# The Turnover Process at Chalk River Laboratories from Operations to Decommissioning

Paul POTTELBERG[a*], Roger TREMBLAY[b]

[a, b]*Canadian Nuclear Laboratories, 286 Plant Rd., Chalk River, Ontario, K0J 1J0*

**corresponding author: paul.pottelberg@cnl.ca*

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## *ASTRACT*

Canadian Nuclear Laboratories (CNL) has 200 facilities that account for approximately 2 million square feet of building space. Currently there are 23 facilities undergoing various stages of Decommissioning. An additional 30 facilities are scheduled to be turned over to Decommissioning in 2016.

CNL is currently restructuring to transition to a Government Owned/Contractor Operated (GoCo) organization and there will be a focus to accelerate the Decommissioning of legacy facilities on site.

In the past, facilities were shutdown and left in various configurations with limited documentation or limited staff knowledge of the status of the facility at the start of Decommissioning. Recently, guidelines have been developed to ensure that any facility being turned over is put into a proper and documented safe shutdown configuration. This paper will look at CNL's process for turnover of facilities from Operations to Decommissioning and identify some of the key Lessons Learned.

The turnover of nuclear facilities, administrative & support buildings, components or areas from Operations to Decommissioning needs to be documented and managed to ensure Health, Safety, Security and Environmental (HSSE) risks are identified, eliminated or effectively controlled.

At CNL, the turnover document Table of Contents is: Introduction and Purpose; Facility Boundaries; Known Deficiencies; Facility Status; Shutdown Status; Hazards; System/Equipment; Drawings/Maps/Records; Significant Environmental Aspects (SEAs); Interface; and other Transfer Documentation. The transfer documentation specifically covers:

- Defined boundaries of the facility, building, component or area at the time of turnover;
- Identification of all deficiencies associated with the facility, building, component or area and the person, after turnover, who will be responsible for correcting them;
- Confirmation of the status of the facility, building, component or area at the time of turnover with respect to:
  - The status of the Preliminary Decommissioning Plan (PDP). If the PDP is not current then it should be revised before Facilities Decommissioning accepts full responsibility for the facility, building, component or area;
- Details of Shutdown activities (e.g. isolations, draining, decontamination, etc.);
- Hazards that remain;
- Significant environmental aspects and operational controls;
- Details of system/equipment that remain energized or continue to perform their design function (e.g. holding tank still containing radiological liquid, etc.);
- Updated drawings and equipment specifications;
- Status of Engineering Change Control (ECC) that are in progress;
- Safety Related Systems (SRS) list;

- Fire code & building code violations or deficiencies;
- Maintenance schedule;
- Inventory of Nuclear Materials;
- Governing documents e.g. Criticality Safety Document, Preliminary Decommissioning Plan, Environmental Assessment, Safety Analysis Report, Facility Authorization, etc.;
- Outstanding Regulatory commitments;
- Information on any required amendments to the Site License; and
- Listing of all documentation and records to be included with the Transfer Certificate.

Key responsibilities are laid out defining what is required from each party and other groups involved in the transfer of the facility.

## 1. INTRODUCTION

In the past, facilities were shutdown and left in various configurations with limited documentation or limited staff knowledge of the status of the facility at the start of Decommissioning. Guidelines have been developed to ensure that any facility being turned over today is put into a defined and documented safe shutdown configuration.

The turnover of facilities, buildings, components or areas from Operations to Decommissioning needs to be documented and managed to ensure Health, Safety, Security and Environmental (HSSE) risks are identified, eliminated or effectively controlled.

Canadian Nuclear Laboratories (CNL) follows the Canadian Nuclear Safety Commission (CNSC) Regulatory Guide G-219 – Decommissioning Planning for Licensed Activities [1] and CSA standard N294-09 Decommissioning of Facilities Containing Nuclear Substances [2]. There is a process that is followed at Canadian Nuclear Laboratories to turn over Facilities that perform licensed activities from Operations to Decommissioning.

The first step is for the facility to be declared "redundant" by the Operations organization. There are many factors that can lead to this decision including political, social, new business mission, building in poor physical condition, end-of-life cycle or replacement with a new facility. Once Operations decide that the facility is no longer required, they must prepare a Permanent Safe Shutdown State Plan (PSSSP).

The objective of the transition to a permanent safe shut down state (PSSS) is to place the facility and systems in a condition requiring minimal staffing, maintenance and monitoring to maintain the facility in a safe state and controlling or preventing the release of materials to the environment.

The PSSSP provides the following:

- Scope, items to be removed, items that will remain in service, and the building condition;
- A description of facility, construction, timeline (history), purpose and main flow sheets;
- The current status of building and process services, including relevant preventative maintenance information;
- Identification of all deficiencies associated with the facility, building, component or area;
- Sequence of activities performed to eliminate or reduce any type of hazard to onsite workers, the public or the environment, (radiological, chemical, designated substances, industrial);
- The radiological levels and characterization of residual contamination;
- Remaining hazards and conditions;
- A list of references used to create the PSSSP; and
- A template (in the Appendix) for recording details and results from all activities in the PSSSP to ensure they are achieved.

