padre
associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

Received USACE North Bend
Field Office 26 February 2019

February 26, 2019
Project No. 1702-1974

U.S. Army Corps of Engineers
211 E. 7th Avenue, Suite 105
Eugene, Oregon 97401-2722

Attention: Tyler Krug, CENWP-OD-GE

Oregon Department of State Lands
775 Summer Street NE, Suite 100
Salem, Oregon 97301-1279

Attention: Bob Lobdell

Subject: Joint Permit Application for the AT&T China – US Cable Network: Removal of E1 and N9 Cable Segments Project, Offshore, Bandon, Oregon

Dear Mr. Krug and Mr. Lobdell:

Padre Associates, Inc. (Padre), on behalf of AT&T Corporation (AT&T) is submitting a Joint Application for the AT&T China – US Cable Network: Removal of E1 and N9 Cable Segments Project (Project) located offshore, Bandon, Oregon. Implementation of the proposed Project would require authorization from the U.S. Army Corps of Engineers (ACOE) under Section 404 of the Clean Water Act pursuant to Nationwide Permit #12 (NWP #12): Utility Line Activities. Implementation of the proposed Project would also require authorization from the Oregon Department of State Lands (DSL). Existing authorizations for the installation and maintenance of the cables include ACOE Permit No. 98-01244, Oregon Department of Environmental Quality Section 401 Water Quality Certification, Oregon Department of Land Conservation and Development (DLCD) determination of consistency with the Oregon Coastal Management Program, and Oregon Division of State Lands Communication Cable Easement (EA-16987) and removal-fill permit (RP/EA-16987) (dated April 9, 1999).

PROJECT DESCRIPTION

In 1999 and 2000, AT&T installed the E1 and N9 fiber optic telecommunications cables into their existing facilities in Bandon, Oregon. The two cables were installed from the Bandon Landing in Coos County, Oregon to their destinations in China and San Luis Obispo, California (Figures 1-1 and 1-2). The cable routes were selected to avoid sensitive seafloor habitats and active commercial fishing grounds. For a distance of approximately 30 miles offshore, the cables were retroburied or mechanically plowed to a depth of approximately two to four feet deep.

Although expected to operate for 25 years, the cables were rendered obsolete by other developments and have since become unnecessary and are no longer being utilized by AT&T. The Project objective is to terminate of State Lease Number EA-16987 and remove the E1 and N9 Cable segments from the nearshore bore pipe entry (Figure 1-3) to a water depth of 1,000 fathoms (approximately 6,000 feet [ft] or 1,830 meters [m]). The on-land conduits would remain in place for potential future use through coordination with AT&T.

Due to their shallow original burial depth, no trenching or additional disturbance will be required to recover the E1 and N9 Cables. Therefore, all impacts will be temporary, and no permanent impacts will occur as a result of Project implementation. Refer to the attached Project Summary for additional Project information.

IMPACT SUMMARY

Temporary Project impacts are provided in Table 1.

Table 1. Temporary Impacts

Wetland/ Waterbody Name	Removal Dimensions – Temporary Impacts				
	Length (ft)	Width (ft)	Depth (ft)	Area (sq.ft/ac)	Volume (cyd)
Pacific Ocean – E1 Cable	163,310 ft 30.93 mi	3.25 in	--	44,224 sq.ft 1.01 ac	--
Pacific Ocean – N9 Cable	165,422 ft 31.33 mi	3.25 in	--	44,796 sq.ft. 1.02 ac	--
Total				**88,472 sq.ft. 2.03 acres**	

BIOLOGICAL RESOURCES

Implementation of the Project could involve impacts to marine species and habitats that could affect threatened and endangered species in the Project area. A total of 14 Federally listed marine species have been analyzed in the Biological Assessment (BA) prepared for the Project (attached). Critical habitat for the leatherback turtle (*Dermochelys coriacea*) occurs within the Project area. The BA includes an analysis of the potential Project effects on the following: habitat loss, mortality, harassment, loss of prey, loss of shelter/cover, loss of access to habitats, noise and light effects, habitat fragmentation, urbanization, increased predation, and critical habitat.

The proposed Project may affect, but is not likely to adversely affect the listed and proposed species for the following reasons:

- The Project would not involve temporary or permanent loss of habitat;
- The Project would be completed within a 12-day period;
- The Project would be of limited geographic effect; and
- The Project will include avoidance, minimization, and mitigation measures to avoid and minimize potential adverse effects.

The following is a summary of the Project's avoidance, minimization, and mitigation measures to avoid and minimize potential adverse effects:

- Pre-activity environmental orientation;
- Measures to minimize risk of entanglement hazards;
- Vessel-based monitoring;
- Measures to reduce lighting impacts to marine birds;
- Measures to reduce potential vessel collision impacts on marine wildlife; and
- Measures to reduce potential oil spill impacts.

MITIGATION

All Project impacts will be temporary. The Project site will be restored by natural regeneration; therefore, mitigation is not proposed.

PROJECT SCHEDULE

The Project is scheduled to commence in the 2nd quarter of 2019 (April/May). The Project will last approximately two weeks; therefore, the Project will be complete in April/May 2019.

OTHER PERMITS

The Project will likely require a Section 401 Water Quality Certification from the Department of Environmental Quality (DEQ).

Sincerely,

Padre Associates, Inc.

Crystahl Taylor

Crystahl Taylor
Senior Project Manager

Attachment: Joint Permit Application
Figures
Project Summary
Biological Assessment
M/V Layla Biofouling and Sediment Removal Management Plan
M/V Layal Ballast Water Management Plan

c: Jill Yung, Paul Hastings
Jennifer Leighton, Padre
Simon Poulter, Padre

ATTACHMENT 1

JOINT PERMIT APPLICATION

Joint Permit Application

This is a joint application, and must be sent to both agencies, who administer separate permit programs. Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

Date Stamp

U.S. Army Corps of Engineers Portland District	Oregon Department of State Lands
Corps Action ID Number 98-1244 (Previously)	DSL Number EA 16987

(1) TYPE OF PERMIT(S) IF KNOWN (check all that apply)

Corps: ☐ Individual ☒ Nationwide No.: _12 (Utilities) ☐ Regional General _______ ☐ Other _____________

DSL: ☒ Individual ☐ General Permit ☐ No State Permit Required ☐ Waiver

(2) APPLICANT AND LANDOWNER CONTACT INFORMATION

	Applicant	Property Owner (if different)	Authorized Agent (if applicable) ☑ Consultant ☐ Contractor
Name (Required)	Robert Wargo		Jill E.C. Yung
Business Name	AT&T Corporation		Paul Hastings, LLP
Mailing Address 1	One AT&T Way		101 California Street
Mailing Address 2	Room 3D 151F		48th Floor
City, State, Zip	Bedminster, NJ 07921		San Francisco, CA 94111
Business Phone	(908) 612-6541		(415) 856-7230
Cell Phone			(415) 272-5306
Fax			
Email	rw1791@att.com		jillyung@paulhastings.com

(3) PROJECT INFORMATION

A. Provide the project location.

Project Name: AT&T China – US Cable Network: Removal of E1 and N9 Cable Segments Offshore Bandon, Oregon	Latitude & Longitude* (43.15, 124.375)

Project Address / Location Offshore Bandon, Oregon	City (nearest) Bandon			County Coos
Township	Range	Section	Quarter / Quarter	Tax Lot
27S	14W	8	Lot 4	400 & 500

Brief Directions to the Site: The Project Site is located offshore Bandon, in Coos County, Oregon in State Easement No. EA 16987. The beach manhole for the onshore cable landing is located at 43°15.07'W and 124°23.07'N. The nearest address is 96613 Wickizer Way

B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)

☐ River / Stream ☐ Non-Tidal Wetland ☐ Lake / Reservoir / Pond

☐ Estuary or Tidal Wetland ☐ Other ☑ Pacific Ocean

Waterbody or Wetland Name**	River Mile	6th Field HUC Name	6th Field HUC (12 digits)
Pacific Ocean	N/A		

* In decimal format (e.g., 44.9399, -123.0283)
** If there is no official name for the wetland or waterbody, create a unique name (such as "Wetland 1" or "Tributary A").

C. Indicate the project category. (Check all that apply.)		
☐ Commercial Development	☐ Industrial Development	☐ Residential Development
☐ Institutional Development	☐ Agricultural	☐ Recreational
☐ Transportation	☐ Restoration	☐ Bridge
☐ Dredging	☑ Utility lines	☐ Survey or Sampling
☐ In- or Over-Water Structure	☐ Maintenance	☐ Other:

(4) PROJECT DESCRIPTION

A. Summarize the overall project including work in areas both in and outside of waters or wetlands.

The Project includes removal of the E1 and N9 Cable segments from the nearshore bore pipe conduit to a water depth of 1,000 fathoms (approximately 6,000 feet/1,850 meters). The on-land components would either be abandoned in place or subject to an ongoing, modified lease (the conduit would be preserved for future use by other cables). The offshore lease (Oregon State Lands Lease No. EA 16987) would be terminated following removal of the offshore cable segments.

B. Describe work within waters and wetlands.

The Project includes the following primary components:

Pre-Project Preparation Activities; including but not limited to survey and identification of the E1 and N9 Offshore Cable Segments;

• Removal of E1 and N9 Nearshore/Offshore Cable Segments from nearshore bore pipe entry out to 1,000-fathom (approximately 6,000 feet/1,850 meters) water depth; and

• Demobilization and Recycling of Recovered Cable Segments.

C. Construction Methods. Describe how the removal and/or fill activities will be accomplished to minimize impacts to waters and wetlands.

Cables E1 and N9 were originally installed within corridors selected to minimize potential impacts. The Cables will be recovered utilizing the M/V Layla, which is a dedicated industry vessel that has been configured to support cable recovery efforts offshore. The E1 and N9 Cables will be recovered utilizing divers who will cut the Cables at the nearshore conduit and then connect a suitable strength messenger cable that will run from the Cables to the M/V Layla. No anchoring of the M/V Layla will be required. Additional support vessels will be required to recover the cables in their entirety. The M/V Layla will pull up the cable and spool it to its deck until reaching the 1,000-fathom cut point approximately 30 miles offshore. The cable will be pulled vertically, in alignment with its position on the seafloor to avoid contact with higher relief substrate. Due to their shallow original burial depth, no trenching or additional disturbance will be required to recover the E1 and N9 Cables. Therefore, all impacts will be temporary, and no permanent impacts will occur as a result of Project implementation.

(4) PROJECT DESCRIPTION (continued)

D. Describe source of fill material and disposal locations if known

The Project will disturb approximately 88,472 ft^2 (2.03 acres) of seafloor. No cut or fill is required. Seafloor sediments are anticipated to quickly settle and fill in the temporary disturbance area following completion of the cable removal activities. No disposal is required.

E. Construction timeline.

What is the estimated project start date? April/May 2019

What is the estimated project completion date? April/May 2019

Is any of the work underway or already complete? If yes, please describe. ☐ Yes ☑ No

F. Removal Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name *	Removal Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq.ft. or ac.)	Volume (c.y.)		
Pacific Ocean – E1 Cable	163,310 ft 30.93 mi	3.25 in	--	44,224 sq.ft 1.01 ac	--	2 weeks	Seafloor sediments
Pacific Ocean – N9 Cable	165,422 ft 31.33 mi	3.25 in	--	44,796 sq.ft. 1.02 ac	--	2 weeks	Seafloor sediments

G. Total Removal Volumes and Dimensions

Total Removal to Wetlands and Other Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Removal to Wetlands	328,732 ft	2.03	--
Total Removal Below Ordinary High Water			
Total Removal Below Highest Measured Tide			
Total Removal Below High Tide Line			
Total Removal Below Mean High Water Tidal Elevation	328,732 ft	2.03	--

H. Fill Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name*	Fill Dimensions					Duration of Impact**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		

(4) PROJECT DESCRIPTION (CONTINUED)

I. Total Fill Volumes and Dimensions

Total Fill to Wetlands and Other Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Fill to Wetlands			
Total Fill Below Ordinary High Water			
Total Fill Below Highest Measured Tide			
Total Fill Below High Tide Line			
Total Fill Below Mean High Water Tidal Elevation			

*If there is no official name for the wetland or waterbody, create a unique name (such as "Wetland 1" or "Tributary A").
**Indicate the days, months or years the fill or removal will remain. Enter "permanent" if applicable. For DSL, permanent removal or fill is defined as being in place for 24 months or longer.
*** Example: soil, gravel, wood, concrete, pilings, rock etc.

(5) PROJECT PURPOSE AND NEED

Provide a statement of the purpose and need for the overall project.

The Project purpose is removal of the currently unutilized AT&T China-US Cables E1 and N9 from their nearshore conduit to 1,000 fathoms offshore in order to satisfy Lease EA 16987 and terminate the offshore lease. Removal of the cables will return the seafloor to its pre-installation condition.

(6) DESCRIPTION OF RESOURCES IN PROJECT AREA

A. Describe the existing physical and biological characteristics of each wetland or waterbody. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.

The Project will be completed within the Pacific Ocean. No wetlands will be impacted. The Project area includes both soft and hardbottom substrate. Hardbottom substrate in the Project area ranges from occasional rock outcroppings to excessive hardbottom conditions.

B. Describe the existing navigation, fishing and recreational use of the waterbody or wetland.

The Project will be completed within the Pacific Ocean which includes navigation, fishing, and recreational use within the Project area. During the 2013 ROV survey, evidence of fishing activities including trawl tracks and abandoned ropes and cables were identified. The Project applicant will submit a Notice to Local Mariners prior to commencement of Project activities.

(7) PROJECT SPECIFIC CRITERIA AND ALTERNATIVES ANALYSIS

Describe project-specific criteria necessary to achieve the project purpose. Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterbody or wetland.*

The Project objective is to remove the E1 and N9 fiber optic cables that are no longer being utilized.

(8) ADDITIONAL INFORMATION

Are there state or federally listed species on the project site?	☑ Yes	☐ No	☐ Unknown
Is the project site within designated or proposed critical habitat?	☑ Yes	☐ No	☐ Unknown
Is the project site within a national Wild and Scenic River ?	☐ Yes	☑ No	☐ Unknown
Is the project site within a State Scenic Waterway?	☐ Yes	☑ No	☐ Unknown
Is the project site within the 100-year floodplain?	☑ Yes	☐ No	☐ Unknown

If yes to any of the above, explain in Block 6 and describe measures to minimize adverse effects to these resources in Block 7.

Is the project site within the Territorial Sea Plan (TSP) Area?	☑ Yes	☐ No	☐ Unknown

If yes, attach TSP review as a separate document for DSL.

Is the project site within a designated Marine Reserve?	☐ Yes	☑ No	☐ Unknown

If yes, certain additional DSL restrictions will apply.

Will the overall project involve ground disturbance of one acre or more?	☐ Yes	☑ No	☐ Unknown

If yes, you may need a 1200-C permit from the Oregon Department of Environmental Quality (DEQ).

Is the fill or dredged material a carrier of contaminants from on-site or off- site spills?	☐ Yes	☑ No	☐ Unknown
Has the fill or dredged material been physically and/or chemically tested?	☐ Yes	☑ No	☐ Unknown

If yes, explain in Block 6 and provide references to any physical/chemical testing report(s).

Has a cultural resource (archaeological) survey been performed on the project area?	☐ Yes	☐ No	☑ Unknown

If yes, provide a copy of the survey with this application to the Corps only. Do not describe any resources in this document.

Will the project result in new impervious surfaces or the redevelopment of existing surfaces? Yes ☐ No ☒

If yes, the Applicant must submit a post-construction stormwater management plan to DEQ's 401 WQC program for review and approval, see http://www.deq.state.or.us/wq/sec401cert/docs/stormwaterGuidelines.pdf

* Not required by the Corps for a complete application, but is necessary for individual permits before a permit decision can be rendered.

Identify any other federal agency that is funding, authorizing or implementing the project.			
Agency Name	Contact Name	Phone Number	Most Recent Date of Contact

List other certificates or approvals/denials required or received from other federal, state or local agencies for work described in this application. For example, certain activities that require a Corps permit also require 401 Water Quality Certification (WQC) from Oregon Department of Environmental Quality (DEQ). For DEQ, please note that all projects that qualify for a Nationwide 401 WQC will be invoiced a fee. Projects that do not qualify for the Nationwide certification will be invoiced based on project complexity. See http://www.oregon.gov/deq/wq/wqpermits/Pages/Section-401-Fees.aspx

Agency	Certificate/ approval / denial description	Date Applied

Other DSL and/or Corps Actions Associated with this Site (Check all that apply.)

☐ Work proposed on or over lands owned by or leased from the Corps (may require authorization pursuant to 33 USC 408).

☐ State owned waterway	DSL Waterway Lease # ________________	
☐ Other Corps or DSL Permits	Corps #	DSL #
☐ Violation for Unauthorized Activity	Corps #	DSL #
☐ Wetland and Waters Delineation	Corps #	DSL #

Submit the entire delineation report to the Corps; submit only the concurrence letter (if complete) and approved maps to DSL. If not previously submitted to DSL, send under a separate cover letter

(9) IMPACTS, RESTORATION/REHABILITATION, AND COMPENSATORY MITIGATION

A. Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts.

The cables will be pulled from the ocean floor. No additional trenching or additional disturbance will be required; therefore, all impacts are temporary.

B. For temporary removal or fill or disturbance of vegetation in waterbodies, wetlands or riparian (i.e., streamside) areas, discuss how the site will be restored after construction to include the timeline for restoration.

All impacts are temporary. The project site will be restored by natural regeneration; therefore, mitigation is not proposed.

Compensatory Mitigation

C. Proposed mitigation approach. Check all that apply:

☐ Permittee-responsible Onsite Mitigation

☐ Permittee-responsible Offsite mitigation

☐ Mitigation Bank or in-lieu fee program

☐ Payment to Provide (not approved for use with Corps permits)

D. Provide a brief description of mitigation approach and the rationale for choosing that approach. If you believe mitigation should not be required, explain why.

All impacts are temporary. The project site will be restored by natural regeneration; therefore, compensatory mitigation is not proposed.

Mitigation Bank / In-Lieu Fee Information:

Name of mitigation bank or in-lieu fee project:

Type of credits to be purchased:

If you are proposing permittee-responsible mitigation, have you prepared a compensatory mitigation plan?

☐ Yes. Submit the plan with this application and complete the remainder of this section.

☑ No. A mitigation plan will need to be submitted (for DSL, this plan is required for a complete application).

Mitigation Location Information (Fill out only if permittee-responsible mitigation is proposed)

Mitigation Site Name/Legal Description	Mitigation Site Address	Tax Lot #
County	City	Latitude & Longitude (in DD.DDDD format)

Township	Range	Section	Quarter/Quarter

(10) ADJACENT PROPERTY OWNERS FOR PROJECT AND MITIGATION SITE

☐ **Pre-printed mailing labels of adjacent property owners attached**	**Project Site Adjacent Property Owners**	**Mitigation Site Adjacent Property Owners**
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	Sunset Cove, LTD Parcel # 27S14W05DTL0180200 PO Box 1067 Hood River, OR 97031-0036	
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	Donald G. Chandler Robert L. Chandler Parcel # 27S14W08TL0020000 15667 Hwy 101 S Bookings, OR 97415-9556	
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	Level 3 Communications LLC Parcel # 27S14W08TL0030000 88661 Wickizer Lane Bandon, OR 97411	

Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	AT&T Corp. Parcel # 27S14W08TL0030100 88665 Wickizer Lane Bandon, OR 97411
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	Highway 101 Farm, LLC Parcel # 27S14W08TL0030200 1707 Portmargate Newport Beach, CA 92660-5323
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	AT&T Corp Parcel # 27S14W08TL0040000 1010 Pine Street St. Louis, MO 63101-2070
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	Karl Berry Revocable Trust; Etal Parcel # 27S14W08TL0040100 88609 Wickizer Lane Bandon, OR 97411
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**	Crisp Family Properties LLC Parcel # 27S14W08TL0040200 PO Box 1056 Gold Hill, OR 97525-1056

(11) CITY/COUNTY PLANNING DEPARTMENT LAND USE AFFIDAVIT (TO BE COMPLETED BY LOCAL PLANNING OFFICIAL)

I have reviewed the project described in this application and have determined that:

☐This project is not regulated by the comprehensive plan and land use regulations
☐This project is consistent with the comprehensive plan and land use regulations
☐This project is consistent with the comprehensive plan and land use regulations with the following:
- ☐Conditional Use Approval
- ☐Development Permit
- ☐Other Permit (explain in comment section below)

☐This project is not currently consistent with the comprehensive plan and land use regulations. To be consistent requires:
- ☐Plan Amendment
- ☐Zone Change
- ☐Other Approval or Review (explain in comment section below)

An application or variance request has ☐ has not ☐ been filed for approvals required above

Local planning official name (print)	Title	City / County

Signature	Date

Comments:

(12) COASTAL ZONE CERTIFICATION

If the proposed activity described in your permit application is within the Oregon coastal zone, the following certification is required before your application can be processed. The signed statement will be forwarded to the Oregon Department of Land Conservation and Development (DLCD) for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program and consistency reviews of federally permitted projects, contact DLCD at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050 or click here.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Applicant Name	Title
Robert Wargo	Principle - Technical Consulting Engineer
Applicant Signature	**Date**
[signature]	2/25/19

(13) SIGNATURES

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.

To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

Fee Amount Enclosed	$

Applicant Signature (required) must match the name in Block 2

Print Name Robert Wargo	Title Principal-Technical Consulting Engineer
Signature	Date 2/25/19

Authorized Agent Signature

Print Name JILL EC YUNG	Title Partner - Paul Hastings
Signature	Date 2/25/19

Landowner Signature(s)*

Landowner of the Project Site (if different from applicant)

Print Name	Title
Signature	Date

Landowner of the Mitigation Site (if different from applicant)

Print Name	Title
Signature	Date

Department of State Lands, Property Manager (to be completed by DSL)

If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.

Print Name	Title
Signature	Date

* Not required by the Corps.

(14) ATTACHMENTS

- ☑ Drawings
  - ☐ Location map with roads identified
  - ☐ U.S.G.S topographic map
  - ☐ Tax lot map
  - ☑ Site plan(s)
  - ☐ Cross section drawing(s)
  - ☑ Recent aerial photo
  - ☐ Project photos
  - ☐ Erosion and Pollution Control Plan(s), if applicable
  - ☐ DSL/Corps Wetland Concurrence letter and map, if approved and applicable
- ☑ Pre-printed labels for adjacent property owners (Required if more than 5)
- ☐ Incumbency Certificate if applicant is a partnership or corporation
- ☐ Restoration plan or rehabilitation plan for temporary impacts
- ☐ Mitigation plan
- ☐ Wetland functional assessment and/or stream functional assessment
- ☐ Alternatives analysis
- ☑ Biological assessment (if requested by Corps project manager during pre-application coordination.)
- ☐ Stormwater management plan (may be required by the Corps or DEQ)
- ☐ Other:
  - ☐
  - ☐

Send Completed form to:

U.S. Army Corps of Engineers
ATTN: CENWP-OD-GP
PO Box 2946
Portland, OR 97208-2946
Phone: 503-808-4373
portlandpermits@usace.army.mil

Counties:
Baker, Clackamas, Clatsop, Columbia, Gilliam, Grant, Hood River, Lincoln, Malheur, Morrow, Multnomah, Polk, Sherman, Tillamook, Umatilla, Union, Wallowa, Wasco, Washington, Wheeler, Yamhill

OR

U.S. Army Corps of Engineers
ATTN: CENWP-OD-GE
211 E. 7th AVE, Suite 105
Eugene, OR 97401-2722
Phone: 541-465-6868
portlandpermits@usace.army.mil

Counties:
Benton, Coos, Crook, Curry, Deschutes, Douglas, Jackson, Jefferson, Josephine, Harney, Klamath, Lake, Lane, Linn, Marion

Send Completed form to:

DSL - West of the Cascades:

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Phone: 503-986-5200

OR

DSL - East of the Cascades:

Department of State Lands
1645 NE Forbes Road, Suite 112
Bend, Oregon 97701
Phone: 541-388-6112

Send all Fees to:
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Pay by Credit Card Online:
https://apps.oregon.gov/dsl/EPS/

INSTRUCTIONS FOR PREPARING THE JOINT APPLICATION

This is a joint application and must be sent to both agencies, who administer separate permit processes. For more complete instructions, contact the Corps and/or DSL or refer to online resources:

- DSL's Removal-Fill Guide; or,
- The Corps Regulatory website: http://www.nwp.usace.army.mil/Missions/Regulatory.aspx

General Instructions and Tips

- Provide the information in the appropriate blocks of the application form. If you need more space, provide a summary in the space provided and attach additional detail as an appendix to the application. Each appendix or attachment must reference which application block number it pertains to.
- Not all items on the application form will apply to all projects.
- Electronic submittal of applications and supporting material is preferred by the Corps. If hard copies are submitted to the Corps, the submittal must be on 8 ½ x 11-inch paper and reproducible in black and white. Currently DSL does not accept electronic submittals. DSL will accept color figures and 11 X 17. Use either all double sided or all single sided paper. Do not use staples or dividers.

For complex projects or for those that may have more than minimal impacts, additional information may be necessary to complete the evaluation and make a permit decision. Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

Section 1. If known, indicate the type of permit/authorization applying for.

Section 2. Applicant and Landowner Contact information
Applicant: The applicant is the responsible party. If the applicant is an agency, business entity or other organization, indicate the name of the organization and a person that has the authority to sign the application. If applicant is a partnership or corporation, applicant name must match the Incumbency Certificate, and business name as listed on OR Secretary of State business registry. Applicant must not be "doing business as" or has an "assumed business name." In such cases the applicant must be an individual.
Applicant Contact Name: If applicant is a business, provide contact name for an individual representing the business.
Authorized Agent: An authorized agent is someone who has permission from the applicant to represent their interests and supply information to the agencies. An agent can be a consultant, an attorney, builder, contractor, or any other person or organization. An authorized agent is optional.
Landowner: Provide landowner information if different from the applicant. DSL requires the landowner's signature, unless the project qualifies as a linear project, e.g. road, pipeline, utility.

Section 3. Project Information
Provide location information. Latitude and longitude must be reported in decimal format and can be found by zooming in to your respective project location and reading off the coordinates displayed on the bottom of the map.

Provide information on wetlands and waterbodies within the project area. Indicate the category of activities that make up your project. For projects with multiple locations, provide latitude and longitude for each location. For linear projects, provide the latitude and longitude for the start and end points.

Section 4. Project Description

A. Overall Description: Provide a description of the overall project, including:

- All associated work with the project both outside and within waters or wetlands.
- Total ground disturbance for all associated work (i.e., area and volume of ground disturbance).
- Total area of impervious surfaces created or modified by the project, if applicable.

B. Work within Waters and Wetlands: Provide a description of the proposed work within waters and wetlands, including:

- Each removal or fill activity proposed in waters or wetlands, as well as any construction or maintenance of in- water or over-water structures.
- The number and dimensions of in-water or over-water structures (i.e., pilings, floating docks) proposed within waters or wetlands.

C. Construction Methods: Describe how the removal and/or fill activities will be accomplished including the following:

- Construction methods, equipment to be used, access and staging areas, etc.
- Measures you will use during construction to minimize impacts to the waterbody or wetland. Examples may include isolating work areas, controlling construction access, site specific erosion and sediment control methods, site specific best management practices, and using specialized equipment or materials. Attach work area isolation and/or erosion and pollution control plans, if applicable.

D. Fill Material and Disposal: Provide a description of fill material and procedure for disposal of removed material, including:

- The source(s) of fill materials (if known).
- Locations for disposal area(s) for dredged material, if applicable. If dredged material is to be discharged on an upland site, identify the site and the steps to be taken (if necessary) to prevent runoff from the dredged material back into jurisdictional waters. If using an upland disposal area that is not a Department of Environmental Quality (DEQ) -regulated landfill, a Solid Waste Letter of Authorization or a Beneficial Use Determination from DEQ may be required.

E. Construction Timing: Provide the proposed start and completion date for the project. Describe project work that is already complete, if applicable.

F. – I. Summary of removal and fill activities: Summarize the dimensions, volume and type/composition of material being placed or removed in each waterbody or wetland. Describe each impact on a separate row. For instance, if two culverts are being removed from Clear Creek, use two rows. Add extra rows if needed, or include an attachment.

The DSL and the Corps use different elevations for determining whether an activity in tidal waters is regulated by the State's Removal-Fill law, the Clean Water Act, and/or the Rivers and Harbors Act. DSL regulates activities below the highest measured tide. The Clean Water Act applies below the high tide line. The Rivers and Harbors Act applies below the mean high water.

If jurisdictional limits are not the same for each agency, prepare a table for each agency stating impacts within that agency's jurisdiction.

Section 5. Project Purpose and Need
Explain the purpose and need for the project. Also include a brief description of any related activities needed to accomplish the project objectives.

The following items are required by DSL, as applicable:

- If the removal-fill would satisfy a public need and the applicant is a public body, include any pertinent findings regarding public need and benefit.
- If the project involves fill in the estuary for a non-water dependent use, explain how the project is for public use and/or satisfies a public need.
- If the project is located within a marine reserve or marine protected area, explain how the project is needed to study, monitor, evaluate, enforce or protect the designated area.

Section 6. Description of Resources in Project Area
Territorial Sea: For activities in the Territorial Sea (mean lower low water seaward 3 nautical miles), provide a separate evaluation of the resources and effects determination.

For each wetland, include:

- Whether the wetland is freshwater or tidal, and the Cowardin class and Hydrogeomorphic (HGM) class.
- Source of hydrology and direction of flow (if any).
- Dominant plant species by layer (herb, shrub, tree).
- A functional assessment of the wetland to be impacted (for impacts greater than 0.2 acre or any amount in estuarine waters), DSL requires use of ORWAP or HGM), should be attached as a separate document.
- Identify any vernal pools, bogs, fens, mature forested wetland, seasonal mudflats, or native wet prairies in or near the project area.
- Include relevant summary information from the wetland delineation report if available. Provide a copy of the wetland delineation report to **the Corps,** if not previously provided to Corps. If a delineation report has not been previously submitted to DSL, then submit to DSL under a separate cover.
- Describe existing uses, including fish and wildlife use (type, abundance, period of use, significance of site).

For rivers, streams, other waterbodies, lakes and ponds, include a description of, as applicable:

- Streamflow regime (e.g., perennial year-round flow, intermittent seasonal flow, ephemeral event-driven flow). If flow is ephemeral, provide streamflow assessment data sheet or other information that supports your determination.
- Field indicators used to identify the Ordinary High Water Mark (OHWM).
- Channel and bank conditions.
- Type and condition of riparian (streamside) vegetation.
- Channel morphology (structure and shape).
- Stream substrate.
- Assessment of the functional attributes including hydrologic, geomorphic, biological and chemical and nutrient related functions.
- Fish and wildlife (type, abundance, period of use, significance of site).

Section 7. Project Specific Criteria and Alternative Analysis
Provide an explanation describing how impacts to waters and wetlands are being avoided and minimized on the project site. For DSL, the alternatives analysis must include:

- Project-specific criteria that are needed to accomplish the stated project purpose.
- A range of alternative sites and designs that were considered with less impact.
- An evaluation of each alternative site and design against the project criteria and a reason for why the alternative was not chosen.
- If the project involves fill in an estuary for a non-water dependent use, a description of Alternative non- estuarine sites must be included.

The level of rigor required in this analysis should be commensurate with the level of impact proposed. Please note that additional information regarding alternatives may be necessary for Corps Individual Permits to comply with the Clean Water Act Section 404(b)(1) Guidelines. Please check with your local Corps contact early in the planning process to determine what level of analysis is required. An alternative analysis is not required for a complete application by the Corps; however, it may be required before a permit decision can be rendered.

Section 8. Additional Information
Any additional information you provide helps the reviewer(s) understand your project and the other approvals or reviews that may be required.

Section 9. Impacts, Restoration/Rehabilitation, and Compensatory Mitigation
A. Description of Impacts: Clearly identify the permanent, temporary, direct and indirect impacts. Provide a written analysis of potential changes the project may make to the hydrologic characteristics of the affected wetlands or waterbodies, and an explanation of measures taken to avoid or minimize any adverse effects of those changes, such as: impeding, restricting or increasing flows; relocating or redirecting flow; and potential flooding or erosion downstream of the project. Provide a table summarizing permanent and temporary impacts by HGM and Cowardin Classifications

B. Site Restoration/Rehabilitation: For temporary disturbance of soils and/or vegetation in waterbodies, wetlands or riparian (streamside) areas, discuss how you will restore the site after construction. This may include the following:

- Grading plans to restore pre-existing elevations.
- Planting plans and species list (native species only) to replace vegetation in riparian or wetland areas.
- Maintenance and monitoring plans to document restoration to wetland condition and/or vegetation establishment.
- Associated erosion control for site stabilization.

C.-D. Compensatory Mitigation. Describe your proposed compensatory mitigation approach, or explain why you believe compensatory mitigation is not required. If proposing permittee-responsible mitigation for permanent impact to wetlands, see OAR 141-085-0705 and 33 CFR 332.4(c) for plan requirements. For permanent impact to waters other than wetlands, see OAR 141-085-0765 and 33 CFR 332.4(c) for plan requirements.

For activities involving discharges of dredged or fill material into waters of the United States, the Corps requires the application to include a statement describing how impacts to waters of the United States are to be avoided and minimized. The application must also include either a statement describing how impacts to waters of the United States are to be compensated for or a statement explaining why compensatory mitigation should not be required for the proposed impacts.

Section 10. Adjacent Property Owners for Project and Mitigation Site(s)
Names and addresses for properties that are adjacent to the project site and permittee responsible mitigation site (if applicable), are required. "Adjacent" means those properties that share or touch upon a common property line or are across the street or stream. If more than 5, attach pre-printed labels. A list of property owners may be obtained by contacting the county tax assessor's office.

Section 11. City/County Planning Department Land Use Affidavit
This section is required to demonstrate land use compatibility for removal fill permits and water quality certifications. Provide this form to your local planning official for them to complete and sign.

Section 12. Coastal Zone Certification
Your signature for this statement is **required** for projects within the coastal zone (generally, west of the summit of the Coast Range).

Section 13. Signatures
The application **must** be signed by the responsible party as identified in section 1. DSL also requires the landowner's signature. Linear Facilities, e.g. road, pipeline, utility, do not require landowner signature.

Section 14: Attachments
Project Drawings. A complete application must include a location map, site plan, and cross-section drawings. DSL also requires a recent aerial photo. All drawings should be clear, legible, and to scale. For the Corps, drawings must be on 8.5 by 11-inch paper and must be in black and white or clearly reproducible in black and white. DSL will accept color and 11 x 17, but all figures must be clear when reproduced in black and white. While illustrations need not be professionally prepared, they should be clear, accurate, and contain all necessary information, as follows:

<u>Location maps</u> (with project boundaries, including staging and construction access, scale bar and north arrow on all):
- Location map with roads identified
- U.S.G.S. Topographic map
- Tax lot map

<u>Site plan(s), including</u>:
- Entire project site and activity areas, which includes staging and construction access areas
- Existing and proposed contours
- Stormwater outfalls and other features
- Location of ordinary high water, wetland boundaries or other jurisdictional boundaries. Clearly identify temporary, permanent, direct and indirect impact areas within waterbodies or wetlands
- Scale bar and north arrow
- Location of staging areas and construction access
- Location of cross section(s), as applicable
- Location of mitigation area, if applicable

Cross section drawing(s), including:

- Existing and proposed elevations
- Clearly identification temporary, permanent, direct and indirect impact areas within waterbodies or wetlands
- Ordinary high water and/or wetland boundary or other jurisdictional boundaries
- Scale bar (horizontal and vertical scale)

Recent Aerial photo

- 1:200, or if not available for your site, highest resolution possible

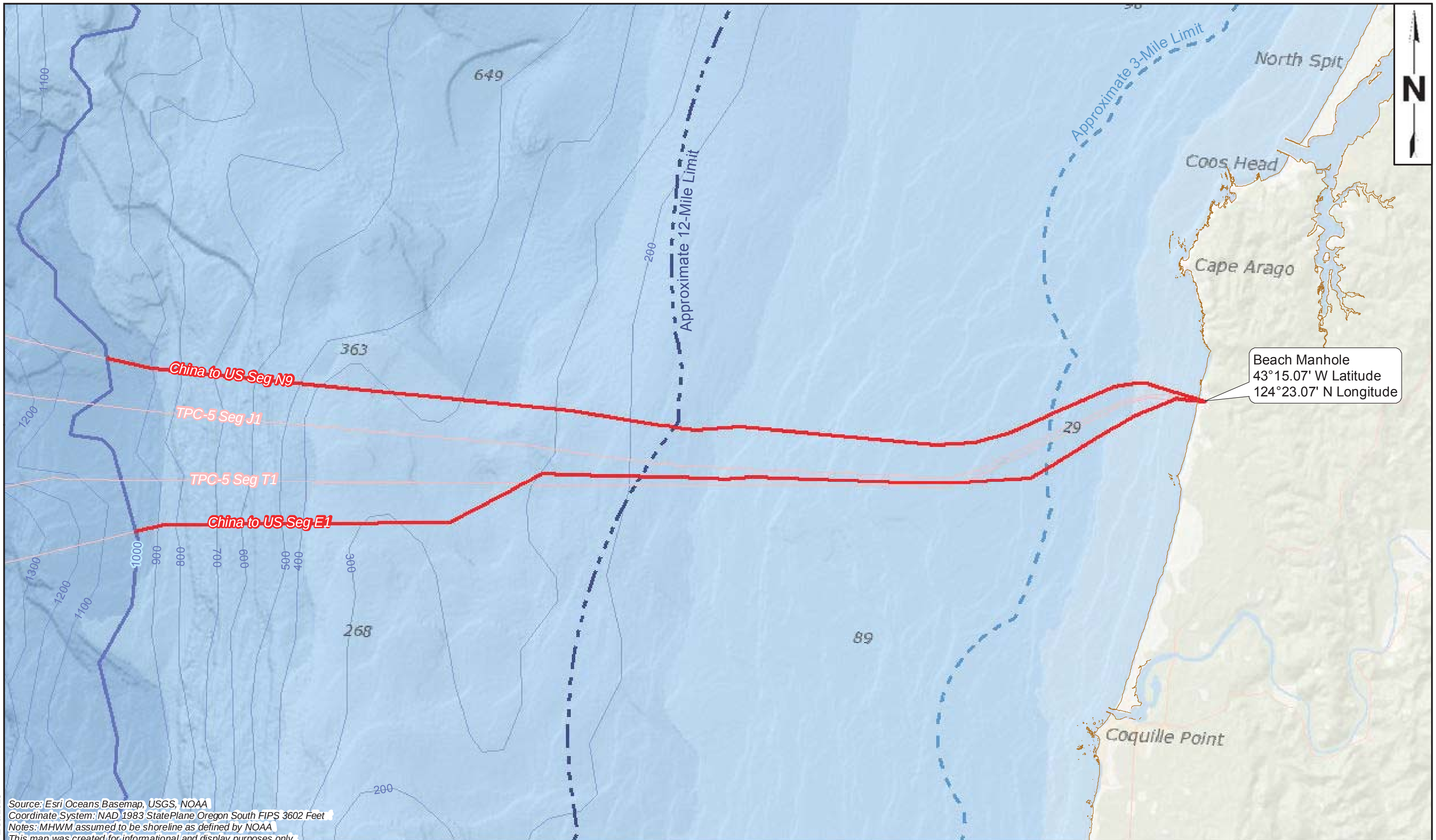
DSL Wetland Concurrence (map and letter only)

Do NOT submit the following items to DSL (unless specifically requested by DSL for your project):

- Wetland delineation report
- Biological assessment
- Cultural/archeological reports
- Stormwater calculations
- Geotechnical reports
- Marketing reports
- Contract agreements
- Applications for other agencies such as local land use applications
- Contractor/construction specifications
- Other extraneous drawings and information

ATTACHMENT 2

FIGURES



AT&T Cable Decommission\Cable Routes - Oregon.mxd 1/30/2019

LEGEND:

- Cable to be Removed
- Existing Cable
- 1,000 Fathom Depth
- Mean High Water Mark (MHWM)

Seg E1 Total Length: 30.93 miles / 49.77 kilometers
State Waters Length: 4.97 miles / 7.99 kilometers
Federal Waters Length: 25.96 miles / 41.78 kilometers
Seg N9 Total Length: 31.33 miles / 50.43 kilometers
State Waters Length: 4.58 miles / 7.37 kilometers
Federal Waters Length: 26.76 miles / 43.06 kilometers

Total area of disturbance *(disturbance corridor is 3.25-inches wide from MHWM to 1,000 fathom depth)*: **88,472 square feet / 2.03 acres**
State Waters Disturbance: 13,470 square feet
Federal Waters Disturbance: 75,001 square feet

MAP EXTENT:

0 2 4
Miles

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

PROJECT NAME:
AT&T CABLE DECOMMISSIONING PROJECT
COOS COUNTY, OR

PROJECT NUMBER: 1702-1974

DATE: January 2019

CABLE ROUTES MAP

FIGURE 1-1

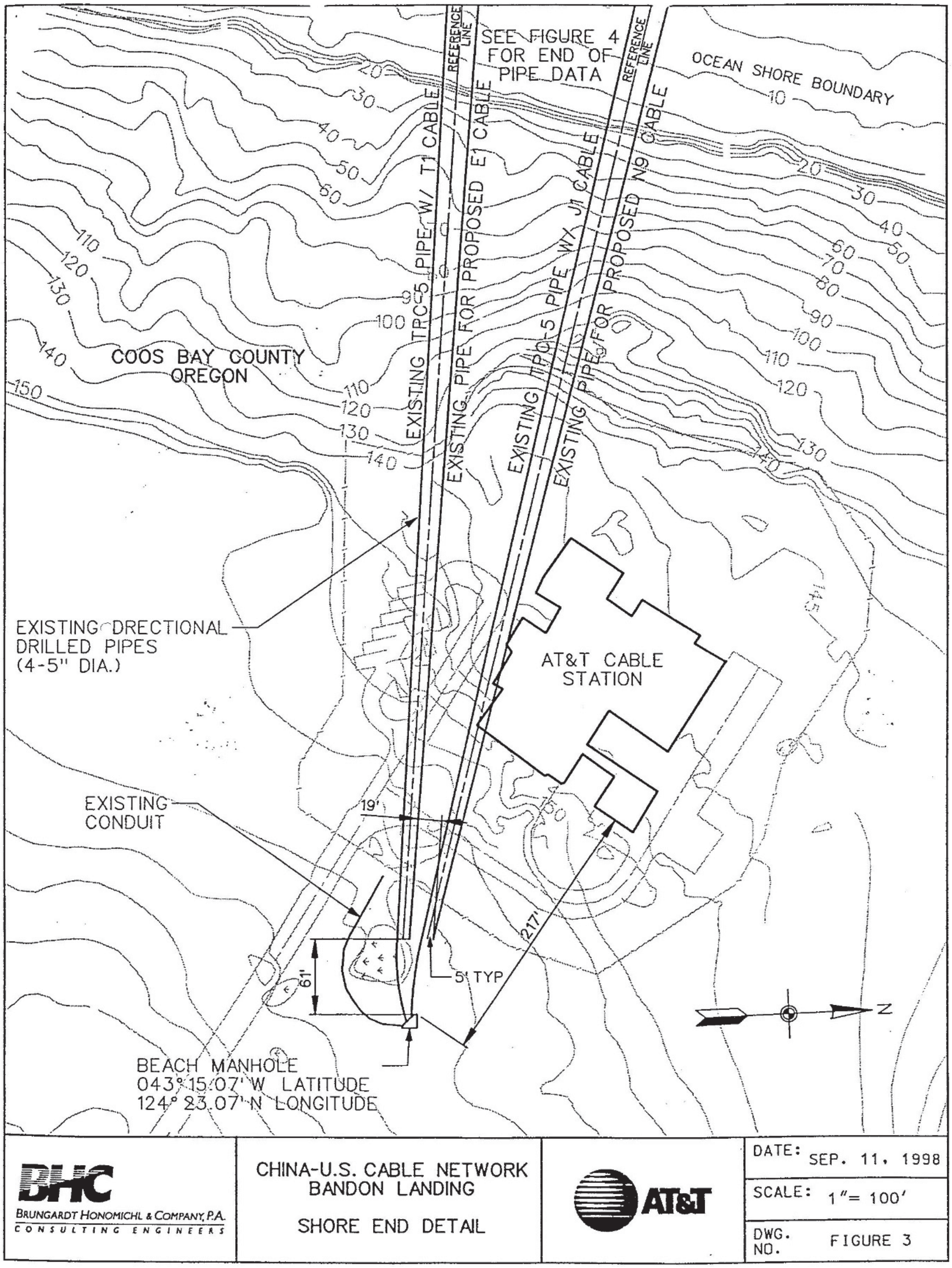


Figure 1-2. Cable Landing Site

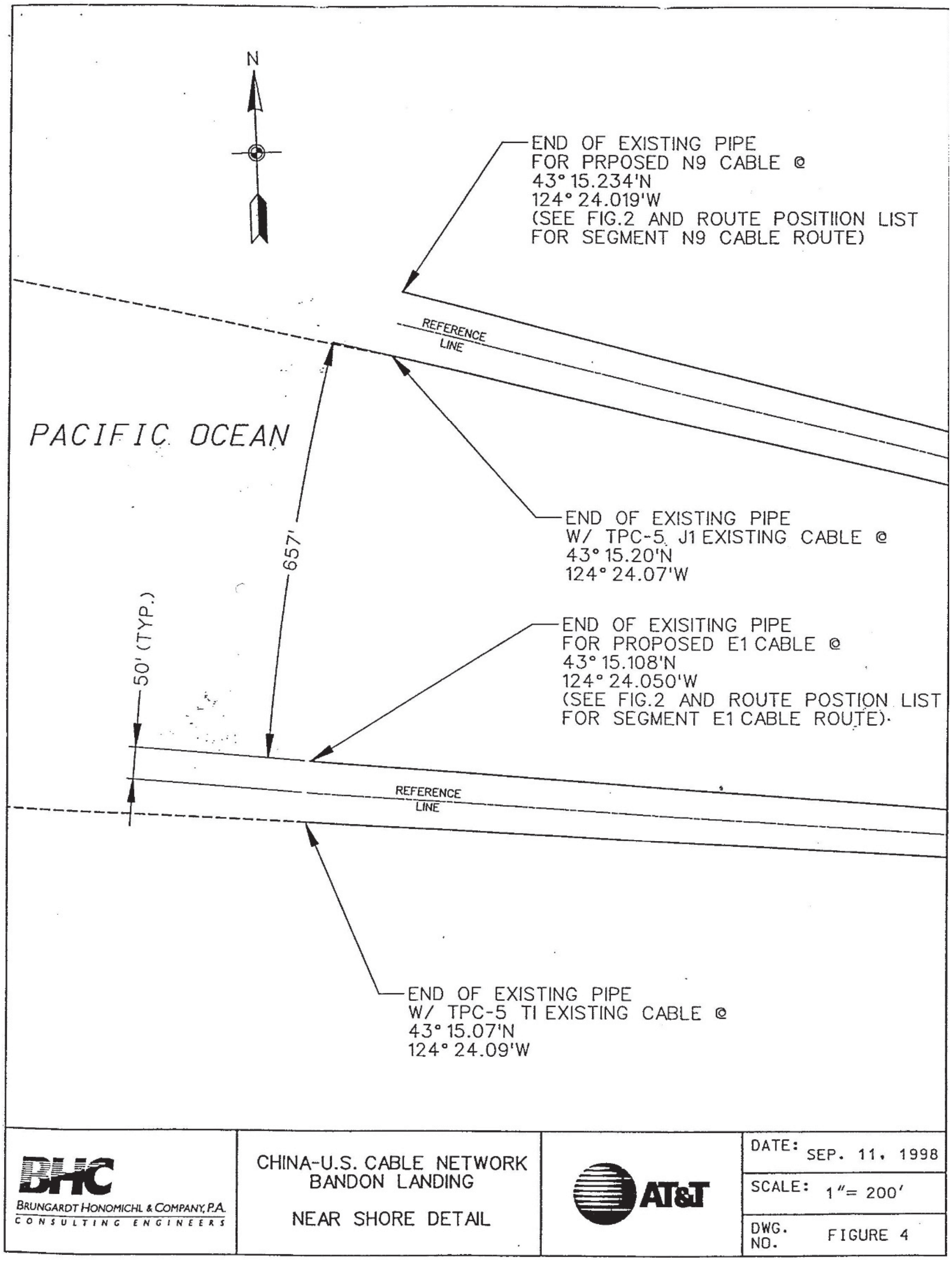


Figure 1-3. Nearshore Exit Pipe Location

ATTACHMENT 3

PROJECT SUMMARY

AT&T REMOVAL OF SEGMENTS E1 AND N9 OF THE CHINA-U.S. CABLE NETWORK

PROJECT SUMMARY

OFFSHORE BANDON, COOS COUNTY, OREGON

Project No. 1702-1974

Prepared for:

AT&T c/o Paul Hastings LLP
101 California Street, 48th Floor
San Francisco, CA 94111

Prepared by:

Padre Associates, Inc.
1861 Knoll Drive
Ventura, California 93003

FEBRUARY 2019

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

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APPENDICES

1.0 SUMMARY OF PROPOSED PROJECT

1.1 INTRODUCTION

In 1999 and 2000, AT&T installed the E1 and N9 fiber optic telecommunications cables into their existing facilities in Bandon, Oregon. The two cables were installed from the Bandon Landing in Coos County, Oregon to destinations in China and San Luis Obispo, California (Figures 1-1 and 1-2). The cable routes were selected based upon avoidance of sensitive seafloor habitats and active commercial fishing grounds. For a distance of approximately 30 miles offshore, the cables were retroburied or mechanically plowed to a depth of approximately two to four feet deep. The cables were operated under the terms of Oregon State Lease Number EA-16987.

Although expected to operate for 25 years, the cables were rendered obsolete by other developments and have since become unnecessary and are no longer being utilized by AT&T. The Project objective is to terminate State Lease Number EA-16987 and remove the E1 and N9 Cable segments from the nearshore bore pipe entry (Figure 1-3) to a water depth of 1,000 fathoms (6,000 feet [ft] or ~1,830 meters [m]). The on-land conduits would remain in place for potential future use through coordination with AT&T.

The authorizations issued for the installation of the cable loosely contemplate abandoning or removing the cables. State Lease Number EA-16987 provides that upon termination effectuated by certain means, “GRANTEE will have 90 days to remove the cable and appurtenances from the State-owned lands.” The U.S. Army Corps of Engineers (ACOE) permit for installation provided that “Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.” Covering removal as well as installation in the original permits would have been appropriate because the environmental impacts associated with removal of buried cables can be expected to be comparable to, and generally less than, the impacts associated with the installation and burial of the cables. Specifically, removing the cable will have essentially the same impacts as installation on air quality, geologic resources, water quality, biological resources, commercial and recreational fishing, and marine transportation. In approving the installation work, the Department of Land Conservation and Development (DLCD) has already found for consistency with the Oregon Coastal Management Program. In light of these earlier decisions, the removal of the cable should not involve an exhausting examination.

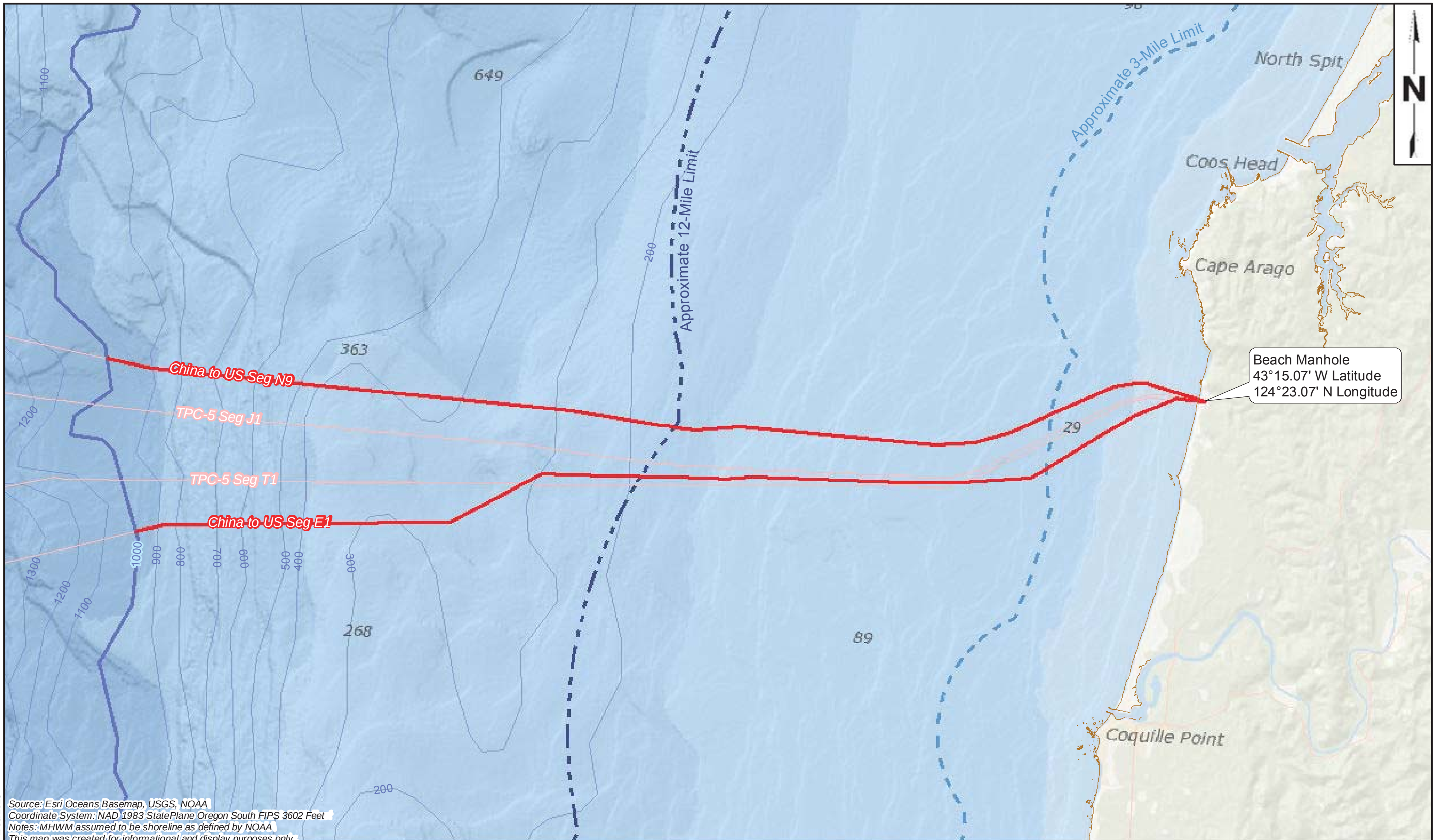
1.2 PROJECT OVERVIEW

The Project includes the following primary components within State and Federal jurisdictions:

Table 1-1. Project Components in State vs. Federal Jurisdictions

State Jurisdiction: **Onshore to 3-Nautical Mile Limit**	**Federal Jurisdiction:** **3-Nautical Mile Limit to 1,000 fathoms**

• Termination/Modification to State Lease No. EA-16987.
• Retention of Existing Conduits from Bandon Station to nearshore bore pipe exit for potential future use through coordination with AT&T.
• Pre-Project Preparation Activities; including but not limited to surveys and identification of E1 and N9 offshore Cable segments.
• Removal of E1 and N9 Nearshore/Offshore Cable Segments from nearshore bore pipe entry to 3-Nautical Mile limit offshore.
  o E1 Cable Length from Shore to 3-Nautical Mile Limit (State Waters) = ~ 4.97 miles (7.99 kilometers)
  o N9 Cable Length from Shore to 3-Nautical Mile Limit (State Waters) = ~ 4.58 miles (7.37 kilometers)
	• .
	• Complete Removal of E1 and N9 Nearshore/Offshore Cable Segments from 3-mile limit to 1,000 fathoms offshore. Live-boating will be conducted during this operation.
	  o E1 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~25.96 miles (47.78 kilometers)
	  o N9 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~26.76 miles (43.06 kilometers)



AT&T Cable Decommission\Cable Routes - Oregon.mxd 1/30/2019

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PROJECT NAME:
AT&T CABLE DECOMMISSIONING PROJECT
COOS COUNTY, OR

PROJECT NUMBER: 1702-1974
DATE: January 2019

CABLE ROUTES MAP

FIGURE
1-1

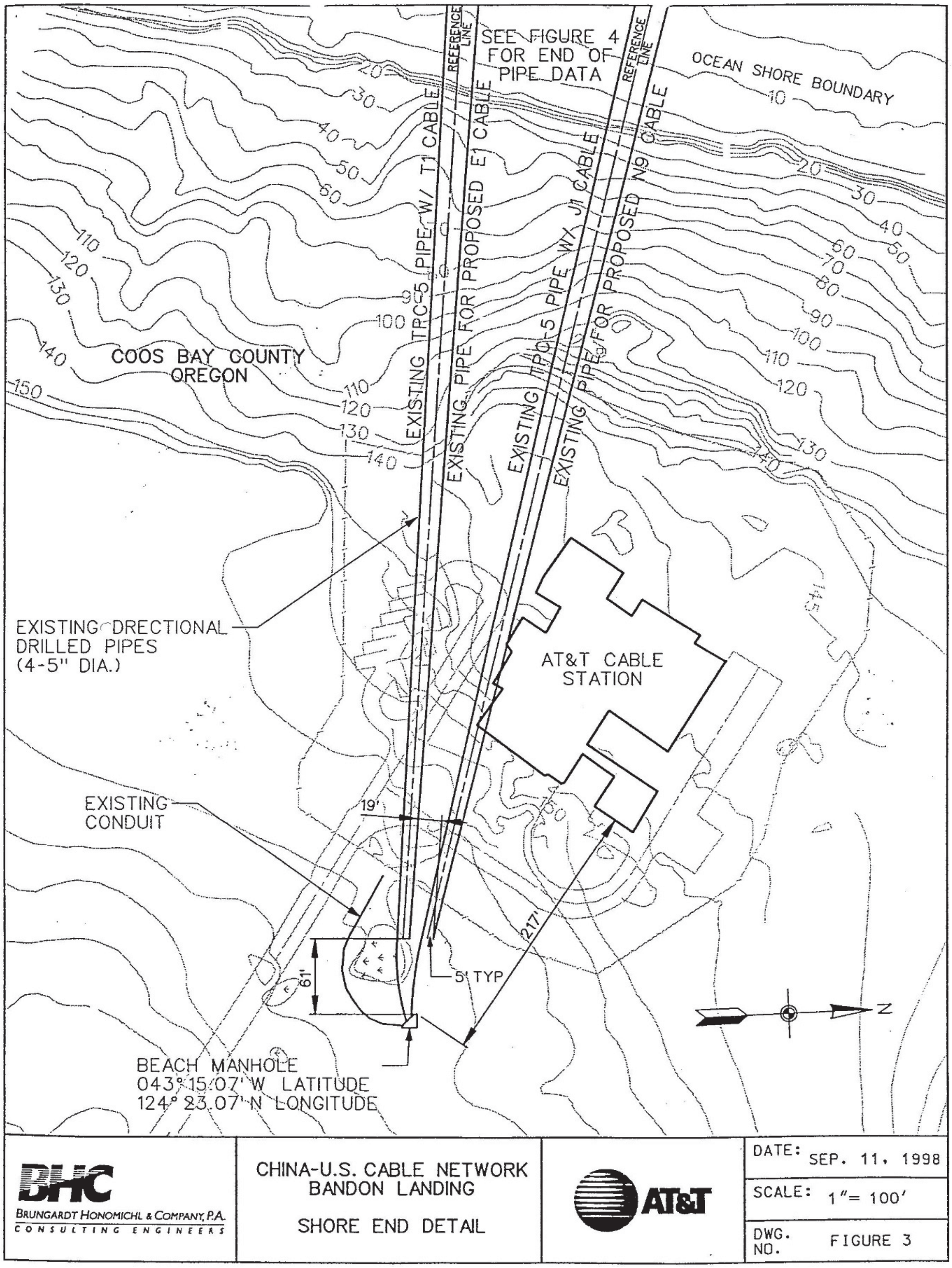

Figure 1-2. Cable Landing Site

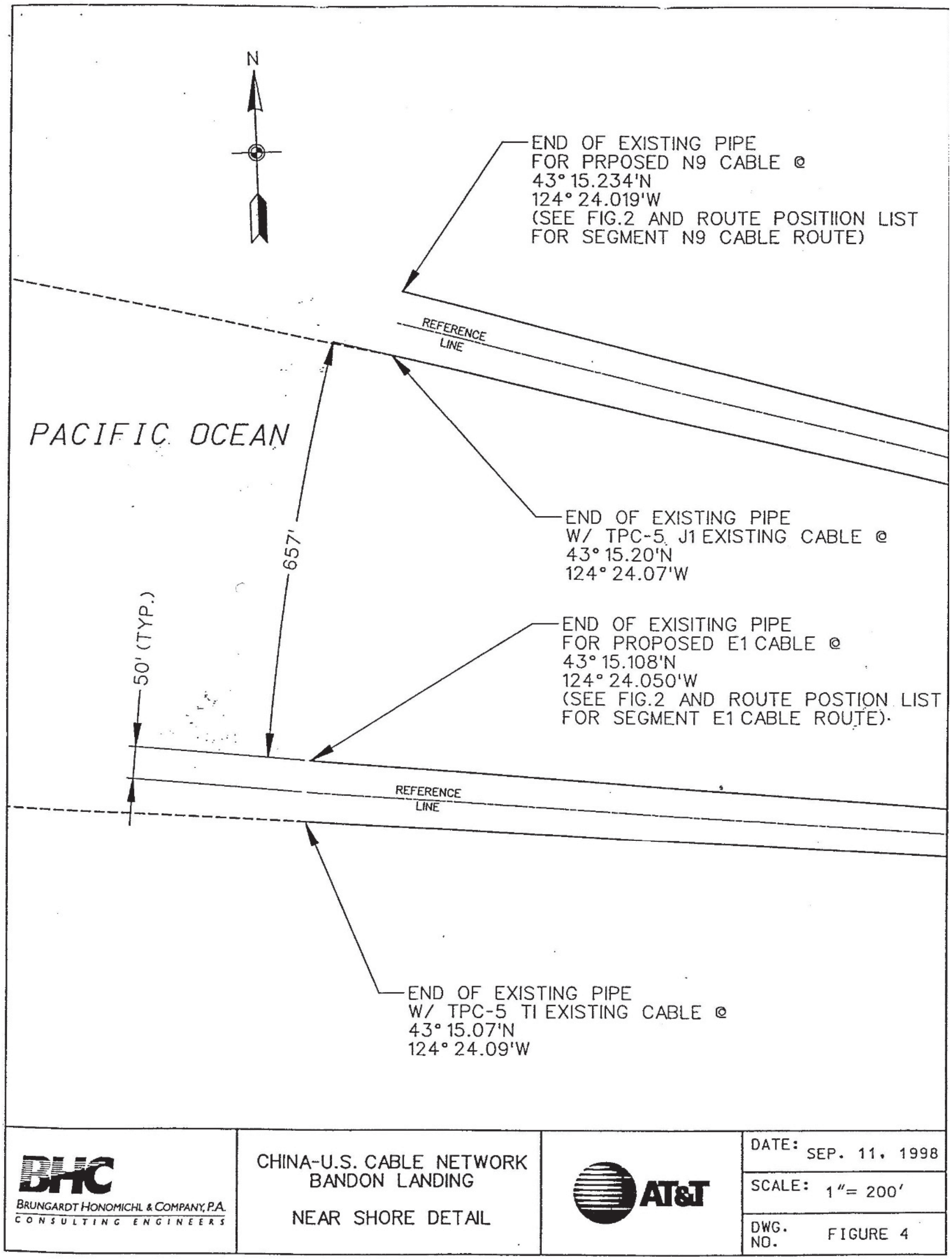

Figure 1-3. Nearshore Exit Pipe Location

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2.0 CABLE REMOVAL PROCEDURES

2.1 CABLE SPECIFICATIONS

The E1 and N9 Cables are 1.25-inches and comprised of a core of optical fibers encased in helically wound steel wires, and polyethylene insulation. The Cables are currently inactive. The portion of the E1 Cable that is subject to removal to 1,000 fathoms is approximately 30.93 miles (49.77 kilometers [km]). The portion of the N9 Cable that is subject to removal to 1,000 fathoms is approximately 31.33 miles (50.43 km).

A remotely operated vehicle (ROV) inspection was conducted in 2013 along the E1 and N9 Cable routes out to a water depth of 1,000 fathoms to evaluate the condition of the cables and determine whether there are any areas where the cables are exposed. The ROV survey results are provided as Appendix B. The ROV surveys showed that both the E1 and N9 Cables are buried at a maximum depth of approximately four feet. Hardbottom substrate ranged from occasional rock outcroppings to excessive hardbottom conditions. The Cables were suspended or exposed in most instances within the rock outcropping areas. Additionally, evidence of fishing activities including trawl tracks and abandoned ropes and cables were common along both Cable alignments. The E1 Cable had no protection at the out-of-service Cable TPC 5-T1 cable crossing (KP 12.121) and the E1 Cable was damaged and broken at KP 5.434. A joint box was observed at KP 4.976 and there was evidence of a cable bight at KP 2.93 to KP 2.863. The N9 Cable was generally well buried and had two repair bight locations at KP 8097.440 and KP 8096.596.

Based on the shallow average cover depth (three feet) and frequent areas where the Cables are suspended or unburied; it has been determined that it will be feasible to recover the Cables by direct extraction (pulling) from the seafloor and that de-trenching using mechanical methods is not required.

2.2 PRE-PROJECT PREPARATION ACTIVITIES

2.2.1 Identification of Cables (Set Tone at 25 Hz)

AT&T maintains a Submarine Cable record and has surveyed the Cables as recently as 2013. These records will be used to locate the Cables on the seafloor. Additionally, technicians in the cable station are anticipated to inject a 25 Hertz (Hz) test set tone (inaudible) signal onto the copper conductor of the cable to assist in locating the cables at the time of removal. A magnetometer on either the cable recovery ship or an ROV are capable of picking up this tone as a means of locating and distinguishing Project cables from others.

2.2.2 Pre-Recovery Diving Inspection

A pre-recovery diving inspection is carried out to verify the actual conditions. Besides it is done to ensure no unexpected situations arise during the recovery works. The inspection includes:

- Inspection of bore pipe exit
- Inspection of cable anchors + pendent wires
- Verification of cable route & burial conditions

- Highlight any points of interest

2.3 REMOVAL OF OFFSHORE CABLE SEGMENT FROM CONDUIT TO 1,000 FATHOMS

Removal of the offshore cable segments will occur within State and Federal waters as follows:

State Waters: E1 Cable Length from Shore to 3-Nautical Mile Limit = ~4.97 miles (7.99 kilometers). N9 Cable Length from Shore to 3-Nautical Mile Limit = ~4.58 miles (7.37 kilometers).

Federal Waters: E1 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~25.96 miles (41.75 kilometers). N9 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~26.76 miles (43.06 kilometers).

A summary of the removal procedure applicable to the entire length of cable(s) to be removed (regardless of jurisdiction) is provided below.

2.3.1 Cable Recovery Vessel (M/V Layla – Mertech Marine)

Offshore Cable recovery would be accomplished with the Marine Vessel (M/V) Layla (or similar equivalent vessel), owned by Mertech Marine. The M/V Layla is a 216 ft (65.85 m) dedicated industry vessel that has been configured in support of cable installation and recovery efforts offshore (Figure 2-1). The M/V Layla has a draft of approximately 13.85 ft (4.22 m), and a transit speed of nine knots. The M/V Layla's Port of Registry is St. John's, Antigua.

The M/V Layla is propelled by a single Caterpillar 3512(B) diesel engine with a power output of 749 kilowatt (kW) and 1,600 rotations per minute (RPM). The M/V Layla has been registered by the Bureau Veritas as a Tier I vessel, holds an International Air Pollution Prevention (IAPP) certificate and contains a Ship Energy Efficiency Management Plan (SEEMP), which limits air emissions significantly.

The M/V Layla cable recovery system also consists of one main winch and tensioners. The main winch provides main pulling force for recovery of the cable; the tensioner is providing the required auxiliary tension for the main winch and transports the recovered cable to the vessels cable tanks. The vessel is equipped with four cable tanks. The proposed Project's Cable recovery can primarily be accommodated on the M/V Layla. However, cable recovered in shallower water depths (100 ft or 30 m) will be taken to shore for appropriate disposal and recycling.

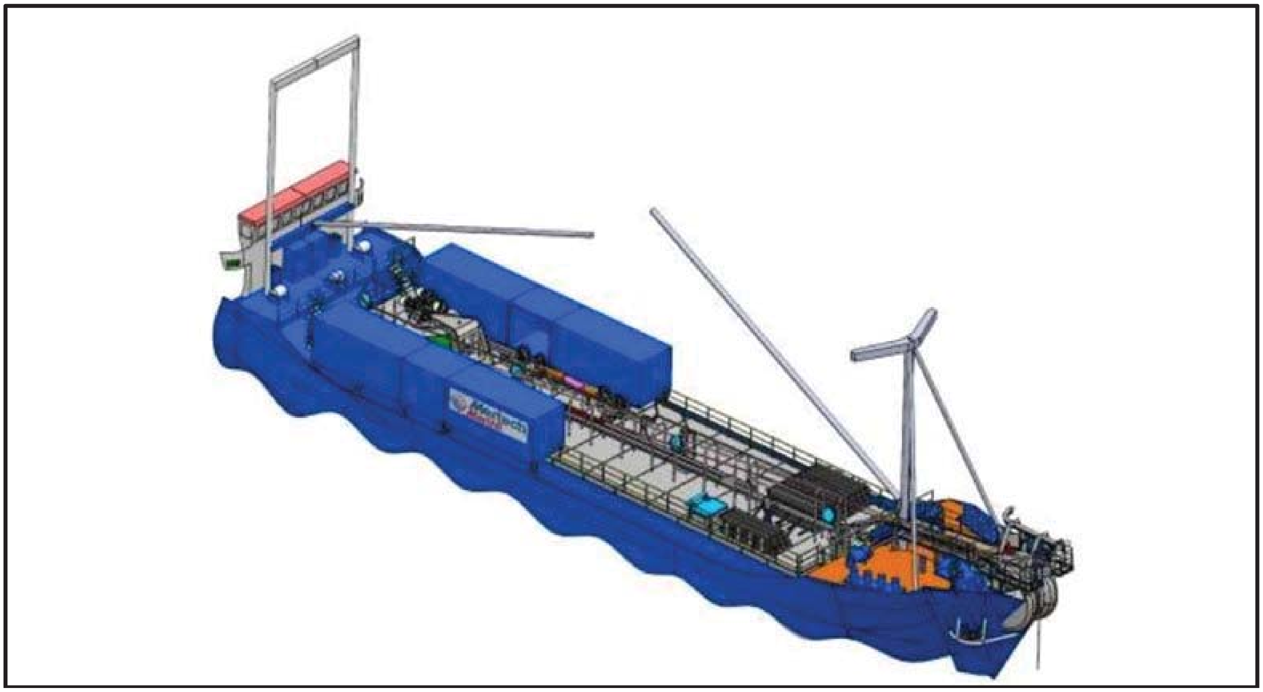

Figure 2-1. M/V Layla

2.3.2 Project Support Vessel

A maximum of four support vessels may be required to conduct Cable removal activities. Two dive support vessels and an additional smaller cable recovery vessel would be required in support of recovery of cable in water depths that are too shallow for the M/V Layla to operate (approximately 100 ft or 30 m). In addition, a Marine Wildlife Monitoring vessel will patrol the Project area and monitor the designated buffer zones for marine wildlife. The support vessels would likely originate from Coos Bay or Newport, Oregon and would be chosen based on appropriate capabilities to assist with cable recovery efforts.

2.3.3 Debris and Ballast Management

All cable recovery procedures and methodologies have been designed to minimize the possibility of introducing debris into the water. All debris produced on board of all vessels will be handled in accordance with International and National Regulations. Very small amounts of waste may be generated by the Project. Offshore vessels are equipped to manage, collect and properly dispose of waste products. Likewise, any waste generated during the shore-end activities will be collected and properly disposed.

To minimize the possibility of introducing non-native species into local waters, AT&T will require that any ballast discharges by non-local vessels take place in deep water beyond the 12-nm limit of the territorial seas. It is not expected that Project-related vessels arriving from outside the area would unexpectedly encounter circumstances requiring ballast water discharge for safe navigation in the nearshore waters.

A log book will be maintained on all work vessels to keep track of all debris created by objects of any kind that fall into waters, as to types, date, time and location during offshore operations to facilitate identification and location of debris for debris recovery and site clearance verification. Any discharges of ballast water will be documented as to location of the vessel and volume discharged. Copies of ships' log books would be available to the U.S. Coast Guard or other agencies upon request to AT&T.

2.3.4 Anchoring

Cable recovery will occur from the cut point at the furthest east portion of the cable and proceed westward to the nearshore conduit exit point in approximately 33 ft (10m) of water. The M/V Layla will not require anchoring during cable recovery activities. The M/V Layla will be accompanied by additional dive support vessels (DSVs) and a Marine Wildlife Monitoring vessel which may require a one- to three-point anchor to recover cable in shallow waters (approximately 100 ft or 30 m). The anchor will be set on previously surveyed soft bottom and retrieved vertically to avoid dragging across the sea floor. Please refer to Appendix C for the Project's Marine Safety Plan for additional details.

2.3.5 Cable Recovery Scope and Methodology

Prior to recovery, the E1 and N9 Cables will be surveyed and identified awaiting the cable recovery vessel (M/V Layla). Offshore work will be completed by the M/V Layla working 24 hours per day for approximately 12 days. A summary of the offshore cable recovery methodology as provided by Mertech is described below.

Cable Recovery from Diving Limit to Shore

- The M/V Layla would be positioned offshore on the Cable route at the diving recovery limit (approximately 100 feet water depth).
- The contractor will send divers down to locate and expose the end of cable. The volume of sea floor sediment that will be jetted to expose the end of the cable will be approximately 10 to 15 cubic yards (8 to 11 cubic meters). The cable will be cut by divers using a water blasting device or exothermic cutting device.
- The cut end of the cable, will be rigged with a lift bag/buoy to allow handover to M/V Layla. The M/V Layla will continue recovery of this section.
- The divers will follow the cable route towards beach and work towards end of conduit, while installing lift bag at regular intervals to de-trench the cable. Divers will use hand trenching tools (i.e air-lift/jetting to expose the cable, if necessary.
- After having de-trenched a certain length of cable (suspended and floating between the lift bags), sections will be lifted on-board the dive support vessel.
- At crossings with other cables (In-Service or Out-of-Service), all cable located within approximately 50 m of crossing will remain in place.
- If manta ray anchors and/or associated steel pendent wires are discovered along cable route (i.e. within hardbottom areas or cable changes in direction), divers will use a hand trenching tool to expose cable, anchors and pendent wires. The volume of sea floor sediments disturbed will be approximately 10 to 15 cubic yards (8 to 11 cubic meters).
- The cable stopper/pendant wire will be cut by divers using a water blasting device or exothermic cutting device.
- The pendant wire and anchor will be connected to a lift bag to bring the items to the surface where they will be lifted onboard the DSV.

Cable Removal from Offshore Diving Limit to Depth of 1,000 Fathoms

- The M/V Layla would be positioned offshore on the cable route at a point close to 1,000 fathom contour.
- Grapnel gear is deployed at appropriate location to perform cutting run.
- After cutting of cable, a holding run is performed from cutting run position to get cable on-board.
- The cable is routed over the bow roller to the traction winch and subsequently via the cable tensions into one of the internal cable tanks and the M/V Layla continues to recover cable from offshore to inshore.
- The M/V Layla will pull itself forward using the cable while recovering. The cable will be pulled vertically, in alignment with its position on the seafloor to avoid contact with higher relief hard bottom substrate.

Figure 2-2 provides a top view of the Cable recovery activities while underway.

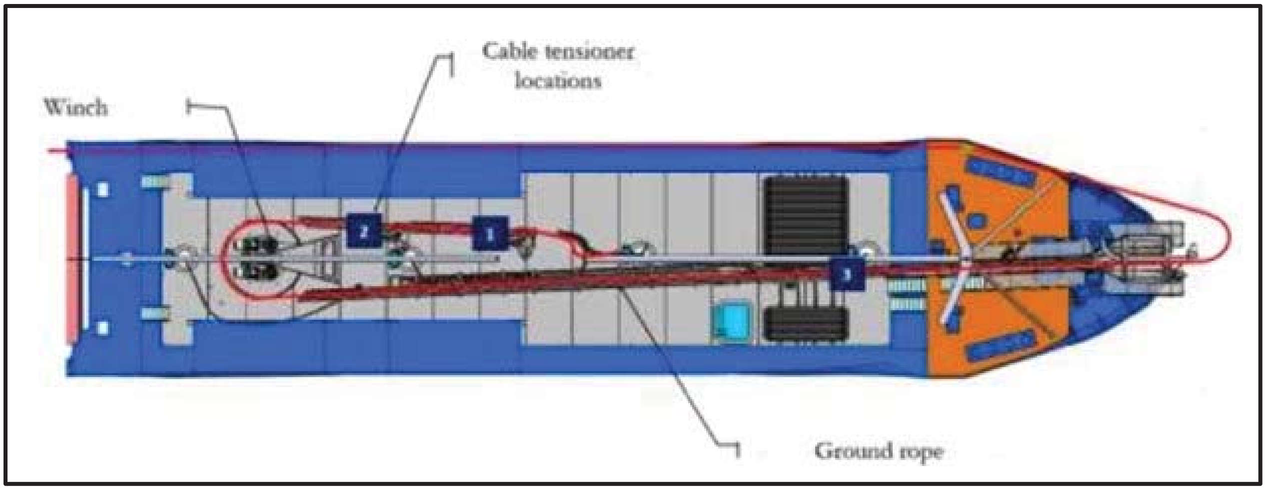

Figure 2-2. M/V Layla During Cable Recovery Operations (Top View)

2.3.6 Contingencies (Severe Weather Curtailment)

The Project vessels and methodology include a Marine Safety Plan prepared by Mertech (Appendix C). To appropriately plan for severe weather events, AT&T and Mertech's Marine Safety Plan includes provisions such as daily weather reporting and extended forecasts, as well as selection of a work window to optimize anticipated offshore sea conditions. However, if these conditions are exceeded, or are expected to worsen, measures will be taken to secure operations. Depending on the predicted severity of the storm, the ship will either ensure that enough cable is laid out to give maneuvering room, or will suspend operations completely, and cut the cable away. It will then either stand offshore until the weather abates, or seek shelter in port, as necessary. The power to determine critical conditions and make these decisions resides with the captain of the ship, who is ultimately responsible for the safety of the ship and its personnel.

2.4 DEMOBILIZATION AND RECYCLING OF RECOVERED CABLE

The recovered cables will be spooled on the M/V Layla and transported to a Mertech-owned mechanical dismantling/recycling factory located in Cape Town, South Africa. The dismantling procedure breaks the out-of-service cables down into their component parts which are then sold into various industries as copper, polyethylene, steel and aluminum. The dismantling process is fully mechanical without any smelting required to recover cable materials.

3.0 EQUIPMENT AND PERSONNEL

3.1 EQUIPMENT REQUIREMENTS

The M/V "Layla" (or equivalent) will be used for Cable Recovery with support by a dive maximum of four support vessels. Cable recovery operations will be accomplished in approximately two weeks total. The primary equipment requirements for the Project are summarized in Table 3-1 below. Please refer to Appendix F for Equipment Specifications Information.

Table 3-1. Project Equipment List

Equipment Type	Horsepower (hp)	Hours/Day	# of Days
Nearshore – 12 Hours/Day			
Diving Support Vessel 1			
(2) Engines – Twin, 4-stroke outboards	60 hp	12 hours	14
(1) Air Lift- Powered by Compressor	-	12 hours	14
(1) LP Air Compressor	300 cfm	12 hours	14
Diving Support Vessel 2			
Engines – TBD	TBD	12 hours	14
Other Equipment - TBD	TBD	12 hours	14
Nearshore Cable Recovery Vessel			
Engines – TBD	TBD	12 hours	14
Other Equipment - TBD	TBD	12 hours	14
Marine Wildlife Monitoring Vessel			
Engines – TBD	TBD	12 hours	14
Offshore – 24 Hours/Day			
Cable Recovery Vessel – M/V Layla			
(1) Caterpillar Engine	749 kw/1,00 hp	24 Hours	12
(1) Caterpillar Generator	360 ekW/482 hp	24 Hours	12
(1) Main Winch (Electrically Driven)	-	24 Hours	12
(1) Tensioner (Electrically Driven)	-	24 Hours	12

3.2 PERSONNEL REQUIREMENTS

Offshore work will be completed by the M/V Layla and offshore diving crew; working 24 hours per day, for approximately 12 days. There is a minimum of approximately 40 persons required for the proposed work activities as detailed in Table 3-2.

Table 3-2. Personnel Requirements

Number of Personnel	Position Title
Cable Recovery Vessel (M/V Layla) Crew	
1	Project Manager
1	Site Manager
1	Shipboard Manager
1	Cable Recovery Vessel Master
5	Cable Recovery Vessel Deck Crew
4	Ship Crew
13	**TOTAL**
Diving Support Vessel 1 Crew	
1	Diving Support Supervisor
1	Diving Support Vessel Master
4	Diving Support Team
2	Diving Support Vessel Deck Crew
8	**TOTAL**
Diving Support Vessel 2 Crew	
1	Diving Support Supervisor
1	Diving Support Vessel Master
TBD	Diving Support Team
TBD	Diving Support Vessel Deck Crew
TBD	**TOTAL**
Nearshore Cable Recovery Crew	
1	Project Manager
1	Site Manager
1	Shipboard Manager
1	Cable Recovery Master
TBD	Cable Recovery Crew
TBD	Ship Crew
TBD	**TOTAL**
Marine Wildlife Monitoring Vessel	
4	Vessel Crew
4	Marine Wildlife Monitors
8	**TOTAL**

4.0 SCHEDULE

Project operations are currently anticipated to take place in the 2nd quarter (April/May) of 2019. It is anticipated that offshore Project activities can conservatively be completed in 12 days offshore; for a total recovery schedule of approximately two weeks.

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5.0 APPLICANT PROPOSED MEASURES (APM) TO REDUCE POTENTIAL IMPACTS

The following technical work plans have been (or will be) developed in support of the proposed Cable recovery Project:

- Marine Safety Plans (Mertech – M/V Layla) – *Appendix C*
- Oil Spill Contingency and Response Plan (OSCRP) – *Appendix D*
- Marine Wildlife Mitigation and Training Plan – *Appendix E*
- Equipment Specifications and Emissions Reduction Plan – *Appendix F*

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6.0 REGULATORY SETTING/EXISTING PERMITS

The following consultations were undertaken and, where applicable, permits/approvals were obtained on behalf of the original cable installation(s). The same approvals that were obtained for installation will be secured prior to initiation of the Segment E1 and N9 cable recovery activities unless the recovery activities involve impacts below regulatory thresholds (see Table 6-1).

Table 6-1. Summary of Regulatory Permit Requirements

Agency	Permit/Approval	Regulated Activity	Authority
Federal Agencies			
US Army Corps of Engineers (ACOE)	Section 404 permit (assumes Nationwide Permit 12)	Discharge of dredged or fill material into waters of the U.S. during construction. Jurisdictional waters include territorial seas, tidelands, rivers, streams and wetlands.	Section 404 Clean Water Act (33 USC 1344)
ACOE	Section 10 permit (assumes Nationwide Permit 12)	Structures or work in or affecting navigable waters of the U.S. Review and issuance concurrent with Section 404.	Section 10 of the Rivers and Harbors Act (33 USC 403)
United States Fish & Wildlife Service (USFWS)	Endangered Species Act (ESA), Section 7 consultation	Impacts to federally-listed and species proposed for listing.	16 USCA 1513 50 CFR Section 17
National Oceanic & Atmospheric Administration (NOAA Fisheries)	ESA, Section 7 consultation for marine mammals Marine Mammal Protection Act	Impacts to federally-listed and species proposed for listing. Protection of Marine Mammals.	16 USCA 1513 50 CFR Section 17
United States Coast Guard (USCG)	Navigation consultation Notice to Mariners	Activities that may affect navigable waters.	33 CFR
State of Oregon Agencies			
Oregon State Lands Commission	Offshore lease agreement termination	Review of environmental impacts in area of jurisdiction. Removal of components in State Territorial Waters.	Oregon Revised Statutes (ORS)
Department of Land Conservation and Development (DLCD)	Coastal Policy/Land Consistency Review	Any development within designated coastal zone.	Coastal Zone Management Act (CZMA)
Department of Environmental Quality (DEQ)	Section 401 certification	Discharges that may affect surface and ground water quality.	Federal Clean Water Act (CWA)
Oregon State Historical Preservation Officer (SHPO)	Section 106 review and compliance	Impacts to historic and pre-historic resources.	National Historic Preservation Act 36 CFR 800

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7.0 ENVIRONMENTAL ISSUE AREAS AND MEASURES INCLUDED TO REDUCE POTENTIAL IMPACTS

The following Sections provide information with respect to potential environmental issues anticipated during cable recovery operations and how the Project has been designed to minimize potential impacts to the greatest extent feasible.

The information below is intended to assist responsible permitting agencies in reviewing the potential environmental impacts of the proposed removal Project. As demonstrated below, taking into account the Project design and field application of proposed mitigation measures, no significant impacts are anticipated.

7.1 AIR QUALITY/GREENHOUSE GAS EMISSIONS

The State of Oregon Department of Environmental Quality (DEQ) does not have State-specific air quality emission thresholds for construction emissions. Due to the short-term construction schedule (two weeks), the operation of a cable recovery ship would not result in short-term exceedances of the Federal air quality standards. In accordance with the Mertech Marine Emissions Reduction Plan (ERP), the recovery vessel (M/V Layla) has all appropriate air pollution prevention certificates and is certified under Tier 1 rules. AT&T and Mertech Marine will implement all commercially feasible best practices, as necessary, to minimize nitrogen oxide (NOx) emissions. Implementation of these measures will result in a less than significant impact to air quality.

7.2 GEOLOGY

Since the original installation in 1999/2000, post-burial surveys have been completed and submitted to the permitting agencies. The most recent survey was conducted in 2013 (Appendix B).

The ROV surveys showed that both the E1 and N9 Cables are buried at a maximum depth of approximately four feet, and as shallow as less than one foot. Hardbottom substrate ranged from occasional rock outcroppings to excessive hardbottom conditions. The Cables were suspended or exposed in most instances within the rock outcropping areas. Additionally, evidence of fishing activities including trawl tracks and abandoned ropes and cables were common along both Cable alignments. The E1 Cable had no protection at the out-of-service Cable TPC 5-T1 cable crossing (KP 12.121) and the E1 Cable was damaged and broken at KP 5.434. A joint box was observed at KP 4.976 and there was evidence of a cable bight at KP 2.93 to KP 2.863. The N9 Cable was generally well buried and had two repair bight locations at KP 8097.440 and KP 8096.596.

During cable recovery operations, disturbance to seafloor substrates will be similar to installation operations. As documented in the post installation surveys, the majority of the seafloor appeared unchanged following burial of the cable during installations. In areas of soft substrate, the seafloor will rapidly recontour to its original condition following cable extraction due to natural seafloor processes (i.e. currents and storms). In areas of rocky substrate where the cable is currently exposed, the cable recovery will be recovered vertically and in alignment of the current installation thereby avoiding disturbance to adjacent sensitive resources.

7.3 WATER QUALITY

Removal would result in small-scale, temporary increases in turbidity. Removal techniques will be less disruptive than installation techniques because while extraction of the buried cable will result in some soft-bottom disturbance, it does not result in suspended sediment to the same extent as the plowing and retroburial activities involved when installing the cable(s).

Disturbance of hardbottom substrates and potential grooving of sedimentary rocks by cables is not anticipated during cable recovery because the cables largely avoided these areas. Regular post-construction surveys have demonstrated that the cables remain principally in the same condition as when they were installed thereby avoiding resuspension of the seafloor.

7.4 BIOLOGICAL RESOURCES

Localized, temporary disturbance of seafloor habitats will occur during cable recovery operations. Primarily, turbidity involving an extremely small fraction of available substrate would disturb biological resources. The 2013 ROV survey showed that both the E1 and N9 Cables are buried at a maximum depth of approximately four feet. Likewise, additional disturbance of seafloor substrates and possible grooving of sedimentary rocks by cables is not anticipated because the cables largely avoided these areas when installed and the 2013 ROV survey demonstrated that the cables remain principally in the same condition as when they were built.

A total of 14 Federally listed marine species have the potential to occur within the Project area. Critical habitat for the leatherback turtle (*Dermochelys coriacea*) occurs within the Project area. Implementation of the Project has the potential to affect the following: habitat loss, mortality, harassment, loss of prey, loss of shelter/cover, loss of access to habitats, noise and light effects, habitat fragmentation, urbanization, increased predation, and critical habitat.

The following is a summary of the Project's avoidance, minimization, and mitigation measures to avoid and minimize potential adverse effects:

- Pre-activity environmental orientation;
- Measures to minimize risk of entanglement hazards;
- Vessel-based monitoring;
- Measures to reduce lighting impacts to marine birds;
- Measures to reduce potential vessel collision impacts on marine wildlife; and
- Measures to reduce potential oil spill impacts.

7.5 CULTURAL RESOURCES

Cable installation was originally designed to avoid rock outcrops and previously known shipwreck locations. Comprehensive marine surveys utilizing side-scan sonar, subbottom profiler, and magnetometer were utilized to assess geophysical conditions at that time of installation to avoid previously unknown cultural resources and obstacles. The final cable route was positioned to avoid these features by an appropriate distance. Cable recovery operations will be restricted to the original installation Cable alignment and will therefore limit any seafloor disturbance to areas previously disturbed during installation.

7.6 COMMERCIAL AND RECREATIONAL FISHING/SOCIOECONOMICS

Removal of the Cables is intended to eliminate the potential for future exposures and potential snagging of commercial fishing gear on the Cables and is consistent with measures previously implemented by AT&T to reduce impacts to regional commercial fishing operations.

Cable removal may temporarily impede fishing in the immediate area during the short duration of the operations; however, removal will also permanently eliminate any potential impacts to fishing operations in the future (e.g., potential economic losses due to avoiding fishing over cables or damage to gear entangled with cables).

AT&T will ensure the publication of a Notice to Mariners, describing the nature, location, and duration of cable recovery activities, at least 15 days prior to initiation of activity. The notice will be given to the Commander, Thirteenth Coast Guard District, 915 2nd Avenue, Seattle, Washington 98174 and will include the following information:

- The requirements of the U.S. Submarine Cable Act (47 USC Section 25) for fishermen to avoid deploying gear within 1 nm of a vessel engaged in cable installation and within 0.25 nm of a buoy marking the location of a cable.
- The location of the work sites, including bore pipe and cable route coordinates.
- The size and type of equipment that will be performing the work, and any distinguishing marks or flags that will enable boaters to identify the vessels.
- The name and radio call signs for working vessels if applicable.
- 24-hour telephone numbers of on-site contact representatives.
- The schedule for completing the project.

AT&T will also provide this information directly to the Harbormaster at Oregon International Port of Coos Bay, to the Pacific Coast Federation of Fishermen's Association, the Bandon Submarine Cable Council, other local fishermen who request it, and to the Cable Multi-Agency Coordinating Committee.

7.7 LAND USE AND RECREATION

The Project would not physically affect an established community and would not conflict with local natural resource planning and conservation on land or in the waters offshore. The cable recovery alignments are outside of any marine sanctuary boundaries. All activities on land will be coordinated with AT&T, and activities on the water will be coordinated with the U.S. Coast Guard. A local Notice to Mariners will be issued approximately 15 days prior to offshore construction to provide adequate notice to offshore recreational vessels.

The Project could temporarily (two weeks) affect recreational activities at Bandon Landing; however, coordination with the Oregon State Parks Department and Oregon Department of State Lands for the scheduling and location of Project activities would reduce potential short-term impacts, if any, to the greatest extent feasible.

7.8 AESTHETICS AND NOISE

Similar to the installation activities, the Project will result in short-term human activity and vessel traffic in a very small area of the nearshore marine environment. Lighted ships will be visible at night. However, Project activities would not result in degradation or alteration of the character of the site or an existing viewshed, would not alter expectations of viewers, and would not introduce new sources of light or glare that would adversely affect day or nighttime views in the area.

Cable recovery would produce short-term noise that would be consistent with noise from existing vessel activities in the area. At Bandon Landing, noise-generating activities would occur during cable recovery operations. Given coordination of all activities with Oregon State Parks Department and Oregon Department of State Lands personnel as described in Recreation above, short-term noise impacts would not be significant.

7.9 MARINE TRANSPORTATION

During cable recovery, the Project vessels will fly the appropriate day shapes (brightly colored flags that vessels use to communicate with each other), and while operating at night, the vessels would be well-lighted. Also, notification would be posted in the USCG Local Notice to Mariners to ensure that mariners on commercial and military vessels as well as recreational boaters would have prior notice of the cable recovery activities.

Recreational boating in the vicinity of the cable route and near the cable landing area would not be significantly affected by the cable recovery activities due to the fact that boaters would be required to maintain a minimum safe distance of 1 nm (1.8 km) from the vessel, thereby avoiding navigational delays or unsafe situations.

7.10 SYSTEM SAFETY/RISK OF UPSET

7.10.1 Oil Spill Contingency and Response Plan (OSCRP)

The likelihood of a vessel fuel oil spill due to a collision during cable recovery is extremely small given the brief duration of installation activities, Notice to Mariners, and buffer zone required around the cable recovery vessel. The potential consequences of such spills are further minimized by the Oil Spill Contingency and Response Plan that has been incorporated into this document (Appendix D). The OSPCP contains preventative measures, as well as procedures to be followed in the event of a spill, including hydraulic fluids as well as fuel and other types of oil spills. Additionally, the M/V Layla will operate in accordance with its vessel specific Oil Spill Contingency Plan which includes requirements for vessel equipment for rapid deployment to contain and clean up any small spill or sheen on the water surface.

7.10.2 Existing Cable Crossings

The E1 Cable to Oregon crosses the existing TPC-5 T1 cable at a perpendicular angle in the nearshore area at a depth of 85 ft (26 m). Both cables are of the Double Armor (DA) type at the crossing. The TPC-5 cable is buried at the location where it is crossed by AT&T's E1 cable. Therefore, during E1 Cable recovery, no interaction with the TPC-5 T1 cable is anticipated.

There aren't any cable crossings along the N9 cable. Therefore, during N9 cable recovery, no interaction with other existing cable is anticipated.

