



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 16, 2000

LICENSEE: Tennessee Valley Authority

FACILITY: Watts Bar Nuclear Plant, Unit 1
Sequoyah Nuclear Plant, Units 1 and 2

SUBJECT: SUMMARY - MARCH 23, 2000 MEETING WITH TVA TO BRIEF THE STAFF
ON THE STATUS OF PLANS FOR TRITIUM PRODUCTION

On March 23, 2000, representatives of the Tennessee Valley Authority (TVA), the licensee for Watts Bar Nuclear Plant (WBN) and Sequoyah Nuclear Plant (SQN), and the U.S. Department of Energy (DOE) met with members of the U.S. Nuclear Regulatory Commission (NRC) staff at NRC Headquarters in Rockville, Maryland. TVA requested this meeting to brief the staff regarding ongoing efforts with DOE to prepare licensing documentation to enable the production of tritium at WBN and/or SQN. A list of attendees is given in Enclosure 1. The handout provided by TVA during the meeting is included as Enclosure 2.

BACKGROUND

Tritium,¹ an essential material in U.S. nuclear weapons, is an isotope of hydrogen that decays at a rate of approximately 5 percent per year. The U.S. has not produced tritium since 1988, when DOE closed its production facility at the Savannah River plant near Aiken, South Carolina. Current, short-term tritium needs are being met by recycling tritium from dismantled U.S. nuclear weapons. Resumption of tritium production will be essential for maintaining the U.S. nuclear weapons stockpile and the U.S. nuclear deterrent.

DOE is responsible for establishing the capability to produce tritium by the end of 2005, in accordance with a Presidential decision directive. As the primary path for producing tritium, DOE proposes to produce tritium in commercial light water reactors (CLWRs) by contracting with TVA for irradiation services at TVA's WBN and SQN facilities. Production of tritium in a CLWR, is subject to NRC statutory authority for the regulation of CLWRs.

TRITIUM PROGRAM AT TVA

The meeting was held to review recent milestones in the Tritium Program at TVA and to discuss forthcoming plans and activities. TVA stated that an agreement had recently been completed between TVA and DOE, effective as of January 1, 2000 for TVA to perform irradiation services at WBN and SQN for DOE.

¹This background information is excerpted from NUREG-1672, "Safety Evaluation Report Related to the Department of Energy's Topical Report on the Tritium Production Core," May 1999.

On the assumption that current requirements for maintenance of the nuclear weapons stockpile will continue, TVA is preparing license amendment applications for WBN and SQN that are planned to be submitted by January 31, 2001. The schedule anticipates the issuance of license amendments by early 2003, subsequent irradiation at WBN Unit 1 and/or SQN Unit 2, followed by the shipment of tritium producing burnable absorber rods to Savannah River site in the summer of 2005. These applications will reference DOE's Topical Report, "Tritium Production Core (TPC) Topical Report." The results of the staff's review of the Topical Report were reported in NUREG-1672, "Safety Evaluation Report Related to the Department of Energy's Topical Report on the Tritium Production Core."

The TVA organization for the tritium program is shown on slide 8. The groups doing much of the technical work (reactor engineering, site engineering, chemistry, radiation protection and environmental) will be located at the sites. Several technical issues were discussed as follows.

The Anticipated Transients Without Scram (ATWS) issue was discussed (slide 14). TVA stated that its objective would be to demonstrate that the feedback mechanisms are comparable to current core designs, implying that ATWS performance would also be comparable. NUREG-1672 indicates that licensees seeking to utilize a TPC topical report must submit a plant-specific application containing a full ATWS analysis. TVA indicated that it was considering requesting a meeting with the NRC staff around June 2000 to discuss this aspect of the TPC.

The reactor vessel integrity assessment issue was discussed (slide 15). TVA stated that all three reactor vessels are in compliance with 10 CFR Part 50, Appendix G requirements for upper shelf energy at end-of-life and that, for WBN, future surveillance capsule testing will measure irradiated vessel material toughness. TVA indicated that the reactor vessel issue would be addressed by not significantly increasing neutron fluence on the vessel and that measures to control fluence will be discussed in detail in the application. The NRC staff indicated that this topic would be reviewed in detail on the plant-specific application.

The LOCTAJR code issue was discussed (slide 16). This code is used in the analysis of the response of the TPBARs to loss-of-coolant conditions. TVA indicated that an updated version of the code would be submitted in June 2000 by Westinghouse and that it would address the two fuel vendors to be used at the two sites. TVA indicated that it would request an expedited review of the report so that any concerns involved with approval of the revised methodology could be resolved with the objective of minimizing the impact on the overall review schedule. The NRC staff indicated that such feedback may not be developed by submittal of the plant-specific applications, as 6 months from submittal of the report to identification of concerns with a new code methodology is considered to be the minimum for identification of such concerns.

May 16, 2000

The meeting was concluded with the notation that a series of meetings have been held by DOE with members of the public in several of the involved states, on the environmental reviews, in the past several years.

