

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8512120384 DOC. DATE: 85/12/05 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
 50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylv 05000388
 AUTH. NAME AUTHOR AFFILIATION
 FIELDS, J. S. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION
 AGUSTINI, D. R. Pennsylvania, Commonwealth of

SUBJECT: Requests approval to modify design of sewage treatment plant expansion. Revised oversize sewage treatment plan expansion drawing, engineering calculations & revised permit modules 1 & 8 encl for review.

DISTRIBUTION CODE: CO01D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 11+1
 TITLE: Licensing Submittal: Environmental Rept Amdt & Related Correspondence

NOTES: 1cy NMSS/FCAF/PM. LPDR 2cys Transcripts. 05000387
 OL: 07/17/82
 1cy NMSS/FCAF/PM. LPDR 2cys Transcripts. 05000388
 OL: 03/23/84

	RECIPIENT		COPIES		RECIPIENT		COPIES			
	ID	CODE/NAME	LTR	ENCL	ID	CODE/NAME	LTR	ENCL		
	BWR	PD3 PD	18	1	1	BWR	PD3 LA	19	1	1
		CAMPAGNONE	04	1	1					
INTERNAL:	ACRS		20	6	6	ADM/LFMB			1	0
	ELD/HDS4			1	0	NRR BWR ADTS			1	1
	NRR PWR-A	ADTS		1	1	NRR PWR-B ADTS			1	1
	<u>REG FILE</u>			1	1	RGN1			1	1
EXTERNAL:	24X			1	1	LPDR	03		2	2
	NRC PDR	02		1	1	NSIC	05		1	1
NOTES:				3	3					

Drawing To: Reg Files
 Aperture Card Dist.

TOTAL NUMBER OF COPIES REQUIRED: LTR 24 ENCL 22

1970-1971
1972-1973
1974-1975
1976-1977
1978-1979
1980-1981
1982-1983
1984-1985
1986-1987
1988-1989
1990-1991
1992-1993
1994-1995
1996-1997
1998-1999
2000-2001
2002-2003
2004-2005
2006-2007
2008-2009
2010-2011
2012-2013
2014-2015
2016-2017
2018-2019
2020-2021
2022-2023
2024-2025

1970-1971
1972-1973
1974-1975
1976-1977
1978-1979
1980-1981
1982-1983
1984-1985
1986-1987
1988-1989
1990-1991
1992-1993
1994-1995
1996-1997
1998-1999
2000-2001
2002-2003
2004-2005
2006-2007
2008-2009
2010-2011
2012-2013
2014-2015
2016-2017
2018-2019
2020-2021
2022-2023
2024-2025

Year	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992-1993	1994-1995	1996-1997	1998-1999	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009	2010-2011	2012-2013	2014-2015	2016-2017	2018-2019	2020-2021	2022-2023	2024-2025	
1																													
2																													
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													
13																													
14																													
15																													
16																													
17																													
18																													
19																													
20																													
21																													
22																													
23																													
24																													
25																													
26																													
27																													
28																													
29																													
30																													
31																													
32																													
33																													
34																													
35																													
36																													
37																													
38																													
39																													
40																													
41																													
42																													
43																													
44																													
45																													
46																													
47																													
48																													
49																													
50																													

Handwritten notes at the bottom of the page, possibly indicating a date or a specific reference.



Pennsylvania Power & Light Company

Two North Ninth Street • Allentown, PA, 18101 • 215 / 770-5151

December 5, 1985

Mr. Dino R. Agustini
Sanitary Engineer, Permits and Grants Section
Bureau of Water Quality Management
Pennsylvania Department of Environmental Resources
90 East Union Street, Second Floor
Wilkes-Barre, PA 18701-3296

SUSQUEHANNA STEAM ELECTRIC STATION ,
SEWAGE TREATMENT PLANT MODIFICATION
WATER QUALITY MANAGEMENT PERMIT NO. 4085411
CCN 741326 FILE 012-4
PLE-43320

Dear Mr. Agustini:

The Pennsylvania Power and Light Company (PP&L) requests Pennsylvania Department of Environmental Resources (Pa. DER) approval to modify the design of the sewage treatment plant expansion as required in Standard Condition No. 1 of this permit. It has been determined by PP&L engineers that a second chlorine contact tank is not necessary in order to meet the minimum of 30 minutes of contact time for the average daily flow of 80,000 gpd (Pa. DER Sewage Manual, 1983 Edition).

In reference to our November 15, 1985 telephone conversation, PP&L is attaching for Pa. DER review and approval a copy of engineering calculations, a revised sewage treatment plant expansion drawing and revised permit Modules 1 and 8.

If you have any questions, please contact me at (215) 770-7889.