APPENDIX A

E1 AND N9 CABLE COORDINATES

Project: China - U.S. Cable Network *From:* Bandon, Oregon
Segment: N9
Datum: W.G.S.-84 *To:* China via Branch Unit

pos. no.	Latitude DD MM.MM N	Longitude DD MM.MM W	Depth (m)	Route Distance		Cable Type	Remarks
				Between	Total		
None	43°15.070' N	124°23.070' W	N/A	0	10137.674	DA	Bandon, Oregon Beach Manhole
None	43°15.234' N	124°24.019' W	10	1.328	10136.354	DA	End of existing directional drilled pipe, Begin Retrobury
None	43°15.440' N	124°25.100' W	27	1.512	10134.842	DA	
None	43°15.450' N	124°25.450' W	33	0.474	10134.368	DA	
None	43°15.325' N	124°26.140' W	42	0.962	10133.406	DA	End Retrobury
None	43°14.100' N	124°29.500' W	58	5.082	10128.324	DA	**Pass 3 Mile Limit**
None	43°13.810' N	124°30.700' W	65	1.711	10126.613	DA	**6 Mile Limit**

September 10, 1998

Project: China - U.S. Cable Network *From:* Bandon, Oregon
Segment: E1
Datum: W.G.S.-84 *To:* San Luis Obispo, California

pos. no.	Latitude DD MM.MM N	Longitude DD MM.MM W	Depth (m)	Route Distance		Cable Type	Remarks
				Between	Total		
001	43°15.070' N	124°23.070' W	N/A	0	0	LWA	Bandon, Oregon Beach Manhole
002	43°15.104' N	124°23.955' W	9	1.2	1.2	DA	
003	43°15.108' N	124°24.050' W	10	0.128	1.328	DA	End of existing directional drilled pipe, Begin Retrobury
004	43°15.065' N	124°24.176' W	12	0.188	1.516	DA	
005	43°14.630' N	124°25.450' W	32	1.903	3.420	DA	
006	43°14.395' N	124°25.930' W	40	0.782	4.202	DA	End Retrobury
007	43°12.645' N	124°29.500' W	63	5.819	10.021	DA	**Pass 3 Mile and 6 Mile limit**

September 10, 1998

APPENDIX B

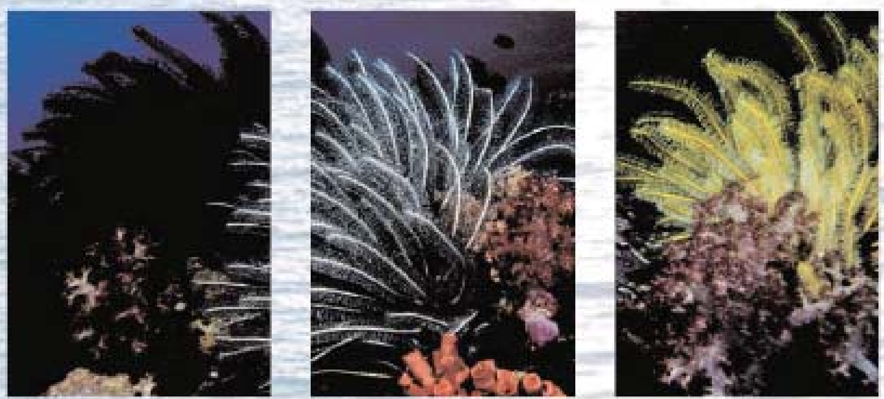
POST INSTALLATION ROV SURVEY (2013)

China-US Segments E1 & N9

Oregon Burial Verification Survey 2013

Completion Report

CS Wave Venture & ST204 ROV
1st August – 25th August 2013



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ID	GMSL Internal Document Review	25/08/2013	WVEN	EJL		
01	Draft Completion Report for customer comments and review.	29/08/13	WVEN	EJL	PS	
02	Final Completion Report	18/09/13	WVEN	EJL	PS	

Signatory Legend WVEN CS Wave Venture

Change History

Revision Number	Section(s)	Page(s)	Brief Description of Change	Author/s of Change
N/A	N/A	N/A	First Issue to Customer	N/A
N/A	N/A	N/A	Final Report	N/A

TABLE OF CONTENTS

Abbreviations

The following abbreviations may be used in this report:

1st	First Splice/Joint
2nd	Second Splice/Joint
A	Ampere
A/C	Alter Course
AOG	Arrived on ground of repair
APO	Amount Paid Out
APU	Amount Picked Up
BAS	Burial Assessment Survey
BJT	Beach Joint
BMH	Beach Manhole
BRH	Bight Release Hook (acoustic bight release hook)
BU	Branching Unit (Usually followed by a number e.g. BU2)
CB	Cable buoy - usually with a number after it to identify it - i.e. CB1
CCE	Chief Cable Engineer
C-OTDR	Coherent Optical Time Domain Reflectometer
CPO	Commence Pay Out
CPT	Cone Penetrometer Test
CPU	Commence Pick Up
CR	Conductor Resistance
CS	Cable Ship
CSF	Cut Shifted Fibre
CTC	Cable Terminating Cubicle
CTE	Cable Terminating Equipment
DA	Double Armour
DCC	Distance Cross Course
DCF	Dispersion Compensated Fibre
DEC	Dispersion Equalisation Cable
DG	Grapnel Drive (Usually followed by a number e.g. DG1)
DGPS	Differential Global Positioning System
DOB	Depth of Burial
DOHB	Draw Off Hold Back
DOL	Distance Off Line
DOW	Depth of Water
DP	Dynamic Positioning
DPR	Daily Progress Report
DPSO	Deputy Power Safety Officer
DSF	Dispersion Shifted Fibre
DWP	Deep Water Protected Cable
EBAS	Electronic Burial Assessment Survey
ETA	Expected time of arrival
ETD	Expected time of departure
ETO	Electrical Technical Officer
FFP	Flexible Fall Pipe
FFPV	Flexible Fall Pipe Vessel
FJB	Factory Joint Box
fm	fathom(s)
FP	Fibre Pair (Usually preceded by a number e.g. 2FP)
FRC	Fast Rescue Craft
FS	Final Splice
FWD	Forward (Usually applies to +ve CR tests on cables)
G	Gifford Grapnels (usually preceded by a number e.g. 2G)
GMSL	Global Marine Systems Limited
Grap	Grapnel
GPS	Global Positioning System
HAZID	Hazardous operations identification
HD	Holding Drive
HDD	Horizontally Drilled Duct
HDPE	High Density Polyethylene
HPR	Hydro Acoustic Position Reference
HPU	Electro Hydraulic Power Unit
IC	Insulation Capacitance
IMO	International Maritime Organization
IOR	Index of Refraction
IR	Insulation Resistance
ITRF	International Terrestrial Reference Framework
JB	Joint Box
JT	Joint
REV	Reverse (Can be used on –ve CR tests on cables or refers sometimes to grapnels)
RFPA	Ready for Provisional Acceptance
RFPS	Ready for Provisional Service

km	Kilometres
kN	Kilo Newton
KP	Kilometer Point
Kpa	Kilo Pascal
kt	Knot(s)
kV	Kilovolt(s)
LARS	Launch and Recovery System
Lat	Latitude position in Degrees and Minutes
LCE	Linear Cable Engine
LCF	Large Core Fibre
LEAF	Large Effective Area Fibre
LFES	Loop Fibre End Seal
LI	Laid-in splice
Long	Longitude position in Degrees and Minutes
LPCFF	Long Prong Cutting Flatfish Grapnel
LPFF	Long Prong Flatfish Grapnel
LPHFF	Long Prong Holding Flatfish Grapnel
LR	Large Rennie Grapnel
LRB	Large Round Bottom Grapnel
LSP	Long Sliding Prong Grapnel
LW	Light Weight Cable
LWA	Light Wire Armour
LWM	Low Water Mark
LWP	Light Weight Protected
LWS	Light Weight Screened
m	Metre(s)
M/V	Motor Vessel
MOB	Man Over Board Boat
NCR	Non-conformance report
NDSF	Non-Dispersion Shifted Fibre
nm	Nautical Mile(s)
NOTS	Nominal Operating Tensile Strength
NPTS	Nominal Permanent Tensile Strength
NTTS	Nominal Transient Tensile Strength
OOU	Out of use cable
OOS	Out of service cable
OPSO	Overall Power Safety Officer
OSPT	Offshore Superintendent
OTDR	Optical Time Domain Reflectometer
PAS	Plough Assessment Survey
PCB	Printed Circuit Board
PD	Plough Down
PEFL	Pulse Echo Fault Locator
PEU	Passive Equalizer Unit
PFE	Power Feed Equipment
PGU	Protection Grounding Unit
PKP	Plough Kilometer Point
PLDN	Plough Down
PLGR	Pre Lay Grapnel Run
PLB	Post Lay Burial
PLI	Post Lay Inspection
PLIB	Post Lay Inspection and Burial
PLUP	Plough Up
PO	Pay Out
POL	Point on Line
PSBR	Power System Branch Repair Unit
PSM	Power Safety Message
PSO	Power Safety Officer
PSPU	Power Supply Protection Unit
PU	Pick Up
QA	Quality Assurance
QHSE	Quality, Health, Safety & Environment
R	Repeater (usually followed by a number e.g. R06)
RA	Rock Armour
RAB	Remote Amplifier Box
RC	Route clearance

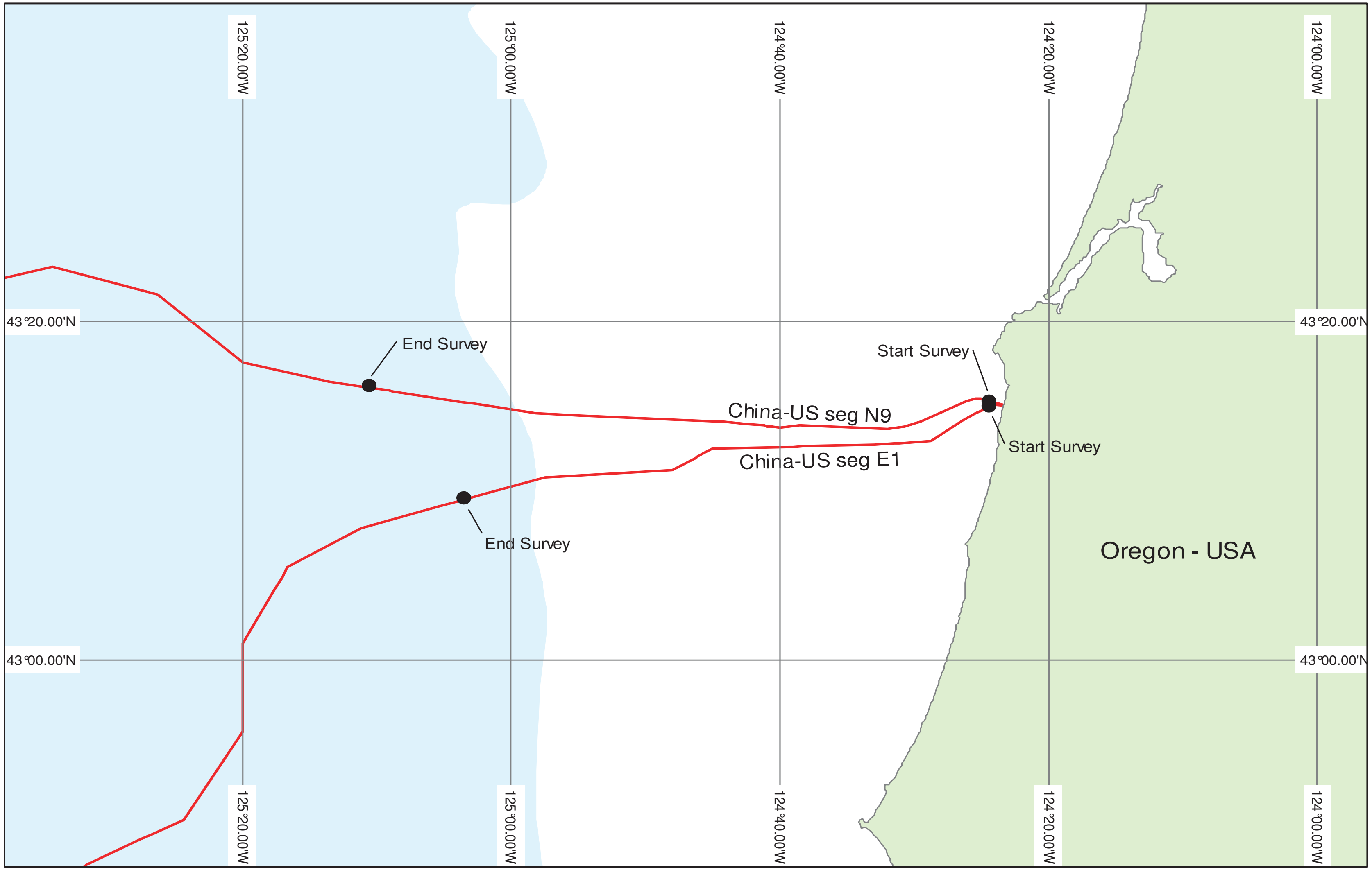
RFS	Ready for Service (commercial acceptance)
RG	Reversed Gifford Grapnels
RIB	Rigid Inflatable Boat
Roto	Reading on the foredeck mechanical rotometers
ROV	Remotely operated vehicle
RPL	Route Position List
SA	Single Armour
SAH	Single Armour Heavy
SAL	Single Armour Light
SAM	Single Armour Medium
Sdg	Sounding Depth of Water
SDH	Synchronous Digital Hierarchy
SLD	Straight Line Diagram
SLLI	System Load and Lay Instructions
SMF	Single Mode Fibre
SPA	Special Application Cable
SPHFF	Short Prong Holding Flatfish Grapnel
SPO	Stop Pay Out
SPU	Stop Pick Up
SSE	Senior Submersibles Engineer
SSP	Short Sliding Prong Grapnel
Stbd	Starboard
t.b.a.	To be advised
TPSO	Terminal Power Safety Officer
Trans	Transition
TSS	TSS(UK)Ltd, manufacture of cable detection
UC	Universal Coupling
UJ	Universal Joint
USBL	Ultra Short Baseline
UTM	Universal Transverse Mercator
UTS	Ultimate Tensile Strength
V	Volt(s)
VO	Variation Order
VOR	Variation Order Request
VRU	Vertical Reference Unit
WDM	Wavelength Division Multiplexing
WGS	World Geodetic System
WoW	Waiting on Weather
Wx	Weather Conditions
XRB	Extended Round Bottom Grapnel

1.0 Commencement Notification

The survey operation was planned in advance and a departure time of 09:00LT on the 1st August agreed. Therefore a commencement notification was not deemed to be necessary.

2.0 Location Map

The location of the survey is presented on the following map.



3.0 Operational Overview

3.1 Introduction

GMSL were contracted to carry out ROV survey and inspections, utilising the CS Wave Venture and ROV ST204, of five NAZ cable systems installed off the coast of Oregon, USA.

As part of the permitting conditions for fibre optic cable installations off Oregon, the Owners are required to carry out a post installation inspection to determine the burial status of the cables. The survey is required to run from as close in as possible out to 1000 fathoms.

China-US Segment E1, installed in 1999, runs between Bandon CLS, Oregon and Morro Bay California and consists of some 1150km of FOC.

China-US Segment N9, installed in 1999, runs between Bandon CLS, Oregon and a BU and consists of some 8358km of FOC.

3.2 Scheduling of Work

The survey was scheduled to be performed by the CS Wave Venture at a mutually agreed time, subject to the vessel's maintenance obligations to the NAZ 2012 contract. The whole OBVS operation was carried out on an interruptible basis to meet these obligations.

Operations commenced on the 1st August 2013 when the vessel departed Nanaimo, Canada. The operations were completed on the 25th August when the vessel returned to Victoria, BC, Canada.

The survey operation was planned to be carried out in the following sequence:

- TPE S3P3
- Northstar S1
- Sothern Cross SF
- AKORN
- China-US SE1
- China-US SN9

Section 4.0 shows the initial POW and final completed POW.

3.3 Operation Objectives

a) To verify that the cable has not moved significantly and that the existing post-lay positional data remains accurate.

b) To provide a continuous and accurate measurement of the cable burial depth throughout the survey region.

c) To analyse the cable burial data and seabed conditions in relation to the post-lay burial data and perform a comparison.

d) To re-bury, if requested by the cable owner/client, where the survey indicates it has become exposed on the surface of the seabed in areas where sea bed conditions are suitable for burial. Burial will be by jetting using a Remotely Operated Vehicle (ROV).

e) To monitor and record any hazards which pose a risk to the cable or evidence of cable damage and pose a significant risk to the fishing activities carried out off the coast of Oregon.

3.4 Operational Synopsis

August 2013

The vessel departed Nanaimo, BC, Canada on the 1st August 2013 and arrived at Astoria, Oregon, USA on the 2nd August 2013. The vessel then completed US state port clearance, embarked two cable owner and two OFCC representatives and bunkering of fuel by the evening of the 2nd August.

The vessel then made passage to the TPE Seg3 P2 survey site#1. At the site the vessel teams commenced completion of the survey suite and equipment mobilisation. This involved HPR and ROV seabed profiler checks and calibration. The survey suite mobilisation was completed on the 4th August.

Bandon CLS provided an In-Service tone of 25Hz at 80mA P-P onto the cable to allow the ROV to track and check burial of the cable using the TSS 350 detection system.

The OBVS survey and inspection for TPE, Northstar, SX & AKORN commenced at 17:24LT on the 4th August beginning at the inshore position of site #1 and was completed at AKORN site #4 at 18:24 LT on the 11th August.

The vessel then made transit to off-shore Coos Bay, Oregon and arrived at 00:80LT on the 12th August . The cable owner and OFCC representatives changed out by boat transfer during this short stay.

The vessel departed off-shore Coos Bay at 12:44LT on the 12th August to commence operations on the China-US system.

The China-US survey operations commenced at 15:13LT on the 12th August on Segment E1.The survey operations were completed on Segment N9 at12:44LT on the 22nd August. The vessel then made transit back to off-shore Coos Bay, Oregon and the cable owner and BSCC representatives disembarked the vessel by boat transfer.

On completion of US immigration clearance the vessel departed Coos Bay at 17:30LT on the 22nd August and made passage to Victoria, BC, Canada. The vessel arrived at 10:33LT on the 24th August and set anchor overnight due to berthing availability. The vessel went alongside Ogden Point, Victoria at 09:00LT on the 25th August.

3.5 Summary of Key Events

DATE	EVENT
1st August 13	Departed Nanaimo for passage to Astoria, Oregon
2nd August 13	Arrived Astoria, Oregon, USA
2nd August 13	Vessel completed port state clearance and embarkation of client reps
2nd August 13	Departed Astoria and commenced transit to TPE CWG
3rd August 13	Arrived TPE CWG commenced HPR and ROV profiler calibrations
4th August 13	Completed HPR and ROV seabed profiler verifications
4th August 13	Commenced survey operations at TPE, Northstar, SX & AKORN cable systems
11th August 13	Completed survey operations at TPE, Northstar, SX & AKORN cable systems
12th August 13	Completed passage to Coos Bay, Oregon and disembark cable owner representatives
12th August 13	Commenced survey operations on China – US Segment E1 cable system
16th August 13	Completed survey operations on China – US Segment E1 cable system
16th August 13	Commenced survey operations on China – US Segment N9 cable system
22nd August 13	Completed survey operations on China – US Segment N9 cable system
22nd August 13	Completed clearance at Coos Bay, Oregon and commenced passage to Victoria, BC, Canada
24th August 13	Arrived Victoria, BC, Canada anchorage
25th August 13	Vessel alongside Ogden Point, Victoria

3.6 Senior Personnel

Captain	Mark Nash
Chief Cable Engineer	Andy McAreavey
Lead Surveyor	Steve Allen
Surveyor	Kevin Coaten, Paul Saleh
Navigational Officer	Josh Strudwick
Chief Systems Engineer (Subsea)	John Wiseman

3.7 Customer Representatives

Company	Name	Date Joined	Date Departed
AT&T	John Thomas	12th August 2013	22nd August 2013
BSCC	Gerald Gunnari	12th August 2013	22nd August 2013
BSCC	Nick Edwards	12th August 2013	22nd August 2013

4.0 Plan of Work

The initial POW is presented below for the whole of the Oregon Burial Verification Survey:

PROVISIONAL PLAN OF WORK FOR NAZ CABLE INSPECTIONS

Issued 01/Aug/13 Issue 6.2
Commander/CSE
M.Nash/A.McAreavey/G. Wills

All times are local

			Data entry		
No	Action	Commence	Duration (Hours)	Complete	
1	Vessel on NAZ standby at Nanaimo, BC			01/08/2013 09:00	
2	Vessel departs Nanaimo - pilotage to sea	01/08/2013 09:00	8.0	01/08/2013 17:00	
3	**Vessel FAOP to Astoria, OR, Pilot station**	01/08/2013 17:00	21.5	02/08/2013 14:30	234nm @12knts to EOP Includes 2 hrs for ROV test dive
4	**Pilotage into Astoria**	02/08/2013 14:30	1.5	02/08/2013 16:00	
5	US Customs and Immigration Clearance Take on Bunkers	02/08/2013 16:00	8.0	03/08/2013 00:00	Embark OFCC and cable representatives. Depart Astoria, OR.
6	Transit to **TPE. Set up ship in DP**	03/08/2013 00:00	4.5	03/08/2013 04:30	33.13nm
6	Launch ROV to place a beacon on the seabed	03/08/2013 04:30	1.0	03/08/2013 05:30	
7	HPR Trials	03/08/2013 05:30	12.0	03/08/2013 17:30	
8	Launch ROV to recover beacon and calibrate Profilers.	03/08/2013 17:30	6.0	03/08/2013 23:30	
9	Launch ROV, Dive 1. Survey Inspection Site #1 and recover. **COMMENCE TPE SURVEY**	03/08/2013 23:30	3.0	04/08/2013 02:30	0.88km to survey. End of **TPE Dive 1**
10	Relocate ship to Inspection Site #2	04/08/2013 02:30	2.5	04/08/2013 05:00	18.63nm
11	Launch ROV, Dive 2. Survey Inspection Site #2 and recover	04/08/2013 05:00	9.0	04/08/2013 14:00	3.82km to survey. End of **TPE DIVE 2**
12	Relocate ship to Inspection Site #3	04/08/2013 14:00	2.0	04/08/2013 16:00	6.59nm
13	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	04/08/2013 16:00	3.0	04/08/2013 19:00	1.05km to survey. End of **TPE Dive 3**
14	Relocate ship to Inspection Site #4	04/08/2013 19:00	2.0	04/08/2013 21:00	6.57nm
15	Launch ROV, Dive 4. Survey Inspection Site #4 and recover	04/08/2013 21:00	6.0	05/08/2013 03:00	1.90km to survey. End of **TPE Dive 4**
16	Relocate ship to Inspection Site #5	05/08/2013 03:00	2.0	05/08/2013 05:00	9.02nm
17	Launch ROV, Dive 5. Survey Inspection Site #5 and recover.	**05/08/2013 05:00**	**4.0**	**05/08/2013 09:00**	1.80km to survey. **End of TPE Dive 5. TPE survey Complete**
18	**RELOCATE SHIP TO NORTHSTAR CABLE and set up in DP**	05/08/2013 09:00	1.0	05/08/2013 10:00	3.43nm
19	Launch ROV, Dive 1. Survey Inspection Site #5 and recover	05/08/2013 10:00	4.5	05/08/2013 14:30	1.0km to survey. End of **NORTHSTAR Dive**

					1
20	Relocate ship to Inspection Site #4	05/08/2013 14:30	1.0	05/08/2013 15:30	1.35nm
21	Launch ROV, Dive 2. Survey Inspection Site #4 and recover	05/08/2013 15:30	10.0	06/08/2013 01:30	4.0km to survey. End of **NORTHSTAR Dive 2**
22	Relocate ship to Inspection Site #3	06/08/2013 01:30	1.5	06/08/2013 03:00	5.07nm
23	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	06/08/2013 03:00	6.0	06/08/2013 09:00	2.2km to survey. End of **NORTHSTAR Dive 3**
24	Relocate ship to Inspection Site #2	06/08/2013 09:00	2.0	06/08/2013 11:00	12.57nm
25	Launch ROV, Dive 4. Survey Inspection Site #2 and recover	06/08/2013 11:00	8.5	06/08/2013 19:30	3.85km to survey. End of **NORTHSTAR Dive 4**
26	Relocate ship to Inspection Site #1	06/08/2013 19:30	3.0	06/08/2013 22:30	14.62nm
27	Launch ROV, Dive 5. Survey Inspection Site #1 and recover.	**06/08/2013 22:30**	**1.5**	**07/08/2013 00:00**	0.2km to survey. **End of NORTHSTAR Dive 5. Survey complete**
28	**RELOCATE SHIP TO SOUTHERN CROSS CABLE and set up in DP**	07/08/2013 00:00	1.0	07/08/2013 01:00	0.56nm
29	Launch ROV, Dive 1. Survey Inspection Site #1 and recover	07/08/2013 01:00	2.0	07/08/2013 03:00	0.50km to survey. **End of SOUTHERN CROSS Dive 1**
30	Relocate ship to Inspection Site #2	07/08/2013 03:00	3.0	07/08/2013 06:00	18.28nm
31	Launch ROV, Dive 2. Survey Inspection Site #2 and recover	07/08/2013 06:00	5.0	07/08/2013 11:00	1.3km to survey. **End of SOUTHERN CROSS Dive 2**
32	Relocate ship to Inspection Site #3	07/08/2013 11:00	2.0	07/08/2013 13:00	12.35nm
33	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	07/08/2013 13:00	3.5	07/08/2013 16:30	1.1km to survey. **End of SOUTHERN CROSS Dive 3**
34	Relocate ship to Inspection Site #4	07/08/2013 16:30	1.0	07/08/2013 17:30	3.42nm
35	Launch ROV, Dive 4. Survey Inspection Site #4 and recover	07/08/2013 17:30	2.0	07/08/2013 19:30	0.6km to survey. **End of SOUTHERN CROSS Dive 4**
36	Relocate ship to Inspection Site #5	07/08/2013 19:30	0.5	07/08/2013 20:00	1.51nm
37	Launch ROV, Dive 5. Survey Inspection Site #5 and recover.	**07/08/2013 20:00**	**5.5**	**08/08/2013 01:30**	2.0km to survey. **End of SOUTHERN CROSS Dive 5. Survey complete.**
38	**RELOCATE SHIP TO AKORN CABLE. Set up in DP**	08/08/2013 01:30	8.0	08/08/2013 09:30	92nm

39	Launch ROV, Dive 1. Survey Inspection Site #1 and recover	08/08/2013 09:30	2.0	08/08/2013 11:30	0.6km to survey. End of **AKORN Dive 1**
40	Relocate ship to Inspection Site #2	08/08/2013 11:30	1.0	08/08/2013 12:30	2.3nm
41	Launch ROV, Dive 2. Survey Inspection Site #2 and recover	08/08/2013 12:30	2.5	08/08/2013 15:00	1.0km to survey. End of **AKORN Dive 2**
42	Relocate ship to Inspection Site #3	08/08/2013 15:00	2.5	08/08/2013 17:30	18.02nm
43	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	08/08/2013 17:30	7.0	09/08/2013 00:30	3.0km to survey. End of **AKORN Dive 3**
44	Relocate ship to Inspection Site #4 Inshore	09/08/2013 00:30	2.0	09/08/2013 02:30	15.5nm
45	Launch ROV, Dive 4. Survey Inspection Site #4 and recover.	**09/08/2013 02:30**	**5.0**	**09/08/2013 07:30**	1.8km to survey. End of **AKORN Dive 4. Survey complete.**
46	**TRANSIT TO COOS BAY AND DISEMBARK REPS. Embark China-US reps.**	**09/08/2013 07:30**	**7.0**	**09/08/2013 14:30**	***75nm***
47	***COOS BAY TO CHINA-US, Segment E1 CABLE. Set up in DP***	*09/08/2013 14:30*	*2.0*	*09/08/2013 16:30*	*10.25nm*
48	*Launch ROV, Dive 1. Survey Inspection Site #1 and recover.*	***09/08/2013 16:30***	***117.0***	***14/08/2013 13:30***	***57.00km approx. End of CHINA-US E1 Dive 1. SURVEY COMPLETE***
49	***RELOCATE SHIP TO CHINA-US, Segment N9 CABLE. Set up in DP***	14/08/2013 13:30	2.0	14/08/2013 15:30	8.94nm
50	*Launch ROV, Dive 1. Survey Inspection Site #1 and recover.*	***14/08/2013 15:30***	***131.0***	***20/08/2013 02:30***	***64.00km approx. End of CHINA-US N9 Dive 1. SURVEY COMPLETE.***
51	US Customs and Immigration Clearance by radio and disembark reps at COOS BAY	*20/08/2013 02:30*	*1.0*	*20/08/2013 03:30*	11nm @ 12knts
52	Ship FAOP from Offshore Coos Bay to Victoria, BC	***20/08/2013 03:30***	*25.5*	*21/08/2013 05:00*	306nm @12knts
53	**Pilotage to Victoria Cable Depot and arrival**	***21/08/2013 05:00***	0.5	***21/08/2013 05:30***	EOP Victoria, BC
54	**ROV Maintenance Contingency of 2 hrs per day**	***21/08/2013 05:30***	28.0	***22/08/2013 09:30***	2 hours per day
	Total Time		**21 days 00:30 hrs**		

PLAN OF WORK FOR NAZ CABLE INSPECTIONS

Issued 15/Aug/13
version 11.0
Commander/CCE/CSE
M.Nash/A.McAreavey/J.Wiseman

All times are local

No	Action	Commence	Data entry Duration (Hours)	Complete	
1	Vessel on NAZ standby at Nanaimo, BC			01/08/2013 08:00	
2	Vessel departs Nanaimo - pilotage to sea	01/08/2013 08:00	9.0	01/08/2013 17:00	
3	**Vessel FAOP to Astoria, OR, Pilot station**	01/08/2013 17:00	20.0	02/08/2013 13:00	234nm @12knts to EOP Includes 2 hrs for ROV test dive
4	**Pilotage into Astoria**	02/08/2013 13:00	3.0	02/08/2013 16:00	
5	US Customs and Immigration Clearance Take on Bunkers	02/08/2013 16:00	6.0	02/08/2013 22:00	Embark OFCC and cable representatives. Depart Astoria, OR.
6	Transit to **TPE. Set up ship in DP**	02/08/2013 22:00	4.5	03/08/2013 02:30	33.13nm **Apply In-Service tone to TPE**
7	Launch ROV to place a beacon on the seabed and complete ROV profilers checks and set up	03/08/2013 02:30	5.5	03/08/2013 08:00	
8	HPR Trials	03/08/2013 08:00	29.5	04/08/2013 13:30	
9	Launch ROV to recover beacon	04/08/2013 13:30	1.0	04/08/2013 14:30	
10	Transit to TPE site#1 and set up in DP	04/08/2013 14:30	2.9	04/08/2013 17:24	
11	Launch ROV, Dive 1. Survey Inspection Site #1 and recover. **COMMENCE TPE SURVEY**	04/08/2013 17:24	5.4	04/08/2013 22:47	0.88km to survey. End of **TPE Dive 1** **CABLE NOT DETECTED**
12	Relocate ship to Inspection Site #2	04/08/2013 22:47	2.1	05/08/2013 00:55	18.63nm
13	Launch ROV, Dive 2. Survey Inspection Site #2 and recover	05/08/2013 00:55	3.3	05/08/2013 04:15	3.82km to survey. End of **TPE DIVE 2** **CABLE NOT DETECTED**
14	Relocate ship to Inspection Site #3	05/08/2013 04:15	1.3	05/08/2013 05:31	6.59nm
15	Launch ROV, Dive 3. Survey Inspection Site #3 and recover. Tone on cable not detected until reconfiguration at Nedonna Beach CLS	05/08/2013 05:31	10.2	05/08/2013 15:40	1.05km to survey. End of **TPE Dive 3**
16	Relocate ship to Inspection Site #2	05/08/2013 15:40	1.4	05/08/2013 17:01	
17	Launch ROV, Dive 4. Survey Inspection Site #2 and recover	05/08/2013 17:01	9.9	06/08/2013 02:53	3.82km to survey.
18	Relocate ship to Inspection Site #4	06/08/2013 02:53	1.4	06/08/2013 04:17	

19	Launch ROV, Dive 5. Survey Inspection Site #4 and recover	06/08/2013 04:17	11.7	06/08/2013 15:57	1.90km to survey. **Includes down time for ROV**
20	Relocate ship to Inspection Site #5	06/08/2013 15:57	1.2	06/08/2013 17:07	9.02nm
21	Launch ROV, Dive 6. Survey Inspection Site #5 and recover.	06/08/2013 17:07	7.1	07/08/2013 00:16	1.80km to survey.
22	**RELOCATE SHIP TO NORTHSTAR CABLE and set up in DP**	07/08/2013 00:16	0.7	07/08/2013 00:59	3.43nm **Apply In-service tone to North Star**
23	Launch ROV, Dive 1. Survey Inspection Site #5 and recover	07/08/2013 00:59	9.5	07/08/2013 10:26	1.0km to survey. End of **NORTHSTAR Dive 1**
24	Relocate ship to Inspection Site #4	07/08/2013 10:26	0.9	07/08/2013 11:20	1.35nm
25	Launch ROV, Dive 2. Survey Inspection Site #4 and recover	07/08/2013 11:20	9.0	07/08/2013 20:21	4.0km to survey. End of **NORTHSTAR Dive 2**
26	Relocate ship to Inspection Site #3	07/08/2013 20:21	1.2	07/08/2013 21:35	5.07nm
27	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	07/08/2013 21:35	5.3	08/08/2013 02:50	2.2km to survey. End of **NORTHSTAR Dive 3**
28	Relocate ship to Inspection Site #2	08/08/2013 02:50	1.6	08/08/2013 04:28	12.57nm
29	Launch ROV, Dive 4. Survey Inspection Site #2 and recover	08/08/2013 04:28	13.0	08/08/2013 17:30	3.85km to survey. End of **NORTHSTAR Dive 4**
30	Relocate ship to Inspection TPE Site #1	08/08/2013 17:30	2.4	08/08/2013 19:51	
31	Launch ROV Survey Inspection TPE Site #1 and recover.	08/08/2013 19:51	3.9	08/08/2013 23:43	0.88km to survey. TPE Survey completed. **Remove in-service tone**
32	**Relocate ship to Inspection Northstar Site #1**	08/08/2013 23:43	0.9	09/08/2013 00:39	
33	Launch ROV Survey Inspection Northstar Site #1 and recover.	09/08/2013 00:39	3.8	09/08/2013 04:30	0.2km to survey. **End of NORTHSTAR Survey complete**
34	**RELOCATE SHIP TO SOUTHERN CROSS CABLE and set up in DP**	09/08/2013 04:30	0.7	09/08/2013 05:10	0.56nm **Apply In-service tone to Southern cross**
35	Launch ROV, Dive 1. Survey Inspection Site #1 and recover	09/08/2013 05:10	2.5	09/08/2013 07:39	0.50km to survey. **End of SOUTHERN CROSS Dive 1**
36	Relocate ship to Inspection Site #2	09/08/2013 07:39	3.0	09/08/2013 10:39	18.28nm
37	Launch ROV, Dive 2. Survey Inspection Site #2 and recover	09/08/2013 10:39	3.5	09/08/2013 14:06	1.3km to survey. **End of SOUTHERN CROSS Dive 2**

38	Relocate ship to Inspection Site #3	09/08/2013 14:06	1.6	09/08/2013 15:40	12.35nm
39	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	09/08/2013 15:40	7.3	09/08/2013 23:00	1.1km to survey. **End of SOUTHERN CROSS Dive 3**
40	Relocate ship to Inspection Site #4	09/08/2013 23:00	0.9	09/08/2013 23:56	3.42nm
41	Launch ROV, Dive 4. Survey Inspection Site #4 and recover	09/08/2013 23:56	2.2	10/08/2013 02:10	0.6km to survey. **End of SOUTHERN CROSS Dive 4**
42	Relocate ship to Inspection Site #5	10/08/2013 02:10	0.5	10/08/2013 02:40	1.51nm
43	Launch ROV, Dive 5. Survey Inspection Site #5 and recover.	10/08/2013 02:40	6.7	10/08/2013 09:23	2.0km to survey. **End of SOUTHERN CROSS Dive 5. Survey complete.**
44	**RELOCATE SHIP TO AKORN CABLE. Set up in DP**	10/08/2013 09:23	9.0	10/08/2013 18:23	92nm **Apply In-Service tone to AKORN**
45	Launch ROV, Dive 1. Survey Inspection Site #1 and recover	10/08/2013 18:23	2.4	10/08/2013 20:45	0.6km to survey. End of **AKORN Dive 1**
46	Relocate ship to Inspection Site #2	10/08/2013 20:45	0.7	10/08/2013 21:25	2.3nm
47	Launch ROV, Dive 2. Survey Inspection Site #2 and recover	10/08/2013 21:25	3.0	11/08/2013 00:23	1.0km to survey. End of **AKORN Dive 2**
48	Relocate ship to Inspection Site #3	11/08/2013 00:23	2.3	11/08/2013 02:43	18.02nm
49	Launch ROV, Dive 3. Survey Inspection Site #3 and recover	11/08/2013 02:43	7.3	11/08/2013 09:59	3.0km to survey. End of **AKORN Dive 3**
50	Relocate ship to Inspection Site #4 Inshore	11/08/2013 09:59	2.0	11/08/2013 11:57	15.5nm
51	Launch ROV, Dive 4. Survey Inspection Site #4 and recover.	11/08/2013 11:57	6.5	11/08/2013 18:24	1.8km to survey. End of **AKORN Dive 4. Survey complete.**
52	**TRANSIT TO COOS BAY AND DISEMBARK REPS. Embark China-US reps.**	11/08/2013 18:24	18.3	12/08/2013 12:44	***35nm Slow passage from AKORN site #4 too Coos bay for ETA 07:30LT 12th August***
53	**COOS BAY TO CHINA-US, Segment E1 CABLE. Set up in DP**	12/08/2013 12:44	2.5	12/08/2013 15:13	10.25nm **Apply In-Service Tone to Seg E1**
54	Launch ROV, Dive 1. Survey Inspection Site #1 and recover.	12/08/2013 15:13	64.5	15/08/2013 07:45	**Offshore survey completed at KP: 56.890**
55	**RELOCATE SHIP TO CHINA-US, Segment E1 plough down position KP:23 CABLE. Set up in DP**	15/08/2013 07:45	2.1	15/08/2013 09:52	
56	Resume ROV survey from KP: 23 heading inshore	15/08/2013 09:52	36.5	16/08/2013 22:24	**Cable inspection in area of rocks and suspensions**

57	**RELOCATE SHIP TO CHINA-US, Segment N9 CABLE. Set up in DP**	16/08/2013 22:24	1.2	16/08/2013 23:35	
58	Launch ROV, Dive 1. Survey Inspection Site #1 and recover.	16/08/2013 23:35	133.2	22/08/2013 12:44	**64.00km approx. End of CHINA-US N9 Dive 1. SURVEY COMPLETE.**
59	Passage to Coos Bay,US Customs and Immigration Clearance and disembark reps at COOS BAY	22/08/2013 12:44	4.8	22/08/2013 17:30	
60	Ship FAOP from Offshore Coos Bay to Victoria, BC	22/08/2013 17:30	41.3	24/08/2013 10:48	**386nm @10knts**
61	**Pilotage to Victoria Cable Depot and arrival**	24/08/2013 10:48	22.2	25/08/2013 09:00	Including standby at anchorage
	Total Time		**24 days 01:00 hrs**		

5.0 Method of Procedure

Method of procedure for application of In-Service tone to the cable is presented below:

	PROCEDURE	VESSEL	BANDON CLS (Ch-US)
1	Preparation	Confirm PSO information with Cable Landing Station	Confirm PSO information with cable ship
2	Tone application	Power Safety Message (PSM) to CLS requesting a 25Hz in service tone applied to the China-US Seg E1 & N9 system at maximum amplitude	Power Safety Message to Wave Venture confirming a 25Hz in service tone has been applied to the China-US Seg E1 & N9 system at maximum amplitude
3	ROV inspection	Complete ROV cable inspection	Monitor tone generator and advise Wave Venture if tone is removed or 'lost'.
4	Tone removal	Power Safety Message (PSM) to CLS requesting the in service tone be removed from the China-US Seg E1 & N9 system and that Wave Venture has completed inspection work on this system.	Power Safety Message to Wave Venture confirming the in service tone has been removed from the China-US Seg E1 & N9 system and that Wave Venture has completed inspection work on this system.

6.0 Survey Results

6.1 Segment E1

This survey consisting of approximately 57.000km of buried cable was undertaken between the 12th August and 16th August. For convenience in data handling, the survey was split approximately into 5km sites as follows:

Site 1: KP 1.894 to KP 2.377

The seabed in this area had a sandy bottom with numerous rock outcrops and loose boulders. The ROV commenced a search for cable tone at KP1.892, but despite several sweeps of the cable line, was unable to locate the cable. Following a move 100m further west, the cable was eventually located at KP1.900. Despite the difficulties in manoeuvring the ROV through the seabed rock formations, survey continued up to KP2.377 when due to seabed conditions a decision was made to relocate to the plough down position at KP23.100. During the survey, several cable suspensions were recorded from KP2.302 to survey end. Where buried, the average cable burial depth was approximately 16cm.

Site 2: KP 23.135 to KP 28.011

Seabed was sandy with large boulder/rock formations. Average cable burial depth was approximately 68cm, although from KP24.480, the burial is in excess of 100cm. There was evidence of fishing activity with trawl tracks and abandoned ropes and cables.

Site 3: KP 28.012 to KP 33.020

Seabed was largely flat and featureless sand/silt. Average cable burial depth, up to KP30.400 was approximately 102cm, then the burial depth falls to an average of approximately 36cm. Cable exposures were recorded at KP30.590 to KP30.733, KP31.341 to KP31.361 and KP32.718 to KP32.826. There was evidence of fishing activity with abandoned ropes and a crab pot.

Site 4: KP 33.020 to KP 38.022

Seabed was largely flat and featureless sand/silt. Average cable burial depth was approximately 98cm. There was evidence of fishing activity with trawl tracks and abandoned ropes and cables.

Site 5: KP 38.022 to KP 43.037

Seabed was largely sand/silt with occasional rock outcrops. Average cable burial depth was approximately 86cm, although burial is shallower around KP41.060. There was also evidence of fishing activity with trawl tracks visible.

Site 6: KP 43.037 to KP 47.999

Seabed was largely sand/silt with occasional small rocks. Average cable burial depth was approximately 101.6cm. Cable suspensions were recorded between KP 43.247 to KP43.276, KP44.350 to KP44.402 and KP44.672 to KP44.758. There was also evidence of fishing activity with trawl tracks visible.

Site 7: KP 47.999 to KP 53.011

Seabed was largely flat and featureless sand/silt. Average cable burial depth was approximately 125cm. There was evidence of fishing activity with trawl tracks and abandoned ropes and cables.

Site 8: KP 53.011 to KP 56.877

Seabed was largely flat and featureless sand/silt. Average cable burial depth was approximately 119cm up to KP54.800, after which the cable is unburied and suspended in many areas.

Sites 9 & 10: KP 23.163 to KP 18.144

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time.

Sites 11 & 12: KP 18.144 to KP 13.143

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time.

Sites 13 & 14: KP 13.143 to KP 7.993

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time. The cable was seen to cross at KP 12.121 the ‘out of service cable’ TPC5-T1; no protection has been afforded. There was also evidence of fishing activity with rope/line found on the cable at KP 9.638.

Sites 15 & 16: KP 7.993 to KP 2.355

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time. Damage, consisting of broken and ‘bird-caged’ armour wires was sighted at KP 5.434, a Joint Box was sighted at KP 4.976 and evidence of a cable bight at KP 2.930 to KP 2.863. There was also evidence of fishing activity with rope/line found on the cable at KP 6.434.

6.2 Segment N9

This survey consisting of approximately 64.000km of buried cable was undertaken between the 16th August and 22nd August. Survey commenced with a search for tone at KP8097.839, but as slow progress was being made in this location, it was decided that the vessel should re-locate to deeper water and return here on completion of the offshore section. For convenience in data handling, the survey was split approximately into 5km sites as follows:

Site 1: KP 8076.138 to KP 8070.997

The seabed in this area composed of flat fine density sand. The cable was exposed for the first part of the survey and the cable suspended between KP8075.820 and KP8075.769. The cable then went into burial at KP 8075.809 and continued so for the rest of the site. There was also evidence of fishing activity with grapnel being found next to the cable at KP 8076.081.
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Site 2: KP 8070.995 to KP 8065.990

The seabed in this area is composed of flat medium density sand. The cable is well buried (>100cm) for the entire site.

Site 3: KP 8065.988 to KP 8060.933

The seabed in this area is composed of flat medium density sand with occasional rock outcrops. The cable is well buried (>130cm) for the entire site. There was also evidence of fishing activity with trawl tracks visible.

Site 4: KP 8060.932 to KP 8055.996

The seabed in this area is composed of flat medium density sand. The cable is well buried (>100cm) for most of the site.

Site 5: KP 8055.995 to KP 8051.006

The seabed in this area is composed of flat medium density sand. The cable is well buried (>80cm) for most of the site. There was also evidence of fishing activity with trawl tracks visible.

Site 6: KP 8051.004 to KP 8046.012

The seabed in this area is composed of flat medium density sand. The cable is well buried (>100cm) for most of the site.

Site 7: KP 8046.011 to KP 8041.034

The seabed in this area is composed of flat soft sand with occasional rock outcrops. The cable is shallow buried with several exposures and suspensions between, KP8042.279 to KP8042.229, small over rocks. There was also evidence of fishing activity with trawl tracks visible.

Site 8: KP 8041.034 to KP 8036.002

The seabed in this area is composed of flat soft sand and the cable is buried to >50cm over most of its route. At KP8036.413 though, the cable becomes exposed at the plow up position (end of burial).

Site 9: KP 8036.004 to KP 8034.644

The seabed in this area is composed of flat soft sand and the cable is either exposed or self-buried over most of its route. At KP8034.463 the ROV had difficulty following the cable tone. Reference to previous PLIB operations indicated the presence of a cable loop in this area and so, with agreement of the Client representative, further survey westwards was halted at this point.

Site 10: KP 8076.135 to KP 8078.606

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time.

Site 11: KP 8078.606 to KP8081.203

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time.

Site 12: KP 8081.205 to KP8083.805

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time. There was also evidence of fishing activity with rope/line found close to the cable at KP8082.874.

Site 13: KP 8083.806 to KP8086.297

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time.

Site 14: KP 8086.297 to KP8088.693

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable indicates that these conditions have existed for some time. There was also evidence of fishing activity with steel wire found across the cable at KP8086.630.

Site 15: KP 8088.693 to KP8091.210

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable and chafing into rock, by the cable at KP8090.820, indicates that these conditions have existed for some time.

Site 16: KP 8091.210 to KP8093.705

The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable and chafing into rock, by the cable at several locations, indicates that these conditions have existed for some time.

Site 17: KP 8093.705 to KP8096.307

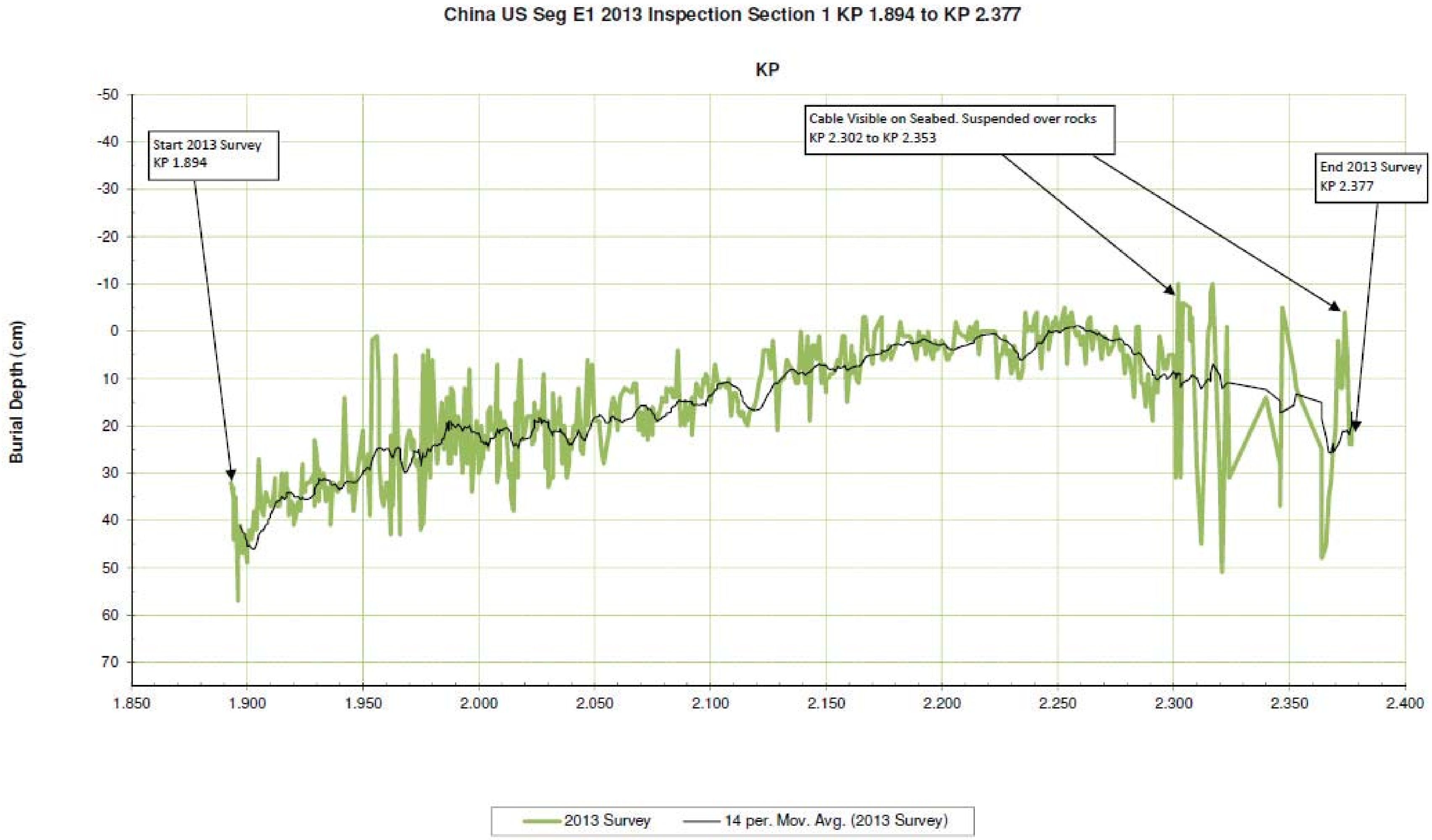
The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable and chafing into rock, by the cable at several locations, indicates that these conditions have existed for some time.

Site 18: KP 8096.307 to KP8097.917

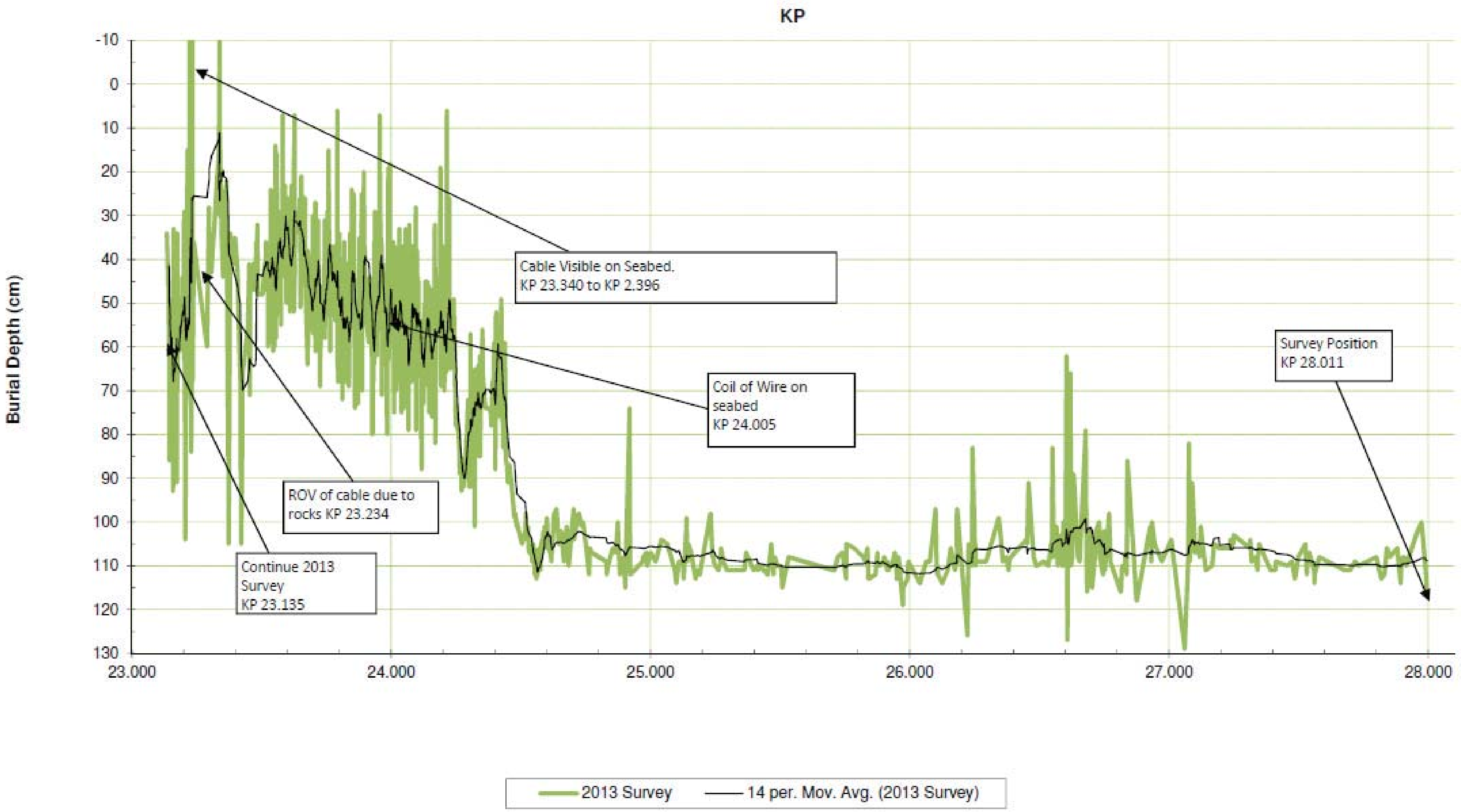
The seabed in this area had a sandy bottom with extensive rock outcrops and loose boulders, which hampered survey progress. Generally the cable is exposed or suspended on rock outcrops, with small areas of shallow burial; marine growth on the cable and chafing into rock, by the cable at several locations, indicates that these conditions have existed for some time. There are 2 in No. repair final bights located in this area at KP8097.440 to KP8097.555 and at KP8096.596 to KP8096.633.

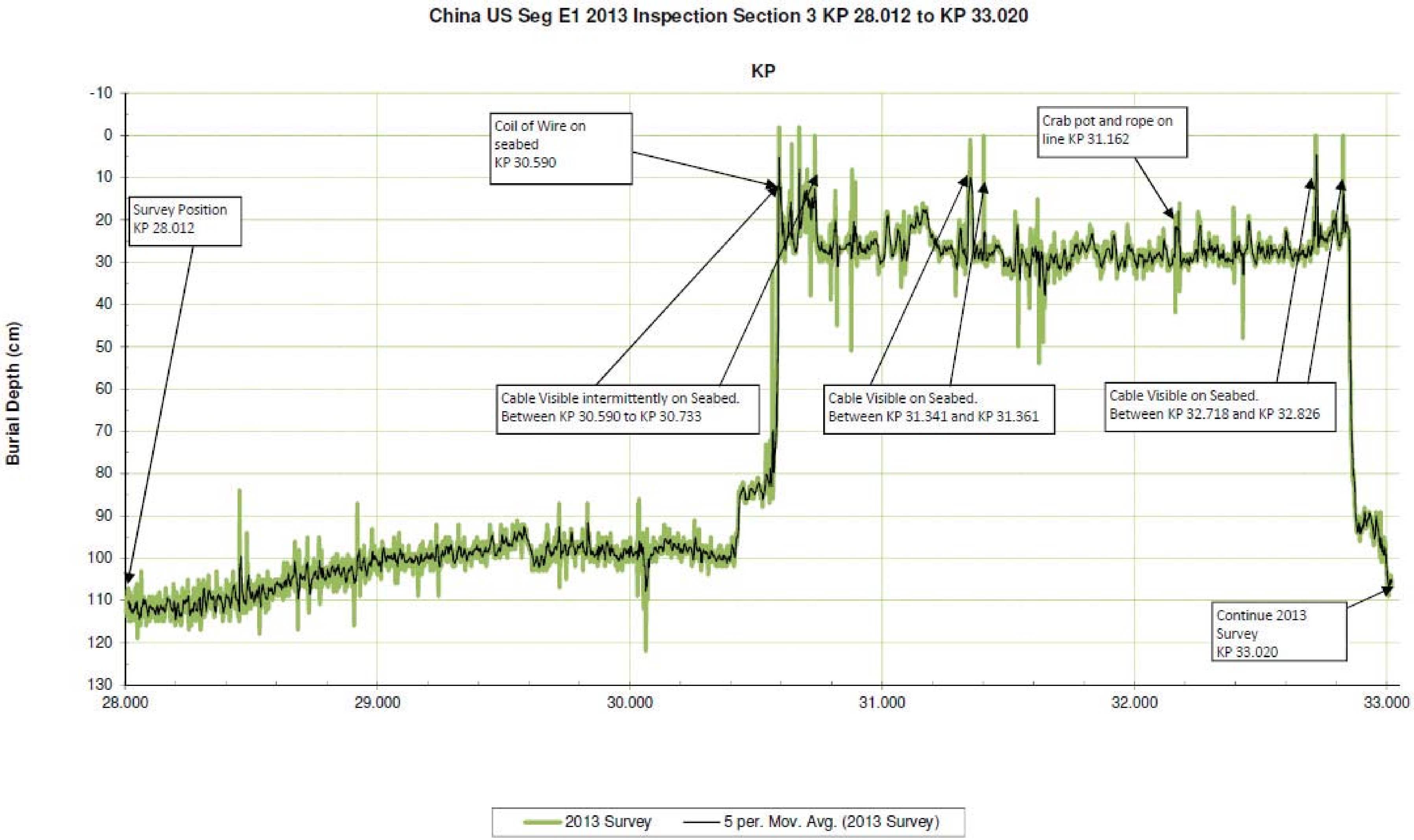
7.0 Cable Burial Graphs

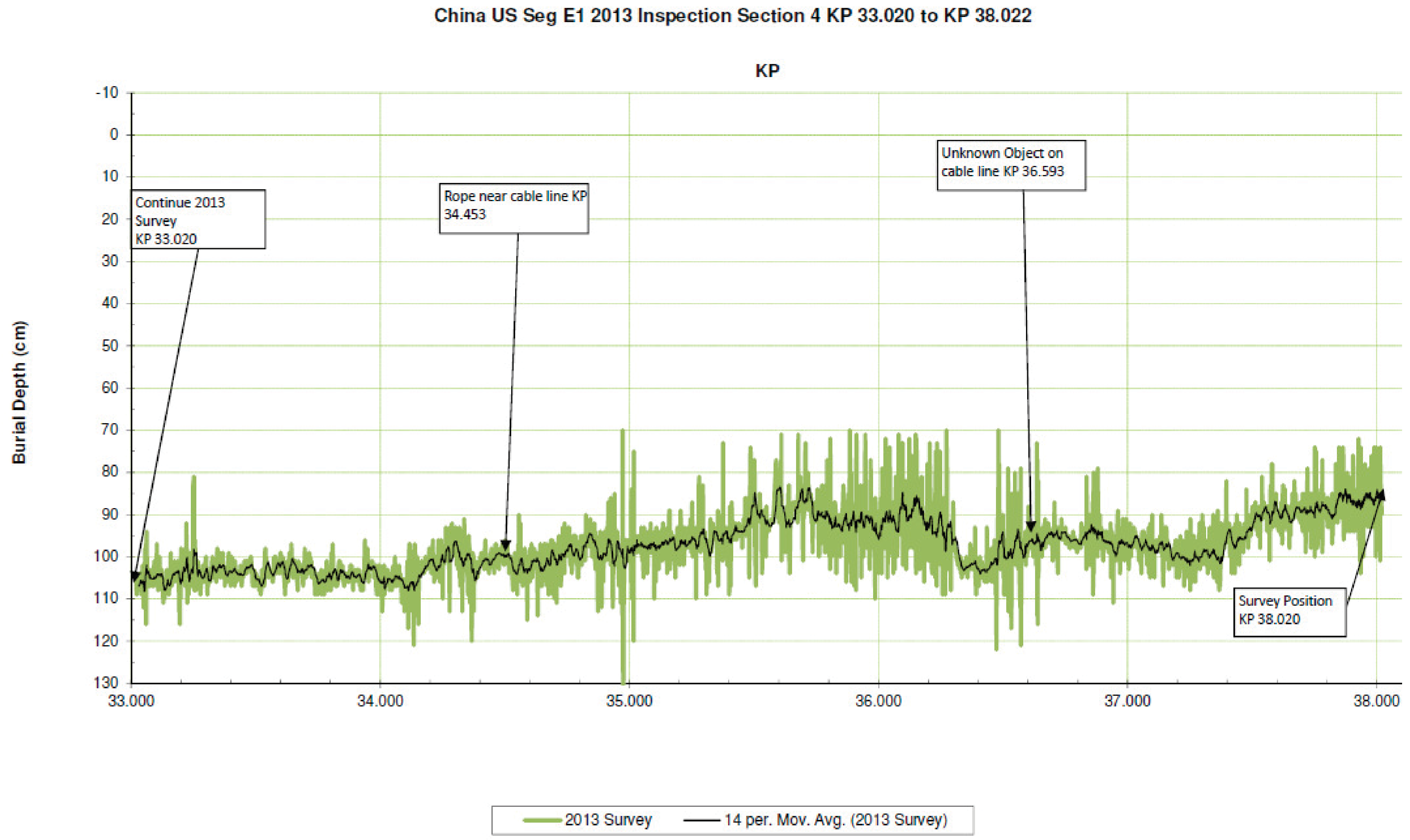
7.1 China-US Seg E1

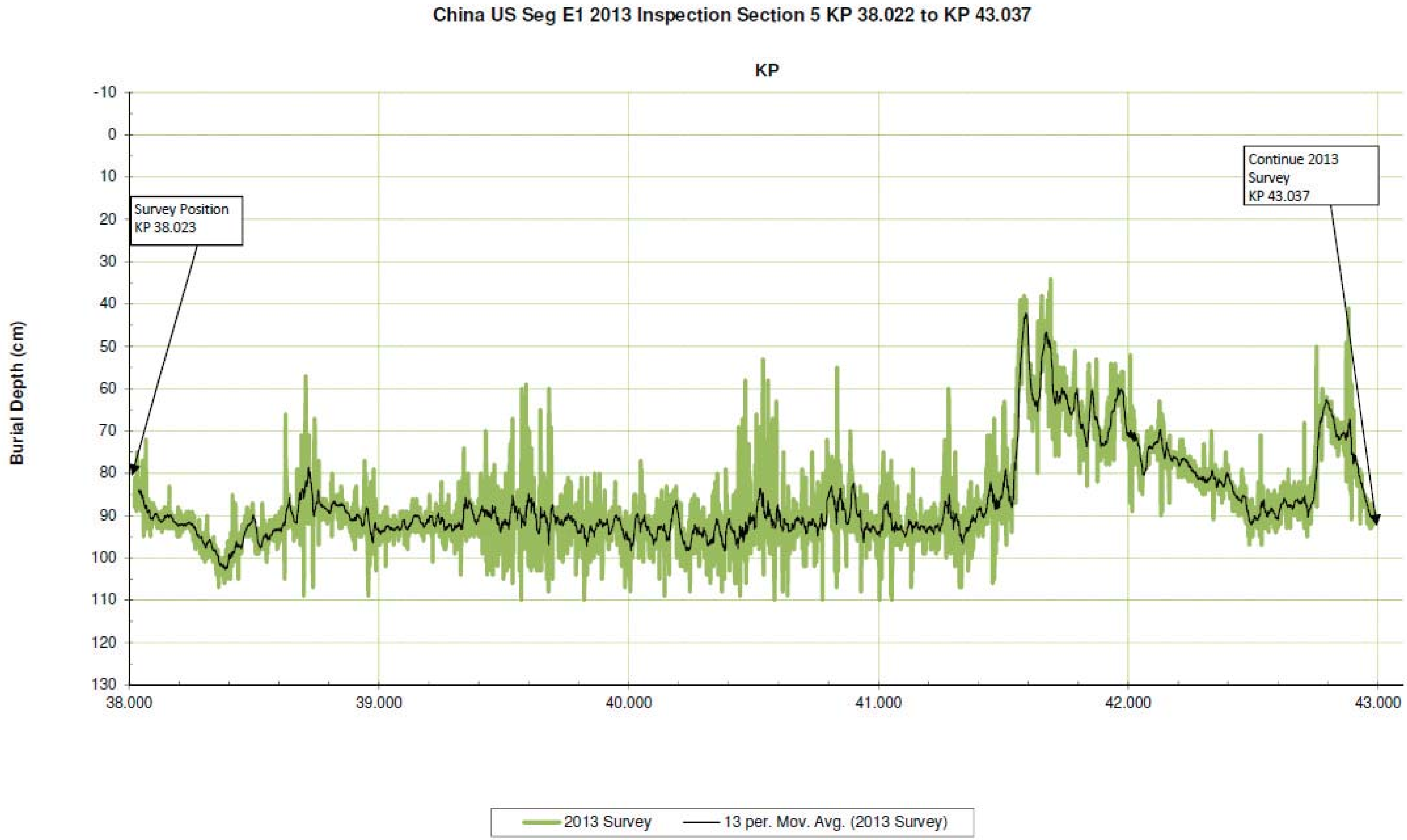


China US Seg E1 2013 Inspection Section 2 KP 23.135 to KP 28.011

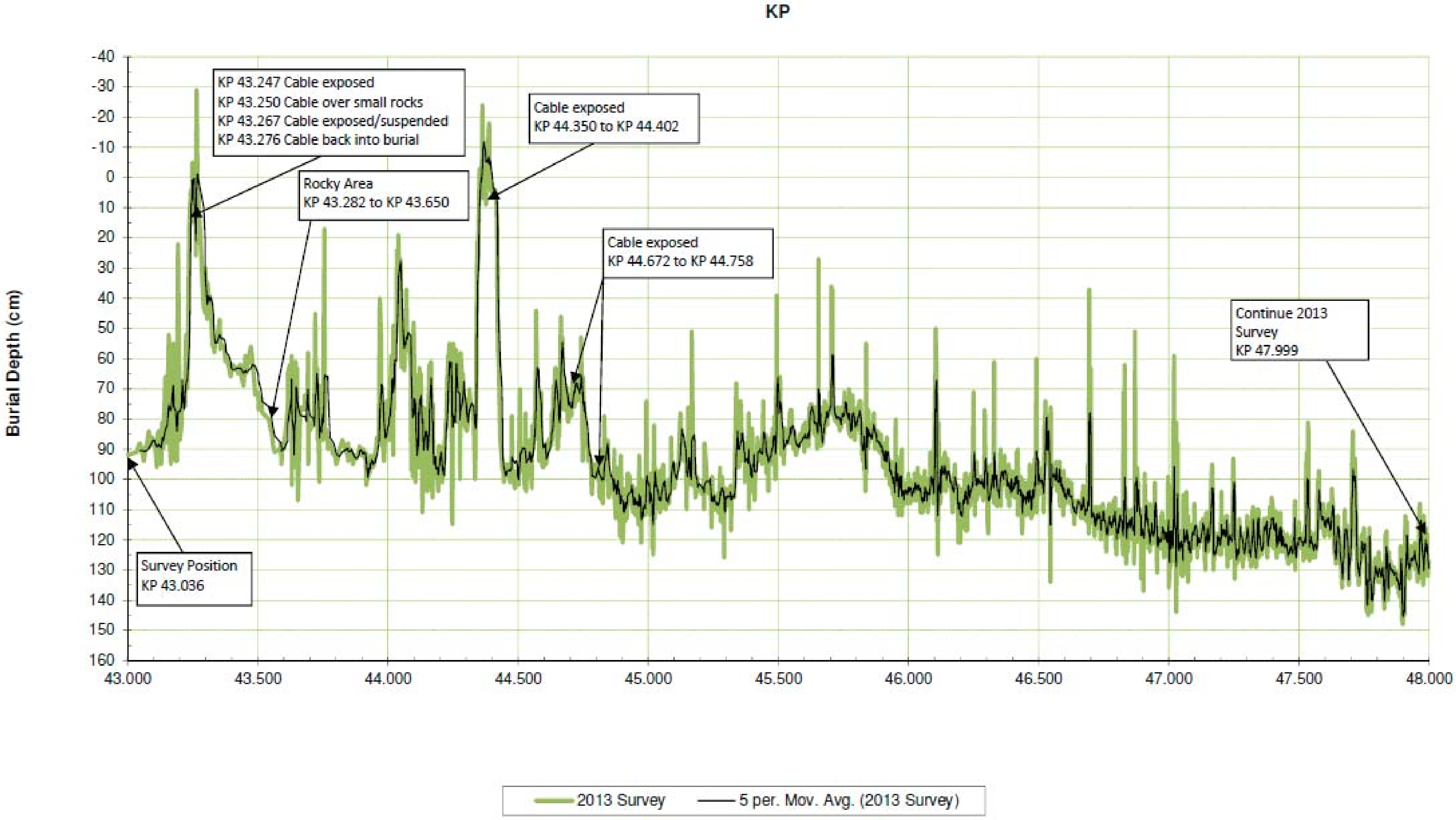


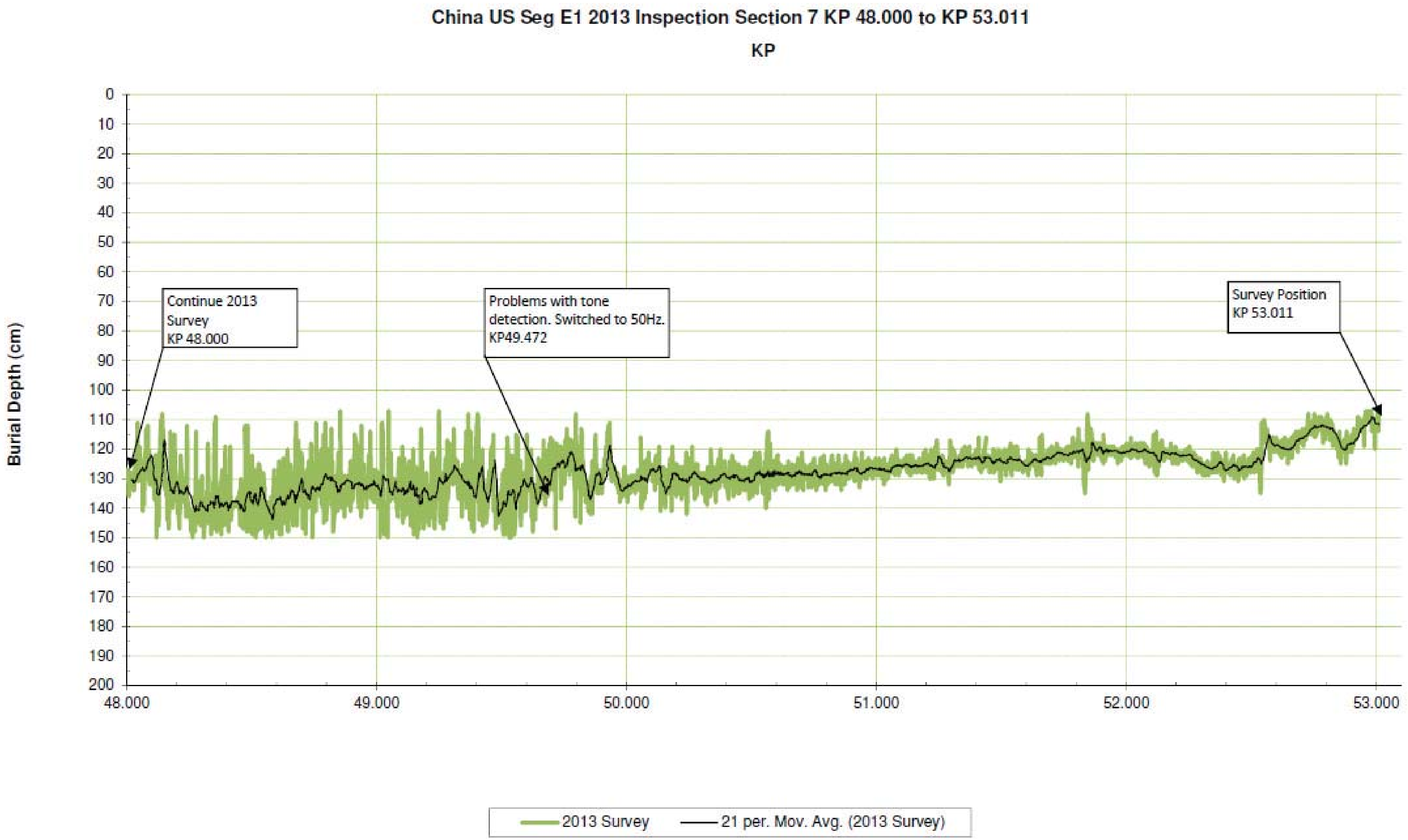

China US Seg E1 2013 Inspection Section 3 KP 28.012 to KP 33.020
KP
Burial Depth (cm)
Coil of Wire on seabed KP 30.590
Crab pot and rope on line KP 31.162
Survey Position KP 28.012
Cable Visible intermittently on Seabed. Between KP 30.590 to KP 30.733
Cable Visible on Seabed. Between KP 31.341 and KP 31.361
Cable Visible on Seabed. Between KP 32.718 and KP 32.826
Continue 2013 Survey KP 33.020
2013 Survey
5 per. Mov. Avg. (2013 Survey)

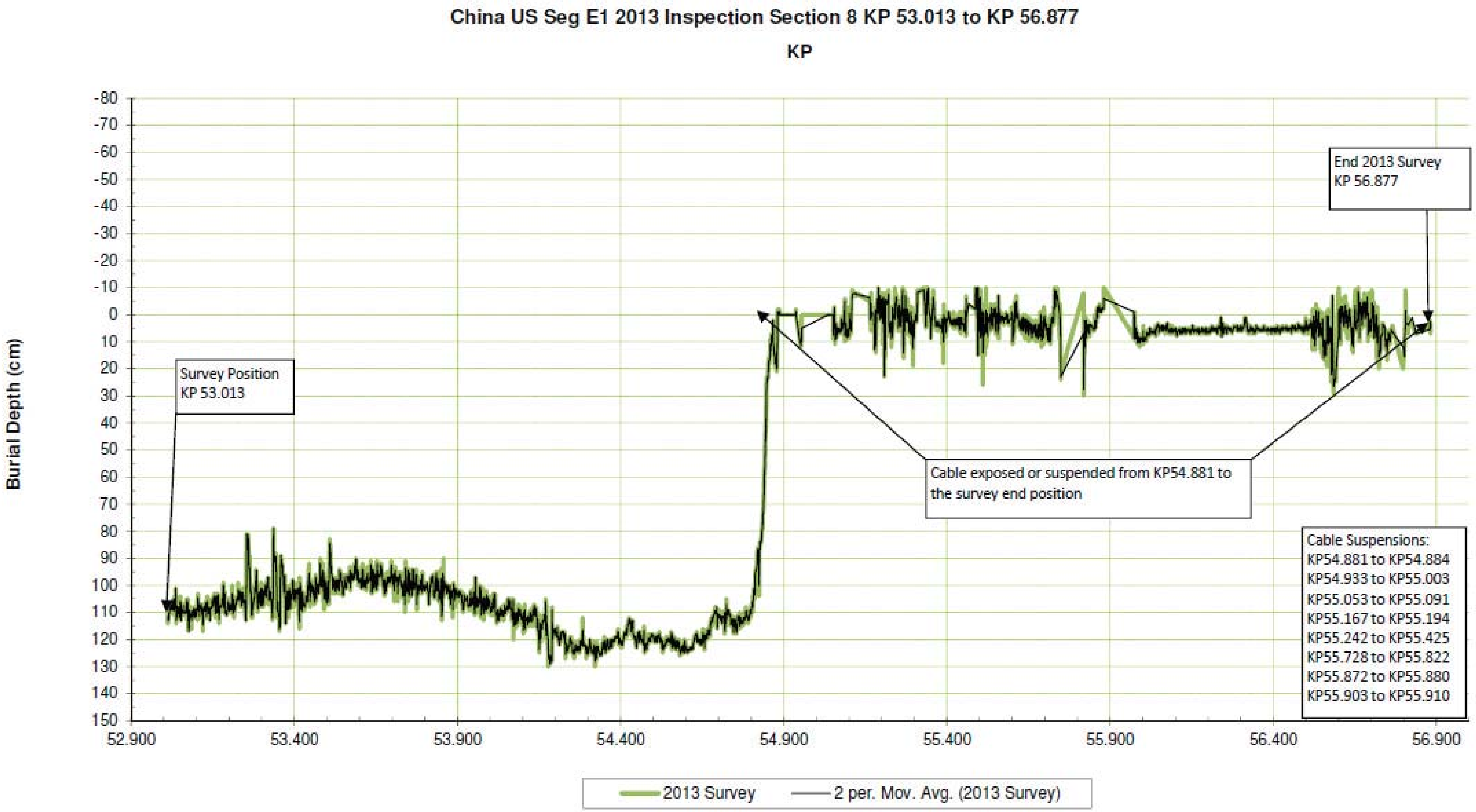

China US Seg E1 2013 Inspection Section 4 KP 33.020 to KP 38.022
KP
Burial Depth (cm)
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
33.000
34.000
35.000
36.000
37.000
38.000
Continue 2013 Survey KP 33.020
Rope near cable line KP 34.453
Unknown Object on cable line KP 36.593
Survey Position KP 38.020
2013 Survey
14 per. Mov. Avg. (2013 Survey)

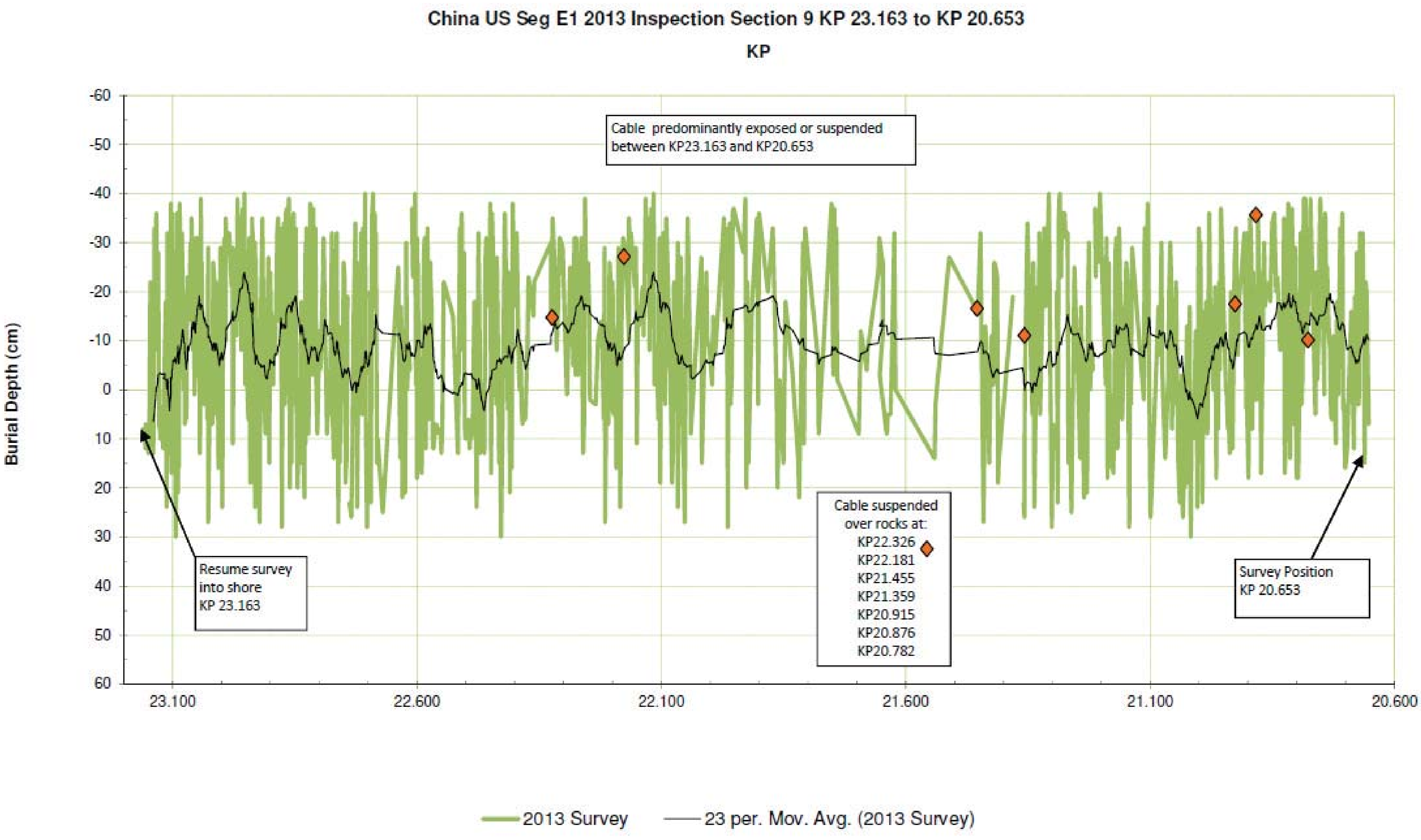

China US Seg E1 2013 Inspection Section 5 KP 38.022 to KP 43.037
KP
Burial Depth (cm)
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
38.000
39.000
40.000
41.000
42.000
43.000
Survey Position
KP 38.023
Continue 2013
Survey
KP 43.037
2013 Survey
13 per. Mov. Avg. (2013 Survey)

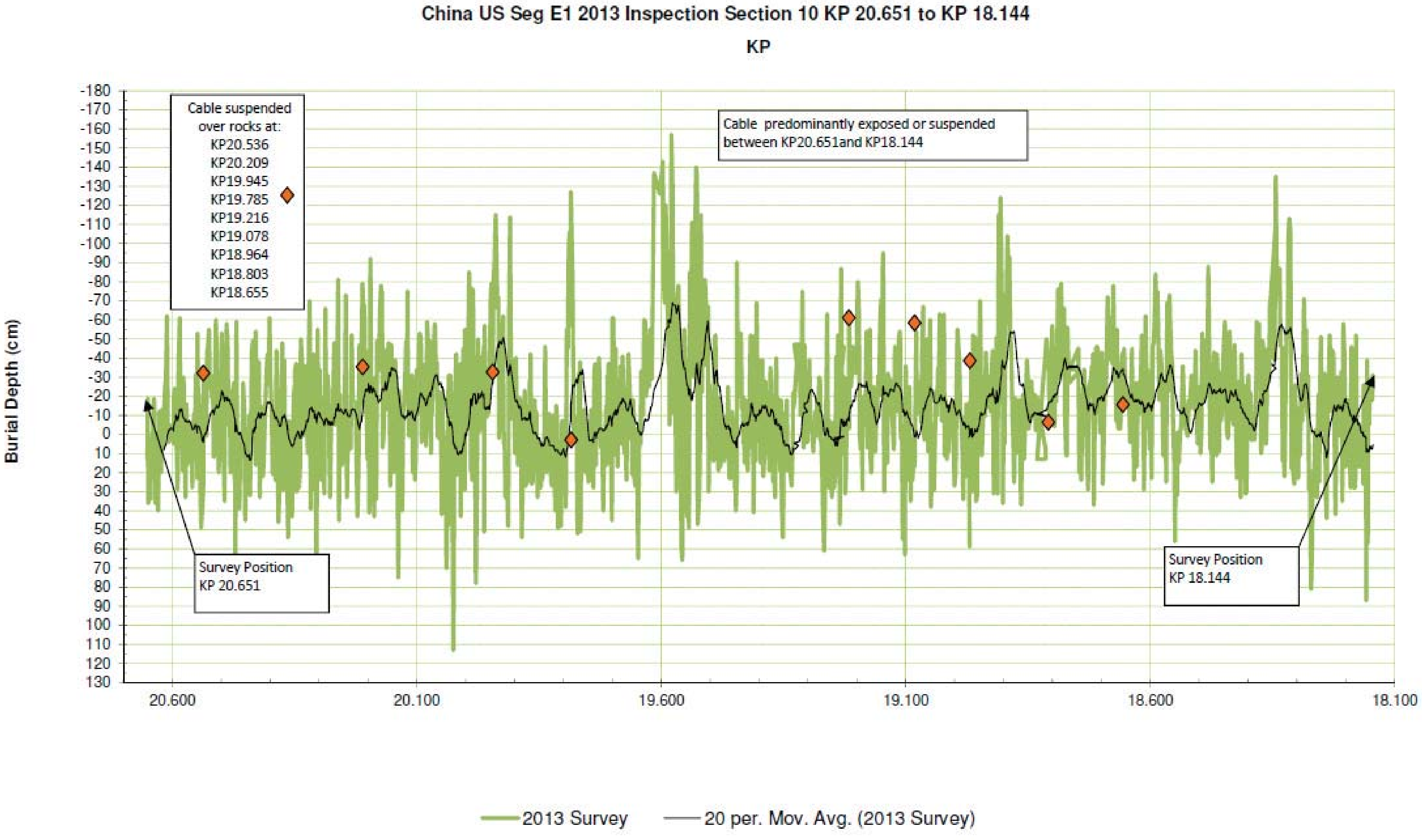
China US Seg E1 2013 Inspection Section 6 KP 43.036 to KP 47.999



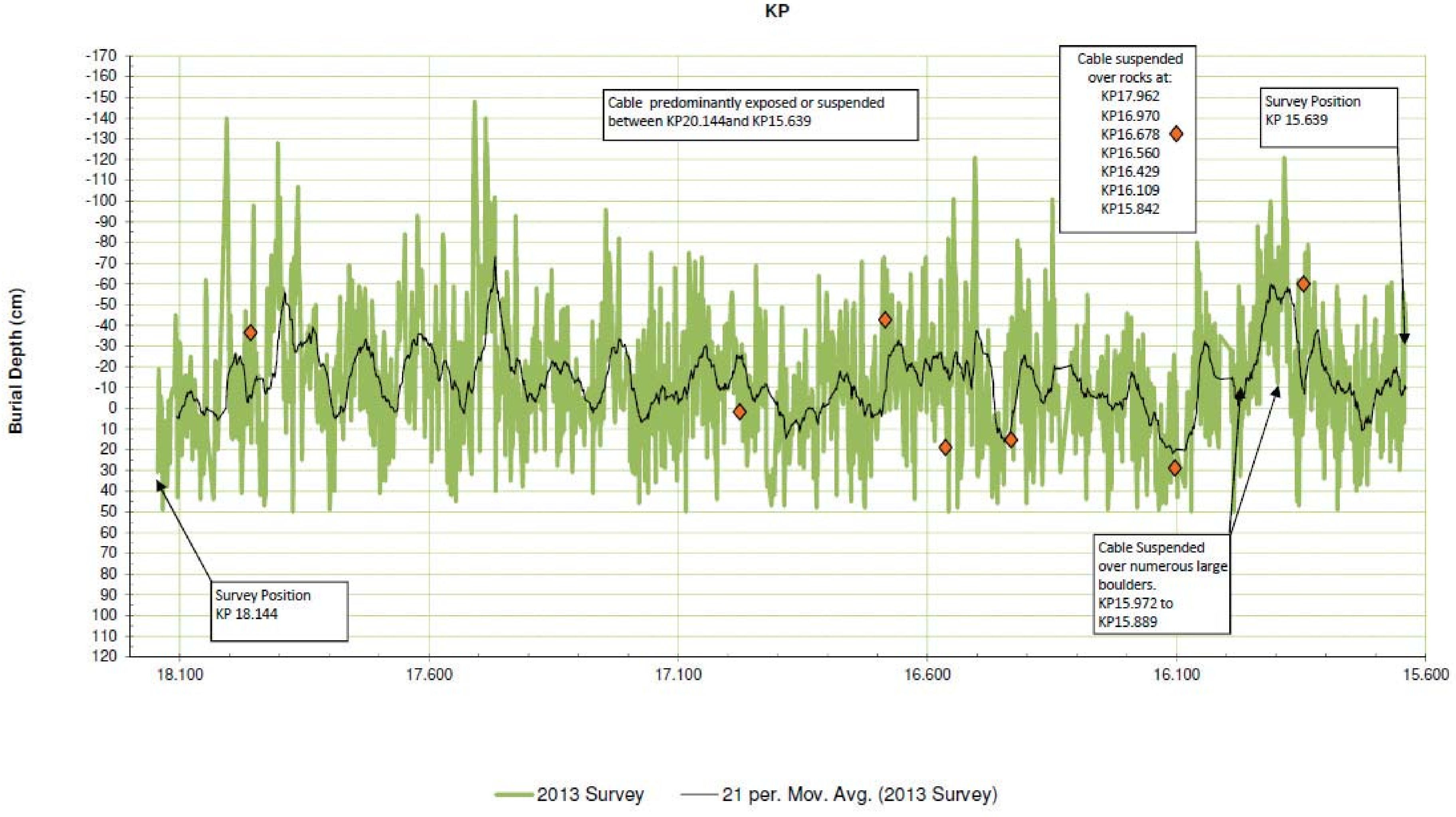

China US Seg E1 2013 Inspection Section 7 KP 48.000 to KP 53.011
KP
Burial Depth (cm)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
48.000
49.000
50.000
51.000
52.000
53.000
Continue 2013 Survey KP 48.000
Problems with tone detection. Switched to 50Hz. KP49.472
Survey Position KP 53.011
2013 Survey
21 per. Mov. Avg. (2013 Survey)

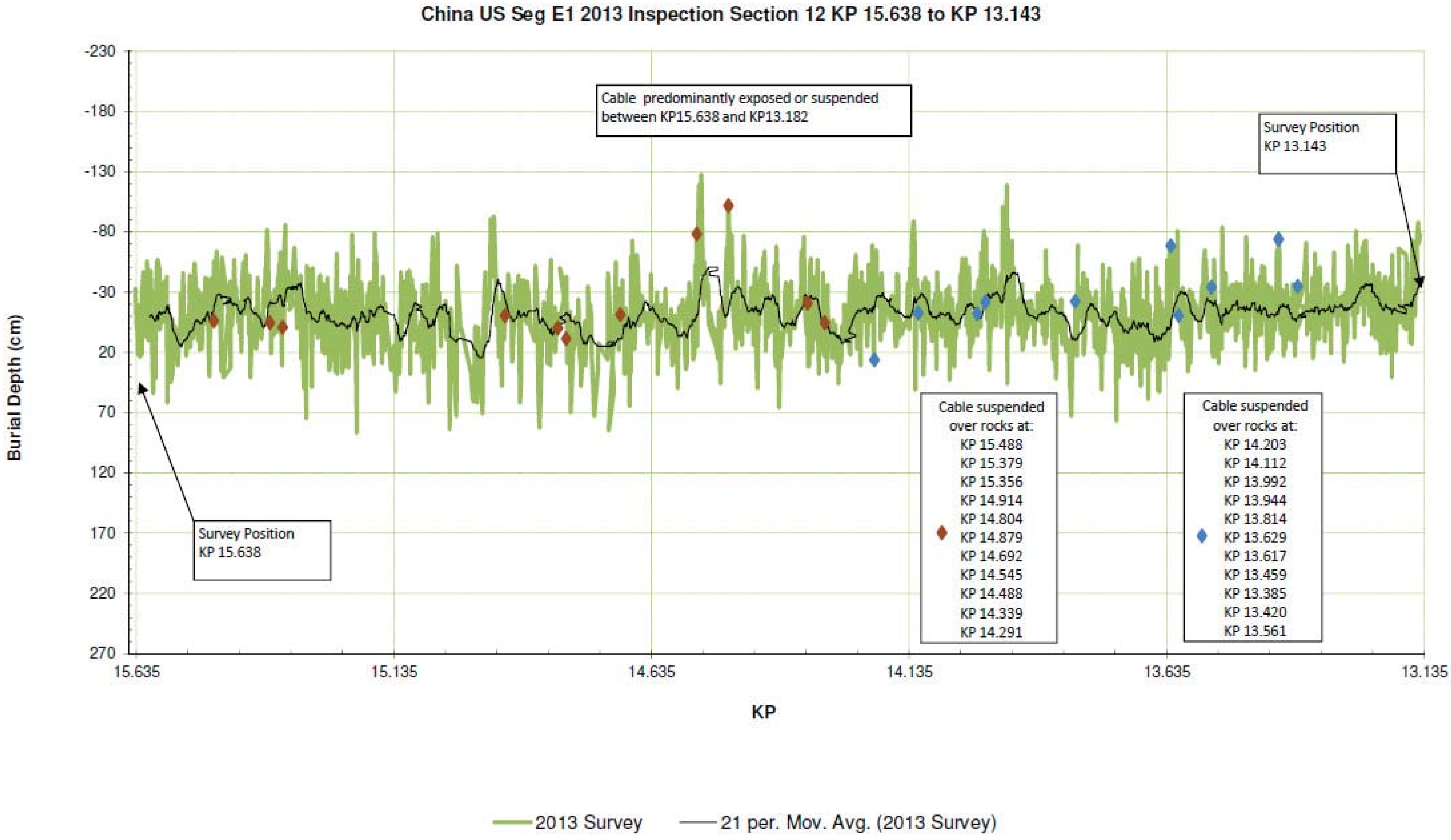

China US Seg E1 2013 Inspection Section 8 KP 53.013 to KP 56.877
KP
Burial Depth (cm)
-80
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
52.900
53.400
53.900
54.400
54.900
55.400
55.900
56.400
56.900
Survey Position KP 53.013
End 2013 Survey KP 56.877
Cable exposed or suspended from KP54.881 to the survey end position
Cable Suspensions:
KP54.881 to KP54.884
KP54.933 to KP55.003
KP55.053 to KP55.091
KP55.167 to KP55.194
KP55.242 to KP55.425
KP55.728 to KP55.822
KP55.872 to KP55.880
KP55.903 to KP55.910
2013 Survey
2 per. Mov. Avg. (2013 Survey)

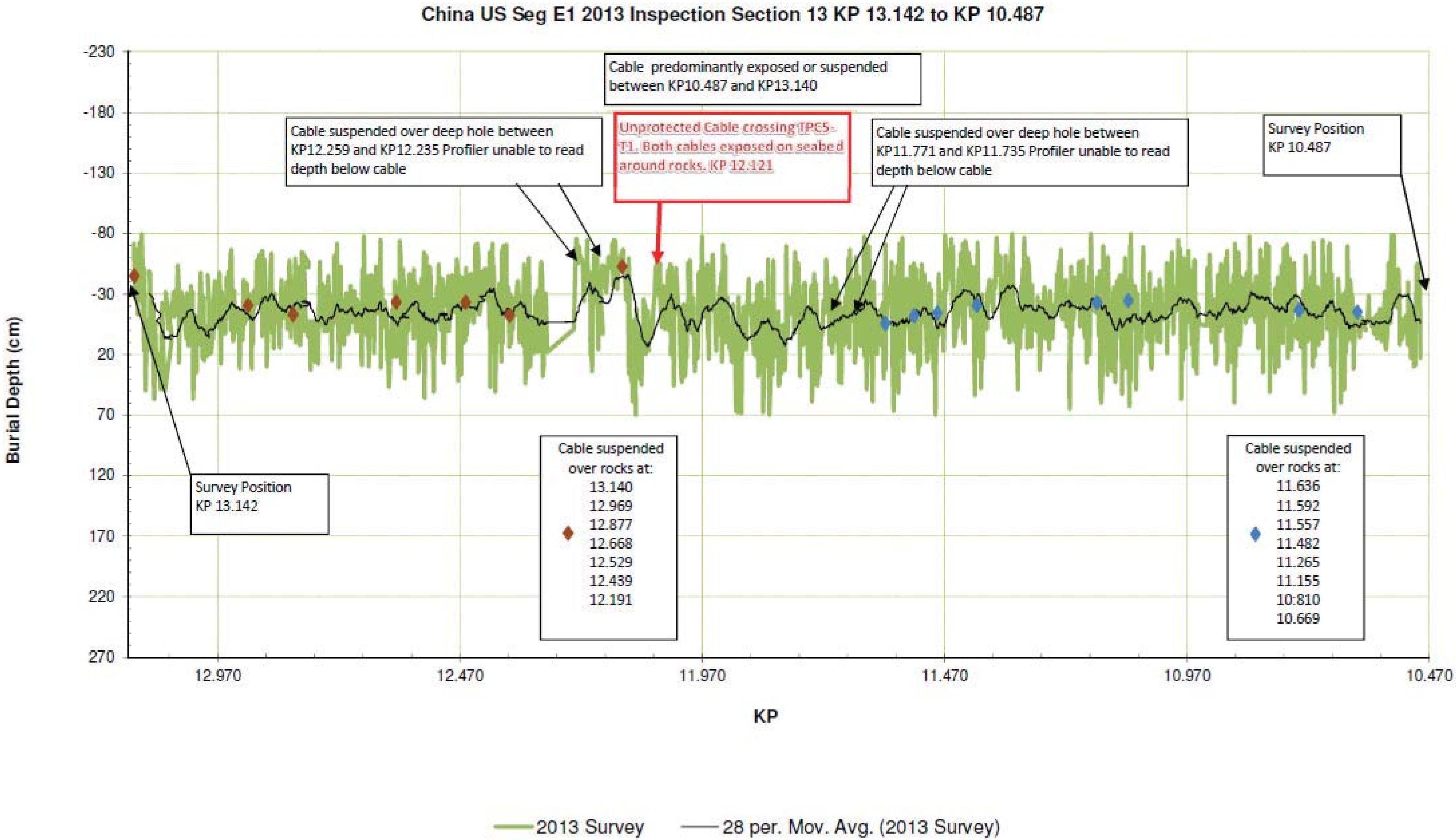

China US Seg E1 2013 Inspection Section 9 KP 23.163 to KP 20.653
KP
Burial Depth (cm)
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
23.100
22.600
22.100
21.600
21.100
20.600
Cable predominantly exposed or suspended between KP23.163 and KP20.653
Resume survey into shore KP 23.163
Cable suspended over rocks at:
KP22.326
KP22.181
KP21.455
KP21.359
KP20.915
KP20.876
KP20.782
Survey Position KP 20.653
2013 Survey
23 per. Mov. Avg. (2013 Survey)

