CHAPTER 4—LABORATORY CONTROLS

4.0—General

This chapter in this volume of the Operation and Maintenance Manual deals (concerns itself) with the controls for the sampling systems discussed in the previous volumes. These laboratory tests serve as an operational tool which will enable the personnel to monitor and control each process, and thus the discharge and effluent which will meet the required standards.

Due to the nature of the jobs that the pump stations, retention basin and support systems are utilized for, there is no laboratory equipment or supplies available to the personnel at the site.

For all practical purposes, all testing and result will be furnished by the Grosse Ile Treatment Plant personnel. The operators at WDCC No. 5 will be responsible for transporting the samples to the Grosse Ile plant. Since testing of samples can only be done during normal working hours (7:30 - 3:30) at the Grosse Ile plant, the WCDD No. 5 personnel will have to store the samples until they can be delivered. The samples should be stored in a refrigeration (at 4C) to keep the integrity of the sample.

4.1—Sampling Procedures

The value of laboratory test results depend on how reliable the sample is. To obtain accurate and precise laboratory results, samples must be collected in such a manner so that nothing is added or lost in the sample taken, and that no change occurs during the time between collection and laboratory examination. There are six methods of sampling and collection: a) individual or grab sampling, b) simple composite, c) sequential composite, d) continuous sampling, e) hand proportioned composite, and f) automatically proportioned composite sampling.

a. The grab sample is a single sample taken at a specified point at a certain time. This sample is used where a particular constitutent of the wastewater is throught to have changed considerably from its normal value. It is also used for analysis of a constitutent that does not change abruptly from time-to-time.

b. A simple composite is a group of small samples taken over a specified period and deposited in the same container.

c. A sequential composite requires the collection of a series (usually 2 to 8) of individual samples per container representing a specific time, generally an hour. This is useful when the character of the waste may vary considerably from hour-to-hour, where batch dumping is expected, or where self-cancelling conditions occur.

d. The continuous sample, in which a small amount of sample is collected in continuous flow, is useful for feeding monitors or pilot scale processes, or for sampling receiving waters. This technique is not recommended where the steam is high in suspended solids unless special provisons are made to avoid setting and plugging or partial plugging of the lines.

e. The hand proportioned composite can be obtained where flow charts are available. Individual or sequential composite samples are manually composited in proportion to the flow to obtain this useful and representative sample.

f. The automatically proportioned composite requires the use of the automatic sampling equipment. These samples are in porportion to the amount of flow occurring throughout the different periods of the day to provide a representative average of the different components in the flow.

To prepare a proportional composite sample (if the samplers are out of service), the following stseps should be taken:

a. Determine the flow rate at the time each sample was taken.

b. The total volume of the composite sample depends on the strength of the water to be sampled and on the tests to be performed. The largest composite sample is that of the final effluent which will require:

TABLE 1 - FINAL COMPOSITE SAMPLE

For BOD	100-150 ml
SS	50-100 ml
Phosphorus	25-100 ml
Ammonia nitrogen	25-100 ml
Losses, spills, etc.	50-100 ml

Approximately 500 ml

However, if duplicate tests are to be run on the same sample, 1 liter will be needed.

c. The composite sample is prepared using individual grab samples, none of which should be smaller than 100 ml. The minimum volume of each individual grab sample is then:

d. Add the values of the grab sample volumes just determined. If it is more than the volume needed (1 liter according to Step 2), proceed with the testing. If it is less than the desired total volume needed then a multiplier must be determined.

e. The product of each grab sample volume (Step c times the multiplier will be the amount of the sample required to produce a composite sample of 1 liter.

For example, assume at least 1 liter of composite sample is required. Total sample volume = 100 + 105 + 108 + 102 = 415 ml. Since 1000 ml is needed, a multiplier must be determined as follows:

Multiplier = 1000/415 = 2.4 Multiplying each volume in the third column of the above table gives the volume of sample required to composite 1000 ml shown in the fourth column of Table 2.

Several precautions should be followed in taking a sample. These are as follows:

a. Make sure the container used is clean.
b. Label the sample accurately so that it can be identified later.
c. Refrigerate samples at a temperature of 400 F. +/- if the samples are not to be analyzed immediately.

The samples should be collected with a dipper made of corrosion resistant material. Care should also be taken when choosing the points of sample collection to insure that there is thorough mixing at the sample location.

