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STATE OF WASHINGTON
Dixy Lee Ray
Governor

DEPARTMENT OF ECOLOGY
Olympia, Washington 98504 206/753-2800

MEMORANDUM

To: Phil Williams

From: Bill Yake

Re: Spokane Sewage Treatment Plant
Class II Inspection

Date: March 13, 1978

Findings and Conclusions:

A Class II inspection was performed at the Spokane Sewage Treatment Plant on February 7-8, 1978, by Eric Egbers, Phil Williams and Bill Yake. Composite samples were obtained of influent (prior to aerated grit chamber) and unchlorinated effluent (effluent from #2 and #4 secondary clarifiers).

Composite samples were split with plant personnel and the results of these analyses are enclosed. Results were generally comparable except total phosphate determinations. Based on DOE laboratory results, 70% phosphate removal was being achieved. The NPDES permits requires 85% removal. Permit limitations for BOD_5 and total suspended solids were being achieved.

One of the fecal coliform samples taken during the inspection (2/8/78 - 8050) revealed 1900 fecal coliform colonies per 100 ml. Total residual chlorine was low (0.3 mg/l) and this, in conjunction with high flow (54 mgd) and apparent short-circuiting in the contact chambers, were probably responsible for this high fecal count in the effluent. The Spokane plant has previously reported occasional fecal coliform counts which substantially exceed mean recorded levels. Similar circumstances may be responsible. It is therefore suggested that a minimum total residual chlorine concentration of 1.0 mg/l be maintained at all times.

Measurements and specifications for a 10 ft. throat width Parshall flume are attached. The flow could not be calibrated because the high effluent flows encountered made head determination impractical with available equipment. The flume dimensions are close to specified dimensions, and flow records from the plant are probably accurate.

The Spokane plant is in the process of ironing out the mechanical and operational difficulties involved in starting up a new plant. Control of coagulant and chlorine addition should improve as these difficulties are solved. This in turn should improve phosphate removal and decrease fecal coliform discharges. The plant laboratory should make special effort to obtain precise measurements of total influent and effluent phosphate.

WY:ee

cc: Central Files
Dick Cunningham

24 Hour Composite Sampler Installations

Sampler	Date and Time Installed	Location
1. Influent aliquot - 250 ml/30 minutes	2/7/78 - 0950	Inlet to aerated grit chamber
2. #2-SC - Effluent aliquot - 250 ml/30 min.	2/7/78 - 1020	Effluent well on #2 secondary clarifier
3. #4-SC - Effluent aliquot - 250 ml/30 min.	2/7/78 - 1050	Effluent well on #4 secondary clarifier

Grab Samples

	Date and Time	Analysis	Sample Location
1.	2/8/78 - 0850	Fecal Coliform	#2 - Contact chamber eff.
2.	1130	Fecal Coliform	Head end of Parshall flume
3.			
4.			
5.			
6.			

Flow Measuring Device

1. Type Secondary plant effluent Parshall flume, Fisher-Porter, preformed and set in place.
2. Dimensions - 10 ft. throat (See attachment)

a. Meets standard criteria ☐ Yes
☐ No Explain: See text.

b. Accuracy check

	Actual Instan. Flow	Recorder Reading	Recorder Accuracy (% of inst. flow)
1.	See text.		
2.			
3.			

☐ is within accepted 15% error limitations
☐ is in need of calibration

Field Data

Parameter	Date and Time	Sample Location	Result
pH	2/7/78 - 0955	Influent	7.2
	- 1015	#2-SC-Eff.	7.0
	-1040	#4-SC-Eff.	7.0
	2/8/78 - 0910	Influent	7.6
	- 1000	#2-SC-Eff.	7.2
	- 1020	#4-SC-Eff.	7.4
Temperature (°C)	2/7/78 - 0955	Influent	11.5
	- 1015	#2-SC-Eff.	10.0
	- 1040	#4-SC-Eff.	10.0

(over)

Parameter	Date and Time	Sample Location	Result
Temperature (°C)	2/8/78 - 0910	Influent	11.5
	- 1000	#2-SC-Effluent	10
	- 1020	#4-SC-Effluent	10
Spec. Conductance (umhos/cm)	2/7/78 - 0955	Influent	585* (650**)
	- 1015	#2-SC-Effluent	639* (710**)
	- 1040	#4-SC-Effluent	666* (740**)
	2/8/78 - 0910	Influent	558* (620**)
	- 1000	#2-SC-Effluent	594* (660**)
	- 1020	#4-SC-Effluent	594* (660**)
Chlorine Residual	2/8/78 - 0850	Effluent of # 2 contact chambers	0.3
	- 1130	Head of effluent Parshall flume	0.7

* Corrected field reading
** Uncorrected field reading

Review of Laboratory Procedures and Techniques

BOD_5 - 1) It is suggested that the PAO, used in oxygen probe calibration, be standardized weekly.

