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 50-323, Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Gas & Electric Co. 05000323  
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 RECIP. NAME: MIRAGLIA, F.J. RECIPIENT AFFILIATION: Licensing Branch 3

SUBJECT: Forwards info re potential net positive suction head problems w/RHR pump when taking suction on containment sump.

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Mr. Frank J. Miraglia, Jr., Chief  
Licensing Branch No. 3  
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Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

Re: Docket No. 50-275  
Docket No. 50-323  
Diablo Canyon Units 1 and 2

Subject: Containment Sump

Dear Mr. Miraglia:

The attached information responds to a question concerning potential net positive suction head problems with the RHR pumps when taking suction on the containment sump.

Kindly acknowledge receipt of the material listed above on the enclosed copy of this letter and return it to me in the enclosed addressed envelope.

Very truly yours,

Attachment

CC w/attachment: Service List

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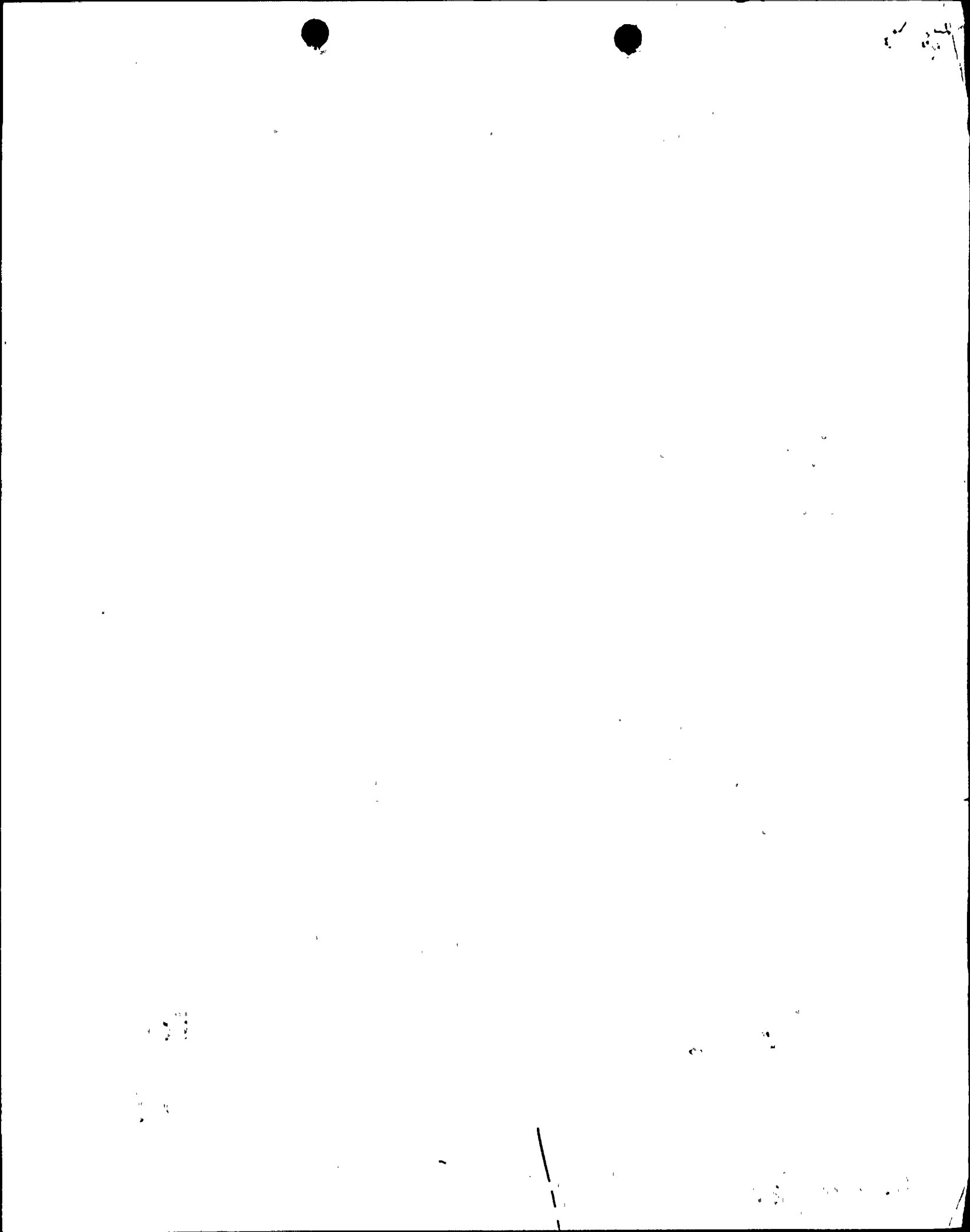
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QUESTION:

