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**VIA E-MAIL/COURIER**

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2005 July 15

**Re: Submission for License Renewals of the MAPLE 1 AND MAPLE 2 Reactors  
And New Processing Facility – Public Hearing 2005-H-12**

Dear Ms. Levert,

With respect to your letter of June 7, 2005 [1], on the subject of the Operating Licence renewals for the MAPLE 1 and MAPLE 2 reactors and the New Processing Facility, this is to inform you that AECL intends to appear at the public hearings for CNSC Reference 2005-H-12.

Please find attached the following two reports for the Day 1 public hearings:

- Information in Support of Licence Renewal for the MAPLE 1 and MAPLE 2 Reactors – Day 1 Hearing
- Information in Support of Licence Renewal for the New Processing Facility – Day 1 Hearing

We would like you to issue these two reports with different CMD numbers, one for each hearing.

We are preparing oral presentations for both hearings. The official language to be used during the presentations is English.

Re: Submission for License Renewals of the MAPLE 1 AND MAPLE 2 Reactors And New Processing Facility –  
Public Hearing 2005-H-12

AECL intends to file additional documentary material to supplement the material contained herein to update this material, as required by changing circumstances. As per CNSC INFO-0715, the additional documentary material will be provided at least seven days before the start of the hearing.

Sincerely,



P. Lafrenière  
General Manager, DIF Operations

cc: K.R. Hedges  
D.B. Taylor  
D. Garrick  
V.G. Snell  
J-P. Létourneau  
G. Archinoff  
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#### Reference

- [1] Letter from L. Levert to J-P. Létourneau, “Notice of Public Hearing 2005-H-12”,  
CNSC File: 1-3-1-9, AECL File: 6400-NOAC-05-0053-L, 2005 June 7.

**INFORMATION IN SUPPORT OF LICENCE RENEWAL  
FOR THE NEW PROCESSING FACILITY**

**Day 1 Hearing**

**Submitted by AECL on July 15, 2005**

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### Acronyms

<b>AECL</b>	Atomic Energy of Canada Limited
<b>AMMS</b>	Advanced Maintenance Management System
<b>CCA</b>	Commissioning Completion Assurance
<b>CDP</b>	Conceptual Decommissioning Plan
<b>CLCS</b>	Closed Loop Cooling System
<b>CNSC</b>	Canadian Nuclear Safety Commission
<b>COGDS</b>	Central Off-Gas Delay System
<b>CR</b>	Change Request
<b>CRL</b>	Chalk River Laboratories
<b>CSA</b>	Canadian Standards Association
<b>DAMRS</b>	Data Acquisition, Monitoring and Response System
<b>DIF</b>	Dedicated Isotope Facilities
<b>DRL</b>	Derived Release Limit
<b>EAFS</b>	Exhaust Air Filtration System
<b>FA</b>	Facility Authority
<b>FCN</b>	Field Change Notice
<b>FM</b>	Facility Manager
<b>FME</b>	Foreign Materials Exclusion
<b>FSAR</b>	Final Safety Analysis Report
<b>HAZOP</b>	Hazard and Operability (Studies)
<b>HEU</b>	Highly Enriched Uranium
<b>MAPLE</b>	Multipurpose Applied Physics Lattice Experimental (Reactor)
<b>MMIR</b>	MDS Nordion Medical Isotopes Reactor
<b>NCR</b>	Non-Conformance Report
<b>NIIT</b>	NPF Integrated Inactive Testing
<b>NPF</b>	New Processing Facility
<b>NRU</b>	National Research Universal (Reactor)
<b>OJT</b>	On-the-Job Training

<b>OLC</b>	Operating Limits and Conditions
<b>OM</b>	Operating Manual
<b>OPEX</b>	Operating Experience
<b>OSA</b>	Operational Safety Assessment
<b>OSH</b>	Occupational Safety and Health
<b>OTP</b>	Operator Test Procedure
<b>PDP</b>	Preliminary Decommissioning Plan
<b>PM</b>	Preventive Maintenance
<b>SERP</b>	Safety, Environmental and Radiological Protection
<b>SSHC</b>	Site Safety and Health Committee
<b>UPS</b>	Uninterruptible Power Supply

## 1 INTRODUCTION

Atomic Energy of Canada Limited (AECL) is in the final stages of completing the MDS Nordion Medical Isotopes Reactor (MMIR) Project at the Chalk River Laboratories (CRL) to put into operation the MAPLE 1 and MAPLE 2 reactors and the New Processing Facility (NPF) for the sole purpose of producing medical isotopes for diagnostic and therapeutic purposes. The MAPLE 1 and MAPLE 2 reactors and the NPF are also referred to as the Dedicated Isotope Facilities (DIF).

The design and construction programs are complete and the completion assurance statements have been submitted to the Canadian Nuclear Safety Commission (CNSC) staff. Non-nuclear commissioning has also been completed and the associated completion assurance statements submitted. Approval was granted by the CNSC Designated Officer in May 2003 to commence active commissioning of the NPF. As of the date of issue of this report, work on completing the prerequisites for active commissioning of the NPF continues.

MDS Nordion would take legal title of the NPF after the successful completion of the commissioning program. Following transfer of legal title, AECL will continue to operate the NPF. In addition, AECL will retain the Design Authority role and be the holder of the Operating Licence.

This report provides summary-level information to support the renewal of the Nuclear Substance Processing Facility Operating Licence, New Processing Facility, NSPFOL-03.01/2005, which expires on November 30, 2005. AECL's application has requested a renewal for a period of 24 months on the basis that this is sufficient to allow resolution of technical issues to enable completion of the commissioning program and accumulation of representative operating experience in the NPF.

