

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

**Public Hearing Day 2**

**Submitted by AECL on October 11, 2005**

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## Acronyms

<b>AECL</b>	Atomic Energy of Canada Limited
<b>AVS</b>	Active Ventilation System
<b>CCA</b>	Commissioning Completion Assurance
<b>CDP</b>	Conceptual Decommissioning Plan
<b>CIP</b>	Continuous Improvement 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>EPC</b>	Engineering, Procurement and Commissioning
<b>FA</b>	Facility Authority
<b>FCN</b>	Field Change Notice
<b>FM</b>	Facility Manager
<b>FME</b>	Foreign Material Exclusion
<b>FSAR</b>	Final Safety Analysis Report
<b>HAZOP</b>	Hazard and Operability (Studies)
<b>HEU</b>	Highly Enriched Uranium
<b>HRSDC</b>	Human Resources Skills Development Canada
<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>	Operational Limits and Conditions
<b>PDP</b>	Preliminary Decommissioning Plan
<b>PM</b>	Preventive Maintenance
<b>UPS</b>	Uninterruptible Power Supply
<b>WAP</b>	Work Activity Plan

## **1 INTRODUCTION**

At the Public Hearing Day One for the operating licence renewal for the New Processing Facility (NPF), AECL and CNSC staff presented information supporting the renewal of the operating licence for a term of 24 months. This supplementary CMD report contains additional information to address requests from the Commission at the Public Hearing Day One and to update the information provided by AECL in support of this application on July 15, 2005.

## **2 GENERAL INFORMATION**

### **2.1 PUBLIC INFORMATION ACTIVITIES**

Communications on the New Processing Facility are handled as part of Chalk River's site-wide communications program.

Between the period September 2003 (when the AECL Corporate Disclosure Policy was issued) and September 2005, 958 requests were received and responses were supplied to all requests. The majority of requests are handled electronically through the website, that is with responses and links to electronic information. As of the end of September 2005, 297 requests or about 30% of the total number received were paper requests. Paper requests include letters and/or hard copies of reports or fact sheets. None of these requests were directly related to the New Processing Facility.

AECL continues to engage the public through a number of activities, including:

- Scheduled meetings and special events at which elected officials, First Nations, interested citizens and members of the general public participate;
- Formal and informal discussions at community events;
- The proactive notification to community stakeholders of all reportable Significance Level 1 and 2 events;
- Project-specific briefings and tours offered to all community stakeholders and their organizations;
- The use of a toll-free line (1-800-364-6989);
- AECL's website ([www.aecl.ca](http://www.aecl.ca));
- The re-establishment of a corporate Speakers Bureau; and
- Ongoing interactions with local media, e.g., a published article highlighting the benefits of nuclear medicine, [Pembroke] Daily Observer, July 30, 2005.

AECL is committed to providing information on its initiatives to protect the environment, such as:

- Community stakeholders receive hard copies of annual environmental monitoring reports, the comprehensive preliminary decommissioning plan, corporate annual reports and project-specific public consultation program materials as they become available. Copies of the reports are also issued in both official languages on the website.
- The "Ecological Effects Review of the Chalk River Laboratories" was released on AECL's website in January 2005 and shared with environmentally-focused individuals and organizations in community meetings.

AECL is in the process of updating its external website to include information on its environmental, health and safety results, as well as updates on specific projects and activities at the Chalk River Laboratories (CRL).



### **3 FACILITY PERFORMANCE**

#### **3.1 CLARIFICATION ON DOSE TO NPF WORKERS IN 2003 AND 2004**

There was a request from the Commission at the Day One Public Hearing to provide clarification on the doses to NPF staff based on the following statement in CMD 05-H21 [1]:

*“Since active commissioning of the NPF has not yet begun, the radiological risks associated with the NPF are currently negligible and the doses to workers and to the public as well as the releases to the environment are all well below regulatory limits, as reported in the NPF annual safety reviews for 2003 and 2004. In 2004, for instance, whole body doses to NPF staff averaged 0.4 mSv, with a maximum of 1.0 mSv, and shallow doses averaged 0.4 mSv with a maximum of 1.1 mSv; the numbers for the 2003 doses are the same or lower.”*

Since early 2003 there has not been any radiological work performed in the NPF. The doses to staff during 2003 were not significantly different from CRL background.

The total annual doses in 2004 for the most part are from CRL background dose rates. There have been occasions where DIF staff have assisted in other licensed facilities throughout the year, and a very small percentage of the total annual dose can be attributed to such activities.

#### **3.2 UPDATE ON KEY DEVELOPMENTS FOR 2005**

Fifteen new staff members have been hired and are receiving training required for authorization. Five NPF Supervisors will soon be hired. These staff will complete the planned shift complement (5 shift crews, with one supervisor and 4 hot cell technicians per crew) for in service operation.

There were no exposures in excess of dose Action Levels and there were no fires in the Facility or lost-time accidents recorded from January 2005 to date.

Results from effluent monitoring since January 2005 to the present time were well below the regulatory Action Levels and the Derived Release Limits (DRLs).

#### ***Unplanned Events***

From January 2005, there were 11 unplanned events, of which, 2 were reportable events:

The Active Ventilation System (AVS) failed to restart automatically following a loss of class IV power, which resulted in loss of the pressure gradient between the hot cells and the room. Since no radioactivity was present there was no radiological impact. This was a repeat of an earlier failure for which the investigation is ongoing.

An Input/Output (I/O) rack failure caused several NPF building systems to fail. The cause of this failure is being investigated.

### **3.3 OVERVIEW OF WORK IN NPF**

AECL contracted external organizations to design, supply and install processing equipment and commission the New Processing Facility. The inactive commissioning tests developed by these contactors were completed in June 2000. The test results identified deficiencies in production performance and maintenance.

The NPF systems were turned over to DIF operations in June 2000 to train the operations staff. During training, from June 2000 to about October 2002, several operational and maintenance issues were raised.

