

EFFICIENT AND EFFECTIVE DELIVERY

Canadian Nuclear Laboratories - 2016 Summary



Canadian Nuclear
Laboratories

Laboratoires Nucléaires
Canadiens

Science of tomorrow.

La science de demain.

MESSAGE FROM THE CEO

Our first year at Canadian Nuclear Laboratories (CNL) was an exciting one. We worked through the challenges of leading the organization, while still managing the transition-in process; we made a point to listen and learn from the people who drive CNL, and began to tackle the key issues they flagged; we worked hard to reshape and align our science and technology programs against what the world needs; and, we made great progress in transforming the sites both physically and culturally to reflect our vision of CNL as a truly world-class S&T organization.

This coming year holds a lot of promise for our organization. We are at the point where a great portion of our first year of operation is now in the rear view mirror, and we can look ahead to what 2017 has in store. Over the coming weeks, greater detail in our strategic plans, our workforce outlook, and key science and technology focus areas will become available. Our new Annual Program of Work and Budget (APWB) and our 5 & 10- Year Strategic Plans are currently in draft and under review, but once signed off by AECL, these will provide an outline of our key commitments for the years ahead.

This year is also one of continued transformation. Our entire workforce is engaged in working towards a new vision, mission and purpose for CNL; one that will bring more energy and excitement to CNL.

Thank you for your support.



Priorities

Leadership

CNL Transformation

Workforce & Talent

Planning & Management

Financial Health

Management Model (GoCo)

DWM Project Management

Waste Management

Transformation: Waste Management

Stored Liquid Waste

Historic Waste Program

Capital Investment in S&T

Generate Value

S&T Facilities

S&T for Government

S&T Project Delivery

Operations & Conduct

Secure Site

Milestone Deliverables

D&WM Skyline Changes

Repatriation

NRU Operating Days

Natural Gas Conversion

Capital Projects

Commercial Revenues

ADDRESSING LIABILITIES. ENABLING RENEWAL.

Our cost effective approach to liability reduction helps to lay the foundation for a revitalized S&T laboratory complex.

21,000

square foot reduction of radiological areas within the existing Controlled Area.

>2 MILLION

pounds of waste were safely removed through decommissioning activities in CRL.

30

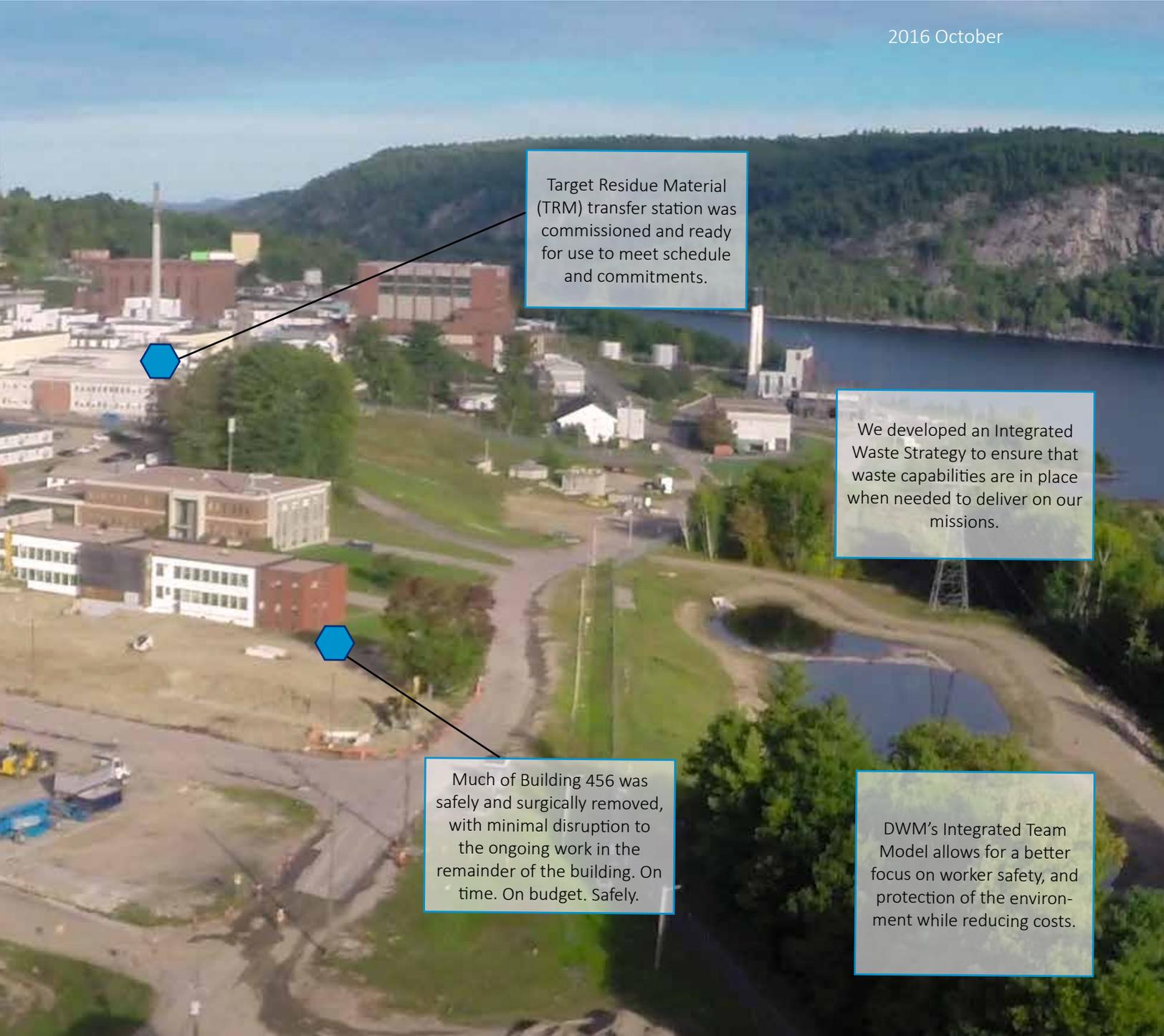
buildings and structures from the Chalk River campus were cleared, allowing for site preparation.



