M&M Environmental Services

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Daily Rounds

Headworks

- Check flow for unusual colors and odors
- Check water level
- Perform housekeeping -- hose down area, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Hand Cleaned Bar Screen

- Check screen for plugging
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the screen
- Rake screen
- Dispose of screenings properly
- Record amount of screenings removed
- Perform housekeeping -- hose down area, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Mechanically Cleaned Bar Screen

- Check screen for plugging
- Check the screenings pile
- Check rake mechanism for rakes are level, proper movement, rake alignment, and chain tension, excessive and/or unusual noises (especially banging), vibrations, and odors (especially burning)
  - ⇒ Check motor (see motor below)
  - ⇒ Check drive chain (see drives below)
  - ⇒ Check oil levels
  - ⇒ Check controls for proper cycling and intervals
- Check elevator or conveyor
  - ⇒ Check mechanism and remove rags
  - ⇒ Check hopper to see how full
  - ⇒ Check wash down water for proper flow
  - ⇒ Check motor (see motor below)
  - ⇒ Check drive chain (see drives below)
  - ⇒ Check oil levels
  - ⇒ Check controls for proper cycling and intervals
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the screen
- Dispose of screenings properly
- Record amount of screenings removed
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Screenings Grinder

- Grind screenings
  - ⇒ Turn on grinder and flushing water before adding screenings
  - ⇒ Rake screenings into hopper, being sure to remove all non-grindable objects, such as cans, sticks, large rags, wire
  - ⇒ Check particle size of screenings returning to the flow
  - ⇒ Adjust water flow
  - ⇒ Determine if teeth need sharpening
  - ⇒ Allow grinder and flushing water to run at least 5 minutes after done grinding screenings

- Check grinder for plugging, proper movement and cutting action, excessive and/or unusual heat, noises, vibrations, and odors (especially burning)
- Check motor (see motor below)
- Check oil levels
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Revolving Drum Comminuter

- Check drum for plugging, proper movement and cutting action, excessive and/or unusual noises (especially banging), vibrations, and odors (especially burning)
- Check motor (see motor below)
- Check oil levels
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the comminuter
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Moving Wiper Comminuter

- Check screen for plugging
- Check wiper for proper movement and cutting action, excessive and/or unusual noises (especially banging), vibrations, and odors (especially burning)
- Check motor (see motor below)
- Check oil levels
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the comminuter
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Barminuter

- Check screen for plugging
- Check cutting mechanism for proper movement, cutting action, alignment, chain tension, excessive and/or unusual noises (especially banging), jerking, vibrations, and odors (especially burning)
  - ⇒ No up and down, sideways movement, or back and forth
  - ⇒ Watch start-up
    - ∗ Motor and cutters should start simultaneously, no hesitation or time delay in cutter starting
    - ∗ Cutters should be up to speed immediately
- Check motor (see motor below)
- Check oil levels
- Check seals for leaks
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the barminuter
- Check cutting mechanism controls for proper cycling and intervals
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Hand Cleaned Grit Chamber

- Check grit depth and location
- Check odors
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the grit chamber
- Perform housekeeping -- hose down area, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Mechanically Cleaned Grit Chamber

- Check grit removal mechanism for proper movement, bucket alignment, chain tension, excessive and/or unusual noises (especially banging), jerking, vibrations, and odors (especially burning)
- Check motor (see motor below)
- Check drive chain and chain drive (see drives below)
- Check elevator or screw conveyor
  - ⇒ Check hopper to see how full
  - ⇒ Check screw and remove rags
  - ⇒ Check wash down water for proper flow
- Check oil levels
- Check grit removal mechanism controls for proper cycling and intervals
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the grit chamber
- Check grit pile
- Dispose of grit properly
- Record amount of grit removed
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Aerated Grit Chamber

- Check tank surface for proper aeration and foam control
  - ⇒ Check pattern and size of air bubbles
  - ⇒ Check scum and foam build-up on tank surface and walkways
  - ⇒ Check foam control spray
    - ∗ Spray pattern and force
    - ∗ Clean if necessary
  - ⇒ Check the controls, motor, drives, blowers, headers, and diffusers
    - ∗ Check oil levels
- Check grit removal mechanism for proper movement, excessive and/or unusual noises (especially banging), jerking, vibrations, and odors (especially burning)
    - ∗ Check controls, motor, and drives
    - ∗ Check oil levels
  - ⇒ Check buckets
    - ∗ Watch the mechanism to see that it is moving properly -- smoothly with no jerking.
      - ◊ Bucket alignment
      - ◊ Chain tension
    - ∗ Listen for excessive and/or unusual noises (especially banging)
    - ∗ Feel for excessive and/or unusual vibrations
    - ∗ Smell for excessive and/or unusual odors (especially burning)
  - ⇒ Check elevator or screw conveyor
    - ∗ Look at the hopper to see how full it is
    - ∗ Watch screw and remove rags
    - ∗ Watch wash down water for proper flow
  - ⇒ Check cyclone
    - ∗ Watch to see if grit is plugged or freely leaving end of cyclone
    - ∗ Check the water discharge for flow, color, and odors
    - ∗ Look for water leaks
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the grit chamber
- Check grit pile
- Dispose of grit properly
- Record amount of grit removed

- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Primary Clarifier

- Check tank surface for solids carryover, grease and scum build up, floating sludge, gasification, oil, and unusual or excessive colors and odors
- Check walls, baffles, weirs, launders, channels for slime and scum buildup
- Check skimmer and scraper for proper movement (smooth, no jerking), excessive and/or unusual noises (especially banging), vibrations, odors (especially burning)
  - ⇒ Properly collecting scum
  - ⇒ Circular tanks
    - ∗ Watch feedwell (stilling ring) rotating for proper movement
    - ∗ Torque indicators
    - ∗ Scum build-up on the skimmer
    - ∗ Remove rags from skimmer
    - ∗ Watch skimmer go over ramp
      - ◊ Release, not hung up
      - ◊ Not damaged or hung up in chute
      - ◊ Proper grease removal
      - ◊ Proper water drainage
  - ⇒ Rectangular tanks
    - ∗ Check flights for proper alignment and spacing
    - ∗ Check for broken flights
    - ∗ Check chain drives (see drives below)
    - ∗ Check to see that sprocket and chain are properly meshing
    - ∗ Remove rags from chain, flights, sprockets
- Check motor (see motor below)
- Check drive chain (see drives below)
- Check oil levels
- Check flow for unusual colors and odors
- Check water level upstream, through, and downstream of the clarifier
- Check scum trough and box
- Pump sludge at least twice per day
  - ⇒ Preferably, pump small amounts frequently
  - ⇒ Eliminate unnecessary water
  - ⇒ Watch sight glass
  - ⇒ Check supernatant return
- Pump scum at least twice per day
  - ⇒ Eliminate unnecessary water
  - ⇒ Prevent crusting
  - ⇒ Wash down tank walls, weirs, channels, and excess scum
- Record amount of scum and sludge pumped
- Check and record torque readings
- Perform housekeeping -- hose down walls, baffles, weirs, launders, channels, and area; wipe off excess oil and grease; remove floating and/or lodged debris and rags and dispose of properly; and clean area

Trickling Filter

- Check bed surface for debris, ponding, proper growth, psychoda flies, icing,
- Check zoogleal mass for proper color and thickness
- Check distributor for proper movement and flow
  - ⇒ Broken parts -- guy wires and splash plates
- Check orifices for flow and plugging
- Check for unusual and/or excessive odors

- Check flow for unusual colors and odors
- Check recirculation (flow, color, odors)
- Check collection boxes
- Check underdrain
- Check for oil leakage near bearing
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Activated Sludge Aeration Tank

- Check tank surface for proper aeration and mixing
  - ⇒ Mixing p–attern
  - ⇒ Size of air bubbles
  - ⇒ Listen to air flow through lines
    - ∗ Too noisy or too quiet
- Check jet mixers – listen for pumps
  - ⇒ Watch bubbles
  - ⇒ Check for leaks
- Check floc
- Check distribution and collection boxes
- Check return sludge (flow, color, odors)
- Check sludge wasting
- Check diffusers and header
- Check floating mixers
- Check scum and foam build-up on tank surface and walkways
- Check foam control spray
  - ⇒ Spray pattern and force
  - ⇒ Clean if necessary
- Check oil levels
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the aeration tank
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Lagoon

- Check dikes
  - ⇒ Check the freeboard
  - ⇒ Check for erosion
  - ⇒ Check for animal damage, such as cow and horse grazing or muskrats
  - ⇒ Remove emergent vegetation, such as cattails
  - ⇒ Check road for erosion, pot holes
  - ⇒ Check for leakage outside of the ponds
- Ponds
  - ⇒ Check for scum, floating algal mats, and sludge build-up, especially near inlets, transfer structures, and corners
  - ⇒ Check for unusual odors such as hydrogen sulfide and pig pen
  - ⇒ Check color of the water in the ponds
  - ⇒ Check for unusual or excessive number of insects
  - ⇒ Check for muskrats and beavers
  - ⇒ Remove emergent vegetation, such as cattails
- Transfer Structures
  - ⇒ Check to see if water is transferring
  - ⇒ Check water level in the structure
  - ⇒ Check flow for unusual colors and odors

- ⇒ Check for erosion around structure
- ⇒ Check transfer pipes
  - ∗ Plugged
  - ∗ Erosion near inlet or outlet pipes
  - ∗ Depth of water in outlet pipe
- ⇒ Check control device (gate valve, boards) for proper position and corrosion
- ⇒ Check lids
- ⇒ Remove floating and/or lodged debris, including nests, and dispose of properly

Final Clarifier

- Check tank surface for solids carryover, grease and scum build up, floating sludge, gasification, oil, and unusual or excessive colors and odors
- Check walls, baffles, weirs, launders, channels for slime and scum buildup
- Check skimmer and scraper for proper movement (smooth, no jerking), excessive and/or unusual noises (especially banging), vibrations, odors (especially burning)
  - ⇒ Properly collecting scum
  - ⇒ Circular tanks
    - ∗ Watch feedwell (stilling ring) rotating for proper movement
    - ∗ Torque indicators
    - ∗ Scum build-up on the skimmer
    - ∗ Remove rags from skimmer
    - ∗ Watch skimmer go over ramp
      - ◊ Release, not hung up
      - ◊ Not damaged or hung up in chute
      - ◊ Proper grease removal
      - ◊ Proper water drainage
  - ⇒ Rectangular tanks
    - ∗ Check flights for proper alignment and spacing
    - ∗ Check for broken flights
    - ∗ Check chain drive (see drives below)
    - ∗ Remove rags from chain, flights, sprockets
- Check motor (see motor below)
- Check drive chain (see drives below)
- Check oil levels
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the clarifier
- Check scum trough and box
- Pump sludge at least twice per day
  - ⇒ Preferably, pump small amounts frequently
  - ⇒ Eliminate unnecessary water
  - ⇒ Watch sight glass
- Pump scum at least twice per day
  - ⇒ Eliminate unnecessary water
  - ⇒ Prevent crusting
- Record amount of scum and sludge pumped
- Check and record torque readings
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area
  - ⇒ Wash down tank walls, weirs, channels, and excess scum

