June 30, 2023

Via Email to A. Ehlers

Hon. Jennifer L. Homendy
Chair, National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, D.C. 20594

Re: Beta's Proposed Findings, Probable Cause Statement, and Safety Recommendations regarding January 2021 Anchor Drags and October 2021 Oil Spill in San Pedro Bay

Dear Chair Homendy:

Beta Operating Company, LLC ("Beta") writes pursuant to 49 C.F.R. § 831.14(a) to submit proposed findings, probable cause statement, and safety recommendations regarding the January 2021 anchor-dragging incident and October 2021 oil spill in San Pedro Bay.

Beta appreciates the engagement by and the opportunity to work with the National Transportation Safety Board ("Board") in connection with this important investigation. We would be happy to discuss this submission and answer any questions the Board may have about the submissions from other parties to the investigation.

I. BETA'S PROPOSED FINDINGS.

As detailed below, Beta has a long record of safely operating the San Pedro Bay Pipeline ("Pipeline"). Prior to October 2021, the Pipeline had never leaked in its 40-year-plus history. Beta properly invested in its infrastructure, conducted regular inspections, and kept state and federal regulators up to date. External, in-line, and right-of-way inspections of the Pipeline repeatedly showed that Beta maintained the Pipeline in excellent condition.

Unfortunately, on January 25, 2021, two massive containerships (the MSC *Danit* and M/V *Beijing*) dragged their anchors in the "no-anchor" zone across the Pipeline. The anchors damaged and displaced the Pipeline. Yet despite the vessels repeatedly crossing the Pipeline's well-known location, nobody informed Beta of these anchor drags. Had the vessels, the Coast Guard, or the Marine Exchange (which monitors vessel traffic) notified Beta of the anchor drags, Beta would have inspected the Pipeline and made any necessary repairs. No disclosures were made, and months later, on October 1 and October 2, 2021, approximately 588 barrels of oil were released at the point of one of the anchor strikes.

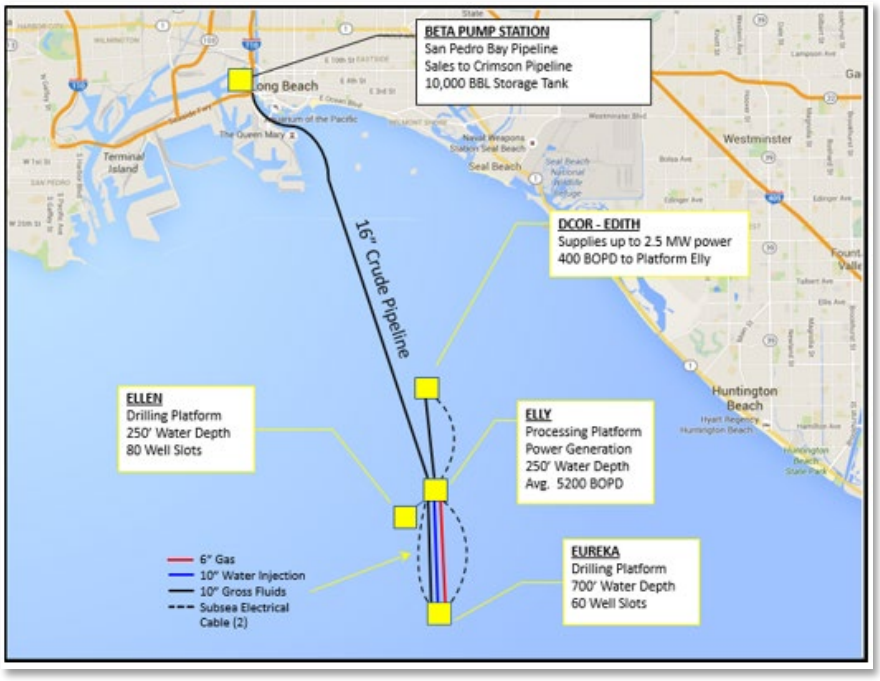
On the night of October 1, 2021, the Beta crew worked diligently and in good faith to troubleshoot what the crew believed were false leak detection alarms. After each leak alarm, crew members acknowledged the alarm, checked the alarm system, turned off the Pipeline, and inspected equipment. The alarm system indicated there was a leak at "mile zero"—*i.e.*, on Platform Elly. As a result, the crew sought to identify a possible leak on Platform Elly and inspected its pipes, valves, shipping pumps, and meters. Though the crew could not identify the source of the alarms, they continued their process-of-elimination, good-faith search throughout the night. Once oil was confirmed in the water the morning of October 2, the crew immediately shut down the Pipeline, and timely notifications were made to the relevant authorities pursuant to Beta's federally-approved Oil Spill Response Plan ("OSRP").

Instead of deflecting blame to the vessels, Beta immediately went to work as a member of Unified Command (a collaborative response team comprised of Beta employees and government agencies) to aid the clean-up. As of June 2, 2023, the Company has booked $164,569,146 in costs related to the incident, including $128,005,725 for the response and $36,563,421 in repairs.

While Beta was working and funding the clean-up, the two vessels continued to deny their responsibility for displacing and damaging the Pipeline and for hiding their misconduct. After an extensive fact and expert discovery process in parallel civil litigation, the vessels agreed to pay Beta $96.5 million for the damages that the vessels caused. In addition, the vessels paid certain insurers tens of millions of dollars and the putative classes of civil plaintiffs an additional $45 million. The $200 million-plus in settlement payments made by the vessels show that the vessels caused the spill, as detailed below in Part I(G) and Part II.

A. The San Pedro Bay Pipeline Operated Safely for Decades.

The Pipeline has operated safely in the San Pedro Bay for more than four decades. The Pipeline was manufactured in 1979 and installed in 1980. Originating at Platform Elly, a processing platform, the Pipeline is approximately 17.3 miles long. The Pipeline runs through the Long Beach Harbor, terminating onshore at Beta Pump Station in Long Beach.



The Pipeline is buried from the Long Beach Harbor breakwater to the shore. Beyond the breakwater, the subsea portion of the Pipeline sits on the ocean floor and always has. The subsea portion of the Pipeline is double-submerged arc-welded, cold expanded X52 steel with a 16 in. outside diameter and 0.5 wall thickness. The subsea portion of the Pipeline up to the riser has a 1-inch-thick concrete coating that weighs 190 pounds per cubic foot. The concrete is applied to weigh down the Pipeline to secure it in place. Under the concrete layer, the Pipeline is protected by a double enamel coat system made of coal tar enamel, reinforcing glass wrap, and outer felt wrap. The Pipeline is further protected by sacrificial zinc anodes, which weigh approximately 315 pounds each and are installed at 100-foot intervals.

Beta operates the Pipeline pursuant to two permits. First, Shell Oil Company, which installed the Pipeline, received a construction permit from the Army Corps of Engineers dated December 11, 1979 (USACE Permit No. 78-178). The permit acknowledged the Pipeline would be unburied from Platform Elly to the breakwater (to protect against seismic activity). The permit required the locations within the breakwater to be buried. The permit contains certain conditions, such as maintaining the Pipeline in good condition and allowing periodic inspections. (Other conditions concerned the Pipeline's construction, which Shell completed.) Beta complies with the ongoing conditions by, among other things, operating the Pipeline in a way that poses "[n]o unreasonable interference with navigation" (the Pipeline is marked on nautical charts and located in a no-anchor zone); allowing announced and unannounced inspections by regulators; and obtaining additional permits where necessary (*e.g.*, Beta obtained additional permits for the post-spill repair work).

Second, a Right-of-Way Permit from the Department of the Interior, dated June 29, 1998 (DOI Permit No. OCS-P-0547), allows Beta to conduct "maintenance and operation of a 16-inch outside diameter oil pipeline from Platform Elly to state waters." Beta complies with this permit by, among other things, conducting regular Pipeline inspections; submitting both inspection plans

and inspection results to regulators; and maintaining an EHS group and Pipeline Superintendent position to monitor compliance with applicable regulations and permit conditions.

In addition to those permits, Beta also follows all applicable regulations from the Department of Transportation with respect to the Pipeline.

Prior to October 2021, the Pipeline had never leaked in its 40-year-plus history.

B. The Pipeline Sits in a No-Anchorage Zone.

Since its original construction, the subsea portion of the Pipeline has rested on the ocean floor. The entirety of the subsea portion of the Pipeline is located in a no-anchorage zone, and the risks of anchor-dragging are mitigated in several ways.

First, the Pipeline is clearly marked on nautical charts of the area. The nautical charts, published by the National Oceanic and Atmospheric Administration, notify mariners about submarine pipelines, with specific symbols. The charts state, "CAUTION SUBMARINE PIPELINES AND CABLES. . . . Not all submarine pipelines and submarine cables are required to be buried . . . . Mariners should use extreme caution when operating vessels in depths of water comparable to their draft in areas where pipelines and cables may exist, and when anchoring, dragging, or trawling." Beta also maintains a public awareness program that provides information about the Pipeline, including its location, to stakeholders. Beta distributes mailers to emergency officials, public officials, and excavators, among others. The mailers include information on the Department of Transportation's National Pipeline Mapping System. The mailers also explain how to recognize the location of a pipeline and how to keep pipelines safe, including by reporting any suspicious activity or unauthorized excavation.

Second, the Marine Exchange of Los Angeles-Long Beach Harbor ("Marine Exchange") monitors and assigns vessel anchorages. Vessels are required to stay in their designated anchorages while at anchor, and they are not permitted to drag anchors outside of the anchorage zones or near the Pipeline. If a vessel travels near or over the Pipeline with its anchor down, Beta expects that the vessel, Marine Exchange, and/or the Coast Guard would inform Beta.

Third, vessel masters, deck officers, and crew are or should be trained to use designated anchorages; not to assume the designated anchorage area is safe; and not to drag anchors outside of anchorage zones. Further, vessels are required to report marine casualties or hazardous conditions, such as when they drag their anchors in no anchorage zones. If vessels comply with regulatory requirements and training, then no anchors should be drug across the Pipeline or in the right of way. If a vessel violates those regulations or drags its anchor, it should inform the Coast Guard, Marine Exchange, and/or Beta.

C. Beta Maintained the Pipeline in Good Condition.

To assess the integrity of the Pipeline and identify changes in its condition, Beta conducted remote-operated vehicle ("ROV") and in-line inspections ("ILI") on a schedule set by regulators. Beta worked with its regulators to share the results of required inspections and communicate

updates about Pipeline operations. Beta's maintenance and inspection schedule for the Pipeline consistently showed the Pipeline was in good condition:[1]

- Beta conducted ILIs in 2007, 2009, 2011, 2013, 2015, 2017, and 2019—more frequently than industry standard for undersea oil pipelines. ILI assessments were consistently good and did not indicate cracks or concerns with the Pipeline's condition. In 2020, because of these positive results, the Bureau of Safety and Environmental Enforcement ("BSEE") approved Beta's transition to a four-year ILI cycle. Pursuant to BSEE's approval, Beta was not obligated to conduct an ILI in 2020 or 2021.

- Beta conducted either ROV inspections or Side Scan Sonar surveys in even-numbered years (ROVs in 2012, 2014, 2018, and 2020 and Side Scan Sonar surveys in 2010 and 2016). Each ROV report in 2012, 2014, 2018, and 2020 found that the Pipeline was "in good condition with no visible damage or anomalies," and that the Pipeline was in its designated location and had not been displaced. The Side Scan Sonar reports from 2010 and 2016 likewise showed the Pipeline was in good condition.

- Beta also conducted line rides, or visual inspections of the Pipeline's right-of-way ("ROW"). While federal regulations require pipeline operators to conduct ROW inspections every three weeks, and at least 26 times a year, Beta conducted nearly 50 ROW inspections every year from 2010 to present. Each ROW indicated that there was "no free oil or visible floating solids" in the water above the Pipeline.

- Beta also conducts weekly pigging of the Pipeline; maintains a robust chemical program; inspects corrosion coupons every six months; and has a long history of successful cathodic protection testing on the Pipeline.

Several post-spill assessments also confirmed that the Pipeline was in good condition. ***First***, an October 2021 ROV found the Pipeline to "be in good condition with no visible external damage," with the primary exceptions limited to the anchor-damaged areas (as discussed below).[2] In short, the post-spill ROV confirmed that only those areas where the anchors struck the Pipeline showed signs of external damage that required repair; the rest of the Pipeline remained in good shape.

Second, Beta retained ADV Integrity in March 2022 to perform a third-party review of the Pipeline's ILI data back to 2011.[3] ADV concluded that—prior to the anchor strikes—the Pipeline had "zero features representative of third-party mechanical damage near the failure site."[4] ADV

[1] After the incident, an engineer with the California State Lands Commission (the agency tasked with overseeing pipelines through California state waters) stated: "It's one of the cleanest lines I've ever seen." *See* Michael R. Blood and Matthew Brown, *Aging equipment, spills test ties between oil, California*, AP News (Oct. 14, 2021), https://apnews.com/article/business-environment-and-nature-california-los-angeles-environment-5d441c7842a9b50fde345d415ca3fd53.
[2] Ex. 1, AMPLIFY-00008398.
[3] Ex. 2, AMPLIFY-00779338.
[4] *Id.*

also concluded that there were "zero indications of third-party mechanical damage elsewhere on the affected pipeline."[5] Further, ADV's analysis of dent and deformation data from the prior ILI reports showed that dents have not significantly increased in size or frequency over time, nor are they concentrated in a particular location along the Pipeline (with the exception of the dents caused by the anchor strikes). In other words, dents discovered along the Pipeline's length (which are limited in number and severity) occurred at random locations and at random intervals.

Third, the Pipeline was hydrotested on December 19, 2022. The Pipeline "was successfully held above 2220 psig for a period of 15 minutes with no pressure deviations."[6] The December 2022 hydrotest results show that the entire Pipeline (including both the undamaged sections and the post-repair anchor-strike sections) remains in good condition.

All of the available data shows that the Pipeline was maintained in good condition and that if the vessels had not struck the Pipeline, no leak would have occurred.

D. Beta Operated the Pipeline Safely.

Beta has a history of safe operations and strong compliance record.

Until the spill, the Pipeline and Hazardous Materials Safety Administration ("PHMSA") had not initiated any Enforcement Actions against Beta for more than a decade (and none during the period of Beta's ownership). In fact, from 2006 to March 2023, Beta received just two warning letters (one in 2008 related to the inspection of main line valves and the pressure setting on two thermal relief valves, and one in 2010 regarding the entry of drug and alcohol testing results into the Management Information System). In 2008, Beta received two notices to amend certain procedures, which it did.[7]

Since 2017, federal regulators conducted 157 inspections across Beta's five California assets (the Elly, Ellen, and Eureka Platforms, Beta Pump Station, and the Pipeline). There were zero facility shut-ins before the spill. Of the 31 incidents of noncompliance ("INCs") since May 2017, 20 were resolved the same day and the others were addressed promptly. (The INCs concerned facilities other than the Pipeline.) The number of INCs has been relatively modest: there were two INCs in 2016, nine in 2017, five in 2018, seven in 2019, four in 2020, and four in 2021.