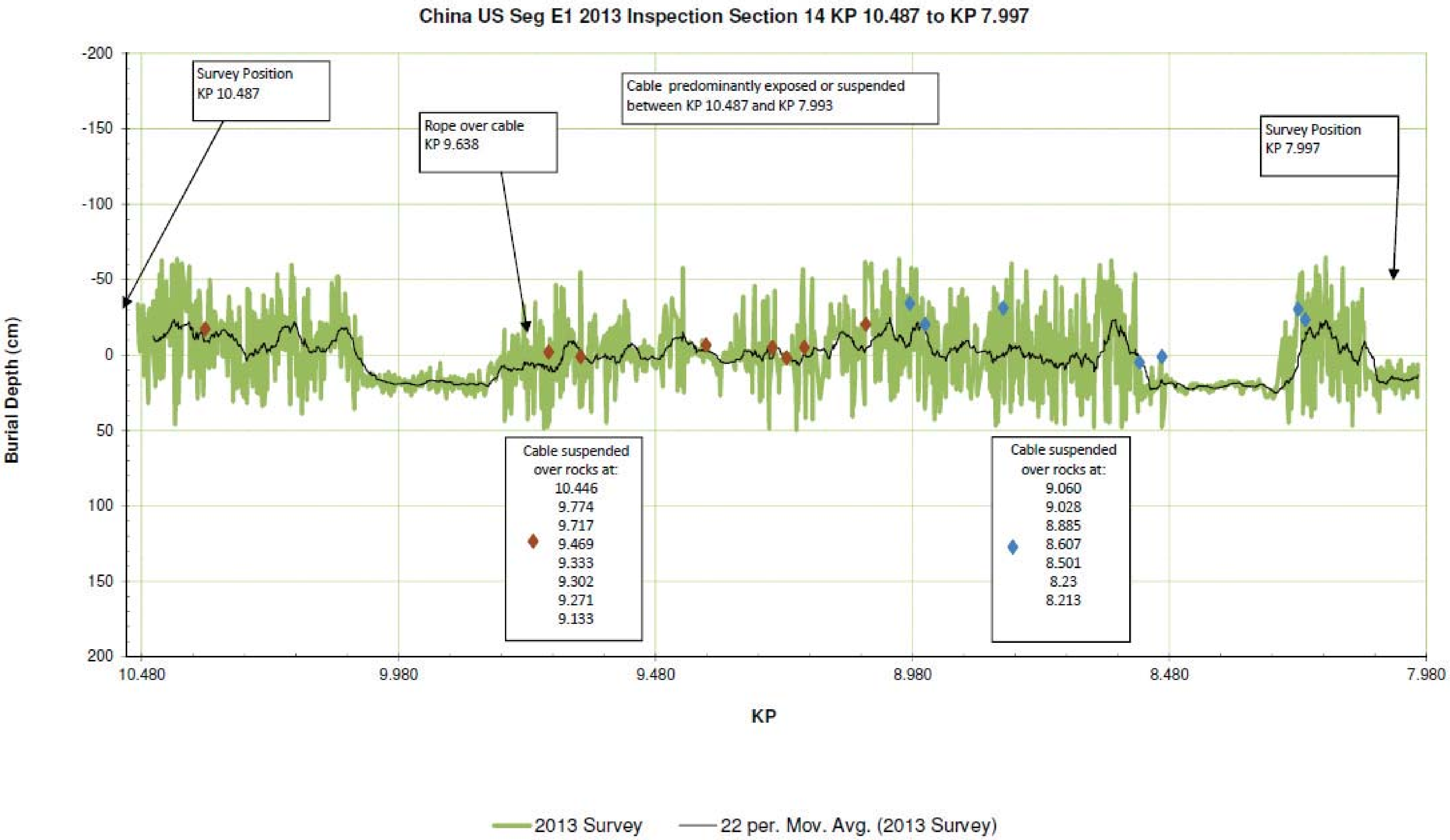

China US Seg E1 2013 Inspection Section 10 KP 20.651 to KP 18.144
KP
Burial Depth (cm)
Cable suspended over rocks at: KP20.536 KP20.209 KP19.945 KP19.785 KP19.216 KP19.078 KP18.964 KP18.803 KP18.655
Cable predominantly exposed or suspended between KP20.651and KP18.144
Survey Position KP 20.651
Survey Position KP 18.144
-180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130
20.600 20.100 19.600 19.100 18.600 18.100
2013 Survey
20 per. Mov. Avg. (2013 Survey)

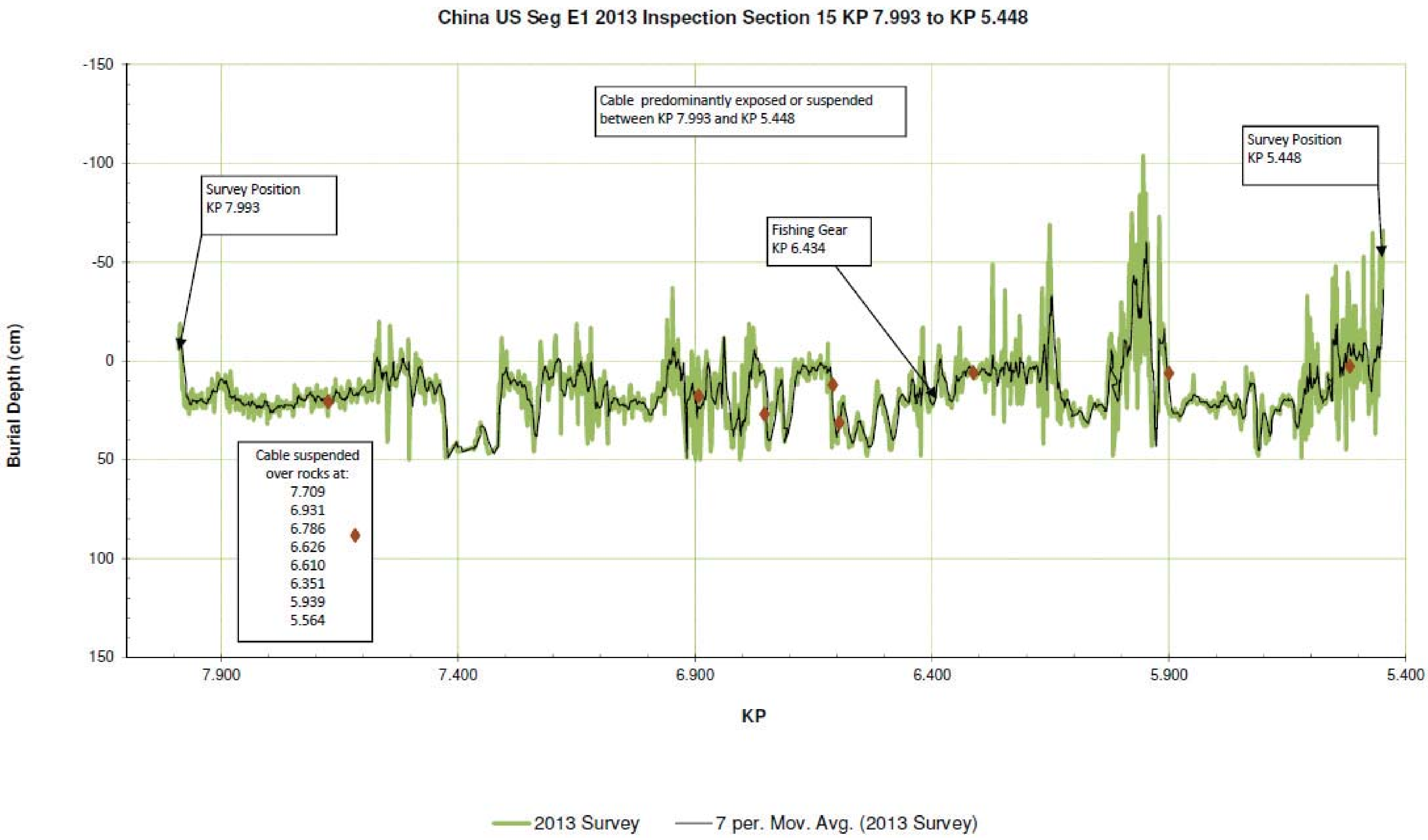
China US Seg E1 2013 Inspection Section 11 KP 18.144 to KP 15.639

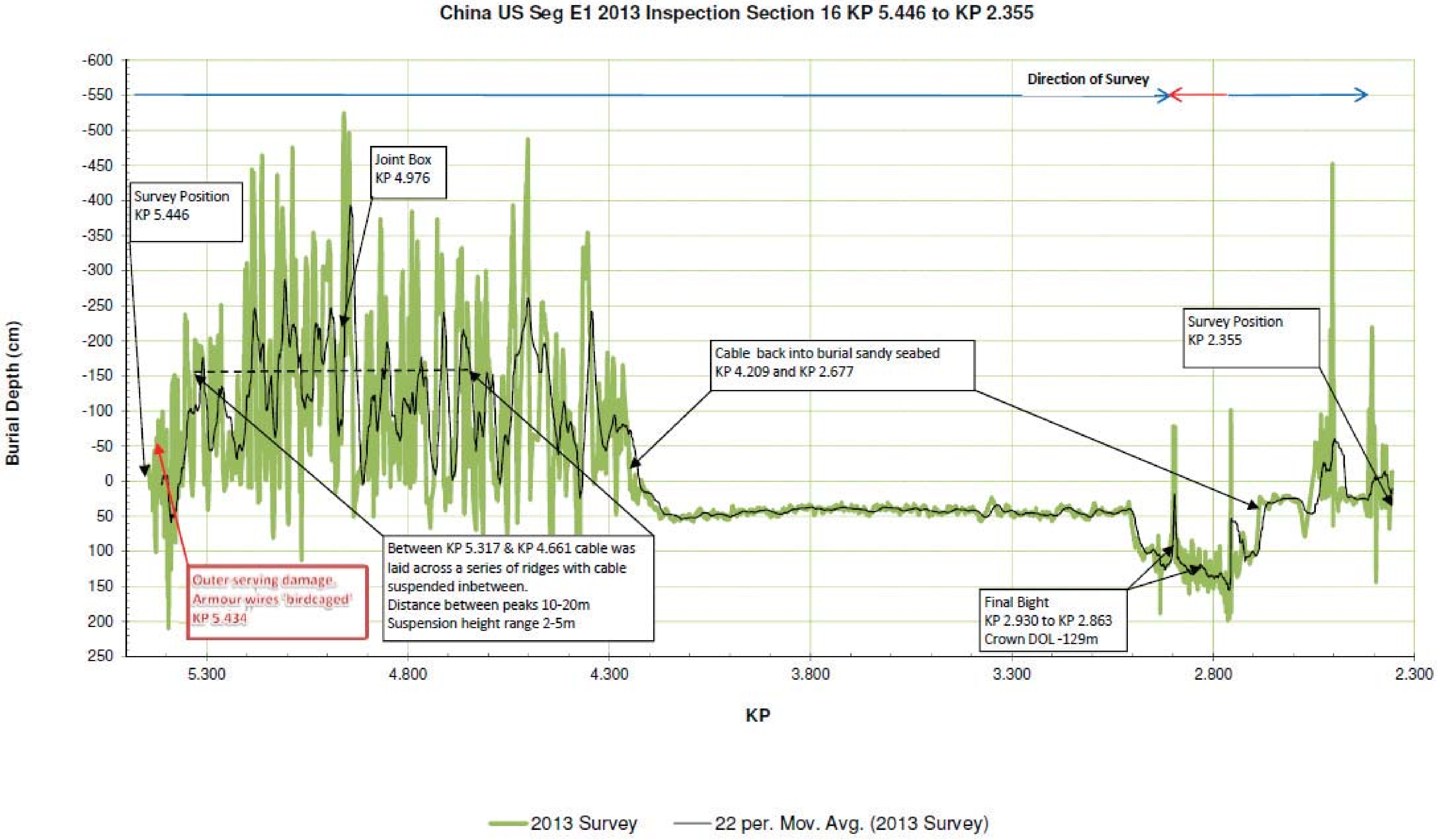



China US Seg E1 2013 Inspection Section 12 KP 15.638 to KP 13.143
Burial Depth (cm)
KP
Cable predominantly exposed or suspended between KP15.638 and KP13.182
Survey Position KP 13.143
Survey Position KP 15.638
Cable suspended over rocks at: KP 15.488 KP 15.379 KP 15.356 KP 14.914 KP 14.804 KP 14.879 KP 14.692 KP 14.545 KP 14.488 KP 14.339 KP 14.291
Cable suspended over rocks at: KP 14.203 KP 14.112 KP 13.992 KP 13.944 KP 13.814 KP 13.629 KP 13.617 KP 13.459 KP 13.385 KP 13.420 KP 13.561
-230
-180
-130
-80
-30
20
70
120
170
220
270
15.635
15.135
14.635
14.135
13.635
13.135
2013 Survey
21 per. Mov. Avg. (2013 Survey)

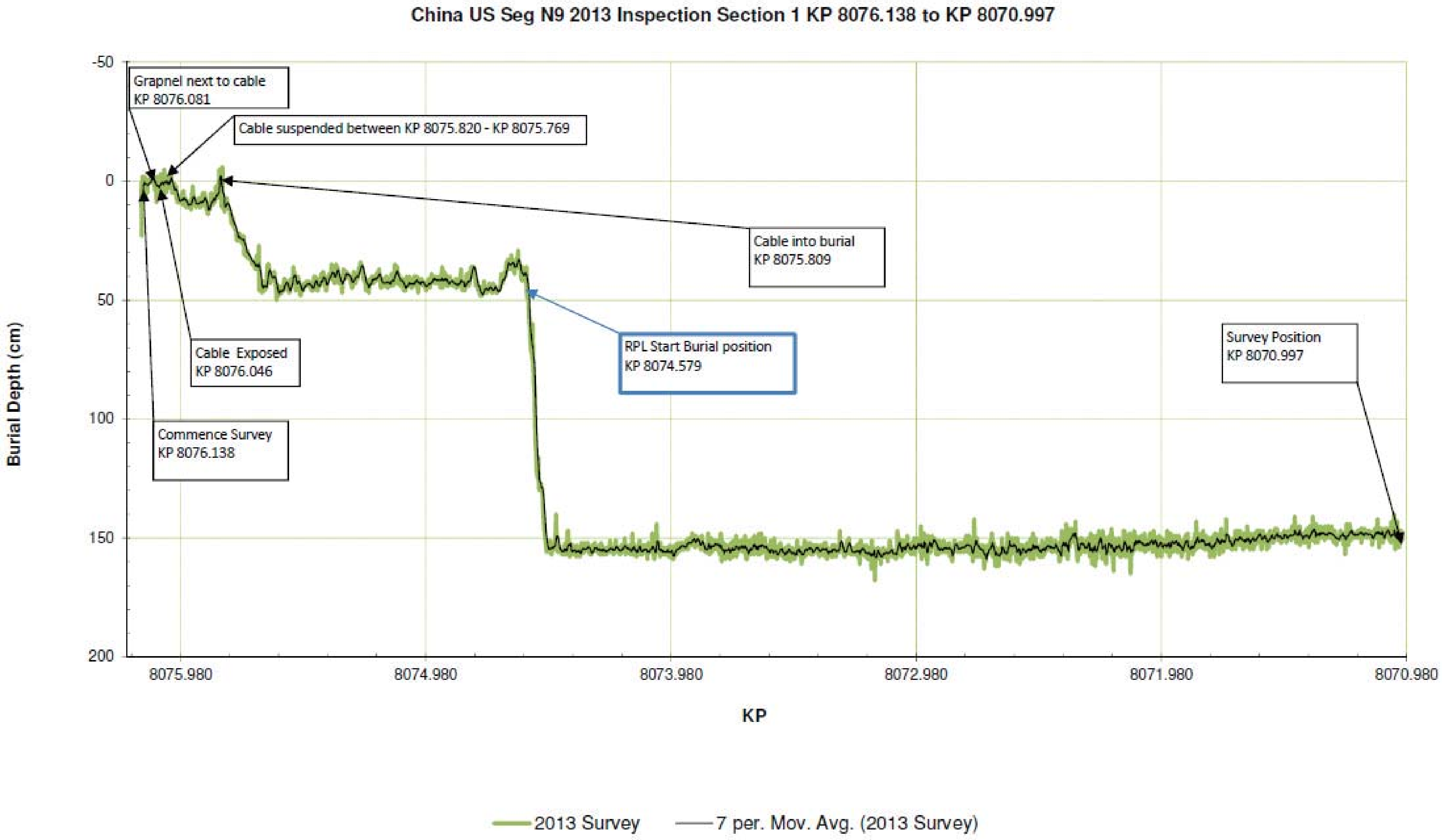

China US Seg E1 2013 Inspection Section 13 KP 13.142 to KP 10.487
Cable predominantly exposed or suspended between KP10.487 and KP13.140
Cable suspended over deep hole between KP12.259 and KP12.235 Profiler unable to read depth below cable
Unprotected Cable crossing TPC5-T1. Both cables exposed on seabed around rocks. KP 12.121
Cable suspended over deep hole between KP11.771 and KP11.735 Profiler unable to read depth below cable
Survey Position KP 10.487
Survey Position KP 13.142
Cable suspended over rocks at: 13.140 12.969 12.877 12.668 12.529 12.439 12.191
Cable suspended over rocks at: 11.636 11.592 11.557 11.482 11.265 11.155 10:810 10.669
Burial Depth (cm)
-230
-180
-130
-80
-30
20
70
120
170
220
270
12.970
12.470
11.970
11.470
10.970
10.470
KP
2013 Survey
28 per. Mov. Avg. (2013 Survey)


China US Seg E1 2013 Inspection Section 14 KP 10.487 to KP 7.997
Survey Position
KP 10.487
Rope over cable
KP 9.638
Cable predominantly exposed or suspended
between KP 10.487 and KP 7.993
Survey Position
KP 7.997
Cable suspended
over rocks at:
10.446
9.774
9.717
9.469
9.333
9.302
9.271
9.133
Cable suspended
over rocks at:
9.060
9.028
8.885
8.607
8.501
8.23
8.213
Burial Depth (cm)
-200
-150
-100
-50
0
50
100
150
200
10.480
9.980
9.480
8.980
8.480
7.980
KP
2013 Survey
22 per. Mov. Avg. (2013 Survey)

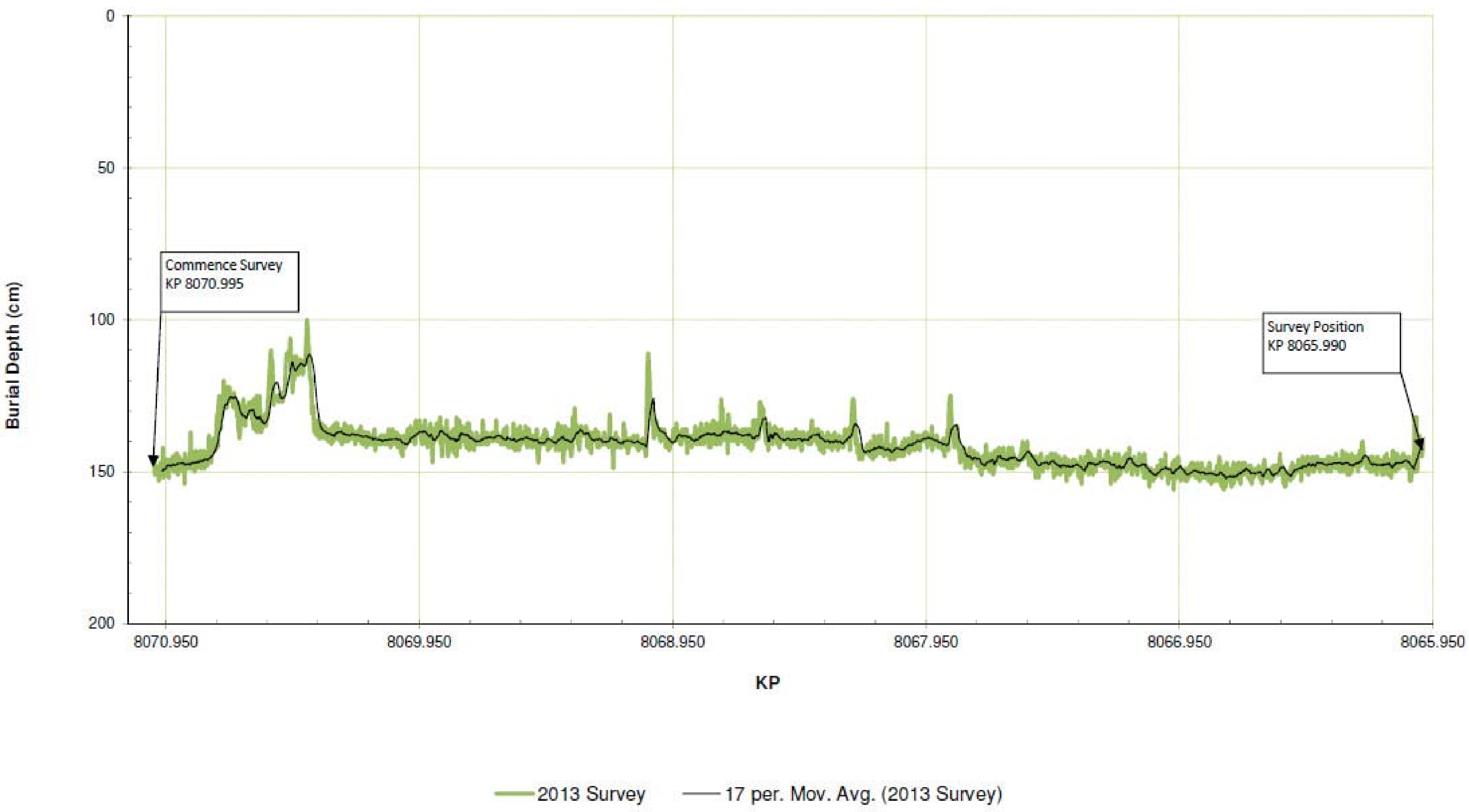

China US Seg E1 2013 Inspection Section 15 KP 7.993 to KP 5.448
Burial Depth (cm)
-150
-100
-50
0
50
100
150
KP
7.900
7.400
6.900
6.400
5.900
5.400
Survey Position
KP 7.993
Cable predominantly exposed or suspended
between KP 7.993 and KP 5.448
Fishing Gear
KP 6.434
Survey Position
KP 5.448
Cable suspended
over rocks at:
7.709
6.931
6.786
6.626
6.610
6.351
5.939
5.564
2013 Survey
7 per. Mov. Avg. (2013 Survey)

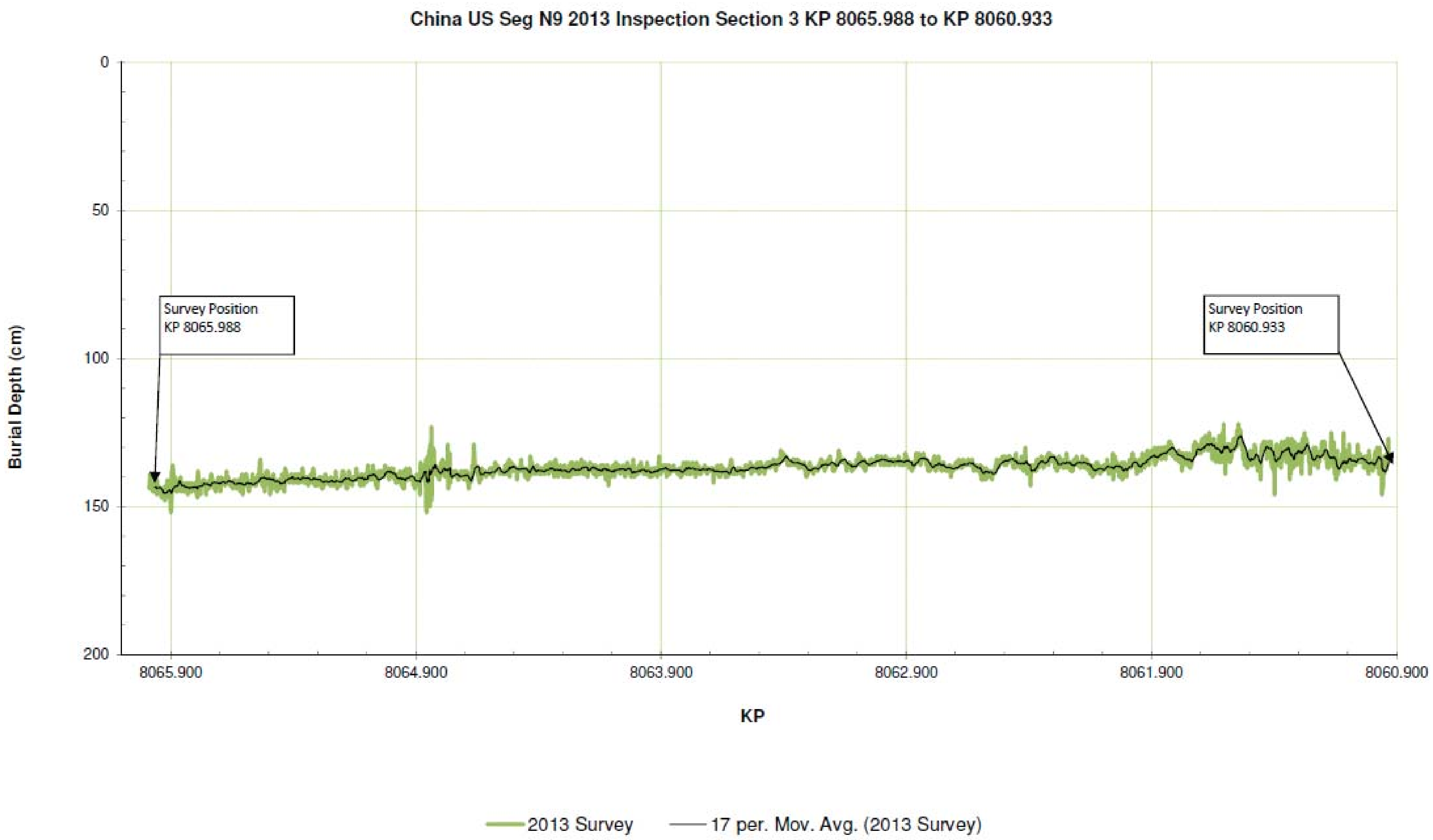

China US Seg E1 2013 Inspection Section 16 KP 5.446 to KP 2.355
Burial Depth (cm)
KP
Direction of Survey
Survey Position
KP 5.446
Joint Box
KP 4.976
Cable back into burial sandy seabed
KP 4.209 and KP 2.677
Survey Position
KP 2.355
Outer serving damage.
Armour wires 'birdcaged'
KP 5.434
Between KP 5.317 & KP 4.661 cable was
laid across a series of ridges with cable
suspended inbetween.
Distance between peaks 10-20m
Suspension height range 2-5m
Final Bight
KP 2.930 to KP 2.863
Crown DOL -129m
2013 Survey
22 per. Mov. Avg. (2013 Survey)

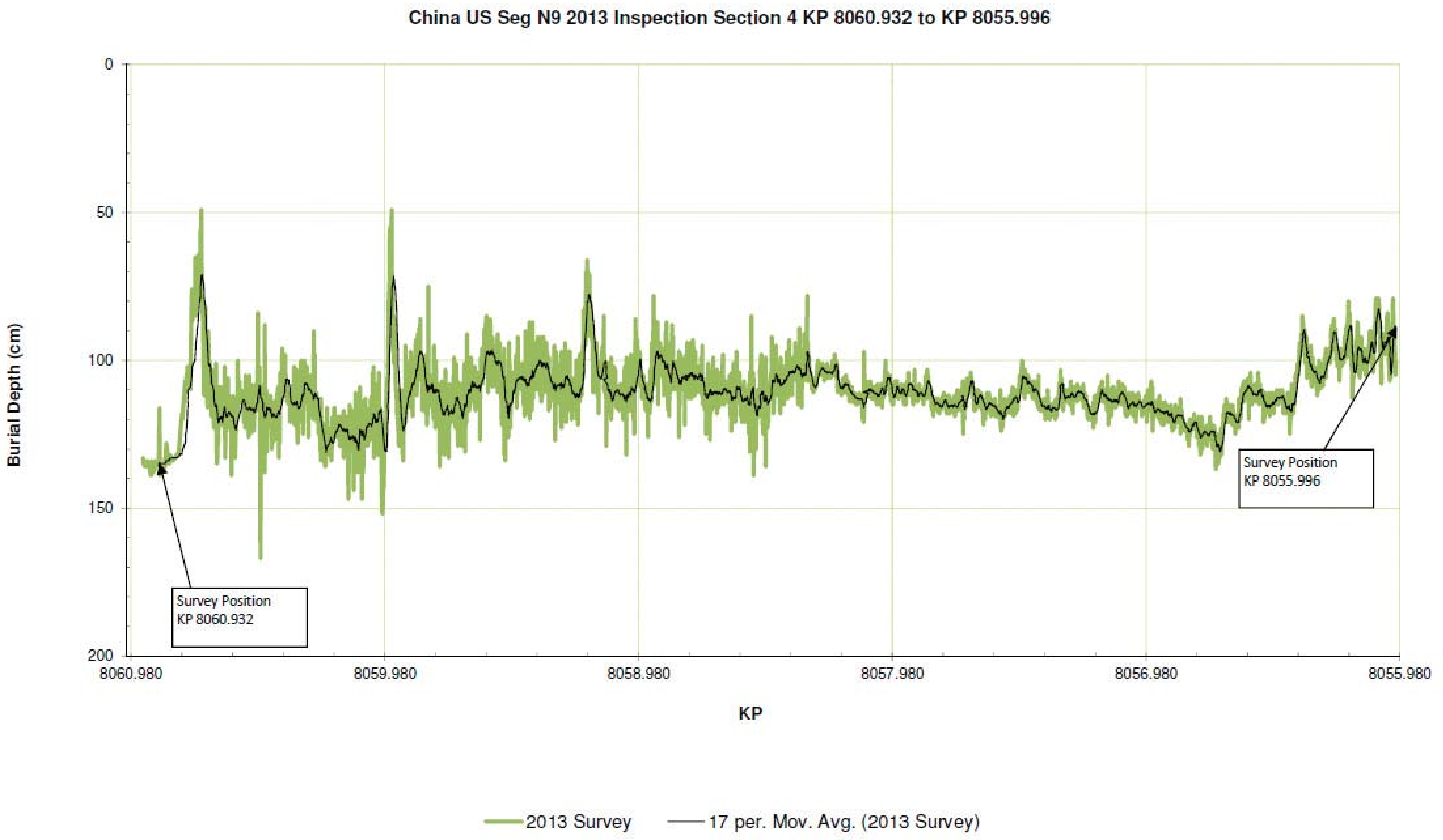
7.2 China-US Seg N9

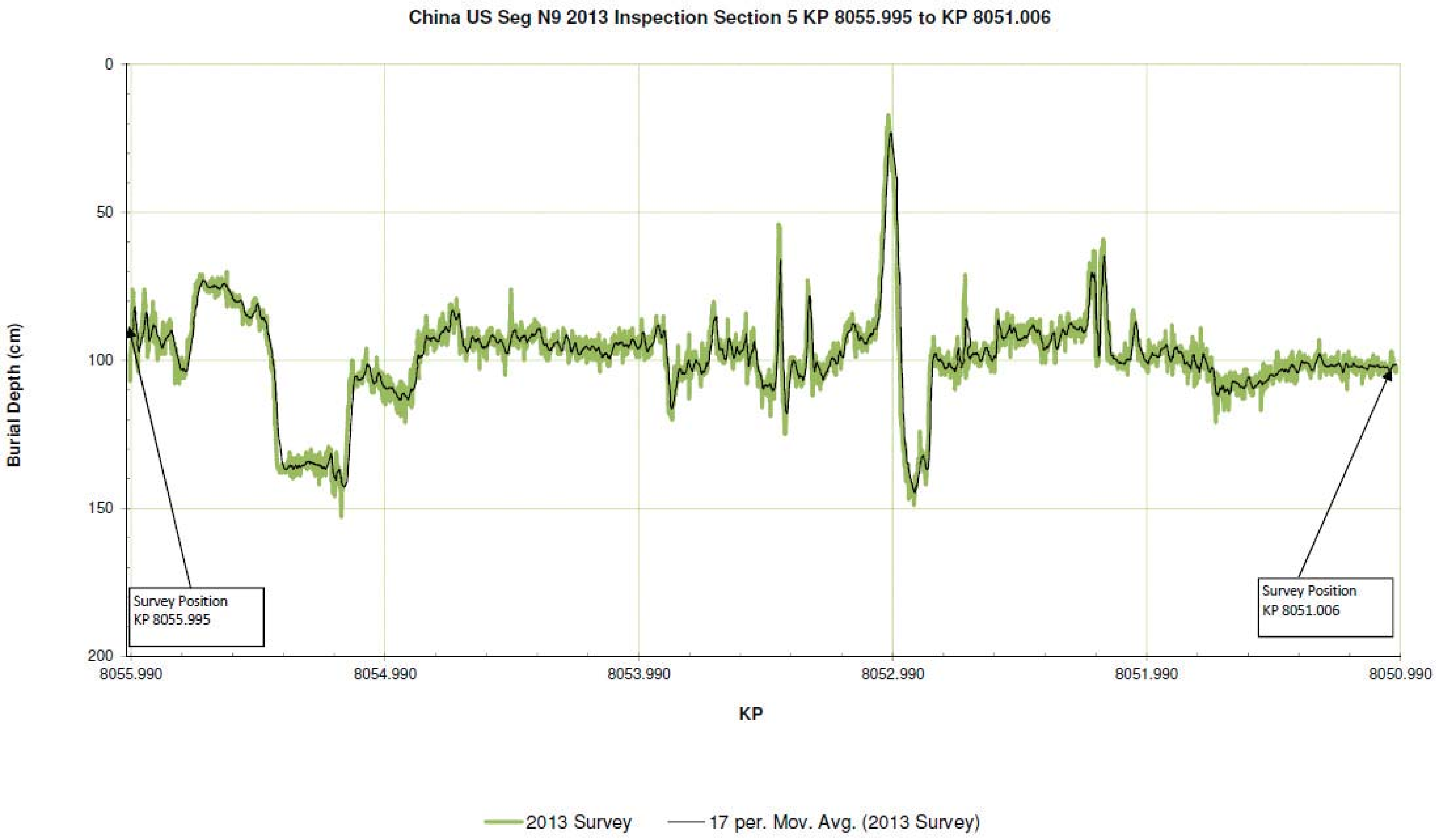


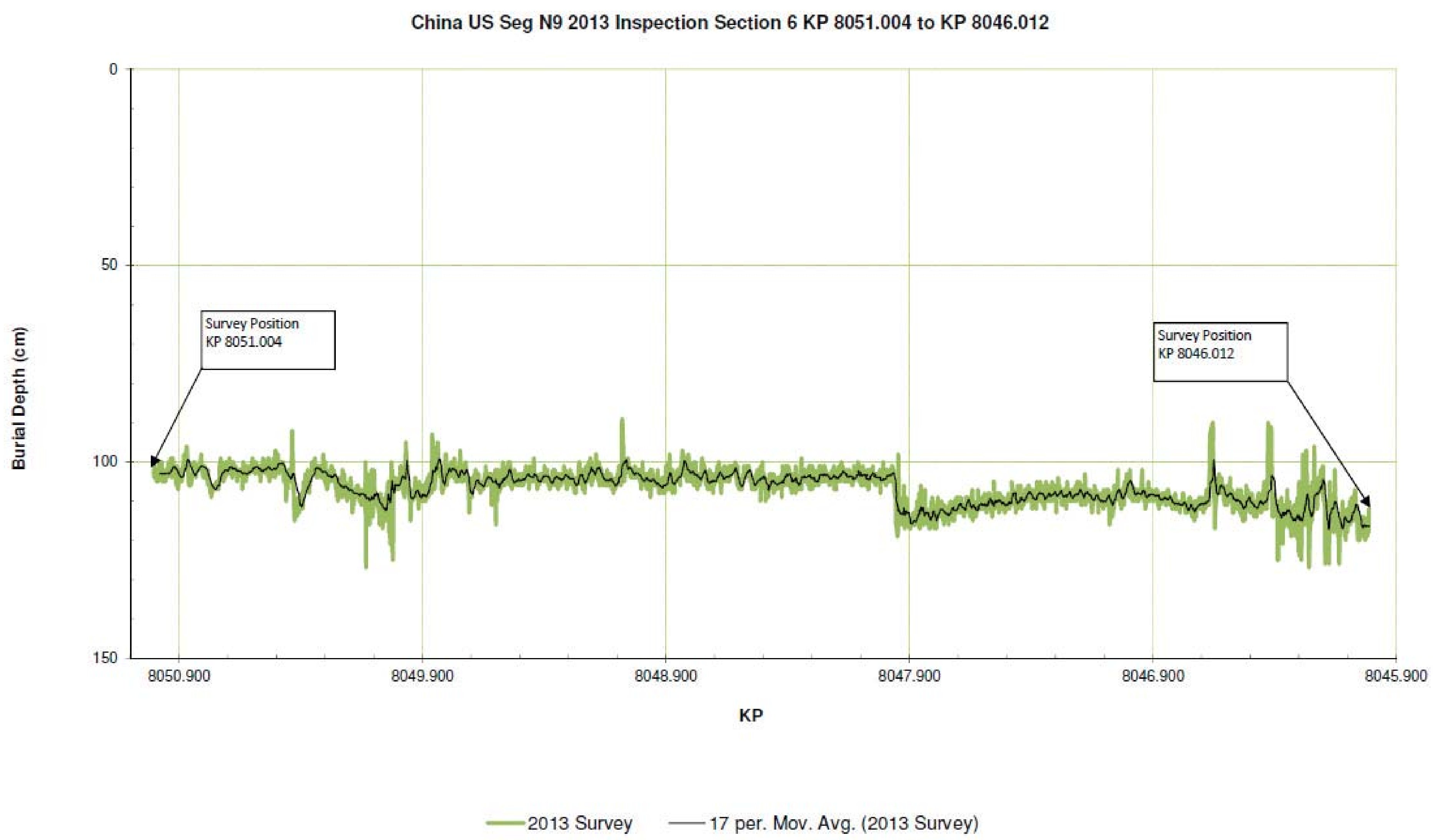
China US Seg N9 2013 Inspection Section 2 KP 8070.995 to KP 8065.990

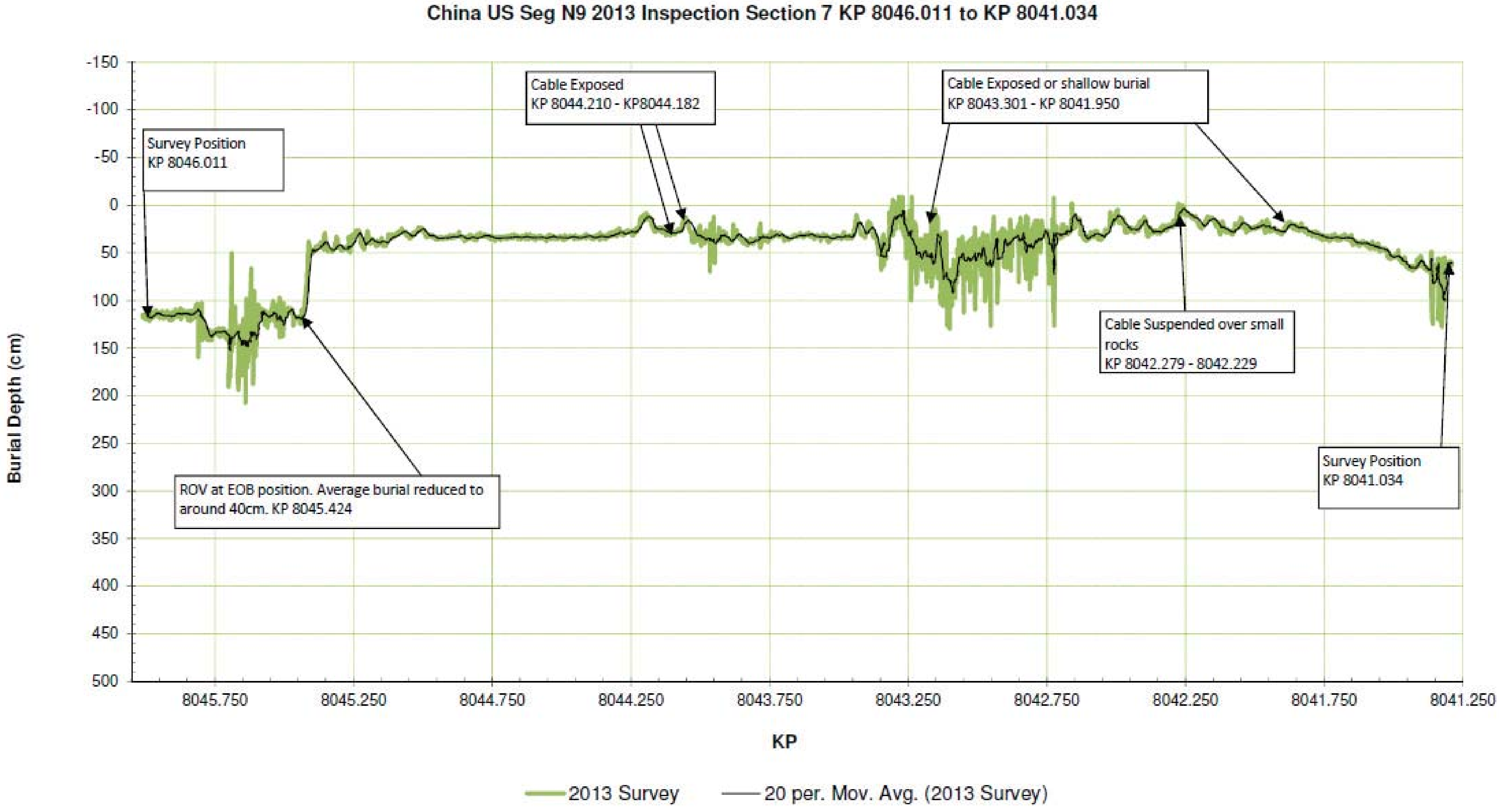


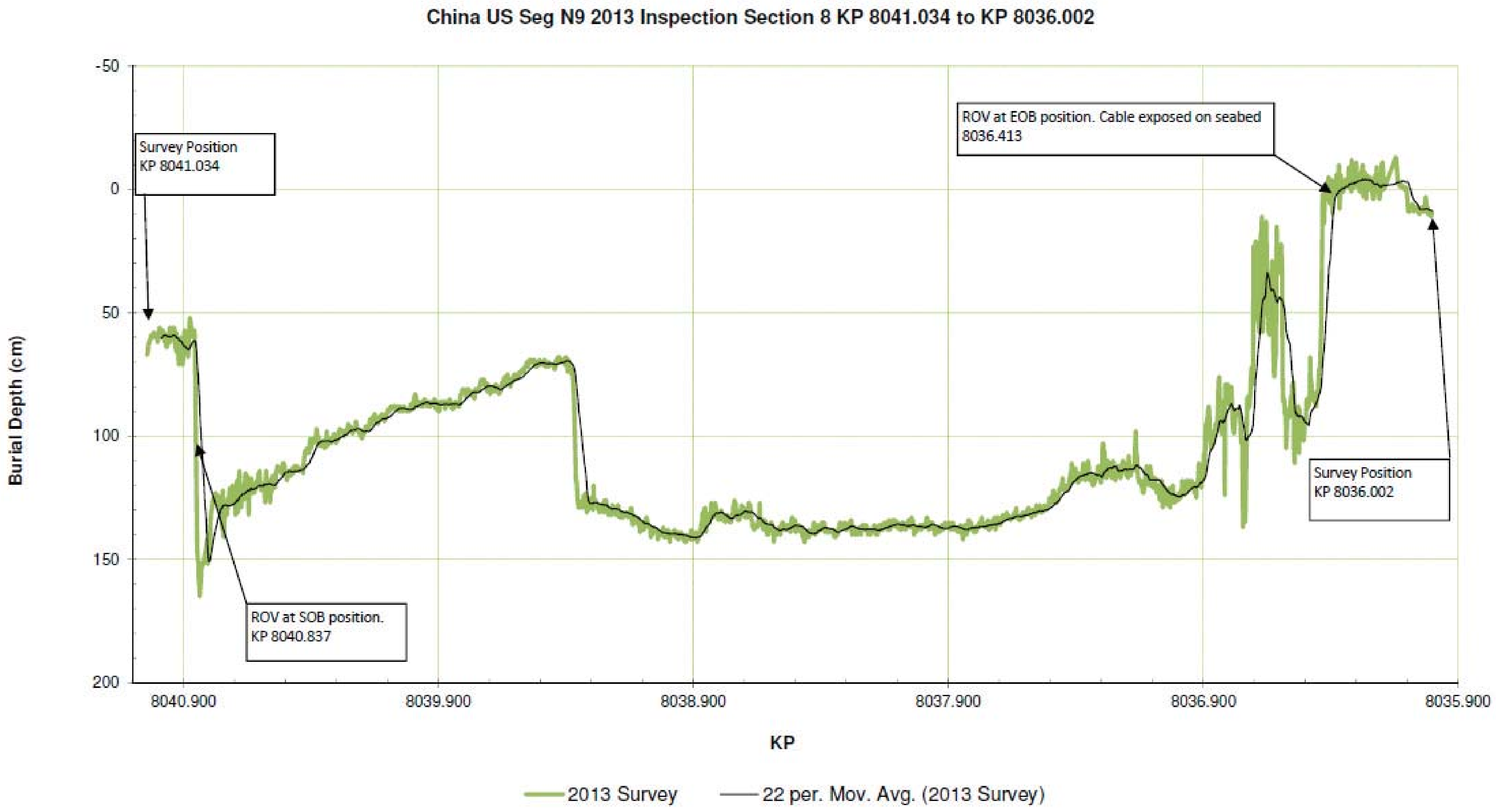

China US Seg N9 2013 Inspection Section 3 KP 8065.988 to KP 8060.933
Burial Depth (cm)
0
50
100
150
200
Survey Position
KP 8065.988
Survey Position
KP 8060.933
8065.900
8064.900
8063.900
8062.900
8061.900
8060.900
KP
2013 Survey
17 per. Mov. Avg. (2013 Survey)


China US Seg N9 2013 Inspection Section 4 KP 8060.932 to KP 8055.996
Burial Depth (cm)
0
50
100
150
200
8060.980
8059.980
8058.980
8057.980
8056.980
8055.980
KP
Survey Position
KP 8060.932
Survey Position
KP 8055.996
2013 Survey
17 per. Mov. Avg. (2013 Survey)

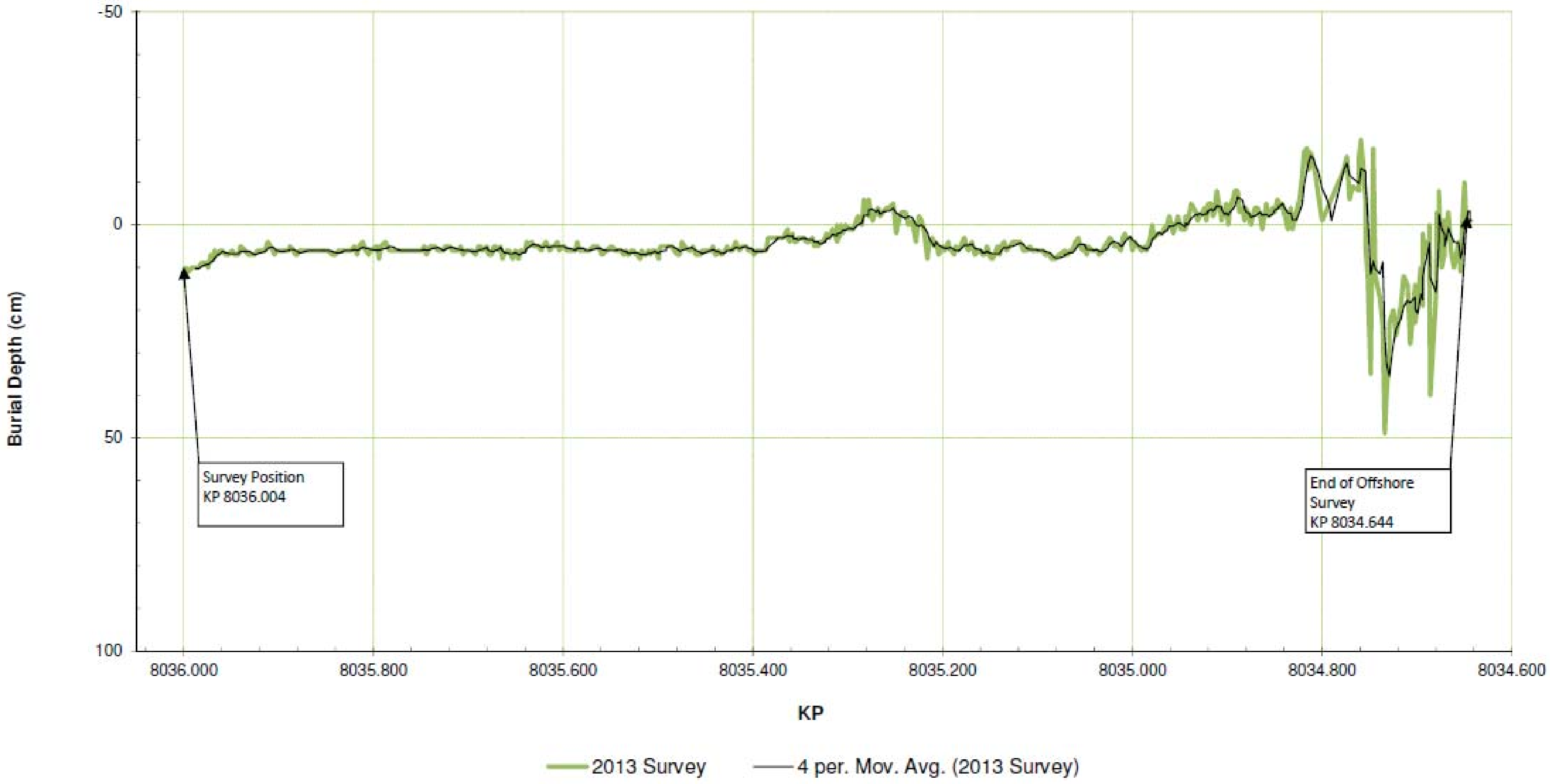

China US Seg N9 2013 Inspection Section 5 KP 8055.995 to KP 8051.006
Burial Depth (cm)
0
50
100
150
200
8055.990
8054.990
8053.990
8052.990
8051.990
8050.990
KP
Survey Position
KP 8055.995
Survey Position
KP 8051.006
2013 Survey
17 per. Mov. Avg. (2013 Survey)

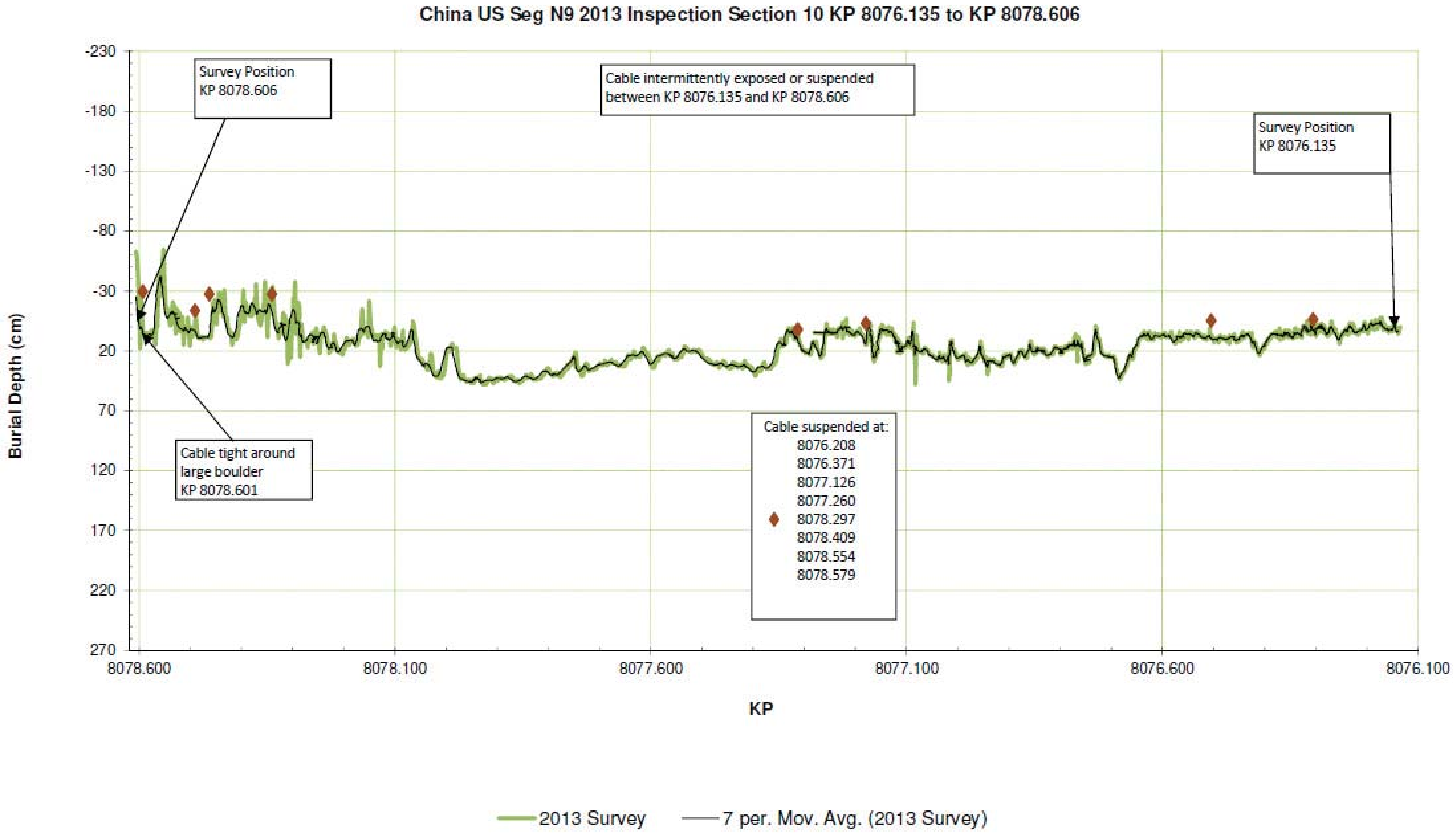

China US Seg N9 2013 Inspection Section 6 KP 8051.004 to KP 8046.012
Burial Depth (cm)
0
50
100
150
Survey Position
KP 8051.004
Survey Position
KP 8046.012
8050.900
8049.900
8048.900
8047.900
8046.900
8045.900
KP
2013 Survey
17 per. Mov. Avg. (2013 Survey)

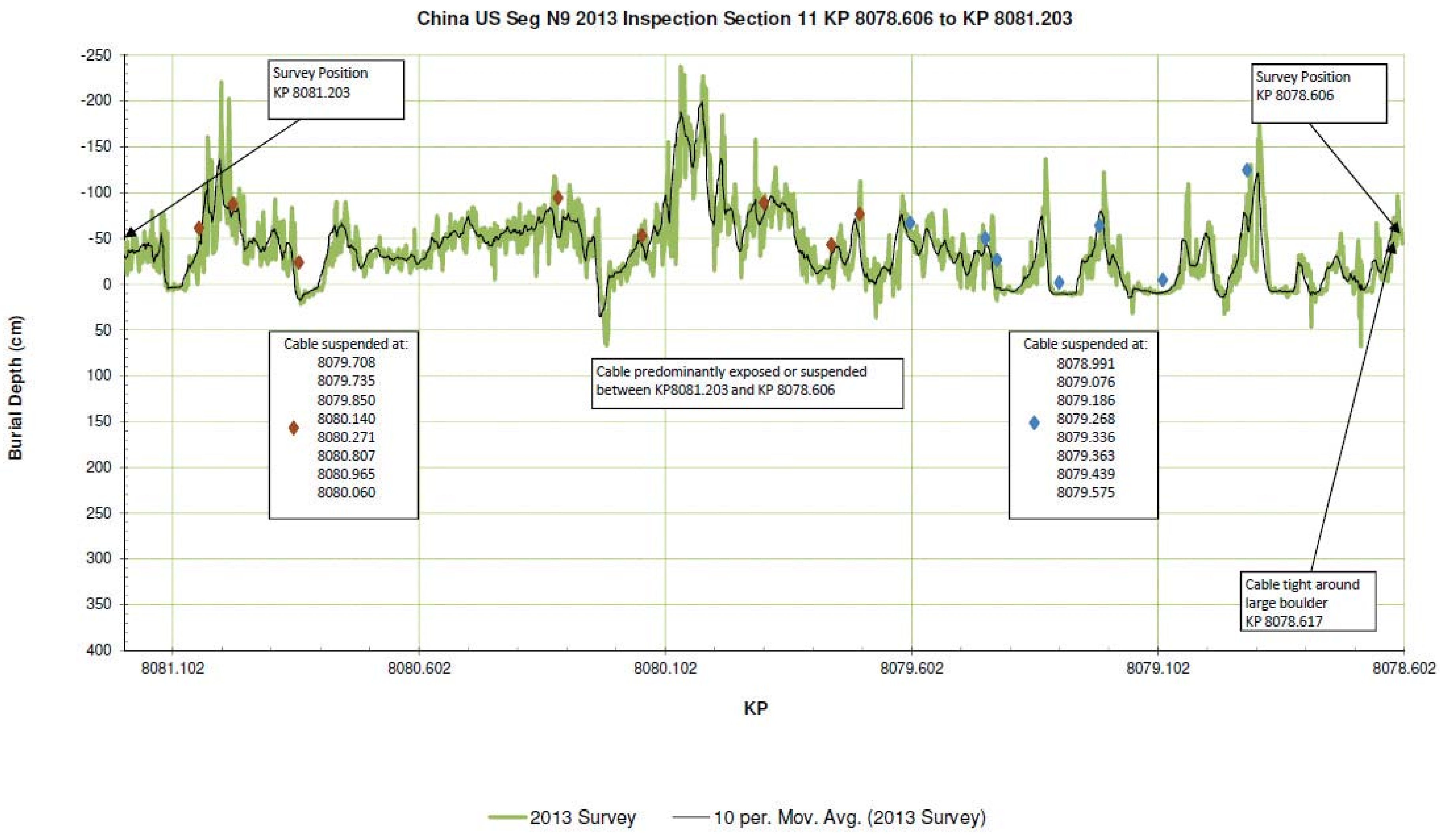

China US Seg N9 2013 Inspection Section 7 KP 8046.011 to KP 8041.034
Burial Depth (cm)
-150
-100
-50
0
50
100
150
200
250
300
350
400
450
500
8045.750
8045.250
8044.750
8044.250
8043.750
8043.250
8042.750
8042.250
8041.750
8041.250
KP
Survey Position KP 8046.011
Cable Exposed KP 8044.210 - KP8044.182
Cable Exposed or shallow burial KP 8043.301 - KP 8041.950
Cable Suspended over small rocks KP 8042.279 - 8042.229
Survey Position KP 8041.034
ROV at EOB position. Average burial reduced to around 40cm. KP 8045.424
2013 Survey
20 per. Mov. Avg. (2013 Survey)

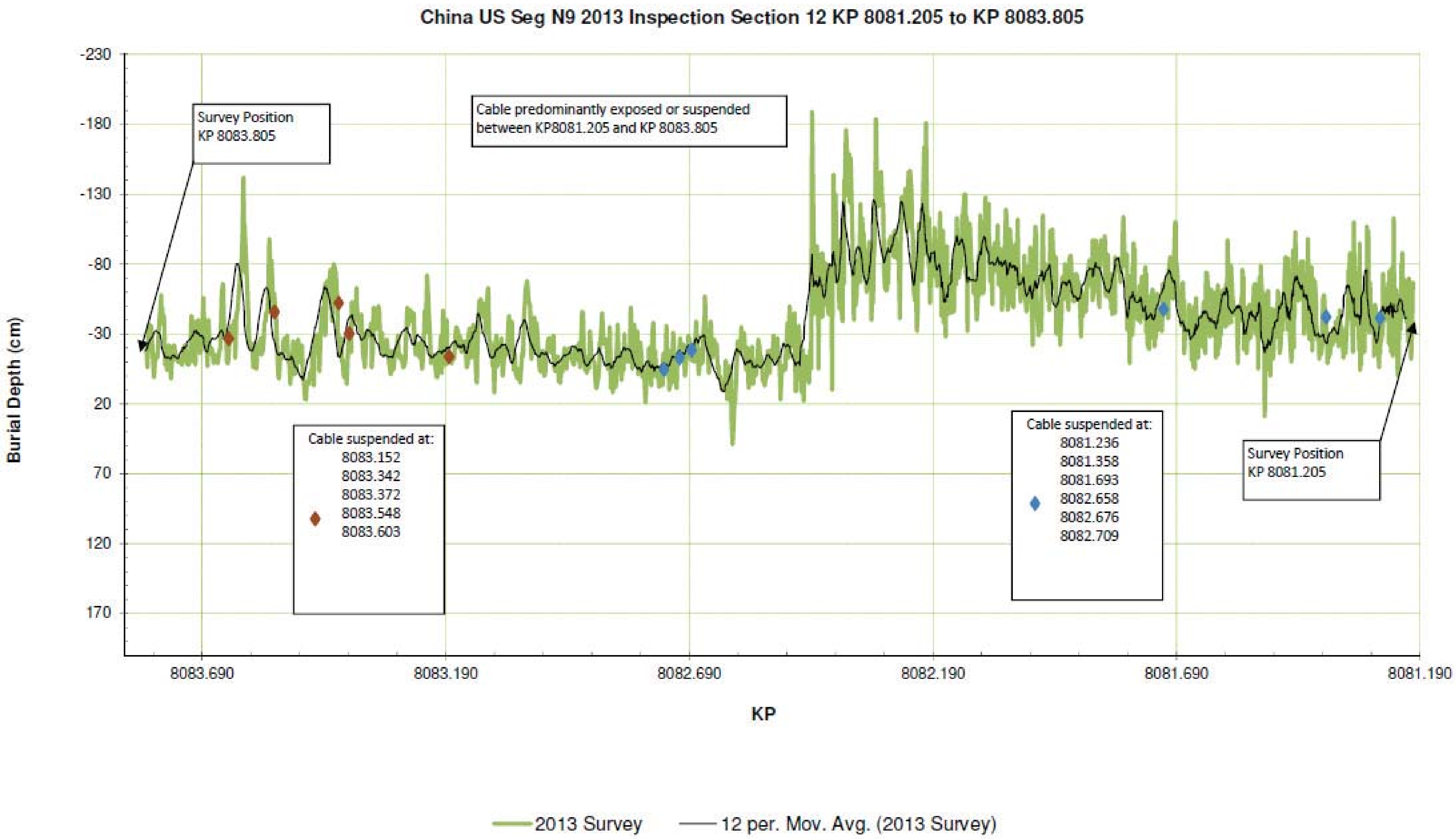

China US Seg N9 2013 Inspection Section 8 KP 8041.034 to KP 8036.002
Burial Depth (cm)
-50
0
50
100
150
200
Survey Position
KP 8041.034
ROV at SOB position.
KP 8040.837
ROV at EOB position. Cable exposed on seabed
8036.413
Survey Position
KP 8036.002
8040.900
8039.900
8038.900
8037.900
8036.900
8035.900
KP
2013 Survey
22 per. Mov. Avg. (2013 Survey)

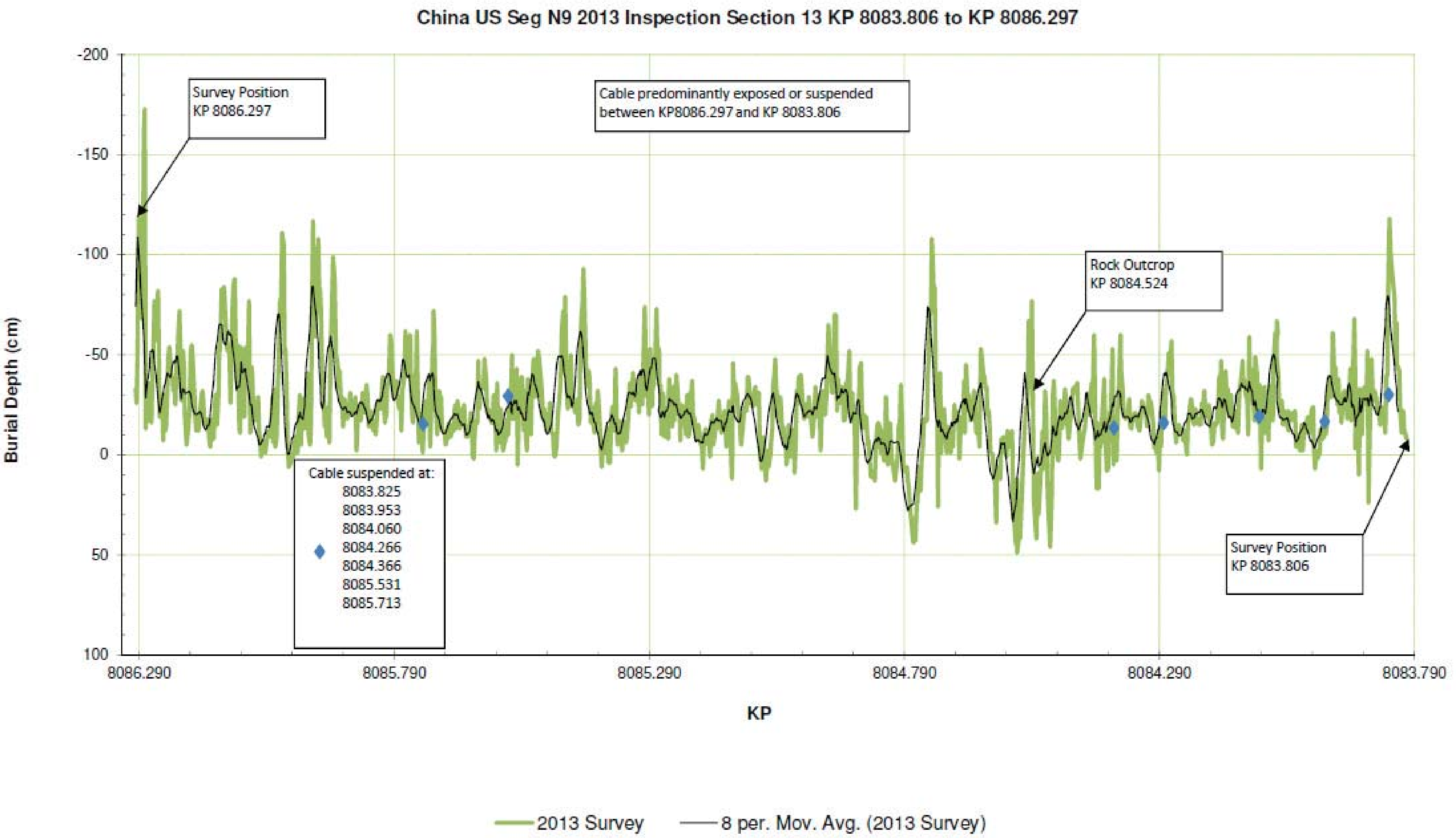
China US Seg N9 2013 Inspection Section 9 KP 8036.004 to KP 8034.644

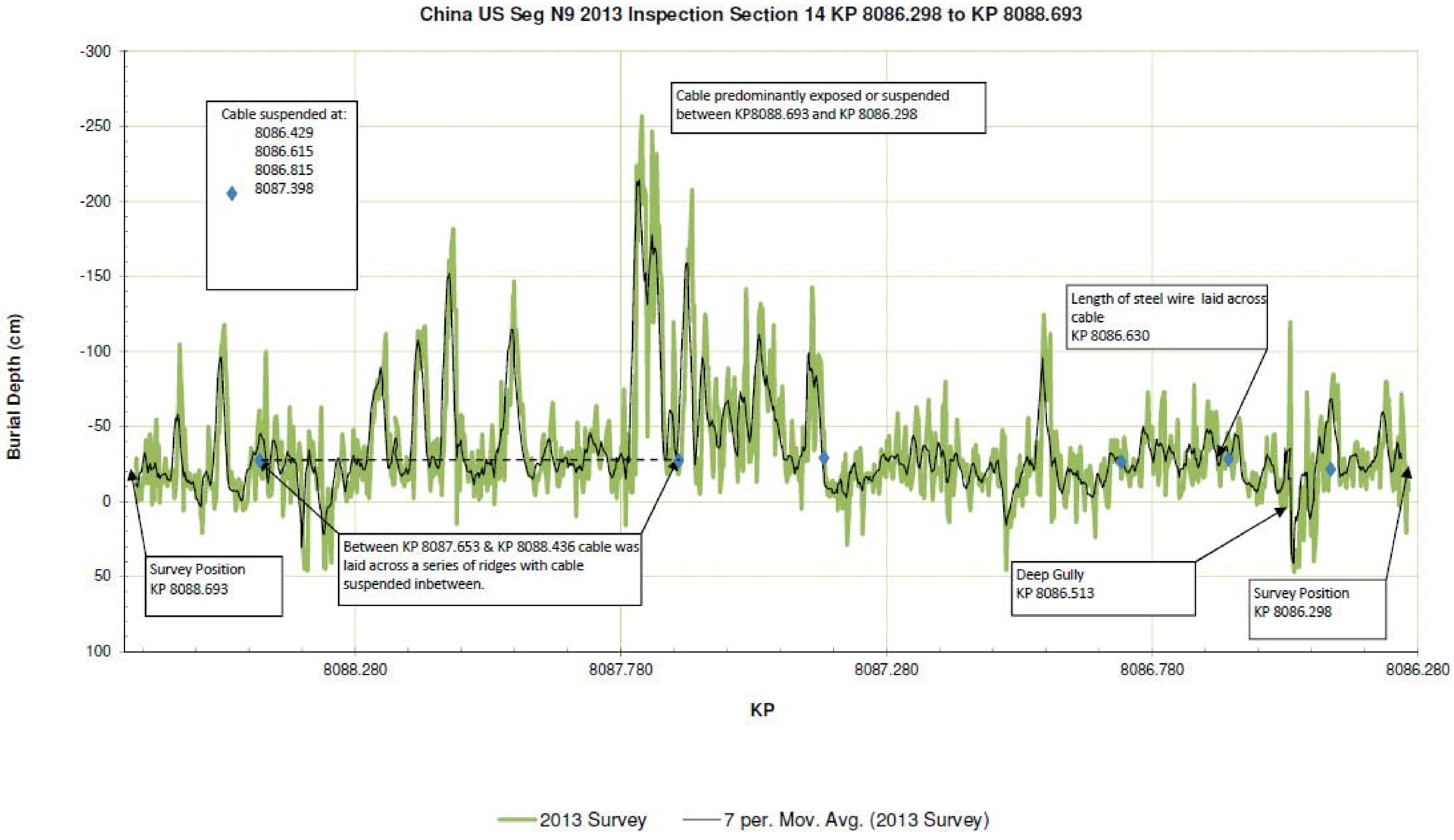


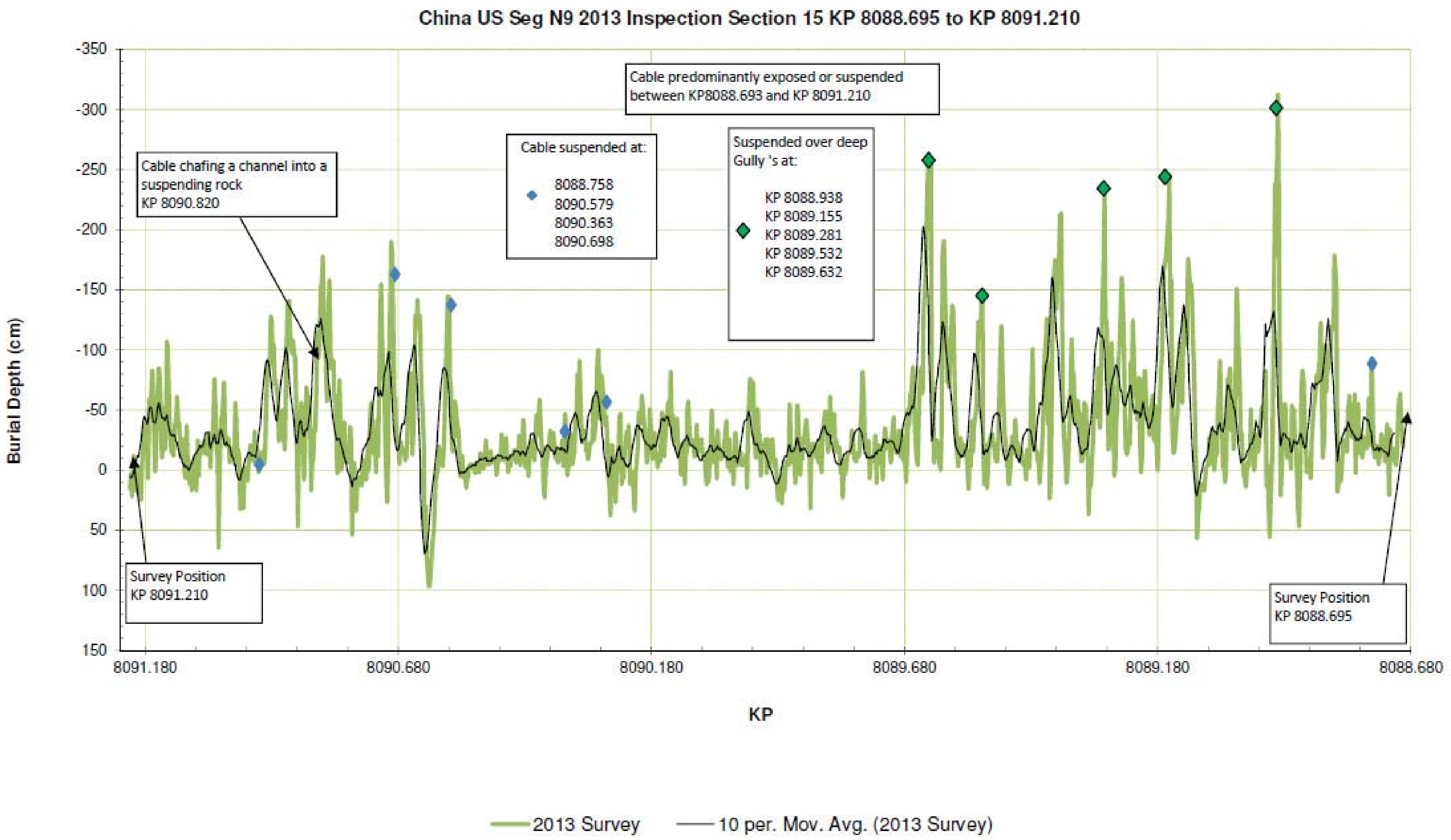

China US Seg N9 2013 Inspection Section 10 KP 8076.135 to KP 8078.606
Survey Position
KP 8078.606
Cable intermittently exposed or suspended
between KP 8076.135 and KP 8078.606
Survey Position
KP 8076.135
Cable tight around
large boulder
KP 8078.601
Cable suspended at:
8076.208
8076.371
8077.126
8077.260
8078.297
8078.409
8078.554
8078.579
Burial Depth (cm)
-230
-180
-130
-80
-30
20
70
120
170
220
270
8078.600
8078.100
8077.600
8077.100
8076.600
8076.100
KP
2013 Survey
7 per. Mov. Avg. (2013 Survey)

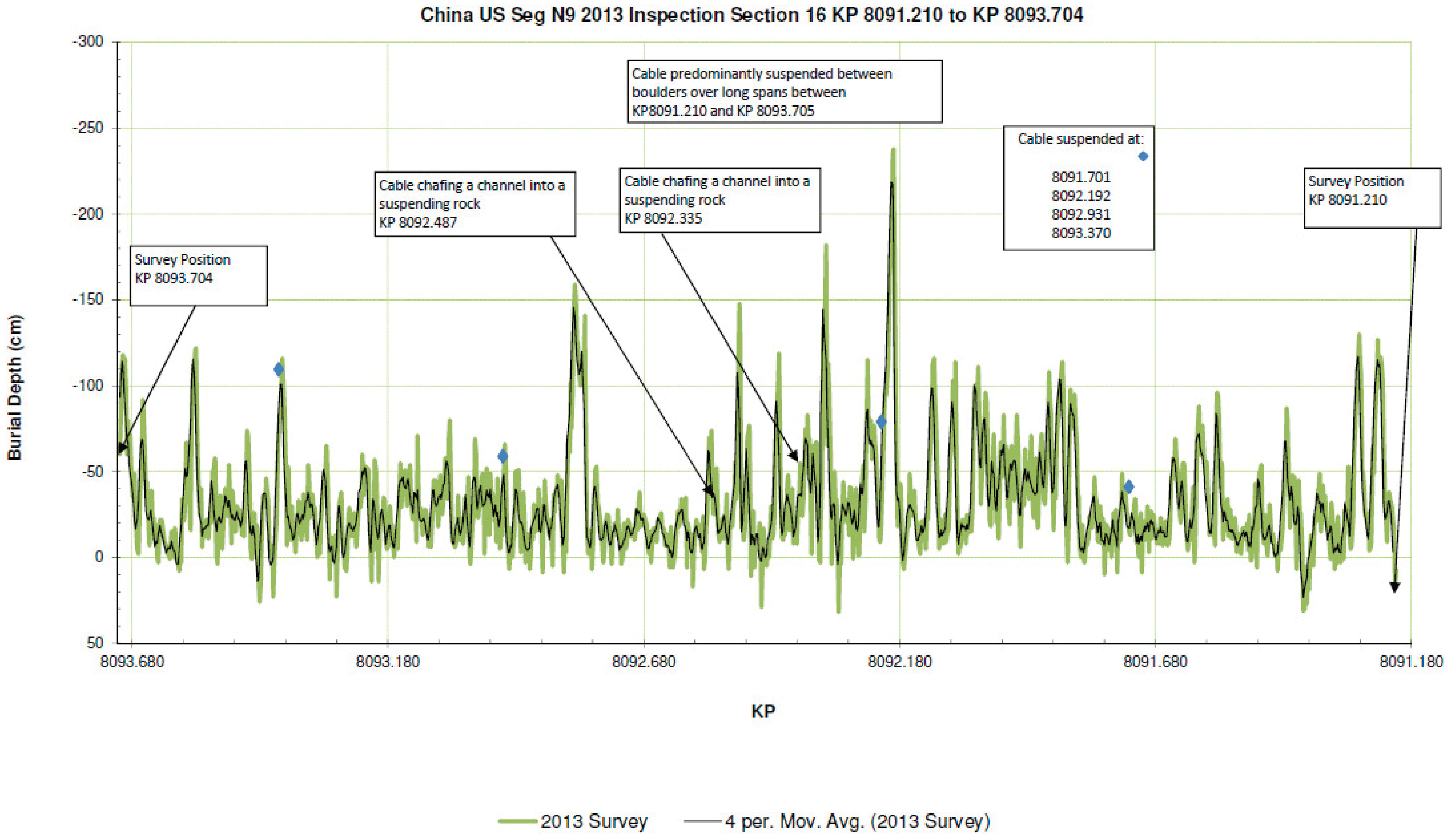

China US Seg N9 2013 Inspection Section 11 KP 8078.606 to KP 8081.203
Survey Position KP 8081.203
Survey Position KP 8078.606
Cable suspended at:
8079.708
8079.735
8079.850
8080.140
8080.271
8080.807
8080.965
8080.060
Cable predominantly exposed or suspended between KP8081.203 and KP 8078.606
Cable suspended at:
8078.991
8079.076
8079.186
8079.268
8079.336
8079.363
8079.439
8079.575
Cable tight around large boulder KP 8078.617
Burial Depth (cm)
-250
-200
-150
-100
-50
0
50
100
150
200
250
300
350
400
8081.102
8080.602
8080.102
8079.602
8079.102
8078.602
KP
2013 Survey
10 per. Mov. Avg. (2013 Survey)

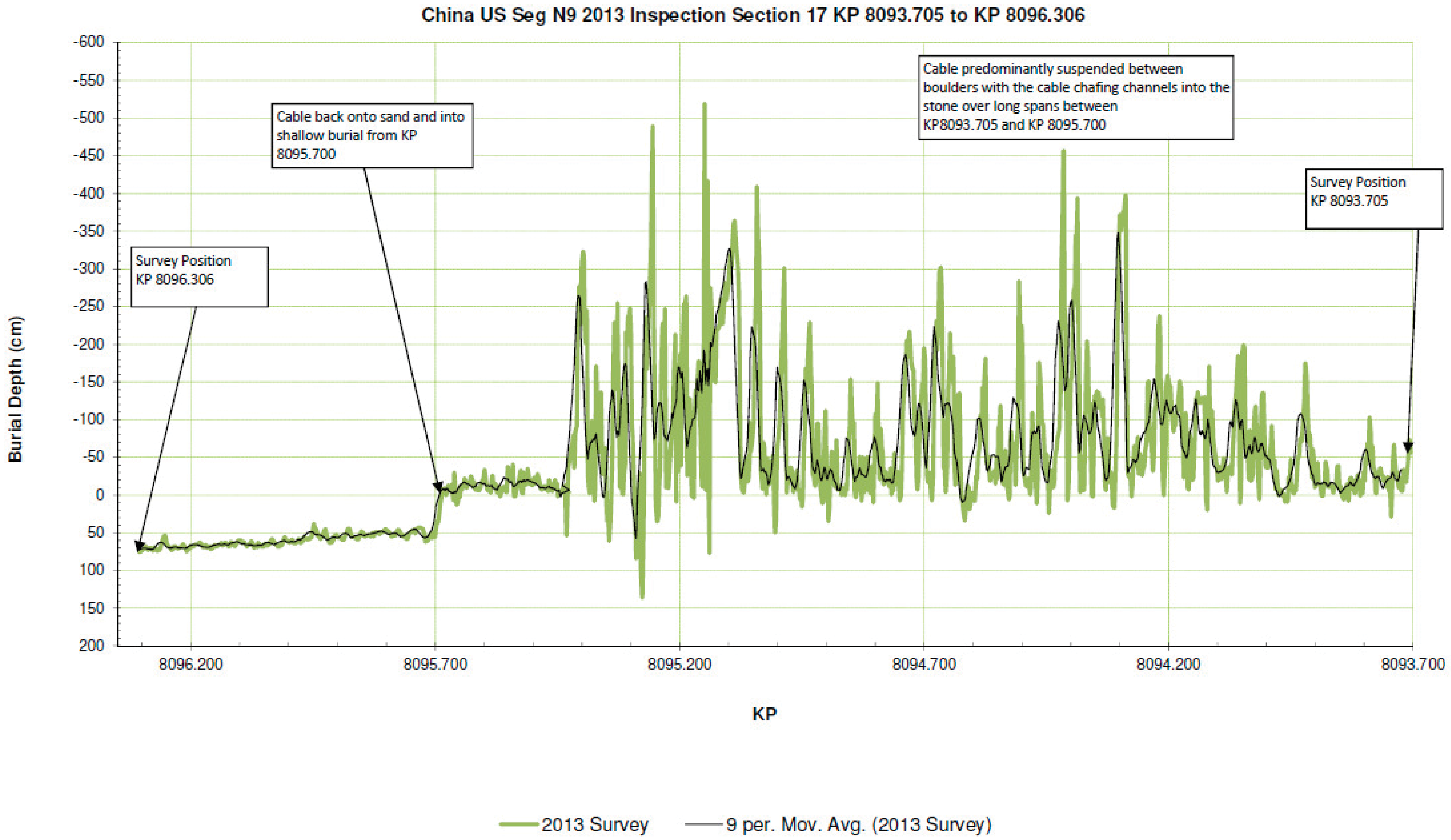

China US Seg N9 2013 Inspection Section 12 KP 8081.205 to KP 8083.805
Survey Position KP 8083.805
Cable predominantly exposed or suspended between KP8081.205 and KP 8083.805
Cable suspended at: 8083.152 8083.342 8083.372 8083.548 8083.603
Cable suspended at: 8081.236 8081.358 8081.693 8082.658 8082.676 8082.709
Survey Position KP 8081.205
Burial Depth (cm)
-230
-180
-130
-80
-30
20
70
120
170
8083.690
8083.190
8082.690
8082.190
8081.690
8081.190
KP
2013 Survey
12 per. Mov. Avg. (2013 Survey)

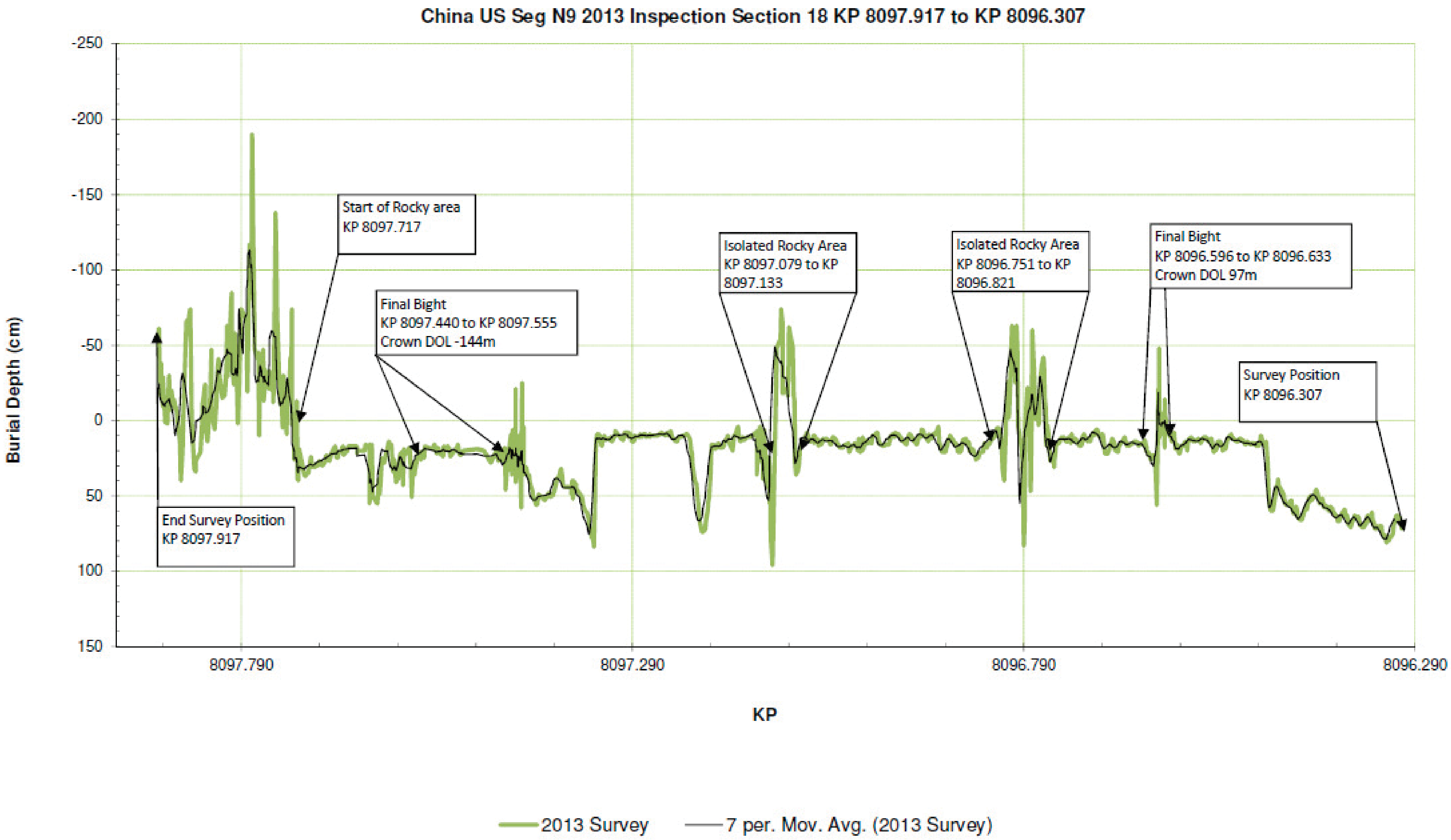

China US Seg N9 2013 Inspection Section 13 KP 8083.806 to KP 8086.297
Burial Depth (cm)
-200
-150
-100
-50
0
50
100
8086.290
8085.790
8085.290
8084.790
8084.290
8083.790
KP
Survey Position
KP 8086.297
Cable predominantly exposed or suspended
between KP8086.297 and KP 8083.806
Rock Outcrop
KP 8084.524
Cable suspended at:
8083.825
8083.953
8084.060
8084.266
8084.366
8085.531
8085.713
Survey Position
KP 8083.806
2013 Survey
8 per. Mov. Avg. (2013 Survey)


China US Seg N9 2013 Inspection Section 14 KP 8086.298 to KP 8088.693
Burial Depth (cm)
-300
-250
-200
-150
-100
-50
0
50
100
KP
8088.280
8087.780
8087.280
8086.780
8086.280
Cable suspended at:
8086.429
8086.615
8086.815
8087.398
Cable predominantly exposed or suspended between KP8088.693 and KP 8086.298
Length of steel wire laid across cable
KP 8086.630
Survey Position
KP 8088.693
Between KP 8087.653 & KP 8088.436 cable was laid across a series of ridges with cable suspended inbetween.
Deep Gully
KP 8086.513
Survey Position
KP 8086.298
2013 Survey
7 per. Mov. Avg. (2013 Survey)


China US Seg N9 2013 Inspection Section 15 KP 8088.695 to KP 8091.210
Burial Depth (cm)
-350
-300
-250
-200
-150
-100
-50
0
50
100
150
8091.180
8090.680
8090.180
8089.680
8089.180
8088.680
KP
Cable predominantly exposed or suspended between KP8088.693 and KP 8091.210
Cable chafing a channel into a suspending rock KP 8090.820
Cable suspended at: 8088.758 8090.579 8090.363 8090.698
Suspended over deep Gully 's at: KP 8088.938 KP 8089.155 KP 8089.281 KP 8089.532 KP 8089.632
Survey Position KP 8091.210
Survey Position KP 8088.695
2013 Survey
10 per. Mov. Avg. (2013 Survey)


China US Seg N9 2013 Inspection Section 16 KP 8091.210 to KP 8093.704
Burial Depth (cm)
-300
-250
-200
-150
-100
-50
0
50
8093.680
8093.180
8092.680
8092.180
8091.680
8091.180
KP
Cable predominantly suspended between boulders over long spans between KP8091.210 and KP 8093.705
Cable suspended at:
8091.701
8092.192
8092.931
8093.370
Cable chafing a channel into a suspending rock KP 8092.487
Cable chafing a channel into a suspending rock KP 8092.335
Survey Position KP 8093.704
Survey Position KP 8091.210
2013 Survey
4 per. Mov. Avg. (2013 Survey)


China US Seg N9 2013 Inspection Section 17 KP 8093.705 to KP 8096.306
Burial Depth (cm)
KP
-600
-550
-500
-450
-400
-350
-300
-250
-200
-150
-100
-50
0
50
100
150
200
8096.200
8095.700
8095.200
8094.700
8094.200
8093.700
Survey Position KP 8096.306
Cable back onto sand and into shallow burial from KP 8095.700
Cable predominantly suspended between boulders with the cable chafing channels into the stone over long spans between KP8093.705 and KP 8095.700
Survey Position KP 8093.705
2013 Survey
9 per. Mov. Avg. (2013 Survey)


China US Seg N9 2013 Inspection Section 18 KP 8097.917 to KP 8096.307
Burial Depth (cm)
-250
-200
-150
-100
-50
0
50
100
150
8097.790
8097.290
8096.790
8096.290
KP
Start of Rocky area
KP 8097.717
Final Bight
KP 8097.440 to KP 8097.555
Crown DOL -144m
Isolated Rocky Area
KP 8097.079 to KP
8097.133
Isolated Rocky Area
KP 8096.751 to KP
8096.821
Final Bight
KP 8096.596 to KP 8096.633
Crown DOL 97m
Survey Position
KP 8096.307
End Survey Position
KP 8097.917
2013 Survey
7 per. Mov. Avg. (2013 Survey)

8.0 Vessel & ROV Diary of Events

SHIP & ROV OPERATIONAL DIARY

Thursday 1st August 2013

08:00 Vessel commenced final preparations for departure from Nanaimo, Canada

09:00 Pilot on Board commenced departure from berth

Departed Nanaimo for passage to Astoria, Oregon

16:43 Pilot away

17:00 Vessel FAOP
Position: Lat 48°21.50 N, Long 123°26.30 W

21:30 Vessel interrupts passage to commence ROV test dive outside of TSS
Distance travelled 59.1nm, average speed 13.13knts

21:54 Vessel stopping to commence ROV test dive - transfer control to aft bridge
ROV: Lat: 48° 32.70780 N Long: 124° 49.77050 W

22:54 HPR Pole deployed
ROV: Lat: 48° 33.20080 N Long: 124° 50.60660 W
Depth: 117.000

23:42 Vessel into DP - Preparing for ROV launch
ROV: Lat: 48° 33.08560 N Long: 124° 50.37930 W
Depth: 121.910

23:44 ROV off deck
ROV: Lat: 48° 33.08620 N Long: 124° 50.37890 W
Depth: 121.800

23:49 ROV at surface
ROV: Lat: 48° 33.08610 N Long: 124° 50.37950 W
Depth: 122.180

23:55 ROV on bottom
ROV: Lat: 48° 33.08330 N Long: 124° 50.37470 W
Depth: 121.750

23:59 Vessel continued with ROV test dive
ROV: Lat: 48° 33.08320 N Long: 124° 50.37450 W
Depth: 121.990

Friday 2nd August 2013

00:00 Vessel continued with ROV test dive
ROV: Lat: 48° 33.08320 N Long: 124° 50.37450 W
Depth: 121.9m

00:39 ROV - commenced recovery
ROV: Lat: 48° 33.08320 N Long: 124° 50.37450 W
Depth: 121.7m

00:42 ROV off bottom

ROV: Lat: 48° 33.08350 N Long: 124° 50.37480 W
Depth: 121.5m

00:47 ROV at surface
ROV: Lat: 48° 33.08490 N Long: 124° 50.38090 W
Depth: 121.4m

00:53 ROV on deck - End of trial dive
ROV: Lat: 48° 33.08570 N Long: 124° 50.37960 W
Depth: 121.3m

01:20 HPR pole recovered

01:30 Vessel resumed passage to Astoria

09:00 Vessel commenced Fire and boat station musters

09:18 Vessel completed fire and boat station musters

12:00 PSM VENT/NEDO/001 (TPE)
PSM VENT/NEDO/001 (NORTHSTAR)
PSM VENT/NEDO/001 (SX)
Sent to Nedonna beach terminal station requesting In-Service tone to be applied

13:00 End Of Passage
Position Lat: 46° 14.5 N Long: 124° 21.2 W
Distance travelled 151.2nm, average speed 13.15knts
Total distance travelled on passage: 210.3nm, average speed 13.14knts

13:29 Pilot on Board via helicopter transfer

14:00 PMS #1 received from Nedonna Beach TS confirming In-Service tone of 25Hz@70mA has been applied to TPE cable system

