

December 10, 2002

Our File: 115-01321-021-002  
Your File: Project No. 722

U.S. Nuclear Regulatory Commission,  
Document Control Desk,  
Washington, D.C. 20555

Attention: Mr. R. Pascarelli,  
Project Manager, ACR

Reference: 1. Letter to S.J. Collins from R. Van Adel, June 19, 2002

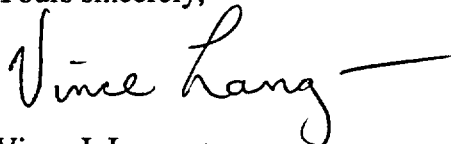
Re: **Proprietary Thermal Hydraulics Documentation in Support of the ACR Pre-Application Review**

In support of the NRC's pre-application review of the ACR (Reference 1), you will find on the enclosed CD copies of proprietary reports (briefly described in Attachment 1) related to the computer codes used in the thermal hydraulics assessment of CANDU reactors, and the validation of these codes against experimental results.

The reports listed in Attachment 1 contain proprietary information of the type that AECL normally maintains in confidence and withholds from public disclosure. The reports have been handled and classified as proprietary to AECL as cited in the affidavit provided in Attachment 2. Therefore, it is requested that the AECL proprietary reports listed in Attachment 1, and contained on the enclosed CD, be handled by the USNRC on a confidential basis and be withheld, in their entirety, from public disclosure in accordance with the provisions of 10CFR2.790 and 9.17.

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

/Attachments

1. Proprietary Thermal Hydraulics Reports in Support of ACR Pre-Application Review
2. AECL Proprietary Information Affidavit

/Enclosure

1. One CD containing copies of the proprietary thermal hydraulics reports

  
ZZZZ  
see Attached  
List

Attached List

File Center .....1 Paper Copy And 1 CD

Walton Jensen.....3 Paper Copy's And 3 CD's

Per Belkys Sosa Do not give Paper Copy's Or CD's  
out unless you go threw her.....415-2375

## **Attachment 1**

### **Proprietary Thermal Hydraulics Reports in Support of ACR Pre-Application Review**

(Letter to R. Pascarelli from V. Langman, "Proprietary Thermal Hydraulics Documentation in Support of the ACR Pre-Application Review", December 10, 2002)

## **CATHENA ABSTRACT**

This document provides an abstract of code documentation for the non-equilibrium, two-fluid thermal hydraulic code CATHENA. The document also provides information on the computer system requirements to execute CATHENA, the availability of CATHENA for different computer systems, a program outline, and a code update history to the CATHENA MOD-3.5c/Rev 0 version.

## **CATHENA PRIMER**

This manual provides an introduction to the input requirements to model thermal hydraulic networks with CATHENA. As a primer, this manual is intended for "first-time" CATHENA users with a background in thermal hydraulics but without extensive experience with thermal hydraulic codes. As an introduction, the manual describes the process of modeling an experimental facility or reactor with CATHENA. In addition, this manual provides a description of the code output files to aid in their interpretation by the user.

## **CATHENA THEORETICAL MANUAL**

This manual describes the theoretical equations and empirical relations used in CATHENA to mathematically represent a thermal hydraulic network. This manual also includes a description of the one-dimensional and two-dimensional heat conduction models in the GENERALIZED Heat Transfer Package (GENHTP) used in CATHENA to represent pipes, fuel pins or other solid materials in contact with the fluid. This manual does not describe in any form the FORTRAN implementation of the CATHENA program.

## **CATHENA INPUT REFERENCE**

This manual describes in detail the input required to model a thermal hydraulic network with CATHENA. The manual also identifies any input requirements that are computer system specific.

## **GENHTP INPUT REFERENCE**

This manual describes in detail the input requirements for the GENeralized Heat Transfer Package (GENHTP) to model solid heat conduction for piping walls or fuel elements and their connection to a thermal hydraulic network.

## **THERMAL HYDRAULICS VALIDATION PLAN**

The Canadian nuclear industry has adopted a phenomenology-based validation-matrix methodology to validate computer programs used for reactor safety-analysis applications. Phenomena known to occur during postulated accident scenarios were identified in validation matrix documents for each scientific discipline involved in reactor safety analysis.

This report outlines the plan developed to validate the CATHENA MOD-3.5c code for phenomena within the system thermal hydraulics application.

## **FUEL-CHANNEL THERMAL-MECHANICAL VALIDATION PLAN**

This report outlines the validation plan developed to qualify CATHENA MOD-3.5c/Rev 0 for phenomena identified in fuel-channel safety analysis during postulated accident scenarios. This validation plan identifies the phenomena for which validation will be performed and provides the rationale to be used in selecting specific test data and the acceptance criteria to be used in assessing CATHENA simulation results.

## **SYSTEM THERMAL HYDRAULICS VALIDATION MANUAL**

This report summarizes all validation exercises conducted to the end of 2001, to qualify CATHENA MOD-3.5c/Rev 0 to perform reactor safety analysis for phenomena relevant to the system thermal hydraulics scientific discipline.

A statement of the application for which CATHENA is being validated is given along with a description of the validation methods used. Data that were used in this validation process are briefly described. Finally an assessment of validation results with respect to computer program accuracy and uncertainty allowances is provided, where applicable.

