STATE OF WASHINGTON
Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
7272 Cleanwater Lane, Olympia, Washington 98504

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MEMORANDUM
March 3, 1980

To: John Glynn

From: Eric Egbers

Subject: Oak Harbor STP Class II Inspection and Receiving Water Study

Introduction

A Class II inspection and receiving water study was conducted November 26, 27, and 28, 1979 at the Oak Harbor sewage treatment plant (STP) and Oak Harbor, respectively. In attendance were Jerry Thielen, Lynn Singleton, Dick Cunningham, and Eric Egbers (DOE Water and Wastewater Monitoring), John Glynn (DOE Northwest Region), and Jim Croft (Oak Harbor Plant Operator). Automatic compositor samplers were installed and grab composites collected at various locations within the plant. Some of the composites were split with the operator and results are found in Table 1. Water samples were collected from Oak Harbor and analyzed for various constituents. Results of the receiving water study may be found elsewhere in this memo.

The Oak Harbor STP has recently been upgraded to achieve secondary treatment. The Northwest Regional Office of DOE wanted to know how sewage treatment had improved subsequent to the upgrade, and what impact the treatment plant's effluent was having on the receiving water. The first portion of this memo will address the Class II inspection of the treatment plant, while the second portion will review the findings of the receiving water study.

Oak Harbor STP is a secondary treatment facility using rotating biological contactor (RBC) units for biological treatment. Influent flow enters the headworks and proceeds to a degritting unit. At the time of this survey, the degritter was down for repair. The wasteflow is comminuted and enters a rectangular, three-chambered primary clarifier operated in parallel. Clarifier effluent is fed to the RBC units where secondary treatment occurs. The flow leaves the RBC units and enters two secondary clarifiers, operated in parallel. From the secondary clarifiers, the flow is chlorinated and proceeds to the chlorine contact chamber and finally is discharged to Oak Harbor, waterway segment number 03-06-07. The five-year strategy plan identifies this segment as presently meeting state and federal water quality goals.

Several features of the plant warrant further discussion. First, sludge from the secondary clarifiers is returned to the headworks between the

comminutor and the primary clarifier. From the literature I've reviewed, this is unnecessary. Direct sludge pumping to the digestors should be adequate and probably preferable. As explained by Mr. Croft, the main reason for this secondary sludge return is the inability to pump it directly to a digester with existing equipment. One specific problem was noted with this sludge return. The plant's influent automatic composite sampler is located just below the sludge return point. Having noted this location, the DOE automatic composite sampler was placed above the sludge return. The results of total suspended solids analysis clearly shows the difference in location.

	Oak Harbor Sampler Location	DOE Sampler Location
Influent (mg/l)	340	130
Effluent (mg/l)	11	11
Percent Reduction	96.8	91.5

The Oak Harbor compositor location does not yield an accurate picture of influent load or treatment efficiency. Therefore, I strongly recommend relocating the influent composite sampler above the sludge return, or solving the apparent problem of directing the secondary sludge directly to the primary digester. There may be some advantages to the recirculation of this secondary sludge to the headworks as an alternate route, but it increases the potential for overloading the primary clarifier and necessitates wasting energy by pumping the sludge twice rather than once.

The plant is achieving satisfactory reduction in total suspended solids, well within their NPDES permit (Table 1). Meeting effluent BOD standards appears to be more difficult. The lack of operational flexibility, inadequate staging configuration, and saltwater infiltration and inflow, as evidenced by unusually high conductivities in Table 1, may all play a part in the difficulty in achieving compliance.

Table 1 also reveals unusually high inorganic (NH_3-N) and organic nitrogen concentrations. Also, total and organic phosphorus concentrations are high. Explanation of these results is unknown in that Oak Harbor has no industry known to Mr. Croft that would contribute such high concentration.

In conclusion, John, a follow-up visit in mid-April will tell you whether any or all of the suggestions and recommendations were accepted and followed. A short memo from you to our office following the visit would be much appreciated.

Review of Laboratory Procedures

Laboratory procedures were reviewed with Mr. Croft. Automatic composite sampler location, BOD, total suspended solids, and fecal coliform were discussed. Specific details may be found within the Laboratory Procedural Survey.

Composite Sample Collection

1. Stationary automatic composite samplers (Manning S 5000) are currently used on the influent and chlorinated effluent. As previously discussed in this memo, the location of the influent sampler should be moved upstream of the secondary sludge return.

