North Atlantic

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The Northeast Utilities System

June 6, 2001

NPDES Permit NH0020338
NYE-01009

Ref: NYE-99017, NYE-98012,
NYE-98021, NYE-98031
NYE-99017, NYE-00009

United States Environmental Protection Agency
Region I
Attn: Ira Leighton, Regional Administrator (acting)
c/o Shelley B. Puleo, Environmental Protection Specialist
Municipal Assistance Unit
Office of EcoSystem Protection
John F. Kennedy Federal Building
Boston, Massachusetts 02203-0001

Seabrook Station
Fifth Supplement to NPDES Permit Renewal Application

North Atlantic Energy Service Corporation (NAESCO) hereby submits, pursuant to 40 CFR 122.21(d), a fifth supplement to its April 23, 1998[1] application to renew National Pollutant Discharge Elimination System (NPDES) Permit No. NH0020338 for Seabrook Station, a nuclear electric generating facility located in Seabrook, NH.

At Seabrook Station, plant discharges to the ocean environment are through the cooling water system discharge transition structure (NPDES Outfall 001). A number of internal water streams that flow to Outfall 001 are also identified and controlled in the permit. The purpose of this supplement is to request changes to the Outfall 001 requirements as well as the internal water streams.

This supplement makes the following changes to the April 23, 1998 NPDES Permit Renewal Application:

1. An increase to the Discharge Limit for Methoxypropylamine (MPA) as a chemical in the discharge from Outfall 001 (Circulating Water System).

2. Addition of EVAC Molluscicide as a chemical in the discharge from Outfall 001 (Circulating Water System).

[1] North Atlantic Energy Service Corporation letter NYE-98012, dated April 23, 1998, "NPDES Permit Renewal Application" Mr. Ted C. Feigenbaum (North Atlantic) to Mr. John P. DeVillars.

C001

3. Addition of Dynacool 1385 Scale Inhibitor as a chemical in the discharge from Outfall 001 (Circulating Water System).

4. An increase to the Circulating Water System (CWS) discharge delta-temperature to support CWS Pump corrective or preventative maintenance.

5. An alternate to the Biopanel Monitoring Program as an element of the Chlorine Minimization Program.

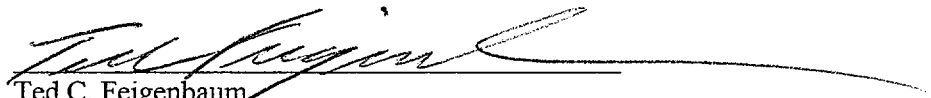
6. Addition of a Steam Generator antiscalant as a chemical in the discharge from Outfall 001 (Circulating Water System).

Enclosure 1 contains a description of the changes in the NPDES permit application being submitted in Supplement 5. Enclosure 2 provides revised pages for insertion into the original Seabrook Station NPDES Permit Renewal Application.

If you have any questions, please call John Hart, Manager of Environmental, Government and Owner Relations at (603) 773-7762.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.



Ted C. Feigenbaum
Executive Vice President and
Chief Nuclear Officer

Certification pursuant to 40 CFR 122.22(d)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Ted C. Feigenbaum
Executive Vice President and Chief Nuclear Officer

June 6, 2001
Date

STATE OF NEW HAMPSHIRE

Rockingham, ss.

Then personally appeared before me, the above-named Ted C. Feigenbaum, North Atlantic Energy Service Corporation, that he is duly authorized to execute and file the foregoing information in the name and on the behalf of North Atlantic Energy Service Corporation and that the statements therein are true to the best of his knowledge and belief.

Marilyn Sullivan, Notary Public
My Commission Expires: March 19, 2002

June 6, 2001
Date

cc:

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ENCLOSURE 1 TO NYE-01009

Description and Discussion of Changes Requested in Seabrook Station's NPDES Permit in Supplement 5 to the Renewal Application

Description and Discussion of Changes Requested in Seabrook Station's NPDES Permit in Supplement 5 to the Renewal Application

This supplement makes the following changes to the April 23, 1998 NPDES Permit Renewal Application and the NPDES Permit Renewal Application Supplements referred to below:

1. An increase to the Discharge Limit for Methoxypropylamine (MPA) as a chemical in the discharge from Outfall 001 (Circulating Water System).

2. Addition of EVAC Molluscicide as a chemical in the discharge from Outfall 001 (Circulating Water System).

3. Addition of Dynacool 1385 Scale Inhibitor as a chemical in the discharge from Outfall 001 (Circulating Water System).

4. An increase to the Circulating Water System (CWS) discharge delta-temperature to support CWS Pump corrective or preventative maintenance.

5. An alternate to the Biopanel Monitoring Monitoring Program as an element of the Chlorine Minimization Program.

6. Addition of a Steam Generator antiscalant as a chemical in the discharge from Outfall 001 (Circulating Water System).

1. Proposed Change to the Discharge Limit for Methoxypropylamine (MPA)

Outfall 001 (Circulating Water System Discharge) and its associated discharge limitations and monitoring requirements are specified in the current NPDES Permit. The NPDES Permit renewal application specifically describes the sources of wastewater and potential chemicals in the wastewater streams that discharge to Outfall 001. An increase in the current discharge limit of 0.5 ppm to 5.0 ppm is proposed for Methoxypropylamine (MPA) when the Condensate Polishing System (CPS) is in operation. When the CPS is not operating the discharge concentration of MPA would be limited to 0.5 ppm (the current NPDES Permit limit). The purpose of this increased MPA discharge limit is to support the operation of the CPS which is scheduled to be operational after completion of Seabrook Station's eighth refueling outage in June 2002.

The CPS will be placed in service to expedite secondary system cleanup as necessary after a refueling or maintenance outage. The CPS would also be operated for short periods during the year in order to support operator training on the system. Additionally, if a small condenser tube leak (approximately 0.01 gallons per minute or 14 gallons per day) occurs during plant operation causing seawater leakage into the plant's secondary system, the CPS will be placed in service to remove the seawater contaminants and allow continued full power operation while preparations are being made to isolate the affected condenser water box, locate and stop the leak. The isolation of a condenser water box to stop a condenser tube leak requires that the plant power level be reduced to approximately 65 percent power which represents a reduction of about 350-400 megawatts of electrical generating capacity. The CPS will provide Seabrook Station the ability, for a small condenser leak, to delay this power reduction while resources are mobilized to address the leak. The situation could also arise that a condenser leak occurs concurrent with

a very high or critical regional energy demand in which case the CPS would be required to operate for an extended period of time.

It is estimated that the CPS would be operated up to three weeks each year, on average, to expedite secondary system purification as necessary after a refueling or maintenance outage as well as to support operator training time. It is expected that during non-refueling outage years with no condenser leaks, the CPS would be maintained in a standby condition and not be operated except to support operator training. Refueling outages are generally scheduled in the spring and fall at about 18 month intervals, thus two refueling outages occur in a three-year period. Station personnel will also expeditiously place the CPS into service upon indication of a small condenser tube leak occurring during plant operation. The CPS will be operated while resources are mobilized. The CPS would be stopped while work is proceeding in the condenser water box and returned to operation to remove seawater contaminants when the condenser section is returned to service. In the event that such a condenser leak occurred during non-critical electrical demand periods the extent of operational time for the CPS would normally be limited to a few days and within the estimated three week per year average. In the event that a condenser leak were to occur concurrent with the summer or winter peak electrical demand period, it is possible that the CPS would be operated for up to two months to avoid reducing the station's generating capacity during a critical regional electricity demand period.

Seabrook Station experienced a small condenser tube sheet leak in March 2001. This event required that Seabrook Station operate at about 65 percent power for about ten days while the leak was identified and isolated. The CPS would have shortened this reduced power period by allowing planning and resource mobilization to proceed while maintaining the station at 100 percent power. Absent the CPS, the station was immediately (upon detecting a condenser leak) forced into the isolation of one of the three condensers and power reduction by about one-third of the station capacity. As initial efforts to locate the leak in the isolated condenser were not successful, the other two condenser sections were also isolated (one-at-a-time) to accommodate leak detection. If a CPS had been available at the time, the plant could have operated at full power while preparations were made to work in these condenser sections.

The first Supplement to Seabrook Station's NPDES Permit Renewal Application[2] requested an increase in the MPA discharge limit from 0.5 ppm to 2.5 ppm. As a result of our recent experience and further evaluations, North Atlantic is now requesting approval for an increase in the MPA limit to 5 ppm to improve the operational potential of the Condensate Polisher System.

The first Supplement to NPDES Permit Renewal Application provided details of the time required to regenerate demineralizer resins and to discharge the regenerant wastewater under 0.5 ppm and 2.5 ppm permit limit assumptions. The regeneration and discharge times provided in the supplement did not account for other time factors in these evolutions such as acid or caustic availability, or plant operators and chemistry technicians performing valve lineup and chemical analyses, in support of the regeneration evolutions. To account for these additional time requirements, North Atlantic is proposing a discharge limit of 5.0 ppm. The proposed MPA limit is fully supported by the toxicity data for MPA as discussed below.