Respectfully yours,

Jerome S. Fields
Jerome S. Fields
Senior Environmental Scientist-Nuclear

JSF/dml

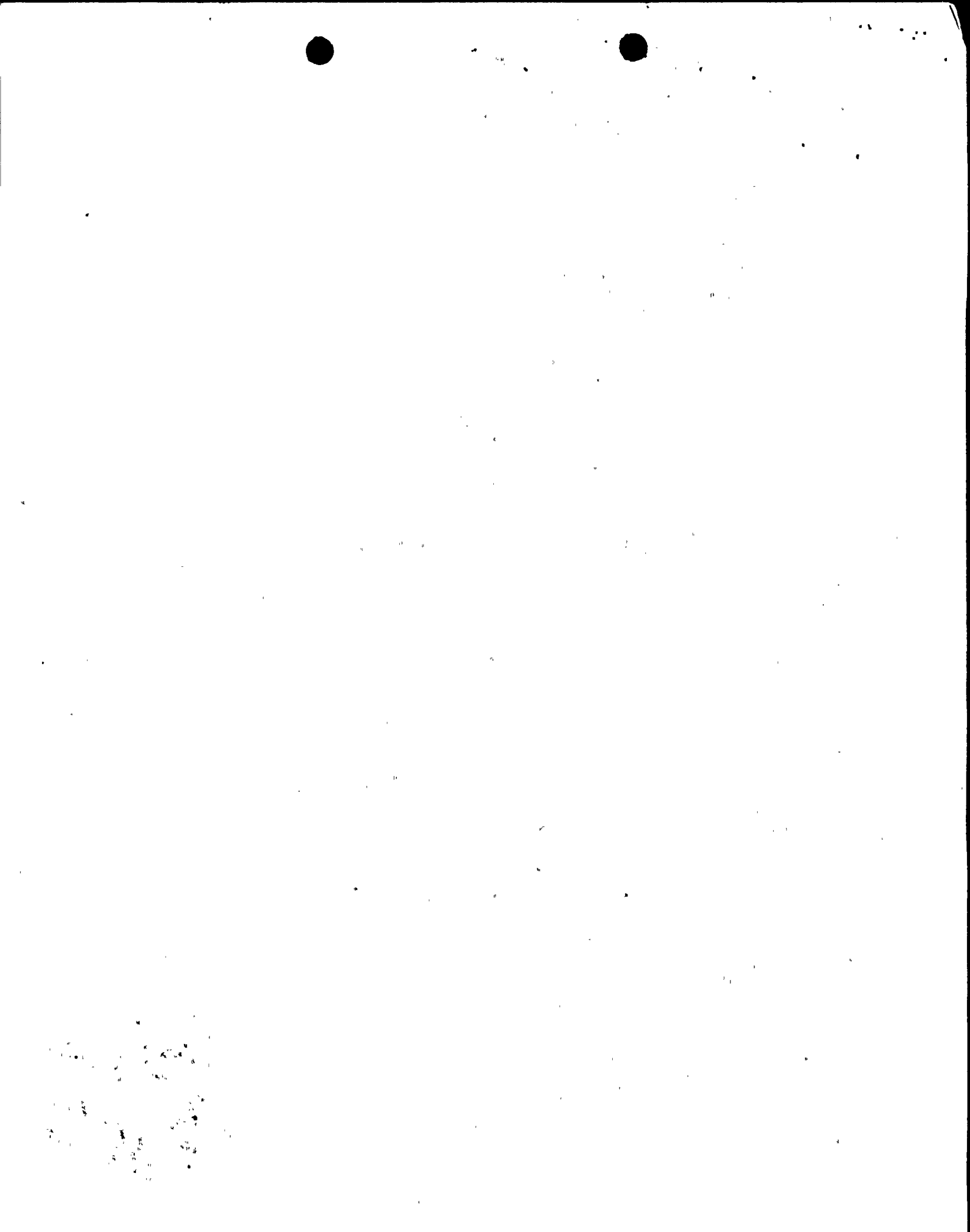
jsflt1004324i

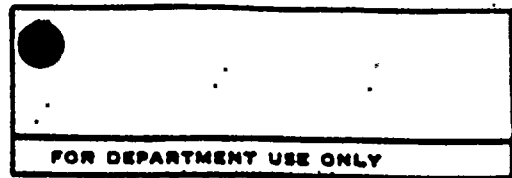
cc:

A. Schwencer	NRC
D. H. Gordon	F&M

8512120384 851205
PDR ADDCK 05000387
P PDR

*Drawing
to: Reg Files
Cool
" Aperture
Card Dist*





DATE PREPARED
Aug. 1, 1985
DATE REVISED
Dec. 5, 1985

WATER POLLUTION CONTROL
MODULE 1 - GENERAL INFORMATION
SEWERAGE.

