CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: RESRAD Family of Risk Assessment Codes Training Course
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DATE/PLACE: April 29-May 2, 2003
Argonne National Laboratory, Woodridge, IL

AUTHOR: Igor Chichkov

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PERSONS PRESENT:

Instructors: Dave J. LePoire, John Arnish, Environmental Assessment Division, Argonne National Laboratory.

Participants: Igor Chichkov, Center for Nuclear Waste Regulatory Analyses, Jim Barber, Duratek Inc., Christopher W. Becker, University of Michigan, Laurie Crutchfield, BWXT Y-12 National Security Complex, Jacqueline Gillings, Ecology & Environment Inc., Brett A. Houser, Syngenta Crop Protection, James Prowse, Shaw Environmental & Infrasturcture Inc., Philip A. Simpson, University of Michigan, Claude Wiblin, Consultant.

BACKGROUND AND PURPOSE OF TRIP:

The RESRAD family of codes is approved by the NRC for dose evaluations by licensees involved in decommissioning, NRC staff evaluation of waste disposal proposals, and dose evaluation of site decommissioning proposal being reviewed by NRC staff. The purpose of the trip was to receive training in the application of the codes to radiation dose analyses.

SUMMARY OF PERTINENT POINTS:

The training course was taught by the code developers. This four-day course introduced participants to the basic modeling approaches of the RESRAD and RESRAD-BUILD computer codes. The course was split between class lectures and hands-on problem sets. The lecture portion describes the models and key parameters used by RESRAD and RESRAD-BUILD to derive residual radioactive material guidelines in soil and buildings. The hands-on problem sets allowed participants to work with the RESRAD and RESRAD-BUILD codes at their own pace, solving problems designed to demonstrate the features of the codes important for pathway modeling. The latest probabilistic versions of RESRAD and RESRAD-BUILD were used.

SUMMARY OF ACTIVITIES:

Participated in four-day long training course from 8 to 5 pm daily.

Day 1: The course started with opening remarks, introduction and RESRAD family codes overview. The RESRAD methodology was explained including available radionuclide library, contaminated soil zone, unsaturated zone and saturated zone radionuclide transport. Detailed description of RESRAD environmental pathway models was provided including direct exposure, inhalation, ingestion of plant foods, ingestion of meats, ingestion of milk, ingestion of aquatic foods, ingestion of water, ingestion of soil, and radon. Special models for H-3 and C-14 were also described. Mathematical equations for the models incorporated into RESRAD code were explained and the references for the RESRAD default values were provided. RESRAD inputs and outputs were demonstrated. Practical exercises illustrating various RESRAD features followed. The solutions to the hands-on exercises were provided and the questions were answered.

Day 2: This portion covered the RESRAD data requirements and gave recommendation for input data collection. MARSSIM methodology was reviewed and RESRAD use for calculation of Derived Concentration Guideline Levels (MARSSIM cleanup criteria) was demostrated. RESRAD sensitivity analysis features were also described and RESRAD output plotting capabilities were demonstrated. An overview of RESRAD verification and validation was also provided. Practical exercises illustrating the data entry and sensitivity analyses followed. The solutions to the hands-on exercises were provided and the questions were answered.

Day 3: This part covered RESRAD-BUILD methodology including source and receptor geometry, external gamma, radioactive material inhalation and ingestion pathway models. RESRAD-BUILD inputs and outputs were demonstrated. The RESRAD-BUILD input data requirements were also explained and the RESRAD-BUILD verification and validation overview was provided. The practical exercises followed including problems involved multiple sources and multiple receptors. The solutions to the exercises were provided and the questions were answered.

Day 4: This day was devoted to the review of the probabilistic RESRAD and RESRAD-BUILD codes. Available probability distributions for physical, behavioral and metabolic parameters were described. The probabilistic RESRAD and RESRAD-BUILD inputs and outputs were demonstrated. Correlation between input parameters and regression analysis capabilities of RESRAD code were explained. Verification and validation was covered. The practical exercises followed, the solutions to the exercises were provided and the questions were answered.

The exercises were simple, practical for health physics and dose pathway analyses—no complex problems were presented. The instructors offered their help based on time availability. The latest versions of RESRAD family codes and the supporting documentation can be downloaded from the RESRAD web site http://web.ead.anl.gov/resrad/home2/

CONCLUSIONS:

The course provided good training for beginners in the application of RESRAD to dose pathway analyses for simplified configurations and simplified radiation sources. Instructors selected various simplified practical examples to demonstrate a wide range of the code capabilities. The

course was well structured and taught with even and balanced pace and rhythm. The instructors were readily available for help during class exercises.

PROBLEMS ENCOUNTERED:

None

PENDING ACTIONS:

None

RECOMMENDATIONS:

Training course is recommended for other Center staff who seek a beginner course in dose analyses applications of RESRAD family codes.

SIGNATURES:

5/15/2003

Igor Chichkov
Research Scientist

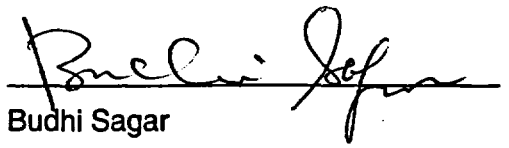
Date

CONCURRENCE:

5/15/2003

Gordon Wittmeyer, Manager
Performance Assessment

Date



5/16/2003

Budhi Sagar
Technical Director

Date