Polishing Filter

- Check filter surface for solids build up, debris, cracks, mudballs, and unusual or excessive colors and odors
- Check walls, baffles, weirs, launders, channels for slime and scum buildup

- Check the water level
- Check and record the head loss
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the filter
- Backwash
- Record length of filter run
- Perform housekeeping -- hose down walls, baffles, weirs, launders, channels, and area; wipe off excess oil and grease; remove floating and/or lodged debris and dispose of properly; and clean area

Chlorinator Room

- Check for leaks
- Check dosage rate (rotameter)
- Check injector suction vacuum
- Check chlorine pressure gauge
- Check water pressure gauge
- Feel temperature of lines
- Check room temperature and lights
- Check exhaust fans and vents
- Check alarm
- Check neutralization system
- Record dosage rate
- Perform housekeeping -- remove debris and dispose of properly, and clean area

Chlorine Cylinder and Manifold

- Check cylinder
- Check for leaks
- Feel temperature of cylinder and lines
- Check room temperature and lights
- Check exhaust fans and vents
- Record weight of cylinder in use and amount of chlorine used each day
- Compare dosage rate with weight used
- Perform housekeeping -- remove debris and dispose of properly, and clean area

Chlorine Contact Chamber

- Check for leaks
- Check foam build-up on tank surface and walkways
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the contact chamber
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Single Stage Anaerobic Digester

- Check sludge level
- Check floating lid and gas seal
  - ⇒ Check condition of seal
  - ⇒ Check height of lid
  - ⇒ Check to see that lid is not cocked and that it is freely moving up and down
  - ⇒ Check for sludge messes on lid and walls, and clean
- Check fixed cover
  - ⇒ Check seal
  - ⇒ Check for gas leaks
- Check gas pressure

- Check regulator
- Check pressure/vacuum relief valves
- Check piping for leaks and failure
- Check digester temperature
- Check room temperature, lights, and ventilation
- Check motor (see motor below)
- Check drive chain (see drives below)
- Check oil levels
- Check furnace
  - ⇒ Check temperature
  - ⇒ Check flame to see that it is proper
  - ⇒ Check pilot light
- Check heat exchanger
  - ⇒ Check inlet and outlet water temperatures
  - ⇒ Check inlet and outlet sludge temperatures
- Check mixer
  - ⇒ Gas mixer
    - ∗ Check compressor and motor (see compressor and motor below)
    - ∗ Check drip traps and drain when necessary
    - ∗ Check gas pressure
    - ∗ Check for leaks
    - ∗ Feel temperature of lines
  - ⇒ Propeller or draft tubes
    - ∗ Check motor (see motor below)
    - ∗ Check to see that mixer is operating
    - ∗ Reverse direction for propeller mixer at least once daily
  - ⇒ Propeller or draft tubes
    - ∗ Check motor (see motor below)
    - ∗ Check to see that mixer is operating
    - ∗ Reverse direction for propeller mixer at least once daily
- Check waste gas burner
- Record gas production
- Withdraw supernatant
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Two Stage Anaerobic Digesters

- Primary Digester
  - ⇒ Check sludge level
  - ⇒ Check floating lid and gas seal
    - ∗ Check condition of seal
    - ∗ Check height of lid
    - ∗ Check to see that lid is not cocked and that it is freely moving up and down
    - ∗ Check for sludge messes on lid and walls, and clean
  - ⇒ Check fixed cover
    - ∗ Check seal
    - ∗ Check for gas leaks
  - ⇒ Check gas pressure
  - ⇒ Check regulator
  - ⇒ Check pressure/vacuum relief valve
  - ⇒ Check piping for leaks and failure
  - ⇒ Check drip traps and drain when necessary
  - ⇒ Check digester temperature

- ⇒ Check room temperature, lights, and ventilation
- ⇒ Check motor (see motor below)
- ⇒ Check oil levels
- ⇒ Check furnace
  - ∗ Check temperature
  - ∗ Check flame to see that it is proper
  - ∗ Check pilot light
- ⇒ Check heat exchanger
  - ∗ Check inlet and outlet water temperatures
  - ∗ Check inlet and outlet sludge temperatures
- ⇒ Check mixer
  - ∗ Gas mixer
    - ◊ Check compressor and motor (see compressor and motor below)
    - ◊ Check drip traps and drain when necessary
    - ◊ Check gas pressure
    - ◊ Check for leaks
    - ◊ Feel temperature of lines
  - ∗ Propeller or draft tubes
    - ◊ Check motor (see motor below)
    - ◊ Check to see that mixer is operating
    - ◊ Reverse direction for propeller mixer at least once daily
- ⇒ Transfer sludge to secondary digester
- ⇒ Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

- Secondary Digester
  - ⇒ Check sludge level
  - ⇒ Check floating lid and gas seal
    - ∗ Check condition of seal
    - ∗ Check height of lid
    - ∗ Check to see that lid is not cocked and that it is freely moving up and down
    - ∗ Check for sludge messes on lid and walls, and clean
  - ⇒ Check fixed cover
    - ∗ Check seal
    - ∗ Check for gas leaks
  - ⇒ Check gas pressure
  - ⇒ Check regulator
  - ⇒ Check pressure/vacuum relief valve
  - ⇒ Check piping for leaks and failure
  - ⇒ Check drip traps and drain when necessary
  - ⇒ Check digester temperature
  - ⇒ Check room temperature, lights, and ventilation
  - ⇒ Check ventilation
  - ⇒ Check motor (see motor below)
  - ⇒ Check oil levels
  - ⇒ Check furnace
    - ∗ Check temperature
    - ∗ Check flame to see that it is proper
    - ∗ Check pilot light
  - ⇒ Check heat exchanger
    - ∗ Check inlet and outlet water temperatures
    - ∗ Check inlet and outlet sludge temperatures

