EXHIBIT 10

TAB 4-L

BOOK I OF 3

CD- EXH 10

TAB 4L

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

January 21, 2003

(b)(6)
Fort Lewis WWTP
PW, AFZH-PWO-R
Box 339500, Bldg. 2012
Ft. Lewis, WA 98433-9500

Dear (b)(6)

(b)(6) and I enjoyed our visit to your facility on December 5th. Thanks for showing us around and explaining the operation. We have reviewed your permit application and the annual reports from the last 3 years. The data indicates significant improvements in biosolids quality since 1998, and supports your comments to that effect during our meeting.

There are only a few issues to be addressed before we can issue final approval of coverage under the statewide general permit. The destination of your biosolids is Fire Mountain Farms, which operates as a beneficial use facility under its own permit coverage. They specify that Ft. Lewis biosolids are land applied in the Burnt Ridge and Lincoln Creek units. Fire Mountain Farms has several additional units. It is important that you have knowledge of the proper management of your biosolids, even and especially when they are handled by another party. You should plan on visiting the Fire Mountain Farms sites at least once per year during the time they are applying your biosolids. That way you can assure yourself that the biosolids are being managed according to your contract specifications, and in accordance with your permit coverage and the biosolids rule.

You will need to develop and follow a sampling plan. If you were to leave there might be a less than adequate understanding of what is necessary. The plan need not be overly long and should be a practical sort of document that a reasonably knowledgeable person could pick up and work with. It should include a diagram of the drying beds and a brief description of how biosolids are managed and consolidated in the beds. We understand this can vary from year to year, so you need not commit to a specific sequence. Rather, you should provide approximate dates of sampling events relative to activities such as consolidation or removal for land application. You will need one sampling protocol for metals and one for fecal coliform. There is no hard formula for this plan. The goal should be to obtain representative samples with consistent results.

Note

Metals sampling can be done pretty much at any time during the year. We would like you to sample material representing at least 25% of the beds. You could sample a random number of

individual beds prior to consolidation, or you could sample the consolidated beds after June. Composite sampling is a common technique which we recommend here. You should make decisions on these matters and also describe how you will randomize individual samples. Let us know if you have questions. We will be happy to review and work with you on a draft sampling plan. Sampling frequency can be reduced if a solid baseline of data is established which documents biosolids quality consistently below the Table 3 values. You may wish to build such a proposal into your sampling plan.

- For fecal coliform (Class B pathogen reduction), samples should be taken from the material that will be removed for land application, ideally 30 days or less before moving the material offsite. The regulatory standard for fecal coliform densities is for less than 2,000,000 most probable number (MPN) per gram of total solids. This standard must be achieved by calculating the geometric mean of seven representative samples. The method for computing the geometric mean is described in Appendix 2 of the Biosolids Management Guidelines for Washington State, revised July 2000. There should be 7 samples taken from random depths and locations.

Please submit your sampling plan for our review. Once we agree on your sampling plan we will conduct SEPA review. After that you will need to carry out public notice, which we can also assist you with. Once public notice is completed and any comments received are resolved we will be able to issue a final letter of approval. We still need to resolve the question of the permit fee, but that will be done at other levels of administration. Call me if you have any questions at (360) 407-6060.

(b)(6)

Sincerely,

Steve Loftness

Steve Loftness
Solid Waste and Financial Assistance Program

cc: (b)(6) TPCHD
Wynn Hoffman, Ecology SWRO

Waste Water Reporting Requirements

Requirement	Frequency	Due	Format	Responsibility	Submitted To	POC
Discharge Monitoring Report	Monthly	10th	DMR	WWTP/Front	EPA WOO	Chae Park
Effluent Metals	Semi-Ann	15 - Dec, 15 - Jun	lab report	WWTP/ENRD	EPA WOO	Chae Park
Total Nitrogen (TKN, N, nitrate, nitrite)	Semi-Ann	15 - Dec, 15 - Jun	lab report	WWTP/ENRD	EPA WOO	Chae Park
Whole Effluent Toxicity (WETT)	Twice per permit	Jun07 Jan08*	report	WWTP/ENRD	EPA WOO	Chae Park
Biosolids-Metals (Collect Jun/Dec)	Annual	Fed	letter format	WWTP/ENRD	DOE/EPA	Chae Park
Biosolids-Pathogen (Collect Sep)	Annual	1-Mar	letter format	WWTP/ENRD	DOE/EPA	Chae Park
I/I Report	Annual	15-Jun	letter format	WWTP/ENRD	EPA WOO	Chae Park
DMR QA (Blind Lab Testing)	Annual	1-Sep	lab report	WWTP	DMR/QA Coord	Chae Park
Outfall Evaluation (Diffusers)	Once per permit	31-Jan-06	report	WWTP/ENRD	EPA WOO	Chae Park
NPDES Permit Application	Every 5 years	31-Jul-08	Permit Application	WWTP/ENRD	EPA WOO	Chae Park

* WET test required one summer and one winter prior to permit application which is due 6 months prior to permit expiration Feb 1, 2009.

EPA Region 10 - NPDES Compliance Unit

Position	Name	Number	Email
Manager	Kim Ogle	(206) 553-0955	ogle.kimberly@epa.gov
Permit POC	Lisa Olsen	(206) 553-0176	
Compliance POC	Chae Park	(206) 553-1441	park.chae@epa.gov
Correspondence POC	Mike Lidgard		lidgard.michael@epa.gov
Permit Writer	Dave Ragsdale	360-407-6589	dave.ragsdale@epa.gov

Address:
EPA Region 10
1200 Sixth Avenue, OCE-133
Seattle, Washington 98101
Fax: (206) 553-1280
Noncompliance Reporting Line: (206) 553-1846

5 USC § 552 (b) (6)

[redacted] (Train Sup qualifications + Training)

5 USC § 552 (b) (6)

Shop	Name	Type of Training	Title of Training	Due Date	Last Date Completed
646	(b)(6)	Certification (CEUs)	Wastewater	12/31/06	Dec-03
646	(b)(6)	ISO 14001	Spill/Emergency Response	12/31/03	Oct-03
646	(b)(6)	ISO 14001	Awareness	12/31/03	Jun-03
646	(b)(6)	Policy/Procedure	ECO	04/30/04	May-03
646	(b)(6)	Safety	Forklift	06/30/04	Jun-02
646	(b)(6)	Safety	Confined Space Instructor	05/31/04	Jun-03
646	(b)(6)	Safety	HAZCOM	06/30/04	Oct-03
646	(b)(6)	Safety	Lockout/Tagout	06/30/04	Jun-03
646	(b)(6)	Policy/Procedure	Suicide Prevention	12/09/03	12/09/03

Just for Info

PROCEDURES FOR EVALUATING PERFORMANCE OF WASTEWATER TREATMENT PLANTS

A Manual

Prepared for

Environmental Protection Agency
Office of Water Programs
Washington, D.C.

Under Contract No. 68-01-0107

by

URS RESEARCH COMPANY
Environmental Systems Division
San Mateo, California 94402

MAINTENANCE DATA*. The maintenance program is usually a good indicator of operational quality; this can be indicated by checking:

- Manufacturer's maintenance schedule for components
- Type of routine being used for maintenance scheduling (as compared with Appendix H)
- Personnel qualifications for the type of maintenance work being performed.

PROCEDURES FOR PROBLEM EVALUATION

In general, the problems detailed in the manual are those most commonly encountered. However, these procedures can be used for any type of problem evaluation. The first step in problem evaluation is to determine if the plant is meeting design performance standards by comparing its effluent quality and overall removal efficiencies with those specified by the design (if design specifications are not available, compare the plant's performance against the guidelines given, see Appendix A). If the plant does not routinely meet performance specifications, it will be necessary to determine whether the deficiency is due to problems which fall into two categories:

PROBLEM DEFINED--If the treatment plant operator has defined the problem:

a. Verify general area of problems, such as related to process, maintenance or design, sampling, etc.

b. For common process problems, refer to that section of the manual dealing with the problem (see Section IV).

c. Develop sampling and testing program to provide additional data, if needed (see Section III).

PROBLEM UNSPECIFIED--If effluent discharge does not meet required standards and no definite problem area has been established:

a. Review flow and process records again in greater detail.

b. Recheck sampling and testing procedures required (see Section III).

c. Compare sampling and testing program against recommended programs in the manual.

d. Recommend a modified testing and sampling program to furnish additional data for evaluation (see Section III).

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* Refer to O & M manual requirements.

e. Compare the data with the problem indicators detailed in the manual (see Section IV) to see if there is a solution offered.

f. For those problems not specifically covered in the manual, and if the evaluator's experience does not suffice, should be recommended that a consultant be hired.

MAINTENANCE PROBLEM--Refer to sample maintenance program (see Appendix H) and compare with actual plant program; recommend new program where needed.

TOTAL PLANT EVALUATION

This should include the following:

1. TOTAL EVALUATION OF PLANT--utilizing the Evaluation Guide materials at the end of this section

   (a) Modification of initial evaluation, if appropriate

   (b) Differences in existing plant performance and operational data with design and/or manual operational or performance data

   (c) Personnel needed for adequate operation*

   (d) Type of sampling program required to give needed data

   (e) Maintenance system needed

   (f) Laboratory equipment needed

   (g) Problems encountered

   - Those corrected by visit
   - Those that need outside help to correct
   - Proposed solutions.

2. FINAL REPORT--should contain the following elements:

   (a) Summary of on-site visit

   (b) A list of problems encountered

   (c) Solutions recommended

   (d) Proposed action.

---

* See EPA Staffing Guides.

Table II-1

PRETREATMENT AND PRIMARY TREATMENT DATA *

Unit Operations or Process	Operational Parameters	Loading Rates	Accumulated Material (Sludges, etc.)	Support Systems
Racks	Bar Spacing in Inches[2]		Cubic feet/MG[1]	Power for mechanically cleaned racks, conveyor belts, grinders
o coarse	1 - 2		3/4 - 3	
o medium	1/2 - 1		3 - 8	
o fine	1/32 - 1/4		5 - 30	
o mechanically cleaned	As small as 5/8 [3]			
Grit Chambers	Flow Velocity:	Mesh of Grit to Be Removed / Overflow Rate*** gal/sq ft/ day	Cubic feet/MG	Power for mechanical cleaning, cyclone operations, and for pumps to supply air. Conveyor system to remove grit.
o Air injected	0.75 to 1.0 ft/sec	35 — 73,000	2 - 8	
		48 — 51,000		
		65 — 38,000		
		100 — 25,000		
		Air Requirement: .025 to .05 cu ft/gal		
Cutters-Shredders (comminuters)	Capacities: 0.35 to 25 MGD[1] or 650-5,200 lb/hr			Power: 1/4 to 3.5 hp motor
Pre-Aeration	Detention Time: 15-45 min.	Air Requirement:[1] .005 to .2 cu.ft/gal or 25 - 40 psi; Overflow Rates:[1] 2000-6000 gal/day/sq.ft	Volume of skimmings: 0.1 to 6 cu.ft/MG or 200 cu.ft/ 1000 person/yr	Cleaning units for diffusors, power supply for air supply.
Sedimentation	Detention Time[2] (hr)	Overflow Rates gal/day/sq ft		
Primary sedimentation before activated sludge	0.75 - 1.0	1,500 - 1,000	Sludge accumulation is approximately .038 cu ft/ capita or 3,500 gal/mg of flow	Cleaning mechanism for units without mechanical scrapers and skimmers. Sludge pumps and power supply for those with pumps and mechanical skimmers.
Imhoff tanks	2.5	600		
Primary sedimentation tanks before trickling filters	2.0 - 2.5	600 - 900		
Intermediate sedimentation between multistage trickling filters	2.0	1,000		
Final sedimentation after activated sludge	2.0	800		
Final sedimentation after standard trickling filters	2.0	800		
Final sedimentation after high-rate trickling filters	2.0	800		
		Weir loading rates: <1 MGD; 10,000 gal/linear ft[4] >1 MGD; 15,000 gal/linear ft		
Chemical Precipitation			Sludge contains chemical high water content and is twice the volume produced from plain sedimentation	Dosing, mixing, flocculation; and sedimentation units; where existing sedimentation units are not being used.

Chlorination[5]	Chlorine residual: 2 mg/l; Contact time: 15 min	Probable Chlorine Requirements		Chlorinator Capacities[2]		Scum and grease accumulated in contact chamber.	Chlorinators, chlorine leak detection equipment baffled contact tank unless adequate contact time is provided in a wastewater outfall or conduit. Safety equipment: Scott air packs, cylinder repair kits, ventilation system. Chlorine residual analyzer scales, evaporators, CPRV
Type of wastewater or effluent:		mg/l	lb/day per 1,000 persons*	mg/l	lb/1,000 persons*		
Raw wastewater, depending on strength and staleness		6-25	5-21	30	25		
Settled wastewater		5-20	4-17	25	20		
Chemically precipitated wastewater		3-20	3-17	25	20		
Trickling filter effluent		3-20	3-17	25	20		
Activated sludge plant effluent		2-20	2-17	25	20		
Intermittent sand filter effluent		1-10	1-3	15	12		

* For background information see Appendix C
** For wastewater flow of 100 gpcd
*** For approx. specific gravity of 2.31

NOTE: 1/ Steel
2/ Imhoff-Fair
3/ 10-State Standards, 1971 edition
4/ ASCE Std Manual
5/ Local requirements should prevail

Table II-2

SECONDARY TREATMENT DATA *

Trickling Filters

Operational Parameters

Recirculation Rate for Maximum BOD of Settled Wastewater

BOD mg/l	1/ Recirculation Ratio
130	1:1
170	2:1
220	3:1
260	4:1

Loading Rates

	Low Rate Filter	High Rate Filter
Hydraulic Loading		
gal/day/sq ft	25-100	200-1,000
million gal/acre/day	1.1-4.4	8.7-44
Organic Loading		
lb/1,000 cu ft/day	5-25	25-300
lb/acre ft/day	220-1,100	1,100-13,000

Support Systems

Dosaging tanks
recycle pumps
power supply

Intermittent Sand Filters

Operational Parameters

Depth of sand 3½-4 ft
Head on filter, 5 ft

Loading Rates

Loading 75,000-125,000 gal/acre/day
Solids 2 lb/5 sq ft/day

Support Systems

Dosing siphon of flow distributor

Stabilization Pond or Lagoon 2/

	Detention (days)** (months)	Depth (ft)	Algae Concentration 4/ (mg/l)	Loading Rates lb/acre/day	Support Systems
1. Large holding reservoir					
2. Stabilization pond					
(a) Facultative	7-30	2-5	10-50	20-50	
(b) High rate	2-6	½-1	100	100-200	
3. Aerated lagoons	1 or 2 - 14	6-15			Aerators
4. Anaerobic	30-50	8-10		300-500	

Final clarification Following

	Overflow Data gals/day/sq ft 3,5/	Support Systems
Low-rate trickling filters	800-1,000	Sludge pumps, power supply for mechanical sweepers, pumps recirculation pump
High-rate trickling filters	800	
Activated sludge (over 2.0 mgd)	800-1,000	
Activated sludge (under 2.0 mgd)	800	

Detention Time (hrs) for Overflow Rates & Depth of Tank 3/

Overflow Rate gal/day/sq ft	Depth 7 ft	8 ft	10 ft
600	2.1	2.4	3.0
800	1.6	1.8	2.25
1,000	1.25	1.4	1.75

Package Aeration Plants

Operational Parameters

Flow Rate: 400 gpc/dwelling or 100 gpc/day

Detention Time for: aeration tank 24 hrs
clarifier 4 hrs

Recirculation rate: 1:1

Loading Rates

Organic load:
10-20 lb BODs/1,000 cu ft of areation tanks/day

Air Supplied:
2,100 cuft/lb BOD/day

Support Systems

Power supply
sludge pumps

Activated sludge System & ponds (see table)

---

* For background information see App. D.

