Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 23-H103.9

File/dossier : 6.01.07
Date : 2023-04-17
Edocs: 7020321

Written submission from Kinectrics Inc.

Mémoire de Kinectrics Inc.

In the Matter of

À l'égard de

Bruce Power Inc.
Bruce Nuclear Generating Stations A and B

Application to amend the power reactor operating licence for the Bruce Nuclear Generating Stations (NGS) A and B

Bruce Power Inc.
Centrales nucléaires de Bruce-A et B

Demande visant à modifier son permis d'exploitation d'un réacteur de puissance pour les centrales nucléaires de Bruce-A et B

Hearing in writing based on written submissions

Audience par écrit fondée sur des mémoires

April 2023

Avril 2023

Canada

Telephone: 416.207.6511
E-mail: david.harris@kinectrics.com

April 14, 2023

Commission Secretariat
Canadian Nuclear Safety Commission
280 Slater Street
P.O. Box 1046, Station B
Ottawa, Ontario
K1P 5S9

Commission Hearing, Application for the Amendment of the Power Reactor Operating Licence

Dear Commission Secretariat,

The purpose of this letter is to express Kinectrics' support for Bruce Power's request for the amendment of Bruce Power's Power Reactor Operating Licence, PROL 18.02/2028, pursuant to sub-section 24(2) of the Nuclear Safety and Control Act and Section 6 of the General Nuclear Safety and Control Regulations (GNSCR). Specifically, Kinectrics supports Bruce Power's request that Licence Condition 15.3 be removed from PROL 18.02/2028 and that all fitness for service requirements applicable to pressure tubes be consolidated under Licence Condition 6.1.

Based on our experience working closely with Bruce Power over many years, we can attest to Bruce Power's unwavering commitment to safety which includes ensuring integrity of pressure tubes through the continued demonstration of the fitness-for-service of plant components. Safety is Bruce Power's number one value, and Bruce Power remains committed to maintaining safe operation of the Bruce A and Bruce B Nuclear Generating Stations through defense-in-depth principles, and specifically the nuclear safety importance of pressure tube integrity.

About Kinectrics

Kinectrics is a proudly Canadian company, committed to sustainable, long-term global growth. We provide complete life cycle management solutions to the electricity industry, working with our customers to fight climate change and save lives through clean electricity generation and medical isotope production. Our headquarters are in Etobicoke, Ontario with offices in Pickering, downtown Toronto, Bruce County, the United States, Germany, Denmark, Romania, United Kingdom and India. We operate

KINECTRICS

over 30 laboratories including CNSC-licensed nuclear facilities and employ more than 1,200 staff, 70% of whom have technical, science or engineering degrees.

At Kinectrics, we invest in state-of-the-art facilities and tools to provide the best and most comprehensive services to our customers. Our laboratories provide testing facilities for a broad range of areas in support of the nuclear industry, including materials analysis, nuclear radiation safety, and chemical analysis. Our world-class experts deliver services including fitness-for-service and operational support, specialized assessment services, and life cycle management for the long life, functionally critical reactor components such as Fuel Channels, Feeders, and Steam Generators. In addition to supporting Bruce Power in these areas, we provide similar services to major nuclear and non-nuclear utilities with over 200 clients in North America, Europe, the Middle East and Asia. We also provide the broader electricity industry with Transmission & Distribution testing services including electrical transformer testing and renewable energy grid interconnection.

Kinectrics and Pressure Tube Integrity

Kinectrics is the primary provider of fuel channel engineering support and pressure tube fitness-for-service assessments, delivering a complete range of operational and life cycle management support to Bruce Power, Ontario Power Generation, and New Brunswick Power, as well as other CANDU operators and the CANDU Owner's Group (COG) for over 20 years.

We have in-depth knowledge of fuel channel design, degradation mechanisms, inspection requirements, applicable codes and standards and the specialized inspection and analysis tools and methods used to help ensure fitness-for-service of these components.

Kinectrics has a large contingent of industry-recognized experts, with hundreds of years of combined experience, that have led the development of fuel channel fitness-for-service and life cycle management practices that have been adopted across the industry, including through implementation into applicable standards such as Canadian Standards Association (CSA) N285.4, *Periodic Inspection of CANDU Nuclear Power Plant Components* and CSA N285.8, *Technical Requirements for In-Service Evaluation of Zirconium Alloy Pressure Tubes in CANDU Reactors*. Our decades of broad-based station support activities, and leadership in methodology development and R&D, has allowed us to support the industry to safely and reliably achieve operational and life targets for these components.

KINECTRICS

Kinectrics also maintains the largest and most qualified pool of Fuel Channel engineering staff (over 35), delivering support in the full range of requisite areas, including:

- Outage Inspection Scope Definition
- Fitness-for-Service Assessments for unit restart, including flaw assessments
- Engineering Assessments, including:
    - Deuterium Uptake Assessments and Modeling (Body of Tube and Rolled Joint)
    - PT Elongation & Dimensional Assessments
    - Operating Guidelines
    - Deterministic Leak Before Break (LBB) & Fracture Protection Assessments
    - Probabilistic Core Assessments for flaws, LBB & Fracture Protection
- Modelling of material behavior, including fracture toughness and crack initiation
- Condition Assessments / Life Cycle Management Plans
- Life extension feasibility studies.

Kinectrics staff are industry-recognized experts in the areas of fracture toughness and fuel channel fitness-for-service evaluations. Our staff have substantial involvement in areas of the COG Fuel Channel Programs related to fracture toughness and fracture protection including the COG Expert Panel on Fracture Toughness. Kinectrics has developed the current fracture toughness model and engineering procedures that are used in fitness-for-service evaluations. Kinectrics has actively supported Bruce Power to demonstrate fracture protection in regions of the pressure tube with potentially elevated hydrogen equivalent concentrations, and this support continues. Our in-depth knowledge of experimental results, material behaviour and fracture mechanics allows us to address all of the various factors that can affect pressure tube integrity and ensure that these factors are considered in the fracture toughness model development and corresponding fracture protection evaluations. We are proud to apply these skills and experience to support Bruce Power to ensure continued safe operation of the Bruce A and Bruce B Nuclear Generating Stations.

The licence amendment requested by Bruce Power is supported by the advancements in understanding related to pressure tube behaviour and documented satisfaction that pressure tube fracture toughness will be sufficient for safe operation beyond 120 ppm in the regions of interest near the pressure tube inlet and outlet rolled joints. Kinectrics is proud to have actively supported Bruce Power in projects related to pressure tube behaviour.

Head Office
800 Kipling Ave., Unit 2
Toronto, ON M8Z 5G5
416-207-6000

Canada
393 University Ave. 4th Floor
Toronto, ON
M5G 1E6

USA
2135 City Gate Lane, Suite 100
Naperville, IL
60563

KINECTRICS

On this basis, Kinectrics supports Bruce Power's request to consolidate all fitness for service requirements within Licence Condition 6.1, with supplemental compliance verification criteria added to the supporting Section 6.1 of the Licence Condition Handbook. If you have any questions or require clarification, please do not hesitate to contact me at 416.207.6511 or david.harris@kinectrics.com.

Sincerely,

David Harris
President and CEO
Kinectrics Inc.

Head Office
800 Kipling Ave., Unit 2
Toronto, ON M8Z 5G5
416-207-6000

Canada
393 University Ave. 4th Floor
Toronto, ON
M5G 1E6

USA
2135 City Gate Lane, Suite 100
Naperville, IL
60563