

December 18, 2002

Our File: 108US-01321-021-001  
Your File: Project No. 722

US NRC  
M/S O-4D9A  
Attn: B. Sosa, ACR Project Manager  
11555 Rockville Pike  
Rockville, MD 20852-2738

**Re: Further to the ACR Pre-Application Plan –  
Detailed Deliverables and Schedule for Focus Topics**

Further to the ACR Pre-Application Review Plan that the NRC received September 26, 2002, you will find the following information enclosed.

Attachment 1: provides an expanded list of requested focus topics for the ACR pre-application review. The desired outcome, and the deliverables and schedule proposed by AECL Technologies to support the desired outcome, are provided for each proposed focus topic.

Attachment 2: provides a tabular summary of the deliverable schedule, in chronological order, as a function of pre-application review focus topic.

The deliverables and schedule summarized in Attachment 1 and 2 supercede those provided in Section 7 of the ACR Pre-Application Review Plan (September 26, 2002).

The desired outcomes are worded in a straightforward manner to ensure that the ultimate objective for each focus topic is clear to all parties. However, AECL Technologies recognizes that these ultimate objectives may not be attained in all cases prior to the planned application for ACR Standard Design Certification in late summer 2004. The attachments are provided in order to obtain feedback from the NRC staff on the nature and extent of information required by the NRC to support attaining the desired outcomes listed in a timely manner.

If you have any questions on this letter and/or the enclosed information please contact the undersigned at (905) 823-9060 extension 6543.

Yours sincerely,



Vince J. Langman  
ACR Licensing Manager

## **Attachment 1**

### **ACR Pre-Application Focus Topics**

#### **1. Class 1 pressure boundary design**

##### **1.1 Desired outcome:**

The NRC staff accepts the principle design features of the ACR RCS pressure boundary (i.e., the use of Zr-2.5wt%Nb pressure tubes, rolled joints, closure plugs, 403 SS end fittings, and fueling machines as components of a Class 1 pressure boundary).

##### **1.2 Deliverables and schedule**

- NRC FM on physics, fuel channels and QA (Dec. 4, 5, 2002)
- NRC FM on the ACR CANFLEX fuel design (July 2003)
- NRC FM on on-power fueling (July 2003)
- Report on the technology of fuel channels (July 31, 2003)
- Report on the technology of on-power fueling (July 31, 2003)

#### **2. Design basis accidents and acceptance criteria**

##### **2.1 Desired outcome:**

The NRC staff accepts the definition of ACR design basis accidents and the associated ACR safety acceptance criteria.

##### **2.2 Deliverables and schedule**

- NRC FM on ACR safety design philosophy, design basis accidents and acceptance criteria (March 31, 2003)
- Technical Basis Document for ACR (April 30, 2003)
- NRC FM on safety analysis methodology and computer codes (May 2003)
- Overview report on the proposed ACR licensing approach in the US (June 30, 2003)
- Detailed report on how ACR safety analysis and licensing addresses the NRC's requirements (June 30, 2003)
- Report on ACR safety analysis methods etc. (no results) (June 30, 2003)

#### **3. Computer codes and validation adequacy**

##### **3.1 Desired outcome**

The NRC staff accepts the computer codes used in ACR safety analysis and the adequacy of their validation as sufficient for the purpose of providing a safety analysis for the ACR in the US.

### **3.2 Deliverables and schedule**

- NRC FM on design and technology base (Sept. 25, 26, 2002)
- NRC FM on physics, fuel channels and QA (Dec. 4, 5, 2002)
- Manuals and validation reports on CATHENA and physics codes (Dec. 15, 2002)
- NRC FM on thermal hydraulics (February 4, 5, 2003)
- NRC FM on safety analysis methodology and computer codes (May 2003)
- Report on safety analysis code validation methodology (compared to NRC approach DG-1120) (Dec. 31, 2003)

## **4. Severe accident definition and adequacy of supporting R&D**

### **4.1 Desired outcome**

The NRC staff accepts the definition of severe accidents for the ACR and considers the nature and extent of R&D support provided by the existing and planned R&D program to be sufficient to support the licensing of the ACR in the US.