From October 2002 to November 2003 the NPF Integrated Inactive Testing (NIIT) of the NPF systems was conducted. The integrated testing identified technical, operational and maintenance issues with the NPF systems. Testing was discontinued in November 2003 and a review of the NPF commissioning results against the design requirements and FSAR requirements was conducted. Since November 2003, work has been underway to address non-conformances and technical operational and maintenance issues.

The NPF Project and Commissioning staff are continuing to resolve technical issues raised during the non-nuclear commissioning and follow on the NPF Integrated Inactive Testing work. The current work is focused on the following seven systems:

- Target Processing
- Central Off Gas Delay System (COGDS)
- Calcination
- Cementation
- Closed Loop Cooling System (CLCS)
- Active Ventilation System (AVS)
- Data Acquisition Monitoring and Response Station (DAMRS)

The status of work on each system is given below.

#### **Target Processing**

The Target Processing system is used to slit targets irradiated in the MAPLE reactors and dissolve the uranium oxide within the annulus of the target. We have successfully demonstrated slitting of the targets with the decladder for exposing the uranium oxide to the nitric acid dissolver solution. The cutting wheels are being improved to be more resistant to corrosion and the decladder elevator drive train has been made more robust.

Progress has been made on implementing the recommendations from the seismic walkdown. The remaining item to be completed is a revision to the operating procedures.

#### **Central Off-Gas Delay System (COGDS)**

The COGDS is used to store fission product gas evolved during dissolution of the targets in pressurized tanks. Commissioning of the additional over-pressure protection capabilities

installed in the system was completed successfully. New compressors to solve performance issues associated with moisture build-up and starting against back-pressure are currently undergoing testing.

### **Calcination System**

The calcination system is used to solidify the highly enriched uranium waste stream generated from the isotope separation stage into a stable uranium oxide solid suitable for long-term storage.

Performance issues related to filter heating, the condenser, the scrubber, system vacuum control and the can welding device were resolved.

Testing of potential solutions relating to improvements in the production throughput and elimination of contamination around the welding zone has been taking place in collaboration with the supplier.

### **Cementation System**

The Cementation System is used to solidify intermediate level waste produced from the isotope separation stage and the calcination evaporation stage.

Several improvements have been made to facilitate maintenance. Several improvements for solving performance issues have been developed and tested by the supplier. These improvements are currently being tested in the NPF.

### **Closed-Loop Cooling System (CLCS)**

The CLCS is a support system used to provide cooling to process systems used in the hot cells for isotope production and waste solidification and cooling to the high level liquid waste tanks in the vault.

The system has been balanced to provide the required flow and temperature for the heat loads.

Design changes to address spurious activation of the pressure relief valve and difficulties in filling and starting the system have been identified and detailed design is in progress.

The design for a back-up connection to the firewater system required to provide emergency cooling for the decladder/dissolver and high level liquid waste tanks is in progress.

### **Active Ventilation System (AVS)**

The AVS is used to treat exhaust air from potentially contaminated areas before it leaves the building.

Work has been done to balance the system, address building air leakage and revise the damper and fan controls.

A solution to address intermittent loss of pressure control has been implemented and tested. Work is in progress to re-balance the system and, followed by commissioning tests, to verify design intent conditions that were not included in the Phase A commissioning program.

**Data Acquisition, Monitoring and Response Station (DAMRS)**

Work is progressing to upgrade the DAMRS computer system documentation to accurately reflect the system requirements and design implementation to support future design modifications and maintenance. Following completion of this work, design changes will be made that are required to support modifications to other systems, such as AVS.

#### **4 NEW PROCESSING FACILITY OPERATING LICENCE**

The CNSC staff is proposing to modify the proposed licence attached to CMD 05-H21 [1] to include the following licence condition:

*“The licensee shall on or before July 1, 2006, provide to the Commission a completed comprehensive preliminary decommissioning plan for the overall Chalk River site for the purpose of a public hearing and decision by the Commission on that plan and the associated financial guarantee, in accordance with the Commission’s Decision dated July 12, 2005.”*

The CRL Decommissioning Plan, including MAPLE 1 and MAPLE 2 reactors and New Processing Facility, is contained in a Comprehensive Preliminary Decommissioning Plan (CPDP) [2].

AECL is currently updating the CPDP to include the decommissioning cost estimates and methodology as requested by the Commission. Discussions with the CNSC staff are ongoing to ensure that the revised CPDP will meet the CNSC staff’s requirements and expectations. The revised CPDP is anticipated to be issued on or before December 1, 2005.

The Commission’s decision on July 12, 2005 also required AECL to provide a revised public consultation plan for the periodic review and updating of the CPDP. AECL is currently revising the document “Framework for a Communication and Public Consultation Plan”, based on interventions raised during the May 20<sup>th</sup> hearing. This framework document outlines the approach for communicating the near and long-term decommissioning plans to the public and is expected to be completed by the end of 2005.

## **5 SAFETY AREAS**

The CNSC staff rated both the CRL site-wide programs and their implementation in seven Safety Areas for the NPF in the presentation at the Public Hearing Day One, on August 18, 2005. One program, Performance Assurance, ranked “C” in implementation. Updates and clarifications on how AECL is addressing the ranking for this program are provided below. Clarifications are also provided with respect to the actions taken to address the “C” ranking for the Environmental Protection program at CRL, which is a site-wide program.

At the Public Hearing Day One, the Commission Members requested further clarifications with respect to the organizational updates, which are part of the Operating Performance program. Note that implementation of this program for NPF has been rated “B” by the CNSC staff. Responses to the requested clarifications are also provided in this section.

### **5.1 OPERATING PERFORMANCE**

#### **5.1.1 Organization Updates**

A number of changes in AECL organization have taken place over the last few months and have been communicated to the CNSC [3]. The DIF organization manages all aspects of the DIF previously covered by the MMIR Project and DIF Operations. The DIF organization ensures management oversight and operational risk review in an integrated manner. This integrated team also ensures that safety and quality practices are enforced.

