



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

March 12, 2010

In Reply Refer To: WTR-7

Troy Hacker
Corporate Environmental, Health & Safety Manager
Thermo Fluids, Inc.
4301 West Jefferson Street
Phoenix, Arizona 85043

Re: August 13, 2009 Clean Water Act Inspection

Dear Mr. Hacker:

Enclosed is the March 12, 2010 report for our August 13, 2009 inspection of Thermo Fluids, Inc., in Phoenix. Please submit a short response to the findings in Sections 2 and 3, to EPA, Phoenix, and ADEQ, by **May 30, 2010**. The main findings are summarized below:

- 1** Thermo Fluids would qualify as a centralized oil treatment and recovery facility under 40 CFR 437 Subpart B, when or if it discharges to the Phoenix sewers. The Phoenix permit correctly applied the Federal standards and local limits.
- 2** Thermo Fluids achieved consistent compliance with the Federal standards and local limits by hauling all residual wastewaters off-site for disposal. Thermo Fluids ceased discharging to the Phoenix sewers because of permit violations for selenium, zinc, arsenic, and molybdenum. The treatment-in-place is not equivalent to the models used in setting the standards because it lacks secondary oil recovery through dissolved air flotation. The facility employs good built-in controls to capture drainage as well as multiple levels of screening, testing, and data logging to guard against the acceptance of off-spec wastes.
- 3** The self-monitoring as set forth in the permit and reflected in the sample record is representative over the sampling day and the reporting period.

I appreciate your helpfulness extended to me during this inspection. I remain available to the City of Phoenix, and to you to assist in any way. Please do not hesitate to call me at (415) 972-3504 or e-mail at arthur.greg@epa.gov.

Sincerely,

Original signed by:

Greg V. Arthur
CWA Compliance Office

Enclosure

cc: Deborah Swartz, Sr. WQ Inspector, City of Phoenix
Gregory Frech, WQ Compliance, ADEQ



U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

CLEAN WATER ACT COMPLIANCE OFFICE

NPDES COMPLIANCE EVALUATION INSPECTION REPORT

Industrial User: Thermo Fluids, Inc.
4301 West Jefferson, Phoenix, Arizona 85043
Zero-Discharging Centralized Oil Treatment and Recovery
(40 CFR 437 Subpart B – zero)

Treatment Works: City of Phoenix
91st Avenue Wastewater Treatment Plant
NPDES Permit No. AZ0020524

Pretreatment Program: City of Phoenix

Date of Inspection: August 13, 2009

Inspection Participants:

US EPA: Greg V. Arthur, Region 9, CWA Compliance Office, (415) 972-3504

Arizona DEQ: None

City of Phoenix: Deborah Swartz, Sr. WQ Inspector, (602) 534-2082
Jessie Ellison, Sr. WQ Inspector, (602) 534-2905

Thermo Fluids: Troy Hacker, Corporate Envr Health & Safety Mgr, (602) 763-4880
Ted Sinclair, Chief Operating Officer, (602) 272-2400

Report Prepared By: Greg V. Arthur, Environmental Engineer
March 12, 2010



1.0 Scope and Purpose

On August 13, 2010, EPA and the City of Phoenix conducted a compliance evaluation inspection of Thermo Fluids, Inc., in Phoenix, Arizona. The purpose was to ensure compliance with the Federal regulations covering the discharge of non-domestic wastewaters into the sewers. In particular, it was to ensure:

- Classification in the proper Federal categories;
- Application of the correct standards at the correct sampling points;
- Consistent compliance with the standards; and
- Fulfillment of Federal self-monitoring requirements.

Thermo Fluids is a significant industrial user (“SIU”) within sewer service areas administered by the City of Phoenix whose compliance was assessed as part of an on-going EPA evaluation of industrial users in EPA Region 9 by sector. The inspection participants are listed on the title page. Arthur conducted the inspection.

See Appendix 1 on page 11 for a schematic of the layout and configuration of wastewater handling. Photo documentation of this inspection follows in Section 1.6 on page 5 of this report.

1.1 Process Description

Thermo Fluids collects spent oils, solvents, and oily wastewaters, from off-site customers for on-site processing, handling, and off-site disposal and reclaim. Collection involves both rail car delivery and a fleet of as many as 200 tanker trucks including vacuum trucks for oily wastewaters collection and delivery. Thermo Fluids Phoenix began operations in 1996 and is one of 30 Thermo Fluids facilities in the West. Thermo Fluids Phoenix de-emulsifies oils through dewatering and filtering to reclaim the oil into end products for asphalt manufacturing and boiler bunker applications. On the date of this inspection, the remaining wastewaters were being delivered to Liquid Environmental in Phoenix for disposal.