### **4.2 Deliverables and schedule**

- Report of MFMI test program (Dec. 15, 2002)
- Report describing severe accident progression in ACR (May 31, 2003)
- NRC FM on ACR severe accidents and supporting R&D (June 2003)
- Report describing the severe accident R&D program (Sept. 30, 2003)

## **5. Design philosophy and safety-related systems**

### **5.1 Desired outcome**

The NRC staff accepts the ACR's safety design philosophy and the ACR treatment of safety-related systems, including the approach to seismic considerations.

### **5.2 Deliverables and schedule**

- NRC FM on ACR safety design philosophy, design basis accidents and acceptance criteria (March 31, 2003)
- Report describing ACR approach to safety related systems (April 30, 2003)
- NRC FM on SDS design (including safety critical software (Oct. 2003)
- NRC FM on ECCS and containment design (Nov. 2003)
- Safety design guides (Nov. 30, 2003)

## **6. Canadian design codes and standards**

### **6.1 Desired outcome**

The NRC staff accepts the use of Canadian design codes and standards to address the CANDU-unique features of the ACR.

### **6.2 Deliverables and schedule**

- NRC FM on physics, fuel channels and QA (Dec. 4, 5, 2002)
- Report comparing CSA N 286 to 10CFR50 Appendix B (Jan. 31, 2003)
- Report on codes and standards used in the ACR design (Nov. 30, 2003)

## **7. Distributed control systems and safety critical software**

### **7.1 Desired outcome**

The NRC staff accepts ACR's use of distributed digital control systems and safety critical software.

### **7.2 Deliverables and schedule**

- NRC FM on ACR safety design philosophy, design basis accidents and acceptance criteria (March 31, 2003)
- NRC FM on SDS design (including safety critical software) (Oct. 2003)
- Report on control system design (comparison to applicable US regs and guides) (Nov. 30, 2003)

## **8. On-power fueling (including safeguards)**

### **8.1 Desired outcome**

The NRC staff accepts the ACR CANFLEX fuel design and the process of on-power refueling. The NRC staff has no significant safeguards issues with on-power refueling for the ACR.

### **8.2 Deliverables and schedule**

- Report on safeguards and security concepts for ACR (June 30, 2003)
- NRC FM on the ACR CANFLEX fuel design (July 2003)
- NRC FM on on-power fueling (July 2003)
- Report on technology of on-power refueling (July 31, 2003)
- Report on the CANFLEX fuel design for ACR (Dec. 31, 2003)
- Report on ACR safeguards and security (March 31, 2004)

## **9. Confirmation of negative void reactivity**

### **9.1 Desired outcome**

The NRC staff accepts that the ACR has a negative void reactivity.

### **9.2 Deliverables and schedule**

- NRC FM on physics, fuel channels and QA (Dec. 4, 5, 2002)
- Manuals and validation reports on physics codes (Dec. 15, 2002)

## **10. Preparation for Standard Design Certification Docketing**

### **10.1 Desired outcome**

The NRC staff will have a good understanding of the safety aspects of the ACR and have identified any issues that could pose a risk to, or a delay in, licensing the ACR in the US.