1. In addition to insulation debris resulting from LOCA effects, debris can be generated within the containment from other sources, such as (1) degraded materials (paint chips), and (2) items which are taken into and left in the containment following maintenance and inspection activities.

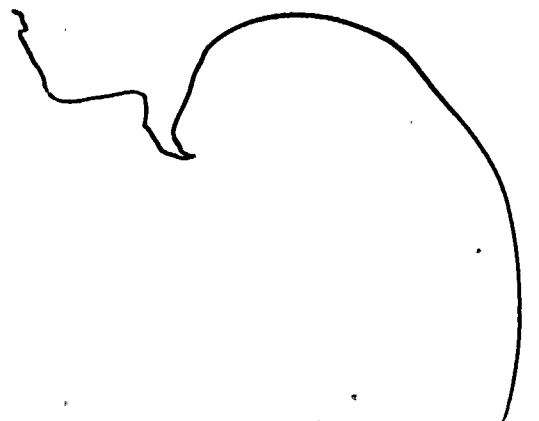
Describe how the housekeeping program for Diablo Canyon will control and limit debris accumulation from these sources. The objective is to assure that debris capable of defeating the post-LOCA core cooling functions are identified and removed from the containment. The response should include references to specific procedures or other means to assure that "as licensed" cleanliness will be attained prior to initial operation and prior to each resumption of operation.

RESPONSE:

Surveillance Test Procedure M-45, "Containment Inspection", contains the instructions for completing containment inspections following maintenance activities and refueling outages, as well as the inspection of the containment recirculation sump and the RHR piping to Valves 8982A and 8982B. The inspection following maintenance activities is conducted under Technical Specification requirement by personnel from the Operations Department and either the Maintenance Department or Technical Department. All areas where step-off pads were located (including the area adjacent to and under the step-off pad areas) are inspected and any debris is removed and recorded on the inspection sheet. All areas where maintenance was performed are inspected and any debris is removed and recorded on the inspection sheet.

The inspection following refueling outages is conducted by the Shift Foreman and a representative from either the Maintenance Department or the Technical Department. This inspection is a thorough inspection of each elevation and area in containment including below the reactor vessel, inside and outside the missile barrier, inside the containment fan cooling units, the top beam of the polar crane, etc. This inspection would identify areas where degraded materials are located and corrective actions could be required.

The inspection of the containment recirculation sump and RHR pump suction piping to Valves 8982A and 8982B is conducted by representatives of the Maintenance Department and Operations Department. The containment recirculation sump, the sump trash racks, screens, and RHR pump suction lines are inspected for debris. Any debris is removed from containment and recorded on the inspection sheet. This inspection is conducted at least once per 18 months, normally in conjunction with the inspection following refueling outages.



QUESTION:

2. Address the degree of compliance of Diablo Canyon with the following recommendations which is also set forth as item c.14 of Reg. Guide 1.82: "In-service inspection requirements for coolant sump components (trash racks, screens, and pump suction inlets) should include the following:
  - a. Coolant sump components should be inspected during every refueling period downtime, and
  - b. The inspection should be a visual examination of the components for evidence of structural distress or corrosion."