Arrived Astoria, Oregon, USA

15:57 Vessel all fast alongside Astoria, Oregon

16:30 USCG commenced vessel inspection

17:00 Commenced bunkering fuel

19:45 Completed Port State Clearance

Vessel completed port state clearance and embarkation of client reps

19:50 Completed bunkering fuel **130MT total**

20:00 Commenced on board pre-ops meeting with cable owner and OFCC reps

20:50 Completed on board pre-ops meeting

21:24 Pilot on board

Departed Astoria and commenced transit to TPE CWG

22:00 Vessel all clear of berth at Astoria – Commenced transit to TPE CWG

23:26 Pilot away

23:59 Vessel continued transit to TPE CWG
Position Lat: 46° 05.63 N Long: 124° 10.34 W

Saturday 3rd August 2013

00:00 Vessel continued transit to TPE CWG
Position Lat: 46° 05.63 N Long: 124° 10.34 W

02:30 Vessel completed transit and commenced setting up into DP control
Position Lat: 45° 39.43 N Long: 124° 00.43 W

Arrived TPE CWG commenced HPR and ROV profiler calibrations

02:55 Vessel completed set up into DP control

03:30 Vessel deployed HPR

04:00 ROV off deck to deploy USBL beacon onto seabed – Dive #2

04:16 ROV deployed USBL beacon on seabed
Pos:Lat: 45° 39.3929 N Long: 124° 00.3486 W Depth: 50.53m

04:20 ROV commenced setting up seabed bed profiler and bathymetric configurations

07:43 ROV commence recovery

07:45 ROV off bottom

07:46 ROV at surface

07:50 ROV on deck - End of Dive #2

07:55 Vessel moving into position for CPR calibration

08:06 Vessel moving off - commence box in of beacon

08:18 Vessel stopping – completed box in and satisfactory

08:27 Vessel moving off to position CPR over beacon

08:38 Vessel stopped in position over beacon

08:38 Vessel stopped in position with CPR over beacon
Pos:Lat: 45° 39.3942 N Long: 124° 00.3485 W Depth: 51.500m

08:45 Vessel commenced Spin test

09:29 Vessel all stop

09:31 Vessel moving off - commenced 2nd spin test

10:10 Vessel all stop

10:32 Vessel moving off - commenced 3rd spin test

11:16 Vessel all stop

12:48 Vessel moving off - commenced 4th spin test

13:12 Vessel all stop – Results of spin test inconclusive – decision made to move to position with WD 100m

13:23	ROV preparing to recover beacon
13:40	ROV off deck - Dive #3
13:44	ROV at surface
13:47	ROV on bottom Pos:Lat: 45° 39.3997 N Long: 124° 00.3750 W Depth: 51.320m.
14:14	ROV commenced recovery - Beacon gripped in manipulator Pos:Lat: 45° 39.3933 N Long: 124° 00.3488 W Depth: 51.460m
14:20	ROV off bottom
14:23	ROV at surface
14:28	ROV on deck - End of Dive #3
14:50	HPR retracted
14:51	Vessel moving off too >100m contour - control transferred to fwd bridge)
15:37	Vessel transfer control to aft bridge Pos:Lat: 45° 39.5672 N Long: 124° 09.2052 W Depth: 102.39m.
15:57	Vessel stopped at HPR cal site Pos:Lat: 45° 39.5683 N Long: 124° 09.8585 W Depth: 106.21m
16:04	ROV off deck to deploy USBL beacon onto seabed – Dive #4
16:09	ROV at surface
16:15	ROV on bottom Pos:Lat: 45° 39.55070 N Long: 124° 09.85080 W Depth: 106.01m
16:17	ROV deployed USBL beacon on seabed Pos:Lat: 45° 39.5509 N Long: 124° 09.8504 W Depth: 106.23m
16:25	ROV off bottom
16:29	ROV at surface
16:34	ROV on deck - End of Dive #4
16:38	Vessel positioning CPR over USBL beacon Pos:Lat: 45° 39.5680 N Long: 124° 09.8628 W Depth: 105.85m
16:43	Vessel in position over USBL beacon – Resume HPR calibration Pos:Lat: 45° 39.5564 N Long: 124° 09.8594 W Depth: 106.11m
16:43	Vessel moving off - commence boxin
17:30	Vessel stopping – completed box in and satisfactory result
17:32	Vessel positioning CPR over USBL beacon
17:40	Vessel in position over USBL beacon – commence spin testing Pos:Lat: 45° 39.5525 N Long: 124° 09.8540 W Depth: 106.06m
23:59	Vessel continuing HPR Calibration

Pos:Lat: 49° 39.5520 N Long: 124° 09 8560 W

Sunday 4th August 2013

00:00 Vessel continuing HPR Calibration
Pos:Lat: 49° 39.5520 N Long: 124° 09 8560 W

03:00 Vessel continuing HPR Calibration
Lat: 45° 39.5279 N Long: 124° 09.8604 W Depth: 105.37m

06:24 Vessel continuing HPR Calibration
Pos:Lat: 45° 39.5279 N Long: 124° 09.8614 W Depth: 104.85m

09:11 Vessel continuing HPR Calibration
Pos:Lat: 45° 39.5493 N Long: 124° 09.8567 W Depth: 105.62m

11:20 Vessel continuing HPR Calibration
Pos:Lat: 45° 39.5526 N Long: 124° 09.8550 W Depth: 106.79m

12:35 HPR calibration data acquisition complete and calculated C-O input into HPR

12:40 Vessel setting up in DP for Spin Test

12:42 Vessel commence spin test (to port)
Pos:Lat: 45° 39.5510 N Long: 124° 09.8544 W Depth: 106.72m

13:00 Vessel completes spin test
Pos:Lat: 45° 39.5492 N Long: 124° 09.8498 W Depth: 106.57m

13:30 HPR calibration completed

Completed HPR and ROV seabed profiler verifications

13:41 ROV off deck - Dive #5 – Recover USBL beacon

13:47 ROV at surface

13:52 ROV on Bottom
Pos:Lat: 45° 39.5387 N Long: 124° 09.8573 W Depth: 106.97m

13:55 ROV moving off

14:11 ROV commenced recovery - Beacon gripped in manipulator
Pos:Lat: 45° 39.551 N Long: 124° 09.854 W Depth: 106.33m

14:15 ROV off bottom

14:19 ROV at surface

14:23 ROV on deck - End of Dive #5

14:33 Vessel commenced transit to TPE survey site#1

Commenced survey operations at TPE, Northstar, SX & AKORN cable systems

Completed survey operations at TPE, Northstar, SX & AKORN cable systems

Sunday 11th August 2013

18:24 Vessel commenced slow transit to Coos Bay to arrive at 07:00LT on the 12th August to carry out rep and crew changes

Pos:Lat: 43° 45.71240 N Long: 124° 57.18780 W KP: 1829.20681

23:59 Vessel continues slow transit to Coos Bay to arrive at 07:00LT on the 12th August
Pos:Lat: 43° 44.87 N Long: 124° 52.04 W

Monday 12th August 2013

00:00 Vessel continued slow transit to Coos Bay to arrive at 07:00LT on the 12th August
Pos:Lat: 43° 44.87 N Long: 124° 52.04 W

06:00 PSM sent requesting In-Service tone be removed from Southern Cross and AKORN cable systems

08:00 Vessel awaiting arrival of transfer boat from Coos Bay
Pos:Lat: 43° 22.49 N Long: 124° 25.07 W

08:10 Vessel in contact with transfer boat *Captain Harold*

09:05 PSM received confirming In-Service tone has been removed from Southern Cross and AKORN cable systems

09:05 Transfer boat *Captain Harold* alongside – starboard side – personnel transfers by pilot ladder

09:50 Transfer boat *Captain Harold* away – vessel standing by awaiting agent to complete clearance

12:36 Transfer boat *Captain Harold* alongside – starboard side

12:38 Transfer boat *Captain Harold* away – vessel completed US clearance

12:44 Vessel commenced transit to China – US segment E1 CWG

Commenced survey operations on China – US Segment E1 cable system

15:13 Vessel on location at China-US Seg E1 Survey site (inshore location)
Pos:Lat: 43° 14.96700 N Long: 124° 24.42000 W KP: 1.89248

15:17 **ROV off deck – CH-US SE1 – Dive #1**

15:21 ROV at surface

15:23 ROV on bottom
ROV Pos:Lat: 43° 14.96690 N Long: 124° 24.42000 W KP: 1.89256
Depth: 14.720m Burial: cm DOL:-24.8144m

15:31 ROV moving off to locate cable using TSS350
ROV Pos:Lat: 43° 14.96680 N Long: 124° 24.41980 W KP: 1.89240
Depth: 14.590m Burial: cm DOL:-25.0990m

15:34 ROV heading south westerly - seabed sandy bottom small sand ripples
ROV Pos:Lat: 43° 14.96830 N Long: 124° 24.41990 W KP: 1.89135
Depth: 14.170m Burial: cm DOL:-22.5241m

15:39 ROV lifting to clear rock
ROV Pos:Lat: 43° 14.97400 N Long: 124° 24.41960 W KP: 1.88652
Depth: 14.800m Burial: cm DOL:-13.1333m

15:43 ROV back on seabed
ROV Pos:Lat: 43° 14.97540 N Long: 124° 24.42000 W KP: 1.88590
Depth: 12.400m Burial: cm DOL:-10.5511m

15:50 ROV past cable line – no tone detected

	ROV Pos:Lat: 43° 14.98600 N Long: 124° 24.42080 W KP: 1.87858 Depth: 17.060m Burial: cm DOL:7.6858m
15:54	ROV – sand seabed with numerous rocks hampering progress ROV Pos:Lat: 43° 14.98670 N Long: 124° 24.42180 W KP: 1.87926 Depth: 17.060m Burial: cm DOL:9.4340m
15:55	ROV lifting to clear rock ROV Pos:Lat: 43° 14.98670 N Long: 124° 24.42160 W KP: 1.87901 Depth: 17.060m Burial: cm DOL:9.3206m
15:58	ROV back on seabed ROV Pos:Lat: 43° 14.98870 N Long: 124° 24.42020 W KP: 1.87573 Depth: 16.390m Burial: cm DOL:11.8718m
16:06	ROV turning to track SE direction ROV Pos:Lat: 43° 15.00290 N Long: 124° 24.42670 W KP: 1.87257 Depth: 17.530m Burial: cm DOL:39.4197m
16:28	ROV Stopped - sand seabed with numerous rocks hampering progress ROV Pos:Lat: 43° 14.98910 N Long: 124° 24.41780 W KP: 1.87247 Depth: 16.080m Burial: cm DOL:11.1714m
16:32	ROV off bottom – decision made to transit 100m further offshore ROV Pos:Lat: 43° 14.98820 N Long: 124° 24.41750 W KP: 1.87281 Depth: 16.050m Burial: cm DOL:9.4897m
16:41	Vessel Stopped - 100m move completed ROV Pos:Lat: 43° 14.96430 N Long: 124° 24.48110 W KP: 1.96953 Depth: 17.830m Burial: cm DOL:5.8275m
16:45	ROV back on seabed – sand seabed ROV Pos:Lat: 43° 14.96570 N Long: 124° 24.48010 W KP: 1.96721 Depth: 17.640m Burial: cm DOL:7.5989m
16:47	ROV moving off to locate cable using TSS350 ROV Pos:Lat: 43° 14.96520 N Long: 124° 24.48100 W KP: 1.96870 Depth: 17.900m Burial: cm DOL:7.2790m
16:51	ROV past cable line – no tone detected ROV Pos:Lat: 43° 14.95630 N Long: 124° 24.47480 W KP: 1.96808 Depth: 17.660m Burial: cm DOL:-11.2090m
17:05	ROV Stopped - 100m South of cable line ROV Pos:Lat: 43° 14.91850 N Long: 124° 24.43140 W KP: 1.94447 Depth: 16.780m Burial: cm DOL:-99.4860m
17:08	ROV moving off - heading North ROV Pos:Lat: 43° 14.92190 N Long: 124° 24.42860 W KP: 1.93838 Depth: 16.600m Burial: cm DOL:-95.3802m
17:36	ROV - located cable using TSS350 ROV Pos:Lat: 43° 14.98350 N Long: 124° 24.43660 W KP: 1.89991 Depth: 17.080m Burial: 87.20cm DOL:12.5475m
17:42	ROV lining up on cable line ROV Pos:Lat: 43° 14.98430 N Long: 124° 24.42530 W KP: 1.88543 Depth: 16.450m Burial: 84.70cm DOL:7.4147m
17:43	ROV moving off to east to start position ROV Pos:Lat: 43° 14.98470 N Long: 124° 24.42920 W KP: 1.88990

Depth: 16.720m Burial: 84.00cm DOL:10.3231m

17:55 **Start Survey pass CH – US E1**
ROV Pos:Lat: 43° 14.98440 N Long: 124° 24.43210 W KP: 1.89369
Depth: 16.360m Burial: 35.00cm DOL:11.4798m

18:06 Cable Position Fix
ROV Pos:Lat: 43° 14.97659 N Long: 124° 24.45780 W KP: 1.93132
Depth: 17.100m Burial: 29.00cm DOL:13.1039m

18:17 Cable Position Fix
ROV Pos:Lat: 43° 14.95920 N Long: 124° 24.50610 W KP: 2.00418
Depth: 17.500m Burial: 19.00cm DOL:11.5893m

18:27 Cable Position Fix
ROV Pos:Lat: 43° 14.94210 N Long: 124° 24.55150 W KP: 2.07326
Depth: 18.160m Burial: 17.00cm DOL:8.9081m

18:30 Cable Position Fix – BD reducing
ROV Pos:Lat: 43° 14.93510 N Long: 124° 24.57090 W KP: 2.10254
Depth: 18.250m Burial: 10.00cm DOL:8.2725m

18:41 Cable Position Fix
ROV Pos:Lat: 43° 14.91390 N Long: 124° 24.63200 W KP: 2.19408
Depth: 19.620m Burial: 0.00cm DOL:7.7107m

18:51 Cable Position Fix – BD shallow - No sight of any cable exposure
ROV Pos:Lat: 43° 14.89280 N Long: 124° 24.69060 W KP: 2.28248
Depth: 20.750m Burial: 8.00cm DOL:5.8736m

18:53 Cable Position Fix
ROV Pos:Lat: 43° 14.88780 N Long: 124° 24.70250 W KP: 2.30099
Depth: 21.090m Burial: 20.00cm DOL:4.3075m

18:54 ROV sights cable exposure
ROV Pos:Lat: 43° 14.88780 N Long: 124° 24.70550 W KP: 2.30467
Depth: 21.810m Burial: -30.00cm DOL:6.0259m

18:55 ROV backing up to start of exposed cable
ROV Pos:Lat: 43° 14.88820 N Long: 124° 24.70410 W KP: 2.30264
Depth: 21.880m Burial: cm DOL:5.8860m

18:56 ROV - Cable suspended start position
ROV Pos:Lat: 43° 14.88870 N Long: 124° 24.70360 W KP: 2.30163
Depth: 22.130m Burial: -66.00cm DOL:6.4463m

19:00 ROV lifting to clear rock
ROV Pos:Lat: 43° 14.88790 N Long: 124° 24.70710 W KP: 2.30655
Depth: 22.110m Burial: 2.00cm DOL:7.1012m

19:04 ROV – area of numerous rocks on seabed
ROV Pos:Lat: 43° 14.88540 N Long: 124° 24.71250 W KP: 2.31513
Depth: 22.540m Burial: 0.00cm DOL:6.0070m

19:05 ROV sighted cable suspended between rocks
ROV Pos:Lat: 43° 14.88580 N Long: 124° 24.71320 W KP: 2.31568
Depth: 22.310m Burial: -34.00cm DOL:7.0734m

19:07 ROV backing up to carry out another visual check – request by client reps
ROV Pos:Lat: 43° 14.88610 N Long: 124° 24.71330 W KP: 2.31557

Depth: 22.030m Burial: -2.00cm DOL:7.6352m

19:09 ROV moving off cable line to avoid vehicle damaging the suspended cable
ROV Pos:Lat: 43° 14.88290 N Long: 124° 24.71830 W KP: 2.32421
Depth: 23.510m Burial: cm DOL:5.1330m

19:12 ROV lifting to clear rocks – cable suspended between numerous rock formations
ROV Pos:Lat: 43° 14.88020 N Long: 124° 24.72090 W KP: 2.32951
Depth: 23.590m Burial: cm DOL:2.0915m

19:20 ROV back on seabed
ROV Pos:Lat: 43° 14.86960 N Long: 124° 24.74220 W KP: 2.36394
Depth: 22.900m Burial: cm DOL:-3.4939m

19:22 ROV turning to go back up cable line to check suspension
ROV Pos:Lat: 43° 14.86920 N Long: 124° 24.74000 W KP: 2.36155
Depth: 22.690m Burial: -64.00cm DOL:-5.4161m

19:28 ROV – cable suspended between numerous rock formations
ROV Pos:Lat: 43° 14.87870 N Long: 124° 24.73510 W KP: 2.34810
Depth: 20.670m Burial: -73.00cm DOL:7.7102m

19:32 ROV – cable back into burial
ROV Pos:Lat: 43° 14.87760 N Long: 124° 24.73830 W KP: 2.35288
Depth: 20.630m Burial: 12.00cm DOL:7.7000m

19:36 ROV – cable suspended between numerous rock formations
ROV Pos:Lat: 43° 14.87410 N Long: 124° 24.74940 W KP: 2.36924
Depth: 23.090m Burial: cm DOL:8.1798m

19:45 ROV lifting to clear rock – cable remains in suspension over rock formations
ROV Pos:Lat: 43° 14.87200 N Long: 124° 24.75410 W KP: 2.37666
Depth: 23.260m Burial: cm DOL:7.3513m

19:47 ROV Stopped
ROV Pos:Lat: 43° 14.87200 N Long: 124° 24.75410 W KP: 2.37666
Depth: 23.260m Burial: cm DOL:7.3513m

20:11 Vessel - due to seabed conditions hampering progress, a joint decision was made to recovery the ROV and transit to the as-laid RPL plough down position and resume survey heading offshore – a decision will be made in due course with regard to completion of the remaining section

20:13 ROV off bottom
ROV Pos:Lat: 43° 14.87200 N Long: 124° 24.75340 W KP: 2.37579
Depth: 23.440m Burial: cm DOL:6.9492m

20:14 ROV at surface

20:18 **ROV end deck – end of Dive #1**

20:21 HPR pole fully retracted

20:25 Vessel commenced transit to plough down position

21:52 Vessel on location at plough down position
Pos:Lat: 43° 12.61170 N Long: 124° 39.28370 W KP: 23.09982

22:02 **ROV off deck – CH-US SE1 – Dive #2**

22:06 ROV at surface

22:13 ROV on bottom
ROV Pos:Lat: 43° 12.63870 N Long: 124° 39.28760 W KP: 23.10358
Depth: 137.770m Burial: cm DOL:27.9713m

22:15 ROV – sonar indicating area of large rock/boulder formations
ROV Pos:Lat: 43° 12.63880 N Long: 124° 39.28790 W KP: 23.10398
Depth: 138.390m Burial: cm DOL:28.1613m

22:16 ROV moving off to locate cable using TSS350
ROV Pos:Lat: 43° 12.63880 N Long: 124° 39.28790 W KP: 23.10398
Depth: 138.780m Burial: cm DOL:28.1613m

22:20 ROV – area of large rock/boulder formations
ROV Pos:Lat: 43° 12.62910 N Long: 124° 39.29780 W KP: 23.11793
Depth: 138.250m Burial: cm DOL:10.6250m

22:22 ROV crossing the cable line
ROV Pos:Lat: 43° 12.62339 N Long: 124° 39.30220 W KP: 23.12421
Depth: 136.430m Burial: -14.00cm DOL:0.2461m

22:24 ROV - located cable using TSS350 - **resume survey pass from KP: 23.134**
ROV Pos:Lat: 43° 12.62130 N Long: 124° 39.30960 W KP: 23.13434
Depth: 135.670m Burial: 35.00cm DOL:-3.3241m

22:31 Cable Position Fix
ROV Pos:Lat: 43° 12.62030 N Long: 124° 39.33870 W KP: 23.17376
Depth: 138.000m Burial: 40.00cm DOL:-4.2649m

22:36 ROV – visual on plough scar
ROV Pos:Lat: 43° 12.61960 N Long: 124° 39.36740 W KP: 23.21265
Depth: 139.130m Burial: 41.00cm DOL:-4.7123m

22:40 ROV off the cable line due to the rocky surface
ROV Pos:Lat: 43° 12.61650 N Long: 124° 39.38290 W KP: 23.23376
Depth: 140.030m Burial: 0.00cm DOL:-9.9834m

22:42 ROV back on the cable line
ROV Pos:Lat: 43° 12.61830 N Long: 124° 39.38700 W KP: 23.23924
Depth: 140.010m Burial: 36.00cm DOL:-6.5297m

22:49 Cable Position Fix
ROV Pos:Lat: 43° 12.61750 N Long: 124° 39.42430 W KP: 23.28978
Depth: 141.100m Burial: 60.00cm DOL:-6.9107m

22:56 Cable coming out of burial
ROV Pos:Lat: 43° 12.61710 N Long: 124° 39.45840 W KP: 23.33597
Depth: 141.120m Burial: 15.00cm DOL:-6.6315m

22:57 ROV Stopped – sighted small cable suspension over rocks
ROV Pos:Lat: 43° 12.61700 N Long: 124° 39.45820 W KP: 23.33570
Depth: 141.420m Burial: cm DOL:-6.8262m

23:11 ROV moving off – tracking cable suspension
ROV Pos:Lat: 43° 12.61690 N Long: 124° 39.46130 W KP: 23.33991
Depth: 139.760m Burial: cm DOL:-6.9229m

23:15 ROV stopped - waiting for visibility to clear
ROV Pos:Lat: 43° 12.61770 N Long: 124° 39.46520 W KP: 23.34516
Depth: 140.180m Burial: cm DOL:-5.3188m

23:19 ROV moving off
ROV Pos:Lat: 43° 12.61710 N Long: 124° 39.47100 W KP: 23.35303
Depth: 140.310m Burial: cm DOL:-6.2574m

23:25 ROV – cable back into burial
ROV Pos:Lat: 43° 12.61610 N Long: 124° 39.50300 W KP: 23.39640
Depth: 141.430m Burial: 41.00cm DOL:-7.1622m

23:40 Cable Position Fix
ROV Pos:Lat: 43° 12.61590 N Long: 124° 39.60480 W KP: 23.53425
Depth: 143.850m Burial: 45.00cm DOL:-4.5068m

23:50 Cable Position Fix
ROV Pos:Lat: 43° 12.61440 N Long: 124° 39.67110 W KP: 23.62408
Depth: 144.680m Burial: 44.00cm DOL:-5.3154m

23:59 ROV continues survey on China – US Seg E1
ROV Pos:Lat: 43° 12.61270 N Long: 124° 39.86660 W KP: 23.88887
Depth: 151.140m Burial: 42.00cm DOL:-2.6661m

Tuesday 13th August 2013

00:00 ROV continues survey on China – US Seg E1
ROV Pos:Lat: 43° 12.61270 N Long: 124° 39.86660 W KP: 23.88887
Depth: 151.140m Burial: 42.00cm DOL:-2.6661m

00:22 ROV – visual on coil of wire rope on cable route
ROV Pos:Lat: 43° 12.61060 N Long: 124° 39.95210 W KP: 24.00473
Depth: 154.570m Burial: 52.00cm DOL:-4.0153m

00:27 Cable Position Fix – seabed transition from rocky to flat featureless sand
ROV Pos:Lat: 43° 12.61040 N Long: 124° 39.99260 W KP: 24.05958
Depth: 156.550m Burial: 60.00cm DOL:-3.1796m

00:48 Cable Position Fix – seabed flat and featureless sand
ROV Pos:Lat: 43° 12.60730 N Long: 124° 40.15260 W KP: 24.27635
Depth: 160.300m Burial: 91.00cm DOL:-4.1723m

00:49 Cable Position Fix
ROV Pos:Lat: 43° 12.60710 N Long: 124° 40.16190 W KP: 24.28895
Depth: 160.740m Burial: 83.00cm DOL:-4.2627m

01:17 Cable Position Fix
ROV Pos:Lat: 43° 12.60380 N Long: 124° 40.35390 W KP: 24.54906
Depth: 165.180m Burial: 107.00cm DOL:-4.6718m

01:33 Cable Position Fix
ROV Pos:Lat: 43° 12.60060 N Long: 124° 40.48330 W KP: 24.72441
Depth: 167.160m Burial: 98.00cm DOL:-6.7504m

01:57 Cable Position Fix
ROV Pos:Lat: 43° 12.59480 N Long: 124° 40.68750 W KP: 25.00114
Depth: 169.960m Burial: 107.00cm DOL:-11.4290m

02:17 Cable Position Fix
ROV Pos:Lat: 43° 12.59160 N Long: 124° 40.88070 W KP: 25.26287
Depth: 172.210m Burial: 111.00cm DOL:-11.6137m

02:29 Cable Position Fix
ROV Pos:Lat: 43° 12.58800 N Long: 124° 40.99280 W KP: 25.41481

Depth: 173.580m Burial: 111.00cm DOL:-14.9500m

03:27 Cable Position Fix
ROV Pos:Lat: 43° 12.57830 N Long: 124° 41.45380 W KP: 26.03942
Depth: 180.590m Burial: 114.00cm DOL:-19.2247m

03:31 ROV – visual sighting of fishing trawl scar
ROV Pos:Lat: 43° 12.57740 N Long: 124° 41.48260 W KP: 26.07846
Depth: 179.900m Burial: 109.00cm DOL:-20.0358m

04:44 Cable Position Fix
ROV Pos:Lat: 43° 12.56480 N Long: 124° 42.11280 W KP: 26.93229
Depth: 190.030m Burial: 109.00cm DOL:-24.6523m

05:16 Cable Position Fix
ROV Pos:Lat: 43° 12.56000 N Long: 124° 42.42000 W KP: 27.34846
Depth: 195.420m Burial: 105.00cm DOL:-24.4182m

05:30 Cable Position Fix
ROV Pos:Lat: 43° 12.55710 N Long: 124° 42.53090 W KP: 27.49875
Depth: 197.360m Burial: 108.00cm DOL:-26.4905m

05:37 Cable Position Fix
ROV Pos:Lat: 43° 12.55610 N Long: 124° 42.59070 W KP: 27.57976
Depth: 199.030m Burial: 108.00cm DOL:-26.5703m

06:01 Cable Position Fix
ROV Pos:Lat: 43° 12.55280 N Long: 124° 42.79180 W KP: 27.85219
Depth: 202.660m Burial: 108.00cm DOL:-26.7091m

06:13 Cable Position Fix
ROV Pos:Lat: 43° 12.55200 N Long: 124° 42.90260 W KP: 28.00226
Depth: 204.950m Burial: 116.00cm DOL:-24.8970m

06:29 Cable Position Fix
ROV Pos:Lat: 43° 12.55140 N Long: 124° 43.03460 W KP: 28.18102
Depth: 209.030m Burial: 111.00cm DOL:-22.0891m

06:30 Cable Position Fix
ROV Pos:Lat: 43° 12.55160 N Long: 124° 43.04600 W KP: 28.19645
Depth: 209.830m Burial: 113.00cm DOL:-21.3842m

07:05 Cable Position Fix
ROV Pos:Lat: 43° 12.54790 N Long: 124° 43.36860 W KP: 28.63342
Depth: 220.260m Burial: 105.00cm DOL:-18.6604m

07:18 Cable Position Fix
ROV Pos:Lat: 43° 12.54670 N Long: 124° 43.48240 W KP: 28.78756
Depth: 225.290m Burial: 106.00cm DOL:-17.5034m

07:35 Cable Position Fix
ROV Pos:Lat: 43° 12.54440 N Long: 124° 43.64620 W KP: 29.00945
Depth: 233.960m Burial: 101.00cm DOL:-16.8948m

07:54 Cable Position Fix – seabed flat and featureless sand
ROV Pos:Lat: 43° 12.54230 N Long: 124° 43.79400 W KP: 29.20967
Depth: 241.930m Burial: 100.00cm DOL:-16.3946m

08:25 Cable Position Fix

ROV Pos:Lat: 43° 12.53790 N Long: 124° 44.06720 W KP: 29.57978
Depth: 253.9m Burial: 93.00cm DOL:-16.4255m

08:54 Cable Position Fix
ROV Pos:Lat: 43° 12.53370 N Long: 124° 44.31630 W KP: 29.91719
Depth: 254.9m Burial: 99.00cm DOL:-17.1281m

09:39 ROV – visual sighting of rope laying on seabed
ROV Pos:Lat: 43° 12.52560 N Long: 124° 44.79390 W KP: 30.56422
Depth: 4.500m Burial: 77.00cm DOL:-19.9560m

09:48 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52550 N Long: 124° 44.81280 W KP: 30.58982
Depth: 4.500m Burial: 00.00cm DOL:-19.6633m

09:50 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52540 N Long: 124° 44.81420 W KP: 30.59173
Depth: 4.500m Burial: 14.00cm DOL:-19.8163m

09:51 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52570 N Long: 124° 44.81540 W KP: 30.59334
Depth: 4.500m Burial: 00.00cm DOL:-19.2304m

09:52 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52570 N Long: 124° 44.81690 W KP: 30.59537
Depth: 4.500m Burial: 13.00cm DOL:-19.1922m

10:08 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52640 N Long: 124° 44.85010 W KP: 30.64030
Depth: 4.500m Burial: 00.00cm DOL:-17.0468m

10:08 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52620 N Long: 124° 44.85130 W KP: 30.64194
Depth: 4.500m Burial: 23.00cm DOL:-17.3828m

10:13 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52610 N Long: 124° 44.87270 W KP: 30.67092
Depth: 4.500m Burial: 00.00cm DOL:-17.0264m

10:14 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52590 N Long: 124° 44.87420 W KP: 30.67296
Depth: 4.500m Burial: 22.00cm DOL:-17.3547m

10:17 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52480 N Long: 124° 44.88680 W KP: 30.69006
Depth: 4.500m Burial: 00.00cm DOL:-19.0775m

10:20 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52350 N Long: 124° 44.89360 W KP: 30.70029
Depth: 4.500m Burial: 15.00cm DOL:-21.2876m

10:20 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52330 N Long: 124° 44.89560 W KP: 30.70301
Depth: 4.500m Burial: 00.00cm DOL:-21.4903m

10:22 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52270 N Long: 124° 44.89860 W KP: 30.70714
Depth: 4.500m Burial: 17.00cm DOL:-22.3373m

10:24 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.52190 N Long: 124° 44.90760 W KP: 30.71940

Depth: 4.500m Burial: 00.00cm DOL:-23.0267m

10:27 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.52000 N Long: 124° 44.91740 W KP: 30.73287
Depth: 4.500m Burial: 15.00cm DOL:-25.6860m

10:34 DOB 25cm
ROV Pos:Lat: 43° 12.50940 N Long: 124° 44.96790 W KP: 30.80239
Depth: 312.280m Burial: 26.00cm DOL:-40.8604m

11:05 DOB 21cm
ROV Pos:Lat: 43° 12.42850 N Long: 124° 45.20990 W KP: 31.18373
Depth: 322.970m Burial: 22.00cm DOL:-16.4795m

11:19 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.38690 N Long: 124° 45.31140 W KP: 31.34126
Depth: 327.740m Burial: 00.00cm DOL:-12.5342m

11:22 Cable exposed on seabed - end
ROV Pos:Lat: 43° 12.38170 N Long: 124° 45.32390 W KP: 31.36074
Depth: 327.040m Burial: 29.00cm DOL:-12.1710m

11:54 Cable Position Fix
ROV Pos:Lat: 43° 12.28150 N Long: 124° 45.55980 W KP: 31.73019
Depth: 333.210m Burial: 31.00cm DOL:-8.5997m

11:58 Cable Position Fix
ROV Pos:Lat: 43° 12.26720 N Long: 124° 45.59350 W KP: 31.78296
Depth: 333.510m Burial: 29.00cm DOL:-8.0615m

12:04 Cable Position Fix
ROV Pos:Lat: 43° 12.24570 N Long: 124° 45.64300 W KP: 31.86094
Depth: 335.200m Burial: 30.00cm DOL:-8.0632m

12:19 Cable Position Fix
ROV Pos:Lat: 43° 12.19770 N Long: 124° 45.75390 W KP: 32.03546
Depth: 337.480m Burial: 31.00cm DOL:-7.9102m

12:26 Cable Position Fix
ROV Pos:Lat: 43° 12.17350 N Long: 124° 45.81020 W KP: 32.12392
Depth: 338.710m Burial: 26.00cm DOL:-7.5717m

12:30 ROV – visual sighting of rope laying on seabed
ROV Pos:Lat: 43° 12.16310 N Long: 124° 45.83460 W KP: 32.16217
Depth: 338.260m Burial: 22.00cm DOL:-7.2826m

12:35 ROV – visual sighting of crab pot & exposed cable
ROV Pos:Lat: 43° 12.16260 N Long: 124° 45.83450 W KP: 32.16252
Depth: 338.960m Burial: 00.00cm DOL:-8.1421m

12:45 ROV lifting over crab pot
ROV Pos:Lat: 43° 12.16310 N Long: 124° 45.83450 W KP: 32.16205
Depth: 340.500m Burial: 00.00cm DOL:-7.3489m

12:54 ROV back on seabed
ROV Pos:Lat: 43° 12.15820 N Long: 124° 45.83810 W KP: 32.17088
Depth: 339.950m Burial: 44.00cm DOL:-12.6701m

13:03 ROV Nav PC requires re-boot
ROV Pos:Lat: 43° 12.15880 N Long: 124° 45.84270 W KP: 32.17567
Depth: 339.820m Burial: 23.00cm DOL:-8.5399m

13:23 ROV completed re-boot of Nav PC's
ROV Pos:Lat: 43° 12.15900 N Long: 124° 45.84230 W KP: 32.17501
Depth: 340.120m Burial: 18.00cm DOL:-8.4885m

13:55 ROV moving off
ROV Pos:Lat: 43° 12.15780 N Long: 124° 45.84640 W KP: 32.18092
Depth: 341.620m Burial: 31.00cm DOL:-7.5692m

13:59 Cable Position Fix
ROV Pos:Lat: 43° 12.15030 N Long: 124° 45.86380 W KP: 32.20828
Depth: 340.260m Burial: 30.00cm DOL:-7.4965m

14:02 Cable Position Fix
ROV Pos:Lat: 43° 12.13980 N Long: 124° 45.88810 W KP: 32.24650
Depth: 340.740m Burial: 30.00cm DOL:-7.4360m

14:07 Cable Position Fix
ROV Pos:Lat: 43° 12.12620 N Long: 124° 45.91920 W KP: 32.29558
Depth: 339.630m Burial: 24.00cm DOL:-7.6208m

14:13 Cable Position Fix
ROV Pos:Lat: 43° 12.10710 N Long: 124° 45.96340 W KP: 32.36512
Depth: 341.800m Burial: 29.00cm DOL:-7.5080m

14:19 Cable Position Fix
ROV Pos:Lat: 43° 12.08810 N Long: 124° 46.00800 W KP: 32.43503
Depth: 341.230m Burial: 27.00cm DOL:-6.9687m

14:34 Cable Position Fix
ROV Pos:Lat: 43° 12.03890 N Long: 124° 46.12330 W KP: 32.61584
Depth: 343.500m Burial: 28.00cm DOL:-5.6897m

14:42 Cable exposed on seabed - start
ROV Pos:Lat: 43° 12.01170 N Long: 124° 46.18500 W KP: 32.71349
Depth: 343.990m Burial: 00.00cm DOL:-5.8062m

14:51 Cable exposed on seabed - start
ROV Pos:Lat: 43° 11.98180 N Long: 124° 46.25580 W KP: 32.82420
Depth: 344.400m Burial: 00.00cm DOL:-3.0819m

15:07 Cable Position Fix
ROV Pos:Lat: 43° 11.93860 N Long: 124° 46.35670 W KP: 32.98252
Depth: 345.890m Burial: 99.00cm DOL:-1.4756m

15:24 Cable Position Fix
ROV Pos:Lat: 43° 11.90180 N Long: 124° 46.44150 W KP: 33.11608
Depth: 346.350m Burial: 107.00cm DOL:-1.7763m

15:31 Cable Position Fix
ROV Pos:Lat: 43° 11.88170 N Long: 124° 46.48810 W KP: 33.18936
Depth: 347.890m Burial: 104.00cm DOL:-1.7453m

15:45 Cable Position Fix
ROV Pos:Lat: 43° 11.83840 N Long: 124° 46.58630 W KP: 33.34468
Depth: 347.180m Burial: 99.00cm DOL:-3.1885m

15:48 PSM received from Bandon CLS confirming In-Service tone has been applied to segment N9 25Hz at 80mA
ROV Pos:Lat: 43° 11.83169 N Long: 124° 46.60310 W KP: 33.37059
Depth: 350.800m Burial: 104.00cm DOL:-2.3096m

15:52 Cable Position Fix
ROV Pos:Lat: 43° 11.81560 N Long: 124° 46.63920 W KP: 33.42785
Depth: 348.160m Burial: 104.00cm DOL:-3.1293m

15:55 Cable Position Fix
ROV Pos:Lat: 43° 11.80700 N Long: 124° 46.66010 W KP: 33.46033
Depth: 4.500m Burial: 103.00cm DOL:-2.4482m

16:03 Cable Position Fix
ROV Pos:Lat: 43° 11.77770 N Long: 124° 46.72730 W KP: 33.56630
Depth: 348.610m Burial: 104.00cm DOL:-2.9028m

16:21 Cable Position Fix
ROV Pos:Lat: 43° 11.71540 N Long: 124° 46.87060 W KP: 33.79212
Depth: 350.610m Burial: 104.00cm DOL:-3.5975m

16:43 ROV Stopped - reset seabed profilers
ROV Pos:Lat: 43° 11.65340 N Long: 124° 47.01280 W KP: 34.01636
Depth: 350.600m Burial: 106.00cm DOL:-4.5585m

17:01 ROV moving off – reset of seabed profilers completed
ROV Pos:Lat: 43° 11.65319 N Long: 124° 47.01410 W KP: 34.01808
Depth: 349.900m Burial: 108.00cm DOL:-3.9874m

17:14 Cable Position Fix
ROV Pos:Lat: 43° 11.61750 N Long: 124° 47.09730 W KP: 34.14873
Depth: 350.990m Burial: 100.00cm DOL:-3.6260m

18:13 Cable Position Fix
ROV Pos:Lat: 43° 11.42970 N Long: 124° 47.53190 W KP: 34.83254
Depth: 350.310m Burial: 93.00cm DOL:-3.8651m

18:25 Cable Position Fix
ROV Pos:Lat: 43° 11.38830 N Long: 124° 47.62630 W KP: 34.98164
Depth: 349.760m Burial: 96.00cm DOL:-4.8861m

18:27 Cable Position Fix
ROV Pos:Lat: 43° 11.38520 N Long: 124° 47.63370 W KP: 34.99319
Depth: 349.070m Burial: 101.00cm DOL:-4.7388m

19:13 ROV – visual sighting of rope laying on seabed
ROV Pos:Lat: 43° 11.25959 N Long: 124° 47.92470 W KP: 35.45094
Depth: 4.500m Burial: 95.00cm DOL:-4.6611m

19:18 ROV – visual sighting of seabed scar
ROV Pos:Lat: 43° 11.25250 N Long: 124° 47.94620 W KP: 35.48271
Depth: 343.100m Burial: 93.00cm DOL:-1.1728m

19:30 ROV at A/C
ROV Pos:Lat: 43° 11.23859 N Long: 124° 48.00150 W KP: 35.56032
Depth: 342.170m Burial: 92.00cm DOL:14.7341m

19:34 DOB gradually shallowing
ROV Pos:Lat: 43° 11.23490 N Long: 124° 48.01740 W KP: 35.58962
Depth: 342.600m Burial: 80.00cm DOL:10.5066m

19:43 DOB approx 90 cm
ROV Pos:Lat: 43° 11.22550 N Long: 124° 48.07250 W KP: 35.66521
Depth: 340.370m Burial: 88.00cm DOL:-2.2500m

20:30 Cable Position Fix
ROV Pos:Lat: 43° 11.20460 N Long: 124° 48.37020 W KP: 36.07018
Depth: 335.570m Burial: 99.00cm DOL:-15.9176m

20:33 ROV Stopped to check noise levels on profiler output
ROV Pos:Lat: 43° 11.20370 N Long: 124° 48.39110 W KP: 36.09855
Depth: 335.420m Burial: 87.00cm DOL:-15.8286m

20:35 ROV moving off - profiler output ok
ROV Pos:Lat: 43° 11.20439 N Long: 124° 48.39540 W KP: 36.10428
Depth: 335.240m Burial: 96.00cm DOL:-14.1823m

20:59 ROV – TSS350 setting changed from auto track to manual
ROV Pos:Lat: 43° 11.19910 N Long: 124° 48.56900 W KP: 36.33965
Depth: 328.270m Burial: 103.00cm DOL:-9.4215m

21:08 ROV Stopped - reset seabed profilers
ROV Pos:Lat: 43° 11.19590 N Long: 124° 48.66280 W KP: 36.46686
Depth: 327.190m Burial: 98.00cm DOL:-7.4693m

21:09 ROV moving off – reset of seabed profilers completed
ROV Pos:Lat: 43° 11.19560 N Long: 124° 48.66280 W KP: 36.46690
Depth: 325.940m Burial: 98.00cm DOL:-8.0237m

21:24 ROV - backing up to check sighting of debris on the seabed
ROV Pos:Lat: 43° 11.19110 N Long: 124° 48.75640 W KP: 36.59399
Depth: 323.440m Burial: 98.00cm DOL:-8.4943m

21:37 ROV moving off from debris site - unknown object on the seabed
ROV Pos:Lat: 43° 11.19080 N Long: 124° 48.75340 W KP: 36.58996
Depth: 324.070m Burial: -44.00cm DOL:-9.3002m

22:27 Cable Position Fix
ROV Pos:Lat: 43° 11.17970 N Long: 124° 49.04850 W KP: 36.99030
Depth: 316.620m Burial: 98.00cm DOL:-5.0780m

23:27 Cable Position Fix
ROV Pos:Lat: 43° 11.15850 N Long: 124° 49.51440 W KP: 37.2277
Depth: 306.670m Burial: 87.00cm DOL:-5.2004m

23:59 ROV continues survey operations on China – US segment E1
ROV Pos:Lat: 43° 11.14370 N Long: 124° 49.80810 W KP: 38.02164
Depth: 297.630m Burial: 88.00cm DOL:-7.9366m

Wednesday 14th August 2013

00:00 ROV continues survey operations on China – US segment E1
ROV Pos:Lat: 43° 11.14370 N Long: 124° 49.80810 W KP: 38.02164
Depth: 297.630m Burial: 88.00cm DOL:-7.9366m

00:32 Cable Position Fix
ROV Pos:Lat: 43° 11.13310 N Long: 124° 50.03070 W KP: 38.32388
Depth: 297.861m Burial: 99.00cm DOL:-9.1503m

00:44 Cable Position Fix
ROV Pos:Lat: 43° 11.12870 N Long: 124° 50.14350 W KP: 38.47693
Depth: 298.215m Burial: 94.00cm DOL:-7.6203m

01:32 Cable Position Fix
ROV Pos:Lat: 43° 11.11160 N Long: 124° 50.54540 W KP: 39.02239

Depth: 297.663m Burial: 92.00cm DOL:-5.9789m

02:27 Cable Position Fix
ROV Pos:Lat: 43° 11.09110 N Long: 124° 51.02990 W KP: 39.67995
Depth: 301.639m Burial: 108.00cm DOL:-2.9158m

02:35 Cable Position Fix
ROV Pos:Lat: 43° 11.08840 N Long: 124° 51.08260 W KP: 39.75152
Depth: 302.453m Burial: 92.00cm DOL:-3.0092m

02:38 Cable Position Fix
ROV Pos:Lat: 43° 11.08690 N Long: 124° 51.10630 W KP: 39.78375
Depth: 302.701m Burial: 93.00cm DOL:-3.4539m

03:27 Cable Position Fix
ROV Pos:Lat: 43° 11.06860 N Long: 124° 51.55390 W KP: 40.39115
Depth: 314.476m Burial: 98.00cm DOL:0.0452m

03:34 Seabed surface starting to get rocky
ROV Pos:Lat: 43° 11.06660 N Long: 124° 51.61530 W KP: 40.47441
Depth: 315.061m Burial: 87.00cm DOL:1.3557m

03:44 ROV manoeuvring round an obstacle
ROV Pos:Lat: 43° 11.06200 N Long: 124° 51.69070 W KP: 40.57691
Depth: 317.373m Burial: 67.00cm DOL:0.1031m

04:27 Cable Position Fix
ROV Pos:Lat: 43° 11.04460 N Long: 124° 52.09680 W KP: 41.12809
Depth: 333.613m Burial: 95.00cm DOL:-0.2993m

05:01 Cable Position Fix - Burial depth < 45 cm
ROV Pos:Lat: 43° 11.02859 N Long: 124° 52.43100 W KP: 41.58188
Depth: 346.461m Burial: 40.00cm DOL:-1.6060m

05:16 Cable Position Fix
ROV Pos:Lat: 43° 11.02240 N Long: 124° 52.58800 W KP: 41.79492
Depth: 355.842m Burial: 60.00cm DOL:0.4994m

05:28 Cable Position Fix
ROV Pos:Lat: 43° 11.01730 N Long: 124° 52.70080 W KP: 41.94805
Depth: 365.298m Burial: 54.00cm DOL:0.0470m

05:48 ROV – visual of seabed scarring
ROV Pos:Lat: 43° 11.00870 N Long: 124° 52.91460 W KP: 42.23817
Depth: 377.697m Burial: 77.00cm DOL:2.1267m

06:19 ROV stopped – pushed offline
ROV Pos:Lat: 43° 10.99100 N Long: 124° 53.29200 W KP: 42.75058
Depth: 406.864m Burial: 00.00cm DOL:3.5870m

06:25 ROV back on cable moving off
ROV Pos:Lat: 43° 10.99210 N Long: 124° 53.29780 W KP: 42.75830
Depth: 407.367m Burial: 70.00cm DOL:3.9430m

06:38 ROV – visual of seabed scarring
ROV Pos:Lat: 43° 10.98540 N Long: 124° 53.42010 W KP: 42.92446
Depth: 419.446m Burial: 83.00cm DOL:2.2759m

06:48 Cable Position Fix
ROV Pos:Lat: 43° 10.97970 N Long: 124° 53.50230 W KP: 43.03628
Depth: 429.001m Burial: 91.00cm DOL:-0.9640m

07:03 ROV – visual on cable exposure
ROV Pos:Lat: 43° 10.97369 N Long: 124° 53.65320 W KP: 43.24105
Depth: 444.838m Burial: 8.00cm DOL:-0.3316m

07:05 ROV – visual of cable suspended over small rocks
ROV Pos:Lat: 43° 10.97310 N Long: 124° 53.65950 W KP: 43.24963
Depth: 445.435m Burial: -3.00cm DOL:-1.0267m

07:12 ROV off the cable to track cable suspensions
ROV Pos:Lat: 43° 10.97320 N Long: 124° 53.67110 W KP: 43.26532
Depth: 447.281m Burial: -29.00cm DOL:0.9023m

07:16 Cable back into burial
ROV Pos:Lat: 43° 10.97140 N Long: 124° 53.67850 W KP: 43.27553
Depth: 446.433m Burial: 15.00cm DOL:-0.1980m

07:23 ROV - Lifting up to clear rocks
ROV Pos:Lat: 43° 10.97219 N Long: 124° 53.68120 W KP: 43.27909
Depth: 444.983m Burial: 485.00cm DOL:-0.9600m

07:25 ROV - Back on seabed
ROV Pos:Lat: 43° 10.97190 N Long: 124° 53.69070 W KP: 43.29197
Depth: 451.263m Burial: 43.00cm DOL:0.5440m

07:38 Cable Position Fix
ROV Pos:Lat: 43° 10.96540 N Long: 124° 53.81170 W KP: 43.45635
Depth: 466.002m Burial: 65.00cm DOL:-1.5981m

07:53 ROV - Lifting up to clear rocks
ROV Pos:Lat: 43° 10.95970 N Long: 124° 53.93950 W KP: 43.62984
Depth: 480.436m Burial: 59.00cm DOL:-2.9913m

07:57 ROV - Back on seabed
ROV Pos:Lat: 43° 10.95860 N Long: 124° 53.95050 W KP: 43.64484
Depth: 481.579m Burial: 78.00cm DOL:-1.3544m

07:58 Cable Position Fix
ROV Pos:Lat: 43° 10.95820 N Long: 124° 53.95440 W KP: 43.65016
Depth: 482.311m Burial: 73.00cm DOL:-2.5564m

08:06 Cable Position Fix
ROV Pos:Lat: 43° 10.95420 N Long: 124° 54.02810 W KP: 43.75029
Depth: 494.172m Burial: 81.00cm DOL:-4.8415m

08:34 ROV - Lifting up to clear uneven seabed
ROV Pos:Lat: 43° 10.94290 N Long: 124° 54.26900 W KP: 44.07738
Depth: 525.786m Burial: 54.00cm DOL:-4.9679m

08:36 ROV - Back on seabed
ROV Pos:Lat: 43° 10.94230 N Long: 124° 54.27860 W KP: 44.09043
Depth: 526.114m Burial: 97.00cm DOL:-6.2961m

08:37 Cable Position Fix
ROV Pos:Lat: 43° 10.94170 N Long: 124° 54.28970 W KP: 44.10551
Depth: 528.472m Burial: 95.00cm DOL:-6.0539m

08:55 ROV – visual on cable exposure
ROV Pos:Lat: 43° 10.93100 N Long: 124° 54.46970 W KP: 44.35017
Depth: 555.401m Burial: 5.00cm DOL:-10.9913m

08:56 ROV – visual of cable suspended over small rocks
ROV Pos:Lat: 43° 10.92950 N Long: 124° 54.47950 W KP: 44.36359
Depth: 559.776m Burial: -9.00cm DOL:-11.6249m

08:58 ROV – visual of cable suspended over small rocks
ROV Pos:Lat: 43° 10.92839 N Long: 124° 54.49290 W KP: 44.38184
Depth: 563.912m Burial: -4.00cm DOL:-12.5965m

09:00 Cable back into burial
ROV Pos:Lat: 43° 10.92790 N Long: 124° 54.50640 W KP: 44.40015
Depth: 565.214m Burial: 2.00cm DOL:-12.7912m

09:19 Cable Position Fix
CRP Pos:Lat: 43° 10.91700 N Long: 124° 54.65830 W KP: 44.60683
ROV Pos:Lat: 43° 10.91620 N Long: 124° 54.67350 W KP: 44.62748
Depth: 576.426m Burial: 82.00cm DOL:-20.3182m

09:22 ROV traversing down slope 7 - 8 degrees
ROV Pos:Lat: 43° 10.91480 N Long: 124° 54.70610 W KP: 44.67173
Depth: 582.161m Burial: 66.00cm DOL:-21.5417m

09:28 ROV slowing due to slope
ROV Pos:Lat: 43° 10.91170 N Long: 124° 54.76810 W KP: 44.75593
Depth: 598.864m Burial: 78.00cm DOL:-20.4903m

09:43 ROV – visual of seabed scarring
ROV Pos:Lat: 43° 10.89839 N Long: 124° 54.90690 W KP: 44.94517
Depth: 613.654m Burial: 106.00cm DOL:-33.1099m

11:09 Cable Position Fix
ROV Pos:Lat: 43° 10.83650 N Long: 124° 55.72470 W KP: 46.05826
Depth: 717.932m Burial: 109.00cm DOL:-79.2149m

11:47 Cable Position Fix
ROV Pos:Lat: 43° 10.81760 N Long: 124° 56.08810 W KP: 46.55190
Depth: 771.973m Burial: 99.00cm DOL:-84.8009m

12:14 Cable Position Fix
ROV Pos:Lat: 43° 10.80280 N Long: 124° 56.31410 W KP: 46.85925
Depth: 809.119m Burial: 114.00cm DOL:-91.3670m

12:23 Cable Position Fix
ROV Pos:Lat: 43° 10.79810 N Long: 124° 56.40590 W KP: 46.98394
Depth: 823.748m Burial: 114.00cm DOL:-92.4667m

12:50 Cable Position Fix
ROV Pos:Lat: 43° 10.79090 N Long: 124° 56.65640 W KP: 47.32355
Depth: 858.893m Burial: 116.00cm DOL:-86.5162m

13:01 Cable Position Fix
ROV Pos:Lat: 43° 10.78739 N Long: 124° 56.77410 W KP: 47.48313
Depth: 880.943m Burial: 109.00cm DOL:-80.2918m

13:19 ROV traversing down slope 10 degrees
ROV Pos:Lat: 43° 10.78410 N Long: 124° 56.95750 W KP: 47.73154
Depth: 918.821m Burial: 131.00cm DOL:-72.4693m

13:41 Cable Position Fix
ROV Pos:Lat: 43° 10.77710 N Long: 124° 57.15560 W KP: 48.00027
Depth: 948.682m Burial: 130.00cm DOL:-70.3936m

14:19 Cable Position Fix - ROV at A/C 12
ROV Pos:Lat: 43° 10.74740 N Long: 124° 57.47640 W KP: 48.45911
Depth: 983.482m Burial: 146.00cm DOL:-98.3475m

14:50 Cable Position Fix -1000m WD
ROV Pos:Lat: 43° 10.70390 N Long: 124° 57.75510 W KP: 48.84417
Depth: 1000.440m Burial: 141.00cm DOL:-69.0028m

15:25 Cable Position Fix
ROV Pos:Lat: 43° 10.65670 N Long: 124° 58.02000 W KP: 49.21321
Depth: 1015.760m Burial: 144.00cm DOL:-48.9546m

15:50 ROV Stopped – unable to detect tone on cable using TSS350
ROV Pos:Lat: 43° 10.62010 N Long: 124° 58.20560 W KP: 49.47363
Depth: 1025.430m Burial: cm DOL:-43.8252m

15:57 ROV turning back to commence search for tone
ROV Pos:Lat: 43° 10.61700 N Long: 124° 58.21960 W KP: 49.49344
Depth: 1025.790m Burial: cm DOL:-47.9856m

16:03 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.62670 N Long: 124° 58.21620 W KP: 49.48397
Depth: 1025.790m Burial: cm DOL:-40.3525m

16:19 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.63180 N Long: 124° 58.24070 W KP: 49.51317
Depth: 1027.120m Burial: cm DOL:-11.7254m

16:21 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.63160 N Long: 124° 58.24000 W KP: 49.51236
Depth: 1027.130m Burial: cm DOL:-10.9852m

16:30 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.62110 N Long: 124° 58.19400 W KP: 49.45802
Depth: 1025.870m Burial: cm DOL:-39.2658m

16:39 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.62370 N Long: 124° 58.19410 W KP: 49.45680
Depth: 1025.900m Burial: cm DOL:-41.5241m

16:46 ROV Stopped – awaiting confirmation from terminal station that tone is on
ROV Pos:Lat: 43° 10.62520 N Long: 124° 58.17200 W KP: 49.42728
Depth: 1024.390m Burial: cm DOL:-43.4747m

16:48 Vessel – terminal station confirm, by telephone, tone is still on – 25Hz at 80mA
ROV Pos:Lat: 43° 10.62440 N Long: 124° 58.17170 W KP: 49.42731
Depth: 1024.390m Burial: cm DOL:-43.3213m

16:52 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.62490 N Long: 124° 58.17170 W KP: 49.42705
Depth: 1024.450m Burial: cm DOL:-48.3199m

16:56 ROV – Re-boot of TSS350 system
ROV Pos:Lat: 43° 10.62690 N Long: 124° 58.15360 W KP: 49.40246
Depth: 1023.970m Burial: cm DOL:-46.0305m

16:58 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.62719 N Long: 124° 58.15290 W KP: 49.40140
Depth: 1023.920m Burial: cm DOL:-48.8276m

17:05 ROV Stopped

ROV Pos:Lat: 43° 10.63850 N Long: 124° 58.13420 W KP: 49.37119
Depth: 1022.820m Burial: cm DOL:-45.2272m

17:12 ROV continues to search for tone using TSS350
ROV Pos:Lat: 43° 10.63799 N Long: 124° 58.13430 W KP: 49.37158
Depth: 1022.860m Burial: cm DOL:-39.4037m

17:30 ROV Stopped - position previously known good tone detection
ROV Pos:Lat: 43° 10.65720 N Long: 124° 58.01730 W KP: 49.20944
Depth: 1016.090m Burial: cm DOL:-48.4641m

17:33 ROV – Re-boot of TSS350 system - no tone
ROV Pos:Lat: 43° 10.65740 N Long: 124° 58.01720 W KP: 49.20921
Depth: 1016.110m Burial: cm DOL:-48.6438m

17:35 Vessel requested terminal station to turn tone off and back on
ROV confirm no tone detected
ROV Pos:Lat: 43° 10.65820 N Long: 124° 58.01570 W KP: 49.20684
Depth: 1016.110m Burial: cm DOL:-48.7407m

17:40 Vessel requested terminal station to change In-service tone to 50Hz
ROV Pos:Lat: 43° 10.65820 N Long: 124° 58.01690 W KP: 49.20840
Depth: 1016.120m Burial: cm DOL:-48.2638m

17:41 ROV confirm tone detected at 50Hz
ROV Pos:Lat: 43° 10.65820 N Long: 124° 58.01750 W KP: 49.20918
Depth: 1016.110m Burial: 141.00cm DOL:-48.5961m

17:44 ROV moving off – resume survey
ROV Pos:Lat: 43° 10.65580 N Long: 124° 58.02880 W KP: 49.22513
Depth: 1016.840m Burial: 138.00cm DOL:-46.6140m

18:02 Vessel requested terminal station to increase tone on Segment China - US Seg N9 to 50Hz

ROV Pos:Lat: 43° 10.63919 N Long: 124° 58.11230 W KP: 49.34236
Depth: 1021.640m Burial: 147.00cm DOL:-44.9167m

18:17 ROV at position where tone was lost
ROV Pos:Lat: 43° 10.61890 N Long: 124° 58.20740 W KP: 49.47659
Depth: 1025.850m Burial: 147.00cm DOL:-43.8225m

18:20 Cable Position Fix
ROV Pos:Lat: 43° 10.61620 N Long: 124° 58.22900 W KP: 49.50609
Depth: 1026.820m Burial: 128.00cm DOL:-41.9104m

18:21 ROV Stopped - Burial depth has increased making signal harder to detect
ROV Pos:Lat: 43° 10.61580 N Long: 124° 58.23130 W KP: 49.50928
Depth: 1027.030m Burial: 157.00cm DOL:-42.2676m

18:22 ROV moving off slowly to continue tracking the cable
ROV Pos:Lat: 43° 10.61519 N Long: 124° 58.23080 W KP: 49.50895
Depth: 1027.020m Burial: 158.00cm DOL:-40.9913m

18:25 Cable Position Fix
ROV Pos:Lat: 43° 10.61050 N Long: 124° 58.25870 W KP: 49.54768
Depth: 1028.400m Burial: 149.00cm DOL:-42.1189m

19:26 Cable Position Fix
ROV Pos:Lat: 43° 10.50880 N Long: 124° 58.73990 W KP: 50.22640
Depth: 1037.120m Burial: 129.00cm DOL:-35.8669m

19:49	Cable Position Fix		
	ROV Pos:Lat: 43° 10.46890 N	Long: 124° 58.93670 W	KP: 50.50311
	Depth: 1039.390m	Burial: 130.00cm	DOL:-33.6619m
20:21	Cable Position Fix		
	ROV Pos:Lat: 43° 10.40860 N	Long: 124° 59.22750 W	KP: 50.91268
	Depth: 1042.120m	Burial: 128.00cm	DOL:-26.2642m
20:45	Cable Position Fix		
	ROV Pos:Lat: 43° 10.36139 N	Long: 124° 59.46600 W	KP: 51.24743
	Depth: 1042.710m	Burial: 125.00cm	DOL:-22.6758m
20:57	Cable Position Fix		
	ROV Pos:Lat: 43° 10.33670 N	Long: 124° 59.58280 W	KP: 51.41219
	Depth: 1040.120m	Burial: 127.00cm	DOL:-20.6576m
21:30	Cable Position Fix		
	ROV Pos:Lat: 43° 10.27270 N	Long: 124° 59.87690 W	KP: 51.82800
	Depth: 1033.440m	Burial: 120.00cm	DOL:-21.0927m
21:38	Cable Position Fix		
	ROV Pos:Lat: 43° 10.26190 N	Long: 124° 59.93480 W	KP: 51.90893
	Depth: 1031.890m	Burial: 117.00cm	DOL:-20.2500m
21:54	ROV slowed down in soft seabed		
	ROV Pos:Lat: 43° 10.23440 N	Long: 125° 00.07130 W	KP: 52.10077
	Depth: 1031.420m	Burial: 90.00cm	DOL:-18.7505m
21:57	ROV - Lifting up to clear uneven seabed		
	ROV Pos:Lat: 43° 10.23239 N	Long: 125° 00.07300 W	KP: 52.10402
	Depth: 1030.610m	Burial: 96.00cm	DOL:-17.1289m
21:58	ROV - Back on seabed		
	ROV Pos:Lat: 43° 10.22999 N	Long: 125° 00.08880 W	KP: 52.12582
	Depth: 1030.050m	Burial: 123.00cm	DOL:-17.8391m
22:21	ROV – visual on unknown object on seabed positioned off the cable		
	ROV Pos:Lat: 43° 10.19420 N	Long: 125° 00.27140 W	KP: 52.38194
	Depth: 1027.800m	Burial: 127.00cm	DOL:-11.9989m
22:41	Cable Position Fix		
	ROV Pos:Lat: 43° 10.16170 N	Long: 125° 00.43660 W	KP: 52.61372
	Depth: 1025.250m	Burial: 122.00cm	DOL:-6.4294m
23:27	Cable Position Fix		
	ROV Pos:Lat: 43° 10.07090 N	Long: 125° 00.88040 W	KP: 53.23820
	Depth: 1015.870m	Burial: 108.00cm	DOL:1.5628m
23:59	ROV – visual of seabed scarring		
	ROV Pos:Lat: 43° 10.01110 N	Long: 125° 01.16500 W	KP: 53.63950
	Depth: 1018.190m	Burial: 100.00cm	DOL:2.8865m

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00:00	ROV – visual of seabed scarring		
	ROV Pos:Lat: 43° 10.01110 N	Long: 125° 01.16500 W	KP: 53.63950
	Depth: 1018.190m	Burial: 100.00cm	DOL:2.8865m
00:57	Cable Position Fix		

ROV Pos:Lat: 43° 09.90450 N Long: 125° 01.68920 W KP: 54.37681
Depth: 1061.490m Burial: 121.00cm DOL:14.1716m

01:34 ROV - DOB decreasing
ROV Pos:Lat: 43° 09.83759 N Long: 125° 02.01520 W KP: 54.83567
Depth: 1066.710m Burial: 75.00cm DOL:19.9639m

01:36 ROV - DOB < 10cm
ROV Pos:Lat: 43° 09.83430 N Long: 125° 02.03790 W KP: 54.86691
Depth: 1067.300m Burial: 2.00cm DOL:21.0204m

01:37 Cable exposed and suspended above seabed - start
ROV Pos:Lat: 43° 09.83070 N Long: 125° 02.04760 W KP: 54.88140
Depth: 1068.360m Burial: cm DOL:20.2308m

01:38 Cable exposed and suspended above seabed - end
ROV Pos:Lat: 43° 09.83090 N Long: 125° 02.04610 W KP: 54.87935
Depth: 1068.480m Burial: cm DOL:20.3458m

01:38 Cable exposed and suspended above seabed - start
ROV Pos:Lat: 43° 09.83050 N Long: 125° 02.04850 W KP: 54.88268
Depth: 1068.620m Burial: cm DOL:20.2257m

01:38 Cable exposed and suspended above seabed - end
ROV Pos:Lat: 43° 09.83030 N Long: 125° 02.04960 W KP: 54.88421
Depth: 1068.750m Burial: cm DOL:20.2652m

01:42 Cable exposed and suspended above seabed - start
ROV Pos:Lat: 43° 09.82310 N Long: 125° 02.08400 W KP: 54.93271
Depth: 1072.190m Burial: cm DOL:19.5027m

01:44 ROV Stopped – onboard reps to observe
ROV Pos:Lat: 43° 09.82230 N Long: 125° 02.08750 W KP: 54.93767
Depth: 1072.790m Burial: cm DOL:20.5851m

01:51 ROV moving off
ROV Pos:Lat: 43° 09.82230 N Long: 125° 02.08650 W KP: 54.93637
Depth: 1072.840m Burial: cm DOL:19.5135m

01:55 ROV Stopped – waiting for visual to improve
ROV Pos:Lat: 43° 09.81980 N Long: 125° 02.09820 W KP: 54.95289
Depth: 1074.120m Burial: cm DOL:18.4917m

02:01 ROV moving off
ROV Pos:Lat: 43° 09.81960 N Long: 125° 02.09950 W KP: 54.95469
Depth: 1074.200m Burial: cm DOL:19.6004m

02:08 Cable exposed and suspended above seabed - end
ROV Pos:Lat: 43° 09.81150 N Long: 125° 02.13370 W KP: 55.00336
Depth: 1076.040m Burial: cm DOL:20.6617m

02:11 Cable exposed and suspended above seabed - start
ROV Pos:Lat: 43° 09.80549 N Long: 125° 02.16970 W KP: 55.05330
Depth: 1078.740m Burial: cm DOL:20.0127m

02:12 Cable exposed and suspended above seabed - end
ROV Pos:Lat: 43° 09.80450 N Long: 125° 02.17330 W KP: 55.05850
Depth: 1079.010m Burial: 3.00cm DOL:20.4173m

02:12 Cable exposed and suspended above seabed - start
ROV Pos:Lat: 43° 09.80300 N Long: 125° 02.17980 W KP: 55.06774
Depth: 1079.790m Burial: cm DOL:20.9009m

02:14 Cable exposed and suspended above seabed - end
ROV Pos:Lat: 43° 09.80100 N Long: 125° 02.19670 W KP: 55.09076
Depth: 1081.800m Burial: cm DOL:22.8025m

02:14 Cable exposed and suspended above seabed - start
ROV Pos:Lat: 43° 09.80120 N Long: 125° 02.20150 W KP: 55.09689
Depth: 1082.330m Burial: cm DOL:22.7973m

02:21 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.79260 N Long: 125° 02.25190 W KP: 55.16691
Depth: 1093.740m Burial: cm DOL:30.4899m

02:24 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.78950 N Long: 125° 02.26850 W KP: 55.19012
Depth: 1098.270m Burial: cm DOL:31.4101m

02:28 Cable exposed and suspended above seabed - ROV into steep incline
ROV Pos:Lat: 43° 09.78539 N Long: 125° 02.29970 W KP: 55.23283
Depth: 1109.440m Burial: cm DOL:34.4634m

02:28 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.78520 N Long: 125° 02.30670 W KP: 55.24203
Depth: 1111.510m Burial: 2.00cm DOL:35.5121m

02:35 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.77430 N Long: 125° 02.36980 W KP: 55.32977
Depth: 1134.510m Burial: cm DOL:41.9532m

02:43 Cable exposed on seabed
ROV Pos:Lat: 43° 09.76400 N Long: 125° 02.43880 W KP: 55.42487
Depth: 1147.960m Burial: 2.00cm DOL:49.6610m

02:46 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.76010 N Long: 125° 02.46940 W KP: 55.46669
Depth: 1159.390m Burial: cm DOL:53.2370m

02:51 ROV Stopped to rest seabed profilers
ROV Pos:Lat: 43° 09.75560 N Long: 125° 02.49900 W KP: 55.50752
Depth: 1155.730m Burial: 0.00cm DOL:59.5695m

03:15 ROV aligning back onto cable
ROV Pos:Lat: 43° 09.75740 N Long: 125° 02.49400 W KP: 55.50008
Depth: 1154.870m Burial: cm DOL:58.4984m

03:24 ROV moving off
CRP Pos:Lat: 43° 09.75730 N Long: 125° 02.48100 W KP: 55.48323
ROV Pos:Lat: 43° 09.75600 N Long: 125° 02.48820 W KP: 55.49327
Depth: 1152.110m Burial: -cm DOL:56.6373m

03:29 Cable Position Fix
ROV Pos:Lat: 43° 09.75290 N Long: 125° 02.52220 W KP: 55.53910
Depth: 1164.850m Burial: 3.00cm DOL:61.5808m

03:34 Cable exposed over rocks
ROV Pos:Lat: 43° 09.74650 N Long: 125° 02.56120 W KP: 55.59315
Depth: 1177.080m Burial: cm DOL:66.9617m

03:39 Cable exposed on seabed
ROV Pos:Lat: 43° 09.74080 N Long: 125° 02.59230 W KP: 55.63657
Depth: 1190.230m Burial: 2.00cm DOL:68.9935m

03:49 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.72990 N Long: 125° 02.65840 W KP: 55.72821
Depth: 1211.960m Burial: cm DOL:74.6206m

03:56 Cable exposed on seabed
ROV Pos:Lat: 43° 09.71830 N Long: 125° 02.72620 W KP: 55.82243
Depth: 1221.930m Burial: cm DOL:79.4025m

04:02 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.71020 N Long: 125° 02.76120 W KP: 55.87217
Depth: 1223.320m Burial: cm DOL:81.7364m

04:05 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.70589 N Long: 125° 02.78300 W KP: 55.90277
Depth: 1219.910m Burial: cm DOL:82.1465m

04:10 Cable exposed on seabed
ROV Pos:Lat: 43° 09.69430 N Long: 125° 02.83870 W KP: 55.98126
Depth: 1210.510m Burial: 0.00cm DOL:82.8776m

04:13 Cable exposed on seabed - ROV ascending 15 degree slope
ROV Pos:Lat: 43° 09.69050 N Long: 125° 02.85490 W KP: 56.00431
Depth: 1205.210m Burial: cm DOL:83.1654m

04:19 Cable exposed on seabed
ROV Pos:Lat: 43° 09.67860 N Long: 125° 02.89550 W KP: 56.06333
Depth: 1198.320m Burial: cm DOL:80.0996m

04:26 Cable exposed on seabed
ROV Pos:Lat: 43° 09.66900 N Long: 125° 02.93210 W KP: 56.11595
Depth: 1201.750m Burial: cm DOL:75.0298m

04:34 Cable exposed on seabed
ROV Pos:Lat: 43° 09.65970 N Long: 125° 02.96700 W KP: 56.16619
Depth: 1207.110m Burial: cm DOL:70.5759m

04:50 Cable exposed on seabed
ROV Pos:Lat: 43° 09.63300 N Long: 125° 03.05440 W KP: 56.29382
Depth: 1220.250m Burial: cm DOL:58.8790m

05:02 Cable exposed on seabed
ROV Pos:Lat: 43° 09.61280 N Long: 125° 03.12750 W KP: 56.39944
Depth: 1224.720m Burial: cm DOL:49.2692m

05:17 Cable exposed on seabed - ROV descending 15 -20 degree slope
ROV Pos:Lat: 43° 09.58060 N Long: 125° 03.25380 W KP: 56.58052
Depth: 1248.620m Burial: cm DOL:38.4507m

05:22 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 09.56940 N Long: 125° 03.30290 W KP: 56.65023
Depth: 1272.370m Burial: cm DOL:38.9437m

05:29 Cable exposed on seabed
ROV Pos:Lat: 43° 09.55630 N Long: 125° 03.36290 W KP: 56.73510
Depth: 1295.470m Burial: cm DOL:38.3256m

05:41 ROV Stopped – checking oil levels

ROV Pos:Lat: 43° 09.53510 N Long: 125° 03.46620 W KP: 56.88050
Depth: 1350.870m Burial: cm DOL:37.0045m

05:56 ROV moving off
ROV Pos:Lat: 43° 09.54220 N Long: 125° 03.47680 W KP: 56.89056
Depth: 1355.280m Burial: cm DOL:57.7508m

06:02 ROV – commenced recovery to carry out maintenance
ROV Pos:Lat: 43° 09.54020 N Long: 125° 03.46470 W KP: 56.87587
Depth: 1351.210m Burial: cm DOL:42.5973m

06:06 ROV off bottom
ROV Pos:Lat: 43° 09.54290 N Long: 125° 03.46070 W KP: 56.86926
Depth: 1340.980m Burial: 302.00cm DOL:47.5329m

06:41 ROV at surface

06:45 **ROV end deck – end of E1 Dive #2**

07:30 **Joint decision made between GMSL and client rep to class the ROV survey complete at the offshore location. The ROV had already passed the end of burial position of the installation plough. Control of the ROV was increasingly difficult due to the steep slopes encountered. With a transition from LWA to SPA cable due in approximately 2.6km, it was considered prudent not to risk damaging the SPA cable in order to reach the 1850m DOW point**

07:44 HPR pole retracted

07:45 Vessel commenced transit to China – US segment E1 inshore plough down location

09:52 Vessel on location at plough down position
Pos:Lat: 43° 12.63550 N Long: 124° 39.33900 W KP: 23.17355

09:54 **ROV off deck – CH-US SE1 – Dive #3**

09:57 ROV at surface

10:03 ROV on bottom
ROV Pos:Lat: 43° 12.63680 N Long: 124° 39.34060 W KP: 23.17566
Depth: 139.422m Burial: cm DOL:24.0492m

10:18 ROV moving off
ROV Pos:Lat: 43° 12.63630 N Long: 124° 39.33970 W KP: 23.17446
Depth: 138.963m Burial: cm DOL:23.6648m

10:25 ROV - located cable using TSS350
CRP Pos:Lat: 43° 12.62100 N Long: 124° 39.33290 W KP: 23.16588
ROV Pos:Lat: 43° 12.62090 N Long: 124° 39.33040 W KP: 23.16250
Depth: 139.397m Burial: 63.00cm DOL:-3.1374m

10:26 ROV moving off - **resume survey pass heading inshore**
ROV Pos:Lat: 43° 12.62070 N Long: 124° 39.33060 W KP: 23.16277
Depth: 139.410m Burial: 62.00cm DOL:-3.5448m

10:28 ROV lifting to clear rocks
ROV Pos:Lat: 43° 12.62100 N Long: 124° 39.32940 W KP: 23.16114
Depth: 139.431m Burial: cm DOL:-5.9884m

10:31 ROV back on seabed
ROV Pos:Lat: 43° 12.62090 N Long: 124° 39.31720 W KP: 23.14462
Depth: 138.792m Burial: 56.00cm DOL:-4.7071m

10:34 Cable exposed on seabed
ROV Pos:Lat: 43° 12.62170 N Long: 124° 39.30230 W KP: 23.12444
Depth: 138.570m Burial: cm DOL:-3.6243m

10:35 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.62190 N Long: 124° 39.29740 W KP: 23.11779
Depth: 138.155m Burial: cm DOL:-2.3123m

10:38 ROV lifted clear of cable and seabed to continue tracking cable
ROV Pos:Lat: 43° 12.62280 N Long: 124° 39.28840 W KP: 23.10556
Depth: 136.113m Burial: cm DOL:-0.4962m

10:49 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.62530 N Long: 124° 39.16780 W KP: 22.94216
Depth: 136.403m Burial: cm DOL:0.7331m

10:50 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.62540 N Long: 124° 39.16260 W KP: 22.93511
Depth: 136.359m Burial: cm DOL:0.1315m

10:55 ROV clear of seabed while tracking cable exposed and suspended
ROV Pos:Lat: 43° 12.62560 N Long: 124° 39.13100 W KP: 22.89232
Depth: 135.494m Burial: cm DOL:-0.0209m

10:58 ROV clear of seabed while tracking cable exposed and suspended
ROV Pos:Lat: 43° 12.62630 N Long: 124° 39.11310 W KP: 22.86805
Depth: 134.317m Burial: cm DOL:-0.3641m

11:06 ROV clear of seabed while tracking cable exposed and suspended
ROV Pos:Lat: 43° 12.62879 N Long: 124° 39.03380 W KP: 22.76056
Depth: 134.623m Burial: cm DOL:0.2372m

11:22 ROV back on seabed
ROV Pos:Lat: 43° 12.63490 N Long: 124° 38.89600 W KP: 22.57365
Depth: 132.553m Burial: 9.00cm DOL:-2.0851m

11:23 Cable Position Fix
ROV Pos:Lat: 43° 12.63550 N Long: 124° 38.89090 W KP: 22.56667
Depth: 132.587m Burial: 12.00cm DOL:-2.1473m

11:26 ROV lifted clear of cable and seabed to continue tracking cable
ROV Pos:Lat: 43° 12.63660 N Long: 124° 38.87510 W KP: 22.54518
Depth: 132.741m Burial: cm DOL:-1.9414m

11:30 ROV back on seabed
ROV Pos:Lat: 43° 12.63910 N Long: 124° 38.84240 W KP: 22.50065
Depth: 131.985m Burial: 9.00cm DOL:-1.5690m

11:31 Cable Position Fix
ROV Pos:Lat: 43° 12.63950 N Long: 124° 38.83920 W KP: 22.49626
Depth: 132.039m Burial: 8.00cm DOL:-1.5656m

11:32 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.64010 N Long: 124° 38.83360 W KP: 22.48861
Depth: 132.039m Burial: cm DOL:-1.2262m

11:32 ROV lifted clear of cable and seabed to continue tracking cable
ROV Pos:Lat: 43° 12.64010 N Long: 124° 38.83220 W KP: 22.48672
Depth: 132.013m Burial: cm DOL:-1.8732m

11:48 Cable exposed and suspended above seabed

ROV Pos:Lat: 43° 12.64900 N Long: 124° 38.71420 W KP: 22.32606
Depth: 126.629m Burial: cm DOL:-0.3772m

11:51 Cable continues intermittent suspensions
ROV Pos:Lat: 43° 12.65090 N Long: 124° 38.68830 W KP: 22.29081
Depth: 125.859m Burial: cm DOL:-0.0413m

11:58 Cable Position Fix
ROV Pos:Lat: 43° 12.65410 N Long: 124° 38.63920 W KP: 22.22405
Depth: 124.063m Burial: cm DOL:-0.2759m

11:59 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.65480 N Long: 124° 38.63230 W KP: 22.21462
Depth: 123.681m Burial: cm DOL:0.0690m

12:01 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.65630 N Long: 124° 38.61590 W KP: 22.19225
Depth: 124.235m Burial: cm DOL:0.2881m

12:02 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.65720 N Long: 124° 38.60780 W KP: 22.18117
Depth: 124.927m Burial:cm DOL:0.8984m

12:09 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.66050 N Long: 124° 38.55340 W KP: 22.10724
Depth: 125.145m Burial: cm DOL:0.7025m

12:10 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.66110 N Long: 124° 38.54320 W KP: 22.09339
Depth: 124.020m Burial: cm DOL:0.6085m

12:16 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.66270 N Long: 124° 38.50400 W KP: 22.04026
Depth: 122.309m Burial: cm DOL:-1.1190m

12:18 ROV – visual of heavy marine growth on cable
ROV Pos:Lat: 43° 12.66400 N Long: 124° 38.48680 W KP: 22.01684
Depth: 120.881m Burial: cm DOL:-1.6533m

12:21 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.66530 N Long: 124° 38.46590 W KP: 21.98843
Depth: 121.487m Burial: cm DOL:-2.1642m

12:39 ROV – visual of heavy marine growth on cable
ROV Pos:Lat: 43° 12.67480 N Long: 124° 38.31920 W KP: 21.78898
Depth: 119.828m Burial: cm DOL:-2.9422m

12:48 Cable continues intermittent suspensions
ROV Pos:Lat: 43° 12.67950 N Long: 124° 38.25040 W KP: 21.69539
Depth: 120.310m Burial: cm DOL:-3.2002m

12:55 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.68330 N Long: 124° 38.19870 W KP: 21.62501
Depth: 118.462m Burial: cm DOL:-1.9272m

13:12 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.69150 N Long: 124° 38.07400 W KP: 21.45545
Depth: 121.191m Burial: cm DOL:-3.3410m

13:23 Cable exposed and suspended above seabed – area of numerous rock out crops
ROV Pos:Lat: 43° 12.69510 N Long: 124° 38.00320 W KP: 21.35936

Depth: 120.817m Burial: cm DOL:-6.0417m

13:29 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.69730 N Long: 124° 37.95690 W KP: 21.29590
Depth: 119.541m Burial: cm DOL:-3.9056m

13:45 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.70040 N Long: 124° 37.83200 W KP: 21.12668
Depth: 120.415m Burial: cm DOL:-0.5509m

13:51 Cable exposed on seabed
ROV Pos:Lat: 43° 12.70080 N Long: 124° 37.77890 W KP: 21.05476
Depth: 120.421m Burial: cm DOL:-1.1907m

14:03 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.70220 N Long: 124° 37.67570 W KP: 20.91497
Depth: 119.275m Burial: cm DOL:0.2599m

14:04 Cable exposed on seabed
ROV Pos:Lat: 43° 12.70240 N Long: 124° 37.66630 W KP: 20.90223
Depth: 119.559m Burial: cm DOL:0.0756m

14:06 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.70270 N Long: 124° 37.64660 W KP: 20.87555
Depth: 119.446m Burial: cm DOL:-0.5731m

14:13 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.70350 N Long: 124° 37.57720 W KP: 20.78154
Depth: 117.999m Burial: cm DOL:-0.8375m

14:27 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.70480 N Long: 124° 37.44070 W KP: 20.59666
Depth: 118.742m Burial: cm DOL:-1.4263m

14:31 Cable exposed and suspended above seabed
ROV Pos:Lat: 43° 12.70580 N Long: 124° 37.40550 W KP: 20.54896
Depth: 118.829m Burial: cm DOL:-0.5598m

14:35 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.70610 N Long: 124° 37.36370 W KP: 20.49235
Depth: 117.540m Burial: cm DOL:-0.3777m

14:39 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.70630 N Long: 124° 37.32310 W KP: 20.43737
Depth: 118.375m Burial: cm DOL:-0.5332m

14:40 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.70640 N Long: 124° 37.30920 W KP: 20.41854
Depth: 117.671m Burial: cm DOL:-0.6665m

14:49 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.70750 N Long: 124° 37.22940 W KP: 20.31044
Depth: 117.079m Burial: cm DOL:-0.6109m

14:58 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.70870 N Long: 124° 37.15450 W KP: 20.20898
Depth: 116.626m Burial: cm DOL:-0.4111m

15:19 Cable exposed and intermittent suspensions above seabed – large boulder
ROV Pos:Lat: 43° 12.70980 N Long: 124° 36.95980 W KP: 19.94529
Depth: 114.129m Burial: cm DOL:-1.9352m

15:30	Cable intermittent exposures on seabed			
	ROV Pos:Lat: 43° 12.71130 N	Long: 124° 36.85270 W	KP: 19.80022	
	Depth: 115.299m	Burial: cm	DOL:-2.0973m	
15:32	Cable back into burial			
	ROV Pos:Lat: 43° 12.71180 N	Long: 124° 36.82960 W	KP: 19.76892	
	Depth: 115.162m	Burial: cm	DOL:-2.4328m	
15:37	Cable intermittent exposures on seabed			
	ROV Pos:Lat: 43° 12.71280 N	Long: 124° 36.78550 W	KP: 19.70917	
	Depth: 114.314m	Burial: cm	DOL:-0.4356m	
15:38	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71320 N	Long: 124° 36.77130 W	KP: 19.68993	
	Depth: 114.465m	Burial: cm	DOL:-0.5777m	
15:57	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71550 N	Long: 124° 36.59020 W	KP: 19.44462	
	Depth: 110.898m	Burial: cm	DOL:0.0199m	
16:00	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71580 N	Long: 124° 36.56330 W	KP: 19.40819	
	Depth: 110.556m	Burial: cm	DOL:-0.0378m	
16:05	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71650 N	Long: 124° 36.52120 W	KP: 19.35116	
	Depth: 110.538m	Burial: cm	DOL:0.1466m	
16:06	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71660 N	Long: 124° 36.50570 W	KP: 19.33017	
	Depth: 110.794m	Burial: cm	DOL:-0.0068m	
16:11	Cable intermittent exposures on seabed			
	ROV Pos:Lat: 43° 12.71690 N	Long: 124° 36.46460 W	KP: 19.27450	
	Depth: 109.710m	Burial: cm	DOL:-0.3601m	
16:14	Cable intermittent exposures on seabed			
	ROV Pos:Lat: 43° 12.71760 N	Long: 124° 36.43510 W	KP: 19.23453	
	Depth: 108.645m	Burial: cm	DOL:0.2420m	
16:16	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71770 N	Long: 124° 36.42110 W	KP: 19.21557	
	Depth: 108.671m	Burial: cm	DOL:0.1488m	
16:21	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71830 N	Long: 124° 36.37040 W	KP: 19.14690	
	Depth: 108.756m	Burial: cm	DOL:0.5020m	
16:32	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71910 N	Long: 124° 36.27140 W	KP: 19.01281	
	Depth: 108.325m	Burial: cm	DOL:-0.4089m	
16:35	Cable intermittent exposures on seabed			
	ROV Pos:Lat: 43° 12.71920 N	Long: 124° 36.24500 W	KP: 18.97706	
	Depth: 107.254m	Burial: cm	DOL:-0.4223m	
16:36	Cable exposed and intermittent suspensions above seabed			
	ROV Pos:Lat: 43° 12.71940 N	Long: 124° 36.23500 W	KP: 18.96351	
	Depth: 107.012m	Burial: cm	DOL:0.6108m	

16:40 Cable Position Fix – cable suspension >100cm
ROV Pos:Lat: 43° 12.71930 N Long: 124° 36.19740 W KP: 18.91259
Depth: 105.388m Burial: cm DOL:-1.6664m

16:45 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.72000 N Long: 124° 36.14620 W KP: 18.84324
Depth: 106.424m Burial: cm DOL:-1.8641m

16:59 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.72190 N Long: 124° 36.00700 W KP: 18.65469
Depth: 103.781m Burial: cm DOL:-1.4175m

17:39 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.72660 N Long: 124° 35.60510 W KP: 18.11031
Depth: 94.244m Burial: cm DOL:-1.2976m

17:50 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.72810 N Long: 124° 35.49530 W KP: 17.96158
Depth: 91.884m Burial: cm DOL:-1.1309m

17:54 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.72830 N Long: 124° 35.45480 W KP: 17.90673
Depth: 89.022m Burial: cm DOL:-1.2998m

18:01 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.72930 N Long: 124° 35.37730 W KP: 17.80175
Depth: 89.782m Burial: cm DOL:-1.3665m

18:14 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73160 N Long: 124° 35.24520 W KP: 17.62280
Depth: 88.512m Burial: cm DOL:-0.2290m

18:25 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73240 N Long: 124° 35.13270 W KP: 17.47043
Depth: 85.520m Burial: cm DOL:-0.7022m

18:32 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73280 N Long: 124° 35.06170 W KP: 17.37428
Depth: 85.029m Burial: cm DOL:-2.8261m

18:57 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73540 N Long: 124° 34.81010 W KP: 17.03350
Depth: 87.537m Burial: cm DOL:-2.8460m

19:05 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73660 N Long: 124° 34.72880 W KP: 16.92337
Depth: 87.136m Burial: cm DOL:-2.4395m

19:13 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73740 N Long: 124° 34.64380 W KP: 16.80824
Depth: 84.204m Burial: cm DOL:-3.0327m

19:22 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73840 N Long: 124° 34.54740 W KP: 16.67767
Depth: 85.650m Burial: cm DOL:-2.5839m

19:30 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.73920 N Long: 124° 34.46090 W KP: 16.56051
Depth: 84.033m Burial: cm DOL:-3.3903m

19:49 Cable intermittent exposures on seabed

ROV Pos:Lat: 43° 12.74160 N Long: 124° 34.26860 W KP: 16.30004
Depth: 75.603m Burial: cm DOL:-4.1501m

19:58 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.74340 N Long: 124° 34.16980 W KP: 16.16619
Depth: 74.781m Burial: cm DOL:-1.9019m

20:11 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.74360 N Long: 124° 34.04500 W KP: 15.99719
Depth: 75.949m Burial: cm DOL:-5.0410m

20:14 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.74420 N Long: 124° 34.00750 W KP: 15.94639
Depth: 77.753m Burial: cm DOL:-4.5789m

20:24 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.74520 N Long: 124° 33.91110 W KP: 15.81582
Depth: 71.911m Burial: cm DOL:-5.0476m

20:40 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.74790 N Long: 124° 33.74530 W KP: 15.59122
Depth: 70.487m Burial: cm DOL:-3.7591m

20:46 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.74930 N Long: 124° 33.68280 W KP: 15.50654
Depth: 72.152m Burial: cm DOL:-2.7104m

20:48 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.74950 N Long: 124° 33.66930 W KP: 15.48826
Depth: 71.930m Burial: cm DOL:-2.2750m

20:50 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.74990 N Long: 124° 33.64370 W KP: 15.45358
Depth: 69.417m Burial: cm DOL:-2.6661m

20:56 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.75060 N Long: 124° 33.58890 W KP: 15.37935
Depth: 70.807m Burial: cm DOL:-2.5882m

21:01 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.75100 N Long: 124° 33.53410 W KP: 15.30513
Depth: 68.157m Burial: cm DOL:-1.9595m

21:07 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.75150 N Long: 124° 33.47490 W KP: 15.22495
Depth: 70.192m Burial: cm DOL:-2.5483m

21:16 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.75230 N Long: 124° 33.39900 W KP: 15.12215
Depth: 69.832m Burial: cm DOL:-3.1259m

21:21 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.75270 N Long: 124° 33.35200 W KP: 15.05849
Depth: 68.109m Burial: cm DOL:-3.7857m

21:36 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.75430 N Long: 124° 33.21940 W KP: 14.87888
Depth: 67.364m Burial: cm DOL:-4.1234m

21:48 Cable exposed and intermittent suspensions above seabed

ROV Pos:Lat: 43° 12.75610 N Long: 124° 33.08160 W KP: 14.69223
Depth: 72.925m Burial: cm DOL:-2.5660m

21:59 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.75880 N Long: 124° 32.97290 W KP: 14.54499
Depth: 69.491m Burial: cm DOL:-0.5921m

22:03 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.75940 N Long: 124° 32.93060 W KP: 14.48769
Depth: 69.042m Burial: cm DOL:-1.0550m

22:14 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.76040 N Long: 124° 32.82080 W KP: 14.33900
Depth: 69.870m Burial: cm DOL:-3.7795m

22:18 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.76070 N Long: 124° 32.78520 W KP: 14.29078
Depth: 69.818m Burial: cm DOL:-4.0165m

22:24 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.76240 N Long: 124° 32.72010 W KP: 14.20256
Depth: 69.980m Burial: cm DOL:-3.6167m

22:37 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.76540 N Long: 124° 32.57910 W KP: 14.01152
Depth: 69.686m Burial: cm DOL:-2.6283m

22:39 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.76540 N Long: 124° 32.56490 W KP: 13.99230
Depth: 69.039m Burial: cm DOL:-2.7949m

22:44 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.76640 N Long: 124° 32.50560 W KP: 13.91196
Depth: 67.969m Burial: cm DOL:-4.9087m

22:51 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.76830 N Long: 124° 32.43320 W KP: 13.81386
Depth: 68.060m Burial: cm DOL:-3.7018m

22:57 Cable intermittent exposures on seabed
ROV Pos:Lat: 43° 12.76910 N Long: 124° 32.37440 W KP: 13.73421
Depth: 68.719m Burial: cm DOL:-4.0425m

23:04 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.77080 N Long: 124° 32.29640 W KP: 13.62853
Depth: 68.844m Burial: cm DOL:-4.3237m

23:09 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.77210 N Long: 124° 32.24690 W KP: 13.56145
Depth: 69.007m Burial: -65.00cm DOL:-3.5427m

23:16 Cable exposed and intermittent suspensions above seabed – large boulders
ROV Pos:Lat: 43° 12.77320 N Long: 124° 32.17150 W KP: 13.45931
Depth: 69.582m Burial: cm DOL:-3.7426m

23:24 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.77640 N Long: 124° 32.08880 W KP: 13.34720
Depth: 67.618m Burial: cm DOL:-2.0213m

23:35 Cable exposed and intermittent suspensions above seabed

ROV Pos:Lat: 43° 12.77880 N Long: 124° 31.96680 W KP: 13.18190
Depth: 63.913m Burial: cm DOL:-1.5399m

23:50 Cable exposed and intermittent suspensions above seabed
ROV Pos:Lat: 43° 12.78370 N Long: 124° 31.81000 W KP: 12.96938
Depth: 66.353m Burial: cm DOL:1.7362m

23:59 ROV continues survey of Seg E1 heading inshore
ROV Pos:Lat: 43° 12.78480 N Long: 124° 31.74150 W KP: 12.87659
Depth: 64.005m Burial: cm DOL:2.1544m

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00:00 ROV continued survey of Seg E1 heading inshore
ROV Pos:Lat: 43° 12.78480 N Long: 124° 31.74150 W KP: 12.87659
Depth: 64.005m Burial: cm DOL:2.1544m

00:12 Cable continues to be suspended over rocks
ROV Pos:Lat: 43° 12.78860 N Long: 124° 31.58780 W KP: 12.66832
Depth: 64.858m Burial: cm DOL:1.9954m

00:22 Cable continues to be suspended over rocks
ROV Pos:Lat: 43° 12.79370 N Long: 124° 31.48520 W KP: 12.52874
Depth: 63.365m Burial: cm DOL:7.2215m

00:29 Cable continues to be suspended over rocks
ROV Pos:Lat: 43° 12.79770 N Long: 124° 31.41900 W KP: 12.43879
Depth: 61.070m Burial: cm DOL:5.7684m

00:39 ROV having to fly over a large abyss
ROV Pos:Lat: 43° 12.80540 N Long: 124° 31.30810 W KP: 12.28793
Depth: 60.282m Burial: cm DOL:3.7709m

00:41 ROV profiler unable to read deep seabed
ROV Pos:Lat: 43° 12.80820 N Long: 124° 31.28580 W KP: 12.25736
Depth: 60.582m Burial: cm DOL:4.9030m

00:44 ROV Stopped
ROV Pos:Lat: 43° 12.81310 N Long: 124° 31.27340 W KP: 12.23972
Depth: 60.582m Burial: -278.00cm DOL:12.2515m

00:45 ROV going back to last known cable position before abyss
ROV Pos:Lat: 43° 12.81470 N Long: 124° 31.27810 W KP: 12.24575
Depth: 60.582m Burial: cm DOL:13.7631m

00:57 ROV moving off re-aligned on the cable
ROV Pos:Lat: 43° 12.80430 N Long: 124° 31.31880 W KP: 12.30255
Depth: 60.582m Burial: cm DOL:6.1752m

01:04 ROV flying over the abyss following cable line
ROV Pos:Lat: 43° 12.80700 N Long: 124° 31.28700 W KP: 12.25920
Depth: 60.582m Burial: cm DOL:3.3514m

01:06 ROV completes tracking over the abyss
ROV Pos:Lat: 43° 12.80870 N Long: 124° 31.26910 W KP: 12.23477
Depth: 60.582m Burial: cm DOL:5.1243m

01:10 Cable Suspended over rocks
ROV Pos:Lat: 43° 12.81100 N Long: 124° 31.23670 W KP: 12.19068
Depth: 60.582m Burial: cm DOL:4.8706m

01:15 ROV visual on cable crossing – unknown cable underneath China - US E1
ROV Pos:Lat: 43° 12.81560 N Long: 124° 31.18570 W KP: 12.12110
Depth: 60.582m Burial: cm DOL:6.1362m

01:29 Cable continues to be on rocky seabed
ROV Pos:Lat: 43° 12.82280 N Long: 124° 31.09290 W KP: 11.99472
Depth: 60.582m Burial: cm DOL:5.5148m

01:32 Cable Suspended over rocks > 1m
ROV Pos:Lat: 43° 12.82410 N Long: 124° 31.07650 W KP: 11.97237
Depth: 60.582m Burial: cm DOL:6.6514m

01:51 Cable back on the seabed
ROV Pos:Lat: 43° 12.82710 N Long: 124° 31.03460 W KP: 11.91536
Depth: 64.223m Burial: cm DOL:6.3128m

02:05 ROV flying over abyss following cable line
ROV Pos:Lat: 43° 12.83530 N Long: 124° 30.92830 W KP: 11.77059
Depth: 63.658m Burial: cm DOL:5.3138m

02:07 ROV profiler unable to read deep seabed
ROV Pos:Lat: 43° 12.83590 N Long: 124° 30.91770 W KP: 11.75620
Depth: 62.979m Burial: cm DOL:4.9492m