The Vice-President, DIF is assigned the overall management responsibility and authority for the safe operation, maintenance and use of the DIF including compliance with all applicable codes, standards, laws, regulations and licences. The Vice President, DIF, is responsible for:

- The DIF Quality Assurance (QA) Program;
- Regularly assessing the effectiveness of the QA Program in meeting AECL business and performance objectives including DIF safety, quality and regulatory objectives;
- Completing the remaining project work; and
- Taking DIF safety, quality, licensing and technical issues to the Senior Executive level for resolution where these cannot be resolved within the DIF.

The organization under the Vice-President, DIF, contains units responsible for operations, engineering, construction, materials management, planning and scheduling, quality assurance, finance, and project support. The organizational chart, along with a summary of the roles and responsibilities of each position for the organization under the Vice President, DIF, is given in Appendix A.

## **5.2 PERFORMANCE ASSURANCE**

### **5.2.1 Quality Assurance Program**

#### ***5.2.1.1 DIF Operations QA Audit 2005***

During May 30 – June 3, 2005, the CNSC conducted its first audit on the DIF Operations QA program since its establishment in 1999. The main focus on this audit was to review the operations aspects of the DIF organization and other elements not previously covered by the CNSC audits in 2003 on the commissioning and project QA programs.

The CNSC audit team noted in its QA audit report “*improvements since the last CNSC commissioning audit in 2003. AECL has taken recent steps to put in place a stronger management team for MMIR and have assigned additional technical staff dedicated to tackle the outstanding issues at MMIR. AECL described the plan to streamline and structure the organization along meaningful functional roles. AECL has recognised the need to strengthen the preventive maintenance program and has shown the audit team a plan to address this. Documentation baseline and configuration management are issues previously identified by CNSC and AECL also has a plan in place to address them.*”

The audit report identified one directive, nine action notices and three recommendations. The directive was issued to identify the absence of an operations non-conformance process implemented under direct management of the operations staff.

AECL responded to each finding. Approximately 75% of the corrective actions will be completed by the end of 2005, and the remaining ~25% in 2006.

#### ***5.2.1.2 MMIR Commissioning QA Audit 2003***

AECL recently received comments from the CNSC staff on AECL’s proposed responses to the MMIR Commissioning audit in 2003. AECL is reviewing these comments and revising the responses to the audit findings.

### **5.2.2 Training Program**

The NPF Training program is established, documented and implemented to support the commissioning activities following AECL's Systematic Approach to Training. There are currently eight Hot Cell Technicians trained to support these activities. Update and refresher training will continue as required to support maintenance of skills and knowledge and changes to system equipment and processes.

Fifteen Hot Cell Technicians have recently been hired and are currently receiving classroom and On-the-Job Training (OJT). These trainees are expected to complete the initial training program in the spring of 2006.

DIF Maintenance has retained two seasoned nuclear power plant maintenance professionals to assist with the maintenance program. Their two main priorities are work management and an integrated program for MAPLE 1, MAPLE 2, and NPF. In both cases, their respective areas of expertise are being applied to mentor maintenance staff and benchmark AECL process against industry best practices.

### **5.3 STAFFING LEVELS**

The staffing requirements to produce medical isotopes in MAPLE reactors and NPF on behalf of MDS Nordion have been updated. There are specific requirements applicable to the dedicated staff for production, technical support, maintenance, radiation protection and work management, support services, and safety and licensing. Separate requirements apply to the non-dedicated staff (support services).

The DIF Production staff is organized into two teams, a shift team and a day team. The shift team consists of five operating crews.

There are sufficient staff to support the current operations in the NPF. Additional staff are currently being trained to support active commissioning.



## **6 PROJECT SCHEDULE**

This section presents the schedule for the NPF.

AECL has developed the schedule to establish targets by which management runs the project. The schedule for the NPF is shown in Figure 1. This is a “work schedule” and it contains significant uncertainties associated with the availability of MAPLE 1 to provide irradiated targets because of the positive Power Coefficient of Reactivity (PCR) and the work in MAPLE 1 to be performed beyond 5 MW.



## **7 LICENSING ISSUES**

As outlined in the CNSC documents CMD 05-H21 [1] and, previously in CMD 04-M28 [4], the CNSC staff developed specific prerequisites or “acceptance criteria” which AECL must complete in order to obtain approval to proceed to Nuclear Commissioning and In-Service for NPF. The schedule showing the target dates for completing each outstanding licensing issue associated with each key milestone is provided in Table B-1, Appendix B.

The following sections provide further details on the current status and deliverables that AECL plans to produce to address the outstanding licensing issues identified in Section 5 of CMD 05-H21.1 [3].

This information is being provided to answer Commission Members’ requests from Public Hearing Day One and to update the Commission on various items. This information does not alter the conclusions in CMD 05-H21.1 [3].

### **7.1 CONFIRMATION OF READINESS FOR ACTIVE COMMISSIONING**

#### **7.1.1 Operational Readiness Work Activity Plan**

To declare operational readiness for start of the active commissioning of the NPF, a formal process will be followed similarly to the process currently used for the MAPLE reactors. The “Declaration of Readiness for Start of Active Commissioning of the New Processing Facility” Work Activity Plan (WAP) will be used to track activities and requirements that need to be completed prior to declaring the NPF ready for active commissioning.

This WAP is currently being developed. The objective of the WAP is to ensure that there are no open or unresolved organizational, process or system issues that could, on receipt of first irradiated HEU targets for the start of active commissioning according to the NPF Commissioning Plan, have an adverse effect on nuclear, personnel or environmental safety.

The work covered by the WAP is subject to the requirements of the NPF Operating Licence NSPFOL-03.01/2005, and the DIF Quality Assurance Program. The WAP lists all the activities to be completed and signed off prior to start of active commissioning.

The activities that need to be completed prior to active commissioning have been grouped into five sections: People, Processes, Operations Management, Maintenance and Radiation Protection, and Systems and Document Configuration. Once all the activities are completed, the Facility Authority will confirm the overall readiness to start the active commissioning of the NPF.

This activity will be completed as shown in Table B-1 in Appendix B.