In order to develop the PSSSP it may require other supporting information including characterization and engineering / optioneering to support decisions made in the PSSSP.

Key responsibilities are laid out defining what is required from each party and other groups involved in the transfer of the facility.

## 1.1 Licensing Process for Transferring Nuclear Facilities from an Operating State to a Storage-with-Surveillance (SWS) or Decommissioning State

*"The licensing philosophy of the Canadian Nuclear Safety Commission (CNSC) consists in having a Licence and an associated Chalk River Laboratories Licence Conditions Handbook (LCH)."*[3]
*"The Chalk River Laboratories (CRL) Nuclear Research and Test Establishment Operating Licence* [4] *contains clear and concise conditions, grouped by safety and control areas, which:*

- *identify programs that must be implemented and maintained by the licensee; and*
- *contains a table of radioactive release limits found in Appendix A to the licence.*

*The associated CRL Licence Condition Handbook contains:*

- *compliance criteria for each licence condition;*
- *appropriate delegation of authority to CNSC staff, where applicable;*
- *reference to licensee documentation;*
- *reference to codes and standards;*
- *reference to CNSC regulatory documents; and*
- *specific commitments made by the licensee to ensure compliance with the CNSC requirements."*

*"The purpose of the CRL Handbook is, for each licence condition, to identify and clarify the regulatory requirements and other relevant parts of the licensing basis to help ensure that the licensee maintains facility operation in accordance with the licensing basis for the facility and the intent of the CRL operating licence. The CRL Handbook provides compliance verification criteria for conditions set out in the licence. For this reason, the criteria are written in mandatory language."* [3]

Several appendices (A-M) are attached to the CRL Handbook. They provide detailed criteria and clarifications where needed, and are integral and mandatory parts of the CRL Handbook. A short description of a few of the appendices attached to the CRL Handbook is provided below.

Appendix A provides a template that will be used to initiate and document the changes to the CRL Handbook.

Appendix B includes a series of tables which list nuclear and support facilities at CRL that are subject to CNSC regulatory oversight, regardless of the state of the facility. Nuclear Facilities typically transition from Operations to a SWS state to allow a period for the development of a Detailed Decommissioning Plan (DDP). The facility would then transition from the SWS state to a separate table in appendix B of the LCH that lists all Nuclear Facilities undergoing decommissioning. The figure below (Figure 1) illustrates the licensing process for transitioning from an operating state to a SWS state. Note: SRC – Safety Review Committee is a CNL committee, responsible for performing independent reviews of safety case documents.

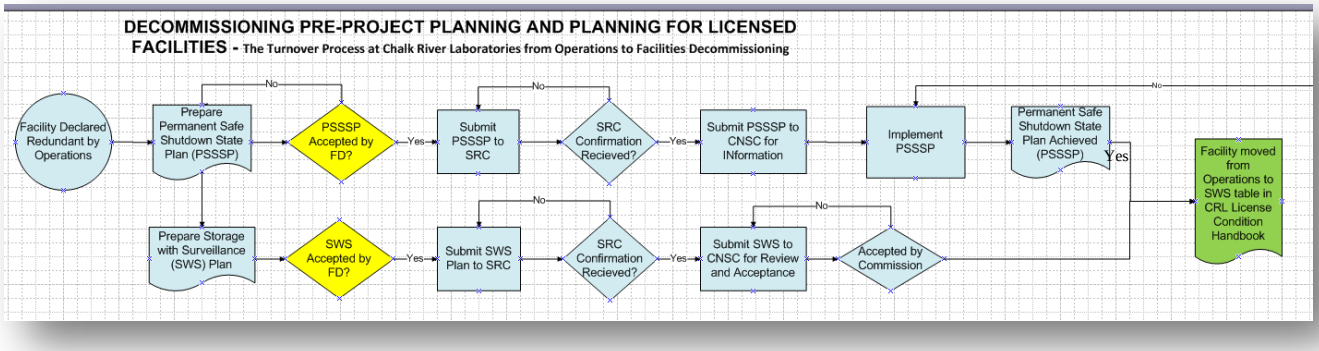



Figure 1- The CNL Process – Initial Documents

Appendix D includes a list of approved documents and serves as a Document Version Control.

Appendix H includes a list of criteria for reportable events.

Appendix I includes a list of the action levels.

*"The construction and decommissioning model for Chalk River Laboratories (CRL) site is one of individual construction or decommissioning projects for its various components over time, each project will be subject to appropriate levels of approval. At the end of the CRL site operational life, a single project (for the site decommissioning as a whole) will occur, until then, individual licence applications will be submitted for each project/facility. Each construction or decommissioning project is subject to the appropriate level of approval, including a determination of the need for an environmental assessment under the Canadian Environmental Assessment Act, 2012 (CEAA). If CNSC approval is required, the determination of the need for an environmental assessment under CEAA is done by CNSC staff. If CNSC approval is not required, the determination of the need for an environmental assessment under CEAA is done by other involved responsible authorities or by the licensee. In any case, an environmental assessment under CEAA may be required."* [3]

At CRL, CNL remains the licensee, regardless of the facility state (construction, commissioning, operations, decommissioning). CNL is a matrix organization, composed of various business lines, including Operations and Decommissioning

The PSSSP is executed by the Operation Group in accordance with the facility's licensing documents listed in Appendix D of the CRL License condition Handbook (LCH) or the Safety Assessment Report (SAR).

