We feel that we must, therefore, add to Zittel's conclusion that inorganic zinc primers should be used in nuclear containment, but that, indeed, it will be necessary—if they are used—to account for them in the Safety Analysis Reports to the Atomic Energy Commission. It is our feeling, also, that if inorganic zinc primers are not used, accountability to the owner of the facility should be made for the frequent maintenance and high cost of same which will be required on the facility.

James R. Lopata

Carboline Company
St. Louis, Missouri

April 6, 1973

REPLY TO "COMMENTS ON 'POST-ACCIDENT HYDROGEN GENERATION FROM PROTECTIVE COATINGS IN POWER REACTORS' "

Dear Sir:

I wish to make the following response to the Letter-to-the-Editor submitted by J. R. Lopata of the Carboline Company. I regret that Lopata feels the nuclear coatings industry was slighted by my article, "Post Accident Hydrogen Generation and Control." However, it was not the intent of my article to demonstrate the acceptability, or endorse the use, of inorganic zinc-rich coatings inside nuclear containment.

My article was written in mid-1970 when post-LOCA hydrogen control via purging (venting) of pressurized water reactor containments was a much publicized subject. As I concluded in my article, purging affords an effective primary and backup means of hydrogen control following a loss-of-coolant accident (LOCA) at many reactor sites without significantly increasing the release of fission products and resulting site doses above those incurred from containment leakage alone. As for hydrogen generation, I stated that three major sources of hydrogen had to be considered: (a) the radiolysis of coolant water, (b) the zirconium-water reaction, and (c) the reaction of aluminum and zinc with the reactor building spray solution. The latter source would include inorganic zinc-rich coatings used in containment.

Provided the owner of a nuclear facility or his architect/engineer can account for all significant sources of hydrogen generation in containment, including inorganic zinc-rich coatings, in his safety analysis report and can demonstrate that purging results in acceptable site doses, the intent of my article is met. However, when a reduction in purging dose is required (i.e., a lengthening of the time before purging is required to allow for additional fission product decay), it is often sufficient just to minimize as low as practicable aluminum and zinc within containment. According to the figures presented by Lopata for a typical 1000-MW(e) plant, galvanized surfaces and inorganic zinc-rich-coated surfaces may generate ~1 vol% of the post-LOCA hydrogen, or one-fourth of the 4.1 vol% lower flammability limit for hydrogen. Galvanized and inorganic-zinc-coated surfaces will thus become primary items for reduction or elimination from containment.

Hydrogen recombiner systems provide for hydrogen removal within containment and eliminate the concern over increasing site doses by having to vent the reactor building, i.e., provided purging is not required as a backup means of hydrogen control. The recombiner obviously permits a greater allowance for hydrogen generation since the system can be properly sized to maintain the hydrogen concentration below its lower flammability limit. Thus, hydrogen from inorganic zinc-rich coatings can be more readily accommodated inside containment when recombiners are used.

Based on my experience with hydrogen generation and control, I cannot totally discount the use of inorganic zinc-rich coatings within reactor containment because of hydrogen evolution. However, even if these coatings pose no hydrogen problem, I would recommend that owners or architect/engineers further investigate the acceptability of these coatings under long-term service and LOCA environment conditions before specifying their use within containment.

Danny W. LaBelle

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June 5, 1973