### **7.1.2 NPF Building Emergency Procedures**

There are no changes on current status on the NPF Building Emergency Procedures. This activity will be completed as shown in Table B-1 in Appendix B.

### **7.1.3 Implementation of Seismic Walkdown Findings**

Five of the 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. The work associated with the remaining recommendations will be completed as shown in Table B-1 in Appendix B.

### **7.1.4 Backup Firewater Cooling Test of the Closed Loop Cooling System**

The Closed Loop Cooling System (CLCS) provides chilled water to the High Level Liquid Waste tanks and to various processes within the NPF.

Currently, a number of changes are being designed to improve performance of the CLCS. AECL approvals to implement once through cooling using firewater as a back-up water supply to CLCS for loss of flow events and to improve overpressure protection and increase operating reliability are in progress.

This activity will be completed as shown in Table B-1 in Appendix B.

The commissioning of the small diesel generator is expected to be completed in conjunction with performing the backup firewater cooling test of the CLCS.

### **7.1.5 Remaining Work as Required for the Active Commissioning**

To ensure that appropriate oversight was part of the assessment process, a multi-disciplinary management committee team, designated as the Management Review Meeting (MRM) team, has been established to review the outstanding action assessments and prerequisite milestone basis.

The review of all outstanding items will be completed as shown in Table B-1 in Appendix B.

### **7.1.6 Recommendations from NIIT Report**

The progress and the current status on the technical issues from the recommendations identified in the NIIT Report are given in Section 3.3.

### **7.1.7 Calcine Waste Canisters**

Verification of the canister shielding using the radioactive source was completed<sup>1</sup>. The remaining work to address the CNSC comments is in progress and is expected to be completed as shown in Table B-1 in Appendix B.

## **7.2 APPROVAL FOR IN-SERVICE OPERATION**

### **7.2.1 Commissioning Completion Assurance**

There are no changes in the current status of the Commissioning Completion Assurance.

Completion of this activity is shown in Figure 1.

### **7.2.2 Small Diesel Generator**

In 2003 AECL performed a systematic review to determine the events and event combinations that are within the design basis with the potential to release radioactivity within the facility while the Active Ventilation System (AVS) is not functioning. The review used a methodology that has been used for CANDU plants. There was particular emphasis on events that could cause coincident failures of the NPF processes and the AVS from a common cause.

The review indicated the need to increase the reliability of dissolver cooling to prevent heat up and overpressurization of the decladder/dissolver, specifically by providing the CLCS with another source of power. A number of options for the supplementary source of power were investigated, and AECL proposed installation of a small diesel to address the issue and to provide additional assurance of continued production in the NPF. This proposal was accepted by the CNSC on May 23, 2003.

#### ***7.2.2.1 Progress and Current Status***

AECL completed the design and procured an 80 kW (100 kVA) Diesel Generator complete with battery charger, remote annunciation panel and accessories including automatic transfer switch, distribution panel, interconnecting power and control cables, and conduits.

AECL contracted the Fire Protection Engineering Services of Labour Program, Human Resources and Skills Development Canada (HRSDC) to perform a Third Party Review of fire protection for the NPF small diesel generator. This review includes the review of the design and field inspection. Details on the progress made and current status of the Third Party Review are provided below:

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<sup>1</sup> This requirement is from CMD 03-H4 [5].

A. Design Review:

- The Third Party Review consisted of reviewing AECL design documents, drawings, vendor documentation and drawings and providing comments. The review is completed.

B. Field Inspection:

- AECL has installed the small diesel generator complete with battery charger, remote annunciation panel and accessories including automatic transfer switch, distribution panel, interconnecting power and control cables, and conduits.
- The Third Party Review of the small diesel generator as well as the associated equipment installation is completed.
- AECL contracted an independent third party consultant to complete a fire hazard assessment for the small diesel generator. This activity is completed.
- AECL contracted an independent third party consultant to complete a fire hazard assessment for the additional electrical panels installed for the small diesel generator within the NPF electrical room. The activity is completed.

AECL has submitted the results of the Third Party Review (i.e., design review and field inspection) and the Fire Hazard Assessment to the CNSC and requested CNSC approval to load diesel fuel into the small diesel generator.

### **7.2.3 Human Factors Program**

Human factors exercises were performed for the Central Off Gas Delay System (COGDS) and the Data Acquisition, Monitoring and Response Station (DAMRS). Approximately 66% of the recommendations were completed; the remaining 34% will be completed by Fall 2006.

This activity will be completed as shown in Table B-1 in Appendix B.

### **7.2.4 Calibration and Commissioning of IAEA Instrumentation**

This activity will be completed as shown in Table B-1 in Appendix B.

### **7.2.5 Periodic Inspection Program Documentation**

AECL will revise “Dedicated Isotope Facilities (DIF) Periodic and Inaugural Inspection Program,” as shown in Table B-1 in Appendix B.

### **7.2.6 Operational Limits and Conditions Document**

The Operational Limits and Conditions Document will be revised and updated prior to requesting CNSC approval to place the NPF In-Service.

### **7.2.7 Document Baseline**

The complete listing of the operations documentation required to support and maintain the safe operation activities within DIF (both MAPLE reactors, MAPLE 1 IPF and NPF) has been issued as the “DIF Operations Baseline”. The documentation required for supporting active commissioning will be placed in the NPF control area.

The document baseline will be updated as required.

### **7.2.8 FSAR Update**

The schedule for producing a revised Final Safety Analysis Report (FSAR) for the NPF was provided to the CNSC staff.

The revised NPF FSAR (excluding Section 10, “Safety Analysis” and Section 11, “Operating Limits and Conditions”) is scheduled to be issued at the end of April 2006. This schedule is based on revising the FSAR to include changes from completed NCRs, FCNs, CRs, ENFs and UERs.

Sections 10 and 11 of the FSAR will be revised prior to requesting CNSC approval to place the NPF In-Service.

