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TITLE: TRAC CODE DEVELOPMENT STATUS

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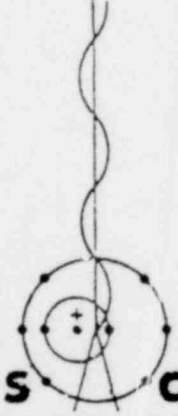

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TRAC CODE DEVELOPMENT STATUS*

by

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TRAC is an advanced, best estimate computer program for analyses of postulated accidents in LWRs. It features a nonhomogenous, multidimensional fluid dynamics treatment; nonequilibrium thermodynamics; detailed heat transfer and reflood models; and a flow-regime dependent constitutive equation package to describe the basic physical phenomena that occur under accident conditions. TRAC can calculate initial steady-state conditions complete accident sequences.

The first version of TRAC, called TRAC-P1, is primarily directed toward loss-of-coolant accidents (LOCAs) in pressurized water reactors (PWRs). A refinement of this version, called TRAC-P1A, was released to the National Energy Software Center (NESC) in March, 1979. An improved version, designated TRAC-PD2, will be released in December and will contain improved reflood and heat transfer models. A fast-running version called TRAC-PF1 will be released in March of next year. TRAC-PF1 will be capable of treating noncondensible gases and a wider range of accident types, including transients such as the Three Mile Island incident. TRAC-PD3 will be released next year and will provide detailed analyses of Anticipated Transients Without Scram (ATWS), Reactivity Insertion Accidents (RIAs), and operational transients.

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*Work performed under the auspices of the United States Nuclear Regulatory Commission.

During the past year, significant gains were made improving the hydrodynamics, heat transfer, and reflood models in the code. Of particular importance are a two-fluid model for one-dimensional components, improvements to the constitutive packages, a fuel conduction model with an automatic noding feature, and a dynamic gap conductance model. Progress was also made in speeding the calculations and optimizing the programming. Numerical difficulties which resulted in water packing and in a lack of mass conservation have been resolved. The first version of a new interactive computer graphics package was completed to provide detailed plots of TRAC results. Development was begun of a fast running version of TRAC which will execute much faster than detailed versions. To be included in this code are a small break model and a separate field for treating non-condensable gases. A three-dimensional space-time kinetics treatment is now under development. Details of these efforts and others are highlighted on the attached copies of the slides.

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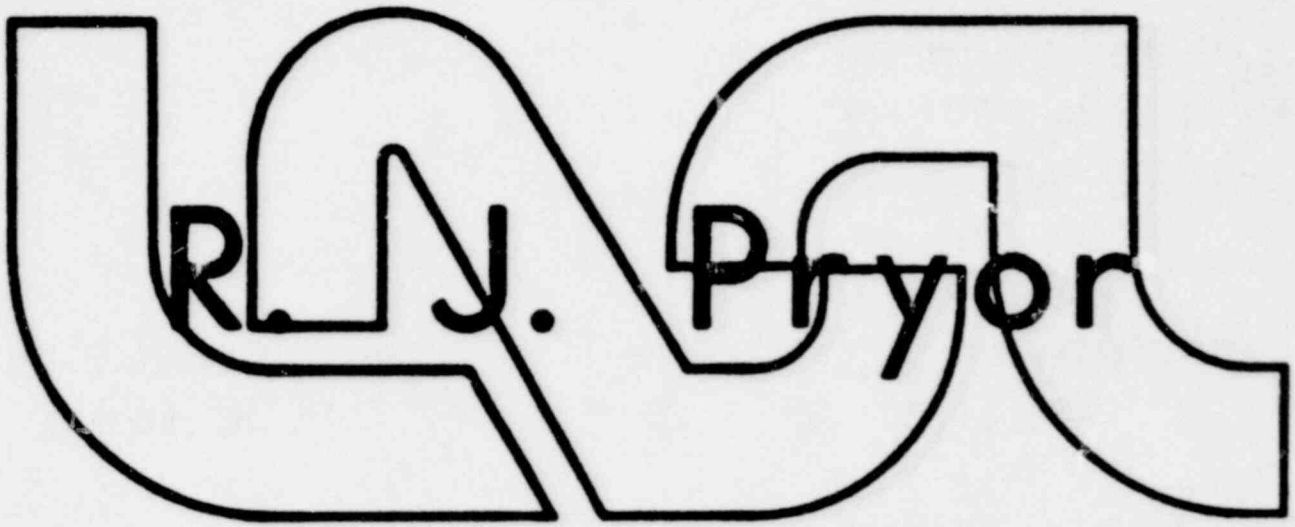

