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DATE OF MEETING

02/09/2000

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Docket Number(s)

Plant/Facility Name

TAC Number(s) (if available)

Reference Meeting Notice

Purpose of Meeting
(copy from meeting notice)

Commission Briefing by the Office of Nuclear

Regulatory Research

NAME OF PERSON WHO ISSUED MEETING NOTICE

Jocelyn Mitchell, contact

TITLE

Senior Level Technical Advisor

OFFICE

RES

NRC FILE CENTER

DIVISION

DRAA

BRANCH

RPER&WM

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COMMISSION BRIEFING

OFFICE OF

NUCLEAR REGULATORY RESEARCH

FEBRUARY 9, 2000

AGENDA

- **Role of RES**
- **Leveraging resources**
- **Current benefits of past research**
- **Planned Accomplishments and examples**
- **Future**
- **Summary**

ELEMENTS OF RES ROLE

To achieve the mission, RES will:

- **Conduct research to improve the agency's knowledge**
- **Coordinate risk-informed, performance-based efforts**
- **Conduct systematic evaluations of regulatory requirements**
- **Conduct independent technical assessments**
- **Identify safety issues from research results, operating experience**
- **Perform anticipatory research**
- **Maintain an infrastructure of expertise, analytical tools, and data**

In performing its work RES will:

- **Ensure meaningful stakeholder participation**
- **Conduct work efficiently, including using leverage**

