%	20.910	<2%	34.47	6.03	486.3
3/24/2017 13:37	60.781211, -151.428787	-1.39	12.37	42100	24.79	<0.1	<10,000	<0.1%	20.910	<2%	33.76	5.96	583.8
3/24/2017 13:38	60.781936, -151.427795	-1.38	12.37	42086	24.78	<0.1	<10,000	<0.1%	20.910	<2%	34.26	5.85	680.3
3/24/2017 13:39	60.782634, -151.426788	-1.4	12.35	42464	25.02	<0.1	<10,000	<0.1%	20.910	<2%	35.67	5.75	774.8
3/24/2017 13:40	60.783195, -151.425979	-1.4	12.31	43176	25.48	<0.1	<10,000	<0.1%	20.910	<2%	38.58	5.33	850.7
3/24/2017 13:41	60.783863, -151.424942	-1.4	12.32	42993	25.36	<0.1	<10,000	<0.1%	20.910	<2%	36.15	5.31	943.3

NR – Instrument did not record a reading at this time interval

Table B3: Revised Buoy Drift 2 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 2: Friday, 3/24/2017													
3/24/2017 14:05	60.769489, -151.440582	-1	12.32	43328	25.68	<0.1	<10,000	<0.1%	20.910	<2%	34.16	6.61	869.0
3/24/2017 14:06	60.770187, -151.439666	-1.1	12.34	43639	25.85	<0.1	<10,000	<0.1%	20.910	<2%	33.31	5.79	777.8
3/24/2017 14:07	60.770896, -151.438827	-1.2	12.28	44621	26.46	<0.1	<10,000	<0.1%	20.910	<2%	30.40	5.59	687.3
3/24/2017 14:08	60.771625, -151.437896	-1.22	12.29	43810	25.93	<0.1	<10,000	<0.1%	20.910	<2%	36.08	5.55	593.1
3/24/2017 14:09	60.772308, -151.43695	-1.25	12.26	44151	26.14	<0.1	<10,000	<0.1%	20.910	<2%	34.69	5.63	503.9
3/24/2017 14:10	60.773002, -151.435974	-1.28	12.34	42874	25.31	<0.1	<10,000	<0.1%	20.910	<2%	34.58	5.63	414.1
3/24/2017 14:11	60.773681, -151.434997	-1.33	12.29	43963	26.00	<0.1	<10,000	<0.1%	20.910	<2%	NR	NR	328.2
3/24/2017 14:12	60.774368, -151.434005	-1.33	12.28	43995	26.02	<0.1	<10,000	<0.1%	20.910	<2%	36.70	5.64	245.9
3/24/2017 14:13	60.775035, -151.433029	-1.36	12.28	44009	26.03	<0.1	<10,000	<0.1%	20.910	<2%	36.33	5.68	177.2
3/24/2017 14:14	60.775726, -151.432006	-1.34	12.27	44007	26.03	<0.1	<10,000	<0.1%	20.910	<2%	36.11	5.72	137.6
3/24/2017 14:15	60.776435, -151.430953	-1.33	12.27	44002	26.03	<0.1	<10,000	<0.1%	20.910	<2%	34.85	5.81	157.8
3/24/2017 14:16	60.777153, -151.429946	-1.34	12.27	43983	26.01	<0.1	<10,000	<0.1%	20.910	<2%	34.52	5.96	221.1
3/24/2017 14:17	60.777877, -151.428924	-1.36	12.28	44059	26.06	<0.1	<10,000	<0.1%	20.910	<2%	36.35	5.85	303.7
3/24/2017 14:18	60.778591, -151.427886	-1.35	12.27	44021	26.03	<0.1	<10,000	<0.1%	20.910	<2%	36.16	5.77	393.4
3/24/2017 14:19	60.779254, -151.426895	-1.36	12.26	44036	26.04	<0.1	<10,000	<0.1%	20.910	<2%	37.09	5.48	480.5
3/24/2017 14:20	60.779907, -151.425903	-1.36	12.27	44042	26.04	<0.1	<10,000	<0.1%	20.910	<2%	36.50	5.44	568.3
3/24/2017 14:21	60.780551, -151.424911	-1.37	12.27	44034	26.04	<0.1	<10,000	<0.1%	20.910	<2%	36.57	5.50	656.1
3/24/2017 14:22	60.78123, -151.423934	-1.37	12.27	44050	26.05	<0.1	<10,000	<0.1%	20.910	<2%	37.04	5.59	746.4
3/24/2017 14:23	60.781875, -151.422943	-1.39	12.27	44042	26.04	<0.1	<10,000	<0.1%	20.910	<2%	38.10	5.27	835.0
3/24/2017 14:24	60.782501, -151.421981	-1.39	12.26	44049	26.04	<0.1	<10,000	<0.1%	20.910	<2%	37.87	5.16	921.2
3/24/2017 14:25	60.783084, -151.421005	-1.39	12.28	43998	26.01	<0.1	<10,000	<0.1%	20.910	<2%	40.76	5.16	1004.6
3/24/2017 14:26	60.783718, -151.420242	-1.41	12.27	44322	26.21	<0.1	<10,000	<0.1%	20.910	<2%	25.61	3.90	1084.3

NR – Instrument did not record a reading at this time interval

Table B4: Revised Buoy Drift 3 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 3: Friday, 3/24/2017													
3/24/2017 14:48	60.770336, -151.44017	-0.85	12.18	44435	26.43	<0.1	<10,000	<0.1%	20.910	<2%	35.90	3.03	774.4
3/24/2017 14:49	60.770877, -151.439575	-0.97	12.21	44746	26.61	<0.1	<10,000	<0.1%	20.910	<2%	23.89	4.25	706.2
3/24/2017 14:50	60.771358, -151.438995	-1.09	12.22	44951	26.71	<0.1	<10,000	<0.1%	20.910	<2%	33.67	3.72	644.3
3/24/2017 14:51	60.771854, -151.438385	-1.1	12.21	45041	26.76	<0.1	<10,000	<0.1%	20.910	<2%	33.69	3.83	580.3
3/24/2017 14:52	60.772361, -151.437728	-1.16	12.22	45162	26.82	<0.1	<10,000	<0.1%	20.910	<2%	32.18	3.92	514.1
3/24/2017 14:53	60.772853, -151.437042	-1.21	12.22	45229	26.86	<0.1	<10,000	<0.1%	20.910	<2%	33.08	3.98	449.1
3/24/2017 14:54	60.773342, -151.43637	-1.21	12.21	45260	26.87	38.9	<10,000	<0.1%	20.910	<2%	35.51	4.01	385.1
3/24/2017 14:55	60.773841, -151.435653	-1.23	12.22	45333	26.92	<0.1	<10,000	<0.1%	20.910	<2%	34.34	4.16	319.8
3/24/2017 14:56	60.774356, -151.434936	-1.26	12.21	45557	27.05	<0.1	<10,000	<0.1%	20.910	<2%	32.57	4.12	254.1
3/24/2017 14:57	60.774883, -151.434234	-1.27	12.20	45601	27.08	<0.1	<10,000	<0.1%	20.910	<2%	32.29	4.24	189.6
3/24/2017 14:58	60.775432, -151.433517	-1.27	12.20	45615	27.09	<0.1	<10,000	<0.1%	20.910	<2%	32.91	4.35	128.6
3/24/2017 14:59	60.775959, -151.4328	-1.29	12.24	45123	26.76	<0.1	<10,000	<0.1%	20.910	<2%	33.13	4.40	89.2
3/24/2017 15:00	60.7765, -151.432022	-1.29	12.29	45136	26.77	<0.1	<10,000	<0.1%	20.910	<2%	34.38	4.42	99.3
3/24/2017 15:01	60.777019, -151.431304	-1.31	12.29	45156	26.78	<0.1	<10,000	<0.1%	20.910	<2%	33.36	4.33	146.4
3/24/2017 15:02	60.777553, -151.430526	-1.31	12.29	45185	26.80	<0.1	<10,000	<0.1%	20.910	<2%	33.91	4.38	210.3
3/24/2017 15:03	60.778095, -151.429763	-1.32	12.31	45216	26.81	<0.1	<10,000	<0.1%	20.910	<2%	34.38	4.37	278.5
3/24/2017 15:04	60.77864, -151.429016	-1.31	12.30	45240	26.83	<0.1	<10,000	<0.1%	20.910	<2%	32.74	4.38	348.3
3/24/2017 15:05	60.779163, -151.428283	-1.33	12.30	45300	26.87	<0.1	<10,000	<0.1%	20.910	<2%	33.44	4.27	416.9
3/24/2017 15:06	60.779663, -151.427566	-1.34	12.30	45337	26.89	<0.1	<10,000	<0.1%	20.910	<2%	35.42	4.05	483.6
3/24/2017 15:07	60.780132, -151.426834	-1.33	12.29	45293	26.86	<0.1	<10,000	<0.1%	20.910	<2%	NR	NR	548.7
3/24/2017 15:08	60.78059, -151.426086	-1.35	12.30	45343	26.89	<0.1	<10,000	<0.1%	20.910	<2%	38.05	4.09	613.6
3/24/2017 15:09	60.781051, -151.425308	-1.36	12.28	45352	26.89	<0.1	<10,000	<0.1%	20.910	<2%	39.66	4.11	679.8
3/24/2017 15:10	60.781509, -151.42456	-1.35	12.30	45357	26.90	<0.1	<10,000	<0.1%	20.910	<2%	37.53	4.03	744.8

NR – Instrument did not record a reading at this time interval
Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

Table B4: Revised Buoy Drift 3 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events **Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity**													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/24/2017 15:11	60.781982, -151.423797	-1.35	12.31	45371	26.91	<0.1	<10,000	<0.1%	20.910	<2%	38.50	4.18	811.6
3/24/2017 15:12	60.782447, -151.423004	-1.35	12.30	45387	26.92	<0.1	<10,000	<0.1%	20.880	<2%	40.95	3.92	878.8
3/24/2017 15:13	60.782882, -151.422241	-1.35	12.28	45412	26.93	<0.1	<10,000	<0.1%	20.910	<2%	41.63	3.90	942.5
3/24/2017 15:14	60.783317, -151.421478	-1.36	12.27	45434	26.95	<0.1	<10,000	<0.1%	20.910	<2%	40.58	3.81	1006.1
3/24/2017 15:15	60.783729, -151.420715	-1.36	12.26	45431	26.94	<0.1	<10,000	<0.1%	20.910	<2%	44.48	3.50	1067.9