** Unless otherwise noted

NOTE: 1/ Now parallel systems
2/ After 1960, Eckenfelder, O'Connor
3/ ASCE STD manual
4/ Algae concentration in suspension
5/ 10-State Standards 1971

Table II-5

SOLIDS TREATMENT DATA*

Unit Operations or Processes	Operational Parameters		Loading Rates		Support Systems
Anaerobic Digestion	pH	6.8-7.2	Loading of Heated Tanks,** lb volatile solids per cu ft per month[1/]		Heat exchangers Circulation pumps o Gas o Sludge
	Temperature	85-95°F			
	Detention	30 days			
	Gas production	12 cu ft/lb volatile matter reduced			
Sludge produced for Anaerobic Digestion by:			Conventional operation	High-rate operation***	
Plain sedimentation			5.0	11	
Plain sedimentation and trickling filtration					
Low-rate operation			4.6	9	
High-rate operation			4.4	9	
Plain sedimentation and activated sludge					
High-rate oporation			4.4	9	
Conventional operation			3.6	7	
Aerobic Digestion	Dissolved oxygen 1.0-1.5 mg/l Detention times 20-30 days				Supernatant Solids Removal Equipment
Sludge Thickening					
Gravity thickener			Overflow gal/sq ft/day	Loading lbs/sq ft/day	Sludge pumps Power supply
o Secondary sludge			400	8	Mechanical comb for water separation
o Activated sludge[3/]			500	8	
Flotation					Diffusers Air supply Sludge pump
Sludge Drying Beds for:	Area in sq ft per capita				Sludge pumps
	Open beds	Covered beds			
o Primary precipitation	1.00	0.75			
o Standard-rate filter[2/]	1.25	1.00			
o High-rate filter[2/]	1.50	1.25			
o Activated sludge[2/]	1.75	1.35			
o Chemical precipitation	2.00	1.50			

* For background information see App. F.
** Tank at 90°F
*** Thickened to twice original solids content

NOTE: 1/ Table, Imhoff-Fair, Chapter 12
2/ These treatments include primary sedimentation
3/ Steel, p. 586

Note: Operational Parameters and Loading Rates information was not available for Sludge Thickening, Flotation, at time of publication.

Table II-6

COMMON SOLIDS TREATMENT DATA*

Type of Sludge	Amounts of Chemicals Commonly Employed in Conditioning Unelutriated Sludge and Yields of Vacuum Sludge Filters: Conditioner, % of dry sludge solids — CaO	— $FeCl_3$	Dry Solids lb per 1,000 persons daily	Filter Capacity lb per sq ft per hr, dry basis	Cake Solids %	Required Filter Area, sq ft per 1,000 persons daily	Sludge Cake, lb per 1,000 persons daily	Conditioner, lb per 1,000 persons daily — CaO	— $FeCl_3$	Support System
Plain sedimentation (primary)										Dosing equipment Power supply Sludge pumps Elutriation tanks Chemical storage
1. Fresh sludge	10	3	143	5	32	1.2	450	12	3.6	
2. Digested sludge	10	2	89	6	32	0.6	280	7.5	1.5	
	0	6	78	6	28	0.5	280	0	4.5	
Plain sedimentation and low-rate trickling filtration										
3. Fresh sludge mixture	12	3	183	4	28	1.9	650	18	4.4	
4. Digested mixed sludge	12	2	117	6	30	0.8	390	11	1.9	
	0	7	99	6	26	0.7	380	0	6.7	
Plain sedimentation and conventional activation										
5. Fresh activated sludge	0	6	71	2.5	20	1.2	350	0	4.1	
6. Fresh settled sludge mixture	0	6	195	4	22	2.1	880	0	11	
7. Digested mixed sludge	0	8	129	2.5	22	2.1	580	0	9.7	

*Adapted from Imhoff-Fair, 2nd edition. For background information, see Appendix F.

Section III

SAMPLING AND TESTING

INTRODUCTION

The sampling and testing program described in this section is designed to determine

- the type of sampling to be done
- the locations of sampling points
- the analyses to be performed for the particular treatment system.

In addition, recommended storage temperatures and durations are given, as well as a list of the laboratory equipment that will be needed to perform the various analyses. Sample forms are included which are intended as aids for the systematic recording of the results of the various analyses.

The information in this section can be used with the problem/solution section of this manual (Section IV) either to establish a sampling and testing program to solve a particular problem involving a particular process, or to institute an adequate sampling program at a plant lacking such a program.

A comparison of the type and frequency of tests needed to control the various processes with the sampling program actually being performed at the plant site can help evaluate the process control system of the plant. In the overall evaluation of the plant, this comparison would be used in ratings of the sampling and testing program, and the laboratory facility to perform necessary tests.

GENERAL

The characterization of waste, whether it be domestic or industrial in origin, begins with sampling. A wastewater treatment plant consists of various components which make up the treatment system. A program of sampling and testing which measures influent, effluent and individual process units on a scheduled basis not only means better plant performance but can also indicate problems quickly so that immediate corrective measures can be taken.

The extent of any testing program should depend on the size and type of treatment facility and the type and quality of receiving waters; however, it probably will depend on the time which can be made available for that purpose, together with the number of persons who staff the laboratory

facilities. The treatment plant should be provided with adequate laboratory facilities for the performance of tests necessary for the proper operation of the plant.

Some more sophisticated treatment plants are provided with instrumentation which allows for constant monitoring of certain treatment processes and it is customary for this information to be telemetered and recorded at some convenient location within the plant control building. Telemetered information can include, but not be limited to, primary effluent pH, final effluent chlorine residual, aeration tank dissolved oxygen, and sludge density. Even though the instruments performing these monitoring functions can be highly reliable, it is recommended that their performance be checked periodically by analyzing concurrent and identical samples.

THE SAMPLING PROGRAM

A well-organized, effective sampling program must consider several factors:

- Type and scheduling of sampling needed for the specific analyses to be made
- Quantity of samples needed
- The most effective sampling locations
- Handling and storage procedures (between sampling point and testing site)
- Types of sample testing to be done.

Tables III-1 and III-2 indicate the common constituents which are analyzed from the flows of various treatment processes. The matrix (Table III-2) also indicates points in the treatment system where samples should be taken. The indicated sampling frequencies are minimum values and are dependent on or can vary with size of plant and staff, complexity of the system, the nature of the waste handled, and on the effluent requirements placed on the facility.

The test indicated should be performed as frequently as indicated in accordance with the prevailing requirements of the agency governing waste discharge within the area in which the plant is located. Every effort should be made to perform the tests in accordance with their scheduled frequency. A test with a "weekly" frequency should be run at a regular hour and day of the week.

Table III-1

PROCESS TESTING GUIDE*

PROCESS	TEST	FREQUENCY
	PRETREATMENT	
Grit Removal	Volatile Solids	Daily
	Total Solids	Daily
	Moisture Content	Daily
	PRIMARY TREATMENT	
Primary Sedimentation	Settleable Solids	Daily
	pH	Daily
	Total Sulfides	Daily
	Biochemical Oxygen Demand	Weekly
	Suspended Solids	Weekly
	Chemical Oxygen Demand	Weekly
	Dissolved Oxygen	Weekly
	Grease	Weekly
	SECONDARY TREATMENT	
Activated Sludge	Suspended Solids	Daily
	Dissolved Oxygen	Daily
	Volatile Suspended Solids	Weekly
	Turbidity	Daily
Trickling Filter	Suspended Solids	Daily
	Dissolved Oxygen	Daily
Oxidation Ponds	Dissolved Oxygen	Daily
	Total Sulfides	Daily
	Total Organic Carbon	Weekly
	Total Phosphorus	Weekly
	Settleable Solids	Daily
	pH	Daily
	Total Sulfides	Daily
Final Sedimentation	Biochemical Oxygen Demand	Weekly
	Suspended Solids	Weekly
	Chemical Oxygen Demand	Weekly
	Dissolved Oxygen	Weekly
	Turbidity	Daily
	M B A S	Weekly

PROCESS	TEST	FREQUENCY
	DISINFECTION	
Chlorination	Chlorine Residual	Daily
	MPN Coliform	Weekly
	SOLIDS HANDLING	
Thickening	Suspended Solids	Daily
	Volatile Solids	Daily
Digestion	Total Solids	Weekly
	Volatile Solids	Weekly
	pH	Daily
	Gas Analysis	Weekly
	Alkalinity	Weekly
	Volatile Acid	Weekly
Centrifuging	Suspended Solids	When in Operation
	Volatile Solids	When in Operation
Vacuum Filters	Sludge Filterability	When in Operation
	Suspended Solids	When in Operation
	Volatile Solids	When in Operation
Incineration	Ash Analysis	When in Operation
	ADVANCED TREATMENT	
Chemical Coagulation & Flocculation	Jar Test	Weekly
	Phosphorus Analysis	Weekly
Activated Carbon	Apparent Density	Weekly
	COD	Weekly
	TOC	Weekly
Recarbonation	pH	Weekly
Ammonia Stripping	Ammonia Nitrogen	Weekly
	pH	Weekly
Filters	Suspended Solids	Daily
	Turbidity	Daily
Microscreen	Suspended Solids	Daily
	Chemical Oxygen Demand	Weekly

*This is a minimum sampling guide, and is subject to change with plant site, complexity of operation, and problems encountered.

Table III-2

EQUIPMENT TESTING MATRIX*

CONSTITUENTS TO BE ANALYZED	Atomic Absorption	600° C Muffle Furnace	103° C Drying Oven	Analytical Balance	Imhoff Cone	pH Meter	Lamotte Kit	Biochemical Oxygen Demand Incubator	Vacuum Pump	Hot Plate	Kjeldahl Unit	Condenser & Extraction Equipment	Dissolved Oxygen Meter & Probe	Autoclave	Amperometric Titrator	Sterilizing Oven	35° C Incubator	Gas Analyzer	Steam Bath	Magnetic Stirrer	Blender	Turbidity Meter	Carbon Adsorption Unit	Desiccator	Spectrophotometer	Stirring Equipment	Vibrating Shaker	Total Organic Carbon Analyzer	Purity Meter	Water Still
Volatile Solids		●	●	●																			●						
Total Solids			●	●																			●						
Settleable Solids					●																								
pH						●																							
Total Sulfides							●																						
Biochemical Oxygen Demand								●																				●	●
Chemical Oxygen Demand										●		●									●							●	●
Suspended Solids			●	●																			●						
Dissolved Oxygen													●																
Chlorine Residual															●														
MPN Coliform																													
Volatile Acids										●		●																●	●
Alkalinity						●														●									
Gas Analysis																		●											
Grease			●	●					●	●		●							●										
Total Organic Carbon																											●		
Turbidity																						●							
Volatile Suspended Solids		●	●	●					●														●						
Total Phosphorous										●																			
MBAS																								●					
Sludge Filterability						●			●																				
Ash Analysis		●																											
Jar Test																									●				
Apparent Density				●																							●		
Iodine Number																													
Isotherms			●	●					●													●					●		
Calcium Content				●																			●						
Ammonia Nitrogen										●		●																	
Organic Nitrogen										●	●	●																	
Nitrate Nitrogen																								●					
Heavy Metals	●																												

EQUIPMENT NEEDED

*The equipment specified in this matrix is subject to plant size and complexity of processes and the degree of control required.

Types of Sampling

Sampling can be either of two types:

1. Grab. This type of sample is taken when wastewater does not flow continuously, when appearance of discharge changes rapidly, and when making sure that the composite sample isn't masking extreme conditions of the waste.

   It is also used when test samples cannot be mixed, such as when testing for residual chlorine, dissolved oxygen, or pH.

2. Composite. With the widely varying characteristics of waste, this type of sampling provides a representation of wastewater over a period of time and can be composited on the basis of proportional flow or the same amount being collected at every interval during the sampling period. Composites should be corrected as specified in Standard Methods.

Location of Sampling Points

Samples should be taken only where the wastewater is well mixed. If large particles are found in the sample, they should be broken up to make a more homogeneous sample. Deposits or growths of floating material which have formed at the sampling point should not be included in the sample.

Quantity of Sample

In order to determine the correct amount of sample to be collected, the past flow records of the plant should be analyzed to determine the daily average flow. The amount of the composite sample to be collected at a given period should be proportional to flow of wastewater at that time. Then determine the quantity of sample needed for analysis; 1 liter is usually sufficient; never try to work with less than about 200 ml.

Handling and Storage of Samples

Samples should be tested as soon as possible. If testing must be delayed, then adequate storage must be provided. Table III-3 recommends appropriate storage temperature and duration in terms of the test to be performed on the stored sample.

Table III-3

STORAGE TEMPERATURE AND TIME[1/]

ANALYSIS	TEMPERATURE	TIME	TEMPERATURE	TIME
Total solids	4°C			
Suspended solids	4 C	Up to several days	0°C	No storage
Volatile suspended solids	4°C	Up to several days	0°C	No storage
COD	4°C	Up to several days	0°C	Unlimited
BOD		Up to one day in composite sampling systems		Lag develops, must use fresh sewage seed

Source: Agardy, F.J., and M.L. Kiado, Effects of Refrigerated Storage on the Characteristics of Waste, 21st Industrial Waste Conference, Purdue University, May 3-5, 1966.

1/For more detailed preservation techniques, see Analytical Quality Control, EPA Chemical Methods, or Standard Methods.

Test Records

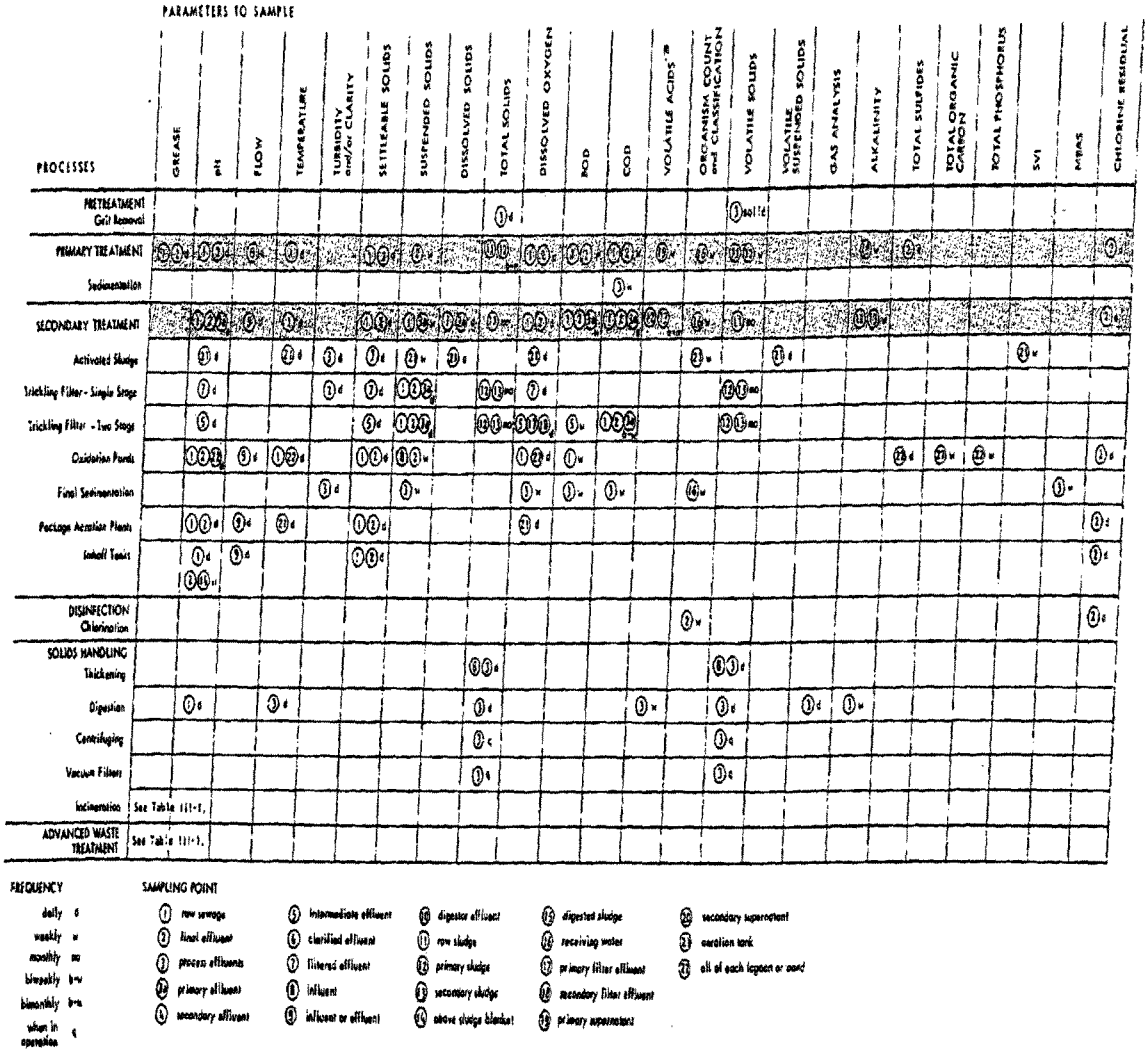
In order that the data developed through the plant sampling program can be properly utilized to gage plant performance, it is necessary that it be systematically recorded and filed for ready reference. The most practical means of satisfying this requirement is to prepare convenient forms on which these data can be recorded. These forms should be prepared to fit the particular operating conditions at each individual plant. The data should be recorded chronologically on these forms and should be organized so that each set of data can be utilized to evaluate a particular aspect of the treatment process. Proper recording of sampling data will allow for more efficient and expedient solution of operational problems. Several examples of operational forms are included at the end of this section which can be utilized for the recording of analytical data pertinent to the treatment process.

