

Docket No. 50-286
IPN-97-004
Enclosure I
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SERVICE WATER IMPROVEMENT PLAN

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SERVICE WATER SYSTEM IMPROVEMENT PLAN

IDSE-SIP-96-005, Rev. 1

ACTS #19245

November 20, 1996

PURPOSE:

The purpose of this plan is to identify actions being taken by the New York Power Authority to improve the reliability of the plant service water system. The Individual Plant Examination (IPE) study found that improvements to the service water system would reduce risk of core damage by over 5%, the seventh highest percentage of all plant systems. In addition, the effect of doubling the unavailability of this system would increase the risk of core damage by almost 5%, the sixth highest system in the station. Therefore, the development of a plan to properly upkeep and improve upon this system would be most beneficial to the safe operation of the plant.

This revision will also be a consolidation of the various action plans that were developed separately to deal with Maintenance Rule concerns and issues raised by Generic Letter 89-13 and subsequent meetings on improving the overall condition of the service water system. In this way, one unified action plan can be followed by anyone interested in the status of all of the ongoing efforts and improvements to the service water system.

Note that this action plan will **not** be tracking normal corrective maintenance activities for the service water system, nor its preventive maintenance cycles. It will **not** track those work packages that will require a minimal amount of engineering, such as a DC package to replace an obsolete or unavailable model valve.

REFERENCES:

1. IDSE-APL-96-015, Revision 1 (ACTS 18446)
2. IDSE-APL-96-022, Revision 0 (ACTS 19246)
3. IDSE-SIP-96-005, Revision 0
4. Generic Letter 89-13, dated July 18, 1989
5. NRC Letter TAC M74003, dated July 18, 1989
6. Letter IPN-90-004, dated February 6, 1990
7. Supplement 1 to Generic Letter 89-13, dated April 4, 1990
8. Letter IPN-92-040, dated September 9, 1992
9. NRC Letter TAC M74016, dated September 30, 1992
10. IP3 Design Basis Licensing Database: Log items 90-013A through L, 92-052, and 92-061-A, B, &C
11. Enercon Services, Inc., "Assessment of IP3 Service Water System Procedures and Training NYPI-PR-01 Final Report", dated March 15, 1991
12. Administrative Procedure AP-58, Revision 1
13. System Engineering Procedure TSP-048, Revision 1
14. System Engineering Procedure TSP-043, Revision 3

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15. Specification 9321-05-248-35, up to and including Addendum H
16. Operations Procedure SOP-RW-5, Revision 18
17. SOR 93-332
18. SOR 93-573
19. Deficiency Event Report DER 94-0385
20. Deficiency Event Report DER 95-1889
21. IP3-RPT-SWS-01927, Rev. 0, "Maintenance Rule Basis Document for System F44-0151 Service Water System"
22. Memo IP-DSE-96-190, with attached notes of meeting, dated October 21, 1996
23. Memo from J. Lafferty to J. Deroy, subject Service Water Repair Team, undated
24. IP3 SWS: Experience & Prognosis & Plans

STATUS:

A. System Condition Strengths

Biofouling and Tube Plugging Prevention

1. NYPA inspects the service water pump intake bay during refueling outages.
2. NYPA monitors heat exchanger condition through aggressive cleaning of its cooling tubes through its Preventive Maintenance program, as well as examine tubing condition through its eddy current testing program.
3. NYPA continuously chlorinates its service water system to prevent biofouling.
4. NYPA performs weekly flow tests on its Emergency Diesel Generator (EDG) coolers (3PT-W1) to ensure that no plugging has occurred in these tubes.
5. NYPA has developed an equipment layup program for its heat exchangers to minimize corrosion (OD-14).

Test Program to Assess Heat Exchanger Capability

1. Aggressive cleaning of heat exchangers with provision to increase and decrease frequency based on findings (multiple maintenance procedures).
2. Pilot test program showing that under worst case conditions (i.e., just prior to semi-annual cleaning), EDG lube oil and jacket water coolers are still capable of handling their design heat loads (ENG-487F).
3. Pilot test program showing that under worst case condition (i.e., fifteen years of operation without tube side cleaning), containment recirculation fan (CRF) is still capable of removing its design heat load (ENG-486F).

