

November 7, 1973

State of
Washington
Department
of Ecology



Memo to: Tom McCann

From: Pat Lee

Subject: Des Moines STP Efficiency Study

An efficiency study was conducted on Des Moines STP on October 8, 1973. The influent and effluent were composited on the half hour, proportionate to flow for eight hours. The plant grounds and equipment were very neat and clean and showed obvious care in maintenance. All parts of the plant were operating. Industrial waste from Sea-Tac airport passes through the plant grounds, but as it is not treated at the Des Moines plant, it was not sampled.

The field and laboratory results (summarized on the efficiency study form) show that the plant is operating with a BOD reduction of 40%; total solids of 72% and a suspended solids of 74%. Disinfection of the effluent was satisfactory except at 1330 hours when coliform counts increased to greater than 1.6 million colonies per 100 ml. This increase was due to a time lag in switching from one chlorine tank to another tank. Although no industrial waste is supposed to be coming through the plant itself, the high conductivity at 0900 hours (900 μ mho/cm) and the high pH at 1600 hours (7.7) imply something more than domestic waste.

PL:jmh

cc: Russ Taylor

STP SURVEY REPORT FORM

(EFFICIENCY STUDY)

City Des Moines Plant Type Primary Population 22,500 Design 65,000
 Served Capacity
 Receiving Water Puget Sound Engineer Tom McCann
 Date Oct. 18, 1973 Survey Period 0800-1600 hours Survey Personnel Pat Lee
 Comp. Sampling Frequency 1/2 hour Weather Conditions Sunny- warm
 (last 48 hours)
 Sampling Alequot Flow MGD (400)

PLANT OPERATION

Total Flow 990,000 G How Measured Totalizer
 Max. (Flow) 3.2 MGD Time of Max. 0800-1100 Min. 2.6 MGD Time of Min. 1600
 Pre Cl₂ ----- #/day Post Cl₂ 375 #/day

FIELD RESULTS

	Influent				Effluent			
	Max.	Min.	Mean	Median	Max.	Min.	Mean	Median
9 Determinations								
Temp. °C	20.5	18.0	19.5	19.7	20.3	17.7	19.2	19.6
pH	7.7	6.8	---	7.0	7.1	6.9	---	7.0
Conductivity (umhos/cm)	900	480	---	500	580	380	---	520
Settleable Solids	17.0	10.0	14.4	15.0	0.3	0.0	0.1	0.1

LABORATORY RESULTS ON COMPOSITE IN PPM

Laboratory Number	Influent	Effluent	% Reduction
	73-3668	73-3669	
5-Day BOD	250	150	40
COD	590	240	60
T.S.	1229	343	72
T.N.V.S.	272	200	27
T.S.S.	424	111	74
N.V.S.S.	66	3	96
pH	7.3	7.3	---
Conductivity	690	610	---
Turbidity	95	55	---

BACTERIOLOGICAL RESULTS

Na₂S₂O₃ added to sample Before Sampling After min.

LAB #	SAMPLING TIME	COLONIES/100 MLS (MF)		Cl Residual	
		Total	Fecal	ppm	(after secs)
73 - 3670	0830	<4000	<1000	>1.0	180 sec
3671	0930	<4000	<2000	>1.0	180 sec
3672	1030	<4000	<1000	>1.0	180 sec
3673	1130	>1.6 X 10 ⁶	>1.6 X 10 ⁵	0	180 sec
3674	1330	<4000	<1000	>1.0	180 sec
3675	1430	<4000	<2000	>1.0	180 sec
3676	1530	3400	<1000	>1.0	180 sec

Operator's Name Ralph Goettling Phone # TA 4-2760

Parameters:	Color	Chlorides	NH ₃	Total Kjeldahl-N
Influent	430	26	---	-----
Effluent	345	25	21.2	23.0
	T-PO ₄	O-PO ₄	NO ₂ -N	NO ₃ -N
Effluent	2.0	.30	None Detected	.06

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SEWAGE TREATMENT PLANT OPERATION AND MAINTENANCE
PRACTICES QUESTIONNAIRE

FORM APPROVED
BUDGET BUREAU NO. 42-11527

CHECK ONE <input checked="" type="checkbox"/> 1ST AUDIT <input type="checkbox"/> RE-AUDIT	DATE OF AUDIT 10-8-73	PLANT DESCRIPTION CODE (For Official Use Only) Primary
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A. GENERAL INFORMATION