- Screening – Customers first must be qualified by Thermo Fluids through a company audit. Once qualified, collected wastewaters are tested three separate times, twice for oil/water content and halogen content, and once for numerous other pollutants: (1) field screening by truck operators at the collection site, (2) facility screening upon receipt at the processing plant, and (3) certified lab testing of tank farm samples for a suite of pollutants. Off-spec or hazardous wastestreams are refused. Operator job evaluations include zero-tolerance for accepting off-spec waste.
- Receiving – All wastewaters delivered to receiving arrive under bills of lading. The contents are recorded into inventory control logs. Rail cars parked on a side spur are emptied to the tank farm through a dedicated pump station. The covered loading rack for truck receiving involves dedicated pump off-loading through canister filters to the tank farm. Various sources of drainage are collected in a corner pit sump in truck receiving for pumping to the tank farm. These drainages include spills and run-off from hard-



plumbed spill trays under the rail cars, and washdown and drainage from the truck receiving loading rack underdrain.

- Tank Farm – Thermo Fluids Phoenix has 1.1 million gallons of on-site storage. Product tanks (T1, T2) hold end product. Day tanks (T5, T6, T7, T8, T9) accept “dry oil” waste-streams with oil contents over 95%. Product split tanks (T3, T4, T10, T11) are used for holding, transfer, and light to heavy blending. Antifreeze tanks (T17, T19, T22) accept spents for holding and transfer. Oily wastewater tanks (T12, T13, T14, T15, T16, T18) are involved in dewatering and de-emulsification. Waste tanks (T20, T24) are for treating or holding residual wastewaters and residual solids.
- Oily Wastewater Handling – Oily wastewaters pumped from receiving are treated through a plate coalescing oil water separator, centrifuge separation, and chemical and heat de-emulsification (T12). Separated oils are stored (T13, T14). The water fractions from the oil water separator, de-emulsification, and oil storage are impounded (T15, T16, T18) for delivery to off-site disposal.
- Wastewater Handling – Residual wastewaters used to be held and batch treated to precipitate metals (T20) for discharge through diatomaceous earth filtration to the Phoenix sewers. However, Thermo Fluids no longer was discharging because wastewaters at times exceeded Phoenix permit limits for selenium, zinc, arsenic, and molybdenum.

Thermo Fluids Phoenix used to discharge to the Phoenix domestic sewers through a single connection under Phoenix permit No.0902-20513. On the date of this inspection, Thermo Fluids was no longer discharging. Domestic sewage discharges downstream of the industrial wastewater connection.

1.2 Facility SIC Code

Thermo Fluids Phoenix is assigned the SIC code for waste oil (SIC 5093).

1.3 Facility Process Wastewater Handling

Sources – The Phoenix permit identified the sources of oils and oily waters as grit traps, fuel impacted water, coolant waters, machine cutting oils, and non-hazardous industrial wastewaters. *See* Section 1.1 on page 2 of this report. *Also see* Photos #1 to #3 in Section 1.6 of this report on page 5.

Discharge – Thermo Fluids was no longer discharging to the Phoenix sewers. Previously, residual wastewaters discharged from Thermo Fluids to the Phoenix domestic sewers through a final trapezoidal flume in the processing area, identified in the 2009 Phoenix permit as compliance sample point No. 20513.02. The sampling point is designated in this report after the permit outfall number as IWD-20513.02. The permit limited peak discharges to the sewers to 18,000 gpd.



Composition - The process-related wastewaters would be expected to contain a wide range of petroleum by-products, as well as other pollutants entrained in the received oily wastewaters, in particular including metals, lubrication metals, and grime.

Delivery – All wastewaters are hard-plumbed through the oily wastewater handling processes and the wastewater treatment steps. On the date of this inspection, all residual wastewaters were off-hauled to Liquid Environmental in Phoenix for off-site disposal. Residual solids are off-hauled as hazardous. Recovered oils are delivered as end products to off-site consumers.

Treatment and Handling – On the date of this inspection, all residual wastewaters were off-hauled to Liquid Environmental in Phoenix for off-site disposal. *See* Appendix 1 on page 11 of this report for the configuration and lay-out of the wastewater handling on-site. *Also see* Section 3.0 on page 10, and Photos #4 to #6 in Section 1.6 of this report on page 5.

Secondary Containment – The tank farm was observed to be surrounded by containment walls. The truck receiving loading rack was surrounded with curbing and underlain with under floor drains. The rail car receiving spur is underlain with drainage capture trays that are hard plumbed to the corner pit in the truck receiving loading rack.

1.4 Sampling Record

The Phoenix permit required Thermo Fluids to self-monitor monthly for lead, selenium, and zinc, quarterly for arsenic, bis(2-ethylhexyl)phthalate, cadmium, carbazole, copper, mercury, molybdenum, tin, and pH, and semi-annually for chromium, cobalt, cyanide, fluoranthene, n-decane, n-octadecane, and silver. The City of Phoenix collected its own samples on multiple days quarterly or semi-annually depending on the pollutant.