4.2—Sampling Procedures

It is important that the personnel become familiar where the samplers are located. It is further important that they realize that the analyses which are performed have a definite function and meaning. The frequency and type of sample necessary is usually determined by requirements of the Municipal Wastewater Division of the Michigan Department of Natural Resources.

4.3—Laboratory Procedures

This subchapter presents the laboratory procedures which may be used in conducting the tests on the samplers provided in the Drainage District. Further details regarding these tests can be obtained from the manufacturers' literature on the equipment and instruments which are furnished in the laboratory. Before any laboratory work is attempted, the personnel should read Subchapter 7.6.6 - Special Precautions for Laboratory Safety.

4.3.1 Suspended Solids-The solids content of sludge and mixed liquor is determined using an Ohaus Model 6010 PC moisture determination balance (MDB). This instrument is designed to determine sludge solids content in 15 min., percent volatile solids in 20 min., and mixed liquor total solids in about 30 min. The advantage of using the moisture determination balance is that it replaces 6 pieces of equipment - analytical balance, weights, bird bath heater, drying oven, muffle furnace, and desiccator.

4.3.1.1 Equipment

1. Ohaus Model 6010 PC moisture determination balance (MDB)
2. Aluminum dish

4.3.1.2 Procedure

Sludge solids content

1. Place 10 g of the sludge to be tested in a clean pan. Place the pan on the weighing platform and balance at zero.

2. Swing the lamp over the dish and adjust to the maximum height setting.

3. Set the timer dial to 60 min.

4. Set the heater control to 8 (make sure that the heat is effectively concentrated on the sample).

CAUTION MUST BE OBSERVED IN THIS STEP AND IF VAPORS AND SMOKE APPEAR, THE HEAT DIAL SETTING SHOULD BE LOWERED UNTIL THE SMOKE STOPS. SMOKING MEANS THAT THE SAMPLE IS BEING BURNED RATHER THAN DRIED.

5. Allow the instrument to operate at a heat setting of 8 for 3 min. and then turn the heat control to 6.

6. The sample will dry in 10 min. after setting the dial to 6. This will vary according to how heavy the sample is. The traveling scale on the readout screen will stop moving. This means that the sample is dry and it is time to record data.

7. Read the percent scale and the percent vernier and record the percent moisture loss.

8. Subtract the percent moisture from 100 percent and the percent solids is the result.

9. Read the grams scale and grams vernier and record the dry sample weight.

10. In order to determine the percent of volatile content, use the same sample and refer to the following procedure for volatiles content testing.

4.3.2 Settleable Solids by Volume - This test can be made to show quickly visibly, and quantitatively the volume of settleable solids in the raw waste and effluents. The turbidity removal due to secondary purification processes is evident immediately to the eye. The results are limited quantitatively but are very illuminating to both the untrained and trained operator.

4.3.2.1 Equipment.

1. Imhoff cone, made either of pyrex glass or clear plastic material.
2. Cone support.
3. Long glass stirring rod.
4. Timer

4.3.2.2 Procedures

1. Fill the Imhoff cone to the 1 liter mark with a well mixed sample.

2. Settle for 45 min. and then gently stir the sample with the glass rod to dislodge suspended sample with the glass rod to dislodge suspended matter clinging to the tapered sides of the cone.

3. Settle 15 min. longer; then read the volume of settleable matter in ml/l.

4.3.3 Fecal Coliform Test, Membrane Filter Method - This test is used for identification of fecal contamination of a water supply. Specifically, it serves to prove the presence of the coliform micro-organisms in the water. These organisms exist only in man and animal fecal wastes and do not occur free in nature. They are easily isolated, consistently occur in high concentration when present, and are identified easily.

The coliforms are used as indicator organisms, that is, it is assumed pathogenic organisms may be presented where coliforms exist. Chlorination of the treated wastewater should kill 99.9 percent of the organisms that did not settle out in the sludge. Therefore, this test may be used to determine if a higher residual of chlorine should be used for disinfection control.