### **10.2 Deliverables and schedule**

- Report on Generic PRA methodology and CANDU 6 results (Dec. 15, 2002)
- Report on the technical description of the ACR (March 31, 2003)
- Report identifying applicable NRC generic safety issues (March 31, 2003)
- Report on ACR safety analysis methods etc. (no results) (June 30, 2003)
- NRC FM on SDS design (including safety critical software) (Oct. 2003)
- NRC FM on ECCS and containment design (Nov. 2003)
- Report on tritium safety and handling in ACR (Dec. 31, 2003)
- Report on the CANFLEX fuel design for ACR (Dec. 31, 2003)
- Report on the resolution of applicable NRC generic safety issues (March 31, 2004)
- Report on the waste management approach for ACR (March 31, 2004)
- Report on ACR safeguards and security (March 31, 2004)
- Tier 1 DCD for ACR (including ITAAC) (June 30, 2004)

## **11. ACR PRA methodology**

### **11.1 Desired outcome**

The NRC staff accepts AECL's PRA methodology as sufficient for the purpose of assessing the ACR for licensing in the US.

### **11.2 Deliverables and schedule**

- Report on Generic PRA methodology and CANDU 6 results (Dec. 15, 2002)
- NRC FM on PRA methodology applied in ACR (June 2003)

- Report on ACR design-assist PRA results (July 31, 2003)

## **12. ACR Technology Base**

### **12.1 Desired outcome**

The NRC staff finds the technology base for the ACR to be comprehensive and essentially complete.

### **12.2 Deliverables and schedule**

- NRC FM on design and technology base (Sept. 25, 26, 2002)
- NRC FM on physics, fuel channels and QA (Dec. 4, 5, 2002)
- Manuals and validation reports on CATHENA and physics codes (Dec. 15, 2002)
- Report of MFMI test program (Dec. 15, 2002)
- NRC FM on thermal hydraulics (February 4, 5, 2003)
- Technical Basis Document for ACR (April 30, 2003)
- NRC FM on safety analysis methodology and computer codes (May 2003)
- NRC FM on ACR severe accidents and supporting R&D (June 2003)
- NRC FM (at WRL) on details of RD-14M results (June 2003)
- Report on ACR Anticipatory R&D (June 30, 2003)
- NRC FM on the ACR CANFLEX fuel design (July 2003)
- NRC FM on on-power fueling (July 2003)
- Report on the technology of fuel channels (July 31, 2003)
- Report on the technology of on-power fueling (July 31, 2003)
- Report describing the severe accident R&D program (Sept. 30, 2003)
- Report on safety analysis code validation methodology (compared to NRC approach DG-1120) (Dec. 31, 2003)
- Report on the CANFLEX fuel design for ACR (Dec. 31, 2003)

Attachment 2

ACR Pre-Application Review - Schedule for Deliverables as a Function of Focus Topic

Event or Deliverable	Commitment Date	Class 1 pressure boundary design	DBA and Acceptance Criteria	Computer codes and validation adequacy	Severe accidents def'n and adequacy of R&D	Design philosophy and safety-related systems	Canadian design codes and standards	Distributed control systems and SC software	On-power fueling (including safeguards)	Confirmation of negative void reactivity	Docketing for Standard Design Certification	ACR PRA methodology	ACR Technology Base
NRC FM on design and technology base	Sept. 25,26/02			X									X
NRC FM on physics, fuel channels and QA	Dec. 4,5, 2002	X		X			X			X			X
Manuals and validation reports on CATHENA and physics codes	Dec. 15, 2002			X						X			X
Report on CANDU 6 Generic PRA Methodology	Dec. 15, 2003										X	X	
MFMI test program	Dec. 15, 2002				X								X
Report comparing CSA N286 to 10CFR50 Appendix B	Jan. 31, 2003						X						
NRC FM on thermal hydraulics	Feb. 2003			X									X
NRC FM on ACR safety design philosophy, design basis accidents and acceptance criteria	Mar. 2003		X			X		X					
Report on ACR Technical Description	Mar. 31, 2003										X		

