

123 Main Street  
White Plains, New York 10601  
914 681.6846



**Ralph E. Beedle**  
Executive Vice President  
Nuclear Generation

April 22, 1992  
IPN-92-020

U. S. Nuclear Regulatory Commission  
Mail Station P1-137  
Washington, DC 20555

Attn: Document Control Desk

Subject: Indian Point 3 Nuclear Power Plant  
Docket No. 50-286  
**Notification of Request to Modify State Pollutant Discharge  
Elimination System (SPDES) Permit**

Dear Sir:

Section 3.2 of the Indian Point 3 (IP3) Non-Radiological Environmental Protection Plan (Part I of Appendix B to the Facility Operating License) requires that proposed changes to the facility's SPDES permit be provided to the NRC at the time the change request is submitted to the New York State Department of Environmental Conservation (NYSDEC). This letter notifies the NRC of a request to modify the Indian Point SPDES permit.

Attachment I provides a copy of the request to allow the use of the chemical molluscicide, BETZ Clamtrol.

If you have any questions, please contact Mr. P. Kokolakis.

Very truly yours,

A handwritten signature in black ink, appearing to read 'R. Beedle', written over a horizontal line.

Ralph E. Beedle  
Executive Vice President  
Nuclear Generation

cc: next page

270006  
9204270365 920422  
PDR ADDCK 05000286  
P PDR

4001 Add: WRR/DET/ESGB 11  
11

cc: U. S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Resident Inspector's Office  
Indian Point 3  
U. S. Nuclear Regulatory Commission  
P.O. Box 337  
Buchanan, NY 10511

Mr. Nicola F. Conicella, Project Manager  
Project Directorate I-1  
Division of Reactor Projects I/II  
U.S. Nuclear Regulatory Commission  
Mail Stop 14B2  
Washington, DC 20555

ATTACHMENT I TO IPN-92-020

REQUEST FOR MODIFICATION OF THE INDIAN POINT  
STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES) PERMIT



## Memorandum

April 20, 1992  
JJK-92-55  
JMK-92-18

Ms. Margaret Duke  
New York State Department of  
Environmental Conservation  
21 South Putt Corners Road  
New Paltz, NY 12561-1969

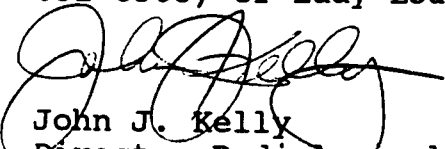
Dear Ms. Duke:

The New York Power Authority (NYPA) and Consolidated Edison (Con Edison) request a modification to the existing SPDES permit (NY-0004472) jointly issued to NYPA and ConEdison for the Indian Point Nuclear Power Stations Units 1,2, and 3, Buchanan, NY, to allow the use of the chemical molluscicide, BETZ Clamtrol, for zebra mussel control. This modification request is based upon the NYS Department of Environmental Conservation's Negative Declaration for Zebra Mussel Control issued June 1991.

NYPA and ConEdison plan to treat with Clamtrol product in the event that populations of zebra mussels pose operational concerns or problems at the Indian Point site. This is currently not the situation at any of the units. We have however confirmed through the monitoring program conducted by NYPA that veligers were present in the waters in front of the facility in 1991 (see attachment A - sampling results). In accordance with the Negative Declaration, NYPA and ConEdison will adhere to all of the conditions as specified on page 7, items 1 thru 5.

NYPA and ConEdison recognize that the use of the Betz product is temperature dependent and will coordinate all treatments to coincide with the available information on the effective temperature range of the product.

I have included for your review (attachment B,C and D respectively) the proposed treatment schemes, product information, and material safety data sheets from Betz for both NYPA and ConEdison. If you have any questions please contact John Kahabka of my staff (914 681-6308) or Eddy Louie of ConEdison (212 460-2882).



John J. Kelly  
Director Radiological and  
Environmental Support

# **ATTACHMENT A**

Normandeau Associates, Inc.  
25 Nashua Road  
Bedford, NH 03102-5999  
(603) 472-5191  
(603) 472-7052 (Fax)

NORMANDEAU ASSOCIATES RECORDS MANAGEMENT SERV

243801

Ref. No. 1250.04

4 November 1991

John M. Kahabka  
New York Power Authority  
123 Main Street  
White Plains, New York 10601

Dear Mr. Kahabka,

This is the status report for the Indian Point 3 zebra mussel monitoring program for the four-week period 29 September - 26 October 1991. Settlement plates and veliger samples were collected as scheduled, and zebra mussel veligers were found but no settled zebra mussels were observed as detailed below.

Veliger samples were collected 7 October and 22 October. No zebra mussel larvae were found in the 7 October sample, although a few of the dark false mussel (Mytilopsis leucophaeata) were present. On 22 October zebra mussels were the dominant species by far in the plankton sample, at a density of 600/m<sup>3</sup>.

Settlement plates from the in-plant monitoring box were retrieved on 7 October, and plates from the intake area of Indian Point 3 were retrieved on 22 October. In addition, sample processing was completed for intake area settlement plates collected on 23 September. None of the plates examined had any zebra mussels, but other species (predominantly dark false mussel) occurred on plates in both locations. Analysis of the 22 October plates is still in progress because of the encrustation of fouling organisms such as hydroids, which makes it necessary to scrape the plates to be able to inspect thoroughly for the very small recently attached bivalves.

Bedford, NH  
Hampton, NH  
Yarmouth, ME

Middleboro, MA  
Bloomfield, CT  
Peekskill, NY  
Lakewood, NJ

Aiken, SC  
Greenville, SC  
LeClaire, IA

## NORMANDEAU ASSOCIATES

John M. Kahabka  
4 October 1991  
Page 2

In summary, plankton samples, intake settlement plates, and an in-plant monitoring box all collected bivalves, but the only zebra mussels found in this four-week reporting period were veliger larvae in the 22 October plankton sample. Those zebra mussel larvae were present at a density of 600/m<sup>3</sup>, which is two orders of magnitude higher than densities of zebra mussels previously observed in this monitoring program. Please call me or Dr. Mattson if you have any questions or need any additional information.

Sincerely,

NORMANDEAU ASSOCIATES INC.

*B. Paul Lindsay*

B. Paul Lindsay  
Project Technical Director

BPL:dfm

cc: Bob Cullen (NYPA)  
Mark Mattson (NAI)

## **ATTACHMENT B**



April 12, 1992

**Betz Industrial**  
Liberty Power District  
403 W. Lincoln Highway - Suite 107  
Exton, PA 19341  
215-524-6080  
Fax: 215-524-6082

Mr. John Kahabka  
New York Power Authority  
123 Main Street  
White Plains, NY 10601

**RE: ZEBRA MUSSEL TREATMENT - INDIAN POINT 3 POWER STATION**

John, enclosed are the Zebra Mussel Control recommendations you requested. Application specifics for the proposed use of Betz ClamTrol CT-1 are provided.

In short, Betz recommends the combined use of intermittent chlorination along with ClamTrol CT-1 applications, as required for the Condenser Cooling Water System. For Service Water, Betz recommends the preventative use of ClamTrol CT-1, as well as intermittent chlorination, to avoid any risk associated with macrofouling of service water systems. Thermal treatment is the recommended approach for the back-up Service Water pumps. This method is 100% effective and should be fairly easy to coordinate.