/RA/

Robert E. Martin, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-390, 50-327, 50-328

Enclosures: 1. Attendance List
2. TVA Handouts

cc w/encls: See next page

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Office of Nuclear Reactor Regulation

HARD COPY

PUBLIC
PDII-2 Reading
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BClayton
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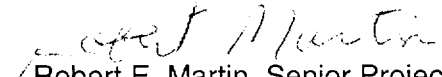
JZwolinski/SBlack
HBerkow
RCorreia
RHernan
RCaruso
JWermiel
JDavis
AHiser
DLange
PFredrickson, RII

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OFFICE	PDII-2\PM	PDII-2\LA	PDII-2\PM	PDII-2\SC	
NAME	RMartin:cn	BClayton	RHernan	RCorreia	
DATE	05/16/00	05/16/00	05/16/00	05/16/00	

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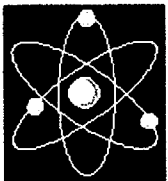
ATTENDEES

MEETING OF MARCH 23, 2000
WITH TVA AND DOE

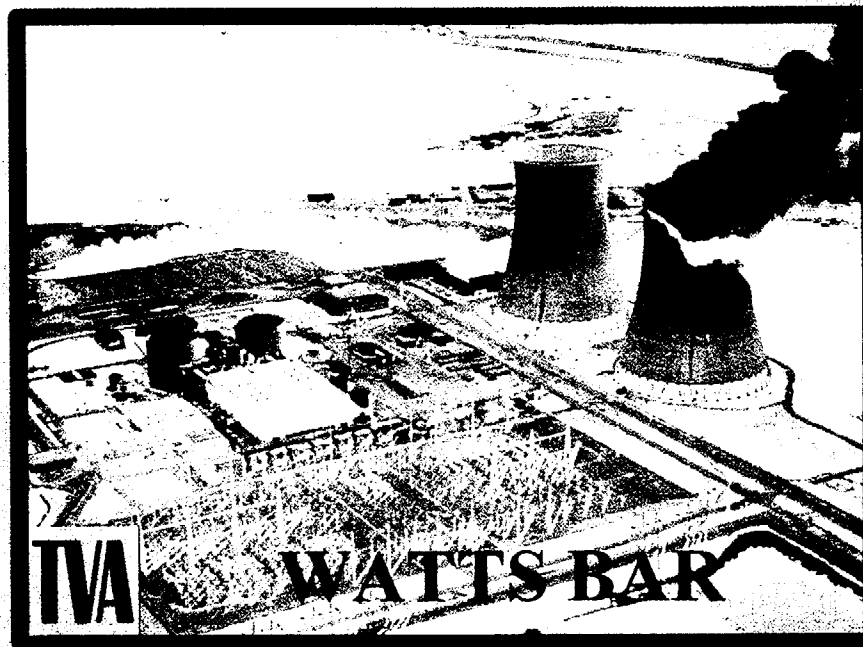
NAME

ORGANIZATION

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Herb Berkow	NRR/DLPM/PDII
Rich Correia	NRR/DLPM/PDII
Ron Hernan	NRR/DLPM/PDII
Max Clausen	DOE/NNSA/DP-25
Ralph Shell	TVA/Licensing
Jim Chardos	TVA/Program Mgmt.
Ralph Caruso	NRC/SRXB
Jerry Wermiel	NRC/NRR/DSSA/SRXB
Rickey Stockton	TVA/WBN/Licensing
Keith Weller	TVA/SQN/Licensing
Chuck Wilson	TVA/Corp. Licensing
Gerald Sorensen	PNNL
Sidney Crawford	Consultant/scrwfrd@erols.com
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Allen Hiser	NRR/DE/EMCB



TRITIUM PROGRAM AT TVA



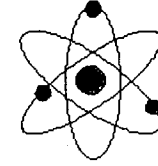
NRC BRIEFING

MARCH 23, 2000



Tritium Program at TVA

Agenda

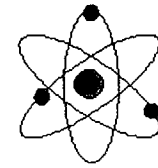


- INTRODUCTION - RALPH SHELL
- MEETING OBJECTIVES - RALPH SHELL
- PROGRAM OVERVIEW - JIM CHARDOS
- ORGANIZATION - JIM CHARDOS
- SCHEDULE - JIM CHARDOS
- SCOPE - JIM CHARDOS
- ISSUES - JIM CHARDOS
- SUMMARY - JIM CHARDOS



Tritium Program at TVA

Introduction

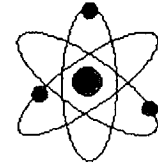


- DOE/TVA AGREEMENT EFFECTIVE JANUARY 1 2000 TO PERFORM IRRADIATION SERVICES AT WBN AND SQN
- DOE TOPICAL REPORT ISSUED FEBRUARY 1999
- NRC SER ISSUED MAY 1999
- DOE TOPICAL REPORT WILL BE USED AS A REFERENCE