In addition to recording the data on forms, graphing of pertinent operating parameters may be appropriate and desirable for visual presentation.

For additional information on sampling and testing, see:

State of Washington Wastewater Plant Operator's Manual
Operation of Wastewater Treatment Plants: A Field Study Training Program, EPA
Effects of Refrigerated Storage on the Characteristics of Waste, 21st Industrial Waste Conference, Purdue University
Standard Methods, 13th Ed
Collection, Storage, Transportation and Pretreatment of Water and Wastewater Samples by Sanitation and Radiation Laboratory, California State Dept. of Public Health
MOP 11
MOP 18

SAMPLING PROGRAM FREQUENCY AND LOCATION



NOTE: This is a minimum sampling program and is subject to changes with plant size and operational problems.

Figure 1. Sampling Program Frequency and Location

Appendix A

CLASSIFICATION OF WASTEWATER TREATMENT PLANTS

This section of the manual contains information for the classification and identification of wastewater treatment plants by various designations. These include:

- Definitions of the classes of plants by function
- Operator classification
- Geographic location and climatic conditions
- Common processes and operational units

Also included is a matrix by which treatment systems are classified by their unit operations, removal efficiencies and expected effluent quality.

This section is used by:

- Isolating treatment system (by various classification)
- Determining the units which fall into that general system
- Learning the performance capabilities of the system.

This information, along with operational data for the particular system from Section II of this manual, is compared to the performance and operational data of the plant being evaluated and is to be considered in the overall evaluation of the plant.

CLASSIFICATION BY FUNCTION

Following are generalized definitions of classes of treatment plants according to their functions:

1. Primary treatment - Those wastewater treatment plants that employ methods which remove or reduce a high percentage of the suspended and floating solids but little or no colloidal and dissolved matter.
2. Secondary treatment- Those methods which remove or reduce fine suspended colloidal, dissolved solids, and cause the reduction of organic material by biological oxidation.
3. Advanced waste treatment - Those methods which remove or reduce nutrients, residual organics, residual solids and pathogens by, but not limited to, sand filtration, chemical treatment, carbon absorption, ammonia stripping, electrodialysis or reverse osmosis.

OPERATOR CLASSIFICATION

The classification system used in the area of the plant being evaluated should be reviewed to see if the proper personnel are being utilized for the existing treatment system.

Table A-1 shows the diversification of wastewater treatment plant classifications as denoted by their type, design flow and population served, contrasted with the class of operator which should be capable of operating them. These classifications have been established by the California Water Pollution Control Association and the California State Water Resources Board. Evaluators should be aware that most states will have their own classification system.

Table A-1

OPERATOR AND TREATMENT PLANT CLASSIFICATION

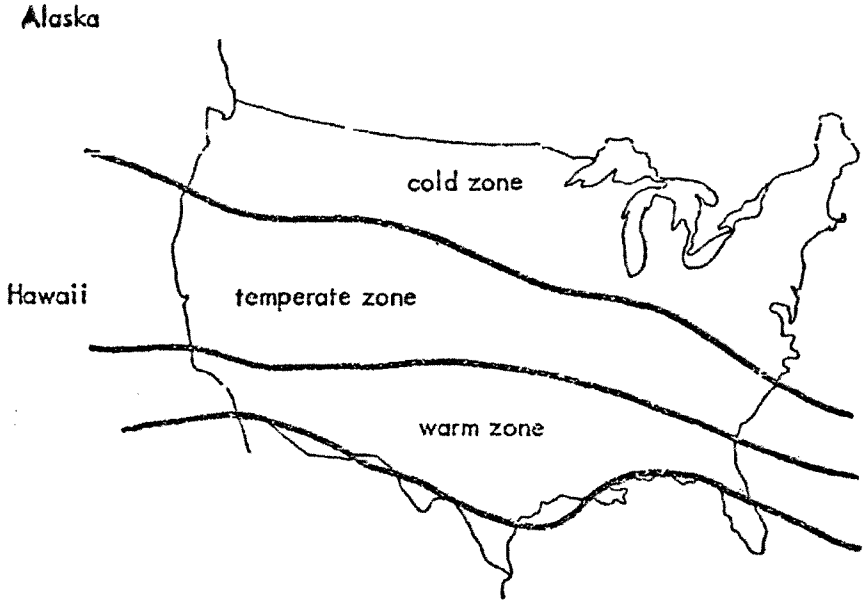
California Water Pollution Control Association	California* Operator Classifications	Treatment Process	Design Flow (MGD)	Population Served
IV	I	Stabilization Pond	All	2000
		Primary	1 or less	
III	II	Primary	1-5	2000 to
		Biofiltration	1 or less	10,000
II	III	Primary	5-20	10,000 to
		Biofiltration	1-10	40,000
		Activated Sludge	5 or less	
		Tertiary	1 or less	
I	IV	Primary	20 & over	40,000
		Biofiltration	10-30	
		Activated Sludge	5-20	
		Tertiary	1-10	
Ia	V	Biofiltration	30 & over	
		Activated Sludge	20 & over	
		Tertiary	10 & over	

*Classification adopted by the State Water Resources Control Board

Temperature zones and their approximate sphere of influence, along with probable effects on operating efficiencies, are defined below.

1. Cold Zone - average January air temperature of 30 F or less will cause a decrease from 4 to 5 percent in operating efficiency
2. Temperate Zone - average January air temperature of 35 to 45 F will cause a decrease of 4 to 5 percent at the 35 F range but normal operation at the higher temperature
3. Warm Zone - average January air temperature of 50 to 70 F allows normal operation at the low temperature and a possible 4 to 5 percent increase in efficiency at the higher range.

The following sketch delineates the approximate climate zones in the United States.



LOCATION OF TEMPERATURE ZONES
IN THE UNITED STATES

COMMON PROCESSES AND OPERATIONAL UNITS

The purpose of this subsection will be to identify all of the operational units and processes common to wastewater treatment plants operating in the primary, secondary and advanced waste treatment mode.

While every treatment plant can be considered unique, it is obvious that most treatment plants will have many operations and processes in common. Below is a list of the most common units used in various treatment modes.

Pretreatment

To remove or reduce floating solids and coarse suspended solids, use:

- Racks
- Medium screens
- Grit chambers
- Skimming tanks

Primary Treatment

To remove or reduce fine suspended solids, use:

- Fine screens
- Sedimentation
  a. Plain sedimentation tanks, with or without mechanical sludge-removal devices
  b. Septic tanks (biological action also takes place)
  c. Imhoff tanks (biological action also takes place)
  d. Chemical precipitation tanks

Secondary Treatment

To remove or reduce suspended colloidal and dissolved solids, oxidize with

- Filters - intermittent sand filters
  contact filters
  trickling filters
- Aeration - activated sludge
  contact aerators (as used in aerated lagoons)
- Chlorination
- Oxidation ponds

Disinfection

- Chlorination
- Ozone

Advanced Waste Treatment

- Chemical/physical treatment methods
- Carbon absorption
- Ammonia stripping
- Electrodialysis
- Reverse osmosis or desalting
- Microscreening

Ultimate Wastewater Disposal

Discharge into receiving waters
Irrigation or disposal on land by
a. Application to surface
b. Subsurface irrigation
c. Groundwater recharge
Treat by advanced treatment system and reuse for industrial water supply or possibly a fire protection system

Treatment and Disposal of Wastewater Solids

Screenings

a. Treatment

(1) Medium - shred and digest

(2) Fine - digest

b. Disposal

(1) Medium - burial or incineration
(2) Fine - burial or incineration

Settled Solids (sludges)

a. Treatment

(1) Sludges from primary and secondary treatment by:

(a) Digestion
(b) Thickening (by gravity or flotation; may or may not be conditioned by elutriation or chemicals)

1) Vacuum filtration
2) Drying on beds or in kilns
3) Centrifugation

b. Disposal

(1) Wet sludges - dumping at sea or piping to sea (where still permitted)

(2) Dried or dewatered sludges - incineration or use as soil conditioner or deposit in a landfill

Performance of Treatment Systems

Table A-2 is a classification matrix of treatment systems by their unit operations, removal efficiencies and expected effluent quality. It indicates the percentage removal of constituents (based on process effluent to process influent) and ranges of effluents of treatment systems which are employed in the wastewater treatment. Most of the systems shown have some form of pretreatment, in combination with primary, secondary or advanced, unit operation which would provide the influent quality that can be handled by the treatment system. In order for plants to approach the effluent ranges indicated, each unit operation would have to be examined and evaluated to determine what operation could be improved without affecting other plant operations.

Appendix B

PERSONNEL REQUIREMENTS

This section of the manual contains information on personnel requirements for effective treatment plant operation. It lists the minimum skills required for the various duties which are performed at treatment plants. A manpower and work schedule is included to delineate the numbers of personnel and hours needed to perform the required work.

Table A-1 (Appendix A) of this manual indicates the classification of operator for plant size and treatment system. This data, along with the information presented in this section, should be compared against personnel information for the plant being evaluated to see if adequate staff (both in numbers and qualifications) is being utilized. This should be included in the overall evaluation rating given to the plant.

GENERAL SKILLS

The skill requirements outlined below are minimal for successful performance of specific required duties. These are only a guide; additional requirements for the particular plant location should be checked.

- Supervisory Personnel (level of ability depends on size and type of plant) - high school education or equivalent, should display better than average ability to:
    1. Use and manipulate basic arithmetic and geometry.
    2. Think in terms of general chemistry and physical sciences.
    3. Understand biological and biochemical actions.
    4. Grasp meaning of written communications.
    5. Express thoughts clearly and effectively, both verbally and in writing.

In addition, supervisory personnel are often responsible for:

1. Public relations
2. Bookkeeping
3. Analysis and presentation of data
4. Budget requests
5. Report writing
6. Personnel

7. Safety educational program
8. Contracts, specifications and codes
9. Estimates and costs
10. Plant library

- Laboratory Technicians - require training in laboratory procedures and mathematics
- Operating Personnel - require training in:
    1. Fundamentals of wastewater treatment processes, including chemistry and biology.
    2. Mathematics (including geometry).
- Maintenance Personnel - must be familiar with and capable of:
    1. Mechanical repairs
    2. Electrical and electronic repairs.

MANPOWER AND WORK SCHEDULING

- Day-Shift Operators. 225 days/year at 6 hours/day = 1,350 hours/year. Attempts to schedule workloads and staff plants on this basis indicates that 5-1/2 hours/day is more realistic. This value will drop as the number of phone calls, visitors, inspectors, and emergencies increase.
- Night-Shift Operators. 7 hours/man/shift (fewer interruptions and work is of the routine inspection and recording nature).

Table B-1 shows ranges of the number of personnel which would be required to operate various modes of treatment systems. Each plant may have its own particular operating mode, depending on the number of components which make up liquid and sludge treatment, along with administrative and general plant functions. The advanced waste treatment plants were not included in this table because of the lack of reliable manpower estimates for this classification.

Table B-1

PLANT MANPOWER REQUIREMENTS*

Type of Plant	Average Capacity (MGD)									
	1	3	5	10	20	35	50	65	80	100
Primary	4.5-6	6.5-7.5	7.5-9	10-13	15.5-19	22-27	29-34	34-41	40-49	50-59
Secondary (including Trickling Filter)	6-7	7.5-9.5	9.5-11.5	13-16	19.5-24	28-34	37-44	45-53	53-61	63.5-76.5
Secondary (including Activated Sludge)	7-8	9.5-10.5	11.5-13	15-18	23-26	33-38	43-49	51-59	61-69	71-82

*Based on a preliminary study performed by Black and Veatch for the EPA.

Appendix F

SOLIDS TREATMENT AND DISPOSAL

This section of the manual supplies background information on the various processes involved in handling and treating of solids accumulated during the wastewater treatment process.

Sludges are characterized by their percentage water content, volatile matter, and the various processes by which they are produced. In addition, this section explains the methods available for final solids disposal. A comparison of operational parameters and loading rates (design specification) with those presented in this manual or in other sources will facilitate an evaluation of the solids treatment and disposal system. Deviations from normal will reveal any problem areas. A check of the common operating parameters, loading rates, and support systems which are generally used in solids handling (Tables II-5 and II-6 in Section II) should also be made. These tables, along with the common problems in solids handling (Section IV), and a review of this section will supply information needed for a general evaluation of the solids handling program carried on at the wastewater treatment plant.

GENERAL BACKGROUND

The solids accumulated from the various wastewater treatment processes can be grouped into one of two categories: those trapped on medium and fine screens in pretreatment, and those formed from processes in the primary, secondary and advanced treatment modes.

Large-size material trapped by racks, such as glass bottles, rags, or pieces of wood, is collected and usually buried in a sanitary landfill. The solids from medium screening are shredded and treated by anaerobic digestion, along with fine-screen solids.

Settled solids (from primary and secondary treatment) can be treated by combinations of thickening, anaerobic and aerobic digestion, conditioning elutriation; or with chemicals, vacuum filtration and drying on beds or in kilns.

The final disposal of wet sludge is accomplished by dumping or piping it to sea or by incineration; dried or dewatered sludges are also incinerated, used as soil conditioners, or buried in sanitary landfills.

TREATMENT OF SLUDGE

The water content of sludge is the controlling factor as to the volume of sludge produced. Sludge can be characterized by the type of process by which it was produced. The following table characterizes sludges produced by the various processes.

Table F-1

SLUDGE CHARACTERISTICS

Process Producing Sludge	Percent Water Content	Volatile Matter as Percentage of Dry Solids
Primary sedimentation sludge	94 - 96*	70
Activated sludge High rate	95 - 97.5	--
Trickling filter	96 - 97	45-70
Chemical precipitation	95	--
Digested sludge (well digested)		32-45
• Primary	88 - 94	
• Primary and activated	94 - 96	
• Primary and trickling filter	90 - 94	

* Steel, Water Supply and Sewage, pp. 574-575

The Digestion Process

Anaerobic organisms break down complex molecular structures of the solids and release much of the bound water, while obtaining nutrients and energy from the conversion of the raw solids into more stable organic and inorganic solids. Anaerobic sludge digestion takes place in three phases:

- Acid fermentation. Soluble or dissolved solids are broken down into simple organic acids (volatile acids) with a decrease of pH.

- Acid regression. The organic acids and nitrogenous compounds are decomposed with an increase in pH.
- Methane production. This occurs simultaneously with the first two phases. Methane bacteria reduce the organic acids and other products of the first and second phases to produce methane and carbon dioxide gases.

Sludge digestion accomplishes the following:

- Reduces organic matter into simple compounds
- Reduces sludge volume
- Releases the remaining water more easily
- Reduces the coliforms by 99.8 percent in 30 days

Aerobic Sludge Digestion

This particular process functions in much the same way as an activated sludge unit, with the feed to the aeration tank being sludge from the primary and secondary sedimentation basins. This process requires adequate mixing and a dissolved oxygen level range of 1.0 to 1.5 mg/l. The detention time required for treatment of sludge is from 20 to 30 days with removals of supernatants and sludge from the digester to maintain a consistent feed rate.

For additional information, see:

Ch. 6, Washington State Treatment Plant Operator's Manual
Ch. 1 and 7, Eckenfelder-O'Connor
Ch. 14, ASCE STP Design
Ch. 26, Steel
Ch. 12, Imhoff-Fair

SLUDGE THICKENING

This process, usually found in the larger treatment plants, precedes digestion, vacuum filtration, or kiln drying. Sludge thickening is used to reduce the liquid volume of the sludge solids which have to be pumped to other treatment units. These treatment units then can be smaller because they do not have to handle the excess liquid.

There are two major types of sludge thickening operations:

- Gravity thickening. Sludge and aerated secondary effluent are introduced into a basin, much like a stirred sedimentation basin except deeper, which allows the concentration of solids from flocculation by interfacial contact and compaction by the weight of the overlaying water. This method can produce a solids content of 8% or greater. Not all sludge combinations will work in a gravity thickener, and testing of sludge produced by the treatment process will be necessary. In some cases, the addition of chemical flocculant will aid in the concentration of the sludge.
- Flotation thickening. This is usually used on sludges formed by biological reactors. This process combines sludge with a liquid which has been exposed to high pressure and contains large amounts of dissolved oxygen. Under less pressure in the thickening tank, air bubbles from the liquid attach themselves to the sludge particles and rise to the surface where the sludge is collected for further treatment.

For additional information, see:

Ch. 15, ASCE STP Design
Ch. 6, Washington State Treatment Plant Operator's Manual
Ch. 26, Steel
Ch. 14, Imhoff-Fair

SLUDGE CONDITIONING

The basic processes which are used in sludge conditioning are elutriation and chemical conditioning.