I have detailed the cost calculations for the CT-1 treatments of both the Condenser and Service Water Systems. The cost estimates are for chemical only. However, there are no other significant costs due to the simplicity and brevity of the proposed applications. There are no freight charges for the mode of delivery quoted (Betz SemiBulk Program). A budget allowance of \$1,000 per application would more than cover the associated manpower and analytical expenses.

Cost information is also being provided for the chlorination approaches. For comparison purposes, I have detailed the cost for both intermittent as well as continuous chlorination. Likewise, enclosed is a cost estimate for a non-stick coating of the intake bays and associated equipment, for your reference.

These recommendations closely parallel what is planned at Con ED IP2. If I can be of any further assistance, please do not hesitate to call me directly.

Thank you for your patience and understanding in the delay of these recommendations.

Very Truly Yours,  
BETZ INDUSTRIAL

  
Steve Jordan  
Area Manager  
Liberty Power District

## STATEMENT OF CONFIDENTIALITY

The observations, determinations, and recommendations presented in this proposal are the work of BETZ, LABORATORIES, INC. and are, as well as any formulatory information of BETZ' products contained herein, the proprietary and confidential information of BETZ (collectively referred to hereinafter as "Confidential Information") and are provided solely with the understanding and New York Power Authority's agreement that:

- (i) the Confidential Information will be treated as such, and
- (ii) the Confidential Information will be provided and/or disclosed only to New York Power Authority personnel and solely on a need-to-know basis and with each being apprised of the nature of the Confidential Information and with each's agreement to maintain such in confidence.

# ***Betz Industrial***

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## **RECOMMENDATIONS**

Betz Industrial recommends the implementation of a Zebra Mussel Control Program consisting of four basic elements: Monitoring, Intermittent Chlorination, Betz ClamTrol CT-1, and Thermal Treatments. The Program design criteria is minimum risk, overall cost economy and built-in safety through redundancy. The performance criteria for the Program is to have the capacity for eliminating existing mussel populations and preventing the establishment of new ones.

### **1. Monitoring**

It is unclear as to what extent the zebra mussel will infest the tidal, brackish waters of the Hudson River. It is imperative that the mussel problem be monitored by means other than the presence or absence of associated plant problems. The control measures can be prudently applied only as long as there is effective monitoring in place.

Betz Industrial recommends the installation of mussel settlement monitors to gauge the onset and degree of mussel fouling in the plant. In addition, fouling plates/ropes/blocks, etc., should be suspended in the intake structures to facilitate evidence of mussel accumulation. Plankton net sampling for veligers is also recommended to provide the earliest warning of settlement. It is understood that a monitoring program is already underway.

### **2. Intermittent Chlorination**

Research work, by Betz Laboratories at Consumers Power, J.R. Whiting Station, has shown that veliger recruitment can be reduced using intermittent chlorination. This work is the subject of a technical paper presented at the EPRI Macrofouling Conference (October 22, 1991). Betz has quantified that a daily, 2 hr treatment of 1 ppm chlorine can significantly reduce (approx. 70%) larval setting rates. It is important to note that this approach is not lethal to existing or future adults that may enter the cooling systems. It is truly a prevention only approach.

# **Betz Industrial**

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Betz recommends that this approach be used during the fouling season, April through October. While this method does not address the trash racks, it will significantly reduce the mussel presence in the rest of the intake area as well as the pumps, condenser intake piping and water boxes.

Feeding 1 ppm chlorine to each bay, one at a time, will not exceed permit restrictions of 0.2 ppm TRC at the outfall. The annual cost of this aspect of the program is estimated at \$103,185.

### **3. Betz ClamTrol CT-1 Treatments**

Betz Industrial recommends that ClamTrol CT-1 be applied to eradicate Zebra mussels that may have settled in the system. For the Main Condenser Cooling Water System, Betz ClamTrol CT-1 treatments are recommended only in the event that infestation is known, quantified, and characterized as "approaching fouling conditions." However, it is also recommended that the Service Water Systems begin periodic treatment as soon as veligers are known to be in the area of the plant. This recommendation is due to the critical nature of the service water and safety related cooling systems. With the warm Hudson River temperatures, the time required to effect a 100% kill is only 3 hours.

#### **Condenser Cooling Water System**

If fouling conditions are approaching, Betz ClamTrol CT-1 should be applied to each intake bay, separately, outside of the trash racks. This will facilitate complete treatment of the entire intake structure. Detoxification requirements will be reduced, or eliminated, by the chemical demand of combining untreated waters. If river water demand for CT-1 is 1.1 ppm or higher, there would be no need to actively detoxify the effluent with clay. Normal river demand ranges from 2 to 5 ppm. The treatments would be made in late Spring and early Fall, while river water temperatures are above 77F to allow for short treatment exposures. The approximate cost for this phase of the program is \$90,000/yr.

# ***Betz Industrial***

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## **Service Water Systems**

Essential as well as Non-essential cooling water systems have much more stringent control requirements for the prevention of fouling than does the main circulating water. This is due in part to the safety related aspects of their operation but also is inherent in their design. The numerous flow paths, low flow areas, small pipe diameters all lend themselves to high fouling conditions. Macrofouling of service water systems, in large part, prompted the issuance of Generic Letter 89-13.

To protect the service water systems, Betz Industrial recommends the use of Betz ClamTrol CT-1 in conjunction with the intermittent chlorination of the service water intake bay. Treatments would be made every 4 to 6 weeks during the spawning season. The exposure time would be 3 to 12 hours and there would be no need for detoxification due to the demand of combining untreated waters prior to discharge.

Continuous chlorination is also considered a very viable approach for service water systems. However, continuous chlorination is highly corrosive to copper based metals. The service water systems at Indian point contain a significant proportion of yellow metal and hence would be subject to the risks associated with corrosion related pipe failures. The long term use of continuous chlorination is not recommended due to the corrosion concern.

From a financial standpoint, neither approach has a significant cost aspect considering the down side risk of macrofouling. Non-the-less, the ClamTrol CT-1 Program is approximately 65% less than the cost of continuous chlorination, or about \$16,000/yr.

## **4. Thermal Treatments - Back-up Service Water Pumps**

The Zebra mussel is a cold water animal that is easily stressed by warmer waters. It is documented that the mussel can be quickly killed, in about 10 minutes, with water of about 106F, or 2 hrs. at 94F. It is understood that these temperatures can be easily reached in the discharge canal through a coordinated effort with Con ED. Plans should be prepared to schedule operation of these pumps 2 times per summer, at elevated temperatures, to effect a 100% kill of any infestation. These pumps discharge to a common SW header. Operation of all the normal SW pumps will help minimize the brief thermal effect on SW cooling components.

# ***Betz Industrial***

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## **APPLICATION SPECIFICS**

### **Intermittent Chlorination Application Description**

**Objective :** To reduce the settlement of zebra mussels in the intake bays and cooling systems throughout the station.

**System/Application:** Treat all of the cooling water flow of the circulating and service water pumps at 1 ppm Chlorine for 2 hrs/day. Treatment would be applied to each bay individually, so as not to exceed discharge limitations of 0.2 ppm TRC. Chlorine would be used for six months from April through October.