FOR DEPARTMENT USE ONLY

CLASS OF CONSTRUCTION

(Check all applicable blocks)

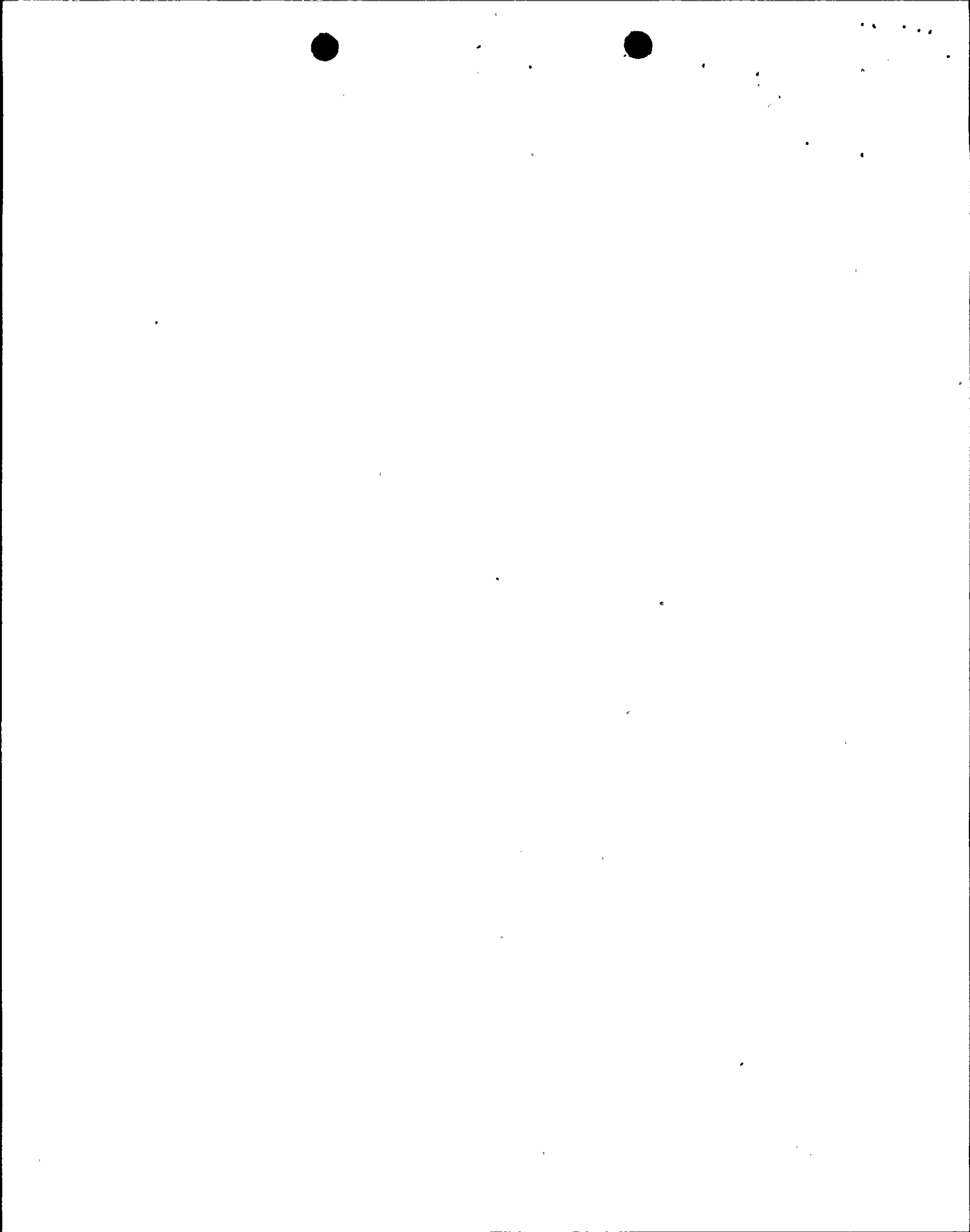
NEW
 REPLACEMENT OF EXISTING UNIT(S)

ADDITIONS AND/OR
 MODIFICATIONS TO EXISTING UNIT(S)

TABLE I - DESIGN LOADING DATA		Existing Facilities Design	Present Operating Data	Proposed Total Facilities Design
1. EQUIVALENT POPULATION TO BE SERVED (NO. OF PERSONS-SUBMIT CALCULATIONS)				
A. DOMESTIC		300-450	1000-1500	1000-1500
B. INDUSTRIAL		-	-	-
C. TOTAL		300-450	1000-1500	1000-1500
2. DESIGN YEAR OR PERIOD FOR OPERATING DATA				
		1985	1985	1990
3. RUNOFF PERIOD (HRS)				
4. DOMESTIC WASTE FLOW DATA	A. PER CAPITA FLOW (GPCD)	80	60	60
	B. AVERAGE DAILY FLOW (MGD)	0.045	0.0385	0.080
	C. INFILTRATION (MGD)	-	-	-
	D. RUNOFF FLOW RATE (MGD)	-	-	-
	E. MAXIMUM FLOW RATE (MGD)	0.1125	0.096	0.20
5. INDUSTRIAL WASTE FLOW DATA	A. AVERAGE DAILY FLOW (MGD)	-	-	-
	B. MAXIMUM DAILY FLOW (MGD)	-	-	-
6. TOTAL DESIGN AVERAGE FLOW (MGD)		0.045	0.0385	0.080