NR – Instrument did not record a reading at this time interval

Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

Table B5: Revised Buoy Drift 4 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 4: Friday, 3/24/2017													
3/24/2017 15:30	60.777332, -151.432846	-0.89	12.24	43797	26.01	<0.1	<10,000	<0.1%	20.910	<2%	104.69	1.51	99.9
3/24/2017 15:31	60.777484, -151.432678	-1.11	12.19	45194	26.86	<0.1	<10,000	<0.1%	20.910	<2%	44.23	1.03	119.0
3/24/2017 15:32	60.777545, -151.4328	-1.16	12.18	45294	26.91	<0.1	<10,000	<0.1%	20.910	<2%	44.23	0.64	121.6
3/24/2017 15:33	60.777469, -151.432846	-1.23	12.17	45499	27.02	<0.1	<10,000	<0.1%	20.910	<2%	44.23	0.57	113.0
3/24/2017 15:34	60.777446, -151.432769	-1.26	12.16	45818	27.22	<0.1	<10,000	<0.1%	20.910	<2%	44.23	0.72	112.8
3/24/2017 15:35	60.777557, -151.432662	-1.27	12.16	45758	27.18	<0.1	<10,000	<0.1%	20.910	<2%	44.23	0.70	126.4
3/24/2017 15:36	60.777488, -151.432785	-1.29	12.16	45794	27.20	<0.1	<10,000	<0.1%	20.910	<2%	44.23	1.07	116.4
3/24/2017 15:37	60.77732, -151.432907	-1.28	12.15	45871	27.25	3.43	<10,000	<0.1%	20.910	<2%	NR	NR	97.0
3/24/2017 15:38	60.777206, -151.433105	-1.3	12.14	45989	27.32	3.27	<10,000	<0.1%	20.910	<2%	44.23	1.77	80.6
3/24/2017 15:39	60.776988, -151.4337	-1.31	12.18	46144	27.42	3.24	<10,000	<0.1%	20.910	<2%	256.34	2.01	46.3
3/24/2017 15:40	60.776977, -151.434127	-1.32	12.16	46142	27.42	3.21	<10,000	<0.1%	20.910	<2%	256.34	1.05	47.0
3/24/2017 15:41	60.77705, -151.434371	-1.3	12.16	46141	27.42	<0.1	<10,000	<0.1%	20.910	<2%	256.34	0.85	59.8
3/24/2017 15:42	60.777164, -151.434356	-1.3	12.16	46191	27.45	<0.1	<10,000	<0.1%	20.910	<2%	256.34	1.14	70.9
3/24/2017 15:43	60.777286, -151.434066	-1.31	12.17	46208	27.46	<0.1	<10,000	<0.1%	20.910	<2%	256.34	2.03	79.7
3/24/2017 15:44	60.777225, -151.433456	-1.28	12.15	46201	27.47	<0.1	<10,000	<0.1%	20.910	<2%	108.51	1.94	75.0
3/24/2017 15:45	60.777034, -151.433227	-1.32	12.11	46262	27.49	3.21	<10,000	<0.1%	20.880	<2%	108.51	1.27	60.8
3/24/2017 15:46	60.776988, -151.433502	-1.29	12.14	46333	27.55	<0.1	<10,000	<0.1%	20.849	<2%	108.51	0.57	49.3
3/24/2017 15:47	60.776897, -151.433532	-1.33	12.18	45734	27.15	<0.1	<10,000	<0.1%	20.880	<2%	188.21	1.46	39.3
3/24/2017 15:48	60.776706, -151.433746	-1.32	12.15	46398	27.58	<0.1	<10,000	<0.1%	20.910	<2%	188.21	0.57	15.2
3/24/2017 15:49	60.776847, -151.43367	-1.29	12.14	46350	27.56	<0.1	<10,000	<0.1%	20.910	<2%	10.71	1.31	31.4
3/24/2017 15:50	60.777019, -151.433502	-1.3	12.12	46378	27.58	<0.1	<10,000	<0.1%	20.910	<2%	10.71	1.64	52.5
3/24/2017 15:51	60.777229, -151.433242	-1.34	12.08	46946	27.93	<0.1	<10,000	<0.1%	20.910	<2%	10.71	1.75	79.5
3/24/2017 15:52	60.777416, -151.432937	-1.34	12.09	46939	27.93	<0.1	<10,000	<0.1%	20.910	<2%	10.71	1.87	105.4

NR – Instrument did not record a reading at this time interval

Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

-- Buoy was removed from the water and repositioned.

Table B5: Revised Buoy Drift 4 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/24/2017 15:53	60.777618, -151.432586	--	--	--	--	--	<10,000	<0.1%	20.910	<2%	35.88	2.20	134.3
3/24/2017 15:54	60.777713, -151.432403	--	--	--	--	--	<10,000	<0.1%	20.910	<2%	37.21	0.75	148.5
3/24/2017 15:55	60.77721, -151.433258	--	--	--	--	--	<10,000	<0.1%	20.818	<2%	217.16	6.27	77.2
3/24/2017 15:56	60.776569, -151.434097	--	--	--	--	--	<10,000	<0.1%	20.880	<2%	214.30	4.40	13.7
3/24/2017 15:57	60.776092, -151.434799	-1.24	12.30	46466	27.65	<0.1	<10,000	<0.1%	20.880	<2%	221.93	2.35	74.9
3/24/2017 15:58	60.775981, -151.435043	-1.24	12.20	46592	27.73	<0.1	<10,000	<0.1%	20.880	<2%	22.22	1.50	92.9
3/24/2017 15:59	60.7761, -151.435012	-1.28	12.18	46615	27.73	<0.1	<10,000	<0.1%	20.910	<2%	356.75	0.88	82.7
3/24/2017 16:00	60.776336, -151.434646	-1.3	12.15	46614	27.73	<0.1	<10,000	<0.1%	20.880	<2%	26.76	2.18	51.2
3/24/2017 16:01	60.776615, -151.43431	-1.3	12.16	46629	27.74	<0.1	<10,000	<0.1%	20.910	<2%	30.40	2.33	25.6
3/24/2017 16:02	60.776901, -151.43399	-1.31	12.14	46646	27.75	<0.1	<10,000	<0.1%	20.910	<2%	28.88	2.18	36.8
3/24/2017 16:03	60.777183, -151.433685	-1.32	12.14	46674	27.76	<0.1	<10,000	<0.1%	20.910	<2%	27.32	2.09	67.9
3/24/2017 16:04	60.777442, -151.433395	-1.32	12.14	46682	27.77	<0.1	<10,000	<0.1%	20.910	<2%	27.04	2.07	99.1
3/24/2017 16:05	60.777702, -151.433105	-1.32	12.15	46722	27.79	<0.1	<10,000	<0.1%	20.910	<2%	27.04	2.03	131.3
3/24/2017 16:06	60.778034, -151.432785	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.04	1.94	171.8
3/24/2017 16:07	60.778289, -151.432556	-1.33	12.13	46716	27.79	<0.1	<10,000	<0.1%	20.880	<2%	27.04	2.01	202.7
3/24/2017 16:08	60.778545, -151.432296	-1.33	12.13	46730	27.80	<0.1	<10,000	<0.1%	20.910	<2%	27.04	2.01	234.4
3/24/2017 16:09	60.778804, -151.432037	NR	NR	NR	NR	<0.1	<10,000	<0.1%	20.941	<2%	27.04	2.01	266.3
3/24/2017 16:10	60.779067, -151.431777	-1.32	12.12	46735	27.80	<0.1	<10,000	<0.1%	20.910	<2%	27.04	2.03	298.7
3/24/2017 16:11	60.779418, -151.431472	-1.32	12.11	46759	27.82	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.87	341.1
3/24/2017 16:12	60.779659, -151.431274	-1.33	12.12	46788	27.83	NR	<10,000	<0.1%	20.910	<2%	27.04	1.87	370.0
3/24/2017 16:13	60.779865, -151.431091	NR	NR	NR	NR	<0.1	NR	NR	NR	NR	27.04	1.79	394.9
3/24/2017 16:14	60.780036, -151.430923	-1.21	12.13	46804	27.88	NR	<10,000	<0.1%	20.910	<2%	27.04	1.74	416.0
3/24/2017 16:15	60.780319, -151.430587	-1.22	12.11	46649	27.77	NR	<10,000	<0.1%	20.910	<2%	27.04	1.64	452.1
3/24/2017 16:16	60.780513, -151.430343	-1.27	12.13	46776	27.84	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.59	477.1

NR – Instrument did not record a reading at this time interval

Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

-- Buoy was removed from the water and repositioned.

Table B5: Revised Buoy Drift 4 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events **Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity**													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/24/2017 16:17	60.780693, -151.430099	-1.26	12.11	46707	27.80	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.53	500.8
3/24/2017 16:18	60.780864, -151.429885	NR	NR	NR	NR	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.55	522.9
3/24/2017 16:19	60.781013, -151.429718	-1.28	12.12	46774	27.84	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.48	541.7
3/24/2017 16:20	60.781192, -151.429519	-1.28	12.11	46802	27.86	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.40	564.3
3/24/2017 16:21	60.781372, -151.42929	-1.27	12.11	46826	27.88	<0.1	<10,000	<0.1%	20.910	<2%	27.04	1.51	587.7
3/24/2017 16:22	60.781547, -151.42897	-1.3	12.13	46798	27.85	<0.1	<10,000	<0.1%	20.910	<2%	61.78	2.44	612.7

NR – Instrument did not record a reading at this time interval

Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

-- Buoy was removed from the water and repositioned.

Table B6: Revised Buoy Drift 5 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 5: Friday, 3/24/2017													
3/24/2017 16:50	60.778907, -151.430801	-0.16	11.93	44026	26.34	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.35	307.2
3/24/2017 16:51	60.778987, -151.430786	NR	NR	NR	NR	NR	<10,000	<0.1%	20.910	<2%	239.22	1.01	315.2
3/24/2017 16:52	60.778915, -151.430969	-0.93	12.14	45962	27.41	<0.1	<10,000	<0.1%	20.910	<2%	NR	NR	303.2
3/24/2017 16:53	60.778835, -151.431121	-0.98	12.10	46071	27.47	<0.1	<10,000	<0.1%	20.910	<2%	239.22	0.85	291.3
3/24/2017 16:54	60.778728, -151.431289	-1.09	12.12	46287	27.58	<0.1	<10,000	<0.1%	20.910	<2%	239.22	0.77	276.4
3/24/2017 16:55	60.778629, -151.431472	-1.14	12.11	46419	27.65	<0.1	<10,000	<0.1%	20.910	<2%	239.22	0.83	261.9
3/24/2017 16:56	60.77853, -151.431671	-1.16	12.13	46498	27.69	<0.1	<10,000	<0.1%	20.910	<2%	239.22	0.92	247.1
3/24/2017 16:57	60.778419, -151.431869	-1.18	12.11	46537	27.71	<0.1	<10,000	<0.1%	20.910	<2%	239.22	0.87	231.1
3/24/2017 16:58	60.778316, -151.432083	-1.21	12.13	46590	27.74	<0.1	<10,000	<0.1%	20.910	<2%	239.22	0.98	215.7
3/24/2017 16:59	60.778198, -151.432342	-1.23	12.11	46756	27.84	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.16	197.8
3/24/2017 17:00	60.778076, -151.432632	-1.25	12.12	46761	27.84	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.22	179.1
3/24/2017 17:01	60.777935, -151.432937	-1.26	12.13	46767	27.84	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.31	158.8
3/24/2017 17:02	60.777801, -151.433258	NR	12.15	46804	27.87	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.37	139.7
3/24/2017 17:03	60.777645, -151.433578	-1.25	12.13	46804	27.87	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.48	119.6
3/24/2017 17:04	60.777473, -151.433914	-1.24	12.11	46853	27.90	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.44	99.6
3/24/2017 17:05	60.777313, -151.434265	-1.25	12.12	46835	27.88	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.66	84.9
3/24/2017 17:06	60.777126, -151.434631	-1.27	12.12	46874	27.91	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.68	74.4
3/24/2017 17:07	60.77695, -151.435012	-1.27	12.12	46852	27.89	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.79	75.7
3/24/2017 17:08	60.776767, -151.435424	-1.27	NR	NR	NR	NR	<10,000	<0.1%	20.910	<2%	239.22	1.66	88.3
3/24/2017 17:09	60.776569, -151.435806	-1.26	12.12	46874	27.91	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.77	106.5
3/24/2017 17:10	60.776371, -151.436203	-1.27	12.12	46884	27.91	<0.1	<10,000	<0.1%	20.910	<2%	239.22	1.87	130.1
3/24/2017 17:11	60.776165, -151.436645	-1.27	12.12	46894	27.92	<0.1	<10,000	<0.1%	20.910	<2%	239.22	2.00	158.8
3/24/2017 17:12	60.775947, -151.437133	-1.28	12.12	46897	27.92	<0.1	<10,000	<0.1%	20.910	<2%	227.70	2.09	191.8