**Point of Application:** Existing chlorination header injection point.

**Treated Water Flow:** 140,000 gpm - circ. pump (Hi Flow)  
30,000 gpm - 6 service water pumps

**Duration/Dosage:** 2 hrs. @ 1 ppm

**Combining Water Flows:** 700,000 gpm

**Predicted Demand:** .25 ppm

**Est. Effluent Conc.:** 0.0 ppm

**Approx. Cost of Appl.:** \$103,185/yr

### **Betz ClamTrol CT-1 Application Description**

**Objective:** Achieve 100% mortality of Zebra mussel infestation throughout the Condenser Cooling Water System.

**System/Application:** Treat intake bays, trash racks, screen wells, pump wells and associated piping to and from the associated condenser. Treat each intake bay independently. For each unit pump:

**Point of Application:** Immediately upstream of Trash Rack

**Treated Water Flow:** 84,000 gpm (Low Flow)

**Duration/Dosage:** 3 hrs. @17 ppm (25 deg. C)

**Combining Water Flows:** 730,000 gpm

**Predicted Demand:** 2 ppm

**Est. Effluent Conc.:** <0.2 ppm

**Detoxification Requirement:** none

**Approx. Cost of Appl.:** \$44,928

Total annual cost, treating 6 bays 2x/yr = \$89,856

# ***Betz Industrial***

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## **Betz ClamTrol CT-1 Application Description - Service Water**

**Objective:** Achieve 100% mortality of Zebra mussel infestation throughout all Service Water cooling systems.

**System/Application:** Treat all of the water in the Service Water Intake Bay, with six service water pumps operating simultaneously. Treat the service water systems as much as 6 times per year.

**Point of Application:** Immediately upstream of Trash rack

**Treated Water Flow:** 30,000 gpm

**Duration/Dosage:** 3 hrs. @ 17 ppm (25 deg. C)

**Combining Water Flows:** 840,000 gpm (Circ. Pumps - Hi Flow)

**Predicted Demand:** 2 ppm

**Est. Effluent Conc.:** 0.0 ppm

**Total annual cost:** \$16,046/yr

# **ATTACHMENT C**



Consolidated Edison Co. of N.Y.

Indian Point Units 1 and 2 Proposed Clamtrol Treatment

Service Water

Unit 1 service water system will be treated with Clamtrol by injecting product as close as possible to suction of the service water pumps.

Treated water flow at Unit 1: 32,000 gpm

Duration/Dosage: 12 hrs. @ 15 ppm (15° C), 3 hrs. @ 15 ppm (25° C)

Unit 2 service water system will be treated with Clamtrol by injecting product upstream of the travelling screens.

Treated water flow at Unit 2: 20,000 gpm

Duration/Dosage: 12 hrs. @ 15 ppm (15° C), 3 hrs. @ 15 ppm (25° C)

The combining water flow at Unit 2 (Unit 1 service water discharges to Unit 2) will be 840,000 gpm.

Maximum number of separate treatments = 4.

Condenser Cooling Water

Unit 2 has six condenser cooling water pumps that can operate at 84,000 or 140,000 gpm. Treatment will consist of applying the product upstream of the trash racks.

Treated water flow: 84,000 or 140,000 gpm

Duration/Dosage: 6 hrs. @ 15 ppm (22° C), 3 hrs. @ 15 ppm (25° C)

The combining water flow when one bay is treated will be 720,000 gpm.

Maximum number of separate treatments = 4

Note: Service Water and Main Condenser Cooling Systems may be treated separately or combined, but the total number of separate or combined treatments will not exceed 4/year.

# **ATTACHMENT D**

## CHEMICAL CONTROL MEASURES - MITIGATION

The use and application of molluscicides is similar to thermal treatment in its effect. The approach is a mitigation technique designed to remove the settled veligers before they become a fouling problem. This approach can be highly effective and is the most widely used.

### Biocide Registration

All biocides must be registered with the United States Environmental Protection Agency prior to sale for commercial use. Betz Laboratories was the first to register a product as a molluscicide for *Corbicula Fluminea* (the Asiatic Clam). Betz currently has three non-oxidizing biocides registered and patented for macrofouling control. These products include QUAT, DGH, and a synergistic blend of DGH/QUAT which comprises Betz ClamTrol CT-1. The only other known registered molluscicide is the polyquat. It is understood that U.S. EPA registration is being sought for two additional products, the TCMTB and QUAT under a different trade name.

In New York State, a "Negative Declaration" was issued by the Department of Environmental Conservation on the use of Chlorine and Betz ClamTrol CT-1 for Zebra mussel control. It was determined that the proper application of these two approaches will not have a deleterious impact on the environment. In effect, the D.E.C. has given a blanket approval to both techniques as long as they are conducted within the guidelines established for the respective treatments. A copy of the Negative Declaration is enclosed in Section 5.

### Efficacy and Environmental Toxicity

As is shown in the following biocidal efficacy data for the various compounds (Table 1), the synergistic blend of DGH/QUAT, or ClamTrol CT-1, is the most toxic biocide to *Dreissena Polymorpha* at equivalent actives dosage. Yet, as is shown in Table 3 (Environmental Toxicity), the DGH/QUAT blend is the least toxic biocide to non-target organisms, particularly fish. Furthermore, the amount of chemical consumed and hence discharged to the environment for one plant treatment, is more than 10 fold less for ClamTrol CT-1 than for any other non-oxidizing biocide. This chemical economy in addition to the selective toxicity of ClamTrol to bi-valve mollusks (Zebra mussels, Blue mussels, Asiatic clams, oysters, etc.) are the primary reasons Betz recommends the use of the DGH/QUAT blend (versus the QUAT alone, or any other biocide).

**BIOCIDAL EFFICACY**

The following data has been collected from a variety of sources provided to the writer (referenced in Appendix B). Some of the comparisons use data pertaining to Corbicula Fluminea due to a lack of application data on Dreissena Polymorpha. However, the Corbicula data is considered relevant due to the similarities in dose/response data of the two species where dual studies were conducted.

**TABLE 1. TOXICITY TO DREISSENA POLYMORPHA**  
(ALL TESTS AT 20 C)

BIOCIDE	DOSAGE		DURATION (HRS.)	CHEMICAL CONSUMPTION/MMGPD		
	PRODUCT (PPM)	ACTIVE (PPM)		ACTIVE (LBS.)	PRODUCT (LBS.)	MORTALITY %
Polyquat	.5	.3	826	85.7	143	100
	1.0	.6	680	141.1	235	100
	2.0	1.2	313	129.9	216	100
	4.0	2.4	244	202.5	337	100
	8.0	4.8	197	327.0	545	100
TCMTB	.5	.15	758	39.3	131	100
	1.0	.30	485	50.3	168	100
	2.0	.60	313	65.0	217	100
	4.0	1.20	260	107.9	360	100
QUAT	50.0	5.0	24	41.5	415	100
DGH/QUAT	15.0	1.95	6	4.0	31	100
CHLORINE	0.5	0.5	384	66.4	--	100
BROMINE	0.5	0.5	384	66.4	--	100

**TABLE 2. CONTINUOUS FLOW STUDIES  
ON  
CORBICULA FLUMINEA**

BIOCIDE	ACTIVE CONC. (PPM)	FEED DURATION (HRS.)	TEMPERATURE (DEG. C)	MORTALITY (%)	TEST DURATION (DAYS)
DGH/QUAT	0.5	24	20-23	100	5
QUAT	2.0	24	19-23	100	5
POLYQUAT	2.0	24	25-31	23	15
POLYQUAT	3.0	120	19-23	100	11