## **8 REFERENCES**

- [1] CMD 05-H21, “Information and Recommendations from Canadian Nuclear Safety Commission Staff Regarding Atomic Energy of Canada Limited Renewal of the Operating Licence for the New Processing Facility (NPF) at the Chalk River Laboratories,” 2005 August 18.
- [2] Comprehensive Preliminary Decommissioning Plan for AECL’s Chalk River Laboratories,” CPDP-01600-PDP-002, Revision 0, 2005 March.
- [3] CMD 05-H21.1, “Information in Support of Licence Renewal for the New Processing Facility,” 2005 July 15.
- [4] CMD 04-M28, “Information and Recommendations from Canadian Nuclear Safety Commission Staff Regarding 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.
- [5] CMD 03-H4, “Information and Recommendations from Canadian Nuclear Safety Commission Staff Regarding Atomic Energy of Canada Limited Renewal of the Nuclear Substance Processing Facility Operating Licence for the New Processing Facility (NPF) at the Chalk River Laboratories”, 2003 January 15.



# **Appendix A**

## **DIF Organization and Responsibilities**

## Appendix A

### DIF Organization and Responsibilities

The overall organization under the Vice President, DIF, is presented in

Figure 2. A summary of the roles and responsibilities of each position shown in

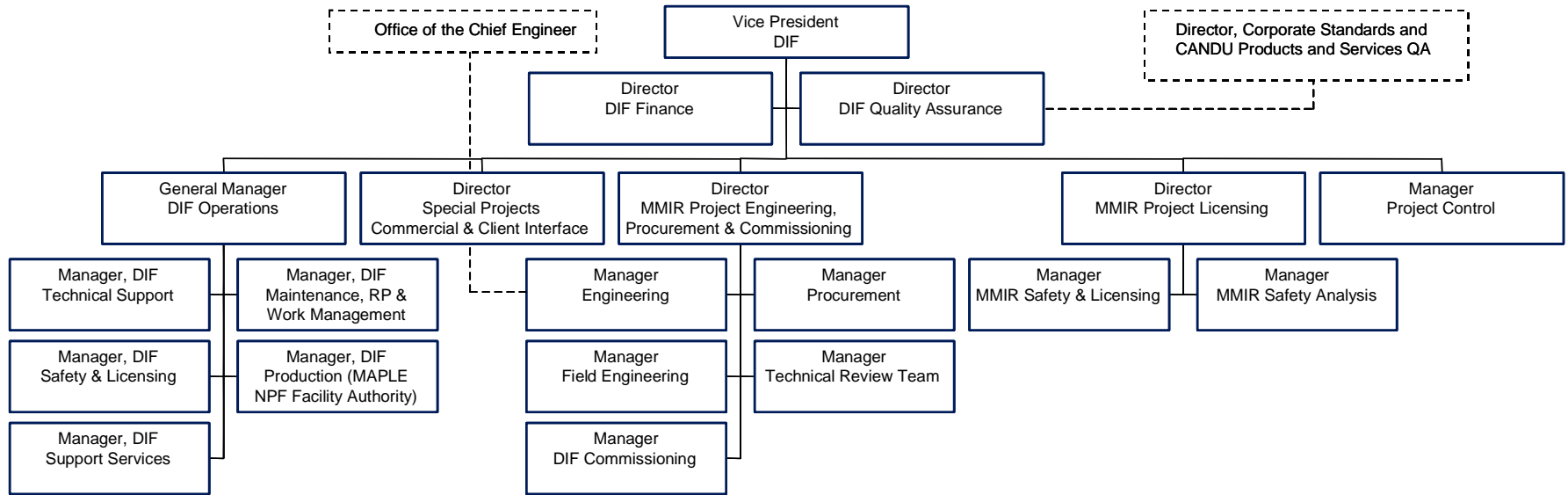
Figure 2 is given below.

#### Director, DIF Quality Assurance

The Director, DIF Quality Assurance is the Senior Quality Representative for DIF appointed by the Vice President, DIF in consultation with the Director, Corporate Standards & CANDU Products and Services QA. The Senior Quality Representative reports administratively to the Vice President, DIF and functionally to Director, Corporate Standards & CANDU Products and Services QA. With respect to the DIF QA Program, the Senior Quality Representative is responsible for:

- Review of the DIF Audit Program Plans;
- Scheduling and ensuring that audits, monitoring, and surveillance of activities are conducted and reported to assess compliance and effectiveness with respect to the applicable requirements;
- Providing the services of Facility Quality Representatives to support licensed facility operation with respect to QA related matters;
- Reporting Level 1 non-conformances to Corporate QA;
- Monitoring and assessing the effectiveness of the corrective action processes;
- Reporting outstanding QA issues to the Vice President, DIF and General Manager, DIF to facilitate resolution; and
- Verifying that the QA manual is adequate and meets specified requirements.

The Director, DIF Quality Assurance has the authority and responsibility to report conditions adverse to quality, that are not resolved within the line organisation in a timely manner, to the Director, Corporate Standards & CANDU Products & Services QA and to the Vice President, DIF.



**Figure 2: DIF Organization**

### General Manager, DIF Operations

The General Manager, DIF Operations reports to the Vice President, DIF. With respect to Operations QA and the supporting AECL Compliance Programs, the General Manager, DIF Operations is responsible for:

- Providing oversight of safety;
- Providing an oversight and exercising necessary monitoring and controls as needed;
- Ensuring that DIF Operations work effectively with major suppliers/Participants (e.g., MMIR Project) and the Nuclear Laboratories Business Unit (NLBU) site support groups to ensure an efficient transition to isotope production;
- Ensuring that the DIF Quality Assurance program is compliant and effective;
- Meeting regulatory requirements and fostering a positive relationship with the CNSC;
- Provision of strategic direction, leadership and support to DIF Operations;
- Provision of support and direction in developing unit goals and objectives;
- The DIF Operations Business Plan, including planning and executing work in accordance with agreed milestones;
- Improving operating performance and management succession by training, developing, motivating and effectively utilizing employees; and
- Representing AECL at CNSC meetings on matters relating to DIF licences and Operation.