TABLE II - FACILITIES DESIGN DATA (Specify number of units)

Units	Existing	To Be Abandoned	Total Proposed	Units	Existing	To Be Abandoned	Total Proposed
1. SCREENING DEVICES	1			14. RAPID SAND FILTER(S)			
2. GRIT CHAMBER(S)				15. MICROSCREEN UNIT(S)			
3. COMMINUTOR(S)	1			16. WASTE STABILIZATION POND(S)			
4. EQUALIZATION TANK(S)	1		1	17. CHLORINE CONTACT TANK(S)	1		
5. PRE-AERATION TANKS				18. DISINFECTION FACILITIES	1		1
6. PRIMARY SETTLING TANKS				19. SLUDGE THICKENING TANK(S)			
7. TRICKLING FILTERS				20. AEROBIC DIGESTION TANKS			
8. INTERMEDIATE SETTLING TANKS				21. ANAEROBIC DIGESTORS			
9. AERATION TANKS	3		1	22. MECHANICAL SLUDGE DEWATERING			
10. FINAL SETTLING TANKS	3		1	23. SLUDGE DRYING BEDS			
11. MIXING AND FLOCCULATION TANKS				24. INCINERATOR(S)			
12. CHEMICAL TREATMENT				25. OTHER (SPECIFY) Sludge Holding	1		
13. INTERMITTENT SAND FILTERS							



DATE PREPARED Aug. 1, 1985
DATE REVISED Dec. 5, 1985

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

WATER POLLUTION CONTROL
MODULE 8

FOR DEPARTMENT USE ONLY

TABLE 1 – FILTERS (other than rapid sand filter) (N/A)
--

DESCRIBE EACH FILTERING DEVICE TO BE USED, INCLUDING: TYPE OF FILTER; MEDIA (TYPE, DEPTH, ETC); FILTRATION RATE; BACKWASH PROCEDURE, RATES AND APPLIED LOADING.

TABLE 2 – DISINFECTION

DESCRIBE THE METHOD OF DISINFECTION TO BE PROVIDED. INCLUDING DISINFECTANT TYPE; FEED MECHANISM; EFFECTIVE DOSAGE RANGE; EXPECTED RESIDUAL; CONTACT TIME AND SAFETY FEATURES:

Disinfection will be accomplished by the injection of Sodium Hypochlorite into the influent in the chlorine contact tank. The Hypochlorite is diluted with water in a large plastic container and pumped by the variable speed chemical pump to provide a minimum of 0.5 mg/l chlorine residual after a 17 minute detention time in the chlorine tank. The disinfection equipment is a Wallace & Tierman Model 94-100.

There is an additional estimated 13 minutes of chlorine contact time in the sewer pipe (2,230 feet) between the sewage treatment plant and the river. The combined contact time of 30 minutes for an average daily flow of 80,000 gpd meets the requirements of the Pa. DER Sewage Manual, 1983.



CALCULATION COVER SHEET

CALC. NO. QA-C-DAR-075

FILE NO. 892-07

SUPERSEDED BY -

SAFETY-RELATED ASME III OR XI OTHER QUALITY NON QUALITY

Quality control checkboxes

PROJECT SSES - Sewage Treatment Plant Mods

ER/CTN NO. 400865

DESIGN ACTIVITY/PMR NUMBER PDSEA 201885

PAGE 1 OF 8

TITLE/DESCRIPTION Sewage Treatment Plant Mods

STATEMENT OF PROBLEM

Evaluate the need for a new chlorine contact tank in conjunction with the additional proposed treatment capacity for the STP.

DESIGN BASIS (DC020.0 OR DC020.1)

DER Sewerage Manual

REFERENCES/FORMULAE

- 1 DER Sewerage Manual, 1968 & 1983 Editions
2 Spec C-34
3 Applied Hydraulics in Engr., by Morris
4 Dwg. C-86 & C-53
5 AISC Steel Manual (properties of circle)
6 Spec C-1048

SUMMARY/CONCLUSIONS

By using the existing recirculation box and chlorine contact tank, chlorine contact times will be within DER requirements - without adding an additional chlorine contact tank.