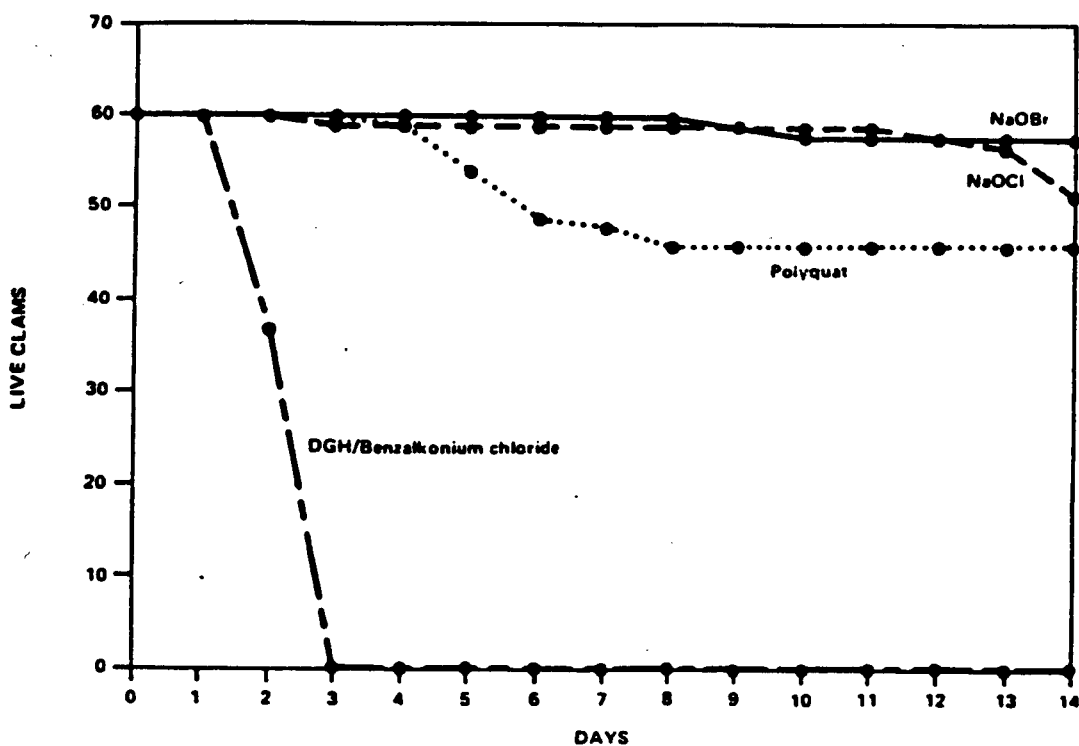


FIGURE 1. Continuous Flow Test 1.  
DGH/benzalkonium chloride, polyquat - 2.0 mg/l for 24 hours  
NaOCl, NaBr - 0.5 mg/l for 14 days.  
25-30 DEG. C

Ref. #1 - G. Ramsay, et. al., Southern Company Services  
Research and Environmental Affairs

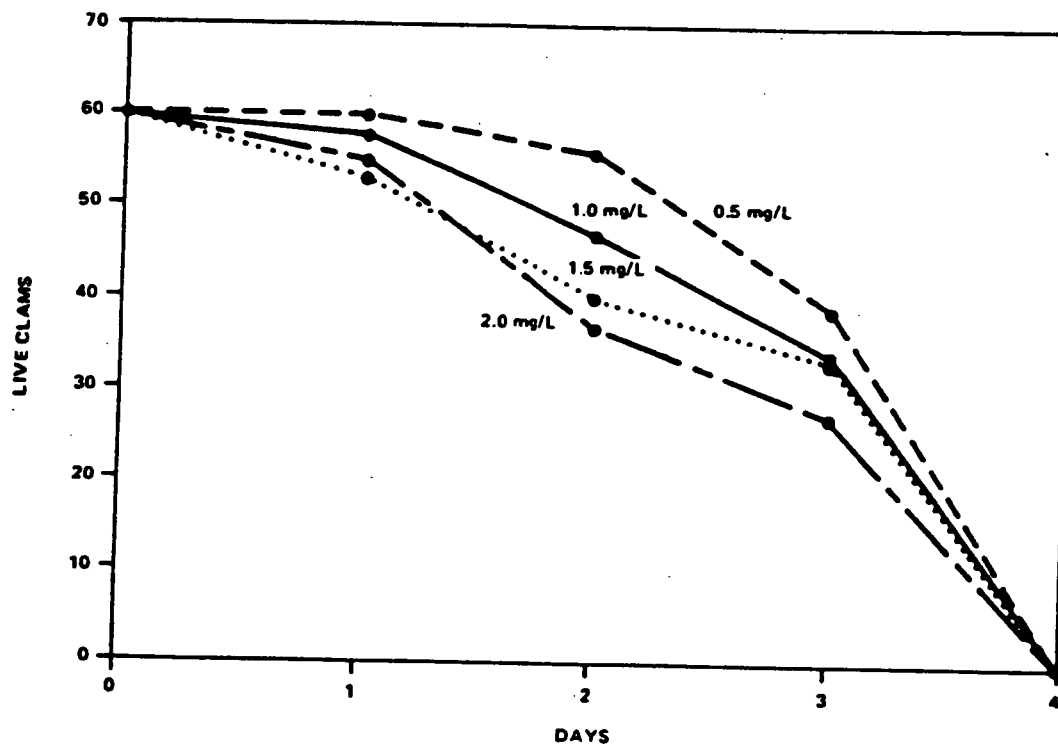


FIGURE 2. Continuous Flow Test 4.  
DGH/benzalkonium chloride fed for 24 hours.  
20-23 DEG. C.

Reference 1. G. Ramsay, et. al.

**TABLE 3. ENVIRONMENTAL TOXICITY TO NON-TARGET ORGANISMS**

BIOCIDES	ANIMAL	DURATION hrs	LD 50 mg/l	CHEM. FEED	
				DURATION hrs	DOSAGE mg/l
Quat (10% active)	Daphnia	24	0.72	24	50.0
	Bluegill sunfish	24	0.32	24	50.0
	Rainbow Trout	24	0.4	24	50.0
	Chinook Salmon Fry	24	1.0	24	50.0
Polyquat (60% active)	Daphnia	48	0.16	826	0.5
	Rainbow Trout	96	0.43	826	0.5
	Bluegill sunfish	96	0.45	826	0.5
DGH/Quat (13% active)	Daphnia	48	0.4	6	15.0
	Rainbow Trout	96	14.7	6	15.0
	Fathead minnow	96	2.9	6	15.0
ClamTrol CT-1)	Bluegill sunfish	96	4.3	6	15.0
HOCl	Daphnia	48	0.46	384	0.5
HOBr	Rainbow Trout	96	0.87	384	0.5
(Chlorine/ Bromine Chemistry)	Fathead minnow	96	2.25	384	0.5

TCMTB                      Data unavailable

As is shown above, the relative toxicity of ClamTrol CT-1, particularly for fish species, exhibits much less toxicity than the other biocides. In addition, the considerably shorter application period with ClamTrol CT-1, as opposed to the other biocides, also presents less potential environmental impact. Furthermore, it has been demonstrated that ClamTrol CT-1 can be readily neutralized by a variety of natural materials including clays, silts, suspended solids, humic acid, and microfouled surfaces of cooling systems. As a result of this rapid neutralization potential, ClamTrol CT-1 application can be further diluted and neutralized by passive processes. If passive neutralization is not achievable when treating larger water volumes, then ClamTrol CT-1 can be actively detoxified with a blend of clays (Betz DTS) to less than detectable levels (0.2 mg/l as product).