02:09 ROV completes tracking over the abyss
ROV Pos:Lat: 43° 12.83760 N Long: 124° 30.90210 W KP: 11.73486
Depth: 61.583m Burial: cm DOL:5.1387m

02:17 Cable suspended
ROV Pos:Lat: 43° 12.84280 N Long: 124° 30.82960 W KP: 11.63621
Depth: 61.747m Burial: cm DOL:5.9262m

02:21 Cable suspended over rocks
ROV Pos:Lat: 43° 12.84410 N Long: 124° 30.79690 W KP: 11.59191
Depth: 63.299m Burial: cm DOL:3.9668m

02:24 Cable continues to be suspended over rocks
ROV Pos:Lat: 43° 12.84640 N Long: 124° 30.77150 W KP: 11.55726
Depth: 59.230m Burial: cm DOL:3.7071m

02:28 Exposed cable back on the seabed
ROV Pos:Lat: 43° 12.84650 N Long: 124° 30.73340 W KP: 11.50593
Depth: 59.490m Burial: -19.00cm DOL:-0.6708m

02:30 Cable back in suspension over rocks
ROV Pos:Lat: 43° 12.84590 N Long: 124° 30.71560 W KP: 11.48207
Depth: 58.754m Burial: cm DOL:-3.9501m

02:45 Cable in suspension in-between rocks
ROV Pos:Lat: 43° 12.86120 N Long: 124° 30.55640 W KP: 11.26469
Depth: 58.379m Burial: cm DOL:-1.1568m

02:48 ROV Stopped
ROV Pos:Lat: 43° 12.86880 N Long: 124° 30.51910 W KP: 11.21297
Depth: 59.246m Burial: cm DOL:2.0851m

02:53 ROV moving off
ROV Pos:Lat: 43° 12.86600 N Long: 124° 30.51560 W KP: 11.20880
Depth: 57.720m Burial: cm DOL:1.8673m

02:56 Cable back into suspension

ROV Pos:Lat: 43° 12.86950 N Long: 124° 30.47640 W KP: 11.15532
Depth: 57.055m Burial: cm DOL:4.2266m

03:13 Cable back on seabed
ROV Pos:Lat: 43° 12.88530 N Long: 124° 30.27590 W KP: 10.88222
Depth: 57.477m Burial: cm DOL:3.9871m

03:16 Cable suspended over rocks
ROV Pos:Lat: 43° 12.88950 N Long: 124° 30.22250 W KP: 10.80949
Depth: 58.592m Burial: cm DOL:4.6938m

03:25 Cable on seabed over rocks
ROV Pos:Lat: 43° 12.89690 N Long: 124° 30.11950 W KP: 10.66933
Depth: 60.782m Burial: cm DOL:3.7233m

03:45 Cable continues on seabed
ROV Pos:Lat: 43° 12.90870 N Long: 124° 29.95500 W KP: 10.44549
Depth: 65.518m Burial: cm DOL:1.3176m

04:04 Cable suspended off seabed
ROV Pos:Lat: 43° 12.92130 N Long: 124° 29.78470 W KP: 10.21368
Depth: 65.354m Burial: cm DOL:1.3193m

04:22 ROV back on seabed
ROV Pos:Lat: 43° 12.93330 N Long: 124° 29.62970 W KP: 10.00260
Depth: 65.856m Burial: cm DOL:-0.4375m

04:25 Cable back into burial
ROV Pos:Lat: 43° 12.93490 N Long: 124° 29.60650 W KP: 9.97104
Depth: 65.973m Burial: 17.00cm DOL:0.4674m

04:29 Seabed -sand waves
ROV Pos:Lat: 43° 12.93790 N Long: 124° 29.56850 W KP: 9.91929
Depth: 66.058m Burial: 8.00cm DOL:-0.1285m

04:30 Cable exposed intermittently in sand waves
ROV Pos:Lat: 43° 12.93920 N Long: 124° 29.55240 W KP: 9.89735
Depth: 65.979m Burial: 15.00cm DOL:1.0755m

04:37 Cable out of burial
ROV Pos:Lat: 43° 12.94490 N Long: 124° 29.46980 W KP: 9.78500
Depth: 66.129m Burial: cm DOL:-1.0104m

04:39 Cable suspended on rocks
ROV Pos:Lat: 43° 12.94540 N Long: 124° 29.46160 W KP: 9.77386
Depth: 65.874m Burial: cm DOL:-0.5923m

04:42 Cable exposed on rocky seabed
ROV Pos:Lat: 43° 12.94720 N Long: 124° 29.43690 W KP: 9.74024
Depth: 64.999m Burial: 4.00cm DOL:-1.3308m

04:45 Cable back into suspension
ROV Pos:Lat: 43° 12.94870 N Long: 124° 29.42000 W KP: 9.71719
Depth: 64.674m Burial: cm DOL:-1.3073m

04:51 Cable exposed on rocky seabed
ROV Pos:Lat: 43° 12.95190 N Long: 124° 29.37900 W KP: 9.66135
Depth: 65.385m Burial: cm DOL:-0.4570m

04:53 ROV – visual on rope positioned on cable
ROV Pos:Lat: 43° 12.95290 N Long: 124° 29.36150 W KP: 9.63759

	Depth: 65.320m	Burial: cm	DOL:-2.4029m	
05:00	Cable on rocky seabed			
	ROV Pos:Lat: 43° 12.95650 N	Long: 124° 29.31010 W		KP: 9.56766
	Depth: 65.099m	Burial: cm	DOL:-1.7273m	
05:08	Cable back into suspension			
	ROV Pos:Lat: 43° 12.96210 N	Long: 124° 29.23750 W		KP: 9.46880
	Depth: 65.021m	Burial: cm	DOL:-2.9449m	
05:14	Cable on hard flat seabed			
	ROV Pos:Lat: 43° 12.96600 N	Long: 124° 29.18880 W		KP: 9.40245
	Depth: 61.217m	Burial: cm	DOL:-1.5217m	
05:20	Cable back into suspension			
	ROV Pos:Lat: 43° 12.97060 N	Long: 124° 29.13780 W		KP: 9.33287
	Depth: 61.973m	Burial: cm	DOL:-1.3500m	
05:24	Cable back into suspension			
	ROV Pos:Lat: 43° 12.97430 N	Long: 124° 29.09240 W		KP: 9.27102
	Depth: 61.973m	Burial: cm	DOL:-0.7599m	
05:34	Cable back on seabed			
	CRP Pos:Lat: 43° 12.98110 N	Long: 124° 29.02900 W		KP: 9.18431
	ROV Pos:Lat: 43° 12.98100 N	Long: 124° 29.02140 W		KP: 9.17409
	Depth: 61.653m	Burial: cm	DOL:0.7015m	
05:38	Cable back into suspension over rocks			
	ROV Pos:Lat: 43° 12.98390 N	Long: 124° 28.99140 W		KP: 9.13312
	Depth: 60.063m	Burial: cm	DOL:2.5312m	
05:43	Large cable suspension			
	ROV Pos:Lat: 43° 12.99010 N	Long: 124° 28.93790 W		KP: 9.05987
	Depth: 58.132m	Burial: cm	DOL:5.6579m	
05:52	Cable back onto seabed			
	ROV Pos:Lat: 43° 13.00140 N	Long: 124° 28.85800 W		KP: 8.95006
	Depth: 55.604m	Burial: cm	DOL:14.6158m	
05:57	Cable back into suspension			
	ROV Pos:Lat: 43° 13.00950 N	Long: 124° 28.81110 W		KP: 8.88532
	Depth: 59.476m	Burial: cm	DOL:21.6914m	
06:18	Large suspension >0.5m			
	ROV Pos:Lat: 43° 13.07030 N	Long: 124° 28.63230 W		KP: 8.60667
	Depth: 59.394m	Burial: cm	DOL:-0.5988m	
06:27	Cable exposed on seabed			
	ROV Pos:Lat: 43° 13.10180 N	Long: 124° 28.56720 W		KP: 8.50097
	Depth: 61.018m	Burial: cm	DOL:-0.9301m	
06:45	Cable exposed on seabed			
	ROV Pos:Lat: 43° 13.17150 N	Long: 124° 28.42330 W		KP: 8.26724
	Depth: 59.359m	Burial: cm	DOL:-3.0131m	
06:48	Cable back into suspension			
	ROV Pos:Lat: 43° 13.18350 N	Long: 124° 28.40150 W		KP: 8.23035
	Depth: 57.234m	Burial: cm	DOL:-1.1528m	
06:49	Cable exposed on seabed			
	ROV Pos:Lat: 43° 13.18920 N	Long: 124° 28.39090 W		KP: 8.21255

Depth: 55.729m Burial: cm DOL:-1.6436m

07:00 Cable suspended between sand waves
ROV Pos:Lat: 43° 13.24310 N Long: 124° 28.27740 W KP: 8.02931
Depth: 58.530m Burial: cm DOL:-3.3029m

07:03 ROV lifting over rocks
ROV Pos:Lat: 43° 13.25260 N Long: 124° 28.25760 W KP: 7.99725
Depth: 58.400m Burial: cm DOL:-3.1841m

07:14 ROV on bottom
ROV Pos:Lat: 43° 13.25770 N Long: 124° 28.24790 W KP: 7.98108
Depth: 58.464m Burial: cm DOL:-3.2229m

07:15 Cable intermittently buried
ROV Pos:Lat: 43° 13.26100 N Long: 124° 28.24100 W KP: 7.96992
Depth: 58.464m Burial: 17.00cm DOL:-3.6924m

07:26 Cable into burial
ROV Pos:Lat: 43° 13.30330 N Long: 124° 28.15470 W KP: 7.82923
Depth: 58.209m Burial: 25.00cm DOL:-2.5388m

07:37 Cable exposed on seabed
ROV Pos:Lat: 43° 13.34270 N Long: 124° 28.07450 W KP: 7.69841
Depth: 57.967m Burial: 12.00cm DOL:-2.9679m

07:39 Cable intermittently buried
ROV Pos:Lat: 43° 13.34730 N Long: 124° 28.06570 W KP: 7.68376
Depth: 57.843m Burial: 22.00cm DOL:-1.4330m

07:50 Cable exposed on seabed
ROV Pos:Lat: 43° 13.38490 N Long: 124° 27.98870 W KP: 7.55840
Depth: 57.620m Burial: 6.00cm DOL:-2.8046m

08:01 Cable back into burial
ROV Pos:Lat: 43° 13.42620 N Long: 124° 27.90390 W KP: 7.42043
Depth: 56.336m Burial: 105.00cm DOL:-2.7002m

08:03 ROV traversing 6 degree slope
ROV Pos:Lat: 43° 13.43460 N Long: 124° 27.88850 W KP: 7.39445
Depth: 56.042m Burial: 90.00cm DOL:-1.6343m

08:11 Cable exposed on seabed
ROV Pos:Lat: 43° 13.45840 N Long: 124° 27.83770 W KP: 7.31278
Depth: 56.203m Burial: cm DOL:-2.6241m

08:13 Cable intermittently buried
ROV Pos:Lat: 43° 13.46470 N Long: 124° 27.82610 W KP: 7.29324
Depth: 55.975m Burial: 14.00cm DOL:-2.8173m

08:43 Cable into burial
ROV Pos:Lat: 43° 13.54930 N Long: 124° 27.65220 W KP: 7.01042
Depth: 53.220m Burial: 21.00cm DOL:-2.9299m

08:48 Cable exposed on seabed
ROV Pos:Lat: 43° 13.57020 N Long: 124° 27.61000 W KP: 6.94141
Depth: 53.062m Burial: cm DOL:-2.4956m

08:49 Cable suspended
ROV Pos:Lat: 43° 13.57300 N Long: 124° 27.60360 W KP: 6.93132

Depth: 52.847m Burial: cm DOL:-2.7270m

08:56 ROV lifting off seabed
ROV Pos:Lat: 43° 13.59960 N Long: 124° 27.55080 W KP: 6.84451
Depth: 50.866m Burial: cm DOL:-3.1557m

09:03 Cable exposed on seabed
ROV Pos:Lat: 43° 13.61650 N Long: 124° 27.51670 W KP: 6.78874
Depth: 51.360m Burial: cm DOL:-1.9127m

09:03 Cable suspended
ROV Pos:Lat: 43° 13.61730 N Long: 124° 27.51510 W KP: 6.78611
Depth: 51.236m Burial: cm DOL:-1.5094m

09:05 Cable back into burial
ROV Pos:Lat: 43° 13.62360 N Long: 124° 27.50210 W KP: 6.76500
Depth: 52.271m Burial: 10.00cm DOL:-1.5885m

09:17 Cable exposed on seabed
ROV Pos:Lat: 43° 13.64840 N Long: 124° 27.45160 W KP: 6.68264
Depth: 51.268m Burial: cm DOL:-2.5513m

09:22 Cable suspended
ROV Pos:Lat: 43° 13.66500 N Long: 124° 27.41670 W KP: 6.62626
Depth: 51.189m Burial: cm DOL:-2.6957m

09:38 Cable exposed on seabed
CRP Pos:Lat: 43° 13.71490 N Long: 124° 27.31690 W KP: 6.46258
ROV Pos:Lat: 43° 13.71920 N Long: 124° 27.30680 W KP: 6.44679
Depth: 49.701m Burial: 7.00cm DOL:-1.5806m

09:40 ROV – visual of fishing gear and rocks' around cable
ROV Pos:Lat: 43° 13.72350 N Long: 124° 27.29960 W KP: 6.43426
Depth: 49.780m Burial: cm DOL:-1.4415m

09:42 Cable into burial
ROV Pos:Lat: 43° 13.72920 N Long: 124° 27.28710 W KP: 6.41432
Depth: 49.493m Burial: 13.00cm DOL:-1.5365m

09:44 Cable exposed on seabed
ROV Pos:Lat: 43° 13.73630 N Long: 124° 27.27350 W KP: 6.39171
Depth: 49.505m Burial: cm DOL:-0.4740m

09:46 Cable into burial
ROV Pos:Lat: 43° 13.74310 N Long: 124° 27.25870 W KP: 6.36805
Depth: 48.952m Burial: 19.00cm DOL:-1.1694m

09:47 Cable suspended
ROV Pos:Lat: 43° 13.74830 N Long: 124° 27.24810 W KP: 6.35077
Depth: 48.704m Burial: cm DOL:-0.7090m

10:05 Cable into burial
ROV Pos:Lat: 43° 13.81910 N Long: 124° 27.10360 W KP: 6.11526
Depth: 47.173m Burial: 21.00cm DOL:-2.1861m

10:23 Cable suspended
CRP Pos:Lat: 43° 13.86810 N Long: 124° 27.00520 W KP: 5.95408
ROV Pos:Lat: 43° 13.87180 N Long: 124° 26.99540 W KP: 5.93925
Depth: 44.953m Burial: cm DOL:-0.5006m

10:26 Cable into burial

ROV Pos:Lat: 43° 13.88190 N Long: 124° 26.97580 W KP: 5.90679
Depth: 49.467m Burial: 9.00cm DOL:0.0317m

10:52 Cable exposed on seabed
ROV Pos:Lat: 43° 13.96660 N Long: 124° 26.80160 W KP: 5.62356
Depth: 46.770m Burial: cm DOL:-0.8970m

10:59 Cable suspended
ROV Pos:Lat: 43° 13.98380 N Long: 124° 26.76520 W KP: 5.56489
Depth: 45.052m Burial: cm DOL:-1.0649m

11:14 ROV – visual on serving damage on cable
ROV Pos:Lat: 43° 14.02440 N Long: 124° 26.68590 W KP: 5.43385
Depth: 39.582m Burial: cm DOL:1.4764m

11:28 ROV – visual armour wire exposure on cable – stop for inspection
ROV Pos:Lat: 43° 14.02420 N Long: 124° 26.68600 W KP: 5.43418
Depth: 39.977m Burial: cm DOL:0.9253m

11:29 ROV moving off

11:38 ROV Stopped to re-boot seabed profilers
ROV Pos:Lat: 43° 14.03620 N Long: 124° 26.66130 W KP: 5.39402
Depth: 36.045m Burial: cm DOL:0.7548m

14:25 ROV moving off – data comms issues resolved
ROV Pos:Lat: 43° 14.02800 N Long: 124° 26.67820 W KP: 5.42148
Depth: 34.556m Burial: 2.00cm DOL:0.1491m

14:27 Cable Position Fix
ROV Pos:Lat: 43° 14.03530 N Long: 124° 26.66130 W KP: 5.39495
Depth: 34.101m Burial: cm DOL:-0.9178m

14:31 Cable suspended
ROV Pos:Lat: 43° 14.04960 N Long: 124° 26.63220 W KP: 5.34748
Depth: 38.161m Burial:cm DOL:-1.9220m

14:34 Cable suspended - >2.0m
CRP Pos:Lat: 43° 14.05570 N Long: 124° 26.62080 W KP: 5.32837
ROV Pos:Lat: 43° 14.05930 N Long: 124° 26.61370 W KP: 5.31668
Depth: 39.364m Burial: cm DOL:-1.2200m

14:37 Cable suspended - >4.0m
ROV Pos:Lat: 43° 14.07140 N Long: 124° 26.59010 W KP: 5.27767
Depth: 37.674m Burial: cm DOL:-0.5961m

14:43 Cable suspended - >3.0m
ROV Pos:Lat: 43° 14.09340 N Long: 124° 26.54220 W KP: 5.20111
Depth: 34.822m Burial: cm DOL:-2.2693m

14:49 Cable suspended - >4.0m
ROV Pos:Lat: 43° 14.11630 N Long: 124° 26.49600 W KP: 5.12555
Depth: 35.497m Burial: cm DOL:-1.1278m

14:52 Cable suspended - >6.0m
ROV Pos:Lat: 43° 14.12990 N Long: 124° 26.47020 W KP: 5.08252
Depth: 38.155m Burial: cm DOL:0.0668m

14:55 Cable suspended - >5.0m
ROV Pos:Lat: 43° 14.14480 N Long: 124° 26.44130 W KP: 5.03466
Depth: 38.986m Burial: cm DOL:2.1457m

15:00 Cable Position Fix - Joint box lying on ridge
ROV Pos:Lat: 43° 14.16110 N Long: 124° 26.40430 W KP: 4.97624
Depth: 36.134m Burial: cm DOL:-0.3916m

15:03 ROV – visual of groove cut into coral by the action of the cable
ROV Pos:Lat: 43° 14.17400 N Long: 124° 26.37590 W KP: 4.93101
Depth: 34.405m Burial: cm DOL:-1.7840m

15:05 Cable suspended
ROV Pos:Lat: 43° 14.18330 N Long: 124° 26.35580 W KP: 4.89882
Depth: 33.275m Burial: cm DOL:-2.9376m

15:08 Cable suspended - >3.0m
ROV Pos:Lat: 43° 14.19220 N Long: 124° 26.33610 W KP: 4.86749
Depth: 32.509m Burial: cm DOL:-4.1884m

15:14 Cable suspended - >4.0m
ROV Pos:Lat: 43° 14.21480 N Long: 124° 26.28810 W KP: 4.79021
Depth: 31.094m Burial: cm DOL:-6.3103m

15:20 Cable suspended - >3.0m
ROV Pos:Lat: 43° 14.23290 N Long: 124° 26.24890 W KP: 4.72747
Depth: 32.048m Burial: cm DOL:-9.1886m

15:24 Cable suspended - >2.0m
ROV Pos:Lat: 43° 14.25060 N Long: 124° 26.21930 W KP: 4.67593
Depth: 34.112m Burial: cm DOL:-4.0743m

15:43 Cable suspended
ROV Pos:Lat: 43° 14.33350 N Long: 124° 26.05570 W KP: 4.40650
Depth: 37.340m Burial: cm DOL:0.6965m

15:49 Cable suspended - >0.5m
ROV Pos:Lat: 43° 14.35750 N Long: 124° 26.00491 W KP: 4.32464
Depth: 34.299m Burial: cm DOL:0.8229m

15:57 Cable back in burial
ROV Pos:Lat: 43° 14.39170 N Long: 124° 25.93320 W KP: 4.20875
Depth: 40.244m Burial: 23.00cm DOL:-0.8235m

15:58 ROV on bottom
ROV Pos:Lat: 43° 14.39620 N Long: 124° 25.92440 W KP: 4.19422
Depth: 41.265m Burial: 32.00cm DOL:-1.1669m

17:06 ROV at A/C
ROV Pos:Lat: 43° 14.62410 N Long: 124° 25.44290 W KP: 3.41565
Depth: 33.837m Burial: 43.00cm DOL:-13.1573m

17:26 Cable Position Fix
ROV Pos:Lat: 43° 14.67890 N Long: 124° 25.29750 W KP: 3.19438
Depth: 31.636m Burial: 52.00cm DOL:-3.9767m

17:31 Cable Position Fix
ROV Pos:Lat: 43° 14.69460 N Long: 124° 25.25330 W KP: 3.12788
Depth: 30.915m Burial: 47.00cm DOL:-3.3525m

17:46 ROV lost tone signal on cable
ROV Pos:Lat: 43° 14.73740 N Long: 124° 25.11900 W KP: 2.92963
Depth: 28.974m Burial: cm DOL:-5.3349m

17:58 ROV moving off to search for cable using TSS350
ROV Pos:Lat: 43° 14.73820 N Long: 124° 25.12640 W KP: 2.93808
Depth: 29.065m Burial: cm DOL:-6.0345m

18:02 ROV – TSS350 signal intermittent – checking equipment
ROV Pos:Lat: 43° 14.73920 N Long: 124° 25.12260 W KP: 2.93263
Depth: 29.078m Burial: cm DOL:-6.3097m

18:10 ROV moving off
ROV Pos:Lat: 43° 14.73920 N Long: 124° 25.12240 W KP: 2.93239
Depth: 29.110m Burial: 143.00cm DOL:-6.1494m

18:23 ROV Stopped – Terminal station requested to change tone to 25Hz
ROV Pos:Lat: 43° 14.74530 N Long: 124° 25.09010 W KP: 2.88800
Depth: 28.682m Burial: cm DOL:-13.5770m

18:25 ROV moving off to search for cable using TSS350
ROV Pos:Lat: 43° 14.74530 N Long: 124° 25.09030 W KP: 2.88824
Depth: 28.695m Burial: cm DOL:-15.4543m

18:34 ROV- Tone detected - re-aligning back on the cable line
ROV Pos:Lat: 43° 14.73890 N Long: 124° 25.12490 W KP: 2.93569
Depth: 29.246m Burial: 77.00cm DOL:-6.8622m

18:36 ROV resumes tracking cable
ROV Pos:Lat: 43° 14.73560 N Long: 124° 25.11830 W KP: 2.93019
Depth: 29.090m Burial: 111.00cm DOL:-7.8751m

18:40 ROV – cable tracking to the south east of the route – ROV heading 60.5 degrees
ROV Pos:Lat: 43° 14.72570 N Long: 124° 25.10700 W KP: 2.92408
Depth: 28.941m Burial: 116.00cm DOL:-26.4131m

18:56 ROV continues to follow the cable heading south east
ROV Pos:Lat: 43° 14.68920 N Long: 124° 25.06310 W KP: 2.89885
Depth: 28.181m Burial: cm DOL:-115.1624m

18:57 ROV Stopped – TSS350 losing signal strength
ROV Pos:Lat: 43° 14.68760 N Long: 124° 25.06140 W KP: 2.89801
Depth: 28.116m Burial: cm DOL:-120.7305m

19:06 ROV moving off
ROV Pos:Lat: 43° 14.68760 N Long: 124° 25.06190 W KP: 2.89863
Depth: 28.233m Burial: cm DOL:-124.1654m

19:12 ROV moving of north east towards position inshore and track back to inspect apparent repair bight on seabed
ROV Pos:Lat: 43° 14.68210 N Long: 124° 25.05500 W KP: 2.89448
Depth: 28.077m Burial: cm DOL:-137.9630m

19:30 ROV – TSS350 locates cable
ROV Pos:Lat: 43° 14.78060 N Long: 124° 25.01260 W KP: 2.76529
Depth: 27.869m Burial: 153.00cm DOL:-3.3622m

19:31 ROV re-aligned on cable – continue survey heading east inshore to original start position
ROV Pos:Lat: 43° 14.78250 N Long: 124° 25.00960 W KP: 2.76012
Depth: 27.668m Burial: 136.00cm DOL:1.3025m

19:31 Resume Survey
ROV Pos:Lat: 43° 14.78230 N Long: 124° 25.00940 W KP: 2.76004
Depth: 27.869m Burial: 139.00cm DOL:1.0722m

19:39 Cable Position Fix
ROV Pos:Lat: 43° 14.79730 N Long: 124° 24.96430 W KP: 2.69297
Depth: 27.331m Burial: 92.00cm DOL:2.4465m

19:40 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.80080 N Long: 124° 24.95320 W KP: 2.67661
Depth: 27.337m Burial: cm DOL:2.4468m

19:52 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.82380 N Long: 124° 24.88200 W KP: 2.57127
Depth: 23.368m Burial: cm DOL:0.3556m

19:54 Cable back into suspension
ROV Pos:Lat: 43° 14.82810 N Long: 124° 24.86830 W KP: 2.55110
Depth: 22.661m Burial: cm DOL:-0.2852m

19:59 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.83670 N Long: 124° 24.84790 W KP: 2.51935
Depth: 18.864m Burial: cm DOL:0.6868m

20:09 Cable back into burial
ROV Pos:Lat: 43° 14.84830 N Long: 124° 24.81900 W KP: 2.47481
Depth: 25.454m Burial: 23.00cm DOL:3.9912m

20:16 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.86070 N Long: 124° 24.78780 W KP: 2.42683
Depth: 25.382m Burial: 19.00cm DOL:7.3268m

20:27 Cable Position Fix – end of survey at inshore position
ROV Pos:Lat: 43° 14.87770 N Long: 124° 24.74050 W KP: 2.35551
Depth: 22.463m Burial: cm DOL:9.2665m

20:32 ROV recovered to docking head
Pos:Lat: 43° 14.87710 N Long: 124° 24.74370 W KP: 2.35990

20:36 Vessel Moving off to complete survey at cable deviation
Pos:Lat: 43° 14.87550 N Long: 124° 24.74790 W KP: 2.36630

20:55 Vessel in position to lower ROV
Pos:Lat: 43° 14.78400 N Long: 124° 25.00640 W KP: 2.75502

20:59 ROV at surface

21:03 ROV on bottom
ROV Pos:Lat: 43° 14.78360 N Long: 124° 25.00650 W KP: 2.75546
Depth: 27.885m Burial: cm DOL:4.1918m

21:05 ROV moving off to search for cable using TSS350
ROV Pos:Lat: 43° 14.78330 N Long: 124° 25.00620 W KP: 2.75532
Depth: 27.950m Burial: cm DOL:4.1918m

21:07 ROV – TSS350 locates cable – resume survey heading west
ROV Pos:Lat: 43° 14.78160 N Long: 124° 25.01150 W KP: 2.76316
Depth: 28.088m Burial: 147.00cm DOL:3.8848m

21:13 ROV tracking slowly
ROV Pos:Lat: 43° 14.77520 N Long: 124° 25.02810 W KP: 2.78853
Depth: 28.236m Burial: 142.00cm DOL:3.1443m

21:22 Cable Position Fix
ROV Pos:Lat: 43° 14.76460 N Long: 124° 25.05790 W KP: 2.83339

Depth: 28.491m Burial: 101.00cm DOL:1.6584m

21:26 Cable Position Fix
ROV Pos:Lat: 43° 14.75940 N Long: 124° 25.07281 W KP: 2.85574
Depth: 28.734m Burial: 137.00cm DOL:1.0495m

21:27 Cable Position Fix - cable deviating from as laid route to the south
ROV Pos:Lat: 43° 14.75620 N Long: 124° 25.07680 W KP: 2.86315
Depth: 28.769m Burial: 105.00cm DOL:1.2039m

21:30 Cable Position Fix
ROV Pos:Lat: 43° 14.74990 N Long: 124° 25.08120 W KP: 2.87348
Depth: 28.748m Burial: 127.00cm DOL:-2.2327m

21:32 Cable Position Fix
ROV Pos:Lat: 43° 14.74430 N Long: 124° 25.08370 W KP: 2.88093
Depth: 28.770m Burial: 118.00cm DOL:-8.5308m

21:33 Cable Position Fix
ROV Pos:Lat: 43° 14.74060 N Long: 124° 25.08320 W KP: 2.88322
Depth: 28.771m Burial: 105.00cm DOL:-12.5903m

21:37 Cable Position Fix
ROV Pos:Lat: 43° 14.73120 N Long: 124° 25.08190 W KP: 2.88899
Depth: 28.704m Burial: 109.00cm DOL:-26.9780m

21:41 Cable Position Fix
ROV Pos:Lat: 43° 14.72180 N Long: 124° 25.07740 W KP: 2.89084
Depth: 28.548m Burial: 116.00cm DOL:-48.3834m

21:43 Cable Position Fix
ROV Pos:Lat: 43° 14.71820 N Long: 124° 25.07520 W KP: 2.89096
Depth: 28.588m Burial: 118.00cm DOL:-56.1250m

21:45 Cable Position Fix
ROV Pos:Lat: 43° 14.71410 N Long: 124° 25.07320 W KP: 2.89172
Depth: 28.517m Burial: 108.00cm DOL:-65.5444m

21:47 Cable Position Fix
ROV Pos:Lat: 43° 14.70910 N Long: 124° 25.07020 W KP: 2.89196
Depth: 28.459m Burial: 111.00cm DOL:-77.1115m

21:48 Cable Position Fix
ROV Pos:Lat: 43° 14.70440 N Long: 124° 25.06860 W KP: 2.89368
Depth: 28.354m Burial: 106.00cm DOL:-85.1880m

21:49 Cable Position Fix
ROV Pos:Lat: 43° 14.70270 N Long: 124° 25.06750 W KP: 2.89366
Depth: 28.302m Burial: 90.00cm DOL:-89.2858m

21:51 Cable Position Fix
ROV Pos:Lat: 43° 14.69900 N Long: 124° 25.06560 W KP: 2.89423
Depth: 28.290m Burial: 73.00cm DOL:-96.7673m

21:53 Cable Position Fix
ROV Pos:Lat: 43° 14.69290 N Long: 124° 25.06220 W KP: 2.89485
Depth: 28.146m Burial: 41.00cm DOL:-107.9812m

21:55 Cable Position Fix
ROV Pos:Lat: 43° 14.68830 N Long: 124° 25.05940 W KP: 2.89501
Depth: 28.108m Burial: 50.00cm DOL:-119.1012m

21:56 Cable Position Fix - ROV heading changes indicate start of crown of bight
ROV Pos:Lat: 43° 14.68750 N Long: 124° 25.05860 W KP: 2.89466
Depth: 28.079m Burial: 79.00cm DOL:-121.0106m

21:58 Cable Position Fix
ROV Pos:Lat: 43° 14.68400 N Long: 124° 25.05580 W KP: 2.89397
Depth: 28.128m Burial: -28.00cm DOL:-129.6033m

22:02 Cable Position Fix
ROV Pos:Lat: 43° 14.68130 N Long: 124° 25.05590 W KP: 2.89621
Depth: 28.002m Burial: cm DOL:-135.9397m

22:05 Cable Position Fix – crown of the tracked bight
ROV Pos:Lat: 43° 14.68280 N Long: 124° 25.06070 W KP: 2.90092
Depth: 28.156m Burial: 50.00cm DOL:-137.1535m

22:12 **ROV completes survey of cable bight and completes all survey operations on Segment E1**

ROV Pos:Lat: 43° 14.68790 N Long: 124° 25.06130 W KP: 2.89766
Depth: 28.138m Burial: cm DOL:-124.3380m

22:15 ROV off bottom
ROV Pos:Lat: 43° 14.68780 N Long: 124° 25.06290 W KP: 2.89970
Depth: 19.613m Burial: cm DOL:-124.8521m

22:16 ROV at surface

22:21 **ROV end deck – end of E1 Dive #3**

22:24 Vessel commenced transit to China – US segment N9 inshore location

23:35 Vessel in position for ROV launch China – US segment N9 inshore location
Pos:Lat: 43° 15.33920 N Long: 124° 24.46490 W

23:37 **ROV off deck – CH-US SN9 – Dive #1**

23:41 ROV at surface

23:44 ROV on bottom - landed on rock outcrop
ROV Pos:Lat: 43° 15.33950 N Long: 124° 24.46400 W KP: 8097.84168
Depth: 12.589m Burial: cm DOL:-30.1081m

23:51 Vessel & ROV attempting to locate suitable position to land ROV
ROV Pos:Lat: 43° 15.34380 N Long: 124° 24.46550 W KP: 8097.83780
Depth: 12.449m Burial: cm DOL:-39.3607m

23:59 ROV continues setting up for survey on Seg N9
ROV Pos:Lat: 43° 15.34940 N Long: 124° 24.46450 W KP: 8097.83662
Depth: 10.967m Burial: cm DOL:-49.2607m

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00:00 ROV continues setting up for survey on Seg N9
ROV Pos:Lat: 43° 15.34940 N Long: 124° 24.46450 W KP: 8097.83662
Depth: 10.967m Burial: cm DOL:-49.2607m

00:12 ROV on bottom
ROV Pos:Lat: 43° 15.32500 N Long: 124° 24.47030 W KP: 8097.83986
Depth: 10.825m Burial: cm DOL:-3.8924m

00:23 ROV moving off to search for cable using TSS350
ROV Pos:Lat: 43° 15.32500 N Long: 124° 24.47080 W KP: 8097.83920
Depth: 21.440m Burial: cm DOL:-3.8505m

00:29 ROV in area of numerous rock outcrops hampering progress
ROV Pos:Lat: 43° 15.32470 N Long: 124° 24.47660 W KP: 8097.83171
Depth: 21.629m Burial: cm DOL:-0.9318m

00:49 ROV Stopped
ROV Pos:Lat: 43° 15.33420 N Long: 124° 24.48680 W KP: 8097.81409
Depth: 17.352m Burial: cm DOL:-11.3945m

00:51 Decision made to recover the ROV and head offshore to resume survey in light of the slow progress that would be made in this location. The vessel will return here on completion of the offshore section

00:52 ROV off bottom
ROV Pos:Lat: 43° 15.33300 N Long: 124° 24.48680 W KP: 8097.81462
Depth: 12.843m Burial: cm DOL:-11.0493m

00:53 ROV at surface

00:57 HPR fully retracted

00:58 **ROV on deck – end of CH-US SN9 Dive #1**

01:03 Vessel commenced transit offshore

02:59 Vessel in position for ROV Launch
Pos:Lat: 43° 13.77630 N Long: 124° 39.97510 W KP: 8076.14437

03:02 **ROV off deck – CH-US SN9 – Dive #2**

03:05 ROV at surface

03:11 ROV on bottom
ROV Pos:Lat: 43° 13.77990 N Long: 124° 39.97320 W KP: 8076.14770
Depth: 147.457m Burial: cm DOL:10.5073m

03:14 ROV moving off to search for cable using TSS350
ROV Pos:Lat: 43° 13.77990 N Long: 124° 39.97310 W KP: 8076.14783
Depth: 147.450m Burial: cm DOL:10.6949m

03:18 ROV – visual on cable
ROV Pos:Lat: 43° 13.79160 N Long: 124° 39.98170 W KP: 8076.13880
Depth: 147.785m Burial: cm DOL:-7.2275m

03:19 ROV aligning over the cable
ROV Pos:Lat: 43° 13.79160 N Long: 124° 39.98250 W KP: 8076.13773
Depth: 147.811m Burial: 23.00cm DOL:-12.1948m

03:22 **Start Survey pass CH – US N9**
ROV Pos:Lat: 43° 13.79250 N Long: 124° 39.98190 W KP: 8076.13873
Depth: 147.834m Burial: 4.00cm DOL:-16.2302m

03:23 Cable exposed on surface
ROV Pos:Lat: 43° 13.79300 N Long: 124° 39.98440 W KP: 8076.13547
Depth: 147.800m Burial: -2.00cm DOL:-16.6256m

03:29 ROV – visual on grapnel positioned next to cable
ROV Pos:Lat: 43° 13.79420 N Long: 124° 40.02100 W KP: 8076.08083
Depth: 148.160m Burial: 2.00cm DOL:-22.2877m

03:32 Cable exposed on surface
ROV Pos:Lat: 43° 13.79450 N Long: 124° 40.04670 W KP: 8076.04615
Depth: 148.853m Burial: -3.00cm DOL:-19.9091m

03:41 Cable intermittent shallow burial
ROV Pos:Lat: 43° 13.79530 N Long: 124° 40.11700 W KP: 8075.95127
Depth: 153.406m Burial: 11.00cm DOL:-12.0012m

03:44 Cable intermittent shallow burial
ROV Pos:Lat: 43° 13.79620 N Long: 124° 40.14190 W KP: 8075.91756
Depth: 153.786m Burial: 11.00cm DOL:-10.3751m

03:51 Cable suspended
ROV Pos:Lat: 43° 13.79900 N Long: 124° 40.21380 W KP: 8075.82017
Depth: 156.202m Burial: -2.00cm DOL:-5.4009m

03:53 Cable intermittent shallow burial
ROV Pos:Lat: 43° 13.80040 N Long: 124° 40.23980 W KP: 8075.78488
Depth: 157.854m Burial: 11.00cm DOL:-3.9416m

03:56 Cable into burial
ROV Pos:Lat: 43° 13.80210 N Long: 124° 40.26830 W KP: 8075.74617
Depth: 158.381m Burial: 23.00cm DOL:-3.8433m

04:03 Cable burial depth increasing
ROV Pos:Lat: 43° 13.80690 N Long: 124° 40.34310 W KP: 8075.64451
Depth: 159.443m Burial: 44.00cm DOL:-2.7937m

04:10 Seabed flat, featureless sand
ROV Pos:Lat: 43° 13.81250 N Long: 124° 40.42260 W KP: 8075.53638
Depth: 160.592m Burial: 47.00cm DOL:-2.2520m

04:20 Cable Position Fix
ROV Pos:Lat: 43° 13.82060 N Long: 124° 40.52370 W KP: 8075.39868
Depth: 162.114m Burial: 39.00cm DOL:-3.0198m

04:50 Cable Position Fix
ROV Pos:Lat: 43° 13.84120 N Long: 124° 40.82710 W KP: 8074.98613
Depth: 167.088m Burial: 44.00cm DOL:-1.3874m

05:20 Cable burial depth increasing
ROV Pos:Lat: 43° 13.86320 N Long: 124° 41.15380 W KP: 8074.54192
Depth: 172.584m Burial: 76.00cm DOL:-0.2045m

05:22 Cable burial depth increasing
ROV Pos:Lat: 43° 13.86470 N Long: 124° 41.17160 W KP: 8074.51766
Depth: 172.870m Burial: 129.00cm DOL:0.4172m

05:27 Cable burial depth increasing
ROV Pos:Lat: 43° 13.87050 N Long: 124° 41.24640 W KP: 8074.41583
Depth: 174.286m Burial: 153.00cm DOL:0.3449m

05:40 Cable Position Fix
ROV Pos:Lat: 43° 13.88510 N Long: 124° 41.41910 W KP: 8074.18045
Depth: 177.748m Burial: 155.00cm DOL:-0.9286m

06:52 Cable Position Fix

ROV Pos:Lat: 43° 13.96060 N Long: 124° 42.32920 W KP: 8072.94037
Depth: 196.714m Burial: 158.00cm DOL:-5.2191m

07:56 Cable Position Fix
ROV Pos:Lat: 43° 14.02510 N Long: 124° 43.08790 W KP: 8071.90653
Depth: 215.009m Burial: 156.00cm DOL:-20.9428m

09:18 Cable Position Fix
ROV Pos:Lat: 43° 14.10260 N Long: 124° 44.07210 W KP: 8070.56644
Depth: 257.846m Burial: 132.00cm DOL:-36.9023m

10:58 Cable Position Fix
ROV Pos:Lat: 43° 14.15880 N Long: 124° 45.21050 W KP: 8069.02364
Depth: 327.787m Burial: 137.00cm DOL:-54.0024m

11:21 Cable Position Fix
ROV Pos:Lat: 43° 14.16930 N Long: 124° 45.48610 W KP: 8068.65003
Depth: 340.293m Burial: 137.00cm DOL:-54.6938m

11:45 Cable Position Fix
ROV Pos:Lat: 43° 14.17840 N Long: 124° 45.74230 W KP: 8068.30278
Depth: 351.410m Burial: 142.00cm DOL:-56.2357m

11:58 Cable Position Fix
ROV Pos:Lat: 43° 14.18220 N Long: 124° 45.88260 W KP: 8068.11272
Depth: 357.396m Burial: 142.00cm DOL:-55.0614m

12:04 Cable Position Fix
ROV Pos:Lat: 43° 14.18290 N Long: 124° 45.94750 W KP: 8068.02490
Depth: 359.610m Burial: 141.00cm DOL:-51.9245m

12:14 Cable Position Fix
ROV Pos:Lat: 43° 14.18460 N Long: 124° 46.04860 W KP: 8067.88803
Depth: 363.451m Burial: 141.00cm DOL:-47.9442m

12:22 Cable Position Fix
ROV Pos:Lat: 43° 14.18600 N Long: 124° 46.14080 W KP: 8067.76323
Depth: 367.322m Burial: 147.00cm DOL:-45.1615m

12:37 Cable Position Fix
ROV Pos:Lat: 43° 14.19100 N Long: 124° 46.30530 W KP: 8067.54035
Depth: 372.846m Burial: 144.00cm DOL:-42.9336m

12:43 Cable Position Fix
ROV Pos:Lat: 43° 14.19360 N Long: 124° 46.37670 W KP: 8067.44357
Depth: 374.956m Burial: 150.00cm DOL:-43.0731m

12:53 Cable Position Fix
ROV Pos:Lat: 43° 14.19730 N Long: 124° 46.48280 W KP: 8067.29976
Depth: 377.813m Burial: 150.00cm DOL:-43.7410m

13:07 Cable Position Fix
ROV Pos:Lat: 43° 14.20370 N Long: 124° 46.63700 W KP: 8067.09067
Depth: 381.857m Burial: 152.00cm DOL:-44.4538m

13:14 Cable Position Fix
ROV Pos:Lat: 43° 14.20740 N Long: 124° 46.71560 W KP: 8066.98406
Depth: 383.928m Burial: 149.00cm DOL:-45.8360m

14:02 Cable Position Fix
ROV Pos:Lat: 43° 14.22740 N Long: 124° 47.21110 W KP: 8066.31225

Depth: 394.366m Burial: 149.00cm DOL:-51.2902m

14:25 Cable Position Fix
ROV Pos:Lat: 43° 14.23610 N Long: 124° 47.44870 W KP: 8065.99019
Depth: 395.589m Burial: 140.00cm DOL:-51.7157m

14:30 Cable Position Fix
ROV Pos:Lat: 43° 14.23760 N Long: 124° 47.49950 W KP: 8065.92136
Depth: 395.480m Burial: 144.00cm DOL:-51.7882m

15:23 Cable Position Fix
ROV Pos:Lat: 43° 14.25130 N Long: 124° 48.04130 W KP: 8065.18751
Depth: 391.869m Burial: 141.00cm DOL:-40.5182m

15:32 ROV visual on seabed track across cable line
ROV Pos:Lat: 43° 14.25330 N Long: 124° 48.12480 W KP: 8065.07443
Depth: 390.929m Burial: 136.00cm DOL:-39.3617m

15:50 Cable Position Fix
ROV Pos:Lat: 43° 14.25910 N Long: 124° 48.31760 W KP: 8064.81320
Depth: 388.500m Burial: 138.00cm DOL:-37.6778m

16:04 Cable Position Fix
ROV Pos:Lat: 43° 14.26290 N Long: 124° 48.42600 W KP: 8064.66629
Depth: 387.038m Burial: 138.00cm DOL:-37.8835m

16:19 Cable Position Fix
ROV Pos:Lat: 43° 14.26690 N Long: 124° 48.53020 W KP: 8064.52503
Depth: 385.425m Burial: 136.00cm DOL:-38.3030m

16:35 Cable Position Fix
ROV Pos:Lat: 43° 14.27250 N Long: 124° 48.67570 W KP: 8064.32778
Depth: 383.107m Burial: 136.00cm DOL:-38.9822m

16:48 Cable Position Fix
ROV Pos:Lat: 43° 14.27790 N Long: 124° 48.80470 W KP: 8064.15287
Depth: 381.038m Burial: 137.00cm DOL:-40.2722m

16:56 ROV visual on seabed track across cable line
ROV Pos:Lat: 43° 14.28210 N Long: 124° 48.89400 W KP: 8064.03174
Depth: 379.736m Burial: 136.00cm DOL:-42.4078m

17:25 ROV visual on seabed track across cable line
ROV Pos:Lat: 43° 14.29630 N Long: 124° 49.20040 W KP: 8063.61616
Depth: 374.644m Burial: 135.00cm DOL:-48.8661m

17:39 Cable Position Fix
ROV Pos:Lat: 43° 14.30250 N Long: 124° 49.33380 W KP: 8063.43523
Depth: 371.983m Burial: 136.00cm DOL:-51.6075m

18:19 Cable Position Fix
ROV Pos:Lat: 43° 14.31710 N Long: 124° 49.69260 W KP: 8062.94876
Depth: 363.725m Burial: 134.00cm DOL:-55.3659m

18:50 ROV Stopped – Vessel turning head
ROV Pos:Lat: 43° 14.32620 N Long: 124° 49.95260 W KP: 8062.59638
Depth: 357.641m Burial: 137.00cm DOL:-54.9200m

18:57 ROV moving off
ROV Pos:Lat: 43° 14.32690 N Long: 124° 49.95360 W KP: 8062.59497
Depth: 357.730m Burial: 138.00cm DOL:-55.4178m

19:24 Cable Position Fix
ROV Pos:Lat: 43° 14.33510 N Long: 124° 50.19650 W KP: 8062.26579
Depth: 352.782m Burial: 135.00cm DOL:-54.9209m

20:23 Cable Position Fix
CRP Pos:Lat: 43° 14.35260 N Long: 124° 50.80840 W KP: 8061.43683
ROV Pos:Lat: 43° 14.35400 N Long: 124° 50.81790 W KP: 8061.42386
Depth: 350.960m Burial: 130.00cm DOL:-48.8076m

20:59 Cable Position Fix
ROV Pos:Lat: 43° 14.36790 N Long: 124° 51.18020 W KP: 8060.93273
Depth: 350.857m Burial: 135.00cm DOL:-51.3930m

21:15 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.37190 N Long: 124° 51.31000 W KP: 8060.75686
Depth: 352.575m Burial: 104.00cm DOL:-50.0541m

21:19 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.37220 N Long: 124° 51.34760 W KP: 8060.70599
Depth: 351.348m Burial: 56.00cm DOL:-49.1248m

21:43 Cable Position Fix
ROV Pos:Lat: 43° 14.37890 N Long: 124° 51.59150 W KP: 8060.37560
Depth: 357.078m Burial: 105.00cm DOL:-44.6756m

21:54 Cable Position Fix
ROV Pos:Lat: 43° 14.38050 N Long: 124° 51.69750 W KP: 8060.23213
Depth: 359.652m Burial: 113.00cm DOL:-41.3090m

22:38 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.39350 N Long: 124° 52.14430 W KP: 8059.62683
Depth: 373.095m Burial: 102.00cm DOL:-35.0664m

23:34 ROV lifting clear of rocks
ROV Pos:Lat: 43° 14.40730 N Long: 124° 52.69870 W KP: 8058.87596
Depth: 391.738m Burial: 109.00cm DOL:-25.8515m

23:58 Cable Position Fix
ROV Pos:Lat: 43° 14.41300 N Long: 124° 52.95680 W KP: 8058.52646
Depth: 404.835m Burial: 139.00cm DOL:-20.4495m

23:59 ROV continues survey on N9 heading west to offshore
ROV Pos:Lat: 43° 14.41440 N Long: 124° 52.97370 W KP: 8058.50349
Depth: 405.324m Burial: 115.00cm DOL:-20.1791m

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00:00 ROV continues survey on N9 heading west to offshore
ROV Pos:Lat: 43° 14.41440 N Long: 124° 52.97370 W KP: 8058.50349
Depth: 405.324m Burial: 115.00cm DOL:-20.1791m

00:12 Cable Position Fix
ROV Pos:Lat: 43° 14.41890 N Long: 124° 53.11530 W KP: 8058.31163
Depth: 414.425m Burial: 106.00cm DOL:-17.4190m

00:32 Cable Position Fix
ROV Pos:Lat: 43° 14.42510 N Long: 124° 53.36350 W KP: 8057.97547
Depth: 434.335m Burial: 110.00cm DOL:-15.2135m

00:40 Cable Position Fix

ROV Pos:Lat: 43° 14.42860 N Long: 124° 53.47210 W KP: 8057.82832
Depth: 447.446m Burial: 110.00cm DOL:-13.1728m

01:42 Cable Position Fix
ROV Pos:Lat: 43° 14.44800 N Long: 124° 54.17750 W KP: 8056.87279
Depth: 525.643m Burial: 121.00cm DOL:-2.7857m

01:43 ROV visual on seabed track across cable line
ROV Pos:Lat: 43° 14.44770 N Long: 124° 54.18950 W KP: 8056.85659
Depth: 527.122m Burial: 119.00cm DOL:-3.5648m

02:41 Cable Position Fix
ROV Pos:Lat: 43° 14.47829 N Long: 124° 54.82430 W KP: 8055.99553
Depth: 597.873m Burial: 106.00cm DOL:-16.7370m

02:56 Cable Position Fix
ROV Pos:Lat: 43° 14.48490 N Long: 124° 55.01660 W KP: 8055.73484
Depth: 621.506m Burial: 80.00cm DOL:-15.7656m

03:18 Cable Position Fix
ROV Pos:Lat: 43° 14.49140 N Long: 124° 55.27850 W KP: 8055.38017
Depth: 661.601m Burial: 137.00cm DOL:-9.1702m

04:29 Cable Position Fix
ROV Pos:Lat: 43° 14.52210 N Long: 124° 56.14530 W KP: 8054.20544
Depth: 757.656m Burial: 94.00cm DOL:-4.7721m

05:12 Cable Position Fix
ROV Pos:Lat: 43° 14.53860 N Long: 124° 56.66610 W KP: 8053.49982
Depth: 812.607m Burial: 108.00cm DOL:0.5192m

05:27 Cable Position Fix
ROV Pos:Lat: 43° 14.54370 N Long: 124° 56.85340 W KP: 8053.24613
Depth: 837.346m Burial: 100.00cm DOL:5.5368m

06:08 Cable Position Fix
ROV Pos:Lat: 43° 14.56490 N Long: 124° 57.37290 W KP: 8052.54181
Depth: 905.732m Burial: 87.00cm DOL:4.7436m

07:11 Cable Position Fix
ROV Pos:Lat: 43° 14.60190 N Long: 124° 58.14420 W KP: 8051.49371
Depth: 999.206m Burial: 106.00cm DOL:-7.1756m

07:44 Cable Position Fix
ROV Pos:Lat: 43° 14.63800 N Long: 124° 58.50180 W KP: 8051.00567
Depth: 1018.940m Burial: 104.00cm DOL:8.9598m

07:52 Cable Position Fix
ROV Pos:Lat: 43° 14.64680 N Long: 124° 58.58780 W KP: 8050.88814
Depth: 1022.050m Burial: 103.00cm DOL:11.9173m

08:14 Cable Position Fix
ROV Pos:Lat: 43° 14.67580 N Long: 124° 58.82860 W KP: 8050.55780
Depth: 1032.580m Burial: 102.00cm DOL:11.0444m

08:51 ROV Stopped – to check umbilical
ROV Pos:Lat: 43° 14.71800 N Long: 124° 59.21750 W KP: 8050.02566
Depth: 1046.130m Burial: 138.00cm DOL:18.6893m

09:19 ROV moving off to make umbilical adjustment
ROV Pos:Lat: 43° 14.72140 N Long: 124° 59.21350 W KP: 8050.03000

	Depth: 1046.320m	Burial: 147.00cm	DOL:12.5659m
10:16	ROV setting up at position before making umbilical adjustment		
	ROV Pos:Lat: 43° 14.72070 N	Long: 124° 59.19560 W	KP: 8050.05412
	Depth: 1046.210m	Burial: 111.00cm	DOL:7.6804m
10:19	ROV moving off – resume survey		
	ROV Pos:Lat: 43° 14.71980 N	Long: 124° 59.20530 W	KP: 8050.04143
	Depth: 1046.260m	Burial: 108.00cm	DOL:7.7791m
11:19	Cable Position Fix		
	ROV Pos:Lat: 43° 14.78100 N	Long: 124° 59.72880 W	KP: 8049.32383
	Depth: 1057.180m	Burial: 104.00cm	DOL:12.1232m
12:14	Cable Position Fix		
	ROV Pos:Lat: 43° 14.85190 N	Long: 125° 00.32770 W	KP: 8048.50262
	Depth: 1057.400m	Burial: 100.00cm	DOL:11.4335m
12:42	Cable Position Fix		
	ROV Pos:Lat: 43° 14.88600 N	Long: 125° 00.60610 W	KP: 8048.12055
	Depth: 1056.000m	Burial: 104.00cm	DOL:11.1080m
12:55	Cable Position Fix		
	ROV Pos:Lat: 43° 14.90250 N	Long: 125° 00.73300 W	KP: 8047.94611
	Depth: 1056.020m	Burial: 117.00cm	DOL:10.5252m
13:27	Cable Position Fix		
	ROV Pos:Lat: 43° 14.93550 N	Long: 125° 01.02220 W	KP: 8047.54993
	Depth: 1048.950m	Burial: 110.00cm	DOL:13.3303m
13:42	Cable Position Fix		
	ROV Pos:Lat: 43° 14.95080 N	Long: 125° 01.16620 W	KP: 8047.35301
	Depth: 1046.850m	Burial: 109.00cm	DOL:12.8117m
14:38	Cable Position Fix		
	ROV Pos:Lat: 43° 15.01790 N	Long: 125° 01.70190 W	KP: 8046.61740
	Depth: 1042.040m	Burial: 105.00cm	DOL:8.6479m
15:51	ROV Stopped – waiting on visibility to improve		
	ROV Pos:Lat: 43° 15.10290 N	Long: 125° 02.37380 W	KP: 8045.69453
	Depth: 1074.800m	Burial: 177.00cm	DOL:-2.6783m
15:56	ROV moving off – lifting over rocks		
	ROV Pos:Lat: 43° 15.10210 N	Long: 125° 02.37040 W	KP: 8045.69931
	Depth: 1074.800m	Burial: 140.00cm	DOL:-3.0681m
16:03	ROV on bottom		
	ROV Pos:Lat: 43° 15.11450 N	Long: 125° 02.44840 W	KP: 8045.59143
	Depth: 1074.070m	Burial: 114.00cm	DOL:-2.1899m
16:29	Cable Position Fix – seabed soft and burial <40cm		
	ROV Pos:Lat: 43° 15.15260 N	Long: 125° 02.74340 W	KP: 8045.18601
	Depth: 1084.980m	Burial: 36.00cm	DOL:-12.8215m
16:34	Cable Position Fix - ROV at end of burial position as per as-laid RPL		
	ROV Pos:Lat: 43° 15.15980 N	Long: 125° 02.79210 W	KP: 8045.11861
	Depth: 1086.670m	Burial: 34.00cm	DOL:-14.9573m
16:49	Cable Position Fix		
	ROV Pos:Lat: 43° 15.18510 N	Long: 125° 02.97290 W	KP: 8044.86948

Depth: 1096.770m Burial: 28.00cm DOL:-20.2937m

17:27 ROV visual on seabed track across cable line
ROV Pos:Lat: 43° 15.25300 N Long: 125° 03.41470 W KP: 8044.25880
Depth: 1162.890m Burial: 28.00cm DOL:-37.8220m

17:30 Cable exposed on seabed
ROV Pos:Lat: 43° 15.25940 N Long: 125° 03.45000 W KP: 8044.20969
Depth: 1171.110m Burial: cm DOL:-41.0967m

17:32 Cable back into burial
ROV Pos:Lat: 43° 15.26180 N Long: 125° 03.47010 W KP: 8044.18213
Depth: 1176.550m Burial: 13.00cm DOL:-42.4308m

17:49 Cable Position Fix
ROV Pos:Lat: 43° 15.29090 N Long: 125° 03.65580 W KP: 8043.92562
Depth: 1195.390m Burial: 32.00cm DOL:-51.9304m

17:59 ROV Stopped – carrying out visual inspection of seabed debris
ROV Pos:Lat: 43° 15.30720 N Long: 125° 03.75900 W KP: 8043.78288
Depth: 1190.010m Burial: 19.00cm DOL:-59.2207m

18:05 ROV – visual inspection of seabed debris appears to be corrugated steel positioned off the cable line
ROV Pos:Lat: 43° 15.30460 N Long: 125° 03.75460 W KP: 8043.78955
Depth: 1190.160m Burial: 125.00cm DOL:-55.5635m

18:08 ROV moving off passing around seabed debris
ROV Pos:Lat: 43° 15.30710 N Long: 125° 03.75890 W KP: 8043.78304
Depth: 1190.100m Burial: 45.00cm DOL:-55.0374m

18:09 ROV back on the cable line
ROV Pos:Lat: 43° 15.30770 N Long: 125° 03.76590 W KP: 8043.77351
Depth: 1190.010m Burial: 32.00cm DOL:-59.4881m

18:17 ROV – visual inspection of seabed debris appears to be fishing nets on cable line
ROV Pos:Lat: 43° 15.31830 N Long: 125° 03.82550 W KP: 8043.69070
Depth: 1191.490m Burial: 34.00cm DOL:-61.4303m

18:48 ROV lifting off seabed due difficulties manoeuvring on very soft seabed conditions
ROV Pos:Lat: 43° 15.34900 N Long: 125° 04.08290 W KP: 8043.33774
Depth: 1198.340m Burial: 63.00cm DOL:-63.1585m

18:50 ROV back on seabed and tracking cable
ROV Pos:Lat: 43° 15.35070 N Long: 125° 04.08130 W KP: 8043.33935
Depth: 1199.460m Burial: 52.00cm DOL:-61.6955m

18:55 Cable exposed on surface
ROV Pos:Lat: 43° 15.35410 N Long: 125° 04.10920 W KP: 8043.30107
Depth: 1187.830m Burial: -1.00cm DOL:-62.4628m

19:09 Cable exposed on surface - ROV ascending seabed gradient
ROV Pos:Lat: 43° 15.36140 N Long: 125° 04.16710 W KP: 8043.22156
Depth: 1160.090m Burial: 52.00cm DOL:-68.5607m

19:29 Cable back into burial
ROV Pos:Lat: 43° 15.38290 N Long: 125° 04.27750 W KP: 8043.06760
Depth: 1131.280m Burial: 36.00cm DOL:-75.3992m

19:56 Cable Position Fix
ROV Pos:Lat: 43° 15.40200 N Long: 125° 04.40200 W KP: 8042.89556

	Depth: 1116.470m	Burial: 59.00cm	DOL:-83.8812m
20:02	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.41010 N	Long: 125° 04.44610 W	KP: 8042.83422
	Depth: 1106.880m	Burial: 46.00cm	DOL:-88.4868m
20:14	Cable back into Burial		
	ROV Pos:Lat: 43° 15.42140 N	Long: 125° 04.50820 W	KP: 8042.74786
	Depth: 1096.960m	Burial: 26.00cm	DOL:-93.6940m
20:21	ROV Stopped – waiting on visibility to improve		
	ROV Pos:Lat: 43° 15.41690 N	Long: 125° 04.52730 W	KP: 8042.72376
	Depth: 1096.410m	Burial: 354.00cm	DOL:-90.4013m
20:28	ROV moving off		
	ROV Pos:Lat: 43° 15.41890 N	Long: 125° 04.52690 W	KP: 8042.72368
	Depth: 1096.470m	Burial: 107.00cm	DOL:-85.2289m
20:35	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.43130 N	Long: 125° 04.57220 W	KP: 8042.65940
	Depth: 1094.630m	Burial: -1.00cm	DOL:-101.0737m
20:36	Cable suspended above seabed		
	ROV Pos:Lat: 43° 15.43330 N	Long: 125° 04.57850 W	KP: 8042.65037
	Depth: 1094.300m	Burial: 19.00cm	DOL:-99.5289m
20:37	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.43440 N	Long: 125° 04.58300 W	KP: 8042.64403
	Depth: 1093.930m	Burial: 14.00cm	DOL:-102.1213m
20:38	Cable back into Burial		
	ROV Pos:Lat: 43° 15.43720 N	Long: 125° 04.60010 W	KP: 8042.62035
	Depth: 1093.840m	Burial: 33.00cm	DOL:-102.0348m
20:45	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.44500 N	Long: 125° 04.67620 W	KP: 8042.51639
	Depth: 1094.090m	Burial: 16.00cm	DOL:-100.9588m
20:48	ROV visual of abundant growth of marine fauna on cable		
	ROV Pos:Lat: 43° 15.44740 N	Long: 125° 04.69310 W	KP: 8042.49310
	Depth: 1094.520m	Burial: 14.00cm	DOL:-100.0722m
20:48	Cable back into burial		
	ROV Pos:Lat: 43° 15.44680 N	Long: 125° 04.69980 W	KP: 8042.48435
	Depth: 1094.660m	Burial: 18.00cm	DOL:-99.6539m
20:53	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.45230 N	Long: 125° 04.75440 W	KP: 8042.40979
	Depth: 1100.260m	Burial: 20.00cm	DOL:-96.7685m
20:54	Cable back into burial		
	ROV Pos:Lat: 43° 15.45380 N	Long: 125° 04.76800 W	KP: 8042.39118
	Depth: 1101.690m	Burial: 28.00cm	DOL:-96.6313m
20:56	ROV sonar visual on seabed track across cable line		
	ROV Pos:Lat: 43° 15.45520 N	Long: 125° 04.78520 W	KP: 8042.36779
	Depth: 1103.300m	Burial: 29.00cm	DOL:-96.0128m
20:59	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.45770 N	Long: 125° 04.81420 W	KP: 8042.32832

	Depth: 1106.550m	Burial: 22.00cm	DOL:-93.8508m
21:01	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.46070 N	Long: 125° 04.83790 W	KP: 8042.29577
	Depth: 1108.880m	Burial: 22.00cm	DOL:-92.3752m
21:02	ROV visual on seabed track across cable line		
	ROV Pos:Lat: 43° 15.46120 N	Long: 125° 04.84670 W	KP: 8042.28387
	Depth: 1109.870m	Burial: 13.00cm	DOL:-92.0613m
21:02	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.46180 N	Long: 125° 04.85000 W	KP: 8042.27928
	Depth: 1110.140m	Burial: 7.00cm	DOL:-91.7228m
21:03	Cable suspended over rocks		
	ROV Pos:Lat: 43° 15.46210 N	Long: 125° 04.85310 W	KP: 8042.27506
	Depth: 1110.190m	Burial: -1.00cm	DOL:-91.3966m
21:07	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.46500 N	Long: 125° 04.88670 W	KP: 8042.22933
	Depth: 1118.650m	Burial: 11.00cm	DOL:-88.3607m
21:09	Cable back into burial		
	ROV Pos:Lat: 43° 15.46550 N	Long: 125° 04.91190 W	KP: 8042.19555
	Depth: 1121.230m	Burial: 24.00cm	DOL:-87.2589m
21:10	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.46650 N	Long: 125° 04.91450 W	KP: 8042.19176
	Depth: 1121.410m	Burial: 24.00cm	DOL:-87.0111m
21:11	Cable back into Burial		
	ROV Pos:Lat: 43° 15.46679 N	Long: 125° 04.92170 W	KP: 8042.18207
	Depth: 1121.810m	Burial: 21.00cm	DOL:-86.4128m
21:11	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.46710 N	Long: 125° 04.92330 W	KP: 8042.17984
	Depth: 1121.960m	Burial: 17.00cm	DOL:-85.9959m
21:15	Cable in area over numerous rocks		
	ROV Pos:Lat: 43° 15.47080 N	Long: 125° 04.96510 W	KP: 8042.12292
	Depth: 1125.850m	Burial: 26.00cm	DOL:-81.9045m
21:20	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.47420 N	Long: 125° 05.02380 W	KP: 8042.04354
	Depth: 1134.670m	Burial: 19.00cm	DOL:-77.7160m
21:24	Cable exposed on surface		
	ROV Pos:Lat: 43° 15.47650 N	Long: 125° 05.06670 W	KP: 8041.98559
	Depth: 1140.990m	Burial: 21.00cm	DOL:-72.5695m
21:25	Cable in area over numerous rocks		
	ROV Pos:Lat: 43° 15.47840 N	Long: 125° 05.07320 W	KP: 8041.97632
	Depth: 1141.810m	Burial: 18.00cm	DOL:-70.6400m
21:31	Cable back into burial		
	ROV Pos:Lat: 43° 15.48190 N	Long: 125° 05.13690 W	KP: 8041.89025
	Depth: 1151.640m	Burial: 24.00cm	DOL:-67.4274m
22:01	Cable Position Fix - burial depth increasing >40cm		
	ROV Pos:Lat: 43° 15.50039 N	Long: 125° 05.38710 W	KP: 8041.55067
	Depth: 1189.110m	Burial: 49.00cm	DOL:-41.6079m

22:26 ROV visual on seabed track across cable line
ROV Pos:Lat: 43° 15.50910 N Long: 125° 05.49760 W KP: 8041.40054
Depth: 1190.860m Burial: 61.00cm DOL:-34.1040m

22:47 ROV lifting off seabed to clear debris
ROV Pos:Lat: 43° 15.51330 N Long: 125° 05.54460 W KP: 8041.33653
Depth: 1188.990m Burial: 99.00cm DOL:-30.3990m

22:50 ROV back on seabed
ROV Pos:Lat: 43° 15.51810 N Long: 125° 05.56340 W KP: 8041.30995
Depth: 1188.110m Burial: 62.00cm DOL:-31.3328m

23:22 ROV Stopped – commence recovery to carry out essential maintenance
ROV Pos:Lat: 43° 15.53400 N Long: 125° 05.81140 W KP: 8040.97413
Depth: 1188.390m Burial: 58.00cm DOL:-8.0606m

23:33 ROV off bottom – survey suspended
ROV Pos:Lat: 43° 15.53350 N Long: 125° 05.81220 W KP: 8040.97322
Depth: 1186.530m Burial: cm DOL:-6.9036m

23:59 ROV continues recovery of ROV for essential maintenance
Pos:Lat: 43° 15.53 N Long: 125° 05.80 W KP: 8040.97959

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00:00 ROV continues recovery of ROV for essential maintenance
Pos:Lat: 43° 15.53 N Long: 125° 05.80 W KP: 8040.97959

00:02 ROV at surface

00:06 **ROV on deck – end of CH-US SN9 Dive #2 – commenced ROV downtime to carry out essential maintenance**

04:27 **ROV off deck – CH-US SN9 – Dive #3 – end of downtime for ROV maintenance**

04:30 ROV at surface

05:00 ROV on bottom
ROV Pos:Lat: 43° 15.52430 N Long: 125° 05.75400 W KP: 8041.05372
Depth: 1183.850m Burial: cm DOL:-10.1007m

05:03 ROV aligned on cable and moving off – resume survey
ROV Pos:Lat: 43° 15.52610 N Long: 125° 05.75440 W KP: 8041.05262
Depth: 1183.830m Burial: 64.00cm DOL:-7.8868m

08:29 Cable Position Fix
ROV Pos:Lat: 43° 15.74800 N Long: 125° 07.61550 W KP: 8038.50084
Depth: 1318.190m Burial: 134.00cm DOL:9.8193m

10:58 ROV Stopped – waiting on visibility to improve
ROV Pos:Lat: 43° 15.90300 N Long: 125° 08.95490 W KP: 8036.66600
Depth: 1364.520m Burial: 55.00cm DOL:35.8036m

11:30 ROV moving off to re-set up on cable
ROV Pos:Lat: 43° 15.90470 N Long: 125° 08.95960 W KP: 8036.65920
Depth: 1364.350m Burial: 38.00cm DOL:33.2543m

11:37 ROV Stopped
ROV Pos:Lat: 43° 15.89980 N Long: 125° 08.93540 W KP: 8036.69301
Depth: 1361.960m Burial: 40.00cm DOL:35.2722m

12:03 ROV moving off to re-set up on cable
ROV Pos:Lat: 43° 15.89030 N Long: 125° 08.96080 W KP: 8036.66214
Depth: 1370.240m Burial: cm DOL:55.8076m

12:17 ROV Stopped – setting back up on cable line
ROV Pos:Lat: 43° 15.89530 N Long: 125° 08.89210 W KP: 8036.75216
Depth: 1358.910m Burial: 104.00cm DOL:33.2418m

12:33 ROV moving off
ROV Pos:Lat: 43° 15.89950 N Long: 125° 08.92480 W KP: 8036.70724
Depth: 1360.850m Burial: 76.00cm DOL:35.5793m

12:57 Cable exposed on seabed – end of burial position
ROV Pos:Lat: 43° 15.91620 N Long: 125° 09.14170 W KP: 8036.41289
Depth: 1398.780m Burial: 4.00cm DOL:51.6572m

13:12 ROV visual of abundant growth of marine fauna on cable
ROV Pos:Lat: 43° 15.94370 N Long: 125° 09.31730 W KP: 8036.17005
Depth: 1477.110m Burial: cm DOL:45.3647m

13:12 Cable suspended < 10cm
ROV Pos:Lat: 43° 15.94390 N Long: 125° 09.32160 W KP: 8036.16426
Depth: 1478.640m Burial:cm DOL:46.2422m

13:18 Cable exposed on surface
ROV Pos:Lat: 43° 15.95350 N Long: 125° 09.37780 W KP: 8036.08629
Depth: 1484.450m Burial: cm DOL:42.5034m

13:22 Cable Position Fix - cable self buried
ROV Pos:Lat: 43° 15.96070 N Long: 125° 09.42670 W KP: 8036.01881
Depth: 1482.590m Burial: 10.00cm DOL:41.8385m

13:29 Cable exposed on surface
ROV Pos:Lat: 43° 15.97830 N Long: 125° 09.51960 W KP: 8035.88936
Depth: 1485.870m Burial: cm DOL:32.7594m

13:59 Cable Position Fix
ROV Pos:Lat: 43° 16.05320 N Long: 125° 09.86881 W KP: 8035.39999
Depth: 1500.140m Burial: cm DOL:-20.9766m

14:02 Cable Position Fix - seabed incline of 5degrees
ROV Pos:Lat: 43° 16.06190 N Long: 125° 09.91860 W KP: 8035.33084
Depth: 1508.880m Burial: 5.00cm DOL:-25.3490m

14:27 Cable Position Fix
ROV Pos:Lat: 43° 16.12590 N Long: 125° 10.22170 W KP: 8034.90640
Depth: 1567.070m Burial: -1.00cm DOL:-71.3362m

14:30 Cable Position Fix
ROV Pos:Lat: 43° 16.13500 N Long: 125° 10.26601 W KP: 8034.84444
Depth: 1582.710m Burial: -4.00cm DOL:-78.8197m

14:44 ROV off cable
ROV Pos:Lat: 43° 16.16249 N Long: 125° 10.41010 W KP: 8034.64360
Depth: 1670.420m Burial: cm DOL:-103.8561m

14:46 ROV Stopped
ROV Pos:Lat: 43° 16.16300 N Long: 125° 10.41040 W KP: 8034.64304
Depth: 1670.560m Burial: cm DOL:-99.7954m

14:55	ROV moving off		
	ROV Pos:Lat: 43° 16.16410 N	Long: 125° 10.41460 W	KP: 8034.63709
	Depth: 1671.080m	Burial: 148.00cm	DOL:-95.9198m
14:56	ROV relocates cable using TSS350		
	ROV Pos:Lat: 43° 16.16639 N	Long: 125° 10.41550 W	KP: 8034.63515
	Depth: 1671.190m	Burial: 7.00cm	DOL:-96.8976m
15:30	ROV off cable		
	ROV Pos:Lat: 43° 16.18160 N	Long: 125° 10.49431 W	KP: 8034.52527
	Depth: 1668.750m	Burial: cm	DOL:-112.8685m
15:32	ROV moving off		
	ROV Pos:Lat: 43° 16.18400 N	Long: 125° 10.49270 W	KP: 8034.52663
	Depth: 1668.740m	Burial: cm	DOL:-116.4558m
15:39	ROV relocates cable using TSS350		
	ROV Pos:Lat: 43° 16.18130 N	Long: 125° 10.50720 W	KP: 8034.50818
	Depth: 1668.520m	Burial: cm	DOL:-105.6932m
15:43	Cable exposed on surface		
	ROV Pos:Lat: 43° 16.17550 N	Long: 125° 10.51240 W	KP: 8034.50310
	Depth: 1668.510m	Burial: cm	DOL:-101.5105m
16:01	ROV off cable		
	ROV Pos:Lat: 43° 16.16310 N	Long: 125° 10.51540 W	KP: 8034.50307
	Depth: 1669.400m	Burial: cm	DOL:-72.4434m
16:20	ROV relocates cable using TSS350		
	ROV Pos:Lat: 43° 16.18410 N	Long: 125° 10.53400 W	KP: 8034.47156
	Depth: 1667.400m	Burial: 13.00cm	DOL:-104.7768m
16:24	ROV moving off		
	ROV Pos:Lat: 43° 16.18240 N	Long: 125° 10.53440 W	KP: 8034.47157
	Depth: 1667.390m	Burial: 8.00cm	DOL:-109.9551m
16:27	ROV Stopped TSS350 signal track distortion indicates probable cable loop on seabed		
	ROV Pos:Lat: 43° 16.18040 N	Long: 125° 10.54130 W	KP: 8034.46335
	Depth: 1667.390m	Burial: cm	DOL:-109.4100m
16:36	ROV Stopped – visual on cable loops on seabed		
	ROV Pos:Lat: 43° 16.18810 N	Long: 125° 10.55450 W	KP: 8034.44333
	Depth: 1666.740m	Burial: cm	DOL:-111.1603m
16:39	Decision made by client rep to end survey at this position		
	ROV Pos:Lat: 43° 16.18710 N	Long: 125° 10.55460 W	KP: 8034.44352
	Depth: 1666.710m	Burial:cm	DOL:-112.0236m
16:44	Commence recovery		
	ROV Pos:Lat: 43° 16.18660 N	Long: 125° 10.55630 W	KP: 8034.44140
	Depth: 1666.770m	Burial: 5.00cm	DOL:-112.5540m
16:44	ROV off bottom		
	ROV Pos:Lat: 43° 16.18860 N	Long: 125° 10.55470 W	KP: 8034.44291
	Depth: 1666.770m	Burial: 5.00cm	DOL:-112.5994m
17:31	ROV at surface		
17:37	**ROV on deck – end of CH-US SN9 Dive #3**		
17:38	HPR pole retracted – commence transit to inshore location to resume survey on N9		

20:25 Vessel in position for ROV launch
Pos:Lat: 43° 13.78690 N Long: 124° 40.00830 W KP: 8076.09926

20:25 **ROV off deck – CH-US SN9 – Dive #4**

20:29 ROV at surface

20:37 ROV on bottom
ROV Pos:Lat: 43° 13.78490 N Long: 124° 40.00340 W KP: 8076.10622
Depth: 149.418m Burial: cm DOL:-11.5336m

20:42 ROV moving off to search for cable using TSS350
ROV Pos:Lat: 43° 13.78490 N Long: 124° 40.00340 W KP: 8076.10622
Depth: 149.518m Burial: cm DOL:-10.9015m

20:44 ROV aligning over the cable – cable on seabed and exposed
ROV Pos:Lat: 43° 13.79270 N Long: 124° 40.00010 W KP: 8076.11429
Depth: 149.512m Burial: 1.00cm DOL:-13.7584m

20:45 ROV moving off – resume survey
ROV Pos:Lat: 43° 13.79340 N Long: 124° 39.99860 W KP: 8076.11646
Depth: 149.599m Burial: 2.00cm DOL:-20.2401m

20:51 Cable exposed on surface
ROV Pos:Lat: 43° 13.79100 N Long: 124° 39.95480 W KP: 8076.17484
Depth: 148.499m Burial: 3.00cm DOL:-14.3799m

20:54 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.79030 N Long: 124° 39.93020 W KP: 8076.20777
Depth: 147.464m Burial: cm DOL:-9.2776m

20:55 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.79040 N Long: 124° 39.92040 W KP: 8076.22097
Depth: 146.917m Burial: 4.00cm DOL:-7.6634m

20:58 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.79170 N Long: 124° 39.88790 W KP: 8076.26495
Depth: 146.168m Burial: 5.00cm DOL:-3.4766m

21:07 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.79620 N Long: 124° 39.81000 W KP: 8076.37068
Depth: 145.672m Burial: 1.00cm DOL:0.1693m

21:10 Cable back into burial
ROV Pos:Lat: 43° 13.79820 N Long: 124° 39.78880 W KP: 8076.39962
Depth: 146.006m Burial: 16.00cm DOL:0.2074m

21:12 Cable exposed on surface
ROV Pos:Lat: 43° 13.79980 N Long: 124° 39.77260 W KP: 8076.42175
Depth: 145.989m Burial: cm DOL:-0.6805m

21:24 Cable exposed on surface
ROV Pos:Lat: 43° 13.81070 N Long: 124° 39.65980 W KP: 8076.57578
Depth: 144.831m Burial: cm DOL:-2.2134m

21:29 Cable suspended over Rocks
ROV Pos:Lat: 43° 13.81460 N Long: 124° 39.61720 W KP: 8076.63391
Depth: 146.297m Burial: cm DOL:-3.5482m

21:30 Cable back into burial
ROV Pos:Lat: 43° 13.81580 N Long: 124° 39.60350 W KP: 8076.65259
Depth: 146.689m Burial: 17.00cm DOL:-2.4887m

21:37 Cable exposed on surface
ROV Pos:Lat: 43° 13.82040 N Long: 124° 39.55200 W KP: 8076.72284
Depth: 146.960m Burial: cm DOL:-3.5851m

21:39 Cable back into burial
ROV Pos:Lat: 43° 13.82170 N Long: 124° 39.53600 W KP: 8076.74463
Depth: 146.922m Burial: 24.00cm DOL:-3.7853m

21:41 Cable exposed on surface
ROV Pos:Lat: 43° 13.82310 N Long: 124° 39.52260 W KP: 8076.76296
Depth: 146.831m Burial: cm DOL:-3.4640m

21:43 Cable back into burial
ROV Pos:Lat: 43° 13.82440 N Long: 124° 39.50910 W KP: 8076.78139
Depth: 146.826m Burial: 15.00cm DOL:-0.9340m

21:59 Cable exposed on Surface
ROV Pos:Lat: 43° 13.83570 N Long: 124° 39.38190 W KP: 8076.95487
Depth: 146.480m Burial: cm DOL:-3.4518m

22:00 Cable back into burial
ROV Pos:Lat: 43° 13.83810 N Long: 124° 39.36100 W KP: 8076.98349
Depth: 146.309m Burial: 29.00cm DOL:-4.2792m

22:10 Cable exposed on the surface
ROV Pos:Lat: 43° 13.84430 N Long: 124° 39.28600 W KP: 8077.08568
Depth: 145.732m Burial: cm DOL:-4.9098m

22:13 Cable back into burial
ROV Pos:Lat: 43° 13.84550 N Long: 124° 39.26850 W KP: 8077.10948
Depth: 145.509m Burial: 17.00cm DOL:-5.2137m

22:16 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.84680 N Long: 124° 39.25650 W KP: 8077.12590
Depth: 145.258m Burial: 4.00cm DOL:-4.6121m

22:19 Cable exposed on Surface
ROV Pos:Lat: 43° 13.84880 N Long: 124° 39.23290 W KP: 8077.15806
Depth: 144.671m Burial: cm DOL:-5.3890m

22:20 Cable exposed on Surface
ROV Pos:Lat: 43° 13.85050 N Long: 124° 39.22400 W KP: 8077.17039
Depth: 144.553m Burial: cm DOL:-5.5278m

22:21 Cable exposed on Surface
ROV Pos:Lat: 43° 13.85010 N Long: 124° 39.21710 W KP: 8077.17958
Depth: 144.460m Burial: cm DOL:-5.1625m

22:22 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.85090 N Long: 124° 39.21290 W KP: 8077.18540
Depth: 144.375m Burial: cm DOL:-4.9556m

22:28 Cable back into burial
ROV Pos:Lat: 43° 13.85600 N Long: 124° 39.15200 W KP: 8077.26840
Depth: 143.617m Burial: 24.00cm DOL:-5.2601m

22:30 Cable exposed on surface

ROV Pos:Lat: 43° 13.85680 N Long: 124° 39.14150 W KP: 8077.28269
Depth: 143.598m Burial: cm DOL:-4.9107m

22:30 Cable exposed on surface
ROV Pos:Lat: 43° 13.85690 N Long: 124° 39.14071 W KP: 8077.28378
Depth: 143.617m Burial: 14.00cm DOL:-4.6736m

22:30 Cable back into burial
ROV Pos:Lat: 43° 13.85730 N Long: 124° 39.13590 W KP: 8077.29033
Depth: 143.538m Burial: 22.00cm DOL:-4.5938m

22:32 Cable exposed on surface
ROV Pos:Lat: 43° 13.85900 N Long: 124° 39.11730 W KP: 8077.31571
Depth: 143.453m Burial: 11.00cm DOL:-5.8135m

22:35 Cable back into burial
ROV Pos:Lat: 43° 13.86060 N Long: 124° 39.09760 W KP: 8077.34254
Depth: 143.315m Burial: 15.00cm DOL:-5.3186m

22:53 Cable Position Fix - burial depth > 20cm
ROV Pos:Lat: 43° 13.87330 N Long: 124° 38.93671 W KP: 8077.56164
Depth: 142.108m Burial: 24.00cm DOL:-3.8779m

23:09 ROV tracking around boulder
ROV Pos:Lat: 43° 13.88490 N Long: 124° 38.80090 W KP: 8077.74675
Depth: 141.422m Burial: cm DOL:-3.8035m

23:32 Cable Position Fix
ROV Pos:Lat: 43° 13.90050 N Long: 124° 38.60140 W KP: 8078.01838
Depth: 139.387m Burial: 42.00cm DOL:0.4715m

23:38 Cable Position Fix
ROV Pos:Lat: 43° 13.90080 N Long: 124° 38.60170 W KP: 8078.01804
Depth: 139.367m Burial: 41.00cm DOL:-1.8925m

23:43 Cable exposed on surface
ROV Pos:Lat: 43° 13.90230 N Long: 124° 38.57080 W KP: 8078.05992
Depth: 138.957m Burial: 7.00cm DOL:0.7024m

23:45 Cable back into burial
ROV Pos:Lat: 43° 13.90310 N Long: 124° 38.56270 W KP: 8078.07098
Depth: 138.991m Burial: 14.00cm DOL:0.4425m

23:46 Cable exposed on surface
ROV Pos:Lat: 43° 13.90320 N Long: 124° 38.55250 W KP: 8078.08472
Depth: 138.898m Burial: 8.00cm DOL:2.3328m

23:49 Cable back into Burial
ROV Pos:Lat: 43° 13.90410 N Long: 124° 38.53380 W KP: 8078.11006
Depth: 138.429m Burial: 10.00cm DOL:2.9255m

23:50 Cable exposed on surface
ROV Pos:Lat: 43° 13.90510 N Long: 124° 38.53180 W KP: 8078.11296
Depth: 138.436m Burial: 6.00cm DOL:3.0990m

23:56 Cable back into burial
ROV Pos:Lat: 43° 13.90760 N Long: 124° 38.48870 W KP: 8078.17197
Depth: 137.643m Burial: 15.00cm DOL:4.3350m

23:59 ROV continues with survey at inshore location of Segment N9
Pos:Lat: 43° 13.90680 N Long: 124° 38.47840 W KP: 8078.18598

Tuesday 20th August 2013

00:00 ROV continues with survey at inshore location of Segment N9
Pos:Lat: 43° 13.90680 N Long: 124° 38.47840 W KP: 8078.18598

00:02 Cable exposed on surface
ROV Pos:Lat: 43° 13.90840 N Long: 124° 38.45680 W KP: 8078.21506
Depth: 137.247m Burial: 13.00cm DOL:-0.2840m

00:03 Cable back into burial
ROV Pos:Lat: 43° 13.90950 N Long: 124° 38.45060 W KP: 8078.22335
Depth: 136.890m Burial: 17.00cm DOL:-0.9674m

00:04 Cable exposed on surface
ROV Pos:Lat: 43° 13.90880 N Long: 124° 38.44190 W KP: 8078.23517
Depth: 136.811m Burial: 7.00cm DOL:-1.5518m

00:08 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.90960 N Long: 124° 38.40390 W KP: 8078.28651
Depth: 135.240m Burial: cm DOL:-5.5004m

00:12 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.90980 N Long: 124° 38.37020 W KP: 8078.33207
Depth: 134.356m Burial: 0.00cm DOL:-9.2848m

00:18 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.90790 N Long: 124° 38.31790 W KP: 8078.40296
Depth: 131.995m Burial: cm DOL:-7.7015m

00:26 Cable back into burial
ROV Pos:Lat: 43° 13.90580 N Long: 124° 38.26910 W KP: 8078.46914
Depth: 132.615m Burial: 9.00cm DOL:-10.1005m

00:28 Cable back into burial
ROV Pos:Lat: 43° 13.90550 N Long: 124° 38.25690 W KP: 8078.48567
Depth: 132.614m Burial: 6.00cm DOL:-8.6482m

00:35 Cable intermittent suspensions
ROV Pos:Lat: 43° 13.90380 N Long: 124° 38.20650 W KP: 8078.55398
Depth: 130.187m Burial: cm DOL:-8.2971m

00:38 Cable back into burial
ROV Pos:Lat: 43° 13.90340 N Long: 124° 38.18800 W KP: 8078.57903
Depth: 130.754m Burial: 9.00cm DOL:-8.6864m

00:38 Cable exposed on surface
ROV Pos:Lat: 43° 13.90300 N Long: 124° 38.18530 W KP: 8078.58272
Depth: 130.814m Burial: cm DOL:-6.8443m

00:42 Cable on surface and under tension around rock
ROV Pos:Lat: 43° 13.90130 N Long: 124° 38.16001 W KP: 8078.61707
Depth: 128.031m Burial: cm DOL:-5.5132m

00:49 Cable exposed on surface
ROV Pos:Lat: 43° 13.89970 N Long: 124° 38.11070 W KP: 8078.68389
Depth: 129.448m Burial: cm DOL:-6.3508m

01:03 Cable exposed on surface
ROV Pos:Lat: 43° 13.89750 N Long: 124° 38.04600 W KP: 8078.77159
Depth: 129.065m Burial: cm DOL:-6.5045m

01:10 Cable exposed on surface
ROV Pos:Lat: 43° 13.89600 N Long: 124° 38.01811 W KP: 8078.80944
Depth: 126.837m Burial: cm DOL:-5.2895m

01:20 Cable exposed on surface
ROV Pos:Lat: 43° 13.89430 N Long: 124° 37.97110 W KP: 8078.87316
Depth: 127.871m Burial: cm DOL:-3.4206m

01:22 Cable suspended > 1.00m
ROV Pos:Lat: 43° 13.89340 N Long: 124° 37.95600 W KP: 8078.89366
Depth: 124.472m Burial: cm DOL:-3.8641m

01:29 Cable exposed on surface
ROV Pos:Lat: 43° 13.89160 N Long: 124° 37.90400 W KP: 8078.96413
Depth: 126.507m Burial: cm DOL:-3.7811m

01:34 Cable suspension over a large boulder
ROV Pos:Lat: 43° 13.89090 N Long: 124° 37.88400 W KP: 8078.99125
Depth: 124.472m Burial: cm DOL:-4.3408m

01:41 Cable continues to be suspended
ROV Pos:Lat: 43° 13.88910 N Long: 124° 37.83720 W KP: 8079.05470
Depth: 124.412m Burial: cm DOL:-2.3981m

01:43 Cable back into burial
ROV Pos:Lat: 43° 13.88860 N Long: 124° 37.82180 W KP: 8079.07556
Depth: 126.190m Burial: 6.00cm DOL:-4.3240m

01:50 Cable exposed on surface
ROV Pos:Lat: 43° 13.88680 N Long: 124° 37.77830 W KP: 8079.13455
Depth: 126.230m Burial: cm DOL:-2.6254m

01:51 Cable back into burial
ROV Pos:Lat: 43° 13.88670 N Long: 124° 37.76940 W KP: 8079.14660
Depth: 126.065m Burial: 6.00cm DOL:-3.2954m

01:52 Cable exposed on surface
ROV Pos:Lat: 43° 13.88660 N Long: 124° 37.76650 W KP: 8079.15053
Depth: 126.058m Burial: cm DOL:-3.2770m

01:57 Cable suspended over rocks
ROV Pos:Lat: 43° 13.88500 N Long: 124° 37.74030 W KP: 8079.18610
Depth: 123.443m Burial: cm DOL:-2.0803m

02:00 Cable suspended > 1.00m
ROV Pos:Lat: 43° 13.88530 N Long: 124° 37.72220 W KP: 8079.21055
Depth: 119.994m Burial: cm DOL:-2.6642m

02:05 Cable back into burial
CRP Pos:Lat: 43° 13.88320 N Long: 124° 37.69120 W KP: 8079.25265
ROV Pos:Lat: 43° 13.88210 N Long: 124° 37.68020 W KP: 8079.26762
Depth: 124.800m Burial: 10.00cm DOL:-1.5883m

02:11 Cable exposed on surface
ROV Pos:Lat: 43° 13.88180 N Long: 124° 37.64310 W KP: 8079.31783
Depth: 124.707m Burial: cm DOL:-2.3052m

02:12 Cable suspended over rocks
ROV Pos:Lat: 43° 13.88130 N Long: 124° 37.62980 W KP: 8079.33586
Depth: 121.033m Burial: cm DOL:-0.4256m

02:16 Cable back into burial
ROV Pos:Lat: 43° 13.88050 N Long: 124° 37.59950 W KP: 8079.37690
Depth: 123.969m Burial: 6.00cm DOL:-1.0081m

02:24 Cable suspended over rocks
ROV Pos:Lat: 43° 13.87920 N Long: 124° 37.55350 W KP: 8079.43923
Depth: 121.467m Burial: cm DOL:-2.0608m

02:28 Cable suspended over rocks
ROV Pos:Lat: 43° 13.87810 N Long: 124° 37.50990 W KP: 8079.49830
Depth: 120.783m Burial: cm DOL:-2.6306m

02:34 Cable exposed on surface
ROV Pos:Lat: 43° 13.87580 N Long: 124° 37.45340 W KP: 8079.57490
Depth: 119.795m Burial: cm DOL:-1.6568m

02:43 Cable suspended over rocks
ROV Pos:Lat: 43° 13.87130 N Long: 124° 37.35500 W KP: 8079.70837
Depth: 119.216m Burial: cm DOL:0.5944m

02:45 Cable exposed on surface
ROV Pos:Lat: 43° 13.87110 N Long: 124° 37.33570 W KP: 8079.73449
Depth: 119.690m Burial: cm DOL:-0.9290m

02:53 Cable suspended over rocks
ROV Pos:Lat: 43° 13.86800 N Long: 124° 37.25080 W KP: 8079.84958
Depth: 117.268m Burial: cm DOL:-0.3011m

02:55 Cable in large suspension over rocks
ROV Pos:Lat: 43° 13.86740 N Long: 124° 37.22110 W KP: 8079.88980
Depth: 114.440m Burial: cm DOL:-0.6647m

02:57 Cable suspended over rocks
ROV Pos:Lat: 43° 13.86570 N Long: 124° 37.18810 W KP: 8079.93458
Depth: 114.644m Burial: cm DOL:-0.1373m

03:03 Cable suspended over rocks
ROV Pos:Lat: 43° 13.86380 N Long: 124° 37.12650 W KP: 8080.01805
Depth: 114.756m Burial: cm DOL:0.6172m

03:08 Cable suspended over rocks
ROV Pos:Lat: 43° 13.86170 N Long: 124° 37.06810 W KP: 8080.09721
Depth: 111.225m Burial: cm DOL:0.3226m

03:10 Cable back into burial
ROV Pos:Lat: 43° 13.86040 N Long: 124° 37.03620 W KP: 8080.14047
Depth: 113.670m Burial: cm DOL:0.9462m

03:18 Cable in suspension over large rock
ROV Pos:Lat: 43° 13.85600 N Long: 124° 36.93980 W KP: 8080.27122
Depth: 112.586m Burial: cm DOL:0.2040m

03:20 Cable suspended over rocks
ROV Pos:Lat: 43° 13.85540 N Long: 124° 36.90990 W KP: 8080.31171
Depth: 110.239m Burial: cm DOL:1.4922m

03:29 Cable suspended over rocks
ROV Pos:Lat: 43° 13.85210 N Long: 124° 36.81030 W KP: 8080.44670
Depth: 109.326m Burial: cm DOL:1.3105m

03:38 Cable back into burial
ROV Pos:Lat: 43° 13.84850 N Long: 124° 36.69750 W KP: 8080.59957
Depth: 112.053m Burial: cm DOL:1.6603m

03:41 Cable exposed on surface
ROV Pos:Lat: 43° 13.84700 N Long: 124° 36.65060 W KP: 8080.66312
Depth: 111.764m Burial: cm DOL:0.8653m

03:43 Cable suspended over rocks
ROV Pos:Lat: 43° 13.84690 N Long: 124° 36.63650 W KP: 8080.68220
Depth: 111.875m Burial: cm DOL:0.9142m

03:44 Cable exposed on surface
ROV Pos:Lat: 43° 13.84610 N Long: 124° 36.61660 W KP: 8080.70919
Depth: 111.618m Burial: cm DOL:-0.5232m

03:46 Cable suspended over rocks
ROV Pos:Lat: 43° 13.84550 N Long: 124° 36.59310 W KP: 8080.74103
Depth: 109.976m Burial: cm DOL:0.4479m

03:51 Cable back into burial
ROV Pos:Lat: 43° 13.84410 N Long: 124° 36.54420 W KP: 8080.80728
Depth: 112.546m Burial: 7.00cm DOL:1.2443m

03:54 Cable exposed on surface
ROV Pos:Lat: 43° 13.84290 N Long: 124° 36.51800 W KP: 8080.84281
Depth: 112.039m Burial: cm DOL:-0.7351m

04:04 Cable suspended over rocks
ROV Pos:Lat: 43° 13.84000 N Long: 124° 36.42790 W KP: 8080.96492
Depth: 108.254m Burial: cm DOL:0.0762m

04:09 Cable in suspension over large rocks
ROV Pos:Lat: 43° 13.83940 N Long: 124° 36.37900 W KP: 8081.03111
Depth: 109.009m Burial: cm DOL:-1.4872m

04:11 Cable exposed on surface
ROV Pos:Lat: 43° 13.83770 N Long: 124° 36.35800 W KP: 8081.05966
Depth: 111.178m Burial: cm DOL:0.5747m

04:21 Cable suspended over rocks
ROV Pos:Lat: 43° 13.83400 N Long: 124° 36.28210 W KP: 8081.16263
Depth: 109.659m Burial: cm DOL:1.1295m

04:28 Cable suspension over rocks
ROV Pos:Lat: 43° 13.83300 N Long: 124° 36.22820 W KP: 8081.23561
Depth: 106.368m Burial: cm DOL:1.1638m

04:36 Cable exposed on surface
ROV Pos:Lat: 43° 13.83020 N Long: 124° 36.14590 W KP: 8081.34716
Depth: 107.234m Burial: cm DOL:0.0842m

04:36 Cable in suspension over rocks
ROV Pos:Lat: 43° 13.82980 N Long: 124° 36.13820 W KP: 8081.35760
Depth: 107.294m Burial: cm DOL:0.8653m

04:48 Cable exposed on surface
ROV Pos:Lat: 43° 13.82640 N Long: 124° 36.03410 W KP: 8081.49869
Depth: 106.328m Burial: cm DOL:3.3179m

04:55 Cable suspended over rocks
ROV Pos:Lat: 43° 13.82650 N Long: 124° 35.97070 W KP: 8081.58444
Depth: 104.358m Burial: cm DOL:1.2917m

05:03 Cable in suspension over large rocks
ROV Pos:Lat: 43° 13.82150 N Long: 124° 35.89110 W KP: 8081.69252
Depth: 101.653m Burial: cm DOL:2.4501m

