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RECIP.NAME RECIPIENT AFFILIATION
AUGUSTINI,D. Pennsylvania, Commonwealth of,

SUBJECT: Forwards comments on 841126 draft NPDES Permit PA0047325. Flow & ph monitoring requested to be required only on days that discharges made to Sedimentation Pond S-2. Requests deletion of max daily & instantaneous max iron limits.

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PP&L Pennsylvania Power & Light Company
Two North Ninth Street • Allentown, PA 18101 • 215/770-5151

January 21, 1985

Mr. Dino Augustini
Department of Environmental Resources
90 East Union Street, Second Floor
Wilkes-Barre, PA 18701

SUSQUEHANNA STEAM ELECTRIC STATION
NPDES DRAFT PERMIT COMMENTS
PERMIT NO. PA0047325
CCN 741326 FILE 012
PLE-6614

Dear Mr. Augustini:

Attached are the Pennsylvania Power and Light (PP&L) Company's comments on the Susquehanna Steam Electric Station's (Susquehanna SES) draft NPDES permit transmitted to us on November 26, 1984.

If you have any questions regarding the attached comments, or would like to discuss them further, please contact me at (215) 770-7891.

Respectfully yours,

Jerome S. Fields/DAS.

Jerome S. Fields
Sr. Environmental Scientist-Nuclear

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COMMENTS ON EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Outfall 070/S-2 Sedimentation Pond

As stated in the March 1984 Permit Application, outfall 070, the S-2 sedimentation pond, primarily discharges storm water runoff. Occasionally, batch-discharges from miscellaneous outdoor sumps, manholes, or pits are directed to this pond. Since these discharges are infrequent (approximately one/month) daily flow and pH monitoring would reflect only the quantity and quality of storm water runoff. PP&L, therefore, requests that flow and pH monitoring be required only on those days that discharges are made to the S-2 pond, or "daily when discharged to."

Currently, no flow measuring equipment exists on the S-2 pond's discharge. PP&L requests that six months be allowed for the installation of this equipment.

B. Outfall 071-Cooling Tower Blowdown

1. Flow Monitoring

The flow monitoring equipment for outfall 071 has been inoperable for several months. Due to the location of the flow sensing elements in the blowdown line, this equipment cannot be repaired until the cooling tower basins are drained during a major refueling outage. These modifications are scheduled to be made during the first refueling outage beginning February 9, 1985 for Unit 1 and in August, 1986 during the first refueling outage for Unit 2. Until these flow elements are replaced, flows will continue to be estimated using cooling tower basin level vs. discharge valve position curves developed by PP&L.

2. Chromium

On Form 2C of our March 1984 Permit Application, PP&L reported total chromium of 0.018 mg/l in outfall 071 and 0.002 mg/l in our intake water. This data, in combination with the cooling towers' design cycles of concentration of 3.87, indicates that total chromium concentrations in outfall 071 are expected to be approximately 0.008-0.018 mg/l. This value is much less than the proposed BAT limit for chromium of 0.20 mg/l. Additionally, no chromium is added to the circulating water system nor does PP&L plan to use any chromium-containing water treatment chemicals. PP&L, therefore, requests the minimum monitoring requirement for chromium of once per year.

3. Maximum Daily and Instantaneous Maximum Iron Limits

The monthly average iron (total) limit of 6.8 mg/l was developed using appropriate water quality modeling techniques presented in Chapter 3, Part C.3 of the Pa. DER's NPDES Technical Guidance Manual. Standard multiplication factors of 2.0 and 2.5 were then applied to this average limit to establish maximum daily and instantaneous maximum limits, respectively. These factors were "borrowed" from

effluent quality variability ratios established for technology-based limits. However, such general factors do not sufficiently reflect the degree of variability in the quality of Susquehanna SES's cooling tower blowdown discharge.

Susquehanna SES's circulating water system utilizes raw river water treated only with chlorine for biological control and occasionally with acid or caustic for pH and scale control. PP&L also plans to initiate the use of a dispersant and corrosion inhibitors beginning in the second quarter of 1985. Cooling tower blowdown water quality generally follows river water quality, which varies greatly. Historical data presented in Attachment 1 shows blowdown iron concentrations approximately 2-3 times greater than corresponding river water quality due to the evaporative losses in the cooling towers. Additionally, blowdown water quality lags approximately 24 hours behind river water quality due to flow-through time in the basins.

