ATTACHMENT 10

TREATMENT PROCEDURES

waste storage and treatment will be conducted in an enclosed 20,250 square foot building within three in-ground concrete steel lined stabilization/processing pits totaling approximately 90,000 gallons. The process pits are constructed of 24-inch thick reinforced concrete with a ¾-inch plate steel liner. Waste incompatible with the materials of construction of a process pit are not placed in process pits by Dynecol. Compatibility is determined as outlined in the WAP.

The process pits in Building 4 have secondary containment that meets the requirements of 40 CFR 264, Subpart J. Each of the process pits is adequately designed and has sufficient structural strength and compatibility with waste(s) to be stored or treated, to ensure that it will not collapse, rupture or fail. The process pits are constructed of 24-inch thick reinforced concrete with a ¾-inch plate steel liner. The existing steel liner will be overlaid by another steel liner and will serve as secondary containment. The pits are designed to allow for monitoring in the void between the concrete and the plated vessel to detect any free liquids accumulating in the interstitial space and may be used to remove such liquid. Liquid collected in the secondary containment are properly managed in accordance with applicable regulations. If liquid materials are detected in the secondary containment, the accumulated liquid materials will be characterized based on materials present in the Subpart J mixing tank or the material itself. Liquid accumulated in the secondary containment structure is removed within 24 hours, or in as timely manner as is possible.

C2.A(1)(b) Description of other non-regulated tanks

Tanks #9 and #15 are each 27,600-gallon steel tanks and are typically used to store liquid sodium hydroxide or liquid potassium hydroxide or any other alkaline reagents prior to use in the waste treatment process. These tanks measure 24 feet high by 14 feet in diameter.

Tank #14 is a 14,000-gallon steel tank, typically used to store lime slurry prior to use in the waste treatment process. The tank measures 12 feet high by 14 feet in diameter.

Tank #22 is a 1,000-gallon vertical FRP tank measuring eleven feet, six inches high, with a four-foot diameter and possessing an overflow nozzle. This tank is located in the lower level of the filter press building and is typically used as a mild acid cleaning solution holding tank for the filter presses.

Tank #23 is a 6,000-gallon tank and is typically used to store lime slurry. It measures 16 feet high, with an 8-foot diameter.

Tank #24 is a 6,000-gallon carbon steel tank measuring 16 feet high with an 8-foot diameter. It is typically used as a holding tank for sodium hydroxide used in the scrubber.

Tanks #25 and #26 are each vertical 50,000-gallon carbon steel tanks measuring 60 feet high with a 12-foot diameter and a cone bottom. The tanks are used to store dry lime or other reagents.

Tank #28 is a 1,900-gallon stainless steel tank located in the CMF used to store non-hazardous wastes.

C2.A(1)(c) Hazardous Waste Treatment Operations

The waste treatment processes undertaken at Dynecol in the commercial waste water treatment plant include primary treatment, secondary treatment, solids de-watering, carbon adsorption, and effluent polishing. These treatment processes result in the detoxification of the water contained in the initial solutions, stabilization of toxic constituents, and the fixation of the constituents into a solid mass that is reduced in volume and is safer to handle and properly dispose of. The following discussion describes the handling procedures for hazardous wastes that are stored and processed in tanks at the Dynecol facility.

C2.A(1)(d) Delivery and Receipt of Materials

Hazardous wastes are delivered to the treatment and container storage areas in bulk trailers and containers. Vehicles arriving at the facility are unloaded only within designated areas in the plant which are provided with spill control structures and equipment to contain spills or leaks. Prior to unloading a shipment of hazardous waste, the accompanying manifest and land disposal restriction notification are inspected. A sample of the tankers' or containers' content is fingerprinted to verify that the waste received is the same as described on both the accompanying manifest and the waste characterization report on file at the facility, see Module A3. The contents of the tanker are either removed by pressurization of the tanker with air or by a pump system. Containers are unloaded with fork lifts and drum handlers.

C2.A(1)(e) Storage of Hazardous Wastes Prior to Treatment

Currently, in the commercial waste water treatment plant, two storage vessels, designed for hazardous wastes, may receive the incoming waste material. The storage vessels, identified as tanks #7 and #10, can be used to store hazardous waste until a primary treatment vessel becomes available to process the waste. This occurs within less than 24-hours, normally. Additionally Dynecol proposes to increase hazardous waste storage capacity in the existing Treatment Facility by 154,200 gallons. These vertical FRP tanks have the following capacities:

- Tank #11 - 20,000 gallons (currently out of service)
- Tank #27 - 20,000 gallons
- Tanks #32 & #33 - 5,500 gallons each
- Tanks #12, 13, 16 & 17 - 25,800 gallons each

C2.A(1)(f) General Description of Treatment Methods

C2.A(1)(f)(i) Primary Treatment

Primary treatment processes are batch rather than continuous, and typically entail chemical oxidation, chemical reduction, adsorption, co-precipitation initiation, and neutralization. Chemical oxidation can be achieved either through air injection at a pressure point of 30 pounds per square inch (psi) or through the addition of chemical reagents and proper agitation with air sparger/mechanical mixer.