The extensive toxicity testing information provided in the first NPDES Permit renewal supplement demonstrates that an MPA discharge concentration of 5 ppm would not impact the aquatic environment. For instance the NOAEL (No Observed Acute Effects Level) for mysid shrimp, the most sensitive marine species tested, is 75 ppm which is 15 times higher than the proposed short-duration MPA discharge concentration of 5 ppm. In addition, the rapid dilution of 10:1 from Seabrook Station diffuser nozzles provides an even greater margin between the proposed MPA discharge limit and the NOAEL for mysid shrimp. Toxicity test data for a freshwater invertebrate was also provided (No Observable Effects

Concentration for reproduction for *Ceriodaphnia dubia* was 6.25 ppm). In order to include saltwater toxicty data for invertebrate reproduction, North Atlantic is also planning to provide additional marine toxicity testing on MPA using the Sea Urchin Fertilization Test.

Provided as Enclosure 3 is a revision to the attachment provided in the First Supplement describing the originally proposed MPA discharge concentration increase from 0.5 ppm to 2.5 ppm. This revised description reflects the newly proposed increase in MPA discharge concentration of 5 ppm as well as some refinements to the regeneration and discharge time information.

2. Use of EVAC Molluscicide to supplement the application of sodium hypochlorite (chlorine) to control biofouling in the Circulating Water System (Outfall 001).

Outfall 001 (Circulating Water System Discharge) and its associated discharge limitations and monitoring requirements are specified in the current NPDES Permit. The NPDES Permit renewal application specifically describes the sources and potential chemicals in the wastewater streams that discharge to Outfall 001. An additional input to the Circulating Water System discharge is being requested in the form of the Molluscicide, EVAC.

North Atlantic's first supplement to the NPDES Permit Renewal Application[2] provided detailed information on the possible use of EVAC to supplement the application of sodium hypochlorite (chlorine) to control biofouling in the Circulating Water System. The results of an EVAC Feasibility Study[3] performed in September 1998, following the submital of the first permit application supplement, indicate that EVAC will be an effective supplement to the use of sodium hypochlorite in controlling macrofouling (mussels, barnacles, etc.) in the Circulating Water System intake. The introduction of EVAC into the Seabrook Station biofouling control regime should result in an annual reduction in sodium hypochlorite consumption ranging from 10% to 20% or a reduction of about 3,000 to 6,000 pounds at Outfall 001 (ocean discharge). Estimates of actual reductions in sodium hypochlorite discharges will be specified in the annual Chlorine Minimization Report.

Application of EVAC in Seabrook Station's Circulating Water System is expected to be required twice each year (late spring and late summer). The expected application dosage would be about 4.3 ppm EVAC. The total application would occur over a period of about 36 and 48 hours. It is estimated that the discharge concentration would be about 3.0 ppm EVAC. The 10:1 dilution provided by the discharge diffuser nozzles would further reduce the concentration of EVAC to about 0.3 ppm a short distance from the discharge.

EVAC has been used effectively since 1998 to control zebra mussels at the Nine Mile Point Nuclear Plant on Lake Ontario in New York. The manufacturer of EVAC, Cerexagri, Inc. and its distributor, Nalco Chemical Company, have previously provided a generic briefing on the use of EVAC to EPA Region I personnel.

[2] North Atlantic Energy Service Corporation letter NYE-98021, dated August 3, 1998, "Supplement to NPDES Permit Renewal Application," Mr. Ted C. Feigenbaum (North Atlantic) to Mr. John P. DeVillars

[3] North Atlantic Energy Service Corporation letter NYE-98037, dated November 25, 1998, "EVAC Molluscicide Feasibility Study Report," Mr. John B. Hart (North Atlantic) to Mr. Carl DeLoi (EPA)

A detailed response to the EPA's generic questions on EVAC was previously submitted to the EPA by EVAC's manufacturer, Cerexagri, Inc. (formerly Elf Atochem North America, Inc.).[4] A copy of the cover letter for this submittal is provided in Enclosure 4.

3. Addition of a sodium hypochlorite (chlorine) line antiscalant, Dynacool 1385 for for use in controlling the buildup of calcium carbonate in the Cooling System chlorination supply line.

Outfall 001 (Circulating Water System Discharge) and its associated discharge limitations and monitoring requirements are specified in the current NPDES Permit. The NPDES Permit renewal application specifically describes the sources and potential chemicals in the wastewater streams that discharge to Outfall 001. An additional input to the Circulating Water System discharge is being requested in the form of Dynacool 1385 Scale Inhibitor. The product would be used to prevent the buildup of calcium carbonate scale inside Seabrook Station's three mile long chlorination line which is integral to the Cooling Water Intake Tunnel. In 1997 the scale buildup was treated with acid (see below). This scale is produced in the chlorination line as a result of the chemical reaction of sodium hypochlorite and seawater which are mixed in the chlorination line. Seabrook Station's initial NPDES Permit Renewal Application identified ThruGUARD 300 as an additive under consideration for use in the control of calcium carbonate scale inside the chlorination line.

Dynacool 1385 Scale Inhibitor employs the same active ingredients (potassium phosphonate and acrylic polymer) as ThruGUARD 300, but is a more concentrated product. About 10 gallons of the Dynacool 1385 Scale Inhibitor would be injected into the chlorination line each day. Chlorination of the intake tunnel is typically performed during the period from early March to early December, thus Dynacool 1385 would only be used during this period. The expected discharge concentration would be less than 0.1 mg/L which is well below the level that exhibit toxic effects to the marine species specified below.

The following marine toxicity testing information is provided from the Material Safety Data Sheet (MSDS) for Dynacool 1385 Scale Inhibitor. A copy of the MSDS is provided as Enclosure 5.

Silverside (Menidia beryllina)

96 hour static acute LC50 > 1,000 mg/L
96 hour no observed effect concentration is 1,000 mg/L

Shrimp (Mysidopsis bahia)

96 hour static acute LC50 > 368 mg/L
96 hour no observed effect concentration is 158 mg/L

The alternative to using Dynacool 1385 Scale Inhibitor to remove the calcium carbonate scale would be to perform a chemical cleaning under the current provisions in the NPDES Permit (Outfall 026). Seabrook Station performed a chemical cleaning in the spring of 1997 and used about 4,000 gallons of hydrochloric acid to dissolve the calcium carbonate. Use of the scale inhibitor will avoid or postpone another chlorination line cleaning.

[4] Cerexagri, Inc. Letter dated March 6, 2001, EVAC Biocide (EPA Reg. No. 4581-380), Response to Jack Paar's Letter of August 20, 1998 and April 29, 1999," Christopher Davis (Cerexagri, Inc.) to Damien Houlihan (EPA).

4. Increased Circulating Water System (CWS) Discharge delta-temperature to support CWS Pump Corrective or Preventative Maintenance.

Outfall 001 (Circulating Water System Discharge) and its associated discharge limitations and monitoring requirements are specified in the current NPDES Permit. The NPDES Permit renewal application specifically describes the temperature limits applicable to Outfall 001. North Atlantic requests an increase in the Circulating Water System (CWS) discharge delta-temperature (ΔT) for up to 15 days each year when one of the three CWS pumps is out-of-service for corrective or preventative maintenance. In order to support this mode of operation North Atlantic is requesting an increase in Seabrook Station's NPDES Permit limits to 45 °F (average monthly) and 47 °F (daily maximum). The current CWS ΔT limits of 39 °F (average monthly) and 41 °F (daily maximum) will remain in effect at all other times of the year.

It is noted that evaluations supporting the increased CWS ΔT limits also included the additional heat rejection to the ocean associated with a future approximate six percent plant power uprate. The power uprate will involve an increase to the thermal output of the reactor that will translate to an increase in the electrical output of the plant. North Atlantic expects to submit an amendment to the Nuclear Regulatory Commission Operating License requesting this power uprate during the term of the next NPDES Permit.

Following EPA briefings in 2000 on an initial reduced cooling water flow proposal, Seabrook Station Engineering personnel evaluated the plant transient effects associated with a CWS pump shutdown with two CWS pumps in operation and with the plant operating at 100 percent power. Under these conditions the analysis demonstrated that an automatic shutdown of the reactor would occur (this is not postulated if one of three operating pumps experience a shutdown). It is also postulated that potential condenser damage (i.e. tube or tube sheet leakage) could be caused by this transient resulting in leaks in some of the thousands of heat exchanger tubes in the condenser or the condenser tube sheet that would result in seawater inleakage. In light of the possibility of an automatic shutdown of the reactor and condenser damage North Atlantic has concluded that it will not pursue NPDES Permit approval for extended operation at reduced CWS flow.