Since the NPF is at the Chalk River Laboratories, operations are integrated with many of the CRL site-wide programs, which are covered under the Nuclear Research and Test Establishment Operating Licence, NRTEOL-01.02/2006.

As part of its continuous improvement program, including results of AECL's assessments, various audits, and root cause evaluations, AECL is putting in place improvement programs for the operation of the DIF in several areas. AECL is taking actions to develop and implement a comprehensive improvement plan for DIF to achieve the following:

- Clearly communicate accountabilities for program requirements and for execution of work;
- Implement an Operation Score Card to continuously evaluate performance;
- Implement a Human Performance Improvement program for Operations and Maintenance;
- Incorporate lessons learned from major improvements in National Research Universal (NRU) reactor processes;



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- Establish performance benchmarks against utilities and other research reactors;
- Improve the planning process by incorporating lessons learned from utilities and other AECL projects;
- Implement a plan for a transition from the MMIR Project to routine operations, maintenance, and technical support.

## **2 FACILITY PERFORMANCE DURING THE CURRENT LICENSING PERIOD**

The summary of key developments for the NPF for 2003 and 2004 is based on the NPF Annual Safety Review Reports [1], [2]. The summary of key developments for the NPF up to July 2005 is also provided.

### **2.1 KEY DEVELOPMENTS DURING 2003**

During 2003, much of the work focused on the identification and resolution of technical issues found during further NPF Integrated Inactive Testing (NIIT). This involved field improvements, revisions to Operating Manuals (OMs), enhanced equipment readiness, and disposition of non-conformances. NIIT also provided opportunities for on-the-job training or refresher training of Operations personnel. Work activities were directed at addressing CNSC requirements to obtain approval for Phase B active commissioning. Pursuant to Licence Condition C2(a) of NSPFOL-3.02/2003, approval was granted by the CNSC Designated Officer in May 2003 to commence active commissioning of the NPF [3]. Work activities continued to address the prerequisites for active commissioning.

Radioactive material handled in the NPF during 2003 consisted primarily of a uranyl nitrate solution for testing of the calcination process using a representative concentration as that anticipated during operations. There was one reportable unplanned event in the Facility during 2003. Airborne and liquid effluent releases to the environment were well below Action Levels for the Facility and small fractions of the Derived Release Limits (DRLs) for the site. The collective whole-body dose equivalent was 5.1 person-mSv during 2003. The average individual dose for the year was 0.3 mSv and the maximum individual dose was 0.8 mSv.

As a result of a re-organization in DIF, the Manager of the MAPLE Reactors, in addition to the duties of Facility Authority (FA) for the MAPLE 1 and MAPLE 2 Reactors, assumed the responsibility of Acting FA for the NPF in December 2003. Also, the Facility Manager (FM) for the MAPLE Reactors assumed the additional responsibility of Acting FM for the NPF in December 2003.

During 2003, staff from the Operational Safety Assessment (OSA) section of Facilities Safety and Licensing Branch monitored the operation of the NPF and performed monthly safety inspections. In addition, the NPF was included in CRL site-wide inspections of all licensed facilities in April and October. The inspection team was comprised of representatives from Safety, Environmental and Radiological Protection (SERP), Occupational Safety and Health (OSH), Site Safety and Health Committee (SSHC), Security, Fire Department, and OSA. Facility staff addressed all issues identified during the inspections, as required.

Since Phase A commissioning of the NPF was completed in July 2000, activities in the Facility have focused on addressing outstanding Phase A commissioning items, identification and resolution of technical found during NIIT, and training of operations

and maintenance staff. Maintenance and calibration activities were carried out during the year. The System Testing Plan for NPF Integrated Inactive Testing, consisting of 12 individual tests, was initiated in 2002 and continued in 2003. This series of tests, designed to bridge the time line between Phase A and B commissioning, was developed to demonstrate the functionality and operability of systems in an integrated mode.

All effluent monitors, area radiation monitors, and instruments were calibrated and source-checked as required throughout the year.

An annual third-party review of the Fire Protection System was carried out by an external independent agency in December to comply with one of the requirements of Licence Condition 8.4 in NSPFOL-03.01/2005.

## **2.2 KEY DEVELOPMENTS DURING 2004**

During 2004, much of the work focused on identification and resolution of technical issues found during system and process testing. This involved field improvements, revisions to Operating Manuals (OMs), enhanced equipment readiness, and disposition of non-conformances. These commissioning activities also provided opportunities for on-the-job training or refresher training of Operations personnel.

Radioactive material handled in the NPF during 2004 consisted primarily of natural uranyl nitrate solutions for testing of the calcination process using a representative concentration as that anticipated during operations. Airborne and liquid effluent releases to the environment were well below regulatory Action Levels and small fractions of the DRLs. The collective dose was 4.4 person·mSv during 2004. The average individual effective (whole-body) dose for the year was 0.4 mSv, and the maximum individual dose was 1.0 mSv. There were three unplanned events reportable to the CNSC in the Facility during 2004.

During 2004, staff from the Operational Safety Assessment (OSA) section of Facilities Safety and Licensing Branch monitored the operation of the NPF, which included monthly safety inspections. In addition, the NPF was included in site-wide inspections of all licensed facilities in May and October. The inspection team was comprised of representatives from SERP, OSH, SSHC, Security, Fire Department, and OSA. Facility staff addressed all issues identified during inspections as required.