Chemical reduction is required whenever hexavalent chromium is present in a waste stream. Wastes containing hexavalent chromium are first processed to chemically reduce the hexavalent state to a trivalent one. Hexavalent chromium, when placed in an aqueous solution containing excess acid and ferrous iron or sodium bisulfite, is reduced to the trivalent oxidation state. The trivalent chromium can then be readily precipitated in the secondary treatment process.

Organic adsorption can be performed through the addition of powdered activated carbon to the treatment vessel. Adsorption is a relatively rapid process when conducted under a strong mixing condition, i.e, air sparging or mechanical agitation.

Chemical co-precipitation of toxic metals during the secondary treatment process can be initiated, if necessary, during the primary treatment process by the addition of recycled/reused reagents such as ferrous sulfate, ferrous chloride, or ferric chloride to the waste stream being processed.

Oxidation/reduction/adsorption can then be followed by neutralization in the primary treatment process. Acidic solutions are treated with various alkaline solutions, such as sodium hydroxide solution or lime slurry, to a pH of about 5.

The primary treatment procedures are typically as follows:

- Pumping treatment reagents to a designated process vessel;
- Agitating the waste and reagent mixture using sparger/mechanical agitator which is provided for each vessel;
- Providing adequate retention time to allow the reaction mixture to equalize at pH of +/- 5.0.

C2.A(1)(f)(ii) Secondary Treatment

The secondary treatment processes are batch rather than continuous, and normally include neutralization, chemical precipitation, flocculation, detoxification, clarification, sedimentation, chemical fixation, and lime stabilization. Treatment reagents used in the secondary treatment step include lime slurry or other alkaline solutions. This process detoxifies the original solution by removing the toxic heavy metals from the liquid phase, and stabilizing them in a solid phase.

The secondary treatment process is carried out by the addition of lime slurry or other alkaline solutions, and by thoroughly agitating the waste and reagent mixture with mechanical mixers which are present on the vessel. The process is concluded when the appropriate pH is obtained to precipitate the inorganic constituent.

The lime or alkaline solutions that are added during the secondary treatment processes react with the heavy metals to form metal hydroxides, which are insoluble and will then precipitate from solution. Once precipitated, the heavy metals are no longer dissolved in the aqueous phase, and the liquid portion is detoxified. The precipitated heavy metal hydroxide are encapsulated and chemically fixed in a matrix of excess lime, iron hydroxide and other inert, non-hazardous solid materials. The excess lime, which will remain in the solid state through subsequent processing and disposal, will stabilize the resulting de-watered sludge.

Iron salts introduced, if necessary, during the primary treatment process in the form of either ferrous sulfate or ferrous/ferric chloride can facilitate co-precipitation of certain heavy metals during the secondary treatment process. These iron salts can also enhance the chemical fixation of the toxic metals and act as the primary flocculent for sludge conditioning/de-watering.

C2.A(1)(f)(iii) De-watering

In the final step of processing, treated wastes from the secondary treatment process are de-watered and fixed by pressure filtration. Pressure filtration compresses the material into a solid mass, which typically contains about 40-60% solids. In this final form, the toxic components which were present in the initial solutions are tightly bound in the solid mass. The stabilized, fixated, and de-watered solids resist leaching of toxic heavy metals and organics from the solid mass during acid extraction testing. Prior to disposal of the de-watered solids off-site, the solids are periodically sampled and tested for hazardous waste characteristics (see Modules A2 and A3)

There are two recessed chamber filter presses (A and B) on site for the de-watering of characteristic/listed wastes. Each filter press has a processing capacity of about 167 cubic feet of de-watered sludge per cycle. A third filter press (C) that has a processing capacity of 100 cu ft per cycle and is normally used to de-water the Other Listed Wastes can also be used to de-water listed-filter cake-generating characteristic wastes and the listed wastes (except K062). These presses are located on the second floor of a two-story building, with the first floor used to receive solid transport vehicles. A pre-coat system can be used for any of the filter presses by the injection of a solution of diatomaceous earth, activated carbon or other pre-coat material at the beginning of the de-watering operation.

The de-watering and filtration process is carried out in batches staggered among any of the filter presses. After the secondary treatment is complete, the treated waste is pumped into a filter press by means of air diaphragm pumps. The completion of the filtration cycle is indicated by the feed pump discharge whenever a pressure of about 90-psi is reached and no more liquid can be pumped. The filter press is then opened, and de-watered sludge is allowed to fall into the solid transport vehicle located directly below each filter. The de-watered sludge is recycled or shipped to an appropriate landfill for ultimate disposal in accordance with all provisions of 40 CFR 268.

The solid transport vehicle area below the filter presses is cleaned daily and additionally as necessary to prevent the track-out of sludges. Wash waters are collected in the sump and reprocessed through the treatment system.

C2.A(1)(f)(iv) Effluent Management

Treated effluent from the de-watering process is discharged to the Detroit wastewater treatment facility in accordance with discharge permit requirements. This effluent is exempt from hazardous waste regulations under the domestic sewage exclusion in 40 CFR 261.4.

Treated effluent from the filter press may be subjected to carbon adsorption. This can be performed by routing effluent from either tank #30 or #31 through a system composed of an in-line filter and two 1,000-pound carbon vessels in parallel.