Table with 7 columns: REV. NO., DATE, PREPARED BY, REVIEWED/CHECKED BY, DATE, APPROVED BY, DATE. Row 1: 0, 11-19-85, D. Reinemith, A. M. Watson, 11/27/85, G. R. Johnson, 12-2-85

9C110.0-A REV. 0

Dept. NPE-Civil
Date 11-18 19 85
Designed by DAR
Approved by Amul

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT STP Mods

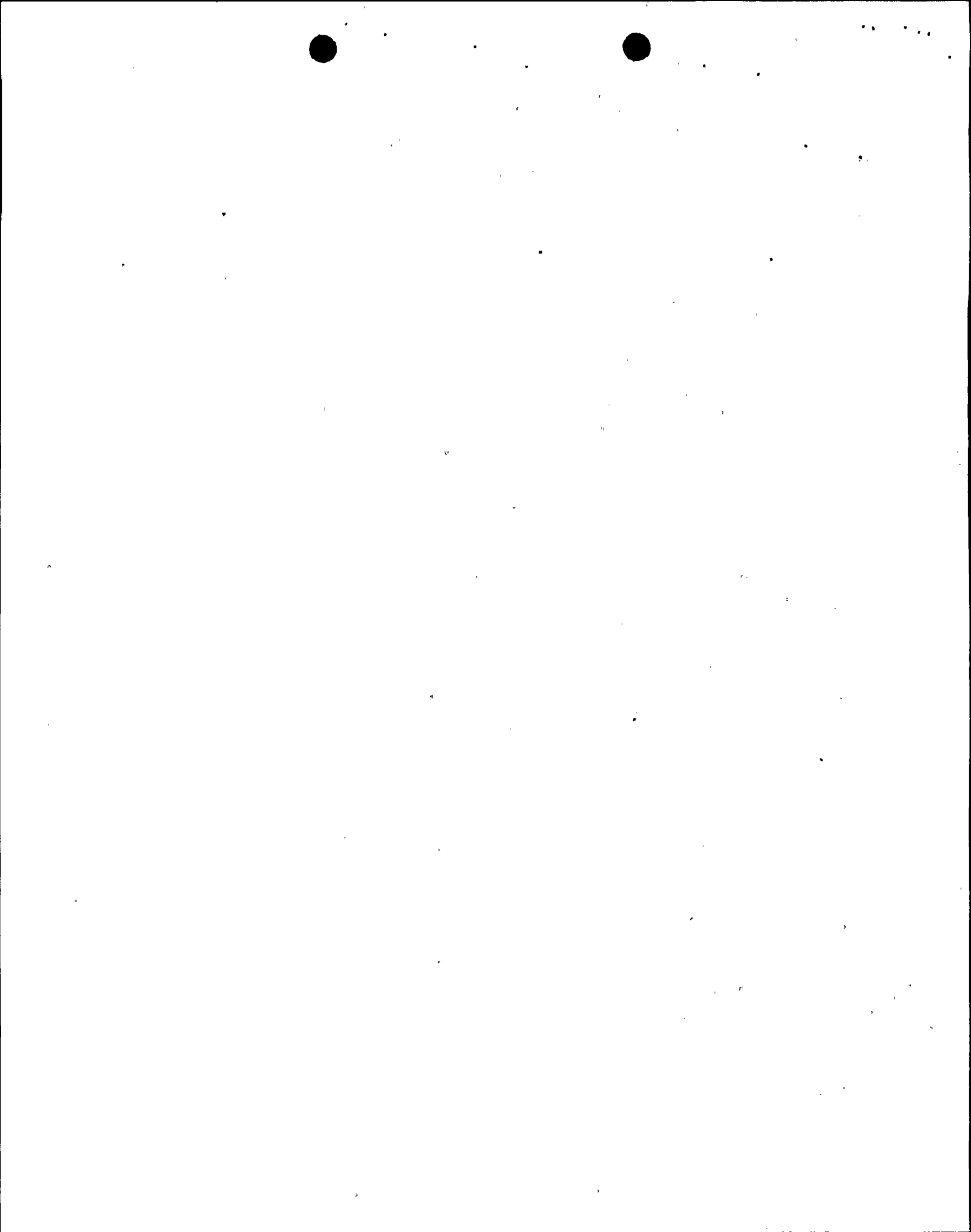
ER No. 400865
Calc. Q# C-DAR-075
Sht. No. 2 of 8

The existing chlorine contact tank has a capacity of 470 gal. With a maximum flow of 45,000 gpd, the original design basis =

$$\frac{470 \text{ gal}}{45,000 \text{ gal/day}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ hr}}{60 \text{ min}} = 15 \text{ minutes}$$

Using the existing recirculation loop (next to the existing chlorine contact tank) for additional chlorine contact time (by injecting chlorine at the inlet to the recirculation box), the proposed total contact time will be as follows:

$$\frac{470 \text{ gal} + 470 \text{ gal}}{80,000 \text{ gal/day}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ hr}}{60 \text{ min}} = 17 \text{ minutes}$$



Dept. NPE-Civil
Date 11-19 19 85
Designed by DRR
Approved by Amw

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT STP Mods

ER No. 400865
QH-C-DRR-075
Sht. No. 3 of 8

DER REQUIREMENTS FROM DER SEWERAGE MANUAL:

1968 Edition
(original Design Basis)

- A minimum chlorine contact period of 15 minutes at peak hourly flow or maximum rate of pumpage.

