



Advanced CANDU Reactor Licensing

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Canada

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Canada



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Pre-Licensing Objectives

- **To identify any potential regulatory showstoppers early in the design, so there is time to address them before project commitment**
- **To assure a utility that the project risk from licensing is acceptable before a project is committed**
- **To use the results of pre-licensing in the project review, so the latter takes less time**
- **To reduce risk and cost of licensing in other jurisdictions**



Pre-Licensing Experience, CANDU 9

- **CANDU 9 – a large CANDU based on Bruce/Darlington core in single unit containment**
- **Detailed pre-licensability review in Canada in early 1990s**
 - 2 years, >200 formal documents
- **Review of design requirements, design methods, safety analysis, probabilistic safety analysis, QA, decommissioning, safeguards, Generic Action Items etc.**
- **Detailed Canadian Nuclear Safety Commission (CNSC) Staff review & report**
- **Follow-up actions for items of low risk or which were more appropriate for project phase**

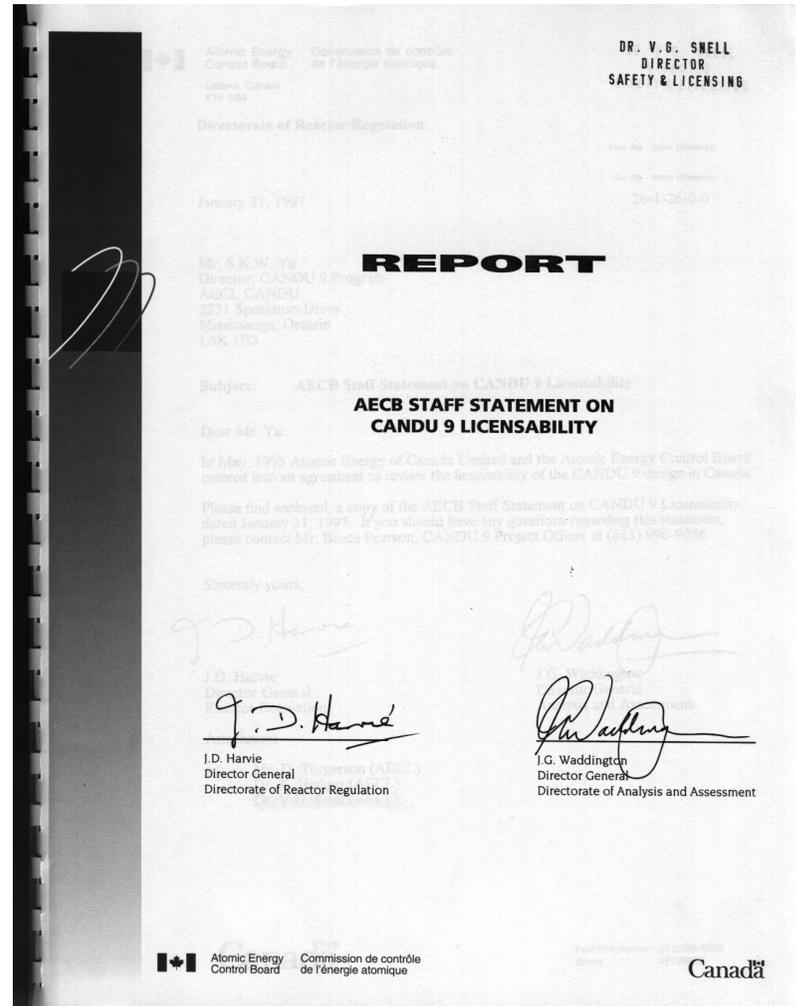


Licensability Report on CANDU 9

“On the basis of the review documented in this report, AECB staff judges that:

- The CANDU 9 design complies or can practically be made to comply with licensing requirements in effect, in Canada, on January 1, 1995;
- AECL's proposals to address Generic Action Items for the CANDU 9 design are acceptable. In all cases the proposed method for addressing Generic Action Items is equivalent to or an improvement with respect to what is currently accepted on operating CANDU reactors in Canada, and
- AECL has adequately addressed the major issues identified by the AECB staff in its June 1996 Interim statement on CANDU 9 licensability.