Tritium Program at TVA

Meeting Objectives

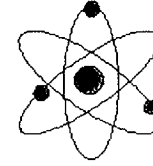


- PROGRAM STATUS DISCUSSION
 - ORGANIZATION
 - SCHEDULE
 - AMENDMENT SCOPE
 - ISSUES



Tritium Program at TVA

Program Overview



Tritium-Producing
Burnable Absorber Rod
(TPBAR) Manufacturer

Irradiated TPBARs
are shipped to DOE's
Savannah River Site

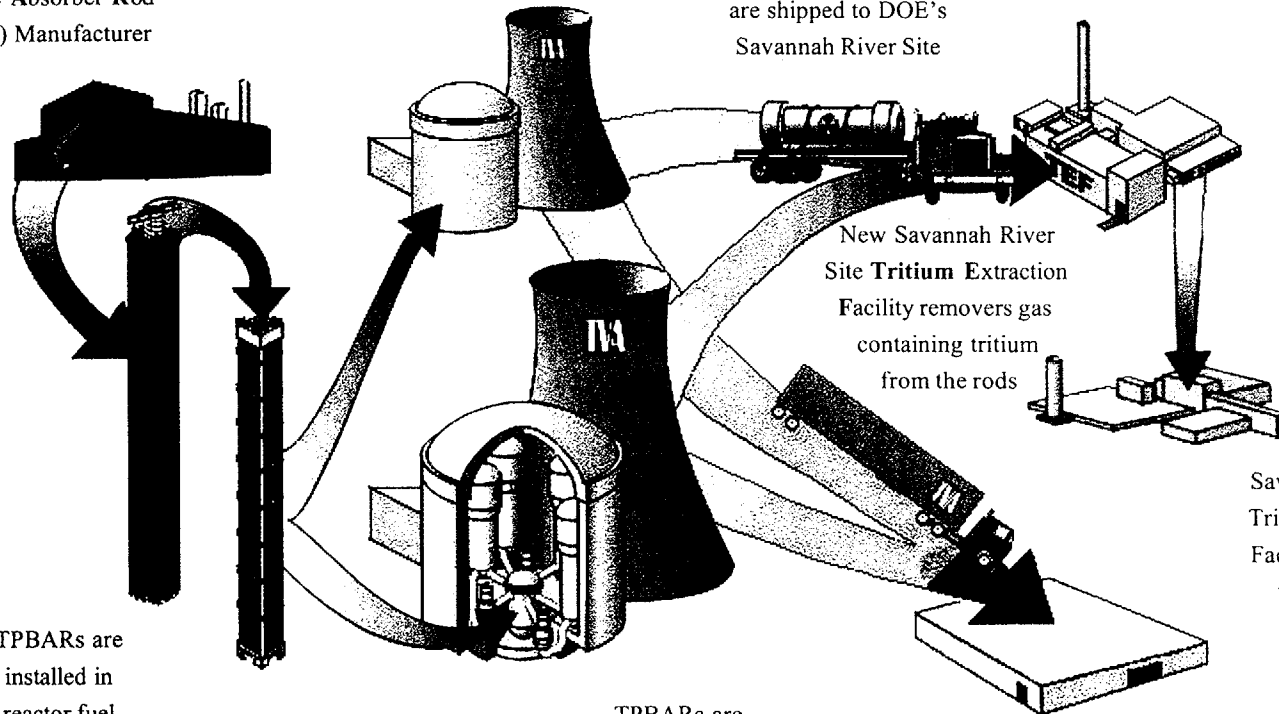
New Savannah River
Site Tritium Extraction
Facility removes gas
containing tritium
from the rods

Savannah River
Tritium Recycle
Facility purifies
tritium gas

TPBARs are
installed in
reactor fuel
assemblies

TPBARs are
irradiated in one or
more reactors
for one operating cycle

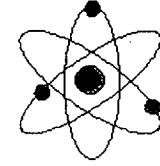
Low-Level Radioactive
Waste is shipped to a
low-level radioactive
waste facility.





Tritium Program at TVA

Program Overview

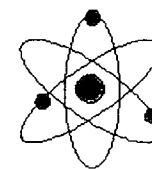


- NEW TRITIUM IS NEEDED BY ABOUT FY 2005 TO SUPPORT CURRENT REQUIREMENTS FOR THE NUCLEAR WEAPONS STOCKPILE
- GIVEN THE ABOVE, TVA IS PLANNING TO:
 - BEGIN IRRADIATION IN THE FALL OF 2003
 - WATTS BAR UNIT 1
 - SEQUOYAH UNIT 2
 - SHIP IRRADIATED TPBARS TO SAVANNAH RIVER SITE IN THE SUMMER OF 2005