4.3.3.1 Equipment

1. Filter holder
2. Filter flask, 1 liter
3. Vacuum - pressure pump
4. Stainless steel forceps
5. Incubator, water bath
6. Plastic petri dishes
7. Waterproof plastic bags
8. Pipettes, 10 ml graduated
9. Rubber hose
10. Filters, type HA, white grid
11. M-FC broth
12. Phosphate buffer, sterile
13. Distilled water
14. Sodium hydroxide
15. Rosolic acid

4.3.3.2 Procedure

1. M-FC Medium

Typtose	1	percent
Proteose peptone no. 3	0.5	percent
Yeast extract	0.3	percent
Sodium chloride	0.5	percent
Lactose	1.25	percent
Bile salts no. 3	0.15	percent
Aniline blue	0.10	percent

Dissolve 1 g of rosolic acid in 100 ml of 0.2 normal sodium hydroxide solution. Add ingredients to distilled water containing 0.01 percent rosolic acid reagent, heat to boiling point and promptly remove from heat. Cool the medium to 45 C. Do not sterilize by autoclaving. The final pH should be 7.4 Store the medium at 2 to 10C and discard any unused medium after 96 hr.

2. To prepare stock phosphate buffer solution, dissolve 34.0 grams potassium diphydrogen phosphate (KH PO) in 500 ml distilled water, adjust to pH 7.2 with 1 N NaOH, and dilute to 1 liter with distilled water. Add 1.25 ml stock phosphate buffer to 1 liter distilled water. Dispense in amounts that will provide 99 +/- 2.0 ml or 9 +/-0.3 ml after autoclaving for 15 min. This buffer can then be used for dilution and for rinsing funnels.

3. Place a sterile type HA filter (grid side up) aseptically in a sterile filter folder.

4. Pour the water sample (50 ml) into the funnel and apply the vacuum to start filtration.

5. Rinse the funnel walls with at least 50 ml of sterile phosphate buffer.

6. Place the filter aseptically in a plastic petri dish containing a sterile absorbent pad saturated with 2 ml of M-FC medium.

7. Invert the bag, place it in a waterproof plastic bag, and incubate submerged for 24 hr in a 44.5 C water bath.

8. Examine the count all blue colonies. Nonfecal coliform colonies are grey to cream colored.

4.3.3.3 Calculations

Fecal coliform colonies per 100 ml = blue colonies counted x 100 ml sample filtered.

CHAPTER 5—RECORDS

5.0—General

Due to the nature of the operation of the units included in the retention structure and support, units, operational records will be necessary.

The maintenance of the units, are discussed in Chapter 9—Preventive Maintenance of Volume 1—Guidebook.

CHAPTER 6—PERSONNEL

6.0—General

There are no personnel especially assigned to the retention structure and system equipment. The responsibility for operating and maintaining the units are the responsibility of the operators of WCDD No. 5 on duty.

CHAPTER 7—PREVENTIVE MAINTENANCE

7.0—General

As with all Chapters in this Volume, the reader (personnel) is urged to study Chapter 8—Preventive Maintenance in Volume 1—Guidebook, before continuing through this Chapter. This Chapter deals with maintenance procedures, including ad equipment record keeping system, planning and scheduling maintenance, inventory system, general lubrication and maintenance procedures.

The remaining part of this Chapter will be divided up into subchapters dealing with the groups of equipment utilized in the retention structure operation.

The contents of these subchapters include a list of equipment, a reference list of manufacturers instructions, shop drawings, set of maintenance schedules, and a spare parts list. Each subchapter is preceded by a blue numbered tab.

DESCRIPTION

METER CHAMBER	1
POLYMER SYSTEM	2
SODIUM HYPOCHLORITE SYSTEM	3
DECANTING AND SLUDGE DRAW-OFF	4
FLUSHING SYSTEM	5
SAMPLING SYSTEM	6
INSTRUMENTATION AND CONTROLS	7
COMPRESSED AIR SYSTEM	8
SUMP PUMPS	9
HEATING AND VENTILATION	10
VALVES AND GATES	11
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MAINTENANCE VEHICLE	13

Meter Chamber

2-24 in. air operated plug (sludge) valves; w/oil-air cylinders actuators, Model ACG 16C8, DeZurik

References

Maintenance instruction A 17639
Installation drawings Y 54300-54249

Spare Parts

Gasket (journal cover)	1
Plug	1
Gasket (body)	1
Gland	1
Rod seal	1
Piston seal	1
O-ring (piston)	1
Seal (cylinder cap)	1
O-ring (cylinder cap)	1
Gasket (housing)	2
Gasket (housing)	2
Seal (gear sector)	2
Gasket (extension)	3