NR – Instrument did not record a reading at this time interval

Table B6: Revised Buoy Drift 5 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/24/2017 17:13	60.77573, -151.437622	-1.29	12.13	46858	27.89	<0.1	<10,000	<0.1%	20.910	<2%	228.38	2.16	225.7
3/24/2017 17:14	60.775508, -151.43814	-1.3	12.13	46903	27.92	<0.1	<10,000	<0.1%	20.880	<2%	226.79	2.18	261.8
3/24/2017 17:15	60.775283, -151.43869	-1.28	12.11	46936	27.94	<0.1	<10,000	<0.1%	20.910	<2%	228.51	2.35	299.9
3/24/2017 17:16	60.775047, -151.439224	-1.3	12.13	46903	27.92	<0.1	<10,000	<0.1%	20.910	<2%	226.96	2.48	338.1
3/24/2017 17:17	60.774803, -151.439788	-1.29	12.13	46904	27.92	<0.1	<10,000	<0.1%	20.880	<2%	227.80	2.50	378.3
3/24/2017 17:18	60.774532, -151.440383	-1.3	12.13	46952	27.95	<0.1	<10,000	<0.1%	20.880	<2%	226.14	2.53	421.6
3/24/2017 17:19	60.774261, -151.440963	-1.27	12.12	46966	27.97	<0.1	<10,000	<0.1%	20.880	<2%	225.83	2.51	464.5
3/24/2017 17:20	60.77399, -151.441543	-1.27	12.12	46951	27.96	<0.1	<10,000	<0.1%	20.880	<2%	224.20	2.44	507.5
3/24/2017 17:21	60.773715, -151.442108	-1.26	12.12	46981	27.98	<0.1	<10,000	<0.1%	20.910	<2%	224.84	2.55	550.1
3/24/2017 17:22	60.773426, -151.442733	-1.22	12.12	46998	28.00	<0.1	<10,000	<0.1%	20.910	<2%	225.20	2.68	596.4
3/24/2017 17:23	60.773132, -151.443344	-1.31	12.13	46930	27.93	<0.1	<10,000	<0.1%	20.910	<2%	221.34	2.48	642.5
3/24/2017 17:24	60.772834, -151.443954	-1.29	12.13	46970	27.96	<0.1	<10,000	<0.1%	20.880	<2%	223.32	2.72	688.9
3/24/2017 17:25	60.772518, -151.444595	-1.3	12.12	46953	27.95	<0.1	<10,000	<0.1%	20.880	<2%	224.80	2.77	737.9
3/24/2017 17:26	60.772201, -151.445251	-1.28	12.13	46958	27.96	<0.1	<10,000	<0.1%	20.880	<2%	224.08	3.01	787.7
3/24/2017 17:27	60.771873, -151.445907	-1.27	12.13	46984	27.98	<0.1	<10,000	<0.1%	20.910	<2%	224.42	3.01	838.2
3/24/2017 17:28	60.77153, -151.446563	-1.26	12.12	46970	27.97	<0.1	<10,000	<0.1%	20.941	<2%	222.30	3.16	889.9
3/24/2017 17:29	60.770973, -151.447586	-1.24	12.12	46983	27.99	<0.1	<10,000	<0.1%	20.880	<2%	220.25	3.22	972.2
3/24/2017 17:30	60.770793, -151.447906	-1.24	NR	NR	NR	NR	NR	NR	NR	NR	220.98	3.18	998.4
3/24/2017 17:31	60.77042, -151.448623	-1.24	12.12	46980	27.98	<0.1	<10,000	<0.1%	20.910	<2%	223.41	3.57	1054.9
3/24/2017 17:32	60.770034, -151.44934	-1.23	12.12	46994	27.99	<0.1	<10,000	<0.1%	20.910	<2%	222.85	3.48	1112.4
3/24/2017 17:33	60.769638, -151.450088	-1.23	12.12	46976	27.99	<0.1	<10,000	<0.1%	20.910	<2%	221.62	3.57	1171.9
3/24/2017 17:34	60.769237, -151.450851	-1.23	12.12	46982	27.99	<0.1	<10,000	<0.1%	20.910	<2%	221.40	3.81	1232.5
3/24/2017 17:35	60.768795, -151.45166	-1.22	12.12	46994	28.00	<0.1	<10,000	<0.1%	20.910	<2%	221.85	3.98	1298.0
3/24/2017 17:36	60.768341, -151.452468	-1.21	12.11	47026	28.02	<0.1	<10,000	<0.1%	20.910	<2%	218.27	4.03	1364.4

NR – Instrument did not record a reading at this time interval

Table B6: Revised Buoy Drift 5 March 24, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events **Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity**													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/24/2017 17:37	60.767871, -151.453262	-1.22	12.12	47005	28.01	<0.1	<10,000	<0.1%	20.910	<2%	219.18	4.01	1431.4
3/24/2017 17:38	60.767395, -151.454055	-1.24	12.12	47006	28.01	<0.1	<10,000	<0.1%	20.910	<2%	219.44	4.07	1499.0
3/24/2017 17:39	60.766914, -151.454849	-1.23	12.12	47005	28.00	<0.1	<10,000	<0.1%	20.910	<2%	218.23	4.29	1567.0
3/24/2017 17:40	60.766426, -151.455688	-1.25	12.12	47018	28.01	<0.1	<10,000	<0.1%	20.910	<2%	219.03	4.12	1637.4
3/24/2017 17:41	60.765914, -151.456527	-1.26	12.11	46989	27.99	<0.1	<10,000	<0.1%	20.910	<2%	218.31	4.35	1709.7
3/24/2017 17:42	60.765399, -151.457366	-1.24	12.12	47060	28.03	<0.1	<10,000	<0.1%	20.880	<2%	218.81	4.48	1782.3
3/24/2017 17:43	60.764862, -151.458221	-1.24	12.11	47013	28.01	<0.1	<10,000	<0.1%	20.910	<2%	216.26	4.24	1857.3
3/24/2017 17:44	60.764316, -151.459091	-1.24	12.12	47058	28.03	<0.1	<10,000	<0.1%	20.880	<2%	219.70	4.92	1933.5
3/24/2017 17:45	60.763767, -151.459976	-1.26	12.12	47079	28.05	<0.1	<10,000	<0.1%	20.880	<2%	217.31	4.35	2010.7
3/24/2017 17:46	60.763195, -151.460861	-1.25	12.12	47116	28.07	<0.1	<10,000	<0.1%	20.910	<2%	NR	NR	2089.7
3/24/2017 17:47	60.762599, -151.461837	-1.25	12.10	47051	28.03	<0.1	<10,000	<0.1%	20.880	<2%	226.29	5.75	2174.2

NR – Instrument did not record a reading at this time interval

Table B7: Revised Buoy Drift 1 March 26, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 1: Sunday, 3/26/2017													
3/26/2017 9:35	60.78498, -151.419479	-1.13	12.51	46194	27.50	<0.1	<10,000	<0.1%	20.925	<2%	224.04	7.13	1217.0
3/26/2017 9:36	60.784172, -151.421005	-1.23	12.34	45987	27.34	<0.1	<10,000	<0.1%	20.925	<2%	223.41	7.22	1095.0
3/26/2017 9:37	60.78339, -151.422607	-1.23	12.32	44970	26.68	<0.1	<10,000	<0.1%	20.925	<2%	224.58	7.14	972.6
3/26/2017 9:38	60.782615, -151.424148	-1.27	12.32	44756	26.53	32.51	<10,000	<0.1%	20.925	<2%	224.14	7.16	853.1
3/26/2017 9:39	60.781826, -151.425674	-1.3	12.26	44753	26.52	32.51	<10,000	<0.1%	20.925	<2%	223.60	7.16	733.0
3/26/2017 9:40	60.781024, -151.427215	-1.31	12.25	44601	26.42	<0.1	<10,000	<0.1%	20.925	<2%	222.22	7.35	611.5
3/26/2017 9:41	60.7802, -151.428771	-1.32	12.27	44455	26.32	<0.1	<10,000	<0.1%	20.925	<2%	223.62	7.16	488.0
3/26/2017 9:42	60.779373, -151.430404	-1.35	12.27	44400	26.28	<0.1	<10,000	<0.1%	20.925	<2%	223.62	7.77	362.6
3/26/2017 9:43	60.778606, -151.431991	-1.36	12.26	44299	26.21	<0.1	<10,000	<0.1%	20.925	<2%	226.95	7.11	247.0
3/26/2017 9:44	60.777801, -151.433547	-1.37	NR	NR	NR	<0.1	<10,000	<0.1%	20.894	<2%	225.28	7.11	137.0
3/26/2017 9:45	60.776706, -151.435668	-1.37	12.31	43535	25.72	<0.1	<10,000	<0.1%	20.894	<2%	220.84	7.33	100.0
3/26/2017 9:46	60.775844, -151.437194	-1.39	12.34	43113	25.44	<0.1	NR	NR	NR	NR	222.89	7.57	199.3
3/26/2017 9:47	60.775054, -151.438812	-1.39	12.28	44300	26.20	<0.1	<10,000	<0.1%	20.894	<2%	225.07	7.16	318.5
3/26/2017 9:48	60.774295, -151.440383	NR	NR	44276	26.19	<0.1	<10,000	<0.1%	20.925	<2%	226.38	7.37	436.4
3/26/2017 9:49	60.773483, -151.442016	-1.4	12.43	41793	24.59	<0.1	<10,000	<0.1%	20.925	<2%	223.23	7.46	561.5
3/26/2017 9:50	60.772659, -151.443527	-1.4	12.48	41751	24.56	<0.1	<10,000	<0.1%	20.925	<2%	222.81	7.20	682.8
3/26/2017 9:51	60.771842, -151.444992	NR	NR	NR	NR	<0.1	<10,000	<0.1%	20.925	<2%	220.33	7.09	802.3
3/26/2017 9:52	60.771018, -151.446426	-1.4	12.48	41700	24.53	<0.1	<10,000	<0.1%	20.925	<2%	221.11	7.24	921.4
3/26/2017 9:53	60.770191, -151.447921	-1.41	12.48	41726	24.54	<0.1	<10,000	<0.1%	20.925	<2%	223.01	7.01	1043.3
3/26/2017 9:54	60.769443, -151.449325	NR	NR	NR	NR	<0.1	<10,000	<0.1%	20.925	<2%	NR	NR	1155.9
3/26/2017 9:55	60.768684, -151.450714	-1.42	12.47	41588	24.45	<0.1	<10,000	<0.1%	20.894	<2%	221.85	6.68	1268.7
3/26/2017 9:56	60.767936, -151.452117	-1.42	12.47	41528	24.41	<0.1	<10,000	<0.1%	20.925	<2%	221.73	6.61	1381.3
3/26/2017 9:57	60.767181, -151.45346	-1.42	12.47	41358	24.30	NR	<10,000	<0.1%	20.925	<2%	219.51	6.63	1492.1