Once the PSSSP is achieved, the Storage-with-Surveillance (SWS) Plan replaces the previous licensing documents. The SWS plan does not come into effect until it has been accepted by the Commission and the licensee has been informed the facility can be transitioned from Operations to Decommissioning.

SWS is a planned period in the decommissioning life cycle of a facility or building during which the remaining structures, equipment, contaminated materials and site are kept under controlled surveillance and maintained in a safe condition. The activities involved are described in a Storage-with-Surveillance Plan.

Regulatory control by the Canadian Nuclear Safety Commission (CNSC) remains in effect during SWS periods.

The SWS Plan provides the following information:

- the purpose and scope of the plan;
- the facility description and operating history, including any failures or known significant incidents;
- a list of all functional remaining services and systems;
- a list of all the required monitoring, surveillance and testing activities required; and
- existing building hazards including radiological, chemical, industrial and criticality control.

The SWS also describes hazard control measures, access control, zoning, environmental protection, emergency planning, usage boundaries, the facility change or modification process, waste management, quality assurance and training requirements.

### 1.2 CNL Internal Transfer – Operations to Decommissioning

All turnovers shall be consistent with the Nuclear Research Test Establishment Operating License issued by the CNSC. [4]

Listed Nuclear Facilities are operated in accordance with the requirements of the Nuclear Safety Control Act, its regulations and the CRL site licence. At the end of their useful lives, the facilities must be safely shut down while respecting the requirements of the facility authorization. At the time of transfer, the Preliminary Decommissioning Plan should be up-to-date and Storage-with-Surveillance Plan prepared.

The SWS Plan will become the new governing document after its transfer to Facilities Decommissioning. The facility owner shall ensure these documents are in place at the time of transfer.

An internal CNL document and a Transfer Certificate are prepared to transfer the ownership of the facility from Site Operations to Facilities Decommissioning (FD).
At Canadian Nuclear Laboratories, the turnover document contains the following information:

**Introduction and Purpose**

Through the approval of this document, the responsibility for the maintenance, care, control and security of the facility is turned over from Operations to Facilities Decommissioning. This change in responsibility is in accordance with the requirements of the Facilities Decommissioning Quality Assurance Plan and the Turnover to Facilities Decommissioning Procedure.

**Facility Boundaries**

The facility/building boundaries are described as the facility/building footprint plus one meter around the perimeter of the facility/building, including any additional structures or components that may be included e.g. storage tanks.

**Known Deficiencies**

Any deficiencies or departures from the permanent safe shutdown state plan are listed and the record copy of the PSSSP is appended to the transfer certificate.

**Facility Status**

Operations certify that the facility, building, component or area is in a permanent safe shutdown state.

Any gaps or exceptions between existing conditions and permanent safe shutdown state plan expectations are summarized in a table and included in the turnover document.

**Shutdown Status**

This section documents the activities carried out by Operations to remove components/furniture, isolate systems as well as general post operational clean-up activities. The building services conditions are described in the permanent safe shutdown state plan report. On approval of the transfer certificate, the responsibility for any further monitoring, maintenance and shutdown activities are the responsibility of Facilities Decommissioning.

**Hazards**

All remaining hazards (radiological, industrial, chemical etc.) are identified and a link to the specific section of the governing Permanent Safe Shutdown State Plan is provided.

It is expected that bulk inventories of radioactive material and sources, chemicals and other hazardous material be removed from the facility where practical. This could include emptying of tanks and other vessels that contain process liquid or solid wastes. It is expected some hazards will remain at the time of transfer but those should be identified. This would include known asbestos, Polychlorinated Biphenyls (PCBs), Mercury (Hg) in switches, industrial hazards and others. Records of spills, accidents and malfunctions should be provided.

**System/Equipment**

The status of process systems, services and other equipment should be described. Defective equipment should be disconnected. All process equipment is to be isolated, drained and placed into a safe, shutdown state. Non-essential services should be removed where possible or isolated with proper lock out/tag out in place. Systems are to be de-energized and lines purged and/or flushed out (e.g. process lines, Hydrogen ($H_2$) lines, etc.). Safety systems such as HEPA filtered exhaust ventilation, area radiation monitoring instruments and fire detection and protection equipment and emergency lights are typically required to remain operational until final Decommissioning.

**Drawings/Maps/Records**

Typically, a list of the applicable drawings is included as an appendix to the transfer certificate. Relevant drawings and equipment specifications should be provided. Drawings should be marked up where systems or equipment were removed or modified during the PSSSP. This includes the status of any Engineering Change Control (ECC's) that are in progress or not closed out.