2. To date, the sampling lines have not been cleaned. Cleaning these lines periodically (once per month) will discourage sidewall bacterial growth that might occur. One cycle of a mild acid solution (HCl or H_2SO_4) followed by one cycle of sodium bicarbonate ($NaHCO_3$) and finally several cycles of distilled water should be sufficient to remove any accumulation that presently exists. After this initial cleansing, several cycles of hot water once per month should be adequate.

Biochemical Oxygen Demand

Mr. Croft's technique is for the most part adequate. However, there are several areas where improving his technique will yield more accurate results.

1. There is some question where exactly his technique originated. It resembles "Standard Methods" but not exactly. A copy of DOE BOD_5 procedures was left with Mr. Croft as a reference and it was suggested that a written procedure be available for new employees.

2. Seed material is currently being collected from the influent composite sampler. The material is filtered and the resultant liquid used as the seed. Because the influent pH often exceeds 8.0, which may retard microbial growth, it was recommended that seed material be collected, as a grab, from either the primary clarifier or secondary clarifier. This sample should be settled, not filtered, for 24 hours and the resultant supernatant used as seed material.

3. The effluent sample is collected from a chlorinated source. Therefore, the sample must be dechlorinated prior to setup. Mr. Croft adds enough sodium thiosulfate to the sample to yield a zero chlorine residual. It was recommended he employ a proper dechlorinating procedure as explained on page 10 of the DOE procedural manual for BOD or page 546 of *Standard Methods*, 14th edition.

4. As mentioned previously, the influent pH often exceeds 8.0. According to Mr. Croft, pH values of samples are not adjusted prior to setup. It was recommended that any time a sample's pH is outside the range of 6.5 to 8.0, the pH should be adjusted to within this range.

5. The temperature within the BOD incubator is periodically checked for external gauge accuracy. It was recommended that a thermometer, contained in a water filled flask, be placed in the incubator on the same shelf as the BOD bottles. The temperature should be checked daily and recorded in a daily temperature log. This will eliminate any question as to what the exact temperature of the samples is within the incubator.

6. Mr. Croft is currently using a YSI dissolved oxygen meter and probe to obtain his dissolved oxygen results. The meter is calibrated using the Winkler-Azide modification method. He uses sodium thiosulfate in the Winkler, but has never standardized it. It was recommended he standardize his "thio" at least every month, and not rely on the manufacturer's normality.

7. The operator's BOD worksheet and calculation was reviewed, and the following were recommended:

   a. Should be included on the worksheet:

      1) Sample pH;
      2) Dilution water blank 0-5 day results and depletion; and
      3) Amount of seed used.

Total Suspended Solids

Total suspended solids analysis was reviewed and found to be quite adequate. The only discrepancy found was the type of filter paper used. Mr. Croft advised me that an order had been placed for approved paper and would be used as soon as they arrived.

Fecal Coliform

Fecal coliform analysis was reviewed with Mr. Croft and found to be totally unacceptable. He claims to have attended several of Janet Rhodes' seminars on fecal coliform analysis. He also has several copies of the departmental procedures on fecal coliform analysis and yet he does not sterilize any of his equipment, sample bottles, or reagents. He does not use phosphate buffer for rinsing. He reports the monthly arithmatic mean instead of geometric mean on his monthly discharge reports. In short, all fecal coliform data are highly questionable. It was recommended he study *Standard Methods* and the department's publication as soon as possible report only valid fecal coliform data.

EE:cp

Class II Field Review and Sample Collection
24-hour Composite Sampler Installations

Sampler	Date and Time Installed	Location
1. Influent* sample aliquot: 225 ml/30 min.	11/27 @ 1120	At headworks between comminutor and secondary sludge addition
2. Primary Clarifier Effluent sample aliquot: 225 ml/30 min.	11/27 @ 1045	At effluent mixing box
3. RBC (South) Effluent sample aliquot: 225 ml/30 min.	11/27 @ 1035	At effluent channel
4. Final Effluent** sample aliquot: 225 ml/30 min.	11/27 @ 1030	At effluent chamber prior to discharge