North Atlantic is requesting an increase in the current NPDES Permit CWS ΔT limits to allow Seabrook Station to be operated at full power with a Circulating Water System Pump out-of-service for corrective or preventative maintenance. The duration of such maintenance is expected to be short thus minimizing the potential for an unplanned pump shutdown and associated plant transient. North Atlantic expects that the duration of such maintenance activities would not exceed 15 days per year. Recent operating experience supports the requested 15-day duration. An unplanned CWS pump shutdown occurred in May 2001 requiring Seabrook Station to operate at reduced power (95 percent) for 16 days in order to comply with the CWS ΔT limits, while the pump was repaired.

The proposed increase in CWS ΔT limits of 45 °F average monthly and 47 °F daily maximum will not result in an increase to the ocean water surface temperature above the NPDES Permit limit of 5 °F in the near-field mixing region, measured as a monthly average. The jet-mixing region is defined as the receiving waters within 300 feet of the submerged discharge diffuser in the direction of discharge. The resulting thermal plume during two CWS pump operation plus the power uprate condition is predicted to be slightly smaller and slightly warmer. The changes to the thermal plume during operations with two CWS pumps were evaluated using the EPA CORMIX2 Model along with other public analytical models. This evaluation also included the additional heat rejection to the ocean associated with the future plant power uprate.

Seabrook Station's NPDES Permit Part I.A.h. states, "the measurable thermal plumes at Seabrook Station shall: (a) not block zones of fish passage, (b) not interfere with spawning of indigenous populations, (c) not change the balanced indigenous populations of the receiving water and (d) not contact surrounding shorlines." The reduced CWS proposal is not expected to impact compliance with these NPDES Permit conditions. No environmental impacts are expected at the nearest intertidal area – the Inner and Outer Sunk Rocks – as the thermal plume will be slightly small, albeit slightly warmer than the current thermal plume. No environmental impacts have been detected from the current thermal plume to these intertidal areas after more than ten years of plant operation. Therefore, no environmental impacts are expected as a result of the reduced CWS flow proposal since the thermal plume will be no larger than the existing three-CWS pump plume.

The reduction in CWS flow will result in slightly lower entrainment of fish eggs and larvae. Since fish egg and larvae entrainment is highly variable during the year, this reduction is not quantifiable until the reduced flow period has occurred.

5. Alternate to Biopanel Monitoring Monitoring Program as an element of the Chlorine Minimization Program.

North Atlantic is proposing to eliminate the current Biofouling Panel Monitoring Program for detection of Circulating Water System macrofouling in favor of a Biofouling Monitoring Program that is intended to provide a more precise indication of macrofouling.

Seabrook Station's NPDES Permit Renewal Application proposed that the biological monitoring plates (biofouling panels) specified in Part I.A.2.h.1. of the NPDES Permit, be eliminated. It was proposed that the Circulating Water System (CWS) chlorination cycle would be based on condenser performance as an indicator of microfouling. Seabrook Station is modifying this request and is now proposing an improved alternative to the Biofouling Panel Monitoring Program.

The biofouling panels are an original component of the Chlorine Minimization Program and were intended to monitor macrofouling (settlement of mussels, barnacles etc.) in the intake portion of the Circulating Water System (CWS). The biofouling panels are plexiglass plates suspended in the forebays of the CWS and Service Water System Pumphouses. The panels are inspected for the presence of newly settled macrofouling organisms using a compound microscope. The inspection frequency is twice per month during the warmer water periods (April-November) when biofouling is greatest and monthly during colder water periods (December-March) when biofouling is lowest. After each inspection the panels are cleaned in order to provide a method for assessing the changes between inspections.

It was recently determined that the biofouling panels have not been an effective method of monitoring macrofouling. This is most likely because the biopanels monitor settlement of mussels and barnacles on a clean biopanel surface which is not representative of the concrete surfaces in the intake of the CWS and SWS which have an established biofilm that promotes settlement of macrofoulers. Biofouling is less likely on the biopanels since they are regularly cleaned in order to assess biofouling changes between inspections. As such, biopanels have provided misleading results in that they underestimate the level of fouling in the CWS and SWS.

North Atlantic is, therefore, proposing an improved Biofouling Monitoring Program. It is noted that condenser performance continues to be an effective indicator of microfouling (blue-green algae).

An alternative to the current the Biofouling Panel Monitoring Program was proven to be necessary based on Seabrook Station operating experience. The current program provided misleading information in October 1999 when no macrofouling was observed on the biopanels. This condition was the primary input in deciding to discontinue chlorination of the CWS intake tunnel in October 1999, more than two months earlier than it had been stopped in previous years. This extended chlorination outage coupled with resumption of CWS intake tunnel chlorination in early May, about two months later than normal (as a result of equipment problems), allowed a significant growth of mussels and barnacles in the CWS intake. This was evidenced by the daily accumulation of up to several cubic yards of mussel and barnacle shells in screen wash debris during the summer of 2000 as the die-off of these macrofouling organisms occurred.

North Atlantic is proposing to conduct Bivalve Larvae Monitoring as an alternative to the Biofouling Panel Monitoring Program. A targeted Bivalve Larvae Monitoring Program will collect samples in the vicinity of the offshore intakes and at the on-site entrainment sampling station. Chlorination of the CWS intake will be linked to the density of bivalve larvae in the water column so that chlorination will occur when bivalve larvae are available for settlement in the CWS.

Sampling will be performed weekly by Seabrook Station's Environmental Monitoring contractor, Normandeau Associates, from November through April at the intake (offshore) and on-site entrainment station in the CWS Pumphouse. Offshore samples will be taken using the same methods as for the current offshore and on-site Bivalve Larvae Monitoring Program. (It is noted that the current Bivalve Larvae Monitoring and Bivalve Larvae Entrainment Programs are not sufficient for this purpose because they begin in April and end in October of each year and thus don't coincide with the typical chlorination system outage period).

The density of bivalve larvae will be evaluated and a measure of fouling potential will be estimated in order to schedule the annual CWS tunnel chlorination outage. The goal of the program is to maximize the chlorination outage period in support of the Chlorine Minimization Program. Bivalve larvae are at their lowest levels (near zero) during the coldest ocean temperature periods when bivalve spawning is minimal. Macrofouling potential is also at its lowest level during this period.

Historically the chlorination outage period is from mid-January through early March based on the recommendation from the Seabrook Station Offsite Chlorine Minimization Study[5] and to a lesser extent, results obtained from the Biofouling Panel Monitoring Program. The data obtained from the proposed Biofouling Monitoring Program will be used to control and minimize the use of chlorine in the CWS and SWS.

6. Addition of a Steam Generator antiscalant chemical for use in controlling the buildup of scale.

Outfall 001 (Circulating Water System Discharge) and its associated discharge limitations and monitoring requirements are specified in the current NPDES Permit. The NPDES Permit renewal application specifically describes the sources and potential chemicals in the wastewater streams that discharge to Outfall 001. An additional input to the Circulating Water System discharge is being requested in the form of the discharge of a Steam Generator antiscalant, BetzDearborn DA6801. The product consists of poly acrylic acid and ethanolamine (already approved for discharge by Seabrook Station NPDES Permit). North Atlantic plans to apply this antiscalant in the feedwater to the plant's

[5] "Seabrook Station Offsite Chlorine Minimization Study – 1987," Normandeau Associates, Inc. dated July 1988.

steam generators at very low concentrations on a continuous basis. This antiscalant will be applied to the secondary-side of two steam generators in order to change the density and morphology of accumulated scale to assist in its subsequent mechanical removal during the plant's operating cycle. The scale is a combination of aluminum, iron, magnesium, calcium, silicates, carbonates and oxides. This continuous antiscalant application will increase the long-term integrity and longevity of Seabrook Station's steam generators.

The feedwater concentration of the antiscalant is expected to be about 1-10 parts per billion (ppb). The concentration at Outfall 001 (ocean discharge) is expected to be 0.007 ppb.

ENCLOSURE 2 TO NYE-01009

Supplement 5 Revised Pages for Insertion into the Seabrook Station NPDES Renewal Application

List of Revised Pages

Remove	**Insert**
Page 239 (supplement 3)	Page 239 (supplement 5)
Page 240	Page 240 (supplement 5) Page 240A (supplement 5)
Page 240	Page 241 (supplement 5)
Page 243	Page 243 (supplement 5)

~~c.~~ B. The following chemicals are approved for water discharge. These discharge levels may not be increased nor chemicals substituted without written approval by the Regional Administrator and the Director or their designees. The permittee must demonstrate that the aquatic toxicity of the proposed changes are equal to or less than approved chemicals herein listed.