This section may also contain a requirement for the Operations group to forward key records (e.g. logs, maintenance records, inspection reports, operational records etc.) to Facilities Decommissioning within a specified time from the date of signing the transfer certificate. FD personnel will confirm that all required records for the proposed turnover are complete, correct and stored in the CNL records management system.

**Significant Environmental Aspects (SEAs)**

The list of significant environmental aspects and the applicable control measures should be provided to Facilities Decommissioning along with a list of operational limits and controls.

This section identifies the environmental aspects of the facility, building, component or area which is to be transferred with a link to the specific environmental evaluation/assessment reports which need to be identified in full.

**Inventory of Nuclear Materials**

It is fully expected that nuclear materials and sources will have been removed from the facility. The remaining 'source term' would then be limited to embedded contamination and possibly loose contamination located in inaccessible areas. The radiological safety zoning should be updated. Areas of known contamination should be communicated to Facilities Decommissioning.

**Fire & Building code violations or deficiencies**

Any known deficiencies or violations should be identified. This should also include any outstanding actions from the Fire Hazard Analyses (FHA) or fire inspections.

**Safety Related Systems List**

This list should include any system that is required for the period of SWS.

**Regulatory Commitments**

Any outstanding commitments should be communicated to Facilities Decommissioning at the time of transfer. It is expected the facility owner will have attempted to address those commitments by the transfer date.

**Governing documents**

The Criticality Safety Document (CSD), Preliminary Decommissioning Plan (PDP), Environmental Assessment (EA), Safety Analysis Report (SAR), Facility Authorization (FA), where applicable should be updated. Some of these documents may be replaced by the SWS plan. Any commitment to revise licensing documentation should be communicated to Facilities Decommissioning.

**Interface**

In this section document any ongoing support that may continue to be provided by Operations i.e. until FD staff is fully trained and qualified.

## 2. ADDITIONAL DECOMMISSIONING REQUIREMENTS

Additional decommissioning documentation may be prepared or started while a facility is still under Operations. This documentation is used in the process to prepare for Decommissioning of a facility. Some of the key steps involve facility walk downs, performing radiological gap analysis, preparing & implementing scoping surveys, performing building condition assessments, preparing cost, waste and dose estimates, all of this information feeds into the development of the Detailed Decommissioning Plan (DDP). The detailed decommissioning plan is based on the preliminary decommissioning plan (PDP). The preliminary decommissioning plan is required to be prepared as early as possible in the life-cycle of a licensed activity.

The preliminary decommissioning plan (PDP) should have been maintained during facility operations.
The PDP should be reviewed and updated in light of operational experience and technological advances. All significant changes should be discussed with the assigned CNSC officer.
During the facility operation stage, the CNSC may inspect the facility operational records and preliminary decommissioning plan for the purpose of ensuring that the plan and the financial guarantee program remain consistent with the projected scale of the decommissioning effort.
The detailed decommissioning plan is normally a refinement and procedural of the work package structure established in the PDP. The results of detailed post-operational contamination surveys, assessments of hazard and environmental impacts and new technological developments or regulatory requirements may precipitate a change in the decommissioning strategy. The DDP should include the following elements: [1]

- *A brief description of, and diagram showing the various areas, components and structures to be decommissioned;*
- *A history of the operation and any incidents or accidents that may affect the decommissioning;*
- *A statement of the final radiological, physical and chemical end-state objectives for the site;*
- *A description of any specific requirement for long-term institutional controls;*
- *Results of a comprehensive & systematic survey of the radiological and other potentially hazardous conditions at the facility, including any remain gaps or uncertainties;*
- *Overview of the decommissioning strategy for each planning envelope, highlighting any significant changes from the preliminary plan strategy;*
- *A description of each decommissioning work package;*
- *A schedule, cost estimate and financial guarantee;*
- *A description of the waste management plan; including expected quantities and clearance levels;*
- *An assessment of the potential environmental effects and the measure to mitigate and monitor them;*
- *Information on the quality assurance, emergency response, site security, radiation protection, environmental protection, personnel training, human factors and occupational health and safety programs;*
- *A list of federal and provincial regulatory agencies involved;and*
- *Final radiation survey requirements and listing of records and retention periods.*

The Detailed Decommissioning Plan should describe the method or combination of methods selected for decommissioning (i.e. long-term storage, prompt decontamination and dismantlement or partial D&D). It should include a list and describe the major activities and tasks related to decommissioning. The activities and tasks should be identified and discussed briefly in the order that they will take place. The level of detail of the description provided for each of the activities will depend on the nature of the activity. For prompt decommissioning/dismantlement some of the activities that would be described are, removal of the vessel and internals removal of other large components, including major radioactive components, removal of the primary system(s), removal of any structures, decontamination of radioactive components, including chemical

decontamination techniques, special or unusual activities (i.e. removing debris/sludge from bays /pools), on site storage, shipment and processing and final storage location.
If a facility is going to go into long-term storage (Storage-with-Surveillance) the activities and tasks required to maintain the facility in a safe state should also be discussed, such as, draining of specific systems & processes, decontamination of specific high doses areas & equipment, removal of waste, de-energizing or deactivating specific systems, reconfiguration of specific systems, inspection, testing and monitoring plans/requirements during SWS and any required preventative maintenance.