Water quality data collected by Ichthyological Associates, Inc. from 1972-1983 reflect an average total iron concentration of 2.67 mg/l with maximum values of up to 52.8 mg/l recorded (periodic total iron concentrations in the range of 15-17 mg/l are not uncommon). These extremely high iron concentrations occur periodically throughout the year during periods of high river discharge, when settled sediments containing iron-oxide precipitates are resuspended and flushed down-river. Iron levels in Susquehanna SES's discharge increase accordingly, due to higher iron concentrations in the raw water supply.

As stated above, maximum iron concentrations in the river often exceed the average concentrations observed by greater than a factor of six, and the Susquehanna SES's cooling tower blowdown discharge varies accordingly. However, the Pa. DER proposes to establish maximum concentration limits by using factors of only 2.0-2.5 times greater than average limiting concentrations. Establishing effluent limits in such a manner is overly-restrictive since it does not take into account the true variability in the quality of the discharge, which is due solely to intake water quality. Establishing such effluent limits does nothing to protect water quality; it merely subjects PP&L to NPDES permit violations which are beyond PP&L's control.

PP&L recommends the deletion of the maximum daily and instantaneous maximum limits or, at a minimum, the establishment of maximum limits which reflect the true variability in the effluent quality. If the Pa. DER insists on establishing maximum limits PP&L recommends use of a variability ratio of approximately six (based on maximum observed/average observed iron concentrations in both the raw water supply and cooling tower blowdown presented in Attachment 1). Using

this approach, the appropriate maximum daily limit would be 6.8 mg/l (monthly average limit) x 6 or 40.8 mg/l.

PP&L considers such an effluent limitation reasonable for a number of reasons. First, the literature shows that exposure to total iron concentrations in the range of 30-40 mg/l is not acutely toxic to aquatic life (acute toxicity information is applicable here since high river discharges and correspondingly high blowdown iron concentrations generally only last a few days). Bradford, Miller, and Buss found that up to 40 mg/l of iron had "no" effect on hatching shad (1) while Ellis reported finding "good fish fanna" in waters with up to 30 mg/l of "free iron" (2). Secondly, at the "high" river discharges commonly encountered during these periods of high iron in the river 40 mg/l of total iron in Susquehanna SES's discharge would not create a measurable increase in downriver iron concentrations (see calculations presented in Attachment 2). Such an approach is consistent with the Pa. DER's water quality modeling techniques presented in the NPDES Technical Guidance Manual, where ambient water quality exceeds applicable Water Quality Criteria (WQC).

Finally, and most importantly, deleting entirely or establishing higher short-term limitations will not reduce the degree of water quality protection required by Susquehanna SES's permit. Pa. DER's NPDES Technical Guidance Manual states that " ... the specification of these short-term limitations is <u>not</u> intended to <u>diminish</u> the degree of water quality protection to be provided by the permittee. These limitations <u>are</u> intended to reflect the reality that <u>all</u> dischargers will exhibit different degrees of effluent quality variability ... ." PP&L will still be required to meet the average monthly iron limit of 6.8 mg/l, which was established to assure compliance with the Pa. DER's WQC. The Pa. DER's manual further states that " ... it is, therefore, unlikely that by limiting effluent quality ... as an 'average monthly' value, a negative water quality impact will occur." Therefore, the removal or the change of the maximum daily and instantaneous maximum iron limits as proposed will prevent PP&L from being exposed to uncontrollable NPDES permit violations and at the same time ensure water quality protection.

4. <u>Total vs. Total Recoverable Metals</u>

Final NPDES regulations issued in the <u>Federal Register</u> on September 26,1 984 include Section 122.45(c) which states that for all permits which become final and effective after March 9, 1982, all effluent limits for a metal shall be expressed in terms of "total <u>recoverable</u> metal." The preamble to that regulation further states that " ... using the total recoverable method to set water quality-based effluent limitations is independent of the method used to develop water quality standards for the receiving water." Therefore, any

metal limits should be expressed as total recoverable with no change in the corresponding effluent limitations in the Final Permit.