Product	Calculated Maximum Discharge #001 Concentration, ppm	Plant Water System	
Hydrazine	0.5	Secondary Steam System	
Ammonia	0.5	Secondary Steam System	
Supp. 3 Boron	5	Primary System, Secondary Steam System	Supp. 3
Lithium Hydroxide	0.5	Primary System	
Ethylene Glycol	50	Exterior Heating/ Cooling System	
Propylene Glycol	50	Same as Ethylene Glycol	
Bulab 9328	0.4	Corrosion protection for fresh water systems	
Bulab 6002	20	Biocide in cooling tower	
Cat Floc TL	0.1	Liquid Radwaste System. To facilitate the removal materials made radioactive by neutron radiation in primary system	
Cat Floc L	0.1	Same as Cat Floc TL	
Nalcolyte 7134	0.1	Same as Cat Floc TL	
Sodium Nitrite	0.5	Heating/Cooling Systems	
Sodium Molybdate	0.5	Heating/Cooling Systems	
Sodium Silicate	5	Auxiliary Secondary System Scale Inhibitor	
Morpholine	0.1	Steam Generators	
Ethanolamine	0.5	Secondary Steam System	Supp. 3
~~Hyperspers AS 120~~	~~0.5~~	~~Anti-scalant~~	Supp. 3
~~Flocon~~	~~0.01~~	~~Sequestering Agent~~	Supp. 1
Methoxypropylamine (MPA) EVAC	0.5 ~~5.0~~ 5.0 *	Secondary Steam System Circulating Water System biofouling control	Supp. 5 Supp. 5

O. The permittee may propose to conduct feasibility studies involving new chemicals not currently approved for water discharge. Prior to the use of any such chemicals in a feasibility study, the permittee shall request approval from the Regional Administrator and Director with information regarding toxicity on aquatic organisms and concentration of the chemical in the discharge and duration of the discharge. Prior to full scale use of such chemicals, the permittee shall submit a report to the Regional Administrator and Director regarding discharge frequency and concentration

* 5.0 ppm discharge limit during operation of Condensate Polishing System (CPS)

001 A

2. During the period beginning the Effective Date and lasting through Expiration Date, the permittee is authorized to discharge from outfall(s) serial number(s) 001, Circulating Water System Discharge (A combination of all Seabrook Station waste water streams: Condenser Cooling Water, Service Water System, Liquid Waste Distillate, Steam Generator Blowdown, Cooling Tower Blowdown, Demineralizer Waste, Secondary Plant Leakage, ~~Treated Sanitary Wastes,~~ and Storm Water Runoff). Supp. 5

a. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Avg. Monthly	Max. Daily	Measurement Frequency	Sample Type
Flow, MGD	Report	Report	Continuous*	Estimate
Temperature Rise, (Delta-T), °F**	39	41	Hourly	Hourly Avg.
Temperature (Maximum), °F	Report	Report	Hourly	Hourly Avg.
Total Residual Oxidants (TRO), mg/l	0.15	0.20	1/day***	Grab
pH, s.u.	6.5	8.0	1/week***	Grab

* The flow rate may be estimated from pump capacity curves.

** Temperature Rise is the difference between the Discharge Temperature (Discharge Transition Structure) and Intake Temperature (Intake Transition Stricture). The intake and discharge temperatures will recorded by instruments or computers. The Temperature Rise and Maximum Temperature shall be calculated as a hourly average based upon at least twelve (12 times) per hour. These hourly average values will then be reported in the monthly DMRs. Relief from the delta-t monitoring requirement is provided for a period of up to 48 hours during non-power operations to facilitate maintenance of temperature monitoring equipment or other equipment sharing common power supplies. See Paragraph I.A.2.d. 11

*** Samples to be taken once per day at approximately the same time period. See Subparagraph "e" below for additional TRO requirements.

b. The pH of the discharge shall not be less than 6.5 standard units nor greater than 8.0 standard units or as naturally occurs in the receiving waters, Par. I.F.1.a. The pH of the marine waters at the Intake Transition Structure shall be considered as the receiving water pH for this permit.

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2. During the period beginning the Effective Date and lasting through Expiration Date, the permittee is authorized to discharge from outfall(s) serial number(s) 001, Circulating Water System Discharge (A combination of all Seabrook Station waste water streams: Condenser Cooling Water, Service Water System, Liquid Waste Distillate, Steam Generator Blowdown, Cooling Tower Blowdown, Demineralizer Waste, Secondary Plant Leakage, ~~Treated Sanitary Wastes,~~ and Storm Water Runoff). during operation with two circulating water system pumps to support CWS pump corrective or preventive maintenance. Supp. 5

a. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Avg. Monthly	Max. Daily	Measurement Frequency	Sample Type
Flow, MGD	Report	Report	Continuous*	Estimate
Temperature Rise, (Delta-T), °F**	~~39~~ 4	41	Hourly	Hourly Avg.
Temperature (Maximum), °F	Report	Report	Hourly	Hourly Avg.
Total Residual Oxidants (TRO), mg/l	0.15	0.20	1/day***	Grab
pH, s.u.	6.5	8.0	1/week***	Grab

* The flow rate may be estimated from pump capacity curves.

** Temperature Rise is the difference between the Discharge Temperature (Discharge Transition Structure) and Intake Temperature (Intake Transition Stricture). The intake and discharge temperatures will recorded by instruments or computers. The Temperature Rise and Maximum Temperature shall be calculated as a hourly average based upon at least twelve (12 times) per hour. These hourly average values will then be reported in the monthly DMRs. Relief from the delta-t monitoring requirement is provided for a period of up to 48 hours during non-power operations to facilitate maintenance of temperature monitoring equipment or other equipment sharing common power supplies. See Paragraph I.A.2.d. 11

*** Samples to be taken once per day at approximately the same time period. See Subparagraph "e" below for additional TRO requirements.

b. The pH of the discharge shall not be less than 6.5 standard units nor greater than 8.0 standard units or as naturally occurs in the receiving waters, Par. I.F.1.a. The pH of the marine waters at the Intake Transition Structure shall be considered as the receiving water pH for this permit.

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c. There shall be no visible discharge of oil sheen, foam, or floating solids in the vicinity of the diffuser ports. Naturally occurring sea foam in the discharge transition structure is allowed. Except in cases of condenser leak seeking and sealing, use of a reasonable amount of biodegradable and non-toxic material may be used to the extent necessary to locate and/or seal any condenser leak. The permittee shall report in the appropriate monthly DMR the occasions wherein this material was used giving the date(s) of the incident, the type of materials used and the amount of materials discharged.

d. The temperature of the discharge at Discharge Transition Structure shall not exceed an Average Monthly of 39 ^{o}F or Maximum Daily of 41 ^{o}F rise over the temperature of the intake **except for periods of up to 15 days each year when a Circulating Water System Pump is shutdown for preventive or corrective maintenance when the temperature rise shall not exceed an Average Monthly of 45 ^{o}F or Maximum Daily of 47 ^{o}F.** The Monthly Average and Maximum Daily temperatures shall be reported without limit. The temperatures shall be based upon a one-hour average temperature at the intake and discharge. During non-power operations, when the nuclear reactor is shutdown, the plant heat load is minimal. Relief from the delta-t monitoring requirement is provided for a period of up to 48 hours to facilitate maintenance on temperature monitoring equipment or other equipment sharing common power supplies. Supp. 5

e. The Total Residual Oxidant (TRO) concentration shall not exceed 0.20 mg/l at any time the Discharge Transition Structure.

f. Total Residual Oxidant Concentration shall be measured in the Discharge Transition Structure.

Total Residual Oxidants shall be tested using the Amperometric Titration Method, Method 4500-CL E in Standard Methods for the Examination of Water and Wastewater, 17th Edition dated 1989 or Method 330.1 in the EPA Manual of Methods of Analysis of Water and Wastes .

For this permit the Minimum Level (ML) [the minimum practical detection level] for Total Residual Oxidants has been defined as 0.05 mg/l (50 ug/l) and that value may be reduced as more sensitive test methods are approved by the EPA and the State.

g. Samples taken in compliance with the monitoring requirements above shall be taken at the Discharge Transition Structure prior to the cooling water entering the discharge tunnel.

h. The permittee shall submit annually a Chlorine Minimization Report to the Regional Administrator and the Director as a component of the annual biological and hydrological report, Par. I.A.11 below. The objective of this chlorination report is to continue minimizing the usage of chlorine consistent with

(1) The seasonal chlorination cycle employed during the reporting period: the days the system was chlorinated, the sodium hypochlorite dosage level, the experimentally determined marine water chlorine demand, the TRO reported in the Discharge Transition Structure, ~~the report on the biological monitoring plates in the Intake cooling water system,~~ and the results of any inspections of the Intake Structures by divers or robots. Supp. 5 13

the report on the Biological Monitoring program

(2) Annually, the permittee may propose long-term changes in the chlorination seasonal dosage rates. These proposed changes with their justification are to be included in the annual review of the biological and hydrological data by the Technical Advisory Committee (TAC), Par. I.A.11.b below. The proposed chlorination plan shall be implemented only after the acceptance by the TAC and approval of the Regional Administrator and the Director.