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
BUREAU OF PESTICIDE MANAGEMENT  
ALBANY, NEW YORK 12233

# CERTIFICATE OF PESTICIDE REGISTRATION

**STATUS KEY**  
N—New  
R—Renewal  
S—Suspended—(No longer register)  
D—Discontinued—(Registered but  
longer in prodn  
E—Experimental

The Company listed below is authorized to distribute, sell or offer for sale in New York State the products list below. Registration is not an endorsement or approval by the Department of any product or any claim made it. No reference may be made to the New York State Department of Environmental Conservation in labeling advertisements. Registration may be canceled pursuant to applicable law and rules and regulations. The co position of each product and label used on it must be the same as those submitted by the registrant. Only lab approved by the Director may represent a pesticide.

BETZ LABORATORIES, INC  
ATTN: KEVIN MANNING  
4636 SOMERTON RD  
TREVOSÉ PA 19047

EPA. CO. NO. LICENSE NUMBER ISSUE DATE  
Mo Da Yr  
03876 03876 06/06/89 03

**THIS LICENSE SUPERSEDES ALL  
ISSUED PRIOR TO THIS DATE**

STATUS	REGISTRATION NUMBER	PRODUCT NAME	RES
R	00707 00133 45017	SLIME-TROL RX-68	
N	01448 00081 03876	BETZ GCP-987	
R	01839 00099 03876	BETZ GCP-981	
R	03876 00034	BETZ SLIMICIDE J-12	
R	03876 00034	POWERLINE 3612	
R	03876 00061	BETZ SLIMICIDE C-30	
R	03876 00074	SLIMICIDE 364	
R	03876 00095	BETZ SLIMICIDE 508	
R	03876 00095	POWERLINE 3608	
R	03876 00095	BETZ GCP-908	
R	03876 00095 34571	BETZ ENTEC 365	
R	03876 00121	BETZ SLIMICIDE C-31	
R	03876 00121	POWERLINE 3631	
N	03876 00121	BETZ GCP-931	
R	03876 00127	POWERLINE 3641	
R	03876 00127	SLIMICIDE C-41	
N	03876 00138 03876	BETZ GCP-950P	
R	03876 00143	SLIMICIDE C-68	
R	03876 00143	BETZ GCP-986	
R	03876 00143 34571	BETZ ENTEC 368	
R	03876 00145	SLIMICIDE C-74	
N	03876 00145	CLAM-TROL CT-1	
N	03876 20001	SLIMICIDE C-70	
N	03876 20001 45017	SLIME-TROL RX-83	
R	05785 00063 34571	BETZ ENTEC 367	
R	05785 00065 03876	SLIMICIDE C-77P	
N	05785 00065 03876	SLIMICIDE C-78P	
N	05785 00066 03876	SLIMICIDE C-82	
N	06836 00113 03876	SLIMICIDE C-72P	
N	06836 00113 34571	BETZ ENTEC 440	
N	09386 00004 45017	SLIME-TROL DPB-1155	
N	10182 00030 45017	PAPERCHEM RX-81	
R	35427 00001 34571	BETZ ENTEC DRAIN PAN BIOCID	

**A Certificate of Registration for Pesticides is NOT Transferable.**

If there is a change in business ownership, a new application and fee(s) are necessary.

PRODUCTS





LABORATORIES, INC.

AQUATIC  
TOXICOLOGY  
LABORATORY



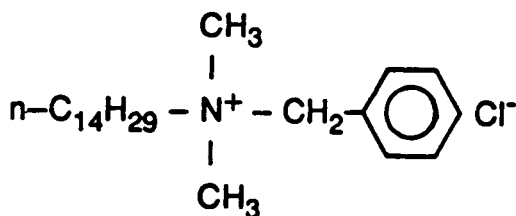
SOMERTON ROAD • TREVOSE, PA 19047 • U.S.A. / TEL: 215-355-3300 • TELEX: 173 148 • FAX # 355-2869

## BETZ CLAM-TROL CT-1

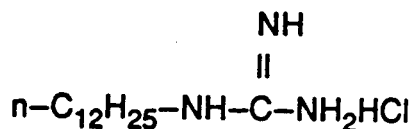
### ENVIRONMENTAL INFORMATION PACKAGE

Clam-Trol CT-1 is an effective molluscicide for controlling Asiatic clam macrofouling problems in both once-through and recirculating cooling systems. The unique molluscicide applications can be used for exterminating adult Asiatic clams which cause advanced stage fouling conditions in cooling systems and can also be used as part of a preventative program for eliminating larvae and juvenile clams before they attain the adult fouling size which can cause advanced fouling conditions. Clam-Trol CT-1 can also be used as a broad spectrum microbiocide for the control of bacterial, fungal and algal slimes.

Clam-Trol CT-1 contains 13% active ingredients of two cationic surfactants and 87% inert materials. The two cationic surfactants are n-alkyl dimethyl benzyl ammonium chloride (Quat) and dodecylguanidine hydrochloride (DGH).



Quat



DGH

Both straight chain hydrocarbon containing molecules are referred to as surface active agents and have a hydrophobic tail and positively charged moiety that readily attaches to membranes to induce biocidal activity. The inert materials of this formulation - ethylene glycol, isopropyl alcohol, and water - are relatively non-toxic to aquatic organisms.

Several studies on the adsorptive characteristics, aquatic toxicity, biodegradation, environmental fate and detoxification processes have been conducted for these cationic surfactants. The results of these studies are summarized herein.

### Adsorption: Biocidal Mechanism and Adsorption Rates

The toxic properties of cationic surfactants result from a strong interaction with membrane proteins. Membrane proteins are essential for many transport mechanisms including various specific ion transport channels. The alkyl portion of these actives becomes imbedded in these membranes. In effect, these cationic surfactants are good biocidal performers but they are short-lived once their positive charge is neutralized upon adsorption to various surfaces.

DGH and Quat have extremely strong affinities for many kinds of suspended material and substrates. A series of laboratory and field studies conducted by the American Cyanamid Company evaluated the degree and rate that DGH is electrostatically bound to suspended matter and other substrates.

In one study, weighed portions of sludge containing 5.2% solids obtained from a sewage treatment plant were inoculated with 10 ppm and 20 ppm of DGH (100% active) and thoroughly mixed. After 1 hour and 24 hours, duplicate samples of the mixtures were centrifuged to separate the solids. DGH was analyzed in the supernatant. The results in the table below show that less than 2 ppm of DGH remained in the supernatant.

DGH added (ppm)	Contact Time (hours)	DGH Found in Supernatant (ppm)
10	1	1.2
10	1	1.6
10	24	1.0
10	24	1.2
10	(Control; water only)	11.0
20	1	1.1
20	1	1.7
20	24	1.6
20	24	1.3
20	(Control; water only)	23.5

Other laboratory studies utilizing cooling tower water samples from Utah Power and Light demonstrated a loss of 95% DGH in 1/2 hour or less contact time after initial DGH concentrations of 350 ppm, 700 ppm, and 1,750 ppm were added to the samples. The residual DGH (ppm) in the supernatant after precipitates were filtered out and the % loss are provided in the table below:

DGH added (ppm)	Residual DGH (ppm) in Supernatant	% Loss
350	19	95
350	17	95
700	24	97
700	31	96
1750	52	97
1750	85	95

The rate of adsorption (loss of DGH to the cooling tower solids) was also determined from the above sample. Results are presented below:

DGH added (ppm)	Contact time (hours)	Residual DGH (ppm) in Supernatant
350	1	28
	6	16
	24	12
1750	1	82
	6	61
	24	42

Field studies have also demonstrated that DGH is rapidly removed from cooling water systems. The two tables below show the concentration of DGH detected in the cooling tower effluents on two different occasions.