Tritium Program at TVA

Program Overview

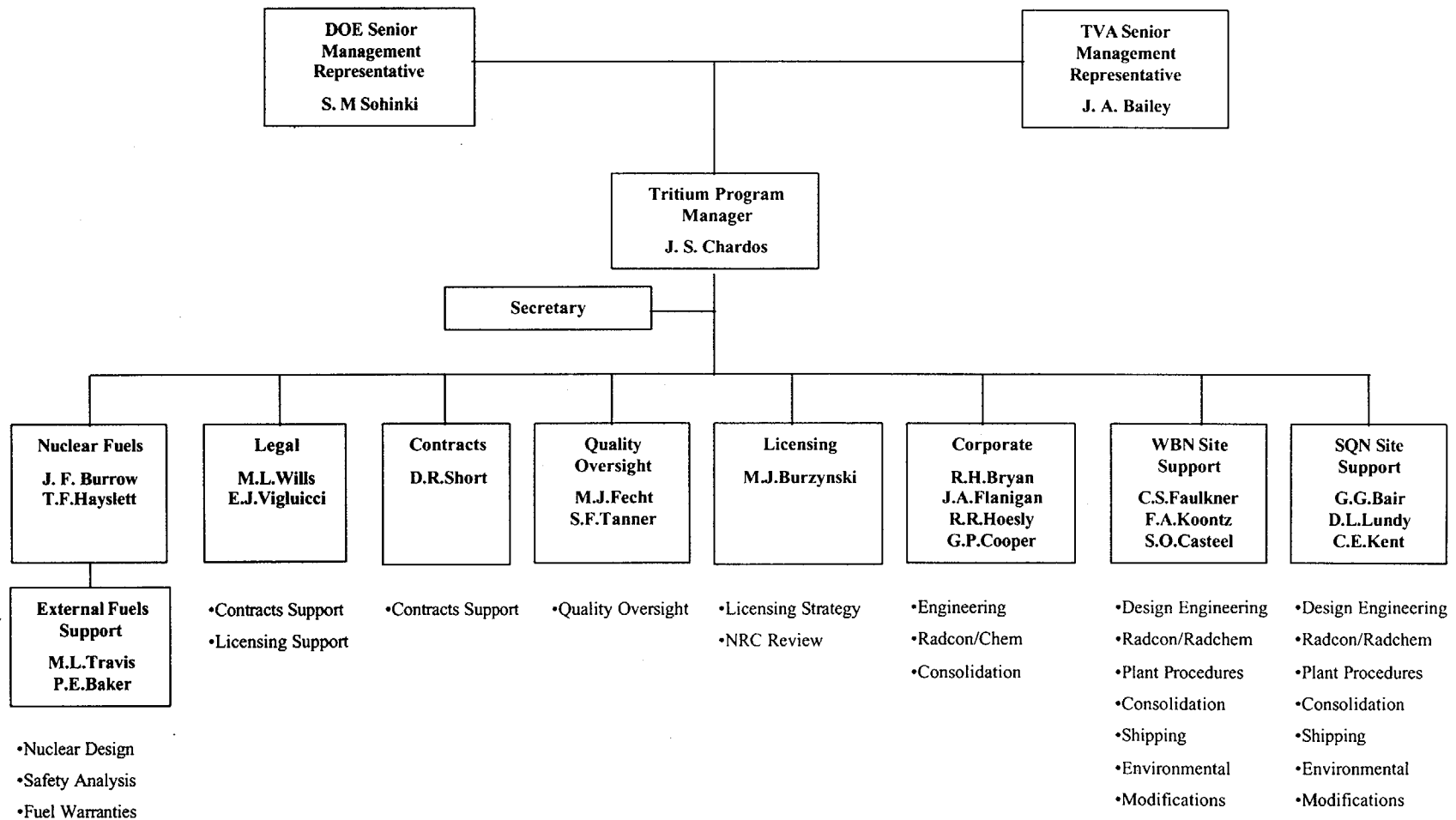
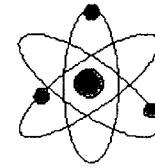


- PLANNING PHASE - PREPARE NRC LICENSE AMENDMENTS WITH ASSOCIATED ANALYSIS. ALSO, IDENTIFY NEEDED PROGRAM CHANGES (RADCON, CHEMISTRY, TRAINING, ETC.)
- IMPLEMENTATION PHASE - OBTAIN LICENSE AMENDMENTS AND MAKE NECESSARY PLANT MODIFICATIONS TO PERMIT IRRADIATION AND IMPLEMENT ABOVE PROGRAM CHANGES
- STANDBY PHASES
 - PREPARE TO IRRADIATE
 - OPERATING CYCLE BEFORE IRRADIATION IS TO BEGIN.
 - FUEL CYCLE DESIGN FINALIZED AND OTHER PROGRAMS IN PLACE
 - POST IRRADIATION
 - CYCLE AFTER IRRADIATION IF NOT PREPARING FOR IRRADIATION DURING THE UPCOMING CYCLE
 - CONSOLIDATION AND SHIPMENT OF TPBARS
 - BASELINE
 - OPERATING CYCLES WHERE THERE IS NO IRRADIATION PLANNED FOR THE FUTURE
 - MAINTAIN DESIGN BASIS



