CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Nuclear Criticality Safety - Tennessee Industries Week Short Course (20.01402.158)

DATE/PLACE: August 12-16, 2002, University of Tennessee, Knoxville, Tennessee

AUTHOR: Lane Howard

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PERSONS PRESENT:

Instructors: Dr. H.L. Dodds, C.M. Hopper, D.A. Reed, R.G. Taylor, Dr. R.M. Westfall.

Participants: Lane Howard (CNWRA), Timothy Ake (Framatome ANP, Inc.), Brian Bailey (H&R Technical Associates, Inc.), Jim Lewis (United States Enrichment Corporation), Julio Lopez (ENUSA Industrias Avanzadas S.A.), Mark McHugh (WESKEM), John Wallace (United States Enrichment Corporation).

BACKGROUND AND PURPOSE OF TRIP:

The focus of the course was on criticality safety with emphasis on standards, regulations, review of accidents, hand calculation methods, subcritical limits, operating limits, code validation techniques, criticality safety evaluations, and transient excursion modeling. The purpose of the trip was to obtain up-to-date training in the practical application of criticality safety to facilitate reviews related to the conduct of analyses needed for pre- and post-closure criticality safety.

SUMMARY OF PERTINENT POINTS:

The training course was taught by five instructors who are currently nuclear criticality safety specialists including Dr. Dodds who is the Nuclear Engineering Department Head at the University of Tennessee and the course facilitator. The instructors' combined experience level in the field was over 120 years. They provided many practical examples from on-going work in this field as well as numerous references and sources of additional information.

SUMMARY OF ACTIVITIES:

The training consisted of a one-week long course from 8:30 to 5:00 PM daily. The course covered the following topic areas.

Day 1:
Review of accidents and anomalies
Standards and regulations
Neutron cross sections
Transport codes and applications

Day 2:
Accident Modeling
PRA and human factors
Single homogeneous unit criticality data
Conversions using hand calculation methods

Day 3:
Homogeneous versus heterogeneous systems
Loosely coupled arrays of units
Approaches to criticality safety evaluations
Examples of criticality safety evaluations

Day 4:
Subcritical limits
Operating limits and controls
Code validation
Response to off-normal conditions and alarm system considerations

Day 5:
Transient excursion modeling
Excursion applications and examples

CONCLUSIONS:

The course provided good training in the current state and methods of nuclear criticality safety as well as a historical perspective and in-depth review of the criticality accidents that have occurred. The review of accidents and their associated effects provides insights into the associated risk in criticality safety analyses.

PROBLEMS ENCOUNTERED:

None.

PENDING ACTIONS:

None.

RECOMMENDATIONS:

This course is recommended for other staff seeking an intensive update in nuclear criticality safety theory, procedures, and practices as well as access to professionals working and conducting research in this field. A number of additional courses are taught as a part of Tennessee Industries Week that appeared to be well done and informative. These include Radiological Assessment, Bayesian Reliability Analysis, and Monte Carlo Analysis.

SIGNATURES:

Lane Howard
Senior Research Engineer, Performance Assessment

9/10/02
Date

CONCURRENCE:

Gordon Wittmeyer
Manager, Performance Assessment

9/10/2002
Date

Budhi Sagar
Technical Director

9/11/2002
Date