2) It is suggested at least one duplicate be run with each dilution.

TSS - 1) Presently the plant laboratory is using Whatman GF/s filters. It is suggested that TSS data reported in compliance with the NPDES permit, be determined using filters specified in Standard Methods (Reeves Angel 934 AH or Gelman A/E).

$T\text{-}PO_4\text{-}P$ 1) Although the stannous chloride technique of color development is acceptable and approved by Standard Methods (14th Edition), it is not among methods approved by EPA (See Manual of Methods for Chemical Analysis of Water and Wastes, USEPA, 1974; Guidelines Establishing Test Procedures for Analysis of Pollutants, Federal Register; December 1, 1976). The possibility of using and EPA-approved technique, particularly if improved accuracy can be attained, should be considered. The plant laboratory has indicated that they are in the process of ordering new phosphate standards and that this may well improve the accuracy of total phosphate determinations.

$NO_3\text{-}N$ 1) Initially there was a substantial discrepancy between NO_3-N determined by DOE and the plant. Subsequently both determinations were scrutinized and the plant personnel discovered an error in the calibration curve which corrected the discrepancy. This illustrates the importance of internal quality control checks on laboratory analysis and subsequent calculations.

CONCLUSION: In general, the Spokane Laboratory is operated in a conscientious and professional manner. Analytical results from split samples agreed well in most cases. It is hoped that the above mentioned suggestions will serve to further improve analytical results.

The following table is a comparison of laboratory results from 24 hour composite(s) together with NPDES permit effluent limitations. Additional results pertinent to this inspection have also been included.

	DOE			SPOKANE STP			NPDES (Monthly average)
	Influent	#2-SC-Eff.	#4-SC-Eff.	Influent	#2-SC-Eff.	#4-SC-Eff.	
BOD_5 mg/l	115	12	8	120	15	15	30
lbs/day	44,100	4600	3070	46,000	5750	5750	10,008
TSS mg/l	214	17	13	181	17	11	30
lbs/day	82,100	6520	4990	69,400	6520	4220	10,008
Total Plant Flow MGD				46.0			
NH_3-N (mg/l)	7.0	8.4	8.4	11.20	11.76	8.84	
NO_2-N (mg/l)	<.02	<.02	<.02	- -	- -	- -	
NO_3-N (mg/l)	2.0	1.3	1.6	2.05	1.43	1.79	
O-PO_4-P (mg/l)	1.6	0.2	<0.1	- -	- -	- -	
T-PO_4-P (mg/l)	2.3	0.6	0.8	3.66	.36	.30	2.1 (0.35)**
lbs/day)	882	230	306	1400	138	115	377 (132)**
COD (mg/l)	274	78	86	311	85	28	
pH	7.7	7.4	7.5				
	7.2*	7.0*	7.0*				
	7.6*	7.7*	7.2*				
	7.6***	7.2***	7.4***				
Sp. Cond. (Mmhos/cm)	566	667	639				
	585*	639*	666*				
	558*	594*	594*				
	441***	711***	675***				
Temp. (°C)	11.5*	10.0*	10.0*				
	11.5*	10.0*	10.0*				
Turbidity (NTU)	72	7.4	7.5				

* Field Analysis -grab "<" is "less than" and ">" is "greater than"

** 15% of influent concentration (or loading)

*** Field analysis - composite

	DOE			Chlorinated eff. - end of contact chamber			NPDES (Monthly Average)
	Influent	#2-SC-Eff.	#4-SC-Eff.	DOE	Spokane STP	DOE Sludge	
Total Solids (mg/l)	572	420	398				
Total Non-Vol, Solids (mg/l)	368	335	322				
Total Sus. Non-Vol. Solids	107	9	6				
Total Chlorine Res. (mg/l)				0.3*[1] 0.7*[2]			
Total Coliforms (col/100 ml)				- - -	- - 1633[2]		
Fecal Coliforms (col/100 ml)				1900[1] < 10[2]	- - 6[2]		
Zinc (Mg/l)	130	50	30			1020[3]	
Copper (mg/l)	20	10	10			260[3]	
Chromium (Mg/l)	<10	<10	<10			78[3]	
Lead (Mg/l)	<50	<50	<50			550[3]	
Cadmium (Mg/l)	<10	<10	<10			11[3]	

1) Sample taken 2/8/78 - 0850, at end of #2 contact chamber

2) Sample taken 2/8/78 - 1130, at headend of Parshall flume

3) mg/kg dry solids (sludge 12.9% solids)

* Field Analysis

"<" is "less than" and ">" is "greater than"