

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

November 21, 1989

NRC INFORMATION NOTICE NO. 89-76: BIOFOULING AGENT: ZEBRA MUSSEL

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is intended to alert addressees to potential problems related to biofouling of service water and cooling water systems that may result from a recently identified biofouling agent, Dreissena polymorpha (zebra mussel). It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Discussion:

The potential for biofouling has been of concern to the NRC since 1980 because biofouling can compromise the vital transfer of heat to the ultimate heat sink. The NRC issued Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," on July 18, 1989, requesting licensees to adopt either the specific recommended surveillance and control procedures delineated in the generic letter or an equally effective alternative course of action for preventing biofouling of their nuclear service water systems. This aspect of the generic letter presents the results and recommendations from an NRC research program initiated in 1982 when biofouling agents were noted to clog service water systems. The principal biofouling agents noted in the generic letter were Corbicula fluminea (Asiatic clam), Crassostrea virginica (American oyster), and Mytilus edulis (blue mussel). In 1980, the number of nuclear power plants directly affected by these agents was small, but by 1984 the infestation by these aquatic bivalves had spread to a large portion of the United States.

The following information about the zebra mussel is taken from the abstract of a paper given at the Electric Power Research Institute Service Water System Reliability Improvement Seminar at Charlotte, North Carolina, on November 6-8, 1989. The paper is entitled, "The Zebra Mussel, Dreissena Polymorpha (Pallas, 1771), in North America: Impact on Raw Water Users." The authors are R. W. Griffiths, Ontario Ministry of the Environment, Ontario, Canada; W. P. Kovalak, Detroit Edison Company; and D. W. Schloesser, U.S. Fish and Wildlife Service.

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"The zebra mussel, Dreissena polymorpha (Pallas), is a small mollusc native to the Black, Caspian, and Azov Seas that was discovered in Lake Erie of the Laurentian Great Lakes of North America in 1988. The mussel raises immediate concerns for raw water users because it can obstruct the flow of water through pipes, hoses, screens, and condensers when it occurs in substantial numbers. Biofouling attributed to this mussel was observed at several power plants, water treatment plants, and processing and industrial facilities along Lake Erie in 1989. At one power plant, densities as high as 700,000 per m² were observed in the intake canal in August. In addition, large numbers were found in main steam condensers and in the service water system threatening operation of cooling, fire protection, and dust suppression systems. Intakes of municipal water supplies along the Canadian and the United States shorelines have also been impaired. In one southeast Michigan city, drinking water withdrawal from Lake Erie was reduced 45% by the mussel."

The geographical area of immediate concern for this source of potential bio-fouling is along the Great Lakes and major tributaries and canals. This potential is the subject of an international conference at Rochester, New York, on November 28 and 29, 1989. Additional information on the meeting may be obtained from Charles R. O'Neill, Jr., of New York Sea Grant at (716) 395-2638 or Don W. Schloesser of the U.S. Fish and Wildlife Service at (313) 994-3331.

~~This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate NRR project manager.~~


Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: C. Vernon Hodge, NRR
(301) 492-1169

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

| Information Notice No. | Subject | Date of Issuance | Issued to |
|------------------------|---|------------------|--|
| 89-75 | Falsification of Welder Qualifications for Contractor Employees | 11/20/89 | All holders of OLS or CPs for nuclear power reactors. |
| 89-74 | Clarification of Transportation Requirements Applicable to Return of Spent Radiopharmacy Dosages from Users to Suppliers | 11/7/89 | All manufacturers and distributors of radiopharmaceuticals for medical use, nuclear pharmacies, and medical licensees. |
| 89-73 | Potential Overpressurization of Low Pressure Systems | 11/1/89 | All holders of OLS or CPs for nuclear power reactors. |
| 89-72 | Failure of Licensed Senior Operators to Classify Emergency Events Properly | 10/24/89 | All holders of OLS or CPs for nuclear power reactors. |
| 89-71 | Diversion of the Residual Heat Removal Pump Seal Cooling Water Flow During Recirculation Operation Following a Loss-of-Coolant Accident | 10/19/89 | All holders of OLS or CPs for nuclear power reactors. |
| 89-70 | Possible Indications of Misrepresented Vendor Products | 10/11/89 | All holders of OLS or CPs for nuclear power reactors. |
| 89-69 | Loss of Thermal Margin Caused by Channel Box Bow | 9/29/89 | All holders of OLS or CPs for BWRs. |
| 89-68 | Evaluation of Instrument Setpoints During Modifications | 9/25/89 | All holders of OLS or CPs for nuclear power reactors. |
| 89-67 | Loss of Residual Heat Removal Caused by Accumulator Nitrogen Injection | 9/13/89 | All holders of OLS or CPs for PWRs. |

OL = Operating License
CP = Construction Permit

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The geographical area of immediate concern for this source of potential biofouling is along the Great Lakes and major tributaries and canals. This potential is the subject of an international conference at Rochester, New York, on November 28 and 29, 1989. Additional information on the meeting may be obtained from Charles R. O'Neill, Jr., of New York Sea Grant at (716) 395-2638 or Don W. Schloesser of the U.S. Fish and Wildlife Service at (313) 994-3331.

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Of major immediate concern is the potential fouling of water intake structures in municipal, industrial, and power generation facilities. Fouling can result in major flow restrictions. The geographical area of immediate concern is along the Great Lakes and major tributaries and canals. This potential is the subject of an international conference at Rochester, New York, on November 28 and 29, 1989. Additional information on the meeting may be obtained from Charles R. O'Neill, Jr., of New York Sea Grant at (716) 395-2638 or Don W. Schloesser of the U.S. Fish and Wildlife Service at (313) 994-3331.

The NRC issued GL 89-13 to resolve service water system problems affecting safety-related equipment. GL 89-13 includes resolution of Generic Issue 51, "Improving the Reliability of Open-Cycle Service Water Systems." Modes of failure of the service water system addressed in the generic letter include flow blockage from biofouling, sedimentation, and corrosion agents. To determine appropriate surveillance and control measures for biofouling agents, all species that may potentially cause flow blockage problems were included in the scope of GL 89-13, which was not restricted to certain biospecies. The surveillance and control programs established in response to GL 89-13 are expected to be sufficient to keep any biofouling agent, including Dreissena polymorpha, from becoming a safety concern.

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