05:08 Cable exposed on rocky surface
ROV Pos:Lat: 43° 13.81890 N Long: 124° 35.84490 W KP: 8081.75522
Depth: 100.524m Burial: cm DOL:2.7039m

05:29 Cable exposed on rocky surface
ROV Pos:Lat: 43° 13.81150 N Long: 124° 35.61400 W KP: 8082.06814
Depth: 93.612m Burial: cm DOL:-0.1277m

05:32 Cable suspended over rocks
ROV Pos:Lat: 43° 13.81070 N Long: 124° 35.57480 W KP: 8082.12123
Depth: 94.294m Burial: cm DOL:2.0884m

05:49 Cable suspended over rocks
ROV Pos:Lat: 43° 13.80450 N Long: 124° 35.38960 W KP: 8082.37224
Depth: 94.332m Burial: cm DOL:-0.7403m

05:54 All stopped to recover ROV due to deteriorating weather conditions – Winds gusting 35knots and seas to 3m and forecasted to increase
ROV Pos:Lat: 43° 13.80280 N Long: 124° 35.34220 W KP: 8082.43649
Depth: 87.511m Burial: cm DOL:-1.6207m

05:59 ROV – commence recovery

06:02 ROV at surface

06:07 **ROV on deck – end of CH-US SN9 Dive #3**

06:09 Vessel commenced weather downtime – commenced slow speed stooging pattern
Pos:Lat: 43° 13.80300 N Long: 124° 35.34010 W KP: 8082.43932

12:00 Vessel continues weather downtime – slow speed stooging pattern at CWG
Pos:Lat: 43° 13.20 N Long: 124° 36.75 W

16:00 Vessel continues weather downtime – slow speed stooging pattern at CWG
Pos:Lat: 43° 13.87 N Long: 124° 35.30 W

20:00 Vessel continues weather downtime – slow speed stooging pattern at CWG
Pos:Lat: 43° 11.71 N Long: 124° 35.95 W

23:59 Vessel continues weather downtime – slow speed stooging pattern at CWG
Pos:Lat: 43° 15.27 N Long: 124° 34.84 W

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00:00 Vessel continues weather downtime – slow speed stooging pattern at CWG
Pos:Lat: 43° 15.27 N Long: 124° 34.84 W

13:43 Vessel in position for ROV launch – End of weather downtime
Pos:Lat: 43° 13.82810 N Long: 124° 35.38320 W KP: 8082.37893

13:47 **ROV off deck – CH-US SN9 – Dive #5**

13:56 ROV at surface

14:02 ROV on bottom – area of numerous rocks
ROV Pos:Lat: 43° 13.82740 N Long: 124° 35.38580 W KP: 8082.37547
Depth: 3.045m Burial: cm DOL:-41.8885m

14:09 ROV lifting clear of rocks and commenced move to position for resumption of survey
ROV Pos:Lat: 43° 13.82670 N Long: 124° 35.38570 W KP: 8082.37567
Depth: 97.751m Burial: cm DOL:-40.3759m

14:19 **ROV - resume survey of segment N9 heading east inshore**
ROV Pos:Lat: 43° 13.80400 N Long: 124° 35.37120 W KP: 8082.39717
Depth: 95.581m Burial: 10.00cm DOL:-0.6225m

14:22 Cable exposed on seabed
ROV Pos:Lat: 43° 13.80310 N Long: 124° 35.35090 W KP: 8082.42470
Depth: 94.119m Burial: cm DOL:0.8550m

14:38 Cable Position Fix - cable shallow self burial
ROV Pos:Lat: 43° 13.79840 N Long: 124° 35.20930 W KP: 8082.61662
Depth: 94.764m Burial: 6.00cm DOL:2.0351m

14:39 Cable exposed on seabed
ROV Pos:Lat: 43° 13.79820 N Long: 124° 35.20000 W KP: 8082.62921
Depth: 94.339m Burial: cm DOL:1.3165m

14:41 Cable suspended over rocks
ROV Pos:Lat: 43° 13.79760 N Long: 124° 35.17880 W KP: 8082.65793
Depth: 93.633m Burial: cm DOL:1.2935m

14:43 Cable suspended over rocks
ROV Pos:Lat: 43° 13.79710 N Long: 124° 35.16520 W KP: 8082.67637
Depth: 93.803m Burial: -39.00cm DOL:1.8255m

14:44 Cable exposed on seabed
ROV Pos:Lat: 43° 13.79690 N Long: 124° 35.15560 W KP: 8082.68938
Depth: 93.810m Burial: cm DOL:2.1120m

14:46 Cable suspended over rocks
ROV Pos:Lat: 43° 13.79610 N Long: 124° 35.14120 W KP: 8082.70892
Depth: 93.785m Burial: cm DOL:1.9126m

14:49 ROV visual of wire rope on seabed away from cable
ROV Pos:Lat: 43° 13.79520 N Long: 124° 35.11090 W KP: 8082.74998
Depth: 93.206m Burial: 1.00cm DOL:1.7625m

14:59 ROV visual of wire rope on seabed away from cable
ROV Pos:Lat: 43° 13.79160 N Long: 124° 35.01910 W KP: 8082.87444
Depth: 92.549m Burial: cm DOL:1.7444m

15:18 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.78480 N Long: 124° 34.83370 W KP: 8083.12578
Depth: 92.879m Burial: cm DOL:3.3247m

15:20 Cable suspended over rocks
ROV Pos:Lat: 43° 13.78480 N Long: 124° 34.81410 W KP: 8083.15229
Depth: 91.483m Burial: cm DOL:2.4047m

15:34 Cable suspended over rocks
ROV Pos:Lat: 43° 13.78030 N Long: 124° 34.67390 W KP: 8083.34229
Depth: 90.410m Burial: cm DOL:1.9274m

15:40 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.77830 N Long: 124° 34.60400 W KP: 8083.43700
Depth: 90.708m Burial: cm DOL:3.9992m

15:49 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.77540 N Long: 124° 34.52900 W KP: 8083.53868
Depth: 89.497m Burial: cm DOL:5.3889m

15:56 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.77340 N Long: 124° 34.48190 W KP: 8083.60256
Depth: 88.958m Burial: cm DOL:6.9718m

16:03 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.77140 N Long: 124° 34.41950 W KP: 8083.68713
Depth: 87.236m Burial: cm DOL:5.7195m

16:06 Cable exposed on seabed
ROV Pos:Lat: 43° 13.77030 N Long: 124° 34.39410 W KP: 8083.72158
Depth: 87.165m Burial: cm DOL:5.8066m

16:09 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.76870 N Long: 124° 34.35520 W KP: 8083.77432
Depth: 87.088m Burial: cm DOL:7.0603m

16:13 Cable suspended over rocks >30cm
ROV Pos:Lat: 43° 13.76780 N Long: 124° 34.31810 W KP: 8083.82458
Depth: 85.914m Burial: cm DOL:5.4528m

16:14 Cable exposed on seabed
ROV Pos:Lat: 43° 13.76710 N Long: 124° 34.30210 W KP: 8083.84628
Depth: 82.395m Burial: cm DOL:7.2711m

16:20 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.76500 N Long: 124° 34.25200 W KP: 8083.91422
Depth: 82.207m Burial: cm DOL:7.9884m

16:23 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.76440 N Long: 124° 34.22330 W KP: 8083.95308
Depth: 82.743m Burial: cm DOL:5.3737m

16:30 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.76070 N Long: 124° 34.14430 W KP: 8084.06025
Depth: 81.720m Burial: m DOL:7.3488m

16:33 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.76030 N Long: 124° 34.11060 W KP: 8084.10587
Depth: 82.810m Burial: cm DOL:6.6261m

16:43 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.75660 N Long: 124° 33.99240 W KP: 8084.26605
Depth: 83.960m Burial: cm DOL:7.6522m

16:49 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.75450 N Long: 124° 33.91900 W KP: 8084.36550
Depth: 81.063m Burial: cm DOL:7.1815m

16:58 Cable Position Fix - large rock outcrop adjacent to cable
ROV Pos:Lat: 43° 13.75060 N Long: 124° 33.80170 W KP: 8084.52448
Depth: 78.266m Burial: cm DOL:6.8065m

17:11 Cable exposed on seabed
ROV Pos:Lat: 43° 13.74450 N Long: 124° 33.67610 W KP: 8084.69487
Depth: 75.254m Burial: cm DOL:10.1873m

17:24 Cable exposed on seabed
ROV Pos:Lat: 43° 13.73920 N Long: 124° 33.54110 W KP: 8084.87792
Depth: 79.291m Burial: cm DOL:12.1724m

17:28 Cable suspended over rocks >50cm
ROV Pos:Lat: 43° 13.73800 N Long: 124° 33.50190 W KP: 8084.93104
Depth: 77.784m Burial: cm DOL:11.8400m

17:42 Cable suspended
ROV Pos:Lat: 43° 13.73330 N Long: 124° 33.35720 W KP: 8085.12715
Depth: 77.138m Burial: cm DOL:11.8501m

17:53 Cable continues to be suspended
ROV Pos:Lat: 43° 13.73010 N Long: 124° 33.24170 W KP: 8085.28364
Depth: 78.619m Burial: cm DOL:9.3033m

18:07 Cable exposed on seabed
ROV Pos:Lat: 43° 13.72450 N Long: 124° 33.08290 W KP: 8085.49890
Depth: 77.263m Burial: cm DOL:10.9481m

18:10 Cable in suspension over large rock
ROV Pos:Lat: 43° 13.72380 N Long: 124° 33.05930 W KP: 8085.53088
Depth: 76.246m Burial: cm DOL:11.6694m

18:22 Cable in suspension over large rock
ROV Pos:Lat: 43° 13.71890 N Long: 124° 32.92470 W KP: 8085.71335
Depth: 75.327m Burial: cm DOL:11.1122m

18:38 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.71320 N Long: 124° 32.76090 W KP: 8085.93538
Depth: 70.499m Burial: cm DOL:12.9223m

18:57 Cable in suspension over sea bed ridge
ROV Pos:Lat: 43° 13.70780 N Long: 124° 32.55940 W KP: 8086.20837
Depth: 67.777m Burial: cm DOL:10.4730m

19:13 Cable suspended between large rocks
ROV Pos:Lat: 43° 13.70260 N Long: 124° 32.39690 W KP: 8086.42860
Depth: 68.278m Burial:cm DOL:9.8019m

19:15 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 13.70140 N Long: 124° 32.37070 W KP: 8086.46414
Depth: 67.816m Burial: cm DOL:10.2725m

19:17 ROV off cable line over seabed depression
ROV Pos:Lat: 43° 13.70270 N Long: 124° 32.35340 W KP: 8086.48743
Depth: 68.415m Burial: cm DOL:10.9695m

19:19 Seabed depression > 80m and 20m in length
ROV Pos:Lat: 43° 13.70070 N Long: 124° 32.33490 W KP: 8086.51263
Depth: 68.102m Burial: cm DOL:9.3975m

19:22 ROV back on the cable line – exposed on seabed
ROV Pos:Lat: 43° 13.70040 N Long: 124° 32.32920 W KP: 8086.52036
Depth: 73.567m Burial: cm DOL:9.9648m

19:31 Cable suspended over rocks

	ROV Pos:Lat: 43° 13.69770 N	Long: 124° 32.25960 W	KP: 8086.61473	
	Depth: 73.613m	Burial: cm	DOL:11.7742m	
19:32	ROV visual of wire rope on seabed over cable line			
	ROV Pos:Lat: 43° 13.69740 N	Long: 124° 32.24820 W	KP: 8086.63017	
	Depth: 73.320m	Burial: cm	DOL:10.2634m	
19:45	Cable exposed over Rocky ground			
	ROV Pos:Lat: 43° 13.69470 N	Long: 124° 32.11170 W	KP: 8086.81503	
	Depth: 76.813m	Burial: cm	DOL:8.3999m	
20:24	Cable intermittent suspensions over rocks			
	ROV Pos:Lat: 43° 13.71730 N	Long: 124° 31.68260 W	KP: 8087.39761	
	Depth: 72.479m	Burial: cm	DOL:12.5816m	
20:26	ROV off the cable line to move around seabed obstacle			
	ROV Pos:Lat: 43° 13.71970 N	Long: 124° 31.66250 W	KP: 8087.42517	
	Depth: 66.534m	Burial: cm	DOL:11.2536m	
20:28	ROV back on cable line			
	ROV Pos:Lat: 43° 13.72040 N	Long: 124° 31.64800 W	KP: 8087.44482	
	Depth: 66.853m	Burial: cm	DOL:12.8719m	
20:32	Cable suspended over rocks > 100cm			
	ROV Pos:Lat: 43° 13.72440 N	Long: 124° 31.59740 W	KP: 8087.51371	
	Depth: 68.578m	Burial: cm	DOL:14.4035m	
20:42	ROV flying over seabed depression – cable suspended			
	ROV Pos:Lat: 43° 13.73670 N	Long: 124° 31.49600 W	KP: 8087.65277	
	Depth: 69.489m	Burial: cm	DOL:13.9199m	
20:44	ROV flying over seabed depression – cable suspended			
	ROV Pos:Lat: 43° 13.74110 N	Long: 124° 31.45950 W	KP: 8087.70282	
	Depth: 70.877m	Burial: cm	DOL:5.7589m	
20:45	Cable exposed on seabed - touch down onto series of seabed ridges			
	ROV Pos:Lat: 43° 13.74320 N	Long: 124° 31.43780 W	KP: 8087.73245	
	Depth: 68.207m	Burial: cm	DOL:1.2169m	
20:56	Cable intermittent suspensions over rocks			
	ROV Pos:Lat: 43° 13.75670 N	Long: 124° 31.25540 W	KP: 8087.98061	
	Depth: 71.108m	Burial: cm	DOL:8.1784m	
20:58	Cable exposed on seabed			
	ROV Pos:Lat: 43° 13.75850 N	Long: 124° 31.23250 W	KP: 8088.01179	
	Depth: 64.525m	Burial: cm	DOL:11.2637m	
21:02	ROV flying over seabed depression – cable suspended			
	ROV Pos:Lat: 43° 13.76480 N	Long: 124° 31.17570 W	KP: 8088.08955	
	Depth: 63.489m	Burial: cm	DOL:9.6016m	
21:04	Cable exposed on seabed			
	ROV Pos:Lat: 43° 13.76660 N	Long: 124° 31.15550 W	KP: 8088.11710	
	Depth: 65.515m	Burial: cm	DOL:10.5755m	
21:07	Cable intermittent suspensions over rocks			
	ROV Pos:Lat: 43° 13.76800 N	Long: 124° 31.13830 W	KP: 8088.14053	
	Depth: 65.594m	Burial: cm	DOL:11.0420m	
21:10	Cable exposed on seabed			
	ROV Pos:Lat: 43° 13.76960 N	Long: 124° 31.11570 W	KP: 8088.17126	

Depth: 64.485m Burial: cm DOL:10.4842m

21:15 Cable suspended over rocks > 100cm
ROV Pos:Lat: 43° 13.77340 N Long: 124° 31.07420 W KP: 8088.22788
Depth: 67.403m Burial: cm DOL:11.1064m

21:20 Cable intermittent suspensions over seabed ridges
ROV Pos:Lat: 43° 13.77650 N Long: 124° 31.04010 W KP: 8088.27442
Depth: 65.350m Burial: cm DOL:11.5226m

21:29 Cable intermittent suspensions over seabed ridges
ROV Pos:Lat: 43° 13.78250 N Long: 124° 30.97340 W KP: 8088.36540
Depth: 68.618m Burial: cm DOL:11.2160m

21:30 Cable exposed on seabed
ROV Pos:Lat: 43° 13.78440 N Long: 124° 30.96190 W KP: 8088.38129
Depth: 65.898m Burial: cm DOL:11.1158m

21:35 Cable suspended
ROV Pos:Lat: 43° 13.78700 N Long: 124° 30.93180 W KP: 8088.42233
Depth: 66.855m Burial: cm DOL:10.0981m

21:36 Cable exposed on seabed
ROV Pos:Lat: 43° 13.78810 N Long: 124° 30.92190 W KP: 8088.43588
Depth: 66.545m Burial: cm DOL:10.3553m

21:50 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.79900 N Long: 124° 30.82500 W KP: 8088.56857
Depth: 65.778m Burial: cm DOL:6.3508m

22:09 Cable suspended over rocks > 100cm
ROV Pos:Lat: 43° 13.81760 N Long: 124° 30.68750 W KP: 8088.75799
Depth: 63.198m Burial: cm DOL:-1.7561m

22:17 Cable suspended over rocks > 100cm
ROV Pos:Lat: 43° 13.82620 N Long: 124° 30.63390 W KP: 8088.83192
Depth: 66.485m Burial: cm DOL:5.0332m

22:26 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 13.83870 N Long: 124° 30.57570 W KP: 8088.91401
Depth: 62.782m Burial: cm DOL:8.8241m

22:28 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 13.84280 N Long: 124° 30.55880 W KP: 8088.93811
Depth: 62.261m Burial: cm DOL:9.9156m

22:46 Cable on seabed under rock
ROV Pos:Lat: 43° 13.87000 N Long: 124° 30.44930 W KP: 8089.09467
Depth: 65.039m Burial: cm DOL:6.9206m

22:50 Cable suspended going up over a large boulder
ROV Pos:Lat: 43° 13.87540 N Long: 124° 30.42690 W KP: 8089.12661
Depth: 61.786m Burial: cm DOL:7.0361m

22:53 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 13.88030 N Long: 124° 30.40700 W KP: 8089.15504
Depth: 61.918m Burial: cm DOL:6.2513m

23:06 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 13.90390 N Long: 124° 30.31950 W KP: 8089.28122

Depth: 61.489m Burial: cm DOL:3.4863m

23:22 Cable on seabed under rock
ROV Pos:Lat: 43° 13.93390 N Long: 124° 30.18230 W KP: 8089.47504
Depth: 58.627m Burial: cm DOL:7.5160m

23:27 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 13.94280 N Long: 124° 30.14200 W KP: 8089.53202
Depth: 58.515m Burial: cm DOL:8.9854m

23:35 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 13.96020 N Long: 124° 30.07190 W KP: 8089.63224
Depth: 58.752m Burial: cm DOL:7.6644m

23:40 Cable on seabed under rock
ROV Pos:Lat: 43° 13.96930 N Long: 124° 30.03100 W KP: 8089.69011
Depth: 63.297m Burial: cm DOL:8.2964m

23:59 ROV continues survey of N9 heading east inshore
Pos:Lat: 43° 14.00 N Long: 124° 29.87 W KP: 8089.90545

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00:00 ROV continues survey of N9 heading east inshore
Pos:Lat: 43° 14.00 N Long: 124° 29.87 W KP: 8089.90545

00:16 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 14.04180 N Long: 124° 29.73690 W KP: 8090.11029
Depth: 59.544m Burial: cm DOL:5.1976m

00:31 Cable suspended over rocks > 100cm
ROV Pos:Lat: 43° 14.07040 N Long: 124° 29.62140 W KP: 8090.27537
Depth: 58.317m Burial: cm DOL:3.2124m

00:48 Cable on seabed under rock
ROV Pos:Lat: 43° 14.10410 N Long: 124° 29.49410 W KP: 8090.45882
Depth: 59.412m Burial: cm DOL:-3.0081m

00:59 Cable suspended over rocks > 100cm
ROV Pos:Lat: 43° 14.12990 N Long: 124° 29.41260 W KP: 8090.57889
Depth: 57.269m Burial: cm DOL:4.6244m

01:05 Cable suspended over rocks > 150cm
ROV Pos:Lat: 43° 14.14270 N Long: 124° 29.37380 W KP: 8090.63647
Depth: 57.473m Burial: cm DOL:6.7309m

01:11 Cable suspended over rocks > 200cm
ROV Pos:Lat: 43° 14.15610 N Long: 124° 29.33220 W KP: 8090.69796
Depth: 54.356m Burial: cm DOL:9.9166m

01:23 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 14.18800 N Long: 124° 29.25290 W KP: 8090.82037
Depth: 55.799m Burial: cm DOL:5.2878m

02:23 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 14.40060 N Long: 124° 28.67090 W KP: 8091.70113
Depth: 54.541m Burial: cm DOL:3.5721m

02:54 Cable suspended over rocks > 150cm
ROV Pos:Lat: 43° 14.51850 N Long: 124° 28.34620 W KP: 8092.19190
Depth: 53.817m Burial: m DOL:4.5664m

03:03 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 14.55460 N Long: 124° 28.25300 W KP: 8092.33463
Depth: 50.398m Burial: cm DOL:0.8110m

03:42 Cable suspended over rocks > 50cm
ROV Pos:Lat: 43° 14.69780 N Long: 124° 27.85880 W KP: 8092.93048
Depth: 46.890m Burial: cm DOL:0.5084m

04:11 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 14.80200 N Long: 124° 27.56680 W KP: 8093.37030
Depth: 44.462m Burial: cm DOL:1.7570m

04:34 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 14.88370 N Long: 124° 27.34600 W KP: 8093.70525
Depth: 48.640m Burial: cm DOL:-0.7161m

04:49 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 14.94250 N Long: 124° 27.18390 W KP: 8093.95019
Depth: 48.969m Burial: cm DOL:0.1510m

05:00 Cable suspended over rocks > 150cm
ROV Pos:Lat: 43° 14.98080 N Long: 124° 27.07580 W KP: 8094.11278
Depth: 46.843m Burial: cm DOL:0.6089m

05:04 Cable suspended over rocks > 150cm
ROV Pos:Lat: 43° 14.99630 N Long: 124° 27.03540 W KP: 8094.17452
Depth: 43.534m Burial: cm DOL:-0.8190m

05:07 Cable suspended over rocks > 190cm
ROV Pos:Lat: 43° 15.00670 N Long: 124° 27.00720 W KP: 8094.21727
Depth: 41.528m Burial: cm DOL:-0.5656m

05:12 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 15.02430 N Long: 124° 26.96190 W KP: 8094.28668
Depth: 41.831m Burial: cm DOL:-2.1134m

05:18 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 15.04560 N Long: 124° 26.90480 W KP: 8094.37344
Depth: 38.642m Burial: cm DOL:-3.4907m

05:19 ROV flying over seabed depression – cable suspended
ROV Pos:Lat: 43° 15.04790 N Long: 124° 26.89880 W KP: 8094.38260
Depth: 38.412m Burial: cm DOL:-3.2396m

05:23 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 15.06420 N Long: 124° 26.85760 W KP: 8094.44598
Depth: 39.805m Burial: cm DOL:-5.0871m

05:28 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 15.08270 N Long: 124° 26.80470 W KP: 8094.52534
Depth: 37.065m Burial: cm DOL:-5.0747m

05:35 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 15.10190 N Long: 124° 26.74350 W KP: 8094.61534
Depth: 37.058m Burial: cm DOL:-2.1746m

05:52 ROV visual - cable action creating a groove into the rock surface
ROV Pos:Lat: 43° 15.16390 N Long: 124° 26.58310 W KP: 8094.86083
Depth: 35.908m Burial: cm DOL:-5.3728m

06:06 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 15.20990 N Long: 124° 26.45230 W KP: 8095.05727
Depth: 37.314m Burial: cm DOL:-3.3157m

06:21 Cable intermittent suspensions over rocks
ROV Pos:Lat: 43° 15.26530 N Long: 124° 26.29930 W KP: 8095.28836
Depth: 32.801m Burial: cm DOL:-3.6164m

06:29 Cable suspended over rocks > 200cm
ROV Pos:Lat: 43° 15.29120 N Long: 124° 26.22340 W KP: 8095.40169
Depth: 38.812m Burial: cm DOL:-0.5584m

06:49 Cable Position Fix
ROV Pos:Lat: 43° 15.34610 N Long: 124° 26.01730 W KP: 8095.70004
Depth: 40.344m Burial: 53.00cm DOL:-5.2427m

07:33 Cable Position Fix
ROV Pos:Lat: 43° 15.42380 N Long: 124° 25.58150 W KP: 8096.30713
Depth: 35.199m Burial: 72.00cm DOL:-7.2405m

07:41 Cable Position Fix
ROV Pos:Lat: 43° 15.43510 N Long: 124° 25.49510 W KP: 8096.42570
Depth: 33.984m Burial: 55.00cm DOL:-0.1293m

07:46 ROV at A/C
ROV Pos:Lat: 43° 15.44030 N Long: 124° 25.44680 W KP: 8096.49341
Depth: 33.269m Burial: 15.00cm DOL:5.8405m

07:55 ROV approaching repair Final bight location
ROV Pos:Lat: 43° 15.44350 N Long: 124° 25.37700 W KP: 8096.58768
Depth: 32.356m Burial: 17.00cm DOL:-5.2539m

07:57 ROV at start of final bight
ROV Pos:Lat: 43° 15.43920 N Long: 124° 25.37120 W KP: 8096.59574
Depth: 32.336m Burial: 16.00cm DOL:-1.8180m

07:57 Cable Position Fix
ROV Pos:Lat: 43° 15.43710 N Long: 124° 25.37000 W KP: 8096.59747
Depth: 32.270m Burial: 8.00cm DOL:0.7253m

07:59 Cable Position Fix
ROV Pos:Lat: 43° 15.43270 N Long: 124° 25.36730 W KP: 8096.60135
Depth: 32.205m Burial: 8.00cm DOL:7.4002m

08:00 Cable Position Fix
ROV Pos:Lat: 43° 15.42820 N Long: 124° 25.36600 W KP: 8096.60334
Depth: 32.100m Burial: 6.00cm DOL:16.0517m

08:02 Cable Position Fix
ROV Pos:Lat: 43° 15.42180 N Long: 124° 25.36410 W KP: 8096.60623
Depth: 32.126m Burial: 4.00cm DOL:28.1425m

08:05 Cable Position Fix
ROV Pos:Lat: 43° 15.41210 N Long: 124° 25.36210 W KP: 8096.60943
Depth: 31.968m Burial: 1.00cm DOL:45.8191m

08:08 Cable Position Fix
ROV Pos:Lat: 43° 15.40150 N Long: 124° 25.35960 W KP: 8096.61335
Depth: 31.955m Burial: 2.00cm DOL:64.2585m

08:11 Cable Position Fix

ROV Pos:Lat: 43° 15.39120 N Long: 124° 25.35720 W KP: 8096.61711
Depth: 31.804m Burial: 12.00cm DOL:83.2013m

08:11 ROV approaching crown of bight – loss of cable tone track
ROV Pos:Lat: 43° 15.39010 N Long: 124° 25.35660 W KP: 8096.61798
Depth: 31.876m Burial: cm DOL:86.1516m

08:42 ROV unable to relocate cable - Heading north to pick up cable line
ROV Pos:Lat: 43° 15.38310 N Long: 124° 25.35340 W KP: 8096.62266
Depth: 31.954m Burial: cm DOL:106.2679m

09:00 ROV located cable
ROV Pos:Lat: 43° 15.44480 N Long: 124° 25.30040 W KP: 8096.69124
Depth: 32.052m Burial: 43.00cm DOL:-5.0059m

09:02 ROV moving off west back towards final bight
ROV Pos:Lat: 43° 15.44620 N Long: 124° 25.30580 W KP: 8096.68386
Depth: 32.098m Burial: 34.00cm DOL:-7.4785m

09:03 Cable Position Fix
ROV Pos:Lat: 43° 15.44700 N Long: 124° 25.31260 W KP: 8096.67463
Depth: 32.138m Burial: 35.00cm DOL:-8.1008m

09:05 Cable Position Fix
ROV Pos:Lat: 43° 15.44860 N Long: 124° 25.32510 W KP: 8096.65764
Depth: 32.249m Burial: 15.00cm DOL:-9.7122m

09:06 Cable Position Fix
ROV Pos:Lat: 43° 15.44830 N Long: 124° 25.32580 W KP: 8096.65670
Depth: 32.170m Burial: 51.00cm DOL:-9.8642m

09:07 Cable Position Fix
ROV Pos:Lat: 43° 15.44830 N Long: 124° 25.33450 W KP: 8096.64493
Depth: 32.275m Burial: 15.00cm DOL:-9.9646m

09:09 Cable Position Fix
ROV Pos:Lat: 43° 15.44820 N Long: 124° 25.34800 W KP: 8096.62668
Depth: 32.499m Burial: 27.00cm DOL:-9.6330m

09:10 Cable Position Fix
ROV Pos:Lat: 43° 15.44660 N Long: 124° 25.35390 W KP: 8096.61878
Depth: 32.492m Burial: 26.00cm DOL:-10.0483m

09:10 ROV at start of final bight
ROV Pos:Lat: 43° 15.44550 N Long: 124° 25.35630 W KP: 8096.61559
Depth: 32.538m Burial: 24.00cm DOL:-8.8529m

09:11 Cable Position Fix
ROV Pos:Lat: 43° 15.44270 N Long: 124° 25.35930 W KP: 8096.61167
Depth: 32.590m Burial: 25.00cm DOL:-6.3249m

09:12 Cable Position Fix
ROV Pos:Lat: 43° 15.43400 N Long: 124° 25.36090 W KP: 8096.60994
Depth: 32.623m Burial: 19.00cm DOL:2.9738m

09:13 Cable Position Fix
ROV Pos:Lat: 43° 15.43170 N Long: 124° 25.36070 W KP: 8096.61033
Depth: 32.558m Burial: 15.00cm DOL:5.7834m

09:14 Cable Position Fix

ROV Pos:Lat: 43° 15.42390 N Long: 124° 25.36070 W KP: 8096.61072
Depth: 32.538m Burial: 10.00cm DOL:18.9473m

09:14 Cable Position Fix
ROV Pos:Lat: 43° 15.42180 N Long: 124° 25.36070 W KP: 8096.61083
Depth: 32.439m Burial: 22.00cm DOL:23.9449m

09:16 Cable Position Fix
ROV Pos:Lat: 43° 15.41340 N Long: 124° 25.35910 W KP: 8096.61342
Depth: 32.439m Burial: 3.00cm DOL:41.1511m

09:17 Cable Position Fix
ROV Pos:Lat: 43° 15.40680 N Long: 124° 25.35830 W KP: 8096.61483
Depth: 32.282m Burial: -18.00cm DOL:52.9714m

09:18 Cable Position Fix
ROV Pos:Lat: 43° 15.40000 N Long: 124° 25.35550 W KP: 8096.61897
Depth: 32.387m Burial: 28.00cm DOL:62.1781m

09:19 Cable Position Fix
ROV Pos:Lat: 43° 15.39370 N Long: 124° 25.35500 W KP: 8096.61996
Depth: 32.275m Burial: 4.00cm DOL:77.4856m

09:22 Cable Position Fix – ROV heading back east inshore
ROV Pos:Lat: 43° 15.39380 N Long: 124° 25.35460 W KP: 8096.62050
Depth: 32.328m Burial: cm DOL:93.5148m

09:33 Cable Position Fix
ROV Pos:Lat: 43° 15.43540 N Long: 124° 25.36110 W KP: 8096.60960
Depth: 32.866m Burial: 18.00cm DOL:26.6100m

09:37 Cable Position Fix
ROV Pos:Lat: 43° 15.44910 N Long: 124° 25.34310 W KP: 8096.63326
Depth: 32.715m Burial: 18.00cm DOL:-9.3233m

09:44 Cable Position Fix
ROV Pos:Lat: 43° 15.44580 N Long: 124° 25.28810 W KP: 8096.70783
Depth: 32.498m Burial: 13.00cm DOL:-9.6365m

09:49 ROV off bottom
ROV Pos:Lat: 43° 15.44270 N Long: 124° 25.25640 W KP: 8096.75088
Depth: 33.070m Burial: 31.00cm DOL:-4.4579m

09:52 Cable intermittent suspensions
ROV Pos:Lat: 43° 15.44060 N Long: 124° 25.24230 W KP: 8096.77006
Depth: 30.516m Burial: cm DOL:-2.0544m

09:57 Cable into burial
ROV Pos:Lat: 43° 15.43090 N Long: 124° 25.20480 W KP: 8096.82128
Depth: 31.173m Burial: 6.00cm DOL:12.6420m

10:20 Cable Position Fix
ROV Pos:Lat: 43° 15.41700 N Long: 124° 25.01800 W KP: 8097.07941
Depth: 24.986m Burial: 34.00cm DOL:11.6440m

10:24 Cable Position Fix
ROV Pos:Lat: 43° 15.41200 N Long: 124° 24.97880 W KP: 8097.13313
Depth: 27.216m Burial: 8.00cm DOL:9.3005m

10:33 Cable Position Fix
ROV Pos:Lat: 43° 15.40170 N Long: 124° 24.89720 W KP: 8097.24491

Depth: 25.957m Burial: 8.00cm DOL:1.2781m

10:48 Cable Position Fix
ROV Pos:Lat: 43° 15.37610 N Long: 124° 24.77080 W KP: 8097.42235
Depth: 23.944m Burial: 38.00cm DOL:5.1575m

11:00 ROV at inshore cable bight - start
ROV Pos:Lat: 43° 15.40940 N Long: 124° 24.74990 W KP: 8097.43499
Depth: 23.846m Burial: 12.00cm DOL:-52.6206m

11:13 ROV at crown of bight
ROV Pos:Lat: 43° 15.45130 N Long: 124° 24.73770 W KP: 8097.43239
Depth: 23.792m Burial: 58.00cm DOL:-139.4704m

11:17 Cable Position Fix
ROV Pos:Lat: 43° 15.44160 N Long: 124° 24.73340 W KP: 8097.44235
Depth: 23.753m Burial: 17.00cm DOL:-132.8608m

11:28 Cable Position Fix
ROV Pos:Lat: 43° 15.40320 N Long: 124° 24.71160 W KP: 8097.48807
Depth: 23.509m Burial: 19.00cm DOL:-73.0191m

11:36 ROV at inshore cable bight - end
ROV Pos:Lat: 43° 15.36820 N Long: 124° 24.67270 W KP: 8097.55474
Depth: 23.004m Burial: 19.00cm DOL:-26.6018m

11:53 ROV moving around rocks
ROV Pos:Lat: 43° 15.34550 N Long: 124° 24.55790 W KP: 8097.71565
Depth: 21.667m Burial: 19.00cm DOL:-9.7080m

12:01 ROV at large rock face
ROV Pos:Lat: 43° 15.34610 N Long: 124° 24.53250 W KP: 8097.74876
Depth: 18.017m Burial: cm DOL:-17.0308m

12:10 Cable intermittent suspensions
ROV Pos:Lat: 43° 15.34980 N Long: 124° 24.49090 W KP: 8097.80176
Depth: 19.969m Burial: cm DOL:-41.7239m

12:21 Cable intermittent suspensions
ROV Pos:Lat: 43° 15.32270 N Long: 124° 24.42810 W KP: 8097.89632
Depth: 19.563m Burial: cm DOL:-12.4796m

12:23 Cable intermittent suspensions
ROV Pos:Lat: 43° 15.32330 N Long: 124° 24.43240 W KP: 8097.89040
Depth: 19.169m Burial: cm DOL:-13.4616m

12:25 Cable Position Fix
ROV Pos:Lat: 43° 15.32200 N Long: 124° 24.42520 W KP: 8097.90044
Depth: 19.628m Burial: cm DOL:-13.0495m

12:29 End of survey – Vessel completed all survey operations for China – US. Vessel released from cable ground by AT&T cable owner representative
ROV Pos:Lat: 43° 15.32010 N Long: 124° 24.41300 W KP: 8097.91731
Depth: 15.410m Burial: cm DOL:-13.8686m

12:31 ROV - commenced recovery
ROV Pos:Lat: 43° 15.32020 N Long: 124° 24.41320 W KP: 8097.91701
Depth: 14.499m Burial: cm DOL:-13.2778m

12:32 ROV at surface

12:38 **ROV on deck – end of CH-US SN9 Dive #5**

12:44 **Vessel commenced transit to Coos bay for US clearance and disembarkation of client representatives**
Pos:Lat: 43° 15.41460 N Long: 124° 24.46400 W

13:00 PSM sent to Banadon CLS requesting removal of In-Service tone from China – US Segments E1 & N9

13:25 PSM received from Bandon CLS confirming In-Service tone has been removed from E1 & N9

15:13 Transfer boat *Captain Harold* alongside – starboard side – personnel transfers by pilot ladder

15:24 Transfer boat *Captain Harold* away – personnel transfers completed

15:31 Vessel stooging awaiting US clearance before departure

17:24 Vessel received US clearance

Completed clearance at Coos Bay, Oregon and commenced passage to Victoria, BC, Canada

17:30 Vessel FAOP - passage to Victoria, BC, Canada
Pos:Lat: 43° 29.80 N Long: 124° 27.00 W

23:59 Vessel continues passage to Victoria, BC, Canada
Pos:Lat: 44° 29.94 N Long: 124° 48.07 W

Friday 23rd August 2013

00:00 Vessel continued passage to Victoria, BC, Canada
Pos:Lat: 44° 29.94 N Long: 124° 48.07 W

23:59 Vessel continued passage to Victoria, BC, Canada
Pos:Lat: 48° 20.60 N Long: 125° 64.60 W

Saturday 24th August 2013

00:00 Vessel continued passage to Victoria, BC, Canada
Pos:Lat: 48° 20.60 N Long: 125° 64.60 W

09:00 **End of Passage – 368.36nm – 39.5hrs, average speed 9.32knots**
Pos:Lat: 48° 15.70 N Long: 123° 26.30 W

10:00 Pilot on board

10:33 Vessel – let go anchor at Royal Roads anchorage, Victoria, BC, Canada
Pos:Lat: 48° 24.90 N Long: 123° 26.24 W

10:48 Pilot away

23:59 Vessel at anchor Royal Roads anchorage, Victoria, BC, Canada
– awaiting berth at Ogden point, Victoria

Sunday 25th August 2013

00:00 Vessel at anchor Royal Roads anchorage, Victoria, BC, Canada
– awaiting berth at Ogden point, Victoria

06:00 Commenced preparations for transit to Ogden point, Victoria

07:39 Commenced weighing anchor

07:56 Pilot on board

08:08 Anchor sighted and clear – Commenced transit to Ogden Point, Victoria

08:37 First line ashore

09:00 Vessel all fast alongside Ogden Point, Victoria – Pilot away

End of Reporting

9.0 Notices & Permits

There was no ‘Notice to Mariners’ required for the whole operation.

Navigational warning broadcast by the BSCC representatives were on VHF Channel 16 if the need arose due to a build-up of small fishing vessels.

10.0 Incident Reports

No incident reports were generated during this operation.

11.0 Waivers and Concessions

None.

12.0 Performance DMOQ

Oregon Burial Verification Survey 2013 – Phase 2			
Description	**Performance Requirements**	**Performance**	**Comments**
Time to mobilize Cable ship and sail for a Repair operation	24 Hours from receipt of call	**DMOQ N/A**	
Average economic transit speed of Cable ship passage to Repair location	Average economic transit speed sailed of no less than 12 knots	**DMOQ Achieved** Average economic transit speed: 13.14knts	Total distance travelled on passage: 210.3nm in 16hrs, average speed 13.14knts
Time to complete a cable Repair operation	112 hours for an operation in water depth greater than 15 meters but less than 1000 meters 160 hours for an operation in water depth greater than 1000 meters but less than 3000m 200 hours for an operation in water depth greater than 3000 meters	**DMOQ N/A**	
Time to commence a cable load operation	Commence loading the necessary spare submersible plant , required for the Repair, onto the Cable ship within 12hrs from receipt of notification for the Cable ship from the relevant Maintenance Authority	**DMOQ N/A**	
Cable Loading Operation	Load LW or LWP type cable at minimum average speed of 5 km per hour and load armour cable at minimum average speed of 3 km per hour	**DMOQ N/A**	
Vessel Predicted Fuel Use	Vessel fuel consumption shall be within 10% of Service Provider's estimate for: *Economic Transit speed @ 12 kts or greater *During cable working operations operations	**DMOQ Achieved** Consumption Figures: On passage:17.2MT/day On CWG: 12.13MT/day In Port: 2.5MT/day	Predicted Consumption Figures: On passage = 27 MT/day. On CWG = 15 MT/day. In port = 5 MT/day
ROV Availability	22 hours per 24 hours of operation to be accumulated * NAZ survey operation only	**DMOQ Achieved** ROV Available 23.46hrs/day	Total ROV combined operation time = 192.26hrs (8.01 days) Total ROV non-operational time = 4.35hrs (0.18 days) ROV downtime: General maintenance

Vessel Availability	The vessel's downtime shall not exceed 2% of the total operational time that prevents the vessel from performing cable Repair operations.	**DMOQ Achieved**	No Vessel downtime
Time to issue Synopsis Report after operation	1 week from the completion of the Repair	**DMOQ Achieved** Draft report issued: 29/08/13	Draft report due: 29/08/13
Time to issue Completion Report after the operation	1 month from the completion of the Repair	**DMOQ Achieved** Final report issued: 20/09/2013	Final Report Due: 21/09/13

13.0 Survey Documentation

13.1 Survey Area and Navigation Software

The following were entered into the survey software to form the project navigational database:

- Coordinate System.

- Latest issue RPL of the proposed cable routes for:
  TPE Segment 3P2
  Northstar Segment 1
  Southern Cross Segment F
  AKORN Segment 2
  China – US Segment E1
  China – US Segment N9

GMSL integrated navigation and data acquisition software, Navigator, was used for the 'on-line' navigation and survey.

Data is logged continuously into set log file formats. Each log file (Event or ProjectLog) simultaneously records data, referenced with a fix number and time stamp, at a user defined logging interval. Data is extracted, processed and archived using GMSL off-line processing software Post processing Tool (PPT).

GMS Navigator Ver 2.3.1..7424

GMS PPT Ver 1.27.12.223

The Navigator software .ini file was modified to accept the following subsea survey equipment:

Item Comments

Profilers Tritech Sea King Profiler ST205 - Serial Number: 1216.59345 (SVOC005324) Sea King Profiler ST207 1216.95001 (SVOC005323)
Bathy Tritech Seaking Bathy 704/20
Gyro Tritech Intelligent Gyro Compass
Altimeter Tritech PA500
TSS 340/350 V1.1. Using 350 only.
Barometer Vaisala PTB220
Tidal Data C-Tides, C&C Technologies

Log files were then checked to ensure data was recorded and readable.

On passage to the work site, a ROV wet trial was completed. A log file was run and post-processed, confirming that all sensor data had been logged correctly

13.2 Primary Navigation

Primary navigation was provided by 2 in No. C-Nav3050 integrated C-Nav/RTK Extend Receivers providing decimetre-level position accuracy. C-Nav3050 provides 66-channel tracking, including multi-constellation support for GPS, and GLONASS.

- 66-channel combined GPS/GNSS/L-band receiver provides decimeter, precise point positioning accuracy worldwide between 72°N and 72°S.

- Multi-constellation support and tracks GPS, GLONASS, C-Nav, other SBAS (WAAS/EGNOS) signals, and accepts external RTCM input.

The C-Nav® Corrections Service is a global system for the distribution of dynamic DGNSS Precise Point Positioning corrections, giving the user the ability to position anywhere in the world with exceptional reliability and unprecedented accuracy of better than 10 cm (4 inches). The differential GNSS corrections are broadcast via Inmarsat geostationary satellites, thus the user needs no local reference stations or post-processing to get this exceptional accuracy. The worldwide coverage of the geostationary satellites delivers a consistent high level of accuracy virtually anywhere from 72° N to 72° S latitude.

C-Tides

C-Tides consists of a software application combining the exceptional real-time accuracy of C-Nav with the latest in advanced ocean and coastal models to deliver Mean Sea Surface (MSS) elevation in real-time.

C-Tides Online Features Include:

- Real-time elevation filter
- Vessel offsets and dynamic aiding option
- Comprehensive plots of:
- Real-time Mean Sea Surface (MSS) elevation
- Real-time VORF elevations
- Variable draft corrections

13.3 Heading Sensor

Heading information was provided by the vessel's Sperry Marine Navigat X Mk 1 Gyro Compass.

13.4 Acoustic Tracking

Acoustic tracking of the ROV was accomplished using a Sonardyne 900 Series HPR system. The ROV was fitted with a responder for primary use, and 3 transponders for backup purposes. The sound velocities for transducer depth, mean water column and seabed were measured continuously by the CSD unit onboard the ROV and by a manually cast unit, daily from the ship. These values were then entered into the Sonardyne HPR unit at the start of the ROV dives.

13.5 Navigation Software

GMSL Navigator Integrated Navigation software, as part of the GMSL CLARITY system, was used on the vessel for offshore positioning and survey requirements. The system consisted of networked PCs, with all data being backed up daily onto the processing computer (offline) and also onto removable media.

Data was extracted, processed and archived from this system by the offline computer without interrupting the normal navigation cycle. Processed data files/burial graphs etc where forwarded to GMSL Charting Dept to enable the final report and charts to be drawn up.

13.6 Mobilisation

Interfacing of the Sonardyne HPR system, Simrad EA600 echo sounder, Navigat Gyro Compass and the Navslack network was tested and found to be operational. A 19" rack unit houses two Shuttle Glamor PCs, which were used to run the Navigator and NavPPT software. The PCs were interfaced to the sensors via the rack unit's built-in DIN rail, with Digiboard interface cards installed in each of the computers. All vessel offsets were measured, and the Navigator software configured for ROV and survey operations.

Trials & Calibrations

Prior to sailing, equipment checks were carried out to confirm operational status. The navigation computers were powered up and operated on test routines, including outputs to graphics monitors on the bridge. The C-Nav 3050 receivers were powered up, their operational status confirmed and a 'health check' carried out. A gyro calibration was conducted with the vessel alongside a known reference azimuth. The primary and backup logging computers were tested to ensure the correct log files were being generated and stored correctly.

Navigation Systems Performance

Throughout the operation both DGPS systems were continuously monitored, with the position difference between them displayed on the online Navigator monitor.

13.7 Navigation Parameters

The following geodetic parameters were used throughout the survey operations:

SPHEROIDAL PARAMETERS	
Ellipsoid	WGS 84
Datum	WGS 84
Semi-Major Axis	6378137m
Reciprocal Flattening	298.2572235634
Eccentricity	0.006694380
Grid Projection Parameters	
Grid Projection	Universal Transverse Mercator (UTM) Zone 10N
Central Meridian	123° West
False Northing	0
False Easting	500000
Unit	International metres

13.8 Communications Settings

Configuration & Unit	Computer & Comm Port	Baud rate	Data Bit	Stop Bits	Parity
GPS 1 Input C-Nav 3050 DGPS	OPS1 Port 4	19200	8	1	none
GPS 1 Input C-Nav 3050 DGPS	OPS2 Port 3	19200	8	1	none
Gyro 1 Input Navigat 2	OPS1 Port 6	4800	8	1	none
Gyro 1 Input Navigat 2	OPS2 Port 6	4800	8	1	none
Depth Sounder input Kongsberg EA600	OPS1 Port 7	9600	8	1	none
USBL Simrad 900 Series	OPS1 Port 9	9600	8	1	none
Cable tracker TSS350 V1.1	ROV Port 4	9600	8	1	none
Profiler (Sonar) Tritech Seaking 4367.72843	ROV Port 10	9600	8	1	none
Bathymetry Unit Tritech Seaking Bathy 704/20	ROV Port 9	9600	8	1	none
Atmospheric Barometer	ROV Port 1	9600	8	1	none

13.9 Vessel and ROV Offsets

Vessel Offsets

X, Y, Z values are measured from the Common Reference Point (CRP) to the offset in accordance with the following convention:

X = Positive to starboard, Y = Positive ahead, Z = Positive upwards

Position	X(m)	Y(m)	Z(m)
CRP	0.000	0.000	0.000
GPS 1 Antenna	-1.400	-2.600	23.500
GPS 2 Antenna	1.400	-2.600	23.500
HPR Pole	-0.870	1.3500	0.000

The CRP was defined as a point on the vessel's centreline 0.87m foreword of the Sonardyne transducer pole, and all offsets are referenced to the CRP (0, 0, 0).

ROV Offsets

The ROV umbilical entry point to the ROV was defined as the CRP of the ROV. The X, Y, Z values are measured from the Common Reference Point (CRP) to the offset in accordance with the following convention:

X = Positive to starboard, Y = Positive ahead, Z = Positive upwards

Position	X(m)	Y(m)	Z(m)
CRP	0.000	0.000	0.000
A11	0.700	1.700	0.000
A22	-0.700	1.700	0.000
A33	-0.900	-1.700	0.000
TSS350	-1.200	1.700	-1.830
Stbd Profiler	0.900	2.200	-0.795
Port Profiler	-0.900	2.200	-0.795
Bathy Unit	-1.350	1.600	-0.59
Altimeter	-1.200	1.500	-2.500
350 Survey Point	0.000	1.600	-2.500

TSS350 fixed coil height = 0.81m

13.10 Measurement Units and Presentation

Dates were quoted in dd.mm.yy format.
Times were quoted in hh.mm.ss format.
Linear measurements were quoted in metres (m) or kilometres (km).
Angular measurements were quoted in degrees (°) and minutes ('), Grid (G) or True (T).
Angular measurements may also be quoted in degrees and decimals.
Route distances were quoted in KP, referenced against the as laid RPL for each cable segment.

14.0 SURVEY CALIBRATION RESULTS

Prior to the ROV survey operations, a series of calibrations and repeatability tests were carried out in order to ensure that survey-relevant equipment was fully operational and working within system-specific accuracies:

14.1 Gyro Calibration

A gyro compass calibration was carried out whilst alongside Nanaimo Cruise terminal. A baseline of 40.5m was established on the quay, at an azimuth of 232.91° and a series of measurements taken from each end of the baseline to the side of the vessel, with the gyrocompass being read simultaneously. The angular offset of the vessel with respect to the quay was then calculated and compared with the known bearing of the quay to derive the compass error.

The calculated heading was then compared with the observed gyro reading. A mean of the resultant C-O values was obtained to give a final C-O which was input into the GMSL Navigator system. Results were as follows:

GYRO CALIBRATION CERTIFICATE

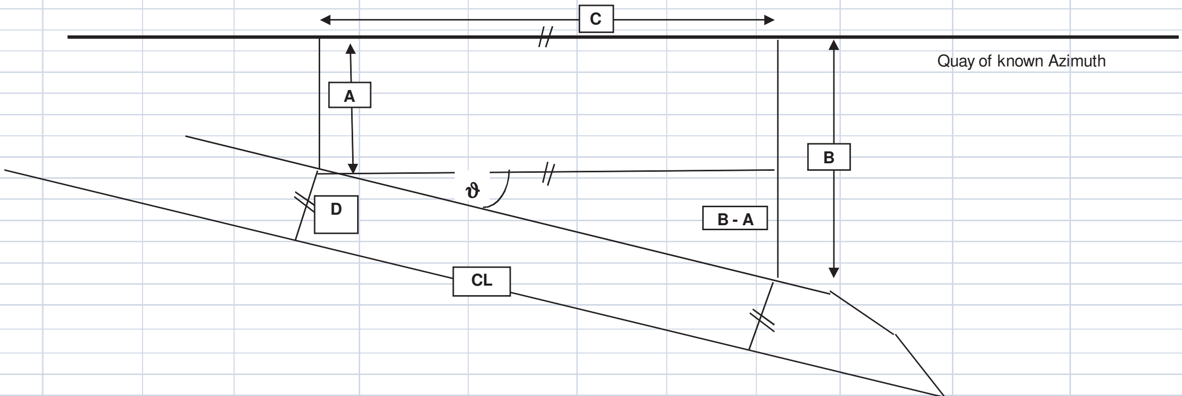
Global Marine Systems

Location: **Nanaimo** **Project:** **NAZ Survey**
Vessel: **Wave Venture** **Gyro:** **Gyro 1**
Date: **29-Jul-13**

Distance between measurements C = 40.50 m
Berth Heading from Land Survey (Island Surveying) = 232.91 degrees

Fix No	Date	Time	Observed GYRO1 Heading	Aft Measurement A	Fore Measurement B	Calculated Radians	Calculated Degrees	Calculated Heading	Calc-Observed	Statistical Check C-O's in range (mean +/- (3 x SD	
73	29/07/2013	14:02:00	232.34	3.50 m	3.46 m	-0.001	-0.057	232.853	0.513	TRUE	0.513
74	29/07/2013	14:02:30	232.34	3.50 m	3.46 m	-0.001	-0.057	232.853	0.513	TRUE	0.513
75	29/07/2013	14:03:00	232.30	3.49 m	3.46 m	-0.001	-0.042	232.868	0.568	TRUE	0.568
76	29/07/2013	14:03:30	232.30	3.49 m	3.46 m	-0.001	-0.042	232.868	0.568	TRUE	0.568
77	29/07/2013	14:04:00	232.34	3.49 m	3.45 m	-0.001	-0.057	232.853	0.513	TRUE	0.513
78	29/07/2013	14:04:30	232.34	3.49 m	3.46 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
79	29/07/2013	14:05:00	232.34	3.49 m	3.46 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
80	29/07/2013	14:05:30	232.30	3.49 m	3.45 m	-0.001	-0.057	232.853	0.553	TRUE	0.553
81	29/07/2013	14:06:00	232.34	3.48 m	3.45 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
82	29/07/2013	14:06:30	232.34	3.48 m	3.45 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
83	29/07/2013	14:07:00	232.34	3.45 m	3.45 m	0.000	0.000	232.910	0.570	TRUE	0.570
84	29/07/2013	14:07:30	232.34	3.48 m	3.46 m	0.000	-0.028	232.882	0.542	TRUE	0.542
85	29/07/2013	14:08:00	232.34	3.49 m	3.46 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
86	29/07/2013	14:08:30	232.34	3.48 m	3.45 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
87	29/07/2013	14:09:00	232.34	3.48 m	3.46 m	0.000	-0.028	232.882	0.542	TRUE	0.542
88	29/07/2013	14:09:30	232.34	3.49 m	3.46 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
89	29/07/2013	14:10:00	232.34	3.48 m	3.46 m	0.000	-0.028	232.882	0.542	TRUE	0.542
90	29/07/2013	14:10:30	232.34	3.50 m	3.46 m	-0.001	-0.057	232.853	0.513	TRUE	0.513
91	29/07/2013	14:11:00	232.34	3.47 m	3.46 m	0.000	-0.014	232.896	0.556	TRUE	0.556
92	29/07/2013	14:11:30	232.34	3.47 m	3.44 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
93	29/07/2013	14:12:00	232.34	3.47 m	3.45 m	0.000	-0.028	232.882	0.542	TRUE	0.542
94	29/07/2013	14:12:30	232.34	3.48 m	3.44 m	-0.001	-0.057	232.853	0.513	TRUE	0.513
95	29/07/2013	14:13:00	232.34	3.48 m	3.46 m	0.000	-0.028	232.882	0.542	TRUE	0.542
96	29/07/2013	14:13:30	232.33	3.48 m	3.45 m	-0.001	-0.042	232.868	0.538	TRUE	0.538
97	29/07/2013	14:14:00	232.34	3.48 m	3.44 m	-0.001	-0.057	232.853	0.513	TRUE	0.513
98	29/07/2013	14:14:30	232.34	3.48 m	3.45 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
99	29/07/2013	14:15:00	232.34	3.47 m	3.45 m	0.000	-0.028	232.882	0.542	TRUE	0.542
100	29/07/2013	14:15:30	232.34	3.47 m	3.44 m	-0.001	-0.042	232.868	0.528	TRUE	0.528
101	29/07/2013	14:16:00	232.39	3.48 m	3.45 m	-0.001	-0.042	232.868	0.478	TRUE	0.478
102	29/07/2013	14:16:30	232.38	3.47 m	3.46 m	0.000	-0.014	232.896	0.516	TRUE	0.516
103	29/07/2013	14:17:00	232.34	3.47 m	3.45 m	0.000	-0.028	232.882	0.542	TRUE	0.542

Mean Calculated - Observed	**0.532°**
Standard Deviation	**0.019**



Calibrated by Paul Saleh & Steve Allen

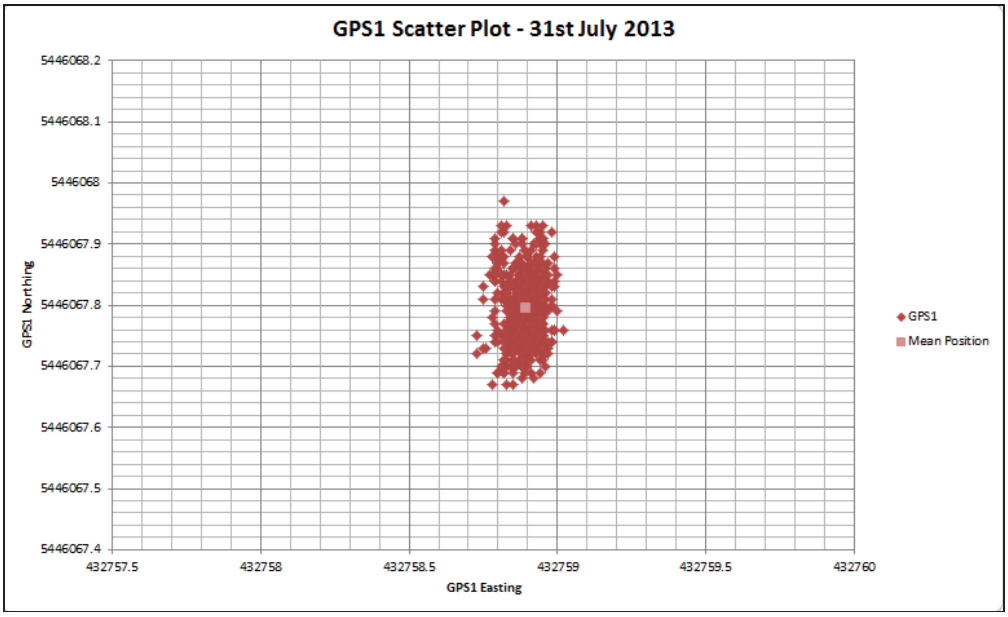
14.2 GPS 1 Verification - Differential with SBAS enabled

Vessel:	Wave Venture
Location:	Nanaimo Cruise Terminal Berth, B.C. Canada
Date:	31st July 2013
Project:	NAZ Cable Inspections

DGPS1 (Port antenna)

Type:	C-Nav 3050
Serial No.:	14850
Differential & Satellite:	SBAS

	Mean Easting (m) at Antenna	Mean Northing (m) at Antenna
GPS1	432758.89	5446067.79

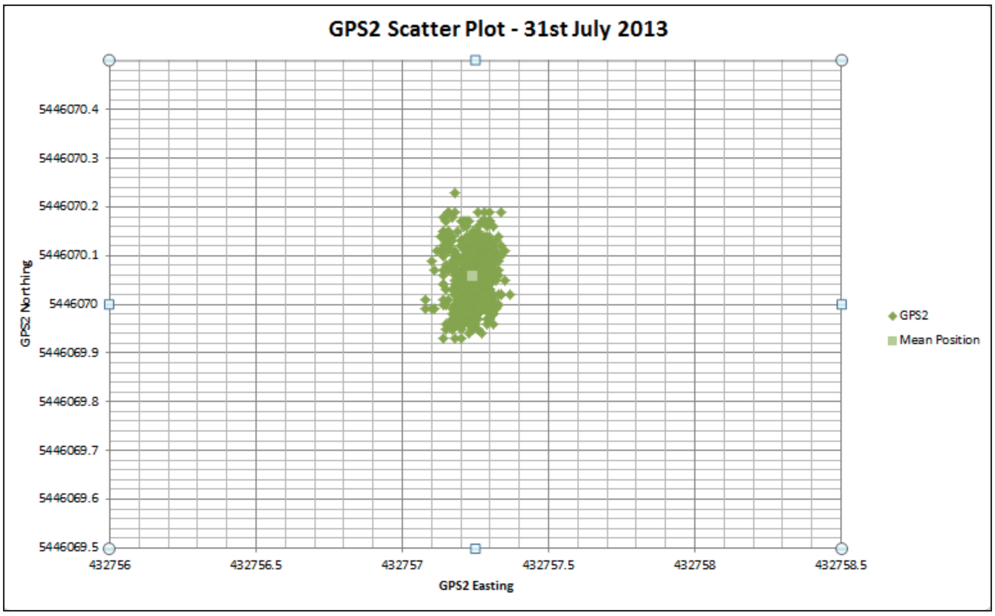


Vessel:	Wave Venture
Location:	Nanaimo Cruise Terminal Berth, B.C. Canada
Date:	31st July 2013
Project:	NAZ Cable Inspections

DGPS2 (Stbd antenna)

Type:	C-Nav 3050
Serial No.:	14840
Differential & Satellite:	SBAS

	Mean Easting (m) at Antenna	Mean Northing (m) at Antenna
GPS2	432757.24	5446070.057



14.3 USBL Calibration

A USBL calibration was carried out onboard CS Wave Venture on 3rd August 2013, Location Lat: 45° 39.5564 N Long: 124° 09.8594 W. A temperature and salinity dip was carried out prior to the USBL calibration and the following results were obtained and input into the vessel's Sonardyne USBL system.

Velocity at USBL head 1478.3 ms-1
Velocity at 50m 1480.4 ms-1
Mean Velocity 1479.3 ms-1

A transponder was then deployed, fixed to a weighted frame to the seabed in order to carry out the calibration. Sonardyne Casius USBL calibration software was used to compute the corrections required to be applied to the Sonardyne system. The following results were obtained:

Mean Velocity 1,479.0 ms-1
Bearing 0.13°
Pitch 0.70°
Roll -1.18°

These corrections were then applied to the Sonardyne HPR system.

CASIUS Calibration Report

Vessel: CS Wave Venture **Device No:** 01327 **Date/Time:** 04 August 2013 13:17:45

Settings:

Initial Estimates for Boxin	
Transceiver depth offset	3.907m
Transceiver depth	9.400m
Antenna starboard offset	-1.400m
Antenna forward offset	-2.600m
Antenna height offset	23.500m

Error Estimates for Boxin	
DGPS lags USBL	0.00s
Range measurement	0.2m
Range gate	3.0m
DGPS position	2.0m
Beacon position	1.0m
Beacon depth	5.0m
Sound velocity	3.0m/s
Transceiver depth	0.5m
Transceiver offset	1.0m

Transceiver & Beacon	
Transceiver Index	-1
Beacon Name	
Turn Around Time	30.0ms

Depth Aiding	
Boresight Angle Limit	22.0°
Depth Difference Limit	1.0m

Transceiver Attitude Calculation Inputs	
Angle Gate	2.0°
Known Heading Correction	n/a

Values Used During Data Collection	
Transceiver Pitch Correction	0.00°
Transceiver Roll Correction	0.00°
Transceiver Heading Correction	0.00°
Sound Velocity	1479.0m/s

Results:

Beacon Boxin	Beacon Eastings	Beacon Northings	Beacon Depth	Sound Velocity	Transceiver Starboard Offset	Transceiver Forward Offset
Before	409298.00m	5056843.00m	105.00m	1479.00m/s	-0.87m	1.35m
Calculated	409298.69m	5056842.09m	105.42m	1478.94m/s	-1.06m	0.89m
Calculated Accuracy	0.12m	0.12m	0.12m	0.91m/s	0.12m	0.12m

Transceiver Attitude	Pitch Correction	Roll Correction	Heading Correction
Before	0.00°	0.00°	0.00°
Calculated	0.70°	-1.18°	0.13°
Calculated Accuracy	0.01°	0.01°	0.04°

Statistics:

	Before CASIUS (distance)	After CASIUS (distance)	Before CASIUS (% depth)	After CASIUS (% depth)
39.4% Beacon Positions (1 sigma)	1.7m	0.8m	1.61	0.78
50.0% Beacon Positions (CEP)	2.0m	1.1m	1.87	1.03
63.2% Beacon Positions (1 Drms)	2.4m	2.0m	2.24	1.88
86.5% Beacon Positions (2 sigma)	2.8m	3.2m	2.63	3.02
98.2% Beacon Positions (2 Drms)	3.5m	9.4m	3.34	8.96

General:

	Beacon Boxin	Transceiver Attitude
Number of Iterations	3	14
Number of Fixes Used	1329	1329
Number Depth Aided		992
Average weighted residuals	0.207	0.262

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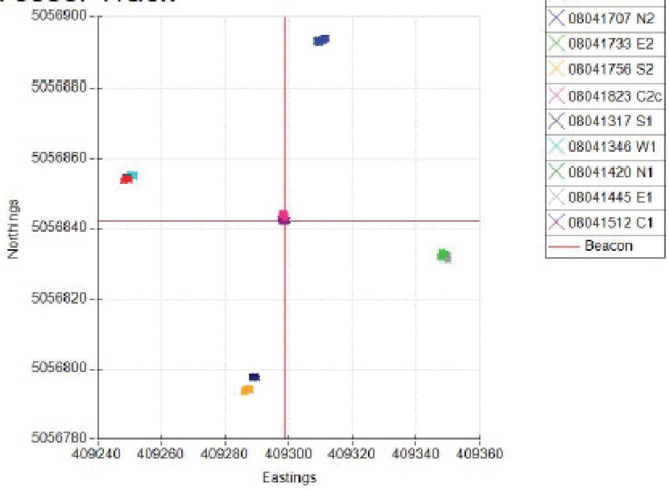
Vessel Track



Data used:

Name	Filename	Start	End	#Acoustic	#Position
08041637 W2	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041637 W2.CSV	04/08/2013 16:37:35	04/08/2013 16:44:34	159	421
08041707 N2	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041707 N2.CSV	04/08/2013 17:07:45	04/08/2013 17:13:05	128	324
08041733 E2	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041733 E2.CSV	04/08/2013 17:33:10	04/08/2013 17:37:09	112	239
08041756 S2	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041756 S2.CSV	04/08/2013 17:56:21	04/08/2013 18:01:21	108	304
08041823 C2c	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041823 C2c.CSV	04/08/2013 18:23:50	04/08/2013 18:26:46	74	179
08041317 S1	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041317 S1.CSV	04/08/2013 13:17:45	04/08/2013 13:23:50	139	371
08041346 W1	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041346 W1.CSV	04/08/2013 13:46:54	04/08/2013 13:52:02	135	309
08041420 N1	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041420 N1.CSV	04/08/2013 14:20:19	04/08/2013 14:25:00	104	285
08041445 E1	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041445 E1.CSV	04/08/2013 14:45:12	04/08/2013 14:50:02	112	296
08041512 C1	C:\Documents and Settings\User\Desktop\HPR Cal Files\08041512 C1.CSV	04/08/2013 15:12:15	04/08/2013 15:23:05	263	653

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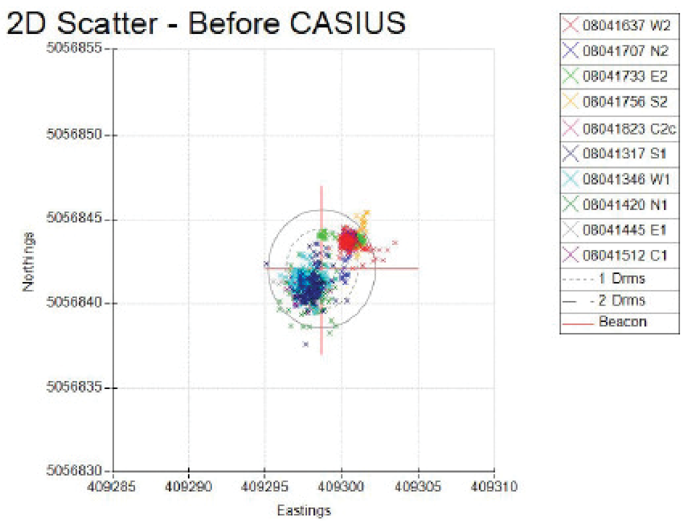

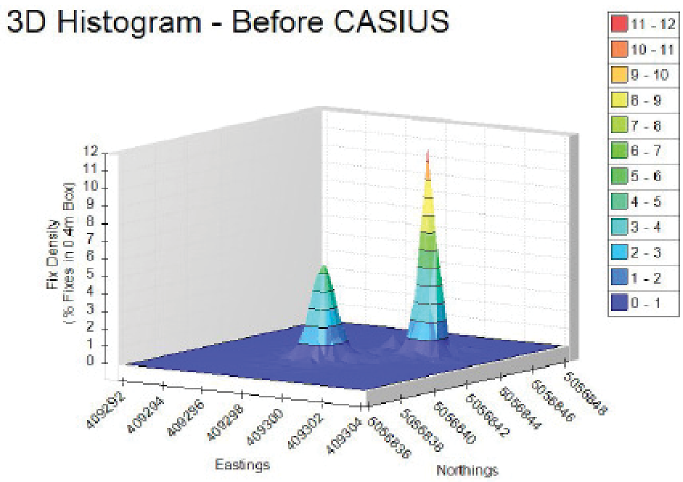

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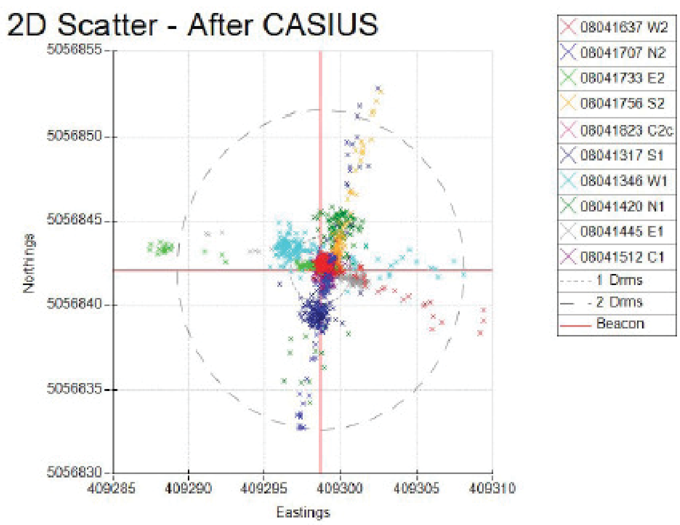

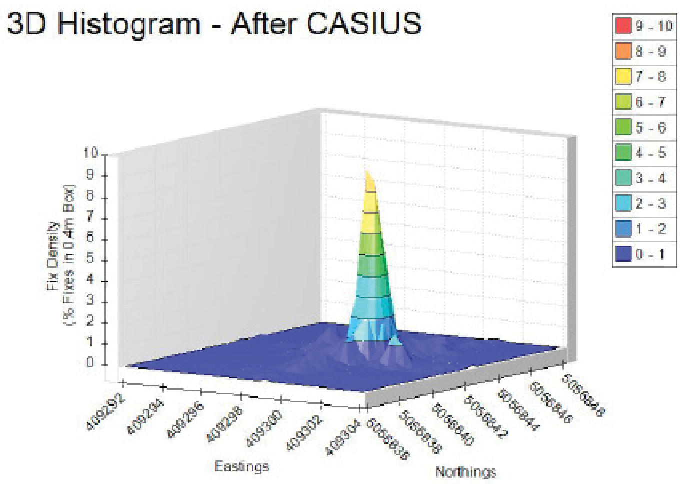

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14.4 Profiler Calibration

To ensure the accuracy of the Super SeaKing scanning profilers mounted on the ROV, the velocity of sound (VOS) through water was automatically calculated, and updated by the bathy unit, utilising its CT probe. Rotational alignment of the profilers was checked by on a flat seabed, to give a horizontal reference. Fine adjustments were then made as required, in order to meet the offset value of profiler head to ROV skid height, measured on deck.

Three profiler offsets were applied as follows:

Measured offset from the ROV centre point to the profiler head (Fwd)	2200 mm
Measured offset laterally from the ROV centre point to the profiler heads	900 mm
Height of profiler heads above the bottom of the skids	1820 mm

The height of the profilers from the bottom of the skids was applied as an offset in the survey suite.

14.5 TSS Survey Equipment

The following offsets and settings were used to set up the TSS cable survey equipment mounted on the ROV:

TSS 350 (active detection system)

- Coil calibration constant for each coil
- Coil separation distance
- Fixed coil height

Tritech Surface Control Unit (SCU)

- Profiler head lateral offset to vehicle centre point (X)
- Profiler head fore/aft offset to vehicle centre point (Y)
- Bathy sensor head height above bottom of skids
- Bathy altimeter height above skids

The following information was also regularly checked and updated in the SCU to ensure best quality data to survey.

- Real time input of barometric pressure to bathy.

The following offsets were input into the survey suite:

- TSS 350 fore/aft distance to vehicle centre point
- TSS 340 fore/aft distance to vehicle centre point
- Profiler fore/aft distance to vehicle centre point
- Profiler height above the bottom of the vehicle skids
- Responder fore/aft distance to vehicle centre point
- Responder lateral offset to vehicle centre point
- Transponder fore/aft distance to vehicle centre point
- Transponder lateral offset to vehicle centre point

TSS 350 Coil Arrangement and Calibration

The TSS 350 coil separation distance - between the centre of the starboard forward coil (SF) and the centre of the port forward coil (PF) – was 285 cm.

The TSS 350 fixed coil height - the distance from the bottom of the ROV skids to the middle of the lateral coils (PL/SL) – was 81 cm.

The above offsets were entered into the TSS Surface Display Console (SDC).

Each of the TSS 350 sensing coils supplied by TSS has a 3-figure serial number and a 5-figure calibration constant stamped on it. These constants have to be input into the SDC to compensate for residual differences between sensing coils.

To prove that the coils were within tolerance, a Calibrated 350 Coil Tester (S/N CT0157) was used on each coil on pre and post dive checks. Their test results were displayed on the SDC screen. The test equipment produced a tone of 25 hertz at a signal strength which generated an output of 1.25V +/- 0.25 volts.

A logging offset of 160 cm was derived from the centre point of the ROV to the middle of the TSS 350 lateral coils.

14.6 Survey Accuracies

Based on equipment checks and calibrations outlined in the previous section, the overall survey accuracies achieved were in the order of:

Vessel Surface Positioning (DGPS C-Nav): ± 5 -10 cm
ROV Positioning with Sonardyne USBL (combined with C-Nav): 1% of range
Depth of Burial: ± 0.2 m

15.0 Methodology

Tritech Super SeaKing profilers were used to acquire the mean seabed level either side of the cable tracked by the ROV. The cable was tracked with TSS 350 (25 Hz tone tracking system), with a TSS 340 (pulse induction tracking system) as back-up. The mean seabed level was then used as an offset to provide an absolute depth of burial value.

True depth of burial was calculated as part of post processing using raw data from TSS and the profilers.

The calculation used for actual burial depth was as follows:

DoB = (Vrt- Alt) + (PFH- MSB)

Where:

- DoB = depth of burial, i.e. depth that the cable is below mean seabed (not necessarily buried)
- Vrt = vertical range to target, i.e. the actual vertical distance TSS 350 measures the cable to be from the horizontal axis between its 2 coil arrays
- Alt = TSS 350 altitude, i.e. the fixed height that the TSS 350 coils are above the bottom of the skids (a fixed measured distance of 81 cm, included in final calculations by survey)
- PFH = profiler fixed height, i.e. the vertical distance the 2 profiler heads are above the bottom of the skids (a fixed measured distance of 182 cm, included in final calculations by survey)

- MSB = mean seabed, i.e. the average seabed level generated from the profiler heads (average taken from a swath either side of the ROV)

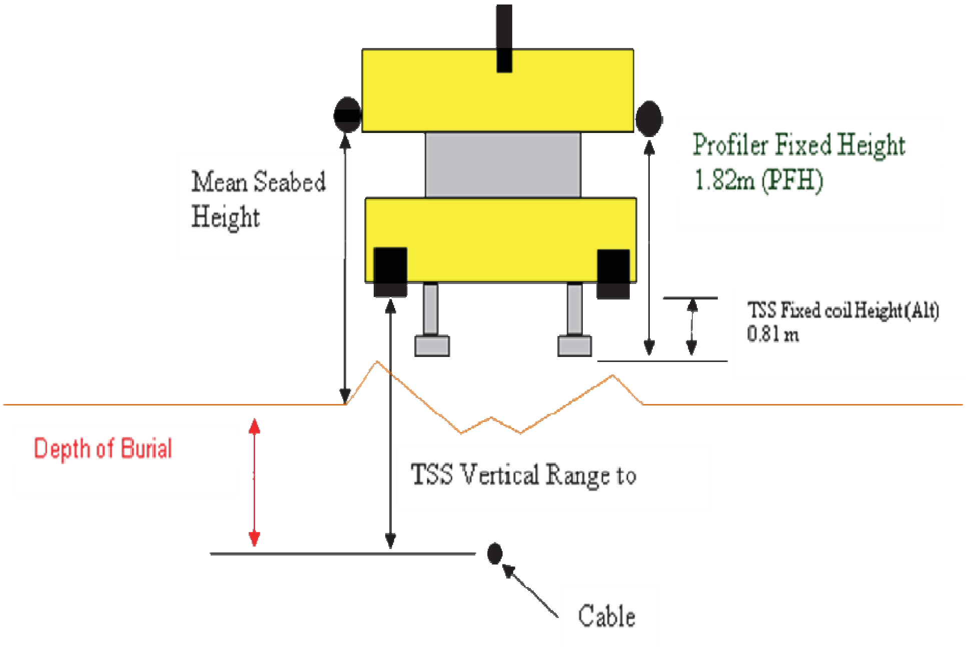


Illustration of ROV burial measurement offsets

A bathymetry unit was integrated with the profilers. This unit collected conductivity and temperature values throughout the water column in order to calculate the velocity of sound (VOS) through the water. This data was also used by the ship's acoustic tracking system (Sonardyne) to determine the position of the ROV beacons relative to the vessel.

The bathymetry unit was also used to give a calibrated value of vehicle depth, and its altimeter was used for confidence checks of the mean seabed level output obtained from the profilers.

A Doppler velocity log was utilised to accurately gauge the distance travelled over the ground by the ROV between given events. ROV heading was derived from the vehicle's internal gyro system, as were pitch and roll information.

The GMSL Navigator software was configured such that the primary steer point (SP1) was the ST204 ROV Launch and Recovery System (LARS), and the secondary steer point (SP2) was the ROV. All KP values on the burial graphs correspond to the secondary steer point.

Main logging was carried out according to specification, with logging at 1m intervals and where not possible, always better than the maximum specified 10m interval.

APPENDIX C

MERTECH MARINE SAFETY PLAN

Marine Safety Plan

Project document number:	MMP1701-03-MSP-R00-ATT-CHUS
Document revision:	00
Revision date:	03-12-2018

Revision table

REV	DATE	REVISION DESCRIPTION	PREPARED BY	REVIEWED BY	AUTHORIZED BY
0	03/12/2018	Initial release	MR	TN	TN

Table of Contents

1 Introduction

The intention of this document is to provide client with general information regarding safe vessel operations. It covers preparation of the actual execution of a cable recovery project.

Please be informed that the project specific risk assessment is not part of this documents.

2 Abbreviations and definitions

Find below a list of abbreviations:

BU	Branch Unit
CRP	Cable Recovery Plan
ECDIS	Electronic Chart Display Information System
ICPC	International Cable Protection Committee
JB	Junction Box
OOS	Out of service cable
PI	Pay In
PO	Pay Out
PPE	Personal protection equipment
RP	Repeater
SP	Splice Box
Supermarket	Provision container
WD	Water Depth
RPL	Route Positioning List

Find below a list of definitions:

Adjustable repeater way	Movable peace of the repeater way
Black pipe	Plastic pipe to guide the cable to the cable tanks, or to shore during discharging operations.
Cutting run	Cutting the cable with a grapnel with inserted knive
Fishing gear	The gear used for a cutting and a holding run
Holding run	Catching the cable by means of grapnels and rennies
Fleeting Knives	Guide on the winch to keep the cable on position on the drum
Live cables	Cable section from current position towards section to be recovered
Long end	Cable section between cutting position
Repeaters	Amplifier for signals
Short end	Cable section from current position towards cutting position
Splitter	Device to guide the cable to the right cable tank
Winch man	Person responsible for controlling the winch and the Tensioners

3 Project preparation

3.1 Cable Recovery Plan (CRP)

1. Before starting a recovery operation a Cable Recovery Plan (CRP) is being prepared at the office based on all relevant up to date cable information. This CRP contains the following information:
   - Cable specifications
   - Cable route
   - Recoverable cable sections (incl. start- and end position)
   - Cable length per cable section
   - Affected cables in the area of the recovery operation
   - Planned holding- and cutting position
   - Bathymetric charts and seabed specifications (if available)

2. The initial draft of the CRP is shared with the captain of the recovery vessel. The vessel crew will review the document and comments will be processed.
3. After completion of the CRP, all cable owners will be informed via ICPC.
4. Recovery of planned cable will only take place after all comments from cable owners have been discussed and appropriate solutions have been found for their concerns.

3.2 Weather

To ensure cable recovery operations are performed in a safe and efficient manner, it is important to plan recovery operations in an appropriate weather window. Mertech Marine makes use of below services:

- MetOcean – Hindcast data
  The hindcast data service provides accurate historical marine weather data from multi-year numerical model simulations.
- MeteoGroup - SPOS9
  Route-planning and optimization involves juggling safety, efficiency, navigation, costs, port rotation, ETAs, speed ranges and additional constraints, such as trim and seakeeping. For ship captains, this is a complex challenge that requires the aid of a decision-supporting tool to give them confidence in their decisions and support either and execution. MeteoGroup developed SPOS9 (Ship Performance Optimization System) to address these challenges.

3.3 Cable recovery information

The following information recourses will be provided before commencing a recovery operation:

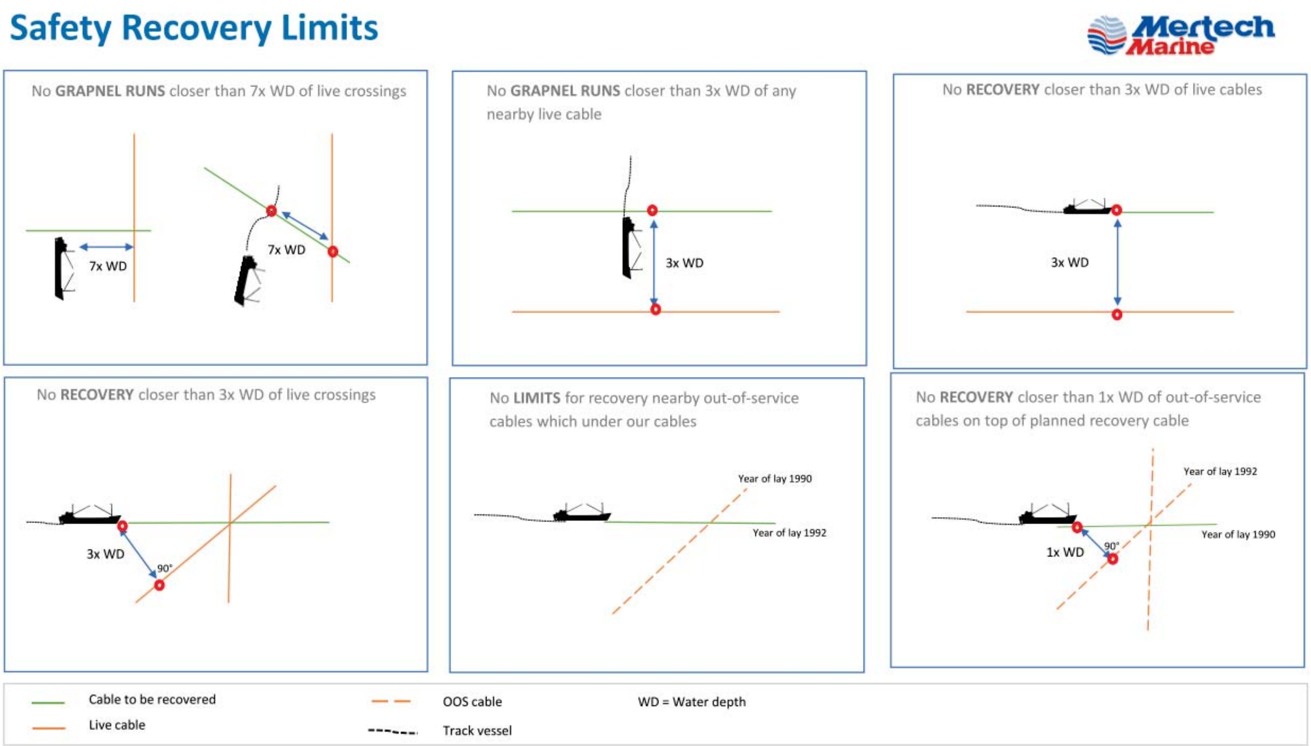
- RPL of the cable to be recovered (GeoCable)
- RPL as-laid of the cable to be recovered (origin cable laying vessel)
- Positions of all cables in close proximity of the to be recovered cable
- Digital information package of all above items to be used in the ECDIS software on board
- Original chart with cable positions (if available).

3.4 ICPC regulations

To ensure that nearby cables are not affected by the recovery operation below mentioned safety limits are used for offshore recovery operations.

1. No grapnel runs closer than 3x WD of any live cable
2. No grapnel runs closer than 7x WD of live crossings
3. No recovery closer than 3x WD of live cables
4. No recovery closer than 3x WD of live crossings
5. No limits for recovery near out-of-service cables which under our cable
6. No recovery closer than 1x WD of out-of-service cables on top of our cable

These criteria are based on ICPC Recommendations No. 1 “Management of Redundant and Out-Of-Service Cables”.



In case Mertech Marine decides to deviate from above safety limits in specific situations, this will be clearly communicated and discussed/agreed with both the client and other cable owners (via ICPC). Reasons to do so include (but is not limited to):

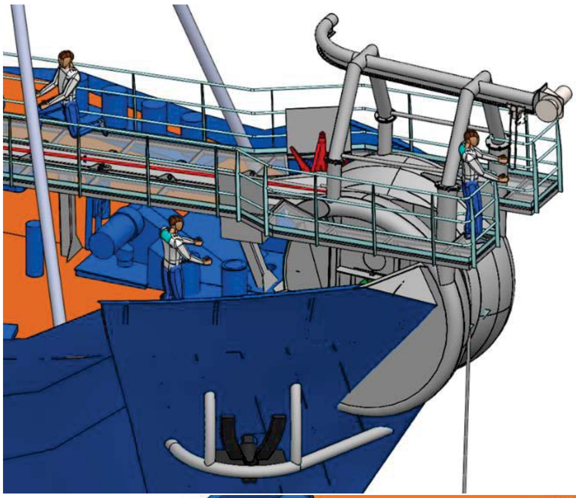
- Diver assisted recovery, where no cutting- and holding runs are required
- Shallow water operations, where a multiple of WD is not an appropriate measure to indicate safety zones
- Specific agreements are in place with other cable owners

4 Project execution

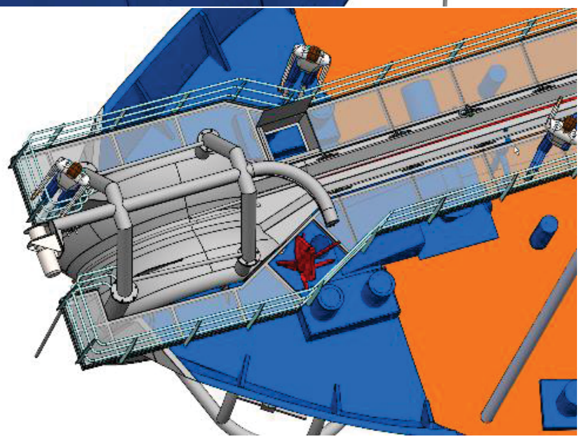
4.1 Equipment

For recovering subsea telecommunication cables special equipment is being used on deck.

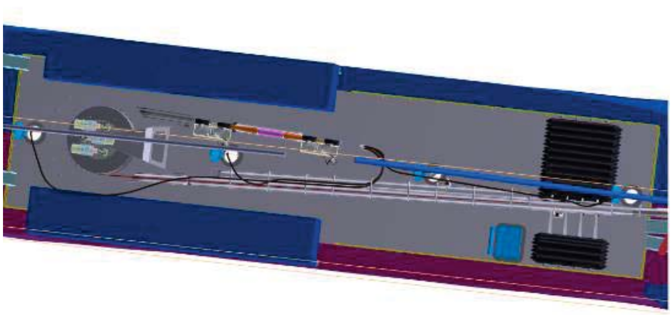
Bow roller
Used to guide the ropes or cable, from sea to vessel and the other way around.



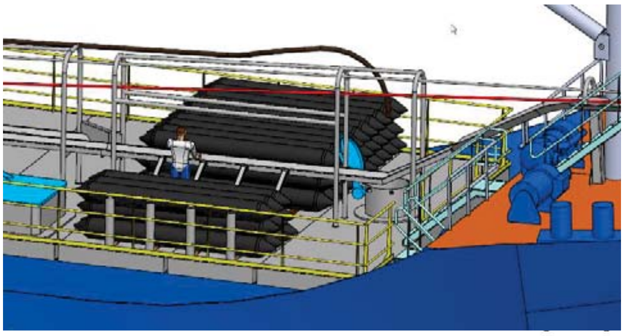
Bow platform
The Bow platform is designed as working platform for the crew.
A special A-Frame is mounted on top of the bow platform which can be used to lift and guide recovery equipment to and away from the platform.



Repeater way
The repeater way is being used to guide the cable or grapnel rope

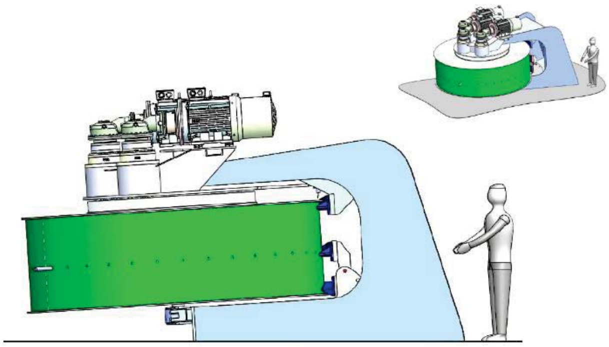


Repeater storage
The repeater storage is being used to store the repeaters.

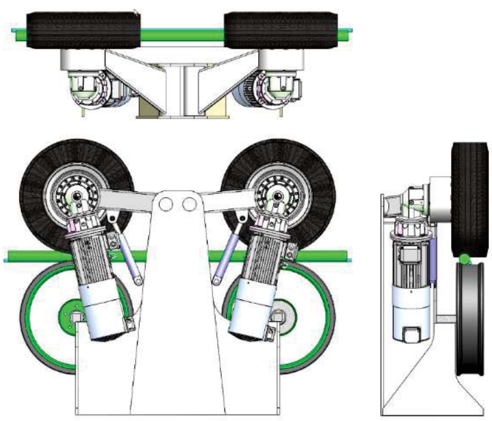


Winch
The winch is being used to pay in and pay out the cable or the grapnel rope. The winch can be controlled from two positions: from the bridge and from deck.
Specifications:

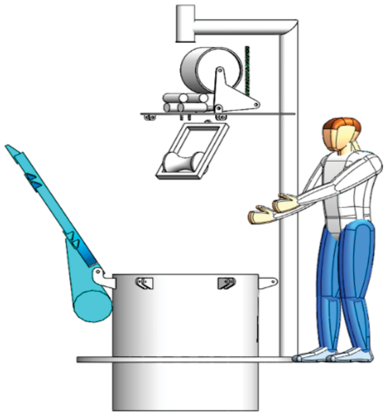
- Max tension: 20 ton
- Equipped with emergency buttons
- Equipped with alarms and safety protocols



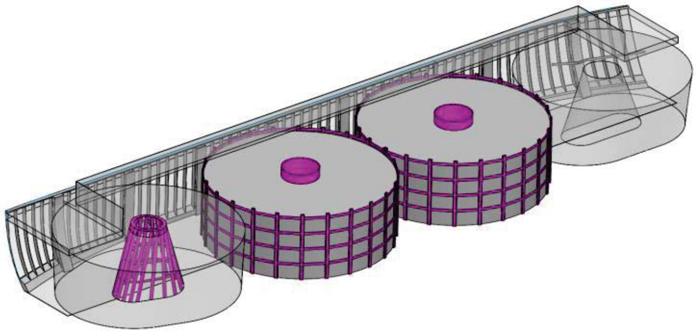
Tensioners
The tensioners will keep the cable ore rope under tension so that the winch will work properly.
The tensioners will adjust automatically, but can also be controlled manually.



Cable counters
The cable counters are being used to count the length of kilometres recovered and kilometres discharged.



Cable tanks
Special designed cable tanks are being used to create as much as possible volume to store cable



Monitoring equipment
On the bridge and in the control container, monitoring and control equipment is being placed.

4.2 Recovery process

4.2.1 Preparing fishing gear

First the fishing gear needs to be connected to the rope to conduct both cutting- as holding run. Different equipment can be used:

- Tail chain - stored in box under bow platform
- Grapnel - stored under or attached to bow platform
- Rennies - stored on the side of the repeater way;
- Leading chain – stored at the end of the repeater way;
- Grapnel rope - stored in inner cone cable tanks.

This is dependent on variables like:

- Weather conditions
- Seabed conditions

- Cable type

4.2.2 Cutting Run

For the cutting run a grapnel with a knife is being used, tensions are low during this run. The aim of this run is to cut the cable.

4.2.3 Holding run

The aim of the holding run is to bring the cable on board. For the holding run all fishing equipment on board can be used, depending on the situation and location. During the holding run the tension can be high. When the cable is hooked in the fishing gear the tension will increase. slowly the tension will increase due to increasing length of cable that hangs on the grapnel and is lifted towards the surface.

4.2.4 Cable recovery

As soon as the cable is brought on board, both ends of the cable (long and short) can be brought on the winch drum. The cable will be guided through the tensioners. The tensioners will hold tension on the cable independently from the diameter of the cable. Via the splitter, the cable will be guided to one/two of the 4 cable tanks.

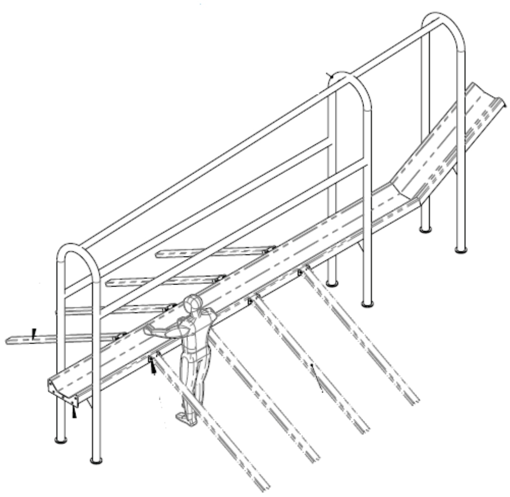
4.2.5 Repeater handling

Repeaters can be handled on board in two ways.
Option 1: Cut out the repeater on the repeater way
Option 2: guide repeater on the winch and cut out without tension behind tensioners

As soon as the winch man noticed that a repeater is coming out of the water he will inform the deck crew and will slowly pay in. By use of cameras the winch man will always have eyes on the bow platform.

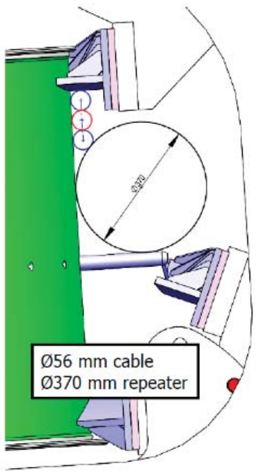
<u>Option 1 cutting out</u>

A. The repeater will be slowly guided to the repeater slide;
B. When the repeater is in position, stoppers need to be placed on the cable to prevent that the cable will slip back into sea;
C. As soon as the cable is connected with stoppers on the ship, the repeater can be secured;
D. Next to this, safety beams can be placed on the slide, this to prevent the repeater to move towards the operator.
E. When the repeater is secured the cable can be cut at both ends of the repeater;
F. Lower the repeater by means of slings which can be connected on top of the repeater slide;
G. Secure the repeater on the repeater storage;
H. Connect both cable ends;
I. Guide the cable around the winch and through the tensioners via the black pipes into the cable tanks.



Option 1: via winch drum

A. Pay in up to the repeater reaches the winch;
B. Prepare pins in the drum of the winch;
C. Guide the repeater via the adjustable repeater way on the pins;
D. Slowly pay in and guide the repeater on the winch;
E. Repeater leaves the winch and will pass the tensioners which will adjust automatically on the diameter of the repeater;
F. After the winch, there is no more tension and the repeater can be cut out;
G. The repeater can be moved by help of the electrical winch on the bowplatform. The repeater can then be secured in the repeater storage.



3 windings cable and 1 winding with repeater of 370mm only possible for cable sizes ≤ 56mm

4.2.6 Cable tank

The cable will be stored in one of the four cable tanks. The cable will be guided to the tank via the black pipes and cable counters. Special manholes are mounted on the hatches for this purpose. The cable will be coiled inside one of the cable tanks via hatches.