Establishment of a Routine Inspection and Maintenance Program to Ensure SWS Reliability

1. Revised of TSP-048 to incorporate field experiences with areas most susceptible to silting and corrosion and targeting areas for investigation and trending.

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2. Bio-boxes installed in conventional chemistry (SWAP) lab and in control room air conditioning (CRAC) room to monitor presence of zebra mussels in SWS. Biofouling plates installed in front of plant intake are monitored monthly.
3. Availability of Zebra Mussel Task Force to respond to imminent threat of zebra mussels to service water system at Indian Point 3.

Confirm that SWS is Operating in Accordance with Design and Licensing Bases

1. Design Basis Document has been established. Revision 1 was approved May 19, 1995.
2. A hydraulic model has been developed to compute the flows of service water through various parts of the system.

Confirm that Training, Maintenance, Operating and Emergency Procedures are Adequate

1. The Service Water System is considered a Risk Significant system and is included in the plant Maintenance Rule program.
2. Operating procedures have been established for the service water system and are constantly updated by plant staff in response to feedback from operating crews.
3. Operations staff are qualified on operations and emergency procedures on an ongoing basis.

B. System Condition Problem Areas

1. Small bore piping and valves are in poor condition, as borne out by recent inspections.
2. Coating and insulation of the service water piping is poor and haphazard (e.g., the use of fiberglass on outdoor installations).
3. Replacements of system hardware difficult due to increasing obsolescence.
4. Increasing need for more corrosion/biofouling monitoring.

C. Maintenance Rule Status vs. Performance Criteria

1. *Maintenance Preventable Functional Failures (MPFFs) ≤ 2 per cycle:* As of the third quarter, 1996 reporting period the service water system has 3 MPFFs for the cycle, which causes the service water system to be in (a)(1) status.
2. *No Repeat MPFFs.* The service water system is currently in (a)(1) status due to recurring failures of the auto strainer backwash valves.
3. *3.0% max. unavailability of each of the six main service water pumps.* As of the third quarter, 1996, all six main service water pumps have met this goal.

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ACTIONS:

A. Improvement of System Condition

1. Identify valves which should be replaced to maximize service water system reliability.
Responsible Person: P. Zellmer **Due Date:** Completed
Completion Document: Printout of modifications w. affected valves (see A.19)
2. Protect the service water system pipe installed by completion of outstanding work requests for this problem.
Responsible Person: A. Bortz **Due Date:** 12/31/96
Tracking Items: WR 96-00003-05 (completed), WRs 96-00006-44, -45, -46, -47, -55
3. Provide written report to docket SWS replacement plan to NRC.
Responsible Person: J. Lafferty **Due Date:** 12/31/96
Tracking Item: IDSE-SIP-96-005
4. Provide engineering package for replacement of seal oil cooler service water piping.
Responsible Person: T. Schaefer **Due Date:** 1/4/97 (both)
Tracking Items: WRs 96-03539-00, 96-03539-01
5. Provide engineering package for replacement of CRAC service water pipe.
Responsible Person: M. Pactong **Due Date:** 1/16/97
Tracking Item: WR 95-01994-00
6. Provide engineering package for replacement of CRAC unit condensers.
Responsible Person: J. Bubniak **Due Date:** 1/16/97
Tracking Item: WR 95-03752-00
7. Provide engineering package for replacement of exciter cooler isolation valves.
Responsible Person: T. Czerniewski **Due Date:** 1/20/96
Tracking Items: WR 96-03461-49 (ACTS 18751), WR 96-03005-00 (work)
8. Prepare a report consolidating and summarizing results of failure studies and present recommendations for service water improvements.
Responsible Person: D. Werder (MPR), w. W. Spataro consulting
Due Date: 2/1/97 **Tracking Item:** IDSE-SIP-96-005