- ⇒ Check mixer
  - * Gas mixer
    - ◊ Check compressor and motor (see compressor and motor below)
    - ◊ Check drip traps and drain when necessary
    - ◊ Check gas pressure
    - ◊ Check for leaks
    - ◊ Feel temperature of lines
  - * Propeller or draft tubes
    - ◊ Check motor (see motor below)
    - ◊ Check to see that mixer is operating
    - ◊ Reverse direction for propeller mixer at least once daily
- ⇒ Withdraw supernatant
- ⇒ Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

- Check waste gas burner and pilot light
- Record gas production

Aerobic Digesters

- Check tank surface for proper aeration -- pattern and size of air bubbles
- Check floc
- Check diffusers and header
- Check floating mixers
- Check scum and foam build-up on tank surface and walkways
- Check foam control spray
  - ⇒ Spray pattern and force
  - ⇒ Clean if necessary
- Check motor (see motor below)
- Check oil levels
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the aerobic digester
- Decant
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove floating and/or lodged debris and rags, and dispose of properly, and clean area

Drying Beds

- Check sludge
  - ⇒ Progress of drying
  - ⇒ Look for new water or sludge in beds
- Record number of beds in use
- Perform housekeeping -- remove debris and dispose of properly, and clean area

Sludge Lagoon

- Check dikes
  - ⇒ Check the freeboard
  - ⇒ Check for erosion
  - ⇒ Check for damage
  - ⇒ Remove emergent vegetation, such as cattails
  - ⇒ Check road for erosion, pot holes
  - ⇒ Check for leakage outside of the lagoons
- Lagoons
  - ⇒ Check level
  - ⇒ Check for unusual odors such as hydrogen sulfide and pig pen
  - ⇒ Check color of the water in the ponds

⇒ Check for unusual or excessive number of insects
⇒ Check for muskrats and beavers
⇒ Remove emergent vegetation, such as cattails

Laboratory Tests

- Collect and analyze influent and effluent samples for BOD, D.O., pH, settleable solids, TSS, TKN, ammonia, nitrates, oil and grease, phosphorus, and temperature
- Collect and analyze primary effluent samples for BOD, D.O., pH, settleable solids, TSS, and temperature
- Collect and analyze samples from the aeration tank, final clarifier, return sludge, and waste sludge for TSS, ATC, depth of blanket, D.O., MLSS or MLVSS, RSC, and settleometer
  ⇒ For ammonia removal, collect and analyze sample of aeration tank influent for alkalinity
- Examine activated sludge floc microscopically
- Collect and analyze raw sludge sample for total solids, volatile solids, and pH
- Collect and analyze effluent samples for chlorine residual, coliforms, and turbidity
- Collect and analyze sludge samples from the anaerobic digesters for pH, volatile acids, alkalinity, and total and volatile solids
- Collect and analyze sludge samples from the aerobic digester for D.O., MLSS, and total and volatile solids
- Collect and analyze anaerobic digester supernatant samples for total and volatile solids
- Collect and analyze samples from the digested sludge to drying beds for total and volatile solids
- Calibrate lab equipment
  ⇒ Change pH buffers
- Properly tag samples
- Record data
  ⇒ Lab results
  ⇒ Calibration data
  ⇒ Complete chain of custody paperwork
- Set-up samples for next day

Control Panels

- Check for unusual and/or excessive heat, noises, vibrations, and odors, especially burning
- Check switch positions
- Check lights
- Check gauges and meters
- Check timers for proper settings, cycling and intervals
- Record readings
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Motors

- Check for unusual and/or excessive heat, noises, vibrations, paint discoloration, and odors, especially burning
- Check oil levels
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Drives

- Check drives for proper movement
- Check allens for wear, rust, corrosion, and tightness
- Check key ways for wear, rust, corrosion, and tightness
- Check alignment
  ⇒ UV joints -- not straight
  ⇒ Couplers – straight
- Check tension
- Check for unusual and/or excessive heat, noises (such as squealing or banging when starting), and odors, especially burning
- Check for vibrations, jerking, and slipping

- Check lubrication
- Check oil levels
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area
- Check belt drives
  - ⇒ Check belts for wear, cracking, fraying, and belt scraps
  - ⇒ Check pulleys for corrosion, wear, broken parts, cracks, and missing pieces or pieces of the pulley in the area
- Check chain drives
  - ⇒ Check chain links and pins for corrosion, wear, broken parts, cracking, and missing pieces
  - ⇒ Check sprockets and spindles for corrosion, wear, broken parts, cracks, and missing pieces
  - ⇒ Check to see that chain and sprockets are properly meshing
- Check universal joints and carrier bearings
  - ⇒ Check joints for corrosion, wear, broken parts, cracks, and missing pieces
  - ⇒ Check bearings for corrosion, wear, broken parts, cracks, and missing pieces
  - ⇒ Check bolts for tightness
- Check couplers
  - ⇒ Check coupler for corrosion, wear, cracking, rubber dust, and scraps
  - ⇒ Check spacing between coupler halves
- Check shaft
  - ⇒ Check shaft for corrosion, wear, cracking, twisting, pitting or bending
  - ⇒ Check rotation
  - ⇒ Check for side or end play
- Check gear reduction unit
  - ⇒ Check bearings for unusual and/or excessive heat, noises, vibrations, and odors
  - ⇒ Check seals for leaks