CNEA is supporting the benchmarking of CRL's proposed framework for environmental restoration against USDOE and other remedial actions in Canada; providing review and comment on CRL Preliminary Soil Cleanup Criteria for D&WM; and, the provision of training materials and programs from CNEA affiliates.



2015 November



2016 October

Target Residue Material (TRM) transfer station was commissioned and ready for use to meet schedule and commitments.

We developed an Integrated Waste Strategy to ensure that waste capabilities are in place when needed to deliver on our missions.

Much of Building 456 was safely and surgically removed, with minimal disruption to the ongoing work in the remainder of the building. On time. On budget. Safely.

DWM's Integrated Team Model allows for a better focus on worker safety, and protection of the environment while reducing costs.

D&WM PROGRAM



13 FEDERAL ORGANIZATIONS

participated in a review of our science and technology projects. Feedback across the federal system continues to be positive.

>120

CNL hosted its first Advanced Reactor Forum, which brought together more than 120 participants from industry, government and regulatory bodies to discuss industry needs and a path forward for advanced reactor technology.

GROWTH

CNL identified seven strategic initiatives that will drive CNL into the future. These programs build on our differentiating capabilities.

COMMERCIAL

In one year S&T third party commercial work for new customers has increased by over 50%. Over the last 2 years third party commercial work for new customers has almost doubled.

SCIENCE & TECHNOLOGY



PLAN

The overall plan for site redevelopment of S&T facilities to support S&T capability is progressing well with 10 business cases initiated. The ongoing development of the Site Master Plan is positive and captures the evolving needs of CNL.

FEDERAL

CNL worked with our federal customers to build a program that serves federal needs, developing knowledge, services, and products to underpin their policies.

GUIDANCE

CNL's Science Advisory Board (SAB) was created in order to provide a global technical perspective and to identify possible opportunities for commercial business and/or partnering.

OPERATIONS



\$5.3 MILLION

We avoided approximately \$2M annually by applying a risk informed approach to fire system code requirements with agreement from CNSC staff, and saved an additional \$3.3M by challenging project scope and method of execution.

PROGRESS

We successfully restarted the U2 experimental facility in NRU, and achieved a solid record of safe, reliable reactor operation. We also made great progress in planning for safe shutdown of the reactor in 2018.

We concluded routine Mo-99 production and transitioned effectively into stand by operations and preparation for repatriation (TRM) shipments.

\$500,000

in energy costs avoided through the use of natural gas on the Chalk River site.



INTEGRATION

We are taking a more integrated approach to managing our resources, through the embedding of dedicated trade, maintenance and Radiation Protection staff into project teams or facilities. This approach helped deliver the handover of 10 additional buildings to Decommissioning well ahead of schedule.

APPROACH

Work is being managed more effectively through decentralizing maintenance to zones, developing multi-skilled trades, and working with others in CNL to increase facility usage.

-16 DEGREES

ONE COLD DECEMBER MORNING, THE CNL NUCLEAR RESPONSE FORCE SUCCESSFULLY DEFENDED THE SITE FROM AN ADVERSARIAL TESTING TEAM

Throughout the challenges of year one, we maintained or strengthened our focus on health, safety, security and the environment.