Field Data

Parameter(s)	Date and Time	Sample Location
pH, Spec. Cond., Temperature	11/27 @ 1150	Influent
pH, Spec. Cond., Temperature	11/27 @ 1200	Primary effluent
pH, Spec. Cond., Temperature	11/27 @ 1210	RBC effluent (South)
pH, Spec. Cond., Temperature	11/27 @ 1215	Secondary effluent (South)
pH, Spec. Cond., Temperature	11/27 @ 1145	Final effluent
pH, Spec. Cond., Temperature	11/28 @ 1040	Influent
pH, Spec. Cond., Temperature	11/28 @ 1055	Primary effluent
pH, Spec. Cond., Temperature	11/28 @ 1105	RBC effluent (South)
pH, Spec. Cond., Temperature	11/28 @ 1110	Final effluent
pH, Spec. Cond., Temperature	11/28 @ 1145	Secondary effluent (North)
pH, Spec. Cond., Temperature	11/28 @ 1150	Secondary effluent (South)
pH, Spec. Cond., Temperature	11/28 @ 1155	RBC effluent (North)
Total Chlorine Residual	11/27 @ 1145	Final effluent
Total Chlorine Residual	11/28 @ 1100	Final effluent

Grab Samples

Lab Analysis	Date and Time	Sample Location
***	11/27 @ 1145	RBC (North), Secondary (North & South)
***	11/27 @ 1430	RBC (North), Secondary (North & South)
***	11/27 @ 1615	RBC (North), Secondary (North & South)
***	11/28 @ 1030	RBC (North), Secondary (North & South)
***	11/28 @ 1145	RBC (North), Secondary (North & South)
Nutrients	11/28 @ 1145	Between RBC stages (North)
Nutrients	11/28 @ 1145	Between RBC stages (South)
Fecal Coliform	11/27 @ 1145	Final effluent
Fecal Coliform	11/28 @ 1100	Final effluent
Metals	11/28 @ 1115	Secondary digester sludge

*Influent sampler collected only half anticipated composite. Sampler failure.
**Final effluent sampler collected about six samples. Sampler failure.
***pH, Spec. Cond., Turbidity, COD, BOD_5, Solids, Nutrients, Alkalinity

Flow Measuring Device

Type: In-line

Dimensions:

a. Meets standards criteria? ? Explain:

Because the location of an in-line flow measuring device makes it impossible to calibrate or check accuracy, no data was collected.

b. Accuracy check:

Actual Instantaneous Flow	Recorder Reading ( )	Recorder Accuracy (% of Instan. Flow)	Percent Error
1.			
2.			
3.			

_____ Is within acceptable 15% error limitation.

_____ Is in need of calibration.

from 24-hour composite(s) together with NPDES permit effluent limitations. Addi-
included.

