



July 2, 2024

Mr. Peter Campbell
Alaska Department of Environmental Conservation
43335 Kalifornsky Beach Rd #11
Soldotna, AK 99669

RE: 2023 Injection Well Rehabilitation Work Plan - Revised
Marathon Kenai Refinery

Dear Mr. Campbell:

Trihydro is resubmitting this letter work plan on behalf of Tesoro Alaska, LLC (Marathon) for injection well rehabilitation at the Marathon Kenai Refinery (Refinery). The project was originally scheduled for August 2023, but due to scheduling conflicts, rehabilitation efforts were rescheduled for Summer of 2024. The changes to this work plan address EPA Comments received August 7, 2023, in response to the original August 1, 2023, letter work plan. Although the scope of work did not change, the following changes were made in this revised work plan:

- Clarifying scope of rehabilitation to include only IR-31 and IR-32
- Amending Attachment 1, Section 2.10

Rehabilitation of wells falls under maintenance activities of the RCRA Post-Closure Permit No. AKD 04867 9682 (Permit); but requires Alaska Department of Environmental Conservation approval due to the use of acid and bio-dispersant. Rehabilitation efforts will be performed on injection wells IR-31 and IR-32, east of the Kenai Spur Highway at the Kenai Refinery (Figure 1). Injection wells IR-29 and IR-30 were replaced in September of 2023 and do not need rehabilitation. Attachment 1 outlines the well rehabilitation procedures and Figures 1 and 2 show work location and details.

PURPOSE

IR-31 and IR-32 are A-aquifer treated water injection wells installed in 1990. IR-31 and IR-32 have had a steady reduction in flow capacity since June 2023. Decreased well function and eventual failure due to iron fouling is a common problem with recovery wells, injection wells, and air sparge wells at the Refinery. Iron-fouling is likely occurring in IR-31 and IR-32, rehabilitation will be used to extend the functional life of the well.

SCOPE OF WORK

Well Rehabilitation

The screen intervals on IR-31 and IR-32 appear to have fouling from deposits of iron and biogenic material. The goal of rehabilitation is to remove biofouling and iron encrustation from the well casing and screen. The primary steps for well rehabilitation include:



Mr. Peter Campbell
July 2, 2024
Page 2

- Preliminary scrubbing and bailing of the well casing and screen to remove loose scale and solids
- Acid and bio-dispersant treatment
- Removal of treatment fluids and biofoul materials using an air pump

Well rehabilitation procedures are further detailed in Attachment 1, Well Rehabilitation Procedures.

Waste Management

Fluids generated during rehabilitation and disinfection activities will be containerized in a suitable vessel. The fluids will be integrated into the refinery waste management program for onsite disposal per the Refinery Environment Department once acceptable pH values are obtained.

Schedule

The proposed schedule for 2024 injection well rehabilitation and possible installation is:

- Early August – Schedule with Refinery and subcontractors, complete safety and permitting requirements.
- Late August – Complete well rehabilitation.
- November – Rehabilitation Report will be included in Quarterly Progress Report 24-4.

If you have questions or comments, please contact me at (907) 262-2315 or bforce@trihydro.com.