NR – Instrument did not record a reading at this time interval
Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

Table B7: Revised Buoy Drift 1 March 26, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events
Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity

AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/26/2017 9:58	60.766391, -151.454772	-1.42	12.47	41205	24.20	<0.1	<10,000	<0.1%	20.925	<2%	218.86	6.72	1604.5
3/26/2017 9:59	60.765575, -151.4561	-1.43	NR	NR	NR	<0.1	<10,000	<0.1%	20.925	<2%	218.89	7.03	1719.7
3/26/2017 10:00	60.764789, -151.457427	-1.43	12.47	NR	NR	<0.1	<10,000	<0.1%	20.925	<2%	219.46	6.61	1832.6
3/26/2017 10:01	60.764019, -151.458709	NR	12.47	41060	24.11	33.07	<10,000	<0.1%	20.925	<2%	218.25	6.64	1942.5
3/26/2017 10:02	60.763225, -151.460006	-1.43	12.48	41039	24.10	<0.1	<10,000	<0.1%	20.894	<2%	218.79	6.53	2055.0
3/26/2017 10:03	60.762454, -151.461257	NR	NR	NR	NR	<0.1	<10,000	<0.1%	20.925	<2%	219.00	6.44	2163.9
3/26/2017 10:04	60.761199, -151.463394	NR	NR	NR	NR	2.54	<10,000	<0.1%	20.925	<2%	220.65	6.46	2345.1
3/26/2017 10:05	60.760314, -151.46495	-1.43	12.48	40951	24.04	33.08	<10,000	<0.1%	20.894	<2%	219.99	6.33	2474.7
3/26/2017 10:06	60.759578, -151.466201	-1.43	12.48	40936	24.03	<0.1	<10,000	<0.1%	20.925	<2%	NR	NR	2580.9
3/26/2017 10:07	60.758842, -151.467453	NR	NR	NR	NR	<0.1	<10,000	<0.1%	20.925	<2%	219.95	6.25	2687.2
3/26/2017 10:08	60.758148, -151.468627	-1.43	12.49	40934	24.03	33.09	<10,000	<0.1%	20.925	<2%	218.23	5.83	2787.1
3/26/2017 10:09	60.757442, -151.469726	-1.44	12.47	40927	24.02	<0.1	<10,000	<0.1%	20.894	<2%	217.39	5.79	2885.3
3/26/2017 10:10	60.756748, -151.470855	-1.44	12.47	40959	24.04	<0.1	<10,000	<0.1%	20.894	<2%	219.42	5.72	2983.7
3/26/2017 10:11	60.756088, -151.471939	-1.44	12.47	40913	24.01	<0.1	<10,000	<0.1%	20.894	<2%	218.20	5.42	3077.6
3/26/2017 10:12	60.755424, -151.472991	-1.44	12.48	40871	23.99	<0.1	<10,000	<0.1%	20.925	<2%	218.27	5.27	3170.7
3/26/2017 10:13	60.75489, -151.473968	-1.44	12.48	40880	23.99	<0.1	<10,000	<0.1%	20.894	<2%	224.15	4.42	3250.3
3/26/2017 10:14	60.754409, -151.474914	-1.44	12.48	40634	23.83	<0.1	<10,000	<0.1%	20.925	<2%	223.46	4.35	3324.5
3/26/2017 10:15	60.753852, -151.475784	-1.44	12.48	40631	23.83	<0.1	<10,000	<0.1%	20.894	<2%	219.97	4.55	3402.1
3/26/2017 10:16	60.753326, -151.476715	-1.44	12.48	40575	23.80	<0.1	<10,000	<0.1%	20.925	<2%	223.52	4.40	3479.4
3/26/2017 10:17	60.752853, -151.477691	-1.44	12.50	40417	23.70	<0.1	<10,000	<0.1%	20.894	<2%	224.96	4.42	3554.0
3/26/2017 10:18	60.752365, -151.478591	-1.44	12.48	40496	23.75	33.15	<10,000	<0.1%	20.925	<2%	219.62	4.16	3627.1
3/26/2017 10:19	60.751865, -151.479293	-1.44	12.46	41074	24.12	33.06	<10,000	<0.1%	20.894	<2%	203.95	3.51	3693.9
3/26/2017 10:20	60.751346, -151.47998	-1.44	12.47	40945	24.03	<0.1	<10,000	<0.1%	20.894	<2%	211.13	3.98	3761.8
3/26/2017 10:21	60.75085, -151.480789	-1.45	12.49	40840	23.96	<0.1	<10,000	<0.1%	20.925	<2%	223.99	4.14	3832.2

NR – Instrument did not record a reading at this time interval
Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

Table B7: Revised Buoy Drift 1 March 26, 2017

REVISED Data for March 24 and March 26, 2017 Air/Water Interface Buoy Events **Dissolved Oxygen concentrations adjusted to reflect water temperature and salinity**													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/26/2017 10:22	60.750408, -151.481689	-1.45	12.83	34920	20.21	<0.1	<10,000	<0.1%	20.925	<2%	224.76	4.05	3901.5
3/26/2017 10:23	60.749916, -151.482574	-1.45	12.51	40931	24.02	<0.1	<10,000	<0.1%	20.925	<2%	222.70	4.18	3974.3

NR – Instrument did not record a reading at this time interval

Blue Highlights – Sensor membrane was compromised. Readings to be verified through repeat study.

Table B8: Summary for Air / Water Interface Buoy Drifts March 29, 2017

Buoy Type	Drift Name	General Tide Description	Date	Release Time	Release Location	Retrieval Time	Retrieval Location	Drift Duration	Minimum Distance to MRP (m)	Wind (Knots/direction)	Wave Height (m)
Air / Water	D01-032917	Ebb	3/29/2017	12:32	60 46.823 N 151 25.37 W	12:53	60 45.751 N 151 27.264 W	0:21	148	12, SW	0
Air / Water	D02-032917	Ebb	3/29/2017	13:09	60 46.593 N 151 25.945 W	13:27	60 45.791 N 151 27.265 W	0:18	78	9, SW	0
Air / Water	D03-032917	End of Ebb/Slack	3/29/2017	13:47	60 46.588 N 151 25.926 W	14:48	60 46.609 N 151 25.97 W	1:01	17	3, SW	0
Air / Water	D04-032917	End of Slack/Flood	3/29/2017	15:25	60 46.432 N 151 26.378 W	15:36	60 46.976 N 151 25.618 W	0:11	114	Calm	0
Air / Water	D05-032917	Flood	3/29/2017	15:53	60 46.204 N 151 26.731 W	16:41	60 48.936 N 151 21.968 W	0:48	159	Calm	0

Table B9: Preliminary Buoy Drift 1 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 1 - Wednesday 3/29/2017													
3/29/2017 12:32	60.780391, -151.422836	-0.86	12.17	44019	26.16	ERR	< 20	< 0.1	20.925	< 1	228.69	8.00	733
3/29/2017 12:33	60.77964, -151.424438	-1.02	12.23	44332	26.32	ERR	< 20	< 0.1	20.925	< 1	222.25	7.16	614
3/29/2017 12:34	60.778877, -151.426025	-1.08	12.22	44452	26.39	ERR	< 20	< 0.1	20.925	< 1	222.07	7.98	495
3/29/2017 12:35	60.778011, -151.427703	-1.15	12.24	44587	26.45	ERR	< 20	< 0.1	20.925	< 1	225.15	7.68	369
3/29/2017 12:36	60.777156, -151.429397	-1.18	12.24	44644	26.48	ERR	< 20	< 0.1	20.925	< 1	222.75	7.66	250
3/29/2017 12:37	60.776275, -151.430984	-1.19	12.23	44672	26.50	ERR	< 20	< 0.1	20.925	< 1	219.94	7.90	159
3/29/2017 12:38	60.775405, -151.432556	-1.25	12.26	44735	26.52	ERR	< 20	< 0.1	20.925	< 1	221.67	7.51	148
3/29/2017 12:39	60.774528, -151.434188	-1.24	12.22	44746	26.53	ERR	< 20	< 0.1	20.925	< 1	221.15	8.00	229
3/29/2017 12:40	60.773616, -151.435791	-1.26	12.24	44811	26.57	ERR	< 20	< 0.1	20.925	< 1	220.72	7.74	346
3/29/2017 12:41	60.772781, -151.437438	-1.27	12.23	44828	26.58	ERR	< 20	< 0.1	20.925	< 1	222.89	7.57	465
3/29/2017 12:42	60.771911, -151.439071	-1.28	12.24	44837	26.58	ERR	< 20	< 0.1	20.925	< 1	221.71	7.68	591
3/29/2017 12:43	60.771083, -151.440521	-1.3	12.25	44873	26.60	ERR	< 20	< 0.1	20.925	< 1	220.16	7.25	710
3/29/2017 12:44	60.770278, -151.441925	-1.31	12.26	44910	26.62	ERR	< 20	< 0.1	20.925	< 1	220.89	7.18	826
3/29/2017 12:45	60.769428, -151.443313	-1.31	12.25	44887	26.61	ERR	< 20	< 0.1	20.925	< 1	217.88	6.98	947
3/29/2017 12:46	60.768596, -151.444702	-1.31	12.25	44904	26.62	ERR	< 20	< 0.1	20.925	< 1	220.82	7.25	1065
3/29/2017 12:47	60.767738, -151.446151	-1.3	12.25	44924	26.63	ERR	< 20	< 0.1	20.925	< 1	220.07	7.38	1188
3/29/2017 12:48	60.766876, -151.44757	-1.32	12.25	44960	26.65	ERR	< 20	< 0.1	20.925	< 1	219.46	7.31	1311
3/29/2017 12:49	60.766033, -151.448989	-1.32	12.25	44989	26.67	ERR	< 20	< 0.1	20.925	< 1	219.91	7.24	1432
3/29/2017 12:50	60.765144, -151.450378	-1.32	12.25	45020	26.69	ERR	< 20	< 0.1	20.925	< 1	215.96	7.48	1556
3/29/2017 12:51	60.764247, -151.451751	-1.34	12.24	45078	26.72	ERR	< 20	< 0.1	20.925	< 1	215.48	7.24	1681
3/29/2017 12:52	60.763385, -151.453094	-1.33	12.23	45074	26.72	ERR	< 20	< 0.1	20.925	< 1	217.74	7.03	1801
3/29/2017 12:53	60.762512, -151.454406	-1.34	12.26	45066	26.71	ERR	< 20	< 0.1	20.925	< 1	214.65	7.03	1921

ERR – Sensor malfunction confirmed. No valid data was collected.