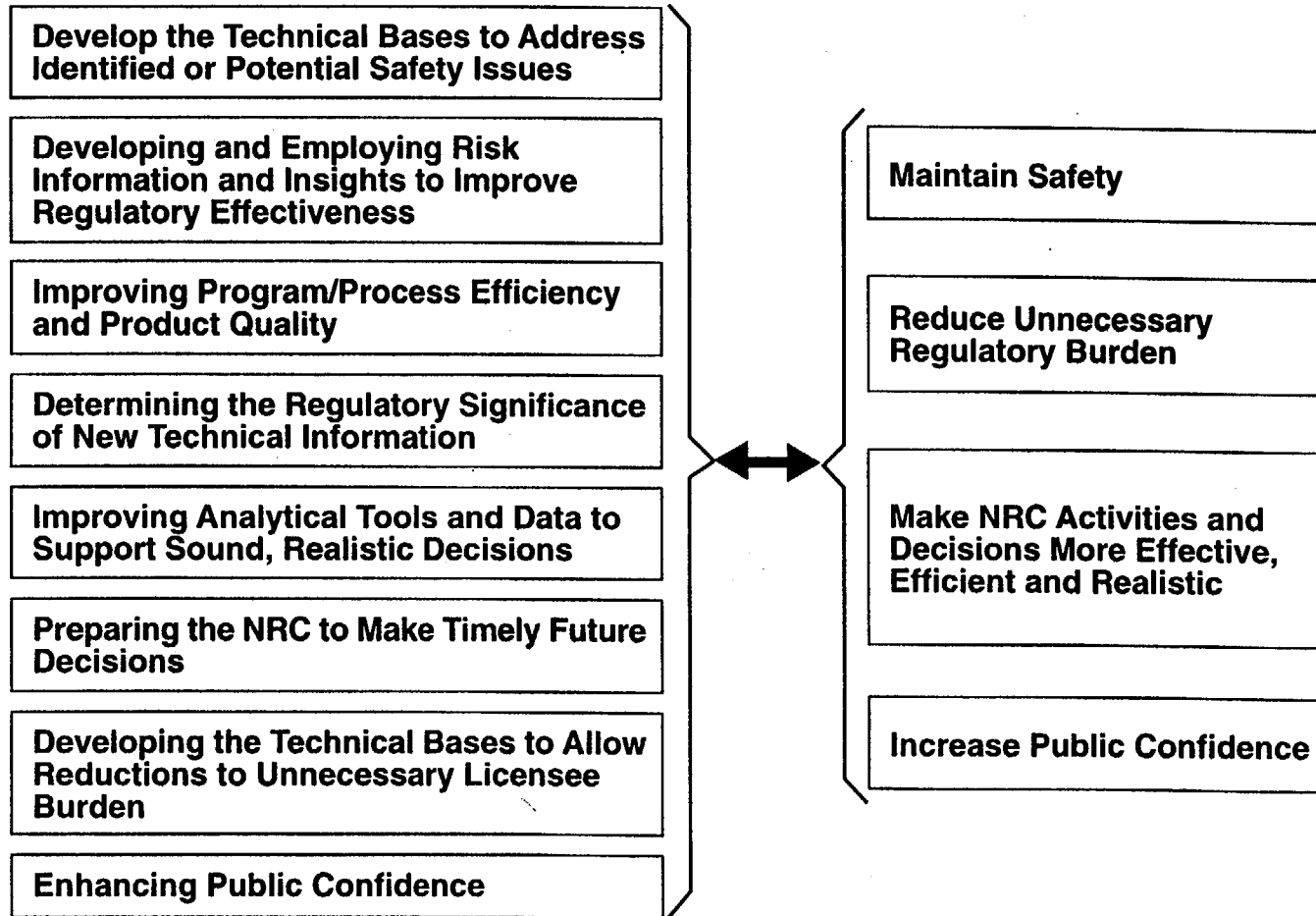
LEVERAGING NRC RESOURCES

- **Domestic agreements with 13 entities**
 - **Electric Power Research Institute and Department of Energy participate in several programs**
- **Bi-lateral or multi-lateral agreements with 29 countries**
- **For an NRC contribution of approximately \$4M, NRC receives a research benefit costing approximately \$60M**