Sincerely,
Trihydro Corporation

Brianna Force, Project Geologist/Hydrogeologist
Project Manager

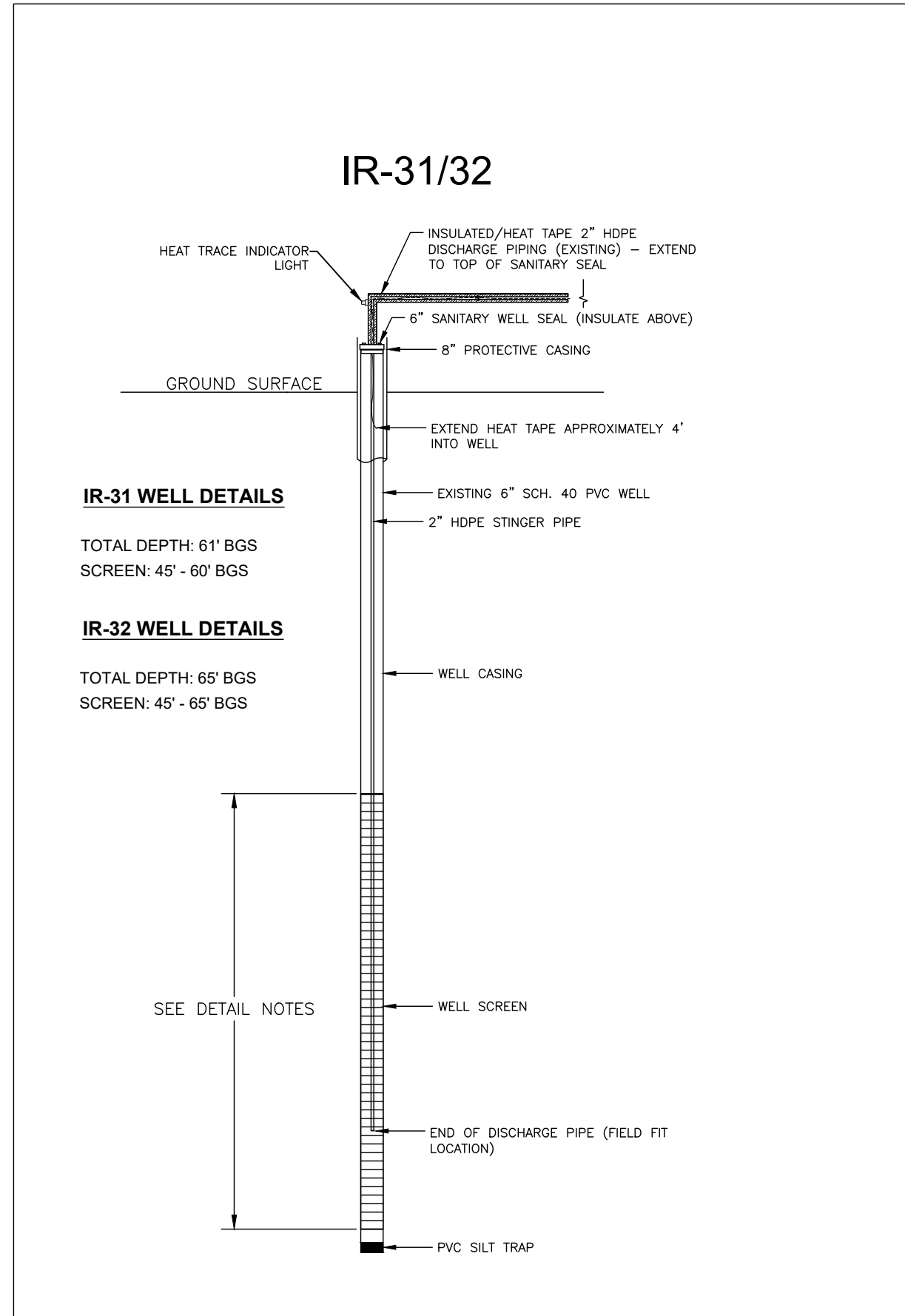
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Attachments

