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MEMORANDUM FOR: R. Wayne Houston, Chief
Accident Evaluation Branch
Division of Systems Integration

THRU: T. R. Quay, Leader
Systems Analysis Section, AEB

FROM: Harry E. Krug
Systems Analysis Section, AEB

SUBJECT: MINUTES OF CONTROL ROOM HABITABILITY MEETING
HELD NOVEMBER 18 & 19, 1980 IN BETHESDA

4-11-80
 11-11-80
 11-11-80

The meeting minutes are enclosed along with an attendance list. The persons receiving a copy of these minutes include all attendees plus those indicated on this memo.

HEP Krug
 Harry E. Krug,
 Systems Analysis Section
 Accident Evaluation Branch
 Division of Systems Integration

cc: S. Ramos, NRC
J. Dodds, Bechtel

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MINUTES OF THE MEETING WITH PNL AND OTHERS ON CONTROL ROOM HABITABILITY

The control room habitability meeting was held on November 18 and 19, 1980, in Bethesda as scheduled. A list of attendees is given in Enclosure I.

The purpose of the meeting was to:

1. discuss applicability of the Bechtel control room X/Q formulation to the Susquehanna station and the potential applicability of this X/Q formulation to other plants;
2. discuss Pacific Northwest Laboratory's progress on the contract for control room habitability evaluations as required by Task Action Plan (TAP) item III.D.3.4 ("Control Room Habitability") of NUREG-0660.

Summary for November 18, 1980

I. THE X/Q FORMULATION

Two concerns were raised concerning the X/Q formulation by the meteorology specialists present:

1. a more appropriate value of the coefficient "K" might be 4 or 5 rather than 2 as used by Bechtel; and
2. the X/Q formulation may not be applicable at certain angles from the normal to the front of building. Wind at these angles may result in concentration levels higher than what would be predicted by the various models. Specifically, with respect to the Susquehanna plant, the X/Q formulation problems arise, in part, because of the close proximity of the single control room inlet to the back of the reactor building. It appears that a generic formulation capable of accounting for such close-in receptor points may be at least a few years off.

Further, it was felt that the best hope for an adequate quantitative evaluation of the as-built configuration may be produced through wind tunnel tests. Discussion of the wind tunnel tests made it clear that the test geometry and conditions would have to be carefully and completely designed. It would be prudent to seek approval in advance of such a specific test from NRC. Nevertheless, it was believed that such a test, including an adequate number of wind direction angles, could be performed for less than \$50,000.000.

The sense of the group was that such a test might show that the as-built configuration at Susquehanna is acceptable. Presumably if the existing control room intake location were found unacceptable, it would be prudent if the test provided definitive information concerning acceptable locations for an additional inlet(s).

The possibility of achieving an acceptable geometry at Susquehanna by simply increasing the height of the SGTS stack was discussed. This option may well provide one acceptable solution. Clearly, if a properly built stack were "very tall", the configuration would be found to be acceptable. Estimation of the proper height of the stack was not pursued, in part, because of concern that, during startup of the STGS at the beginning of a postulated accident diffuse leakage (which short-circuits the STGS vent to the atmosphere outside the reactor building) will occur. In the case of the Susquehanna station, there appear to be a number of good engineering reasons why this assumption may be unduly conservative. This option, however, could be evaluated further, and it is possible that a higher stack may provide an acceptable solution.

The applicability of the X/Q formulation as proposed by Bechtel to control room ventilation intake locations experienced at other plants is questionable. Within the next two weeks, PNL will consummate, with NRC concurrence, a subcontract with Ray Hosker of ORNL to assist in the review of generic formulations on control room X/Q's. In addition, within the same time frame, Mr. Hosker has agreed to: (1) document his comments concerning the applicability of the Bechtel X/Q formulation to the Susquehanna station, and to (2) provide some preliminary information comparing the Bechtel, Wilson and Murphy-Campe X/Q models. This information is expected to be generated as part of the subcontract to PNL.

Mr. Hosker indicated that the Murphy-Campe correlation was conservative and that while the Wilson correlations were also conservative, it is more realistic than the Murphy-Campe model.

Our present perception is that the review of the operating reactor control room X/Q under III.D.3.4 will result in the identification of plants in three categories: (1) acceptable, (2) not acceptable and (3) questionable. It is the consensus of the committee that a task force of three to five principals, including strong representation by those expert in the interpretation of wind tunnel test results, can perform rapid evaluations (given adequate information). PNL has agreed to provide drawings and projection positives of the questionable cases for the review and discussion.

Although the exact protocol has not yet been established, the current thinking is that the review of the questionable cases will identify those that are acceptable and those which will require additional modification before acceptability can be judged. In the latter case, suggested modifications may be identified. For the acceptable cases, a lower limit on the control room X/Q will be specified by the task force.

II. WIND TUNNEL TESTS

The committee indicated that wind tunnel tests for understanding air flow patterns in terrain containing structures is as much art as science. For some structural configurations, small variations in incident air flow angles can give large variations in the X/Q's. Thus the effects of wind directions must be thoroughly examined in the tunnel.

Recent information indicates that Halitsky's tests were too laminar, yielding wake effects which were too wide, and underestimating the effects of building reattachment zones. Generally speaking, however, Halitsky's results are more conservative than the recent results for those incident angles measured by Halitsky. Unfortunately, as the case of Susquehanna points out, the application of simple correlations to certain as-built configurations is not meaningful for all wind directions of interest. Further clouding the applicability of simple calculations, in some cases, is the presence of cooling towers and terrain features of significant size to make the application of a generic formulation questionable.

With respect to the value of wind tunnel test data, the attendees pointed out that flow field studies should be performed along with concentration measurements. Being able to compare the two allows much greater confidence in the results.

Summary for November 19, 1980

Dennis Murphy and Harry Krug met and discussed the status of the PNL contract for Control Room Habitability and also discussed the meeting of the previous day.

Staff comments on the proposed PNL review check list and evaluation summary letters were discussed. Mr. Murphy agreed to initiate a subcontract with Ray Hoskins of NOAA within the next two weeks to: assist in the generic formulations of X/Q's, document his comments concerning the applicability of the Bechtel X/Q formulation to the Susquehanna station, and to provide some preliminary information comparing the Bechtel, Wilson and Murphy-Campe X/Q models.

List of Attendees - - Meeting of November 18 & 19, 1980

Name	Organization
Harry Krug	NRC/DSI/AEB
Ted Quay	NRC/DSI/AEB
Dennis Murphy	Battelle PNL
Bob Scherpelz	Battelle PNL
Jerry Sagendorf	NOAA/ARL
Ron Drake	Battelle PNL
Earl Markee	NRC/DSI/AEB
Ray Hosker	NOAA/ATDL (Oak Ridge)
Ken Murphy	NRC/DSRR
Kazamieras Campe	NRC/SAB
Frank Akstulewicz	NRC/DSI/AEB
Leta Brown	NRC/OSD
Robert Kornasiewicz	NRC/OSD