5 Vessel safety

5.1 Safety meetings

Before starting a new recovery operation, a safety/operations meeting will take place. In this meeting, the (project specific) risk assessment will be discussed. In addition, every morning the crew will come together for a toolbox talk to discuss the operation and associated risks are recognized. Mitigation measures are initiated when necessary.

5.2 Personal Protection Equipment (PPE)

On deck the next PPE is being used:

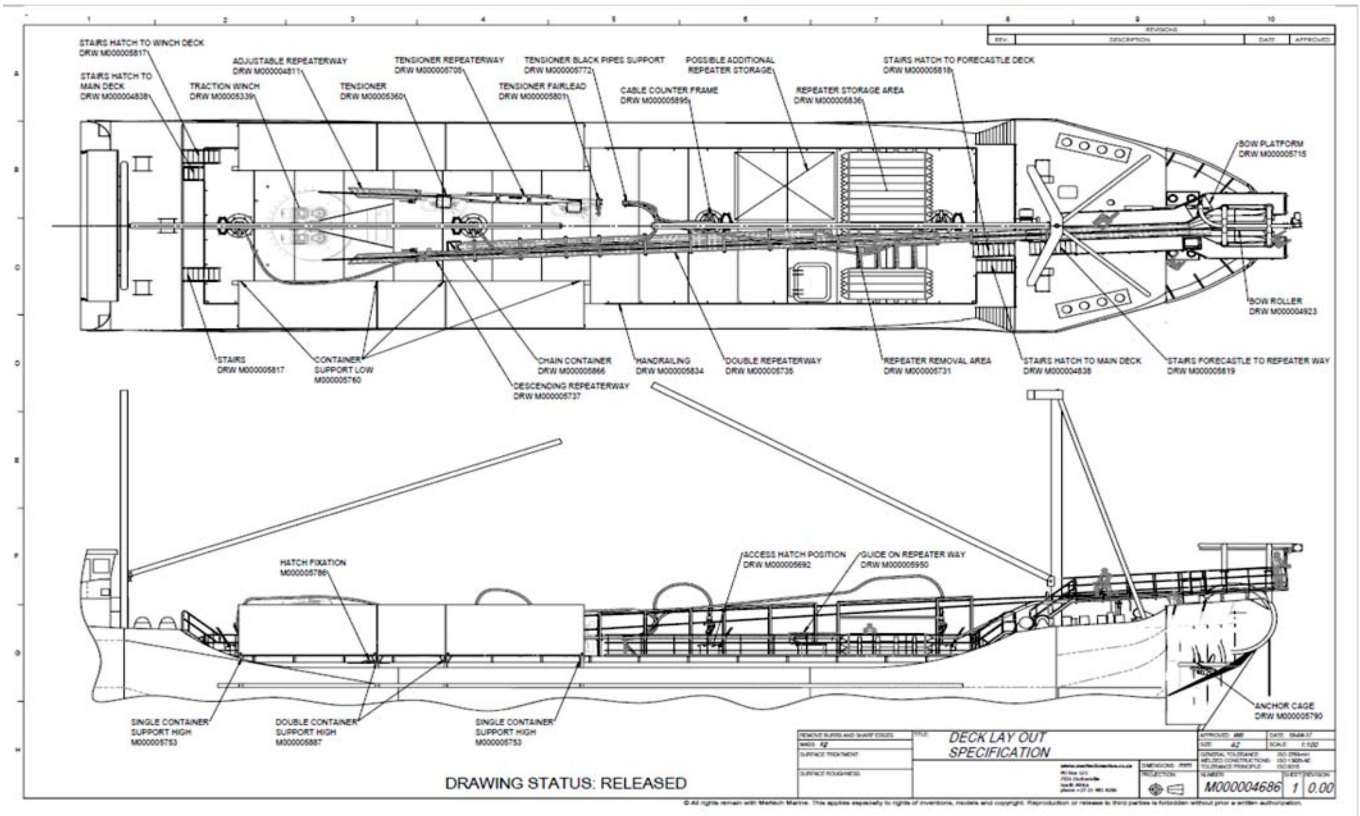
- Safety helmet
- Safety shoes
- Safety hand gloves
- Overalls
- Ear protection (for job specific tasks)
- Safety glasses (for job specific tasks)
- Life jacket (for job specific tasks)

5.3 Risk assessment

A project specific risk assessment can be found in appendix A.

Appendix A – Risk assessment

Appendix B – Deck layout



RISK ASSESSMENT

Name of Risk Assessment	MMP1702-03 San Luis Shore end Recovery	**Document Number**	MMP1702-03-RA-R00-ATT-CHUS
		Revision No.	00

Risk Assessment Team

Print Name	Company / Role Title	Signature	11-11-2018
Martijn Rensen	MMP / Project manager		
Jasper Romp	MMP / Cable recovery team		
Misha Hoekstra	MMP / Cable recovery team		

Site Address/Location	Description of Activity/Task
San Luis Obispo, California	Cable recovery operation

Supporting Attachments e.g. Procedures/ Sketches / Drawings	Existing Controls	
Project Execution Plan	During project preparation and cable loading, all required PPE must be worn. Required PPE: - Helmet - High visibility jacket - Gloves - Safety shoes - Ear protection (when exposed to noise hazard) - Safety glasses Additional task specific PPE to be worn.	Toolbox talk must be held prior to commencement of operations. Toolbox talk contains: - Summary of Risk Assessment document - Safety awareness - Communication

STEPS	TASK / ACTIVITY	HAZARDS		INITIAL RISK			CONTROLS	RESIDUAL RISK			FURTHER ACTIONS REQUIRED TO REDUCE RISKS	RESPONSIBLE PARTY
		Persons at Risk & How	Hazards	Likelihood	Severity	Risk Rating	Control Measures	Likelihood	Severity	Risk Rating		
General												
1.1	**Equipment preparations and positioning**	All operational involved personnel	1. Personal injury - body parts stuck between rotating parts, cutting sharp edges	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Review of vessel layout drawings prior to positioning equipment. 3. Personal awareness; ensure safe position whilst equipment is being positioned. 4. Use appropriate PPE	2 - Unlikely	C - Moderate	Medium	Subject during Toolbox Talk. Maintain good communication between involved personnel. Keep safety always in mind.	MMP
1.2	**Communication**	All operational involved personnel	1. Equipment damage 2. Personel injuries - stress/friction	2 - Unlikely	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. All communication during operations between all parties (I.e. onshore, diving support vessel, recovery vessel) by radio. 3. All radios to be fully charged prior to operations and charged spare batteries available. 4. Communication language in English 5. Daily pre-recovery meeting between all parties involved	1 - Very Unlikely	B - Slight	Low	Subject during Load-out meeting/Toolbox Talk. Check all stations regularly.	MMP
1.4	**Working close to edge of quayside/water (not applicable to vessel operations)**	All involved personnel who come near or on jetty/quayside/vessel	1. Personal injuries - Fall in water	2 - Unlikely	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-lrecovery meeting. 2. Wear a life vest when near the waterside 3. Life vests to be certified safe for usage 4. Only designated people involved within this project are allowed.	1 - Very Unlikely	B - Slight	Low	Subject during Load-out meeting/Toolbox Talk.	MMP
1.5	**Manual handling**	Personnel rigging lifting gear, moving objects etc..	1. Personal injuries.	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Use lifting equipment/aids when objects are too heavy to lift manually. 3. Bend through the knees, not the back when manually lifting cannot be avoided. Person should be fit for the task. 4. Check if load can be divided in smaller/lighter pieces. 5. Assess load for size, shape, centre of gravity, weight, etc. 6. Decent lighting positioned and used in case it would be necessary. 7. Check if route is safe to use and walk with the load.	2 - Unlikely	C - Moderate	Medium	Do not lift manually when doubt. Use lifting aids to save the body.	MMP
1.6	**Weather conditions**	All involved personnel	1. Personal injuries. 2. Damage to cable/equipment.	2 - Unlikely	D - High	Medium	General 1. Check weather forecast prior to operations and during operations. Lighting 1. Lower lifted equipment as much as possible 2. Avoid working at height 3. Leave deck and seek shelter indoor when flash-to-thunder-time is less than 30 seconds 4. Ensure earthing is installed on all equipment Wind/severe gusts: 1. Secure loose items. 2. Avoid working at height or close to open edges/overboard in case of severe winds and gusts. Wave: 1. Secure loose items. 2. Avoid working at height or close to open edges/overboard in case of severe waves Sun: 1. Arrangements to be provided in case of hot/cold weather like sun cream, warm clothing, water, etc..)	2 - Unlikely	C - Moderate	Medium	Check forecast. Toolbox talk	MMP
1.7	**Lifting operations**	Personnel who will lift equipment.	1. Personal injuries.	3 - Remote	C - Moderate	Medium	1. Only competent personnel involved within lifting operations. 2. Work according to industry practice and lift plans (if applicable). 3. No working or walking under suspended load. 4. Person available to warn and inform people about lifting operations. 5. All lifting gear certified and visually checked 6. Good housekeeping throughout operations. Area must kept clean.	3 - Remote	C - Moderate	Medium	Use certified, well maintained equipment in a proper way.	MMP
1.8	**Offshore transfer of personnel**	All personnel present on vessel/barge	1. Personnel injury - drowning, hypothermia	3 - Remote	C - Moderate	Medium	1. Check weather forecast before carrying out transfer 2. Only transfer when the person involved is confident with the situation 3. Prepare pilot ladder 4. Inform vessel about upcoming operations such that assistance can be arranged 5. Wear life vest	2 - Unlikely	C - Moderate	Medium		MMP

STEPS	TASK / ACTIVITY	HAZARDS: Persons at Risk & How	HAZARDS: Hazards	INITIAL RISK: Likelihood	INITIAL RISK: Severity	INITIAL RISK: Risk Rating	CONTROLS: Control Measures	RESIDUAL RISK: Likelihood	RESIDUAL RISK: Severity	RESIDUAL RISK: Risk Rating	FURTHER ACTIONS REQUIRED TO REDUCE RISKS	RESPONSIBLE PARTY
Cable recovery from M/V Layla												
2.1	**Positioning of vessel towards deployment position of grapnel**	All involved people	1. Damage to vessel/equipment 2. Damage to environment and 3rd party assets	3 - Remote	C - Moderate	Medium	1. Vessel crew to discuss recovery plans with recovery team before commencement of recovery trip 2. Make sure captain and crew is aware of all information written in CRP 3. Vessel crew to verify information in CRP with ECDIS	2 - Unlikely	C - Moderate	Medium	-	MMP
2.2	**Handling of grapnel gear on deck and deployment of grapnel (cutting and holding)**	All involved people	1. Personal injuries - Lacerations and abrasions of the skin, possibly deeper wounds. 2. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Wear appropriate PPE (incl. life jacket) 2. Vessel crew to have toolbox talk 3. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 4. Only the necessary designated persons are allowed on deck 5. Supervision. 6. Use certified, well-maintained equipment only 7. Avoid manual lifting as much as possible and use dedicated tools/equipment 8. Inform authorities regarding upcoming recovery activities (and limited manouverability) 9. Verify weather window 10. Check general condition of cable winch. (oil levels, drive belts and such, all equipment properly greased). 11. No obstructions on repeater way and on deck from rope storage tank to the bow roller 12. Hammerlocks connected correctly to the swivels, leading chains, grapnel hooks and/or rennies. The hammerlocks pins in position and fixed & properly secured. 13. Check all links separately. Verify all links are in good working condition. Lock pins in place. 14. Radio contact with deck established on working channel. 15. Make sure that the condition of rope is good and has no damages. 16. Make sure that all cameras in working condition and in recording mode. 17. All crew notified of operations scheduled.	2 - Unlikely	C - Moderate	Medium		MMP
2.3	**Cutting and holding run**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	3 - Remote	D - High	High	1. Vessel crew to have toolbox talk 2. Only the necessary designated persons are allowed on deck 3. Master and chief officer well experienced with cable recovery operations 4. Vessel crew to verify correct position 5. Continuously monitor: - Cable tensions - Environment - ECDIS system - Weather conditions 6. Use certified equipment 7. Halt operations in case of unexpected, unforeseen and/or rapdily changing situations and take time to evaluate situation 8. Always adhere to CRP. Only deviate from plans after consulting the engineering department 9. All key personnel equipped with radio 10. Adhere to weather limits for this operation: o Wind speed: 25 knots o Wave height [Hs]: 3 m	2 - Unlikely	D - High	Medium		MMP
2.4	**Bringing in cutting grapnel**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Vessel crew to have toolbox talk 2. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 3. Only the necessary designated persons are allowed on deck 4. Crew will use safe passage route when cable is under tension; 5. Safety meetings and risk assessments (with according actions if necessary) will take place before commencement of recovery operation 6. Modification to deck layout: Safety rings around the repeater way and bow platform; Protection in front of the control unit on deck; Protection around the adjustable repeater way; Protection around the winch; 7. Safe passage route in place 8. Proper supervision. 9. Bring all necessary tools to workplace 10. Ensure work place is clean and neat 11. Wear appropriate PPE (incl. life jacket) when working on bow platform 12. Use appropraite tools and equipment in place to perform handling 13. Use A-frame to position heavy equipment	2 - Unlikely	C - Moderate	Medium		MMP
2.5	**Bringing in holding grapnel**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Vessel crew to have toolbox talk 2. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 3. Only the necessary designated persons are allowed on deck 4. Proper supervision. 5. Bring all necessary tools to workplace 6. Ensure work place is clean and neat 7. Wear appropriate PPE (incl. life jacket) when working on bow platform 8. Use appropraite tools and equipment in place to perform handling 9. Use A-frame to position heavy equipment	2 - Unlikely	C - Moderate	Medium		MMP
2.6	**Guide cable end to winch**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instructions with respect to installation of cable stopper 2. Check tools before use 3. Use the right tool for the job 4. Bring all tools and appropriate PPE to workplace 5. Use appropriate PPE 6. Inform your collegues about activities 7. Pre-install pulling rope on winch and cable highway 8. Only the necessary designated (experienced) persons are allowed on bow platfrom when installing cable stopper	2 - Unlikely	C - Moderate	Medium		MMP
2.5	**Cable recovery**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Vessel crew to have toolbox talk 2. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 3. Only the necessary designated persons are allowed on deck 4. Crew will use safe passage route when cable is under tension; 5. Safety meetings and risk assessments (with according actions if necessary) will take place before commencement of recovery operation 6. Modification to deck layout: Safety rings around the repeater way and bow platform; Protection in front of the control unit on deck; Protection around the adjustable repeater way; Protection around the winch; 7. Safe passage route in place 8. Proper supervision 9.Continuously monitor: - Cable tensions - Environment - ECDIS system 10. All key positions on-board occupied 11. Halt operations in case of unexpected, unforeseen and/or rapdily changing situations and take time to evaluate situation 12. Ensure work place is clean and neat 13. Wear appropriate PPE (incl. life jacket) when working on bow platform 14. Use appropraite tools and equipment in place to perform handling 15. Use A-frame to position heavy equipment 16. Adhere to weather limits for this operation: o Wind speed: 30 knots o Wave height [Hs]: 4 m 17. Recovery operations carried out at captain's discretion while giving consideration to safety of crew, vessel, environment and 3 rd party assets.	2 - Unlikely	C - Moderate	Medium		MMP
2.5	**Cutting of FO cable**	All involved people	1. Personal injuries - Lacerations and abrasions of the skin, possibly deeper wounds.	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instructions with respect to installation of chinese finger & band-it 2. Check tools before use 3. Use the right tool for the job 4. Bring all tools and appropriate PPE to workplace 5. Use appropriate PPE 6. Inform your collegues about activities	2 - Unlikely	C - Moderate	Medium	-	MMP
2.6	**Installation of chinese finger on cable end**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment - Chinese finger sliding from cable end	2 - Unlikely	B - Slight	Low	1. Supervision. Clear instructions with respect to installation of chinese finger & band-it 2. If necessary, bring cable end out of the water with crane to install chinese finger on vessel 3. Use certified chiinese finger 4. Use band-it to prevent sliding of chinese finger over the cable 5. Perform activity before float-in of pulling rope	2 - Unlikely	B - Slight	Low	-	MMP
2.7	**Use Diving Support Vesel (DSV) or RIB to float-in pulling rope from cable end to Cable Recovery Vessel (CRV)**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment - Pulling rope in propeller, loss of proulsion, vessel grounding	2 - Unlikely	E - Very High	High	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Direct radio communication between vessel and DSV/RIB 3. Use polyprop rope because of floating properties 4. Minimilze amount of slack in pulling rope 5. Direct radio communication between crew present at vessel stern CRV (monitoring the situation) and master 6. Perform activities under favourable weather conditions 7. Have a weather forecast in place	1 - Very Unlikely	E - Very High	Medium	-	MMP
2.8	**Water ingress due to waves**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment	2 - Unlikely	C - Moderate	Medium	1. The weather will be closely monitored to be able to plan and act in time; 2. During loading of the cable one manhole will be open to guide the rope in to the hold. If bad weather is suspected, recovery operation will be suspended and the manhole hatch will be closed to guarantee the safety of the ship and his crew.	1 - Very Unlikely	C - Moderate	Medium	-	MMP
2.9	**Repeater handling**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment	2 - Unlikely	C - Moderate	Medium	1. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board; 2. Only the necessary designated persons are allowed on deck; 3. Stoppers installed to fixate the cable before handling of repeater 4. Check tools before use 5. Use the right tool for the job 6. Bring all tools and appropriate PPE to workplace 7. Use appropriate PPE 8. Use dedicated repeater slide to guide the repeater downwards	2 - Unlikely	B - Slight	Low	-	MMP
2.10	**Adverse weather**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment/cable	2 - Unlikely	C - Moderate	Medium	1. Strictly monitor weather forecast 2. Cutting run performed if apprproate weather window is available 3. Holding run only performed when there is a sufficient weather window for performing recovery operations directly afterwards 3. Recovery operations carried out at captain's discretion while giving consideration to safety of crew, vessel, environment and 3 rd party assets. 4. When the decision is made to abort recovery operations: - All personnel will leave deck - Winch is put on break - Tensions will be closely monitored - Cable to remain fixed to winch - cable used as anchor 5. In case of extreme circumstances, captain can decide to cut the cable.	2 - Unlikely	B - Slight	Low	-	MMP

STEPS	TASK / ACTIVITY	HAZARDS: Persons at Risk & How	HAZARDS: Hazards	INITIAL RISK: Likelihood	INITIAL RISK: Severity	INITIAL RISK: Risk Rating	CONTROLS: Control Measures	RESIDUAL RISK: Likelihood	RESIDUAL RISK: Severity	RESIDUAL RISK: Risk Rating	FURTHER ACTIONS REQUIRED TO REDUCE RISKS	RESPONSIBLE PARTY
Removal of AP												
3.1	**Bringing AP over bow roller**	Traction winch operator & watchman	1. Personal injury - unexpected sliding of AP over bow roller 2 . Damage to vessel/equipment - Damage to bow roller	2 - Unlikely	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. One crew member dedicated for monitoring of bow roller (which is in direct communication with traction winch operator) 3. Keep clear distance 4. Removal of seabed anchoring before commencement of operation to reduce the required pulling force 5. Location of AP-area indicated by marker buoys and MAXSEA-system 5. Daylight operations only - diving support available	2 - Unlikely	A - Negligible	Low		MMP
3.2	**Dismounting of AP (Mechanical)**	Personnel involved in removal of AP	1 . Personal injury - body parts stuck in moving parts, Lacerations and abrasions of the skin, possibly deeper wounds	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Use torque wrench to remove bolts, before using alternatives (hot work) 3. Inspect tools before usage 4. Use apprpriate PPE	2 - Unlikely	C - Moderate	Medium		MMP
3.3	**Dismounting of AP (Hot work)**	Personnel involved in removal of AP	1. Personal injury - Entrapment body parts 2. Damge to vessel/equipment - Damage to cable guide	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Ensure work is performed by competent personnel 3. Obtain gas-free certificate (in case working above tanks) 4. Ensure fire fighting equipment (fire blanket, fire extuingisher) is close 5. Remove items/equipment/tools that can be damaged by sparks, heat, etc or cover items with welding blanket 6. Use the right tools for the job 7. Wear appropriate PPE	2 - Unlikely	C - Moderate	Medium		MMP
3.4	**Lifting AP-sections from cable guide**	Personnel involved in cable lifting	1. Personal injury - Entrapment body parts, strain your back	3 - Remote	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Lift sections piece by piece and separate bottom and top section 3. Use dedicated lifting tools 4. Wear appropriate PPE	2 - Unlikely	B - Slight	Low		MMP
3.5	**Lift AP-sections towards repeater storage area**	Personnel involved in cable lifting	1. Personal injury - Entrapment body parts, strain your back	3 - Remote	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Lift sections piece by piece and separate bottom and top section 3. Use installed trolley to move AP-sections 4. Wear appropriate PPE 5. Sea-fasten AP with ratchet straps to prevent movement	3 - Remote	B - Slight	Low		MMP

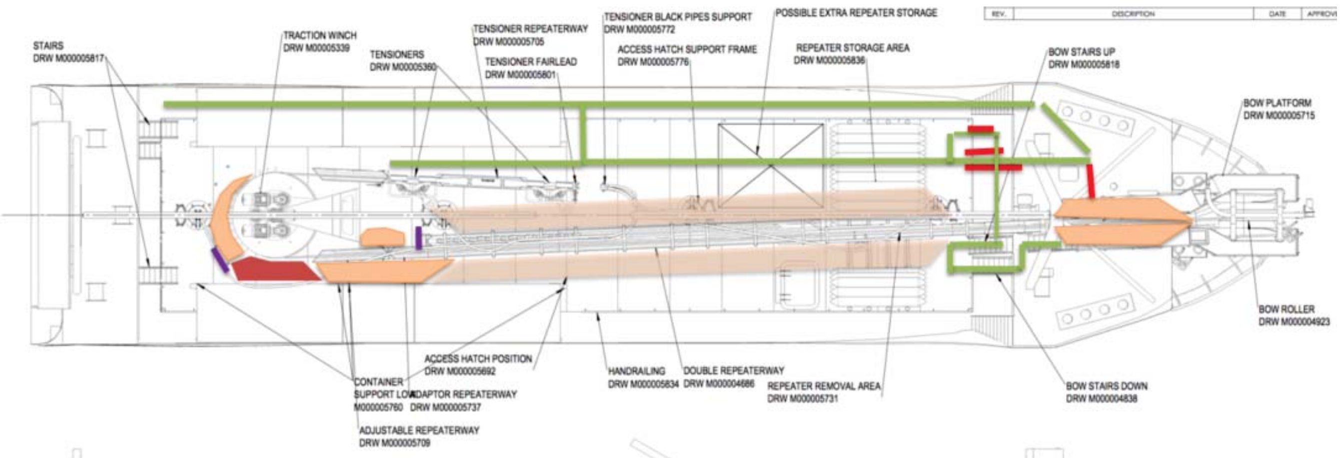
Risk Matrix

SEVERITY		CONSEQUENCES: People	CONSEQUENCES: Environment	CONSEQUENCES: Assets		PROBABILITY: Very Unlikely 1	Unlikely 2	Remote 3	Likely 4	Very Likely 5
SEVERITY	**Negligible A**	Negligible injury, no absence from work.	Negligible loss of function/production with no damage to the environment.	Negligible loss of function/production with no damage to equipment	A - Negligible	**Low A1**	**Low A2**	**Low A3**	**Low A4**	**Low A5**
	Slight B	Minor injury requiring first-aid treatment.	Slight impact to the environment	Damage to equipment requiring minor remedial repair, loss of production	B - Slight	**Low B1**	**Low B2**	**Low B3**	**Medium B4**	**Medium B5**
	Moderate C	Event resulting in a lost time incident.	Moderate pollution incurring some compensation costs	Localised damage to equipment requiring substantial repair, significant loss of function/production	C - Moderate	**Medium C1**	**Medium C2**	**Medium C3**	**High C4**	**High C5**
	High D	Major injury.	Severe pollution with short-term localised implications incurring significant compensation costs	Major damage to equipment resulting in significant loss to programme	D - High	**Medium D1**	**Medium D2**	**High D3**	**High D4**	**High D5**
	Very High E	Death or permanent disability.	Major pollution with long-term implication and very high compensation costs	Plant shutdown/Major damage to equipment resulting in critical impact on programme	E - Very High	**Medium E1**	**High E2**	**High E3**	**High E4**	**High E5**

	PROBABILITY
Very Unlikely 1	A freak combination of factors would be required for an incident to result. Hazard believed to be credible but never experienced in the offshore wind industry.
Unlikely 2	A rare combination of factors would be required for an incident to result. Unlikely that hazard will be realised but has been experienced in the offshore wind industry.
Remote 3	Could happen when additional factors are present but otherwise not expected to occur.
Likely 4	Not certain to happen but an additional factor may result in an accident or incident.
Very Likely 5	Almost inevitable that an accident would result.

LOW RISK A1-B3	MEDIUM RISK B4-E1	HIGH RISK C4-E5
May be acceptable; however, review task to see if risk can be reduced.	Task should only proceed with appropriate management authorisation after consultation with specialist personnel and assessment team. Where possible, the task should be redefined to take account of the hazards involved or the risk should be reduced further prior to task commencement.	Task must not proceed. It should be redefined or further control measures put in place to reduce risk. The controls should be re-assessed for adequacy prior to task commencement.

Appendix B – Safe passage route



- Dangerous position – no direct escape route

- Dangerous position – with direct escape route

- Dangerous position – with direct escape routes

- Safe route on deck

1

APPENDIX D

OIL SPILL CONTINGENCY AND RESPONSE PLAN

Plan in Progress

To Be Forwarded Once Completed

APPENDIX E

MARINE WILDLIFE MITIGATION AND TRAINING PLAN

Plan in Progress

To Be Forwarded Once Completed

APPENDIX F

EQUIPMENT SPECIFICATIONS AND EMISSIONS REDUCTION PLAN

Plan in Progress

To Be Forwarded Once Completed

ATTACHMENT 4

BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT

AT&T REMOVAL OF SEGMENTS E1 AND N9 OF THE CHINA-U.S. CABLE NETWORK COOS COUNTY, OREGON

Project No. 1702-1974

Prepared for:

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FEBRUARY 2019

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ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

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LIST OF ACRONYMS

ACOE	U.S. Army Corps of Engineers
AT&T	AT&T Corporation
BA	Biological Assessment
BCC	Bird of Conservation Concern
DPS	Distinct population segment
ESCA	Endangered Species Conservation Act
FE	Federally endangered
FESA	Federal Endangered Species Act
ft	feet/foot
FT	Federally threatened
GPS	Global positioning system
Hz	Hertz
IAPP	International Air Pollution Prevention
kg	kilogram
km	kilometer
km/h	Kilometers per hour
kW	kilowatt
lbs	pounds
LNG	Liquified Natural Gas
m	meter
M/V	Marine vessel
MBTA	Migratory Bird Treaty Act
mi	miles
MMPA	Marine Mammal Protection Act
mph	miles per hour
MWM	Marine Wildlife Monitor
MWMTP	Marine Wildlife Mitigation and Training Plan
NEPA	National Environmental Policy Act
nm	Nautical miles
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
OGV	Ocean going vessel
ROV	Remotely Operated Vehicle
RPM	Rotations per minute
SEEMP	Ship Energy Efficiency Management Plan
USCG	U.S. Coast Guard
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

The following Biological Assessment (BA) is for the proposed AT&T Corporation (AT&T) Segments E1 and N9 of the China-U.S. Cable Network Removal Project (Project). The BA has been prepared to review the potential extent the proposed action may affect any Federally threatened, endangered or proposed species described in this document. This BA is prepared in accordance with legal requirements set forth under Section 7 of the Federal Endangered Species Act (FESA, 16 U.S.C. 1536(c)), and follows the standard established by the National Environmental Policy Act (NEPA) and FESA guidance. In addition, the BA is prepared in accordance with the U.S. Marine Mammal Protection Act (MMPA) of 1972, amended in 1994, which protects all marine mammals by prohibiting intentional killing or harassment of cetaceans, pinnipeds, and sirenians. The species considered in this document were based on information obtained from National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) protected species list for the Project area.

1.1 SUMMARY OF PROPOSED PROJECT

In 1999 and 2000, AT&T installed the E1 and N9 fiber optic telecommunications cables into their existing facilities in Bandon, Oregon. The two cables were installed from the Bandon Landing in Coos County, Oregon to destinations in China and San Luis Obispo, California (Figures 1.2-1 and 1.2-2). The cable routes were selected based upon avoidance of sensitive seafloor habitats and active commercial fishing grounds. For a distance of approximately 30 miles offshore (1,000 fathoms [6,000 feet or ~1,830 meters), the cables were retroburied or mechanically plowed to a depth of approximately two to four feet deep. The cables were operated under the terms of Oregon State Lease Number EA-16987.

Although expected to operate for 25 years, the cables were rendered obsolete by other developments and have since become unnecessary and are no longer being utilized by AT&T. The Project objective is the termination of State Lease Number EA-16987 and removal of the E1 and N9 Cable segments from the nearshore bore pipe entry (Figure 1-3) to a water depth of 1,000 fathoms (6,000 feet [ft] or ~1,830 meters [m]). The on-land conduits would remain in place for potential future use through coordination with AT&T.

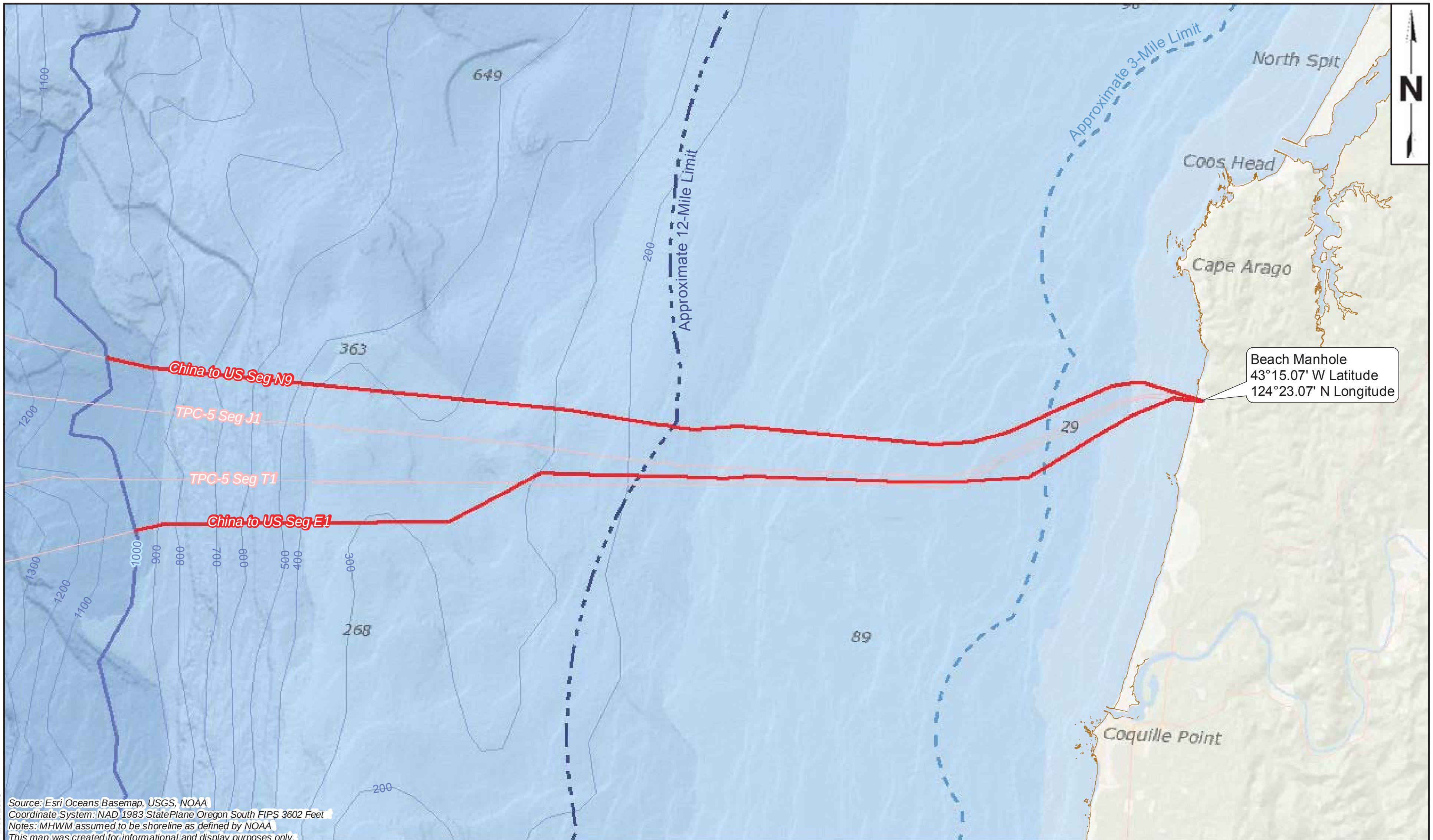
1.2 PROJECT OVERVIEW

The Project includes the following primary components within State and Federal jurisdictions:

Table 1.2-1. Project Components in State vs. Federal Jurisdictions

State Jurisdiction: Onshore to 3-Nautical Mile Limit	Federal Jurisdiction: 3-Nautical Mile Limit to 1,000 fathoms
• Termination/Modification to State Lease No. EA-16987. • Retention of Existing Conduits from Bandon Station to nearshore bore pipe exit for	• Complete Removal of E1 and N9 Nearshore/Offshore Cable Segments from 3-mile limit to 1,000 fathoms offshore. Live-boating will be conducted during this

State Jurisdiction: Onshore to 3-Nautical Mile Limit	Federal Jurisdiction: 3-Nautical Mile Limit to 1,000 fathoms
potential future use through coordination with AT&T. • Pre-Project Preparation Activities; including but not limited to surveys and identification of E1 and N9 offshore Cable segments • Removal of E1 and N9 Nearshore/Offshore Cable Segments from nearshore bore pipe entry to 3-Nautical Mile limit offshore. o E1 Cable Length from Shore to 3-Nautical Mile Limit (State Waters) = ~ 4.97 miles (7.99 kilometers) o N9 Cable Length from Shore to 3-Nautical Mile Limit (State Waters) = ~ 4.58 miles (7.37 kilometers)	operation. o E1 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~25.96 miles (47.78 kilometers) o N9 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~26.76 miles (43.06 kilometers)



LEGEND:

- Cable to be Removed
- Existing Cable
- 1,000 Fathom Depth
- Mean High Water Mark (MHWM)

Seg E1 Total Length: 30.93 miles / 49.77 kilometers
State Waters Length: 4.97 miles / 7.99 kilometers
Federal Waters Length: 25.96 miles / 41.78 kilometers
Seg N9 Total Length: 31.33 miles / 50.43 kilometers
State Waters Length: 4.58 miles / 7.37 kilometers
Federal Waters Length: 26.76 miles / 43.06 kilometers

Total area of disturbance *(disturbance corridor is 3.25-inches wide from MHWM to 1,000 fathom depth)*: **88,472 square feet / 2.03 acres**
State Waters Disturbance: 13,470 square feet
Federal Waters Disturbance: 75,001 square feet

MAP EXTENT:

0 2 4
Miles

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

PROJECT NAME:
AT&T CABLE DECOMMISSIONING PROJECT
COOS COUNTY, OR

PROJECT NUMBER: 1702-1974
DATE: January 2019

CABLE ROUTES MAP

FIGURE 1.2-1

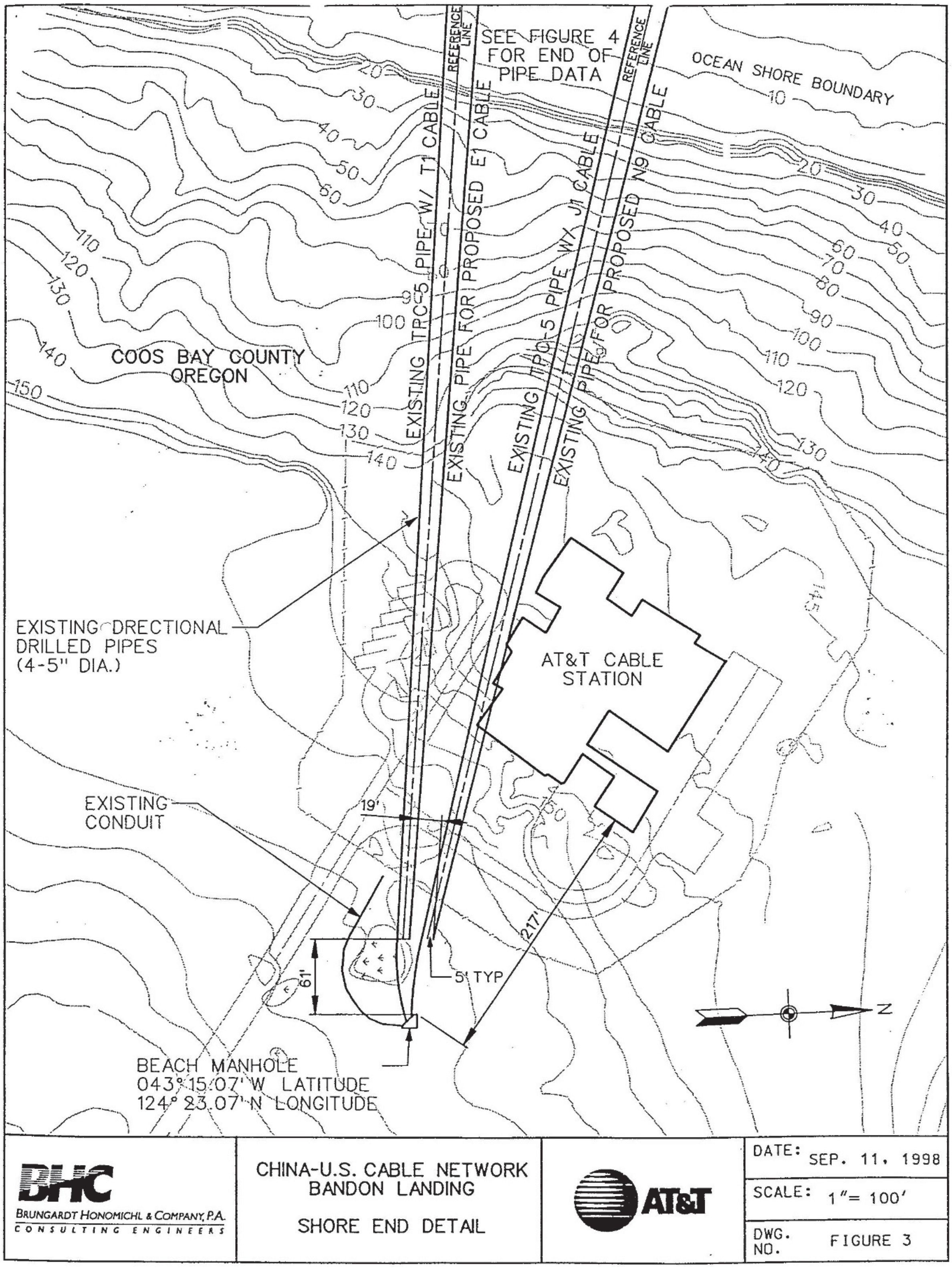


Figure 1.2-2. Cable Landing Site

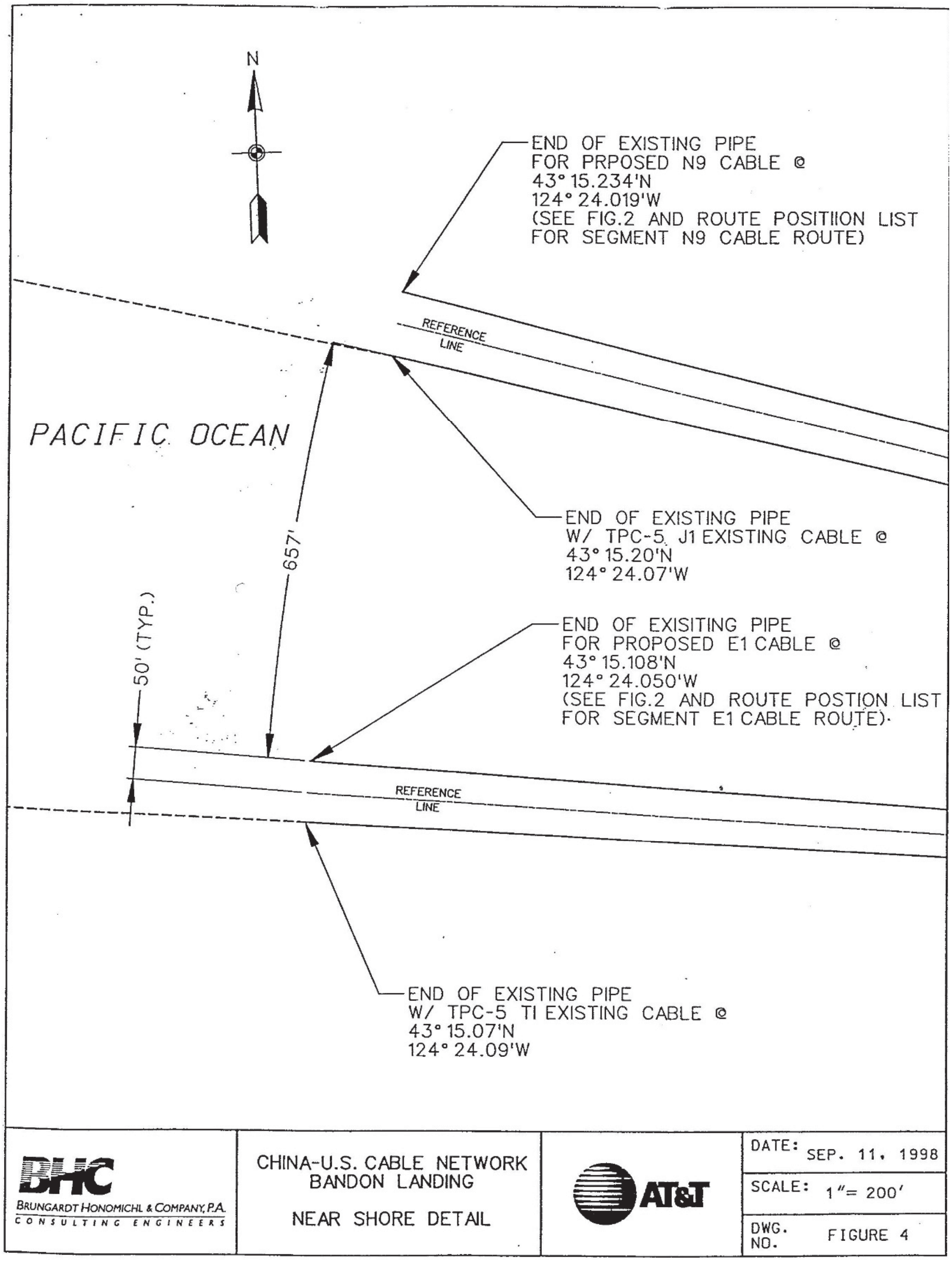


Figure 1.2-3. Nearshore Exit Pipe Location

1.3 CABLE REMOVAL PROCEDURES

1.3.1 Cable Specifications

The E1 and N9 Cables are 1.25-inches and comprised of a core of optical fibers encased in helically wound steel wires, and polyethylene insulation. The Cables are currently inactive. The portion of the E1 Cable that is subject to removal to 1,000 fathoms is approximately 30.93 miles (49.77 km). The portion of the N9 Cable that is subject to removal to 1,000 fathoms is approximately 31.33 miles (50.43 km).

A Remotely Operated Vehicle (ROV) inspection was conducted in 2013 along the E1 and N9 Cable routes out to a water depth of 1,000 fathoms to evaluate the condition of the cables and determine whether there are any areas where the cables are exposed (Global Marine, 2013). The ROV surveys showed that both the E1 and N9 Cables are buried at a maximum depth of approximately four feet. Hardbottom substrate ranged from occasional rock outcroppings to excessive hardbottom conditions. The Cables were suspended or exposed in most instances within the rock outcropping areas. Additionally, evidence of fishing activities including trawl tracks and abandoned ropes and cables were common along both Cable alignments. The E1 Cable had no protection at the out-of-service Cable TPC 5-T1 cable crossing (KP 12.121) and the E1 Cable was damaged and broken at KP 5.434. A joint box was observed at KP 4.976 and there was evidence of a cable bight, or loop, at KP 2.93 to KP 2.863. The N9 Cable was generally well buried and had two repair bight locations at KP 8097.440 and KP 8096.596.

Based on the shallow average cover depth (three feet) and frequent areas where the Cables are suspended or unburied; it has been determined that it will be feasible to recover the Cables by direct extraction (pulling) from the seafloor and that de-trenching using mechanical methods is not required.

1.3.2 Pre-Project Preparation Activities

1.3.2.1 Identification of Cables (Set Tone at 25 Hz)

AT&T maintains a Submarine Cable record and has surveyed the Cables as recently as 2013. These records will be used to locate the Cables on the seafloor. Additionally, technicians in the cable station are anticipated to inject a 25 Hertz (Hz) test set tone (inaudible) signal onto the copper conductor of the cable to assist in locating the cables at the time of removal. A magnetometer on either the cable recovery ship or an ROV are capable of picking up this tone as a means of locating and distinguishing Project cables from others.

1.3.3 Removal of Offshore Cable Segment from Conduit to 1,000 Fathoms

Removal of the offshore cable segments will occur within State and Federal waters as follows:

> **State Waters:** E1 Cable Length from Shore to 3-Nautical Mile Limit = ~4.97 miles (7.99 kilometers). N9 Cable Length from Shore to 3-Nautical Mile Limit = ~4.58 miles (7.37 kilometers).

Federal Waters: E1 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~25.96 miles (41.75 kilometers). N9 Cable Length from 3-Nautical Mile Limit to 1,000 fathoms = ~26.76 miles (43.06 kilometers).

A summary of the removal procedure applicable to the entire length of cable(s) to be removed (regardless of jurisdiction) is provided below.

1.3.3.1 Cable Recovery Vessel (M/V Layla – Mertech Marine)

Offshore Cable recovery would be accomplished with the Marine Vessel (M/V) Layla (or similar equivalent vessel), owned by Mertech Marine. The M/V Layla is a 216 ft (65.85 m) dedicated industry vessel that has been configured in support of cable installation and recovery efforts offshore (Figure 2-1). The M/V Layla has a draft of approximately 13.85 ft (4.22 m), and a transit speed of nine knots. The M/V Layla's Port of Registry is St. John's, Antigua.

The M/V Layla is propelled by a single Caterpillar 3512(B) diesel engine with a power output of 749 kilowatt (kW) and 1,600 rotations per minute (RPM). The M/V Layla has been registered by the Bureau Veritas as a Tier I vessel, holds an International Air Pollution Prevention (IAPP) certificate and maintains a Ship Energy Efficiency Management Plan (SEEMP), which limits air emissions significantly.

The M/V Layla cable recovery system also consists of one main winch and tensioners. The main winch provides main pulling force for recovery of the cable; the tensioner is providing the required auxiliary tension for the main winch and transports the recovered cable to the vessels cable tanks. The vessel is equipped with four cable tanks. The proposed Project's Cable recovery can primarily be accommodated on the M/V Layla. However, cable recovered in shallower water depths (100 ft or 30 m) will be taken to shore for appropriate disposal and recycling.

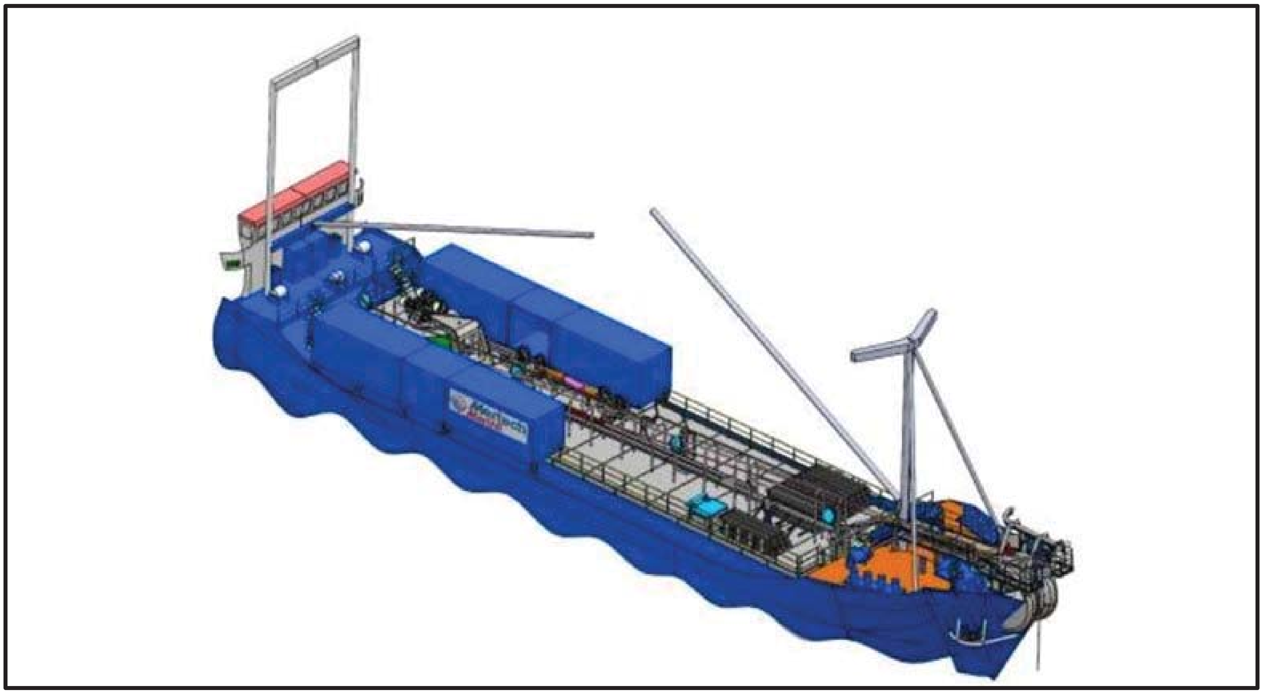


Figure 1.3-1. M/V Layla

1.3.3.2 Project Support Vessels

A maximum of four support vessels may be required to conduct Cable removal activities. Two dive support vessels and an additional smaller cable recovery vessel would be required in support of recovery of cable in water depths that are too shallow for the M/V Layla to operate (approximately 100 ft or 30 m). In addition, a Marine Wildlife Monitoring vessel will patrol the Project area and monitor the designated buffer zones for marine wildlife. The support vessels would likely originate from Coos Bay or Newport, Oregon and would be chosen based on appropriate capabilities to assist with cable recovery efforts.

1.3.3.3 Debris and Ballast Management

All cable recovery procedures and methodologies have been designed to minimize the possibility of introducing debris into the water. All debris produced on board of all vessels will be handled in accordance with International and National Regulations. Very small amounts of waste may be generated by the Project. Offshore vessels are equipped to manage, collect and properly dispose of waste products. Likewise, any waste generated during the shore-end activities will be collected and properly disposed.

To minimize the possibility of introducing non-native species into local waters, AT&T will require that any ballast discharges by non-local vessels take place in deep water beyond the 12-nautical miles (nm) limit of the territorial seas. It is not expected that Project-related vessels arriving from outside the area would unexpectedly encounter circumstances requiring ballast water discharge for safe navigation in the nearshore waters.

A log book will be maintained on all work vessels to keep track of all debris created by objects of any kind that fall into waters, as to types, date, time and location during offshore operations to facilitate identification and location of debris for debris recovery and site clearance verification. Any discharges of ballast water will be documented as to location of the vessel and volume discharged. Copies of ships' log books would be available to the U.S. Coast Guard (USCG) or other agencies upon request to AT&T.

1.3.3.4 Anchoring

Cable recovery will occur from the cut point at the furthest east portion of the cable and proceed westward to the nearshore conduit exit point in approximately 33 ft (10m) of water. The M/V Layla will not require anchoring during cable recovery activities. The M/V Layla will be accompanied by additional dive support vessels (DSVs) and a Marine Wildlife Monitoring vessel which may require a one- to three-point anchor to recover cable in shallow waters (approximately 100 ft or 30 m). The anchor will be set on previously surveyed soft bottom and retrieved vertically to avoid dragging across the sea floor. . Please refer to Appendix B for the Project's Marine Safety Plan for additional details.

1.3.3.5 Cable Recovery Scope and Methodology

Prior to recovery, the E1 and N9 Cables will be surveyed, identified, and delineated with buoys in nearshore areas awaiting the cable recovery vessel (M/V Layla). Offshore work will be completed by the M/V Layla working 24 hours per day for approximately 12 days. A summary of the offshore cable recovery methodology as provided by Mertech is described below.

Cable Recovery from Diving Limit to Shore

- The M/V Layla would be positioned offshore on the Cable route at the diving recovery limit (approximately 100 feet water depth).
- The contractor will send divers down to locate and expose the end of cable. The volume of sea floor sediment that will be jetted to expose the end of the cable will be approximately 10 to 15 cubic yards (8 to 11 cubic meters). The cable will be cut by divers using a water blasting device or exothermic cutting device.
- The cut end of the cable, will be rigged with a lift bag/buoy to allow handover to M/V Layla. The M/V Layla will continue recovery of this section.
- The divers will follow the cable route towards beach and work towards end of conduit, while installing lift bag at regular intervals to de-trench the cable. Divers will use hand trenching tools (i.e air-lift/jetting to expose the cable, if necessary.
- After having de-trenched a certain length of cable (suspended and floating between the lift bags), sections will be lifted on-board the dive support vessel.
- At crossings with other cables (In-Service or Out-of-Service), all cable located within approximately 50 m of crossing will remain in place.
- If manta ray anchors and/or associated steel pendent wires are discovered along cable route (i.e. within hardbottom areas or cable changes in direction), divers will use a hand trenching tool to expose cable, anchors and pendent wires. The volume of sea floor sediments disturbed will be approximately 10 to 15 cubic yards (8 to 11 cubic meters).
- The cable stopper/pendant wire will be cut by divers using a water blasting device or exothermic cutting device.
- The pendant wire and anchor will be connected to a lift bag to bring the items to the surface where they will be lifted onboard the DSV.

Cable Removal from Offshore Diving Limit to Depth of 1,000 Fathoms

- The M/V Layla would be positioned offshore on the cable route at a point close to 1,000 fathom contour.
- Grapnel gear is deployed at appropriate location to perform cutting run.
- After cutting of cable, a holding run is performed from cutting run position to get cable on-board.
- The cable is routed over the bow roller to the traction winch and subsequently via the cable tensions into one of the internal cable tanks and the M/V Layla continues to recover cable from offshore to inshore.
- The M/V Layla will pull itself forward using the cable while recovering. The cable will be pulled vertically, in alignment with its position on the seafloor to avoid contact with higher relief hard bottom substrate.

Figure 1.3-2 provides a top view of the Cable recovery activities while underway.

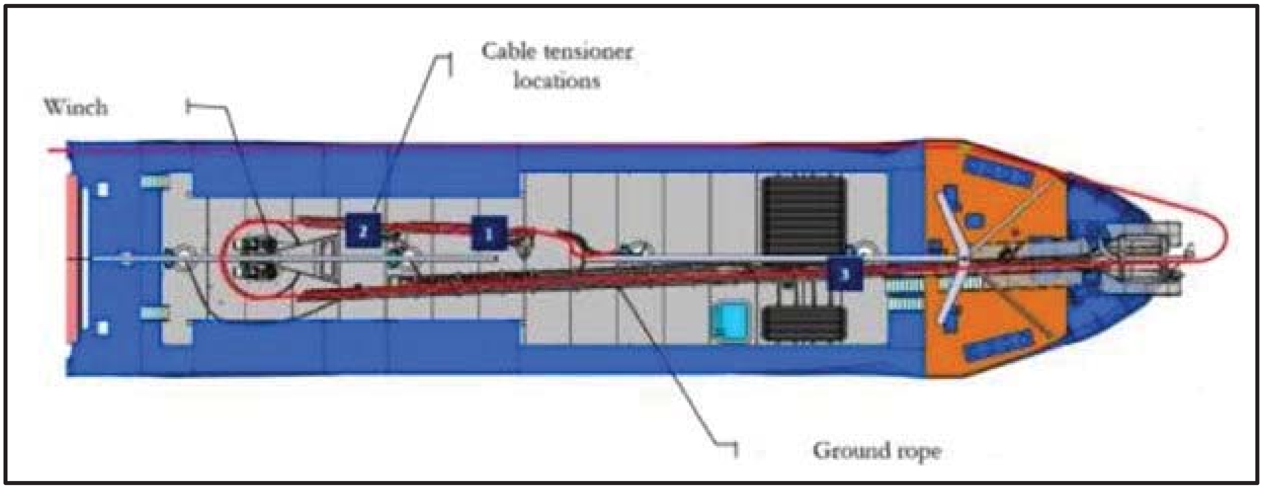


Figure 1.3-2. M/V Layla During Cable Recovery Operations (Top View)

1.3.3.6 Contingencies (Severe Weather Curtailment)

The Project vessels and methodology include a Marine Safety Plan prepared by Mertech (Appendix B). To appropriately plan for severe weather events, AT&T and Mertech's Marine Safety Plan includes provisions such as daily weather reporting and extended forecasts, as well as selection of a work window to optimize anticipated offshore sea conditions. However, if these conditions are exceeded, or are expected to worsen, measures will be taken to secure operations. Depending on the predicted severity of the storm, the ship will either ensure that enough cable is laid out to give maneuvering room, or will suspend operations completely, and cut the cable away. It will then either stand offshore until the weather abates, or seek shelter in port, as necessary. The power to determine critical conditions and make these decisions resides with the captain of the ship, who is ultimately responsible for the safety of the ship and its personnel.

1.3.4 Demobilization and Recycling of Recovered Cable

The recovered cables will be spooled on the M/V Layla and transported to a Mertech-owned mechanical dismantling/recycling factory located in Cape Town, South Africa. The dismantling procedure breaks the out-of-service cables down into their component parts which are then sold into various industries as copper, polyethylene, steel and aluminum. The dismantling process is fully mechanical without any smelting required to recover cable materials.

1.4 EQUIPMENT AND PERSONNEL

1.4.1 Equipment Requirements

The M/V Layla (or equivalent) will be used for cable recovery with support by a maximum of four support vessels. Cable recovery operations will be accomplished in approximately two weeks total. The primary equipment requirements for the Project are summarized in Table 1.4-1 below.

Table 1.4-1. Project Equipment List

Equipment Type	Horsepower (hp)	Hours/Day	# of Days
Nearshore – 12 Hours/Day			
Diving Support Vessel 1			
(2) Engines – Twin, 4-stroke outboards	60 hp	12 hours	14
(1) Air Lift- Powered by Compressor	-	12 hours	14
(1) LP Air Compressor	300 cfm	12 hours	14
Diving Support Vessel 2			
Engines – TBD	TBD	12 hours	14
Other Equipment - TBD	TBD	12 hours	14
Nearshore Cable Recovery Vessel			
Engines – TBD	TBD	12 hours	14
Other Equipment - TBD	TBD	12 hours	14
Marine Wildlife Monitoring Vessel			
Engines – TBD	TBD	12 hours	14
Offshore – 24 Hours/Day			
Cable Recovery Vessel – M/V Layla			
(1) Caterpillar Engine	749 kw/1,00 hp	24 Hours	12
(1) Caterpillar Generator	360 ekW/482 hp	24 Hours	12
(1) Main Winch (Electrically Driven)	-	24 Hours	12
(1) Tensioner (Electrically Driven)	-	24 Hours	12

1.5 PERSONNEL REQUIREMENTS

Offshore work will be completed by the M/V Layla and offshore diving crew; working 24 hours per day, for approximately 12 days. There is a minimum of approximately 40 persons required for the proposed work activities as detailed in Table 1.5-1.

Table 1.5-1. Personnel Requirements

Number of Personnel	Position Title
Cable Recovery Vessel (M/V Layla) Crew	
1	Project Manager
1	Site Manager
1	Shipboard Manager
1	Cable Recovery Vessel Master
5	Cable Recovery Vessel Deck Crew
4	Ship Crew
13	**TOTAL**
Diving Support Vessel 1 Crew	
1	Diving Support Supervisor
1	Diving Support Vessel Master
4	Diving Support Team
2	Diving Support Vessel Deck Crew
8	**TOTAL**
Diving Support Vessel 2 Crew	
1	Diving Support Supervisor
1	Diving Support Vessel Master
TBD	Diving Support Team
TBD	Diving Support Vessel Deck Crew
TBD	**TOTAL**
Nearshore Cable Recovery Crew	
1	Project Manager
1	Site Manager
1	Shipboard Manager
1	Cable Recovery Master
TBD	Cable Recovery Crew
TBD	Ship Crew
TBD	**TOTAL**
Marine Wildlife Monitoring Vessel	
4	Vessel Crew
4	Marine Wildlife Monitors
8	**TOTAL**

1.6 SCHEDULE

Project operations are currently anticipated to take place in the 2nd quarter (May) of 2019. It is anticipated that offshore Project activities can conservatively be completed in 12 days offshore; for a total recovery schedule of approximately two weeks.

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2.0 SPECIES ACCOUNTS AND STATUS OF SPECIES IN THE ACTION AREA

Based on the species lists provided on the USFWS and NMFS websites (USFWS, 2019; and NMFS, 2019a), an analysis of the range and habitat preferences was conducted. The descriptions in this section are confined to those listed species that have a potential to occur in the Project area (Tables 2.0-1). Certain species were eliminated from these analyses due to the absence of the preferred habitat within the Project site. Other species were eliminated from consideration because the Project site was beyond the recorded geographic range for the species.

Table 2.0-1. Federally Listed Species Within the Project Area and Their Likelihood of Occurrence within the Project Area

Common Name	Scientific Name	Status[1]	Likelihood to occur
TURTLES			
Olive Ridley turtle	*Lepidochelys olivacea*	FT	Possible
Green turtle	*Chelonia mydas*	FT	Possible
Loggerhead turtle	*Caretta caretta*	FT	Possible
Leatherback turtle	*Dermochelys coriacea*	FE	Possible
BIRDS			
Black oystercatcher	*Haematopus bachmani*	M, BCC	Likely to Occur
Marbled murrelet	*Brachyramphus marmoratus*	M, FT	Likely to Occur
Short-tailed albatross	*Phoebastria albatrus*	M, FE	Unlikely to Occur
MAMMALS			
Blue whale	*Balaenoptera musculus*	FE	Possible
Fin whale	*Balaenoptera physalus*	FE	Possible
Humpback whale	*Megaptera novaeangliae*	FE	Possible
Northern right whale	*Eubalaena glacialis*	FE	Unlikely to Occur
Sperm whale	*Physeter macrocephalus*	FE	Possible
Sei whale	*Balaenoptera borealis*	FE	Possible
Southern resident killer whale	*Orcinus orca*	FE	Possible

Status[1]
M = Protected under the Federal Migratory Bird Treaty Act (MBTA)
FE = Federally endangered BCC = USFWS Bird of Conservation Concern
FT = Federally threatened

2.1 SPECIES ACCOUNTS

2.1.1 Black oystercatcher (*Haematopus bachmani*)

2.1.1.1 Status

The black oystercatcher was selected as a USFWS Bird of Conservation Concern (BCC) in 2002 due to its small population size and restricted range and vulnerability to human-related habitat disturbances.

2.1.1.2 Range and Habitat

The Black Oystercatcher occurs along the North American Pacific coast from the Aleutian Islands to Baja California, though they are most abundant in the northern portions of their range. Only 20 percent of the population is found in the southern half of the geographic range, from northern Washington to the central Pacific coast of Baja California. The majority of the estimated global population resides in Alaska (Tessler et al., 2007).

2.1.1.3 Natural History

Black oystercatchers are a keystone species in the Pacific Northwest intertidal and favor rocky shorelines foraging on intertidal invertebrates including mussels, limpets, chitons, crabs, and barnacles. Black oystercatchers are a long-lived shorebird that nests above the high tide line on offshore rocks, rocky shores, and sand/gravel beaches. In Oregon, black oystercatchers breed on the outer coasts of marine shorelines in individual (non-colonial) nesting sites. They are an uncommon to fairly common resident on rocky shores and sand/gravel beaches which characterize the shoreline within the Project region. During breeding season in Oregon (May to August), Black oystercatchers are most abundant in south of Cape Arago which is approximately 3.5 miles (5.7 kilometers) north of the Project area (Tessler et al., 2007).

2.1.1.4 Population Trend

To date, there is no systematic census on the population of black oystercatchers, but non-specific multispecies bird surveys estimate approximately 8,900 and 11,000 individuals. If population estimates are accurate, the black oystercatcher is one of the least abundant marine shorebirds in North America. Due to the lack of a systematic sampling effort, broad-scale population trends are unknown (Tessler et al., 2007).

2.1.2 Marbled Murrelet (*Brachyramphus marmoratus*)

2.1.2.1 Status

The marbled murrelet was listed as a Federally threatened species in 1992. Critical habitat has been designated in nesting habitat east of Coos Bay, but does not occur in the Project area (USFWS, 2016).

2.1.2.2 Range and Habitat

The marbled murrelet is a small sea bird that spends most of its life in the nearshore marine environment, but nests and roosts inland in low-elevation old growth forests, or other forests with remnant large trees. It is generally confined to the marine fog belt near the coast. Nesting generally occurs in the marine fog belt within 50 mi (80.4 km) of the coast in coast redwood, Douglas fir, western red cedar, western hemlock, and Sitka spruce. The species nests from Washington to central California (Monterey Bay area). Studies have found that murrelet abundance is greater offshore of fine- to medium- grained sand beaches and was also greater offshore of estuaries and marshes, compared to other substrates (Stine et al., 2018). In an earlier study of murrelet habitat use off southern Oregon, murrelets were most abundant near ocean bays, river mouths, sandy shores, and submarine canyons (Stine et al., 2018). Murrelet habitat nearest to the Project area includes the Coquille River mouth in Bandon and Coos Bay and estuary.

2.1.2.3 Natural History

Nesting season for this species is late March to late September; downy young, and fledged juveniles have been observed June to September. Activity in forest nesting areas is highest from mid-April through late July in California and Oregon, early May through early August in Washington, and mid-May through early August in Alaska. Clutch size is one and incubation lasts about 30 days. Murrrelet's diet includes fishes (sandlance, capelin, herring, etc.), crustaceans (mysids, euphausiids), mollusks (NatureServe Explorer, 2017).

2.1.2.4 Population Trends

No definitive population data is known; however, current studies suggest that the current population exhibits a long-term downward trend (USFWS, 2017c).

2.1.3 Short-tailed Albatross (*Diomedea albatrus*)

2.1.3.1 Status

The short-tailed albatross was originally listed as endangered in accordance with the Endangered Species Conservation Act of 1969 (ESCA) as a foreign species. On July 31, 2000, the listing was revised to reflect the short-tailed albatross as endangered throughout its range. No critical habitat has been designated (USFWS, 2014).

2.1.3.2 Range and Habitat

As of 2014, 78 percent of the known breeding short-tailed albatross use a single colony, Tsubamezaki, on Torishima Island. The remaining population nests on other islands surrounding Japan and one suspected pair was identified on Kure Atoll in the Northwestern Hawaiian Islands. During the non-breeding season, short-tailed albatross range along the Pacific Rim from southern Japan to northern California, primarily along continental shelf margins (USFWS, 2008). There is evidence that the waters surrounding the Aleutian Islands are important foraging grounds while albatross undergo an extensive molting period. Primarily juvenile short-tailed albatrosses have been recorded along the Oregon coastline including the Project region (USFWS, 2014).

2.1.3.3 Natural History

Nests consist of a divot on the ground lined with sand and vegetation with eggs hatch in late December and January. The diet of this species is not well studied; however, research suggests at sea during the non-breeding season that squid, crustaceans, and fish are important prey (USFWS, 2009).

2.1.3.4 Population Trends

As of 2014, the estimated population was 4,354 short-tailed albatrosses with a three-year running average growth rate range of 5.2 to 9.4 percent (USFWS, 2014).

2.2 TURTLES

2.2.1 Green Turtle (*Chelonia mydas*)

2.2.1.1 Status

The East Pacific distinct population segment (DPS) was listed as Federally threatened on April 6, 2016. Critical habitat has been designated for the species in Puerto Rico, but none in the Project area (NMFS, 2015).

2.2.1.2 Range and Habitat

Green turtles generally occur worldwide and generally found in tropical and subtropical waters along continental coasts and islands between 30 degrees North and 30 degrees South. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south (NMFS, 2015). Southern Oregon is on the northern border of the Eastern Pacific Distinct Population Segment (DPS).

2.2.1.3 Natural History

Green turtles can weigh 300 to 350 pounds (lbs) (135 to 160 kilograms [kg]) and three feet (one meter) in length. They are herbivorous, feeding primarily on algae and sea grasses (NMFS, 2017c). Nesting season varies depending on location, but in the southeastern U.S., females generally nest in the summer between June and September; peak nesting occurs in June and July. During the nesting season, females nest at approximately two-week intervals, laying an average of five clutches. In Florida, green turtle nests contain an average of 135 eggs, which will incubate for approximately two months before hatching. Females will return to their natal beaches to lay eggs every two to four years. Sexual maturity in green turtles may occur anywhere between 20 and 50 years (NMFS, 2015). In the U.S., green turtles nest primarily along the central and southeast coast of Florida where an estimated 200 to 1,100 females nest annually. There are no known nesting sites along the west coast of the U.S., and the only known nesting location in the continental U.S. is on the east coast of Florida.

2.2.1.4 Population Trends

Recent minimum population estimates for green turtles indicate that at least 20,112 individuals are known to occur in the eastern Pacific (NMFS, 2015).

2.2.2 Loggerhead Turtle (*Caretta caretta*)

2.2.2.1 Status

The loggerhead was first listed as endangered throughout its range on July 28, 1978. In September 2011, NMFS and USFWS listed nine DPS of loggerhead turtles under the ESA. At that time, the North Pacific loggerhead turtle DPS was Federally listed as an endangered species (NMFS, 2011). No critical habitat has been designated for the North Pacific DPS (NMFS, 2011).

2.2.2.2 Range and Habitat

Loggerheads are circumglobal, occurring throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Loggerheads are the most abundant species of sea turtle found in coastal waters. Within the North Pacific, loggerhead nesting has been documented only in Japan, although low level nesting may occur outside of Japan in areas surrounding the South China Sea. In the South Pacific, nesting beaches are restricted to eastern Australia and New Caledonia and, to a much lesser extent, Vanuatu and Tokelau (NMFS, 2011). Southern California is considered to be the northern limit of loggerhead turtle distribution in the eastern Pacific; however, loggerhead turtles have been stranded on beaches as far north as Alaska (NMFS 2011). In the U.S., nesting occurs only in Florida (NMFS, 2011).

2.2.2.3 Natural History

Loggerhead turtles primarily occur in subtropical to temperate waters and are generally found over the continental shelf (NMFS, 2009). In the southeastern U.S., mating occurs in late March to early June and females lay eggs between late April and early September. Females can lay three to five nests during a single nesting season. Loggerhead sea turtles are primarily carnivorous, although they do consume some plant matter as well (NMFS, 2009).

2.2.2.4 Population Trends

The north Pacific population of loggerhead turtles is declining (NMFS and USFWS, 2008).

2.2.3 Leatherback Turtle (*Dermochelys coriacea*)

2.2.3.1 Status

The leatherback turtle was listed as Federally endangered in 1970. NMFS designated critical habitat to provide protection for endangered leatherback sea turtles along the U.S. West Coast in January 2012 (NMFS, 2017c). Critical habitat within Oregon extends 25,004 square miles (64,760 square km) stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 6,562 ft (2,000 m) depth contour. The Project area is located near the southern boundary of designated critical habitat.

2.2.3.2 Range and Habitat

Leatherback turtles are the most common sea turtle off the west coast of the U.S. Leatherback turtles have been sighted as far north as Alaska and as far south as Chile (Dept. of the Navy, 2000; NMFS, 2013) and their extensive latitudinal range is due to their ability to maintain warmer body temperatures in colder waters (NMFS, 2013). Off the U.S. west coast, leatherback turtles are most abundant from July to September; however, their presence off the U.S. west coast is “two pronged” with sightings occurring in northern California, Oregon, Washington, and southern California, with few sightings occurring along the intermediate (central California) coastline. Among foragers tagged in coastal waters off California, the majority moved north and spent time in areas offshore of northern California and Oregon, before moving towards the equatorial eastern Pacific, then eventually westward presumably towards western Pacific Ocean nesting beaches (NMFS, 2013).

2.2.3.3 Natural History

The leatherback turtle can reach 2,000 lbs (900 kg) and get 6.5 ft (2 m) in length (Sea Turtle Conservancy, 2019). Their lifespan and age of sexual maturity are both unknown. Leatherback turtles are omnivores, but feed principally on soft prey items such as jellyfish and planktonic chordates (e.g., salps) (Sea Turtle Conservancy, 2019). The leatherback turtle lacks a hard shell, and instead has a thick, leathery carapace consisting of connective tissue covering dermal bones. Female leatherbacks lay clutches of approximately 100 eggs on sandy, tropical beaches. Females nest several times during a nesting season, typically at eight to 12-day intervals. The eggs will incubate for 60-65 days before hatching (Sea Turtle Conservancy, 2019).

2.2.3.4 Population Trends

Recent leatherback turtle eastern Pacific population estimates indicate that at least 361 nesting females are known to occur (NMFS, 2007c). This population is believed to be decreasing worldwide (NMFS, 2019b).

2.2.4 Olive Ridley Turtle (*Lepidochelys olivacea*)

2.2.4.1 Status

In 1978, the breeding populations of the olive ridley turtle, on the Pacific coast of Mexico were listed as Federally endangered, while all other populations were listed as Federally threatened. No critical habitat has been designed for the species.

2.2.4.2 Range and Habitat

This species is considered to be the most common of the marine turtles and is distributed circumglobally (NMFS, 2014). Within the eastern Pacific Ocean, olive ridley turtles typically occur in tropical and subtropical waters, as far south as Peru and as far north as California, but occasionally have been documented as far north as Alaska (NMFS, 2014). The olive ridley is mainly a "pelagic" sea turtle, but has been known to inhabit coastal areas, including bays and estuaries.

2.2.4.3 Natural History

Olive ridley turtles weigh on average 100 lbs (45 kg) and are 22 to 31 in (55 to 80 cm) in length. Their lifespan is unknown, but they reach sexual maturity around 15 years. Vast numbers of turtles come ashore and nest in what is known as an "arribada" during which hundreds to thousands of females come ashore to lay their eggs. At many nesting beaches, the nesting density is so high that previously laid egg clutches are dug up by other females excavating the nest to lay their own eggs. Major nesting beaches are located on the Pacific coasts of Mexico and Costa Rica (NMFS, 2014).

2.2.4.4 Population Trends

At-sea abundance estimates appear to support an overall increase in the Endangered breeding colony populations on the Pacific coast of Mexico (NMFS, 2014).

2.3 MARINE MAMMALS (MYSTICETI)

2.3.1 Blue Whale (*Balaenoptera musculus*)

2.3.1.1 Status

The blue whale was listed as Federally endangered throughout its range in 1970 under the ESCA of 1969 prior to the passage of the endangered Species Act in 1973. No critical habitat has been designated.

2.3.1.2 Range and Habitat

Blue whales are distributed worldwide in circumpolar and temperate waters, and although they are found in coastal waters, they are thought to occur generally offshore compared to other baleen whales (Allen et al., 2011). Like most baleen whales, they migrate between warmer water breeding and calving areas in winter and high-latitude feeding grounds in the summer. Feeding grounds have been identified in coastal upwelling zones off the coast of California primarily within two patches near the Gulf of the Farallones and at the western part of the Channel Islands (Allen et al., 2011). They migrate seasonally between summer and winter, but some evidence suggests that individuals remain in certain areas year-round. Blue whales are occasionally observed off the Oregon coast, but usually stay approximately ten miles offshore (ODFW, 2019).

2.3.1.3 Natural History

Blue whales on average are 75 to 80 ft (21 to 24 m) in length and weigh 100 to 150 tons (90,700 to 136,000 kg) making it the largest animal on Earth (Allen et al., 2011). Blue whales have no known social structure and can be seen traveling alone or in groups of 19 to 80 individuals. Blue whales migrate to tropical waters off Mexico and Central America for breeding and calving (ODFW, 2019). Blue whales feed primarily on euphausid shrimp (krill).

2.3.1.4 Population Trends

The most recent estimates of the blue whale indicate that at a minimum of 1,551 individuals are known to occur off the west coast (NMFS, 2018a).

2.3.2 Fin Whale (*Balaenoptera physalus*)

2.3.2.1 Status

The fin whale was listed as a Federally endangered species in 1973, but no critical habitat has been identified for this species to date.

2.3.2.2 Range and Habitat

Fin whales are found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes, and less commonly in the tropics. Fin whales are migratory, moving seasonally into and out of high-latitude feeding areas, and their wintering areas are not widely known (NMFS, 2017). They are mostly commonly seen feeding over the continental shelf in areas of high productivity. Fin whales occur year-round off the coasts of Oregon, but abundance is lower in the Spring (NMFS, 2017a).

2.3.2.3 Natural History

Fin whales are on average 59 ft (18 m) in length and weigh 50 to 70 tons (45,000 to 64,000 kg) (Allen et al., 2011). Little is known about the social and mating systems of fin whales. It is believed that males become sexually mature at six to ten years of age; and females at seven to 12 years of age. Physical maturity is attained at approximately 25 years for both sexes. Usually mating and birthing occurs in tropical and subtropical areas during midwinter. Fin whales feed on euphasid shrimp, copepods, and small fish. Fin whales are usually found in groups of two to seven whales and are considered fast swimmers (NMFS, 2017a).

2.3.2.4 Population Trends

The most recent estimates of the fin whale population indicate that at least 8,127 individuals are known to occur off California, Oregon, and Washington (NMFS, 2017a).

2.3.3 Humpback Whale (*Megaptera novaeangliae*)

2.3.3.1 Status

The humpback whale was listed as Federally endangered in 1970. In September 2016, NMFS revised the ESA listing for the humpback whale to identify 14 DPS, list one as threatened, four as endangered, and identify nine others as not warranted for listing. The humpback whale Central America DPS is listed as Federally endangered and the Mexico DPS is listed as a Federally threatened population, both DPS feed offshore of Oregon (NMFS, 2018b). No critical habitat has been designated.

2.3.3.2 Range and Habitat

Humpback whales are distributed worldwide and travel great distance during their seasonal migration, the farthest migration of any animal. Humpback whales spend the winter and spring months offshore of Central America and Mexico for breeding and calving, and then migrate to their summer and fall range between California and southern British Columbia to feed (Allen et al., 2011). Although humpback whales typically travel over deep, oceanic waters during migration, their feeding and breeding habitats are in shallow, coastal waters over continental shelves. Cold and productive coastal waters characterize feeding grounds (NMFS, 2018b). In the North Pacific, the California/Oregon/Washington stock winters in coastal Central America and Mexico, and migrates to areas ranging from the coast of California to southern British Columbia in summer/fall (NMFS, 2018b).

2.3.3.3 Natural History

Humpback whales are on average 42 ft (13 m) in length and weigh 25 to 40 tons (22,600 to 36,200 kg). Humpback whales are well known for their long pectoral fins, which can be up to 15 ft (4.6 m) long. These extensive fins give them increased maneuverability and they can be used to slow down or even go backwards. During the summer months, humpbacks spend the majority of their time feeding and building up fat stores (blubber) that they will live off of during the winter. Humpbacks filter feed on tiny crustaceans (mostly krill), plankton, and small fish (Allen et al., 2011).

2.3.3.4 Population Trends

The most recent population estimates of humpback whales indicate that at least 1,876 individuals occur off California, Oregon, and Washington (NMFS, 2018b). This population appears to be increasing.

2.3.4 North Pacific Right Whale (*Eubalaena japonica*)

2.3.4.1 Status

The northern Pacific right whale was listed as Federally endangered in 2008. In April 2008, NMFS designate critical habitat in the Gulf of Alaska and within the Bering Sea (NMFS, 2017b). The Project area is not within designated critical habitat.

2.3.4.2 Range and Habitat

Northern right whales inhabit the Pacific Ocean, particularly between 20 and 60 degrees North latitude. They primarily occur in coastal or shelf waters, although movements over deep waters are known. For much of the year, their distribution is strongly correlated to the distribution of their prey. During winter, right whales occur in lower latitudes and coastal waters where calving takes place. However, the whereabouts of much of the population during winter remains unknown. Right whales migrate to higher latitudes during spring and summer (NMFS, 2017b). Few sightings of right whales occur in the central North Pacific and Bering Sea. Sightings have been reported as far south as central Baja California in the eastern North Pacific, as far south as Hawaii in the central North Pacific, and as far north as the sub-Arctic waters of the Bering Sea and sea of Okhotsk in the summer (NMFS, 2017b).

2.3.4.3 Natural History

North Pacific right whales weigh up to 70 tons (63,500 kg) and can be 45 to 55 ft (13.7 to 16.7 m) in length. They are slow swimmers, reaching top speeds of five miles per hour (mph) (8 kilometers per hour [km/h]), and spend a lot of time on the surface; These characteristics may contribute to their high incidence in ship strikes (Allen et al., 2011). Females give birth to their first calf at an average age of nine to ten years. Gestation lasts approximately one year. Calves are usually weaned toward the end of their first year. This species feeds from spring to fall, and also in winter in certain areas. The primary food sources are zooplankton, including copepods, euphausiids, and cyprids. Unlike other baleen whales, right whales are skimmers: they feed by removing prey from the water using baleen while moving with their mouth open through a patch of zooplankton.

2.3.4.4 Population Trends

Photographic recapture rate population estimates for this species remain low, with only 26 individuals being photographed (NMFS, 2017b).

2.3.5 Sei Whale (*Balaenoptera borealis*)

2.3.5.1 Status

The sei whale was listed as an endangered species in 1973. No critical habitat has been designated for the species.

2.3.5.2 Range and Habitat

Sei whales occur throughout most temperate and subtropical oceans of the world. The northern Pacific stock rarely ventures above 55 degrees North latitude or south of California (Allen et al., 2011; NMFS, 2017c). Sei whales are associated with areas of strong upwelling and mixing, where copepod densities would be high.

2.3.5.3 Natural History

Sei whales are up to 40 to 60 ft (12 to 18 m) in length and can weigh up to 100,000 pounds (45,000 kg). Sei whales are among the fastest of all the rorqual whales, reaching speeds of 35 mph (56 km/h). Like most baleen whales, they migrate between warmer waters used for breeding and calving in winter and high-latitude feeding grounds where food is plentiful in the summer. The northern Pacific stock ranges almost exclusively in pelagic waters and rarely ventures into coastal waters (Allen et al., 2011; NMFS, 2017c). Sei whales tend to avoid ships, and therefore are rarely sighted (Allen et. al., 2011).

2.3.5.4 Population Trends

The most recent estimates of the sei whale northern Pacific stock population indicate that at least 374 individuals are known to occur off California, Oregon, and Washington (NMFS, 2017c).

2.4 MARINE MAMMALS (ODONTECETI)

2.4.1 Sperm Whale (*Physeter macrocephalus*)

2.4.1.1 Status

The sperm whale was listed as a Federally endangered species in 1970 under the endangered Species Conservation Act of 1969. No critical habitat has been designated.

2.4.1.2 Range and Habitat

Sperm whales tend to inhabit areas with a water depth of 1,968 ft (600 m) or more and are uncommon in waters less than 984 ft (300 m) deep. Female sperm whales are generally found in deep waters (at least 3,280 ft [1,000 m]) of low latitudes (less than 40 degrees, except in the North Pacific where they are found as high as 50 degrees). These conditions generally correspond to sea surface temperatures greater than 15 degrees Celsius, and while female sperm whales are sometimes seen near oceanic islands, they are typically far from land. Off Oregon, sperm whales are present in offshore waters year-round, with peak abundance from March through November (Allen et al., 2011; ODFW, 2019).

2.4.1.3 Natural History

Sperm whales are on average 36 to 53 ft (11 to 16 m) in length and weigh 50 tons (45,000 kg). Female sperm whales reach sexual maturity around nine years of age when they are roughly 29 ft (9 m) long. One calf is produced every five years after a 14 to 16-month gestation period. Males reach physical maturity around 50 years and when they are 52 ft (16m) long. Sperm whales are the deepest divers of any marine mammals reaching depths of 1.2 mi (2 km) remaining under water for around one hour (Allen et al., 2011). There are no known mating or birthing grounds, but both more than likely occur in lower latitudes between April and

August (Allen et al., 2011). Sperm whales feed on squid, octopus, sharks, rays and fish (ODFW, 2019).

2.4.1.4 Population Trends

The most recent estimates indicate that at least 1,270 individuals are known to occur off California, Oregon, and Washington (NMFS, 2018c). Long-term population trends appear to be stable at this time (NMFS, 2018c).

2.4.2 Southern Resident Killer Whale

2.4.2.1 Status

The Southern Resident population of killer whales were listed as Federally endangered in November 2005. Critical habitat is designated for the species within the inland waters of Washington State and does not occur within the Project area.

2.4.2.2 Range and Habitat

Killer whales have a cosmopolitan distribution and along the west coast of North America, killer whales occur along the entire North Pacific coast from Alaska to the outer coasts of California. The Southern Resident killer whale pods L1 and K1 spend more time offshore in the winter and have been sighted as far south as Monterey Bay in recent years; however, Southern Resident killer whales primarily spend April through October within the Puget Sound (NMFS, 2018d).

2.4.2.3 Natural History

The Southern Resident killer whale population is comprised of three pods, designated J, K, and L. Whales from the same pod tend to stay together and consist of many matriarch whales and their offspring (NOAA, 2014). Southern Resident killer whales feed mostly on chinook salmon in the intra-coastal waters of British Columbia and Washington in the summer but will also consume other salmon species and ground fish during the winter and spring months while offshore (NOAA, 2014).

2.4.2.4 Population Trends

It is estimated that the Northern Resident killer whale population has decreased in recent years from 96 whales in 1993 to 79 whales in 2001. The most recent population estimate is 83 whales. In addition, the reduction in salmon stocks continues to jeopardize the population's growth.

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3.0 IMPACT ASSESSMENT

This Biological Assessment has been prepared to provide information to the Federal lead agencies, NMFS and the USFWS, to determine the potential to affect threatened or endangered species, based on one of three possible findings for each species potentially affected:

- No effect: the proposed action will not affect the listed species or critical habitat;
- Not likely to adversely affect: effects of the listed species are expected to be discountable (extremely unlikely to occur), insignificant (minimal impact without take), or beneficial; and
- Likely to adversely affect: adverse effect may occur as a direct or indirect result of the proposed action, and the effect is not discountable, insignificant or beneficial.

Potential impacts due to Project activities includes lighting effects on wildlife and birds, potential entanglement from in-water cables and lines, degradation of water quality or seafloor habitats from the discharge of petroleum from an accidental spill, and accidental collisions with marine wildlife. Potential impacts are described below.

3.1 LIGHTING IMPACTS

Studies suggest that light effects include disorientation, structural-related mortality due to disorientation, and interruption of natural behaviors (Saleh, 2007; Schaar, 2002; Harder, 2002). Recommended mitigations include the elimination of “bare bulbs” and upward-pointing lights, shielding or cantering light sources, and minimizing overall light level to that which is needed for safe operations (Saleh, 2007).

Effects range from attraction to disorientation, as well as alteration of flight patterns, and can result in an increase in mortality from striking buildings, and/or exhaustion and, ultimately, increased predation. Podolsky (2002) indicates that artificial lighting appears to “confuse” seabirds, particularly during their migration between urbanized nesting sites and their offshore feeding grounds. Longcore and Rich (2001) reported that migrating birds can be attracted to tall, well-lit structures, which can result in collisions. The Project schedule overlaps with migrating birds in Spring that will use the rocky coastline for foraging and potentially nesting habitat. The bird species listed in Table 2.0-1 have the potential to occur within the Project area during nighttime operations. Poot et al. (2008) found that white and red light interfere with the magnetic compass of migrating birds, where they caused disorientation at low light intensity, compared to a high-intensity green light that caused less disorientation. The researchers concluded that the disorientation is due to the wavelength; green and blue lights have a short wavelength resulting in very little observable impact to bird’s orientation.

The M/V Layla will be lit for compliance with USCG navigational hazard requirements. Shielding of the lighting to direct it downward, green and/or blue lighting, and limiting the lighted area will reduce the potential impacts to flying seabirds. USCG-required vessel lighting will be onboard and on deck lighting will be shielded and directed inward to avoid over-water lighting. The potential effects of lighting on marine wildlife, particularly birds, are expected to be minimal, if any; however, to reduce the possibility of bird strikes during night operations, some Project-specific mitigations are recommended as further described in Section 4.4 (Measures to Reduce Lighting Impacts to Marine Birds).

3.2 ENTANGLEMENT

Project equipment and vessel activity in the Project area increases the probability that marine wildlife might become entangled in the cable segments being recovered or ROV support lines; however, there have been no reports of marine wildlife becoming entangled in support cables or mooring lines along the Pacific outer continental shelf. The M/V Layla will not be required to anchor or install moorings for anchorage. Given the limited scope of cable or lines in the water and the short Project duration, impacts from entanglement not likely to adversely affect threatened or endangered species.

3.3 VESSEL COLLISION

Impacts from vessel operations can range from a change in the animal's travel route or time on the surface to direct mortality. Incidental collisions of Project-related vessels would be expected to most likely affect marine mammals and sea turtles. Such collisions have been documented in southern California; however, those collisions are typically associated with areas with higher population densities of marine wildlife, large ship interactions, and slower-moving marine wildlife on the ocean surface.

The Project vessel will progress slowly along transit routes during mobilization and during cable recovery activities; therefore, interactions with whales are not expected. The vessel collision impacts on marine wildlife is not expected to be significant. In addition, AT&T has proposed additional monitoring and mitigation measures to further reduce any potential impact (refer to Section 5.5 – Measures to Reduce Vessel Collision Impacts).

3.4 OIL SPILL POTENTIAL

The unintentional release of petroleum into the marine environment from proposed Project activities could result in potentially significant impacts to the marine biota, particularly avifauna and early life stage forms of fish and invertebrates, which are sensitive to those chemicals. Refined products (i.e., diesel, gasoline.) are more toxic than heavier crude or Bunker-type products, and the loss of a substantial amount of fuel or lubricating oil during survey operations could affect the water column, seafloor, intertidal habitats, and associated biota, resulting in their mortality or substantial injury, and in alteration of the existing habitat quality. The release of petroleum into the marine environment is considered a potentially significant impact.

Although many marine organisms have created adaptive strategies to survive in their environment, when these marine organisms are introduced to oil, it adversely affects them physiologically. For example, physiological effects from oil spills on marine life could include the contamination of protective layers of fur or feathers, loss of buoyancy, and loss of locomotive capabilities. Direct lethal toxicity or sub-lethal irritation and temporary alteration of the chemical make-up of the ecosystem can also occur.

3.4.1 Turtles

Oil spills are not considered a high cause for mortality for sea turtles, although recent reports from the Gulf of Mexico Deepwater Horizon spill indicate a possible increase in strandings of oil impacted turtles. Since sea turtle species have been listed as threatened or endangered under the FESA, there is very little direct experimental evidence about the toxicity of oil to sea turtles. Sea turtles are negatively affected by oil at all life stages: eggs on the beach, post hatchings, young sea turtles in near shore habitats, migrating adults, and foraging grounds. Each life stage varies depending on the rate, severity, and effects of exposure.

Sea turtles are more vulnerable to oil impacts due to their biological and behavior characteristics including indiscriminate feeding in convergence zones, long pre-dive inhalations, and lack of avoidance behavior (Milton et al., 1984). A sea turtles diving behavior puts individuals at risk because they inhale a large amount of air before diving and will resurface over time. During an oil spill, this would expose sea turtles to long periods of both physical exposure and petroleum vapors, which can be the most harmful during an oil spill.

3.4.2 Marine Birds

Marine birds can be affected by direct contact with oil in three ways: (1) thermal effects due to external oiling of plumage; (2) toxic effects of ingested oil as adults; and (3) effects on eggs, chicks, and reproductive abilities.

The loss of waterproofing is the primary external effect of oil on marine birds and buoyancy can be lost if the oiling is severe. A main issue with oil on marine birds is the damage oil does to the arrangement of feathers, which is responsible of water repellency (Fabricius, 1959). Without water repellency, the water can go through the dense layers of feathers to the skin exposing the bird to cold water temperatures. To survive, the bird must metabolize fat, sugar, and eventually skeletal muscle proteins to maintain body heat. The cause of oiled bird deaths can be the result from exposure and loss of these energy reserves as well as the toxic effects of ingested oil (Schultz et al., 1983). The internal effect of oil on marine birds varies. Anemia can be the result of bleeding from inflamed intestinal walls. Oil passing into the trachea and bronchi could result in the development of pneumonia. A bird's liver, kidney, and pancreatic functions can be disturbed due to internal oil exposure. Ingested oil can inhibit a bird's mechanism for salt excretion that enables seabirds to obtain fresh water from salt water and could result in dehydration (Holmes and Cronshaw, 1975).

A bird's vulnerability to an oil spill depends on each individual species' behavioral and other attributes. Some of the more vulnerable species are alcids and sea ducks due to the large amount of time they spend on the ocean surface, the fact that they dive when disturbed, and their gregarious behavior. Also, alcids and other birds have low reproductive rates, which result in a lengthy population recovery time. A bird's vulnerability depends on the season as well. For example, colonial seabirds are most vulnerable between early spring through autumn because they are tied to breeding colonies.

3.4.3 Marine Mammals

The impact of direct contact with oil on the animal's skin varies by species. Cetaceans have no fur; therefore, they are not susceptible to the insulation effects of hypothermia in other mammals. However, external impacts to cetaceans from direct skin contract with oil could include: eye irritation, burns to mucous membranes of eyes and mouth, and increase vulnerability to infection.

Baleen whales skim the surface of water for feeding and are particularly vulnerable to ingesting oil and baleen fouling. Adult cetacean would most likely not suffer from oil fouling of their blowholes because they spout before inhalation, clearing the blowhole. Younger cetaceans are more vulnerable to inhale oil. Internal injury from oil is more likely for cetaceans due to oil. Oil inhaled could result in respiratory irritation, inflammation, emphysema, or pneumonia. Ingestion of oil could cause ulcers, bleeding, and disrupt digestive functions. Both inhalation and ingested chemicals could cause damage in the liver, kidney, lead to reproductive failure, death, or result in anemia and immune suppression.

An accidental petroleum release is highly unlikely to occur; therefore, impact from the accidental release of petroleum are not likely to adversely affect threatened and endangered species. In order to reduce the potential impacts from oil spills, AT&T has prepared an Oil Spill Response Plan that will detail emergency response protocols in case of a petroleum release and the equipment and resources that will be available on the Project vessels (refer to Appendix A).

4.0 PROJECT INCORPORATED MEASURES

The applicant proposed mitigation measures detailed in the following section will be implemented to further minimize the potential disturbance of marine wildlife during Project operations. The Project incorporates both design and operational procedures for minimizing potential impacts to special-status species.

4.1 PRE-ACTIVITY ENVIRONMENTAL ORIENTATION

A marine biologist will present an environmental orientation for all Project personnel prior to conducting work. The purpose of the orientation is to educate Project personnel on identification of wildlife in the Project area and to provide an overview of the mitigation measures that will be implemented during the Project. Specifically, the orientation will include, but not be limited to, the following:

- Identification of wildlife expected to occur in the Project area and periods of occurrence along the central coast;
- Overview of the Marine Mammal Protection Act (MMPA), Federal Endangered Species Act (FESA), and Oregon Endangered Species Act (ESA), regulatory agencies responsible for enforcement of the regulations, and penalties associated with violations;
- Procedures to be followed during mobilization and demobilization, transiting of Project vessels, and the implementation of shutdowns and ramp-ups throughout the duration of the Project; and
- Reporting requirements in the event of an inadvertent collision and/or injury to a marine wildlife or sensitive habitats.

Prior to Project activities briefings will be held between the AT&T representatives, the vessel captains, vessel representatives and the Marine Wildlife Monitors (MWMs). Topics will include personnel safety, identification of key personnel, communication protocol, and lines of authority.