Tritium Program Highlights

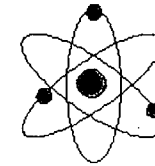
TVA Organization





Tritium Program at TVA

Integrated Schedule



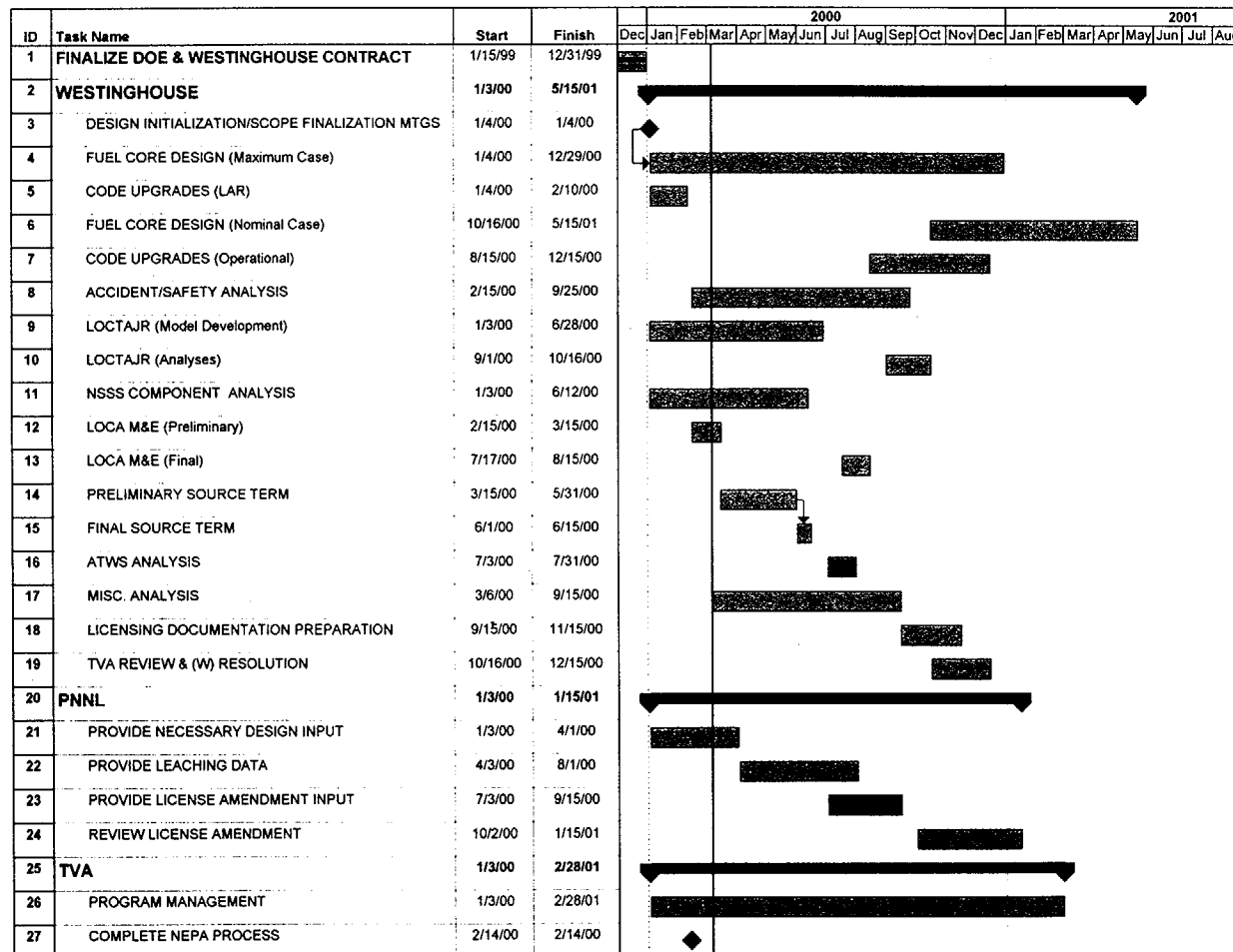
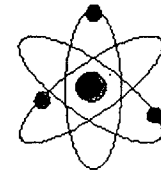
Schedule for DOE's Commercial Light Water Reactor Project

FY	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
TPBAR Technology											
Post-Irradiation Exam (PIE) of ATR Rods											
TPBAR Design											
Laboratory Confirmatory Testing											
Lead Test Assembly Irradiation (WBN)											
Lead Test Assembly PIE											
TPBAR Fabrication (First 6000 TPBARs)											
Lead Test Assembly Fabrication											
Component Fabrication											
TPBAR Assembly											
Reactor Acquisition											
Prepare and Issue Draft & Final RFP											
Receive and Evaluate Proposals											
Prepare DOE-TVA Interagency Agreement											
TPBAR Irradiation											
Planning Phase - Prepare LAR, plan site mods											
Implementation Phase - Submit LAR, Respond to NRC questions. Site mods.											
NRC Issues License Amendments											
Irradiation Phase - Irradiate TPBARs in WBN/SQN2											
Statutory And Regulatory											
NRC Review of Lead Test Assembly (LTA)											
Environmental Impact Statements (EIS)											
Tritium Extraction Facility											
TEF Conceptual/Preliminary Design											
TEF Detailed Design											
TEF Site Preparation											
TEF Construction											
TEF Startup and Operations											
Initial Operational Capability - First Gas											