cc: Jan Palumbo, Environmental Protection Agency

FIGURES

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IR-31 WELL DETAILS

TOTAL DEPTH: 61' BGS
SCREEN: 45' - 60' BGS

IR-32 WELL DETAILS

TOTAL DEPTH: 65' BGS
SCREEN: 45' - 65' BGS

SEE DETAIL NOTES

EXPLANATION

APPROX.	APPROXIMATELY
PVC	POLYVINYL CHLORIDE
DIA.	DIAMETER
HDPE	HIGH-DENSITY POLYETHYLENE
SCH.	SCHEDULE
TYP.	TYPICAL

1 IR-31 AND IR-32 WELL REHABILITATION DETAIL
SCALE: NONE

REV.	DATE	DESCRIPTION	BY	CHKD
B	7/19/2019	REVIEW REVISIONS	JWM	BF
A	4/16/2019	ISSUE FOR INTERNAL REVIEW	JWM	BF

DRAWN BY: JWM
CHECKED BY: BF
DATE: 7/19/2023
SCALE: NONE
FILE: 39B-KENAL_IR29_REHAB_201904



INJECTION WELL DETAIL
INJECTION WELL REHABILITATION
MARATHON KENAI REFINERY
KENAI, ALASKA

SHEET
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2 OF 2
REV: **B**

ATTACHMENT 1

ATTACHMENT 1. WELL REHABILITATION PROCEDURES

WELL REHABILITATION PROCEDURES

The goal of recovery or injection well rehabilitation is to remove biofouling and iron deposits from the well casing and screen so the screen can function at or near intended capacity. The two-primary steps for well rehabilitation are:

1. Preliminary well casing/screen scrubbing and bailing to remove loose scale and solids
2. Acid and bio-dispersant treatment

1.0 Procedure for Scrubbing Recovery or Injection Well (Step 1)

- 1.1 Prior to cleaning a recovery well, **de-energize pump** and lockout-tagout (**LOTO**) the **appropriate breaker**. Verify all electrical is off by using a fluke meter at the electric control box near the well head.
- 1.2 Prior to cleaning an injection well, close well isolation valve and **LOTO the isolation valve**.
- 1.3 **Remove downhole pumps and equipment** from the well casing. Use equipment appropriate to lift well equipment out of well without damaging (drill rig, crane, excavator as appropriate).

For recovery wells, ensure aboveground piping or piping connected via pitless adapter are appropriately disconnected. Pull pump by connecting to and drop tube and safety cable. If the safety cable is not visible from the top of the well casing, then the pump will be pulled up using the HDPE drop tube. If a pitless adapter is in place, a pipe will be secured to the pitless adapter down well and used to begin lifting pump. Once a section is exposed above ground, the HDPE drop tube will be clamped at the well head to prevent it from falling while the drill rig releases the pipe. Once the clamps are secured to the HDPE at the well head, the drill rig will clamp on to the HDPE pipe near the well head and pull another 10' section. This process will be repeated until the pump is above ground. Once removed, the pipe and pump will be carefully placed on the ground for inspection and any needed reconfiguration.

For injection wells, stinger piping will be removed using same techniques as pulling pump, but the load will be lighter, so rigging and connections can be modified as appropriate to lighter load. Depending on depth, the pipe can also be pulled by hand if a crew of 2 is available.

- 1.4 Assess the condition of the well prior to rehabilitation. **Collect a grab sample from the well to confirm background pH levels** using a disposable bailer and pH meter. Measure the bottom depth of each well for reference. Subtract the actual depth measured from the installation bottom depths; this will provide the amount of buildup in the bottom of the well. Confirm well depths and configuration from boring logs and/or well logs so depth of sediment can be assessed.
- 1.5 **Prior to scrubbing the well, all workers should don standard PPE: hard hat, safety glasses, FRCs, steel toed boots, and hand protection (leather work gloves, nitrile gloves).**
- 1.6 The well brush will be raised and lowered using appropriate equipment (preferably a drill rig, but excavator or other lifting equipment might be appropriate). **Attach the lifting mechanism to the top of the metal brush.**
- 1.7 As an extra precaution, **attach a safety wire to the metal part of the brush**. This serves as a backup connection in the event the rope is severed, or a knot comes loose.

ATTACHMENT 1. WELL REHABILITATION PROCEDURES

- 1.8 **The well will be scrubbed until the brush reaches the associated bottom depths.** Check this periodically with the fluid level meter when the brush is out of the injection well.
- Use a hard bristle, non-metallic, multi-stage brush. If a metallic or semi-metallic brush is used, it cannot come in contact with any PVC materials since it will permanently scour, weaken, or compromise the PVC.
- 1.9 **Pump all loose material from the well** and store it in a container stationed near the injection well for disposal. After scrubbing, use an air-lift pump to pump loose material from the well and into a container. Pump until water is clear with no sediment or orange staining is present.
- 1.10 Continue to **scrub the length of the well for at least 30 minutes.** This should become easier as the brush travels up and down the well. Check with the fluid level meter that the well is cleared to the bottom depth.
- 1.11 Clean the brush and other equipment after use.
- 1.12 Re-assess the condition of the well prior to chemical rehabilitation. **Collect a grab sample from well with disposable bailer to assess pH levels** using a pH meter. Measure the bottom depth to confirm well is clear to the bottom.