Beta has a solid record of minimizing and preventing spills. There were no discharges of over a gallon of oil from any equipment in the Beta oilfield between 2015 and the October 2021 incident.[8]

Beta's safety performance, as measured by work-related injuries and incidents, is excellent. Between 2018 and 2020, Beta had no "OSHA recordable" incidents. Further, Beta's "Total Recordable Incident Rate," a safety metric that normalizes injury rates among Beta employees and

[5] *Id.*
[6] Ex. 3, AMPLIFY-01335316.
[7] It was not until 2012 that a corporate predecessor of Amplify (Memorial Production Partners) acquired some interest in Beta. The remaining interest in Beta was acquired in 2017.
[8] Ex. 4, AMPLIFY-00749972.

contractors across companies of all sizes, was zero in 2018, zero in 2019, and zero in 2020. In 2020, the American Equity Underwriters, Inc. selected Beta as a safety award winner.

Beta's strong safety record is the result of its significant investments in the facilities. Between 2018 and 2021, the Company spent $6.5 million, $7.7 million, $6.0 million, and $7.2 million, respectively, on Beta facilities and pipeline maintenance and improvements (excluding normal, ongoing maintenance).

E. Beta Had Industry-Standard Pipeline Policies and Procedures.

Beta maintained policies and procedures for maintaining and operating the Pipeline—including with respect to leak detection, prevention, and response—that were consistent with federal and state pipeline regulations, and similar to the policies and procedures employed by other oil pipeline operators.

Beta develops its policies and procedures with the help of third-party consultants, and with input from Beta's employees. Beta's policies and procedures are updated in accordance with federal and state regulations. Federal regulators audit and/or approve certain procedures.

Beta maintained several policy and procedure manuals relating to operating and maintaining the Pipeline, including:

Hazardous Liquids Operations and Maintenance ("O&M") Manual. The O&M Manual contains various policies and procedures relevant to Pipeline operations, including Procedure 1.01 (Reporting and Control of Accidents), Procedure 5.02 (CPM and Leak Detection), and Procedure 9.01 (Pipeline Repair Procedures). Beta regularly updates its O&M Manual, including through a full review process every two years. Beta provides updated copies to PHMSA when requested.

Pipeline Specific Operations and Maintenance Manual ("PSOM"). The PSOM, which Beta updates annually,[9] contains procedures to help ensure that control room operators, pipeline technicians, facility operators, and contractors know how to safely operate and maintain specific sections of the Pipeline and related equipment.[10] For instance, the PSOM includes procedures for the startup and shutdown of the Pipeline; launching and receiving cleaning pigs; corrosion monitoring; and emergency shutdown, isolation, and drawdown. The PSOM also requires the submission of a Management of Change ("MOC") form—akin to a safety check-list—for changes to equipment, processes, or operating procedures.[11] The MOC process ensures that the personnel who would be impacted by a change are aware of it and have an opportunity to comment on it.

Integrity Management Plan ("IMP"). The IMP details how Beta monitors and maintains the Pipeline.[12] It requires Beta to develop a baseline assessment method for testing the integrity of the Pipeline, establish repair procedures, and develop preventative measures to mitigate Pipeline risks.[13] Beta conducts risk assessments of the Pipeline pursuant to the IMP. Risk assessments are

[9] NTSB_PHMSA_00000357.
[10] NTSB_PHMSA_00000355.
[11] NTSB_PHMSA_00000419.
[12] NTSB_PHMSA_00004894.
[13] *Id.* at NTSB_PHMSA_00005026–5108.

a multiday process; personnel gather and analyze various data points, including the location of the Pipeline, baseline inspection and maintenance findings for the Pipeline, subsequent historical data and inspection and maintenance results (including ILI and ROV data), and updated or different policies or procedures. The assessments integrate identified risk factors to determine the relevant risk ranking of the Pipeline and the most important factors driving the risk analysis. With assistance from various contractors and personnel, the Pipeline Superintendent completed risk assessments for the Pipeline in 2009, 2011 2016, and 2020. Beta's risk assessments have determined that the risk factors associated with the Pipeline are similar over time because (a) the general location of the Pipeline has not changed, and (b) the results of Pipeline inspections have not meaningfully differed from the results of baseline inspections. Beta also conducted annual evaluations of the effectiveness of its integrity assessment methods and its preventative and risk control activities.[14] The IMP was audited every three years through agency reviews, self-assessment, external audits performed by a third-party contractor, and/or management reviews.[15] The Pipeline Superintendent also reviews the IMP annually.[16]

OSRP. Among other things, the OSRP designates the personnel in charge of spill response; contains various procedures and checklists for effectively identifying and controlling the source of a spill, monitoring and tracking it, and assessing the risks that it could spread; and identifies the protocol for notifications once a spill estimated to exceed one barrel of oil is verified.[17] To ensure an efficient response to a spill, the OSRP also describes the location of relevant response equipment (such as sorbent pads and tracking buoys),[18] which Beta inspects monthly and tests semi-annually during equipment deployment exercises.[19]

Beta's employees are trained on the policies and procedures, as detailed in the next section.

F. Beta Had Experienced, Well-Trained Employees.

Beta employs an experienced, well-trained crew. The Platform Superintendent on-hitch on October 1–2, 2021 had been working offshore with the relevant assets since 1998. One of the two control room operators had worked on offshore platforms for 25 years, and had been a control room operator on Platform Elly since 2013. The other control room operator had been working for Beta as a control room operator, facility operator, and wellbay operator for 11 years. The Pipeline Superintendent had worked on the Beta assets since 1996; he has been the Pipeline Superintendent since 2014. The two pipeline technicians had been with Beta for 11 and seven years, respectively.

Beta provided its experienced crew with industry-standard knowledge- and skills-based training, which allowed them to operate the Pipeline safely, including in detecting, preventing, and responding to potential leaks. Beta's training programs had various components.

[14] *Id.* at NTSB_PHMSA_00005090.
[15] *Id.* at NTSB_PHMSA_00005091.
[16] *Id.*
[17] NTSB_PHMSA_00005342; *id.* at NTSB_PHMSA_00005354.
[18] *Id.* at NTSB_PHMSA_00005893–94.
[19] *Id.* at NTSB_PHMSA_00005894–95.

First, personnel responsible for operating the Pipeline (as well as operational employees who support daily operations or who provide relief to those who do) participate in a multi-day, T2 training program, also known as Production Safety Systems Training. It covers the use and maintenance of devices and safety systems. Beta also provides monthly T2 and safety refresher courses, which cover a range of safety-operational topics.

Second, Beta regularly trains employees on safety-focused matters, including production safety systems, environmental hazards, and government programs (like the National Pollution Discharge Elimination System). Employees are assigned two to three safety trainings per month. Courses include: (1) Dealing with Hazardous Spills; (2) Accidental Release Measures & Spill Cleanup Procedures; (3) System Troubleshooting; and (4) Emergency Planning, among others.[20]

Third, employees responsible for operating the Pipeline complete operator qualification ("OQ") training modules. Most trainings are completed either annually or once every three years, depending on the course. Example OQ trainings include: Pipeline Operations, Control Room Management, Incident Reporting, and Pipeline Emergency Response. Additionally, Beta employees involved in Pipeline operations and who are T2-certified complete certain OQ modules like Abnormal Operating Conditions and Fatigue, among others.

Fourth, Beta conducts monthly "Emergency Drills" with its offshore personnel. These drills each cover a specific scenario, including (1) fire and explosion; (2) severe weather; (3) uncontrolled well blowout; (4) hydrogen sulfide and other chemical release; and (5) earthquakes.

Fifth, Beta trains employees on their responsibilities under the OSRP, spill identification, the spill notification process, and steps to mitigate spills and minimize the potential for environmental damage, among other things. Beta also conducts annual spill-drill training with the crew on duty at the time of the drill. There are other training exercises specific to the Spill Management Team, including quarterly Qualified Individual Notification Exercises and annual SMT Tabletop Exercises. At least once every three years, there is a government initiated unannounced exercise, which tests Beta's ability to respond to a spill.

Sixth, like other pipeline companies, Beta also uses on-the-job training to teach employees the skills needed to successfully operate and maintain their systems, including leak detection systems. Generally, on-the-job training is conducted by in-house experts on a given aspect of work. With respect to control room operators, an operator-in-training works simultaneously with more experienced operators before they are allowed to run "solo" in the control room. Typically, per the MOC process, the most experienced person in the role for which the new employee is training is responsible for conducting and monitoring training and progress of the trainee. On-the-job training does not end when an employee has assumed a new position; on-the-job training is a continual process of self-improvement, as less experienced employees regularly acquire new knowledge and skills by observing and assisting more experienced counterparts every day. The MOC process ensures that employees taking on new roles have the training to perform their responsibilities safely and receive direct guidance from more experienced peers.

[20] Ex. 5, AMPLIFY-00155827.

Seventh, consistent with BSEE guidance, Beta has an established Safety and Environmental Management System ("SEMS") program. The purpose of a SEMS program is to enhance the safety and environmental performance of operations by reducing the frequency and severity of incidents. Beta's program has all 17 of the required elements, including Stop Work Authority (30 CFR § 250.1930) and Reporting of Unsafe Working Conditions (30 CFR § 250.1933). The SEMS program is managed by Beta's HSE Manager, Production Manager, and the Operations Engineer / SEMS Coordinator, with support from management and operational and engineering resources. The program is audited by BSEE.

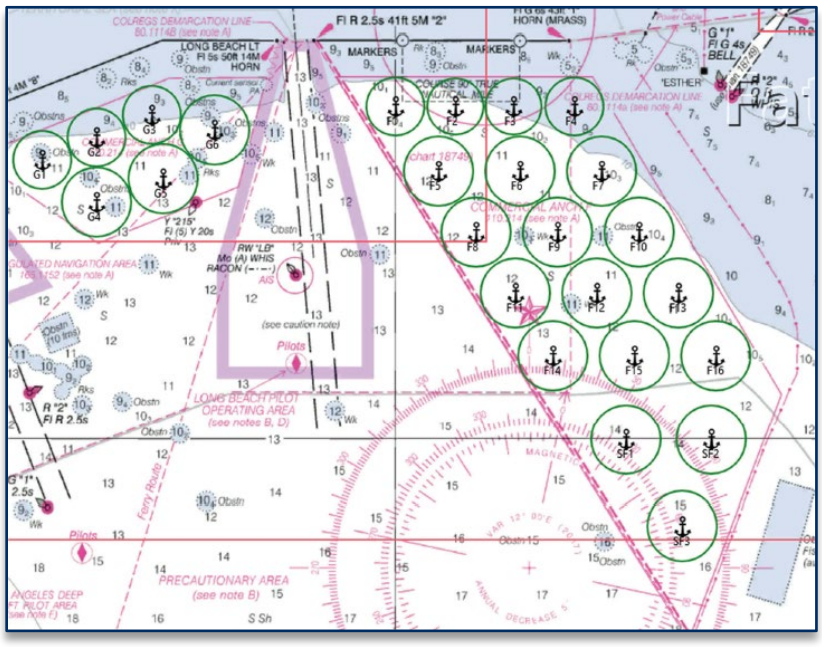
G. The Vessels Struck and Damaged the Pipeline and Failed to Disclose It.

On January 25, 2021, the *Danit* and *Beijing*, two massive containerships, dragged their anchors outside of their designated anchorages and into a "no-anchor" zone across the Pipeline. Both vessels repeatedly crossed the Pipeline's well-known location, damaging and displacing the Pipeline, yet neither vessel nor the Marine Exchange informed Beta of the anchor drags.

Prior to January 25, 2021, both vessels had been anchored off of Long Beach in designated anchorage zones near the Pipeline: the *Danit* in SF-3, and the *Beijing* in SF-12.[21] The *Danit* was anchored in SF-3 with seven shackles (approximately 630 feet) of chain in the water. The *Beijing* was anchored in SF-12 with six shackles (approximately 540 feet) of chain in the water.[22] Both vessels were aware of the Pipeline's location, as it is publicly charted on NOAA maps,[23] and appears on both vessels' Electronic Chart Display and Information Systems ("ECDIS"). (An ECDIS provides navigational information to vessel masters on the bridge, such as the vessel's

[21] Anchorages Display, MX_036114.
[22] December 17, 2020 *Beijing* Bell Book, BEIJING000011 at BEIJING000036. This section cites a limited number of materials produced by the *Beijing* and *Danit* in the civil litigation, such as the *Beijing* Master's statement of facts and the *Danit*'s bell book. Beta assumes that the vessels provided the NTSB with those materials during the course of the NTSB's investigation.
[23] NOAA Chart 18746.

position, heading, and speed, as well as the relative location of nearby vessels, including their speed and heading.[24])



Beginning around midnight on January 24, 2021, other vessels anchored in the area had started to drag their anchors and/or decided to retrieve their anchor and proceed to a safer area and drift.[25] The weather continued to deteriorate in the San Pedro Bay in the early morning hours of January 25, 2021. At 2:00 a.m., the Vessel Traffic Service of the Marine Exchange of Southern California ("VTS") issued a heavy weather notice instructing that "all commercial vessels at anchor shall place their propulsion plants in immediate standby and have a second anchor made ready to let go."[26] By around 3:23 a.m., VTS noted that anchorage alarms were indicating that several vessels at anchor in San Pedro Bay may be dragging.[27]

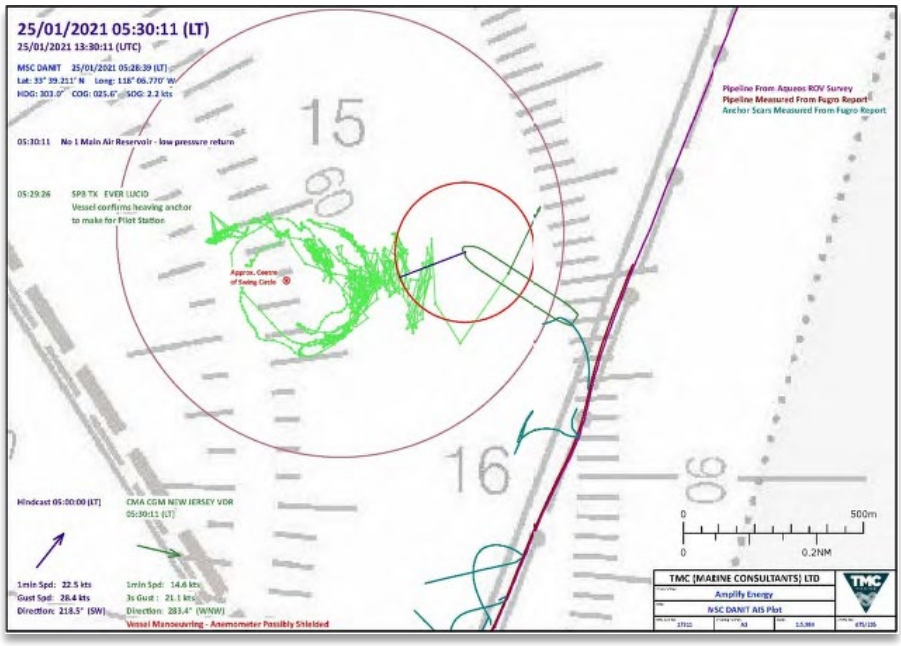
Neither the *Danit* nor the *Beijing* complied with the VTS's instructions to put their engines on immediate standby. Instead, as detailed below, as the storm picked up, both vessels dragged out of their anchorage zones and crossed over the Pipeline with their multi-ton anchors deployed.