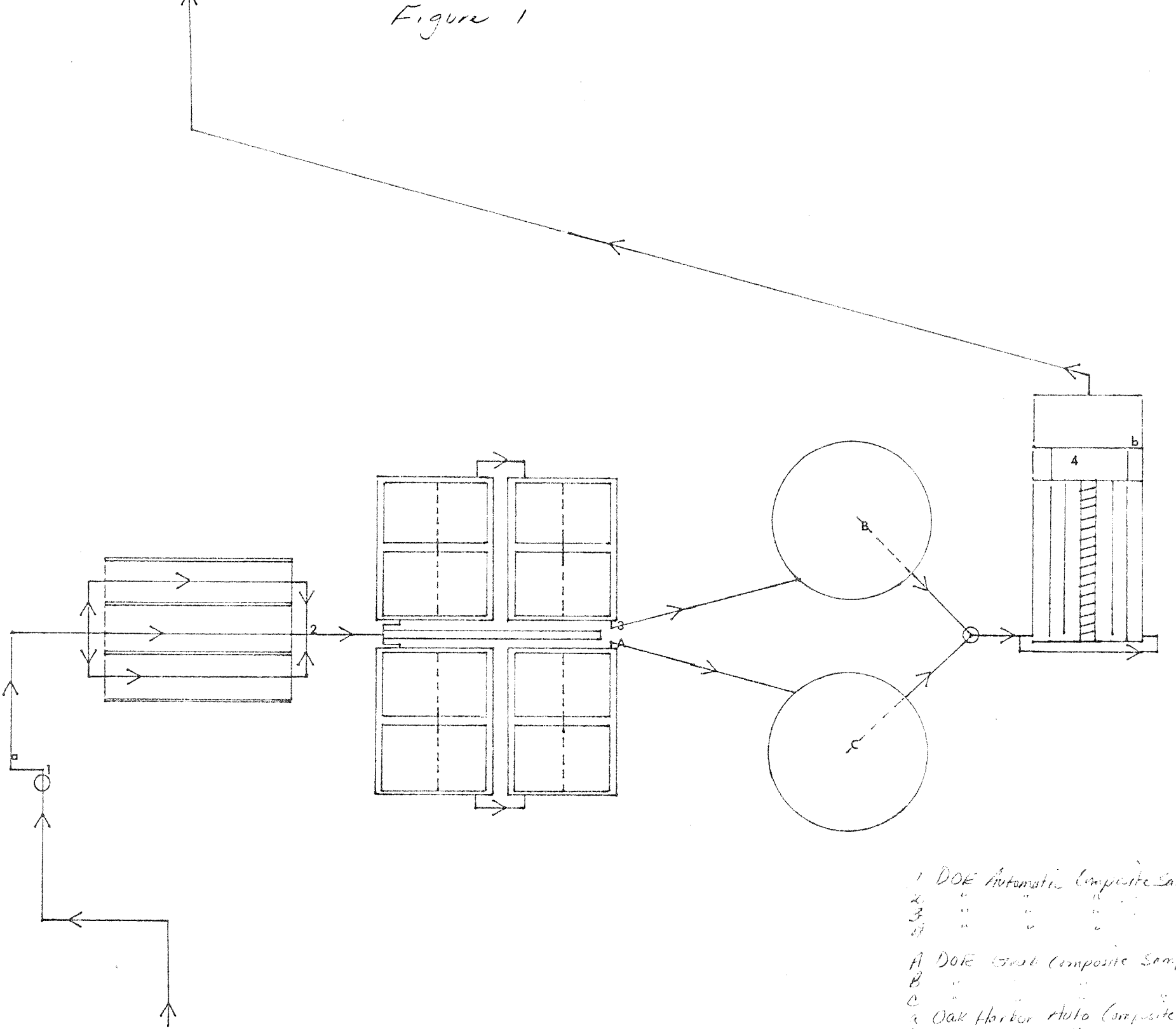
oratory Results					Oak Harbor Results		
North RBC Eff. DOE	South Secondary DOE	North Secondary DOE	Final OH	% Removal DOE Influent	Influent DOE	Final OH	NPDES (Monthly
np Grab Comp	Grab Comp	Grab Comp	Auto Comp	to Final	Auto Comp	Auto Comp	average)
68	40	41	30	84	210	31	30
284	167	171	125		878	130	300
			48				
62	22	20	11	92	164	22	30
259	92	84	46		685	92	300
			0.501				
35.4	34.6	36.6	29.8				
<0.2	<0.2	<0.2	<0.2				
0.2	<0.2	0.2	<0.2				
35.4	34.6	36.6	29.8				
17.6	16.4	10.4	3.2				
53.0	51.0	47.0	33.0				
9.0	8.4	8.8	8.6				
10.2	8.5	7.6	9.6				
800	680	620	680				
640	570	500	580				
11	5	3	6				
220	140	170	160				
7.2	7.2	7.1	7.4				
1520	1400	1300	1350				
260	240	240	210				
38	17	14	12				

Table 2. Grab Samples and Field Data Results

	Date/Time	Influent	Primary Eff.	RBC Eff(S)	RBC Eff(N)	Secondary Eff(S)	Secondary Eff(N)	Final Eff.	Secondary Sludge
pH	11-27/1150-1215	8.2	7.6	5.8		7.2		7.0	
Conductivity	11-27/1150-1215	2500	1560	1320		1250		1200	
Temperature	11-27/1150-1215	15.0	15.4	15.8		15.7		15.4	
Total Chlorine Residual	11-27/1145							2.5	
Fecal Coliform	11-27/1145							36	
*pH	11-28/1040-1155	8.0	6.3	5.3	5.0	5.4	5.8	5.1	
*Conductivity	11-28/1040-1155	1950	1380	1390	1400	1390	1230	1320	
*Temperature	11-28/1040-1155	3.8	4.6	4.8	8.2	10.6	10.8	9.0	
Total Chlorine Residual	11-28/1110							2.0	
Fecal Coliform	11-28/1110							23 est.	
Total Solids (%)	11-28/1145								3.7
Silver (mg/kg dry wt)									34
Copper (mg/kg dry wt)									710
Chromium (mg/kg dry wt)									57
Lead (mg/kg dry wt)									240
Zinc (mg/kg dry wt)									1800
Cadmium (mg/kg dry wt)									16
Nickel (mg/kg dry wt)									37