Since Phase A Commissioning of the NPF was completed in July 2000, activities in the Facility have focused on the identification and resolution of technical issues found during NIIT work and training of operations and maintenance staff. Various maintenance and calibration activities were carried out during the year. In addition, field improvements, revisions to Operating Manuals (OMs), enhanced equipment readiness, and disposition of non-conformances were conducted to demonstrate the functionality and operability of systems in an integrated mode. The resolution of technical issues was deemed to be essential prior to the start of Phase B Commissioning, as the work required cell entry to complete.

All effluent monitors, area radiation monitors, and instruments were calibrated and source-checked as required throughout the year.

An annual third-party review of the Fire Protection System was carried out by an external independent agency in December to comply with one of the requirements of Licence Condition 8.4 in NSPFOL-03.01/2005.

### **2.3 CURRENT STATUS IN 2005**

The NPF Project and Commissioning staff are currently resolving issues found during the non-nuclear commissioning and the NIIT work. NPF Operations continues to work on operational readiness for the start of active commissioning.

A number of changes in the AECL organization have taken place over the last few months. The DIF organization, in its new constituency, manages all aspects of the DIF previously covered by the MMIR Project and DIF Operations. The DIF organization will ensure management oversight and operational risk review in an integrated manner. Further, this integrated team will ensure that safety and quality practices are enforced.

### 3 NPF PROGRAMS

#### 3.1 SITE-WIDE PROGRAMS

Operation of the NPF relies on many of the CRL site-wide programs, which are described in summary in Reference [4]. The site-wide programs used by the NPF are:

1. Environmental Protection Program (Reference [4], section 2.1.1), which includes management of radioactive and non-radioactive emissions and waste management.
2. AECL's Overall Quality Assurance (QA) Program (Reference [4], section 2.1.2), which is supplemented by the MDS Nordion Medical Isotopes Reactor (MMIR) Project QA Manual for the remaining project activities (Reference [5]), and the Dedicated Isotope Facilities (DIF) Operations QA Manual (Reference [6]) that applies to the operation of the MAPLE reactors and the NPF.
3. Emergency and Protective Services Program (Reference [4], section 2.1.3).
4. Occupational Safety & Health Program (Reference [4], section 2.1.4).
5. Operating Experience Program (Reference [4], section 2.1.5).
6. Radiation Protection Program (Reference [4], section 2.1.6).
7. Emergency Preparedness Program (Reference [4], section 2.1.7).
8. Nuclear Materials and Safeguards Management Compliance Program (Reference [4], section 2.1.8).
9. Radioactive Material (RAM) Transportation Compliance Program (Reference [4], section 2.1.9).
10. Radioactive Waste Management Program (Reference [4], section 2.2.2).
11. Training Program (Reference [4], section 2.2.7) that provides training for site-wide programs, organizational development, and radiation protection. Line managers define training requirements for staff. The Operations Training Manager in the DIF organizes facility-specific training and facilitates and tracks staff training. Training requirements for staff that are certified by the CNSC are specified in the current Operating Licences.
12. Independent Review and Approval (Reference [4], section 2.2.9).
13. Community Relations Program (Reference [4], section 4.6.6).

#### 3.2 SPECIFIC PROGRAMS

In addition to AECL company-wide and CRL site-wide programs, facility specific programs are in use, as outlined in the QA Manuals and supporting procedures for the MMIR Project and the operation of the DIF (References [5], [6]). Some site-wide programs require specific implementation in the context of the DIF. The following is a brief description of how key programs are implemented in the DIF.

### 3.2.1 QA Program

#### 3.2.1.1 MMIR Project QA Program

The objective of the MMIR Project QA program is to ensure that commissioning activities are properly planned and executed by competent individuals and that the results demonstrate system compliance with specified requirements.

The MMIR Project QA program includes verification activities, self-assessments, audits, and other actions to verify that activities are performed to obtain the assurance of quality and that non-compliance with specified requirements are identified, recorded, and corrected. Records are produced and retained as objective evidence of compliance with the specified requirements.

The documents supporting the program objectives are:

- AECL Overall Quality Assurance Manual, 00-01913-QAM-010;
- MMIR Project Quality Assurance Manual [5], which complies with the requirements specified in the Canadian Standards Association CSA-N286.1, CSA-N286.2, CSA-N286.3, CSA-N286.4, and CSA-N286.7.
- MMIR Project procedures to provide specific guidance on the QA program implementation.

The QA programs applicable to the MMIR Project activities are described as follows:

- Procurement is performed in accordance with the requirements described in the Company-Wide Procurement QA Manual, 00-01913-QAM-011, and the MMIR Project QA Manual [5].
- Design activities are performed in accordance with the requirements described in the Company-Wide Design QA Manual, 00-01913-QAM-005, and the MMIR Project QA Manual [5].
- Construction and fieldwork activities performed under direct MMIR Project control are conducted in accordance with the MMIR Project QA Manual [5] and the Company-Wide Construction QA Manual, 00-01913-QAM-013, as applicable. Construction activities performed by Participants and /or Contractors are conducted in accordance with their quality program manual, which is accepted by the MMIR Project prior to the start of the activity. QA programs specified by MMIR Project and acceptable to jurisdictional authorities govern these activities, depending on the system classification.
- Commissioning activities are performed in compliance with the requirements of the MMIR Project QA Manual [5].
- The development and use of analytical, scientific, and design software complies with the Company-Wide QA Manual for Analytical, Scientific, and Design Computer Programs, CW-507230-QAM-102.