ENERGY DIVISION
LOS ALAMOS SCIENTIFIC LABORATORY

NOVEMBER 7, 1979

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TRAC

TRANSIENT REACTOR ANALYSIS CODE

Characterization:

AN ADVANCED BEST-ESTIMATE COMPUTER CODE FOR LWR ACCIDENT ANALYSIS

Objectives:

- PROVIDE VERIFIED ANALYSES OF POSTULATED ACCIDENTS IN FULL-SCALE LWRs
- EVALUATE MARGINS OF CONSERVATISM IN LICENSING CODES
- PROVIDE DETAILED ANALYSIS OF KEY PROBLEM AREAS. (E.G. STEAM BINDING. MULTIDIMENSIONAL EFFECTS. ETC)
- PROVIDE DESIGN ASSISTANCE FOR NEW LARGE-SCALE REACTOR SAFETY EXPERIMENTS

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TRAC DESIGN FEATURES

- TREATS ALL ACCIDENT PHASES (E.G.,BLOWDOWN, BYPASS, REFILL, REFLOOD) IN A SINGLE CALCULATION
- TRANSIENT AND AUTOMATIC STEADY STATE
- MODULAR PROGRAMMING
- EFFICIENT SOLUTION STRATEGIES
- TRIPS, GRAPHICS, DUMP/RESTART

TRAC MODELING FEATURES

- MULTIDIMENSIONAL FLUID DYNAMICS
- NONHOMOGENOUS, NONEQUILIBRIUM MODELS
- FLOW REGIME, DEPENDENT CONSTITUTIVE EQUITIONS
- WALL AND FUEL ROD HEAT TRANSFER INCLUDING REFLOOD QUENCH FRONT CAPABILITY
- NO DIALS

PROGRESS SINCE LAST MEETING

- TRAC-P1A RELEASED
- THERMO PROPERTIES IMPROVED
- NETWORK SOLUTION METHOD IMPLEMENTED
- HEAT TRANSFER AND REFLOOD MODELS IMPROVED
- TWO-FLUID, ONE-DIMENSIONAL MODEL DEVELOPED
- INTERACTIVE GRAPHICS POST-PROCESSOR COMPLETED

CURRENT RESEARCH ACTIVITIES

- IMPROVED REFLOOD MODEL
- ADDITION OF AIR FIELD
- IMPROVED HEAT TRANSFER MODEL
- TWO-FLUID MODEL IN 1-D COMPONENTS
- COARSE MESH VESSEL

CURRENT RESEARCH ACTIVITIES (Cont.)

- CRITICAL FLOW MODEL
- 3-D SPACE-TIME KINETICS
- IMPROVED GAP CONDUCTANCE MODEL
- IMPROVED TRIP AND CONTROL LOGIC
- HIGHER ORDER NUMERICAL METHODS
- IMPROVED COMPUTER GRAPHICS PACKAGE

TRAC NAMING CONVENTION

TRAC-XYN WHERE:

X=Reactor type

P-PWR
B-BWR

Y=Calculation option

F-FAST
D-DETAILED

N=Version number

TRAC RELEASE AND DEVELOPMENT SCHEDULE

VERSION	TARGET DATE
TRAC-P1	12/77
TRAC-P1A	3/78
TRAC-PD2	12/79
TRAC-PF1	3/80
TRAC-PD3	10/80

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