Treated effluent from the filter press may be subjected to effluent polishing. This can be performed by routing effluent from either tanks #30 or #31 through a system composed of holding tanks, a dissolved air flotation device, and a sand filter. Tanks #34 and #35 are used to hold effluent during quality control testing. When testing is complete, the effluent is sent to a dissolved air flotation device where the effluent polishing process will be conducted in three stages. In the first stage, the pH of the wastewater is adjusted using aluminum sulfate that will be injected into the DAF unit with an automatic pH control system to a desired pH range. After the pH is adjusted polymers will be injected into a plug-flow-reactor type pipe flocculator. These chemicals remove soluble metals and cause the precipitated metals to agglomerate in a dense floc. Dissolved air is then injected at precise points to the system so that micro air bubbles force the flocculated material to the surface, where it is skimmed off and pumped into a collection tank (Tank #36). The sludge will be routed back to the filter presses for de-watering and ultimately disposed of in either a hazardous or a solid waste landfill, in compliance with the provisions defined in 40 CFR 268. Polished effluent is collected in two retention tanks (#'s 37 and 38) and for final quality control before being discharged to the City of Detroit Sanitary Sewer System in accordance with the requirements of Dynecol's Wastewater Discharge Permit.

The effluent polishing system is located in the area between the current Container Management Facility and the Maintenance Garage as seen on the site plan as shown on the site plan. (See Figure A1-4).

C2.A(1)(f)(v) Procedures for characteristic/listed wastes

The treatment procedures for characteristic wastes (corrosives, TCLP metals, TCLP organics, and listed wastes – see Table A2-1) are as follows:

- After fingerprint verification, the hazardous wastes are transferred into one of four 20,000-gallon primary treatment vessels. Air emissions from these tanks are vented through a control system.

- The wastes will then be typically subjected to primary treatment and secondary treatment processes, as described above.

- After secondary treatment, the treated waste is de-watered through one of the three filter presses, i.e, A through C, as appropriate under other permit conditions.

- In case of listed waste (see Table A2-1), proper decontamination of process tankage and equipment used in the treatment will be performed by running a non-listed or non-listed filter cake-generating waste through all tankage, piping, de-watering equipment (Press A or B), and effluent polishing equipment. De-watered solids from the decontamination processes are collected and handled in the same manner as the solids from the wastes that originated the decontamination requirement.

C2.A(1)(f)(vi) Air Emission Control Systems

Dynecol has installed and operates air control systems for all treatment and storage tanks in compliance with current Michigan Department of Environmental Quality – Air Quality Division permits.

The current processes permitted for the treatment of hazardous waste at Dynecol do not include any processed identified in 40 CFR 264.1030. Specifically, the air sparging of hazardous waste that occurs in the Primary treatment system is designed only to maintain a homogenous solution within the tank. All organic wastes are treated through chemical reactions or physical treatment as defined above.

C2.A(1)(f)(vii) Subpart J Regulated Waste Treatment Technologies

Building 4, the proposed hazardous waste storage and treatment will be conducted in an enclosed 20,250 square foot building within three in-ground concrete stabilization/processing pits totaling approximately 90,000 gallons. These process pits have secondary containment that meets the requirements of 40 CFR 264, Subpart J. The hazardous wastes received for treatment are characteristic wastes and listed hazardous wastes. These wastes are delivered to the Stabilization Facility in containers and bulk shipment. Other materials that are handled at this facility include non-hazardous industrial wastes and recycled materials which are used as effective substitutes for commercial chemical products.

Dynecol will utilize several different treatment technologies in order to meet the applicable land disposal restriction (LDR) or other standard as applicable. Dynecol utilizes the term "stabilization" throughout this document in a generic sense to mean the treatment of a waste material to make it physically and chemically stable. In this sense, it consists of those processes, which make the material pass applicable LDR standards or other applicable standard(s).

In this process, waste will be treated to meet land disposal restrictions (e.g., elimination of free liquids, chemical and/or physical stabilization to remove or immobilize hazardous constituents, etc) or to meet other appropriate requirements (e.g., permit or regulatory requirements). 40 CFR §268.42 provides specific definitions for several potentially distinct treatment technologies including Stabilization, Chemical Oxidation, Chemical Reduction, Deactivation, Neutralization, Adsorption, and Precipitation. Although the above treatment technologies may be considered distinct processes, the stabilization process is defined in the more generic sense due to the overlap of the associated treatment technologies and methods.

Pre-treatment analyses will consist of tests necessary to insure the wastes can be treated to meet the applicable treatment requirement. In-process analyses are generally not required. Post-treatment analyses will be performed, as necessary, to ensure restricted wastes meet applicable treatment standards. Treatment will be performed to meet EPA LDR standards. Sampling, analysis verification of the treatment effectiveness and frequency of testing follows the guidelines presented in Module A3, Waste Analysis Plan.

The following technologies, defined as "stabilization" and associated documents will be utilized by Dynecol:

Stabilization

Stabilization is defined as stabilization with the following reagents (or waste reagents) or combinations of reagents (1) Portland Cement; or (2) lime/pozzolans (e.g., fly ash and cement kiln dust) – this does not preclude the addition of reagents (e.g., iron salts, silicates, and clays) designed to enhance the set/cure time and/or compressive strength, or to overall reduce the leachability of the metal or organic. Stabilization is the treatment of appropriate waste streams by use of pozolonic materials or wastes with pozolonic properties to reduce the leachability of organic, inorganic or metals of concern. Appropriate use of this treatment technology is determined during the approval process.