***The* Danit.** The *Danit* began yawing heavily (swinging left and right at the stern) as the winds increased after midnight on January 25, 2021—a sign that the anchor was either not holding position or the vessel was at risk of dragging anchor. VTS had been radioing other surrounding

[24] *See* V.SHIPS012543 – Master's Statement of Facts (authored on January 25, 2021, the Master states that on January 23, 2021, he was aware that the *Beijing* was anchored "4.2" cables from "Pipelines."); MSCSA0680 - ECDIS Chart Pilot Display of MSC *Danit* (January 25, 2021) (showing marked location of the Pipeline displayed to the east of the *Danit*'s anchor).
[25] *See, e.g.*, MX_015488; MX_020002.
[26] January 25, 2021 VTS Radio Recording, MX_000182.
[27] January 25, 2021 VTS Norcontrol Recording, MX_000185.

vessels, including the nearby *Beijing*, since 3:54 a.m.[28] Nevertheless, the *Danit* did not heed VTS's warnings or react to the fact that so many other vessels were dragging anchor.

At 5:27 a.m., VTS called the *Danit* because the *Danit*'s "alarm . . . [was] sounding and [VTS] would like to confirm you are not dragging anchor." The *Danit*'s Captain responded that the vessel was "not dragging for the moment."[29] At 5:30 a.m., however, AIS data showed the *Danit*, was in fact, dragging in a north-easterly direction at around 2.2 knots.[30]

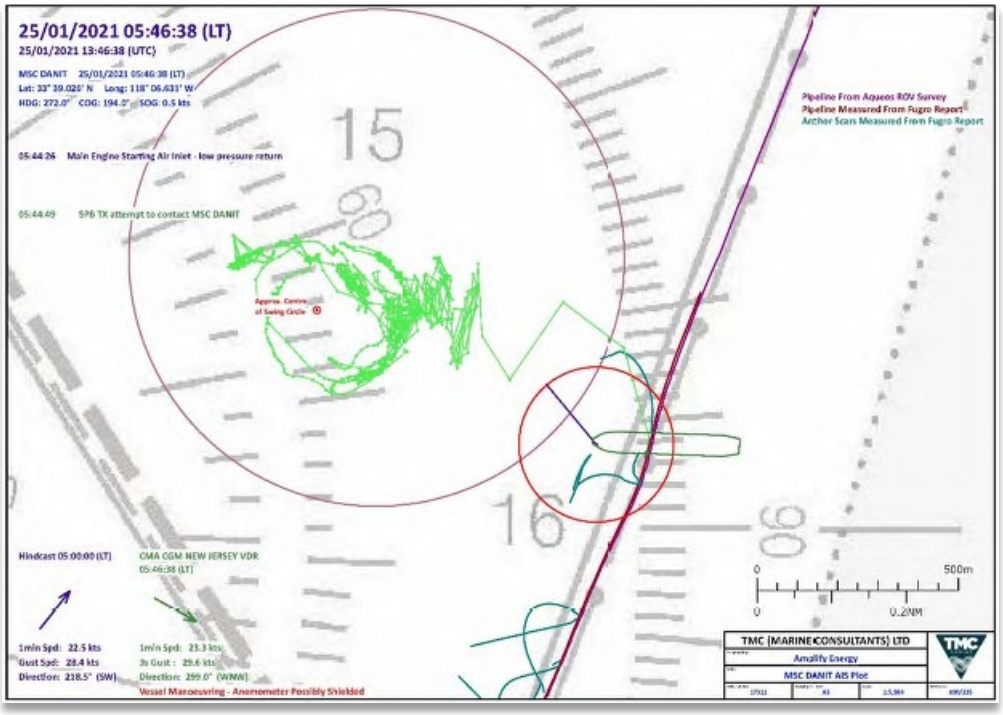


Had the *Danit* had her engines at immediate readiness before 5:30 a.m., she likely could have prevented dragging altogether, or at the very least mitigated the speed or trajectory of the

[28] V.SHIPS012543 – *Beijing* Master's Statement of Facts.
[29] MX000185 at 2:23:56.
[30] Automatic Identification System ("AIS") is an automatic tracking system that serves to identify vessels, their dimensions, course, speed, position, and other data using VHF radio waves. Unlike radar, which detects the appearance of nearby objects, and approximates their current direction and speed, AIS data provides much more detailed and accurate information in an effort to reduce or eliminate vessel collisions. AIS data is displayed on the navigational bridge of vessels equipped with an ECDIS. Vessels are required to have an AIS transmitter, and maintain it in working condition. Usually, the AIS transmitter is located above the navigational bridge, but the location can vary depending on the particular vessel.

The charts reproduced here reflect the AIS data of the *Danit* or *Beijing*'s respective positions at the particular time indicated in the top left corner. The larger red circle indicates the vessel's assigned anchorage position (e.g., SF-3). The small, green vessel-shaped object represents the vessel. The black line emanating from its bow represents the anchor cable connecting the vessel to the anchor's position. The lime green line indicates the historical markers of the vessel's AIS data transmitter as a continuing plot. The smaller red circle reflects the estimated circumference of the area of the vessel's yawing movement, depending on the amount of anchor cable paid out at that particular time. The thin maroon line reflects the location of the Pipeline to the east of the anchorage circles. The turquoise lines curving off the maroon line reflect anchor scarring in the sand that was located after the spill. *See* AMPLIFY-00000005 at AMPLIFY-00000032.

drag. But the *Danit*'s main engine was not engaged and set to bridge control until 5:23 a.m.[31] Further, its engine room was unprepared. The *Danit*'s engine starts by injecting air into the rotor, and that air is stored in air bottles with particular dimensions and regulated pressure. Air injections are required for each start of the engine or any change from "dead slow ahead" (forward) to "dead slow astern" (backward). The *Danit*'s air bottles were not full the morning of January 25, 2021, limiting the amount of available engine starts. The *Danit* experienced multiple low air pressure alarms that morning, indicating the pressure was dangerously low and within the range where the engine might fail to start due to lack of air.[32] By 5:46 a.m., as shown in the next graphic, the *Danit*'s bow crossed over the Pipeline for the first time. Had the *Danit*'s air bottles been properly maintained and full, the *Danit* may have been able to prevent dragging anchor across the Pipeline by fully engaging its engines "dead slow head" or "slow ahead" and driving into the wind.



At 5:49 a.m., VTS again radioed the *Danit*. This time, the *Danit*'s Captain replied that the vessel "cannot hold position anymore, we use engine, and we start to heave up. We intend to drift inside VTS area, start to heave up anchor, we proceed to drift south inside VTS area."[33] VTS responded to confirm receipt that the *Danit* was heaving anchor and would proceed southward to drift. According to its bridge bell book, the *Danit* began heaving up anchor four minutes after its bow crossed the Pipeline, and shortly after it radioed VTS, at 5:50 a.m.[34] But, the *Danit* did not succeed in raising its anchor until 8:20 a.m., two-and-a-half hours later.[35] In the intervening hours, the *Danit* crossed back and forth across the Pipeline multiple times with its anchor deployed.

[31] MSCA0573 – *Danit* Engine Data Logger.
[32] *Id.*
[33] MX000185 at 2:42:01.
[34] MSCSA0572 – *Danit* Bell Book.
[35] *Id.*

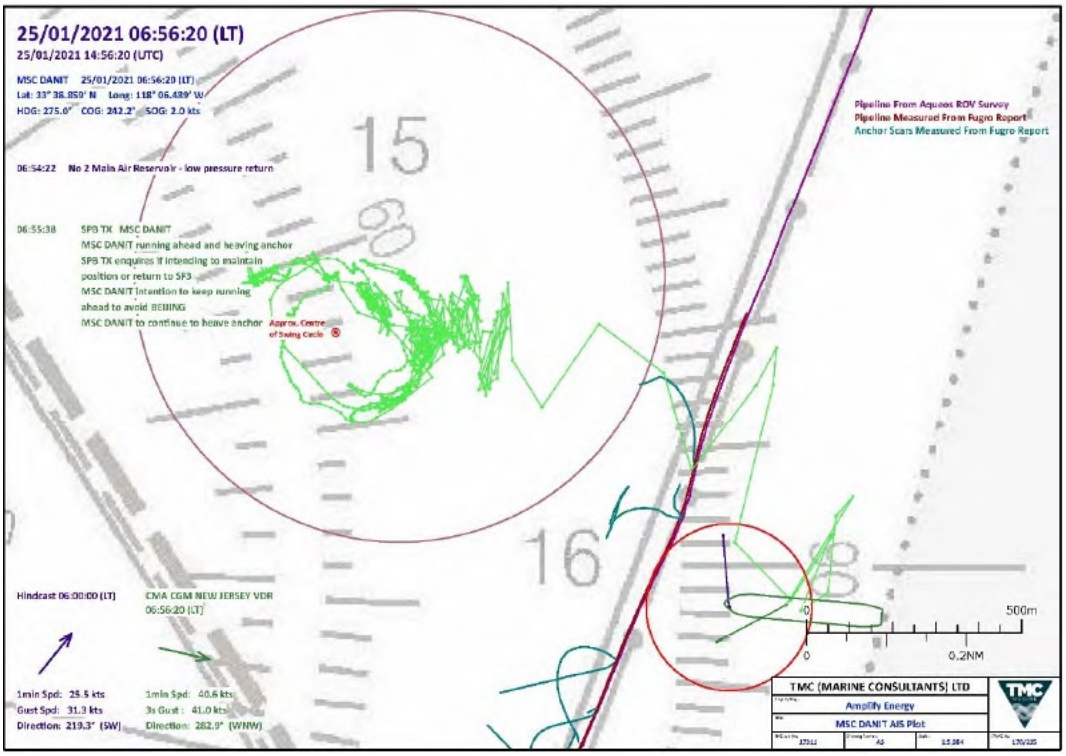
For example, by 5:59 a.m., AIS data showed the Pipeline was directly under the bow of the *Danit*. By 6:05 a.m., the *Danit* had completely crossed the Pipeline, along with an estimated half a cable of anchor chain. Also at, 6:05 a.m., the Captain ordered the *Danit*'s main engine to "slow ahead," at around the same time the *Danit* tried to maneuver back towards its anchor, create slack in the anchor cable, and hoist it back into the vessel. One minute later, at 6:06 a.m., VTS radioed the *Danit* to advise her to "take caution" around the *Beijing*, drifting nearby and moving at a speed of about 1.5 knots.

By 6:14 a.m., the *Danit* began to approach a protected fish hatchery zone in the Bay. At 6:34 a.m., the *Danit* radioed the *Beijing* to ask for confirmation of the *Beijing*'s condition because, at that point, the *Beijing* was moving towards the *Danit* at around 2.4 knots. The *Beijing* confirmed that, although it was using its engine, its windlass was "still not working"; this meant the vessel had to maintain position because it could not heave up its anchor. At 6:35 a.m., VTS asked the *Danit* if it could "keep an appropriate distance" from the *Beijing*, to which the *Danit*'s Captain replied he would "try." Between 6:34 a.m. and 6:36 a.m., the *Danit* put its engine deadslow astern three times for short intervals.[36]

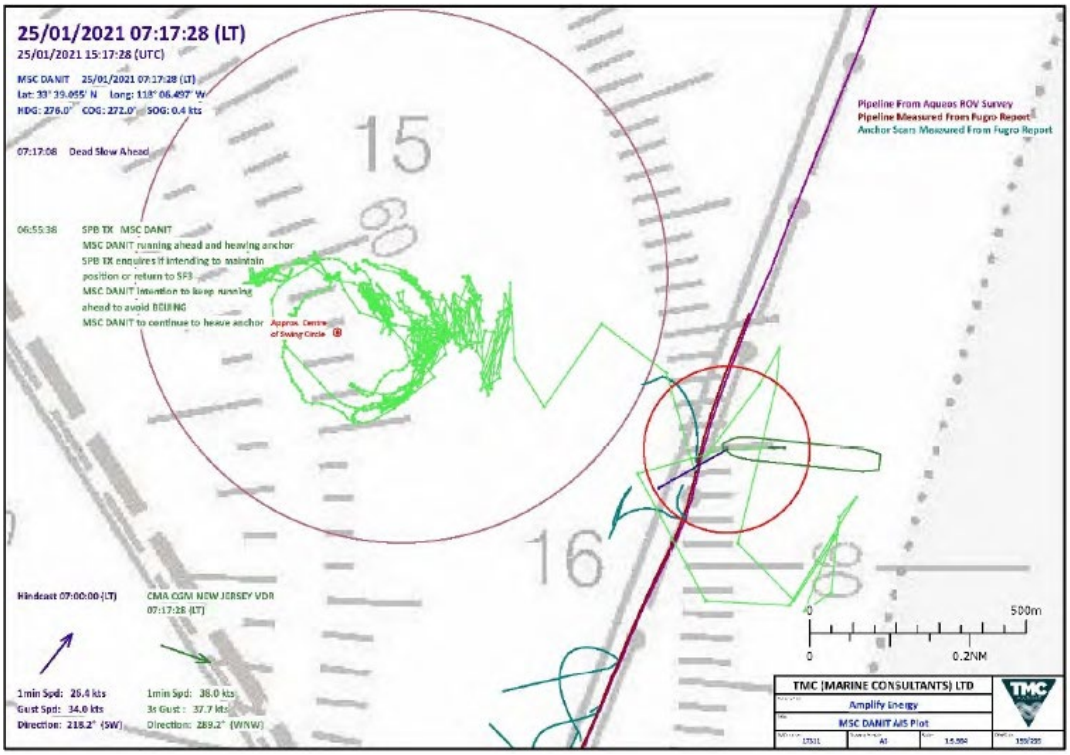
Nevertheless, at 6:36 a.m., when the *Danit*'s Captain gave the engine order to go from "dead slow astern" to "dead slow ahead," the *Danit*'s main engine registered a "start fail/block" alarm.[37] In other words, the *Danit*'s engine failed to respond to the order, continuing to rotate astern (backward) rather than adjusting to "ahead."[38] The *Danit*'s inability to reverse course or counteract its sternward momentum damaged the Pipeline. Had the *Danit* heeded VTS's 2:00 a.m. warning to have its engine on immediate readiness, such a "start fail/block" alarm and engine failure would never have occurred.

