



RD-14M Quality Assurance Program

**By John Buell, Darryl Dormuth, Paul Ingham, Randall Swartz
Experimental Thermalhydraulics and Combustion Branch**

Presented to US Nuclear Regulatory Commission

Winnipeg/Pinawa, Manitoba

June 4-5, 2003





Background

- **AECL published 00-01913-QAM-010, “Overall Quality Assurance Manual” in 1999 July, and revised the document in 2000 September and 2001 September to address comments internal to AECL as well as external (CNSC)**
 - **Meets the requirements of N286 series of standards (Canadian standards for nuclear power plants)**
- **AECL published 00-01913-QAM-018, “Research and Development Quality Assurance Manual” in 2001 January (met the requirements of ISO 9001:1994) and revised the document in 2003 April to meet the requirements of ISO 9001:2000**



Background (concluded)

- **The QA manuals are supported by a number of company-wide procedures:**
 - **Control of R&D data**
 - **Control of inspection, measurement, and test equipment**
 - **Documentation/document review and comment**
 - **Proposal and contract review**
 - **Change control**
 - **Design**
 - **Procurement**
 - **..... and others**



Responsibilities

- **AECL top management is responsible to ensure quality activities are performed to meet the requirements of ISO 9001:2000**
 - This is accomplished through adherence to the AECL Quality Manuals and specific AECL Procedures
 - Verification of compliance is established through audits (internal as well as third-party external audits (e.g., CNSC, Clients))
 - Quality activities are monitored by the office of AECL's Chief Quality Officer who reports directly to the President and CEO of AECL



Electronic Database

- **An electronic database (MS Access) was developed and is continually maintained for the RD-14M program**
 - Development/implementation of database began in 1991
- **Provides a means of accessing, searching, and viewing:**
 - Details of test conditions and procedures
 - Instrumentation setup for each experiment
 - Entire history of instrument calibrations
 - Loop configuration history
 - Summary of documentation relevant to specific experiments, facility description and characterization, and instrumentation
- **Aids in the analysis of experiments, and provides a means of electronically archiving relevant information**