RESPONSE:

Surveillance Test Procedure M-45, (STP M-45) "Containment Inspection", specifies that "at least once per 18 months, a visual inspection of the containment sump and RHR pump suction lines to Valves 8982A and 8982B is performed. The purpose of this inspection is to check for debris which could restrict flow of water to the RHR pump suction. Furthermore, trash racks and screens are inspected for evidence of structural distress or corrosion." The procedure further states "the inspection of the containment sump and piping to Valves 8982A and 8982B will normally be conducted in conjunction with the inspection following refueling outages, provided that the interval between inspections does not exceed 18 months."

STP M-45 meets the requirements of Reg. Guide 1.82, and no modification to the procedure is necessary.

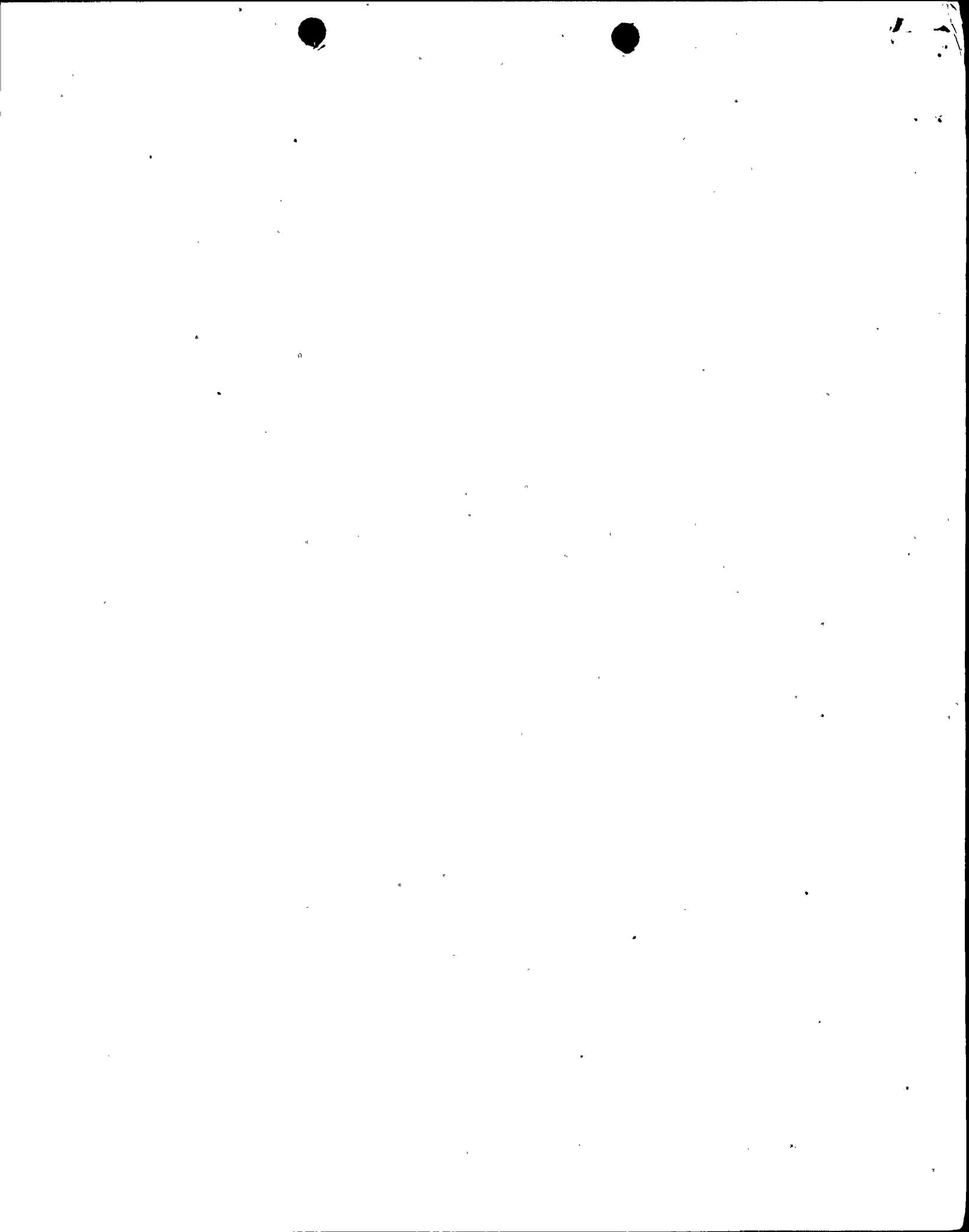
QUESTION:

3. The resolution of the concerns noted below plus the provisions of adequate NPSH under non-debris conditions, and adequate housekeeping practices are expected to reduce the likelihood of problems during recirculation. However, in the event that LPI recirculation system problems such as pump cavitation or air entrainment do occur, the operator should have the capability to recognize and contend with the problems.

Both cavitation and air entrainment could be expected to cause pump vibration and oscillations in system flow rate and pressure. Show that the operator will be provided with sufficient instrumentation and appropriate indications to allow and enable detection of these problems. List the instrumentation available giving both the location of the sensor and the readout.

RESPONSE:

Pump discharge pressure, pump motor current, and cold and hot injection flow rates are provided on the main control board. Oscillations in the above instrumentation would be indicative of pump cavitation or air





entrapment if they should occur. The operator is taught to recognize these symptoms of abnormal pump operation in his operator training program and to take corrective action such as throttling the pump discharge flow. The cold leg flow sensors are located on the outlet of each RHR heat exchanger outside containment (reference PG&E drawing 102009 Sheet 5 coordinate 55B). The hot leg flow element is located downstream of the RHR heat exchanger outside containment (reference PG&E drawing 102010 Sheet 3 coordinate 30B). The sensor for the pump motor current is located in the switchgear for these motors.

QUESTION:

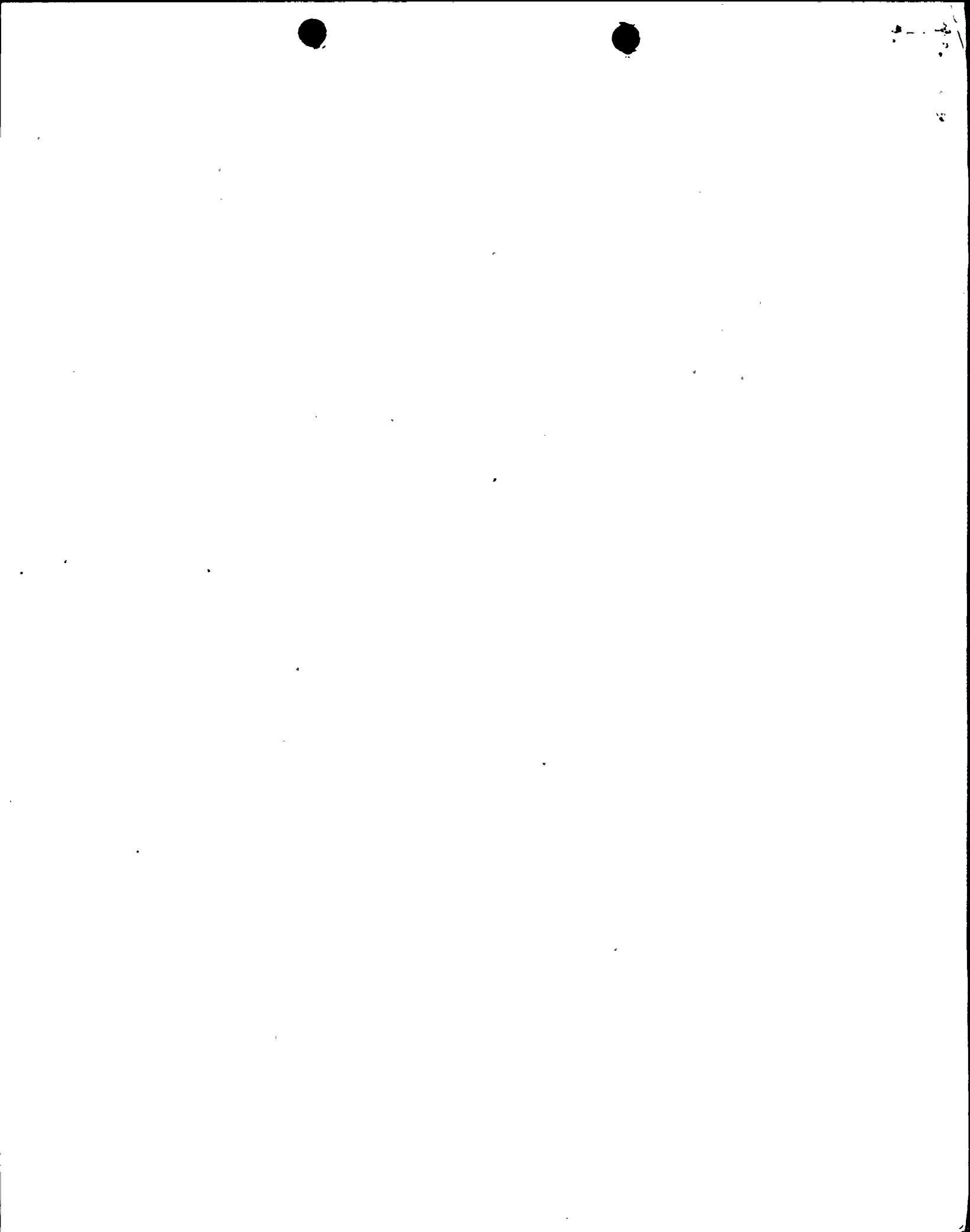
- 3a. The incidence of cavitation, air entrainment or vortex formation could be reduced by reducing the system flow rate. The operator should have the capability to perform indicated actions (e.g., throttling or terminating flow, resort to alternate cooling system, etc.). Show that the emergency operating instructions and the operator training consider the need to monitor the long term performance of the recirculation system and consider the need for corrective actions to alleviate problems.