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit: Air Operated Sludge Valves — Unit No.: Meter Chamber

Model: 2400 ACG 16C8 — Manufacturer: DeZurik

Capacity: _____ — Lubricant (type): _____

Motor Mfr.: _____ — See manufacturers instructions

phase: _____ volt: _____

hp: _____ rpm: _____

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check operation of air operated actuators	

Polymer System

1-8 ft dia × 20 ft long, fiberglass polymer storage tank w/liner and appurtenances, Model 86 MHTE, 5750 gal., Owens/Corning Fiberglass

1-Polymer dilution unit (23 in. dia × 36 in. high) w/duplex pumps, Model 682, 50 gal., Aurora Pumps

6-1 in. Polymer dilution valves (air operated) w/cylinder actuators (ASG 5), DeZurik

6-Polymer pumps, Model 7120 H-S-E, Pulsafeeder

References

1. Owens/Corning Fiberglass drawing no. SP 122 and VH 32204
2. DeZurik installation drawings A 18667 and A 14165
3. Pulsafeeder operation and maintenance bulletin No. 4

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Polymer Dilution Unit — Unit No.: Polymer

Model: 682 — Manufacturer: Aurora Pump

Capacity: 20 gpm @ 20 ft TDH — Lubricant (type): _____

Motor Mfr.: GE

phase: 3 — volt: 230/460

hp: $\frac{1}{2}$ — rpm: 1750

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check for signs of leaking	

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Polymer Dilution Valves — Unit No.: Polymer

Model: ASG 5 — Manufacturer: DeZurik

Capacity: 1 in. — Lubricant (type):

Motor Mfr.:

phase: volt:

hp: rpm:

Comments:

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check operation of valves	

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit Polymer Pumps Unit No. Polymer

Model 7120 H-S-E Manufacturer Pulsafeeder

Capacity 25.6 gpm Lubricant (type) _____

Motor Mfr. GE _____

phase 1 volt 230/460 _____

hp $\frac{1}{2}$ rpm 1725 _____

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check pumps for signs of leaking	
2.	Check for any unusual operating signs or noises	

Sodium Hypochlorite System

1–Constant head tank, Durcon
6–Air operated pinch valves, Durcon
2–Two sodium hypochlorite pumps, Durcon

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit: Sodium Hypochlorite Pumps — Unit No.: Sodium Hypochlorite

Model: HR — Manufacturer: Durcon

Capacity: 100 gpm — Lubricant (type): _____

Motor Mfr.: Eakins

phase: 3 — volt: 230/460

hp: 5 — rpm: 1800

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check pumps for signs of leaking	
2.	Check for any unusual operating signs	

Decanting System

2–22 in. vertical decanting pumps, mixed flow, w/20 in. discharge elbow and appurtenances, Peerless Pump

References

Drawing No. 2732648

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit Decanting Pumps Unit Decanting

Model 233005-06 Manufacturer Peerless Pumps

Capacity 5000 gpm @ 30 ft 10,000 gpm @ 10 ft Lubricant (type) _____

Motor Mfr. GE

phase 3 volt 466

hp 75 rpm 870

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check to see that the unit is functioning properly	
2.	Check all electrical connections	
3.	Check all bolts and nuts	
4.	Check grease reservoir	
5.	Check motor for overheating	

Flushing System

3-Flushing pumps, w/motor, vertical mounting, single stage, double suction, split case, Series 8000, Model 250, Allis-Chalmers

2-Backwash stainers w/motors, self-cleaning, Model AP, S.P. Kinney

E-1, E2, E3

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit Flushing Pumps — Unit Flushing

Model 250 Series 8000 — Manufacturer Allis Chalmers

Capacity 3100 gpm @ 123 ft TDH — Lubricant (type) AMOBAR GREASE No. 2

Motor Mfr. US Motors — MINERAL GREASE WITH A SODA SOAP BASE.

phase 3 volt 460

hp 150 rpm 1800

Comments:

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	MONTHLY	
1.	Check bearing temperature	
	QUARTERLY	
1.	Check grease lubricated bearings for saponification. Inspect	
	and regrease if necessary	
	SEMI ANNUALLY	
1.	Check packing and replace if necessary	
2.	Check sleeve and shaft for scoring	
3.	Check alignment of pump and motor. Shim up units if	
	necessary	
	ANNUALLY	
1.	Remove rotating element, inspect for wear.	
2.	Check wearing clearances	
3.	Measure total dynamic suction and discharge head	

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Backwash Strainer — Unit No.: Flushing

Model: AP — Manufacturer: S.P. Kinney

Capacity: _____ — Lubricant (type): _____

Motor Mfr.: Reliance — A. Pennzoil cylinder No. 2 & 32 F

phase: 3 — volt: 230/460 — B. Pennzoil Maxol E.P. No. 4-32F

hp: $1\frac{1}{2}$ — rpm: 860 — C. Sun Prestige EP 742

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	MONTHLY	
1.	Check oil level, add oil if necessary	A, B
2.	Grease main shaft bearings and packing lantern	C
	YEARLY	
1.	Drain, flush, and refill	A, B

Sampling System Equipment

2-Automatic composite samplers, Sentinel Series VI, N-Con Systems Co., Inc.

References

1. Sentinel Engineering, Operating and Maintenance Manual.
2. Automatic sampler submittal data.
3. General arrangement—refrigerated model, drawing no. 1530/8 and 1559/3
4. Electrical wiring diagram, drawing no. 1670
5. Detailed sequence of operation, drawing no. 1658.

Spare Parts

1-Control timer, sampling frequency (1TR)
1-Thermal relay (2TR)
1-Control relay (1CR)
1-A contact N/O switch blocks
1-B contact N/O switch blocks
1-Sampler dipper, 30 ml
1-Motor operator, dipper driver
1-Sampler bottle, 2 gallon
2-Fuse, 1.5 amp 3 AG
2-Fuse, 1/2 amp S/O BLO AG
4-Lights bulbs, 110V type, TE-1/4 bayonet
1-Spray bottle, 200M cleaner

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Samplers — Unit No.: Effluent & Decanting

Model: Sentinel Series VI

Capacity: 10 to 25 gpm

Motor Mfr.:

phase: 1 volt: 115

hp: rpm:

Comments:

Manufacturer: N-CON Systems, Inc.

Lubricant (type):

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY (if necessary)	
1.	Clean waterline deposits off of sampling chamber walls.	
2.	Defrost refrigerator by turning off unit and dust	
	condensor fins before returning sampler to service.	
3.	Flush sampler inlet lines and sample chamber with	
	algicide/bacteriocide—DO NOT USE ABRASIVE	
	CLEANERS (clean sample tube with bottle brush)	
4.	Every two years, have a trained refrigeration service	
	personnel check the Freon 12 level in each refrigeration	
	unit.	

Instrumental Equipment

3-Operations recorders, model A620x, flush mounted, Esterline Angus
6-Level and flow recorders, series 2600, Bristol
6-Level and flow indicators, 51 PG/PM1000, Fisher and Porter
5-Air bubbler systems, model 2D08-10B, Bristol
2-Level over the outlet weir sensor, series 50805 and 508-15, Drexelbrook
6-NaOCl, tank level sensors, model 157, Robert Shaw
9-Im pulse counters, 133 CO38U01, Landis and Gyr, Inc.
1-Stepping drum programmer, model 2000-AG, Tenor
1-Magnetic flow meter, 55UC 1000, Fisher and Porter
1-Level indicator, 1321, Fisher and Porter

References

1. Contract drawings I-1 thru 1–5, and E-1 thru E-7
2. Esterline Angus Bullentin D-300
3. Badger Analog and Pulse Imput Receiver 2600
4. Drexelbrook data sheet 508-5 and 508-15
5. Robert Shaw drawing 909-622-326
6. Tenor bullentin 200A
7. Fisher and Porter Bullentin 55UC 1000, 54-1321, 51 PG, 1 PM 1000, and drawing OD-51-1484
8. W. D. Gale drawing EC-7

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit Instrumentation — Metering Chamber & Retention Tank

Model (See Equipment List)

Capacity

Motor Mfr.

phase volt

hp rpm

Comments:

Manufacturer

Lubricant (type)

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check units for proper operation	
2.	If necessary, replace recorder charts, and check ink supply	
3.	Record totalize figure, and read gauge	
	ANNUALLY	
1.	Have instruments inspected and if necessary, cleaned and	
	calibrated by a factory trained technician.	