Table B10: Preliminary Buoy Drift 2 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 2 - Wednesday 3/29/2017													
3/29/2017 13:09	60.776546, -151.432418	-0.97	12.12	45590	27.15	ERR	< 20	< 0.1	20.925	< 1	213.61	6.37	78
3/29/2017 13:10	60.775684, -151.43367	-1.1	12.17	45873	27.30	ERR	< 20	< 0.1	20.925	< 1	212.56	7.57	100
3/29/2017 13:11	60.774784, -151.43486	-1.18	12.20	46050	27.40	ERR	< 20	< 0.1	20.925	< 1	216.26	7.00	207
3/29/2017 13:12	60.774032, -151.436111	-1.21	12.19	46095	27.42	ERR	< 20	< 0.1	20.925	< 1	217.44	6.33	309
3/29/2017 13:13	60.773262, -151.437362	-1.23	12.19	46134	27.44	ERR	< 20	< 0.1	20.925	< 1	220.30	6.85	415
3/29/2017 13:14	60.772518, -151.438598	-1.24	12.18	46181	27.47	ERR	< 20	< 0.1	20.925	< 1	217.64	6.31	520
3/29/2017 13:15	60.771755, -151.439849	-1.26	12.19	46210	27.48	ERR	< 20	< 0.1	20.925	< 1	219.11	6.14	627
3/29/2017 13:16	60.771007, -151.441131	-1.26	12.19	46104	27.41	ERR	< 20	< 0.1	20.925	< 1	220.54	6.35	735
3/29/2017 13:17	60.770267, -151.442428	-1.27	12.19	46240	27.49	ERR	< 20	< 0.1	20.925	< 1	220.75	6.42	842
3/29/2017 13:18	60.769489, -151.44374	-1.28	12.18	46261	27.51	ERR	< 20	< 0.1	20.925	< 1	218.96	6.64	954
3/29/2017 13:19	60.768741, -151.444992	-1.28	12.20	46281	27.52	ERR	< 20	< 0.1	20.925	< 1	218.74	6.24	1061
3/29/2017 13:20	60.768013, -151.446197	-1.29	12.19	46311	27.54	ERR	< 20	< 0.1	20.925	< 1	220.26	5.85	1165
3/29/2017 13:21	60.767311, -151.447341	-1.3	12.19	46303	27.53	ERR	< 20	< 0.1	20.925	< 1	217.43	5.88	1264
3/29/2017 13:22	60.766624, -151.448501	-1.3	12.19	46303	27.53	ERR	< 20	< 0.1	20.925	< 1	219.44	5.92	1363
3/29/2017 13:23	60.765941, -151.449691	-1.3	12.19	46310	27.53	ERR	< 20	< 0.1	20.925	< 1	219.80	5.83	1462
3/29/2017 13:24	60.765232, -151.450912	-1.31	12.19	46322	27.54	ERR	< 20	< 0.1	20.925	< 1	221.10	6.09	1565
3/29/2017 13:25	60.764541, -151.452087	-1.31	12.20	46297	27.52	ERR	< 20	< 0.1	20.925	< 1	220.13	5.85	1665
3/29/2017 13:26	60.763866, -151.453277	-1.32	12.18	46351	27.55	ERR	< 20	< 0.1	20.925	< 1	220.08	5.75	1764
3/29/2017 13:27	60.763187, -151.454421	-1.32	12.19	46335	27.54	ERR	< 20	< 0.1	20.925	< 1	216.78	5.85	1861

ERR – Sensor malfunction confirmed. No valid data was collected.

Table B11: Preliminary Buoy Drift 3 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 3 - Wednesday 3/29/2017													
3/29/2017 13:47	60.77647, -151.432098	-1.07	12.67	37406	21.86	ERR	< 20	< 0.1	20.925	< 1	235.92	3.31	96
3/29/2017 13:48	60.776161, -151.432968	-1.16	12.70	37664	22.01	ERR	< 20	< 0.1	20.925	< 1	232.82	3.44	66
3/29/2017 13:49	60.77584, -151.433883	-1.2	12.72	37746	22.05	ERR	< 20	< 0.1	20.925	< 1	232.67	3.57	82
3/29/2017 13:50	60.775512, -151.434799	--	--	--	--	--	< 20	< 0.1	20.925	< 1	237.62	3.50	129
3/29/2017 13:51	60.775409, -151.436798	--	--	--	--	--	< 20	< 0.1	20.925	< 1	243.10	10.46	206
3/29/2017 13:52	60.774108, -151.438293	-0.21	12.02	42660	25.44	ERR	< 20	< 0.1	20.925	< 1	172.17	8.16	366
3/29/2017 13:53	60.774314, -151.436874	-0.26	11.92	41969	24.98	ERR	< 20	< 0.1	20.925	< 1	21.09	10.33	301
3/29/2017 13:54	60.775943, -151.435287	-0.04	11.98	42002	25.05	ERR	< 20	< 0.1	20.925	< 1	43.13	10.11	105
3/29/2017 13:55	60.776336, -151.434265	0.22	11.93	42493	25.43	ERR	44	< 0.1	20.925	< 1	117.58	1.40	35
3/29/2017 13:56	60.775653, -151.433456	0.36	11.78	41376	24.73	ERR	< 20	< 0.1	20.925	< 1	175.67	10.05	105
3/29/2017 13:57	60.774459, -151.435668	0.69	11.57	41233	24.71	ERR	< 20	< 0.1	20.925	< 1	256.62	9.79	256
3/29/2017 13:58	60.774562, -151.437561	1.14	11.45	40885	24.57	ERR	43	< 0.1	20.925	< 1	305.72	4.51	302
3/29/2017 13:59	60.774944, -151.437805	0.97	11.64	41063	24.65	ERR	43	< 0.1	20.925	< 1	47.00	2.61	281
3/29/2017 14:00	60.775321, -151.43692	1.17	11.66	40912	24.60	ERR	42	< 0.1	20.925	< 1	42.39	4.25	218
3/29/2017 14:01	60.775733, -151.43637	1.34	11.56	41459	24.99	ERR	42	< 0.1	20.925	< 1	30.65	2.18	166
3/29/2017 14:02	60.77597, -151.435806	1.52	11.58	40724	24.54	ERR	42	< 0.1	20.925	< 1	56.11	2.94	126
3/29/2017 14:03	60.776027, -151.435165	1.51	11.52	41272	24.90	ERR	< 20	< 0.1	20.925	< 1	88.03	1.83	94
3/29/2017 14:04	60.77592, -151.435119	1.48	11.57	40420	24.33	ERR	< 20	< 0.1	20.925	< 1	88.03	0.00	101
3/29/2017 14:05	60.77602, -151.435058	1.39	11.48	41212	24.84	ERR	< 20	< 0.1	20.925	< 1	88.03	0.64	90
3/29/2017 14:06	60.776107, -151.435043	1.53	11.50	40331	24.28	ERR	41	< 0.1	20.925	< 1	88.03	0.94	84
3/29/2017 14:07	60.776241, -151.434936	0.9	12.19	31564	18.50	ERR	41	< 0.1	20.925	< 1	60.51	0.51	70
3/29/2017 14:08	60.776252, -151.434768	1.28	12.11	31061	18.23	ERR	40	< 0.1	20.925	< 1	55.79	2.44	62
3/29/2017 14:09	60.77626, -151.434661	1.3	12.12	31427	18.47	ERR	< 20	< 0.1	20.925	< 1	91.12	0.42	57
3/29/2017 14:10	60.776279, -151.43457	1.39	12.11	31062	18.25	ERR	< 20	< 0.1	20.925	< 1	75.16	0.37	52

-- Buoy was removed from the water and repositioned.

ERR – Sensor malfunction confirmed. No valid data was collected.

Table B11: Preliminary Buoy Drift 3 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/29/2017 14:11	60.776374, -151.434509	1.34	12.00	31461	18.50	ERR	40	< 0.1	20.925	< 1	75.16	0.79	43
3/29/2017 14:12	60.776428, -151.434585	1.27	12.08	31919	18.78	ERR	39	< 0.1	20.925	< 1	75.16	0.88	44
3/29/2017 14:13	60.77647, -151.434631	1.32	12.06	31437	18.48	ERR	39	< 0.1	20.925	< 1	75.16	0.85	44
3/29/2017 14:14	60.776603, -151.434494	1.54	12.04	31749	18.71	ERR	39	< 0.1	20.925	< 1	75.16	1.37	35
3/29/2017 14:15	60.776725, -151.434341	1.69	12.00	31981	18.88	ERR	< 20	< 0.1	20.925	< 1	75.16	0.27	32
3/29/2017 14:16	60.776668, -151.434234	1.82	12.00	31699	18.72	ERR	60	< 0.1	20.925	< 1	75.16	0.66	23
3/29/2017 14:17	60.776477, -151.434082	1.95	11.87	31503	18.61	ERR	115	< 0.1	20.925	< 1	153.91	1.83	17
3/29/2017 14:18	60.776222, -151.434066	2.18	11.88	31203	18.45	ERR	60	< 0.1	20.925	< 1	153.91	1.94	41
3/29/2017 14:19	60.77597, -151.434219	2.4	11.70	31394	18.60	ERR	37	< 0.1	20.925	< 1	209.15	1.48	71
3/29/2017 14:20	60.77584, -151.434448	2.46	11.54	31296	18.54	ERR	37	< 0.1	20.925	< 1	209.15	0.94	88
3/29/2017 14:21	60.775848, -151.434616	2.67	11.53	30974	18.36	ERR	37	< 0.1	20.925	< 1	209.15	1.75	91
3/29/2017 14:22	60.776084, -151.434738	2.56	11.53	31423	18.64	ERR	36	< 0.1	20.925	< 1	209.15	2.05	73
3/29/2017 14:23	60.776275, -151.434906	2.5	11.58	31475	18.67	ERR	36	< 0.1	20.925	< 1	209.15	1.25	67
3/29/2017 14:24	60.776428, -151.434951	2.7	11.47	31529	18.73	ERR	57	< 0.1	20.925	< 1	209.15	1.24	62
3/29/2017 14:25	60.776565, -151.435028	2.9	11.37	31341	18.63	ERR	57	< 0.1	20.925	< 1	209.15	1.29	64
3/29/2017 14:26	60.776683, -151.434509	3.26	11.21	31014	18.46	ERR	90	< 0.1	20.925	< 1	69.39	2.09	38
3/29/2017 14:27	60.776741, -151.434112	-0.29	12.22	35413	20.75	ERR	34	< 0.1	20.894	< 1	56.74	0.74	23
3/29/2017 14:28	60.776813, -151.434188	-0.93	12.53	36575	21.36	ERR	56	< 0.1	20.925	< 1	56.74	0.98	32
3/29/2017 14:29	60.776958, -151.4346	-1.05	12.62	36833	21.50	ERR	56	< 0.1	20.925	< 1	301.34	1.59	59
3/29/2017 14:30	60.776943, -151.434387	-1.13	12.15	45121	26.81	ERR	55	< 0.1	20.925	< 1	301.34	0.96	50
3/29/2017 14:31	60.776885, -151.434005	-1.17	12.16	45183	26.83	ERR	88	< 0.1	20.925	< 1	137.32	1.05	35
3/29/2017 14:32	60.776935, -151.433746	-1.14	12.13	45172	26.84	ERR	76	< 0.1	20.925	< 1	137.32	0.90	40
3/29/2017 14:33	60.777061, -151.433654	-1.17	12.17	45180	26.83	ERR	54	< 0.1	20.925	< 1	137.32	1.05	55
3/29/2017 14:34	60.777221, -151.433532	-1.19	12.18	45206	26.85	ERR	87	< 0.1	20.925	< 1	137.32	1.61	73
3/29/2017 14:35	60.777492, -151.433486	--	--	--	--	--	31	< 0.1	20.925	< 1	336.42	2.53	103

-- Buoy was removed from the water and repositioned.