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9. Provide engineering package for replacement of service water header to SWAP lab, including header isolation valve SWT-73.
Responsible Person: M. Pactong **Due Date:** 2/3/97
Tracking Item: WR 96-05068-01
10. Provide engineering package for replacement of Fan Cooler Unit (FCU) motor cooler return pipe.
Responsible Person: R. Lee **Due Date:** 2/15/97
Tracking Item: WR 95-04997-00
11. Provide engineering package for replacement of FCU cooling coil inlet flanges.
Responsible Person: M. Pactong **Due Date:** 2/15/97
Tracking Item: WR 95-00278-18
12. Install MMP 95-3-241 SWS, CRAC piping replacement.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Item: WR 95-01994-01
13. Install DC 95-3-129 SWS, CRAC condenser replacement.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Item: WR 95-03752-xx
14. Install DC 95-3-303 SWS, FCU motor cooler return piping replacement.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Item: WR 95-04997-01
15. Install MMP 96-3-212 SWS, FCU flanged connections replacement.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Item: WR 95-00278-21
16. Install DC 96-3-190 SWS, DC 96-3-191 SWS, seal oil coolers SW valve & pipe replacement.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Items: WR 96-03539-05, 96-03539-04
17. Install DC 96-3-179 SWS, exciter cooler valve replacement.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Items: WRs 96-03493-00 (SWT-25-1), 96-03499-01 (SWT-25-2), 96-03005-01 (SWT-25-3), 96-03503-00 (SWT-25-4), 96-03005-04 thru -08 inclusive (SWT-26-1 thru -4)
18. Install DC 96-3-339 SWS, SWAP lab header and SWT-73 replacements.
Responsible Person: N. Nilsen **Due Date:** End of R09
Tracking Items: WR 95-05068-02 (piping), 95-05068-05 (SWT-73)

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19. Provide engineering to replace following portions of service water system during R09 or shortly after R09:
- * Main service water pump backwash piping (WR 96-07499-00)
 - * IACC supply/return piping (WR 96-07500-00)
 - * Circulating Water Pump seal/lube water piping/valves (WR 96-07504-00)
 - * R16 A/B piping/valve replacement (PID 59646)
 - * Backup service water pump backwash piping (WR 96-07659-00)
 - * Replacement of drain lines 470 & 471 (WR 96-08018-00)
- Responsible Person:** J. Bubniak, w. F. Gilbert (Yankee Atomic)
Due Date: Prior to start of R09 **Tracking Item:** IDSE-SIP-96-005
20. Install the following portions of the service water system during R09:
- * DC 96-3-507 SWS: Main service water pump backwash piping (WR 96-07499-01)
 - * DC 96-3-504 SWS: IACC supply/return piping (WR 96-07500-01)
 - * R16 A/B piping/valve replacement (PID 59646)
 - * Replacement of drain lines 470 & 471 (WR 96-08018-01)
- Responsible Person:** N. Nilsen, w. H. Safar (NPS)
Due Date: End of R09 **Tracking Item:** IDSE-SIP-96-005
21. Provide engineering to replace following portions of service water system during R10:
- * Isophase bus duct coolers supply/return piping (WR 96-07501-00)
 - * Exciter cooler piping/valves (WR 96-07502-00)
 - * Main Boiler Feed Pump lube oil cooler piping/valves (WR 96-07503-00)
 - * TCV-1104/TCV-1105 pipe replacement (WR 96-07505-00)
- Responsible Person:** J. Bubniak, w. F. Gilbert (Yankee Atomic)
Due Date: Prior to start of R10 **Tracking Item:** IDSE-SIP-96-005
22. Install the following portions of the service water system by the start of refueling outage R10:
- * Backup service water pump backwash piping (WR 96-07659-01)
- Responsible Person:** N. Nilsen, w. H. Safar (NPS)
Due Date: Prior to start of R10 **Tracking Item:** IDSE-SIP-96-005

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23. Install or complete the installation of the following portions of the service water system during R10:
- * DC 96-3-508 SWS: Isophase bus duct coolers supply/return piping (WR 96-07501-01)
 - * DC 96-3-506 SWS: Exciter cooler piping/valves (WR 96-07502-01)
 - * DC 96-3-509 SWS: Main Boiler Feed Pump lube oil cooler piping/valves (WR 96-07503-01)
 - * DC 96-3-510 SWS: Circulating Water Pump seal/lube water piping/valves (WR 96-07504-01)
 - * DC 96-3-505 SWS: TCV-1104/TCV-1105 pipe replacement (WR 96-07505-01)

Responsible Person: N. Nilsen, w. H. Safar (NPS)

Due Date: End of R10

Tracking Item: IDSE-SIP-96-005

24. Service Water Project Manager to coordinate replacement of service water piping over next two to three outages, including materials procurement, engineering, and installation.