Compressed Air Equipment

2-Air compressors, 3 stage/2 stage, 3 hp, 720 rpm, 230/460 V, 3ph, TEFC motor, V-belt drive, automatic drain valve, oil pressure shutdown switch, 250 psi 120 gallon receiver (model Fq 310-120), Quincy

2-Compressor air dryers, heaterless, molecular sieve, twin tower, fully automatic air dryer, 175 psi, Deltrech Eng

2-Compressed air filters, series 200, model 210, 250 psi, Deltrech Eng

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit: Air Compressor — Flushing & Decanting Bldg

Model: FQ 310-120 — Manufacturer: Quincy Compresser

Capacity: 250 psi — Lubricant (type):

Motor Mfr.:

phase: 3 — volt: 230/460

hp: 3 — rpm: 1750

Comments:

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check operation of compressor for overheating, vibrations	
	and noise.	
2.	Test compressor pressure switch (by reading discharge	
	gauge) to insure that the unit starts and stops at the	
	proper levels	
3.	Drain receiver tank and open mosture trap, and remove	
	all accumulations of liquid from the system.	
	MONTHLY	
1.	Inspect condition of intake airfilter, clean and replace as	
	required.	

Sump Pumps

2–Submersible sump pumps, 50 gpm, 3 hp, 460 v, 3 ph, Model SEB-2 1/2-6050 SF, Weil Pump Co.
2–Submersible sump pumps, 75 gpm, 1 1/2 hp, 460 v, 3ph, Model SEB-2, Weil Pump Co.
2–Submersible sump pumps, 150 gpm, 3 hp, 460v, 3ph, Model SE 4-SE-4521 SF, Weil Pump Co.

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Sump Pump — Unit No.: Meter Chamber

Model: SEB-2 $\frac{1}{2}$-6050 SF — Manufacturer: Weil Pump Co.

Capacity: 50 gpm @ 49 ft TDH — Lubricant (type):

Motor Mfr.: Weil

phase: 3 — volt: 460

hp: 3 — rpm: 1750

Comments:

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check operation of pumps for excessive noise or vibration	
	ANNUALLY	
1.	Remove pumps from sump and inspect for wear, and	
	pump motor signs of leakage	

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Sump Pump — Unit No.: Wet Well

Model: SE-4-SE 4521 SF — Manufacturer: Weil Pump Co.

Capacity: 150 gpm @ 28 ft TDH — Lubricant (type):

Motor Mfr.: Weil

phase: 3 — volt: 460

hp: 3 — rpm: 1150

Comments:

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check operation of pumps of excessive noise or vibration	
	ANNUALLY	
1.	Remove pumps from sump and inspect for wear, and	
	pump motor housing for signs of leakage	

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit: Sump Pump — Flushing and Decanting Bldg

Model: SEB-2 — Manufacturer: Weil Pump Co.

Capacity: 75 gpm @ 24 ft TDH — Lubricant (type):

Motor Mfr.: Weil

phase: 3 — volt: 460

hp: 1 1/2 — rpm: 1150

Comments:

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check operation of pumps for excessive noise or vibration	
	ANNUALLY	
1.	Remove pumps from sump and inspect for wear, and	
	pump motor housing for signs of leakage	

Heating and Ventilation

Ventilation Equipment

2–Exhaust fans, 7000 cfm, $\frac{3}{4}$ hp, $\frac{1}{8}$ sp, Model RB 302,
1–Exhaust fan, 8400 cfm, $1\frac{1}{2}$ hp, $\frac{1}{8}$ sp, Model RB 302
1–Exhaust fan, 3000 cfm, $\frac{1}{4}$ hp, $\frac{1}{8}$ sp, Model LB 242,
2–Supply fans, 17,500 cfm, $7\frac{1}{2}$ hp, Model Q,
1–Exhaust fan, 4000 cfm, $\frac{1}{2}$ hp, $\frac{1}{8}$ sp, Model LB 242,
1–Exhaust fan, 1800 cfm, $\frac{3}{4}$ hp, $\frac{1}{2}$ sp, Model CB-051
1–Exhaust fan, 2500 cfm, $\frac{3}{4}$ hp, $\frac{1}{4}$ sp, Model CB-051