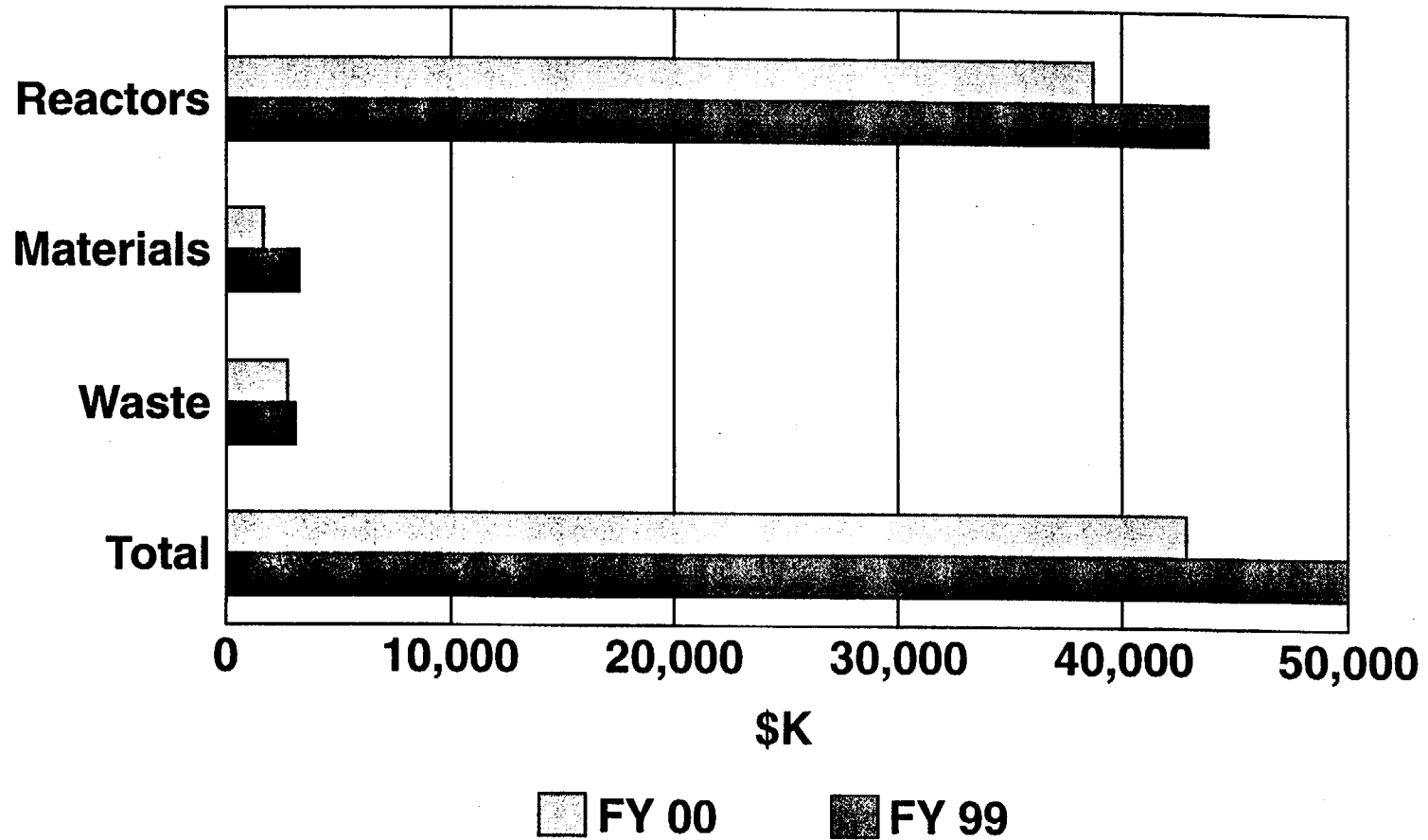
EXAMPLES OF CURRENT BENEFITS FROM PAST RESEARCH

- **License Renewal**
- **Risk Informed Activities**
- **Decommissioning**
- **Revised Source Term Rule**