AECB staff therefore concludes that there are no fundamental barriers to CANDU 9 licensability in Canada.”





Pre-Licensing scope on ACR

- **Based on CANDU 9 process**
 - Written agreement committing both organizations to the review
 - Report committed from CNSC Staff on licensability
 - Does not bind Commission but good-faith expected
- **Scope extended relative to CANDU 9 because of:**
 - Design innovations
 - Request to review supporting R&D & environmental factors
 - New CNSC rules



Review Basis

- **CNSC Staff review design against:**
 - **Licensing requirements for a new nuclear power plant in Canada**
 - **Technical aspects of the Environmental Assessment**
 - **Overall adequacy of the supporting R&D programme**
- **CNSC developing a new Licensing Basis**



AECL Progress

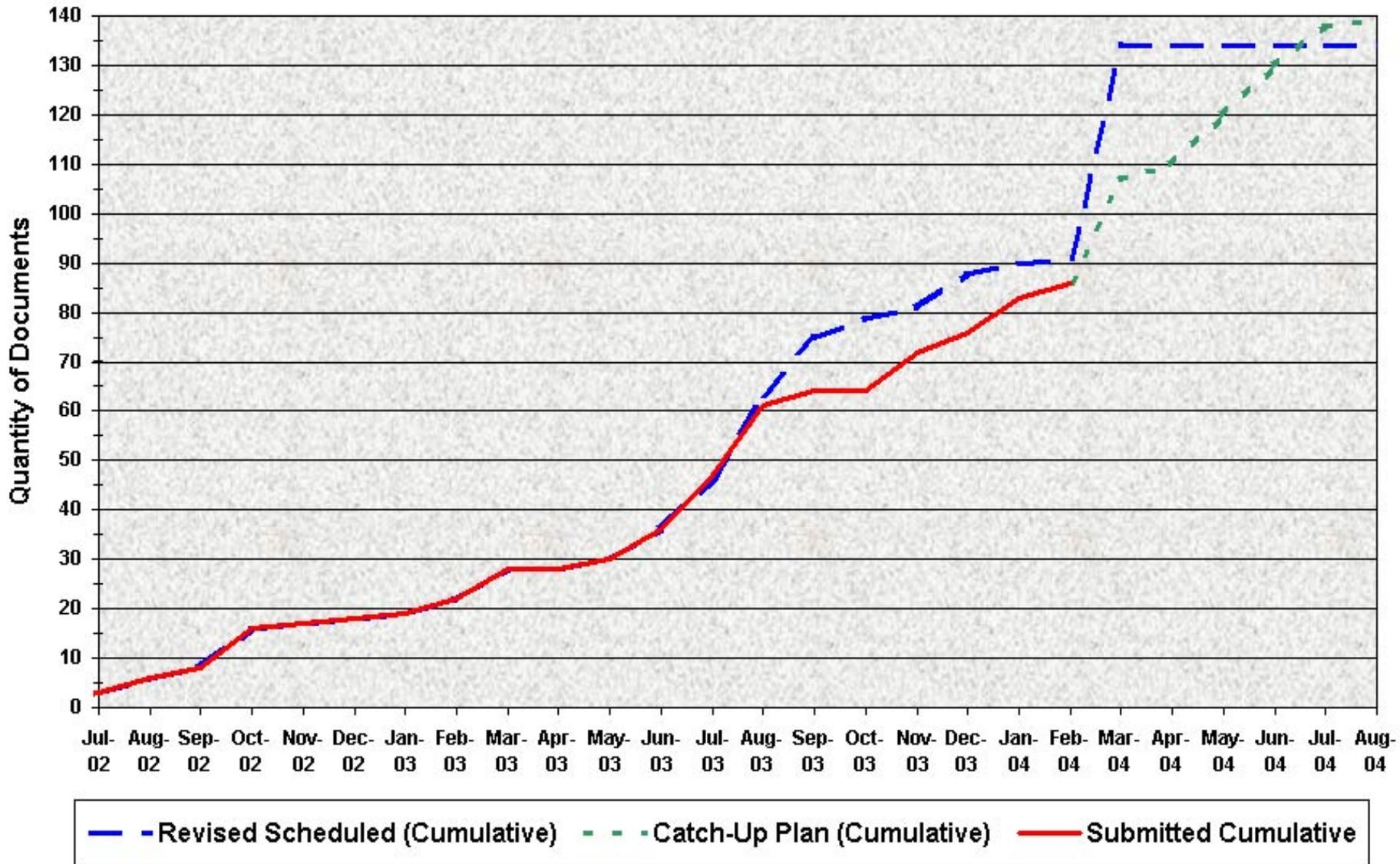
- **Schedule & deliverables formally agreed in Memorandum of Understanding with CNSC**
- **Tracking to amended plan so far**