ERR – Sensor malfunction confirmed. No valid data was collected.

Table B11: Preliminary Buoy Drift 3 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/29/2017 14:36	60.777454, -151.43341	--	--	--	--	--	< 20	< 0.1	20.925	< 1	238.12	0.94	100
3/29/2017 14:37	60.777202, -151.433609	--	--	--	--	--	< 20	< 0.1	20.925	< 1	181.06	2.22	71
3/29/2017 14:38	60.776901, -151.433792	-1.14	12.18	45459	27.02	ERR	30	< 0.1	20.925	< 1	141.07	1.07	36
3/29/2017 14:39	60.777088, -151.433715	-1.24	12.21	45617	27.10	ERR	< 20	< 0.1	20.925	< 1	141.07	1.90	57
3/29/2017 14:40	60.777023, -151.433822	--	--	--	--	--	< 20	< 0.1	20.925	< 1	240.12	1.25	50
3/29/2017 14:41	60.77713, -151.433959	--	--	--	--	--	< 20	< 0.1	20.925	< 1	345.29	1.12	62
3/29/2017 14:42	60.777229, -151.434051	--	--	--	--	--	< 20	< 0.1	20.925	< 1	333.54	0.62	73
3/29/2017 14:43	60.777423, -151.43402	--	--	--	--	--	< 20	< 0.1	20.925	< 1	333.54	1.88	94
3/29/2017 14:44	60.777736, -151.433944	--	--	--	--	--	< 20	< 0.1	20.925	< 1	6.01	0.79	129
3/29/2017 14:45	60.777339, -151.433624	--	--	--	--	--	< 20	< 0.1	20.925	< 1	154.06	1.98	85
3/29/2017 14:46	60.777248, -151.433349	--	--	--	--	--	82	< 0.1	20.925	< 1	154.06	0.92	79
3/29/2017 14:47	60.777381, -151.433059	--	--	--	--	--	< 20	< 0.1	20.925	< 1	38.37	2.14	99
3/29/2017 14:48	60.777618, -151.43283	--	--	--	--	--	26	< 0.1	20.925	< 1	33.13	1.51	128

-- Buoy was removed from the water and repositioned.
ERR – Sensor malfunction confirmed. No valid data was collected.

Table B12: Preliminary Buoy Drift 4 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 4 - Wednesday 3/29/2017													
3/29/2017 15:25	60.77386, -151.439636	-1.23	12.32	45430	26.98	ERR	< 20	< 0.1	20.925	< 1	22.72	4.31	436
3/29/2017 15:26	60.774444, -151.43901	-1.24	12.27	45476	27.01	ERR	< 20	< 0.1	20.925	< 1	30.07	4.92	367
3/29/2017 15:27	60.775108, -151.43814	-1.13	12.29	45634	27.14	ERR	< 20	< 0.1	20.925	< 1	30.52	5.00	285
3/29/2017 15:28	60.77584, -151.437164	-1.23	12.26	45524	27.04	ERR	< 20	< 0.1	20.894	< 1	35.09	6.22	198
3/29/2017 15:29	60.776641, -151.436019	-1.24	12.25	45581	27.07	ERR	33	< 0.1	20.925	< 1	33.92	7.00	118
3/29/2017 15:30	60.777496, -151.434768	-1.25	12.24	45565	27.06	ERR	NR	< 0.1	NR	NR	36.71	7.22	114
3/29/2017 15:31	60.778369, -151.433486	-1.26	12.26	45554	27.05	ERR	< 20	< 0.1	20.925	< 1	36.14	7.51	200
3/29/2017 15:32	60.779258, -151.432174	-1.27	12.25	45573	27.06	ERR	< 20	< 0.1	20.925	< 1	36.15	7.48	311
3/29/2017 15:33	60.780166, -151.430892	-1.27	12.25	45554	27.05	ERR	< 20	< 0.1	20.925	< 1	33.39	7.35	430
3/29/2017 15:34	60.781063, -151.429626	-1.27	12.25	45561	27.05	ERR	< 20	< 0.1	20.925	< 1	34.00	7.64	549
3/29/2017 15:35	60.782001, -151.428314	-1.28	12.25	45558	27.05	ERR	31	< 0.1	20.925	< 1	35.45	7.64	674
3/29/2017 15:36	60.782939, -151.426971	-1.27	12.24	45571	27.06	ERR	< 20	< 0.1	20.925	< 1	35.76	7.74	800

NR – Instrument did not record a reading at this time interval.
ERR – Sensor malfunction confirmed. No valid data was collected.
Orange Highlights – Measurement suspected to be influenced by boat exhaust.

Table B13: Preliminary Buoy Drift 5 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
Launch 5 - Wednesday 3/29/2017													
3/29/2017 15:53	60.770069, -151.44551	-1.26	12.18	47338	28.21	ERR	< 20	< 0.1	20.925	< 1	36.83	6.11	962
3/29/2017 15:54	60.770812, -151.44432	-1.28	12.15	47321	28.20	ERR	< 20	< 0.1	20.894	< 1	32.83	7.83	857
3/29/2017 15:55	60.771831, -151.44313	-1.29	12.15	47424	28.26	ERR	< 20	< 0.1	20.894	< 1	29.63	9.53	730
3/29/2017 15:56	60.772987, -151.441772	-1.29	12.13	47460	28.28	ERR	< 20	< 0.1	20.894	< 1	29.90	9.01	587
3/29/2017 15:57	60.774135, -151.440414	-1.3	12.13	47515	28.32	ERR	< 20	< 0.1	20.925	< 1	31.50	9.29	448
3/29/2017 15:58	60.775321, -151.438919	-1.31	12.13	47542	28.33	ERR	< 20	< 0.1	20.925	< 1	32.95	9.66	309
3/29/2017 15:59	60.776523, -151.437347	-1.3	12.13	47569	28.35	ERR	< 20	< 0.1	20.925	< 1	33.71	9.94	190
3/29/2017 16:00	60.777683, -151.435699	-1.31	12.11	47580	28.36	ERR	< 20	< 0.1	20.925	< 1	38.34	9.53	159
3/29/2017 16:01	60.778846, -151.433929	-1.31	12.10	47622	28.38	ERR	< 20	< 0.1	20.925	< 1	35.82	9.68	252
3/29/2017 16:02	60.78004, -151.432159	-1.31	12.11	47599	28.37	ERR	< 20	< 0.1	20.894	< 1	35.00	10.01	396
3/29/2017 16:03	60.781204, -151.43048	-1.3	12.10	47630	28.39	ERR	< 20	< 0.1	20.894	< 1	35.00	9.33	546
3/29/2017 16:04	60.78231, -151.428771	-1.31	12.10	47622	28.38	ERR	< 20	< 0.1	20.925	< 1	38.04	9.61	694
3/29/2017 16:05	60.783405, -151.42694	-1.31	12.10	47624	28.38	ERR	< 20	< 0.1	20.925	< 1	39.03	9.77	846
3/29/2017 16:06	60.784534, -151.425094	-1.31	12.10	47617	28.38	ERR	< 20	< 0.1	20.925	< 1	39.22	9.88	1004
3/29/2017 16:07	60.785667, -151.423202	-1.31	12.10	47572	28.35	ERR	< 20	< 0.1	20.925	< 1	39.22	9.88	1164
3/29/2017 16:08	60.7868, -151.42134	-1.31	12.10	47619	28.38	ERR	< 20	< 0.1	20.894	< 1	39.70	9.55	1324
3/29/2017 16:09	60.787883, -151.419464	-1.31	12.11	47562	28.34	ERR	< 20	< 0.1	20.925	< 1	39.69	9.74	1479
3/29/2017 16:10	60.788967, -151.417602	-1.31	12.10	47521	28.32	ERR	< 20	< 0.1	20.894	< 1	41.10	9.29	1635
3/29/2017 16:11	60.789997, -151.415725	-1.31	12.10	47532	28.32	ERR	< 20	< 0.1	20.894	< 1	42.35	9.46	1787
3/29/2017 16:12	60.79103, -151.413787	-1.31	12.10	47531	28.32	ERR	< 20	< 0.1	20.894	< 1	40.69	9.22	1941
3/29/2017 16:13	60.792045, -151.411865	-1.31	12.11	47447	28.27	ERR	< 20	< 0.1	20.894	< 1	43.15	8.72	2093
3/29/2017 16:14	60.793025, -151.41014	-1.31	12.11	47442	28.27	ERR	NR	< 0.1	NR	NR	39.14	8.57	2236
3/29/2017 16:15	60.794036, -151.408416	-1.31	12.11	47445	28.27	ERR	NR	< 0.1	NR	NR	40.80	8.68	2381
3/29/2017 16:16	60.794963, -151.406799	-1.31	12.12	47393	28.23	ERR	< 20	< 0.1	20.925	< 1	38.73	8.27	2516
3/29/2017 16:17	60.795932, -151.405273	-1.31	12.11	47396	28.24	ERR	< 20	< 0.1	20.894	< 1	37.37	8.46	2652

NR – Instrument did not record a reading at this time interval.
ERR – Sensor malfunction confirmed. No valid data was collected.

