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JUL 14 1982

MEMORANDUM FOR: Paul F. Hayes
 Siting and Environment Branch, RES

FROM: Eugene V. Imbro, Lead Engineer
 Reactor Systems 3
 Reactor Operations Analysis Branch, AEOD

SUBJECT: WORKSCOPES FOR BIOFOULING PROJECTS

The following general comments on the draft workscope, "Safety Implications of Auxiliary Systems Biofouling at Nuclear Power Stations," and the proposal, "The Second International Corbicula Symposium," are provided below as requested by your memo of June 8, 1982. Attached for your consideration is a marked-up copy of the draft workscope reflecting the proposed changes.

1. Responses to IEB 81-03 and the ORAB service water study identified system fouling due to mud, silt, and corrosion products to be as much of a concern as biofouling. It may, therefore, be advisable to broaden the scope of the proposed study to include a review of other fouling mechanisms. I believe this would be best accomplished using the existing task structure rather than adding a separate task.
2. Before Task 1 of the draft workscope can be accomplished, it is necessary to identify the fouling organisms and other mechanisms for fouling that can pose a threat to plant safety systems. I think this is important so that the workscope can be directed towards a review of several of the more important (from a safety point of view) types of fouling. Algae and slime, for example, are also manifestations of biofouling that have received much attention due to the economic penalties they can impose on plant operation. They do not, however, represent a safety concern of the same magnitude as the Asiatic clam. Therefore, I suggest another task be added in the beginning to focus the scope of the investigation.
3. Since there are differences from plant to plant in design philosophy, operation, and nomenclature of service water and fire protection systems, it would be easier and more efficient to look at these systems generically on an elemental level to identify how piping arrangements, components, system operating conditions, and ambients are either affected by or affect bio-fouling.
4. A review of the proposed symposium indicates that it leans heavily towards the biological side of the biofouling question. Since our interests are twofold, i.e., biology and engineering, I think the program should be equally

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weighted to address the systems/operational concerns as well as the biological aspects. The addition of someone to the symposium steering committee that has experienced the operational difficulties caused by Corbicula would be helpful in organizing the engineering part of the program.

Please contact me if I can be of further assistance. I can be reached on 492-4495.

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Attachment:
As stated

cc w/attachment:
CMichelson, AEOD
CHeltemes, AEOD
KSeifrit, AEOD
TWolf, AEOD
MMasnik, NRR
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DATE	07/18/82	07/18/82	07/13/82	07/13/82		

SAFETY IMPLICATIONS OF ~~AUXILIARY~~ SYSTEMS
OF SERVICE WATER AND FIRE PROTECTION SYSTEMS
~~BIOFOULING~~ AT NUCLEAR POWER STATIONS

Objectives

The purpose of this work is to provide the NRC staff with generic information about biofouling at nuclear power stations. This work will serve as a technical reference source for the staff when addressing the extent and importance of this issue at particular facilities during CP/OL hearings, technical specification changes, and I&E inspections.

1. Identify the fouling organisms ^(and other mechanisms for fouling) that can pose a threat to the operability of plant safety-related service water and fire protection systems.

2 X. Document and review the current state-of-knowledge about the biological characteristics of fouling organisms ^{and other mechanisms for fouling identified in Task 1} that enable them to ^{degrade} infest service water and fire protection systems at nuclear power plants.

- Divide the review ^{of fouling organisms} into freshwater and marine species with emphasis on Corbicula, mussels, and oysters, and fresh water sponges.
- Divide the review of other fouling mechanisms into externally and internally generated sources with emphasis on mud, silt and corrosion products.
- Identify critical areas of importance to understanding the fouling phenomenon where information is lacking.

3 X. Conduct a review of nuclear power plant ^{safety-related service water and fire protection} auxiliary systems ~~and~~ piping and components to identify those areas that ^{are either conducive to the growth of} present a likely potential ^{organisms or the action of other fouling mechanisms} for biofouling and the reasons that this fouling might develop.

~~Categorize these systems according to the potential for fouling and the safety significance of the system/component.~~

4 3. Conduct a review of the state-of-the-art of ~~the~~ fouling control strategies and their effectiveness under various situations that have been used at both nuclear and non-nuclear power plants that are relevant to ~~auxiliary~~ ^{safety-related service water and fire protection} systems at nuclear plants.

5 A. Conduct a review of ^{plant operating conditions and abnormal occurrences and determine} factors ~~that~~ might interact with existing ^{which, if any, of these} fouling and exacerbate the fouling problems at the facility leading to a more critical situation than would exist with either the incident or the fouling alone.

- Examples of these interacting factors might be specific operating procedures, seismic events, transients, ^{resulting from an accident} ~~a flow surge through the~~ systems, etc. ^{system flow and temperature}

- Examine these events in terms of ^{the amount} ~~various degrees~~ of fouling, and ^{that systems can tolerate} the likely importance of the scenario outcome.

6 5. Produce a guidance document based on tasks 1-⁵ for the NRC staff to use when reviewing the potential significance and consequences of ~~the~~ fouling in service water and fire protection systems at nuclear power plants. This guideline should be structured to provide information on where (geographical location, ^{types of piping layouts,} ~~and plant~~ components) and under what operational conditions ~~systems~~ ^{systems} fouling problems are most likely to occur, and the predicted extent and significance of the problem. This guidance will be used to evaluate proposed licensee control and surveillance programs and their likely effectiveness in dealing with ~~the~~ fouling problems and the need for NRC required action.