Tritium Program at TVA

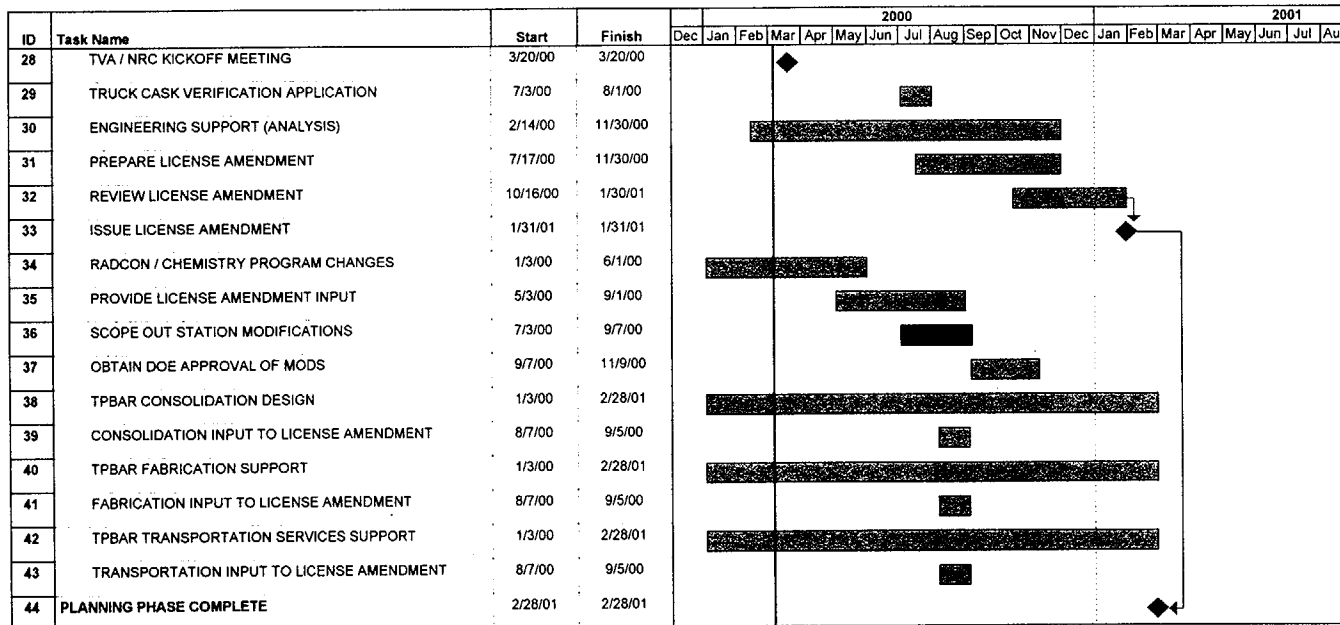
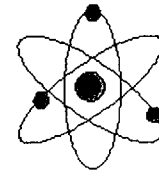
WBN Schedule - Planning Phase





Tritium Program at TVA

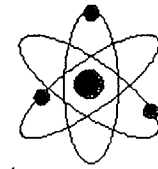
WBN Schedule - Planning Phase





Tritium Program at TVA

License Amendment Scope

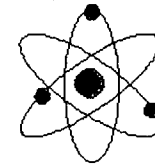


- PERFORM A REVIEW TO CAPTURE NEEDED ACTIVITIES FOR THE PREPARATION AND SUBMISSION OF BOTH THE WBN AND SQN AMENDMENTS
- REVIEW THE TRITIUM PROGRAM TOPICAL AND NRC SAFETY EVALUATION REPORT AND COMPARE THE TPC TOPICAL TO:
 - STANDARD REVIEW PLAN (SRP)
 - UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) FOR EACH SITE
 - ENVIRONMENTAL IMPACT STATEMENT
 - SITE TECHNICAL SPECIFICATIONS
- IDENTIFY POTENTIAL CONFLICTS BASED ON THE ABOVE COMPARISON REVIEW
- IDENTIFY ANY OTHER ISSUES THAT MAY WARRANT NRC DISCUSSION
- MEET WITH NRC TO DISCUSS ANY ISSUES IDENTIFIED



Tritium Program at TVA

Licensing Amendment Requests (LARs)