### 3.2.1.2 DIF Operations QA Program

DIF Operations has established and implemented an Operations QA Program to ensure that qualified individuals operate and maintain the NPF safely and within the requirements defined in NSPFOL-03.01/2005 and detailed in “New Processing Facility Operational Limits and Conditions,” 6424-05410-OLC-001.

The DIF QA program includes verification activities, self-assessments, audits, and other actions to verify that activities are performed to obtain the assurance of quality and that non-compliance with specified requirements are identified, recorded and corrected. Records are produced and retained as objective evidence of compliance with the specified requirements.

The documents supporting the program objectives are:

- DIF Quality Assurance Manual [6], which covers both the Owner and Operator’s responsibilities as per the requirements of the CSA-N286.0 and CSA-N286.5.
- Supporting documents to provide specific guidance on QA program implementation:
  - Company-wide procedures;
  - Chalk River procedures;
  - DIF-specific quality procedures;
  - MMIR Project quality procedures;
  - Conduct of Operations procedures;
  - Instructions to Staff documents; and
  - Compliance program manuals (e.g., radiation protection, emergency preparedness) and their referenced procedures.

Opportunities for improvement were identified from self-assessments, event investigations, root cause analyses, DIF Operations Oversight Assessment, and CNSC inspections and audits. Additional resources have been added to ensure prompt and effective resolution and implementation of these opportunities for improvement.

A comprehensive improvement plan for DIF is under development to achieve the following:

- Clearly communicate accountabilities for program requirements and for execution of work;
- Implement an Operation Score Card to continuously evaluate performance;
- Implement a Human Performance Improvement program for Operations and Maintenance;
- Incorporate lessons learned from major improvements in NRU processes;

- Establish performance benchmarks against utilities and other research reactors;
- Improve the planning process by incorporating lessons learned from utilities and other AECL projects;
- Implement a plan for a transition from the MMIR Project to routine operations, maintenance, and technical support.

An operational risk review and management oversight process has been implemented with 8 procedures produced. Operations and maintenance staff are being trained on the procedures.

Based on a review of best industry practices, utility peers have developed conduct of operations expectations for DIF Operations; training on the conduct of operations expectations has started. An observation and coaching program for operations and maintenance staff is being run by recognized experts in the field.

An extensive review of procedures, identification of gaps and improvements to the procedures are underway. Training on the revised and new procedures is being provided when they are issued for use.

### **3.2.2 Safety Analysis Program**

The objective of the Safety Analysis program is to demonstrate that the requirements for health and safety of persons and for protection for the environment are met for all accident scenarios in the Final Safety Analysis Report (FSAR).

Currently, the Safety Analysis program is focused on completing a revision of the Hazard and Operability (HAZOP) studies performed on NPF systems. This revision was undertaken to perform a comprehensive assessment of the potential safety-related impacts from the design changes implemented to address deficiencies found during non-nuclear commissioning and NIIT work. Upon completion, the HAZOP study results will be used to review and modify, as required, the bounding cases for safety analysis. As the need for any new analysis arises, it will be performed and documented prior to the initiation of active commissioning.

The documents supporting the program objectives are:

- Safety case to support commissioning activities (as required);
- NPF Final Safety Analysis Report;
- “Criticality Safety Document for the New Processing Facility,” 6403-03200-AR-002, CSD-57;
- “Criticality Safety Document for the Calcine Waste Transfer Flask,” 6403-03200-AR-005, CSD-58.

The Safety Analysis program also includes the revision and update of the FSAR. This will include revision of all FSAR sections, with the exception of those sections containing safety analysis results. These safety analysis sections will be updated once the



NPF design is finalized and the results of the active commissioning tests are available. In the meantime, safety cases will be produced, as required, to support commissioning activities.

The AECL Nuclear Criticality Safety Panel has placed two conditions on the approval of CSD-57 (Criticality Safety Document for the NPF):

- Condition 1 limits total quantity of highly enriched uranium (HEU) in the NPF to 550 g U-235; and
- Condition 2 requires the proponent to develop a detailed plan with procedures for tracking and controlling HEU in components and vessels in which criticality is not inherently ensured by geometry, including analysis of the flushing solutions for uranium concentration to confirm that no significant quantity of uranium is accumulated in the Active Liquid Waste tanks. Approval of the plan by the AECL Nuclear Criticality Safety Panel is a prerequisite for removing Condition 1.

The actions to be taken by AECL are:

- Develop the detailed plan and procedures for tracking and controlling HEU in components and vessels and evaluate for operational effectiveness;
- Update the procedures for HEU accounting in the NPF and evaluate for operational effectiveness.

### **3.2.3 Radiation Protection Program**

The NPF is operated in accordance with the AECL Radiation Protection Program. All applicable elements of the AECL Radiation Protection Requirements are implemented in the DIF to the extent required for current commissioning and operational status.

The documents supporting the program objectives are:

- AECL's Radiation Protection Requirements, 00-872.1/RC-2000-633-0;
- Radiation Protection Manual, RC-2000-633-1;
- Radiation Protection training documents;
- Facility specific documents.

### **3.2.4 Operational Limits and Conditions**

The NPF is operated in accordance with NSPFOL-03.01/2005 for the Facility and NRTEOL-01.02/2006 for CRL site-wide programs. "New Processing Facility Operational Limits and Conditions," 6424-05410-OLC-001, Revision 4, is the version currently referenced in Appendix B of NSPFOL-03.01/2005. The OLC document sets out the key requirements, limits, and conditions for the safe operation of the NPF.

