Docket No. 70-687

MEMORANDUM FOR: Gary Comfort
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   Facilities Section
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Division of Industrial and
   Medical Nuclear Safety, NMSS

THRU: George H. Bidinger, Section Leader
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FROM: Robert E. Wilson
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SUBJECT: SAFETY EVALUATION REPORT, CINTICHEM, INC., TUXEDO, NEW YORK,
STORAGE OF URANIUM IN THE GAMMA PIT

Background

During an inspection of the licensee's facility, an inspector noted that two
types of underwater uranium storage racks were arrayed near each other. The
licensee had evaluations for the safety of the individual rack arrays but not
for the interaction between them. Cintichem responded with an evaluation
(reference 1) largely based on the solid angle method, which affirmed that the
two rack types have little interaction between them.

Discussion

The evaluation supplied by Cintichem (reference 1) used an unusual application
of the solid angle method. Because one of the conditions for the normal use of
the method is that fully flooded arrays have essentially no interaction, it is
not commonly used for underwater storage interaction studies. A type of the
solid angle method was discussed (reference 2) by Henry which could extend the
solid angle method to predict critical array conditions for submerged units.

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1) Letter, Robert A. Strack to Ronald R. Bellamy, "Unresolved item
(70/687/89-01-05) Storage of Uranium in the Gamma Pit," dated May 25, 1989.
2) H.F. Henry, Extensions of Neutron Interaction Criteria, K-1478, September 1961.

This was the method and reference used by the licensee. The method, as applied to an array for which Cintichem has calculations, showed a K_{eff} value 30 percent low. Cintichem adjusted the array value 30 percent higher than the underwater solid angle method calculated and concluded the fuel element rack and total array K_{eff} would be 0.5827. The calculations indicated trivial interaction between the rack types. This method would need to be validated to the standards of ANS-8.1.

The staff performed a series of computer calculations, using KENO-Va with Hansen-Roach cross sections in SCALE. Based on information in the Cintichem letters, the calculations showed that the reactor fuel element rack has a K_{eff} of 0.57 and that together the array of the reactor fuel element racks and waste storage containing rack have essentially the same value.

Conclusion

It is concluded that the rack types do not have a significant interaction which would effect the approved margin of safety.

Original Signed By:

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