Pumps

- Check pump and bearings for unusual and/or excessive heat, noises, odors, vibrations, jerking, and slipping
  - ⇒ Piston pump
    - ∗ Check piston face for wear, corrosion, pitting, scarring or cracking
    - ∗ Check piston movement
    - ∗ Check shear pin to see if in place or broken
    - ∗ Check oil dripper
      - ◊ Proper dripping rate according to manufacturer's recommendations
      - ◊ Oil level in the reservoir and add when necessary
    - ∗ Check oil level and condition in piston
      - ◊ Oil should just cover the wrist pin
    - ∗ Check timer
    - ∗ Check sight glass for color, movement, and condition of sludge, and air bubbles
    - ∗ Check expansion tanks for leaks and holes
    - ∗ Check guides for wear, alignment, and tightness
    - ∗ Check piston face
    - ∗ Check block bearings for wear
    - ∗ Check eccentric for wear, shape, and movement
- Check allens for wear, rust, corrosion, and tightness
- Check key ways for wear, rust, corrosion, and tightness
- Check alignment
- Check tension
- Check lubrication
- Check oil levels

- Check packing
  - ⇒ Water seal for piston pumps
    - ∗ Check to see that water is running at all times
    - ∗ Check to see that there is enough flow to go completely around piston, but not overflow
    - ∗ Check drain to see that it is flowing and the condition of drain water
  - ⇒ Oil seal for piston pump
    - ∗ Squirt oil around the piston several times a day for continuos operation
    - ∗ Squirt oil before each start-up and when done pumping for manual operations
    - ∗ Check drain cap for leaking
- Check packing gland adjustment
  - ⇒ Centrifugal pump
    - ∗ Adjust if necessary
    - ∗ Replace when gland is within 1/8” of the housing
  - ⇒ Piston pump
    - ∗ Adjust if necessary (avoid sludge messes)
    - ∗ Replace when gland is within 1/4” of the housing
- Check seals
  - ⇒ Water seal
    - ∗ Check leaking rate and adjust if necessary
    - ∗ Check seal water pressure (should be at least 5 PSI greater than the pump discharge pressure)
    - ∗ Check drain to see that it is flowing and the condition of drain water
  - ⇒ Grease seals
    - ∗ Grease when necessary
- Check gauges
- Check controller for proper cycling
- Check valves
  - ⇒ Operate check valve at least once a day
    - ∗ Clogged
    - ∗ Broken shear pin
    - ∗ Broken shaft
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Blowers and Compressors

- Check blowers/compressors and bearings for unusual and/or excessive heat, noises, odors, vibrations, jerking, and slipping
- Check packing
- Check packing gland adjustment
  - ⇒ Adjust if necessary
  - ⇒ Replace when gland is within 1/8” of the housing
- Check seals
  - ⇒ Water seal
    - ∗ Check leaking rate and adjust if necessary
    - ∗ Check seal water pressure (should be at least 5 PSI greater than the pump discharge pressure)
  - ⇒ Grease seals
    - ∗ Grease when necessary
- Check gauges
- Check valves
- Check drip traps and drain when necessary
- Check cooling water flow
- Check for leaks (oil and gas)
- Check temperature of lines
  - ⇒ Lines should be too hot to touch and hold when operating correctly
- Check pressure relief valves

- Check allens for wear, rust, corrosion, and tightness
- Check key ways for wear, rust, corrosion, and tightness
- Check alignment
- Check tension
- Check for vibrations, jerking, and slipping
- Check for unusual noises and odors
- Check lubrication
- Check oil levels
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Chemical Feeders

- Dry feeders
  - ⇒ Check to see that the feeder is actually delivering chemical to solution tank
  - ⇒ Check chemical addition to mixing tank
  - ⇒ Check water addition to mixing tank
  - ⇒ Check water level in mixing tank
  - ⇒ Check mixing action in mixing tank
  - ⇒ Check condition of solution in mixing tank
  - ⇒ If necessary, adjust feed rate to plant flow
  - ⇒ Record pounds of chemical used
  - ⇒ Record water usage
- Solution feeders
  - ⇒ Check solution level
  - ⇒ Check condition of solution in tank
  - ⇒ Check pump (see pump above)
  - ⇒ If necessary, adjust feed rate to plant flow
  - ⇒ Record drawdown
- Check to make sure that there is actually flow, not just that the pumps are pumping
- Perform housekeeping

Valves

- Check position
- Telescopic valves
  - ⇒ Check flow
  - ⇒ At least once a day, operate all of the way down and up to remove debris, and wash down sump
    - ∗ Record number of turns and compare with manufacturer's specifications
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Flow Meter and Recorder

- Check chamber
  - ⇒ Float
    - ∗ Remove rags and scum off of the flow
  - ⇒ Stilling Well
    - ∗ Flush
- Check recorder
- Check flow for unusual colors and odors
- Check water level upstream, thru, and downstream of the flow meter
- Check ink reservoir
- Record flow
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Repressurized Water System (non-potable)

- Check pressure gauges
- Check water level
- Check for unusual colors and odors
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Wet Wells

- Check wet well for debris, scum, and grease balls
- Check flow for unusual colors and odors
- Check water level upstream and in the wet well
- Perform housekeeping -- hose down area, wipe off excess oil and grease, remove debris and dispose of properly, and clean area