A revised OLC document will be issued, as required, to reflect design changes, lessons learned, and knowledge gained from commissioning.

### **3.2.5 Safety-Related Systems Testing Program**

The NPF Reliability Plan, 6424-01300-PLA-001, has been produced to guide Operations in the development of a maintenance program for testing and inspection to demonstrate that the availability, reliability, and effectiveness of any structure, system, or component remain consistent with the "Final Safety Analysis Report for the New Processing Facility," 6403-05230-FSAR-001. The maintenance program and the supporting procedures, such as Operator Test Procedures (OTPs), are under development. An Operating and Routine Maintenance Schedule is being formulated based on the results of an activity base analysis conducted in the DIF in accordance with operational and regulatory requirements. A schedule will be instituted to ensure that all OTPs are conducted as required.

### **3.2.6 Commissioning Program**

The objective of the commissioning program is to perform testing within the NPF to verify that associated systems required to operate the facility perform in accordance with the design intent and safety requirements.

The documents supporting the program objectives are:

- New Processing Facility Commissioning Plan, 6403-92000-CM-002.
- Commissioning Procedures prepared in accordance with 6400-486.1, Commissioning Documentation.

Phase A Commissioning of the NPF was completed in July 2000 and the systems turned over to Operations by November 2000. Since Phase A commissioning, operator training and testing of the systems have resulted in operability and maintainability issues, which have been documented in accordance with the applicable quality process. Work is currently in progress to resolve issues that are identified as prerequisites for starting Phase B Commissioning.

In addition to the completion of prerequisites (see Section 5.1), revision of the NPF Commissioning Plan 6403-92000-CM-002 and Phase B commissioning procedures will be completed prior to the start of Phase B commissioning.

### **3.2.7 Periodic Inspection Program**

The Inaugural and Periodic Inspection Program, based on criteria to be embedded in the overall program document, was completed in October 2000. It includes, but is not limited to, the following:

- The mandatory inspections of key equipment and piping to confirm that there is no significant deterioration of the pressure boundary, which may result in failure of the pressure boundary.

- Inspection of code-classified systems and components per the approved Form 73, with additional requirements.
- Inspection of pressure vessels per the Boiler and Pressure Vessels Act.

An Overall In-Service Inspection Program is to be established to define the program requirements for mandatory and non-mandatory inspections of systems essential to safe shutdown, cooling, and confinement of the NPF. The overall program elements and guidance will be described in a new program document to include:

- Definition of the Mandatory and Non-Mandatory categories of the In-Service Inspection Program;
- Criteria established to differentiate the subprograms;
- The CSA Standard requirements appropriate to the NPF.

The documents supporting the program objectives are:

- “Dedicated Isotope Facilities (DIF) Periodic and Inaugural Inspection Program,” 6423-01510-TD-001.
- DIF Overall In-Service Inspection Program.

The actions to be taken are identified in Section 5.2.3.

### **3.2.8 Maintenance Program**

The objectives of the Maintenance Program are to detect and minimize deterioration in equipment and systems. The program is designed to maximize system availability and reliability and to ensure equipment and components perform their intended functions.

There are two types of maintenance:

- Preventive Maintenance (PM), which includes pre-planned routine testing, inspection, servicing, and overhaul of systems, equipment, and components. The PM program is made up of periodic inspection, periodic testing, in-service inspection, and predictive maintenance.
- Corrective Maintenance, which includes all actions taken to repair and/or restore equipment and components that have failed or are not performing their intended function.

The governing documents of the maintenance program are:

- Maintenance Manual, 6400-01500-MN-001;
- Maintenance procedures;
- DIF Periodic and Inaugural Inspection Program;
- Facility-specific maintenance procedures;
- CRL maintenance procedures, as applicable.

### 3.2.9 Qualification and Staff Training Program

The NPF Training Program is designed to provide and maintain the training, qualification, and authorization of personnel in direct operating positions, namely, the Hot Cell Technicians and NPF Supervisors.

The NPF Training Program:

- Provides efficient and effective training for employees directly involved with the operation of NPF,
- Provides training for employees involved in supporting the operation of NPF, and
- Provides ongoing training for direct operating personnel to maintain qualification.

The documents supporting the program objectives are:

- The NPF Training Program is based on the guidelines and standards set out in the AECL Systematic Approach to Training and supporting procedures;
- NPF Staffing and Training Plan 6403-05500-LS-003;
- System Task Analysis;
- System Training Manuals;
- Master Lesson Directives, On-the-Job Training/Field Checkouts Guides;
- Assessments (exams and answer guides);
- Records of training.

The description of the curricula has been updated and the staffing and training plan is under revision.

### 3.2.10 Nuclear Materials and Safeguards Management Compliance Program

Management of nuclear materials (fissionable materials) in the NPF is in accordance with Nuclear Materials and Safeguards Management Compliance Program, 9100-01900-MAN-001. The material managed includes:

- Irradiated HEU targets;
- High-level liquid waste containing uranium;
- Active liquid waste containing uranium;
- Low-level liquid waste containing uranium;
- Calcined waste;
- Other wastes, samples, etc., containing uranium (unirradiated and irradiated).

The documents supporting the program objectives for the NPF are:

- Accounting of Nuclear Material and Declaration of Nuclear Loss and Plutonium Generation in HEU Targets, 6423-37000-PRO-001;
- Fissionable Materials Management, 6423-37000-PRO-003;
- Design Information Questionnaire, CN-BM.