### 2.1 Change Control Strategy

The primary processes that will guide the safety evaluation of the Facility Shutdown Project work activities include the Engineering Change Control (ECC), Conduct of Operation Procedure (CO) and/or Work Plan Procedure (WP). These processes require that the safety significance of any change be thoroughly evaluated against the facility safety case and for activities that may challenge the established safety envelope be reviewed and confirmed by the CNL Safety Review Committee (SRC) and in some cases reviewed and approved by the CNSC.

The facility Safety Related Systems List (SRSL) will need to be revised and presented to the SRC and CNSC. The revision should identify the systems that will no longer be considered safety related once the specific associated hazard is sufficiently reduced or eliminated. All shutdown project activities will be planned such that the safety related systems needed to support safe shutdown will be operated within the boundaries currently credited in the safety analyses until it has been formally demonstrated that the hazards they mitigate are no longer present.

The specified change category for each work scope is based on the anticipated safety category of the associated system at the time the work is to be performed.

### 2.2 Engineering Change Control Phases

The Engineering Change Control process subdivides scopes of work into phases. A phase is a scope of work that eventually will be captured and carried out in a work package or work plan. Work activities for the identified phases do not need to occur sequentially but rather will be performed in any order dependent upon the technical work logic which is continually updated in the project schedule. However, for most Facility Shutdown Projects, the phase numbers are assigned to reflect planning priorities based on currently known project schedule drivers.

#### 2.2.1 Engineering Change Category Justification

An example of an Engineer Change Control Phase, showing the expected Permanent Safe Shutdown State Configuration for the ventilation may include the following information.

- The final ventilation system(s) for Building A, Building B, Building C, Building D Pits, and Building E configured to support maintaining the facilities in a PSSS during the SWS period.
- All current ventilation lines to Building E will be permanently blanked / capped. Building F ventilation system – maintain operational.
- Ventilation exhaust sources to Building E from Buildings A, B, C, D, G, and H isolated and connection points permanently blanked/capped and all HEPA filters, charcoal absorbers and monitoring equipment removed.
- Building E fans (E-1, E-2, E-3, E-4, S-1, and S-2) de-energized and electrical power source air gapped.

A shutdown schedule is developed to track and co-ordinate the activities required to achieve the permanent safe shutdown down state for the facility.