Standby Generator

- Check temperature
- Check oil level
- Check fuel tank level
- Check battery
- Check battery chargers
- Check room temperature, lights, and ventilation
- Record gauges and meters
- Perform housekeeping -- wipe off excess oil and grease, remove debris and dispose of properly, and clean area

General

- Enter reading and data in computer
- Check gates and fences
  - ⇒ Check to see that gate is locked
  - ⇒ Check sign to see that they are still visible and readable
  - ⇒ Check fence to see that it is still intact

Weekly

Headworks

- Clean and inspect the channel
  - ⇒ Remove all screenings, debris, and grit
  - ⇒ Hose channel, walls, equipment, and walkways

Hand Cleaned Bar Screen

- Clean and inspect the screen and channel
  - ⇒ Remove all screenings from front and back of screen
  - ⇒ Remove grit from the channel
  - ⇒ Hose channel, walls, equipment, and walkways
  - ⇒ Check the condition of the screen

Mechanically Cleaned Bar Screen

- Clean and inspect the screen, rake mechanism, and channel
  - ⇒ Remove all screenings and debris from front and back of screen, the rake mechanism, and the channel
  - ⇒ Remove grit from the channel
  - ⇒ Hose channel, walls, equipment, and walkways
  - ⇒ Check the condition of the screen, screenings removal mechanism (chain, sprockets, rakes, rake wiper, screen, shroud, and elevator or conveyor), motor, drive, and controls

Screenings Grinder

- Clean and inspect grinder and channel
  - ⇒ Remove all screenings from grinder
  - ⇒ Remove grit
  - ⇒ Hose unit and walkway
  - ⇒ Check condition of the teeth, anvil, motor, drive, and controls

Revolving Drum Comminuter

- Clean and inspect comminuter and channel
  - ⇒ Remove all screenings from the drum and channel
  - ⇒ Remove grit from the channel
  - ⇒ Hose channel, walls, equipment, and walkways
  - ⇒ Check condition of the drum, base seal, cutter bars and teeth, motor, drive, and controls

Moving Wiper Comminuter

- Clean and inspect comminuter and channel
  - ⇒ Remove all screenings from the screen (front and back) and channel
  - ⇒ Remove grit from the channel
  - ⇒ Hose channel, walls, equipment, and walkways
  - ⇒ Check condition of the screen, moving wiper arm, and the cutters (moving and stationary), motor, drive, and controls

Barminuter

- Clean and inspect barminuter and channel
  - ⇒ Remove all screenings from the screen (front and back) and channel
  - ⇒ Remove grit from the channel
  - ⇒ Hose channel, walls, equipment, and walkways
  - ⇒ Check condition of the screen, guide bars, cables, chains, seals, clutches or gears, brakes, cutters, motor, drive, and controls

⇒ Before returning barminuter to service, run cutter up and down to check alignment, length of run, and vibrations or noises

Hand Cleaned Grit Chamber

- Remove grit at least once a week and dispose of properly
- Record amount of grit removed
- Clean and inspect the channel
- Check the flow pattern

Mechanically Cleaned Grit Chamber

- Clean and inspect chamber and equipment
  - ⇒ Check for grit build-up
  - ⇒ Remove screenings, debris, and grit from the channel and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
  - ⇒ Check the condition of the channel, grit removal mechanism (buckets, feet, chain, sprockets, shroud, and elevator or conveyor), motor, drive, and controls
- Check the flow pattern

Aerated Grit Chamber

- Clean and inspect chamber and equipment
  - ⇒ Check for grit build-up
  - ⇒ Remove screenings, debris, and grit from the tank and equipment
  - ⇒ Hose tank, channels, baffles, weirs, walls, equipment, and walkways
  - ⇒ Check the condition of the channel, aeration equipment, grit removal mechanism (buckets, feet, chain, sprockets, shroud, and elevator or conveyor, or air line and cyclone), motor, drive, and controls

Primary Clarifiers

- Clean and inspect tank and equipment
  - ⇒ Circular
    - ∗ Condition of the rubber wipers on the skimmer
  - ⇒ Rectangular
    - ∗ Condition of the flights, feet, chain and sprockets
      - ◊ Chain tension
    - ∗ Grease sprockets
  - ⇒ Watch skimmer and scraper for proper operation
  - ⇒ Remove screenings and grit from the channels and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
- Check the whole weir for even flow
- Check the coupling
- Check the flow pattern
- Fill oilers as necessary
- Oil drive chains

Trickling Filter

- Check oil level in the bearings and drain any accumulated water
- Clean and inspect equipment
  - ⇒ Check for corrosion
  - ⇒ Inspect and clean arms and splash plates
    - ∗ Open end gates and unplug orifices, and properly dispose of debris
    - ∗ Brush splash plates and arms to remove slime
    - ∗ Level
  - ⇒ Check guy wires and turnbuckles for proper tension

- ⇒ Check center column for vibrations
- ⇒ Hose down inside wall to remove slime growth
- ⇒ Remove trash and weeds from filter surface and dispose of properly

- Time and record rotation speed and flow
- Check vents for proper flow

Activated Sludge Aeration Tank

- Clean and inspect tank and equipment
  - ⇒ Check the condition of the air lines and diffusers
  - ⇒ Remove debris from the channel and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
  - ⇒ Clean bypass channel
- Grease turbines
- Fill oilers as necessary
- Check the flow pattern
- Calculate and record F/M, MCRT, and sludge age