1. PROJECT (State, Number) Des Moines STP - Wash	SCOPE OF PROJECT (new plant, additions, etc.) 8 hr. Efficiency
2. PLANT LOCATION (City, county) Des Moines King	IDENTIFICATION OF AREAS SERVED Des Moines

3. POPULATION

3A. FRACTION OF AREA POPULATION SERVED (%) 90	3B. PLANT DESIGN (population equivalent) 65,400	3C. SERVED BY PLANT (domestic) 22,500
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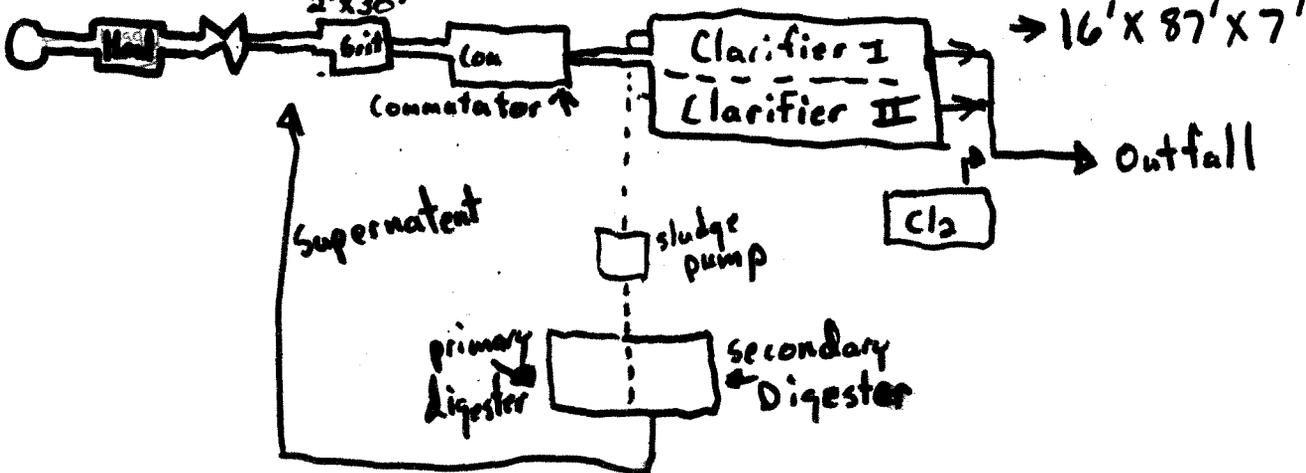
4. TYPE OF COLLECTION SYSTEM

4A. <input type="checkbox"/> COMBINED <input checked="" type="checkbox"/> SEPARATE <input type="checkbox"/> BOTH	4B. ESTIMATE FLOW CONTRIBUTED BY SURFACE OR GROUND WATER (infiltration, mgd)
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5. YEAR COMMUNITY BEGAN SEWAGE TREATMENT 1956	6. YEAR PRESENT SYSTEM PLACED IN OPERATION		6C. ANCILLARY WORKS
	6A. SEWER 1995 1956	6B. PLANT 1965	

7A. SIZE OF PLANT SITE (acres) 25	7B. APPROXIMATE AREA LEFT FOR EXPANSION (acres) 20
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8A. IN THE SPACE PROVIDED BELOW FURNISH A SIMPLIFIED FLOW DIAGRAM OR A WRITTEN DESCRIPTION OF THE PLANT UNITS IN FLOW SEQUENCE. INCLUDE THE METHOD OF ULTIMATE SLUDGE DISPOSAL. SHOW APPROXIMATE SURFACE AREA OF STABILIZATION POND AND NUMBER OF CELLS. INDICATE WHETHER FLOW TO AND FROM PLANT IS BY PUMPING OR GRAVITY.



8B. NOTE ANY SIGNIFICANT OR UNIQUE PROCESSING CONDITIONS.