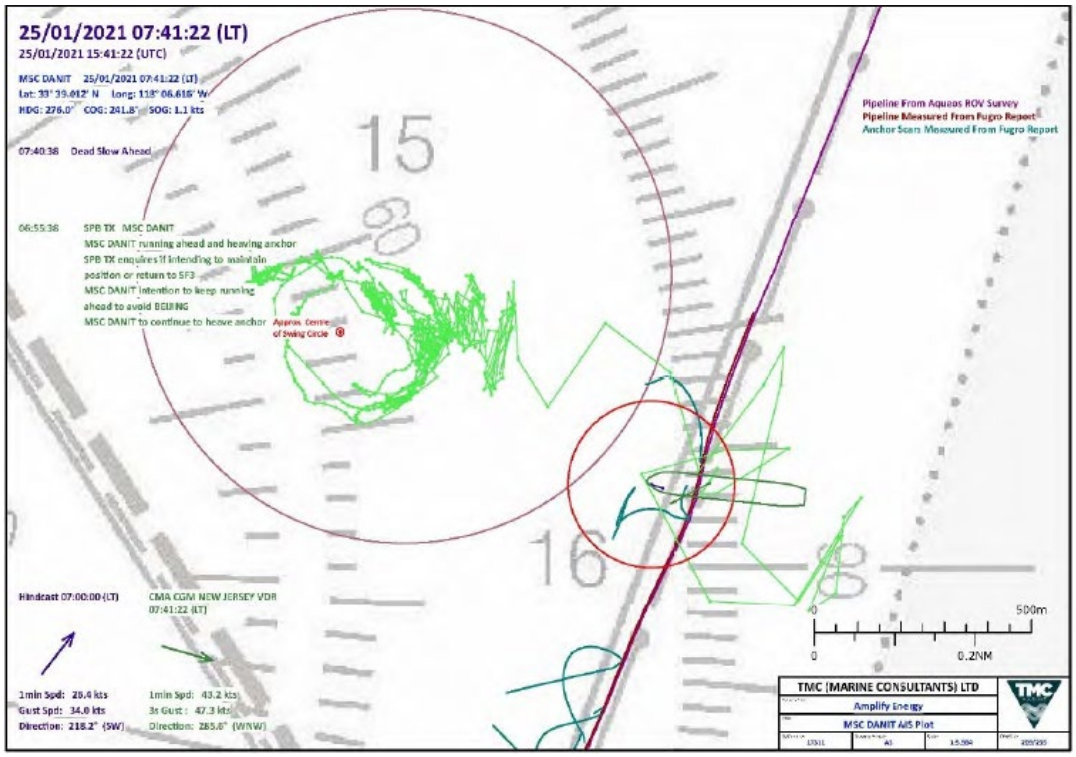
Throughout the entire period, the *Danit*'s anchor remained deployed and in the water. At 6:55 a.m., the *Danit* again radioed VTS to let them know they were "continu[ing] to heave up," meaning the anchor and cable were still deployed. At this time, the vessel was located due East of the Pipeline:

[36] MSCA0573 – *Danit* Engine Data Logger.
[37] MSCA0787 – *Danit* Engine Alarm Log.
[38] MSCA0573 – *Danit* Engine Data Logger.

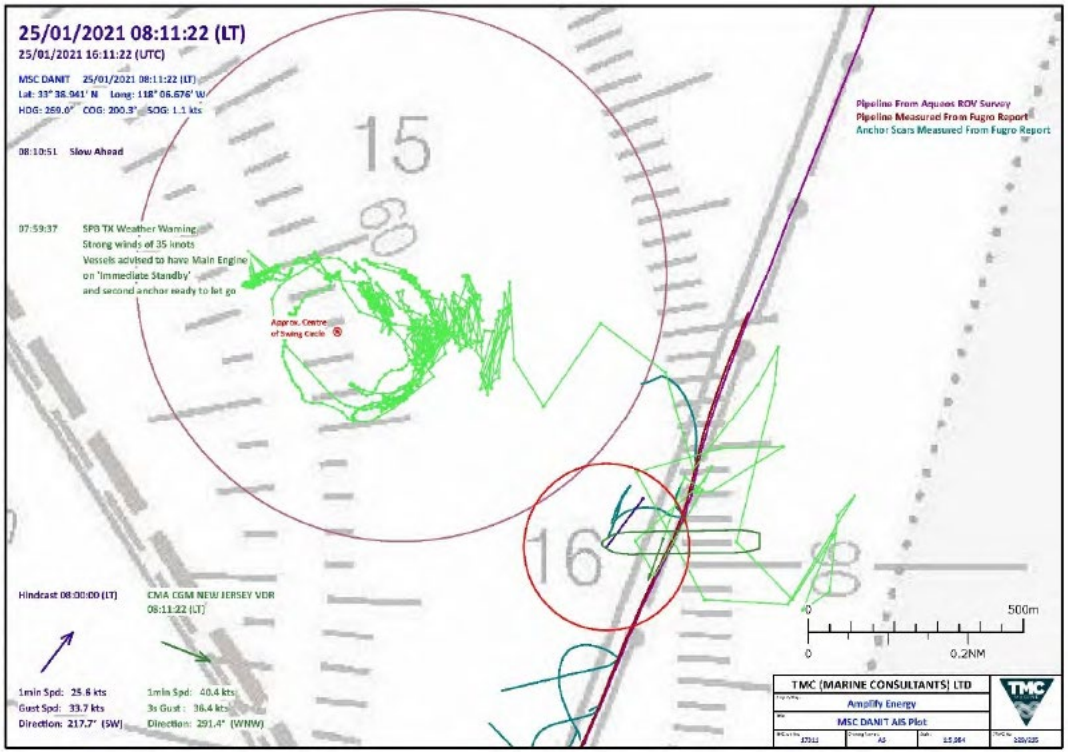


Between 7:00 a.m. to 8:05 a.m., the *Danit* remained within the vicinity of the Pipeline:





The AIS data also shows the *Danit* situated over the Pipeline at 8:11 a.m:

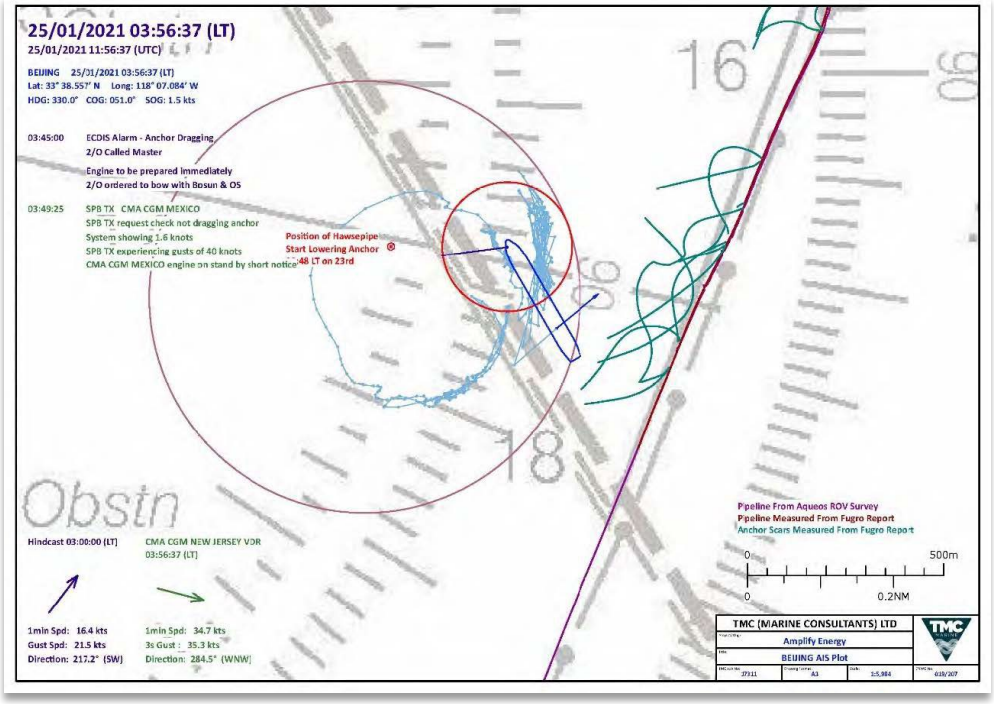


According to the *Danit*'s bell book, at 8:20 a.m., the anchor was fully hoisted, and by 11:00 a.m., she was proceeding to drift.[39]

In short, the *Danit* struck and damaged the Pipeline with its anchor. The Pipeline was in a no-anchor zone. The *Danit* would not have struck the Pipeline had the *Danit* followed the VTS heavy weather protocol or if its crew exercised sound seamanship. The *Danit* did not report its anchor strikes to Beta.

[39] MSCSA0572 – *Danit* Bell Book.

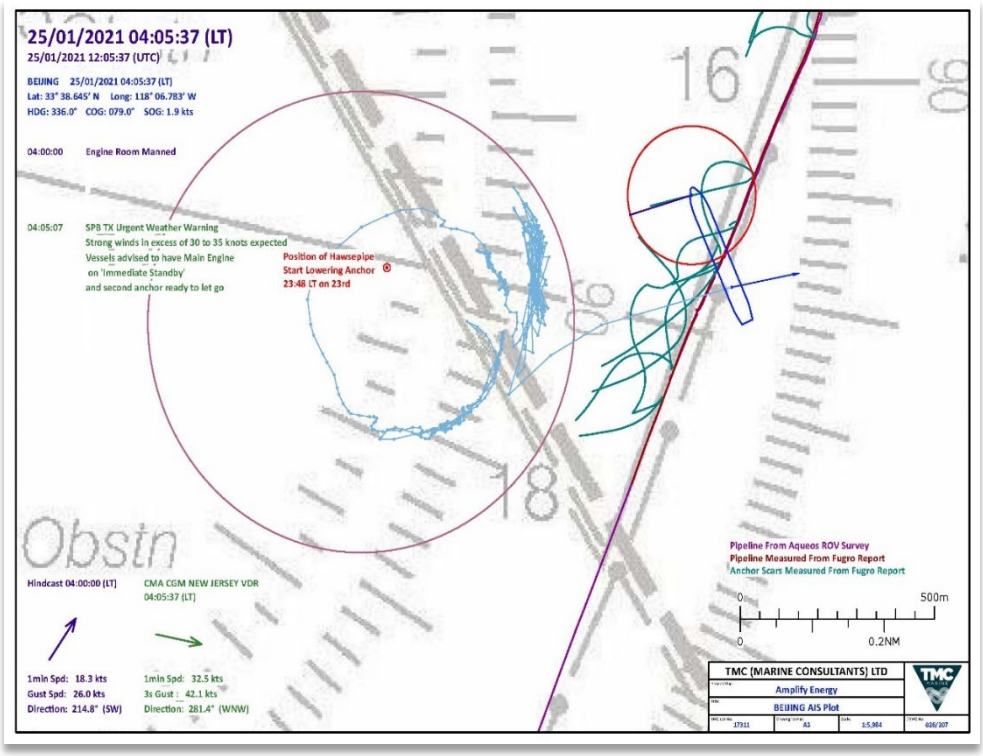
***The* Beijing.** According to the Master of the *Beijing*, the crew reported that it observed the vessel dragging anchor at 3:54 a.m., nearly two hours after the VTS warned all vessels to have their engine on immediate standby.[40] A minute later, the Master reportedly called members of the vessel's crew to begin the process of heaving up the anchor. But the *Beijing* had reacted too late, because at 3:56 a.m., the *Beijing* was already dragging anchor at a speed of 1.5 knots toward the Pipeline:



At 4:04 a.m., VTS called the *Beijing* to check its AIS position "to [e]nsure that you are not dragging anchor," as the "anchor alarm for vessel traffic is going off and sounding for your vessel and we're showing a speed of 1.7 knots to the east[.]"[41] The *Beijing* responded that her anchor was "dredging" and that the crew would "prepare our engine and . . . try to heave up anchor."[42]

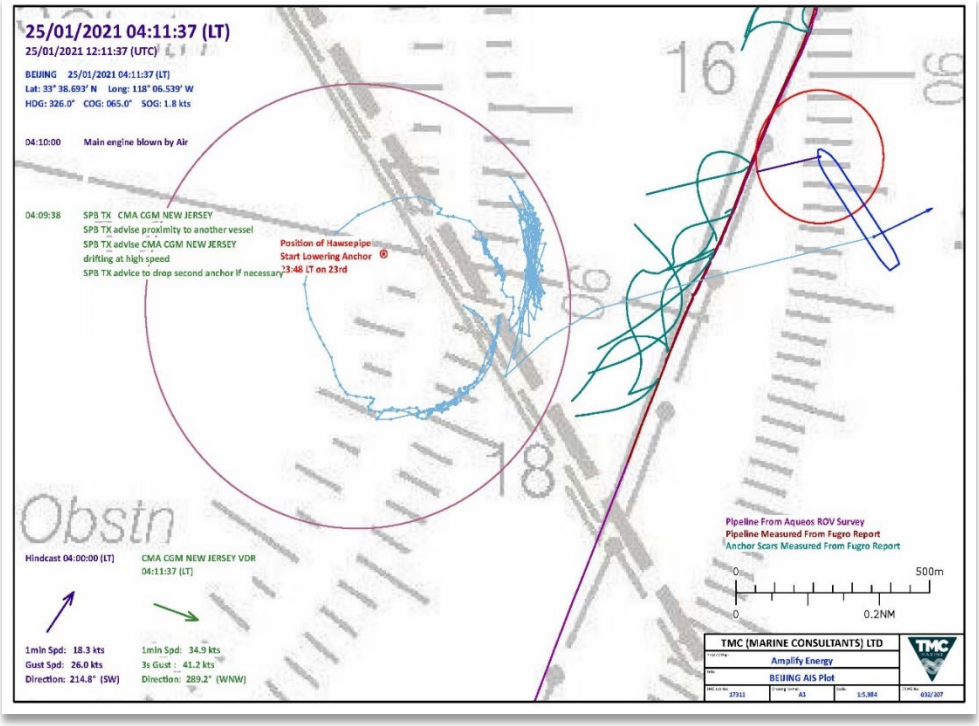
After informing the VTS it was dragging anchor, the *Beijing*'s Master reported that at 4:05 a.m., the crew began heaving up the anchor.[43] Again, it was too late; the vessel was already dragging anchor over the Pipeline:

[40] V.SHIPS012543 – *Beijing* Master's Statement of Facts.
[41] January 25, 2021 VTS Norcontrol Recording, MX_000185 (4:00 a.m.–4:07 a.m.).
[42] *Id.*
[43] V.SHIPS012543 – *Beijing* Master's Statement of Facts.