The General Manager, DIF Operations is responsible for the operation, maintenance, safety, licensing, technical support and support services for the MAPLE reactors, MAPLE 1 IPF, and NPF. This includes ensuring the operational readiness of the facilities and the management of their licenses and associated commitments.

The following report directly to the General Manager, DIF Operations:

- Manager, DIF Production;
- Manager, DIF Maintenance, Radiation Protection and Work Management;
- Manager, DIF Technical Support;
- Manager, DIF Safety and Licensing;
- Manager, DIF Support Services.

Descriptions of the roles and responsibilities of the positions reporting directly to the General Manager, DIF Operations are provided below.

Manager, DIF Production

The Manager, DIF Production is accountable for the safe operation of the MAPLE reactors and the NPF and has the overall responsibility for production activities (e.g., establishment of production schedules, identification of staffing requirements to support production and safe operation, etc.). The Manager, DIF Production is the Facility Authority for the MAPLE reactors, per the MAPLE reactors Operating Licence and its referenced documentation, and the Facility Authority for the NPF, per the NPF Operating Licence and its referenced documentation.

The Manager, DIF Production is responsible for:

- Ensuring that the MAPLE reactors and the NPF are operated in accordance with the most recent OLC documents approved for use by the Safety Review Committee and the CNSC;
- Ensuring the overall safe operation, maintenance and use of the DIF;
- Ensuring that position descriptions for the Production Unit staff are developed and maintained current;
- Ensuring adherence to the requirements of all licences, permits, regulations, and any applicable federal or provincial legislation;
- Identifying QA audit requirements, facilitating the conduct of the required audits, and following through on the results;
- Ensuring all facility-related corrective actions are implemented in a timely manner;
- Monitoring and periodically reviewing the functioning and effectiveness of the operations QA program and that of the supporting services and compliance programs in the Facility; and
- Acting as the official contact with the Safety Review Committee and regulatory authorities in matters that relate to the safe operation, maintenance and use of the DIF.

Manager, DIF Maintenance, Radiation Protection and Work Management

The Manager, DIF Maintenance is responsible for:

- Providing maintenance planning, scheduling, execution, and closeout services for all maintenance activities required for the DIF;
- Providing maintenance support for DIF Operations. The Manager, DIF Maintenance has the overall responsibility for the establishment of an effective work management process, the Foreign Material Exclusion program, and maintenance procedures as required; and
- The supervision and management of maintenance activities, including the establishment of service agreements with providers of maintenance services.

The Radiation & Industrial Safety Manager, DIF has a line reporting function to the Manager, DIF Maintenance and reports functionally to the AECL Radiation Protection Program Authority. The Radiation & Industrial Safety Manager, DIF is responsible for providing the DIF radiation and industrial safety services, and is to be certified for this position by the CNSC. The AECL Radiation Protection Program Authority has designated the Radiation & Industrial Safety Manager, DIF as the Radiation Protection Program Manager for the DIF.

Manager, DIF Technical Support

The Manager, DIF Technical Support is responsible for providing technical support for DIF Operations. The Manager, DIF Technical Support has the overall responsibility for:

- Provision of technical support services in the areas of system health monitoring and plant life management;
- Provision of fuel management, reactor physics and analytical chemistry services;
- Preparation and review of maintenance procedures and procurement documents;
- Assisting with troubleshooting and resolutions to long-term complex design or operational problems by obtaining help from the best resources from AECL Technology Centres; and
- Planning and coordinating projects related to process improvements and upgrades.

The Manager, DIF Technical Support is the primary interface with the MMIR Project for engineering services.

Manager, DIF Safety and Licensing

The Manager, DIF Safety & Licensing is responsible for:

- Reviewing and preparing documents required to ensure that DIF is operated in compliance with the DIF Operating Licenses and safety requirements;
- Coordinating, and where applicable, preparation of regulatory reports required to maintain DIF Operating Licenses;
- Maintaining the OLC documents and supporting safety analyses;
- Defining the maintenance testing and inspection programs required to comply with the safety analyses supporting DIF Operating Licenses;
- Reviewing and assessing operating events that may occur during DIF operation;
- Assessing proposed changes to ensure compliance with DIF safety and licensing requirements;

- Assessing work control documents, as required by procedures, to ensure compliance with DIF safety and licensing requirements;
- Review of Emergency Procedures to mitigate the consequences of potential accidents considered in DIF safety analyses;
- Providing the licensing interface between the MMIR Project and DIF Operations on all safety and licensing matters;
- Supporting the Nuclear Laboratories Business Unit Licensing Single-Point-of-Contact for the renewal of the Operating Licences for the MAPLE reactors and NPF; and
- Supporting the Facility Authority in preparing and managing the correspondence with the Canadian Nuclear Safety Commission.

The Manager, DIF Safety & Licensing is the primary interface with the MMIR Project for licensing and safety analysis services.

#### Manager, DIF Support Services

The Manager, DIF Support Services is responsible for the provision of logistical support (e.g., material management, storage, and transportation) and document control (including management of essential records) services required to support safe operation of the DIF.

The Manager, DIF Support Services has the overall responsibility for the establishment of effective document control and record management processes.

#### Director, Special Projects, Commercial and Client Interface

The Director, Special Projects, Commercial and Client Interface leads the development and implementation of Special Projects related to the DIF. This includes managing major contracts between AECL and external organizations related to the DIF, including the Isotope Production Facilities Agreement with MDS Nordion; providing commercial support for the resolution of contractual issues; and leading all interactions with MDS Nordion and all commercial proposals to MDS Nordion related to the DIF. As well, the Director is responsible for Project reporting. The Director, Special Projects, Commercial and Client Interface, reports to the Vice President, DIF.

#### MMIR Project Director, Engineering, Procurement and Commissioning

The MMIR Project Engineering, Procurement and Commissioning (EPC) Director is responsible for all Project engineering, construction and commissioning for the MAPLE reactors, MAPLE 1 IPF, and NPF. This includes design, resident and field engineering, as well as all associated commissioning up to turnover to DIF Operations and until the DIF have been declared In-Service. The MMIR Project EPC Director is also responsible for all procurement and material management. The MMIR Project EPC Director reports to the Vice President, DIF.