- Elutriation consists of mixing thoroughly 1 part of sludge with 2 parts of water and allowing separation of about 6 hours, followed by decanting the resulting elutriate and drawing off the sludge.
- Chemical conditioning consists of the addition of certain chemicals to coalesce particles in sludge which facilitates moisture removal by filtration. Some of the chemicals commonly used are:

Ferric chloride

Ferric sulfate

Lime and ferric chloride

Chlorinated coppeas

Aluminum sulfate

Chemical solutions

Polyelectrolytes

Activated silicates

Inorganic polyelectrolytes

For additional information, see:

Ch. 15, ASCE STP
Ch. 26, Steel
Ch. 14, Imhoff-Fair

SLUDGE DEWATERING

Some common methods for sludge dewatering are vacuum filtration, centrifuging, and sludge drying.

- Vacuum Filtration is widely used in the separation of liquids from concentrated suspensions, sludges, and slurries. The basic mechanism of this process is the passing of a cylindrical drum which rotates partly submerged through a container of sludge. The solids in the container are agitated to keep them in suspension. A vacuum which is applied between the drum deck and filter media causes the water to be removed while sludge is held on the filter media. Following this process, the sludge is buried in a sanitary landfill or incinerated. The supernatant can be disposed of by returning it to the elutriation tank or returned into the influent of the plant.
- Centrifuging removes water by centrifugal force which tends to force the heavier solids to the outside of the rotating flow stream much like the spin dry cycle of a washing machine.
- Sludge Drying is best suited for sludges which have been digested. The mechanism is that of a shallow sand filter for draining the sludge and air for drying in beds. The supernatant may be disposed of in the same manner as vacuum filtration liquids.

For additional information, see:

Ch. 7, Rich - Unit Operations of Sanitary Engineering
Ch. 26, Steel
Ch. 15, ASCE STP Design
Ch. 14, Imhoff-Fair

DISPOSAL OF SLUDGE

The final disposal of sludge is influenced by many factors:

- The character and composition of the sludge
- Availability of land for dumping of sludge cake or lagooning of wet sludge
- Whether or not regulatory agencies allow piping (deep water sludge outfall) or barging of sludge
- Local market possibilities for its use as fertilizer.

Coastal cities can dispose of sludge through barging or piping to sea, where still allowed. On land, it may be buried in swamps, abandoned quarries, and other lands which have no present use.

Incineration of raw or digested dewatered sludge is gaining popularity. At present, only larger cities are utilizing this process because of its added expense. In general, incineration of sludge is a wet combustion process in which sludge in solution or suspension goes through chemical oxidation processes under pressure.

For additional information, see:

Ch. 14, Rich - Unit Processes of Sanitary Engineering
Ch. 15, ASCE STP Design
Ch. 26, Steel
Short Course - Theory and Design of Advanced Waste Treatment Processes, U.C. Berkeley Extension

Appendix H

MAINTENANCE DATA

This section of the manual describes the basic components of a maintenance system. It describes the type of filing system which could be employed for maintenance data, how to set up such a filing system, and the type of information it should contain.

By comparing the maintenance records at the treatment plant with this guide and manufacturer's maintenance schedule, the plant's maintenance program can be evaluated.

It is imperative that a record be kept of the service requirements of every piece of major equipment in the plant and when and how frequently service is required. Therefore, a system is needed to keep a complete record of maintenance requirements. Such a system should provide a permanent record of all maintenance work together with the advanced scheduling of preventive maintenance for an entire year. The system should also provide the maintenance work schedule for any given day. To be efficient, the system should contain the following five files:

(1) preventive maintenance records

(2) the preventive maintenance schedule for each piece of equipment

(3) specifications on each major piece of equipment, the supplier, and where spart parts can be purchased,

(4) spare parts inventory, and

(5) instructions for operation and maintenance of each item of major equipment.

As a first step in setting up any maintenance record system, each structure and each major piece of equipment should be assigned a file number. A simple means of doing this is assigning each area or each structure within a treatment plant a block of 1000 numbers; and each equipment item in each area or structure requiring maintenance can be assigned an individual number within the block of 1000. Therefore, sufficient open numbers remain to provide for any additional equipment which may be required within that area or structure in the future. The assigned numbers will serve to identify each item of equipment in all of the plant records described above and should also be used to catalog spare parts.

The file of preventive maintenance requirements mentioned in Item 1 above should contain one sheet for each item of plant property which requires periodic attention or maintenance, filed numerically. Listed thereon should be all pertinent requirements with respect to periodic

maintenance including frequency, number of men required, and the estimated time of performance. These sheets are to be filed numerically as recommended above and maintained as a reference file.

The file for preventive maintenance scheduling as mentioned in Item 2 above should show the equipment number and the key information given on the preventive maintenance sheet, together with a specific day for the performance of each item of work. Space should be provided on each equipment card for the operator to know the work items performed and the date of performance. A systematic means of pulling these cards on the dates on which maintenance work is required should be devised.

The equipment data file mentioned in Item 3 above should contain cards with complete nameplate data for each item of equipment. These cards may also be used to show the type of lubricant required, together with the nature of any special service requirement. The cards should also be filed numerically in accordance with the recommended system.

The operation and maintenance instruction file mentioned in Item 4 above should contain information relating to maintenance, operation, and servicing of each item of equipment. This information should be filed numerically in accordance with the recommended system. Specifically, the file should contain all maintenance and operation manuals furnished by equipment manufacturers, parts lists, dimension drawings, and other informative literature.

In order to maintain an effective maintenance program it is recommended that the maintenance record system be kept up to date faithfully and consistently. Service requirements should be modified as equipment ages and flow rates increase. All modifications to major plant equipment should be recorded in the maintenance record system.

A complete set of the as-built drawings of the wastewater treatment plant should be available for the ready use of the plant operators. The plant operators should record on these plans all changes that are made in the plant piping, equipment, and electrical circuitry. The original drawings of the treatment plant should be updated at least yearly in accordance with the changes made on site.

For additional information, see:

Ch. 11, Operation of Wastewater Treatment Plants, EPA.

Appendix J

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COMPLIANCE CATEGORY: MUNICIPAL WASTEWATER MANAGEMENT	
REGULATORY REQUIREMENT OR MANAGEMENT PRACTICE	**REVIEWER CHECKS**
	(NOTE: The U.S. EPA or authorized regulatory agency may require that a POTW with a design flow of 5 mgd or less develop a POTW pretreatment program if the nature or volume of the industrial influent, treatment process upsets, violations of POTW effluent limitations, contamination of municipal sludge, or other circumstances warrant, in order to prevent interference with the POTW or pass through.) Verify that the POTW pretreatment program includes procedure which enables the POTW to: – identify and locate all possible industrial users which might be subject to the POTW pretreatment program – identify the character and volume of pollutants contributed to the POTW by the identified industrial users – notify identified industrial users of applicable pretreatment standards and any applicable requirements under sections 204(b) and 405 of the CWA and subtitles C and D of RCRA – receive and analyze self-monitoring reports and other notices submitted by industrial users in accordance with the self-monitoring requirements – randomly sample and analyze the effluent from industrial users and conduct surveillance activities in order to identify, independent of information supplied by industrial users, occasional and continuing noncompliance with pretreatment standards – inspect and sample the effluent from each significant industrial user at least once a year – evaluate, at least once every 2 yr, whether each significant industrial user needs a plan to control slug discharges – investigate instances of noncompliance with pretreatment standards and Requirements, as indicated in the required reports and notices, or indicated by analysis, inspection, and surveillance activities – perform sample taking and analysis and the collection of other information with sufficient care to produce evidence admissible in enforcement proceedings or in judicial actions – comply with the public participation requirements of 40 CFR 25 in the enforcement of national pretreatment standards. Verify that the procedures include provisions for at least annual public notification in the largest daily newspaper published in the municipality in which the POTW is located, of industrial users which, at any time during the previous 12 mo, were in significant noncompliance with applicable pretreatment requirements. (NOTE: An industrial user is in significant noncompliance if its violation meets one or more of the following criteria: – chronic violations of wastewater discharge limits, defined here as those in which 66 percent or more of all of the measurements taken during a 6-mo

COMPLIANCE CATEGORY: MUNICIPAL WASTEWATER MANAGEMENT	
REGULATORY REQUIREMENT OR MANAGEMENT PRACTICE	**REVIEWER CHECKS**
	period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter – Technical Review Criteria (TRC) violations, defined as those in which 33 percent or more of all of the measurements for each pollutant parameter taken during a 6-mo period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC=1.4 for BOD, TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH) – any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that the Control Authority determines has caused, alone or in combination with other discharges, interference or pass through (including endangering the health of POTW personnel or the general public) – any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority to halt or prevent such a discharge – failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance – failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, 90-day compliance reports, periodic self-monitoring reports, and reports on compliance with compliance schedules – failure to accurately report noncompliance – any other violation or group of violations which the Control Authority determines will adversely affect the operation or implementation of the local pretreatment program.)
MWW.30.3. A POTW requesting approval of a POTW pretreatment program is required to develop a program description and follow certain procedures (40 CFR 403.9(a) through 403.9(c), 403.9(e), and 403.9(g)).	Verify that the program description is submitted to the Approval Authority that will make a determination on the request for program approval. Verify that a POTW requesting approval of a POTW pretreatment program develops a program description which contains the following information: – a statement from the City Solicitor or a city official acting in a comparable capacity (or the attorney for those POTWs which have independent legal counsel) that the POTW has authority adequate to carry out the programs described in 40 CFR 403.8. This statement shall: – identify the provision of the legal authority under 40 CFR 403.8(f)(1) which provides the basis for each procedure under 40 CFR 403.8(f)(2) – identify the manner in which the POTW will implement the program requirements set forth in 40 CFR 403.8, including the means by which pretreatment standards will be applied to individual industrial users (e.g., by order, permit, ordinance, etc.) – identify how the POTW intends to ensure compliance with pretreatment standards and requirements, and to enforce them in the event of noncompliance by industrial users

COMPLIANCE CATEGORY: MUNICIPAL WASTEWATER MANAGEMENT	
REGULATORY REQUIREMENT OR MANAGEMENT PRACTICE	**REVIEWER CHECKS**
	– a copy of any statutes, ordinances, regulations, agreements, or other authorities relied upon by the POTW for its administration of the Program, including a statement reflecting the endorsement or approval of the local boards or bodies responsible for supervising and/or funding the POTW Pretreatment Program if approved – a brief description (including organization charts) of the POTW organization which will administer the Pretreatment Program. If more than one agency is responsible for administration of the Program the responsible agencies should be identified, their respective responsibilities delineated, and their procedures for coordination set forth – a description of the funding levels and full- and part-time manpower available to implement the Program. (NOTE: The POTW may request conditional approval of the pretreatment program pending the acquisition of funding and personnel for certain elements of the program. The request for conditional approval must meet the requirements set forth for the program description except that the requirements may be relaxed if the submission demonstrates that: – a limited aspect of the Program does not need to be implemented immediately – the POTW had adequate legal authority and procedures to carry out those aspects of the program which will not be implemented immediately – funding and personnel for the program aspects to be implemented at a later date will be available when needed. The POTW will describe in the submission the mechanism by which this funding will be acquired. Upon receipt of a request for conditional approval, the Approval Authority will establish a fixed date for the acquisition of the needed funding and personnel. If funding is not acquired by this date, the conditional approval of the POTW Pretreatment Program and any removal allowances granted to the POTW, may be modified or withdrawn.) Verify that any POTW requesting POTW pretreatment program approval submits to the Approval Authority three copies of the submission. Verify that the POTW pretreatment program is consistent with any approved water quality management plan developed in accordance with 40 CFR 130, 131, as revised, where such 208 plan includes Management Agency designations and addresses pretreatment in a manner consistent with 40 CFR 403.

COMPLIANCE CATEGORY: MUNICIPAL WASTEWATER MANAGEMENT	
REGULATORY REQUIREMENT OR MANAGEMENT PRACTICE	**REVIEWER CHECKS**
MWW.30.4. POTWs are required to have sufficient resources a qualified personnel to carry out the POTW pretreatment program (40 CFR 403.8(f)(3)).	Verify that the POTW has sufficient resources and qualified personnel to carry out the Pretreatment Program authorities and procedures. (NOTE: In some limited circumstances, funding and personnel may be delayed where: – the POTW has adequate legal authority and procedures to carry out the pretreatment program requirements – a limited aspect of the Program does not need to be implemented immediately.)
MWW.30.5. POTWs are required to develop and implement an enforcement response plan (40 CFR 403.8(f)(5)).	Verify that the POTW develops and implements an enforcement response plan that contains detailed procedures indicating how a POTW will investigate and respond to instances of industrial user noncompliance. Verify that the plan, at a minimum: – describes how the POTW will investigate instances of noncompliance – describes the types of escalating enforcement responses the POTW will take in response to all anticipated types of industrial user violations and the time periods within which responses will take place – identifies (by title) the official(s) responsible for each type of response – adequately reflects the POTW's primary responsibility to enforce all applicable pretreatment requirements and standards.
MWW.30.6. POTWs are required to prepare and maintain a list of significant industrial users (40 CFR 403.8(f)(6)).	Verify that the POTW maintains a list of significant industrial users (40 CFR 403.3(t)) and the criteria applicable to each industrial user. Verify that the list indicates whether the POTW has made a determination that the industrial user should not be considered a significant industrial user. Verify that the list, plus any modifications, is submitted to the Approval Authority.
MWW.30.7. POTWs with approved Pretreatment Programs are required to provide the Approval Authority with a report containing certain information (40 CFR 403.12(i)).	Verify that POTWs with approved Pretreatment Programs provide the Approval Authority with a report that briefly describes the POTW's program activities, including activities of all participating agencies, if more than one jurisdiction is involved in the local program. Verify that the required report is submitted no later than 1 yr after approval of the POTW's Pretreatment Program, and at least annually thereafter. Verify that the report includes, at a minimum, the following: – an updated list of the POTW's industrial users, including their names and

COMPLIANCE CATEGORY: MUNICIPAL WASTEWATER MANAGEMENT	
REGULATORY REQUIREMENT OR MANAGEMENT PRACTICE	**REVIEWER CHECKS**
	addresses, or a list of deletions and additions keyed to a previously submitted list, including: – a brief explanation of each deletion – which Industrial Users are subject to categorical pretreatment Standards and specify which Standards are applicable to each Industrial User – which Industrial Users are subject to local standards that are more stringent than the categorical Pretreatment Standards – the Industrial Users that are subject only to local Requirements – a summary of the status of Industrial User compliance over the reporting period – a summary of compliance and enforcement activities (including inspections) conducted by the POTW during the reporting period – a summary of changes to the POTW's pretreatment program that have not been previously reported to the Approval Authority – any other relevant information requested by the Approval Authority.
MWW.30.8. POTWs are required to keep specific reports (40 CFR 403.12(o)).	Verify that records are kept of all information resulting from monitoring activities. Verify that the records include for all samples the following information: – the date, exact place, methods, and time of sampling and the names of the person or persons taking the samples – the dates analyses were performed – who performed analyses – the analytical techniques, methods used – the results of the analyses. Verify that records are kept for 3 yr. and are signed and certified by the equivalent of a responsible corporate officer.
MWW.30.9. POTWs which are required to collect whole effluent toxicity (WET) data must meet specific requirements (40 CFR 122.21(j)).	(NOTE: Many new and existing POTWs (with approved pretreatment programs or meeting certain other criteria) are required to collect WET data for submission to the permitting authority at time of application or re-application for an NPDES permit.) Verify that the following POTWs provide the results of valid whole effluent biological toxicity testing to the Director: – all POTWs with design influent flows equal to or greater than one million gallons per day – all POTWs with approved pretreatment programs or POTWs required to develop a pretreatment program

COMPLIANCE CATEGORY: MUNICIPAL WASTEWATER MANAGEMENT	
REGULATORY REQUIREMENT OR MANAGEMENT PRACTICE	**REVIEWER CHECKS**
	(NOTE: In addition to the POTWs listed above, the Director may require other POTWs to submit the results of toxicity tests with their permit applications, based on consideration of the following factors: – the variability of the pollutants or pollutant parameters in the POTW effluent (based on chemical-specific information, the type of treatment facility, and types of industrial contributors) – the dilution of the effluent in the receiving water (ratio of effluent flow to receiving stream flow) – existing controls on point or nonpoint sources, including total maximum daily load calculations for the waterbody segment and the relative contribution of the POTW – receiving stream characteristics, including possible or known water quality impairment, and whether the POTW discharges to a coastal water, one of the Great Lakes, or a water designated as an outstanding natural resource – other considerations (including but not limited to the history of toxic impact and compliance problems at the POTW), which the Director determines could cause or contribute to adverse water quality impacts.) Verify that POTWs required to conduct toxicity testing use U.S. EPA's methods or other established protocols that are scientifically defensible and sufficiently sensitive to detect aquatic toxicity. Verify that testing has been conducted since the last NPDES permit reissuance or permit modification under 40 CFR 122.62(a), whichever occurred later. Verify that all POTWs with approved pretreatment programs provide a written technical evaluation of the need to revise local limits under 40 CFR 403.5(c)(1) to the Director.