Chemical Oxidation

Chemical oxidation is a treatment process targeted primarily at organic constituents, (e.g., toluene and benzene) but may be used for inorganic constituents as well (e.g., cyanides and heavy metals such as mercury). An organic or inorganic species is oxidized when its respective chemical oxidation number increases (i.e., loses electrons). The following oxidation reagents (or waste reagents) may be used in part or whole: (1) Hypochlorite (e.g. bleach); (2) chlorine; (3) chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent efficiency.

Chemical Reduction

Chemical reduction or redox occurs when the targeted component/constituent atoms change as a resultant transfer of electrons from one chemical species to another. The chemical oxidation number for the targeted components decrease (i.e., gains electrons) when the target constituents are reduced. Conversely, the reducing reagents used in this process lose electrons or become oxidized. The following reducing reagents (or waste reagents) may be used in whole or part: (1) Sulfur dioxide; (2) sodium, potassium, (salts), or other alkali salts or sulfites, bisulfites, metabisulfites and polyethylene glycols (e.g., NaPEG and KPEG); (3) sodium hydrosulfide; (4) ferrous salts; and/or (5) other reducing reagents of equivalent efficiency.

Deactivation

Deactivation is the treatment of those wastes that exhibit the characteristics of ignitability, corrosivity, and/or reactivity. Appropriate use of this treatment technology is determined during the pre-acceptance process.

Neutralization

Neutralization is a treatment process designed to render corrosive matrices non-corrosive. According to 40 CFR 268.42, the following reagents (or waste reagents) in part or whole may be used for neutralization: (1) Acids; (2) Bases; or (3) water (including wastewater's) resulting in a pH greater than 2 but less than 12.5 measured in the aqueous residuals.

Precipitation

Precipitation is the process by which regulated metals and/or inorganics are precipitated out as insoluble precipitates of oxides, hydroxides, carbonates, sulfates, chlorides, fluorides, or phosphates. This process entails adjusting the pH of the waste matrix between 9 and 11. This pH range is ideal for hydroxide precipitation. An alternative to this common standard practice is sulfide precipitation. Sulfide precipitates are less soluble and non-amphoteric (less pH dependent than hydroxyl precipitates). However, caution must be employed to ensure hydrogen sulfide is not released at harmful levels by maintaining a pH greater than 8 throughout the treatment process. Based on 40 CFR 268.42, the following reagents (or waste reagents) are typically used alone or in combination: (1) Lime (i.e., containing oxides and/or hydroxides of calcium and/or magnesium; (2) caustic (i.e., sodium and/or potassium hydroxides; (3) soda ash (i.e., sodium carbonate); (4) sodium sulfide; (5) ferric sulfate or ferric chloride; (6) alum; or (7) sodium sulfate. Additional flocculating, coagulation or similar reagents/processes that pertain to precipitation are not precluded from use.

Adsorption
Adsorption is the use of an appropriate reagent (e.g. activated carbon or treated clay) to remove chemical components from aqueous or compressed gas waste streams. It is most commonly employed for the removal of organic compounds, although some inorganic constituents are effectively removed as well. This process is achieved through physical, chemical, and electrostatic interactions between the waste material and the adsorbent media. Pursuant with 40 CFR 268.42, Total Organic Carbon can be used as an indicator parameter for the adsorption of many organic constituents that cannot be directly analyzed in wastewater residues.

C2.A(2) Dimensions and Capacity of Each Tank
{R 299.9615 (1) and 40 CFR 270.16 (b)}

See Table C2-1.

Building 4 has three in-ground concrete steel lined stabilization/processing pits totaling approximately 90,000 gallons. The process pits are constructed of 24-inch thick reinforced concrete with a ¾-inch plate steel liner. The process pits in Building 4 have secondary containment that meets the requirements of 40 CFR 264, Subpart J.

C2.A(3) Description of Feed Systems, Safety Cutoff, Bypass System, and Pressure Controls
{R 299.9615 (1) and 40 CFR 270.16 (c)}

C2.A(3)(a) Feed Systems
{R 299.9615 (1) and 40 CFR 270.16 (c)}

See Table C2-1, Appendix C2-5 and Appendix C2-6.

Loading and unloading operations of the process pits are constantly monitored by plant personnel to ensure against overfilling and the maintenance of adequate freeboard. Dynecol personnel will also maintain a written log of all materials received in each process pit. If the equipment personnel observe a condition which does not provide sufficient freeboard to allow proper treatment withi the pits, the operator will cease mixing and remove material as necessary.

C2.A(3)(b) Safety Cutoff or Bypass Systems
{R 299.9615 (1) and 40 CFR 270.16 (c)}

See Table C2-1 and Appendix C2-5.