Lagoons

- Ponds
  - ⇒ Measure and record the depth of each pond
  - ⇒ Perform housekeeping -- remove debris and dispose of properly, and clean area
- Transfer Structures
  - ⇒ Measure and record the depth of each structure
  - ⇒ Perform housekeeping -- remove debris and dispose of properly, and clean area
- Lab Tests
  - ⇒ Collect and analyze influent and effluent samples for BOD, D.O., pH, settleable solids, suspended solids, ammonia, nitrates, oil and grease, phosphorus, and temperature
  - ⇒ Collect and analyze effluent samples for chlorine residual, coliforms, and turbidity

Final Clarifiers

- Clean and inspect tank and equipment
  - ⇒ Circular
    - ∗ Condition of the rubber wipers on the skimmer
  - ⇒ Rectangular
    - ∗ Condition of the flights, feet, chain and sprockets
      - ◊ Chain tension
    - ∗ Grease sprockets
  - ⇒ Watch skimmer and scraper for proper operation
  - ⇒ Remove debris from the channels and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
- Check the whole weir for even flow
- Check the coupling
- Check the flow pattern
- Fill oilers as necessary
- Oil drive chains

Chlorination

- Clean and inspect chlorine cylinders, chlorinator, piping, contact chambers, exhaust fans, and scales
  - ⇒ Remove debris from the channels and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
- Check and clean water screen
- Check the flow pattern in contact chamber

Anaerobic Digesters

- Clean and inspect lid, gas piping, mixer, furnace, heat exchanger, relief valves, waste gas burner, pressure regulators, and exhaust fan
  - ⇒ Check draft tubes for plugging
- Transfer sludge from bottom of the primary digester to the secondary digester
- Work floating cover seal
- Withdraw excess digested sludge
- Record amount of sludge withdrawn
- Backflush sludge lines
- Fill oilers as necessary

Aerobic Digesters

- Clean and inspect equipment
  - ⇒ Remove debris from the channels and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
- Transfer sludge from bottom of the primary digester to the secondary digester
- Withdraw excess digested sludge
- Record amount of sludge withdrawn
- Backflush sludge lines
- Fill oilers as necessary

Drying Beds

- Clean as soon as sludge is dry
  - ⇒ Clean and inspect all parts and equipment before refilling
- Properly dispose of dried sludge
- Record amount of sludge removed

Sludge Lagoons

- Measure and record the depth of each lagoon

Control Panel

- Clean and inspect panels, switches, alarms, gauges, lights and timers

Motors

- Clean and inspect
- Fill oilers as necessary

Drives

- Clean and inspect
- Fill oilers as necessary
- Shaft
  - ⇒ Grease pillow block bearings
- Gear Reduction Units
  - ⇒ Check to see that shims are in place

Pumps

- Clean and inspect
    - ∗ Centrifugal pumps
    - ∗ Follower, slinger, casting, and seal

  - ⇒ Piston pumps
    - ∗ Piston, seal, shear pin, eccentric, connecting rods, guides, pressure gauges, pillow block bearings, expansion tanks, ball check valves, and oil dripper
    - ∗ Change oil over wrist pin
    - ∗ Grease guides
  - ⇒ Progressive cavity
    - ∗ Seal and pressure gauges
- Repack as necessary
  - ⇒ Check for metal parts
  - ⇒ Properly replace lantern ring
  - ⇒ Check wear sleeve or shaft for wear and roughness
- Fill oilers as necessary

Blowers and Compressors

- Clean and inspect
  - ⇒ Seal, pressure gauges, cooling water, and drip traps
- Record temperatures
- Fill oilers as necessary

Flow Meter and Recorder

- Clean and inspect channel and stilling well
  - ⇒ Check float and cable for wear
  - ⇒ Remove grit and scum
  - ⇒ Check float and cable for wear
- Clean and inspect recorder
  - ⇒ Wind clock
  - ⇒ Change chart
  - ⇒ Check chain
  - ⇒ Check and fill ink reservoir as necessary
- Check the flow pattern

Wet Wells

- Clean and inspect wet well and equipment
  - ⇒ Remove debris from the channels and equipment
  - ⇒ Hose channel, baffles, weirs, walls, equipment, and walkways
- Check the flow pattern

Standby Generators

- Exercise the generators
  - ⇒ Check voltage
  - ⇒ Check cycles
  - ⇒ Check engine
    - ∗ Check for unusual and/or excessive heat, noises, vibrations, and odors, especially burning
    - ∗ Oil levels
    - ∗ Oil pressure
    - ∗ Temperature of manifold, after cooler, and heat exchanger
    - ∗ Hoses for leaks
    - ∗ Fuel pressure
    - ∗ Cooling fan and radiator
    - ∗ Water circulation pumps

- ⇒ Check battery
  - ∗ Charge rate
  - ∗ Water level
- Fill oilers as necessary

General

- Gates and Fences
  - ⇒ Check for vandalism (holes, sections torn down, burrowing under the fence)
  - ⇒ Perform housekeeping -- remove debris and dispose of properly, and clean area
- Surrounding Area
  - ⇒ Check for leaking and ponding
  - ⇒ Perform housekeeping -- remove debris and dispose of properly, and clean area

Monthly

Hand Cleaned Grit Chamber

- Calculate and record velocity and detention time, and compare to design and process standards

Mechanically Cleaned Grit Chamber

- Calculate and record velocity and detention time, and compare to design and process standards

Aerated Grit Chamber

- Blow out all air lines
- Clean diffusers
  - ⇒ Grease swing arm knees
- Calculate and record surface settling rate and detention time, and compare to design and process standards