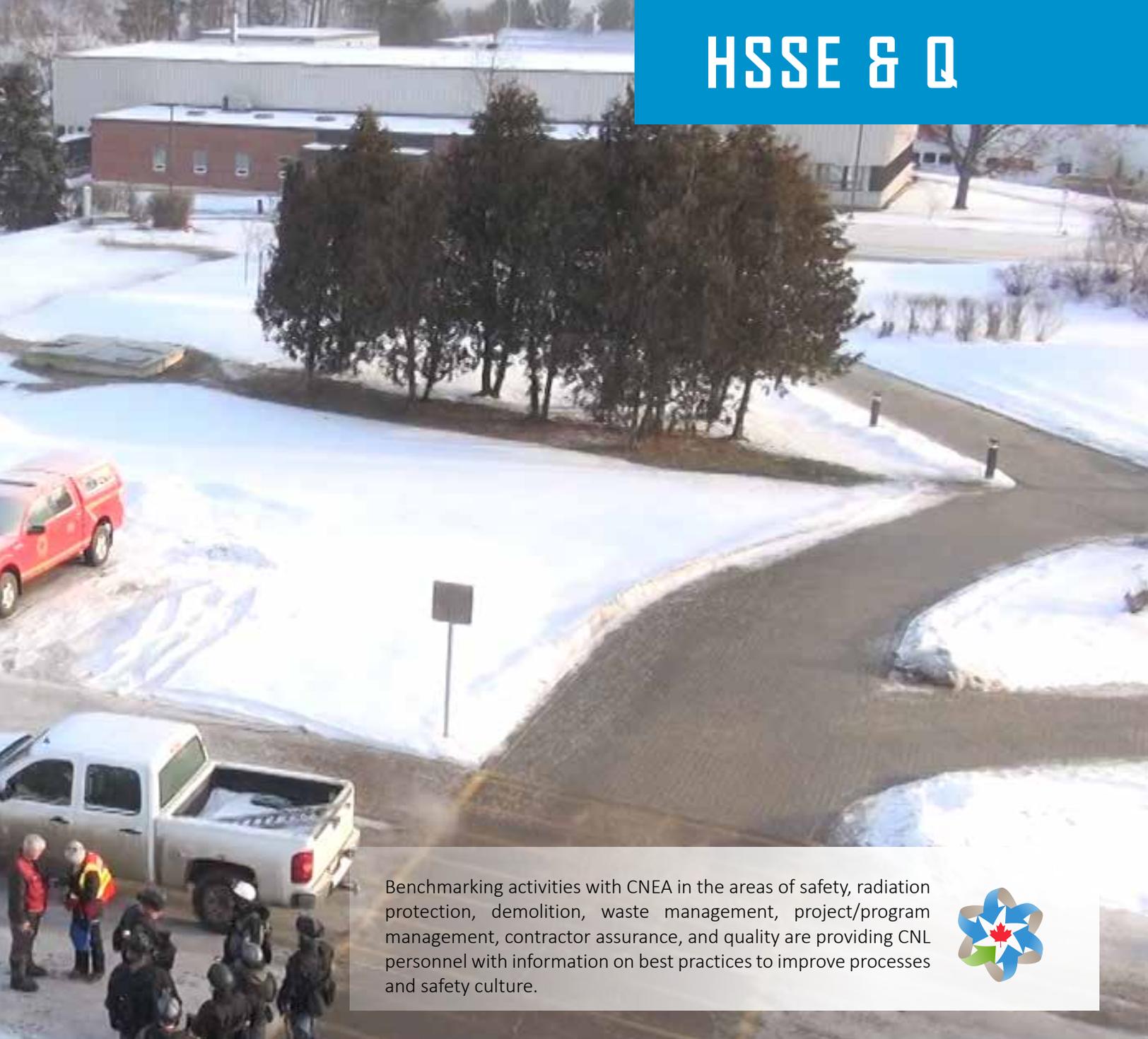
FIRE SAFETY

The Fire Protection team purchased and implemented wireless detection equipment to ensure reliable detection is in place during the safe shutdown of facilities. This is a first in the Canadian nuclear industry.

We also commissioned the Live Fire Training Facility and Program at CNL, making us now compliant with the CSA N293 fire protection code.

OVERSIGHT

The Safety Advisory Board (SAB) was replaced with a new safety committee that reports directly to the board. The new committee consists of external and internal members, which increases efficiency and quality. Internal members are at a more senior level, and familiar with the organization and facilities. Decisions are reached more quickly, and with better consideration for how things currently function in the facilities.