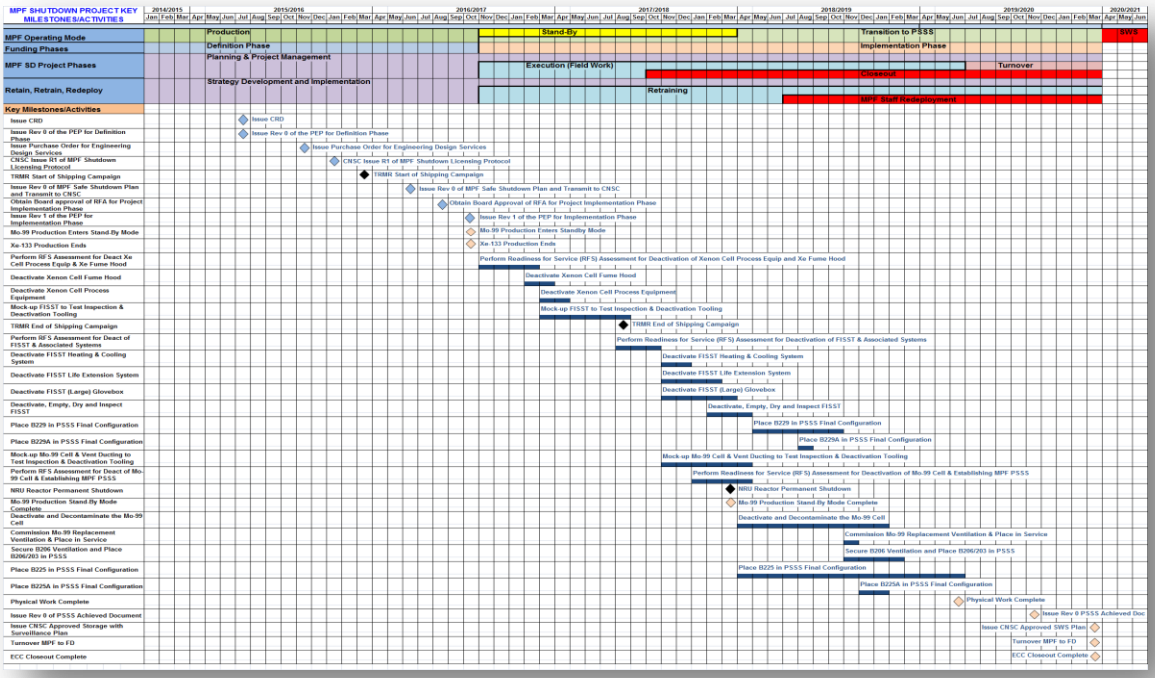



Figure 2 - Example of a Project Shutdown Schedule

## 2.3 Conduct Building Condition Assessment of the Facility

### 2.3.1 Scope – Where Long Term Storage is required

- Perform a building condition assessment of the facility and recommend actions required to maintain the asset in operating condition during the extended defined period of time. Some of the elements that should be inspected include Architectural, Structural, Transportation, Mechanical and Electrical elements.
- The objective of the building condition assessment is to investigate various site and building factors at the element level, including:
  - Element condition;
  - Equipment obsolescence;
  - Design problems and deficiencies that adversely affect operation and maintenance activities;
  - Compliance with the latest edition/revision of applicable codes, standards, policies, directives; and
  - Assessment of remaining life.

### 2.3.2 Additional Detail

- A building condition assessment is performed in order to determine the most appropriate management strategy for retention, maintenance, and/or retrofit/renewal. Analysis of the inventory is critical to the effective and efficient life-cycle management of the inventory, and a building condition report provides the detailed technical information upon which this management strategy is based.

  A building condition assessment is typically done early in the Facility Shutdown Project (i.e., early in preliminary design) to identify any additional work that may need to be accomplished during transition to place the facility in a PSSS.

## 3. KEY LESSONS LEARNED

The shutdown of the NRX reactor took place in 1993. Numerous documents were written for shutting down each of the systems. Once the plans were implemented the reactor was placed in Storage-with-Surveillance and the facility staffing levels were adjusted accordingly. Over the years and through attrition, most staff familiar with the facility had moved on and/or retired. The current team looking after the facility found that not all drawings were maintained up-to-date or that they matched the physical plant configuration. It was also found that the records expected from following the documents written to shut down the systems were hard to find or missing. The decommissioning team brought in a retiree familiar with the systems and the shutdown activities to verify the current plant status and to document it in an end-state report. The need to properly maintain records, drawing and photos during shutdown from operations to decommissioning is critical.

The CRL site has operated for more than 70 years, during the time facilities have been modified, cleaned up and re-used to support various missions over that time frame. Some of the facilities ceased operations in the 50's and remain in SWS today. Some of the historical data to support today's decommissioning goal is either lost or there is no record available.

There have been numerous issues that have led to the challenges being faced with configuration management.

- There was a fire on site in the mid 1950's that burned down a building that housed many records being stored on site. Most documents destroyed were not backed up by any other means. (Loss of Historical records)

Figure 3 – Fire at CNL facility in the 1950's

- In the past, some of the scanned documentation was poor quality making it very difficult to read. Originals may no longer be available. In some cases, these are the only remaining record. (Quality of records)

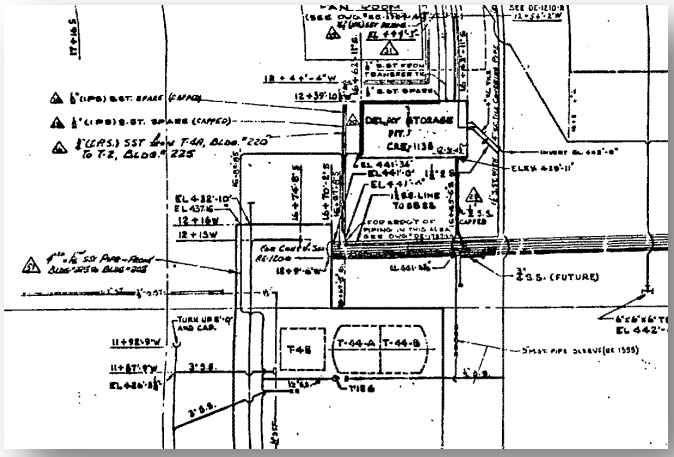
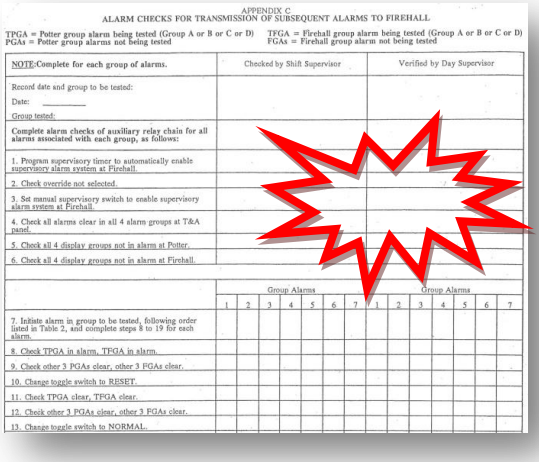


Figure 4 – Poor quality records

- Verification of information provided on the record is critical. In the past, some records were not verified and information was either missing and/or incomplete. Documents had to be walked down and field verified again to confirm status.
  (Completion of records)