Milestones

- **Agreement on Scope of Review** **March 31 2003**
- **Familiarization, submissions** **Mar 2003 - now**
- **Issues & draft CNSC screening report** **Jun 30 2004**
- **CNSC Screening report** **Aug 31 2004**
- **Preliminary safety case** **Aug 31 2004**
- **Second CNSC Interim report** **Jun 30 2005**
- **Final draft CNSC report** **Dec 31 2005**
- **Final CNSC report** **Mar 31 2006**

ACR CNSC Milestones





Project Licensing Expectations

- **Pre-licensing will have identified all major issues and led to resolution**
- **Pre-licensing will shorten the time needed for review by CNSC of the construction licence application**
- **Review by CNSC of technical aspects of environmental impact will not lead to major technical surprises in the Environmental Assessment**
- **Review by CNSC of R&D programme will not lead to late requests for R&D**



U.S.



Canada 



Interactions with USNRC

- **Overall US Objective: Obtain Standard Design Certification (SDC) as vendor, and/or Combined Licence (COL) in support of utility**
- **Currently in Phase 2 of the pre-application review**
- **Customer schedule shows need to apply for Standard Design Certification by early 2005**



Pre-Application Review Objectives

- **Objective: positive response from NRC on CANDU specific issues by end of the review:**
 - **No major design issues based on pre-application review findings**
 - **Limit amount of regulatory R&D**
 - **Reasonable review costs & schedule**



ACR Pre-Application Review

SCOPE

- **Phase 1: June 2002 to August 2003**
 - **Establish CANDU-specific focus topics**
 - **Extensive technical familiarization meetings**
 - **Reports submitted for NRC review in support of focus topics, including understanding of ACR technology base**
 - **Respond to NRC staff RAIs**



ACR Pre-Application Review

SCOPE

- **Phase 2: September 2003 to September 2004**
 - Further technical meetings on focus topics
 - Participate in NRC PIRT meetings for ACR
 - Additional reports being submitted for NRC review
 - Respond to NRC staff RAIs
 - Meetings with ACRS
- **Expect NRC Staff report in September 2004**