A submerged outfall sewer may be used in lieu of a chlorine contact tank.

1983 Edition

- A minimum chlorine contact period of 15 minutes at peak hourly flow or maximum rate of pumpage or a minimum of 30 minutes at average daily flow.

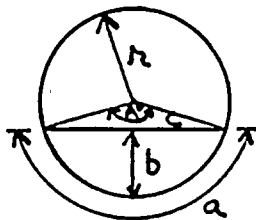
Dept. NPE-Civil
Date 11-19 19 85
Designed by DRR
Approved by SMW

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT STP Mads

ER No. 400865
QH-C-DRR-075
Sht. No. 4 of 8

For added conservatism (although not strictly required by interpretation of the DER requirements) additional chlorine contact time is obtained through the discharge pipe & manholes between the STP and the Susquehanna River as follows:



$\phi = 8''$ $L = 2230'$
 $r = 4''$ ELEV. DIFF = $542' - 490'$

10 manholes - ignore for conservatism

$Q = 80,000 \text{ gpd} = .124 \text{ cfs}$ $S = \frac{542 - 490}{2230} = .0233$

$n = \text{Manning friction coeff.} = .013$

$R = \text{hydraulic radius} = \frac{A}{P_w}$

$P_w = \text{wetted perimeter} = a$

$A = \text{wetted area}$

$V = \frac{1.49}{n} R^{2/3} S^{1/2}$ $Q = \frac{V}{A}$

$Q = \frac{1.49 A}{n} R^{2/3} S^{1/2}$

$A R^{2/3} = \frac{n Q}{1.49 S^{1/2}} = \frac{.013 (.124)}{1.49 (.0233)^{1/2}} = .00709$

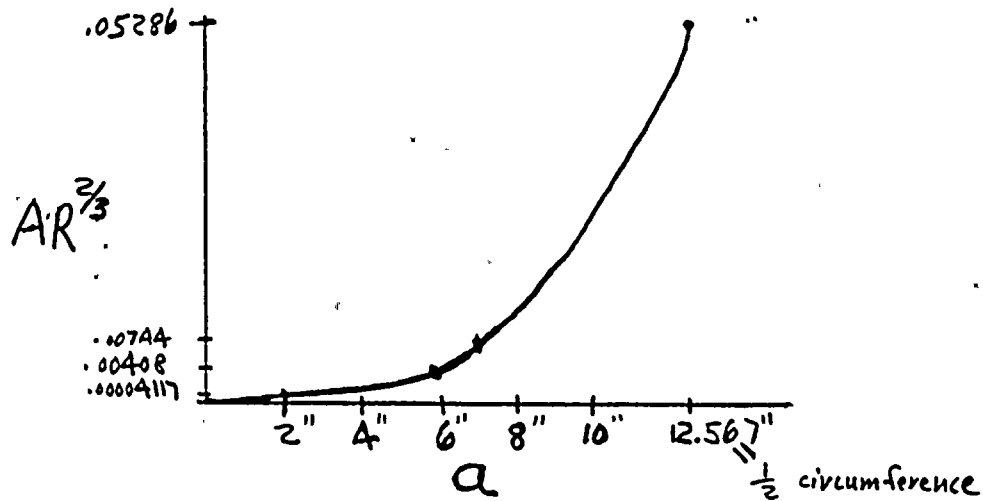
Dept. NPE-Civil
Date 11-19 19 85
Designed by DRR
Approved by MMH

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT STA Mods

ER No. 400865
QH-C-DRR-075
Sht. No. 5 of 8

By trial & error find the wetted perimeter and corresponding area for the given flow:



$$A = \frac{ar - 2r \sin \frac{A^\circ}{2} (r-b)}{2}$$

$$a = .017453 \sqrt{A^\circ}$$

$$c = 2r \sin \frac{A^\circ}{2}$$

$$b = \frac{c}{2} \tan \frac{A^\circ}{4}$$

EXAMPLE: for $a = 6.9$

$$A^\circ = \frac{a}{.017453 \sqrt{A}} = \frac{6.9}{.017453 \sqrt{A}} = 98.84^\circ$$

$$c = 2r \sin \frac{A^\circ}{2} = 2(4) \sin 49.418^\circ = 6.08'$$

Dept. NPE-Civil
Date 11-19 19 85
Designed by DRR
Approved by AMW

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT STP Mids

ER No. A00865
QH-L-DRR-075
Sht. No. 6 of 9

$$b = \frac{c}{2} \tan \frac{A^\circ}{4} = \frac{6.08}{2} (\tan 24.71^\circ) = 1.40''$$