APPENDIX C

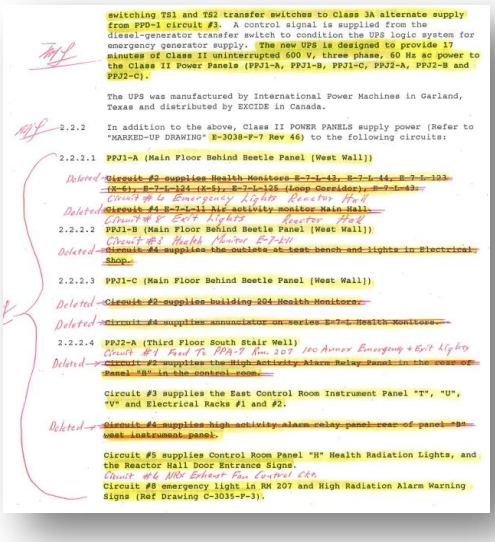
ALARM CHECKS FOR TRANSMISSION OF SUBSEQUENT ALARMS TO FIREHALL

TPGA = Potter group alarm being tested (Group A or B or C or D) TFGA = Firehall group alarm being tested (Group A or B or C or D)
PGAs = Potter group alarms not being tested FGAs = Firehall group alarm not being tested

| NOTE: Complete for each group of alarms. | Checked by Shift Supervisor | Verified by Day Supervisor |
|---|---|---|
| Record date and group to be tested:<br>Date: _____<br>Group tested: | | |
| **Complete alarm checks of auxiliary relay chain for all alarms associated with each group, as follows:** | | |
| 1. Program supervisory timer to automatically enable supervisory alarm system at Firehall. | | |
| 2. Check override not selected. | | |
| 3. Set manual supervisory switch to enable supervisory alarm system at Firehall. | | |
| 4. Check all alarms clear in all 4 alarm groups at T&A panel. | | |
| 5. Check all 4 display groups not in alarm at Potter. | | |
| 6. Check all 4 display groups not in alarm at Firehall. | | |

| | Group Alarms | | | | | | | Group Alarms | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. Initiate alarm in group to be tested, following order listed in Table 2, and complete steps 8 to 19 for each alarm. | | | | | | | | | | | | | | |
| 8. Check TPGA in alarm, TFGA in alarm. | | | | | | | | | | | | | | |
| 9. Check other 3 PGAs clear, other 3 FGAs clear. | | | | | | | | | | | | | | |
| 10. Change toggle switch to RESET. | | | | | | | | | | | | | | |
| 11. Check TPGA clear, TFGA clear. | | | | | | | | | | | | | | |
| 12. Check other 3 PGAs clear, other 3 FGAs clear. | | | | | | | | | | | | | | |
| 13. Change toggle switch to NORMAL. | | | | | | | | | | | | | | |

Figure 5 - Record Copy – Missing signature & sign-off



switching TS1 and TS2 transfer switches to Class 3A alternate supply from PPD-1 circuit #3. A control signal is supplied from the diesel-generator transfer switch to condition the UPS logic system for emergency generator supply. The new UPS is designed to provide 17 minutes of Class II uninterrupted 600 V, three phase, 60 Hz ac power to the Class II Power Panels (PPJ1-A, PPJ1-B, PPJ1-C, PPJ2-A, PPJ2-B and PPJ2-C).

The UPS was manufactured by International Power Machines in Garland, Texas and distributed by EXCIDE in Canada.

2.2.2 In addition to the above, Class II POWER PANELS supply power (Refer to "MARKED-UP DRAWING" E-3038-F-7 Rev 46) to the following circuits:

2.2.2.1 PPJ1-A (Main Floor Behind Beetle Panel [West Wall])

Deleted ~~Circuit #2 supplies Health Monitors E-7-L-43, E-7-L-44, E-7-L-123 (X-61), E-7-L-124 (X-5), E-7-L-125 (Loop Corridor), E-7-L-43;~~
Circuit #6 Emergency Lights Reactor Hall
Deleted ~~Circuit #3 E-7-L-11 hi activity monitor Main Hall.~~
Circuit #8 Exit lights Reactor Hall

2.2.2.2 PPJ1-B (Main Floor Behind Beetle Panel [West Wall])
Circuit #3 Reads Reactor Exhaust
Deleted ~~Circuit #4 supplies the outlets at test bench and lights in Electrical Shop.~~

2.2.2.3 PPJ1-C (Main Floor Behind Beetle Panel [West Wall])

Deleted ~~Circuit #2 supplies building 204 Health Monitors.~~
Deleted ~~Circuit #4 supplies annunciator on series E-7-L Health Monitors.~~

2.2.2.4 PPJ2-A (Third Floor South Stair Well)
Circuit #1 Feed To PPJ-2 Rm. 207 100 Ampere Emergency + Exit Lights
Deleted ~~Circuit #2 supplies the High Activity Alarm Relay Panel in the rear of Panel "B" in the control room.~~

Circuit #3 supplies the East Control Room Instrument Panel "T", "U", "V" and Electrical Racks #1 and #2.