Because of the *Beijing* crew's slow reaction and failure to heed the VTS's warning to put its engine in standby at 2:00 a.m., the *Beijing* dragged anchor over the Pipeline without use of its main engines. Indeed, according to the *Beijing*'s alarm log, the main engines were dead prior to 4:06:28 a.m.[44] According to the Master, it was not until 4:10 a.m. that the main engine was tested and found ready.[45] Prior to that time, the *Beijing* would not have been able to counteract her dragging or arrest her movement with use of her engine. At 4:11:37 a.m., the *Beijing* remained over the Pipeline with its anchor deployed. According to its bell book log, the *Beijing*'s first recorded engine movement did not take place until 4:25 a.m., which was too late to prevent the *Beijing* from dragging over the Pipeline.[46]

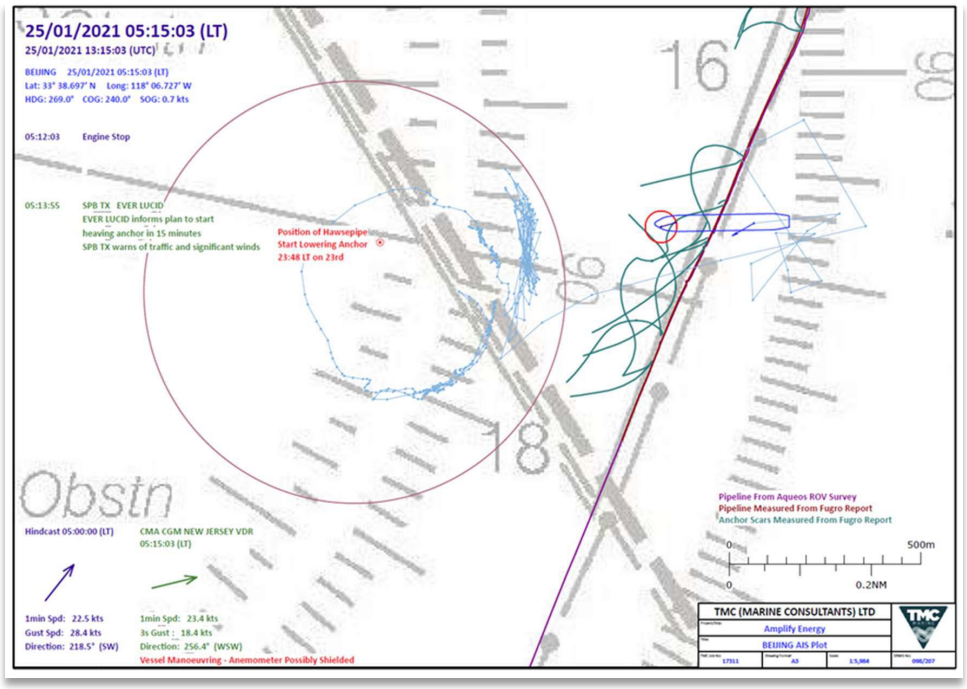
[44] January 2021 Alarm Logs, CAPE129062.002.
[45] V.SHIPS012543 – *Beijing* Master's Statement of Facts.
[46] BEIJING000037 – *Beijing* Bell Book Log.



Compounding the *Beijing* crew's failure to promptly react, an important piece of anchoring equipment on the *Beijing* failed on the morning of January 25, 2021. Specifically, the Statement of Facts reflects that around 4:10 a.m. the *Beijing* crew reported she was unable to heave anchor as planned due to a purported power problem with her portside windlass motor.[47] This equipment failure meant the *Beijing* was unable to heave anchor for hours. During the period when the *Beijing*'s crew attempted to heave up the anchor, AIS data showed the *Beijing* zig-zagging back and forth over the Pipeline. According to the *Beijing* Master's Statement of Facts, at 5:15, with the vessel situated over the Pipeline, the Master noted that the anchor heaving up process was "terminated due to an electrical power problem."[48]

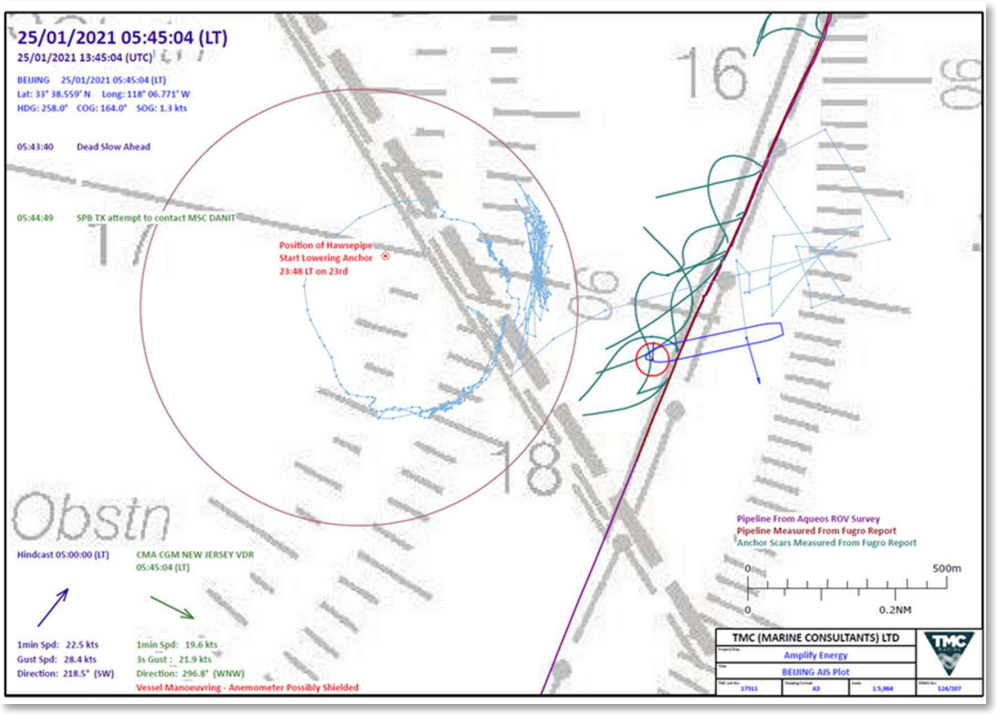
[47] *See* V.SHIPS012543 – *Beijing* Master's Statement of Facts. A windlass is a piece of machinery at the bow of a containership that, on the *Beijing*, both anchors and moors the vessel. A containership, like the *Beijing*, has two windlasses—one on the port side and the other on the starboard side. Each windlass on the *Beijing* is attached to one of the vessel's two anchors. The windlass motor on the *Beijing* can be used to drive either the anchor windless or a mooring winch. The electric motor is common to both the windlass and the mooring winch. When the windlass is set to lift and lower the anchor, the electric motor—which drives the windlass—and the chain lifter connects via a gearbox.

[48] *See id.*



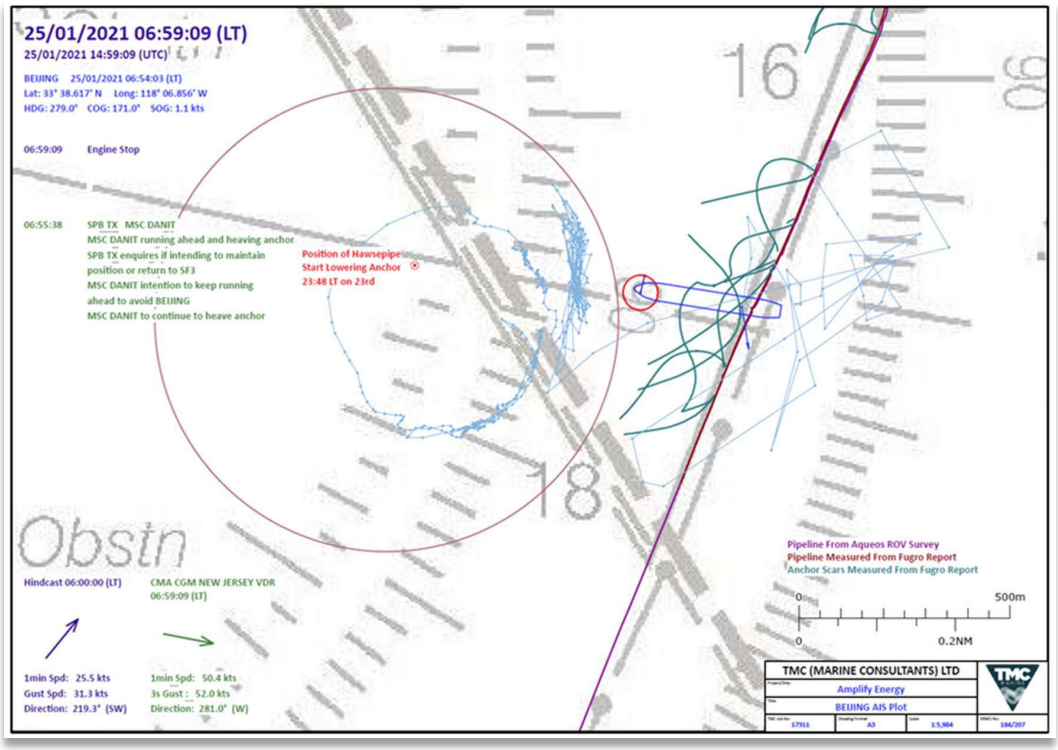
Twenty minutes later, the *Beijing* crew tried again until about 5:45, when they again terminated the attempt.[49] The vessel was over the Pipeline, as shown in the image below. At this same time, the Master reported that 1.5 shackles (or 135 feet) of anchor chain remained in the water.[50] The charted depth at the *Beijing*'s position was approximately 101 feet.[51] According to Classification Society Rules, which provide vessel standards, a windlass must be capable of lifting the weight of the anchor and three free-hanging shackles of cable (*i.e.*, twice as many shackles as were in the water at this time).[52] This means that the *Beijing* should have been able to easily pick up the anchor, unless there was excessive load on the motor, which would occur if, for example, the anchor had fouled (become entangled with or caught on) on the Pipeline.

[49] *See id.*
[50] *See id.* The *Beijing* responded to VTS at 6:16 a.m. that it had one and half shackles in the water and its windlass was overheated and out of order. *See* MX_000185 (6:10 a.m.–6:20 a.m.).
[51] V.SHIPS012543 – *Beijing* Master's Statement of Facts.
[52] IACS Unified Requirements A, Mooring and Anchoring, URA3 Anchor Windlass Design and Testing at para 3.1.4 (https://iacs.org.uk/publications/unified-requirements/ur-a/).



Finally, at 7:00 a.m., while still located over the Pipeline, the *Beijing* Master reported that her port side windlass had burned out.[53] At this point, the *Beijing* had crossed repeatedly over the Pipeline for hours with its anchor down.

[53] V.SHIPS012543 – *Beijing* Master's Statement of Facts.



In short, the *Beijing* struck and damaged the Pipeline with its anchor. The Pipeline was in a no-anchor zone. The *Beijing* would not have struck the Pipeline had the *Beijing* followed the VTS heavy weather protocol or if its crew exercised sound seamanship. The *Beijing* did not report its anchor strikes to Beta.

* * *

In short, both vessels knew that they were anchored near the Pipeline, dragged out of their anchorage zones, and dragged their anchors back and forth over the Pipeline. Had both vessels disclosed their anchor drags, Beta would have suspended operations, inspected the Pipeline with a ROV, and repaired the damage.

No disclosures were made, and months later, on October 1 and October 2, 2021, approximately 588 barrels of oil were released at the point of one of the anchor strikes.

H. Beta Confronted Various Operational Challenges on October 1–2.

This section details various activities of the Beta crew and others on October 1 and 2, 2021.

Beta faced various operational challenges on October 1–2 that made it particularly difficult to determine whether the leak detection system was accurately indicating a leak. The crew reasonably believed, based on the information available to them and their good-faith troubleshooting, that the leak alarms on October 1–2 were false alarms. Nonetheless, after each alarm, the crew turned off the Pipeline and took steps to determine whether and where the Pipeline might be leaking.

As detailed below, the crew's response was informed by several factors:

- ***Pipeline's Good Condition***. The crew had good reason to believe that the leak detection alarms were false alarms because they knew the Pipeline was in good condition; the crew did not know that anchors had damaged the Pipeline; the Pipeline had functioned well for about 40 years; the Pipeline had no history of corrosion or resulting leaks; the Pipeline was regularly cleaned and inspected; and the pressures were relatively normal and below the maximum operating pressure ("MOP").

- ***Mile Zero***. The leak detection system consistently indicated a potential leak at Mile 0 (on Platform Elly), not on the subsea portion of the Pipeline. Given the Mile 0 reading, the crew reasonably focused on locating a potential leak on Platform Elly, including by checking valves, drain lines, pumps, and sumps.

- ***Impact of Operational Upset***. An operational upset on October 1 resulted in upwards of 100 times more water entering the Pipeline during the day on October 1. It was reasonable to expect that this excess water could have impacted the meter and pressure readings on which the leak detection system relied.

- ***Communication-Loss Alarms***. The crew was simultaneously experiencing communication-loss alarms on October 1. The crew believed that communication-loss issues were potentially contributing to the leak alarms. They followed their usual procedures in resetting the leak detection system, by shutting off the pumps and allowing the Pipeline to settle, in response to such communication-loss alarms.

* * * * *

Around 8:13 a.m. on October 1, 2021, Beta turned off Shipping Pump P05C in order to load a cleaning pig into the Pipeline. The pig was launched, and the crew turned P05C back on around 8:20 a.m. Beta's personnel were aware that there was a pig in the Pipeline throughout the events of October 1–2, and they knew from experience that the pig's movement could create pressure waves in the Pipeline and potentially contribute to or trigger false leak alarms.

Around 11:00 a.m., as part of a separate pigging operation on the 10" intrafield pipeline that connects Platform Elly and Platform Eureka, Beta began to experience an "upset" condition in the processing equipment on Platform Elly. Platform Elly had just received the first of a three-pig chemical train from that 10" intrafield pipeline.[54] The three-pig chemical train included a chemical "pill," containing a BT 8415 biocide treatment, that was carried by a K-Disc pig located between a lead brush-cup pig and a trailing Yellow Flex filming pig. Beta's personnel believed that the chemicals "flipped" the free water knockout ("FWKO") tank. Typically, the FWKO tank separates free water from an oil/water emulsion, with oil floating to the top of the tank and water draining from the bottom (which has the effect of reducing the water content of the processing stream that ultimately enters the Pipeline). But because the tank was "flipped," water was at the

[54] Controller 1 NTSB Interview Tr. at 15:7–12.

top of the tank, and was flowing downstream into other processing equipment and, ultimately, the Pipeline.[55]

Beta's personnel spent several hours in the late morning and afternoon of October 1 working to resolve the upset condition. The upset resulted in up to 100 times more water entering the Pipeline than normal.[56] The control room operator on duty at the time, Controller 1, contacted the Person-In-Charge, the Platform Superintendent, around 12:30 p.m., to ask for further assistance in resolving the upset.[57] Around 1:30 or 2:00 p.m., Controller 1 and the Platform Superintendent decided to wake Controller 2—an experienced, second control room operator—and Plant Operator, an experienced outside operator.[58] With Controller 2's help, the crew determined that the "water-out" dump valve on the FWKO tank was not operating correctly.[59] This meant that there was an abnormal amount of water exiting the FWKO tank and eventually entering the Pipeline. The upset was eventually resolved around 4:00 p.m., but the crew was aware that there continued to be unusually large amounts of water in the Pipeline on October 1–2.