1.5 POTW Legal Authorities

The City of Phoenix has enacted an ordinance to implement a pretreatment program in the areas serviced by the 91st and 23rd Avenue Wastewater Treatment Plants. Under this authority, the City issued City permit No.0902-20513 authorizing discharge of non-domestic wastewater to the sewers.



1.6 Photo Documentation

Six of the eight photographs taken during this inspection are depicted below and saved as *thermo fluids-01.jpg through -08.jpg*. Two files were corrupted and lost.



Photo #1: Rail Car Loading Spur
Taken By: Greg V. Arthur
Date: 08/13/09

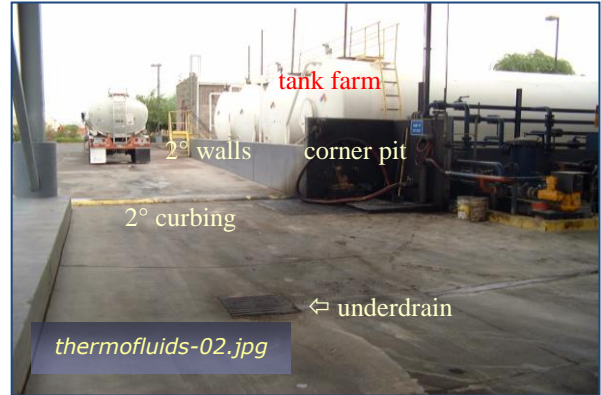


Photo #2: Truck Receiving Loading Rack
Taken By: Greg V. Arthur
Date: 08/13/09

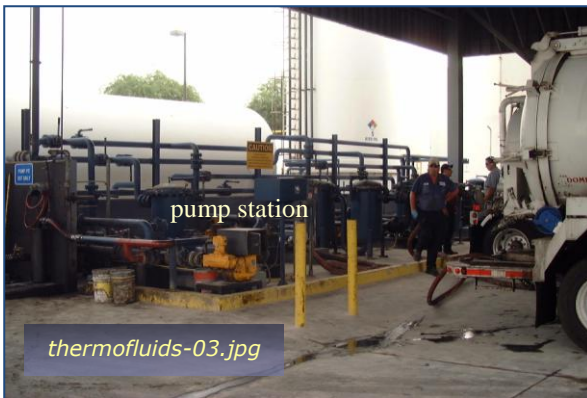


Photo #3: Truck Receiving Pump Station
Taken By: Greg V. Arthur
Date: 08/13/09

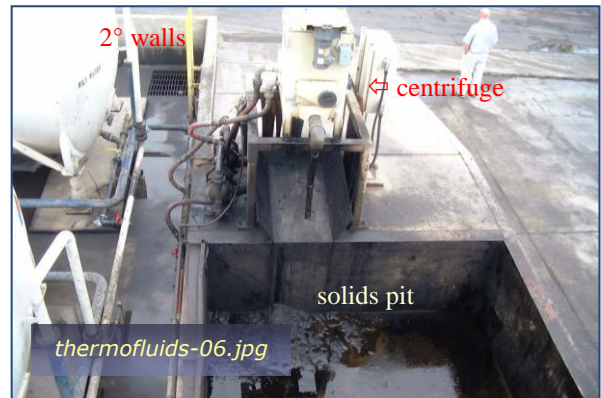


Photo #4: Oily Wastewater Treatment - Centrifuge
Taken By: Greg V. Arthur
Date: 08/13/09



Photo #5: Oily Wastewater Treat - De-emulsifier
Taken By: Greg V. Arthur
Date: 08/13/09

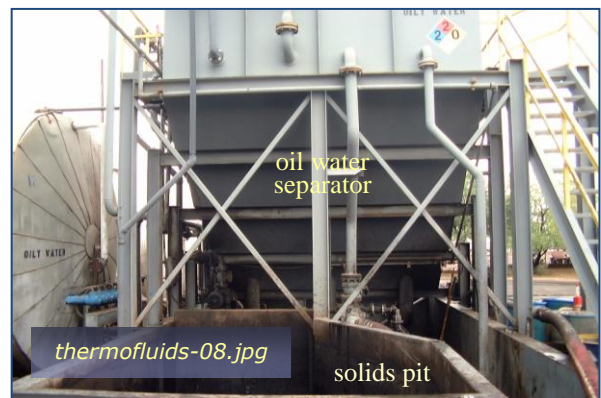


Photo #6: Oily Wastewater Treatment - O/W Sep
Taken By: Greg V. Arthur
Date: 08/13/09



2.0 Sewer Discharge Standards and Limits

Federal categorical pretreatment standards (where they exist), national prohibitions, State groundwater, and the local limits (where they exist) must be applied to the sewered discharges from industrial users. (40 CFR 403.5 and 403.6).