## **FUEL AND FUEL-CHANNEL THERMAL-MECHANICAL EFFECTS VALIDATION MANUAL**

This report summarizes all validation exercises conducted to the end of 2001, to qualify CATHENA MOD-3.5c/Rev 0 to perform reactor safety analysis for phenomena relevant to the Fuel and Fuel-Channel Thermal-Mechanical Effects scientific discipline.

A statement of the application for which CATHENA is being validated is given along with a description of the validation methods used. Data that were used in this validation process are briefly described. Finally, an assessment of validation results with respect to computer program accuracy and uncertainty allowances is provided, where applicable.

## **BIBLIOGRAPHY**

This report is a historical list of all publications that have involved the use of CATHENA in thermal hydraulic analyses, or prepared as part of CATHENA validation or code model development work. The list includes papers, published reports, unpublished reports and technical notes. This list is updated regularly and is not specific to a particular CATHENA code version. The list provides an overall background for the development and use of CATHENA on the analyses since its inception.

ATTACHMENT 2  
APPLICATION FOR THE NUCLEAR REGULATORY COMMISSION'S WITHHOLDING  
FROM PUBLIC DISCLOSURE  
OF PROPRIETARY AECL REPORTS

10 C.F.R. § 2.790  
AFFIDAVIT OF KEN HEDGES

I, Ken Hedges, Vice-President, AECL Technologies Inc., do hereby affirm and state:

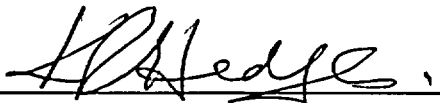
1. I am the Vice-President, Technology for AECL Technologies Inc., and have been delegated the function of reviewing the proprietary information sought to be withheld from public disclosure, and am authorized to apply for its withholding on behalf of AECL Technologies Inc.
2. In the attached letter R. Pascarelli from V. Langman, "Proprietary Thermal Hydraulics Documentation in Support of the ACR Pre-Application Review", dated December 10, 2002, and Enclosure 1 to that letter, AECL Technologies Inc. is providing information in support of the Nuclear Regulatory Commission's (NRC) pre-application review of the Advanced CANDU Reactor (ACR). The documents included in Enclosure 1 constitute proprietary commercial information that should be held in confidence by the NRC pursuant to 10 CFR §§ 2.790(a)(4) and 9.17(a)(4), because of one, or more, of the following reasons:
  - i. This information is confidential and has been held in confidence by AECL, which is the parent company of AECL Technologies Inc. The information is contained in AECL reports or other documents that are normally held in confidence in accordance with AECL's procedures for the protection of information. The reports or other documents are part of AECL's comprehensive safety and technology base for the CANDU design, and their commercial value extends beyond the original development costs, which in themselves are considerable.
  - ii. The information is contained in CANDU Owners Group Inc. (COG) reports that are held in confidence by both AECL and the Canadian nuclear utilities that participate in research and development programs via COG. There is a rational basis for holding the reports in confidence since the information contains sensitive technical and/or commercial information relating to the supporting research, design and/or operation of CANDU reactors. Also, COG reports are only distributed to participants in COG research and development programs. These participants expend significant amounts of money to fund the COG research and development programs, which produce the information described in these reports. Additionally, public disclosure by the NRC of the information contained in COG reports, which are supplied in confidence by COG to AECL, could jeopardize the

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future availability of such information to AECL. AECL is contractually obligated to COG and to other participants in COG programs to maintain the confidentiality of such reports. AECL relies, in part, on COG reports to improve the safety, operability and maintainability of the ACR, and to help develop and recommend improvements to enhance the safety, operability and maintainability of existing CANDU plants. COG would be reluctant to provide such information to AECL, and could move to restrict AECL Technologies' ability to provide such reports to the NRC, if there was a possibility that the NRC might make the information publicly available, after being supplied to the NRC by AECL Technologies Inc. AECL would suffer harm to its commercial business and competitive position if it did not have access to these reports and was unable to improve existing and future designs. Further, other participants in COG research and development programs would be reluctant to enter into such programs in which AECL was a participant; those participants enter into and fund such programs with the expectation that the results will remain confidential to COG and program participants; if there is a possibility that information generated in such programs would become publicly available through AECL Technologies' provision of COG reports to the NRC. For the same reason, disclosure of such reports by the NRC would also hinder the ability of the NRC to receive similar reports in the future from AECL Technologies, since COG would likely withhold such reports from AECL.

- iii. This information is being transmitted to the NRC in confidence.
- iv. This information is generally not available in public sources and could not be gathered readily from other publicly available information.
- v. Public disclosure of this information would create substantial harm to the competitive position of AECL by disclosing sensitive commercial information about the design and/or operation of CANDU reactors and/or the ACR to other parties whose commercial interests may be adverse to those of AECL. Also, the information contained in these reports has been developed at significant cost to AECL (the parent company of AECL Technologies).

3. Accordingly, AECL Technologies Inc. requests that the information provided in Enclosure 1 be withheld from public disclosure pursuant to the policy reflected in §§ 2.790(a)(4) and 9.17(a)(4).

  
Ken Hedges, Vice-President, AECL Technologies Inc.

Subscribed and sworn before me on this 12<sup>th</sup> day of Dec, 2002.