Table B13: Preliminary Buoy Drift 5 March 29, 2017

PRELIMINARY Data for March 29, 2017 Air/Water Interface Buoy Events													
AKDT	Location	Temp (C)	DO (mg/L)	Specific Conductance (S/m)	Salinity (PSU)	Dissolved CH4 (mg/L)	CH4 (air) (ppm)	CO2 (%Vol)	Oxygen (%Vol)	LEL (% Vol)	Course (Degrees)	Speed (MPH)	Distance From Leak (Meter)
3/29/2017 16:18	60.796928, -151.403594	-1.31	12.11	47498	28.30	ERR	< 20	< 0.1	20.925	< 1	41.31	8.74	2795
3/29/2017 16:19	60.797882, -151.401809	-1.31	12.10	47407	28.24	ERR	< 20	< 0.1	20.925	< 1	43.02	8.57	2938
3/29/2017 16:20	60.798805, -151.400039	-1.32	12.11	47399	28.24	ERR	< 20	< 0.1	20.894	< 1	42.87	8.48	3078
3/29/2017 16:21	60.799713, -151.398254	-1.31	12.11	47298	28.17	ERR	< 20	< 0.1	20.894	< 1	44.64	8.09	3216
3/29/2017 16:22	60.800529, -151.396499	-1.31	12.11	47176	28.09	ERR	< 20	< 0.1	20.894	< 1	49.28	8.20	3346
3/29/2017 16:23	60.801368, -151.394668	-1.3	12.13	46992	27.97	ERR	< 20	< 0.1	20.925	< 1	43.28	8.33	3481
3/29/2017 16:24	60.802261, -151.393096	-1.3	12.14	46980	27.97	ERR	< 20	< 0.1	20.894	< 1	39.33	7.77	3611
3/29/2017 16:25	60.80315, -151.391677	-1.31	12.14	47035	28.00	ERR	< 20	< 0.1	20.925	< 1	42.74	7.37	3737
3/29/2017 16:26	60.803981, -151.390136	-1.31	12.12	47159	28.08	ERR	< 20	< 0.1	20.894	< 1	40.78	7.74	3861
3/29/2017 16:27	60.804862, -151.388565	-1.31	12.13	47086	28.03	ERR	< 20	< 0.1	20.894	< 1	40.85	7.94	3990
3/29/2017 16:28	60.805751, -151.386993	-1.31	12.13	47053	28.01	ERR	< 20	< 0.1	20.894	< 1	41.75	7.96	4121
3/29/2017 16:29	60.806606, -151.385391	-1.31	12.12	47171	28.09	ERR	< 20	< 0.1	20.894	< 1	41.46	7.79	4249
3/29/2017 16:30	60.807449, -151.383819	-1.31	12.13	46956	27.95	ERR	< 20	< 0.1	20.925	< 1	41.89	7.68	4376
3/29/2017 16:31	60.808292, -151.382247	-1.31	12.14	47042	28.00	ERR	< 20	< 0.1	20.894	< 1	43.01	7.72	4502
3/29/2017 16:32	60.809123, -151.38063	-1.31	12.14	47035	28.00	ERR	< 20	< 0.1	20.925	< 1	43.42	7.68	4629
3/29/2017 16:33	60.809921, -151.378997	-1.31	12.15	46891	27.91	ERR	< 20	< 0.1	20.925	< 1	44.43	7.57	4753
3/29/2017 16:34	60.81068, -151.37738	-1.31	12.15	46856	27.88	ERR	< 20	< 0.1	20.894	< 1	45.58	7.33	4874
3/29/2017 16:35	60.811416, -151.375793	-1.31	12.15	46832	27.87	ERR	< 20	< 0.1	20.894	< 1	47.29	7.18	4992
3/29/2017 16:36	60.812168, -151.374114	-1.31	12.15	46896	27.91	ERR	< 20	< 0.1	20.925	< 1	46.92	7.64	5114
3/29/2017 16:37	60.812923, -151.372467	-1.31	12.15	46884	27.90	ERR	< 20	< 0.1	20.894	< 1	47.23	7.46	5236
3/29/2017 16:38	60.813655, -151.370803	-1.31	12.14	46970	27.96	ERR	< 20	< 0.1	20.894	< 1	47.35	7.33	5356
3/29/2017 16:39	60.814292, -151.369201	-1.31	12.13	46981	27.96	ERR	< 20	< 0.1	20.925	< 1	52.01	6.79	5466
3/29/2017 16:40	60.814945, -151.367523	-1.31	12.15	46812	27.85	ERR	< 20	< 0.1	20.894	< 1	47.44	6.94	5580
3/29/2017 16:41	60.815601, -151.366134	-1.32	12.15	46797	27.84	ERR	< 20	< 0.1	20.925	< 1	44.03	7.20	5685

NR – Instrument did not record a reading at this time interval.
ERR – Sensor malfunction confirmed. No valid data was collected.

ADDITIONAL SAFETY DOCUMENTATION

DAILY JOB REPORT

Directions: *Note problems encountered, RFI's, verbal communications with Client's representative, change order work performed. Note any important events Send a copy via fax to Nikiski office by 900 am.*

to

Report No. 4

Peak Job No. 23054 Date 3/29/2017

Job Name HSE support for air water interface sampling and water sampling for Gas Pipeline Leak

Work By PEAK:

The work performed by 1 PEAK employee Safety Professional was to provide HSE support to the personnel obtaining water samples for the Hilcorp Pipeline Gas Leak. HSE support included: JSA, pre-job safety meeting, permit to work, continuous monitoring of three 4-gas meters and continuous safety support.

Work by Subcontractors:

Work performed by 6 subcontractors, was that of water sampling by 2 SLR employees, 2 Kinetic Lab employees and air water interface by 2 Aridea employees.

Safety Topic/Injury's

JSA and permit to work were completed for this job. Copy of JSA/permit to work is attached with this daily job report. Discussed weather conditions with the recent precipitation. Talked about going slow and taking time for safety.

Comments:

Time line of events for this job are attached in a word document to this daily job report.

Supervisor (Safety Professional

Signature

Subs	Trade	PEAK
No. of Men		No. of Men
2	SLR	
2	Aridea	
2	Kinnetic Lab	
	Peak HSE	1
	TOTAL	
	Equipment	
3	4-gas meters (Hilcorp)	

The follow is a list of events that took place for the Hilcorp pipeline gas leak air water interface sampling and acoustic testing on Sunday 3-29-2017:

0900– JSA and pre-job safety meeting completed

0940 – Depart Port aboard the Resolution owned and operated by OMSI

0940 – Weather noted: Overcast, wind at 8 knots, calm seas and temperature at 27* F. Ice conditions were favorable.

1000 – Three 4-gas meters were taped to wooden mop handles and taped to the railings of the vessel. The height of all the gas meters ranged between 5'6" and 6'0". One was placed at the bow, one was placed 30 feet towards the rear on the portside of the vessel and one was placed mid-deck on the starboard side of the vessel. The monitors were turned on at this time.

1108 – First water sample taken at 250 meters with 0% LEL on gas meters. (buoy float)

1232 – First air water interface sample taken at 623 meters with 0% LEL on gas meters. (air water interface buoy sample)

1309 – Second air water interface sample taken at 80 meters with 0% LEL. (air water interface buoy float)

1410– Water collect off the side of the vessel and air water interface buoy was floated along side of the vessel. We were within feet of the leak and methane bubbles were visual. Pointed one of the 4-gas meters over the bubbles with 0% LEL readings.

1450 – Third air water interface sample taken at 150 meters with 0% LEL. (air water interface buoy float).

1534 – Second water sample and fourth air water interface sample taken at 858 meters with 0% LEL on meters. (buoy float and air water interface buoy float).

1700 – Monitors off and headed back to port.

1715– Arrived to port and close out of Permit to Work.

There were no injuries/incidents and safety was a focus for all personnel performing today's tasks. Proper use of safety toe boots, hard hats, gloves and fall protection were noted throughout all tasks. A focus on pinch points, crush-by/contact-by and overhead objects were a focus during rigging and work being performed via crane. Slick surfaces were mitigated with ice melt and three points of contact while ascending and descending stairs.

Permit to Work (PTW) / Job Safety Analysis (JSA)

JSA's should be considered prior to any work. JSA's are mandatory for that require the use of Hilcorp Alaska's Permit to Work system.

DATE: 3-29-17 START TIME: 9:00 Am END TIME: 9:00 pm

FACILITY: N/A LOCATION / AREA: Cook Inlet MSG

PROJECT DESCRIPTION: methane pipeline leak water sampling & water air interface

Emergency Contact Info

Area controller: Vessel Captain

Safety: Hilcorp Safety Professional

~~Environment~~ Construction Rep: Hilcorp Environmental Specialist

Emergency Muster Area: Bridge/deck of vessel

CONFINED SPACE ENTRY REQUIREMENTS:

The operations team and work team have evaluated the confined space and agree that none of the following conditions exist and a Confined Space Entry Permit is not required. Operations Lead or Permit Issuer Initials:____

1) The space does not contain any type of hazardous atmosphere.
2) The space does not have the potential to entrap or engulf an entrant.
3) The space does not contain any other serious safety or health hazard.

GENERAL SAFETY CONSIDERATIONS	Y	N	N/A
Are Standard Operating Procedures available and being followed?	✓		
Do personnel have proper tools/equipment for the job?	✓		
Are tools/equipment in good condition/inspected?	✓		
Is there a planned escape route?	✓		
Are personnel aware of the location of First Aid supplies?	✓		
Have the emergency notification procedures been covered with employees?	✓		
Has Hilcorp EH&S been notified 72 hrs. prior to Confined Space Entry projects?			✓
Are all personnel trained/ certified to use equipment/ engage in task?	✓		
Are all personnel donning appropriate PPE?	✓		
Will this project create a hazard to others in the vicinity?			✓
Do all personnel understand correct incident/spill reporting?	✓		

Additional Permits Required: ☐ Hot Work ☐ Confined Space Entry ☐ Isolation of Hazardous Energy ☐ Excavation & Trenching

HAZARD-CONTROL INDEX (THIS LIST IS NOT EXHAUSTIVE)

SLIPS/TRIPS/FALLS
- ☑ Clean surfaces (housekeeping)
- ☐ Barricade
- ☑ Focus on path
- ☐ Use alternate route
- ☐ Relocate equipment/project
- ☐ Examine scaffolding condition
- ☑ Examine handrail condition

FALLS FROM ELEVATION (4'+)
- ☐ Move work to ground level
- ☐ Ladder inspections
- ☐ Proper ladder material/placement
- ☑ Additional PPE (Fall Protection)
- ☑ rails

PINCH POINTS/SHARP OBJECTS
- ☑ Proper guarding
- ☑ Proper body placement

FIRE/EXPLOSION
- ☐ Permitting
- ☑ Air testing/monitoring
- ☐ Remove combustible/flam materials
- ☐ Fire watch
- ☐ Fire extinguishers
- ☑ Additional PPE

HIGH NOISE LEVELS
- ☐ Relocate work
- ☐ Additional PPE (Hearing protection etc.)

ENERGIZED EQUIPMENT
- ☑ Guarding
- ☑ Proper body placement
- ☑ No loose clothing

REPETITIVE MOTION
- ☐ Proper technique/tools
- ☐ Ask for assistance
- ☐ Work/rest schedule

PRESSURE
- ☐ Communication
- ☐ Barricading
- ☐ Shielding
- ☐ Proper body placement
- ☐ Block & bleed protocol

ELECTRICAL SHOCK
- ☐ Testing
- ☑ Grounding
- ☑ Equipment shielding/condition
- ☐ GFCI's
- ☐ Examine electrical clearances

LIFTING/PULLING/PUSHING
- ☑ Utilize right tools for job
- ☑ Proper technique
- ☑ Smaller/lighter loads
- ☑ Examine path
- ☐ Use alternate route
- ☐ Work rest schedule

LOCK-OUT/TAG-OUT CONDITIONS
- ☐ Electrical isolation
- ☐ Pressure isolation
- ☐ Energized equipment isolation
- ☐ Fire/explosion isolation

HAZARDOUS CHEMICALS
- ☐ Consult MSDS
- ☐ Label/store containers correctly
- ☐ Spill prevention considered
- ☐ Additional PPE (Goggles etc.)

ATMOSPHERIC
- ☐ Respirators
- ☑ Testing/monitoring

WORK TEAM LEADER (print): Environmental Sampler Signature: Environmental Sampler

PERMIT APPROVER (print): Safety Professional Signature: Safety Professional

AREA CONTROLLER (print): Vessel Captain Signature: Vessel Captain

Revalidation or Extension Time (4 Hour Max):

Permit Approver (print): _____ Time: _____

Signature _____

Close Out Signature:

Work Team Leader: Environmental Sampler Time: 5:45 30

Area Controller: Vessel Captain Time: 5:15

HILCORP ALASKA, LLC: JOB SAFETY ANALYSIS (JSA)

	JOB STEPS (Describe and number each step)		POTENTIAL HAZARDS ASSOCIATED WITH EACH JOB STEP (Identify each hazard with a CAPITAL letter)		CORRECTIVE ACTION(S) (Identify responsible person with initials)	
1	Travel to location, retrieval & redeployment of equipment - travel to port	A	Contact with sea ice falls, items moving	a	Handrails, pilot data NWS forecast	
		B	Heavy seas - slips, trips, falls fall overboard, items moving	b	Handrails, secure items procedure for extreme weather	
				b	PPE on deck, non-slip foot wear, captain discretion	
		C	Heavy wind - slips, trips, falls wind burn, items moving	C	Handrails, secure items PPE, captain discretion	
		D	Cold temps - frost bite, skin/eye irritation, hypothermia, cold exposure	d	cold weather procedures PPE, warm clothing	
		E	Dangerous atmosphere - contact w/ increased LEL %	e	Continuous monitoring of three 4-gas meters	
2	Rigging of Equipment	A	pinch points, crushing & cuts	a	rigging procedures, PPE, identify pinch points	
				a	communication, proper equip and inspect, trained for use	
3	Lifting of equipment for deployment & redeployment	A	Falls, slips, trips	a	housekeeping, Fall protection ice-free deck, life vest	
		B	moving & falling overhead material, crushing or struck-by	b	use crane for heavy equip no working under items	
				b	moved overhead, communication hard hats, safety toe boots	
		C	mechanical	C	inspect equip & material trained for use	

This JSA should be reviewed by everyone involved with the project. This JSA is not considered complete until everyone involved with the project signs below, along with any other contributing personnel. Should personnel need more space to complete the JSA, or if new hazards are presented due to changing conditions, an additional JSA form should be utilized and attached to these pages. Make notes on how the task can be performed in an even safer manner, and keep JSA's on file so that they may be referenced in the future should a similar project be conducted.