Summary

Thermo Fluids Phoenix would qualify for regulation under 40 CFR 437 Subpart B for existing source centralized oil treatment and recovery facilities if process wastewaters from the facility discharged to the sewers. The Phoenix permit applied the local limits and the appropriate Federal standards. The application of Federal categorical standards, national prohibitions, and local limits was determined through visual inspection. *See* Appendix 2 on page 12 of this report for the permit limits.

Requirements

- None.

Recommendations

- None.

2.1 Classification by Federal Point Source Category

Thermo Fluids Phoenix ceased discharge in 2009. Thermo Fluids would qualify for regulation under 40 CFR 437 Subpart B for oil treatment and recovery if and when process-related wastewaters from the facility discharge to the sewers.

40 CFR 437B – Discharge would qualify Thermo Fluids for regulation under 40 CFR 437 Subpart B because the facility accepts oily wastes, as defined in 40 CFR 437.2(p). Table 14-1 of the development document lists the centralized treatment wastes regulated under Subpart B as (1) used oils, (2) oil-water emulsions or mixtures, (3) lubricants, (4) coolants, (5) contaminated groundwater clean-up from petroleum sources, (6) used petroleum products, (7) oil spill clean-up, (8) bilge water, (9) rinse and wash waters from petroleum sources, (10) interceptor wastes, (11) off-spec fuels, (12) underground storage remediation waste, (13) tank clean-out from petroleum or oily sources, (14) non-contact used glycols, (15) aqueous and oil mixtures from parts cleaning operations, and (16) wastewater from oil bearing paint washes. The development document also indicates that Subpart B applies to received wastes unlisted in Table 14-1 with oil and grease contents exceeding 100 mg/l.

40 CFR 437A – Discharge would not qualify the facility for regulation under 40 CFR 437 Subpart A because the facility does not accept metals-bearing wastes, as defined in 40 CFR 437.2(l). Table 14-1 of the development documents list the centralized treatment wastes regulated under Subpart A as (1) spent electroplating baths and sludges, (2) metal finishing rinse water and sludges, (3) chromate wastes, (4) air pollution control blow down and



sludges, (5) spent anodizing solutions, (6) incineration wastewaters, (7) waste liquid mercury, (8) cyanide-containing wastes, (9) waste acids and bases with or without metals, (10) cleaning, rinsing, and surface preparation solutions from electroplating or phosphating operations, (12) vibratory deburring wastewater, and (13) [alkaline and acid solutions used to clean metal parts or equipment](#). The development document also indicates that Subpart A applies to received wastes unlisted in Table 14-1 with oil and grease contents less than 100 mg/l and with metals contents exceeding 0.2 mg/l cadmium, 8.9 mg/l chromium, 4.9 mg/l copper, and 37.8 mg/l nickel.

40 CFR 437C – Discharge would not qualify the facility for regulation under 40 CFR 437 Subpart C because the facility does not accept organic wastes, as defined in 40 CFR 437.2(r). Table 14-1 of the development documents list the centralized treatment wastes regulated under Subpart C as (1) landfill leachate, (2) contaminated groundwater clean-up from non-petroleum sources, (3) solvent-bearing wastes, (4) off-spec organic product, (5) still bottoms, (6) byproduct waste glycol, (7) wastewater from paint washes, (8) wastewater from adhesives and epoxies formulations, (9) wastewater from organic chemical products operations, and (10) tank clean-out from organic, non-petroleum sources.

40 CFR 437D – Discharge also would not qualify the facility for regulation under 40 CFR 437 Subpart D because the facility does not accept multiple waste streams comprising oil wastes and either metals-bearing or organic wastes, or both.

40 CFR 419 – Discharge would not qualify Thermo Fluids for regulation under 40 CFR 419 for petroleum refining because no oil refining steps are done on-site.

New or Existing Sources – In 40 CFR 403.3(k), a centralized waste treatment facility constructed after December 22, 2000 is a new source (1) if it entirely replaces a process which caused a discharge from an existing source or (2) if it is substantially independent of the existing sources on-site. The preamble to the 1988 Federal rule states that new source standards apply when “an existing source undertakes major construction that legitimately provides it with the opportunity to install the best and most efficient production process and wastewater treatment technologies” (*Fed Register, Vol.53, No.200, October 17, 1988, p.40601*). After the 2000 deadline, the new source standards apply to new installations of centralized waste treatment lines, rebuilt or moved lines, lines temporarily removed to install secondary containment, or existing lines converted to do new operations. New source standards generally do not apply to the piecemeal replacement of tanks in otherwise intact lines.

Thermo Fluids Phoenix began operations in 1996. As a result, Thermo Fluids Phoenix would qualify as an existing source.

2.2 Local Limits and National Prohibitions

Local limits and the national prohibitions are meant to express the limitations on non-domestic discharges necessary to protect the sewers, treatment plants and their receiving waters from adverse impacts. In particular, they prohibit discharges that can cause the pass-through of pollutants into the receiving waters or into reuse, the operational interference of



the sewage treatment works, the contamination of the sewage sludge, sewer worker health and safety risks, fire or explosive risks, and corrosive damage to the sewers. The national prohibitions apply nationwide to all non-domestic sewer discharges. The Phoenix local limits apply to non-domestic discharges in the service areas.