Sample	Time	Oil and Grease (ppm)	DGH Content in Effluent (ppm)
Addition of DGH (16-17 ppm)	8:15 am	158	0
	9:30 am	1300	0
	10:15 am	700	0.4
	12:00 pm	1500	0.9
Makeup Water added		14	0

Samples from cooling tower operation submitted by Chevron Oil, Salt Lake City, Utah, on December 20, 1972.

Tower has contained volume of 350,000 gallons and a blowdown of 400 gpm.

Sample	Time	Suspended Solids (ppm)	Organic Carbon (ppm)	DGH Content in Effluent (ppm)
Before addition	1:30 pm	-	17	0
DGH addition = 13 ppm				
After addition	3:00 pm	280 (233 organic)	16 (filtered)	0
	4:00 pm	-	16	0
	5:00 pm	-	15	0

Radioactive labelled Quat solutions at concentrations of .01 to .1 ppm were used for studies conducted by Rohm and Haas Company (Krezeminski, SF, et.al., 1977) to determine adsorptive characteristics to different types of material. In these  $^{14}\text{C}$  studies, adsorption was measured by the loss of radioactivity from the labelled solutions exposed to three different types of adsorbent material - river silt, and aquatic plant, and alum floc. Results are reported below:

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Adsorptive characteristics of Hyamine 3500  
(50% Active Quat)

Adsorbent	Contact Time (hr)	Concentration in Water (ppm)		
		Initial	Final	% Adsorbed
River Silt	1/60	0.070	0.006	91
Aquatic Plant				
(Azolla Caroliniana)	24	0.056	0.008	86
Alum Floc <sup>a</sup>	1/2	0.094	0	100

a) 400 ppm = turbidity  
30 ppm = alum concentration

---

As with the DGH studies, field studies conducted by Rohm and Haas have determined the residual Quat concentrations in cooling tower blowdown water at various intervals following biocide application. The adsorptive nature of the active to the surfaces of the cooling system and to particulate material caused a substantial loss.

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Hyamine 3500 (50% Active Quat) in Cooling Tower Blowdown

Water as a Function of Time After Dosing<sup>a</sup>

Concentration of Hyamine 3500 (ppm)

Time After Dosing (hrs)	Dose 1 (60 ppm)	Dose 2 (30 ppm)	Dose 3 (30 ppm)
1	60.0	26.8	31.6
2.5	52.2	21.1	21.0
5	44.8	14.8	14.2
8	26.5	10.6	9.9
72	5.18	0.25	0.041
120	2.50	0.011	NDR <sup>b</sup>
168	1.16	0.008	NDR

a) Three consecutive dosings (60, 30, 30 ppm) at one-week intervals

b) NDR = no detectable residue; less than 0.005 ppm

Cooling tower capacity = 40,000 gallons

Blowdown rate = 30 gpm

---

## Aquatic Toxicity: Adsorbed vs. Free Actives

Acute toxicity tests determining  $LC_{50}$  values for Clam-Trol CT-1 with 13% active ingredients is provided as follows:

Daphnia magna: 48 hr  $LC_{50}$  = 0.41 mg/l (.37 - .49 T.L.)

Fathead minnow: 96 hr  $LC_{50}$  = 2.9 mg/l (2.5 - 3.3 T.L.)

Bluegill Sunfish: 96 hr  $LC_{50}$  = 4.3 mg/l (4.2 - 6.6 T.L.)

Rainbow trout: 96 hr  $LC_{50}$  = 14.7 mg/l (10 - 15.5 T.L.)

The above  $LC_{50}$  values represent toxicity levels for the neat formulation when 100% of the "free" actives are available to the aquatic organism (that is, no suspended solids for adsorption of the actives).

However, when the formulation is exposed to adsorbent material (i.e., bentonite clay or activated carbon), acute toxicity is greatly reduced due to the adsorption properties of the active ingredients. Tables 1 to 4 provide cumulative percent mortalities to fathead minnow and Daphnia magna, of Clam-Trol CT-1 which has been exposed to various concentrations of either bentonite clay or activated carbon. Even the most sensitive test species, Daphnia magna, was not affected when sufficient clay or carbon was available to adsorb the free actives. A ppm ratio of 1 to 1 of clay to Clam-Trol CT-1 and 2 to 1 of activated carbon to Clam-Trol CT-1 resulted in the reduction of acute toxicity to fathead minnows to the point that the water becomes essentially non-toxic.

Both the  $LC_{50}$  bioassays and the detoxification studies were conducted by the Aquatic Toxicology Laboratory of Betz Laboratories.

## Biodegradation

The rate of biodegradation of the Quat active was evaluated in both acclimated and unacclimated microbial cultures (Gawel, L.J. 2 Huddlestown, R.L., Continental Oil Company, 1972). The microorganisms used for the biodegradation tests were derived from both soil and raw city sewage, and which grew on a defined medium. Rates of biodegradation were determined analytically using an extraction procedure to remove all unde-graded Quat. The results reported below present biodegradation data from cultures acclimated for different time intervals to the Quat (100% active).

### EFFECT OF CULTURE ACCLIMATION ON QUAT BIODEGRADATION

Acclimation Incubation Period	<u>None</u>		<u>20 Hours</u>		<u>48 Hours</u>		<u>9 Days</u>	
	24 hr/48 hr		24 hr/48 hr		24 hr/48 hr		24 hr/48hr	
Percent Degraded	37	95	60	97	60	97	15	50

The reduced rate of biodegradation at 9 days was attributed to the additional transfers of Quat causing an increased biocidal effect upon the cultures.

The Rohm and Haas investigation, previously cited, reported biodegradation studies of Quat conducted by exposing the  $^{14}\text{C}$  labelled active to activated sludge. Fresh synthetic sewage (nutrients) and labelled Quat were renewed daily except weekends to a closed culture system during a 24 day study period. Biological activity was determined by measuring the  $^{14}\text{CO}_2$  that was generated from the labelled Quat. In order to allow for acclimation and any toxic effect, dosing of the labelled active started at 1 ppm and increased gradually over period of days to 10 ppm. Figure 1 presents the results as the percent  $^{14}\text{C}$  detected in the supernatant as unde-graded active removed from the closed system and the present  $^{14}\text{C}$  as  $^{14}\text{CO}_2$  converted during biological degradation of the Quat.

During the first two weeks, 80% of all labelled Quat added to the culture unit was converted to  $^{14}\text{CO}_2$ . This activity increased to a 92% conversion after a two week accumulation period. It was concluded from this study that biodegradation of the Quat was, after a short period of microbial acclimation, quite rapid and complete.