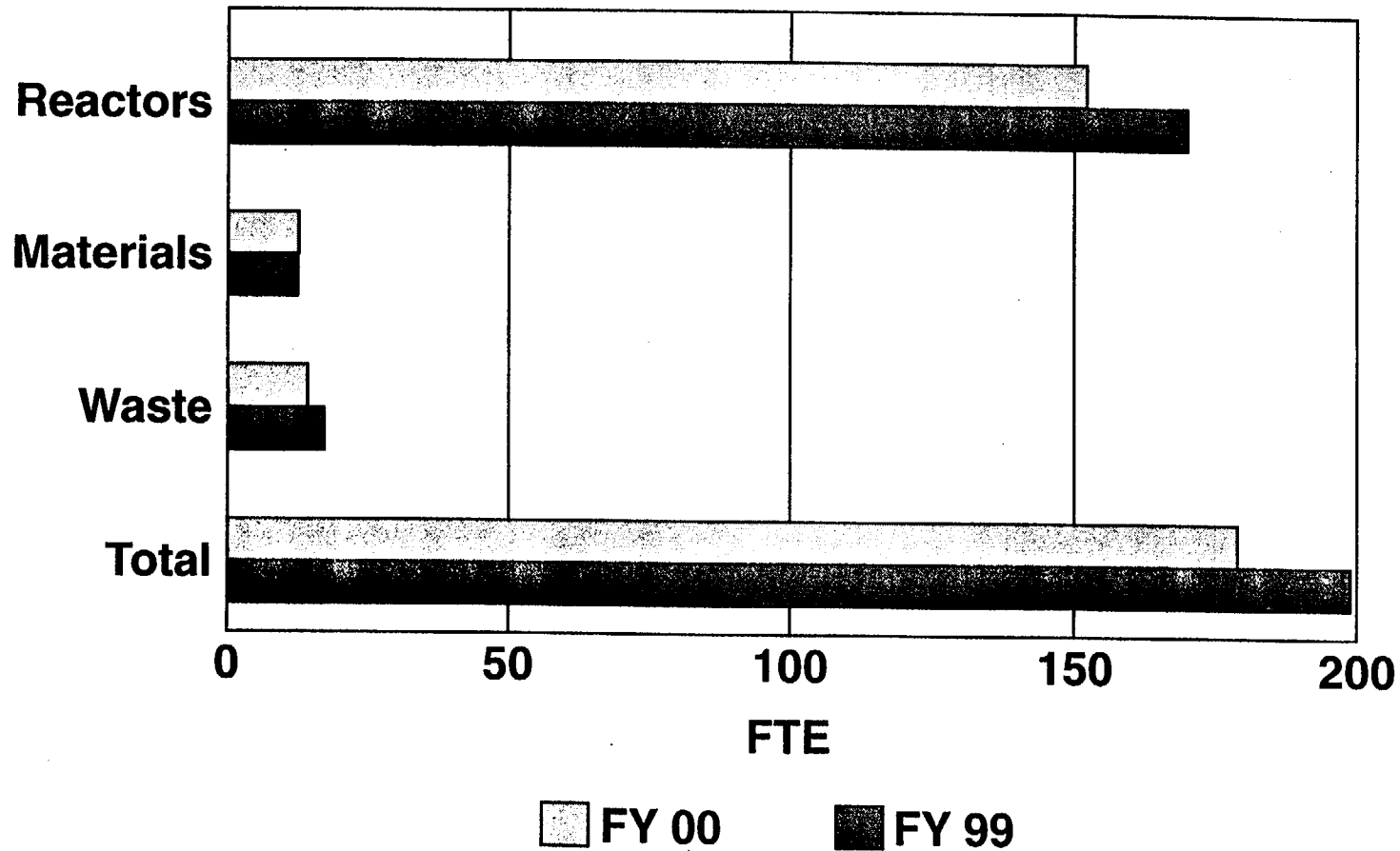
EIGHT PLANNED ACCOMPLISHMENTS ARE OUTCOME ORIENTED



RESOURCE TREND OVERVIEW - \$



RESOURCE TREND OVERVIEW - FTE



ASSURING THE INTEGRITY OF THE RPV

OUTCOME: Plants can increase operational flexibility and a few plants can have flexibility to consider license renewal through improved understanding of RPV issues

ACCOMPLISHMENTS: FY99

- **PTS re-evaluation project**
- **Completed work with ASME on revision of basis for P-T limits**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Complete development of technical bases for PTS re-evaluation**
- **Complete final draft of RG 1.99, Rev. 3 on Radiation Embrittlement**

T/H program supports

LONG TERM STORAGE OF SPENT FUEL

OUTCOME: Realistic evaluation of spent-fuel storage systems and timely evaluation of dry cask storage renewal requests

ACCOMPLISHMENTS: FY99

- **Initiated a cooperative program with EPRI and DOE**
- **Opened the Castor-V/21 steel cask loaded in 1985**
- **Performed a visual inspection of the cask seals, fuel assemblies, and fuel tubes**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Remove 12 rods from one assembly to determine fuel integrity**
- **Perform a visual inspection of the VSC-17 concrete cask exterior**
- **Seek foreign and additional domestic participation**
- **Develop models for nuclide inventories and source characteristics**

REALISTIC IMPACTS - RADIATION EXPOSURE

OUTCOME: Realistic decisions on decommissioning, clearance, and products and materials exempt from licensing, resulting in better safety focus and reduced cost

ACCOMPLISHMENTS: FY99

- **Characterization of waste disposal costs**
- **Initiate BEIR VII - health effects, low level ionizing radiation**
- **Feasibility study of entombment as a decommissioning option**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Technical basis for collective doses and costs for clearance rule**
- **Assessment of doses for exempt products and materials**
- **Completion of dose modeling for DandD and RESRAD codes**

OPERATIONAL DATA ASSESSMENTS

OUTCOME: Important lessons of operating experience are learned. Operational experience can be used to evaluate the effectiveness of the regulatory framework.

ACCOMPLISHMENTS: FY99

- **Evaluation of operating events**
- **Development of performance indicators**
- **Preparation of reports on reactor system reliability**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Review of operating events and system reliability**
- **Development of risk-based performance indicators**
- **Maintain equipment reliability databases**

RISK-INFORM REGULATIONS AND ACTIONS

OUTCOME: Regulations and regulatory actions will have a better safety focus. Will result in safety improvements and in lower costs

ACCOMPLISHMENTS: FY99

- **SECY-98-300 on options for modifying Part 50 to be risk-informed**
- **Provided insights on risk-informed inspection program**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Complete study of reactor technical requirements and develop bases for proposed changes**
- **Finalize RG on ISI, update RGs on TS, IST, QA**
- **Develop Agency plan for risk-informed activities**

T/H program supports

MANAGING AND RESOLVING GSIs

OUTCOME: Important new risk-significant generic information is incorporated into the regulatory process

ACCOMPLISHMENTS: FY99

- **One GSI was reprioritized based on updated information, and five GSIs were resolved with no new or revised requirements for licensees.**
- **A new Management Directive was developed to improve the efficiency, timeliness, and clarity of the Generic Issue process.**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Three new reactor GSIs were identified for prioritization.**

PROVIDING BURNUP CREDIT TO REDUCE REGULATORY BURDEN

OUTCOME: Potentially fewer casks needed for storage or transportation of spent fuel

ACCOMPLISHMENTS: FY99

- **Interim Staff Guidance for assessment of residual BUC margins for actinides**
- **Finalize agreement with Belgonucleaire for integral test data**

KEY FUTURE ACTIVITIES: FY00 FY01

- **Assessment of residual BUC margins for fission products and 62 Gwd/MTU fuel**
- **Obtain fission product test data to validate codes used for BUC**