The following report directly to the MMIR Project Director, Engineering, Procurement and Commissioning:

- Engineering Manager;
- Field Engineering Manager;
- DIF Commissioning Manager;
- Procurement Manager;
- Technical Review Team Manager.

Descriptions of the roles and responsibilities of the positions reporting directly to the MMIR Project Director, Engineering, Procurement and Commissioning are provided below.

Engineering Manager

The Engineering Manager reports to the MMIR Project Director, Engineering, Procurement and Commissioning and is accountable to the AECL Chief Engineer for all design aspects of the MMIR Project. The Engineering Manager is responsible for managing all design and engineering activities required for the MMIR Project, establishing and maintaining an effective Resident Engineering team to deal with issues at the site and represent design engineering interests at site, executing the design authority delegated from AECL's Chief Engineer.

Field Engineering Manager

The Field Engineering Manager reports to the MMIR Project Engineering, Procurement and Commissioning Director. Assisted by a team of engineers, technical staff and one or more Deputies, the Field Engineering Manager is responsible for organizing and overseeing the field implementation of:

- Field Change Notices (FCNs) which have been approved by the Resident Engineering Manager or the MMIR Engineering Manager,
- Change Requests (CRs) which have been approved by the Change Control Board, and
- The approved dispositions of Non-Conformance Reports (NCRs) requiring field work.

Implementation activities include, as delegated by the Engineering Manager, responsibility for the preparation of Release for Construction drawings (approved by the Resident Engineering Manager), preparation of Work Packages (approved by the DIF Facility Manager), and procurement of required materials, equipment/components, and services.

The Field Engineering Manager is responsible for "as-built" documentation updates for the approved disposition of NCRs, FCNs and CRs, and to identify to DIF



Operations, Commissioning and Design Engineering the associated documentation updates for which they are responsible.

The MMIR Engineering Manager or delegate approves documentation updated by Field Engineering. The Field Engineering Manager is responsible for the updating of Construction History Dockets, the closure of NCRs and FCNs, and for providing the necessary evidence of field implementation of CRs.

The responsibility of the Field Engineering Manager ends when the documentation or History Docket Addendum associated with the implementation and Quality Surveillance and Resident Engineering have accepted closure of an NCR, FCN, or CR, and the modification or repair is accepted by Commissioning (able to resume commissioning) or DIF Operations (Work Order closed).

#### DIF Commissioning Manager

The DIF Commissioning Manager reports to the MMIR Project Engineering, Procurement and Commissioning Director and is responsible for the MMIR Project Commissioning Program and all commissioning activities to ensure that all design intent, safety and commissioning completion assurance requirements for the DIF are met in a manner consistent with applicable standards. The DIF Commissioning Manager provides commissioning oversight, drives schedule and budget compliance and facilitates a common commissioning interface with the balance of the MMIR Project.

#### Procurement Manager

The Procurement Manager reports to the MMIR Project Engineering, Procurement and Commissioning Director and is responsible for managing procurement activities for the Project, namely:

- Acquiring quality products and services that satisfy the design requirements;
- Establishing and documenting the complete requirements for each purchase order;
- Carry-out procurement in a cost effective manner;
- Ensuring that work is contracted to Suppliers who have offered products and services which conform to the requirement in a cost effective manner;
- Ensuring qualified sources are available to support the business;
- Ensuring through appropriate means that the products and services purchased meet the requirements specified in the procurement documents; and
- Achieving continuous improvement.

The Procurement Manager is also responsible for materials management (equipment, components, fuel, nuclear waste, etc.) for the Project and DIF Operations, including material handling, storing, preserving, issuing, and replenishing spare parts inventory.

Administratively, the Procurement Manager reports to the Director, Nuclear Laboratories Business Operations.

Technical Review Team Manager

The Technical Review Team Manager reports to the MMIR Project Engineering, Procurement and Commissioning Director. Assisted by a team of independent specialists, knowledgeable and experienced in design and procurement for nuclear projects, the Technical Review Team Manager is responsible for technical verification of MMIR Project and DIF procurement-related and other engineering documents. This verification is separate from the line function verification.

MMIR Project Licensing Director

The MMIR Project Licensing Director is responsible for all Project (MAPLE reactors, MAPLE 1 IPF, and NPF) licensing, physics and safety analysis. The MMIR Project Licensing Director provides physics, safety analysis and licensing support to DIF Operations. The MMIR Project Licensing Director takes the lead on all safety and licensing matters not related to running the DIF facilities. The MMIR Project Licensing Director is the Single Point of Contact with the CNSC on all Project regulatory issues and manages the interface with the CNSC. The MMIR Project Licensing Director coordinates with the DIF Safety and Licensing Manager, DIF Operations, to ensure that both groups are fully informed and coordinate their activities, regulatory actions and regulatory interactions. The MMIR Project Licensing Director reports to the Vice President, DIF.

The following report directly to the MMIR Project Licensing Director:

- Safety and Licensing Manager;
- Safety Analysis Manager.

Descriptions of the roles and responsibilities of the positions reporting directly to MMIR Project Licensing Director are provided below.

Safety and Licensing Manager

The MMIR Safety and Licensing Manager is responsible for Project licensing work and assists the MMIR Project Licensing Director in managing the interface with the CNSC. The MMIR Safety and Licensing Manager is also responsible for overall direction of external contracts on the Power Coefficient of Reactivity, for safety analysis of MMIR targets in NRU, and for expert specialist and oversight review of selected work done by the Project and Operations.

The Safety and Licensing Manager reports to the MMIR Project Licensing Director.