9. RECEIVING STREAM

9A. NAME OF STREAM Puget Sound			
9B. STREAM FLOW IS <input checked="" type="checkbox"/> PERENNIAL <input type="checkbox"/> INTERMITTENT		<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> REGULATED	
		<input checked="" type="checkbox"/> INTERSTATE <input type="checkbox"/> INTRASTATE	
<input type="checkbox"/> COASTAL			

B. CURRENT PERFORMANCE AND PLANT LOADING INFORMATION

1A. ANNUAL AVERAGE DAILY FLOW RATE (mgd) 5	1B. PEAK FLOW RATE (mgd)		1C. MINIMUM FLOW RATE (mgd) 1
	DRY WEATHER 4	WET WEATHER 10	
2. AVERAGE BOD OF RAW SEWAGE (5 DAY 20°C) (ppm) 220	3. AVERAGE SETTLEABLE SOLIDS OF RAW SEWAGE (mg/l) 260		
4. AVERAGE SUSPENDED SOLIDS OF RAW SEWAGE (mg/l) 260	5. AVERAGE COLIFORM DENSITY OF RAW SEWAGE (mpn/100 ml) 7.6 = 55 FC = 19 (EFF) 1.5 cl2		
6A. BOD (5)	6B. SETTLEABLE SOLIDS (%)	6C. SUSPENDED SOLIDS (%)	6D. COLIFORM DENSITY (%)
35	99	60	99.8

7A. DOES PLANT HAVE STANDBY POWER GENERATOR FOR MAJOR PUMPING FACILITIES? <input checked="" type="checkbox"/> YES <input checked="" type="checkbox"/> NO	7B. ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
8. ARE CHLORINATION FACILITIES PROVIDED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, ANSWER 8A THRU G	IF YES, IS CHLORINATION CONTINUOUS? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF NO, EXPLAIN REASON FOR INTERMITTENT CHLORINATION

↓ Pump stations ↓ plant

8A. PURPOSE OF CHLORINATION
Disinfection

8B. TYPE OF CHLORINATOR
Fisher Porter

8C. POINT OF APPLICATION OF CHLORINE
After Clarifiers

8D. CAN BYPASSED SEWAGE BE CHLORINATED?
 YES NO

8E. AVERAGE FEED RATE OF CHLORINE (lb/day)
375

8F. CHLORINE RESIDUAL IN EFFLUENT
1.5 PPM AT END OF **3** MINUTES

8G. MINIMUM SUPPLY OF CHLORINE STORED ON PREMISES (lb)
4,000

9. ARE FACILITIES PROVIDED FOR COMPLETE BYPASS OF RAW SEWAGE?
 YES NO IF YES, ANSWER A THRU G BELOW, ANSWER H IN EITHER CASE.

9A. FREQUENCY (times monthly)

9B. AVERAGE DURATION (hours)

9C. REASON FOR BYPASSING

9D. ESTIMATED FLOW RATE DURING BYPASS IS
 WITHIN HYDRAULIC CAPACITY OF PLANT
 BEYOND HYDRAULIC CAPACITY OF PLANT BY

9E. DOES SEWAGE OVERFLOW IN DRY WEATHER?
 YES NO

9F. TYPE OF DIVERSION STRUCTURE

9G. AGENCIES NOTIFIED OF BYPASS ACTION

9H. DO OPERATORS HAVE OPTION TO BYPASS INDIVIDUAL PLANT UNITS? (If no, has this caused any operational problems?)
 YES NO

10A. ARE BACK FLOW DEVICES PROVIDED AT ALL CONNECTIONS TO CITY WATER SUPPLY? (If no, explain)
 YES NO

10B. CHECK TYPE OF BACK FLOW PREVENTION DEVICE
 DOUBLE CHECK VALVE PRESSURE OPERATED PHYSICAL DISCONNECT OTHER(specify)