Benchmarking activities with CNEA in the areas of safety, radiation protection, demolition, waste management, project/program management, contractor assurance, and quality are providing CNL personnel with information on best practices to improve processes and safety culture.



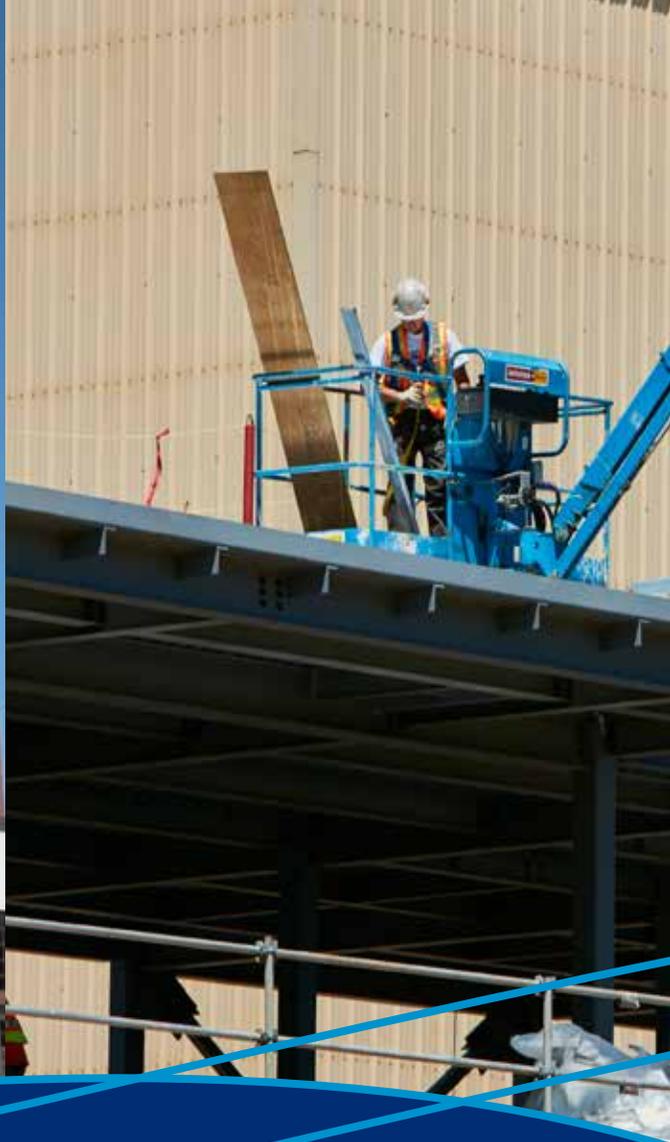
SECURITY

CNL made many improvements in the physical and cyber security culture and in the posture of the CRL site from the following perspectives: tactical effectiveness, security barrier systems, security detection and assessment capability, effectiveness of work area, and the ability to track performance through metrics.

1300+

In early-January, more than 1,000 staff from across CNL participated in “Energizing Launch” sessions as a means to introduce them to the Culture Shift initiative. Of those, more than 70 volunteered to serve as facilitators, helping to further train and support the development of a new organizational culture within CNL.

PROJECTS



ENERGY USE

CNL identified opportunities for further conversion to natural gas within the Integrated Site Master Plan, reviewed current propane consumers for potential conversions, and included three facilities in the draft 2017/18 APWB.

A third-party energy study was tendered, the result of which supports installation of a Tri-Generation energy system at CRL further utilizing natural gas to reduce energy costs. Energy management programs were benchmarked and an energy baseline developed for CRL, to form the basis for an energy improvement plan.

OVERSIGHT

CNL is working hard to implement a project management approach across the organization; a key part of this is the introduction of an Earned Value Management System (EVMS).

In addition, we have challenged project scope when justified and implemented new processes or approaches to larger jobs.

We are aligning commissioning procedures, and reorganizing project teams to improve coordination and communications.



COMMUNICATION

During the project planning for the decommissioning of the B444 High Head Tank, security-sensitive equipment was relocated for a fraction of the estimated cost, saving as much as \$4.5 million from previous estimates. A well-executed collaboration between CRL security technicians, tradespeople, contract support, decommissioning staff, R&D staff and Capital Project staff resulted in many efficiencies being realized through small scope increases to existing projects and ultimately a huge cost and time savings for CNL.

HISTORIC WASTE

As of November 8, the Low-Level Radioactive Waste Management Office (LLRWMO) and Port Hope Area Initiative - two entities which have a common history and are already sharing technical, business, legal, HR and communications resources - have been consolidated under a single accountability within D&WM called the Historic Waste Program (HWP).