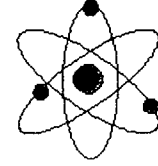
- SCOPE
 - PROVIDE NECESSARY CONFIRMING CHECKS AS SET OUT IN THE VARIOUS TABLES IN THE TPC TOPICAL REPORT
 - PROVIDE NECESSARY INFORMATION TO ADDRESS THE 17 NRC IDENTIFIED INTERFACE ITEMS
 - PROVIDE NECESSARY TECHNICAL SPECIFICATION/ UFSAR CHANGES
 - FUEL CYCLES WILL BE DESIGNED TO MEET CURRENT LIMITS AND MAINTAIN LOW LEAKAGE LOADING PATTERNS
- FORMAT
 - WBN WILL REFERENCE THE TPC TOPICAL AND NOTE CHANGES AND DIFFERENCES INCLUDING CONFIRMING CHECKS AS REQUIRED
 - SQN WILL UTILIZE THE TPC TOPICAL WHERE APPLICABLE AND DEVELOP A TECHNICAL REPORT NOTING THE DIFFERENCES
- DEVELOP, REVIEW, AND SUBMIT BY THE END OF JANUARY 2001
- WORK WITH NRC TO OBTAIN AMENDMENT APPROVALS IN APPROXIMATELY 10 TO 12 MONTHS AFTER SUBMITTAL



Tritium Program at TVA

Issues - WBN and SQN

ATWS Evaluation



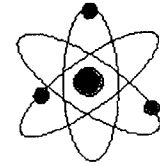
- CURRENT CORE DESIGN FOR WBN AND SQN IS THAT THE MODERATOR TEMPERATURE COEFFICIENT (MTC) SHALL BE NEGATIVE AT OPERATING CONDITIONS
- REACTIVITY FEEDBACK MECHANISMS IMPORTANT TO ATWS WILL BE EVALUATED FOR THE TRITIUM PROGRAM
- OBJECTIVE WILL BE TO DEMONSTRATE THAT THE FEEDBACK MECHANISMS ARE COMPARABLE TO CURRENT CORE DESIGNS, IMPLYING THAT ATWS PERFORMANCE WOULD BE COMPARABLE
- TRITIUM PROGRAM IS NOT EXPECTED TO CHANGE CURRENT MTC ATTRIBUTE



Tritium Program at TVA

Issues - WBN and SQN

Reactor Vessel Integrity Assessment



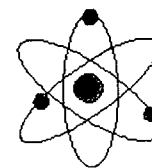
- ALL THREE REACTOR VESSELS REMAIN UNDER THE SCREENING LIMITS FOR PRESSURIZED THERMAL SHOCK (10CFR50.61)
- ALL THREE REACTOR VESSELS ARE IN COMPLIANCE WITH 10CFR50, APPENDIX G REQUIREMENTS FOR UPPER SHELF ENERGY AT END-OF-LIFE.
- IN ACCORDANCE WITH 10 CFR 50 APPENDIX H REQUIREMENTS, FUTURE WBN SURVEILLANCE CAPSULE TESTING WILL MEASURE IRRADIATED VESSEL MATERIAL TOUGHNESS.
- THE TRITIUM PROGRAM HAS COMMITTED TO AVOID ANY INCREASED IRRADIATION OF CRITICAL AREAS (MAINTAIN LOW LEAKAGE LOADING PATTERNS.)
- IMPLEMENTATION OF TRITIUM PROGRAM IS NOT EXPECTED TO INVALIDATE COMPLIANCE WITH APPENDIX G, H, AND PTS RULE



Tritium Program at TVA

Issues - WBN and SQN

Use of LOCTAJR Code

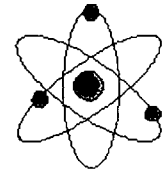


- LOCTAJR DERIVED FROM NRC APPROVED VERSIONS OF LOCTA AND USED IN TRITIUM PROGRAM TOPICAL REPORT
- LOCTAJR CODE ADDRESSES TPBAR BEHAVIOR DURING LBLOCA AND SBLOCA
- TVA/WESTINGHOUSE PLAN TO USE LOCTAJR METHODOLOGY FOR THE TRITIUM PROGRAM LICENSE AMENDMENT REQUESTS FOR WBN AND SQN
- IN RESPONSE TO TOPICAL REPORT SER (INTERFACE ITEM NO. 16), THE LOCTAJR CODE WILL BE SUBMITTED FOR NRC ACCEPTANCE BY EARLY JUNE 2000
- NRC FEEDBACK NEEDED ON A TIMELY BASIS IN ORDER TO MAKE LICENSE AMENDMENT SUBMITTALS BY JANUARY 2001