Category: Management-Employee Relations Program

Premium Pay

Premium pay refers to additional pay authorized by Title 5, United States Code, for overtime, night, holiday, Sunday work, and other types of work. Department of Army is authorized to determine an employee's entitlement to premium pay. Refer to the menu/index for specific types of work ordered or performed for which premium pay is authorized.

Employees may be paid premium pay only to the extent that the payment does not cause the employees aggregate of pay for any pay period to exceed the maximum rate for GS-15. Compesationary time off may not be granted when payment for the extra work at the overtime rates would be improper.

The authority to order or approve overtime is delegated to the commander of any activity that employs civilians. Commanders may designate other officials to act for them in ordering and approving overtime. A copy of overtime authorizations must be retained for audit purposes. Court of claims decisions have held that when employees have been "induced" by their supervisors to perform overtime in order to effectively complete their assignments, this overtime was held to have been "offcially ordered or approved." It is necessary in this connection to determine whether an approving official ordered or induced the work to be performed.

References	Related Topics
Code of Federal Regulations: Title 5, Ch 532 Subpart E, Chapter 550, Subpart A, Chapter 551, Subpart E U.S. Code: Title 5, Chapter 55, Subchapter 5	

This file was last updated: 12/9/97

Return to: PERMISS Homepage | Management-Employee Relations Program

NPDES Permit Quality Review Checklist - For POTWs

Pre-Review Information

		Response	Comment
1.	NPDES Permit number of facility		
2.	Name of facility:		
3.	Permit Reviewer (Last Name)		
4.	Date of review (MM/DD/YYYY)		
5.	Is the draft permit complete ? (Y/N)		
6.	Is the fact sheet complete ? (Y/N)		
7.	Did the State provide all appropriate supporting information (e.g., permit application, supporting documentation) ? (Y/N)		
8.	Reviewer obtained PCS/DMR data for last 3 years (Y/N)		
9.	Reviewer examined previous permit, application, and fact sheet (Y/N/NA)		
10.	Reviewer examined all pertinent file information (Y/N)		
11.	Reviewer notified other Regional offices of reissuance (Y/N)		

Facility Information

		Response	Comment
12.	Are all outfalls (including combined sewer overflow points) from the POTW treatment facility properly identified and authorized in the permit? (Y/N)		
13.	Does the record or permit contain a description of the wastewater treatment process and discharge point? (Y/N)		
14.	Does the record or permit describe the physical location of the facility? (Y/N)		
15.	Does the record or permit provide a description of the receiving water body(s) to which the facility discharges? (Y/N)		

Permit Cover Page/Administration

		Response	Comment
16.	Does the permit term exceed 5 years? (Y/N)		
17.	Does the permit contain specific authorization-to-discharge information (from where to where, by whom)? (Y/N)		
18.	Does the permit contain appropriate issuance, effective, and expiration dates and authorized signatures ? (Y/N)		

Effluent Limits

General Elements

		Response	Comment
19.	Does the record describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)? (Y/N)		
20.	Does the record indicate that any limits are less stringent than those in the previous NPDES permit? (Y/N)		
21.	If yes, does the record discuss whether "antibacksliding" provisions were met? (Y/N)		

Technology-Based Effluent Limits (POTWs)

		Response	Comment
22.	Does the permit contain numeric limits for ALL of the following: BOD (or an alternative; e.g., CBOD, COD, TOC), TSS, pH, and percent removal? (Y/N)		
23.	Are percent removal requirements for BOD (or BOD alternative) and TSS included, and are they consistent with secondary treatment requirements (generally 85%; or modified in accordance with 40 CFR Part 133 allowances)? (Y/N)		
24.	Are technology-based permit limits expressed in appropriate units of measure (i.e., concentration, mass, SU)? (Y/N)		
25.	Are permit limits for BOD and TSS expressed in terms of both 30-day (monthly) average and 7-day (weekly) average limits ? (Y/N)		
26.	Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day (monthly) average and 45 mg/l BOD5 and TSS for a 7-day (weekly) average)? (Y/N)		
26a.	If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations? (Y/N/NA)		

Water Quality-Based Effluent Limits

		Response	Comment
27.	Does the record indicate that the receiving water is impaired (i.e., that the receiving water is listed on the State's 303(d) list)? (Y/N)		
27a.	If yes, does the record indicate that a TMDL has been COMPLETED for the receiving water? (Y/N/NA)		
27b.	If yes, does the record indicate that any WQBELs were derived from a completed TMDL? (Y/N/NA)		
27.	Does the record describe (list) the designated uses of the water body to which the facility discharges (e.g., contact recreation, aquatic life use)? (Y/N)		
28.	Does the record provide effluent characteristics for each outfall? (Y/N)		
29.	Does the record document that a "reasonable potential" evaluation was performed? (Y/N)		

Facility Name_____ NPDES Permit Number_____

29a.	If yes, does the record indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures ? (Y/N/NA)		
30.	Does the record describe the basis for allowing or disallowing in-stream dilution or a mixing zone? (Y/N)		
31.	Does the record present WLA calculation procedures for all pollutants that were found to have "reasonable potential"? (Y/N/NA)		
32.	Does the record indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)? (Y/N/NA)		
33.	Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined? (Y/N/NA)		
34.	Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the record? (Y/N/NA)		
35.	For all final WQBELs, are BOTH long-term (e.g., average monthly) AND short-term (e.g., maximum daily, instantaneous) effluent limits established? (Y/N/NA)		
36.	Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)? (Y/N)		
37.	Does the record indicate that the permit will allow new or increased loadings to the receiving water? (Y/N)		
37a.	If yes, does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy? (Y/N/NA)		

Monitoring and Reporting Requirements

		Response	Comment
38.	Does the permit require at least annual monitoring for all limited parameters? (Y/N)		
38a.	If no, does the record indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver? (Y/N)		
39.	Does the permit identify the physical location where monitoring is to be performed for each outfall? (Y/N)		
40.	Does the permit require influent monitoring for BOD (or alternative) and TSS? (Y/N)		
41.	Does the permit require testing for Whole Effluent Toxicity? (Y/N)		

Facility Name_____ NPDES Permit Number_____

Special Conditions

		Response	Comment
42.	Does the permit include appropriate pretreatment program requirements? (Y/N/NA)		
43.	Does the permit include appropriate biosolids use/disposal requirements? (Y/N/NA)		
44.	Does the permit include appropriate storm water program requirements? (Y/N/NA)		
45.	If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements ? (Y/N/NA)		
46.	Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations? (Y/N/NA)		
47.	Does the permit allow discharges from Combined Sewer Overflows (CSOs) ? (Y/N)		
47a.	If yes, does the permit require implementation of the "Nine Minimum Controls" ? (Y/N/NA)		
47b.	If yes, does the permit require development and implementation of a "long-term control plan"? (Y/N/NA)		
47c.	If yes, does the permit require monitoring and reporting for CSO events? (Y/N)		
48.	Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs)]? (Y/N)		

Standard Conditions

		Response	Comment
49.	Does the **permit** contain all 40 CFR 122.41 standard conditions? (Y/N)		

List of Standard Conditions – 40 CFR 122.41

- Duty to comply
- Duty to reapply
- Need to halt or reduce activity not a defense
- Duty to mitigate
- Proper O & M
- Permit actions
- Property rights
- Duty to provide information
- Inspections and entry
- Monitoring and records
- Signatory requirement
- Reporting requirements
  - Planned change
  - Anticipated noncompliance
  - Transfers
  - Monitoring reports
  - Compliance schedules
  - 24 hour reporting
  - Other non-compliance
- Bypass
- Upset

50.	Does the permit contain the additional standard condition for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]? (Y/N)		

FY01 ANNUAL WORK PLAN
WATER PROGRAM

LONG RANGE GOAL	ANNUAL OBJECTIVE	PROJECT	MECH	REQ	PHASE	METRIC	DRIVER
Maintain Compliance with NPDES Permit	Reduce I&I	wastewater flow monitoring	contract	25,000	JUN	% reduction in I&I	ISO 14000 - NPDES permit *
	Obtain new NPDES permit	Track and facilitate permit application	in-house		x	permit status	NPDES permit *
	Comply with SWPPP	Implement stormwater BMPs	contract/ supply buys	15,000	SL	# of reports of sheen on receiving waters	NPDES permit *
		inspect stormwater sites	in-house		X	# of inspection reports	SWPPP - ISO 14000
		Update and Maintain Stormwater Pollution Prevention Plan	contract	50,000	NOV		SWPPP
	Comply with NPDES permit conditions	WW certification training	1556	5,000	SL	$ spent	WAC *
		Change to Multi-Sector General Permit for Stormwater	in-house	10,000	SL		NPDES *
		WWTP lab analysis	in-house/contract	40,000	SL	DMRs	NPDES permit *
		Visual stormwater inspections	monitoring team		SL	DMRs	NPDES permit *
		Stormwater lab analysis	contract	2,000	SL		
		Brush removal at outfalls and landfill #5	contract	21,000	OCT		NPDES permit *
		Evaluate new DMR software	in-house		JAN	decision	NPDES permit * *
	Comply with Federal Facilities Compliance Agreement	Upgrade Stormwater Treatment Facilities	contract	1,500,000	NOV		FFCA *
		Divert stormwater runoff @ GAAF	contract	170,000	AUG		FFCA

Work Plan designed by Mr. McConkey Book 2001

*Note Drivers Pertaining to WWTP Plant

		construct treatment facility at outfall #4	MCA	x		FFCA
Comply with State Biosolids Permit						WAC 173-308
	Obtain State Biosolids Permit	track permit application	in-house	x		WAC 173-308
	Manage biosolids	sludge disposal contract	contract	50,000 Sep	tons disposed	WAC 173-308
		Sludge testing and monitoring	contract	6,000 SL	# missed suspenses	WAC 173-308
		permit fees		12,000	$ spent	WAC 173-308
	Reporting	Prepare and submit annual biosolids report	in-house	FEB	timely product	WAC 173-309
	Improve Biosolids Quality					
Reduce Pollution and Enhance Environmental Health and Safety		Develop and implement an OWS maintenance plan	CERL \ in-house		product	Economics - NPDES permit - non-point source control
Protect Surface Water Quality						Stewardship - Public health - WAC 173-201
	Surface Water Monitoring	Water Quality Monitoring	in-house	2,000		Stewardship - Public health - WAC 173-201
		Flow Monitoring	in-house	2,000		
	Improve surface water flow regimes	channel improvements, Murray Creek	contract	40,000 AUG		CWA - flood control
		Culvert, Ferrell Marsh	contract	10,000 JUL		stewardship
		Culvert, Fiander Lake	contract	10,000 JUN		stewardship
		Demo creosote bridge, Indian Creek	contract	12,000 AUG		WAC 173-201
		Clear channel, Sequalitchew Creek	contract	50,000 JAN		stewardship
	Watershed (salmon habitat) restoration projects	Watershed (salmon habitat) restoration projects	contract	20,000 JUL		ESA; stewardship

Protect Groundwater Quality						
	Assess impacts from munitions	GW monitoring at impact areas	monitoring team	60,000 SL	test results	ISO 14000; WAC 173-340; WAC 173-201a; Training impacts
		GW monitoring at YTC Range 14	monitoring team	2,500		RCRA Part B Permit
		Investigate ASP well for possible munitions contamination				
	Assess and remediate contaminated sites	GW monitoring at 10A33	contract - COE	60,000 OCT	test results	WAC 173-340
	Monitor GW quality at landfill #5	GW monitoring at Landfill #5	monitoring team	32,000 SL		WAC 173-351 - TPCHD solid waste permit
		Assess Problems at well 88				WAC 173-351
	Field GW monitoring team	GW team supplies	purchases	15,000 SL		Class 0 requirement
	Assess open-cover alternative	Mandy's ORISE project	ORISE	15,000 SL	data accumulated	Stewardship
Maintain High Drinking Water Quality					# of compliants	SDWA - WAC 246-290
	Source Water Protection	Improve Sequalitchew weir	contract	OCT	# of incidents of contamination	WAC 246-290 - Seq lake level management plan
		beaver control	US F&W		lake level	WAC 246-290 - Seq lake level management plan

	Comply with drinking water permit conditions?	Conduct mandated training	CC	5,000	$ spent	SDWA - WAC 246-290
		Conduct required testing	contract	14,000	test results	SDWA - WAC 246-290
		Cross-connection control	contract	20,000 3	$ spent	SDWA - WAC 246-290
		Prepare Consumer Confidence Report	in-house	10,000 2	timely product	SDWA
		permit fees		9,000	$ spent	DOH permit
Reduce Costs / Improve Program Efficiency						
	Train Personnel	Water Program professional development training		5,000		
	Create Comprehensive Surface Water Management Plan	Comprehensive Surface Water Management Plan	new process			Stewardship - Public health - WAC 173-201
Comply with Solid Waste Permit						WAC 173-351 - TPCHD solid waste permit
	Meet reporting requirements	Prepare quarterly and annual GW monitoring reports for landfill #5	in-house	2,000	timely, acceptable product	WAC 173-351 - TPCHD solid waste permit
			Total Requirement	2,301,500		
			Funded	2,144,000		
			UFR	**157,500**		

GOVERNMENT VISA CREDIT CARD REQUEST/RECEIPT INFORMATION	UNIT 6425	SUPPLIES X	DATE
		SERVICE	1/30/07

1. REQUEST THE FOLLOWING ITEMS BE PURCHASED WITH THE GOVERNMENT CREDIT CARD:

ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE
1	LCD FLAT PANEL SCREEN	1	149.99	
2	FLAT PANEL WALL MOUNT SUPPORT	1	24.00	
				173.99

2. SOURCE OF SUPPLY/SERVICE — TOTAL PRICE 174.00

COMPANY NAME SEARS

COMPANY ADDRESS LACEY

POC TRAVIS (ELECTRONICS) PHONE NO. 360-412-5337

JUSTIFICATION:

TO BE USED FOR SHIPPING (b)(6) TO VETTED CONTRACTOR SUPPLIED TAPES OF SYSTEMS

(b)(6) 1/30/07 DATE

SIGNATURE OF APPROVING OFFICAL

(b)(6) (b)(6) DATE

EXHIBIT 6

Samsung High-Design 40" Flat-Panel LCD HDTV

Model: LN-S4051D

VIEW MORE PHOTOS

Reg. Price: $1,799.99
On Sale Now:
See price in cart 1499.00

ADD TO CART

- On Sale
- 10% Off Wall Mount Offer
- 10% Off Bose Speaker System Offer
- Free Shipping
- Gift by Mail

Limited Delivery Availability. Check Delivery availability.

Store Pickup: Available at most stores Select preferred store availability

Product images, including color, may differ from actual product appearance.

Whether you're catching up with the latest episode of your favorite TV show or checking your e-mail, this sleek flat-panel LCD HDTV can handle it. The crisp and stunning high-definition picture creates a stellar entertainment experience.

Learn more about HDTV.

Learn more about Samsung High-Design LCD HDTVs.

- **Built-In HDTV Tuner:** Add HD-capable antenna to receive over-the-air high-definition broadcasts, where available. Optional set-top box required for high-definition cable or satellite programming.
- HDMI inputs provide an uncompressed all-digital audio/video link for the highest-quality connection and supports copy-protected HD broadcast content
- 1366 x 768 pixel resolution with built-in image scaler

More Options

- Protect your investment with a Service Plan.
- Do you have all the accessories you need?
- Compare with products in this price range.
- View printable version.

Product Specs

Product Features

- 16:9 widescreen aspect ratio delivers a cinema-style entertainment experience
- DNIe (Digital Natural Image Engine) circuitry provides enhanced detail and contrast, video noise reduction and white-balance enhancements for an amazing picture
- Ultrafast 8 ms response time
- Wide 178° horizontal and vertical viewing angles make every seat the best in the house
- High brightness (500 cd/m²) and incredible contrast (4000:1) for an arresting viewing experience
- 3D Y/C digital comb filter delivers state-of-the-art detail and color enhancement
- Two 10W hidden bottom speakers with D.A.C.S. (Dual Acoustic Chamber System) provide outstanding sound quality
- SRS TruSurround XT delivers a virtual surround sound

7.0% Sale Price 1499.00

GOVERNMENT VISA CREDIT CARD REQUEST/RECEIPT INFORMATION	UNIT PW	SUPPLIES SERVICE	X	DATE 1/25/07

1. REQUEST THE FOLLOWING ITEMS BE PURCHASED WITH THE GOVERNMENT CREDIT CARD:

ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE
1	Safety Training Program "Confined Spaces Annual Class"	1	495.00	495.00
1a	"Permit Required"	1	FREE	0.
2	Safety Training Program "Lock out - Tag out"	1	295.00	295.00
3	" "No Injury No Accident"	1	295.00	295.00
4	" "Confined Space Rescue"	1	395.00	395.00
				1680.00
			-20%	-336.00
			TOTAL PRICE	1344.00

2. SOURCE OF SUPPLY/SERVICE

COMPANY NAME: Learning Communications — 155.00

COMPANY ADDRESS: 214 Ind. Drive
Bensenville, IL 60106

POC: Help Needed — PHONE NO. 1-800-626-7995

JUSTIFICATION:
Monthly Safety Training Program Requirement
3 Months of Safety Training

SIGNATURE OF REQUESTOR		SIGNATURE OF APPROVING OFFICAL	
(b)(6)	1/30/07 DATE	(b)(6) (b)(6)	DATE

EXHIBIT 6

oduct Search

You can search by keyword in the field below. Please use a single keyword, phrase or the exact title. You can also use the Advanced Search feature by clicking on that tab. This will give you the ability to search for products by format (such as VHS, book or DVD), training categories, versions and product collections.