Primary Clarifiers

- Check the overload system and alarm
- Check for sludge buildup
- Check and adjust sludge pumping schedule
- Check oil levels in worm gear and spur gear
- Calculate and record detention time, surface settling rate, weir overflow rate, removal efficiencies, and sludge production rates, and compare to design and process standards

Trickling Filter

- Flush vents, underdrains and collection boxes
- Check the distribution (pan test)
- Calculate and record the hydraulic and organic loading rates, and removal efficiencies, and compare to design and process standards

Activated Sludge Aeration Tank

- Blow out all air lines
- Clean diffusers
  - ⇒ Grease swing arm knees
- Calculate and record detention time, organic loading rates, and removal efficiencies, and compare to design and process standards

Lagoons

- Ponds
  - ⇒ Check for sludge deposits
  - ⇒ Check for short circuiting
  - ⇒ Check for dead spots
- Transfer Structures
  - ⇒ Clean
- Lab Tests
  - ⇒ Run a D.O. profile in the pond

Final Clarifiers

- Check the overload system and alarm
- Check for sludge buildup
- Check and adjust sludge pumping schedule
- Check oil levels in worm gear and spur gear

- Calculate and record detention time, surface settling rate, weir overflow rate, removal efficiencies, and sludge production rates, and compare to design and process standards

Chlorination

- Calculate and record the chlorine dosage, demand, and residual, and compare to design and process standards

Anaerobic Digesters

- Blow out all gas lines
- Check and adjust digested sludge removal schedule
- Check and record carbon dioxide concentrations in the stack gases from furnaces burning digester gas
- Grease wheels on floating cover
- Calculate and record the detention time, volatile solids loading rate, volatile solids reduction, volatile acid/alkalinity ratio, gas production rates, and the digested sludge production rate, and compare to design and process standards

Aerobic Digesters

- Blow out all gas lines
- Clean diffusers
- Grease swing arm knees
- Check and adjust digested sludge removal schedule
- Calculate and record the detention time, volatile solids loading rate, volatile solids reduction, and the digested sludge production rate, and compare to design and process standards

Control Panels

- Check heaters and electrical connections for corrosion, tightness, and proper operation
- Clean outside of panel
- Turn off power
  ⇒ Vacuum and clean inside

Motors

- Check heaters and electrical connections for corrosion, tightness, and proper operation
- Check draw on each lead wire
  ⇒ All should read the same and agree with the ratings
- Clean outside of panel
- Turn off power
  ⇒ Vacuum and clean inside

Blowers and Compressors

- Clean filters

Flow Meters and Recorders

- Calibrate by hand

Valves

- Operate all valves
  ⇒ Record and compare number turns between full open and full close
- Lubricate all valve stems
  ⇒ Check for wear and broken threads
- Clean
- Check packing
- Telescopic
  ⇒ Grease

- Plug
  ⇒ Grease
- Ball check
  ⇒ Check balls and seats for wear, pitting, and cracks
- Swing check
  ⇒ Operate lever to see if broken shear pin or shaft
  ⇒ Lubricate shaft

Standby Generators

- Check battery
  ⇒ Specific gravity
- Check condition of gauges

Furnace

- Replace filters

General

- Gates and Fences
  ⇒ Check for corrosion
  ⇒ Check signs to see that they are visible and readable

Quarterly

Processes and Equipment

Grit Chamber, Primary and Final Clarifiers, and Chlorine Contact Chambers

- Dye test to check for short circuiting

Laboratory Tests

- Analyze grit for total and volatile solids
- Microscopically examine trickling filter zoogleal mass
- Analyze lagoon transfer structure effluent for BOD, D.O., pH, settleable solids, suspended solids, ammonia, and nitrates

Semi-Annual

Electrical/Mechanical Equipment

- Change oils
  ⇒ Look for metal parts
- Grease

Chlorinator

- Clean and inspect pressure regulator

Control Panels

- Clean and inspect inside of the panel
- Check resistance

Pumps

- Piston
  ⇒ Check drive units and piston alignment and movement
- Progressive cavity
  ⇒ Check condition of the stator, rotor, shaft, and pins

Furnace

- Clean and inspect tubes, firebox, orifices, expansion tanks, and electrode arc gap
- Clean and inspect heat exchanger (sludge tubes)

Yearly

Processes and Equipment

Channels, Headworks, Screening Devices, Comminuters, Barminuters, Grit Chambers, Primary and Final Clarifiers, Trickling Filters, Activated Sludge Aeration Tanks, Chlorine Contact Chambers, Flow Measuring Devices and Wet Wells

- Dewater and inspect all tank parts

Chlorination

- Calibrate scale
- Replace auxiliary valve, pigtail, gaskets, and O-rings
- Clean and inspect interior parts of the chlorinator

Anaerobic Digesters

- Inspect the gas system
- Have gas meter professionally calibrated

Control Panels

- Clean and inspect stabs

Pumps

- Clean and inspect
  - ⇒ Centrifugal
    - ∗ Inspect impeller, volute, shaft, and wear sleeve for wear, pitting, and chipping
- Check tolerances
- Check and record efficiency
  - ⇒ Hydraulic
  - ⇒ Electrical

Blowers and Compressors

- Clean and inspect
- Check tolerances
- Check and record efficiency

Flow Meter and Recorder

- Have professionally calibrated

Every Three Years

Anaerobic Digesters

- Clean tank and inspect equipment

Tips

Greasing

- Don't over lubricate

Changing Oil

- Look for metal parts

Repacking

- Remove and replace all old packing
  ⇒ Check for metal bits
- Properly replace and align lantern ring

