CT-1803

PDR 051385

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SUBJECT: MIST PMG MEETING
29 and 30 January 1984
Palo Alto, California

March 2, 1985

A number of presentations were made the first day of the three day meeting. On the second day there was a tour of the SRI facility so I did not attend. The third day agenda included separate effects work.

RELAP5 and TRAC are bing used to help develop test procedures. The codes are weak in some respects and their use on MIST may build in models that will not extrapolate to full scale. The emphasis should be on developing confidence in predictions of full scale plant behavior. Unfortunately the focus is on MIST with its many weaknesses.

A presentation of INEL plans for RELAP5 - Mod 2/ Cycle 36 was given by Gary Johnson. The fiscal 1985 period will yield a release of yet another version, an updated users manual, continuing effort to incorporate a two-step (time) scheme (which LANL claims is slower then theirs), and provide user support. They are into the develepmental assessment phase. A large number of experiments will be used. They are still having trouble with steady-state. They intend to model the TMLB' transient for RESAR. They will model core recirculation with three annular rings. The modeling of core recirculation with RELAP5 is based on poor physics. I think cycle 36 is the end of RELAP5 development.

B & W is evaluating the above code to assure themselves that the code is okay before making a large number of runs. Unlike YAEC, they are using the latest version. They are working very close with INEL in this effort. For an experimental program that is well on its way, this seems to be a strange way to do business. It will be three or four months before the code is in hand well enough to do calculations. The experiment seems to be in the lead not the code. The code is to be the tool for full scale plant calculations. How can the experimental program be designed to validate a code whose problems are unknown? One needs to know its idiosyncracies before examining them.

RELAP5 pretest matrix is being prepared to verify that test procedures are properly conducted. The focus is the facility. We need to know how the facility non-prototypic aspects impact on the goals. The only way I see to do this is with TRAC. This is particularly important now that no separate effects study of the downcomer will be conducted. We must not forget that one of the

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key NRR issues is loop to loop interactions and this may well take place via multi-dimensional flow in the downcomer.

Bob Jones of NRR noted that the MIST facility cannot address problems where a multi-dimensional downcomer is important. If this is the case, then the importance of multi-dimensional flow in the downcomer had better be established soon enough to impact on future test plans. Here again, the only hope seems to be fuly three-dimensional TRAC calculations of plant behavior. Although this may be expensive, it should be done soon. Thad Knight, LANL, has done TRAC calculations of the MIST behavior and believes the MIST downcomer is one dimensional. This is a major NRC program. It dominates the T/H area. A value/impact assessment is needed to be sure that 1) a major issue is not unresolved and 2) if it is, enough value is left to continue the program.

RELAP5 is an ill posed mathematical representation of the real world as is TRAC. This is not a problem if the code user is experienced. That they are ill posed is demonstrated by effect of nodalization on answers. Even the code developer didn't know how nodalization changed time step sensitivity. This is another example of why NRR contractors responsible for licensing calculations must be involved in doing calculations for comparison against the results of experimental programs. They need the practice.

TRAC-PF1 modeling of the MIST AFW seems to be hit or miss. The number of tubes wetted is just changed until the experimental data is matched. Unfortunately the data is from a 19 tube SG. We should be trying to answer questions about the adequacy of modeling full size SG which means understanding the physics not just replicating 19 tube SG data by post-diction.

The TRAC-PF1 predictions show the flow reversing in the intact cold leg. Theofanus argues that the flow should be counter current with SI flow towards the downcomer. Codes like TRAC cannot handle this. The artifical one-dimensional calculations lead to prediction of the wrong behavior. The code calculations may be correct for a two inch pipe (MIST) but are certainly not for large pipes found in a plant. Not being able to predict counter current flow almost always results in reverse flow. How important this is will be a function of what one is looking at.

Plant calculation using TRAC are the responsibility of someone other than Mike Young. This means that the pace is not set by his needs. It seems to me that with IST being a major program, the plant calculations should be done. Someone needs a shove.

A very well though out separate effects study of hot leg and U-bend behavior is being carried out by Ishii at ANL. He found, under a wide range of flow conditions, oscillatory behavior that

is of sufficient amplitude that it could couple with other loops in an unpredicable way. He furtner argues that the processes governing flow in the hot leg will be diameter dependent until the diameter exceeds 15 cm. (contrast this with MIST where the diameter is much less).

SAI is conducting two separate effects programs for EPRI. One deals with flow regimes in the hot leg. The diameter of the simulated hot leg is much larger than the limiting value of 15 cm. given by Ishii. Slug flow did not occur. Rather, the flow appears to stay in the churn-turbulent flow regime. The different flow regimes will result in different amounts of coolant inventory in the hot leg. The time to loss of natural circulation will also be affected by the flow regime.

The second separate effects experiment is to determine certain needed characteristics of the OTSG generator being used in MIST. Early B & W experiments in this area were with air and water. SAI will inject cold AFW into a steam environment. The results will be used for model development as well as MIST program planning. The primary product will be a heat transfer model. It's not clear to me that a 19 tube SG is big enough for the model to generate enough knowledge for use in predictions at full plant scale.