KEYWORD SEARCH | ADVANCED SEARCH

no injury

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NO INJURY, NO ACCIDENT? ADD TO CART ADD TO WISHLIST

Discover how near misses can add up to major accidents.

NO INJURY, NO ACCIDENT? SECOND EDITION ADD TO CART ADD TO WISHLIST

Update of a major Safety Best Seller illustrating that workplace incidents that are near misses must be reported and addressed.

Search Tip:
If you are using our online search feature and you know the exact title that you are looking for, please type it in the field. If you don't know the exact title, please type in a distinguishing keyword instead of a phrase that may not match a title exactly. For example, if you are looking for "Give 'em The Pickle" and you don't remember the exact name, just type in "Pickle."

oduct Search

'ou can search by keyword in the field below. Please use a single keyword, phrase or the exact title. You an also use the Advanced Search feature by clicking on that tab. This will give you the ability to search for roducts by format (such as VHS, book or DVD), training categories, versions and product collections.

KEYWORD SEARCH | ADVANCED SEARCH

confined space

Featured Products | New Releases |

CLEARING THE AIR: CONFINED SPACE ENTRY ADD TO CART ADD TO WISHLIST

This video discusses the potential dangers of confined space entry and shows how to enter confined spaces safely.

CONFINED SPACE ENTRY ADD TO CART ADD TO WISHLIST

To avoid serious hazards associated with a confined space entry, employees must be quick-thinking and fast-acting with their response.

CONFINED SPACE ENTRY: INSIDE MANEUVERS ADD TO CART ADD TO WISHLIST

This dynamic program uses the USS Atlanta, a United States Naval submarine, and its crew as a dramatic backdrop to compare the dangers of working in a submarine to that of working in a confined space.

CONFINED SPACE ENTRY: INVESTIGATION ADD TO CART ADD TO WISHLIST

Investigates two real confined space accidents -- what happened, what went wrong and how they could have been prevented.

CONFINED SPACE ENTRY: PERMIT REQUIRED ADD TO CART ADD TO WISHLIST

Will help protect your employees from the dangers of working in confined spaces.

CONFINED SPACES, DEADLY PLACES ADD TO CART ADD TO WISHLIST

The first module of the Confined Space Training Program .

Search Tip:
If you are using our online search feature and you know the exact title that you are looking for, please type it in the field. If you don't know the exact title, please type in a distinguishing keyword instead of a phrase

oduct Search

ou can search by keyword in the field below. Please use a single keyword, phrase or the exact title. You an also use the Advanced Search feature by clicking on that tab. This will give you the ability to search for roducts by format (such as VHS, book or DVD), training categories, versions and product collections.

KEYWORD SEARCH | ADVANCED SEARCH

tag

Featured Products | New Releases |

LOCKOUT - TAGOUT PROCEDURES ADD TO CART ADD TO WISHLIST

This program covers the purpose of lockout - tagout, the hazards associated with the accidental release of stored energy, proper lockout - tagout procedures for attaining zero energy state, proper startup procedures and special situations.

LOCKOUT / TAGOUT: AN OPEN & SHUT CASE ADD TO CART ADD TO WISHLIST

This program helps solve the mystery of lockout/tagout by focusing on the basics.

LOCKOUT / TAGOUT: REAL, REAL-LIFE ADD TO CART ADD TO WISHLIST

This video program will (b you comply with OSHA's Lockout/Tagout Standard (1910.147).

SIGNS, TAGS, LABELS, AND PLACARDS ADD TO CART ADD TO WISHLIST

Injuries and accidents can be prevented and lives can be saved when signs, tags, labels and placards are used properly. This training package includes a 17-minute video, Trainer's Manual with reproducible participant material and is an effective way to reinforce what employees see everyday, but don't often heed.

Search Tip:
If you are using our online search feature and you know the exact title that you are looking for, please type it in the field. If you don't know the exact title, please type in a distinguishing keyword instead of a phrase that may not match a title exactly. For example, if you are looking for "Give 'em The Pickle" and you don't remember the exact name, just type in "Pickle."

Learning Communications L.L.C.
3345 University Ave. Suite G-1
Clive Iowa, 50325

Fax Correspondence

Date: February 21, 2007

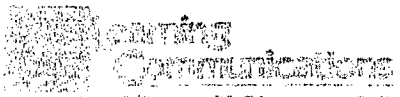
To: (b)(6) Fax Number: 703-963-2547

Company: US Army Pages (including cover): 2

From: Hap Newell, Learnacom – Des Moines

Remarks: Urgent For Review Reply ASAP Please Comment
Message:

Please call me at 800-676-7975 to confirm that you received your fax. Hap



Accounting Office - 38 Discovery, Suite 200
Irvine CA 92618

Invoice Number: [illegible]
Invoice Date: [illegible]

Bill To Customer: 81350

Ship To Customer: 81350

Attn: (b)(6)
Supervisor, Public Works
US Army
Bldng 7972 Vancouver Rd North Fort
Fort Lewis, WA 98433

(b)(6)
Supervisor, Public Works
US Army
Bldng 7972 Vancouver Rd North Fort
Fort Lewis, WA 98433

(b)(6) Terms: NET DUE IN 30 DAYS

			Product Description	Unit Price	Total Price
			COMBINED SPACES, DEATH TRACES ENGLISH DVD Type: Conversion of Purchased VS Sale	420.75	420.75
			COMBINED SPACES, SCRIPTS AT DEATH	.00	.00
			NO INJURY, NO ACCIDENT AT ON STATION PAT VERSION	420.75	420.75
			NO INJURY, NO ACCIDENT AT CO CD-ROM TRAINING MATERIALS	.00	.00
			NO INJURY, NO ACCIDENT SCORE EDITION TRAINING LEADER'S GUIDE	.00	.00
			SOLE FOR 4WD MEDIUM TRUCK DRIVER DVD VERSION	315.75	315.75
7 EA	1	0 XC0193 S DVD	LOOKOUT - [illegible]	315.75	315.75

For further information, please contact
Mac Newell
800-676-7575 or (b)(6)

Item Subtotal: 1,053.00

Total US Dollars: [illegible]

Visa [illegible]

Federal ID#: 33-0600084 - Payable in US Dollars

experience; auto volume leveler
- Ultraslim (3-2/5" deep), lightweight design is ideal for wall mounting; swivel stand for added convenience
- Progressive scanning maximizes the picture quality of progressive-scan DVD players, set-top boxes and digital video recorders
- USB input for quick connection of a digital camera or other USB devices; PC input allows the TV to function as a high-resolution monitor
- Inputs: 2 RF, 1 component, 2 S-video, 2 composite, 2 HDMI, 1 PC S-sub, 1 RS232C, A/V
- Outputs: 1 sound monitor, 1 optical sound, 1 headphone
- V-Chip parental controls keep children from being exposed to undesirable material
- Other convenient features include auto channel search, multilingual on-screen displays, still picture, picture-in-picture, optimized game mode and sleep timer

Product Details

Warranty Terms - Parts	1 year
Warranty Terms - Labor	1 year
Product Height	28-1/10" with stand (25-9/10" without)
Product Width	39"
Product Weight	50.3 lbs.
Product Depth	12-4/5" with stand (3-2/5" without)
TV Type	LCD flat panel
Screen Size	40"
Aspect Ratio	16:9
Display Type	Flat-panel LCD
Built-In Player	No
Built-In DVR	No
Digital Cable Ready	No
Digital Capabilities	HD built-in
Maximum Resolution	1366 x 768
Vertical Scanning Lines (Native Mode)	768
Contrast Ratio	4000:1
Brightness	500 cd/m²
Comb Filter	3D Y/C
Media Card Slot	No
USB Slot	Yes
Digital Convergence	Yes
Picture-In-Picture	Yes
HDMI Inputs	2
DVI Inputs	No
S-Video Inputs	2
Component Video Inputs	1
Composite Inputs	2
RGB Inputs	No
PC Inputs	1
RF Antenna Input	2
Headphone Jacks	1
Watts/Channel	10W
Speakers	2
Sound Leveler	Yes
Language Options	English, French, Spanish
V-Chip	Yes
Sleep/Alarm Timer	Yes
Channel Labeling	Yes

Ex Supply Card order to Rec.
2.9.07

GOVERNMENT VISA CREDIT CARD REQUEST/RECEIPT INFORMATION	UNIT 64256	SUPPLIES X	DATE 11/30/06
		SERVICE	

1 REQUEST THE FOLLOWING ITEMS BE PURCHASED WITH THE GOVERNMENT CREDIT CARD:

ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE
	TV STAND	1		307.96

2. SOURCE OF SUPPLY/SERVICE — TOTAL PRICE 307.96

COMPANY NAME SEARS

COMPANY ADDRESS LACEY

POC TRAVIS (ELECTRONICS) PHONE NO. 360-412-5557

SIGNATURE OF REQUESTOR	DATE	SIGNATURE OF HAND RECEIPT HOLDER	DATE
SIGNATURE OF APPROVING OFFICIAL	DATE	SIGNATURE OF ADP MANAGER	DATE
		TRANSPORTATION OFFICER	DATE

I HAVE RECEIVED THE ABOVE REQUESTED ITEMS, AS ANNOTATED ON THE INVOICE, FROM THE CREDIT CARD HOLDER

SIGNATURE	PRINTED NAME	POSITION	DATE

EXHIBIT 6

STAND

SEARS

SEARS, WA 02219

RETAIN FOR COMPARISON WITH MONTHLY STATEMENT OR FOR RETURN OR EXCHANGE

SALESCHECK #
022190571459

PURCHASER: (b)(A. (b)
ADDRESS: 7972 VANCOUVER RD
CITY/STATE: TACOMA, WA
ZIP CODE: 98433
PHONE:
253-967-2527 253-967-7453

EXPECTED DATE: 02/09/07

TRAN#	PG/STORE	REG#	ASSOC#
1459	99 02219	057	2006

RINGING ASSOC # 2006

MERCHANDISE HOLDING
CUSTOMER PICKUP

2057	40786	SAM STAND, MDS	249.99T
57	60048	RCA,50'KKR MDS	17.99T
	UPC: 079000317975		
57	60064	RCA,6'COMP MDS	24.99T
	UPC: 079000331674		
57	60049	RCA,6'STER MDS	14.99T
	UPC: 079000316862		
		SUBTOTAL	307.96
		TAX EXEMPT	.00

02/09/07 VISA TOTAL 307.96

RC: 0407-9267-7381-7187

THE FOLLOWING ITEM(S) MAY BE SUBJECT TO A CANCELLATION/RESTOCKING FEE IF RETURNED:

2057 40786 SAM STAND

DRAFT PW Goals

Strategy	#	Goal	Objectives
Invest in People (Internal and External)	1-1	Enhance customer satisfaction and understanding so that we are the "preferred service provider".	
	1-2	Maximize employee potential in competency, leadership and personal development. (Internal)	
	1-3	Cultivate an understanding and appreciation of all PW employees, purpose, function and accomplishments. (1. Set up a personnel rotation program in certain areas. 2. Team approach to project management.)	
	1-4	Create an environment of empowerment. (Internal)	
	1-5	Cultivate ownership of problems/projects in PW employees (Internal)	
	1-6	Sustain a quality work environment. (Internal)	
	1-7	Develop community relations so that "the community wants us here". (External)	
Cultivate Leadership	2-1	Cultivate leadership attributes in Public Work employees (Ethical (do the right thing), Open/communicates, Positive attitude, Accountable, Responsible, Motivated, Innovative, Trust (both ways), Consistent, Compassionate, Confident)	
	2-1	Develop and position employees with leadership potential.	
Sustain Continual Innovation and Process Improvement System	3-1	Adopt systems to continually improve mission effectiveness through critical evaluation and innovation. (Rewards, Resources, Time and Energy for learning/exploration)	
	3-2	Manage our future- Anticipate future requirements and conditions; plan and manage to succeed, excel and control our future.	
	3-3	Embed resource stewardship and conservation in project and program management.	
Foster Effective Information Sharing	4-1	Improve information flow (internal and external) by standardizing information systems (e.g., work procedures; Maximo)	
	4-2	Improve information flow (internal and external) by Increasing information availability	
	4-3	Improve information flow (internal and external) by Enhancing information quality	
	4-4	Improve information flow (internal and external) by Establishing meetings/verbal communication standards (shop/division meeting frequency).	
Develop Strategic Alliances	5-1	Partner with communities to create allies for future actions (Environmental groups, neighbors)	
	5-2	Attract and retain "best quality" vendors to increase capability	
	5-3	Partner with service providers to increase capability (COE, Contractors, RCI/Prioritization/CA)	
	5-4	Partner with other agencies to increase capability (Other Services, Navy, Air Force, Regulators)	

Confined Space Equipment Inspection

1. All confined space equipment shall be visually inspected prior to use. If line fraying or damage is observed, the supervisor shall be notified and the equipment is not to be used.

2. The Bachrach Sentinel 44 Gas Monitors will be checked with a known gas (zero air) prior to use. If the area being entered has potential for LEL, H2S, or CO, these known gases will be checked also. If the known gas value is exceeded high or low by more than 10%, the monitor should be calibrated.

3. The Bachrach Sentinel 44 Gas Monitors only require calibration when either the sensors are replaced, the monitor displace specifies calibration, or when pre-checking with a known gas exceeds 10% of the label value.

4. All inspections will be noted on the permit.

Safety

WWTP Fort Lewis - 253-967-7453

Sup - (b)(6) WW Group IV Certification
Ldr - (b)(6) WW Group II Certification
Lab - (b)(6) WW Group III
Op - (b)(6) WW Group II
Op - (b)(6) WW Group III
Op - (b)(6) WW Group III
Op - (b)(6) WW Group II
Op - (b)(6) WW Group II
Op - (b) (b)(6) WW Group III
Op - Rob (b)(6) WW Group III

Requirements
Sup - WW Group III
Op - WW Group II
Lab - none

[Code of Federal Regulations]
[Title 5, Volume 1, Parts 1 to 699]
[Revised as of January 1, 1998]
From the U.S. Government Printing Office via GPO Access
[CITE: 5CFR550.143]

[Page 491-492]

TITLE 5--ADMINISTRATIVE PERSONNEL

CHAPTER I--OFFICE OF PERSONNEL MANAGEMENT

PART 550--PAY ADMINISTRATION (GENERAL)--Table of Contents

Subpart A--Premium Pay

Sec. 550.143 Bases for determining positions for which premium pay under Sec. 550

(a) The requirement for the type of position referred to in Sec. 550.141 that an employee regularly remain at, or within the confines of, his station must meet all the following conditions:

(1) The requirement must be definite and the employee must be officially ordered to remain at his station. The employee's remaining at his station must not be merely voluntary, desirable, or a result of geographic isolation, or solely because the employee lives on the grounds.

(2) The hours during which the requirement is operative must be included in the employee's tour of duty. This tour of duty must be established on a regularly recurring basis over a substantial period of time, generally at least a few months. The requirement must not be occasional, irregular, or for a brief period.

(3) The requirement must be associated with the regularly assigned duties of the employee's job, either as a continuation of his regular work which includes standby time, or as a requirement to stand by at his post to perform his regularly assigned duties if the necessity arises.

(b) The words ``at, or within the confines, of his station'', in Sec. 550.141 mean one of the following:

(1) At an employee's regular duty station.

(2) In quarters provided by an agency, which are not the employee's ordinary living quarters, and which are specifically provided for use of personnel required to stand by in readiness to perform actual work when the need arises or when called.

(3) In an employee's living quarters, when designated by the agency as his duty station and when his whereabouts is narrowly limited and his activities are substantially restricted. This condition exists only during periods when an employee is required to remain at his quarters and is required to hold himself in a state of readiness to answer calls for his services. This limitation on an employee's whereabouts and activities is distinguished from the limitation placed on an employee who is subject to call outside his tour of

[[Page 492]]

duty but may leave his quarters provided [illegible] arranges for someone else to respond to calls or leaves a telephone number by which [illegible] can be reached should his services be required.