2.3 Federal Categorical Pretreatment Standards Centralized Oil Treatment and Recovery - 40 CFR 437 Subpart B

40 CFR 437B (mg/l)	d-max	mo-avg	40 CFR 437B (mg/l)	d-max	mo-avg
antimony	0.237	0.141	tin	0.249	0.146
barium	0.427	0.281	zinc	6.95	4.46
chromium	0.947	0.487	bis(2-ethylhexyl)phthalate	0.267	0.158
cobalt	56.4	18.8	carbazole	0.392	0.233
copper	0.405	0.301	n-decane	5.79	3.31
lead	0.222	0.172	fluoranthene	0.787	0.393
molybdenum	3.50	2.09	n-octadecane	1.22	0.925

Applicability – Under 40 CFR 437.2(p), the Federal centralized oil treatment and recovery standards apply to the on-site treatment of oily wastes collected off-site from “manufacturing or processing facilities or other commercial operations”. Under 40 CFR 437.20(a), the regulated wastewaters are those generated by the on-site treatment or recovery of oil from the collected oily wastes, including (1) equipment/area washdown, (2) water separated from recovered/recycled materials, (3) contact/wash water from recovery and treatment operations, (4) transport container washdown, and (5) contaminated stormwater. Regulated discharges from Thermo Fluids would consist of the following residuals from oily wastewater treatment:

- clarified effluent decant from the plate-coalescing clarifier
- decant from the de-emulsifier (T12)
- tank bottoms from oil recovery tanks (T13, T14)
- wastewaters collected in oil wastewater treatment holding tanks (T15, T16, T18, T20)

See the Development Document for Effluent Guidelines for the Centralized Waste Treatment Point Source Category. <http://epa.gov/guide/cwt/final/develop/index.html>

Basis of the Standards – The centralized oil treatment and recovery standards for existing source facilities were based on emulsion breaking, gravity separation, and dissolved air flotation. The best-available-technology equivalent standards for existing sources were set where existing centralized oil treatment and recovery facilities with the model treatment in-place operated at a long-term average and variability that achieved a compliance rate of 99% (1 in 100 chance of violation).

Adjustments – Under 40 CFR 403.6(e), the Federal standards for discharges from Thermo Fluid would need no adjustment to account for either dilution or multiple categories.

Compliance Deadline – Under 40 CFR 437.25, existing source centralized oil treatment and recovery facilities were required to comply before December 22, 2003.



2.5 Federal Prohibitions

The Federal standards in 40 CFR 403.6(d) and 403.17(d) prohibit dilution as a substitute for treatment, and the bypassing of any on-site treatment necessary to comply with standards, respectively. The City of Phoenix sewer use ordinance establishes the prohibition against the dilution as a substitute for treatment (§28-8g), but not for the bypassing treatment necessary to comply. The ordinance does establish related provisions for protection from accidental discharges (§28-53).

2.6 Compliance Sampling and Point(s) of Compliance

Thermo Fluids Phoenix was no longer discharging to the Phoenix sewers. The Phoenix permit designated a final trapezoidal flume in the processing area as the location of the discharge compliance sampling point (designated in this report as IWD-20513.02).

Federal Standards - Federal categorical pretreatment standards apply end-of-process-after-treatment to all Federally-regulated discharges to the sewers. Sample point IWD-20513.02, would be a suitable end-of-process-after-treatment sample point representative of day-to-day discharges of Federally-regulated wastewaters from Thermo Fluids.

Local Limits - Local limits and the national prohibitions apply end-of-pipe to non-domestic flows. The sample point IWD-20513.02 would be a suitable end-of-pipe sample point representative of day-to-day non-domestic wastewater discharges from Thermo Fluids.

Sampling Protocols – The national prohibitions are instantaneous-maximums comparable to samples of any length. Federal categorical pretreatment standards are daily-maximums comparable to 24-hour composites. The 24-hour composites can be replaced with single grabs or manually-composited grabs representative of the sampling day's discharge. The Phoenix permit specified the sampling protocols by parameter (page 2 of 4). *See* Appendix 2 on page 12.



3.0 Compliance with Federal Categorical Standards Local Limits and National Prohibitions

Industrial users must comply with the Federal categorical pretreatment standards that apply to their process wastewater discharges. 40 CFR 403.6(b).

Categorical industrial users must comply with the prohibition against dilution of the Federally-regulated waste streams as a substitute for treatment. 40 CFR 403.6(d).

All non-domestic wastewater discharges to the sewers must comply with local limits and the national prohibitions. 40 CFR 403.5(a,b,d).