C. Outfalls 072, 073, 074, 076-Miscellaneous Sumps

All of these outfalls are sumps of known volume from which batch-type discharges are made. Since these are intermittent discharges, PP&L requests that both flow and pH measurement frequencies be changed from "daily" to "daily when discharged." Additionally, discharge volumes are calculated from the known sump volumes; therefore, the sample type for flow measurement should be "sump volume."

D. Outfall 079-Sewage Treatment Plant

The monitoring requirement for chlorine is expressed as "chlorine residual." PP&L requests clarification as to whether this limitation is based on free available chlorine or total residual chlorine analyses. Since free available chlorine better represents the toxicity of the effluent and since PP&L has historically reported this value as free available chlorine, PP&L recommends the specification of free available chlorine.

E. Outfalls 171,271,371 and 471-pH Limitations on Internal Waste Streams

Regulations governing low volume waste sources (40 CFR 423.12(b)(3)) specify only TSS and oil and grease limitations for these low volume waste discharges. Limitations on pH are not contained in these regulations, and therefore, should not be imposed on these internal waste streams prior to combination with the cooling tower blowdown. Regulations in 40 CFR 423.12(b)(1) require the pH of all "discharges" to meet the 6.0 to 9.0 pH limit. However, "discharge" as defined in 40 CFR 122.2 implies this limit should be applied at the point of discharge to "Waters of the United States", not on internal waste streams. The pH limit on outfall 071-cooling tower blowdown satisfies the requirement that all "discharges" meet the 6.0 to 9.0 pH limit, and therefore, additional pH monitoring on outfalls 171,271,371 and 471 is unnecessary. Additionally, due to the large volume of dilution provided by the cooling tower blowdown flow, mixing of these low volume waste sources with the blowdown will not cause the 6.0 to 9.0 limits on outfall 071 to be exceeded.

F. Outfall 171-Liquid Radwaste Effluent

The liquid radwaste treatment system processes water used in the plant in order to remove any dissolved, suspended, or radioactive contaminants prior to reuse or discharge. Water is treated, using precoat filters and deep mixed-bed demineralizers, and recycled for reuse unless it does not meet the required specifications or if no storage capacity is available. In both of these cases, it is then discharged to the blowdown line.

The radwaste treatment system produces extremely pure water which will easily meet the proposed low-volume waste limits (see Attachment 3 for radwaste discharge quality data). However, due to carbon dioxide dissolving in this ultra-pure water, the pH sometimes drops to below 6.0. If the Pa. DER insists on imposing pH limitations on this outfall, contrary to the comments presented in Item E., PP&L requests a change in the pH limit to between 5.5 and 9.0 to allow these carbon dioxide-saturated discharges.

Oil and grease content is not a problem in this ultra-pure water. PP&L conducts Total Organic Carbon (TOC) analyses of each tank prior to discharge (see Attachment 3). PP&L requests a reduction in the required frequency of oil and grease analyses to the minimum once/year since none is expected to be present.

Finally, radwaste discharges are batch-type discharges from individual sample tanks. The flow measurement sample type is more appropriately described as "tank volume" rather than "pump rate or weir."

G. Outfall 371-Neutralization Basin Discharge

This discharge originates from a neutralization basin of known volume. PP&L, therefore, requests that the flow monitoring sample type is changed from "pump rate or weir" to "sump volume."

H. Special Conditions

1. Condition #3

The reference to "Environmental Technical Specifications" is a misnomer and should simply be stated as "Technical Specifications."

2. Conditions #8 and #9

In condition #8, the DER references "2000 mpn per 100 milliliters" while in condition #9, "200/100 ml of Fecal Coliform Organisms" is referenced. PP&L requests a clarification as to whether the fecal coliform "most probable number" test method is implied in both of these conditions, and requests that the terminology be standardized.

3. Additional Special Conditions

PP&L requests the addition of a special condition to the permit similar to the following:

Effluent limitations, monitoring requirements, and other standard and special conditions which relate to the discharge(s) of pollutants authorized by this permit and are contained in previous Water Quality Management Permits for the facility are superseded by the terms and conditions of this permit, unless specifically noted otherwise.