Tritium Program at TVA

SUMMARY

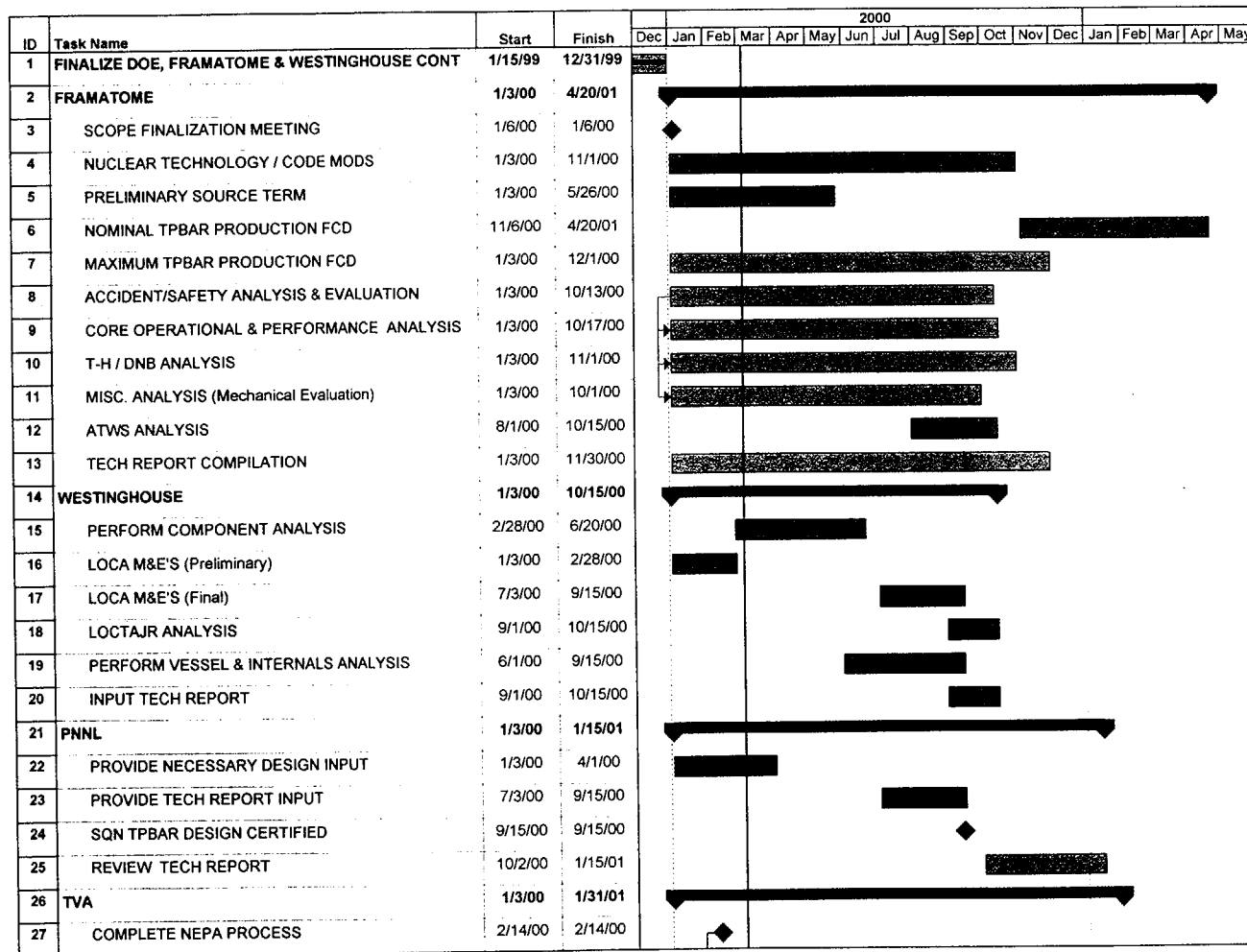
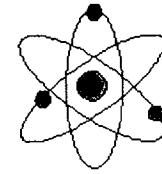


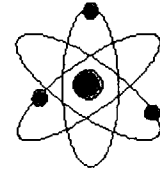
- FUTURE TVA/NRC MEETINGS
 - REDUCE DIFFERENCES ON KNOWN ISSUES
 - WILL REDUCE REQUESTS FOR ADDITIONAL INFORMATION AND THEREFORE OVERALL REVIEW AND APPROVAL
 - PERIODIC STATUS DISCUSSIONS
- PRELIMINARY RESULTS OF ANALYSIS TO DATE
 - NO MAJOR TECHNICAL ISSUES FOUND



Tritium Program at TVA

SQN Schedule - Planning Phase

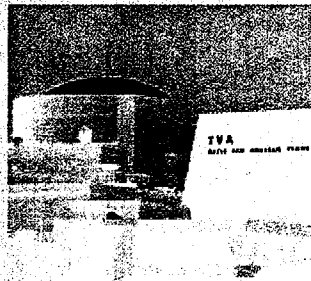


19

**WATTS
BAR**



SEQUOYAH



TVA



NUCLEAR



PLANTS

Tennessee Valley Authority

**SEQUOYAH NUCLEAR PLANT
WATTS BAR NUCLEAR PLANT**

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Tennessee Valley Authority

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WATTS BAR NUCLEAR PLANT**

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