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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
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ADVISORY COMMITTEE ON
REACTOR SAFEGUARDS
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PDR 9/13/79

To: Paul Shewmon

From: Warren Berry

Subject: Comments on ACRS Subcommittee Meeting on Metal Components on
           July 10, 1979

My comments are directed toward corrosion and corrosion related phenomena.

1. General

In order to carry out its objectives relating to safety in the nuclear
industry, it is necessary that NRC fund research in areas where needed
information is not available. In many corrosion related areas, much of the
needed information is available or is being obtained by other organizations.
Where not available, NRC should sponsor or cosponsor research.

2. Specific

   a. Surry Steam Generator Cadaver

   I am in favor of continuing with the examination of the steam
generator being removed from the Surry Plant, if for nothing more than
ensuring that no other (as yet recognized) problems exist. Moreover, the
information gained from this examination should provide valuable direction
for the continued operation of existing PWR steam generators. I believe
that because of design, materials, and operating incidents, the corrosion
problems in present steam generators will continue, although probably at
a much slower rate (despite elimination of phosphate, change to AVT, and
tightening up on secondary water chemistry--reduced condenser leaks, etc.)
Cosponsoring of the examination by EPRI is an added bonus.

   b. Water Specifications

   Research should be conducted (continued) to develop optimum water
specifications, particularly in the areas of BWR primary coolant and PWR
secondary coolant. Model boiler and stress corrosion type testing will be
required to help define these limits.

      (1) BWR Primary Coolant   1109 079

      Information is needed on the effect of O_2 and H_2O_2 content in
BWR coolant during operation and startup/shutdown on SCC of sensitized 3045.5

to ascertain what (if any) oxygen limits are required to approach trouble-free operation conditions.

(2) PWR Secondary Coolant

Information is needed on the effect of pH, O_2, Cl, and other contaminants on corrosion and SCC of existing and future steam generator components. Of particular interest is the establishment of time-concentration tolerance limits for out of specification operation.

c. Environmental Cracking

(1) SCC

Emphasis in SCC should be directed toward establishing the environmental, fabrication, and operating variables (and their limits) that affect SCC rather than attempting mechanistic studies where the past track record is poor. SCC crack growth rates appear to be relatively fast and thus cannot be used to predict probable continued life of a component. Thus, research on SCC crack growth rates should be limited to their use in evaluating parametric effects within SCC research studies.

(2) Corrosion Fatigue

Research on corrosion fatigue crack growth rates is justified since for the most part, they are sufficiently slow that life time predictions can be made. Research on corrosion fatigue should be expanded to include off-chemistry conditions such as accidental introduction of oxygen, low pH excursions, and shut down/start up conditions (high O_2, H_2O_2, etc). Also needed is the effect of small cyclic loads that occur during steady state operating conditions, and the effect of the strain-environment spectrum for an actual plant during start up/shut down operation. Preliminary research in the area of low cyclic loads in high O_2 simulated BWR conditions, have produced cracks with the appearance and high propagation rates of SCC.