Beta was also experiencing periodic alarms indicating lost communication between Platform Elly and Beta Pump Station.[60] Platform Elly and Beta Pump Station had historically experienced brief losses of communication; in 2020, Beta invested in a series of replacements and upgrades to the communications systems, which had reduced the frequency of communication issues. But Beta sometimes still experienced communication losses, particularly during foggy weather. In such circumstances, the leak detection system would indicate the loss of communication, and Beta's personnel would shut off the shipping pumps to allow communication to return and to allow the LDS to reset.[61] Beta received communication-loss alarms throughout the day on October 1, including at 3:25 p.m., 3:26 p.m., 3:35 p.m., 4:17 p.m., 4:32 p.m., 5:20 p.m., and 5:29 p.m.[62] Beta's personnel acknowledged these alarms and were aware of the possibility that unstable communications were contributing to or triggering leak alarms.

Around 4:10 p.m., the leak detection system issued a leak detection alarm and indicated a leak location of Mile 0.[63] Controller 1 acknowledged the alarm, which was the first leak alarm issued on October 1, at 4:11 p.m.[64] Based on the fluctuating hydraulic line conditions that Controller 1 had been experiencing on October 1, including because of the processing upset, Controller 1 reasonably concluded that the 4:10 p.m. alarm was false. Controller 1 and Controller 2 allowed one shipping pump to continue for about an hour, because they believed that, even if the leak alarm was not a false alarm, at minimum it was indicating a leak on Platform Elly, and not on the subsea portion of the Pipeline.[65] Further, the crew was still dealing with the consequences of the high-water upset, knew that high water levels were already in the Pipeline, and believed that

[55] *See id.* at 15:13–16.
[56] Controller 2 NTSB Interview Tr. at 15:19–20.
[57] Controller 1 NTSB Interview Tr. at 16:19–22.
[58] *Id.* at 18:1–8; Controller 2 NTSB Interview Tr. at 15:1–2.
[59] Controller 2 NTSB Interview Tr. at 15:13–14.
[60] Controller 1 NTSB Interview Tr. at 28:11–12, 38:2–5.
[61] *Id.* at 28:6–7.
[62] NTSB_PHMSA_00000069.
[63] *Id.*; NTSB_PHMSA_00015266.
[64] NTSB_PHMSA_00000069.
[65] Controller 1 NTSB Interview Tr. at 20:15–17, 21:18–21.

continuing to pump would reduce the amount of water pumped into the Pipeline and return the Pipeline to normal operations.[66]

During this period, after the first leak alarm, Controller 1 and Controller 2 checked the lambdas generated by the leak detection system and displayed on their HMI screens. The "lambdas" measure the Pipeline's pressure differentials between Platform Elly and Beta Pump Station, as calculated by the leak detection system's proprietary methods.[67] Beta's control room operators knew that increasing lambdas could signal an increasing likelihood of an actual leak. When Controller 1 and Controller 2 noticed that the lambdas had begun rising during the hour that one shipping pump remained on, they conferred and, consistent with their past experience, shut off the shipping pump to allow the Pipeline to settle.[68] Controller 1 and Controller 2 reasonably did not attribute the increased lambdas to a leak, because they believed that the lambdas had a tendency to increase when the Pipeline was shipping oil containing high water content, as it had been for hours at multiples higher than normal.[69] Controller 1 and Controller 2 turned off the shipping pump at about 5:10 p.m., and allowed the Pipeline to settle for about a half-hour, before restarting shipping around 5:40 p.m.[70]

Around 5:52 p.m., the leak detection system issued a second leak alarm, again indicating a leak at Mile 0.[71] Beta's control room operators shut off the shipping pump at about 5:53 p.m., and acknowledged the alarm at 5:56 p.m.[72] Controller 1 and Controller 2 reasonably believed that the second leak alarm was false, particularly given slack line conditions associated with the restart. Given the length of the Pipeline, once the pumps are turned off, it takes a few minutes for oil to stop flowing out of the Pipeline to Beta Pump Station. Similarly, it takes a few minutes for oil to begin flowing into Beta Pump Station after the pumps are turned on. This means that in the minutes after the pumps are turned on or off, the flow and pressure readings at either end of the Pipeline diverge, until the Pipeline returns to steady-state operations. Beta's personnel reasonably believed that slack line conditions, which were associated with each start and stop on October 1–2, could be triggering false leak alarms.

Beta's control room operators also reasonably believed, following each leak alarm, that if there were a leak, it was at Mile Zero (i.e., on Platform Elly) as indicated by the leak detection system, and not on the Pipeline. During the time that the pumps were off, Controller 2 requested the assistance of other personnel to visually check for a leak by observing the pumps, discharge line, and meters on Platform Elly. At various times that evening, the Plant Operator checked equipment at Platform Elly, including the PAM units, shipping pumps, and the Pipeline itself.[73] The Plant Operator also put on a flotation device and visually checked the Pipeline down to the point at which it entered the water.[74] At 7:03 p.m., having given the Pipeline over an hour to settle

[66] *Id.* at 19:19–21, 20:21–22.
[67] *Id.* at 21:7–18.
[68] *Id.* at 21:15–24.
[69] *Id.* at 39:7–12.
[70] NTSB_PHMSA_00000069.
[71] *Id.*
[72] *Id.*; NTSB_PHMSA_00015266.
[73] Controller 2 NTSB Interview Tr. at 31:2–7.
[74] *Id.*

without any active alarms, and having detected no leak on the Platform, Controller 2 restarted one shipping pump.

Around 7:15 p.m., the leak detection system issued a third leak alarm, again indicating a leak at Mile 0.[75] Controller 2 acknowledged the alarm shortly thereafter but reasonably allowed shipping to continue for a short period of time, in order to determine whether the leak detection system would normalize. Beta's personnel continued to believe that they were receiving false leak alarms, particularly because of the leak location reading, the upset condition and its attendant effects (like the abnormally high quantity of water in the Pipeline), the communication-loss alarms, and the presence of a pig in the Pipeline. When the leak alarm did not resolve itself, Controller 2 again shut down the Pipeline at 7:42 p.m.

After the third leak alarm, in addition to directing the Plant Operator to continue checking for a leak on Platform Elly, Controller 2 alerted the Platform Superintendent about the issues that Beta was experiencing with the LDS.[76] They agreed to call the Senior Pipeline Technician who was not on shift at the time, to go to Beta Pump Station to assist in troubleshooting the LDS alarms.[77] The Senior Pipeline Technician then called the Pipeline Superintendent around 7:30 p.m. and informed him that Platform Elly was experiencing issues.[78] The Pipeline Superintendent agreed that the Senior Pipeline Technician should go to Beta Pump Station. The Senior Pipeline Technician arrived at Beta Pump Station around 8:00 p.m. and rebooted the leak detection system.[79] Once the alarms had cleared, at around 8:29 p.m., Beta's personnel reasonably restarted shipping.[80]

Around 8:39 p.m., the leak detection system issued a fourth leak alarm, again indicating a leak at Mile 0.[81] Controller 2 acknowledged the alarm at 8:39 p.m. and turned off the shipping pump at 8:43 p.m.[82] In addition to continuing to check Platform Elly for leaks, and in light of the Mile 0 indication, Beta's personnel also considered whether the programmable logic controllers ("PLCs") at Platform Elly or Beta Pump Station were causing false alarms. Beta's PLCs converted analog flow measures from the SCADA system's meters into an actual flow rate, by scaling the data. But PLCs, like flow meters themselves, can fail and/or report inaccurate data. The Pipeline Superintendent came to believe that the scaling system could have failed, such that the flow rate was inaccurate. (Later in the evening, the Pipeline Superintendent therefore texted and called an engineer with the company that supplied and serviced Beta's SCADA system. The engineer eventually confirmed that the scaling appeared to be correct, but not until about 5:30 a.m. on October 2.)

In the meantime, Controller 2 and the Senior Pipeline Technician were monitoring the data on their HMI screens, but believed that it appeared to be normal, given the presence of a pig and an abnormal quantity of water in the Pipeline. To continue comparing pressure and flow readings,

[75] NTSB_PHMSA_00000069.
[76] Controller 2 NTSB Interview Tr. 29:16–20.
[77] *Id.*
[78] *Id.* at 30:1–3
[79] *Id.* at 35:1–2.
[80] NTSB_PHMSA_00000069.
[81] *Id.*
[82] *Id.*

the pumps had to be on for at least some of the time. Around 9:12 p.m., Controller 2 reasonably restarted one shipping pump to continue troubleshooting, and he switched from PAM A, which Beta had been using, to PAM B to evaluate whether the meter was causing the leak alarms.[83]

Around 9:23 p.m., the leak detection system issued a fifth leak alarm, again indicating a leak at Mile 0.[84] Controller 2 acknowledged the alarm and turned off the shipping pump at about 9:24 p.m.[85] Controller 2 continued monitoring SCADA and HMI data, and personnel further discussed the Mile 0 indication. The Pipeline Superintendent informed the Platform Superintendent and Controller 2 that he believed there could be an open valve or drain line on Platform Elly, and recalled that in the past a one-inch drain line had been accidentally kicked open, resulting in a higher rate out of the meter than was actually being shipped. The Pipeline Superintendent directed Controller 2 to again check the PAM unit for any leaks or open valves, and the Plant Operator assisted in doing so.

The Senior Pipeline Technician also called the Pipeline Superintendent and the two discussed the discrepancy between the flow meters on Platform Elly and Beta Pump Station, with the Pipeline Superintendent indicating that he believed there was either a problem on Platform Elly or false alarms due to the severity of the high-water upset. The Pipeline Superintendent was particularly concerned about the accuracy of the meters given the high quantity of water in the Pipeline. Controller 2 shared the Pipeline Superintendent's concern, particularly because he believed that the pig and the possibility of entrained gas in the system could be exacerbating the line-pack uncertainty that was also heightened by the on-and-off pumping. Eventually, at about 9:44 p.m., having discovered no issues with any meters or valves on Platform Elly, and with the LDS having settled and all alarms having cleared, Controller 2 reasonably restarted one shipping pump to continue troubleshooting the leak alarms.[86]

Around 10:01 p.m., the leak detection system issued a sixth leak alarm, again indicating a leak at Mile 0.[87] Controller 2 acknowledged the alarm at about 10:01 p.m. and turned off the

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[83] There have been allegations that the Beta crew put the leak detection in "sleep" mode. Those allegations are misplaced and misleading. Placing the system in "sleep" mode does not "stop" the system or equate to "ignoring" it. Rather, the crew still receives and acknowledges the alarms, but the loud ringing is paused. By using sleep mode, the operators—who continue to acknowledge and respond to the alarms—can more easily discuss the alarms and their troubleshooting efforts without the distraction of loud ringing. *See* Pipeline Superintendent NTSB Interview Tr. at 56:9–15, 57:10–15, 58:3–4; *see also, e.g.*, *id.* at 56:15–16. It would therefore be misleading to suggest that, by putting the leak detection system in sleep mode, the Beta crew was not attentive to the leak alarms or the possibility of an oil spill, or that they were not working hard to troubleshoot the alarms. Regardless, there is no evidence that Beta failed to receive or acknowledge a leak alarm during the period in which the leak detection system was purportedly in sleep mode. Controller 2 said that the Pipeline was in sleep mode between about 9:15 p.m. and 9:45 p.m. *See* Controller 2 NTSB Interview Tr. at 46:1–20. The SCADA data shows that Shipping Pump P05A was restarted around 9:12 p.m., the leak detection system issued a leak alarm at 9:23 p.m., the controller acknowledged the alarm at 9:24 p.m., and the controller shut off the shipping pumps at 9:24 p.m. *See* NTSB_PHMSA_00000069; NTSB_PHMSA_00015266. The controller restarted Shipping Pump P05A around 9:44 p.m., received another leak alarm at 10:01 p.m., and acknowledged the alarm at 10:01 p.m. *Id.* There is no evidence that placing the leak detection system in "sleep" mode impacted the response and evaluation of the leak alarms in any manner.

[84] NTSB_PHMSA_00000069; NTSB_PHMSA_00015266.

[85] *Id.*

[86] *Id.*

[87] *Id.*

shipping pump at about 10:33 p.m.[88] During the half-hour that he allowed shipping to continue, Controller 2 was focused on the earlier upset and wanted to build an oil pad in the tank in order to return the Pipeline to normal operations. During this period, Controller 2 also compared the Pipeline's inlet and outlet pressures, and based on his experience, the difference between the two seemed reasonable.[89] Controller 2 ultimately shut down shipping, as Beta's personnel had after each and every leak alarm, but continued to believe that the LDS was providing false alarms, or else that there was a leak on Platform Elly that the crew had been unable to locate. Controller 2 decided to switch the production stream back from PAM B to PAM A, and also switched shipping pumps, to determine whether either change made a difference. Beta thus reasonably resumed shipping at about 11:15 p.m. in order to continue troubleshooting the leak alarms.

Around 11:30 p.m., the leak detection system issued a seventh leak alarm, again indicating a leak at Mile 0.[90] Controller 2 acknowledged the alarm at about 11:31 p.m., but continued to ship with one pump so that the onshore and offshore crew could conduct a manual leak detection.[91] In a manual leak detection test, the crew measures the flow meter data at each end of the Pipeline, in order to compare the amount of oil shipped from Platform Elly to the amount received at Beta Pump Station.[92] Controller 2 and the Senior Pipeline Technician conducted the manual leak detection test in thirty-minute increments (the interval prescribed by the procedure), taking meter readings between about 12:20 a.m. to 2:20 a.m., from Platform Elly and Beta Pump Station, respectively.[93]

The manual leak detection readings revealed a difference of about ten barrels of oil between what was shipped from Platform Elly and what was received at Beta Pump Station.[94] The crew believed that this ten-barrel difference could be attributable to factors other than a leak, given the size of the Pipeline, the volume of water in the Pipeline, the pig in the Pipeline, and the possibility of instrument issues and meter inaccuracy. Nonetheless, the crew shut down shipping at the conclusion of the manual leak detection test.[95] Controller 2 and the Platform Superintendent then conferred and decided to order a line ride. Around 2:30 a.m., the Platform Superintendent called SoCal Ship Services, Beta's contractor, to conduct the line ride. Beginning around 3:30 a.m., the *Nicholas L* traced the charted path of the Pipeline, from Beta Pump Station to Platform Elly, and searched for a sign of an oil spill. (The *Nicholas L*, like Beta, did not know the Pipeline had been displaced from its charted location.) The pumps stayed off until the *Nicholas L* called the platform and indicated no oil was discovered. After that all-clear from the *Nicholas L*, the crew restarted shipping at about 5:11 a.m. on October 2.[96]

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[88] *Id.*
[89] Controller 2 NTSB Interview Tr. at 35:3–10.
[90] NTSB_PHMSA_00000069; NTSB_PHMSA_00015266.
[91] *Id.*
[92] Manual leak detection is an appropriate tool to use when the efficacy of the automated leak detection system is in question. A manual leak detection analysis provides additional information to control room operators about the conditions of a pipeline. In the circumstances, conducting manual leak detection was a prudent step for the crew to take as part of their good-faith troubleshooting efforts.
[93] Controller 2 NTSB Interview Tr. at 31:12–32:2.
[94] *Id.* at 32:2–9.
[95] *Id.* at 32:11–14.
[96] *Id.* at 33:10.