C2.A(3)(c) Pressure Controls
{R 299.9615 (1) and 40 CFR 270.16 (c)}

BASIS OF DESIGN AND DESIGN CAPACITY

BULK TREATMENT FACILITY

I. GENERAL

A. Treatment of hazardous and non-hazardous wastes, sludges and other wastes generated off-site.

B. Design capacity: 144,000 gallons per day in a 24-hour per day operation (average flow rate: 100 gpm)

C. Primary treatment: Three (3) 20,000-gallon rubber-lined steel tanks

D. Secondary treatment: Four (4) 20,000-gallon FRP tanks

E. Sludge dewatering: Two (2) 167-cubic foot recessed chamber filter presses.

F. Carbon filtration: Two (2) 1,000-pound carbon filters

G. Listed Hazardous Waste treatment system: One (1) 20,000 gallon working capacity treatment vessel and One (1) 100 cubic foot recessed chamber filter press.

II. PRIMARY TREATMENT SYSTEM

A. General Equipment

1. Tanks: Three (3) 20,000-gallon rubber-lined steel tanks

2. Containment System: concrete with New Generation 100 coating by Spartan Chemicals (or equivalent).

3. Mixing: compressed air system and sparger.

4. pH Control System: Lakewood Model 820 (or equivalent).

5. Chemical Feed system: lime slurry feed system and/or caustic/caustic pot ash feed system.

6. High level alarm with overfill protection.

7. Vent: discharge to air emissions control scrubber.

B. Treatment Process: Oxidation, Reduction, Neutralization on batch basis.

1. Liquid transfer from bulk tanker to primary tanks via hose and piping system: Q= 200 GPM avg.

2. Control: manual with continuous supervision from control room.

3. Typical treatment volume: 12,000 gallons

4. Mixing: continuous via air sparger system

5. Chemical Addition:
   . caustic/caustic pot ash/lime slurry solution via pump system with typical feeding rate of 120 GPM.
   . sodium bisulfite solution via pump system with typical feed rate of 100 GPM.
   . ferrous sulfate/chloride or ferric chloride solution via pump system with typical feed rate of 200 GPM.
   . activated carbon powder via top opening of tank.

6. Neutralization: following oxidation/reduction process, and as follows:
   . neutralization to a typical pH range of 5.0 to 6.0 (volume increase: generally about 30%).
   . treatment time: variable, depending on initial pH and/or initial acid concentration (average: 2 hours).
   . transfer to secondary treatment system via one of two transfer pumps (typical feed rate of 320 GPM) and CPVC (or equivalent) piping system.

III. SECONDARY TREATMENT SYSTEM

A. General Equipment

1. Tanks: Four (4) 20,000 gallon FRP tanks in vertical position with cone bottom.

2. Containment System: concrete with New Generation 100 chemical resistant coating (or equivalent).

3. Transfer Pumps: Two (2) centrifugal pumps rated at approximately 320 GPM.

4. Mixing: Two (2) mechanical mixers, 25 HP side-mount and 5 HP bottom mount agitators by Process Equipment Company (or equivalent).

5. pH Control System: Lakewood Model 520 probe and 900 Controller (or equivalent).

6. Chemical Feed System: lime slurry feed system.

7. Process Piping: CPVC (or equivalent).

8. Vent: discharge to air emissions control scrubber.

9. High-level alarm and overfill protection.

B. Treatment Process: Neutralization, chemical precipitation, flocculation, detoxification, clarification, sedimentation, chemical fixation, and lime stabilization on batch basis.

1. Liquid transfer from primary to secondary tank via process piping, valves and transfer pumps.

2. Valves: air actuated, spring to close remote operation from the main control panel.

3. Treatment Volume: 8,250 gallons.

4. Mixing: continuous via two mechanical mixers per tank.

5. Chemical addition: lime slurry transfer pump rated at approximately 300 GPM.

6. pH adjustment to typical range from 7.0 to 10.5 depending on the type of waste being treated.

7. Transfer to filtration process via two air diaphragm pumps rated at approximately 120 GPM each.

8. Average Flushing Time: 5 minutes.

IV. DEWATERING SYSTEM

A. General Equipment

1. Two (2) 167 cubic foot recessed chamber filter presses by Durco.

2. Operating Pressure Range: 90-100 psig.

3. Plate Material: polypropylene (or equivalent).

4. Cloth Material: Crossible polypropylene 89X (or equivalent).

5. Hydraulic Closing Mechanism: semi-automatic with maximum pressure of 3,600 psi.

6. Feed Pump: dual air operated diaphragm pumps with neoprene diaphragms (or equivalent).

B. Operating Discussion

1. Filtrate Volume: 8,500 gallons average.

2. Feed Rate: variable, average = 120 GPM.

3. Average Filtration Period: 75 minutes.

4. Average Cake Dumping Time: 45 minutes.

5. Average Clean-up Time: 2 Hours.

6. Average Cycle Time: 4 hours.

7. Typical Sludge Volume: 167 cubic feet per cycle and 195 cubic yards per day (average at 144,000 GPD treatment rate.

V. LISTED WASTES/OTHER LISTED WASTES TREATMENT SYSTEM

A. General Equipment

1. Tank: One (1) 20,000 FRP tank in vertical position with cone bottom.

2. Containment System: as defined for Tank Farm Building (#2).

3. Mixing: Two (2) mechanical mixers, 25 HP side mount and 5 HP bottom mount.

4. pH Control System: Lakewood Model 520 probe and 900 controller (or equivalent).