Industrial users must comply with the provision restricting the bypass of treatment necessary to comply with any pretreatment standard or requirement. 40 CFR 403.17(d).

Thermo Fluids Phoenix now complies with its Federal standards by hauling all generated residual wastewaters for off-site disposal. In order to discharge in compliance with Federal standards and local limits, Thermo Fluids would need both source controls (which were found to be effective but dependent on operator competency) and treatment-in-place (which was found not quite equivalent to the models used in originally setting the Federal standards). Overall observed improvements (+) and deficiencies (-) in the design and operation observed during this inspection are listed below.

- + **Off-hauling of all wastewaters for off-site disposal.**
- + Multiple levels of testing, screening, and inventory data logging.
- + Excellent storm water handling with built-in loading rack curbing, tank farm retaining walls, railway trays, and positive delivery into the oily wastewater recovery process.
- + Excellent housekeeping with no oily sheens observed on a day with rainfall precipitation.
- Treatment-in-place lacks second-stage oil removal through dissolved air flotation and thus is not equivalent to the models used in setting the Federal standards.
- Dependent on operator competency to screen off-spec and unacceptable wastes.
- Metals precipitation in Tank 20 did not involve pH/ORP end-point metering.

See Section 2.0 on page 6 of this report. *Also* see Appendix 1 on pages 11 of this report for the configuration and layout of wastewater handling.

Requirements

- None.

Recommendations

- None.

