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To: Dave Lockbaum/ Kim Stevens
From: Arnie Gundersen
Subject: Forensic Evidence to Support Blowout

There is one piece of forensic evidence to support the Blowout theory which to my knowledge is not yet in evidence. Specifically, the condition of the makeup demineralizers after the accident indicates that they were subjected to extreme temperature which could only have been caused by hot gases passing over them.

GPU Technical Plan TPO/TMI-072 (Bates 0006006185) states in its appendix on page A-2 that "The estimated maximum temperature experienced by the resins in the makeup and purification system was 360 degrees Fahrenheit." Note however that the makeup system had relief valves set for 80 psi. The saturation temperature of steam at 80 psia is 312 degrees; at 80 psig it is 324 degrees. Therefore, steam and water could not have been responsible for heating the resin to 360 degrees. We are certain that water entered the demineralizers after 7PM on the day of the accident and the system remained in use with water in it after that time. We can conclude that the demineralizers were damaged by temperatures of 360 degrees prior to 7PM on the first day of the accident.

There can be two causes for this high temperature. The first is that uranium and radioactive fission products trapped in the resin caused it to overheat. However, the uranium was deposited in the resins when the reactor coolant pumps were restarted on the evening of the accident, when the system was full of water. The demineralizer held 2,746 pounds of water, with 4 pounds of uranium stuck to the resin. Compared to full power, the decay heat from uranium 15 hours after shutdown is one half of one percent. There is no way that four pounds of uranium could generate enough heat to boil dry the demineralizer with 2746 pounds of water in an open system. Page A-2 of the report states that researchers could only model the resin degradation using a combination of radiation and heating, and not radiation alone.

The other alternative is that there was a blowout. The "A" demineralizer had a "crust over the resin" which was difficult to penetrate with a sample probe. Page A-6 also states that "The "A" demineralizer resin has a crusted appearance and severe channeling exists." The presence of a crust at the top of the resin indicates that it was subjected to a sudden flux of high temperature gas. The crust cannot be explained by radiational heating or radiation damage, since the radiation profile of the vessel (Figure 2-2) shows most of the radiation was concentrated in the middle. In addition, had the temperature gradually risen from uniform radiational heating of the entire resin, no surface crust would have developed. The severe channeling was then due to hot gases causing the entire resin to contract, not homogeneously, but in clumps, much the same way a down comforter dries in a hot air dryer.

I conclude on the basis of forensic evidence that sometime before 7 PM on the first day of the accident, the makeup system and its demineralizer were subjected to hot gases from a blowout.