18

CNL continues to build its relationship with schools and youth programs, hosting or supporting 18 such events at the CRL site. These visits are tailored to specific needs of the participants and are aligned with their curriculum through three different streams: environment, biology, and physics.

THREE

Completing its tenth consecutive year of operation, the Environmental Stewardship Council held three meetings including one that was held at CRL involving field visits to locations of significance to upcoming proposed projects. The council is comprised of community and stakeholder representatives, consisting of elected officials and community interest groups.

\$146,000

Our workforce is dedicated to improving and supporting the communities in which they live. This year, through company supported initiatives, they collectively contributed over \$146,000 to local charities and community causes.



A PARTNER IN LOCAL COMMUNITIES

This year, CNL connected with the community more than ever: 900 inquiries through our website, the launch of our social media channels, support for dozens of community events... and more to come.



COMMUNICATIONS

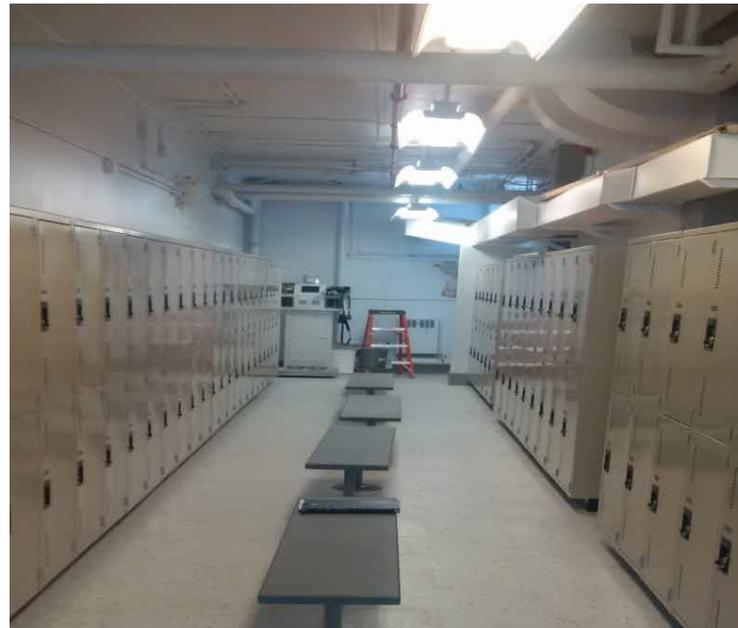
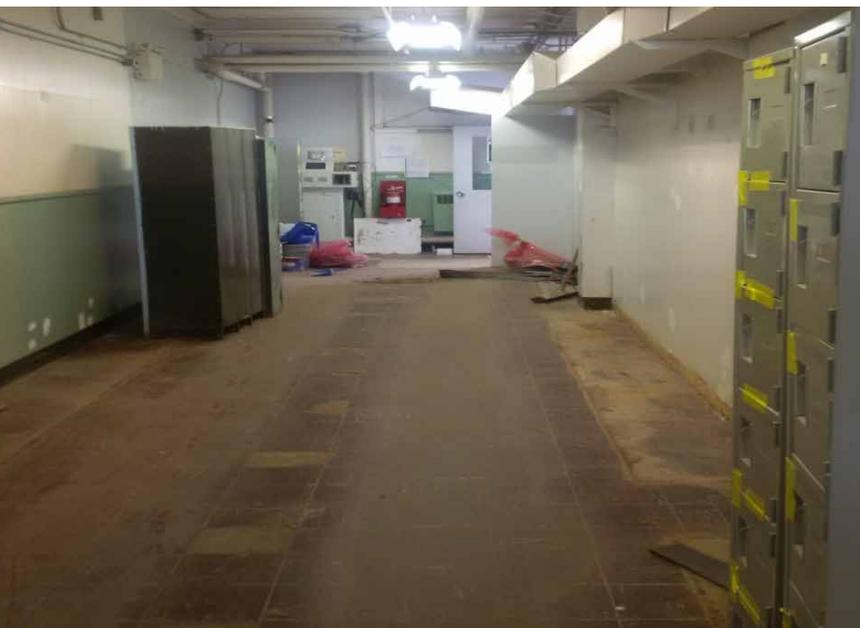
BREATHING NEW LIFE INTO CANADA'S PREMIER NUCLEAR LABORATORIES

Achieved through world class science facilities, transformed industrial work spaces, and a rigorous approach to site maintenance and housekeeping.

Centre: Minister Jim Carr, and Parliamentary Secretary Kim Rudd, were joined by CNL, AECL and community leadership to open the Harriet Brooks Building. Their presence at the event was a positive sign for a continued strong and supportive relationship with government.