The actions to be taken prior to In-Service are identified in Section 5.2.4.

### 3.2.11 Design

There has been a continuing need for design services to resolve non-conformances and design facility improvements and to provide design support to spares procurement, operations, and maintenance.

The documents supporting the program objectives are:

- The MMIR Project QA Manual [5] and the referenced procedures, particularly the change control procedures and instructions and the non-conformance procedure, which comply with CSA-N286.2;
- Change Requests to document design changes and approval of these changes;
- Change Request Closeout documents to demonstrate completion of change requests, including revision status of affected documents;
- The MMIR Project Design Verification Plan and associated design verification documents.

It has been identified in past audits that a better delineation between changes that can be approved by site staff and those that require design engineering review was required. Changes were made to procedures, and staff were trained to address these issues.

The following improvements have been made to the process for the procurement of items and services used during the design, construction, commissioning, and operation of the DIF:

- Issued the MMIR/DIF Procurement Process procedure, 6400-850.1, to provide a roadmap through the Corporate Procurement process, to identify roles and responsibilities for all aspects of the procurement process, and to include an independent verification before Engineering Manager approval.
- Issued the MMIR/DIF Technical Review of Procurement operating instruction, 6400-850.1.1, to provide technical verification in the procurement process.

### **3.2.12 Occupational Health and Safety Program**

The NPF is operated in accordance with the AECL Occupational Health and Safety Program. All applicable elements of the program are implemented in the DIF. The prime objective of the program is to provide a safe and healthy work environment.

The documents supporting the program objectives are:

- AECL Occupational Safety and Health Program Manual, 00-07010-MAN-001;
- Detailed standards, guidelines, procedures, and processes;
- Facility-specific documents such as confined space protocol and personal respirators.

### **3.2.13 Decommissioning**

In May 1999, AECL submitted a Conceptual Decommissioning Plan (CDP), as part of its application for construction approvals of the MAPLE reactors and the NPF. At that time, CNSC staff judged the CDP to be equivalent to a Preliminary Decommissioning Plan (PDP) and accepted it. Once AECL has produced a PDP for the CRL site that is acceptable to the CNSC staff, then the CNSC staff will review the CDP for the DIF against the requirements of CNSC Regulatory Guide G-219 and for the appropriate fit with the CRL site PDP.

### **3.2.14 System Performance Monitoring Program**

A DIF System Performance Monitoring Program will be established to supplement operator surveillance, preventive maintenance, and system surveillance testing activities and will include the following elements:

- Systematic review of plant / equipment performance via system walkdowns, trending, and Operating Experience (OPEX) review;
- Review of system operational test and maintenance results for equipment deficiencies and compliance with design requirements;
- Preparation of formal Reports (Report Cards) on system performance, with improvement recommendations as appropriate.

The plan for the establishment of a DIF System Performance Monitoring Program is as follows:

- Development of a System Performance Monitoring Program;
- Implementation of the System Performance Monitoring Program;
- Self-assessment of the System Performance Monitoring Program within 12 to 18 months of its implementation.

### **3.2.15 Human Factors Program**

As part of our engineering validation of the NPF, there have been two exercises to confirm the human factors engineering: one exercise related to the operation of the Central Off-Gas Delay System (COGDS) and the other to the Data Acquisition, Monitoring, and Response System (DAMRS). In both exercises the staff performed the required tasks as trained. Recommendations for improving the efficiency have been made for the COGDS and for the DAMRS. The recommendations are being implemented as part of the improvements to the COGDS and DAMRS. These will be completed by the time that the operational readiness review is performed to demonstrate that the NPF is ready for active commissioning.

The document supporting the program objectives is:

- “NPF Human Factors Work Scope and Criteria,” 6403-08000-DP-001.

An assessment of HF work has been conducted on design changes that have occurred during the current licensing period.

### **3.2.16 Chemistry Control Program**

A Chemistry Control Program has been put in place for the NPF to:

- Prevent or minimize corrosion or other deterioration of components;
- Ensure compliance with all licence requirements as listed in the OLC document.

The document supporting the program objectives is:

- New Processing Facility Chemistry Control, 6424-03080-OM-001.

The actions to be taken prior to In-Service are:

- Finalize the requirements for maintaining traceability and for controlling consumables that come in contact with the isotope products, based upon lessons learned from Active Commissioning;
- Update “New Processing Facility Chemistry Control,” 6424-03080-OM-001, to capture the requirements for maintaining traceability and for controlling consumables that come in contact with the isotope products;
- Update “New Processing Facility Chemistry Control,” 6424-03080-OM-001, to capture system requirements from design changes.

### **3.2.17 Configuration Management & Change Control Program**

The NPF design was completed with the issue of a Design Completion Assurance in 2001. Since that time, there has been a continuing need for changes to the Facility to resolve non-conformances and make improvements. A change control process is in place

to ensure that permanent equipment changes are reflected in revised documentation. In addition, temporary changes to the current status of equipment are managed by an Operations process.

The documents supporting the change control processes are:

- Change control procedures as identified in the MMIR Project QA Manual [5] and the DIF QA Manual [6], in compliance with CSA-N286.2, CSA-N286.4, and CSA-N286.5.
- Change Requests to document design changes and approval of these changes.
- Change Request Closeout documents to demonstrate completion of change requests, including revision status of affected documents.
- Jumper System procedure 6423-655.1 to identify temporary facility changes.
- Jumper Records to document temporary facility changes and approval of these changes.
- Control of Facility Equipment procedure 6423-311.1 for facility configuration management.