(c) The words ``longer than ordinary periods of duty'' in Sec. 550.141 mean more than 40 hours a week.

(d) The words ``a substantial part of which consists of remaining in a standby status rather than performing work'' in Sec. 550.141 refer to the entire tour of duty. This requirement is met:

(1) When a substantial part of the entire tour of duty, at least 25 percent, is spent in a standby status which occurs throughout the entire

tour;

(2) If certain hours of the tour of duty are regularly devoted to actual work and others are spent in a standby status, that part of the tour of duty devoted to standing by is at least 25 percent of the entire tour of duty; or

(3) When an employee has a basic workweek requiring full-time performance of actual work and is required, in addition, to perform standby duty on certain nights, or to perform standby duty on certain days not included in his basic workweek.

(e) An employee is in a standby status, as referred to in Sec. 550.141, only at times when he is not required to perform actual work and is free to eat, sleep, read, listen to the radio, or engage in other similar pursuits. An employee is performing actual work, rather than being in a standby status, when his full attention is devoted to his work, even though the nature of his work does not require constant activity (for example, a guard on duty at his post and a technician continuously observing instruments are engaged in the actual work of their positions). Actual work includes both work performed during regular work periods and work performed when called out during periods ordinarily spent in a standby status.

This page can be found on the web at the following url:
http://www.opm.gov/oca/worksch/HTML/AWScws.asp

U.S. Office of Personnel Management
Ensuring the Federal Government has an effective civilian workforce

ALTERNATIVE WORK SCHEDULES (AWS)
COMPRESSED WORK SCHEDULES (CWS)

Description

An agency may implement for its employees an alternative work schedule (AWS) instead of traditional fixed work schedules (e.g., 8 hours per day, 40 hours per week). Within rules established by the agency, AWS can enable employees to have work schedules that help the employee balance work and family responsibilities.

There are two categories of AWS: flexible work schedules (FWS) and compressed work schedules (CWS).

CWS are fixed work schedules, but they enable full-time employees to complete the basic 80-hour biweekly work requirement in less than 10 workdays.

Employee Coverage

A Federal employee, as defined in section 2105(a) or (c) of title 5, United States Code, who is employed by an agency, as defined in 5 U.S.C. 6121(1), may be covered by a CWS. An employee may request to be excluded for a personal hardship.

Implementation Restrictions

- *For employees in a bargaining unit:* The agency must successfully negotiate a CWS program with the union for a represented group of employees prior to implementation (5 U.S.C. 6130).
- *For employees not in a bargaining unit:* The agency must secure a favorable vote from the majority of employees in the affected group before implementing a CWS program (5 U.S.C. 6127(b)(1)).

Credit Hours

Credit hours are not permitted under a CWS program. (See fact sheet on "Flexible Work Schedules.")

Overtime

For full-time employees, all hours worked in excess of the established compressed work schedule are overtime hours.

Compensatory Time Off

An employee on a Compressed Work Schedule (CWS) may request compensatory time off only for the performance of irregular or occasional overtime work. Compensatory time off may not be approved for any member of the Senior Executive Service (SES).

Night Pay

The normal premium pay rules apply for night pay. See 5 CFR 550.121 and 122 for General Schedule employees and 5 CFR 532.505 for prevailing rate employees.

Holidays

On holidays, an employee is normally excused from work and entitled to basic pay for the number of hours of his or her CWS on that day. In the event the President issues an Executive order granting a "half-day" holiday, full-time CWS employees are normally excused from work during the last half of their "basic work requirement" (i.e., nonovertime hours) on that day.

Holiday Premium Pay

Holiday premium pay (equal to 100 percent of the rate of basic pay) is paid for nonovertime hours of work that fall within the hours regularly scheduled on the holiday.

Sunday Premium Pay

Sunday premium pay is paid for nonovertime work performed by full-time employees. For an employee on a CWS, Sunday premium pay is paid for the entire nonovertime regularly scheduled tour of duty that begins or ends on Sunday. It may not be paid for periods of nonwork, including leave, holidays, and excused absence.

References

- 5 U.S.C. 6120 - 6121; and 5 U.S.C. 6127 - 6133
- 5 CFR part 610, subpart D
- Comptroller General Opinions: B-217080, June 6, 1985; B-229473, October 7, 1988; and B-245772, May 7, 1992.
- U.S. Office of Personnel Management, *Negotiating Flexible and Compressed Work Schedules*.
- OPM *Handbook on Alternative Work Schedules* (December, 1996)

- To Work Schedules Home Page
- To AWS Home Page
- To Compensation Administration Home Page

U.S. Office of Personnel Management 1900 E Street NW, Washington, DC 20415 | (202) 606-1800 | TTY (202) 606-2532

This was presented to Management by [redacted] neither Environmental Dept or [redacted] should be telling us what to & how to remove biosolids from WWTP non written.

Biosolids Data Management Issues

Category	Issue	Comments or Follow-up, if any
1. Biosolids Bed Management	Reportedly, biosolids beds are being moved and removed without adequate tracking. Biosolids Bench Sheet does show some, if not all, for moved or combined beds. However, no information on sludge hauled was reported in Biosolids Bench Sheets in 2005 or 2006. No records of biosolids removed were found at the WWTP. See #4 below.	**Beds moved or combined should be tracked on Biosolids Bench Sheet.** It is the responsibility of the wwtp Supervisor but we are stepping in
2. Additions to Biosolids	It appears that material is being added to biosolids beds without adequate documentation and analysis. Largest addition of material was to Primary Digester No. 1 material. Diatomaceous earth was mixed with sludge and grit from Digester No. 1. Total amount mixed in unknown.	**Any material added to biosolids beds must be documented, including quantity and quality recorded.** Description
3. Biosolids Removal and Reporting	Regulatory record keeping requires that not only the amount of biosolids removed from WWTP be documented. To do that it is necessary to know that % total solids at the time material is removed. The WWTP should collect a composite sample based on an SOP or some written protocol. Biosolids leaving the WWTP must be reported in the Annual Biosolids Report. Therefore, for 2006 an estimate of 20% TS was used for biosolids transferred to EcoPark and for Digester No. 1 material hauled to Pierce County (304th St) landfill.	**Any biosolids or material removed from WWTP must be documented at the WWTP.** In addition, biosolids and sludge must be tested at a minimum for % total solids before removed from the WWTP in order to better estimate amount of biosolids transferred to EcoPark, hauled to Landfill or other facilities.
4. Biosolids Removal Data Management	Weight slips are not being kept on file at WWTP. However, data is being tracked in a couple of place. There is an Earthworks Tracking System database for EcoPark and sludge hauled by LeMay is tracked on a spreadsheet by Contract Manager. However, descriptive records on these documents could be improved. Also, need to determine where weight slips are kept for biosolids, biosolids grease and waste transferred to either EcoPark or Pierce County (304th St) Landfill.	**Biosolids and sludge removed from the WWTP should be on Biosolids Bench Sheet.** **In addition, weight slips (or copies of) should be kept on file at the WWTP.**

Note: Page 16 of Permit WA-002195-4

[redacted] should be following the same protocal as Cascade-Fair Mountain LeMay or any other contractor for the removal of biosolids from the facility as the regulations

5. Biosolids Annual Average % of Total Solids (TS)	All past Annual Biosolids Report use 5% to calculate total biosolids treated and processed. Actual TS is variable, and less than 5%. Specifically: 2003: 4.3% 2004: 4.8% 2005: 4.70% 2006: 4.67%	**Recommend using actual annual average which is available, instead of 5%.** Otherwise, we are overstating the amount of biosolids we are generating. FYI: Actual # was used on 2006 Annual Biosolids Report.
6. Digestion Solids Data for 2006	Computer program at WWTP is incorrectly calculating the percentage of % Solids, but is correct for % Volatiles. I could not get data to extract to Excel so I had to re-enter data to calculate the % Solids for the raw water and Primary Digester.	**Recommend that WWTP database be fixed.**
7. Average Ambient Temperature	Reportedly, average ambient temperature data at one time was being entered at the WWTP on a daily basis. Reportedly, data was called in or a call was made to Gray Airfield. Data is now provided by fax on a monthly basis by Environmental Compliance once it is emailed to Water Program Manager, but is not being back entered. So instead of being in WWTP database, the information has to be entered into an Excel spreadsheet. Data is needed show that biosolids treatment is in compliance with air drying regulation.	**Recommend that WWTP operators add average ambient temperature daily data to WWTP database.**
8. Annual Biosolids Data Summary	Database calculates the average sludge pumped per day and primary detention time, but it does not calculate the average bed pours per day, nor the secondary detention time. The data available from WWTP database is extracted to Excel and then data from WWTP Monthly Biosolids Bench Sheet is entered into Excel. Total number of bed poured in gallons could be entered into database at the end of each month. Program would then divide by number of days in the month. Secondary detention time is calculated by: 460,000 gallons / (average sludge pumped in gallons per day + average bed pours in gallons per day).	**Recommend that database is updated if necessary, and/or WWTP operators input data into existing data fields for bed pour average (gal/day).**

9. Vector Attraction Reduction (2)	"The mass of volatile solids in the biosolids must be reduced by a minimum of 38%." Volatile solids are measured and reported for raw wastewater, primary digester sludge and biosolids when first emptied from secondary digesters. Not meeting this requirement requires additional work. Although standard appears to be met thought primary digestion alone, if it were a problem by the time the Annual Biosolids Report is prepared it would be too late to implement other regulatory procedural requirements.	**Recommend Monthly Summary Report look at average monthly volatile solids in raw sludge as compared to average monthly volatile solids in primary digested sludge and biosolids.**
10. Data Protection	It does not look like that data is backed-up on a routine basis. Either a methodology for routine back-up with a zip drive or computer system at WWTP should be connected to FL PW computer system and database kept on share drive.	**Recommend that electronic data be backed-up on a monthly basis.**

TREATMENT OF SLUDGE

The water content of sludge is the controlling factor as to the volume of sludge produced. Sludge can be characterized by the type of process by which it was produced. The following table characterizes sludges produced by the various processes.

Table F-1

SLUDGE CHARACTERISTICS

Process Producing Sludge	Percent Water Content	Volatile Matter as Percentage of Dry Solids
Primary sedimentation sludge	94 - 96*	70
Activated sludge High rate	95 - 97.5	--
Trickling filter	96 - 97	45-70
Chemical precipitation	95	--
Digested sludge (well digested)		32-45
• Primary	88 - 94	
• Primary and activated	94 - 96	
• Primary and trickling filter	90 - 94	

* Steel, Water Supply and Sewage, pp. 574-575

The Digestion Process

Anaerobic organisms break down complex molecular structures of the solids and release much of the bound water, while obtaining nutrients and energy from the conversion of the raw solids into more stable organic and inorganic solids. Anaerobic sludge digestion takes place in three phases:

- Acid fermentation. Soluble or dissolved solids are broken down into simple organic acids (volatile acids) with a decrease of pH.

- Acid regression. The organic acids and nitrogenous compounds are decomposed with an increase in pH.
- Methane production. This occurs simultaneously with the first two phases. Methane bacteria reduce the organic acids and other products of the first and second phases to produce methane and carbon dioxide gases.

Sludge digestion accomplishes the following:

- Reduces organic matter into simple compounds
- Reduces sludge volume
- Releases the remaining water more easily
- Reduces the coliforms by 99.8 percent in 30 days

Aerobic Sludge Digestion

This particular process functions in much the same way as an activated sludge unit, with the feed to the aeration tank being sludge from the primary and secondary sedimentation basins. This process requires adequate mixing and a dissolved oxygen level range of 1.0 to 1.5 mg/1. The detention time required for treatment of sludge is from 20 to 30 days with removals of supernatants and sludge from the digester to maintain a consistent feed rate.

For additional information, see:

Ch. 6, Washington State Treatment Plant Operator's Manual
Ch. 1 and 7, Eckenfelder-O'Connor
Ch. 14, ASCE STP Design
Ch. 26, Steel
Ch. 12, Imhoff-Fair

SLUDGE THICKENING

This process, usually found in the larger treatment plants, precedes digestion, vacuum filtration, or kiln drying. Sludge thickening is used to reduce the liquid volume of the sludge solids which have to be pumped to other treatment units. These treatment units then can be smaller because they do not have to handle the excess liquid.

There are two major types of sludge thickening operations:

- Gravity thickening. Sludge and aerated secondary effluent are introduced into a basin, much like a stirred sedimentation basin except deeper, which allows the concentration of solids from flocculation by interfacial contact and compaction by the weight of the overlaying water. This method can produce a solids content of 8% or greater. Not all sludge combinations will work in a gravity thickener, and testing of sludge produced by the treatment process will be necessary. In some cases, the addition of chemical flocculant will aid in the concentration of the sludge.
- Flotation thickening. This is usually used on sludges formed by biological reactors. This process combines sludge with a liquid which has been exposed to high pressure and contains large amounts of dissolved oxygen. Under less pressure in the thickening tank, air bubbles from the liquid attach themselves to the sludge particles and rise to the surface where the sludge is collected for further treatment.

For additional information, see:

Ch. 15, ASCE STP Design
Ch. 6, Washington State Treatment Plant Operator's Manual
Ch. 26, Steel
Ch. 14, Imhoff-Fair

SLUDGE CONDITIONING

The basic processes which are used in sludge conditioning are elutriation and chemical conditioning.

- Elutriation consists of mixing thoroughly 1 part of sludge with 2 parts of water and allowing separation of about 6 hours, followed by decanting the resulting elutriate and drawing off the sludge.
- Chemical conditioning consists of the addition of certain chemicals to coalesce particles in sludge which facilitates moisture removal by filtration. Some of the chemicals commonly used are:

Ferric chloride

Ferric sulfate

Lime and ferric chloride

Chlorinated coppeas

Aluminum sulfate

Chemical solutions

Polyelectrolytes

Activated silicates

Inorganic polyelectrolytes

For additional information, see:

Ch. 15, ASCE STP
Ch. 26, Steel
Ch. 14, Imhoff-Fair

SLUDGE DEWATERING

Some common methods for sludge dewatering are vacuum filtration, centrifuging, and sludge drying.

- Vacuum Filtration is widely used in the separation of liquids from concentrated suspensions, sludges, and slurries. The basic mechanism of this process is the passing of a cylindrical drum which rotates partly submerged through a container of sludge. The solids in the container are agitated to keep them in suspension. A vacuum which is applied between the drum deck and filter media causes the water to be removed while sludge is held on the filter media. Following this process, the sludge is buried in a sanitary landfill or incinerated. The supernatant can be disposed of by returning it to the elutriation tank or returned into the influent of the plant.

- Centrifuging removes water by centrifugal force which tends to force the heavier solids to the outside of the rotating flow stream much like the spin dry cycle of a washing machine.

- Sludge Drying is best suited for sludges which have been digested. The mechanism is that of a shallow sand filter for draining the sludge and air for drying in beds. The supernatant may be disposed of in the same manner as vacuum filtration liquids.