4.2 ENTANGLEMENT HAZARDS

To minimize the risk of entanglement with marine wildlife, lines and cables necessary to perform the cable recovery tasks will be left in the water only as long as necessary to perform the task and then be retrieved back on deck. All other non-essential lines and cables will be kept clear of the water when not in use. All lines and cables will be kept as short as possible and with a minimum amount of slack.

4.3 MONITORING

4.3.1 Vessel-based Marine Wildlife Mitigation and Training Plan

AT&T will implement a Marine Wildlife Mitigation and Training Plan (MWMTP) that includes measures designed to reduce the potential impacts on marine wildlife, particularly marine mammals, by the proposed operations. The MWMTP will be implemented by a team of experienced MWMs who will be stationed aboard a Project support vessel throughout the duration of the Project. The vessel-based work will provide:

- The basis for real-time mitigation, if necessary, as required by the various permits issued to AT&T;
- Data on the occurrence, distribution, and activities of marine wildlife in Project area; and,
- Information to compare the distances, distributions, behavior, and movements of marine mammals relative to the Project vessel during cable removal activities.

4.3.2 Monitoring Data

Information for each observation will be recorded by onboard MWMs will include the following data:

- Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if determinable), bearing and distance from sound source array, apparent reaction to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and pace;
- Time, location, speed, and activity of the vessel, sea state, and visibility; and,
- The positions of other vessel(s) near the observer location.

The ship's position, speed of the vessel, water depth, sea state, and visibility will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a substantial change in any of those variables.

The MWMs will record their observations onto datasheets or directly into handheld computers. Between watches and during periods when operations are suspended, those data will be entered into a laptop computer running a custom computer database. The accuracy of the data entry will be verified in the field by computerized validity checks as the data are entered, and by subsequent manual checking of the database printouts against the original raw data on the field sheets. These procedures will allow initial summaries of data to be prepared during and shortly after the field season, and will facilitate transfer of the data to statistical, graphical, or other programs for further processing. Quality control of the data will be facilitated by: (1) the start-of-season training session; (2) subsequent supervision by the onboard field crew leader; and, (3) ongoing data checks during the field session.

4.3.3 Marine Wildlife Monitors

Vessel-based monitoring for marine wildlife will be performed by trained MWMs throughout the period of cable removal activities. Visual monitoring will occur during daylight. The MWMs will monitor the occurrence and behavior of marine wildlife near the survey vessels during all operations. MWM duties will include watching for and identifying marine wildlife; recording their numbers, distances, and reactions to the Project operations. A sufficient number of MWMs will be required onboard the survey vessel to meet the following criteria:

- 100 percent monitoring coverage during all periods of survey operations in daylight;
- Maximum of four consecutive hours on watch per MWM; and,
- Maximum of approximately 12 hours of watch time per day per MWM.

An experienced field crew leader will supervise the MWM team onboard the Project vessels or support vessels. Crew leaders and most other biologists will be individuals with experience as observers during similar monitoring projects in Oregon, or other offshore areas in recent years. Resumes for those individuals will be provided to NMFS and USFWS for review and acceptance of their qualifications.

MWMs will have the appropriate safety and monitoring equipment to conduct their observations, such as low light reticulated binoculars and spotting scope, as needed. MWMs will utilize a handheld global positioning system (GPS) or the ship's navigation system to record latitude and longitude for each marine wildlife observation. Each MWM will have a handheld radio for communication with the bridge, other Project vessels, as necessary. In addition, cell phones, VHS radio, and email capabilities will be available to communicate with onshore personnel.

The MWMs will coordinate with the captain of the Project vessel or his representative to select an appropriate monitoring position where they can monitor and will have a clear view of the area of ocean that is in the direction of the course of travel while the vessel is transiting. The MWMs will observe marine wildlife and will request procedures to avoid potential collisions and/or entanglement with marine wildlife.

During active cable removal operations, the MWMs shall establish avoidance Safety Zones around the primary Project vessel for the protection of marine wildlife. The larger avoidance zone will be an approximately 500-meter (1,640-foot) radius for large marine mammals (i.e., whales) and a 152-meter (500-foot) radius avoidance zone for smaller marine wildlife (i.e., dolphins and sea turtles). The Safety Zones will be based on the radial distance from the center of the Project vessel. If the MWM should observe marine wildlife within the applicable Safety Zone, the behavior of marine animal will be monitored, and the captain and Project Manager will be alerted of the potential for an imminent shut down. If the marine animal within the Safety Zone displays abnormal behaviors or distress, the monitor will immediately report that observation to the vessel operator who will shut-down operations, slow the vessel and/or change course in order to avoid contact, as deemed necessary by the MWM, unless those actions will jeopardize the safety of the vessel or crew. Distress can be defined as any abnormal behavior that appears to be related to Project operations such as sudden change in direction, rapid breathing, and sudden or erratic changes in behavior. The MWM will have the authority to stop any work that is perceived to be harming marine wildlife.

4.3.4 Reporting

Throughout the Project, observers will prepare a daily report summarizing the recent results of the monitoring program or at such other intervals as required by regulatory and resource agencies. The reports will summarize the species, number of marine wildlife sighted, and any required actions taken.

4.3.4.1 Injured or Dead Animals

If an injured or dead animal is sighted within Project area, activities will be shut down while the MWMs conduct a brief investigation. Activities can resume after the lead MWM has (to the best of his/her ability) determined that the injury resulted from something other than cable recovery or Project vessel operations. After documenting those observations, including supporting documents (e.g., photographs or other evidence), the operations will resume. Within 24 hours of the observation, the lead MWM will notify NMFS and provide them with a copy of the written documentation. If the cause of injury or death cannot be immediately determined by the lead MWM, the incident will be reported immediately to either the NMFS Office of Protected Resources or the NMFS West Coast Regional Office.

4.4 MEASURE TO REDUCE LIGHTING IMPACTS TO MARINE BIRDS

To minimize the potential for seabirds to be attracted to the vessel, lighting on the work areas will be directed inboard and downward. Where feasible, the vessel cabin windows will be equipped with shades, blinds or shields that block internal light during nighttime operations. In addition, the vessel will carefully contain and remove garbage and food waste to minimize attracting predatory and scavenging birds.

The onboard monitors will routinely inspect the vessel for birds that may have been attracted to the lighted vessel. The monitors shall make every effort for the vessel to maintain a distance of 300 ft (91 m) from aggregations of feeding or resting marine birds. The MWMs shall maintain a log of all birds found onboard the vessels which are incapacitated (dead or alive) and noting the status and health of birds upon retrieval and release. The log will be provided to inquiring agencies when the Project has been completed.

If an injured bird is discovered on a vessel, the bird will be transported on the next returning work vessel to an approved wildlife care facility. The nearest approved wildlife care facility will be contacted upon transport of the bird. The incapacitated bird will be reported on the daily summary report, and added to a cumulative log, which will be sent to USFWS at the completion of the Project.

4.5 MEASURES TO REDUCE POTENTIAL VESSEL COLLISION IMPACTS ON MARINE WILDLIFE

Because of the slow speed at which the Project vessel will maintain during survey operations, collisions with marine wildlife are very unlikely. However, the potential exists for such collisions when transiting to the Project site by the M/V Layla and support vessels. The following measures and procedures will be implemented to minimize the possibility of such collisions.

Vessel operators and on-board personnel will be watchful for marine mammals and turtles during vessel transit and Project activities. Slower moving and surface-dwelling turtles and larger cetaceans could potentially be affected. More common marine mammals in the Project area, such as dolphins and pinnipeds, would be agile enough to avoid vessels. Regardless, all vessel operators shall observe the following guidelines:

- Make every effort to maintain the appropriate separation distance from sighted whales and other marine wildlife (e.g., sea turtles);
- Do not cross directly in front of (perpendicular to) migrating whales or any other marine mammal or turtle;
- When paralleling whales, vessels will operate at a constant speed that is not faster than that of the whales;

- Care will be taken to ensure that female whales are not be separated from their calves; and,
- If a whale engages in evasive or defensive action, vessels will reduce speed or stop until the animal calms or moves out of the area.

If a collision with a marine mammal or turtle occurs, the vessel operator must document the conditions under which the accident occurred, including the following:

- Location of the vessel when the collision occurred (latitude and longitude);
- Date and time;
- Speed and heading of the vessel;
- Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog);
- Species of marine wildlife contacted;
- Whether an observer was standing watch for the presence of marine wildlife; and,
- Name of vessel, operator (the company), and captain or officer in charge of the vessel at time of accident.

Following an unanticipated strike, the vessel will stop if safe to do so. The vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then communicate by radio or telephone all details to the vessel's base of operations. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NMFS West Coast Region, Portland, Oregon, or other regulatory agency representatives to obtain instructions as required by Project permits.

Alternatively, the vessel captain may contact the NMFS' Stranding Coordinator directly using the marine operator to place the call or directly from an onboard telephone, if available. Under the MMPA, the vessel operator is not allowed to aid injured marine wildlife or recover the carcass unless requested to do so by the NMFS Stranding Coordinator. The Stranding Coordinator will then coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. As proposed, and with the existing measures incorporated into the vessel operations, vessel strikes could, but are not likely to, affect Federally listed marine species.

4.6 MEASURES TO REDUCE POTENTIAL OIL SPILL IMPACTS

An oil spill prevention plan will be used to avoid any release of oil-based products into the marine environment, and the existing oil spill response and recovery plan will be used to reduce the effects of accidentally discharged petroleum by facilitating rapid response and cleanup operations. The Project vessel, M/V Layla will be subject to the requirements and guidelines included within the vessel-specific Oil Spill Contingency Plan (Appendix A). All vessel discharges will comply with the requirements of the Clean Water Act under the USCG regulation including the proper treatment and monitoring of vessel effluents as necessary.

Potential spill sources of hydrocarbons during Project activities include releases from offshore equipment (including Project vessels) used during the cable recovery activities, and/or accidental discharges from onshore fuel storage and refueling operations of deck equipment (if needed). The M/V Layla will fuel itself prior to departure to the offshore Project site and will not require bunkering during Project activities. The M/V Layla will have some equipment requiring fuel on board, however the main winch and tensioner are electrically driven. The potential for a release from diesel-powered equipment onboard the vessels is minimal due to the small volume of fuel contained within each piece of equipment. Equipment that is used on a day-to-day basis will be monitored for leaks; if a leak is observed, the faulty equipment will cease operation and appropriate clean-up and corrective measures will be implemented. All equipment will have drip pans under them, and sorbent pads will be available on the vessel for clean-up of minor hydrocarbon leaks from the deck equipment. All equipment refueling will be conducted to minimize the potential for fuel spillage. All hydrocarbon-based fluids stored onboard the vessels will be in appropriate containers and will include secondary containment structures.

The Project contractor (Mertech Marine), in association with Wind BV and Gallagher Marine Systems and under the direction of AT&T will maintain an onsite spill response team to handle minor spills (five barrels or less) and to provide initial response to major spills (more than five barrels) during Project activities. The onsite response team is responsible for reporting, containment, and clean-up of any minor spills using onsite equipment and procedures. The Project contractors also have a contract with the Oil Spill Response Organization (OSRO) certified National Response Corporation (NRC) which has local resources that may be deployed from their Portland, Oregon location in the event of a major marine spill (greater than five barrels).

In the event of a spill, notifications will be made to the Project team, emergency agencies, clean-up contractors (if required), and other interested parties. If a spill impacts navigable waters, notification of the National Response Center is mandatory and normally results in simultaneous notification of the United States (U.S.) Coast Guard (USCG).

5.0 CUMULATIVE EFFECTS

FESA Regulations at 50 CFR 402.14(g)(3)(4) require Federal agencies to "evaluate the effects of the action and cumulative effects on the listed species or critical habitat" and "formulate its biological opinion as to whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat."

According to the Endangered Species Consultation Handbook (USFWS and NMFS, 1998), cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in a biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of FESA. Indicators of effects "reasonably certain to occur" may include but are not limited to: approval of the action by State or local agencies or governments (e.g., permits, grants); indications by granting authorities that an action is imminent; assurances by project sponsors that an action will proceed; the obligation of venture capital; and/or initiation of contracts. Speculative non-Federal actions that may never be implemented are not factored into cumulative effects analyses. The following is a summary of the other marine projects conducted or proposed in the Project area.

5.1 COMPLETED PROJECTS

There are no known completed projects in the region that would contribute to the cumulative effects of the Project.

5.2 PROPOSED PROEJCTS

The proposed Jordan Cove Liquified Natural Gas (LNG) Terminal is planned to be built within Coos Bay, approximately 20 miles North of the Project area. The LNG Terminal will feature an export terminal and associated pipeline for the transportation of natural gas sources form the United States and Canada (Jordan Cove, 2019). The terrestrial components of the Jordan Cove LNG Terminal will not contribute to the cumulative effects of the Project; however, the presence of the M/V Layla and support vessels will potentially contribute to the vessel traffic in the Coos Bay region. This could increase the likelihood of vessel interaction with marine wildlife and contribute to the ambient noise levels of shipping traffic in the region. Project activities represent a minor incremental increase in the overall level of human activity in the region. Therefore, due to the short duration of the Project (12 days), and Project incorporated measures detailed in subsections 4.3 and 4.5, these impacts are not likely to adversely affect threatened or endangered species or their populations.

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6.0 CONCLUSION AND DETERMINATION

Implementation of the Project will involve potential impacts to marine species and habitats that could affect threatened and endangered species in the Project area. A total of 14 Federally listed marine species have been analyzed in this BA. Table 6.0-1 provides an analysis of the potential Project effects on the following: habitat loss, mortality, harassment, loss of prey, loss of shelter/cover, loss of access to habitats, noise and light effects, habitat fragmentation, urbanization, increased predation, and critical habitat.

The proposed Project may affect, but is not likely to adversely affect the listed and proposed species for the following reasons:

- The Project would not involve temporary or permanent loss of habitat;
- The Project would be completed within a 12-day period;
- The Project would be of limited geographic effect; and
- The Project will include avoidance, minimization, and mitigation measures, as detailed in Section 4.0, to avoid and minimize potential adverse effects.

Table 6.0-1. Potential Effects Matrix for Protected Species

Species	Loss of Habitat[1]	Mortality[2]	Harassment[3]	Loss of Prey[4]	Loss of Cover[5]	Loss of Access[6]	Noise/Light[7]	Fragmentation[8]	Urbanization[9]	Predation[10]	Critical Habitat[11]	Effect Determination[12]
Black oystercatcher	b	b,c,d	b	b	c	c	c	c	a	c	a	b
Marbled Murrelet	b	b,c,d	b	b	c	c	c	c	a	c	b	b
Short-tailed Albatross	a	a	a	a	a	a	a	a	a	a	a	a
Green Turtle	b	b,c	c	b	b	b	b	b	a	b	b	b
Loggerhead Turtle	b	b,c	c	b	b	b	b	b	a	b	a	b
Olive Ridley Turtle	b	b,c	c	b	b	b	b	b	a	b	a	b
Leatherback Turtle	b	b,c	c	b	b	b	b	b	a	b	b	b
Blue Whale	b	b,c	c	b	b	b	b	b	a	b	a	b
Fin Whale	b	b,c	c	b	b	b	b	b	a	b	a	b
Humpback Whale	b	b,c	c	b	b	b	b	b	a	b	a	b
Northern Pacific Right Whale	b	a	a	a	a	a	a	a	a	a	a	a
Sei Whale	b	b,c	c	b	b	b	b	b	a	b	a	b
Sperm Whale	b	b,c	c	b	b	b	b	b	a	b	a	b
Southern Resident killer whale	b	b,c	c	b	b	b	b	b	a	b	a	b

[1]Loss of Habitat Codes

a. Species not expected to occur in Project area.
b. No habitat will be temporarily or permanently lost.

[2]Mortality Codes

a. Species not expected to occur in Project area.
b. Collisions with vessels resulting in the death of listed species have occurred in the recent past. However, due to low Project vessel speed during operations, as well as mitigation measures proposed, collisions are a low probability event.
c. Oil spills or the release of other pollutants from the survey vessels is a low probability event based on the nature of the operation.
d. Project designed to avoid impacts to terrestrial species.

[3]Harassment

a. Species not expected to occur in Project area.
b. Species not likely to be subject to noise harassment due to terrestrial habitat
c. Project incorporated measures will eliminate the likelihood harassment will occur.

[4]Loss of Prey

a. Species not expected to occur in Project area.
b. No permanent loss of prey expected. Short-term displacement of prey from immediate area of operations could occur.

[5]Loss of Shelter/Cover

a. Species not expected to occur in Project area.
b. Temporary displacement during survey operations, likely only when vessel is in immediate area of shelter. No permanent loss of cover.
c. Project designed to avoid impacts to terrestrial species.

[6]Loss of Access

a. Species not expected to occur in Project area.
b. Temporary displacement during Project operations likely only when vessel is in immediate area. No permanent loss of access.
c. Project designed to avoid impacts to terrestrial species.

[7]Noise/Light Impacts

a. Species not expect to occur in Project area.
b. Night operations could attract species to illuminated vessels.
c. Project designed to avoid impacts to terrestrial species.

[8]Habitat Fragmentation

a. Species not expected to occur in Project area.
b. No temporary or permanent loss of habitat will occur. Consequently, no fragmentation.

[9]Urbanization

a. Not applicable

[10]Increased Predation

a. Species not expected to occur in Project area.
b. Not likely to be vulnerable to increased predation due short duration of Project operations.
c. Project designed to avoid impacts to terrestrial species.

[11]Critical Habitat

a. No critical habitat designated for species.
b. Critical habitat designated for species, but none occurring in Project area.

[12]Effect Determination

a. No effect
b. May affect, but not likely to adversely affect
c. May affect and likely to adversely affect

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APPENDIX A

OIL SPILL CONTINGENCY PLAN

Plan in Progress

To Be Forwarded Once Completed

APPENDIX B

MERTECH MARINE SAFETY PLAN

Marine Safety Plan

Project document number:	MMP1701-03-MSP-R00-ATT-CHUS
Document revision:	00
Revision date:	03-12-2018

Revision table

REV	DATE	REVISION DESCRIPTION	PREPARED BY	REVIEWED BY	AUTHORIZED BY
0	03/12/2018	Initial release	MR	TN	TN

Table of Contents

1 Introduction

The intention of this document is to provide client with general information regarding safe vessel operations. It covers preparation of the actual execution of a cable recovery project.

Please be informed that the project specific risk assessment is not part of this documents.

2 Abbreviations and definitions

Find below a list of abbreviations:

BU	Branch Unit
CRP	Cable Recovery Plan
ECDIS	Electronic Chart Display Information System
ICPC	International Cable Protection Committee
JB	Junction Box
OOS	Out of service cable
PI	Pay In
PO	Pay Out
PPE	Personal protection equipment
RP	Repeater
SP	Splice Box
Supermarket	Provision container
WD	Water Depth
RPL	Route Positioning List

Find below a list of definitions:

Adjustable repeater way	Movable peace of the repeater way
Black pipe	Plastic pipe to guide the cable to the cable tanks, or to shore during discharging operations.
Cutting run	Cutting the cable with a grapnel with inserted knive
Fishing gear	The gear used for a cutting and a holding run
Holding run	Catching the cable by means of grapnels and rennies
Fleeting Knives	Guide on the winch to keep the cable on position on the drum
Live cables	Cable section from current position towards section to be recovered
Long end	Cable section between cutting position
Repeaters	Amplifier for signals
Short end	Cable section from current position towards cutting position
Splitter	Device to guide the cable to the right cable tank
Winch man	Person responsible for controlling the winch and the Tensioners

3 Project preparation

3.1 Cable Recovery Plan (CRP)

1. Before starting a recovery operation a Cable Recovery Plan (CRP) is being prepared at the office based on all relevant up to date cable information. This CRP contains the following information:
   - Cable specifications
   - Cable route
   - Recoverable cable sections (incl. start- and end position)
   - Cable length per cable section
   - Affected cables in the area of the recovery operation
   - Planned holding- and cutting position
   - Bathymetric charts and seabed specifications (if available)

2. The initial draft of the CRP is shared with the captain of the recovery vessel. The vessel crew will review the document and comments will be processed.
3. After completion of the CRP, all cable owners will be informed via ICPC.
4. Recovery of planned cable will only take place after all comments from cable owners have been discussed and appropriate solutions have been found for their concerns.

3.2 Weather

To ensure cable recovery operations are performed in a safe and efficient manner, it is important to plan recovery operations in an appropriate weather window. Mertech Marine makes use of below services:

- MetOcean – Hindcast data
  The hindcast data service provides accurate historical marine weather data from multi-year numerical model simulations.
- MeteoGroup - SPOS9
  Route-planning and optimization involves juggling safety, efficiency, navigation, costs, port rotation, ETAs, speed ranges and additional constraints, such as trim and seakeeping. For ship captains, this is a complex challenge that requires the aid of a decision-supporting tool to give them confidence in their decisions and support either and execution. MeteoGroup developed SPOS9 (Ship Performance Optimization System) to address these challenges.

3.3 Cable recovery information

The following information recourses will be provided before commencing a recovery operation:

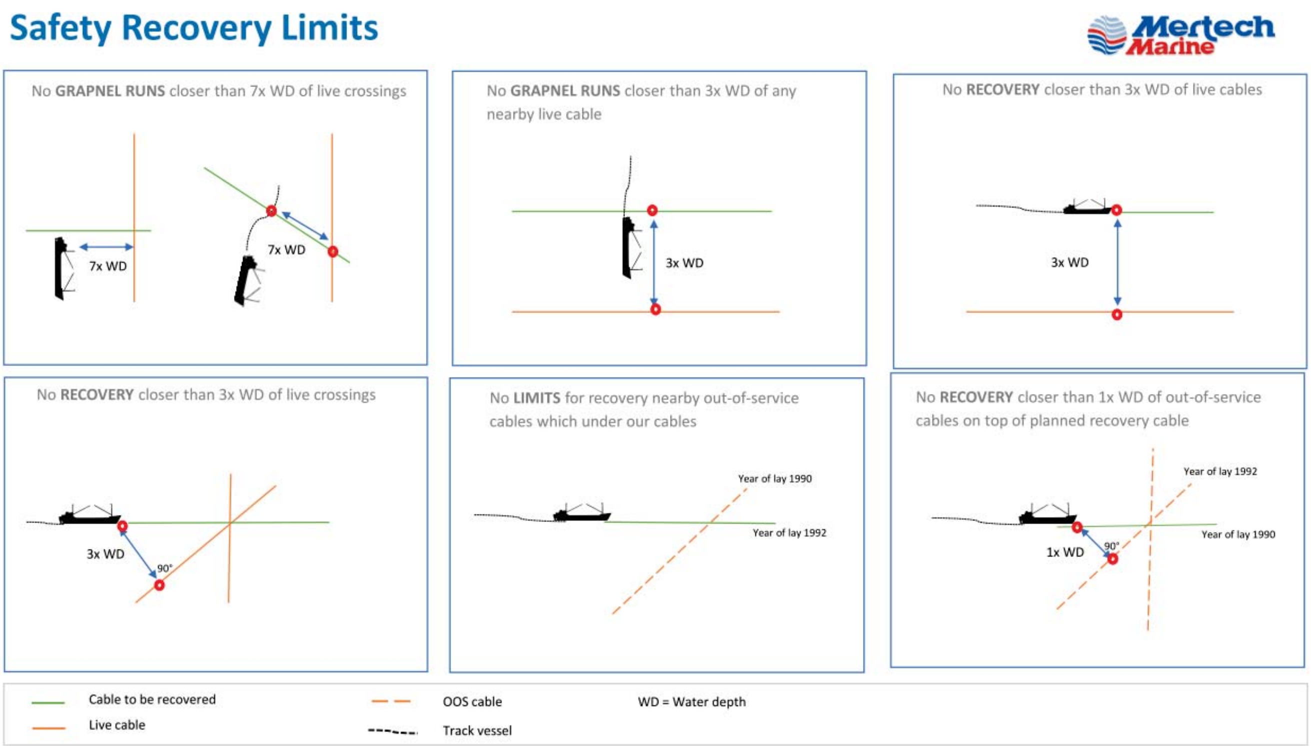
- RPL of the cable to be recovered (GeoCable)
- RPL as-laid of the cable to be recovered (origin cable laying vessel)
- Positions of all cables in close proximity of the to be recovered cable
- Digital information package of all above items to be used in the ECDIS software on board
- Original chart with cable positions (if available).

3.4 ICPC regulations

To ensure that nearby cables are not affected by the recovery operation below mentioned safety limits are used for offshore recovery operations.

1. No grapnel runs closer than 3x WD of any live cable
2. No grapnel runs closer than 7x WD of live crossings
3. No recovery closer than 3x WD of live cables
4. No recovery closer than 3x WD of live crossings
5. No limits for recovery near out-of-service cables which under our cable
6. No recovery closer than 1x WD of out-of-service cables on top of our cable

These criteria are based on ICPC Recommendations No. 1 "Management of Redundant and Out-Of-Service Cables".



In case Mertech Marine decides to deviate from above safety limits in specific situations, this will be clearly communicated and discussed/agreed with both the client and other cable owners (via ICPC). Reasons to do so include (but is not limited to):

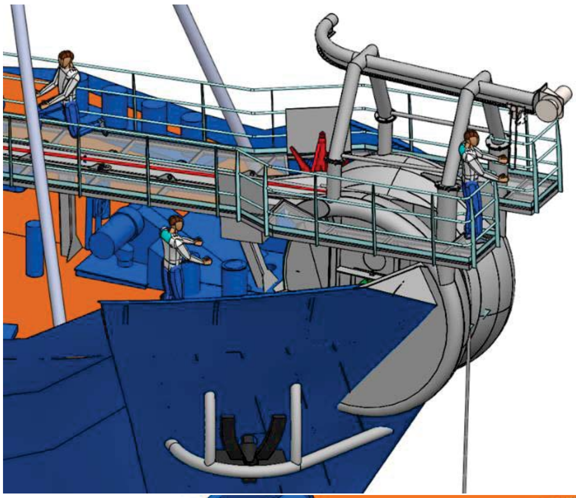
- Diver assisted recovery, where no cutting- and holding runs are required
- Shallow water operations, where a multiple of WD is not an appropriate measure to indicate safety zones
- Specific agreements are in place with other cable owners

4 Project execution

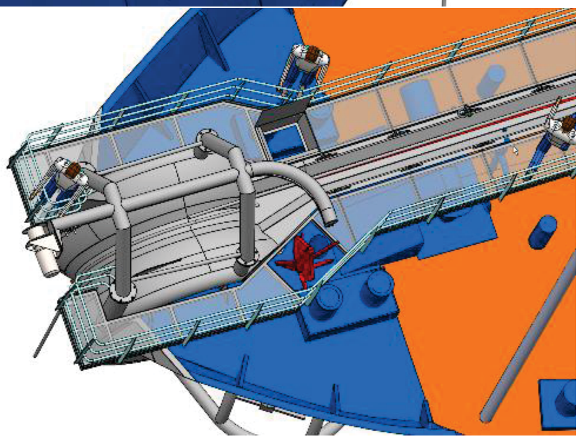
4.1 Equipment

For recovering subsea telecommunication cables special equipment is being used on deck.

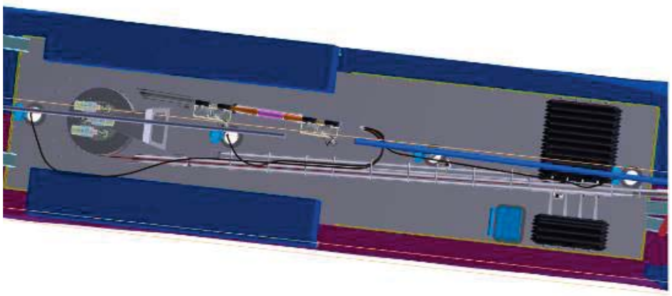
Bow roller
Used to guide the ropes or cable, from sea to vessel and the other way around.



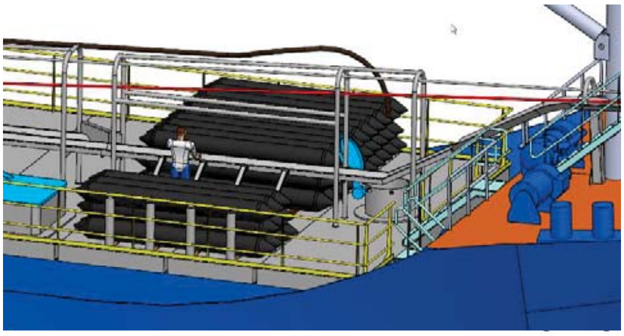
Bow platform
The Bow platform is designed as working platform for the crew.
A special A-Frame is mounted on top of the bow platform which can be used to lift and guide recovery equipment to and away from the platform.



Repeater way
The repeater way is being used to guide the cable or grapnel rope

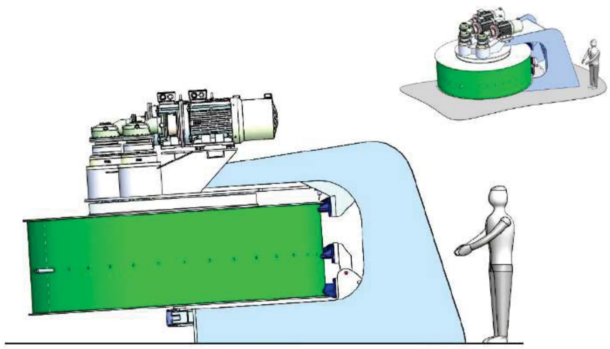


Repeater storage
The repeater storage is being used to store the repeaters.

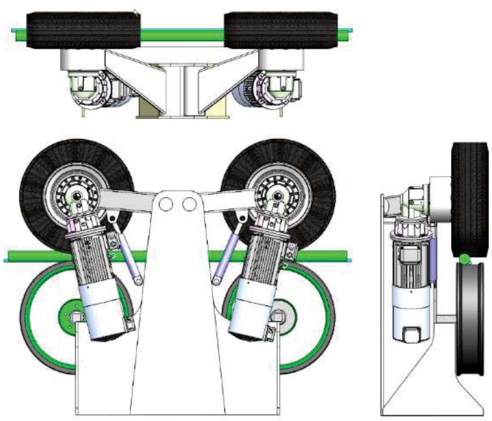


Winch
The winch is being used to pay in and pay out the cable or the grapnel rope. The winch can be controlled from two positions: from the bridge and from deck.
Specifications:

- Max tension: 20 ton
- Equipped with emergency buttons
- Equipped with alarms and safety protocols

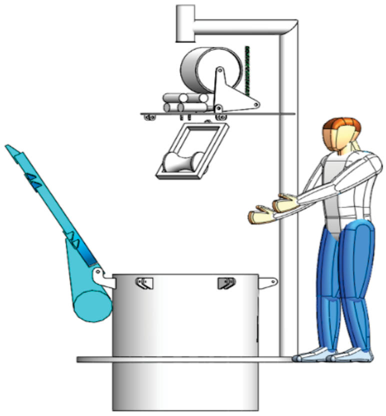


Tensioners
The tensioners will keep the cable ore rope under tension so that the winch will work properly.
The tensioners will adjust automatically, but can also be controlled manually.



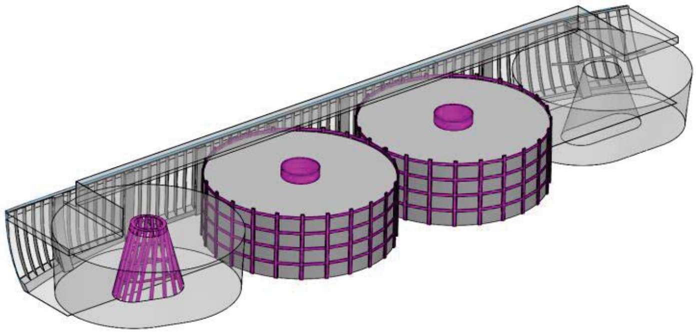
Cable counters

The cable counters are being used to count the length of kilometres recovered and kilometres discharged.



Cable tanks

Special designed cable tanks are being used to create as much as possible volume to store cable



Monitoring equipment

On the bridge and in the control container, monitoring and control equipment is being placed.

4.2 Recovery process

4.2.1 Preparing fishing gear

First the fishing gear needs to be connected to the rope to conduct both cutting- as holding run. Different equipment can be used:

- Tail chain - stored in box under bow platform
- Grapnel - stored under or attached to bow platform
- Rennies - stored on the side of the repeater way;
- Leading chain – stored at the end of the repeater way;
- Grapnel rope - stored in inner cone cable tanks.

This is dependent on variables like:

- Weather conditions
- Seabed conditions

- Cable type

4.2.2 Cutting Run

For the cutting run a grapnel with a knife is being used, tensions are low during this run. The aim of this run is to cut the cable.

4.2.3 Holding run

The aim of the holding run is to bring the cable on board. For the holding run all fishing equipment on board can be used, depending on the situation and location. During the holding run the tension can be high. When the cable is hooked in the fishing gear the tension will increase. slowly the tension will increase due to increasing length of cable that hangs on the grapnel and is lifted towards the surface.

4.2.4 Cable recovery

As soon as the cable is brought on board, both ends of the cable (long and short) can be brought on the winch drum. The cable will be guided through the tensioners. The tensioners will hold tension on the cable independently from the diameter of the cable. Via the splitter, the cable will be guided to one/two of the 4 cable tanks.

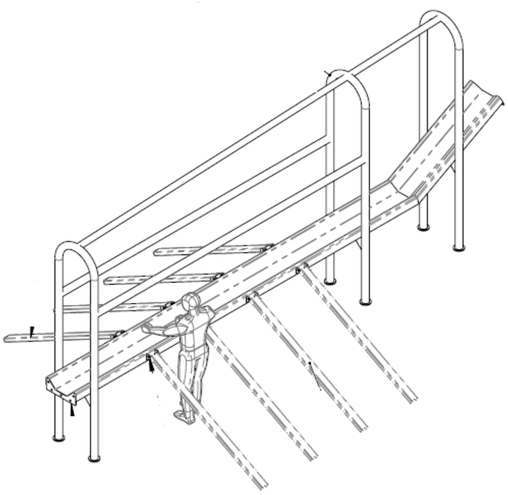
4.2.5 Repeater handling

Repeaters can be handled on board in two ways.
Option 1: Cut out the repeater on the repeater way
Option 2: guide repeater on the winch and cut out without tension behind tensioners

As soon as the winch man noticed that a repeater is coming out of the water he will inform the deck crew and will slowly pay in. By use of cameras the winch man will always have eyes on the bow platform.

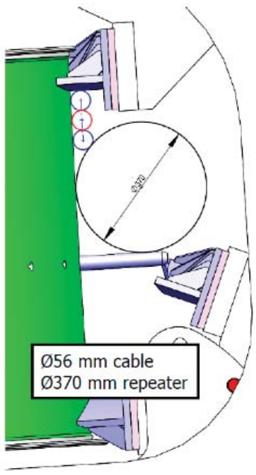
Option 1 cutting out

A. The repeater will be slowly guided to the repeater slide;
B. When the repeater is in position, stoppers need to be placed on the cable to prevent that the cable will slip back into sea;
C. As soon as the cable is connected with stoppers on the ship, the repeater can be secured;
D. Next to this, safety beams can be placed on the slide, this to prevent the repeater to move towards the operator.
E. When the repeater is secured the cable can be cut at both ends of the repeater;
F. Lower the repeater by means of slings which can be connected on top of the repeater slide;
G. Secure the repeater on the repeater storage;
H. Connect both cable ends;
I. Guide the cable around the winch and through the tensioners via the black pipes into the cable tanks.



Option 1: via winch drum

A. Pay in up to the repeater reaches the winch;
B. Prepare pins in the drum of the winch;
C. Guide the repeater via the adjustable repeater way on the pins;
D. Slowly pay in and guide the repeater on the winch;
E. Repeater leaves the winch and will pass the tensioners which will adjust automatically on the diameter of the repeater;
F. After the winch, there is no more tension and the repeater can be cut out;
G. The repeater can be moved by help of the electrical winch on the bowplatform. The repeater can then be secured in the repeater storage.



3 windings cable and 1 winding with repeater of 370mm only possible for cable sizes ≤ 56mm

4.2.6 Cable tank

The cable will be stored in one of the four cable tanks. The cable will be guided to the tank via the black pipes and cable counters. Special manholes are mounted on the hatches for this purpose. The cable will be coiled inside one of the cable tanks via hatches.

5 Vessel safety

5.1 Safety meetings

Before starting a new recovery operation, a safety/operations meeting will take place. In this meeting, the (project specific) risk assessment will be discussed. In addition, every morning the crew will come together for a toolbox talk to discuss the operation and associated risks are recognized. Mitigation measures are initiated when necessary.

5.2 Personal Protection Equipment (PPE)

On deck the next PPE is being used:

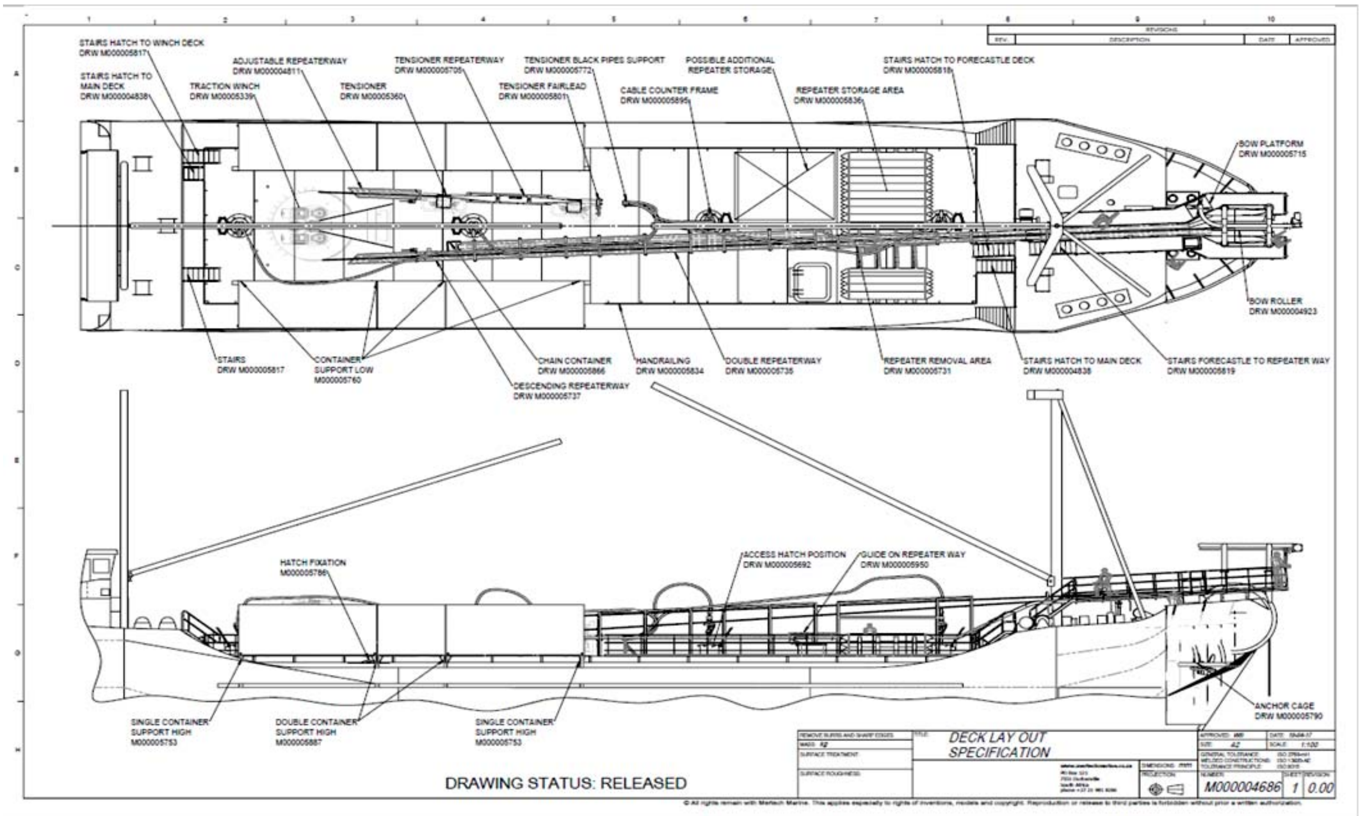
- Safety helmet
- Safety shoes
- Safety hand gloves
- Overalls
- Ear protection (for job specific tasks)
- Safety glasses (for job specific tasks)
- Life jacket (for job specific tasks)

5.3 Risk assessment

A project specific risk assessment can be found in appendix A.

Appendix A – Risk assessment

Appendix B – Deck layout



RISK ASSESSMENT

Name of Risk Assessment	MMP1702-03 San Luis Shore end Recovery	**Document Number**	MMP1702-03-RA-R00-ATT-CHUS
		Revision No.	00

Risk Assessment Team

Print Name	Company / Role Title	Signature	11-11-2018
Martijn Rensen	MMP / Project manager		
Jasper Romp	MMP / Cable recovery team		
Misha Hoekstra	MMP / Cable recovery team		

Site Address/Location	Description of Activity/Task
San Luis Obispo, California	Cable recovery operation

Supporting Attachments e.g. Procedures/ Sketches / Drawings	Existing Controls	
Project Execution Plan	During project preparation and cable loading, all required PPE must be worn. Required PPE: - Helmet - High visibility jacket - Gloves - Safety shoes - Ear protection (when exposed to noise hazard) - Safety glasses Additional task specific PPE to be worn.	Toolbox talk must be held prior to commencement of operations. Toolbox talk contains: - Summary of Risk Assessment document - Safety awareness - Communication

STEPS	TASK / ACTIVITY	HAZARDS		INITIAL RISK			CONTROLS	RESIDUAL RISK			FURTHER ACTIONS REQUIRED TO REDUCE RISKS	RESPONSIBLE PARTY
		Persons at Risk & How	Hazards	Likelihood	Severity	Risk Rating	Control Measures	Likelihood	Severity	Risk Rating		
General												
1.1	**Equipment preparations and positioning**	All operational involved personnel	1. Personal injury - body parts stuck between rotating parts, cutting sharp edges	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Review of vessel layout drawings prior to positioning equipment. 3. Personal awareness; ensure safe position whilst equipment is being positioned. 4. Use appropriate PPE	2 - Unlikely	C - Moderate	Medium	Subject during Toolbox Talk. Maintain good communication between involved personnel. Keep safety always in mind.	MMP
1.2	**Communication**	All operational involved personnel	1. Equipment damage 2. Personel injuries - stress/friction	2 - Unlikely	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. All communication during operations between all parties (I.e. onshore, diving support vessel, recovery vessel) by radio. 3. All radios to be fully charged prior to operations and charged spare batteries available. 4. Communication language in English 5. Daily pre-recovery meeting between all parties involved	1 - Very Unlikely	B - Slight	Low	Subject during Load-out meeting/Toolbox Talk. Check all stations regularly.	MMP
1.4	**Working close to edge of quayside/water (not applicable to vessel operations)**	All involved personnel who come near or on jetty/quayside/vessel	1. Personal injuries - Fall in water	2 - Unlikely	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-lrecovery meeting. 2. Wear a life vest when near the waterside 3. Life vests to be certified safe for usage 4. Only designated people involved within this project are allowed.	1 - Very Unlikely	B - Slight	Low	Subject during Load-out meeting/Toolbox Talk.	MMP
1.5	**Manual handling**	Personnel rigging lifting gear, moving objects etc..	1. Personal injuries.	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Use lifting equipment/aids when objects are too heavy to lift manually. 3. Bend through the knees, not the back when manually lifting cannot be avoided. Person should be fit for the task. 4. Check if load can be divided in smaller/lighter pieces. 5. Assess load for size, shape, centre of gravity, weight, etc. 6. Decent lighting positioned and used in case it would be necessary. 7. Check if route is safe to use and walk with the load.	2 - Unlikely	C - Moderate	Medium	Do not lift manually when doubt. Use lifting aids to save the body.	MMP
1.6	**Weather conditions**	All involved personnel	1. Personal injuries. 2. Damage to cable/equipment.	2 - Unlikely	D - High	Medium	General 1. Check weather forecast prior to operations and during operations. Lighting 1. Lower lifted equipment as much as possible 2. Avoid working at height 3. Leave deck and seek shelter indoor when flash-to-thunder-time is less than 30 seconds 4. Ensure earthing is installed on all equipment Wind/severe gusts: 1. Secure loose items. 2. Avoid working at height or close to open edges/overboard in case of severe winds and gusts. Wave: 1. Secure loose items. 2. Avoid working at height or close to open edges/overboard in case of severe waves Sun: 1. Arrangements to be provided in case of hot/cold weather like sun cream, warm clothing, water, etc..)	2 - Unlikely	C - Moderate	Medium	Check forecast. Toolbox talk	MMP
1.7	**Lifting operations**	Personnel who will lift equipment.	1. Personal injuries.	3 - Remote	C - Moderate	Medium	1. Only competent personnel involved within lifting operations. 2. Work according to industry practice and lift plans (if applicable). 3. No working or walking under suspended load. 4. Person available to warn and inform people about lifting operations. 5. All lifting gear certified and visually checked 6. Good housekeeping throughout operations. Area must kept clean.	3 - Remote	C - Moderate	Medium	Use certified, well maintained equipment in a proper way.	MMP
1.8	**Offshore transfer of personnel**	All personnel present on vessel/barge	1. Personnel injury - drowning, hypothermia	3 - Remote	C - Moderate	Medium	1. Check weather forecast before carrying out transfer 2. Only transfer when the person involved is confident with the situation 3. Prepare pilot ladder 4. Inform vessel about upcoming operations such that assistance can be arranged 5. Wear life vest	2 - Unlikely	C - Moderate	Medium		MMP

STEPS	TASK / ACTIVITY	HAZARDS		INITIAL RISK			CONTROLS	RESIDUAL RISK			FURTHER ACTIONS REQUIRED TO REDUCE RISKS	RESPONSIBLE PARTY
		Persons at Risk & How	Hazards	Likelihood	Severity	Risk Rating	Control Measures	Likelihood	Severity	Risk Rating		
Cable recovery from M/V Layla												
2.1	**Positioning of vessel towards deployment position of grapnel**	All involved people	1. Damage to vessel/equipment 2. Damage to environment and 3rd party assets	3 - Remote	C - Moderate	Medium	1. Vessel crew to discuss recovery plans with recovery team before commencement of recovery trip 2. Make sure captain and crew is aware of all information written in CRP 3. Vessel crew to verify information in CRP with ECDIS	2 - Unlikely	C - Moderate	Medium	-	MMP
2.2	**Handling of grapnel gear on deck and deployment of grapnel (cutting and holding)**	All involved people	1. Personal injuries - Lacerations and abrasions of the skin, possibly deeper wounds. 2. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Wear appropriate PPE (incl. life jacket) 2. Vessel crew to have toolbox talk 3. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 4. Only the necessary designated persons are allowed on deck 5. Supervision. 6. Use certified, well-maintained equipment only 7. Avoid manual lifting as much as possible and use dedicated tools/equipment 8. Inform authorities regarding upcoming recovery activities (and limited manouverability) 9. Verify weather window 10. Check general condition of cable winch. (oil levels, drive belts and such, all equipment properly greased). 11. No obstructions on repeater way and on deck from rope storage tank to the bow roller 12. Hammerlocks connected correctly to the swivels, leading chains, grapnel hooks and/or rennies. The hammerlocks pins in position and fixed & properly secured. 13. Check all links separately. Verify all links are in good working condition. Lock pins in place. 14. Radio contact with deck established on working channel. 15. Make sure that the condition of rope is good and has no damages. 16. Make sure that all cameras in working condition and in recording mode. 17. All crew notified of operations scheduled.	2 - Unlikely	C - Moderate	Medium		MMP
2.3	**Cutting and holding run**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	3 - Remote	D - High	High	1. Vessel crew to have toolbox talk 2. Only the necessary designated persons are allowed on deck 3. Master and chief officer well experienced with cable recovery operations 4. Vessel crew to verify correct position 5. Continuously monitor: - Cable tensions - Environment - ECDIS system - Weather conditions 6. Use certified equipment 7. Halt operations in case of unexpected, unforeseen and/or rapdily changing situations and take time to evaluate situation 8. Always adhere to CRP. Only deviate from plans after consulting the engineering department 9. All key personnel equipped with radio 10. Adhere to weather limits for this operation: o Wind speed: 25 knots o Wave height [Hs]: 3 m	2 - Unlikely	D - High	Medium		MMP
2.4	**Bringing in cutting grapnel**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Vessel crew to have toolbox talk 2. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 3. Only the necessary designated persons are allowed on deck 4. Crew will use safe passage route when cable is under tension; 5. Safety meetings and risk assessments (with according actions if necessary) will take place before commencement of recovery operation 6. Modification to deck layout: Safety rings around the repeater way and bow platform; Protection in front of the control unit on deck; Protection around the adjustable repeater way; Protection around the winch; 7. Safe passage route in place 8. Proper supervision. 9. Bring all necessary tools to workplace 10. Ensure work place is clean and neat 11. Wear appropriate PPE (incl. life jacket) when working on bow platform 12. Use appropraite tools and equipment in place to perform handling 13. Use A-frame to position heavy equipment	2 - Unlikely	C - Moderate	Medium		MMP
2.5	**Bringing in holding grapnel**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Vessel crew to have toolbox talk 2. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 3. Only the necessary designated persons are allowed on deck 4. Proper supervision. 5. Bring all necessary tools to workplace 6. Ensure work place is clean and neat 7. Wear appropriate PPE (incl. life jacket) when working on bow platform 8. Use appropraite tools and equipment in place to perform handling 9. Use A-frame to position heavy equipment	2 - Unlikely	C - Moderate	Medium		MMP
2.6	**Guide cable end to winch**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instructions with respect to installation of cable stopper 2. Check tools before use 3. Use the right tool for the job 4. Bring all tools and appropriate PPE to workplace 5. Use appropriate PPE 6. Inform your collegues about activities 7. Pre-install pulling rope on winch and cable highway 8. Only the necessary designated (experienced) persons are allowed on bow platfrom when installing cable stopper	2 - Unlikely	C - Moderate	Medium		MMP
2.5	**Cable recovery**	All involved people	1. Personal injuries - Wires under tension. 2. Damage to vessel/equipment 3. Damage to environment and 3rd party assets	2 - Unlikely	D - High	Medium	1. Vessel crew to have toolbox talk 2. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board 3. Only the necessary designated persons are allowed on deck 4. Crew will use safe passage route when cable is under tension; 5. Safety meetings and risk assessments (with according actions if necessary) will take place before commencement of recovery operation 6. Modification to deck layout: Safety rings around the repeater way and bow platform; Protection in front of the control unit on deck; Protection around the adjustable repeater way; Protection around the winch; 7. Safe passage route in place 8. Proper supervision 9.Continuously monitor: - Cable tensions - Environment - ECDIS system 10. All key positions on-board occupied 11. Halt operations in case of unexpected, unforeseen and/or rapdily changing situations and take time to evaluate situation 12. Ensure work place is clean and neat 13. Wear appropriate PPE (incl. life jacket) when working on bow platform 14. Use appropraite tools and equipment in place to perform handling 15. Use A-frame to position heavy equipment 16. Adhere to weather limits for this operation: o Wind speed: 30 knots o Wave height [Hs]: 4 m 17. Recovery operations carried out at captain's discretion while giving consideration to safety of crew, vessel, environment and 3 rd party assets.	2 - Unlikely	C - Moderate	Medium		MMP
2.5	**Cutting of FO cable**	All involved people	1. Personal injuries - Lacerations and abrasions of the skin, possibly deeper wounds.	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instructions with respect to installation of chinese finger & band-it 2. Check tools before use 3. Use the right tool for the job 4. Bring all tools and appropriate PPE to workplace 5. Use appropriate PPE 6. Inform your collegues about activities	2 - Unlikely	C - Moderate	Medium	-	MMP
2.6	**Installation of chinese finger on cable end**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment - Chinese finger sliding from cable end	2 - Unlikely	B - Slight	Low	1. Supervision. Clear instructions with respect to installation of chinese finger & band-it 2. If necessary, bring cable end out of the water with crane to install chinese finger on vessel 3. Use certified chiinese finger 4. Use band-it to prevent sliding of chinese finger over the cable 5. Perform activity before float-in of pulling rope	2 - Unlikely	B - Slight	Low	-	MMP
2.7	**Use Diving Support Vesel (DSV) or RIB to float-in pulling rope from cable end to Cable Recovery Vessel (CRV)**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment - Pulling rope in propeller, loss of proulsion, vessel grounding	2 - Unlikely	E - Very High	High	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Direct radio communication between vessel and DSV/RIB 3. Use polyprop rope because of floating properties 4. Minimilze amount of slack in pulling rope 5. Direct radio communication between crew present at vessel stern CRV (monitoring the situation) and master 6. Perform activities under favourable weather conditions 7. Have a weather forecast in place	1 - Very Unlikely	E - Very High	Medium	-	MMP
2.8	**Water ingress due to waves**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment	2 - Unlikely	C - Moderate	Medium	1. The weather will be closely monitored to be able to plan and act in time; 2. During loading of the cable one manhole will be open to guide the rope in to the hold. If bad weather is suspected, recovery operation will be suspended and the manhole hatch will be closed to guarantee the safety of the ship and his crew.	1 - Very Unlikely	C - Moderate	Medium	-	MMP
2.9	**Repeater handling**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment	2 - Unlikely	C - Moderate	Medium	1. Crewmembers will be trained for their tasks and only when proven capable, allowed to perform specific tasks on-board; 2. Only the necessary designated persons are allowed on deck; 3. Stoppers installed to fixate the cable before handling of repeater 4. Check tools before use 5. Use the right tool for the job 6. Bring all tools and appropriate PPE to workplace 7. Use appropriate PPE 8. Use dedicated repeater slide to guide the repeater downwards	2 - Unlikely	B - Slight	Low	-	MMP
2.10	**Adverse weather**	All involved people	1. Personal injuries - bodyparts stuck 2. Damage to vessel/equipment/cable	2 - Unlikely	C - Moderate	Medium	1. Strictly monitor weather forecast 2. Cutting run performed if apprproate weather window is available 3. Holding run only performed when there is a sufficient weather window for performing recovery operations directly afterwards 3. Recovery operations carried out at captain's discretion while giving consideration to safety of crew, vessel, environment and 3 rd party assets. 4. When the decision is made to abort recovery operations: - All personnel will leave deck - Winch is put on break - Tensions will be closely monitored - Cable to remain fixed to winch - cable used as anchor 5. In case of extreme circumstances, captain can decide to cut the cable.	2 - Unlikely	B - Slight	Low	-	MMP

STEPS	TASK / ACTIVITY	HAZARDS		INITIAL RISK			CONTROLS	RESIDUAL RISK			FURTHER ACTIONS REQUIRED TO REDUCE RISKS	RESPONSIBLE PARTY
		Persons at Risk & How	Hazards	Likelihood	Severity	Risk Rating	Control Measures	Likelihood	Severity	Risk Rating		
Removal of AP												
3.1	**Bringing AP over bow roller**	Traction winch operator & watchman	1. Personal injury - unexpected sliding of AP over bow roller 2 . Damage to vessel/equipment - Damage to bow roller	2 - Unlikely	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. One crew member dedicated for monitoring of bow roller (which is in direct communication with traction winch operator) 3. Keep clear distance 4. Removal of seabed anchoring before commencement of operation to reduce the required pulling force 5. Location of AP-area indicated by marker buoys and MAXSEA-system 5. Daylight operations only - diving support available	2 - Unlikely	A - Negligible	Low		MMP
3.2	**Dismounting of AP (Mechanical)**	Personnel involved in removal of AP	1 . Personal injury - body parts stuck in moving parts, Lacerations and abrasions of the skin, possibly deeper wounds	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Use torque wrench to remove bolts, before using alternatives (hot work) 3. Inspect tools before usage 4. Use apprpriate PPE	2 - Unlikely	C - Moderate	Medium		MMP
3.3	**Dismounting of AP (Hot work)**	Personnel involved in removal of AP	1. Personal injury - Entrapment body parts 2. Damge to vessel/equipment - Damage to cable guide	3 - Remote	C - Moderate	Medium	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Ensure work is performed by competent personnel 3. Obtain gas-free certificate (in case working above tanks) 4. Ensure fire fighting equipment (fire blanket, fire extuingisher) is close 5. Remove items/equipment/tools that can be damaged by sparks, heat, etc or cover items with welding blanket 6. Use the right tools for the job 7. Wear appropriate PPE	2 - Unlikely	C - Moderate	Medium		MMP
3.4	**Lifting AP-sections from cable guide**	Personnel involved in cable lifting	1. Personal injury - Entrapment body parts, strain your back	3 - Remote	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Lift sections piece by piece and separate bottom and top section 3. Use dedicated lifting tools 4. Wear appropriate PPE	2 - Unlikely	B - Slight	Low		MMP
3.5	**Lift AP-sections towards repeater storage area**	Personnel involved in cable lifting	1. Personal injury - Entrapment body parts, strain your back	3 - Remote	B - Slight	Low	1. Supervision. Clear instruction from the supervisor of the leading party on operational and safety issues during the toolbox talk and pre-recovery meeting. 2. Lift sections piece by piece and separate bottom and top section 3. Use installed trolley to move AP-sections 4. Wear appropriate PPE 5. Sea-fasten AP with ratchet straps to prevent movement	3 - Remote	B - Slight	Low		MMP

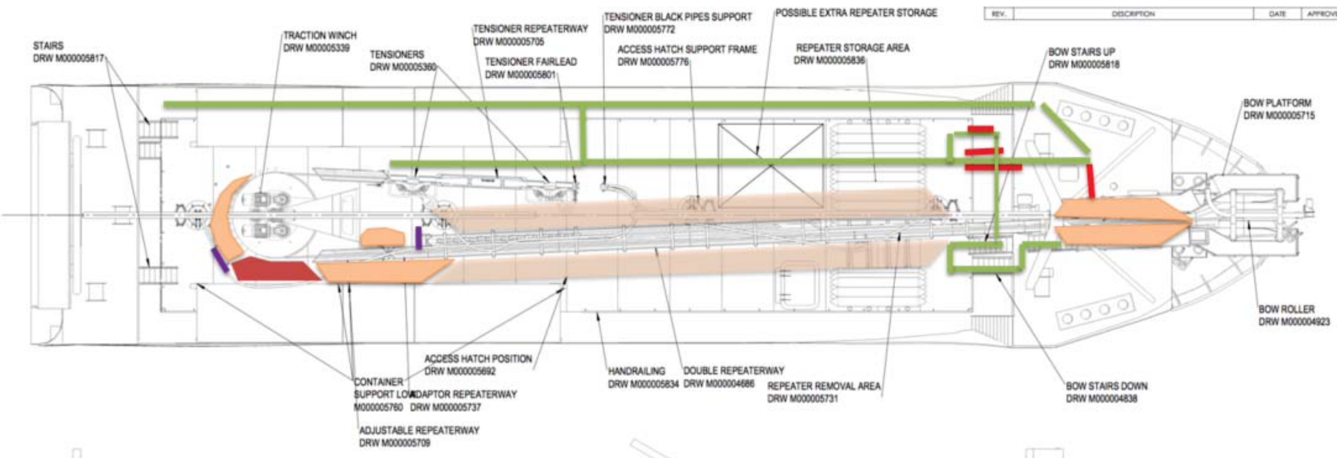
Risk Matrix

		CONSEQUENCES				PROBABILITY				
		People	**Environment**	**Assets**		**Very Unlikely 1**	**Unlikely 2**	**Remote 3**	**Likely 4**	**Very Likely 5**
SEVERITY	**Negligible A**	Negligible injury, no absence from work.	Negligible loss of function/production with no damage to the environment.	Negligible loss of function/production with no damage to equipment	A - Negligible	**Low A1**	**Low A2**	**Low A3**	**Low A4**	**Low A5**
	Slight B	Minor injury requiring first-aid treatment.	Slight impact to the environment	Damage to equipment requiring minor remedial repair, loss of production	B - Slight	**Low B1**	**Low B2**	**Low B3**	**Medium B4**	**Medium B5**
	Moderate C	Event resulting in a lost time incident.	Moderate pollution incurring some compensation costs	Localised damage to equipment requiring substantial repair, significant loss of function/production	C - Moderate	**Medium C1**	**Medium C2**	**Medium C3**	**High C4**	**High C5**
	High D	Major injury.	Severe pollution with short-term localised implications incurring significant compensation costs	Major damage to equipment resulting in significant loss to programme	D - High	**Medium D1**	**Medium D2**	**High D3**	**High D4**	**High D5**
	Very High E	Death or permanent disability.	Major pollution with long-term implication and very high compensation costs	Plant shutdown/Major damage to equipment resulting in critical impact on programme	E - Very High	**Medium E1**	**High E2**	**High E3**	**High E4**	**High E5**

	PROBABILITY
Very Unlikely 1	A freak combination of factors would be required for an incident to result. Hazard believed to be credible but never experienced in the offshore wind industry.
Unlikely 2	A rare combination of factors would be required for an incident to result. Unlikely that hazard will be realised but has been experienced in the offshore wind industry.
Remote 3	Could happen when additional factors are present but otherwise not expected to occur.
Likely 4	Not certain to happen but an additional factor may result in an accident or incident.
Very Likely 5	Almost inevitable that an accident would result.

LOW RISK A1-B3	**MEDIUM RISK B4-E1**	**HIGH RISK C4-E5**
May be acceptable; however, review task to see if risk can be reduced.	Task should only proceed with appropriate management authorisation after consultation with specialist personnel and assessment team. Where possible, the task should be redefined to take account of the hazards involved or the risk should be reduced further prior to task commencement.	Task must not proceed. It should be redefined or further control measures put in place to reduce risk. The controls should be re-assessed for adequacy prior to task commencement.

Appendix B – Safe passage route



- Dangerous position – no direct escape route

- Dangerous position – with direct escape route

- Dangerous position – with direct escape routes

- Safe route on deck

1

ATTACHMENT 5

M/V LAYLA BIOFOULING AND SEDIMENT REMOVAL MANAGEMENT PLAN

United States
Biofouling and
Sediment Removal
Management Plan
and Record Book

Developed For:

Layla Shipping BV

Vessel: LAYLA

IMO Number: 7420936

28 January 2019

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Record of Changes

Ch. No.	Description of Change	Page	By	Date
0	Original Issue	All	MK	28 Jan 2019

Record of Review

Position	Name	Signature	Date

Table of Contents

Chapter 1 Introduction

Foreword

This Compliance System was prepared by:

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On Behalf of:

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Oudegracht 164-168
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The Netherlands
Tel: +31 72 519 32 50

For:

Vessel:	LAYLA
IMO Number:	7420936

Purpose

The purpose of this Plan and Record Book is to document policies, procedures and activities for the control and management of this vessel's biofouling and the accumulation and disposal of ballast tank sediments to minimize the transfer of invasive aquatic species.

Important Note Regarding this Plan

SEDIMENT REMOVAL PROCEDURES:

US Requirements:

The US requirements for Ballast Water Sediment Management pre-date the BW Convention coming into force.

The ballast water Sediment Removal Procedures provided as part of this Plan are written to satisfy the 2012 US Ballast Water Regulation which at 33 CFR 151.2050(g)(3) require that a ship's Ballast Water Management Plan (BWMP) contain "detailed fouling maintenance **and sediment removal procedures**". The procedures described in this Plan also satisfy the requirements of the 2013 Vessel General Permit and the 2017 California State Marine Invasive Species Program regulations, as of the date of this plan.

BW Convention Requirements:

The IMO BW Convention in Regulation B-1 require that a ship's Ballast Water Management Plan be approved by the Administration and contain detailed procedures for the disposal of sediments at sea and to shore.

Which Sediment Management Plan to follow?

BWMPs of most recent ships are modeled from Resolution A.868(20), *Guidelines for the Control and Management of Ships Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens"* dated 01 December 1997.

If the ship's BWMP is modeled on the above resolution, contains ballast sediment management procedures, and is approved by the Administration, then it will also satisfy the US requirements. In this case, the procedures in the ship's BWMP should be followed and the Sediment Management or Sediment Removal Procedures in this plan disregarded.

If the ship's BWMP does not include sediment management procedures, then the procedures included with this plan should be followed to satisfy US requirements. Note that the US does not require that BWMPs be approved by an Administration.

BIOFOULING PLAN

A Biofouling Plan is recommended by IMO, but required by the USCG, the 2013 Vessel General Permit and the State of California. In addition, the State of California requires that a Biofouling Record Book be maintained. Effective May 15 2018 New Zealand requires the biofouling plan and records to be maintained to comply with CRMS (Craft Risk management Standard).

Regulatory Compliance Statement and Disclaimer

This plan is written using the guidance of MEPC.207(62), "2011 Guidelines for the Control and Transfer and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species", the US Coast Guard's "Guidance on Verification of Fouling Maintenance and Sediment Removal Procedures" dated 05 November 2012, and the New Zealand "Craft Risk Management Plan Guidance" as of date of this plan.

Gallagher Marine Systems, LLC has carefully prepared this Biofouling Management and Sediment Removal Plan and Record Book. This Plan and Record Book do not require pre-approval by the Administration or the US Coast Guard. However, it may be examined periodically and evaluated for compliance during Port State Control inspections.

Regular Updates are Required

To remain compliant, this Plan and Record Book requires that updates and entries be made by the ship's Officers and the ship's Technical Manager / Docking Superintendent as needed. With the required regular updates and Record Book entries, this Plan will satisfy the requirements of 33 CFR § 151.2050(g)(3), the 2013 Vessel General Permit, the State of California and New Zealand.

Biofouling Management and Sediment Removal Plan Layout

THIS DOCUMENT CONSISTS OF THE FOLLOWING ELEMENTS:

THIS DOCUMENT CONTAINS THE FOLLOWING TYPES OF INFORMATION:

- A description of the operating profile of the vessel;
- A description of the anti-fouling and anti-corrosion coating systems;
- A description of areas on the ship susceptible to biofouling accumulations;
- A biofouling Action Plan;
- A description of any maintenance of the anti-fouling coating;
- A description or reference to Safety Precautions;
- A description of disposing of biological wastes;
- A description of Crew training and familiarization;
- A description of ballast tank sediment control and removal procedures;
- A description of steps to avoid sediment accumulation;
- A description of procedures for monitoring the volume of sediment in a ballast tank;
- A description of procedures for removing accumulated sediments;
- A description of particulars of vessel design and construction to minimize the uptake and accumulation of sediments;
- Entry Sheets for the Biofouling and Sediment Removal Record Book

Chapter 2 Background and General Information

This Biofouling and Sediment Removal Management Plan are specific and unique to this vessel. It follows the recommendations of MEPC.207(62), the US Coast Guard's "Guidance on Verification of Fouling Maintenance and Sediment Removal Procedures" dated 05 November 2012 and New Zealand's recommendations to comply with CRMS (Craft Risk Management Standards).

MEPC.207(62) provides a great deal of valuable information on biofouling of ships, including where fouling is likely to occur and practical guidance on measures to prevent or control its accumulation and subsequent spread of invasive aquatic species. It should be available to the Senior Officers aboard ship and the ship's Technical Manager should review it in detail as many of the recommended measures must be implemented with the vessel in drydock.

This Plan and Record Book do not require pre-approval by either the US Coast Guard / New Zealand or the ship's Administration. However, the Coast Guard, and possibly other Port States, may review this Plan and Record Book for compliance and to determine the vessel's "Biofouling Risk".

The Plan and Record Book shall be either made a part of the vessel's Ballast Water Management Manual (BWMM) as an addendum or kept as a separate Plan and Record Book (recommended). If kept separately, the BWMM must be annotated to make reference to the Biofouling and Sediment Management Plan (i.e.; "incorporated by reference"). This may be done by inserting an entry or page into the BWMM Table of Contents indicating the location of this Plan and Record Book

The Plan and Record Book shall be readily available to any Port State authority or other authorized officer for viewing on request.

Regulatory Citation

Federal Regulations:

The US Coast Guard published in the Federal Register on 23 March 2012 changes to previous regulations at 33 CFR Part 151 and 46 CFR Part 162 entitled *Standards for Living Organisms in Ships' Ballast Water Discharged in the United States*. This regulation came into effect on 21 June 2012.

For the most part, 33 CFR 151 comprises the United States' implementation of the IMO Ballast Water Convention, particularly Regulations D-2 and D-3 concerning ballast water management, discharge standards, and the schedule of compliance with the Convention. This is outside the scope of this Plan.

33 CFR § 151.2052 (e) and (f):

(e) Rinse anchors and anchor chains when the anchor is retrieved to remove organisms and sediments at their places of origin;

(f) Remove fouling organisms from the vessel's hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, State and Federal regulations.

33 CFR § 151.2050 (g) - (Ballast Water Management Manual must contain…):

(g)(1) Detailed safety procedures;

(g)(2) Actions for implementing the mandatory Ballast Water Management (BWM) requirements and practices;

(g)(3) Detailed fouling maintenance and sediment removal procedures.

(g)(4) Procedures for coordinating the shipboard BWM strategy with USCG authorities;

(g)(5) Identification of the designated officer(s) in charge of ensuring that the plan is properly implemented.

Note: Items (1), (2), (4), and (5) above are existing requirements for the BWMM itself, not this Plan. They are included for background purposes.

2013 Vessel General Permit:

VGP Part 2.2.23

California:

California Code of Regulations, title 2, section 2298.1 et seq.

New Zealand:

Craft Risk Management Standard for Biofouling (CRMS) (Please refer to the Addendum for New Zealand for more information).

Under the Craft Risk Management Standard for Biofouling (CRMS), all vessels arriving in New Zealand from May 2018 will need to show proof of biofouling management in one of the following ways:

- Provide documentation that the vessel has managed biofouling using best practice.
- Provide documentation that the vessel has been cleaned less than 30 days prior to arrival in New Zealand (or within 24 hours of arrival to New Zealand, at an approved facility).
- Application of an MPI-approved treatment.

RECORDKEEPING

MEPC.207(62), New Zealand and the USCG Regulation require that records be maintained for biofouling management and sediment removal activities. These records are maintained in the Biofouling Sediment Removal Record Book. The following events should be recorded & reports to be retained:

1. Hull cleaning and maintenance performed during dry-docking (retain the service reports);

2. Inspection of hull area, fittings, niches, sea chests and gratings, voids below the waterline, anodes, and propeller by divers;
3. Cleaning of hull area, fittings, niches, sea chests and gratings, voids below the waterline, anodes, and propeller by divers;
4. When internal seawater cooling systems have been inspected and cleaned or treated;
5. Maintenance of and repairs to the Marine Growth Prevention System (MGPS);
6. Periods when the ship was laid up or inactive for an extended period of time;
7. Periods of time when the ship was operating outside its normal operating profile;
8. A Log of ballast tank sediment removal and disposal other than drydock (through operational means such as flushing or mechanical means when dockside).
9. Details of official inspection or review of the ship's biofouling risk;
10. Any additional observations and general remarks.

Chapter 3 Implementation Instructions

General Information

The Biofouling Management and Sediment Removal Plan establish the initial conditions affecting biofouling - the type of coating system applied to the hull, areas susceptible to biofouling and other information.

The Plan also establishes certain policies and commitments of the Management Company to periodically review, assess and take action on the biofouling risk of the vessel.

Initial Data

The ship's Officers and the ship's Technical or Docking Superintendent should complete the ship-specific information contained within Chapters 4 and 5 of this Plan. This data reflects the known condition of the vessel with respect to biofouling risk as of the date indicated on this Plan.

Subsequent Data

As the ship operates over its lifetime, events occur which affect the vessel's "biofouling risk". These include proactive measures such as drydock cycles, re-application of hull anti-foulant coatings, dive inspections, propeller cleanings, and other activities. These activities help to prevent or reduce biofouling accumulation, observe and gauge biofouling accumulation, or remove existing accumulation (such as an in-water cleaning).

Other events such as the loss of effectiveness of the anti-foulant coating, extended lay-up or inactivity of the vessel, and prolonged operation in certain parts of the world tend to increase the level of fouling of the vessel.

Recording these events and activities are important to analyzing the biofouling risk of the vessel.

These events are recorded in the Biofouling and Sediment Removal Record Book and supersede some information recorded in the original Plan.

Biofouling and Sediment Removal Record Book

The Record Book consists of loose-leaf forms which are used to document activities that change the biofouling risk of the vessel. For each activity, complete one of the forms and post consecutively in a loose-leaf binder with the Plan at the front.

For example, at the next dry docking, the conditions of existing biofouling on the hull, niches, propeller, etc., should be observed and recorded immediately after the ship leaves the water and before any material is cleaned. This would become the new mapping of "Areas particularly susceptible to Biofouling".

Similarly, if the anti-foulant coating on the hull is re-applied, details of the coating system may change, and this information would supersede the initial data located within this Plan.

Therefore, the Plan establishes the baseline of the vessel, with subsequent entries reflecting changes that have occurred over time.

For ships calling NEW ZEALAND their CRMS Standards apply – please see New Zealand Addendum attached. Amongst other items included in the New Zealand addendum, one of the requirements is to record *any interim maintenance between drydocks*, these can be recorded in the appropriate Appendices A through I of the plan. In addition to entries in the record book, vessels should also retain any additional evidence of biofouling management, such as routine maintenance, hull inspection reports, on board.

Chapter 4 Biofouling Management Plan

This plan is in accordance with Appendix I of MEPC Resolution "Guidelines for the control and management of ship's biofouling to minimize the transfer of invasive aquatic species", adopted at MEPC 62 (15 July 2011)

Responsible Officer:

The Responsible Officer for this Plan and Record Book is the Chief Officer.

Ship's Particulars

Ship's Name:	LAYLA
Flag:	Antigua and Barbuda
Port of Registry:	St. John's
IMO Number:	7420936
Gross Tonnage:	1010
Type of Vessel:	Cable Recovery Vessel
Regulation Length Overall (between Perpendiculars):	65.85 M
Beam (Breadth Mid-section)	10.72 M
International Call Sign:	V2YX9
Year of Construction:	1975
Date of Delivery:	1976
Date Keel was laid:	1975

Description of the Operating Profile of the Vessel

AVERAGE SPEED AND DAYS UNDERWAY, TRADING AREAS, AND DAYS THE SHIP IS STATIC	
Typical operating speed (Average transit speed in Knots):	4 ~ 8 Knots
Typical period of time underway (Average number of days transiting from port to port) (days per year):	146
Typical number of days static (Anchored, Moored, etc.); (days per year):	219
Typical operating areas or trading routes (i.e., primarily Asian Ports; primarily European Ports; primarily Trans-Atlantic; primarily Trans-Pacific, etc.):	Atlantic, Caribbean, Pacific
Planned duration between dry docking in years:	2.5 Years
Is the vessel enrolled in an alternate mid-term dry-docking compliance program? (i.e., Underwater Inspection In lieu of Dry docking (UWILD))?	No

Description of the Anti-Fouling and Anti-Corrosion Control Coating System

INFORMATION ON THE COATING SYSTEMS PRESENTLY APPLIED AND IN SERVICE	
Types of System Coating System Used:	TBT-free self polishing antifouling paint.
Date of application of Fouling Control System:	07th May 2018
Location where the Coating System was Applied? (Shipyard and, shipyard's location):	BLRT Shipyard, Tallinn, Estonia
Active ingredients and their Chemical Abstract Service Registry Number (CAS number) for each anti-foulant paint type applied:	Copper (1) oxide (CAS No. 1317-39-1) Copper pyrithione (CAS No. 14915-37-8)
Operating conditions required for coatings to be effective:	Activity 40%; Static 60%.
Other specifications relevant for paint performance as provided by Manufacturer (if any):	None.
Does the vessel have an Anti-Fouling Certificate applicable to the coating system presently on the vessel? (Y/N)	Yes

Are copies of previous anti-foulant paint reports, diver surveys, docking reports on hull fouling, and any photographs available for attachment to the Hull Record Book?	Yes.
Does vessel have a Marine Growth Prevention System for sea chests and salt water piping? (Y/N) Make and Model	No.

SPECIFIC APPLICATION DETAILS ON THE COATING SYSTEMS PRESENTLY APPLIED AND IN SERVICE

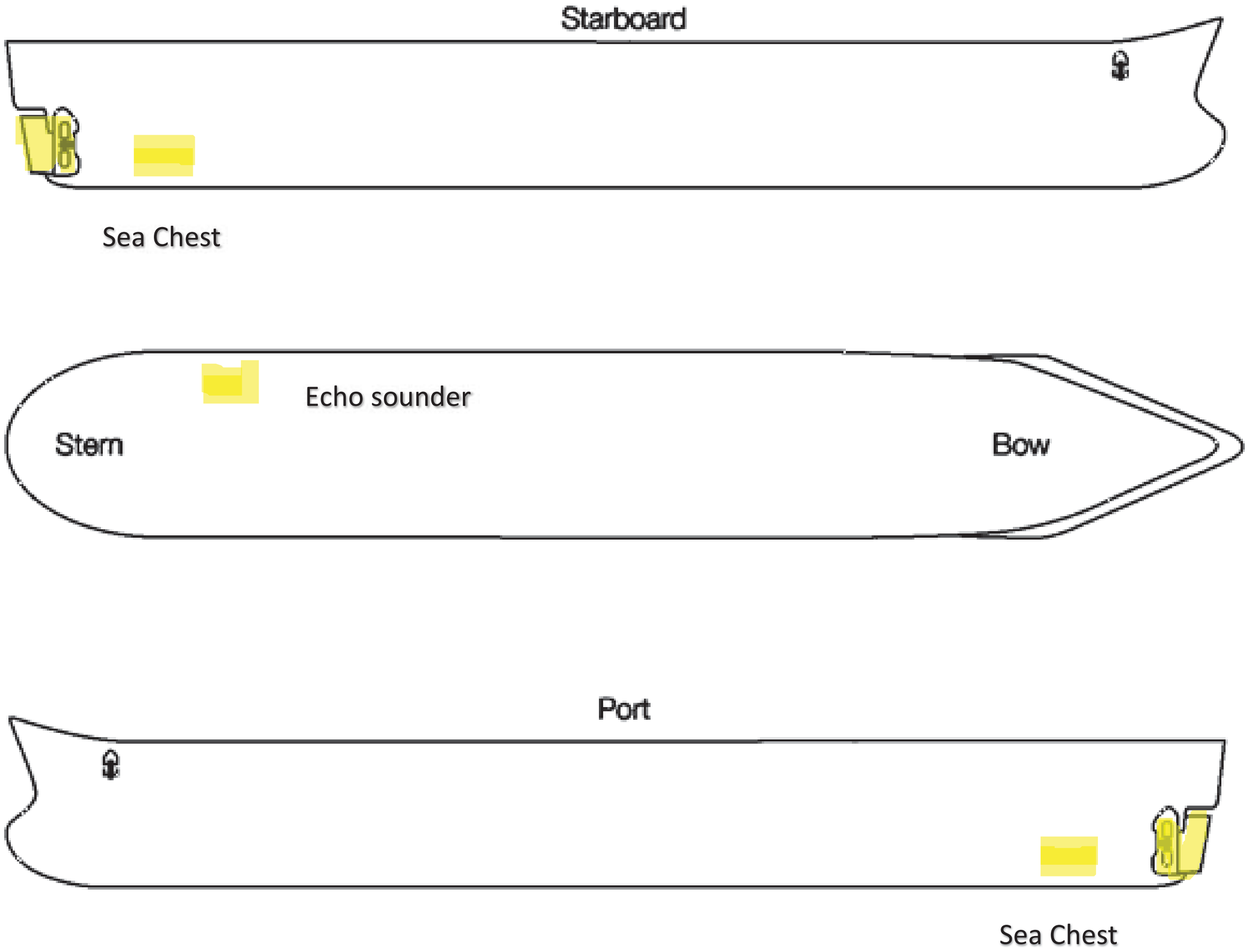
Areas applied: (Flat Bottom, Sides, Rudder, Sea Chest, etc.	DFT (in Microns)	Expected lifetime of system application (Months)	Manufacturer & Manufacturer's Designation	Cleaning requirements	*AFS Certificate Y/N?*
Flat Bottom:	510	36	HEMPEL A/S 175 µm Hempadur Quattro Red 125 µm Hempadur Quattro Light Orange Beige 100 µm Globic 9000 Reddish Bordeaux 110 µm Globic 9000 Reddish Bordeaux	Nil	Y
Turn of Bilge/Vertical Sides:	510	36	HEMPEL A/S 175 µm Hempadur Quattro Red 125 µm Hempadur Quattro Light Orange Beige 100 µm Globic 9000 Reddish Bordeaux 110 µm Globic 9000 Reddish Bordeaux	Nil	Y

SPECIFIC APPLICATION DETAILS ON THE COATING SYSTEMS PRESENTLY APPLIED AND IN SERVICE

Areas applied: (Flat Bottom, Sides, Rudder, Sea Chest, etc.	DFT (in Microns)	Expected lifetime of system application (Months)	Manufacturer & Manufacturer's Designation	Cleaning requirements	*AFS Certificate Y/N?*
Boot-topping:	510	36	HEMPEL A/S 175 µm Hempadur Quattro Red 125 µm Hempadur Quattro Light Orange Beige 100 µm Globic 9000 Reddish Bordeaux 110 µm Globic 9000 Reddish Bordeaux	Nil	Y
Rudder and Gudgeons:	510	36	HEMPEL A/S 175 µm Hempadur Quattro Red 125 µm Hempadur Quattro Light Orange Beige 100 µm Globic 9000 Reddish Bordeaux 110 µm Globic 9000 Reddish Bordeaux	Nil	Y
Sea Chests and Grates:	510	36	HEMPEL A/S 175 µm Hempadur Quattro Red 125 µm Hempadur Quattro Light Orange Beige 100 µm Globic 9000 Reddish Bordeaux 110 µm Globic 9000 Reddish Bordeaux	Nil	Y
Tunnel Thrusters (if applicable)					

SPECIFIC APPLICATION DETAILS ON THE COATING SYSTEMS PRESENTLY APPLIED AND IN SERVICE					
Areas applied: (Flat Bottom, Sides, Rudder, Sea Chest, etc.	**DFT (in Microns)**	**Expected lifetime of system application (Months)**	**Manufacturer & Manufacturer's Designation**	**Cleaning requirements**	***AFS Certificate Y/N?***
Other:					
List any wetted areas of vessel where an anti-foulant coating IS NOT applied (if any).			Echo sounder, Propeller, Zinc Anodes, Certain dock block positions.		

Graphic - Location of Areas on the Ship Susceptible to Biofouling and Sea Chests:



BIOFOULING MANAGEMENT ACTION PLAN TO MINIMIZE THE TRANSFER OF INVASIVE SPECIES

Ship area *(this should be completed for areas found to be particularly susceptible to biofouling on the particular vessel)*	**Planned management action** *(e.g., inspections, cleaning, repairs and maintenance)*	**Management action if ship operates outside its usual operating profile**
External hull surfaces:		
Vertical sides	Inspections at each port for damage to paint or hull (visible areas). Inspections at each intermediate dry-dock (36 months interval max.) Renewal of antifouling system as necessary not exceeding 5 years.	Additional inspections and cleaning as necessary. Consider underwater survey / cleaning if extensive fouling. Repair to A/F is feasible.
Flats	Inspections at each intermediate dry-dock (36 months interval max.) Renewal of antifouling system as necessary not exceeding 5 years.	Additional inspections and cleaning as necessary.
Boot top	Inspections at each port for damage to paint or hull (visible areas). Inspections at each intermediate drydock (36 months interval max.) Renewal of antifouling system as necessary not exceeding 5 years.	Additional inspections and cleaning as necessary. Repair to A/F is feasible.

Ship area *(this should be completed for areas found to be particularly susceptible to biofouling on the particular vessel)*	**Planned management action** *(e.g., inspections, cleaning, repairs and maintenance)*	**Management action if ship operates outside its usual operating profile**
Bow dome	Inspections at each port for damage to paint or hull (visible areas). Inspections at each intermediate drydock (36 months interval max.) Renewal of antifouling system as necessary not exceeding 5 years.	Additional inspections and cleaning as necessary. Repair to A/F is feasible.
Transom	Inspections at each port for damage to paint or hull (visible areas). Inspections at each intermediate drydock (36 months interval max.) Renewal of antifouling system as necessary not exceeding 5 years.	Additional inspections and cleaning as necessary. Repair to A/F is feasible.
Docking Block Positions (out of water support strips)	If feasible blocks are shifted during the docking to cover these areas with A/F coating.	Additional inspections and cleaning as necessary. Repair to A/F is feasible.
Hull appendages and fittings:		
Bilge keels	Inspections at each intermediate drydock (36 months interval max.) Renewal of antifouling system as necessary not exceeding 5 years.	Additional inspections and cleaning as necessary. Repair to A/F is feasible.
A-brackets	Not Applicable	Not Applicable

Ship area *(this should be completed for areas found to be particularly susceptible to biofouling on the particular vessel)*	**Planned management action** *(e.g., inspections, cleaning, repairs and maintenance)*	**Management action if ship operates outside its usual operating profile**
Stabilizer fins (if any)	Not Applicable	Not Applicable
Cathodic Protection Anodes	Inspections at each intermediate drydock (36 months interval max.) Clean or renew if necessary.	Clean or renew if necessary.
Steering and propulsion:		
Propeller	Inspections at each port call, when propeller will be visible. Clean if necessary. During dry-dock complete polishing of propeller.	Additional inspections and cleaning if necessary.
Propeller shaft	Not Applicable	Not Applicable
Stern tube seal	Seal and liner removed every 5 years. Inspected and cleaned. New seals installed.	Additional inspections and cleaning if necessary.
Anchor chain and Anchors	Thorough washing of chain and anchor when hoisting and prior housing anchor.	Additional inspection and cleaning or maintenance as necessary.
Chain locker	Inspect and clean out chain locker every intermediate dry-docking. (max. interval 36 months).	Additional inspection and cleaning or maintenance as necessary.

Ship area *(this should be completed for areas found to be particularly susceptible to biofouling on the particular vessel)*	**Planned management action** *(e.g., inspections, cleaning, repairs and maintenance)*	**Management action if ship operates outside its usual operating profile**
Rope guard	Rope guard is removed during each intermediate docking; seal liner is inspected and cleaned as necessary. Rope guard painted with A/F coating inside and outside before installation.	Additional inspection and cleaning or maintenance as necessary
Rudder	Can be inspected each port call after discharging. Cleaning as necessary. Repair of A/F if feasible.	Additional inspection and cleaning or maintenance as necessary.
Bow/Stern Thrusters	Not Applicable	Not Applicable
Thruster Propeller	Not Applicable	Not Applicable
Thruster body/gearbox	Not Applicable	Not Applicable
Tunnel	Not Applicable	Not Applicable
Tunnel grates	Not Applicable	Not Applicable
Seawater intakes and internal seawater		
Engine cooling system (salt-water side)	Inspection of and cleaning as necessary accessible portion of strainers and piping every 3 months.	Additional inspection and cleaning or maintenance as necessary.

Ship area *(this should be completed for areas found to be particularly susceptible to biofouling on the particular vessel)*	**Planned management action** *(e.g., inspections, cleaning, repairs and maintenance)*	**Management action if ship operates outside its usual operating profile**
Sea chests *(identify number and position)*	inspection during each intermediate drydock (36 months max. interval). Cleaning and scraping as necessary apply full new A/F coating. 1 x Port side Aft 1 x Starboard side Aft.	
Sea chest grates	Grating removed and blasted clean each docking, full A/F coating applied.	Additional inspection and cleaning as required.
Heat Exchangers (salt-water side)	Chemical cleaning every 3 months or as necessary when coolant temperatures rise. Waste disposed of properly.	Additional inspection and cleaning or maintenance as required.
Fire-fighting system	Inspection of and cleaning as necessary accessible portions of strainers and piping every 3 months.	Additional inspection and cleaning or maintenance as required.
Ballast uptake system	Inspection of and cleaning as necessary of accessible portions of strainers and piping every 3 months.	Additional inspection and cleaning or maintenance as required.

Ship area *(this should be completed for areas found to be particularly susceptible to biofouling on the particular vessel)*	**Planned management action** *(e.g., inspections, cleaning, repairs and maintenance)*	**Management action if ship operates outside its usual operating profile**
Auxiliary services system	Inspection of and cleaning as necessary of accessible portions of strainers and piping every 3 months.	Additional inspection and cleaning or maintenance as required.

MAINTENANCE OF THE ANTI-FOULING COATING SYSTEM

A. Timing of operational and maintenance activities:
Schedule of planned inspections, repairs, maintenance and renewal of fouling control coatings.

1. External hull surfaces for damaged condition of paint/hull (vertical sides, transom, boottop, bow dome as visible): Inspection at each port stop. Repairs if feasible / accessible / safety wise.
2. External hull surfaces (bilge keels, flats, appendages, fittings, CP Anodes): Inspection and cleaning as necessary during each intermediate dry-dock. Cleaning and anti-foulant paint renewal every 5 years at dry-docking.
3. Steering and Propulsion:
    a. Propeller, propeller shaft and stern tube seal: Propeller, propeller shaft and stern tube seal/liner inspected and cleaned / polished during each intermediate dry-dock (max. interval 36 months). Stern tube seal renewed each 5-yearly dry-dock.
    b. Chain locker: Visual inspection of chain locker at each intermediate dry-docking. Clean out sediment, dispose of through shipyard. Chip and paint.
    c. Rope guard, rudder and tunnel grates: Inspection during each intermediate dry-docking. Rope guard removed and completely clean, re-painted with A/F in and outside. Rudder inspected and cleaned. Full A/F renewal every 5 years.
4. Seawater intakes and internal seawater cooling systems:
    a. Engine cooling system, firefighting system and auxiliary services system: Inspection and cleaning of accessible areas every 3 months.
    b. Sea chests and sea chest grate: Inspection during intermediate docking (36 months max), cleaning as necessary.
    c. Internal pipework and heat exchangers: Inspection and cleaning as necessary every 3 months.
    d. Ballast uptake system: Inspection, cleaning every 3 months and overhauling valves as necessary.
    e. Seawater/Ballast Water tanks: Inspection and cleaning every 6 months. Sediment Removal as necessary as per procedures and as per Ballast Water Management Plan and this Plan.

B. In-water cleaning and maintenance procedures:

Schedule of planned maintenance procedures to be completed between dry-docking events

Treatment/ cleaning conducted and detailed operational procedures, chemicals, discharge standards applied to specific areas.

1. Every 3 years, when the intermediate dry-docking is conducted, hull is completely HP washed. Depending on the extend of fouling on the hull a decision is made to perform hand scraping, or sand blasting if required and if anti-fouling renewal is required or not.
2. If the vessel has a static period of more than 20 days in warm waters, then an in-water cleaning of the bottom and vertical sides might be required before departure, condition of visible sides of the hull in light weight condition will determine if this is required.
3. A visual inspection of the vessel's hull (all that is exposed) when the vessel is in ballast/light load condition is done at each port call.

C. Planned biofouling management if MGPS is temporarily out of operation.

Document procedures: *(Answer reflects company policy.)*

Not Applicable.

SAFETY PRECAUTIONS FOR THE SHIP AND CREW

A. Safety procedures to be followed during ship inspections:
(Or reference to location, such as ship's SMS, where such Safety Procedures are defined).

1. During A/F application and repair following SMS procedures shall be followed:
   a. Working with chemicals.
   b. Working at heights.
   c. Enclosed space entry.

DISPOSAL OF BIOLOGICAL WASTE

A. Procedures for the disposal of biological waste generated by treatment/cleaning processes*:*
When the cleaning is conducted by, or under the direct supervision of, the ship owner, master or crew.

Where practicable, treatment or cleaning process should be carried out under controlled arrangements in port, drydock, or:

1. At least 200 NM from the nearest land and in water at least 200 Meters in depth. If this is not possible, then:
   a. As far from the nearest land as possible, and in all cases at least 50 NM from the nearest land and in water at least 200 Meters in depth;
   b. In sea areas designated by the Port State;
   c. In accordance with MARPOL Annex VI requirements.

CREW TRAINING AND FAMILIARISATION

A. Provisions for crew training and familiarisation *Document procedures (List training provided to Officers and Crew on ballast water management and biofouling).*
Ballast water management and biofouling plan are explained to Masters and Chief Officers. Familiarization check-list added to each plan.

Chapter 5 Ballast Tank Sediment Control and Removal Procedures

(To be followed if the ship's Ballast Water Management Plan does not contain Sediment Management Procedures)

Steps to Avoid Sediment Accumulation

These steps should be taken to avoid to the extent possible any sediment uptake when ballasting tanks:

1. Avoid loading ballast when vessel is in turbid or muddy water to minimum quantity safely possible.
2. If ballast must be taken on while in port, use high sea chest suction to minimize the uptake of bottom sediments.
3. If possible, use water from shore (fire main or potable water) for ballasting, avoiding the uptake of any sediment from the surrounding water.
4. As early in the voyage as possible, perform a ballast water exchange as required to reduce the spread of invasive species. This exchange should be made in waters 200 NM from any shore.
5. If ballast uptake was made in turbid waters, consider performing several partial pumping and refills (flushing of tanks) to allow movement of the vessel to move ballast water within the tank, washing sediments off of tank structural members.

Procedures for Monitoring the Volume of Sediment in a Ballast Tank

The vessel's Planned Maintenance System specifies the frequency in which Ballast Water Tanks are entered for inspection. Normally this is either annually or semi-annually depending on ship type, its age, and trading pattern. Records of these tank inspections are maintained in the ship's Ballast Water Records and maintained as the responsibility of the Chief Officer.

Included in the Inspection Records are notations on the location and depth of sediments.

The Ship's Safety Management System's Safety Precautions for entering Tanks and Confined Spaces shall be strictly adhered to, including:

1. Company's Health and Safety Policy;
2. Work Permit system used for entering tanks;
3. Risk Assessment meeting held before commencing the operation;
4. Continuous communications with ship's crew provided and tested;
5. Inspector shall wear continuous atmospheric monitoring device.

Procedures for Removing Accumulated Sediments

Accumulated sediments should be removed on a regular basis so their presence and subsequent discharge during de-ballasting does not contribute to the spread of invasive species.

The following procedures should be followed to remove accumulated sediment:

ON-GOING MAINTENANCE OF TANK SEDIMENTS

These standard operating procedures help control and reduce the accumulation of ballast tanks sediments.

1. Routine ballast water exchanges, made as soon as possible in a voyage in waters at least 200NM from any shoreline will help prevent the accumulation of sediments in the ballast tanks.
2. If ballast was loaded from turbid or sediment-containing water, the ballast tank should be flushed. This may be done by pumping the tank to lowest suction, partially filling the tank and allowing the motion of the ship to cause turbulence in the ballast tank. This turbulence will help wash sediment from ballast tank structural members and flats, letting them accumulate in the bottom of the tank.
3. For tanks with heavy accumulation, flushing by partial filling tanks at higher levels first, then at successively lower levels, will help ensure that accumulation at all levels of the tank are flushed clean.
4. If conditions allow, crewmembers using pressurized water sources can be utilized to wash sediments from framing members and structure and direct it to the ballast main bellmouth for suction overboard.

Note that ballast water exchanges and tank flushing operations should be conducted with safety of ship in mind with respect to stability and hull strength. If safe conditions cannot be met then the Master should log the conditions in the ship's logbook claiming a safety exemption to the ballast water exchange requirements.

REMOVAL OF TANK SEDIMENTS DOCKSIDE OR AT DRYDOCK

Normally the removal of large amounts of sediment cannot be removed by flushing alone. If this is the case they must be removed by other methods.

5. If sediment accumulation is present, it is a standard practice of this Company at drydock to require the shipyard to open the Tank Plugs for each Ballast Tank and for the tanks to be flushed clean.
6. If a tank is found with excessive accumulations of sediments and a drydock is not scheduled, it may be necessary to manually shovel out the sediments and/or use high pressure hoses and a vacuum device to remove the sediments. This is determined on a case-by-case basis.

Procedures for Disposing of Sediment

DISPOSAL OF SEDIMENTS AT SEA

Ballast Tank Sediments disposed of at sea are those that are removed during ballast water exchange and/or tank flushing operations. These operations should only be conducted in waters at least 200 NM from the nearest shore.

DISPOSAL OF SEDIMENTS SHORESIDE

If Ballast Water Tanks are cleaned of Sediments either in drydock or dockside, the sediments will be disposed of in a landfill or other disposal method approved by the local officials.

Particulars of Vessel Design and Construction

Vessels may have design features to reduce the uptake and undesirable entrapment of sediments, or to facilitate the removal of sediments. Ship-specific data is provided in the following table.

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