Around 5:28 a.m., the leak detection system issued an eighth leak alarm, again indicating a leak at Mile 0.[97] The crew acknowledged the alarm and continued shipping until about 6:04 a.m., before shutting the Pipeline down to conduct a second line ride in lighter conditions. The *Nicholas L* began a second line ride, after sunrise, around 7:00 a.m., traveling from Platform Elly along the Pipeline, toward Beta Pump Station. Around 8:08 a.m., the crew of the *Nicholas L* informed Beta that it had detected indications of an oil spill, and Beta did not resume shipping thereafter.

In short, the crew was working diligently and in good faith to troubleshoot what the crew believed were false leak detection alarms. After each leak alarm, crew members acknowledged the alarm, checked the alarm system, shut down the Pipeline, and inspected equipment. Though the crew could not identify the source of the alarms, they continued their process-of-elimination, good-faith search throughout the night.

While the Beta crew was troubleshooting the leak alarms, multiple third parties failed to alert Beta of a potential Pipeline leak on October 1 and 2. Beginning around 5:30 p.m. on October 1, the Coast Guard and Orange County Harbor Patrol Dispatch Center received reports of a possible fuel spill north of the Huntington Beach Pier. Similarly, on October 1, the Orange County Sheriff's Department received calls from residents about a "diesel fuel smell" emanating offshore, and the Newport Beach Police Department received around 40 calls between 6:50 p.m. and 11:01 p.m. concerning a "gas smell" in the city. Further, the National Oceanic and Atmospheric Administration discovered a sheen in satellite imagery at around 7:00 p.m. on October 1 and generated a report about "possible oil" at 1:15 a.m. on October 2.

Beta was left unaware of these reports. None of these agencies alerted anyone on the platforms or at Beta, despite knowing that Beta operated the Pipeline in that area. Rather, when Beta personnel learned of oil in the water at about 8:08 a.m. on October 2, Beta immediately began executing its OSRP and shut down all remaining operations in the Beta oil field, in addition to the already shut-in Pipeline.

I. Beta Promptly Reported the Spill and Took Responsibility.

Once oil was confirmed in the water at 8:08 a.m., notifications were made promptly. Beta personnel contacted Witt O'Brien's and Marine Spill Response Corporation by approximately 8:36 a.m. Pursuant to the OSRP, Witt O'Brien's also called BSEE's California Office of Emergency Services at approximately 8:56 a.m. and the National Response Center at approximately 9:06 a.m.

While notifications were being made, Beta was also helping to stand-up the response and clean-up effort. On October 2, Beta, the Coast Guard, and the California Department of Fish and Wildlife established a Unified Command to clean up and respond to the spill. The Unified Command response was a 24/7 operation supported by the Orange County Sherriff Department's Office of Emergency Services, San Diego County's Office of Emergency Services, and the cities of Long Beach, Newport Beach, and Huntington Beach, among others. Beta funded Unified Command and thoroughly and completely supported the efforts to contain and clean up the spill.

[97] NTSB_PHMSA_00000069; NTSB_PHMSA_00015266.

Beta helped ensure a successful clean-up:

- Within a day of the spill, 14 boats were conducting oil recovery operations and four aircraft conducted overflight assessments. By October 3, 2021, personnel recovered about 3,150 gallons of oil and deployed 5,360 feet of boom.[98]

- At the height of the response, Unified Command dispatched over 1,800 personnel to aid cleanup operations, working alongside state and federal response personnel and volunteers.[99]

- Although several beaches in Huntington Beach, Laguna Beach, Newport Beach, and Dana Point closed briefly, most quickly reopened within a matter of days, and some never fully closed at all.[100]

- California reopened all previously closed fisheries on November 30, 2021.

- As of December 27, 2021, Shoreline Assessment and Cleanup teams designated all shoreline segments as returned to their original condition.[101] On February 2, 2022, the Unified Command stood down and concluded its response and monitoring efforts.[102]

As of June 2, 2023, the Company has booked $164,569,146 in costs related to the incident, including $128,005,725 for the response and $36,563,421 in repairs. In addition to funding the clean-up, Beta accepted responsibility in the areas where it fell short the night of October 1 by agreeing to plea guilty or no-contest to several state and federal misdemeanor charges. Specifically, Beta pled guilty or no contest for pumping oil after 1:20 a.m. on October 2, 2021, after the seventh of eight leak alarms. Beta did not plead guilty for—and federal and state prosecutors did not press allegations about—the crew's response to the first six leak detection alarms or any other matter. In addition, Beta agreed to pay $12 million in fines to federal and state authorities, paid approximately $3.1 million to 240 claimants under the Oil Pollution Act economic claims process, and reached a $50 million settlement with several putative classes of civil plaintiffs. The October 2021 spill was the first such incident from the Pipeline, or any Amplify-run operation, and it is not representative of Beta, Amplify, or their operations, which have no pattern or history of wrongdoing.

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[98] *See* Unified Command Update 2, S. Cal. Spill Response, at https://socalspillresponse.com/update-2-unified-command-continues-response-to-oil-spill-off-newport-beach/.

[99] Unified Command Deck, Incident Response February 2 Briefing at 4.

[100] *See, e.g.*, *Huntington Beach City and State Beaches to Reopen Monday, October 11, 2021 at 6:00 a.m.*, Huntington Beach Press Release (Oct. 10, 2021), at https://www.huntingtonbeachca.gov/files/users/residents/HB-Beaches-Reopen.pdf.

[101] *See* February 2 Briefing at 10; Unified Command Update 21, S. Cal. Spill Response, at https://socalspillresponse.com/update-21-unified-command-concludes-cleanup-operations-of-orange-and-san-diego-county-beaches/.

[102] *See* Unified Command Update 22, S. Cal. Spill Response, at https://socalspillresponse.com/update-22-southern-california-oil-spill-response-moves-into-restoration-phase/.

J. Beta Cooperated Fully with the NTSB.

Beta has cooperated with all investigations and agencies interested in learning from the incident, including the Board, PHMSA, the Coast Guard, BSEE, the Environmental Protection Agency, and various California agencies. Beta facilitated crew interviews by PHMSA, NTSB, and the Coast Guard within days of the spill. Beta also responded to dozens of information requests from PHMSA and NTSB and provided over 3,300 documents totaling 15,381 pages, plus alarm data and millions of SCADA data points for the Pipeline. Beta also assisted the NTSB in collecting a key piece of evidence—the damaged Pipeline. Beta spent months and millions of dollars planning and executing the removal of the damaged pipeline from the sea floor and then transporting it to shore for NTSB's inspection.

K. The Vessels Agreed to More than $200 Million in Civil Settlements.

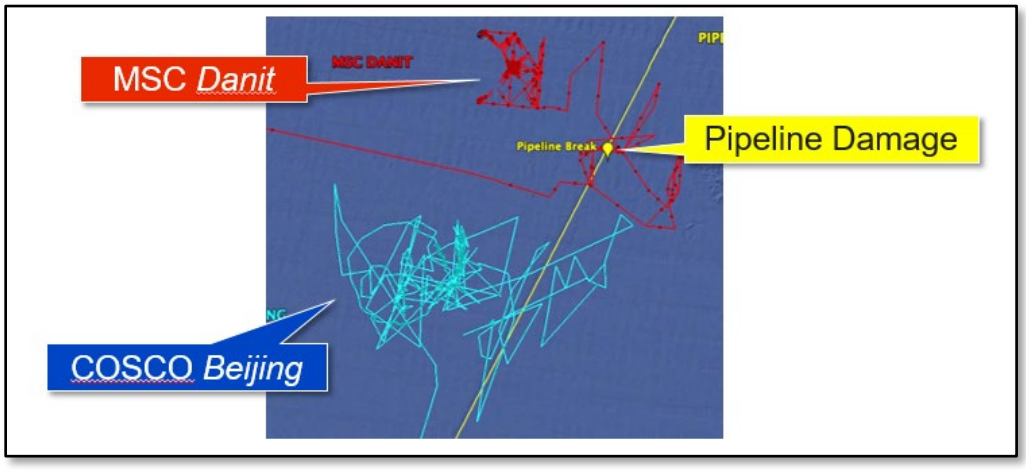
While Beta worked quickly to accept responsibility, the two vessels continued to deny their responsibility for displacing and damaging the Pipeline and for hiding their misconduct. It was not until 17 months after the spill that the vessels agreed to pay Beta $96.5 million for the damages that the vessels caused. In addition, the vessels paid certain insurers tens of millions of dollars and the putative classes of civil plaintiffs an additional $45 million. The $200 million-plus in settlement payments made by the vessels show that the vessels caused the spill.

II. THE ANCHOR DRAGS CAUSED THE SPILL.

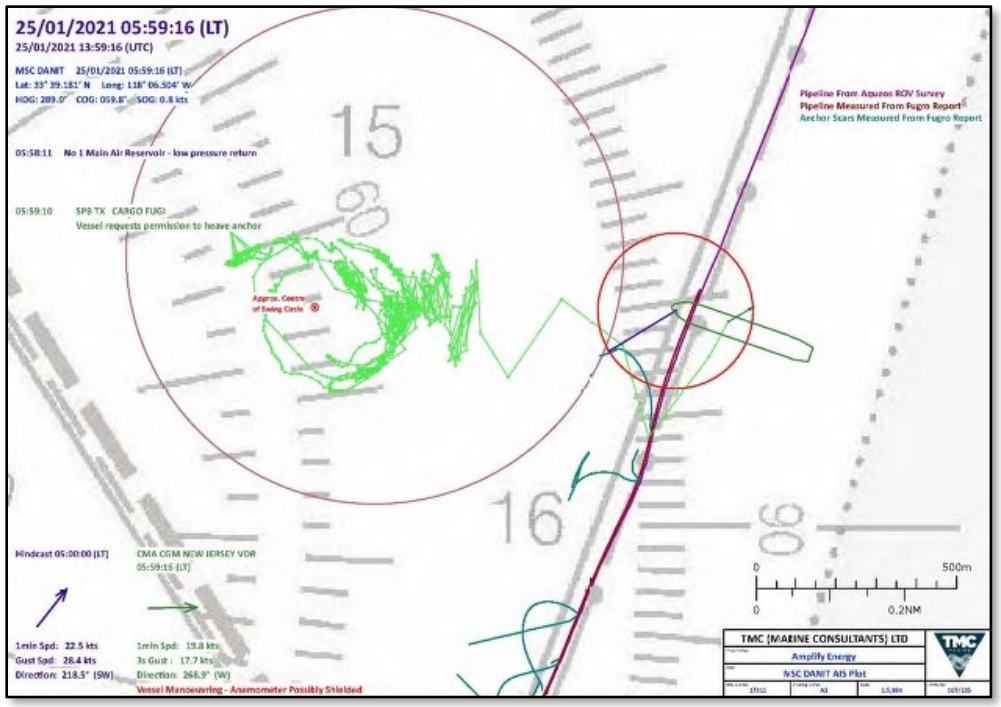
The vessels caused the spill. The vessels drug their anchors across the Pipeline in a no-anchor zone. The anchor drags displaced and damaged the Pipeline. Had the vessels disclosed their anchor drags, Beta would have suspended operations, inspected the Pipeline with a ROV, and repaired the damage. However, the vessels did not report their drags, violating federal regulations that require vessels to report hazardous conditions and marine casualties created by the vessels. *See* 33 C.F.R. § 160.216 (reporting requirements for hazardous conditions), 46 C.F.R. § 4.05–10 (reporting requirements for marine casualties). Because of the failure to report, the Pipeline damage was not repaired. Through cyclic loading over time, the damage led to the Pipeline's failure at the location of one of the anchor contacts, as demonstrated by the expert analysis of Dr. Ravi M. Krishnamurthy. *See* **Exhibit 6** (Feb. 10, 2023 Report); **Exhibit 7** (March 24, 2024 Report).[103]

[103] In connection with the civil litigation, Beta asked Dr. Krishnamurthy to provide metallurgical expert testimony regarding the Pipeline. Dr. Krishnamurthy is the Executive Vice President at Blade Energy Partners, a firm that provides a wide variety of multidisciplinary engineering, research and development, and operational projects in the oil-and-gas space to clients such as Shell, BP, ExxonMobil, ChevronTexaco, KinderMorgan, and Williams. Dr. Krishnamurthy leads the Mechanics, Materials and Corrosion team at Blade. Within the last 10 years, Dr. Krishnamurthy and his team have conducted more than 25 root cause or failure analyses, including more than ten major pipeline failure analyses. For example, the California Public Utilities Commission appointed Dr. Krishnamurthy to evaluate the Aliso Canyon gas leak from an underground storage facility. Dr. Krishnamurthy has more than 50 publications on pipeline integrity and more than 25 publications on corrosion, material selection, and failure analysis. Dr. Krishnamurthy has a Ph.D. in Materials Science from the University of Virginia; a M.S. in Ocean Engineering (with a focus on Marine Materials) from Florida Atlantic University; and a B.Tech. in Naval Architecture from the Indian Institute of Technology in Madras, India. On this project, Dr. Krishnamurthy led a team of five Blade engineers who have, on average, over 15 years of professional engineering experience.