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Event or Deliverable	Commitment Date	Class 1 pressure boundary design	DBA and Acceptance Criteria	Computer codes and validation adequacy	Severe accidents def'n and adequacy of R&D	Design philosophy and safety-related systems	Canadian design codes and standards	Distributed control systems and SC software	On-power fueling (including safeguards)	Confirmation of negative void reactivity	Docketing for Standard Design Certification	ACR PRA methodology	ACR Technology Base
Report identifying applicable NRC generic safety issues	March 31, 2003										X		
Technical Basis Document for ACR	April 30, 2003		X										X
Report describing ACR approach to safety related systems	Apr. 30, 2003					X							
NRC FM on SA methodology and computer codes	May 2003		X	X									X
Report describing ACR severe accident progression	May 31, 2003				X								
Report on ACR licensing approach in the US (high level)	May 31, 2003		X										
Report on ACR safety and licensing in the US (detailed)	June 30, 2003		X										
NRC FM on ACR severe accidents and R&D	June 2003				X								X
NRC FM (WRL) on details of RD-14M results	June 2003			X									X
NRC FM on PRA methodology applied in ACR	June 2003											X	
Report on ACR Anticipatory R&D	June 30, 2003												X



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Event or Deliverable	Commitment Date	Class 1 pressure boundary design	DBA and Acceptance Criteria	Computer codes and validation adequacy	Severe accidents def'n and adequacy of R&D	Design philosophy and safety-related systems	Canadian design codes and standards	Distributed control systems and SC software	On-power fueling (including safeguards)	Confirmation of negative void reactivity	Docketing for Standard Design Certification	ACR PRA methodology	ACR Technology Base
Report on ACR safety analysis methods etc. (no results)	June 30, 2003		X								X		
Report on safeguards and security concepts for ACR	June 30, 2003								X		X		
NRC FM on the ACR CANFLEX fuel design	July 2003	X							X				X
NRC FM on on-power fueling	July 2003	X							X				X
Report on technology of fuel channels	July 31, 2003	X											X
Report on technology of on-power fueling	July 31, 2003	X							X				X
Report on ACR design assist PRA results	July 31, 2003											X	
Report describing severe accident R&D program	Sept. 30, 2003				X								X
NRC FM on SDS design (inc. SC software)	Oct. 2003					X		X			X		
NRC FM on ECCS and containment design	Nov. 2003					X					X		
Report on codes and standards used in the ACR design	Nov. 30, 2003						X						

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Event or Deliverable	Commitment Date	Class 1 pressure boundary design	DBA and Acceptance Criteria	Computer codes and validation adequacy	Severe accidents def'n and adequacy of R&D	Design philosophy and safety-related systems	Canadian design codes and standards	Distributed control systems and SC software	On-power fueling (including safeguards)	Confirmation of negative void reactivity	Docketing for Standard Design Certification	ACR PRA methodology	ACR Technology Base
Safety Design Guides	Nov. 30, 2003					X							
Report on control system design (comparison to applicable US regs and guides)	Nov. 30, 2003							X					
Report on safety analysis code validation methodology (compared to NRC approach DG-1120)	Dec. 31, 2003			X									X
Report on tritium safety and handling in ACR	Dec. 31, 2003										X		
Report on the CANFLEX fuel design for ACR	Dec. 31, 2003								X		X		X
Report on the resolution of NRC generic safety issues (NUREG-0933 and SECY-02-0148)	Mar. 31, 2004										X		
Report on the waste management approach for ACR	Mar. 31, 2004										X		
Report on ACR safeguards and security	Mar. 31, 2004								X		X		
Tier 1 DCD for ACR (including ITAAC)	June 30, 2004										X		

Attachment 2  
ACR Pre-Application Review - Schedule for Deliverables as a Function of Focus Topic

Legend:

FM - Familiarization Meeting

QA - Quality Assurance

MFMI - Molten Fuel Moderator Interaction

SA - Safety Analysis

DBA - Design Basis Accidents

WRL - Whiteshell Research Laboratories

SDS - Shut Down System

SC - Safety Critical

ITAAC - Inspections, Tests, Analyses and Acceptance Criteria

ACR - Advanced CANDU Reactor