ATTACHMENT 1

June, 1983 - October, 1984 Historical
Cooling Tower Blowdown vs. Susquehanna River Iron Concentrations

1. Susquehanna River

   Average Concentration = 2.31 mg/l
   Maximum Concentration Observed = 18.2 mg/l

2. Cooling Tower Blowdown

   Average Concentration = 4.94 mg/l (2.14 times river concentration due to evaporative losses)
   Maximum Concentration Observed = 31.9 mg/l

3. Variability Ratios

   River $= \frac{18.2 \text{ mg/l}}{2.31 \text{ mg/l}} = 7.9$

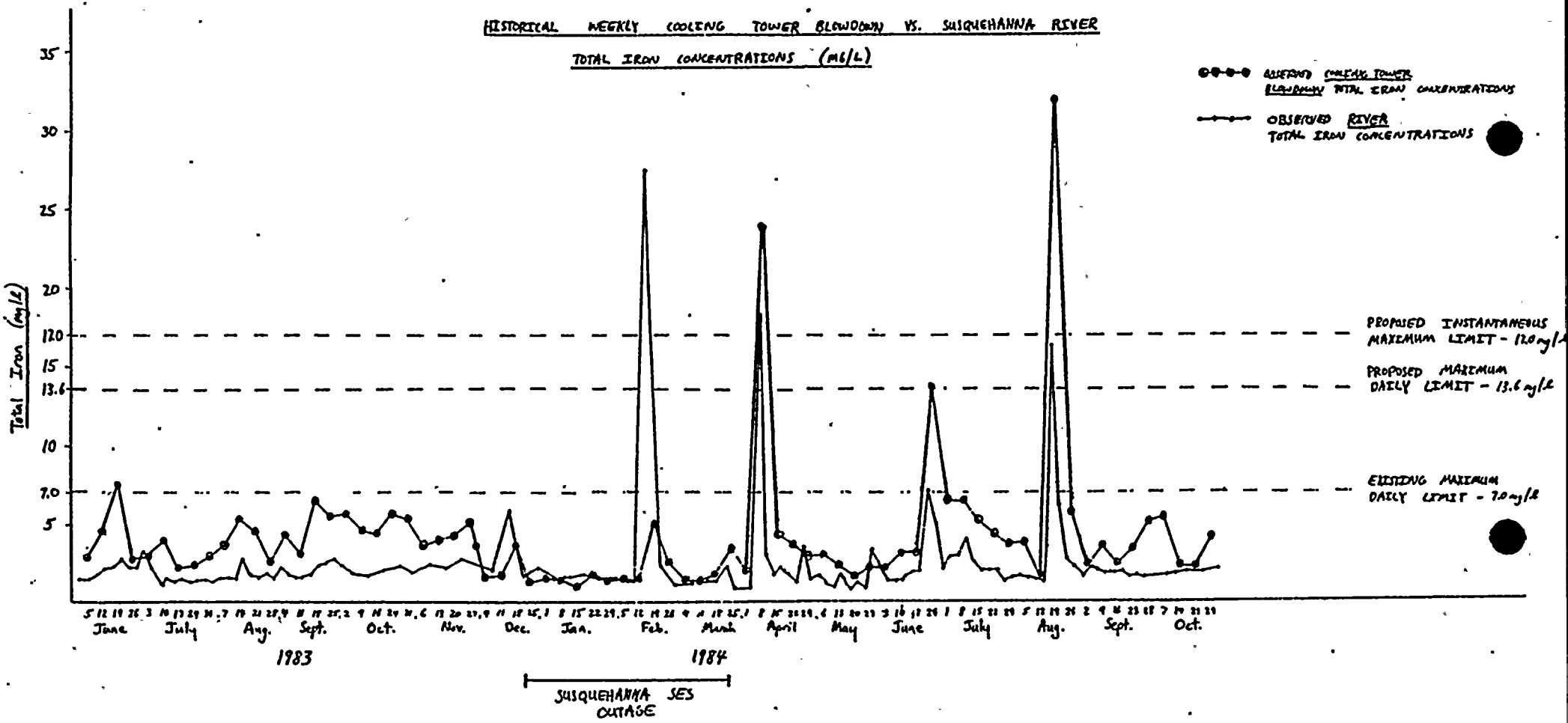
   Blowdown $= \frac{31.9 \text{ mg/l}}{4.94 \text{ mg/l}} = 6.5^*$

*For the cooling tower blowdown, conservatively assume a variability ratio of 6.