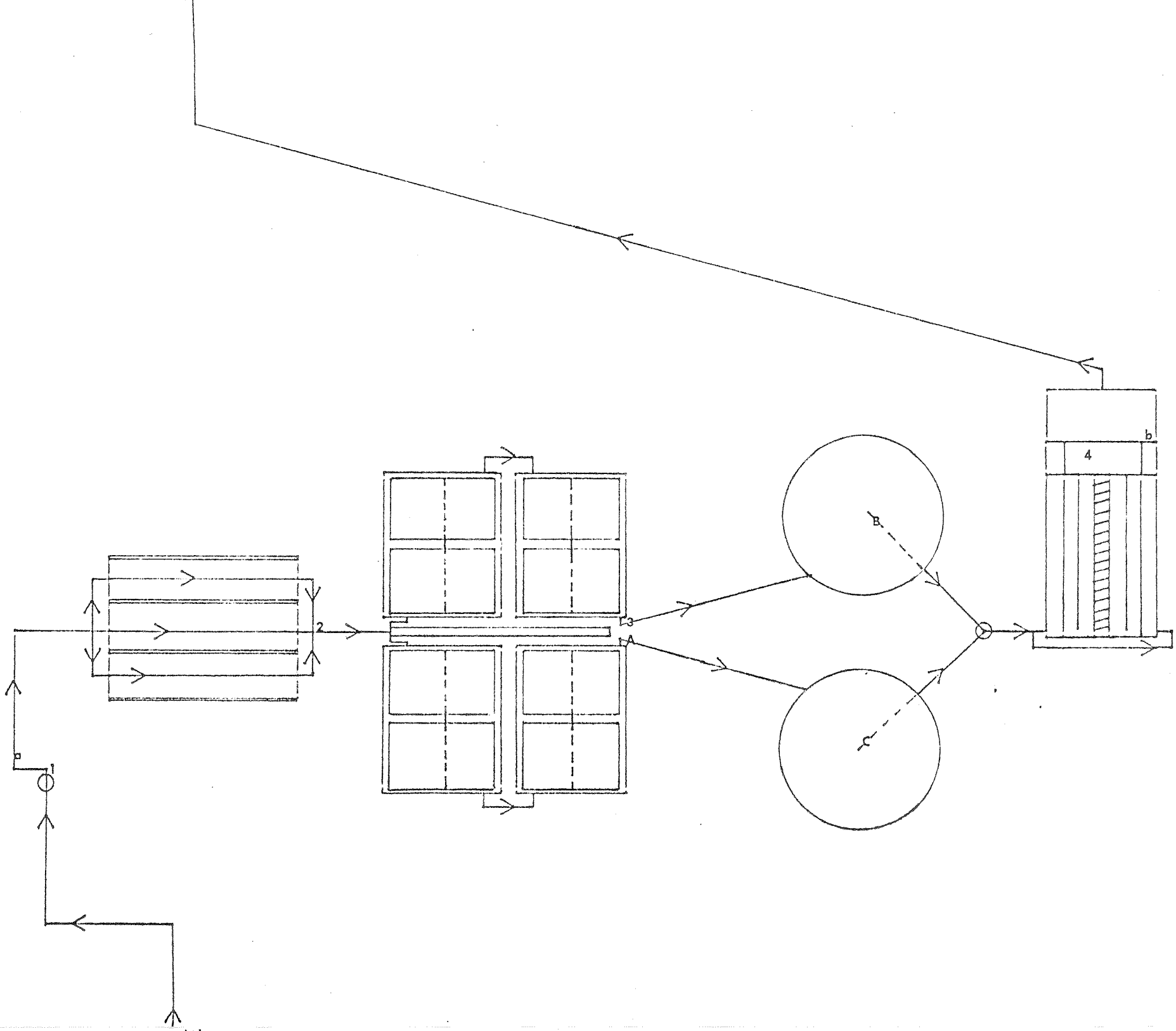
*From DOE automatic composite samplers

Figure 1



1 DOE Automatic Composite Samplers
2 " " " "
3 " " " "
4 " " " "

A DOE Grab Composite Samples
B " " "
C " " "
a Oak Harbor Auto Composite Samples


a
1
2
3
A
B
C
4
b

LABORATORY PROCEDURAL SURVEY

Discharger: Oak Harbors STP

NPDES Permit Number: 002056-7

Date: 11/27-28/79

~~Industrial~~/Municipal Representatives Present: Jim Croft

Agency Representatives Present: Eric Egbers, Dick Cunningham, John Glynn

I. COMPOSITE SAMPLES

A. Collection and Handling

1. Are samples collected via automatic or manual compositing method? automatic, Model? Manning 5 5000 (Stationary)

a. If automatic, are samples portable _____ or permanently installed permanent ?