INVOLVED PERSONNEL SIGNATURES:

Environmental Sampler

Environmental Sampler

Environmental Sampler

Environmental Sampler

Environmental Sampler

Environmental Sampler

Safety Professional

ATTACHMENT C

ACOUSTIC MONITORING SUMMARY REPORT

JASCO APPLIED SCIENCES

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April 4, 2017

PRELIMINARY SUMMARY OF A SUBSET OF DATA FROM ACOUSTIC MONITORING TRIP #1

FROM JASCO Applied Sciences

TO: Hilcorp Alaska

SUBJECT: Preliminary summary of a subset of data from acoustic monitoring at Middle Ground Shoals in Cook Inlet on March 26, 2017

Preliminary data analysis has begun to determine underwater sound levels from recordings collected on March 26, 2017 at Hilcorp Alaska's Middle Ground Shoal natural gas leak site. This summary report provides a subset of the results from data collected during a drift recording conducted between 10:20 to 11:12 AKDT, while the acoustic recorder drifted freely past the leak location, with a closest point of approach of approximately 92 m. The range from the acoustic recorder to the leak location was estimated from GPS coordinates transmitted by a satellite beacon attached the recorder's surface float and the following source location: 60.776578°N, -151.433845°W.

Figure 1 is a spectrogram plot of the received sound levels from this drift recording plotted as a function of frequency and time; the time is given in seconds from the start of the drift recording. High level sounds in the first four minutes of the recording are noise from the monitoring vessel as it motored away from the acoustic recorder. Vessel noise continues to dominate the sound levels at frequencies below 1000 Hz throughout the drift recording. The spectrogram plot in Figure 2 is zoomed in to the three-minute segment of data in which the acoustic recorder reached its closest point of approach to the leak location.

Figure 3 is a power spectral density curve showing the sound level at the closest point of approach as a function of frequency, with a resolution of 1 Hz. This curve was computed by averaging 1-second samples of data recorded during the three-minute segment encompassing the closest point of approach. Elevated levels at low frequencies (below approximately 1 kHz) are due to noise from the monitoring vessel. An increase of levels between approximately 4 and 40 kHz is believed to be sounds from cracking and melting ice.

At the closest point of approach, the broadband received sound pressure level (SPL) was 134 dB re 1 µPa. However, this value includes the full band of recorded frequencies (1 Hz to 64 kHz) and is dominated by sounds from the monitoring vessel. For safety reasons, it was not possible for the monitoring vessel to shut down its engines and avoid this noise contamination. A 500-Hz high-pass filter was applied to the data to remove most of these vessel sounds; sounds from bubbling at the leak site are expected to be at frequencies above 1 kHz. The high-pass filtered SPL was 112 dB re 1 µPa.

The next step in the data analysis will be to process data from a drift conducted at approximately 2.4 km range from the leak location, as a baseline comparison to the close-range data. This will confirm whether the increased levels at high frequencies in the power spectral density curve (between 4 and 40 kHz) are in fact due to noise from ice cracking and melting and will help with assessing which sounds, if any, are attributable to the leak itself.

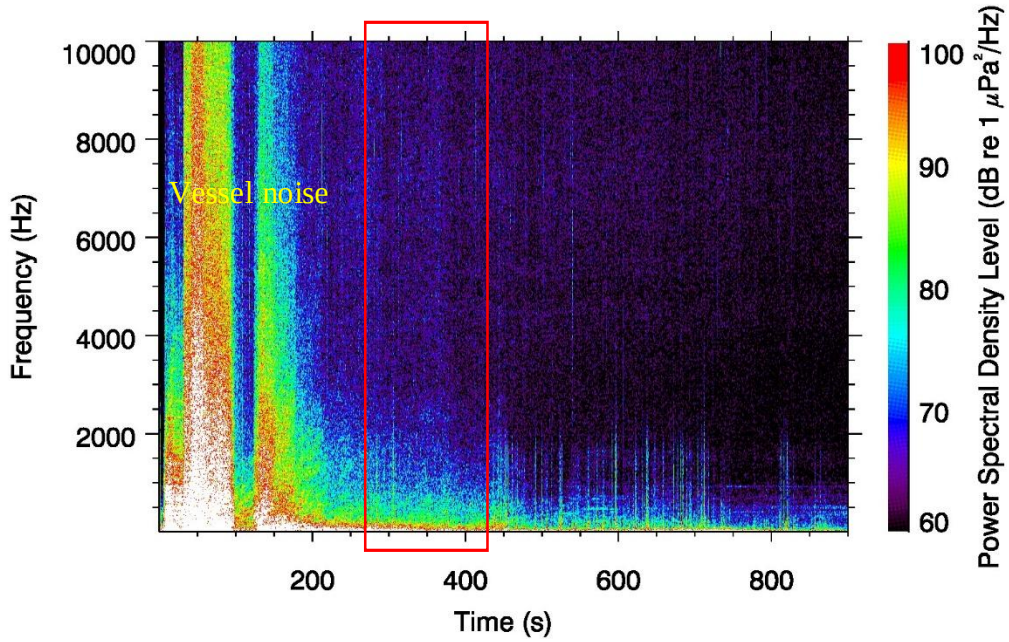

Figure 1: Spectrogram of data recorded from 10:40 to 10:55 AKDT on March 26, 2017 while the acoustic recorder drifted past the leak location. The closest point of approach to the leak location was 92 m at 10:45. The red box indicates the segment of data shown in Figure 2.

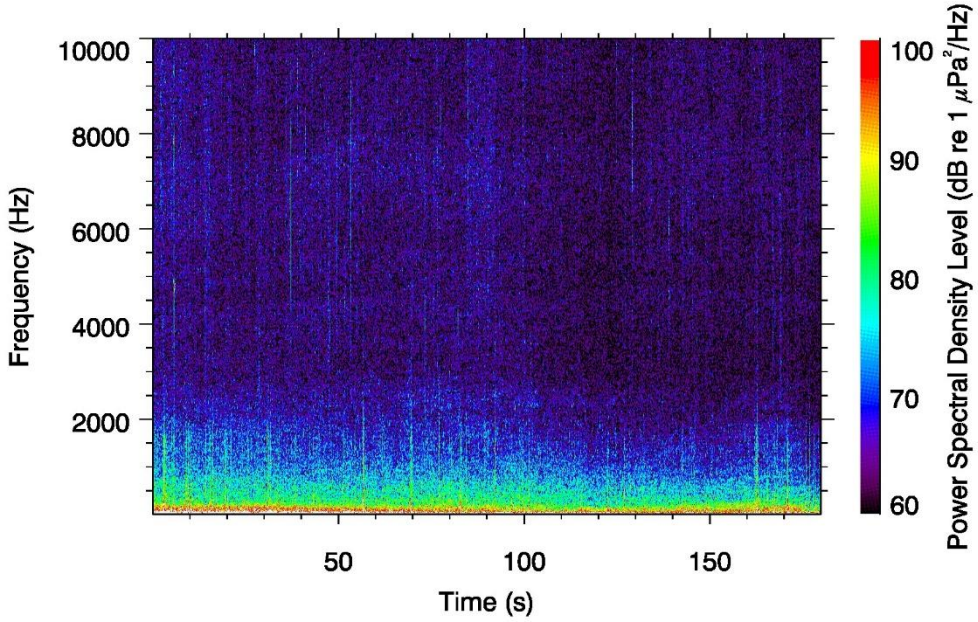

Figure 2 Spectrogram of data recorded from 10:44 to 10:47 AKDT on March 26, 2017 while the acoustic recorder drifted past its closest point of approach of 92 m to the leak location at 10:45.

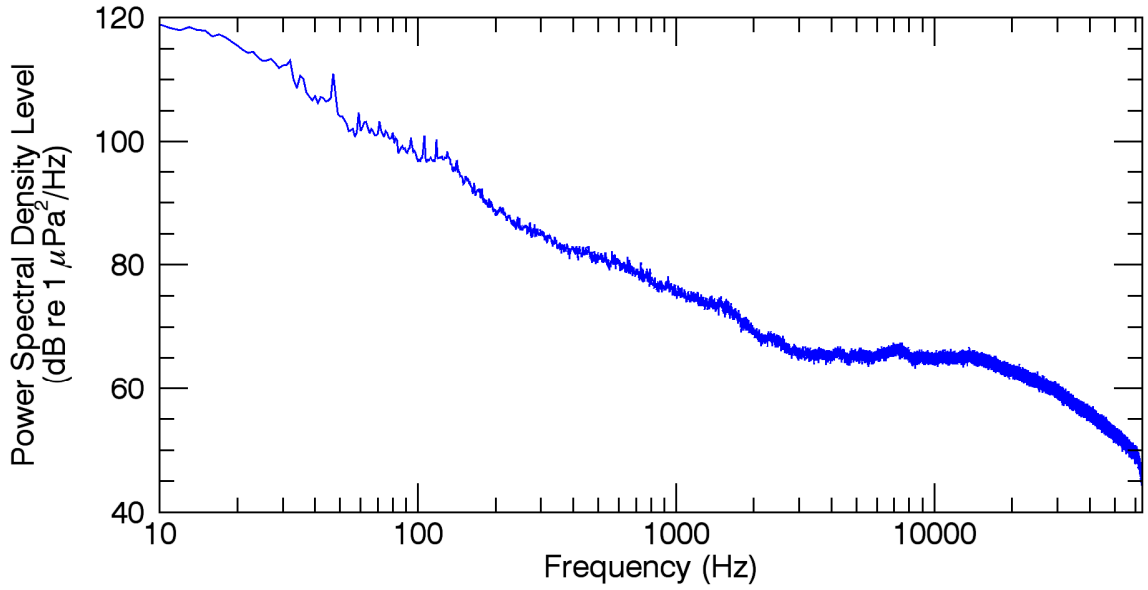

Figure 3 Power spectral density curve from 1-second data samples averaged over the period from 10:44 to 10:47 AKDT as the acoustic recorder passed its closest point of approach to the leak. Elevated sounds at frequencies below 500 Hz are dominantly from the monitoring vessel. The increase of levels between approximately 4 and 40 kHz is suspected to be due to sounds from cracking ice.