Responsible Person: T. Cole

Due Date: R10+

Tracking Item: IDSE-SIP-96-005

B. Installation of Upgrades to Service Water System

1. Provide engineering package for reduction of instrument air (IA) failures to the FCU temperature control valves (TCVs).
Responsible Person: M. Pactong
Tracking Item: WR 95-03321-00
Due Date: 2/15/97
2. Provide engineering package for changeout and upgrade of the hydrogen coolers in the main turbine generator.
Responsible Person: R. Lee
Tracking Item: WR 96-00186-00
Due Date: 2/17/97
3. Install DC 96-3-177 SWS, flexible IA connections to TCV actuators.
Responsible Person: A. Vitale
Tracking Item: WR 95-03321-01
Due Date: 3/15/97
4. Install MMP 96-3-178 SWS, hydrogen cooler upgrade.
Responsible Person: G. Kazakias
Tracking Item: WR 96-00186-01
Due Date: End of R09

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C. Continue/Improve Corrosion/Biofouling Monitoring of Service Water System

1. Determine method of ensuring that Chemistry department personnel are contacted whenever service water system is opened to ensure that a swab sample can be taken to check for microbes.
Responsible Person: J. Kristensen **Due Date:** Completed
Completion Document: Memo IP-CHM-96-122, dated November 6, 1996
2. Evaluate internal inspection points and the need to install manways.
Responsible Persons: T. Moran/J. Bubniak **Due Date:** 1/3/97
Tracking Item: IDSE-SIP-96-005
3. Investigate industry experience with coupon testing for corrosion monitoring.
Responsible Person: T. Moran **Due Date:** 1/3/97
Tracking Item: IDSE-SIP-96-005
4. Begin tracking of river water salinity and track frequency of SWS leaks in relation to salinity levels.
Responsible Persons: T. Moran/J. Kristensen **Due Date:** 12/20/96
Tracking Item: IDSE-SIP-96-005
5. Choose additional inspection points on large bore pipe prior to and during R09. Locations to include 10" headers to FCUs, supply headers to Closed Cooling Water (CCW) heat exchangers, and supply and return headers to EDG coolers.
Responsible Person: D. Pennino **Due Date:** 1/15/97
Tracking Item: IDSE-SIP-96-005
6. Complete qualification of comparative density radiograph (RT) examination technique for inspection of welds.
Responsible Person: P. Peloquin **Due Date:** 1/31/97
Tracking Item: QA Action Plan NDE-96-PLN-1 (ACTS 17839)
7. Identify contingency repair plans based on inspections locations.
Responsible Persons: J. Bubniak/J. T. Ownby **Due Date:** 2/5/97
Tracking Item: IDSE-SIP-96-005
8. Create contract for analysis of microfouling organisms collected from swab samples of service water system.
Responsible Person: H. Hartjen **Due Date:** 3/1/97
Tracking Item: IDSE-SIP-96-005
9. Develop a microbiologically-influenced corrosion (MIC) monitoring program.
Responsible Person: H. Hartjen **Due Date:** 3/15/97
Tracking Item: IDSE-SIP-96-005

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10. Review layup procedure OPS-SD-5 for extended outages and develop recommendations for improvements to service water equipment.
Responsible Persons: D. Lyon/T. Moran **Due Date:** 3/15/97
Tracking Item: IDSE-SIP-96-005
11. NYPA to inspect the SWS Intake Bay during refueling outage R09.
Responsible Persons: C. Bristol/D. Pennino **Due Date:** End of R09
Tracking Item: ACTS 10709
12. NYPA to inspect a minimum of 25 locations using NDE for service water piping during R09.
Responsible Person: D. Pennino **Due Date:** End of R09
Tracking Item: ACTS 10190/WR 96-03461-82
13. NYPA to check six small bore valves which had less than 15% margin using ultrasonic examination (UT) methods.
Responsible Person: D. Pennino **Due Date:** End of R09
Tracking Item: ACTS 14376
14. NYPA to check four welds on service water pump discharge lines for evidence of further degradation.
Responsible Person: D. Pennino **Due Date:** End of R09
Tracking Item: ACTS 21055 & 10190
15. Use boroscope and/or robotic crawler to examine interior of 24" SWS mains 408 and 409 upstream and downstream of valves SWN-98 and SWN-99.
Responsible Person: D. Pennino **Due Date:** End of R09
Tracking Item: ACTS 1122
16. Coordinate boroscope or robotic crawler examination of SWS supply pipe to EDG coolers upstream of SWN-29 and SWN-30.
Responsible Person: D. Pennino **Due Date:** End of R09
Tracking Item: IDSE-SIP-96-005
17. NYPA to check one weld on service water pump discharge lines for evidence of further degradation.
Responsible Person: D. Pennino **Due Date:** End of R10
Tracking Item: ACTS 21056