ATTACHMENT 1 (CON'T)

HISTORICAL WEEKLY COOLING TOWER BLOWDOWN VS. SUSQUEHANNA RIVER

TOTAL IRON CONCENTRATIONS (MG/L)



ATTACHMENT 2

High iron in the river due to high riverflows and subsequent NPDES violations occurred on the following dates:

DATE OF NPDES VIOLATION	COOLING TOWER BLOWDOWN TOTAL Fe (mg/l)	SUSQUEHANNA RIVER TOTAL Fe (mg/l)	RIVER FLOW (cfs)
4/8/84	23.9	18.2 (4/6/84)	210,052 (4/7/84-peak) 127,840 (4/8/84)
6/24/84	13.7	7.82 (6/22/84)	16,845 (6/20/84-peak) 7,204 (6/24/84)
8/19/84	31.9	16.2 (8/17/84)	19,494 (8/16/84-peak) 9,888 (8/19/84)

Using the appropriate water quality model presented in page 3-19 of the Pa. DER's NPDES Technical Guidance Manual, calculate the maximum blowdown total iron concentrations which will cause a measurable change in the downstream river iron concentrations.

$$Csw = \frac{(DR)(Cw)}{1+(DR)} + \frac{Cs}{1+(DR)}$$

Assume: River flow = 7000 cfs (minimum river flow above when high river iron contributed to NPDES violations)

Dilution Ratio (DR) = $\frac{14.4 \text{ MGD}}{4473 \text{ MGD}}$ (Blowdown Flow) (River flow of 7000 cfs less SSES intake of 50 MGD)

Ambient iron (Cs) = 2.67 mg/l (from Ichthyological Associates, Inc. 1973-1983 data)

Cw = Blowdown iron concentration
Csw = Resultant river iron concentration

Inserting these values into the above equation:

Cw (mg/l)	Csw (mg/l)	Increase in Csw from Ambient
2.67	2.67	0
10	2.694	0.024
20	2.726	0.056
30	2.752	0.088
40	2.790	0.120*

*Thus, even at a blowdown iron concentration of 40 mg/l, the downstream river iron concentration does not change measurably (by 0.131 mg/l as defined by Pa. DER) at a riverflow of 7000 cfs.

ATTACHMENT 3

Radwaste Discharge Quality - Selected Sample Data

DATE	pH	TURBIDITY (NTU)	TOC (ppm)	TSS (ppb)
1-17-84	5.99	2.20	1.043	0.175
1-20-84	5.97	0.08	1.293	<0.01
1-31-84	6.12	0.15	0.43	<0.01
2-3-84	5.92	0.14	1.56	<0.01
2-8-84	6.60	0.10	0.543	<0.01
3-5-84	6.84	0.20	0.209	<0.01
3-13-84	5.92	0.06	0.179	<0.01
5-10-84	6.16	0.10	0.940	<0.01
5-12-84	6.23	0.10	0.305	<0.01
6-7-84	6.77	0.25	0.351	<0.01
6-24-84	5.96	0.15	0.184	<0.01
7-6-84	5.87	0.40	0.782	0.025
7-7-84	6.53	12.00	3.35	75.00
7-29-84	5.67	0.25	0.574	0.01
8-4-84	5.90	0.18	0.200	<0.01
8-10-84	6.85	0.40	1.870	0.10
9-6-84	6.03	2.30	0.551	0.25
9-12-84	6.13	0.45	0.651	0.75
10-18-84	6.65	1.50	0.296	0.10
10-31-84	5.92	4.50	0.942	1.00

ATTACHMENT 4

REFERENCES

(1) Bradford, A., J. Miller, and K. Buss 1966. Bioassays on eggs and larval stages of American shad Alosa sapidissima, p. 52-60. In suitability of the Susquehanna River for restoration of shad. U.S. Dept. Int. (et al), Wash. DC., 292-9610; 68-5.

(2) Ellis, M. 1937. Detection and measurement of stream pollution. Bur. Fish. Bull. 48:365-437.

(3) Pa. DER Bureau of Water Quality Management. Technical Guidance for the Development and Specification of Effluent Limitations and Other Conditions in NPDES Permits. August 1983.

(4) Gàle, W. F., T. V. Jacobsen, and K. E. Smith. 1976. Iron and Its Role in a River Polluted by Mine Effluents. Proceedings of the PA Academy of Science. 50:182-195.

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