11. USES OF TREATMENT PLANT EFFLUENT
None

12. USES OF RECEIVING STREAM WITHIN 10 MILES OF OUTFALL
Sporting, Commercial

13. HAVE THERE BEEN ANY ODOR COMPLAINTS BEYOND THE PLANT PROPERTY? (If yes, explain)
 YES NO

14. OBSERVED APPEARANCE AND CONDITION OF EFFLUENT, RECEIVING STREAM, OR DRAINAGE WAY

15. STABILIZATION PONDS

A. WEEDS CUT AND VEGETATIVE GROWTH IN PONDS ELIMINATED?
 YES NO

D. BANKS AND DIKES MAINTAINED (erosion etc.)?
 YES NO

C. FENCING AND "WARNING - POLLUTED WATER" SIGNS PRESENT AND IN GOOD REPAIR?
 YES NO

D. FREQUENCY OF INSPECTION BY OPERATOR
D. Jey

E. WATER DEPTH (feet)
8 HIGH 1 LOW 1.5 MEDIUM

F. ADEQUATE CONTROL OF DEPTH?
 YES NO

G. SEEPAGE REPORTED?
 YES NO

H. ANY REPORTS OF GROUND WATER CONTAMINATION FROM POND (If yes, give details)?
 YES NO

I. MOSQUITO BREEDING PROBLEM?
 YES NO

IF YES, NAME OF SPECIES IF KNOWN

J. CAN SURFACE RUN-OFF ENTER POND?
 YES NO

C. SUPERVISORY SERVICES

1. IS A CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATING AND MAINTENANCE PROBLEMS?
 YES NO IF YES IS IT ON: CONTINUING BASIS OR UPON REQUEST BASIS
IF CONTINUING BASIS, WHAT IS THE FREQUENCY OF VISITS:

2. DO OPERATORS AND OTHER PERSONNEL ROUTINELY ATTEND SHORT COURSES, SCHOOLS OR OTHER TRAINING ACTIVITIES?
 YES NO
IF YES, CITE COURSE SPONSOR AND DATE OF LAST COURSE ATTENDED
PNPCA
IF NO, DO YOU KNOW OF ANY COURSES AVAILABLE TO SERVE THIS AREA?

3A. ARE ALL EQUIPMENT AND PARTS OF THE PRESENT PLANT STILL IN OPERATION? YES NO (If no, explain)

B. ARE PROCESSING UNITS OPERATING AT DESIGN EFFICIENCY? YES NO (If no, explain)

A. HAVE THERE BEEN ANY DIFFICULTIES WITH THE SEWAGE TREATMENT PLANT?

A. STRUCTURAL YES NO (If yes explain)

B. MECHANICAL YES NO (If yes, explain)

Cl₂ just repaired

C. OPERATIONAL YES NO (If yes, explain)

D. BASED ON OPERATING EXPERIENCE TO DATE WHAT IF ANY CHANGES WOULD YOU RECOMMEND TO IMPROVE OPERATION OF THE PLANT?

5. ARE OPERATING RECORDS MAINTAINED? YES NO
 (If maintained, check general items included)

REPORTED? YES NO
 TO WHOM? **DOE**

FREQUENCY	WEATHER	FLOW	SLUDGE HANDLED	CHEMICALS USED	DIGESTER	GRIT HANDLED	ELEC. USED	COST DATA	AIR USED	MAINTENANCE	OTHER
DAILY	X	X	X	Cl ₂ only							
WEEKLY					X	X					
MONTHLY							X	X		X	
ANNUALLY											

6. ARE LABORATORY RECORDS MAINTAINED? (check appropriate box)

NOT AT ALL DAILY WEEKLY MONTHLY ANNUALLY

IF MAINTAINED CHECK FORM OF RECORD BELOW:

LOG BOOK TABULAR SHEET SEPARATE BY OPERATION CONTROL CHARTS GRAPHS

WHAT PLANT AND/OR LABORATORY EQUIPMENT, GAUGES AND METERS ARE CALIBRATED PERIODICALLY?

7. IS LABORATORY TESTING ADEQUATE FOR THE CONTROL REQUIRED FOR THIS SIZE AND TYPE OF PLANT?
 YES NO (If no, explain)

8. INDUSTRIAL WASTES DISCHARGED TO MUNICIPAL SYSTEM: **No**

A. NUMBER AND TYPES OF INDUSTRIES DISCHARGING TO SYSTEMS

B. POPULATION EQUIVALENT (BOD) OF INDUSTRIAL WASTES (pc)

C. POPULATION EQUIVALENT (SS) OF INDUSTRIAL WASTES (pc)

D. VOLUME OF INDUSTRIAL WASTES (mgd)

E. COMPOSITION AND CHARACTERISTICS OF INDUSTRIAL WASTES

F. MAIN DIFFICULTY EXPERIENCED WITH INDUSTRIAL WASTE (explain)

9. HAVE INDUSTRIAL EFFLUENT PROBLEMS BEEN SOLVED? YES NO (If yes, how?)

9A. METHOD OR METHODS USED TO ASSESS INDUSTRIAL WASTE TREATMENT COST (check appropriate box)

NO CHARGE BY CITY PROPERTY TAX WATER USE ASSESSMENT CHARGE BASED ON FLOW

CHARGED BASED ON BOD CHARGE BASED ON SS OTHER METHODS (describe)

COMMENT ON HOW CHARGE IS COLLECTED (fixed charge, sliding scale, etc.)