Top right / Bottom left: Across the Chalk River campus, a significant effort is being put forth to ensure that wastes are properly managed, materials properly stored, and the site is well maintained. This has a positive impact on safety, work execution, and provides a professional impression to visitors and customers.

Bottom right: An Engineering, Procurement and Construction (EPC) contract was used for the new Sanitary Sewer Treatment Facility (SSTF) at CRL. The EPC model reduces project risks for CNL and delivers results in a timely manner.





COMMERCIAL

\$76.2 MILLION

in revenue against a target of \$53.6 million, exceeding our target by 42 per cent. We are sustaining and growing our commercial revenues.



\$15 M

of commercial products and services delivered to new customers. This achievement is against a target of \$10M, exceeding the target by 50 per cent.

14

technologies under development, enabled by a collaborative process between Business Development and R&D to use incremental new technology initiatives funding (NTIF) and margin. These technologies are underpinned by market needs.

TWO

agreements have been renewed with CNL's largest heavy water customers. These agreements will enable CNL to significantly exceed the sales target in Q4.



AGILITY

We have increased our speed and ability to identify and execute on products and services development projects.

POTENTIAL

In addition to business cases regarding opportunities in research reactor fuel, isotope targets and heavy water, CNL is exploring high-potential business opportunities and proposed commercial ventures involving helium-3, and space batteries with industrial partners.

VALUE

Extensive Intellectual Property (IP) discovery activities have been conducted and will continue. With the support of R&D, we are making progress to refine and update our comprehensive IP inventory. Contracts are being negotiated to include technology access fee payments for IP.

A SOLUTION FOR OUR LEGACY WASTES

The Near Surface Disposal Facility is a key enabling facility

Our proposed Near Surface Disposal Facility (NSDF) which will provide a permanent disposal solution for waste arising from historical operations and generated as CNL revitalizes CRL and closes the Whiteshell Laboratories and Nuclear Power Demonstration (NPD) sites.

47

construction contractors and material supply companies from Canada and the U.S. attended the Industry Day session.



1

site selected (East Mattawa Road) as the preferred location for the NSDF.



26

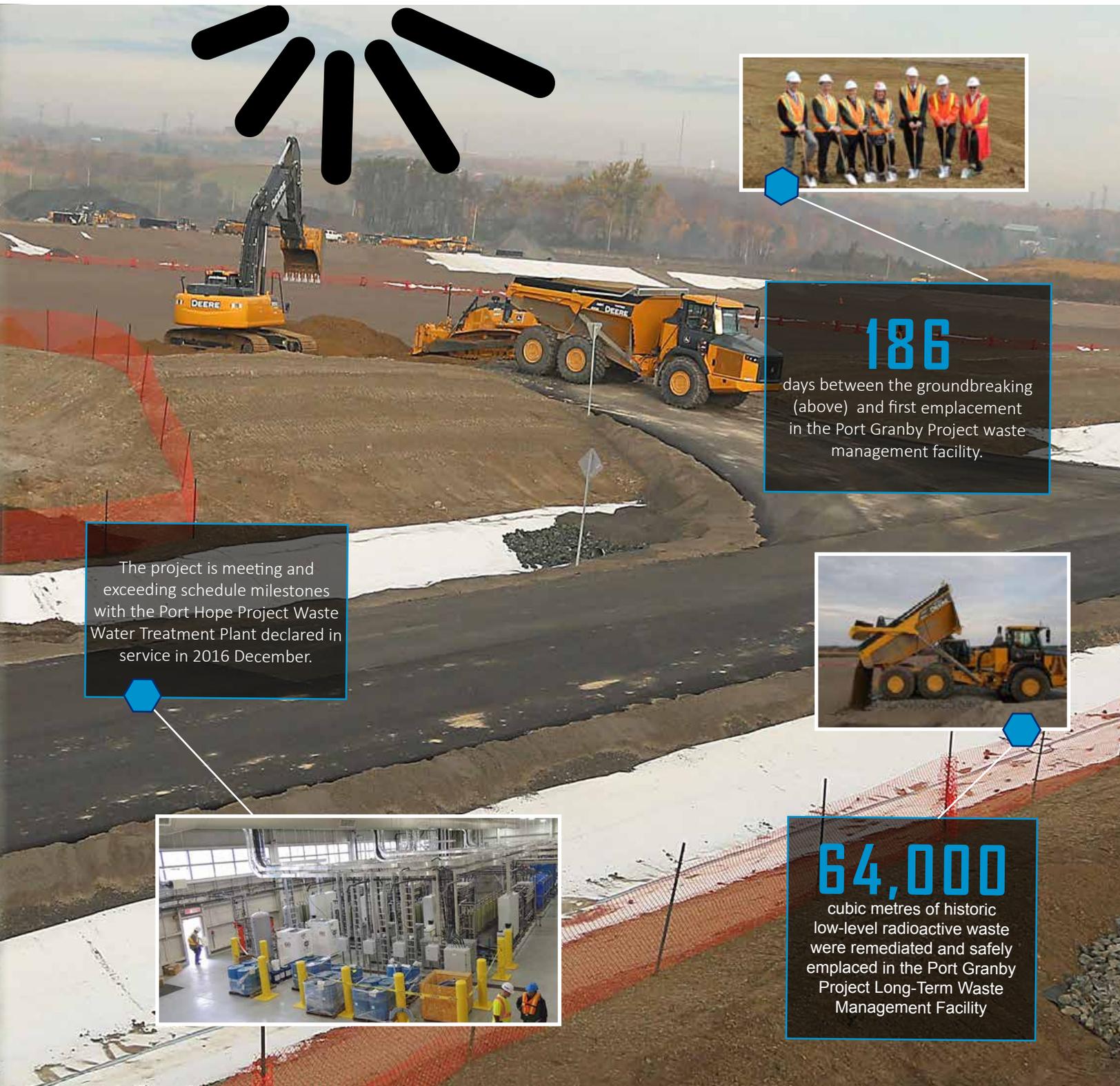
information sessions were held in area communities, to allow residents to discuss this important project.