The permittee may propose changes in the approved seasonal chlorination rates to the Regional Administrator and the Director at any time to accommodate sudden changes in the biological activity of the marine waters which may immediately affect plant condenser efficiency or the Cooling Water System biological fouling. At no time shall the concentration of TRO exceed 0.20 mg/l at the Discharge Transition Structure, Par. I.A.2.a.

(3) The permittee shall report on the likelihood that the thermal backflushing operation will be needed to compliment the continuous chlorination program in the ensuing year (frequency and reason for the backflushing).

(4) The data developed for this report shall be incorporated into the statistical hydrological and biological data base for future operational data comparison.

i. All material removed from the rotating screens in the cooling water intake system shall not be returned to the receiving waters.

j. The discharge of radioactive materials shall be in accordance with the Nuclear Regulatory Commission requirements (10 CFR 20 and the Seabrook Station Operating License, Appendix A, Technical Specifications). 14

k. The permittee shall conduct a Thermal, Biological, Hydrological and Chlorination Monitoring Program in accordance with Paragraphs I.A.1.j, I.A.2.h, and I.A.10.

ENCLOSURE 3 TO NYE-01009

ENCLOSURE 3 TO NYE-01009

Revised Proposed Change to the
Discharge Limit for Methoxypropylamine

Introduction

Methoxypropylamine (MPA) and ethanolamine (ETA) are products that are used for corrosion inhibition in the secondary systems (Main Steam and Condensate Systems) at Seabrook Station. During the time period of 1990 to 1997 the power plant industry and the pressurized water nuclear unit operators in particular have been intensely focused on their secondary chemistry control programs as a means of improving plant reliability and efficiency. Pressurized water reactor operators have designed their secondary chemistry programs to employ the amines, MPA and ETA.

North Atlantic Energy Service Corporation (North Atlantic) requested EPA approval on January 13, 1995[6], to initiate the use of methoxypropylamine (MPA) as a secondary chemistry control agent at Seabrook Station. The EPA and New Hampshire Department of Environmental Services subsequently approved the discharge of MPA on April 13, 1995,[7] and April 21, 1995,[8] respectively, at a maximum discharge concentration of 0.5 ppm. The EPA and NHDES approvals were founded on toxicity data which demonstrated that the discharge concentration would not be expected to significantly impact the aquatic community or public health. The approvals were also in recognition of the expected reduction in the utilization of Hydrazine. North Atlantic estimates that the current secondary chemistry regime has a reduced Hydrazine concentration of approximately 50 percent as a result of the use of MPA.

North Atlantic, in conjunction with its application for renewal of NPDES Permit NH0020338, is proposing an increase in the maximum discharge concentration for MPA from the current limit of 0.5 ppm to 5.0 ppm. The proposed limit, like the current limit, is applicable at the Circulating Water System discharge point, Outfall 001. The proposed limit is supported by aquatic toxicity data for marine species as discussed below which demonstrates that the aquatic community will not be significantly impacted.

The proposed increase in the MPA limit is associated with a planned design change that will install a Condensate Polishing System (CPS). The CPS will be placed in service to expedite secondary system cleanup as necessary after a refueling or maintenance outage. Additionally, if a small condenser tube leak occurs during plant operation causing seawater leakage into the plant's secondary system, the CPS will be placed in service to remove the seawater contaminants. For a small condenser leak of approximately .01 gallons per minute or 14 gallons per day the CPS provides the ability to continue full power operation while resources are mobilized to isolate the affected condenser water box, locate and stop the leak. The CPS is designed to maintain secondary chemistry within acceptable limits for plant operation during small condenser tube leak events. Large condenser tube leak events would exceed the ability of the CPS to maintain acceptable secondary chemistry and would result in plant shutdown. It is estimated that the CPS will be operated up to three weeks per year on average and potentially up to two months during a period of critical regional electricity demand. During normal plant operation, the CPS will be in standby and actual discharge concentrations of MPA will be equivalent to the current discharge concentrations which are well

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[6] NAESO Letter dated January 13, 1995, "Request to Use Methoxypropylamine at Seabrook Station" Mr. R. Jeb DeLoach to Mr. Edward K. McSweeney

[7] EPA Letter dated April 13, 1995, "Proposed Use of Methoxypropylamine" Mr. Edward K. McSweeney to Mr. R. Jeb DeLoach

[8] NHDES Letter dated April 21, 1995, "North Atlantic Energy Service Corporation (NAESCO) NPDES/State Surface Water Discharge Permit No. NH0020338" Mr. Raymond P. Carter to Mr. R. Jeb DeLoach

below 0.5 ppm. The CPS would also be operated for short periods during the year in order to support operator qualifications.

The proposed increase in the MPA discharge concentration limit will significantly increase CPS operational flexibility and may avert a plant shutdown during condenser tube leak events. At the current MPA discharge limit of 0.5 ppm, the rate of discharge from the CPS would be very limiting with the potential that the discharge tanks could not be emptied fast enough to accommodate the required number of demineralizer resin regenerations for the condenser tube leak conditions. At the proposed MPA discharge limit of 5.0 ppm the CPS tanks could be discharged ten times faster allowing more time for demineralizer resin regeneration and possibly averting plant shutdown during a condenser tube leak event.

The avoidance of a plant shutdown is important from an environmental perspective. The volume of water discharged as a result of a plant shutdown is an additional 50,000 to 70,000 gallons containing chemicals currently being used as additives for chemistry control. Additionally, the operation of Seabrook Station for a single day equates to the displacement of approximately 46,500 barrels of oil and many thousands of pounds of combustion gasses.

MPA Toxicity

The Material Safety Data Sheet for Pre-Tect 2040HP (40 % MPA by weight) provides the following aquatic toxicity data:

96 hour LC50 (fathead minnow):	> 1000 ppm
96 hour LC50 (bluegill sunfish):	> 1000 ppm
48 hour LC50 (*Daphnia magna*):	694 ppm
Short-Term Chronic for *Ceriodaphnia dubia*:	
No Observable Effects Concentration for survival (*Ceriodaphnia dubia*):	50 ppm
No Observable Effects Concentration for reproduction (*Ceriodaphnia dubia*):	6.25 ppm

The Northeast Utilities Environmental Laboratory (NUEL) performed marine aquatic toxicity testing in April 1997 on the chemical product Conquor 3585 (40 % MPA by weight). The pending NPDES Permit renewal application for Millstone Station proposes to use Conquor 3585 at Millstone Station Unit 1. The following marine aquatic toxicity results were reported by NUEL to the Connecticut Department of Environmental Protection in October 1997.

48 hour LC50 (*Mysidopsis bahia*):	259.13 ppm
No Observed Acute Effects Level (*Mysidopsis bahia*):	86.38 ppm
(Probit Method)	
48 hour LC50 (*Mysidopsis bahia*):	226.37 ppm
No Observed Acute Effects Level (*Mysidopsis bahia*):	75.46 ppm
(Spearman Karber Method)	
96 hour LC50 (*Cyprinodon variegatus*):	1000 ppm
No Observed Acute Effects Level (*Cyprinodon variegatus*):	333.3 ppm
(Spearman Karber Method)	
96 hour LC50 (*Cyprinodon variegatus*):	1060.66 ppm
No Observed Acute Effects Level (*Cyprinodon variegatus*):	353.5 ppm
(Binomial Method)	

MPA is soluble and easily dispersed in the seawater environment. The product will decompose in the seawater environment and does not exhibit a propensity to bioaccumulate.

The proposed MPA discharge limit of 5.0 ppm is a factor of 15 below the NOAEL for *Mysidopsis bahia*, the most sensitive of the tested marine species. The proposed MPA discharge limit is applicable at the Circulating Water System discharge point, Outfall 001. The MPA concentration will be further reduced by the discharge nozzle design that provides rapid mixing with the surrounding seawater in the jet mixing region. It is estimated that the mixing in this region will result in a dilution factor ten. The MPA concentration at the proposed discharge limit would therefore be approximately 0.5 ppm after this further dilution or a factor of 150 below the NOAEL for *Mysidopsis bahia*.

Given the wide margin between the proposed MPA discharge limit and the NOAEL for the most sensitive of the marine species that have been tested, the discharge of MPA at a maximum discharge concentration of 5.0 ppm will not impact the aquatic community. In addition, North Atlantic plans to have new toxicity tests conducted on MPA using the Sea Urchin Fertilization Test similar to that which the EPA required for the Molluscicide, EVAC. The results of these tests will be provided to the EPA in the near future.