Biodegradation of DGH was examined in 1989 using the OECD Screening Test according to EC Directive 79/831. For the OECD study, a DGH solution was diluted with nutritive salt solutions and mud from the biological part of a clarification plant to nearly 40 mg/L DOC in water. The system was shaken at 24 °C in the dark for 28 days. Dissolved Organic Carbon (DOC) determinations were used to monitor biodegradability of the DGH compound. Test results are presented in the table below.

Biodegradation of DGH (OECD Protocol)

Day	DOC mg/L	% Degradation
0	34	-
1	39	0
4	26	33
7	26	33
14	17	56
18	16	59
22	18	54
26	13	67
29	10	74
31	9	77

The DGH exhibited a DOC removal of greater than 70% within 28 days enabling it to be reported as "easily biodegradable" according to the test standard.

In another study (Goldberg, M.C., et.al., 1969), dodecylguanidine acetate (DGA), an agricultural fungicide, was investigated to evaluate the biodegradation potential by microorganisms originating from soil and river muds. Two species of soil bacteria, one an aerobe and another an anaerobe that were isolated on agar plates and then transferred to dodine (DGA) salt media, grew profusely after a 7 day lag period. When these bacterial species were transferred back to dodine-free medium, growth of the organisms was poor. This study provided a demonstration that certain organisms were quite capable of utilizing DGA as the sole source of carbon.

### Bioaccumulation

Bioaccumulation studies (Rohm and Haas study) with bluegill sunfish determined the steady state interval, which is the time when adsorption equals elimination using  $^{14}\text{C}$  labelled Quat. The steady state interval occurred in the fish after 2 weeks of continuous exposure at sublethal levels at which time the carbon 14 residues in the carcass and the viscera reached a plateau. The concentration of the biocide in the carcass of the fish at the steady state was 42 times that of the concentration of water. It was also found that the biological half-life of the accumulated residues was short, about 7 days, which was determined by the elimination of the carbon 14 residues when the fish were placed in a biocide-free aquarium.

### Summary:

The biocidal activity of Clam-Trol CT-1 results from the two cationic surface active agents (DGH and Quat) in this formulation. The product's efficacy is based on its ability to alter or disrupt various membrane systems of the biofouling organisms. These same inherent properties of these agents which provide biocidal efficacy are rapidly neutralized upon adsorption to many types of naturally occurring materials thus reducing or eliminating acute toxicity to non target organisms.

Several key characteristics of Clam-Trol CT-1 will minimize its environmental impact following its application to cooling systems. These include:

- Adsorption rates of both actives are rapid and thus biocidal activity is short-lived. Both actives readily adsorb to suspend material, sediments, and the surfaces within a cooling system.
- Both of the active components in the formulation are readily biodegradable. Solutions of Quat have been shown to biodegrade by more than 90% in 2 days while solutions of DGH exhibited 70% biodegradation in 28 days.
- Clam-Trol CT-1 provides an alternative to chlorine or a number of halogenated organic or metal containing biocides that are considerably less environmentally desirable.
- Bioaccumulation of the Quat active has been determined by continuous exposure of low levels of free actives to fish, as reaching a steady state after 2 weeks. The half-life of this accumulated material is short once exposure ceases.
- An analytical field method is available for determining the presence of the actives in a treated cooling system. The method is also useful for monitoring discharges.

Biofouling treatment programs to cooling systems need to employ innovative technology that will direct applications in a most effective manner to the target organisms. Applications of Clam-Trol CT-1 can serve to protect cooling systems from both macrofouling and microfouling problems using state-of-the-art technology. No other treatment program exists that can protect a system from infestation by adult mollusks and larvae by employing seasonal applications. Effective control and protection can be accomplished within a 24 hour application.

In addition, Clam-Trol CT-1 applications can provide microfouling protection to safety-related cooling systems due to its unique fast-acting properties and its ability to permeate slime formations. These are applications that will not cause the corrosive problems that develop from continuous chlorination nor require extensive treatment periods for control.

TABLE 1

Table 1: Detoxification of Clam-Trol CT-1 with Bentonite Clay

Clam-Trol CT-1 (mg/L)	Active Clay (mg/L)	Clay: Clam-Trol	Fathead Minnow - Cumulative % Mortality		
			4 hr	24 hr	48 hr
Control	----	----	0	0	0
10 mg/L	----	----	100	100	100
-----	100 mg/L	----	0	0	0
10 mg/L	10 mg/L	1:1	0	0	0
10 mg/L	20 mg/L	2:1	0	0	0
10 mg/L	30 mg/L	3:1	0	0	0
10 mg/L	50 mg/L	5:1	0	0	0
10 mg/L	100 mg/L	10:1	0	0	0

TABLE 2

Table 2: Detoxification of Clam-Trol CT-1 with Bentonite Clay

Clam-Trol CT-1 (mg/L)	Active Clay (mg/L)	Clay: Clam-Trol	Daphnia magna - Cumulative % Mortality		
			6 hr	24 hr	48 hr
Control	----	----	0	0	0
10 mg/L	----	----	100	100	100
-----	100 mg/L	----	0	0	0
10 mg/L	10 mg/L	1:1	35	100	100
10 mg/L	20 mg/L	2:1	0	85	100
10 mg/L	30 mg/L	3:1	0	30	30
10 mg/L	50 mg/L	5:1	0	0	0
10 mg/L	100 mg/L	10:1	-	-	-

TABLE 3

Table 3: Detoxification of Clam-Trol CT-1 with Activated Carbon

Clam-Trol CT-1 (mg/L)	Activated Carbon (mg/L)	Carbon: Clam-Trol	Fathead Minnow - Cumulative % Mortality		
			4 hr	24 hr	96 hr
Control	----	----	0	0	0
----	12.5 mg/L	----	0	0	0
----	25 mg/L	----	0	0	0
10 mg/L	----	----	100	100	100
10 mg/L	12.5 mg/L	1.25:1	0	0	0
10 mg/L	25 mg/L	2.5 :1	0	0	0
25 mg/L	12.5 mg/L	1 :2	0	0	0
25 mg/L	25 mg/L	1 :1	0	0	0

TABLE 4

Table 4: Detoxification of Clam-Trol CT-1 with Activated Carbon

Clam-Trol CT-1 (mg/L)	Activated Carbon (mg/L)	Carbon: Clam-Trol	Daphnia magna - Cumulative % Mortality		
			4 hr	24 hr	48 hr
Control	----	----	0	0	0
----	12.5 mg/L	----	0	5	5
----	25 mg/L	----	0	0	10
10 mg/L	----	----	100	100	100
10 mg/L	12.5 mg/L	1.25:1	0	100	100
10 mg/L	25 mg/L	2.5 :1	0	0	20
25 mg/L	12.5 mg/L	1 :2	90	100	100
25 mg/L	25 mg/L	1 :1	100	100	100

BETZ INDUSTRIAL DIV.  
1 QUALITY WAY, TREVOSE, PA. 19053  
BETZ MATERIAL SAFETY DATA SHEET (PAGE 1 OF 3)  
EMERGENCY TELEPHONE (HEALTH/ACCIDENT) (800)877-1946  
EFFECTIVE DATE 07-10-91

Product: CLAM-TROL CT-1

PRINTED:

REVISIONS TO SECTIONS: 1

PRODUCT APPLICATION : WATER-BASED MICROBIAL CONTROL AGENT.

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

ETHYLENE GLYCOL\*\*\*CAS#107-21-1; LIVER, KIDNEY AND BLOOD TOXIN; CNS DEPRESSANT; ANIMAL TERATOGEN(HIGH ORAL DOSES); PEL/TLV: 50011111-C.