The diagram illustrates the process flow for oil/water separation and treatment. It starts with four input sources for oily wastewaters: truck contents, railcar contents, loading rack drainage, and railway tray drainage. These inputs feed into an oil/water separator (8400 gal). The separator outputs oil to a centrifuge and solids to a solids pit. The centrifuge also outputs oil to a de-emulsifier (T12) and solids to the solids pit. The solids pit outputs material for hazardous disposal. The de-emulsifier (T12) outputs oil to an oil storage tank (T13/14). The oil storage tank outputs oil to oil reclaim and tank bottoms. The tank bottoms feed into a batch treatment unit (T20). The batch treatment unit (T20) receives inputs from DTC metals precipitant (pH 4.0 su) and OH⁻ metals precipitant (pH 9.0 su). The output of the batch treatment unit (T20) goes through a filtration unit (DE) and is then sent to the Phoenix sewer (when TF discharges). The Phoenix sewer has a sample point (IWD 20513.02). Residual wastewaters from the separator, centrifuge, and de-emulsifier feed into three storage tanks (T15, T16, T18). The storage tanks (T15, T16, T18) output to the batch treatment unit (T20). A corner pit is also shown, receiving input from the loading rack drainage and railway tray drainage, and outputting to the oil/water separator. A pump is located between the corner pit and the oil/water separator. Sample points are indicated by red squares and pump locations by blue circles with an 'X'.

```

graph TD
    subgraph Inputs [Oily Wastewaters]
        A[truck contents]
        B[railcar contents]
        C[loading rack drainage]
        D[railway tray drainage]
        E[tank farm drainage]
    end

    A --> J1(( ))
    B --> J1
    C --> J2(( ))
    D --> J2
    E --> J2

    J1 --> F[oil/water separator 8400 gal]
    J2 --> G[corner pit]

    G --> H((X))
    H --> F

    F -- solids --> I[solids pit]
    F -- oil --> J[centrifuge]

    J -- solids --> I
    J -- oil --> K[T12 de-emulsify chem/heat]

    I --> L[haz disposal]

    K -- oil --> M[T13/14 oil storage]
    K --> N[ ]
    N --> O[ ]
    O --> P[ ]
    P --> Q[ ]
    Q --> R[ ]
    R --> S[ ]
    S --> T[ ]
    T --> U[ ]
    U --> V[ ]
    V --> W[ ]
    W --> X[ ]
    X --> Y[ ]
    Y --> Z[ ]
    Z --> AA[ ]
    AA --> AB[ ]
    AB --> AC[ ]
    AC --> AD[ ]
    AD --> AE[ ]
    AE --> AF[ ]
    AF --> AG[ ]
    AG --> AH[ ]
    AH --> AI[ ]
    AI --> AJ[ ]
    AJ --> AK[ ]
    AK --> AL[ ]
    AL --> AM[ ]
    AM --> AN[ ]
    AN --> AO[ ]
    AO --> AP[ ]
    AP --> AQ[ ]
    AQ --> AR[ ]
    AR --> AS[ ]
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    AT --> AU[ ]
    AU --> AV[ ]
    AV --> AW[ ]
    AW --> AX[ ]
    AX --> AY[ ]
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    BG --> BH[ ]
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    BI --> BJ[ ]
    BJ --> BK[ ]
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    CS --> CT[ ]
    CT --> CU[ ]
    CU --> CV[ ]
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    DB --> DC[ ]
    DC --> DD[ ]
    DD --> DE[ ]
    DE --> DF[ ]
    DF --> DG[ ]
    DG --> DH[ ]
    DH --> DI[ ]
    DI --> DJ[ ]
    DJ --> DK[ ]
    DK --> DL[ ]
    DL --> DM[ ]
    DM --> DN[ ]
    DN --> DO[ ]
    DO --> DP[ ]
    DP --> DQ[ ]
    DQ --> DR[ ]
    DR --> DS[ ]
    DS --> DT[ ]
    DT --> DU[ ]
    DU --> DV[ ]
    DV --> DW[ ]
    DW --> DX[ ]
    DX --> DY[ ]
    DY --> DZ[ ]
    DZ --> EA[ ]
    EA --> EB[ ]
    EB --> EC[ ]
    EC --> ED[ ]
    ED --> EE[ ]
    EE --> EF[ ]
    EF --> EG[ ]
    EG --> EH[ ]
    EH --> EI[ ]
    EI --> EJ[ ]
    EJ --> EK[ ]
    EK --> EL[ ]
    EL --> EM[ ]
    EM --> EN[ ]
    EN --> EO[ ]
    EO --> EP[ ]
    EP --> EQ[ ]
    EQ --> ER[ ]
    ER --> ES[ ]
    ES --> ET[ ]
    ET --> EU[ ]
    EU --> EV[ ]
    EV --> EW[ ]
    EW --> EX[ ]
    EX --> EY[ ]
    EY --> EZ[ ]
    EZ --> FA[ ]
    FA --> FB[ ]
    FB --> FC[ ]
    FC --> FD[ ]
    FD --> FE[ ]
    FE --> FF[ ]
    FF --> FG[ ]
    FG --> FH[ ]
    FH --> FI[ ]
    FI --> FJ[ ]
    FJ --> FK[ ]
    FK --> FL[ ]
    FL --> FM[ ]
    FM --> FN[ ]
    FN --> FO[ ]
    FO --> FP[ ]
    FP --> FQ[ ]
    FQ --> FR[ ]
    FR --> FS[ ]
    FS --> FT[ ]
    FT --> FU[ ]
    FU --> FV[ ]
    FV --> FW[ ]
    FW --> FX[ ]
    FX --> FY[ ]
    FY --> FZ[ ]
    FZ --> GA[ ]
    GA --> GB[ ]
    GB --> GC[ ]
    GC --> GD[ ]