5. Chemical Feed Systems: Lime slurry feed system, and other treatment reagents feed systems.

6. Process Piping: CPVC (or equivalent).

7. Vent: Discharge to Air Emissions Control Scrubber.

8. High level alarm and overfill protection.

9. Valves: Air actuated, spring closed for remote operations from the main control panel.

10. Dewatering: One (1) 100 cubic foot recessed chamber filter press with typical specifications as follows:
    - Operating Pressure Range: 90-100 psig.
    - Plate Material: Polypropylene (or equivalent).
    - Cloth Material: Crossible Polypropylene 89 X (or equivalent.
    - Feed Pump: Dual air diaphragm pumps.
    - Filtrate Volume: typically 5,000 gallons.
    - Feed Rate: variable, average = 120 GPM.
    - Average Filtration Period: 50 minutes.
    - Average Cake Dumping Time: One hour.
    - Average Clean-up Time: 1 Hour.
    - Average Cycle Time: 2 Hours.

. Typical Sludge Volume: 100 cubic feet per cycle.

B. Treatment Process: Batch Basis. Typically includes primary and secondary processes (as described in parts II(B) and III(B).

VI. LIME FEED SYSTEM

A. General Equipment

1. Storage Silos: two (2) 12-feet diameter by 60-feet high (5,000 cuft each).

2. Slurry System: 750 gallon tank with mixer, volumetric feeder, level control, etc.

3. Dust Filter: 180 sq. ft. Whirl-Air-Flow.

B. System Capacity

1. Typical Usage: peak 66,800 lbs/day of hydrated lime over 24 hours.

2. Slurry System: 20 % lime (maximum).

3. Typical Water Requirement: 22-60 GPM.

4. Typical Feed Rate: 300 GPM (Peak), 60 GPM (Average).

VII. AIR EMISSIONS CONTROL SYSTEM

A. General Equipment

1. Model 734-XL Heil Fume Alkaline Scrubber with a capacity of 5,000 CFM, 200 DEG F (maximum) at 4-inch water pressure.

2. Recirculation Pump: Vanton Model CG-PY 800, 3HP, 1750 RPM, rated at 75 GPM, 40-foot head (or equivalent).

3. pH System: Great Lakes Instrument, Model #A72-1-1-2-3, and probe # 6030PO (or equivalent).

4. Chemical Pump: Chem-Tech Model #2-120, PVC and Teflon fittings, rated for 0-120 GPD (or equivalent).

5. Centrifugal fan: HCL-20 Heil blower, 10 HP, 1800 RPM, 5000 CFM (or equivalent).

B. Design Capacity

1. Controls vapor and off gases from the three primary treatment tanks, the hazardous waste storage tank, the

four secondary treatment tanks, and certain storage tanks within the tank farm building.

2. Alkaline wet scrubber is capable of controlling nearly all vapors emitted from the treatment and storage processes.

C. Additional Control System for Certain TCLP Organics

Air emissions from the treatment of certain TC organics in treatment tank #3 will be directed through a caustic scrubber with a capacity of 500 CFM and then through the activated carbon adsorption system in the container management facility. The caustic scrubber will have the typical specifications as follows:

- Met-Pro Duall Division Model FW-300 (or equivalent).
- Capacity: 500 CFM
- Temperatures: Exhaust = ambient
  Scrubbing solution = ambient
- Scrubbing Solution: Water and caustic
- Scrubbing Solution Flow Rate: Approximately 5 GPM
- Pressure Drop: Approximately 3 in WC
- Height of Packing: Approximately 20 inches
- Packing Description: Random-dumped, high efficiency polypropylene
- Efficiency: > 80 % on acid gases

VIII. CARBON ADSORPTION SYSTEM

A. General Equipment

1. Filtration Unit: two 1,000-pound filter vessels.

2. Valving: full isolation and control valving.

3. Sampling Port: following each unit.

4. Feed Rate: Average = 50 GPM per carbon vessel.

B. Operating Discussion

1. Usage: 1,000 pounds of activated carbon. Adsorption capacity is dependent upon filtrate stream constituents.

2. Filtration System: primary (Flter presses) and secondary(in-line filter system).

3. Monitoring: periodic checks for applicable organics in effluent of the unit in use to determine possible breakthrough. At confirmation of breakthrough, the feed is rerouted through the second filter unit.

IX. CONTROL SYSTEM

A. General Equipment

1. Main control board and graphics panel
2. Pump and motor, start-stop control
3. Valve actuator controls
4. Level, pH indicators and recorders
5. Running and alarm lights

B. Operations

1. The control system is designed to provide full treatment system feedback and control from the control room.

X. OPERATION PROCEDURE SUMMARY

Treatment system control procedures are outlined below.

A. Typical Operations Sequence

The Batch Treatment Tables (Exhibits A, B, and C) provide a typical treatment sequence including start and stop times, volumes, etc. Tank numbers correspond with actual tank labels at Dynecol.

B. Instrument Calibration

Calibration of pH instruments and level transmitters is routinely performed by either trained maintenance personnel or outside contractor.

C. Console Operating Sequence

1. Turn Control Power Selector Switch on. The Power On light will come on. The audio alarm will usually sound because the batch treatment tanks are empty. The Low Alarm lights will be flashing. Press the Silence pushbutton. The audio alarm will silence and the flashing alarm lights will go to steady ON.