WHAT A DIFFERENCE A YEAR MAKES!

Advancing one of Canada's largest environmental remediation projects.

This was a year of progress for the PHAI that saw 4,000 (of 4,800) private and public properties involved in some aspect of the Port Hope Project Property Radiological Survey; cleanup of waste began in Port Granby; and, the award of the contract to construct and operate the Port Hope Long-Term Waste Management Facility.



186
days between the groundbreaking
(above) and first emplacement
in the Port Granby Project waste
management facility.

The project is meeting and exceeding schedule milestones with the Port Hope Project Waste Water Treatment Plant declared in service in 2016 December.



64,000
cubic metres of historic
low-level radioactive waste
were remediated and safely
emplaced in the Port Granby
Project Long-Term Waste
Management Facility



MORE THAN 2,000...

Chimney Swifts roost in NPD's iconic red and white ventilation stack. This stack is one of the largest roosts in Canada for the Chimney Swift, a migratory bird species. To mitigate potential harm that decommissioning NPD could cause to the Chimney Swift population, the project considered a number of options. By proactively consulting Chimney Swift experts, the project came to an informed decision which protects the Chimney Swift habitat.

NPD DECOMMISSIONING IS A FIRST-OF-A-KIND PROJECT IN CANADA

And we have a great team in place to make it happen!



NINE FEET OF HEAVY CONCRETE

Decommissioning the Nuclear Power Demonstration (NPD) site requires extensive site characterization, including characterization of the reactor vault. In 2016 March, the project successfully penetrated the reactor vault from the fuelling machine room. This was achieved, with assistance from CNL's Mechanical Equipment Development (MED) branch by coring through nine feet of heavy concrete, avoiding the many obstructions, and continue through the vault liner and the dousing tank. Precision drilling was necessary to avoid an active drain line, vertical rebar, and the vertical section of the dousing tank below.

WHITESHELL



8,600 M²

of the WL R&D Complex (Building 300) was cleared in stages 4 & 7. Of the 7,040 tonnes of waste removed, more than 98.6 per cent was recycled as clean material.



In Whiteshell, CNEA has supported outreach and community programs including helping to host 10 Open Houses in communities local to the WL site; and, arranged for Pinawa Mayor Blair Skinner to attend a series of meetings on new business opportunities. CNEA has also partnered with local municipalities and organizations in helping to put the conditions in place to find new and lasting industry for the region including the establishment and funding of the North Forge Business Incubator.



WR-1

The environmental impact statement to grout the WR-1 reactor in place is more than half way complete. Characterization and ground water work are confirming the approach and helping to build public confidence in the project.

95%

of the radiological hazards in the Building 411 Decontamination Facility have been deactivated. Great progress has been made in safely and cost effectively addressing the nuclear liabilities.

In non-nuclear decommissioning, the team demolished buildings 306, 409, 416, 427, 428, and 505.

100%

of crated wastes in Building 421 have been dismantled and repackaged.

In our Waste Management Areas, the CNSC approved the Standpipes project area expansion; the Bypass Road Project was completed, and the Request For Proposal for the standpipes remediation system was issued.

ZERO

reportable skin contaminations, zero reportable environmental releases, zero grievances and 255 days worked without a lost time injury.

Maintaining our focus on world class HSSE, WL is proud to have achieved ISO 14001 certification this year.