The actions to be taken prior to In-Service are:

- Produce the reference document baseline for design, maintenance, and operation based on the current project and operations documents.
- Issue the Master Equipment List.

### **3.2.18 Foreign Materials Exclusion Program**

The objectives of the Foreign Materials Exclusion (FME) Program are:

- To develop and instill a culture amongst all personnel that fosters the prevention of foreign material introduction into the DIF.
- To define the foreign material exclusion requirements for Operations, Maintenance, and all other staff when planning and implementing both routine and non-routine work activities in and around open systems in the DIF.
- To provide guidance and documentation requirements on recovery from intrusion of foreign material in a facility system.
- To evaluate and document the effects of unrecovered foreign material from facility systems and components.

The documents supporting the program objectives are:

- FME Program Manual, 6423-05500-MAN-001;
- Work Plans/work packages.

As part of the annual Quality Assurance program review, DIF Management ensures that the requirements of the FME Program as defined are current.



## 4 PROJECT SCHEDULE

### 4.1 PLANNED ACTIVITIES DURING THE NEXT LICENSING PERIOD FOR NPF

When “Outstanding Issues for the MDS Nordion Medical Isotopes Reactor Project,” CMD 04-M28 [7], was issued, the NPF had completed the planned Phase A Non-Nuclear Commissioning program. Pursuant to Licence Condition C2(a) of NSPFOL-3.02/2003, approval was granted in May 2003 to commence active commissioning of the NPF [3]. To address the outstanding items identified from the commissioning results, AECL plans to do the following:

1. Complete the prerequisites for active commissioning (Active Commissioning Milestone) as listed in Section 5.1.
2. Complete Phase B Commissioning (Phase B CCA Milestone). To demonstrate completion of the Phase B Commissioning, AECL plans to submit:
  - A safety case to demonstrate that there is no impact on health, safety, security, the environment, and Canada’s international obligations.
  - Documentation to demonstrate that active commissioning of the NPF has been successfully completed.
  - Documentation to demonstrate that a small diesel generator to power the CLCS and the charger for the Uninterruptible Power Supply (UPS) have been successfully installed and commissioned.
3. Complete the following prerequisites to allow In-Service Operation (In-Service Milestone):
  - Issue a revised FSAR to demonstrate that there is no impact on health, safety, security, the environment, and Canada’s international obligations.
  - Issue the reference document baseline with updated documentation for design, operations, and maintenance.
  - Issue a revised NPF OLC document to reflect lessons learned and knowledge gained from commissioning.
  - Issue a revised Periodic Inspection Program document to be fully compliant with documentation requirements.

### 4.2 KEY PROJECT MILESTONES DURING THE NEXT LICENSING PERIOD

The following key project milestones for the NPF are included in the MMIR Project schedule for the next licence period:

<b>Milestone</b>	<b>Description</b>
New Processing Facility	
NPF Active Commissioning	CNSC staff confirmation that prerequisites for NPF Active Commissioning are completed
Phase B Completed	NPF Nuclear Commissioning completed
NPF In-Service	NPF available for In-Service

## 5 LICENSING ISSUES

A number of issues that need to be resolved as part of the ongoing licensing process have been identified in the “Outstanding Issues for the MDS Nordion Medical Isotopes Reactor Project,” CMD 04-M28 [7], “Renewal of the Nuclear Substance Processing Facility Operating Licence for the New Processing Facility (NPF) at the Chalk River Laboratories,” CMD 03-H4 [8], and supplementary CNSC requests. The following sections present an overview of the currently outstanding licensing issues, along with an update on the current status and deliverables that AECL plans to produce to address the issues.

### 5.1 CONFIRMATION OF READINESS FOR ACTIVE COMMISSIONING

#### 5.1.1 Prerequisite Completion 1

Licensing Issue identified in CMD 04-M28 [7]:

*AECL demonstrates that it has successfully completed its Operational Readiness Review Workplan.*

#### STATUS:

The NPF Operational Readiness Review Work Activity Plan will be issued and completed prior to active commissioning.

#### 5.1.2 Prerequisite Completion 2

Licensing Issue identified in CMD 04-M28 [7]:

*AECL modifies the NPF building Emergency Procedures to reflect the evacuation requirements under certain loss of ventilation accidents.*

#### STATUS:

The Emergency Operating Procedure will be issued for use prior to active commissioning. The CRL Site Emergency Plan will be revised as required.

### 5.1.3 Prerequisite Completion 3

Licensing Issue identified in CMD 04-M28 [7]:

*AECL demonstrates that it has implemented the seismic walkdown findings for the dissolver/decladder and the central off gas delay system.*

#### STATUS:

Five of the total eight recommendations of the seismic walkdown findings have been completed. Revisions of the operating documents, which are in progress, will address the remaining three recommendations.

### 5.1.4 Prerequisite Completion 4

Licensing Issue identified in CMD 04-M28 [7]:

*AECL successfully completes a backup firewater cooling test of the Closed Loop Cooling System.*

#### STATUS:

The backup firewater-cooling test will be performed prior to completion of the Operational Readiness Review Work Activity Plan.

### 5.1.5 Prerequisite Completion 5

Licensing Issue identified in CMD 04-M28 [7]:

*AECL to demonstrate that all outstanding work designated as "required for active commissioning" that was noted in the completion assurances and nonconformance reports (including any NCRs raised after May 30, 2003) is completed.*

#### STATUS:

All outstanding NCRs and FCNs will be reviewed by management to determine which ones are required to be closed prior to active commissioning. The completion of the Operational Readiness Review Work Activity Plan will demonstrate that there is no outstanding work designated as "required for active commissioning."