North Atlantic will conduct a toxicity test at a time when the CPS Neutralization Tank is being discharged after the regeneration of the demineralizer resins. The NPDES Permit Renewal application proposes two toxicity tests during the term of the permit. This toxicity test will be conducted using the testing protocol identified in the NPDES Permit and will constitute one of the tests required by the permit. The NPDES Permit has been annotated to reflect this proposed change (see attached).

Condensate Polishing System (CPS) Description

The Condensate Polishing System (CPS), when implemented, will be an integral part of the Condensate System. The CPS is designed to remove dissolved and suspended impurities from the Condensate System such as sodium, chloride and iron which can cause corrosion and fouling of secondary components. The system will normally be in a standby condition and is expected to be placed into operation under the following plant conditions:

Saltwater Intrusion into the Condensers

Prior to March 2001 Seabrook Station had experienced only two minor seawater leaks into condensers tubes since 1989. For minor seawater leaks such as those that have occurred at Seabrook Station, the CPS is capable of maintaining acceptable secondary chemistry to allow the plant to remain at full power operation immediately upon discovery of the leak and upon initial return to service of the leaking condenser. In the event of a seawater leak the CPS may be operated for approximately 1-2 weeks while the leak is located and isolated.

Refueling Outages and Other Plant Outages

It is expected that the CPS would be operated for approximately 2 - 3 weeks at the end of a refueling outage during plant heatup, startup and power ascension. Refueling outages are currently scheduled about every 18 months. The CPS may also be operated during other scheduled or unscheduled plant outages. For brief plant outages the CPS may not be operated, while for longer duration outages it may be operated for approximately 2 - 3 weeks as in a refueling outage.

An overview drawing of the Condensate Polishing System is attached. The CPS design consists of cation resin vessels, mixed bed resin vessels, pumps and associated equipment, and a resin regeneration and waste processing system. The CPS is designed to accommodate approximately one third of the total condensate flow or approximately 7500 gallons per minute. The resin vessels remove the ionic constituents from the Condensate System including the amines (MPA and Ethanolamine) used for secondary chemistry control. The resin regeneration and waste processing system is used to regenerate the resin for re-use and to discharge the regeneration and rinsate wastes. Sodium Hydroxide and Sulfuric Acid are the expected regenerant chemicals.

The discharges from the CPS System include: rinses of the CPS components prior to operation and periodically during standby conditions, rinses of the resin vessels following regenerations, regeneration wastewater, sampling system and grab sample waste, system leakage, and system drainage for maintenance.

The CPS regenerant waste will be collected in the Neutralization Tank (30,000 gallon) and Low Conductivity Tank (32,000 gallon) and sampled prior to discharge to ensure compliance with NPDES Permit effluent limitations and monitoring requirements prior to discharge to Outfall 001.

Quantification of Impact of 0.5 ppm and 5.0 ppm Discharge Limits on CPS Operational Flexibility

During operation of the CPS, the secondary system contaminants and secondary chemicals including the corrosion inhibiting amines, MPA and ETA are removed by the demineralizer resins. The demineralizer resins must be regenerated every two to three days, during operation of the system, in order for them to be effective for contaminant removal. Regeneration may be required more frequently than this under larger condenser tube leak events. Regeneration of the demineralizer resins results in the generation and discharge of regenerant waste and rinsate waste from the CPS tanks. Based on the current and projected concentrations of the chemicals used in the secondary system, MPA will control the rate of discharge from the CPS tanks because it is used in the highest concentration. The current NPDES Permit limits for ETA (0.5 ppm), Hydrazine (0.5 ppm), and Ammonia (0.5 ppm) at Outfall 001 can be complied with at CPS discharge rates corresponding to a MPA discharge limit of 5.0 ppm.

The CPS design incorporates sufficient cation bed and mixed bed demineralizers to accommodate continuous uninterrupted operation of the system while a cation bed or mixed bed demineralizer is being regenerated. Three cation bed and four mixed bed demineralizers are included in the CPS design while only two cation bed and three mixed bed demineralizers are required for full operation of the system. The CPS can be operated at reduced capacity with less than two cation beds or three mixed bed demineralizers in service. The cation bed or mixed bed demineralizer that is not in service will be regenerated while the CPS is in operation and the freshly regenerated bed will then be placed into service while another bed is regenerated.

The paragraphs below specify the required regeneration and discharge activities during a typical week that the CPS is in operation and the amount of time required to perform those activities. At the current MPA discharge limit of 0.5 ppm, the rate of discharge (23 gpm) from the CPS would be very limiting, requiring 66 hours, with the potential that the Neutralization Tank may not be emptied fast enough to accommodate the required number of demineralizer resin regenerations. Assuming that three regenerations are required in a typical week, approximately 121.5 to 136 hours of the 168 hour week are required to perform the regeneration activities. If larger condenser tube leakage events were experienced there would be insufficient time to accommodate four or more resin regenerations. In the event that four or more resin regenerations were required but not achievable under the current MPA discharge limit of 0.5 ppm, the CPS

would be forced to operate at reduced capacity which may not be sufficient to avoid a plant shutdown due to unacceptable secondary chemistry parameters. At the proposed MPA discharge limit of 5.0 ppm the discharge of the Neutralization Tank can be accomplished in 13 hours, which is 59 hours faster than is achievable than under the current MPA discharge limit of 0.5 ppm. This 59 hours would provide significant operational flexibility of the CPS such as accommodating a fourth resin regeneration in a week or allowing for any unanticipated system malfunctions that may impact regeneration or discharge times.

Regeneration and Discharge Activities and Times at MPA Discharge Concentration Limit of 0.5 ppm

It is anticipated that two cation beds would require regeneration each week, requiring approximately 8 - 12 hours per regeneration. Assuming conservative removal rates by the resins, the calculated concentration of MPA in the Neutralization Tank is 3939 ppm, following a cation bed regeneration. A mixed bed regeneration is anticipated to be required once per week, also requiring 8 - 12 hours for regeneration and resulting in the same concentration (3939 ppm) in the Neutralization Tank. The discharge from the Neutralization Tank is mixed with at least 190,000 gpm of seawater in the Circulating Water System discharge structure assuming only one Circulating Water pump and two Service Water pumps are in operation. When the plant is operating at full power the Circulating Water System flow is approximately 450,000 gpm with all three Circulating Water pumps and two Service Water pumps operating. In order to maintain a 0.5 ppm MPA discharge limit in the Circulating Water System discharge structure the Neutralization Tank discharge rate can be no more than 23 gpm. Following each cation or mixed bed regeneration there is an additional resin rinse using the Low Conductivity Tank that generates approximately 21,000 gallons of low conductivity water to be discharged from this tank. Since the Low Conductivity Tank is discharged through the same flowpath as the Neutralization Tank, the discharges cannot proceed simultaneously.

The times required for each of these activities are summarized as follows:

Activity	**Hours per week**
Cation Bed Regenerations (2/week)	16 - 24 hours
Mixed Bed Regeneration (1/week)	8 - 12 hours
Neutralization Tank recirculation prior to discharge (2 volumes @ 150 gpm, 3/week)	18 - 21 hours
Neutralization Tank Sample analysis (post Recirculation)	7.5 hours
Neutralization Tank Discharge (3/week)	**66 hours**
Low conductivity Tank Recirculation prior to discharge (2 volumes @ 300 gpm, 3/week)	6 hours
Low Conductivity Water Tank Discharge (3/week)	6 hours
Low Conductivity Tank sample and analysis	7.5 hours
Total Weekly Hours for Regeneration and Regeneration Waste Discharge	**134 – 149 hours**

Regeneration and Discharge Activities and Times at MPA Discharge Concentration Limit of 5.0 ppm

At the proposed MPA discharge concentration of 5.0 ppm, the required resin regeneration and discharge activities are the same as above. Since the Neutralization Tank can be discharged five times faster at this MPA limit, the time required for discharge of the Neutralization Tank is reduced from 66 hours to 6 hours. This 53-hour decrease in Neutralization Tank discharge time provides significant operational flexibility as discussed above.