Calibrations

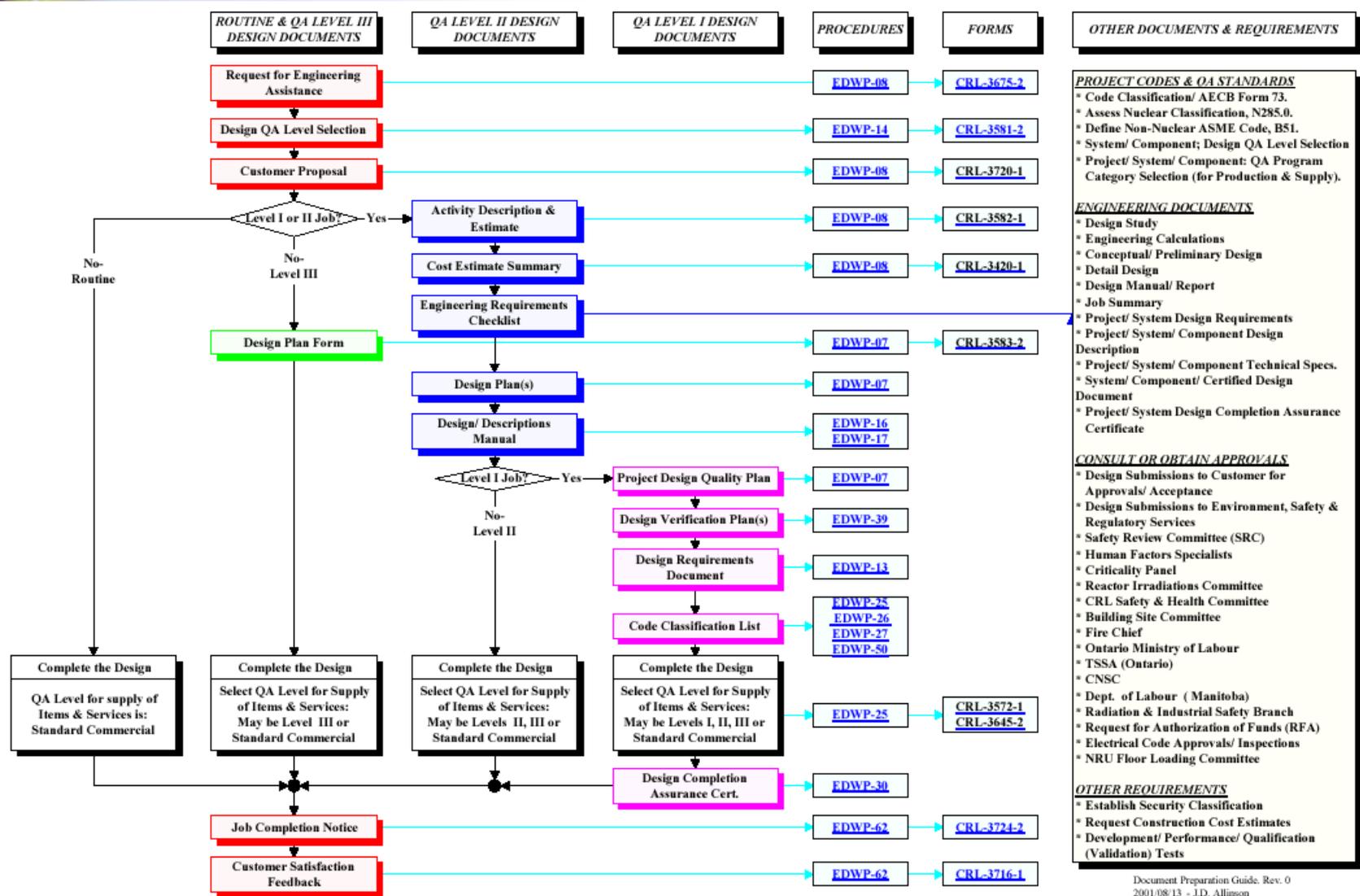
- **Calibrations typically carried out on an annual cycle**
- **Instruments calibrated against traceable standards**
 - **RD-14M maintains a number of primary and secondary standards**
- **~600 calibrations carried out each year**
- **Calibration records are stored electronically and in hard copy**



Design

- **Follow stringent QA guidelines for all design work carried out for RD-14M**
 - **Whiteshell-specific quality control manual approved by Manitoba Labour (regulator for pressure systems)**
 - **AECL Working Procedures and Whiteshell Laboratories Engineering Standards are followed**
 - **Pressure vessel code**
 - **Electrical code**
 - **Design review**
 - **Sign-off of documents**
 - **Specific drawing numbering scheme**

Design Flow Chart



Document Preparation Guide, Rev. 0
2001/08/13 - J.D. Allison



RD-14M Data Archive

- **Data reports issued for each RD-14M test**
- **Data for each test archived on CD-ROM in a standardized ASCII format**
- **Data CD-ROM's contain:**
 - Actual experimental data
 - Initial average conditions
 - Instrumentation scan list including description of instruments, ranges, calibration types, and engineering units
 - Pre-test pressure-drop, mass-flow, and energy balances
 - Full and empty readings for all gamma densitometers
 - Full readings for neutron scatterometer (if measured)



Documentation/Review

- **Proposals**
 - Reviewed by section head, branch manager, program manager, division manager, and customer(s)
- **Test plans**
 - Issued prior to all experimental test series for customer review and acceptance
- **Technical reports**
 - Go through a formal review process
 - Internal: peer, section head, branch manager, division manager review – formal sign-off required
 - Customer (internal or external): sent to the customer(s) for review/acceptance of report



 **AECL**
TECHNOLOGIES INC.