ALERT INCIDENT ON 1/17/02 AT WASHINGTON STATE UNIVERSITY

On 1/16/02 the reactor supervisor was operating the reactor for a power calibration. The reactor acted normally through the entire calibration, and was shut down by manual scram. About half an hour later, the operator was performing a reactor startup to adjust the meters in accordance with the reactor calibration. At this point, the supercritical rod positions for the reactor were well above those from the power calibration, with the linear channel reading 100%, the power channel reading 90%, and Safety channel 1 reading 80%, with fuel temperature at 275°C. The senior reactor operator was notified, and looked at the control rods, as this behavior was consistent with a control element still inserted into the reactor core. However, rods 1,2, and 4 were properly engaged. The pulse rod air system was shown to be at the proper pressure, and the 'air engaged' light was on. At this point, the reactor was rundown, apparently normally.

On 1/17/02, in the morning, the facility director suggested that the incorrect readings might be caused by the pulse rod having been down. At this point, inspection of the pulse rod got the rod stuck at a point about two inches above full down.

Having the pulse rod stuck in an up position is considered to be an alert class emergency. According to the emergency plan, the first procedure for an alert class emergency is to evacuate the building, which happened at about 9:00 this morning, then call the campus communications center, which occurred at about 9:10. The type of emergency had already been determined. Then, looking at the stuck rod procedure, it was determined that there was no radiological or reactor safety hazard with the reactor shut down as it now was.

Immediately after notifying the campus communications center, A call was placed to the Nuclear Regulatory Commission. After reaching the regional office, WSU staff were placed on a phone bridge with several members of the Commission, to describe the incident.

The basic status of the reactor at this point was that it was in a stable configuration with no perceived radiological threat, although no de-escalation of the emergency classification was planned until further consultation with the Reactor Safeguards Committee.

On the afternoon of January 17, 2002, the Reactor Safeguards Committee was apprised of the situation and decided that it was acceptable to end the emergency classification, and carry on with the process of recovery. The NRC and campus communications center were properly notified.

Over the next several days, the pulse rod and drive system was removed from the core according to the standard operating procedure. The actual 'stick' was found to have occurred not in the pulse rod drive, but rather in the hold-down tube and guide tube assembly. (Basically, the pulse rod drive sits on the bridge, while the actual rod travels up

and down in a guide tube that is buckled into one of our fuel clusters. Between the two is a hold-down tube, filled with water, that fits onto the guide tube, and is bolted to the rod drive.) The poison section of the pulse rod was found to have a scrape and gouge in it, indicating that the problem was caused either by some object or objects having found its way into the pulse rod guide tube, or by a dent or burr in the guide tube itself.

The pulse rod hold-down tube was removed, and visually inspected, with no object that could have caused the rod to stick present. This left the guide tube as the only place where the problem could have occurred. The fuel cluster containing the guide tube was removed from the core and placed into a rack. Unfortunately, the guide tube is basically permanently stuck (removal of the guide tube was attempted, but it wouldn't come free) to a set of self-protecting fuel rods. So, to try to get a look inside the guide tube, the facility acquired a small, inexpensive bullet-type camera, covered it with epoxy to make it waterproof, and sent it down into the guide tube. The guide tube appeared to have no defects in the visible area, (the darkened bottom of the guide tube could not be seen,) so a rod with two strong magnets attached was lowered into the tube, retrieving a steel screw and a washer, much rusted. These are believed to be the cause of the problem.

To find anything non-magnetic that might be found within the guide tube, an aluminum pole was sent down with backwards duct tape on the end. The pole returned only with a trace of rust dust. (A similar setup was tested in a bucket and did, in fact pick up a screw that was used as a test object.) Finally, a slug of polyethelene larger than the actual pulse rod was put down the guide tube, and was removed with no scratches that could have been caused by foreign material in the tube.

Therefore, the guide tube appears to be back in working order, and replacement of the fuel, control rods and drives, and restart of the reactor is planned, as soon as the incident is reviewed, and repair approved by the University Reactor Safeguards Committee.

The most important part of evaluating any such incident, however, is to ensure that the failure should not happen again. It is obvious that the foreign material made its way into the guide tube after being dropped from the top of the reactor. Therefore, since there is mechanical work that must occasionally be performed above the reactor, the facility will make it a matter of policy not only to use care when working with small objects on the reactor bridge, but also to mask off nearby areas of access to the pool with either tape or paper when this type of work must be performed.