9B. IS INDUSTRIAL WASTE ORDINANCE IN EFFECT AND ENFORCED? YES NO

10. WHO PROVIDED INITIAL INSTRUCTION IN THE OPERATION OF THE PLANT?
Consulting Engineers

11. IS A MANUAL OF PRACTICE OR INSTRUCTIONS AVAILABLE? YES NO
 IF YES, WHO WROTE AND PROVIDED IT?
same

12. ESTIMATE OF MAN-HOURS PER WEEK DEVOTED TO LABORATORY WORK AND MAINTENANCE OF RECORDS AND REPORTS

D. PLANT PERSONNEL (Annual Average Staff for Most Recent Year Reported in Section "F")

JOB CATEGORY	NUMBER	TOTAL MAN-HOURS PER WEEK	TOTAL NUMBER CERTIFIED OR LICENSED	RANGE IN YEARS EMPLOYED AT PRESENT PLANT	RANGE IN YEARS OF EXPERIENCE IN TREATMENT
1. SUPERINTENDENT	1	40	1	10	10
2. OPERATORS	6	200	3		
3. LABORATORY TECHNICIANS					
4. LABORERS					
5. PART-TIME LABORERS					
6. TOTAL					

E. LABORATORY CONTROL

Enter test codes opposite appropriate items. If any of the below tests are used to monitor industrial wastes place an "X" in addition to the test code.

CODES

1 - 7 or more per week 3 - 1, 2, or 3 per week 5 - 2 or 3 per month 7 - Quarterly 9 - Annually
 2 - 4, 5 or 6 per week 4 - as required 6 - 1 per month 8 - Semi-Annually

ITEM	RAW	PRIMARY EFFLUENT	MIXED LIQUOR	FINAL	SLUDGE		DIGESTOR	RECEIVING STREAM
					RAW	SUPER-NATANT		
1. BOD	5	5						
2. SUSPENDED SOLIDS	5	5						
3. SETTLEABLE SOLIDS	1	1						
4. SUSPENDED VOLATILE	1						3	
5. DISSOLVED OXYGEN	1	1						
6. TOTAL SOLIDS								
7. VOLATILE SOLIDS								
8. pH	1	1						
9. TEMPERATURE	1	1						
10. COLIFORM DENSITY	1	3						
11. RESIDUAL CHLORINE		1						
12. VOLATILE ACIDS		3						
13. M. B. STABILITY								
14. ALKALINITY		3						
15.								
16.								
17.								
18.								
19.								

F. OPERATION AND MAINTENANCE COST FOR PLANT

YEAR OF OPERATION	SALARIES/WAGES	ELECTRICITY	CHEMICALS	MAINTENANCE	OTHER ITEMS	TOTAL
MOST CURRENT YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						
PRIOR YEAR 19						

EVALUATION PERFORMED BY	TITLE	ORGANIZATION
Patrick M. Lee	E II	DOE

INFORMATION FURNISHED BY	TITLE	ORGANIZATION	DATE
Ralph Goettling	Operator	City of Des Moines	

G. NOTATIONS BY EVALUATOR

1. ADDITIONAL REMARKS (If remarks refer to a particular item, identify by number)

2. GENERAL COMMENTS ON HOUSEKEEPING AND MAINTENANCE

Neat, Clean

3. REQUIREMENTS OF HIGHER AUTHORITY

3A. DOES THE PLANT PROVIDE THE DEGREE OF TREATMENT PRESENTLY REQUIRED BY THE STATE? (If no, explain)

YES NO

3B. ARE THERE ANY PENDING ACTIONS (enforcement conferences, change in water quality standards, etc.) THAT WOULD REQUIRE UPGRADING OF TREATMENT BY THIS PLANT?

YES NO (If yes, explain)

3C. NUMBER OF STATE INSPECTIONS OF PRESENT PLANT TO DATE.

4. IS ANY FOLLOW-THRU ACTION REQUIRED TO (1) CORRECT DEFICIENCIES IN THE PLANT OR ITS OPERATION OR (2) RESOLVE INDUSTRIAL WASTE PROBLEMS? (If yes, describe required corrective action) YES NO