$$A = \frac{ar - 2r \sin \frac{A^\circ}{2} (r-b)}{2}$$

$$= \frac{6.9(4) - 2(4)(.7595)(4-1.4)}{2}$$

$$= 5.901 \text{ in}^2 = .0410 \text{ ft}^2$$

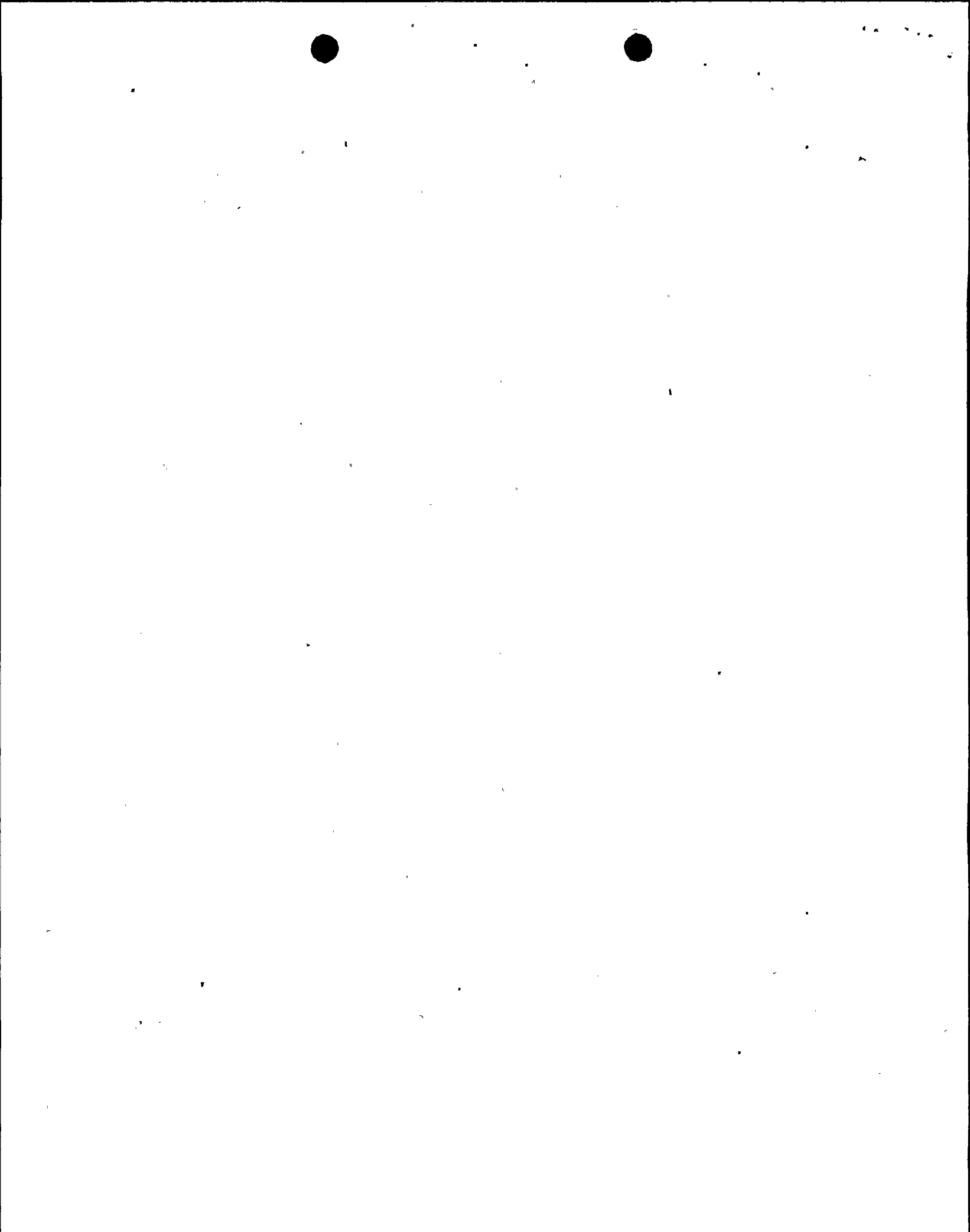
$$A(RH)^{\frac{2}{3}} = .0410 \left(\frac{.0410}{6.9/12} \right)^{\frac{2}{3}} = .00705 \approx \begin{matrix} \text{required} \\ .00709 \end{matrix}$$

$$\therefore V = \frac{1.49}{.013} \left(\frac{.0410}{6.9/12} \right)^{\frac{2}{3}} (.0233)^{\frac{1}{2}} = 3.008 \text{ fps}$$

$$t = \frac{L}{V} = \frac{2230}{3.008} = 741 \text{ sec}$$

$$= 12.4 \text{ minutes}$$

assume flow thru 10 manholes.. will yield
additional contact time; minimum = 13 minutes



Dept. NPE-Civil

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

ER No. 400865

Date 11-18 19 85

QH-L-DRR-075

Designed by DRR

PROJECT STP Mod.