RESPONSE:

The operator has the capability of throttling or terminating flow from the RHR pumps to either the hot or cold legs from the main control board. This will reduce net system flow and reduce air entrainment and vortex formation. Emergency Operating Procedure OP-0, "Reactor Trip with Safety Injection" covers the initial operating steps to be taken in the event of a reactor trip with a safety injection signal. After the operator takes all of the immediate actions, he proceeds into the accident diagnostics part of the procedure. As he performs these operations, he observes the containment pressure, the containment area radiation monitor and the containment recirculation sump level for abnormal levels. At this point, he is instructed to monitor containment pressure and containment recirculation sump level "through out the transient".

Furthermore, if the operator, in the performance of this procedure is referred to Emergency Operating Procedure OP-1, "Loss of Coolant Accident", the operator is instructed to monitor the levels in the "containment sump along with RWST". In addition, generic operator training includes the basic instruction to monitor all ECC system parameters whenever such a system is actuated.

With regard to the operator considering the need for corrective actions to alleviate problems, Emergency Operating Procedure OP-1 states; "During the cold leg recirculation phase, the Shift Foreman will form the plant operators into critical plant systems and equipment assessment teams. The systems or equipment to receive the greatest attention will be determined by the Shift Foreman based on knowledge of past system/equipment reliability and service." This insures that the operating staff will be responsive to unanticipated problems as they develop. These problems could include RHR pump cavitation, air entrainment, or vortex formation.



QUESTION:

4. Does Diablo Canyon utilize sand or similar materials in the containment during power operation for purposes such as reactor cavity annulus biological shielding (e.g., sand tanks or sand bags) or reactor cavity blow out sand plugs?

RESPONSE:

It has been determined that there is no sand or similar materials in the containment during power operation. Surveillance Test Procedure M-45 assures that any sand like material (e.g., oil dry, etc.) introduced by maintenance, refueling or clean up crews will be cleaned up prior to power operation.