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit Supply and Exhaust Fans — Retention Basin & Meter Chamber

Model See Table 3

Capacity

Motor Mfr.

phase volt

hp rpm

Comments:

Manufacturer

Lubricant (type)

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check the overall operation of each unit for proper	
	function or indication of trouble.	
2.	Check overheating, noisy operation or vibrations of the	
	fans	
	MONTHLY	
1.	Check all belts for fraying, crackling and tension, replace	
	and adjust as necessary.	
	QUARTERLY	
1.	Remove and clean filters	
2.	Oil fans 6 to 7 drops is sufficient	

SCHEDULE OF PREVENTIVE MAINTENANCE

Unit: Unit Heaters

Model: See Table 3

Capacity: _____

Motor Mfr.: _____

phase: _____ volt: _____

hp: _____ rpm: _____

Comments: _____

Retention Basins & Meter Chamber

Manufacturer: _____

Lubricant (type): _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Check grille for lint and dust, clean as required.	
2.	Check units to see that they are operating properly.	
	Check for noise or vibration.	

Valves and gate procedures may be found in the discussion in Subchapter 3.12 VALVES AND GATES.

Hoists

2–Motor driven hoist and trolley, 5 ton capacity, AAI Industrial Division

SCHEDULE OF
PREVENTIVE MAINTENANCE

Unit: Hoist — Unit No.: Retention Basin

Model: _____ — Manufacturer: AA1 Industrial Division

Capacity: 10,000 lb. — Lubricant (type): A NLG1 & 2

Motor Mfr.: AA1 Industrial — B. SAE Gear Lubricant No. 40

phase: 3 — volt: 480 — C. Lithium Soap w/Grease box

hp: $8\frac{1}{2}$ — rpm: 1800

Comments: _____

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

No.	Preventive Maintenance	Lubricant
	WEEKLY	
1.	Grease ball bearings	A
2.	Grease needle bearings	A
3.	Lubricate gears	C
4.	Lubricate load chain	B
5.	Clean breaker surfaces	
6.	Clean entire unit	
	SEMI-ANNUALLY	
1.	Check chains for wear	
2.	Inspect brakes and replace any badly worn brake	
	assemblies.	

Maintenance Vehicle

1-One man, toboggan type chassis, off-the-road tracked vehicle. The vehicle is equipped w/a three speed automatic transmission, 300 cu. in., 134 hp at 3300 rpm, in-line overhead valve, six cylinder gasoline engine, model SW 48FA, Bombardier

References

1. Operator's manual, SW48FA
2. Parts manual, SW 48FA
3. Guide to safe driving of off road tracked vehicles
4. Ford Maintenance and Operator's manual, 16 gasoline 300 cu. in. engines
5. Parts lists, 6 cylinder gasoline engines
6. Ford parts and service directory

SCHEDULE OF
PREVENTIVE MAINTENANCE

Maintenance Vehicle

Unit _____ Unit No. _____

Model SW-48FA

Capacity _____

Motor Mfr. Ford

phase _____ volt _____

hp 134 rpm 3300 cu. 300

Comments: _____

Manufacturer Bombardier

Lubricant (type) _____

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No.	Preventive Maintenance	Lubricant
	10 HOURS or DAILY	
1.	Check engine oil, coolant level in radiator, track, tires	
	sprockets and suspension	
	50 HRS or WEEKLY	
1.	Check transmission, differential, governor and hydraulic	
	oil levels.	
2.	Lubricate wheel bearings	Multi purpose grease
3.	Check battery and electrolyte level	
4.	Inspect tracks, tires and sprockets.	
5.	Inspect and lubricate tracks and throttle	
6.	Inspect all belts	

Unit _____ Maintenence Vehicle _____ Unit No. _____

No.	Preventive Maintenance	Lubricant
	100 HOURS	
1.	Replace engine oil and filter	10W-30
2.	Lubricate u-joints and steering levels	Multi-purpose grease
3.	Check air cleaner	
	200 HOURS	
1.	Inspect brake bands	
2.	Check transmission oil	
	600 HOURS	
1.	Replace transmission oil	
	YEARLY	
1.	Replace engine coolant	
2.	Replace air filter	
3.	Replace hydraulic oil	
4.	Replace fuel filter	
5.	Replace plugs, points and condenser	