2. All valves should be closed and their associated selector switches on their auto position. The auto position allows valves and pumps to open and close on demand from the programmable controller computer.

3. Determine which primary tank has been treated and manually connect that tank via a hose to the desired transfer pump, i.e., P1/P2. Open the manual valve

associated with that primary tank.

4. Pick the secondary tank to be filled from that pump and turn the selector switch to the correct tank number.
EXAMPLE: If tank #4 was connected to transfer pump #1 and we wanted to use tank #18, we would turn the selector switch for pump #1 to the T18 position. This switch is located at the bottom corner of the selector switch deck.

5. Press the <u>Start</u> pushbutton for Pump #1; several functions will occur:
   a. The step sequence lights for T18 will go from <u>Off</u> to the <u>Filling</u> step.
   b. Only the appropriate valves will open. In this example, only V1 and V3 will open.
   c. Pump P1 will start and transfer from T4 to T18. As the level in T18 rises, the <u>Low Alarm</u> light will go out. The level can be observed by the meter in the graphic display with T18.
   d. As the level gets above the bottom mounted agitator, A18B will start.
   e. When the level gets up to 45% full, the transfer pump P1 will stop and the inlet valves will close. The next step light treating will flash. This indicates that all conditions are ready to go to the treating step. The process will hold this way until the <u>Start Treatment 18</u> pushbutton is pushed.

6. Press the <u>Start treatment T18</u> pushbutton; several function will occur:
   a. The filling step light will go out and the treating light will go on steady.
   b. Valves 22 and 23 will open.
   c. The side mounted agitator A18S will start.
   d. P18, the recirculation pump, will start.
   e. P18 will circulate liquid from T18 past the pH sensor and back to T18.
   f. If the solution being pumped past the pH sensor gets below pH of 5, the pH <u>Low Alarm</u> will sound and the light will flash until the <u>Silence</u> pushbutton is pushed.
   g. After a preset time of three minutes, the lime feed system will start adding lime to T18.
   h. Valves V172, V173, and V10 will open and the lime feed pump will start and continue until the pH is at a preset level, for example 10.0.
   i. After a preset time of ten minutes, the <u>Instrument Flush</u> step light will start flashing. This indicates that all conditions are ready to go to the Instrument Flush step.

7. Press the <u>Start Instrument Flush T18</u> pushbutton. Two

flushes will occur as follows:

a. Flushing of the pH control loop occurs.
   1) P18 stops and V23 closes.
   2) V24 water flush valve opens and flushes water into T18 for 90 seconds to clean that section of the piping.
   3) V24 closes, V23 opens, and P18 starts for another 90 seconds. The pump, pH sensor, and pipes are flushed.
b. Flushing of the Lime Feed System.
   1) P25 is already off and the valves are closed.
   2) Valve V14 water flush and V172 will open for 90 seconds, flushing the lime back into the day tank T14 or T23.
   3) V172 closes, V173 and V10 open, and P25 starts. The piping section between P25 and T18 will be flushed for 90 seconds.
c. After the flushing of all valves and pumps is done, the filtering step light will flash. This indicates that all conditions are ready to go to the filtering step.
d. The agitators continue to run to keep the solids from settling.

8. The operator must decide which filter press is clean and ready to accept sludge. The sludge feed pumps will not start without adequate hydraulic pressure on the press.
   a. Select the treatment tank to press by turning the selector switch for Press A to the T18 position.
   b. Press the <u>Start Feed</u> to Press A pushbutton and V15 will open and AP3 and AP4 will start and fill Press A.
   c. When the press is full, the High Inlet Pressure Alarm will sound and the light will flash until silenced. If the batch tank is not yet empty, <u>do not</u> push the Stop Feed to Press A pushbutton. To clean the press and continue filtering, the manual inlet valve to the press must be closed, the press emptied and the valve reopened, thus allowing more of the sludge from T18 to be filtered.
   d. If the tank becomes empty before the press is full, press the Stop Feed to Press A pushbutton.
      1) AP3 and AP4 will stop.
      2) V15 will close.
      3) The OFF sequence light will come on.

9. Notes of Clarification
   a. Transfer Pump P1 can pump to T18, T19, T20, or T21. P2 can also pump to any of these tanks. However, due to the fact that they share some common valves and pipes, it is set up so that they cannot crossover.
      EXAMPLE: If P1 is pumping to T20, we cannot allow P2 to pump to T19 or T18. Any time the pump to

treatment tank selectors get into a crossover not allowed position, the <u>Sequence Not Allowed</u> alarm will sound, and it cannot be silenced. Any pump that is running, when this alarm sounds, will stop and will have to be restarted.

b. It is, however, permissible for both P1 and P2 to fill the same tank.

c. The lime feed system is large enough for several tanks to be in the treatment step at the same time.

d. Press A or B can receive sludge from T18, T19, T20, or T21. Due to the fact that they share some pipes and valves, it is set up so that they cannot crossover.
EXAMPLE: Tank T19 is being filtered through Press B. T20 or T21 cannot go to Press A. Any time the treatment tank selectors get put into a crossover not allowed position, the <u>Sequence Not Allowed</u> alarm will sound and it cannot be silenced. Any air pumps running, when this alarm happens, will stop and will have to be restarted.

e. It is allowable, but not recommended, to let one press filter two tanks at the same time.