2.0 Procedure for Chemically Treating Wells (Step 2)

Verify that the mechanical well cleaning has removed encrustation, bio fouling, and loose sediments. Do not chemically treat wells prior to mechanical cleaning.

- 2.1 Prior to cleaning a recovery well, **de-energize pump** and lockout-tagout (**LOTO**) the **appropriate breaker.** Verify all electrical is off by using a fluke meter at the electric control box near the well head.
- 2.2 Prior to cleaning injection well or injection, close well isolation valve and **LOTO the isolation valve.**
- 2.3 **Don appropriate PPE.** Chemical well cleaning involves using hazardous acid solutions. Acid resistant suit, goggles, face shield, chemical resistant gloves (not nitriles), and chemical resistant steel toe boots are required.
- 2.4 Chemical treatment includes three gallons of Hydrochloric Acid (31% strength) and 0.4 - 0.5 gallons NW-310 Bio dispersant.
- 2.5 Pre-mix acid and bio-dispersant chemicals with potable water in the large 55-gallon plastic drum dedicated for chemical mixing. Place the 55-gallon drum on a duck pond secondary containment and **place the drum near the injection well.** Stage all chemicals near the work area before mixing begins. The chemical mixture must be mixed in the following order:
1. **Add 23 gallons of potable water to the 55-gallon drum.**
 2. **Add the 0.4 to 0.5 gallons of bio-dispersant to the 23 gallons of potable water inside of the drum.**
 3. **Add 3 gallons of Hydrochloric Acid to the mixture inside of the drum.**

The chemicals in these proportions should achieve a pH of 3 in the injection well.

ATTACHMENT 1. WELL REHABILITATION PROCEDURES

- 2.6 Use a long mixing stick to mix the chemicals inside the drum. **Mix chemicals at a slow pace to prevent splashing. DO NOT** lean over the drum while chemicals are being mixed. The chemicals being mixed can adversely affect human health through injection, skin contact, and inhalation. See SDS for hazards associated with both NW-310 Bio dispersant, and Hydrochloric Acid (31% strength).
- 2.7 Use at least 70 feet of polypropylene tubing (poly tubing) to syphon the chemicals out of the mixing barrel and into the injection well. The poly tubing will be available on-site and will be gravity fed down well. **Fill the 70 feet of poly tubing by submerging it in the barrel and filling the last 5' with water then lower the poly tube down the well.**
- 2.8 Visually verify that the chemical mixture is flowing down the injection well. Do not pull poly tubing out of well until all of the solution is down the well.
- 2.9 **Use a surge block to adequately mix the applied chemicals in the well.** Continue surging for a period of two hours while periodically confirming the pH level inside the well. Samples should be recovered using a disposable bailer and analyzed using a pH meter. Allow the solution to sit in the well overnight at a pH level of 3. If a pH of 3 is not achieved, repeat steps 5 and 6 in the following mixture ratio of 6.5 parts HCL, 1-part NW-310, 50-parts potable water.
- 2.10 Surge the well for a period of one hour the following day. Pump a sufficient amount of groundwater from the well to restore pH levels to within background conditions (approximate). Pumped groundwater can be transported and consolidated into the container staged near the recovery wells for eventual transport and disposal upon completion of well rehabilitation activities.
- 2.11 After reinstalling appropriate well pumps, pipes, and wire, and before energizing and putting well back into service, perform a system walkthrough to ensure that all valves restoring flow to the injection wells are in the correct position, and all electrical connections have been appropriately completed.
- 2.12 Put well back into service and set appropriate flows and pressures.