NINE

Nine new Collective Agreements covering over 1700 CNL employees provided an opportunity to build partnership with CNL's union leadership.

330

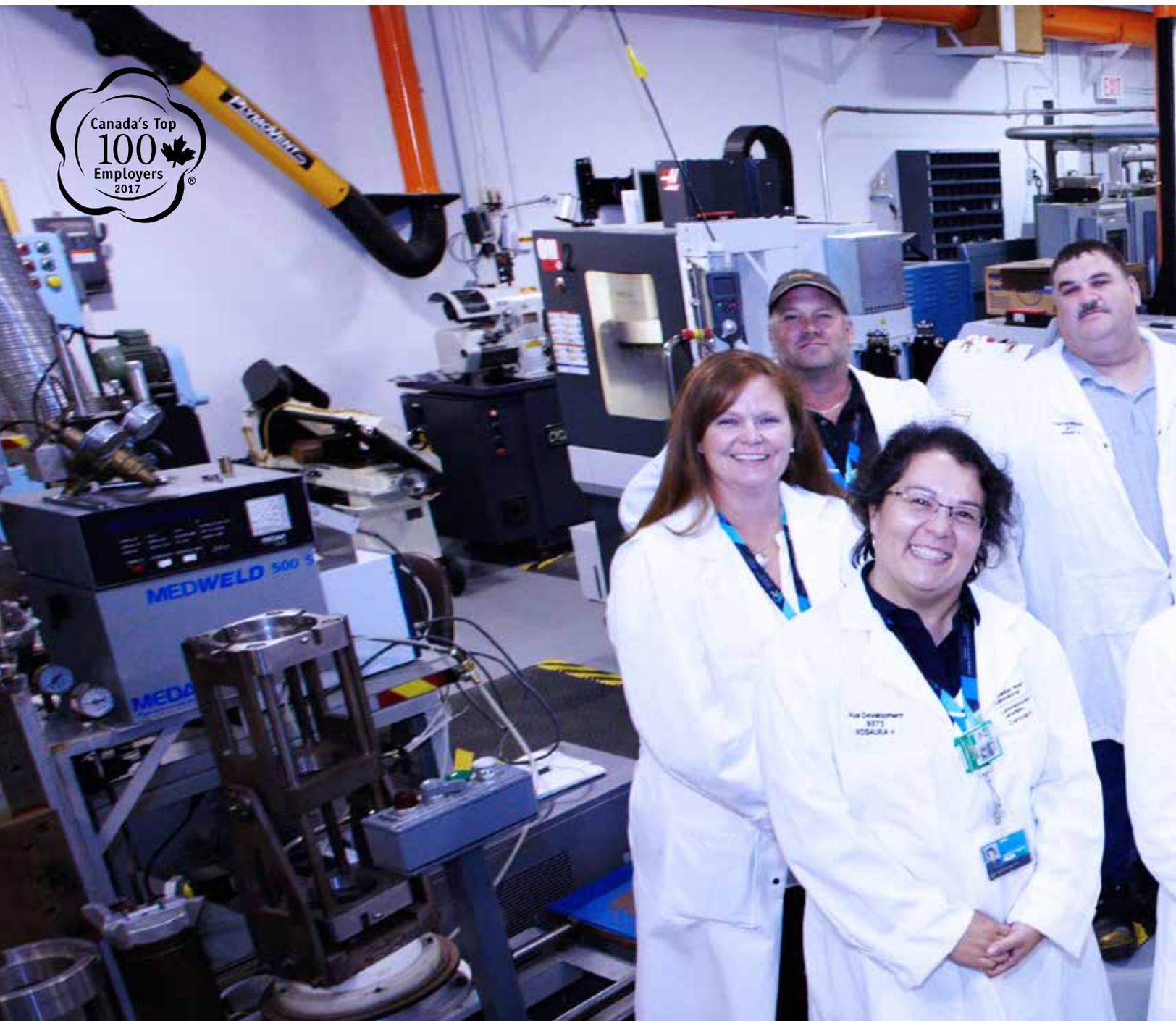
Over 330 new employees now participate in one of two new pension plans.

74%

74 per cent of CNL employees participated in the 2016 Employee Survey run by Hay Group.

500

Almost 500 NRU & Connected employees have a wide range of services now available under the Retain, Retrain, Redeploy initiative, including Career Hub support and the company-wide CNL Skills Inventory..



OUR PEOPLE ARE IMPORTANT

This year saw a real improvement in relationships with our unions, representing over 70% of our employees. We made progress on challenging pension issues; brought new approaches to training and development; and made forward strides in recruitment, employee engagement, and retention of our talented resources.



HUMAN RESOURCES



Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

Science of tomorrow. La science de demain.