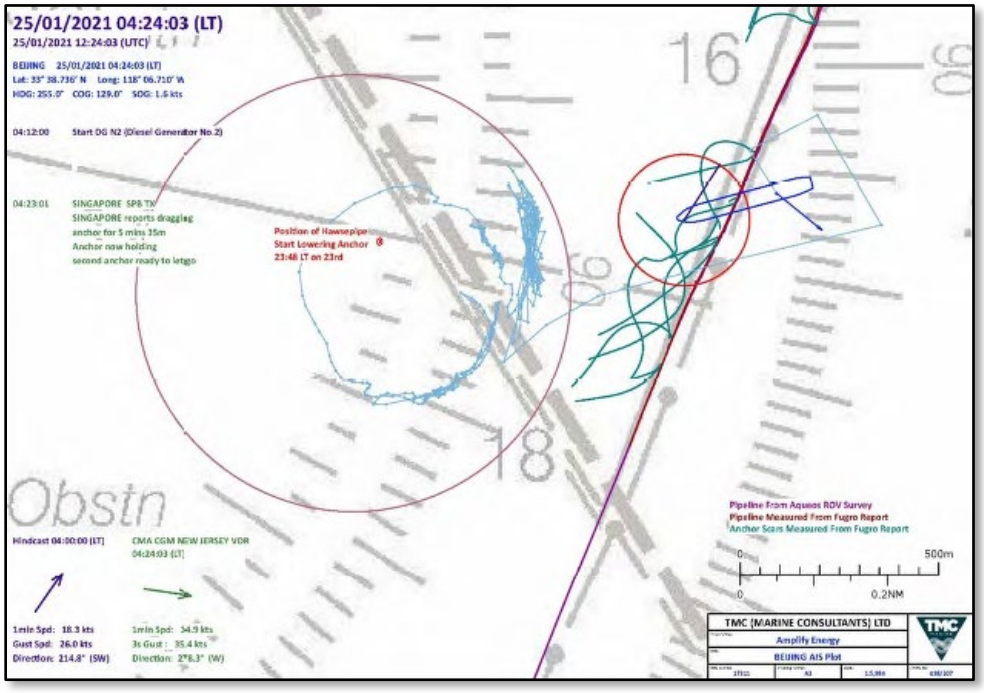
As detailed in Part I(G), on January 25, 2021, the MSC *Danit* and the M/V *Beijing* dragged their anchors outside of their designated anchorages and into a "no-anchor" zone across the Pipeline. Both vessels had been warned of an approaching storm, and authorities had instituted "heavy weather protocols." Many other vessels left their anchorages to ride out the storm in deeper waters, but the *Danit* and *Beijing* remained anchored near the Pipeline. The storm arrived, and both vessels struggled to control their movements in the high waves and winds. They began dragging their anchors across the seafloor. Data from the vessels' transponders show that they repeatedly zig-zagged across the Pipeline:



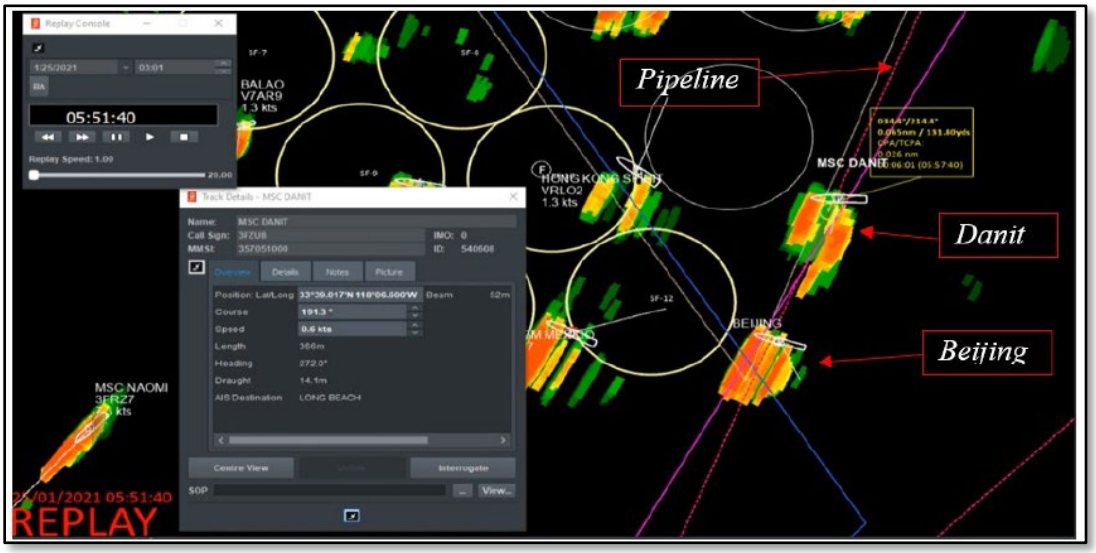
A reconstruction of the *Danit*'s AIS data confirmed the vessel's location directly over the Pipeline with its anchor down:



As did a reconstruction of the AIS data for the *Beijing*:

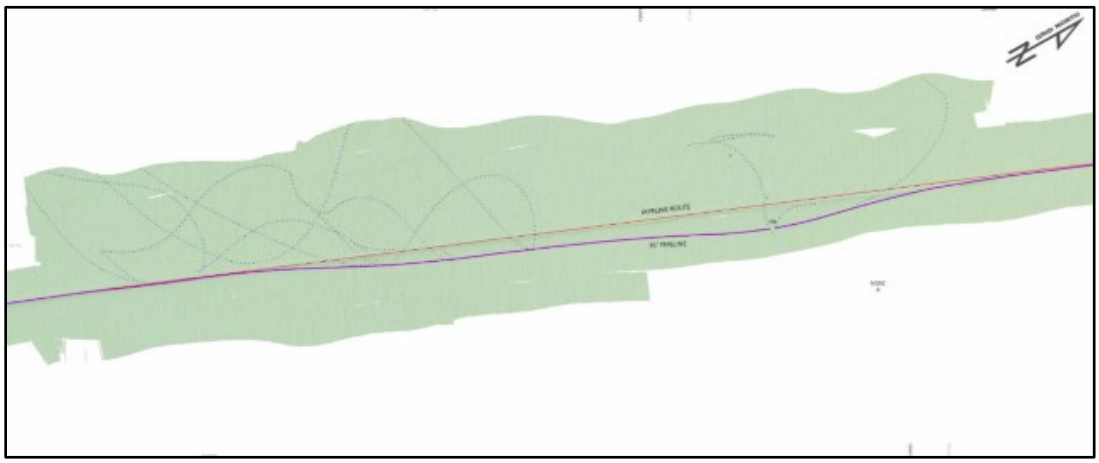


Video provided by the Marine Exchange (which was responsible for monitoring vessel traffic) demonstrated that Marine Exchange also knew, or should have known, of the anchor drags over the Pipeline on January 25:



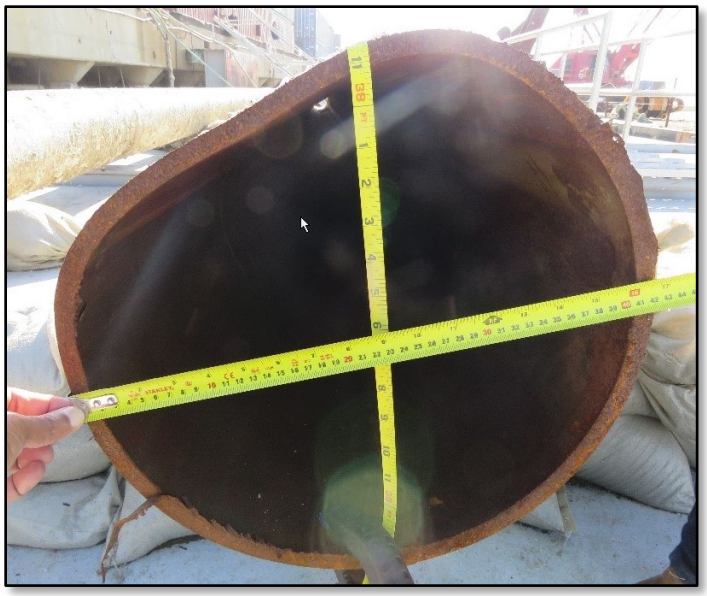
As detailed in Dr. Krishnamurthy's report, when the vessels' anchors dragged along the seafloor, they hooked the Pipeline and bent a 4,000-foot section of it. The anchors damaged and

displaced the Pipeline by up to 105 feet. This chart shows both the anchor drags in the sand, the Pipeline's plotted location, and the Pipeline's displaced location:[104]



Although the Beta crew did not know it on the night of October 1, 2021, the anchors had caused significant damage and displacement to the Pipeline. The following photographs show the bent, deformed, and crushed Pipeline (first at the northern, or *Danit*, anchor contact site, followed by the southern, or *Beijing*, anchor contact site):

[104] Ex. 8, AMPLIFY-00003243.



After an extensive fact and expert discovery process in federal court, the owner of the *Beijing* was forced to admit that "the BEIJING's anchor likely contacted the Pipeline during an anchor dragging incident."[105] Metallurgical experts, including one retained by the *Beijing*, determined that a fatigue mechanism through cyclic loading caused the initial, *Danit*-caused crack to grow to a through-wall crack and leak on October 1, 2021. Specifically, as Dr. Krishnamurthy's report shows, the *Danit* laterally displaced the Pipeline 100 feet. (The *Danit*'s anchor had an unbuoyed weight of about 21.5 tons.) The *Danit*'s anchor caused a global axial strain of 1.12% along the Pipeline axis above the acceptable standards for safe transport of hazardous liquids. The stresses on the Pipeline, along with the in-line pressure, significantly exceeded the yield strength of the material. Local crushing and deformation also generated significantly high local stresses and strains (39.74%) that could initiate micro-cracking. And the local deformation, gouges, and denting occurred adjacent to the weld, which contributed to rupture or cracking at the weld-pipe intersection. This crack grew through fatigue to failure following the initial encounter with the ships. Dr. Krishnamurthy's conclusions are consistent with the Board's analysis of the cracked section. The *Danit*-caused damage had to be—and was—repaired.

The damage to the southern, or *Beijing*, section was also substantial. Dr. Krishnamurthy's report shows that the *Beijing*'s anchor had an unbuoyed weight of about 16.5 tons and initially laterally displaced the Pipeline by about 60 feet prior to the *Danit* encounter. This resulted in a global strain of about 0.95%. It similarly caused a global bend along the Pipeline axis above the acceptable codes and standards for safe transport of hazardous liquids. The stresses and in-line pressure also significantly exceeded the yield strength at this location. The *Beijing*-caused damage had to be—and was—repaired.

[105] *See In the Matter of the Complaint of Dordellas Finance Corp. Owner and MSC Mediterranean Shipping Company S.A., Owner*, ECF No. 209 at 4, 2:22-cv-02153-DOC-JDE (C.D. Cal. 2022).

In short, had the vessels not drug their anchors over the Pipeline, no leak would have occurred. The Pipeline, which Beta maintained in excellent condition, would have continued to operate safely, as it had for forty years.[106]

III. SAFETY RECOMMENDATIONS.

As detailed in Part III(E), Beta has already agreed to and implemented a significant number of safety improvements to resume operations. Beta is also conferring with PHMSA regarding other potential safety improvements. In collaboration with its federal and state regulators, Beta will consider any additional safety improvements that the Board suggests.

In light of the significant commitments that Beta has already made, Beta focuses here on four recommendations that would make the marine industry safer.

A. Safety Recommendation No. 1.

VTS and vessels should be required to make best efforts to contact owners and operators of subsea pipelines and subsea cables upon the VTS' and/or vessel's reasonable belief that there has been a potential anchor contact with or anchor drag in the vicinity of subsea pipelines and/or subsea cables.

B. Safety Recommendation No. 2.

The owners and operators of cargo vessels that sail to U.S. harbors should be required to show, upon request by the U.S. Coast Guard or other maritime authorities, that each crew member on board who has responsibilities for vessel navigation and anchoring has reviewed the nautical charts for the relevant port and identified the location of subsea pipelines and cables.

C. Safety Recommendation No. 3.

To the extent a cargo vessel has an equipment issue with the anchor or anchor-related equipment (like a windlass) that impacts the vessel's ability to heave and/or lower the anchor, the vessel should be required to report the equipment deficiency or issue to the Coast Guard and applicable VTS office upon the vessel's discovery of the equipment issue.

D. Safety Recommendation No. 4.

Although Marine Exchange has already discontinued the use of anchorage zones F-16, SF-2, and SF-3 adjacent to the Pipeline (and discontinued the use of anchorages G-5, F-4, F-6, F-8, F-10, F-12, and F-14 to provide more room for anchored vessels), Marine Exchange should not reinstate use of anchorage zones F-16, SF-2, and SF-3 adjacent to the Pipeline. Although Beta believes that discontinued use of anchorages G-5, F-4, F-6, F-8, F-10, F-12, and F-14 to provide

[106] Even if no leak had occurred, the next regularly scheduled ILI or ROV inspection would have discovered the Pipeline damage. Beta would have immediately shutdown the Pipeline and conducted repairs to address the bending strain, denting, and ovality issues at both the northern and southern sections, which impacted the Pipeline's integrity. Indeed, over the course of many months and millions of dollars, Beta executed an offshore repair project that installed 357 feet of replacement pipe at the northern and southern damage sections, including a new structural clamp.

more room for anchored vessels remains prudent, if Marine Exchange were to reinstate the use of such anchorages, Marine Exchange should require vessels in those anchorages to depart those anchorages in advance of heavy weather warnings.

E. Summary of Beta's Safety-Related Improvements.

Beta's safety improvements fall into the following categories:

Compliance Conditions. Beta agreed to 14 safety improvements as part of its federal and state plea agreements. These conditions and improvements include, among others: (1) additional training on spill notifications; (2) immediate reporting of any leak detection alarm to the Cal-OES State Warning Center; (3) semi-annual ROV inspections; (4) comprehensive review and revision of Beta's procedures; and (5) mandatory training to operational employees and related management personnel on the updated policies and procedures.

Revised Procedures. As part of its commitment to learn from the oil spill, Beta retained Eagle Energy Services, LLC ("Eagle") to perform a top-to-bottom review of Beta's existing procedures and propose improvements. An Eagle consultant conducted a desktop evaluation of procedures for Beta's operations of the offshore facilities. As part of that evaluation, the consultant spent time offshore engaging directly with platform personnel. Ultimately, Eagle recommended—and Beta implemented—revisions to Leak Detection (Section 5.02), Abnormal Operating Conditions (PSOM 17.08), and Emergency Response Procedures (PSOM 17.09), among others. Beta is working with PHMSA to modify additional procedures.

Changes to Pipeline-Related Technology and Equipment. Beta has installed a new, state-of-the art leak detection system from Krohne. Major pipeline operators like BP, Shell, and Chevron use Krohne's technology. The new leak detection system cost about $375,000, excluding the costs of other related improvements, some of which are highlighted in the following bullets.

Changes to Platform-to-Shore Communication Infrastructure. Beta leveraged the operational downtime to complete a major overhaul to the communication networks servicing the platforms and on-shore facilities. These improvements addressed the major network hardware components that connect the offshore platforms to land, including upgrades to critical communication ISP circuits, core network switches, secondary access switches, firewalls, fiber optics, wireless technologies, and network automation. Beta also installed three sets of new high-capacity, long-distance microwave radios that increase performance and reliability of network communications. These investments totaled approximately $180,000. As part of a separate, but related project, Beta also invested in a new SCADA HMI system.

Other Enhancements. Beta will also:

- Increase its staffing on Platform Elly to provide for three control operators (an increase of one per crew) and three plant operators (an increase of one per crew) for a period of three years.

- Automate and commission a second processing train to facilitate safer platform operations by creating redundant systems and allowing greater vessel residence time of produced fluids.

- Enhance the platform's overboard incident protection and response systems to minimize spill incidents.

- Add several Variable Frequency Drives to assist with fine-tuning shipping rate control leaving the platform.

Beta's enhancements demonstrate its commitment to safe operations.

IV. CONCLUSION

Beta thanks the Board for the opportunity to submit these proposed findings, probable cause statement, and safety recommendations. If the Board has any questions or requests for additional information related to Beta's submission or the submissions of other parties to this investigation, please do not hesitate to contact me.

Respectfully Submitted,

/s/ Jeff Ortloff

Jeff Ortloff
Director, Facilities Engineering
Amplify Energy Corp.

cc: Andrew C. Ehlers, Investigator-in-Charge, NTSB