Activity	Hours per week
Cation Bed Regenerations (2/week)	16 - 24 hours
Mixed Bed Regeneration (1/week)	8 - 12 hours
Neutralization Tank recirculation prior to discharge (2 volumes @ 150 gpm, 3/week)	18 - 21 hours
Neutralization Tank Sample analysis (post Recirculation)	7.5 hours
Neutralization Tank Discharge (3/week)	**7 hours**
Low Conductivity Water Tank Discharge (3/week)	6 hours
Total Weekly Hours for Regeneration and Regeneration Waste Discharge	**81 - 96 hours**

The six steps listed above cannot be performed in parallel but must be done in sequence. The discharges from both the Neutralization Tank and Low Conductivity Tank must go through the same piping, individually (NRC requirements for radiological discharges). Each day there are three shift turnovers for a total of 10.5 hours per week. In order to switch from one discharge flow path to another means valve realignment, operators moving from one discharge flow path to another, shutdown/startup up of pumps etc. These activities may take from 1-3 hours per discharge. Thus at an MPA discharge limit of 0.5 ppm, after one week (168 hours) there is not enough time to implement successive CPS discharges, even if all operations occur without any delays. Maintenance on any part of the system would add to the total time. Acid/caustic tank replenishments take 4-6 hours per tank. Occasionally regeneration steps require more time to achieve full regeneration of the resins – this time factor alone could be 6-10 hours per week. Although these same issues exist with a 5.0 ppm MPA discharge limit, the discharge time for the tanks does not become the rate determining step. A 1-2 day time delay due to the above factors can be absorbed in the schedule until the CPS is shutdown.

Conclusion:

North Atlantic, in conjunction with its application for renewal of NPDES Permit NH0020338, is proposing an increase in the maximum discharge concentration for MPA from the current limit of 0.5 ppm to 5.0 ppm. The proposed increase in the MPA limit is associated with the planned design change that will implement a Condensate Polishing System (CPS). This new system is extremely important in ensuring the long term reliability and efficiency of Seabrook Station.

The expected operational time for the CPS is very limited, estimated at three weeks per year on average although the occurrence of a condenser tube leak concurrent with a critical electricity demand period could increase the CPS operational time to as much as two months. During normal plant operation, the CPS will be in standby and actual discharge concentrations of MPA will be equivalent to the current discharge concentrations that are well below 0.5 ppm. The proposed increase in the MPA discharge concentration limit will afford significant CPS operational flexibility allowing system operation at full capacity and potentially avoiding an otherwise unnecessary shutdown of Seabrook Station. There is a wide margin between the proposed MPA discharge limit and the No Observed Acute Effects Level of the most sensitive of the marine aquatic species that have been tested, thus there will be no impact on the aquatic community. Toxicity testing will be performed during discharge of the CPS Neutralization Tank to verify that the aggregate wastewater does not effect the test species.

ENCLOSURE 4 TO NYE-01009

cerexagri

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March 6, 2001

Damien Houlihan
CNH
US EPA Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Dear Mr. Houlihan:

RE: EVAC Biocide (EPA Reg. No. 4581-380)
Response to Jack Paar's Letters of August 20, 1998 and April 29, 1999

With this submission, Cerexagri, Inc. (formerly Elf Atochem North America, Inc.) is providing data on EVAC Biocide in response to your letter of August 20, 1998 and a follow-up letter from Mr. Fred Gay of April 29, 1999. We have completed the new aquatic toxicity studies you requested, and are submitting the additional existing endothall studies that you had asked about as well. Hopefully, this response will provide the remainder of the data you need to complete your review and to allow the use of EVAC in the upcoming season.

The submitted data are arranged as follows:

1) Marine test organisms (new tests)- In order to evaluate potential adverse effects to marine organisms, you requested that we run acute and chronic toxicity tests (per guidance documents EPA/600/4-87/028 and EPA/600/4-90/027) using pure compound and effluent. We have completed studies using the Agency-recommended species of *Americamysis bahia*, *Menidia beryllina*, and *Arbacia punctulata* with the pure compound (Appendix 1). However, without an approval to use EVAC in your region, we were not able to collect fresh effluent for these tests (nor could we acceptably reproduce effluent in the laboratory). We therefore ask that you perform your risk assessment calculations using just the pure compound toxicity data, knowing that it represents the worst case situation for the use of EVAC (that it would be discharged from the plant unchanged from when it was introduced).

   Other issues with the new marine studies:

   i) Control charts/reference tests- You had asked that we include the control charts from the reference tests. These have been included for all three organisms tested for your review (App. 1a)

ii) Confirmation of test concentrations- As you recommended, in order to insure continuous exposure to the test organisms, the tests were performed using fresh test solutions were prepared daily in a static renewal test system. The lab did not have analytical instrumentation necessary to test concentration levels, so no analyses were conducted to confirm that the concentrations stayed at the same level for the 24 hour period between preparation of fresh solutions. However, we are certain that there would be no loss of product, based on the physical/ chemical properties of endothall:

- endothall does not degrade by either photolysis or hydrolysis (App. 6, 7), which would be the main pathways for breakdown in an aquaria toxicity study
- aquatic organisms do not bioaccumulate endothall (App 5) , another potential route of product loss
- in the field, loss is due to dilution and rapid plant uptake, neither of which are in effect in these aquaria studies (App 9, 10)

2) Marine test organisms (FIFRA registration tests)- You had also requested copies of all previously completed studies with EVAC on marine organisms. We have done a battery of studies for our FIFRA registration. The following studies are enclosed with this package"

i) Hydrothol 191- Acute Toxicity to Mysid Shrimp Under Flow-Through Conditions, (App 2)

ii) Hydrothol 191- Acute Toxicity to Sheepshead Minnow Under Flow-Through Conditions, (App 3)

iii) Hydrothol 191- Acute Toxicity to Eastern Oyster Under Flow-Through Conditions, (App 4)

*Please note that EVAC is the same formulation as Hydrothol 191, which is the registered aquatic herbicide trade name for this product.

3) Bioconcentration- We have enclosed our fish bioconcentration study in Appendix 5. The study shows that endothall does not concentration in any portion of the fish (edible or nonedible tissues) after continuous exposure for 28 days.

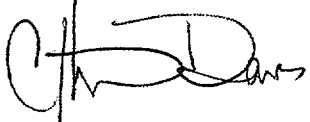
4) Bioaccumulation- We have included two aquatic dissipation studies with this submission (App. 10, 11). In both cases, sediment levels of endothall decreased rapidly, and showed no potential to accumulate.

5) Colorimetric Concentration Methodology- The method is enclosed in Appendix 9.

6) Half life, Dissociation, Degradation- The aquatic dissipation studies submitted in Appendices 10 and 11 give data for the half life of endothall in field situations, considering dilution and other dissipation effects. The dissociation constant for endothall amine is presented in the report in Appendix 8. The aquatic degradation report is found in Appendix 12. As a useful summary, we have included a document entitled "**Environmental Fate Profile: Endothall**" in Appendix 13, which summarizes all of the environmental fate data base for endothall.

Thank you for allowing us to respond and provide these data to help in the review and approval of EVAC Biocide in your region. If you have any questions or comments, please contact me at 215-419-7147.

Sincerely,



Christopher Davis
Registration Manager

EVAC Biocide (EPA Registration No. 4581-380)

List of Submitted Studies

1) Toxicological Evaluation of an Effluent Additive- EVAC Biocide, K. Simon, EnviroSystems Report ELF8620-00-04, April 2000

1a) Reference Control Charts for Toxicological Evaluation of an Effluent Additive- EVAC Biocide

2) Hydrothol 191- Acute Toxicity to Mysid Shrimp Under Flow-Through Conditions, A. Putt, Springborn Laboratories Report 93-10-5000, March 18, 1994

3) Hydrothol 191- Acute Toxicity to Sheepshead Minnow Under Flow-Through Conditions, M. Bettencourt, Springborn Laboratories Report 93-10-4980, March 16, 1994

4) Hydrothol 191- Acute Toxicity to Eastern Oyster Under Flow-Through Conditions, E. Dionne, Springborn Laboratories Report 93-8-4896, January 3, 1995

5) Dipotassium Salt of Endothall- Bioconcentration and Elimination of 14C- Residues with Bluegill Sunfish, E. Dionne, Springborn Laboratories Report 92-5-4269, December 4, 1992

6) Endothall Amine Salt- Determination of pH Dependent Hydrolysis, J. Mao, Springborn Laboratories Report 96-6-6537, March 15, 1997

7) Photodegradation of 14C Endothall in Water Under Artificial Light, T. Zwick, et al, Battelle Report SC890059, October 22, 1992

8) Amine Salt of Endothall Acid- Dissociation Constant, A. Gallacher, Ricerca Report 4200-92-0323-AS-001 , December 9, 1993

9) Colorimetric Determination of Alkyldimethylamine in EVAC Molluscicide, No author, Calgon Bulletin 35-468, February 1998

10) Aquathol K: The Rate of Dissipation of Endothall as a Result of Degradation versus Dilution, A. Ritter, M. Williams, Waterborne Environmental Report WEI 286.03, April 19, 1996

11) Aquathol K: An Aquatic Dissipation Study for Aquatic Non-Crop Uses, R. Biever, Springborn Laboratories Report 95-06-5898, June 21, 1996

12) Aerobic Aquatic Metabolism of 14C-Endothall Dipotassium Salt, J. Reynolds, XenoBiotic Laboratories Report RPT0083, September 24, 1992

13) Environmental Fate Profile: Endothall, J. Sharp, Elf Atochem Summary, November 12, 1999.