10. The filtrate from each press goes to either holding tank 30 or 31. The filtrate will be discharged to the City Sewer system via a centrifugal pump, after a check on the quality of the filtrate is performed.

EXHIBIT A

ANK 4	BATCH #1	BATCH #5	BATCH #9
Starting Volume	12,000	12,000	12,000
Ending Volume	15,600	15,600	15,600
Start Treatment	4 a.m.	8:05 a.m.	4:05 p.m.
Stop Treatment	4:30 a.m.	8:35 a.m.	4:35p.m.

TANK 18	BATCH #1		BATCH #5		BATCH #9	
Starting Volume	8250	7350	8250	7350	8250	7350
Ending Volume	9900	8820	9900	8820	9900	8820
Start Filling	4:30 a.m.	6:35 a.m.	8:33 a.m.	2:35 p.m.	4:35 p.m.	12:40 a.m.
Stop Filling	5:00 a.m.	7:05 a.m.	9:05 a.m.	3:05 p.m.	5:05 p.m.	1:10 a.m.
Start Treatment	5:00 a.m.	7:05 a.m.	9:05 a.m.	3:05 p.m.	5:05 p.m.	1:10 a.m.
Stop Treatment	5:15 a.m.	7:20 a.m.	9:05 a.m.	3:20 p.m.	5:20 p.m.	1:25 a.m.

PRESS A	BATCH #1		BATCH #5		BATCH #9	
Start Filtering	5:15 a.m.	7:20 a.m.	1:15 p.m.	3:20 p.m.	11:20 p.m.	1:25 a.m.
Stop Filtering	6:35 a.m.	8:30 a.m.	2:35 p.m.	4:30 p.m.	12:40 a.m.	2:35 a.m.
Net Volume	9900	8820	9900	8820	9900	8820
Start Dumping	6:35 a.m.	8:30 a.m.	2:35 p.m.	4:30 p.m.	12:40 a.m.	2:35 a.m.
Stop Dumping	7:15 a.m.	9:15 a.m.	3:20 p.m.	5:15 p.m.	1:25 a.m.	3:20 a.m.
Ready	7:15 a.m.	9:15 a.m.	3:20 p.m.	7:20 p.m.*	1:25 a.m.	3:20 a.m.

*Wash edge of filter trays (2 hours, 5:20 p.m. - 7:20 p.m.).

EXHIBIT B

ANK 2

	BATCH #2		BATCH #6		BATCH #10		BATCH #12	
Starting Volume	12,000		12,000		12,000		12,000	
Ending Volume	15,600		15,600		15,600		15,600	
Start Treatment	4:30 a.m.		8:35 a.m.		12:40 p.m.		8:10 p.m.	
Stop Treatment	5:00 a.m.		9:05 a.m.		1:10 p.m.		8:40 p.m.	

TANK 19

	BATCH #2		BATCH #6		BATCH #10		BATCH #12	
Starting Volume	8250	7350	8250	7350	8250	7350	8250	7350
Ending Volume	9900	8820	9900	8820	9900	8820	9900	8820
Start Filling	5:00 a.m.	7:05 a.m.	9:05 a.m.	11:10 a.m.	1:10 p.m.	6:40 p.m.	8:45p.m.	10:50 p.m.
Stop Filling	5:30 a.m.	7:35 a.m.	9:35 a.m.	11:40 a.m.	1:40 p.m.	7:10 p.m.	9:15 p.m.	11:20 p.m.
Start Treatment	5:30 a.m.	7:35 a.m.	9:35 a.m.	11:40 a.m.	1:40 p.m.	7:10 p.m.	9:15 p.m.	11:20 p.m.
Stop Treatment	5:45 a.m.	7:50 a.m.	9:50 a.m.	11:55 a.m.	1:55 p.m.	7:25 p.m.	9:30 p.m.	11:35 p.m.

PRESS B

	BATCH #2		BATCH #6		BATCH #10		BATCH #12	
Start Filtering	5:45 a.m.	7:50 a.m.	9:50 a.m.	11:55 a.m.	5:20 p.m.	7:25 p.m.	9:30 p.m.	11:35 p.m.
Stop Filtering	7:05 a.m.	9:00 a.m.	11:10 a.m.	1:05 p.m.	6:40 p.m.	8:45 p.m.	10:50 p.m.	12:45 a.m.
Net Volume	9900	8820	9900	8820	9900	8820	9900	8820
Start dumping	7:05 a.m.	9:00 a.m.	11:10 a.m.	1:05 p.m.	6:40 p.m.	8:45 p.m.	10:50 p.m.	12:45 a.m.
Stop dumping	7:50 a.m.	9:45 a.m.	11:55 a.m.	1:50 p.m.	7:25 p.m.	9:30 a.m.	11:35 p.m.	1:30 a.m.
Ready	7:50 a.m.	9:45 a.m.	11:55 a.m.	5:20 p.m.*	7:25 p.m.	9:30 p.m.	11:35 p.m.	1:30 a.m.

*2 hours for clearing edges of filter bags (3:20 p.m. - 5:20 p.m.).