### 5.1.6 Prerequisite Completion 6

Licensing Issue identified in CMD 04-M28 [7]:

*AECL to demonstrate that items from Section 4 of the NPF Inactive Integrated Testing Report, which AECL designated as essential for the start of Phase B Commissioning, have been demonstrated to have been successfully completed.*

#### STATUS:

The recommendations from Section 4 of the NIIT Report [9] will be completed prior to active commissioning and the associated documentation will be submitted to the CNSC.

### 5.1.7 Prerequisite Completion 7

Licensing Issue identified in CMD 03-H4 [8]:

*AECL to obtain CNSC approval to operate Calcine Waste canisters.*

#### STATUS:

Verification of the canister shielding using the radioactive source is scheduled for September 2005. The remaining work to address the CNSC comments is in progress.

## 5.2 APPROVAL FOR IN-SERVICE OPERATION

### 5.2.1 Commissioning Completion Assurance

Licensing Issue identified in CMD 04-M28 [7]:

*AECL demonstrates, through the availability of objective evidence, that active commissioning has been successfully completed.*

#### STATUS:

AECL will address these issues by producing the following:

- Signed NPF Commissioning Completion Assurance (CCA) Certificates for active commissioning;
- Commissioning Reports for commissioning tests.

In addition, AECL will produce the following:

- Document baseline to support the ongoing operation of the NPF.

### 5.2.2 Diesel Generator

Licensing Issue identified in CMD 04-M28 [7]:

*AECL to complete the procurement and installation of a small diesel generator to power the Closed Loop Cooling System (CLCS) and the charger for the Uninterruptible Power Supply (UPS) when normal Class III power supplies are lost.*

#### STATUS:

Installation of a small diesel generator is in progress.

### 5.2.3 Baseline and Residual Regulatory Activities

Licensing Issue identified in CMD 04-M28 [7]:

*AECL to modify its Periodic Inspection Program documentation to be fully compliant with documentation requirements.*

#### STATUS:

AECL will address this issue by producing the revised version of "Dedicated Isotope Facilities (DIF) Periodic and Inaugural Inspection Program," 6423-01510-TD-001, to address CNSC staff comments in Reference [10].

### 5.2.4 Safeguards

Licensing Issue identified in CMD 03-H4 [8]:

*Calibration data for the IAEA transmitter monitoring the volumetric changes of the HEU inventory in the 10 L tank in Cell 4a.*

*Calibration data for the IAEA radiation monitor installed in Cell 4b against movement of HEU cans.*

*Documentation of process activities and data to assist in the calibration and commissioning of the IAEA instrumentation.*

**STATUS:**

AECL will complete this issue during active commissioning of NPF.

**5.3 GENERIC LICENSING ISSUES**

**5.3.1 Quality Assurance Audits**

Licensing Issue identified in CMD 04-M28 [7]:

*AECL to demonstrate that actions taken to correct and prevent a recurrence of deficiencies identified during the Commissioning Quality Assurance Program audit (CNSC Report No. 03-C-05) have been effective.*

**STATUS:**

AECL has submitted responses and supporting information to address the CNSC audit report 03-C-05. CNSC staff are currently reviewing AECL's responses. All corrective actions (except one) applicable to the NPF have been completed. The remaining corrective action, relating to a revision of the FSAR, will be completed as described in Section 3.2.2.

QA program reviews to cover the period up to January 2005 have been completed. QA program reviews for 2005 to the end of 2007 have been planned.

## **6 CONCLUSIONS**

Information given in this document and the documents supplied by AECL in support of the MAPLE licence renewal show that adequate programs exist to protect the safety of the public, the environment and the staff at these facilities. The review presented in this document shows that the number of open licensing issues is small. These issues are either close to resolution or will be resolved as a matter of course during the remaining commissioning program.



## 7 REFERENCES

- [1] AECL-MISC-316-03 NPF Annual Safety Review, March 2004.
- [2] AECL-MISC-316-04 NPF Annual Safety Review, March 2005.
- [3] Letter B. Howden to P. Allen, *Approval to Commence Active Commissioning of the New Processing Facility*, CNSC File: 24-1-3-0, AECL File: 6400-NOAC-03-0048-L, 2003 May 30.
- [4] "Documentation in Support of Site Licence Renewal for Chalk River Laboratories," RC-693-CRL, Revision 5, May 2002.
- [5] "MMIR Project Quality Assurance Manual", 6400-01913-QAM-003, Revision 5, 2005 May.
- [6] "Dedicated Isotope Facilities Quality Assurance Manual," 6400-01913-QAM-004, Revision 7, 2005 June.
- [7] CMD 04-M28, "Outstanding Issues for the MDS Nordion Medical Isotopes Reactor Project, Status Report on the Actions and Resolution Criteria and Progress towards Resolving the Outstanding Issues," 2004 July.
- [8] CMD 03-H4, "Renewal of the Nuclear Substance Processing Facility Operating Licence for the New Processing Facility (NPF) at the Chalk River Laboratories," 2003 January.
- [9] NPF Inactive Integrated Testing, 6403-92000-TR-001, Revision 2, 2003 October.
- [10] Letter B. Pearson to V. Snell, *MMIR Periodic Inspection Program (AI 996219)*, CNSC File: 26-1-62-0-0, AECL File: 6400-NOAC-04-0028-L, 2004 September 15.