Comments/problems Influent composite sampler is located downstream of secondary digester supernatant return. Should be relocated to above this return.

2. What is the frequency of collecting composite samples? once per week

3. Are composites collected at a location where homogeneous conditions exist?

a. Influent? no

b. Final Effluent? yes

c. Other (specify)? _____

4. What is the time span for compositing period? 24 hours

Sample aliquot? 5 gallons ~~mls~~ per 24 hours ~~minutes~~

5. Is composite sample flow or time proportional? flow

6. Is final effluent composite collected from a chlorinated or non-chlorinated source? chlorinated

7. Are composites refrigerated during collection? yes @ 4°C.

8. How long are samples held prior to analyses? They are not held any longer than 1 hour after compositing period.

9. Under what condition are samples held prior to analyses?

   a. Refrigeration? X

   b. Frozen? _____

   c. Other (specify)? _____

10. What is the approximate sample temperature at the time of analysis? The temperature of refrigeration

11. Are compositor bottles and sampling lines cleaned periodically? Canister & Jug yes, line no.

   a. Frequency? 1/week

   b. Method? Hot water, Alconox soap, Hot water

12. Does compositor have a flushing cycle? yes

   a. Before drawing sample? yes

   b. After drawing sample? yes

13. Is composite sample thoroughly mixed immediately prior to withdrawing sample? yes

Recommendations:

Sample should be warmed to room temperature prior to analysis.

II. BIOCHEMICAL OXYGEN DEMAND CHECKLIST

A. Technique

1. What analysis technique is utilized in determining BOD_5?

a. Standard Methods? _____ Edition? _____

b. EPA? _____

c. A.S.T.M.? _____

d. Other (specify)? Learned method @ School, probably Standard Methods.

B. Seed Material

1. Is seed material used in determining BOD? yes

2. Where is seed material obtained? influent Composite Sample

3. How long is a batch of seed kept? not Kept

and under what conditions? (temperature, dark) N/A

4. How is seed material prepared for use in the BOD test? It is filtered & collected from the influent compositor.

Recommendations:

The analysis technique should be documented and be readily available in the lab.

Because the pH of the influent is often greater than 8.0, Seed material should be collected elsewhere, possibly from primary clarifiers.

The seed material should be collected as a grab, settled for 24 hours, and resultant supernatant used as the seed.

C. Reagent Water

1. Reagent water utilized in preparing diultion water is:

   a. Distilled? K

   b. Deionized? _____

   c. Tap _____, chlorinated _____ non-chlorinated _____

   d. Other (specify)? _____

2. Is reagent water aged prior to use? yes

   How long? about a week, under what conditions? _____

   Kept in dark, tight fitting lids.

Recommendations:

The reagent water container should be stored with a loose stopper (cotton plug) to allow saturation.

D. Dilution Water

1. Are the four (4) nutrient buffers added to the reagent water? yes

   a. 1 mls of each nutrient buffer per 1000 mls of reagent water

2. When is phosphate buffer, added (in relation to setting up BOD test)? just prior to analyses, let bubble for hour.

3. How often is dilution water prepared? 1/week
   Maximum age of dilution water at the time test is set up.
   fresh

4. Under what conditions is dilution water kept? dark container, in dark, not kept any longer than 1 day.

5. What is temperature of dilution water at time of setup? ~20°C

Recommendations:

E. Test Procedure

1. How often are BOD's being set up? Weekly

   What is maximum holding time of sample subsequent to end of composite period? 1 hour

2. If sample to be tested has been previously frozen, is it reseeded? N/A How? N/A

3. Does sample to be tested contain residual chlorine? yes
   If yes, is sample

   a. Dechlorinated? yes
      How? Add as much as needed to achieve 0 residual. (thiosulfate)

   b. Reseeded? yes
      How? Add 1 ml/liter

4. Is pH of sample between 6.5 and 8.5? no on influent, yes on effluent
   If no, is sample pH adjusted and sample reseeded? no