    GD --> GE[ ]
    GE --> GF[ ]
    GF --> GG[ ]
    GG --> GH[ ]
    GH --> GI[ ]
    GI --> GJ[ ]
    GJ --> GK[ ]
    GK --> GL[ ]
    GL --> GM[ ]
    GM --> GN[ ]
    GN --> GO[ ]
    GO --> GP[ ]
    GP --> GQ[ ]
    GQ --> GR[ ]
    GR --> GS[ ]
    GS --> GT[ ]
    GT --> GU[ ]
    GU --> GV[ ]
    GV --> GW[ ]
    GW --> GX[ ]
    GX --> GY[ ]
    GY --> GZ[ ]
    GZ --> HA[ ]
    HA --> HB[ ]
    HB --> HC[ ]
    HC --> HD[ ]
    HD --> HE[ ]
    HE --> HF[ ]
    HF --> HG[ ]
    HG --> HH[ ]
    HH --> HI[ ]
    HI --> HJ[ ]
    HJ --> HK[ ]
    HK --> HL[ ]
    HL --> HM[ ]
    HM --> HN[ ]
    HN --> HO[ ]
    HO --> HP[ ]
    HP --> HQ[ ]
    HQ --> HR[ ]
    HR --> HS[ ]
    HS --> HT[ ]
    HT --> HU[ ]
    HU --> HV[ ]
    HV --> HW[ ]
    HW --> HX[ ]
    HX --> HY[ ]
    HY --> HZ[ ]
    HZ --> IA[ ]
    IA --> IB[ ]
    IB --> IC[ ]
    IC --> ID[ ]
    ID --> IE[ ]
    IE --> IF[ ]
    IF --> IG[ ]
    IG --> IH[ ]
    IH --> II[ ]
    II --> IJ[ ]
    IJ --> IK[ ]
    IK --> IL[ ]
    IL --> IM[ ]
    IM --> IN[ ]
    IN --> IO[ ]
    IO --> IP[ ]
    IP --> IQ[ ]
    IQ --> IR[ ]
    IR --> IS[ ]
    IS --> IT[ ]
    IT --> IU[ ]
    IU --> IV[ ]
    IV --> IW[ ]
    IW --> IX[ ]
    IX --> IY[ ]
    IY --> IZ[ ]
    IZ --> JA[ ]
    JA --> JB[ ]
    JB --> JC[ ]
    JC --> JD[ ]
    JD --> JE[ ]
    JE --> JF[ ]
    JF --> JG[ ]
    JG --> JH[ ]
    JH --> JI[ ]
    JI --> JJ[ ]
    JJ --> JK[ ]
    JK --> JL[ ]
    JL --> JM[ ]
    JM --> JN[ ]
    JN --> JO[ ]
    JO --> JP[ ]
    JP --> JQ[ ]
    JQ --> JR[ ]
    JR --> JS[ ]
    JS --> JT[ ]
    JT --> JU[ ]
    JU --> JV[ ]
    JV --> JW[ ]
    JW --> JX[ ]
    JX --> JY[ ]
    JY --> JZ[ ]
    JZ --> KA[ ]
    KA --> KB[ ]
    KB --> KC[ ]
    KC --> KD[ ]
    KD --> KE[ ]
    KE --> KF[ ]
    KF --> KG[ ]
    KG --> KH[ ]
    KH --> KI[ ]
    KI --> KJ[ ]
    KJ --> KL[ ]
    KL --> KM[ ]
    KM --> KN[ ]
    KN --> KO[ ]
    KO --> KP[ ]
    KP --> KQ[ ]
    KQ --> KR[ ]
    KR --> KS[ ]
    KS --> KT[ ]
    KT --> KU[ ]
    KU --> KV[ ]
    KV --> KW[ ]
    KW --> KX[ ]
    KX --> KY[ ]
    KY --> KZ[ ]
    KZ --> LA[ ]
    LA --> LB[ ]
    LB --> LC[ ]
    LC --> LD[ ]
    LD --> LE[ ]
    LE --> LF[ ]
    LF --> LG[ ]
    LG --> LH[ ]
    LH --> LI[ ]
    LI --> LJ[ ]
    LJ --> LK[ ]
    LK --> LL[ ]
    LL --> LM[ ]
    LM --> LN[ ]
    LN --> LO[ ]
    LO --> LP[ ]
    LP --> LQ[ ]
    LQ --> LR[ ]
    LR --> LS[ ]
    LS --> LT[ ]
    LT --> LU[ ]
    LU --> LV[ ]
    LV --> LW[ ]
    LW --> LX[ ]
    LX --> LY[ ]
    LY --> LZ[ ]
    LZ --> MA[ ]
    MA --> MB[ ]
    MB --> MC[ ]
    MC --> MD[ ]
    MD --> ME[ ]
    ME --> MF[ ]
    MF --> MG[ ]
    MG --> MH[ ]
    MH --> MI[ ]
    MI --> MJ[ ]
    MJ --> MK[ ]
    MK --> ML[ ]
    ML --> MM
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Appendix 2

Sewer Discharge Standards and Limits for Thermo Fluids @ IWD-20513.02

Pollutants of Concern IWD-20513.02 (mg/l)	Fed stds (d-max)	Fed stds (mo-avg)	nat'l pro (instant)	local lim (inst/dmax)	monitoring frequency ① discharger city	
antimony	0.237	0.141	-	-	1/six-mos	1/year
arsenic	-	-	-	0.13	1/quarter	2/quarter
barium	0.427	0.281	-	-	1/six-mos	1/year
benzene	-	-	-	0.035	②	1/six-mos
bis(2-ethylhexyl)phthalate	0.267	0.158	-	-	1/quarter	1/six-mos
cadmium	-	-	-	0.047	1/quarter	2/quarter
carbazole	0.392	0.233	-	-	1/quarter	1/six-mos
chloroform	-	-	-	2.0	②	1/six-mos
chromium	0.947	0.487	-	-	1/six-mos	2/quarter
cobalt	56.4	18.8	-	-	1/quarter	2/quarter
copper	0.405	0.301	-	1.5	1/quarter	2/quarter
cyanide	-	-	-	2.0	1/six-mos	1/six-mos
fluoranthene	0.787	0.393	-	-	1/six-mos	1/six-mos
lead	0.222	0.172	-	0.41	1/month	2/quarter
mercury	-	-	-	0.0023	1/quarter	2/quarter
molybdenum	3.50	2.09	-	-	1/quarter	2/quarter
n-decane	5.79	3.31	-	-	1/six-mos	1/six-mos
n-octadecane	1.22	0.925	-	-	1/six-mos	1/six-mos
pesticides	-	-	-	③	②	1/six-mos
selenium	-	-	-	0.10	1/month	2/quarter
silver	-	-	-	1.2	1/six-mos	2/quarter
tin	0.249	0.146	-	-	1/quarter	2/quarter
zinc	6.95	4.46	-	3.5	1/month	2/quarter
flow (gpd)	-	-	-	180,000	1/month	-
pH (s.u.)	-	-	<5.0	5.0-10.5	daily	1/six-mos
explosivity	-	-	<140°F ④	<10% LEL	②	②

① Recommended **reductions in green**. Recommended **increases in red**.

② As part of periodic priority pollutant scans in order to identify changes in discharge quality

③ City ordinance prohibits the introduction of these pollutants in any amount.

④ Closed-cup flashpoint