Deleted ~~Circuit #4 supplies high activity alarm relay panel rear of panel "B" west instrument panel.~~

Circuit #5 supplies Control Room Panel "H" Health Radiation Lights, and the Reactor Hall Door Entrance Signs.
Circuit #6 HAA Exhaust Fan Control Ckt
Circuit #8 emergency light in RM 207 and High Radiation Alarm Warning Signs (Ref Drawing C-3035-F-3).

Figure 6 - Field Verification required for end states

- Physical plant configuration does not always match paper configuration

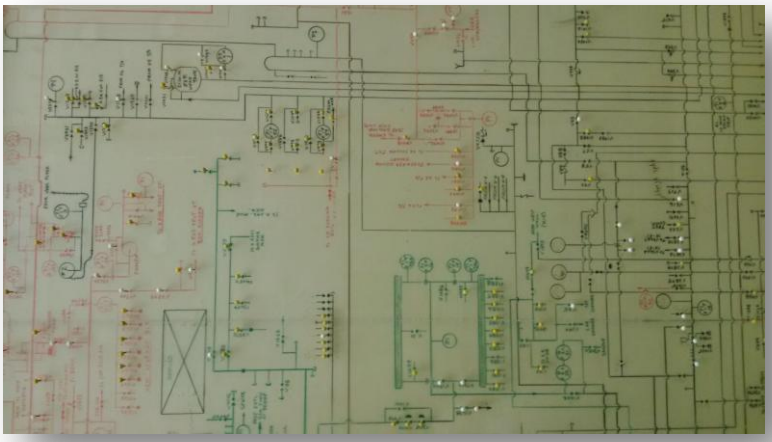


Figure 7 – Configuration Management Challenges

- As-builts on drawings and flow sheets were not always kept up-to-date in the past. It was dependant on finances, staffing levels, engineering support and availability and even the location of the prints were an issue. Equipment status pin boards for example were located in an area where someone could easily brush up against it and knock the pins out. If they were not placed back in the correct position configuration would be incorrect.
- The decommissioning team is finding that physical plant configuration does not always match paper configuration, which cause extra steps and precautions to be written in to the decommissioning plans to deal with the unknowns.
- Historically, there was internal pressure to turn facilities over from the operations group to decommissioning. Often there was little to no funding available to perform post-operational clean-up and safe shutdown of the facility and systems. Decommissioning accepted the liability in an "as-is" state with the majority of the hazards and waste still within the facility. Decommissioning also learned that once you take ownership of a facility you need to ensure that access is controlled. An example is, a walk down was performed in an old lab facility and the contents were documented. After a short period of time, the inventory in the building had accumulated. Other groups on site took it as an opportunity to get rid of unwanted chemicals and other waste. Containers started showing up in the fume hoods and lab benches without proper labelling. Extra effort on the part of Decommissioning was required to properly identify contents and dispose of the chemicals and waste. Needless to say the facility and exterior waste containers were soon locked and under Decommissioning control.

Figure 8 – Post Operational Clean Out Activities

### 3.1 Final Thoughts

For legacy facilities, Canadian Nuclear Laboratories (CNL) needs to place more focus of Knowledge Management (KM) going forward. Knowledge Management should be a policy that is written into the management system for the site. There needs to be effective succession planning, self assessments, external benchmarking, incorporation of lessons learned and OPEX, and risk assessments should be carried out to identify potential loss of critical knowledge and skills.
The operations group should be performing exit interviews to capture critical knowledge and experience when people leave the groups and or organization, this could include video capture, mentoring and coaching and/or narrative documentation. This information should be used to update the PDP and documentation created for the transfer package.

When shutting down a facility and transferring it from Operations to Decommissioning; CNL should look to capitalizing on the experience, training and knowledge of the existing operations staff. The operations staff can be utilized to support the integrated project team supporting the decommissioning of the facility, staff can be retained, retrained and redeployed as necessary to support the mission.

For new facilities, Management System needs to ensure Engineering Change Control (ECC) is applied to keep configuration of the plant up-to-date. Lessons learned need to be captured in a central register. This database would serve as one source of information when periodic updates to the PDP are done.
Decommissioning needs formalize the process to prepare a clear list of expectations with respect to facility documents, records and status of the facility.

## 4. REFERENCES


[1] (CNSC) Canadian Nuclear Safety Commission – Regulatory Guide G-219 – Decommissioning Planning for Licensed Activities 2000 June

[2] (CSA) Canadian Standards Association – CSA N294-09 – Decommissioning of facilities containing nuclear substances

[3] (CNL) Licence Conditions Handbook for Chalk River Laboratories (LCH) CRL-508760-HBK-001 Rev 3 2015 March

[4] (CNL) Nuclear Research and Test Establishment Operating Licence NRTEOL-01.02/2016 Expiry Date: 2016 October 31