### Safety Analysis Manager

The Safety Analysis Manager is responsible for all safety and HAZOPS analysis, and supporting physics analysis, on the MAPLE reactors, MAPLE 1 IPF, and NPF projects, including preparation of the safety analysis and reports to support restart, interim and final operation, in-reactor tests, and licence renewal. Safety and Licensing matters relating to the operation of the facilities are initiated through the DIF Safety and Licensing Manager; the Safety Analysis Manager provides Operations with safety and physics analysis and support in response to their needs. The Safety Analysis Manager reports to the MMIR Project Licensing Director.

### Manager, Project Control

The Manager, Project Control is responsible for ensuring that work is planned, that work is executed in accordance with the committed schedule and budget, and that work is conducted within the scope of the Facilities Plan which is attached to the Isotope Production Facilities Agreement between AECL and MDS Nordion and the approved Change of Scope to the Facilities Plan. The Project Control Manager is also responsible for defining performance metrics, progress reporting, cost control, and document control. The Manager, Project Control reports to the Vice President, DIF.

### Director, DIF Finance

The Director, DIF Finance is responsible for preparing cost reports, invoices and processing payment of invoices. The Director, DIF Finance reports to the Vice President, DIF.

# **Appendix B**

## **Schedule for Outstanding Licensing Issues**

## Appendix B

### Schedule for Outstanding Licensing Issues

**Table B-1: Outstanding Licensing Issues for NPF**

CNSC CMD 05-H21			AECL Plan <sup>2</sup>		
Licensing Issue <sup>3</sup>	Aspect <sup>3</sup>	Acceptance Criteria <sup>3</sup>	Action Status	Milestone	Target Date
Confirmation of Readiness for Active Commissioning	Prerequisite Completion	AECL must demonstrate that it has successfully completed its Operational Readiness Review Workplan.	The NPF Operational Readiness Review Work Activity Plan will be issued and completed.	Active Commissioning	Dec. 2006
	Prerequisite Completion	AECL must modify the NPF building Emergency Procedures to reflect the evacuation requirements under certain loss of ventilation accidents.	The Emergency Operating Procedure will be issued for use prior to active commissioning.	Active Commissioning	Sep. 2006
	Prerequisite Completion	AECL must demonstrate that it has implemented the seismic walkdown findings for the dissolver/decladder and the Central Off Gas Delay System.	Five out of eight recommendations have been implemented.  Implementation of the remaining three is in progress.	Active Commissioning	Sep. 2006

<sup>2</sup> Contains significant uncertainties associated with the availability of MAPLE 1 to provide irradiated targets because of the positive Power Coefficient of Reactivity.

<sup>3</sup> The acceptance criteria are extracted from CMD 05-H21 [1].

CNSC CMD 05-H21			AECL Plan <sup>2</sup>		
Licensing Issue <sup>3</sup>	Aspect <sup>3</sup>	Acceptance Criteria <sup>3</sup>	Action Status	Milestone	Target Date
	Prerequisite Completion	AECL must complete the backup firewater cooling test of the Closed Loop Cooling System.	AECL approvals to implement once through cooling using firewater as a back-up water supply to CLCS for loss of flow events and to improve overpressure protection and increase operating reliability are in progress.  The backup firewater cooling test will be performed after the design changes in CLCS have been implemented.	Active Commissioning	Jun. 2006
	Prerequisite Completion	AECL must demonstrate that all outstanding work designated as 'required for active commissioning', that was noted in the completion assurances and non-conformance reports (including any NCRs raised after 2003 May 30) is completed.	A MRM process has been implemented in DIF. All outstanding NCRs and FCNs will be reviewed by management using the MRM process to determine which ones are required to be closed prior to active commissioning.	Active Commissioning	Sep. 2006
	Prerequisite Completion	AECL must 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 successfully completed.	Work to complete all items from Section 4 of NIIT is in progress.	Active Commissioning	Sep. 2006
	Prerequisite Completion	Obtain approval to operate Calcine Waste canisters. <sup>4</sup>	Verification of the canister shielding using the radioactive source was completed. The remaining work to address the CNSC comments is in progress.	Active Commissioning	Jul. 2006

<sup>4</sup> This acceptance criterion is extracted from CMD 03-H4 [5].

CNSC CMD 05-H21			AECL Plan <sup>2</sup>		
Licensing Issue <sup>3</sup>	Aspect <sup>3</sup>	Acceptance Criteria <sup>3</sup>	Action Status	Milestone	Target Date
Approval for In-Service Operation	Commissioning Completion Assurance	AECL must demonstrate, through the availability of objective evidence, that active commissioning has been successfully completed.		In-Service	Jun. 2007
	Prerequisite Completion	AECL must 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.	Procurement and installation of the small diesel is completed.	In-Service	Completed
			Third party review, fire hazard assessments are completed.		Completed
			AECL to finalize all prerequisites associated with installation of the small diesel generator.		Oct. 2005
	Prerequisite Completion	AECL must implement the corrective actions from the Human Factors program.	66% of the recommendations are completed. Remaining 34% are in progress.	In-Service	Sep. 2006
	Prerequisite Completion	The calibration and commissioning of IAEA instrumentation must be completed.		In-Service	Jul. 2006
	Prerequisite Completion	AECL must modify its Periodic Inspection Program documentation to be fully compliant with documentation requirements.		In-Service	Apr. 2006

CNSC CMD 05-H21			AECL Plan <sup>2</sup>		
Licensing Issue <sup>3</sup>	Aspect <sup>3</sup>	Acceptance Criteria <sup>3</sup>	Action Status	Milestone	Target Date
	Prerequisite Completion	AECL must update the Operational Limits and Conditions document to reflect lessons learned and knowledge gained from commissioning.		In-Service	Aug. 2007
	Prerequisite Completion	AECL must establish, document and implement a document baseline.	The Operations document baseline has been issued. The document baseline will be updated as required.	In-Service	Jun. 2007
	Prerequisite Completion	AECL must update the Final Safety Analysis Report.	The NFP FSAR will be updated as summarized in Section 7.2.8.  Sections 10 and 11 of the FSAR will be revised prior to requesting CNSC approval to place the NPF In-Service.	In-Service	Apr. 2006  Jul. 2007