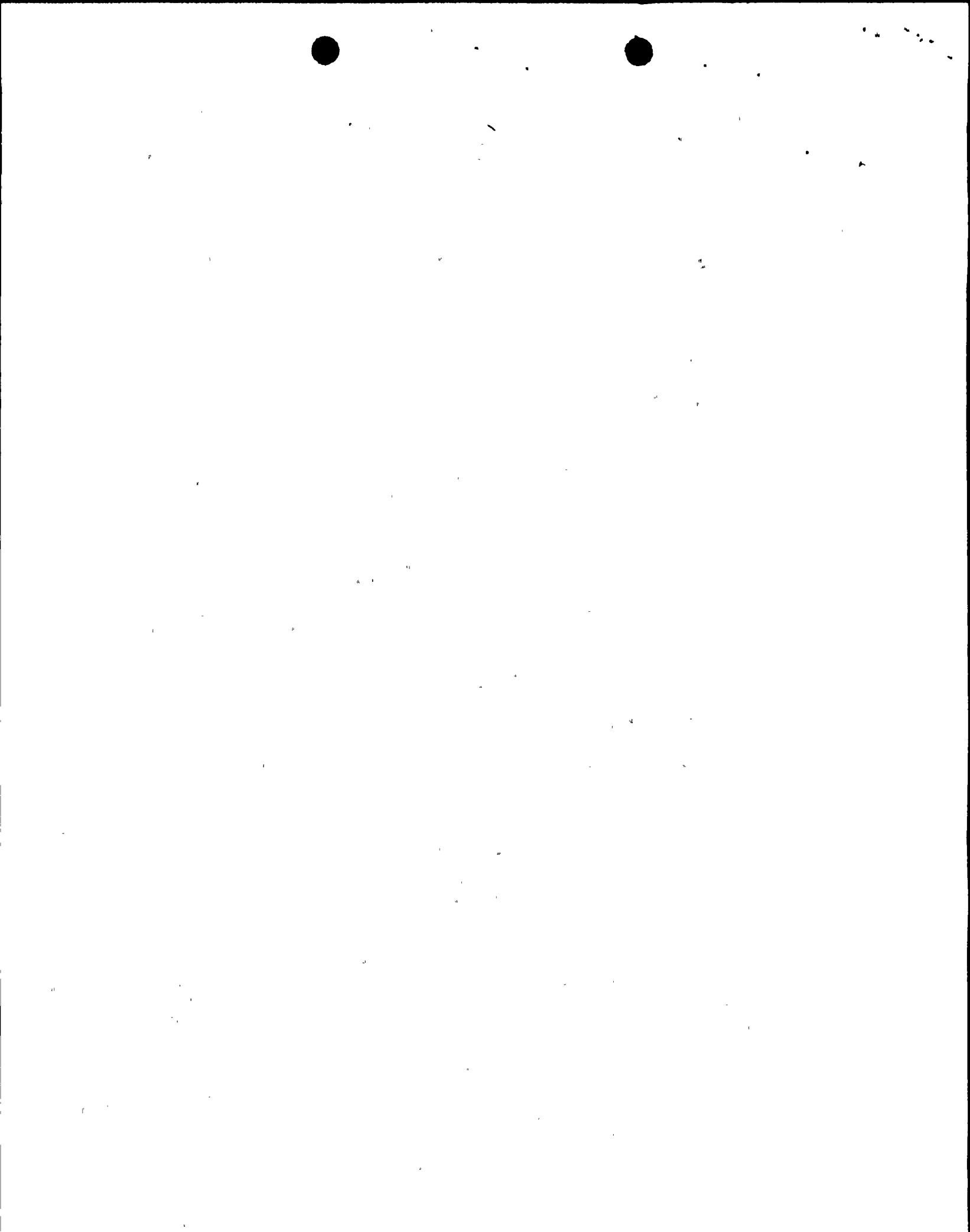
Sht. No. 7 of 8

Approved by DRR

SUMMARY & CONCLUSIONS :

As per the 1983 DER Sewerage Manual requirements for chlorine contact time, the new peak hourly flowrate for the SSES STP will be 80,000 gpd (any higher inflow rates will be equalized by 50,000 gallons of surge tank capacity prior to treatment and discharge) by design. The combination of existing recirculation loop and existing chlorine contact tanks will give 17 minutes of chlorine contact time, thus meeting the 15 minute minimum requirement.

We are adding capacity to the existing STP in order to handle peak periods, such as outages. Ordinarily the average daily flow is expected to be about half of the STP's capacity (at most, even with future sanitary loads). Therefore, at half the discharge flow rate, we will have over 30 minutes of chlorine contact time.



Dept: NPE-Civil
Date 11-15 19 85
Designed by: DRR
Approved by: Ann

PENNSYLVANIA POWER & LIGHT COMPANY
CALCULATION SHEET

PROJECT STP Mods

ER No. 400865
QH-C-DRR-075
Sht. No. 8 of 8

Additionally, at a flow rate of 80,000 gpd, the STP discharge piping system will yield an additional 13 minutes of chlorine contact time before emptying into the Susquehanna River. (Total of $17 + 13 = 30$ minutes)