Focus Topics for Pre-Application Review

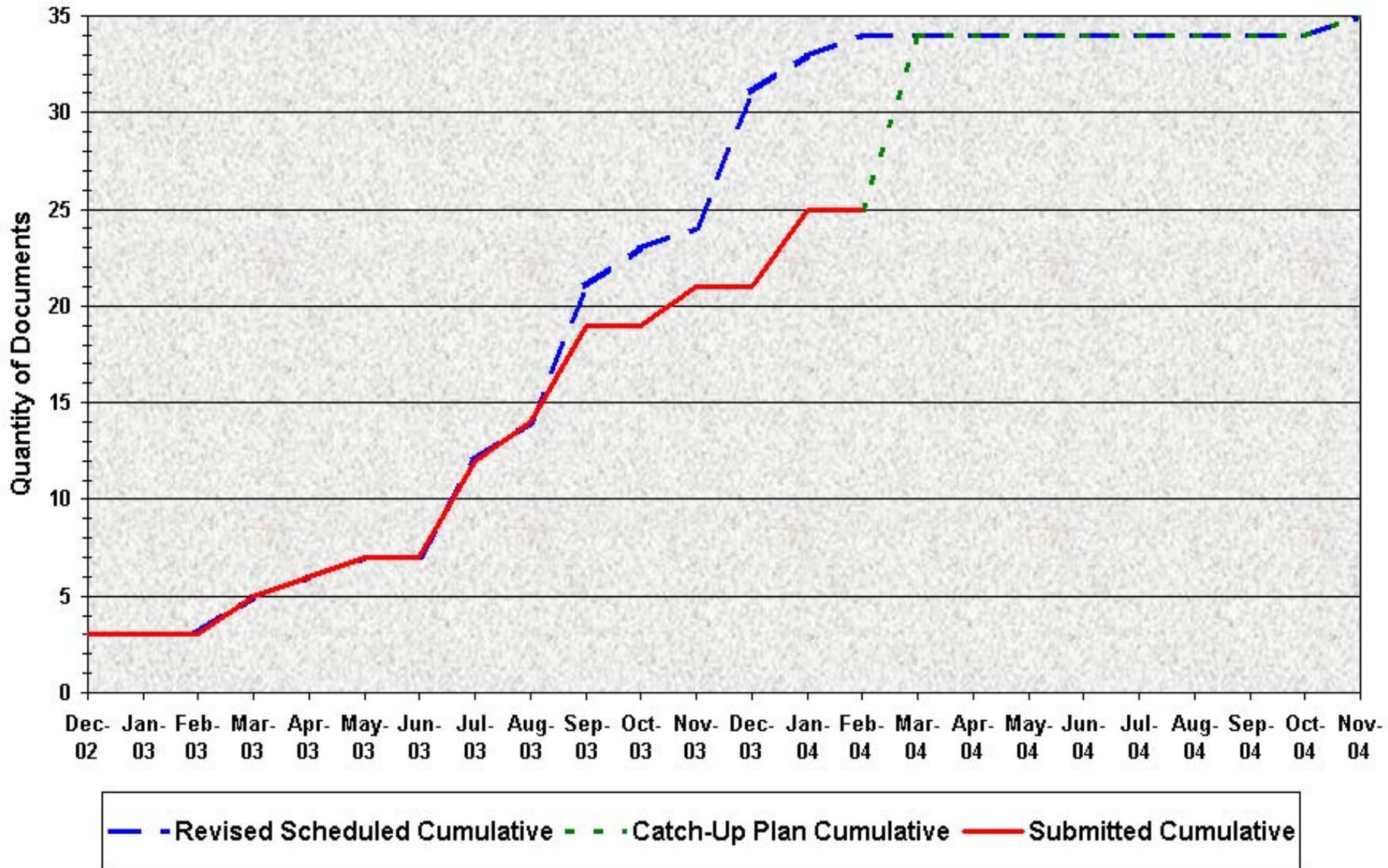
- 1. Class 1 pressure boundary design (key)**
- 2. Design basis accidents and acceptance criteria**
- 3. Computer codes and validation adequacy (key)**
- 4. Severe accident definition and adequacy of supporting R&D**
- 5. Design philosophy and safety-related systems**
- 6. Canadian design codes and standards**
- 7. Distributed control systems and safety critical software**



Focus Topics for Pre-Application Review (continued)

- 8. On-power fueling (including fuel design) (key)**
- 9. Confirmation of negative void reactivity (key)**
- 10. Preparation for Standard Design Certification Docketing**
- 11. ACR PRA Methodology**
- 12. ACR Technology Base**

ACR NRC Milestones





Regulatory Co-operation

- **Need to ensure co-ordination and consistency of high-level licensing strategy between CNSC, USNRC**
- **AECL's objective: one practical design for North America**



Conclusion

Pre-licensing in Canada should:

- Reduce likelihood of licensing-induced project delays
- Shorten time needed for CNSC review of the construction licence application
- Assist licensing reviews in other countries esp. the US

Pre-Application review in US should:

- Define issues for SDC & indicate possible success paths
- Define costs of review
- Define regulatory-required R&D