(C12-16)ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE\*\*\*CAS#64-124-85-1; CORROSIVE(EYES); PEL:NONE; TLV:NONE.

ISOPROPYL ALCOHOL(IPA)\*\*\*CAS#67-63-0; FLAMMABLE LIQUID; CHRONIC OVEREXPOSURE MAY CAUSE LIVER AND KIDNEY TOXICITY; PEL/TLV: 400PPM (50011111-5111).

DODECYLGUANIDINE HYDROCHLORIDE(DGH)\*\*\*CAS#13590-97-1; CORROSIVE; PEL:NONE; TLV:NONE.

ETHYL ALCOHOL(ETHANOL)\*\*\*CAS#64-17-5; FLAMMABLE; EYE IRRITANT; MAY CAUSE DEFATTING DERMATITIS, DIZZINESS AND HEADACHE; PEL/TLV: 1000PPM.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: AS IS	(APPROX.) 5.3	ODOR: MILD
FL.PT.(DEG.F): 116	SLTA(CC)	SP.GR.(70F)OR DENSITY: 1.022
VAPOR PRESSURE(mmHg): 23		VAPOR DENSITY(AIR*1): 1
VISC cps70F: 23		%SOLUBILITY(WATER): 100
EVAP.RATE: 1	ETHER=1	APPEARANCE: COLORLESS
PHYSICAL STATE: LIQUID		FREEZE POINT(DEG.F): -30

-----SECTION 3-----REACTIVITY DATA-----

STABLE.MAY REACT WITH STRONG OXIDIZERS.DO NOT CONTAMINATE.BETZ TANK  
CLEAN-OUT CATEGORY 'B'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

-----SECTION 4-----HEALTH HAZARD EFFECTS-----  
ACUTE SKIN EFFECTS \*\*\* PRIMARY ROUTE OF EXPOSURECORROSIVE TO SKIN  
ACUTE EYE EFFECTS \*\*\*CORROSIVE TO THE EYES  
ACUTE RESPIRATORY EFFECTS \*\*\* PRIMARY ROUTE OF EXPOSURE  
VAPORS, GASES, MISTS AND/OR AEROSOLS CAUSE IRRITATION TO UPPER  
RESPIRATORY TRACTCHRONIC EFFECTS OF OVEREXPOSURE\*\*\*  
PROLONGED OR REPEATED OVEREXPOSURES MAY CAUSE BLOOD CELL DAMAGE OR  
FUNCTIONAL IMPAIRMENT; REPRODUCTIVE SYSTEM TOXICITY; TISSUE NECROSIS AND/OR  
DERMATITIS.MEDICAL CONDITIONS AGGRAVATED \*\*\*  
NOT KNOWN

## SYMPTOMS OF EXPOSURE \*\*\*

INHALATION OF VAPORS/MISTS/AEROSOLS MAY CAUSE EYE, NOSE, THROAT AND LUNG  
IRRITATION; SKIN CONTACT MAY CAUSE SEVERE IRRITATION OR BURNS.PRECAUTIONARY STATEMENT BASED ON TESTING RESULTS \*\*\*  
MAY BE TOXIC IF ORALLY INGESTED.

## -----SECTION 5-----FIRST AID INSTRUCTIONS-----

## SKIN CONTACT\*\*\*

REMOVE CLOTHING. WASH AREA WITH LARGE AMOUNTS OF SOAP SOLUTION OR WATER FOR  
15 MIN. IMMEDIATELY CONTACT PHYSICIAN

## EYE CONTACT\*\*\*

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES. IMMEDIATELY CONTACT A  
PHYSICIAN FOR ADDITIONAL TREATMENT

## INHALATION EXPOSURE\*\*\*

REMOVE VICTIM FROM CONTAMINATED AREA. APPLY NECESSARY FIRST AID  
TREATMENT. IMMEDIATELY CONTACT A PHYSICIAN.

## INGESTION\*\*\*

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM  
DO NOT INDUCE VOMITING. IMMEDIATELY CONTACT PHYSICIAN. DILUTE  
CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

## -----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

## SPILL INSTRUCTIONS\*\*\*

VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND  
ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE  
CONTAMINATED ABSORBENT SHOULD BE CONSIDERED A PESTICIDE AND  
DISPOSED OF IN AN APPROVED PESTICIDE LANDFILL. SEE PRODUCT LABEL  
STORAGE AND DISPOSAL INSTRUCTIONS.  
REMOVE IGNITION SOURCES. FLUSH AREA WITH WATER. SPREAD  
SAND/GRIT.

## DISPOSAL INSTRUCTIONS\*\*\*

WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY  
SEWER TREATMENT FACILITY, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A  
PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT  
PRODUCT (AS IS)-DISPOSE OF IN APPROVED PESTICIDE FACILITY OR ACCORDING TO LABEL  
INSTRUCTIONS

## FIRE EXTINGUISHING INSTRUCTIONS\*\*\*

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING  
APPARATUS (FULL FACE-PIECE TYPE). PROPER FIRE EXTINGUISHING MEDIA:  
DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER

# BETZ MATERIAL SAFETY DATA SHEET

(PAGE 3 OF 3)

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----  
 USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE  
 RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.  
 VENTILATION PROTECTION\*\*\*

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS  
 RECOMMENDED RESPIRATORY PROTECTION\*\*\*

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY,  
 USE A RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE & DUST/MIST PREFILTER  
 RECOMMENDED SKIN PROTECTION\*\*\*

GAUNTLET-TYPE RUBBER GLOVES, CHEMICAL RESISTANT APRON

WASH OFF AFTER EACH USE. REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION\*\*\*

SPLASH PROOF CHEMICAL GOGGLES, FACE SHIELD

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----  
 STORAGE INSTRUCTIONS\*\*\*

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

STORE IN COOL VENTILATED LOCATION. STORE AWAY FROM OXIDIZERS  
 HANDLING INSTRUCTIONS\*\*\*

COMBUSTIBLE. DO NOT USE AROUND SPARKS OR FLAMES. BOND CONTAINERS  
 DURING FILLING OR DISCHARGE WHEN PERFORMED AT TEMPERATURES AT OR  
 ABOVE THE PRODUCT FLASH POINT.

\*\*\*\*\*  
 THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD  
 \*\*\*\*\*

## APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE  
 EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE.  
 ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: THIS IS AN EPA REGISTERED BIOCIDES AND IS EXEMPT FROM TSCA INVENTORY  
 REQUIREMENTS

...FIFRA(40CFR):EPA REG.NO. 3876- 145

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:  
 NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE, THE RCRA HAZARDOUS WASTE  
 IDENTIFICATION NUMBER IS: D001=IGNITABLE;D002=CORROSIVE(SKIN)

...DOT HAZARD/UN#/ER GUIDE# IS: CORROSIVE TO SKIN.COMBUSTIBLE UN1760/#60

...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS: NONE

...SARA SECTION 302 CHEMICALS: NONE

...SARA SECTION 313 CHEMICALS: ETHYLENE GLYCOL(107-21-1) , 21.0-30.0% ;

...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE),DELAYED(CHRONIC) AND FIRE

...MICHIGAN CRITICAL MATERIALS: NONE

NFPA/HMIS : HEALTH - 3 ; FIRE - 2 ; REACTIVITY - 0 ; SPECIAL - CORR ; PE - D