ENCLOSURE 5 TO NYE-01009

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

DYNACOOL 1385 SCALE INHIBITOR

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 01 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: DYNACOOL 1385 SCALE INHIBITOR
DESCRIPTION: An aqueous solution of potassium phosphonate and acrylic polymer

NFPA 704M/HMIS RATING: 1/1 HEALTH 1/1 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

SECTION 02 COMPOSITION AND INFORMATION ON INGREDIENTS

Our hazard evaluation of the ingredient(s) under OSHA's Hazard Communication Rule, 29 CFR 1910.1200 has found none of the ingredient(s) hazardous.

SECTION 03 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
CAUTION: May cause irritation to skin and eyes. Avoid contact with skin, eyes, and clothing. Do not take internally.

Empty containers may contain residual product. Do not reuse container unless properly reconditioned.

PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin

EYE CONTACT: Can cause mild, short-lasting irritation.
SKIN CONTACT: Can cause mild, short-lasting irritation.

SYMPTOMS OF EXPOSURE: A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS: A review of available data does not identify any worsening of existing conditions.

SECTION 04 FIRST AID INFORMATION

EYES: Immediately flush with water for at least 15 minutes while holding eyelids open. Call a physician at once.
SKIN: Wash thoroughly with soap and rinse with water. Call a physician.
INGESTION: Do not induce vomiting. Give water. Call a physician.
INHALATION: Remove to fresh air. Treat symptoms. Call a physician.

NOTE TO PHYSICIAN: Based on the individual reactions of the patient, the physician's judgment should be used to control symptoms and clinical condition.

CAUTION: If unconscious, having trouble breathing or in convulsions,

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

do not induce vomiting or give water.

SECTION 05 FIRE FIGHTING MEASURES

FLASH POINT: None (PMCC) ASTM D-93

EXTINGUISHING MEDIA: Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARD: Not applicable

SECTION 06 ACCIDENTAL RELEASE MEASURES

IN CASE OF TRANSPORTATION ACCIDENTS, CALL THE FOLLOWING 24-HOUR TELEPHONE NUMBER (800) I-M-ALERT or (800) 462-5378.

SPILL CONTROL AND RECOVERY:

Small liquid spills: Contain with absorbent material, such as clay, soil or any commercially available absorbent. Shovel reclaimed liquid and absorbent into recovery or salvage drums for disposal. Refer to CERCLA in Section 15.

Large liquid spills: Dike to prevent further movement and reclaim into recovery or salvage drums or tank truck for disposal. Refer to CERCLA in Section 15.

SECTION 07 HANDLING AND STORAGE

Storage : Keep container closed when not in use.

SECTION 08 EXPOSURE CONTROLS AND PERSONAL PROTECTION

RESPIRATORY PROTECTION: Respiratory protection is not normally needed.

For large spills, entry into large tanks, vessels or enclosed small spaces with inadequate ventilation, a positive pressure, self-contained breathing apparatus is recommended.

VENTILATION: General ventilation is recommended.

PROTECTIVE EQUIPMENT: Wear impermeable gloves, boots, apron and a face shield with chemical splash goggles. Examples of impermeable gloves available on the market are neoprene, nitrile, PVC, natural rubber, viton and butyl (compatibility studies have not been performed). A full slicker suit is recommended if gross exposure is possible.

The availability of an eye wash fountain and safety shower is recommended.

If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION: Based on Nalco's recommended product application and our recommended personal protective equipment, the potential human exposure is: MODERATE.

SECTION 09 PHYSICAL AND CHEMICAL PROPERTIES

COLOR: Clear to hazy yellow	FORM: Liquid	ODOR: Slight organic
DENSITY:	11.2-11.5 lbs/gal.	
SOLUBILITY IN WATER:	Completely	
SPECIFIC GRAVITY:	1.34-1.38 @ 72 Degrees F	ASTM D-1298
pH (NEAT) =	3.6-4.3	ASTM E-70
VISCOSITY:	24 cps @ 72 Degrees F	ASTM D-2983
FREEZE POINT:	15 Degrees F	ASTM D-1177
FLASH POINT:	None (PMCC)	ASTM D-93

NOTE: These physical properties are typical values for this product.

SECTION 10 STABLILITY AND REACTIVITY

INCOMPATIBILITY: Avoid contact with strong oxidizers (eg. chlorine, peroxides, chromates, nitric acid, perchlorates, concentrated oxygen, permanganates) which can generate heat, fires, explosions and the release of toxic fumes.

THERMAL DECOMPOSITION PRODUCTS: In the event of combustion CO, CO2 may be formed. Do not breathe smoke or fumes. Wear suitable protective equipment.

SECTION 11 TOXICOLOGICAL INFORMATION

TOXICITY STUDIES: No toxicity studies have been conducted on this product.

HUMAN HAZARD CHARACTERIZATION: Based on our hazard characterization, the potential human hazard is: LOW

SECTION 12 ECOLOGICAL INFORMATION

AQUATIC DATA:

Results below are based on the product.

96 hour static acute LC50 to Rainbow Trout = Greater than 1,000 mg/L

96 hour no observed effect concentration is 1,000 mg/L based on no mortality

or abnormal effects.

TOXICITY RATING: Essentially non-toxic

96 hour static acute LC50 to Fathead Minnow = Greater thand 1,000 mg/L

96 hour no observed effect concentration is 1,000 mg/L based on no mortality or abnormal effects.

TOXICITY RATING: Essentially non-toxic

48 hour static acute LC50 to Daphnia magna = 797 mg/L

48 hour no observed effect concentration is 400 mg/L based on no mortality or abnormal effects.

TOXICITY RATING: Slightly toxic

96 hour static acute LC50 to Shrimp (Mysidopsis bahia) = 368 mg/L

96 hour no observed effect concentration is 158 mg/L based on no mortality or abnormal effects.

TOXICITY RATING: Slightly toxic

96 hour static acute LC50 to Silversides (Menidia beryllina) = Greater than 1,000 mg/L

96 hour no observed effect concentration is 1,000 mg/L based on no mortality or abnormal effects.

TOXICITY RATING: Essentially non-toxic

If released into the environment, see CERCLA in Section 15.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION: Based on our Hazard Characterization, the potential environmental hazard is: LOW. Based on Nalco's recommended product application and the product's characteristics, the potential environmental exposure is: HIGH.

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous liquid waste, it should be solidified with stabilizing agents (such as sand, fly ash, or cement) so that no free liquid remains before disposal to an industrial waste landfill. A non-hazardous liquid waste can also be incinerated in accordance with local, state, and federal regulations.

SECTION 14 TRANSPORTATION INFORMATION

PROPER SHIPPING NAME/HAZARD CLASS MAY VARY BY PACKAGING, PROPERTIES, AND MODE OF TRANSPORTATION. TYPICAL PROPER SHIPPING NAMES FOR THIS PRODUCT ARE:

ALL TRANSPORTATION MODES : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

SECTION 15 REGULATORY INFORMATION

The following regulations apply to this product.

FEDERAL REGULATIONS:

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, none of the ingredients in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302:
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 and 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370):
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):

This product does not contain ingredients on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40 CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:
Consult Section 13 for RCRA classification.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15/ formerly Sec. 307, 40 CFR 116/formerly Sec. 311:
None of the ingredients are specifically listed.

CLEAN AIR ACT, Sec. 111 (40 CFR 60), Sec. 112 (40 CFR 61, 1990 Amendments), Sec. 611 (40 CFR 82, CLASS I and II Ozone depleting substances):
This product does not contain ingredients covered by the Clean Air Act.

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65:
This product does not contain any chemicals which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS:
This product does not contain ingredients listed on the Michigan Critical Materials Register.

STATE RIGHT TO KNOW LAWS:
This product does not contain ingredients listed by State Right To Know Laws.

INTERNATIONAL REGULATIONS:

This is not a WHMIS controlled product under The House of Commons of Canada Bill C-70.

SECTION 16 OTHER INFORMATION

Nalco internal number F103712/F104323

SECTION 17 RISK CHARACTERIZATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: LOW.

* The environmental risk is: LOW.

Any use inconsistent with Nalco's recommendations may affect our risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

SECTION 18 REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (CD-ROM version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (CD-ROM version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, Ohio (CD-ROM version), Micromedex, Inc., Englewood, CO.

Shepard's Catalog of Teratogenic Agents (CD-ROM version), Micromedex, Inc., Englewood, CO.

Suspect Chemicals Sourcebook (a guide to industrial chemicals covered under major regulatory and advisory programs), Roytech Publications (a Division of Ariel Corporation), Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, Washington (CD-ROM version), Micromedex, Inc., Englewood, CO.

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DATE CHANGED: 08/25/1997 DATE PRINTED: 03/28/1999