5. How is pH measured? Corning pH meter 125
   a. Frequency of calibration? every time used
   b. Buffers used? 4 & 7

6. Is final effluent sample toxic? no

7. Is the five (5) day DO depletion of the dilution water (blank) determined? yes, normal range? 0.0 - 0.2

8. What is the range of initial (zero day) DO in dilution water blank? 8.2 - 8.5

9. How much seed is used in preparing the seeded dilution water? 1 ml/l

10. Is five (5) day DO depletion of seeded blank determined? yes
If yes, is five (5) day DO depletion of seeded blank approximately 0.5 mg/l greater than that of the dilution water blank?
yes, 0.3 - 0.4, 0.6

11. Is BOD of seed determined? no

12. Does BOD calculation account for five (5) day DO depletion of

a. Seeded dilution water? yes

How? _____

b. Dilution water blank? no

How? _____

13. In calculating the five (5) day DO depletion of the sample dilution, is the initial (zero day) DO obtained from

a. Sample dilution? X Mass

b. Dilution water blank? _____

14. How is the BOD_5 calculated for a given sample dilution which has resulted in a five (5) day DO depletion of less than 2.0 ppm or has a residual (final) DO of less than 1.0 ppm? _____

not recorded.

15. Is liter dilution method or bottle dilution method utilized in preparation of

a. Seeded dilution water? liter

b. Sample dilutions? liter

16. Are samples and controls incubated for five (5) days at 20°C ± 1°C and in the dark? yes

17. How is incubator temperature regulated? temperature controlled thermostat

18. Is the incubator temperature gage checked for accuracy? yes
    a. If yes, how? door thermometer & checked on YSI do. meter.
    b. Frequency? weekly

19. Is a log of recorded incubator temperatures maintained? no
    a. If yes, how often is the incubator temperature monitored/checked?

20. By what method are dissolved oxygen concentrations determined?

    Probe X Winkler _____ Other _____

    a. If by probe:
        1. What method of calibration is in use? Winkler using tap water
        2. What is the frequency of calibration? 1/week

    b. If by Winkler:
        1. Is sodium thiosulfate or PAO used as titrant? Thio.
        2. How is standardization of titrant accomplished? It is not standardized.
        3. What is the frequency of standardization? N/A

Recommendations:

Proper dechlorination procedure should be practiced.
If the influent sample pH lies outside the 6.5-8.0 range, it should be adjusted.
The BOD of the seed should be determined as it is used in the seed correction factor in the BOD calculation.
A log of the incubator temperatures should be maintained.
The sodium thiosulfate should be standardized every 2 weeks.

F. Calculating Final Biochemical Oxygen Demand Values Washington State Department of Ecology

1. Correction Factors

a. Dilution factor:

$$= \frac{\text{total dilution volume (ml)}}{\text{volume of sample diluted (ml)}}$$

b. Seed correction:

$$= \frac{(\text{BOD of Seed})(\text{ml of seed in 1 liter dilution water})}{1000}$$

c. F factor ∿ a minor correction for the amount of seed in the seeded reagent versus the amount of seed in the sample dilution:

$$F = \frac{[\text{total dilution volume (ml)}] - [\text{volume of sample diluted ml}]}{\text{Total dilution volume, ml}}$$

2. Final BOD Calculations

a. For seed reagent:

(seed reagent depletion-dilution water blank depletion) x D.F.

b. For seeded sample:

(sample dilution depletion-dilution water blank depletion-scf) x D.F.

c. For unseeded sample:

(sample dilution depletion-dilution water blank depletion) x D.F.

3. Industry/Municipality Final Calculations

$$\frac{\text{Initial} - \text{Final} - \text{Seeded dilution Blank depletion}}{\% \text{ Dilution}} \times 100 = \text{BOD}$$

Recommendations:

Should be included on BOD worksheet:

1) Sample pH

2) Dilution water blank

3) Amount of seed used

4) Seeded dilution water depletion included in calculation.

III. TOTAL SUSPENDED SOLIDS CHECKLIST

A. Technique

1. What analysis technique is utilized in determining total suspended solids?

a. Standard Methods? K Edition _____

b. EPA? _____

c. A.S.T.M.? _____

d. Other (specify)? _____

B. Test Procedure

1. What type of filter paper is utilized:

a. Reeve Angel 934 AH? K

b. Gelman A/E? _____

c. Other (specify)? _____

d. Size? _____

2. What type of filtering apparatus is used? Gooch

3. Are filter papers prewashed prior to analysis? yes

a. If yes, are filters then dried for a minimum of one hour yes at 103°C-105°C yes ?

b. Are filters allowed to cool in a dessicator prior to weighing? yes

4. How are filters stored prior to use? dessicator

5. What is the average and minimum volume filtered? Raw 25 ml, Effluent 100 ml (Run 3@25 for raw, 3@100 for effluent, the 3 are then averaged.)