D. Completed and Continuing Testing Program Efforts

1. Complete testing of an EDG oil-to-water heat exchanger and water-to-water heat exchanger under ENG-487F under Pilot Testing Program for safety-related service water heat exchangers.
Responsible Person: T. Moran **Due Date:** Completed
Completion Document: ENG-487F, ACTS 6748 closed

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2. Complete testing of an FCU air-to-water heat exchanger under ENG-486F under Pilot Testing Program for safety-related service water heat exchangers.
Responsible Person: T. Moran **Due Date:** Completed
Completion Document: ENG-486F, ACTS 1490 closed
3. Summarize results of Pilot Testing Program, showing how results do or do not justify using aggressive cleaning in place of regular testing to demonstrate heat exchanger capability.
Responsible Person: T. Moran **Due Date:** 1/15/97
Tracking Item: IDSE-SIP-96-005
4. Update flow test for service water system to determine actual velocities in various regions of the SWS to better assist in allocation of corrosion monitoring resources.
Responsible Person: D. Pennino **Due Date:** 3/1/97
Tracking Item: IDSE-SIP-96-005
5. Perform flow test for service water system to capture flow data.
Responsible Person: D. Pennino **Due Date:** 6/1/97
Tracking Item: IDSE-SIP-96-005

E. Procedural/Design Basis Action Items

1. Evaluate service water system operation in modes of little or no load. Determine a method of operating the system without cross-tying the two headers.
Responsible Person: T. Moran **Due Date:** 12/24/96
Tracking Item: WR 95-06345-00
2. Review and approve latest version (8.9) of the Service Water System flow model.
Responsible Person: J. Gullick **Due Date:** 12/31/96
Tracking Item: ACTS 10042
3. Update SOP-RW-5 upon completion of work associated with WR 95-06345-00.
Responsible Person: M. Levitan **Due Date:** 1/6/97
Tracking Item: IDSE-SIP-96-005
4. Update service water system piping specification, including use of AL6XN and 254SMo materials.
Responsible Person: D. Pennino **Due Date:** 1/10/97
Tracking Item: IDSE-SIP-96-005
5. Update piping specification to ensure that foamglas or equivalent material is used in outdoor applications to prevent moisture from being trapped in insulation adjacent to pipe.
Responsible Person: D. Pennino **Due Date:** 1/10/97
Tracking Item: IDSE-SIP-96-005

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6. Develop welding procedure using 6% Mo stainless steel.
Responsible Persons: W. Spataro, w. assistance from N. Chapman (JAF)
Due Date: 1/10/97 **Tracking Item:** IDSE-SIP-96-005

F. Maintenance Rule Action Items

1. Review industry experience with this type of failure for lessons learned.
Responsible Person: T. Moran **Due Date:** 12/31/96
Tracking Item: IDSE-SIP-96-005
2. Analyze chronic operating problems with the backwash mode of the Zurn strainers.
Responsible Person: T. Moran **Due Date:** 1/31/97
Tracking Item: IDSE-SIP-96-005
3. Make recommendations for modifications and/or changes to plant PM program.
Responsible Person: T. Moran **Due Date:** 1/31/97
Tracking Item: IDSE-SIP-96-005
4. Monitor and trend failure-to-start DERs for Service Water Pumps for remainder of Cycle 9.
Responsible Person: T. Moran **Due Date:** 7/31/97
Tracking Item: IDSE-SIP-96-005