BENEFITS TO NRC FROM T/H CODES

- **Independent capability to assess/audit vendor/licensee analyses**
 - **Identified a problem with AP600 automatic depressurization system sizing**
 - **Aided review of AP600 test and analysis program**
 - **Identified problem with licensee analysis of Electro-sleeves**
- **Assess operating events, support risk-informed regulation activities**
- **Respond to industry initiatives**
 - **Power uprates, longer operating cycles, new fuel designs**
- **Resolution of safety issues**
 - **PTS, Boron dilution, ATWS, BWR stability**

ANALYSIS INFRASTRUCTURE

ISSUE: Maintaining and Improving NRC Analysis Infrastructure in Thermal-Hydraulics, Fuel Behavior, and Severe Accidents

OUTCOMES: (1) Independent, more accurate codes to be used by the Agency to support regulatory decisions, including development of a risk-informed Part 50, (2) Assessment of high burnup fuel performance, and (3) Reduction in the cost of code maintenance

ACCOMPLISHMENTS: FY99

- **Consolidated the Boiling Water Reactor, Pressurized Water Reactor, and 3-D neutronic capabilities into a single code: TRAC-M**
- **Developed the Graphical User Interface for RELAP5 Code**
- **Performed analyses to support assessment of steam generator tubes repaired by Electro-sleeving**

ANALYSIS INFRASTRUCTURE (CONT)

KEY FUTURE ACTIVITIES: FY00 - FY03

- **T/H code**
 - In FY 2001, support two codes: TRAC-M and RELAP-5
 - In FY 2003, TRAC++ will replace existing suite of codes
 - In FY 2003, complete all major test programs
- **Fuel behavior code**
 - In FY 2001, complete peer review and release of improved FRAPTRAN code

ANALYSIS INFRASTRUCTURE (CONT)

KEY FUTURE ACTIVITIES: FY00 - FY03

- **Severe accident code**
 - **Supporting two codes FY 2000: SCDAP/RELAP5, MELCOR**
 - **In-house analyses for source term implementation**
 - **In FY 2003, all capabilities merged into a single code**
 - **In FY 2003, complete international experimental study on lower head creep**

EXAMPLES OF IMPORTANT ISSUES FOR THE FUTURE

- **High burnup fuel properties and failure criteria**
- **Digital instrumentation and control**
- **Plant aging**
- **Mixed oxide fuel**
- **Risk-informed power plant performance indicators**
- **Future waste technologies**
- **Economic deregulation**
- **New designs**

ENHANCED INTEGRATION WITH INTERNAL STAKEHOLDERS

- **RES employees involved in vision statement, in self-assessment, to achieve culture change**
- **ACRS/ACNW reviews and communications**
- **Periodic office-level meetings with NRR and NMSS**
- **Quarterly Divisional counterpart meetings**
- **Program level review meetings**
- **Active participation of RES in licensing issues that involve new or complex technical issues**
- **Research Effectiveness Review Board**
- **Linking RES Operating Plan with NRR and NMSS**
- **Enhanced Regional communications**

ENHANCED INTEGRATION WITH EXTERNAL STAKEHOLDERS

- **Periodic open meetings of PRA Steering Committee - NRC and industry**
- **Public workshops**
- **Periodic office-level meetings with EPRI and DOE**
- **MOUs with EPRI and DOE**
- **Participation in university workshops**
- **Cooperative research with other Federal agencies**
- **Annual meeting with national laboratory Directors**
- **Participation in standard setting organizations and professional societies**
- **Annual Light Water Reactor Safety Meeting**
 - **NEI, EPRI, utilities, universities, foreign partners**
- **RES web page improved**

CHALLENGES FOR THE FUTURE

- **Current plants are operating with a mix of technologies, some developed over 25 years ago**
- **Infrastructure of US experimental facilities for assessing safety is declining**
- **Competitive market exists for replacement of nuclear skills and knowledge**
- **US influence in world nuclear research agenda has declined in key areas**

SUMMARY

- **Research program is directly tied to NRC goals**
- **Research program is outcome oriented**
- **Research program is providing a center of technical expertise in many areas**
- **Today, NRC and industry are reaping the benefits of past research - we must ensure that forward-looking research will similarly prepare us for the future**
- **Additional challenges remain for the future**