For additional information, see:

Ch. 7, Rich - Unit Operations of Sanitary Engineering
Ch. 26, Steel
Ch. 15, ASCE STP Design
Ch. 14, Imhoff-Fair

DISPOSAL OF SLUDGE

The final disposal of sludge is influenced by many factors:

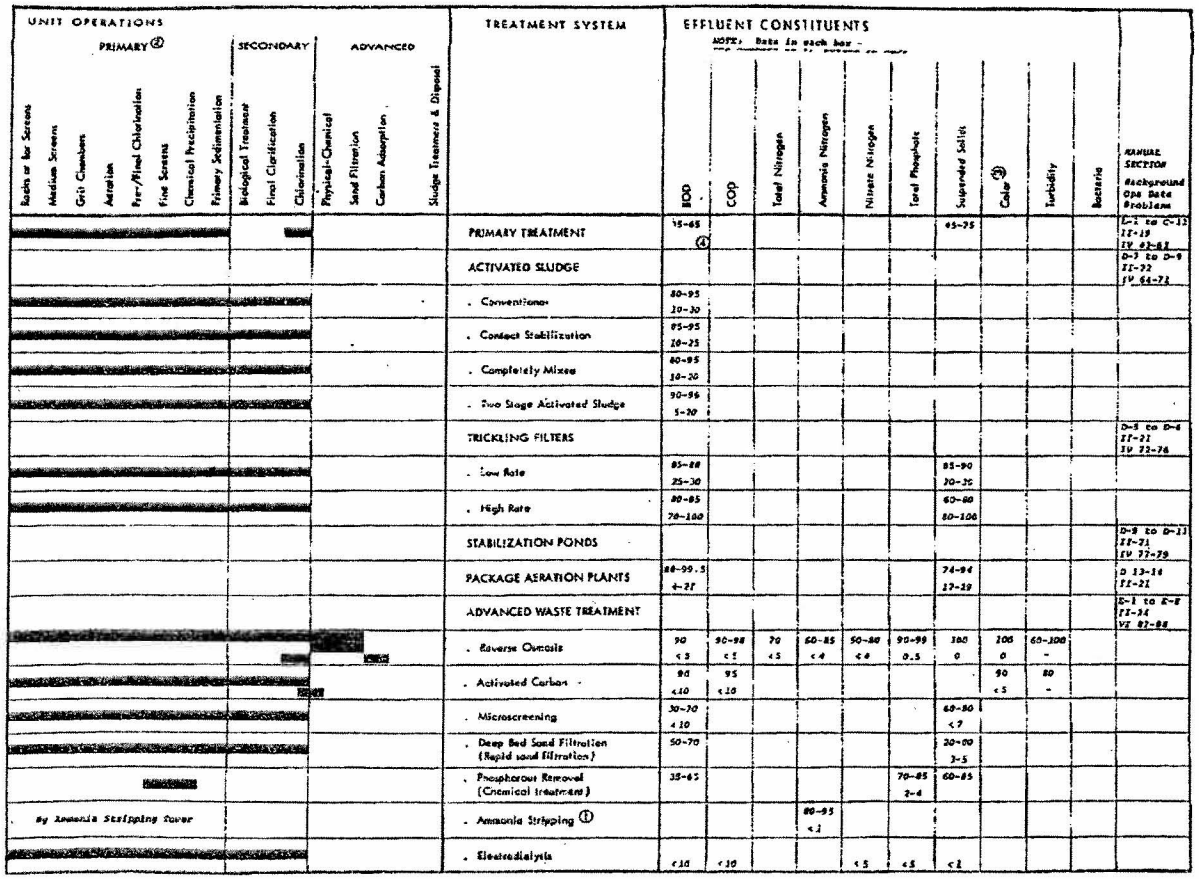
- The character and composition of the sludge
- Availability of land for dumping of sludge cake or lagooning of wet sludge
- Whether or not regulatory agencies allow piping (deep water sludge outfall) or barging of sludge
- Local market possibilities for its use as fertilizer.

Coastal cities can dispose of sludge through barging or piping to sea, where still allowed. On land, it may be buried in swamps, abandoned quarries, and other lands which have no present use.

Incineration of raw or digested dewatered sludge is gaining popularity. At present, only larger cities are utilizing this process because of its added expense. In general, incineration of sludge is a wet combustion process in which sludge in solution or suspension goes through chemical oxidation processes under pressure.

For additional information, see:

Ch. 14, Rich - Unit Processes of Sanitary Engineering
Ch. 15, ASCE STP Design
Ch. 26, Steel
Short Course - Theory and Design of Advanced Waste Treatment Processes, U.C. Berkeley Extension



① A function of pH and temperature
② Not all operations are used in all plants
③ In color units
④ All percent removals are based on process effluent to process influent

Table A-2

Classification Matrix of Treatment Systems by Their Unit Operations, Removal Efficiencies and Effluent Quality

Table II-5

SOLIDS TREATMENT DATA*

Unit Operations or Processes	Operational Parameters		Loading Rates		Support Systems
Anaerobic Digestion	pH	6.8-7.2	Loading of Heated Tanks,** lb volatile solids per cu ft per month[1/]		Heat exchangers Circulation pumps o Gas o Sludge
	Temperature	85-95°F			
	Detention	30 days			
	Gas production	12 cu ft/lb volatile matter reduced			
Sludge produced for Anaerobic Digestion by:			Conventional operation	High-rate operation***	
Plain sedimentation			5.0	11	
Plain sedimentation and trickling filtration					
Low-rate operation			4.6	9	
High-rate operation			4.4	9	
Plain sedimentation and activated sludge					
High-rate operation			4.4	9	
Conventional operation			3.6	7	
Aerobic Digestion	Dissolved oxygen 1.0-1.5 mg/l Detention times 20-30 days				Supernatant Solids Removal Equipment
Sludge Thickening					
Gravity thickener			Overflow gul/sq ft/day	Loading lbs/sq ft/day	Sludge pumps Power supply
o Secondary sludge			400	8	Mechanical comb for water separation
o Activated sludge[3/]			500	8	
Flotation					Diffusers Air supply Sludge pump
Sludge Drying Beds for:	Area in sq ft per capita				Sludge pumps
	Open beds	Covered beds			
o Primary precipitation	1.00	0.75			
o Standard-rate filter[2/]	1.25	1.00			
o High-rate filter[2/]	1.50	1.25			
o Activated sludge[2/]	1.75	1.35			
o Chemical precipitation	2.00	1.50			

* For background information see App. F.
** Tank at 90°F
*** Thickened to twice original solids content

NOTE: 1/ Table, Imhoff-Fair, Chapter 12
2/ These treatments include primary sedimentation
3/ Steel, p. 586

Note: Operational Parameters and Loading Rates information was not available for Sludge Thickening, Flotation, at time of publication.

Table II-6

COMMON SOLIDS TREATMENT DATA*

Type of Sludge	Amounts of Chemicals Commonly Employed in Conditioning Unelutriated Sludge and Yields of Vacuum Sludge Filters: Conditioner, % of dry solids solids — CaO	FeCl$_3$	Dry Solids lb per 1,000 persons daily	Filter Capacity lb per sq ft per hr, dry basis	Cake Solids %	Required Filter Area, sq ft per 1,000 persons daily	Sludge Cake, lb per 1,000 persons daily	Conditioner, lb per 1,000 persons daily — CaO	FeCl$_3$	Support System
Plain sedimentation (primary)										Dosing equipment Power supply Sludge pumps Elutriation tanks Chemical storage
1. Fresh sludge	10	3	143	5	32	1.2	450	12	3.6	
2. Digested sludge	10	2	89	6	32	0.6	280	7.5	1.5	
	0	6	78	6	28	0.5	280	0	4.5	
Plain sedimentation and low-rate trickling filtration										
3. Fresh sludge mixture	12	3	183	4	28	1.9	650	18	4.4	
4. Digested mixed sludge	12	2	117	6	30	0.8	390	11	1.9	
	0	7	99	6	26	0.7	380	0	6.7	
Plain sedimentation and conventional activation										
5. Fresh activated sludge	0	6	71	2.5	20	1.2	350	0	4.1	
6. Fresh settled sludge mixture	0	6	195	4	22	2.1	880	0	11	
7. Digested mixed sludge	0	8	129	2.5	22	2.1	580	0	9.7	

*Adapted from Imhoff-Fair, 2nd edition. For background information, see Appendix F.

Testing of Lab

Table III-1

PROCESS TESTING GUIDE*

PROCESS	TEST	FREQUENCY
	PRETREATMENT	
Grit Removal	Volatile Solids	Daily
	Total Solids	Daily
	Moisture Content	Daily
	PRIMARY TREATMENT	
Primary Sedimentation	Settleable Solids	Daily
	pH	Daily
	Total Sulfides	Daily
	Biochemical Oxygen Demand	Weekly
	Suspended Solids	Weekly
	Chemical Oxygen Demand	Weekly
	Dissolved Oxygen	Weekly
	Grease	Weekly
	SECONDARY TREATMENT	
Activated Sludge	Suspended Solids	Daily
	Dissolved Oxygen	Daily
	Volatile Suspended Solids	Weekly
	Turbidity	Daily
Trickling Filter	Suspended Solids	Daily
	Dissolved Oxygen	Daily
Oxidation Ponds	Dissolved Oxygen	Daily
	Total Sulfides	Daily
	Total Organic Carbon	Weekly
	Total Phosphorus	Weekly
	Settleable Solids	Daily
	pH	Daily
	Total Sulfides	Daily
Final Sedimentation	Biochemical Oxygen Demand	Weekly
	Suspended Solids	Weekly
	Chemical Oxygen Demand	Weekly
	Dissolved Oxygen	Weekly
	Turbidity	Daily
	M B A S	Weekly

PROCESS	TEST	FREQUENCY
	DISINFECTION	
Chlorination	Chlorine Residual	Daily
	MPN Coliform	Weekly
	SOLIDS HANDLING	
Thickening	Suspended Solids	Daily
	Volatile Solids	Daily
Digestion	Total Solids	Weekly
	Volatile Solids	Weekly
	pH	Daily
	Gas Analysis	Weekly
	Alkalinity	Weekly
	Volatile Acid	Weekly
Centrifuging	Suspended Solids	When in Operation
	Volatile Solids	When in Operation
Vacuum Filters	Sludge Filterability	When in Operation
	Suspended Solids	When in Operation
	Volatile Solids	When in Operation
Incineration	Ash Analysis	When in Operation
	ADVANCED TREATMENT	
Chemical Coagulation & Flocculation	Jar Test	Weekly
	Phosphorus Analysis	Weekly
Activated Carbon	Apparent Density	Weekly
	COD	Weekly
	TOC	Weekly
Recarbonation	pH	Weekly
Ammonia Stripping	Ammonia Nitrogen	Weekly
	pH	Weekly
Filters	Suspended Solids	Daily
	Turbidity	Daily
Microscreen	Suspended Solids	Daily
	Chemical Oxygen Demand	Weekly

*This is a minimum sampling guide, and is subject to change with plant site, complexity of operation, and problems encountered.

Table III-2

EQUIPMENT TESTING MATRIX*

EQUIPMENT NEEDED

CONSTITUENTS TO BE ANALYZED	Atomic Absorption	600° C Muffle Furnace	103° C Drying Oven	Analytical Balance	Imhoff Cone	pH Meter	Lamotte Kit	Biochemical Oxygen Demand Incubator	Vacuum Pump	Hot Plate	Kjedahl Unit	Condenser & Extraction Equipment	Dissolved Oxygen Meter & Probe	Autoclave	Amperometric Titrator	Sterilizing Oven	35° C Incubator	Gas Analyzer	Steam Bath	Magnetic Stirrer	Blender	Turbidity Meter	Carbon Adsorption Unit	Desiccator	Spectrophotometer	Stirring Equipment	Vibrating Shaker	Total Organic Carbon Analyzer	Purity Meter	Water Still
Volatile Solids		●	●	●																				●					
Total Solids			●	●																				●					
Settleable Solids					●																								
pH						●																							
Total Sulfides							●																						
Biochemical Oxygen Demand									●																			●	●
Chemical Oxygen Demand										●		●								●								●	●
Suspended Solids			●	●					●															●					
Dissolved Oxygen													●																
Chlorine Residual														●															
MPN Coliform																													
Volatile Acids										●		●																●	●
Alkalinity						●														●									
Gas Analysis																		●											
Grease			●	●						●	●	●							●										
Total Organic Carbon																											●		
Turbidity																						●							
Volatile Suspended Solids		●	●	●						●													●						
Total Phosphorous										●																			
MBAS																									●				
Sludge Filterability						●				●																			
Ash Analysis		●		●																									
Jar Test																									●				
Apparent Density				●																									
Iodine Number																													
Isotherms			●	●						●												●					●		
Calcium Content				●																			●						
Ammonia Nitrogen										●		●																	
Organic Nitrogen										●	●	●																	
Nitrate Nitrogen																									●				
Heavy Metals	●																												

*The equipment specified in this matrix is subject to plant size and complexity of processes and the degree of control required.

SAMPLING PROGRAM FREQUENCY AND LOCATION

PARAMETERS TO SAMPLE

PROCESSES	GREASE	pH	FLOW	TEMPERATURE	TURBIDITY and/or CLARITY	SETTLEABLE SOLIDS	SUSPENDED SOLIDS	DISSOLVED SOLIDS	TOTAL SOLIDS	DISSOLVED OXYGEN	BOD	COD	VOLATILE ACIDS	ORGANISM COUNT and CLASSIFICATION	VOLATILE SOLIDS	VOLATILE SUSPENDED SOLIDS	GAS ANALYSIS	ALKALINITY	TOTAL SULFIDES	TOTAL ORGANIC CARBON	TOTAL PHOSPHORUS	SVI	MBAS	CHLORINE RESIDUAL
PRETREATMENT Grit Removal									③d						①solid									
PRIMARY TREATMENT	①②w	①②d	⑨d	①w		①②d	②w		⑫⑬	①②w	①③w	①②w	⑮w	⑯w	⑪⑫w			⑮w	④d					②d
Sedimentation												③w												
SECONDARY TREATMENT	①②③④	①②③④	⑨d	①②d		①②③④	①②③④	⑨⑩w	⑪ eo	①②③	①②③④	①②③④	⑫⑭	⑭w	⑪ eo			⑮⑯w						②d
Activated Sludge		㉑d		㉑d	③d	③d	③w	㉑d		㉑d				㉑w		㉓d						㉑w		
Trickling Filter – Single Stage		②d			②d	②d	①②㉒		⑫⑬eo	⑦d					⑫⑬ec									
Trickling Filter – Two Stage		⑤d				⑤d	①②㉒		⑫⑬eo	⑤⑦⑧	⑤w	①②㉕			⑫⑬ mo									
Oxidation Ponds		①②㉒d	⑨d	①㉒d		①②d	⑧②w			①㉓d	⑦w								㉒d	㉓w	㉒w			①d
Final Sedimentation					③d		③w			③w	③w	③w		⑯w									③w	
Package Aeration Plants		①②d	⑨d	㉑d		①②d				㉓d														②d
Imhoff Tanks		①d ②㉓w	⑨d			①②d																		②d
DISINFECTION Chlorination														②w										②d
SOLIDS HANDLING Thickening									⑧③d						⑧③d									
Digestion		①d		③d					③d				③w		③d		③d	③w						
Centrifuging									③q						③q									
Vacuum Filters									③q						③q									
Incineration	See Table III-1.																							
ADVANCED WASTE TREATMENT	See Table III-1.																							

FREQUENCY

- daily d
- weekly w
- monthly mo
- biweekly b-w
- bimonthly b-m
- when in operation q

SAMPLING POINT

① raw sewage
② final effluent
③ process effluents
㉒ primary effluent
④ secondary effluent
⑤ intermediate effluent
⑥ clarified effluent
⑦ filtered effluent
⑧ influent
⑨ influent or effluent
⑩ digester effluent
⑬ raw sludge
⑫ primary sludge
⑭ secondary sludge
⑭ above sludge blanket
⑮ digested sludge
⑯ receiving water
⑰ primary filter effluent
⑱ secondary filter effluent
⑲ primary supernatant
⑳ secondary supernatant
㉑ aeration tank
㉒ all of each lagoon or pond

NOTE: This is a minimum sampling program and is subject to changes with plant size and operational problems.

Figure 1. Sampling Program Frequency and Location

50 ppm Oil ("Petroleum Oil") concentration is labled as "inhibiting or Toxic"

Table 5-1. Information on materials which inhibit biological treatment processes

Pollutant	Inhibiting or Toxic Concentration[1] mg/L		
	Aerobic Processes	Anaerobic Digestion	Nitrification
Copper	1.0	1.0	0.5
Zinc	5.0	5.0	0.5
Chromium (Hexavalent)	2.0	3.0	2.0
Chromium (Trivalent)	2.0	2,000[2]	*
Total Chromium	5.0	5.0	*
Nickel	1.0	2.0	0.5
Lead	0.1	*	0.5
Boron	1.0	*	*
Cadmium	*	0.02[2]	*
Silver	0.03	*	*
Vanadium	10	*	*
Sulfides (S^{--})	*	100[2]	*
Sulfates (SO_4^{--})	*	500	*
Ammonia	*	1,500[2]	*
Sodium (Na^{+})	*	3,500	*
Potassium (K^{+})	*	2,500	*
Calcium (Ca^{++})	*	2,500	*
Magnesium (Mg^{++})	*	1,000	*
Acrylonitrile	*	5.0[3]	*
Benzene	*	50	*
Carbon Tetrachloride	*	10[3]	*
Chloroform	15.0	0.1[3]	*
Methylene Chloride	*	1.0	*
Pentachlorophenol	*	0.4	*
1, 1, 1 Trichloroethan	*	1.0[3]	*
Trichlorofluoromethane	*	0.7	*
Trichlorofluoroethane	*	5.0[3]	*
Cyanide (HCN)	*	1.0	2.0
Total Oil (Petroleum origin)[4]	50	50	50

* Insufficient data available to determine effect.

[1] Raw wastewater concentration unless otherwise indicated.

[2] Digester influent concentration only; lower values may be required for protection of other treatment processes as noted above under aerobic and nitrification processes.

[3] Petroleum-based oil concentration measured by API Method 733-58 for determining volatile and non-volatile oily materials. (The inhibitory level does not apply to animal or vegetable oil.)

Taken from ARMY/TPH.pdf Manual on web-site