6. How is sample volume selected?

   a. Ease of filtration? K

   b. Ease of calculation? _____

   c. Grams per unit surface area? _____

   d. Other (specify)? _____

7. What is the average filtering time (assume sample is from final effluent)? 1 min / 100 ml.

8. How does analyst proceed with the test when the filter clogs at partial filtration? never happens on effluent

9. If less than 50 milliliters can be filtered at a time, are duplicate or triplicate sampe volumes filtered? yes

10. Is sample measuring container; i.e., graduated cylinder, rinsed following sample filtration and the resulting washwater filtered with the sample? yes

11. Is filter funnel washed down following sample filtration? _____

not needed w/ gooch

12. Following filtration, is filter dryed for one (1) hour, cooled in a desscator, and then reweighed? yes

13. Subsequent to initial reweighing of the filter, is the drying cycle repeated until a constant filter weight is obtained or until weight loss is less than 0.5 mg? N/A

14. Is a filter aid such as cellite used? NO

a. If yes, explain: _____

Recommendations:

C. Calculating Total Suspended Solids Values Washington State Department of Ecology

A. $mg/l\ TSS = \frac{A-B}{C} \times 10^6$

1. Where: A = final weight of filter and residue (grams)

B = initial weight of filter (grams)

C = Milliliters of sample filtered

2. Industry/Municipality Calculations

$$\frac{A-B}{C} \times 10^6$$

Recommendations:

SPLIT SAMPLE RESULTS:

Origin of Sample _____

Collection Date _____

BOD		TSS		EPA BOD Standard	
DOE	IND./MUN.	DOE	IND./MUN.	DOE	IND./MUN

Test Procedure:

1.) Sample filtration volumes:

How chosen? Primary plant used (were told) to use 100 ml, could not filter, so cut to 50 ml.
~~Try to attain 20-60 colonies for one volume & then I above & one below.~~
Determine which volume produced 20-60 colonies, then choose 1 smaller & 1 larger volume to filter. Balking @ 3.
~~Went to~~ Went to Sanets School several times.

2.) Media:

Prepared in lab or purchased in ampoule (~2 ml) form? ampoules from Millipore.
Poured in dish, allowed to soak in, & excess poured off. yes

3.) Membrane filtration:

Is sample shaken at least 25 times? NO

If less than 20 ml. of sample to be filtered, is ~20 ml rinse buffer added to funnel first? NO

When filtration is over, is ~20-30 ml of rinse buffer used to rinse ~~of~~ 3 times? NO

4) Incubation:

Placed in bag (whirl pak) & submerged in incubator upside down? yes

Incubator temp. 44.5 ± .2°C.? yes

Incubate 20-24 hrs.? 24

5.) ~~Reporting Counts:~~

~~Go to book.~~

Fecal Coliform

Sample Collection:

1.) Where is it collected? Chlor. ~~Eff.~~

2.) Are sample containers sterilized? No, neither is filter apparatus.
How? (Dry heat - 2 hrs @ 170°C?)
(Under pressure - 15 min. @ 250°F, 15 lbs. pressure.?)
~~National Sterilac 10 of 6000-D~~

3.) Is Sodium thio. added to sample bottles? ~~No~~ Yes
When? (~~prior to sterilization~~) After sample is taken.
What volume? (~~one ml/for sample~~) 4 or 5 drops.

4.) How long is sample held prior to analysis? (max. 30 hrs)
Under what conditions? (~~Iced~~ Refrigerated to ~ 4°C) immediately
U.V. Sterilizer ordered / Millipore

Reagents & Equipment?

1.) Phosphate buffer: Not used
Is it prepared in lab or purchased? N/A
~~How is it stored & for how long?~~ (~~dark bottle and/or refrigerator~~)
If prepared in lab, under what conditions is stock buffer kept? (dark bottle or refrig.) N/A
What ~~percentage~~ volume of stock phosphate buffer to magnesium sulfate is added to equal 1 liter? (1.25 ml phos, 5 ml mag / 1000 ml distilled water) N/A
Is rinse buffer sterilized prior to use? No

2) Funnels & Stages: No
Sterilized?

3) Bottles: Cleaned
Cleaned thoroughly & Sterilized?