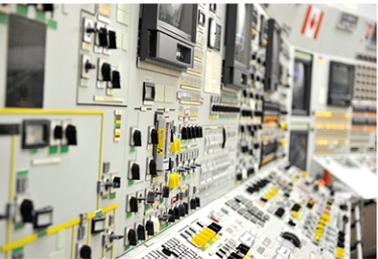


RP Challenges with Unit Refurbishments and Plant Life Extension

ISOE International Symposium

January 11th, 2017

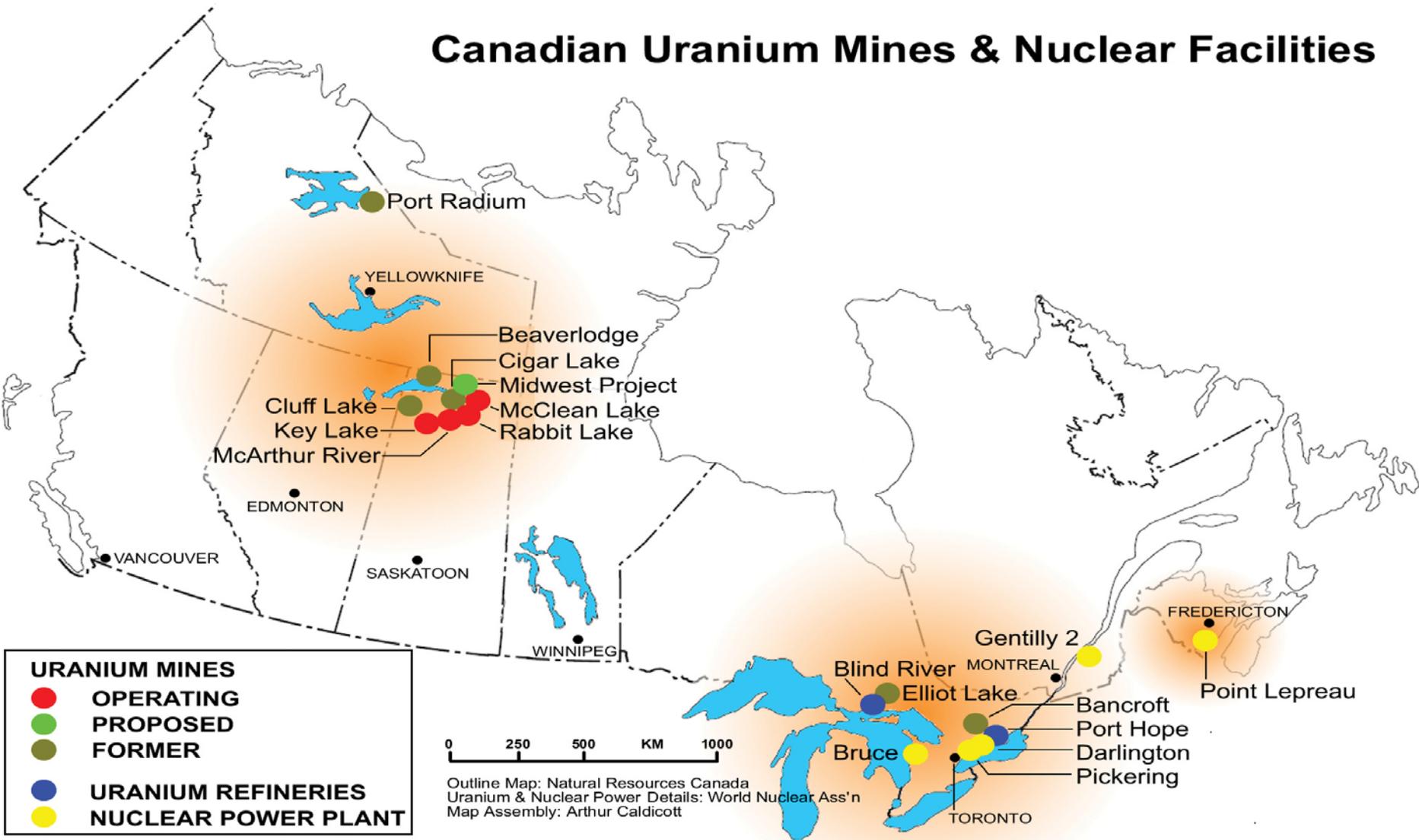


Colin Pritchard – Corporate RPM

Bruce Power™

Innovation at work

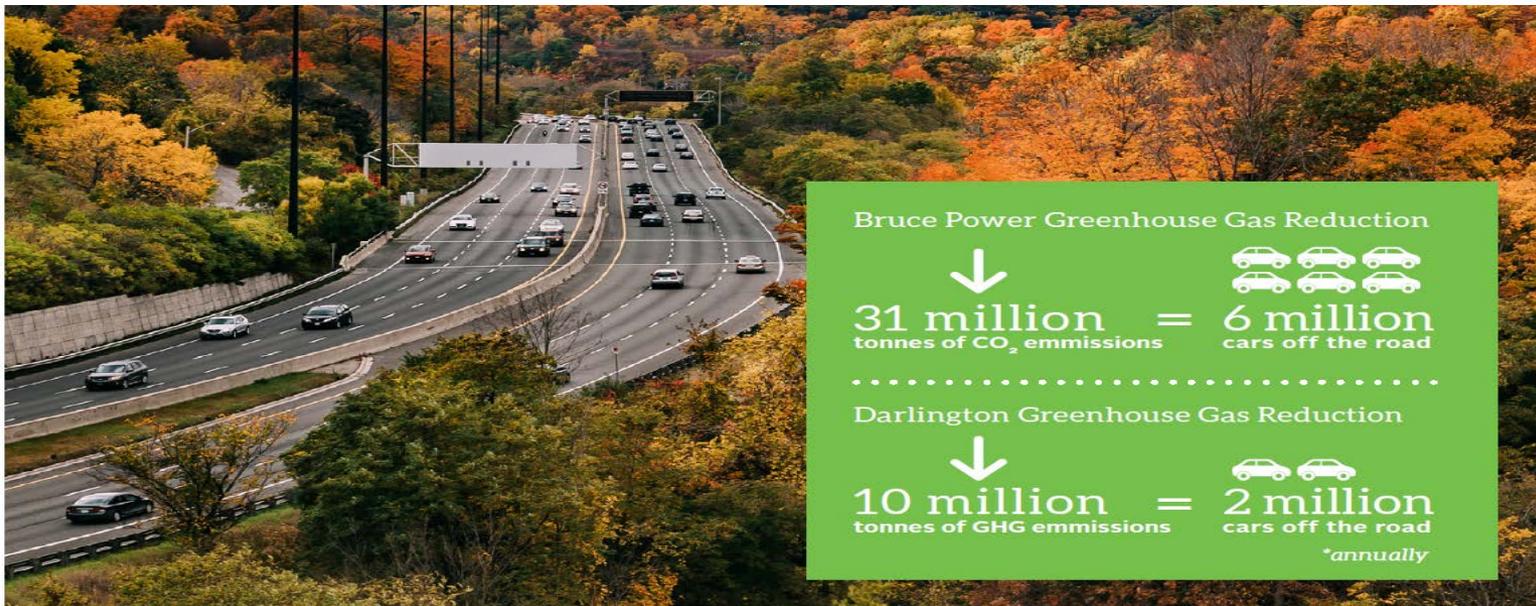
Canadian Uranium Mines & Nuclear Facilities





Meeting Ontario's Long-Term Base Load and Climate Change Goals

- In December 2013, the Ministry of Energy released its Long-Term Energy Plan (LTEP), which indicated that refurbished nuclear is the most cost-effective option available to meet Ontario's baseload requirements, while producing no greenhouse gas emissions.



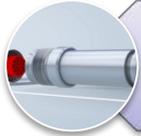
What is MCR?

First of a kind?



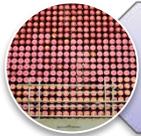
Facilities & Infrastructure

No



Pressure tube replacement

No



Calandria tube replacement

No



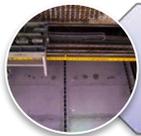
Feeder tube replacement

No



Steam generator replacement

No



Bulkheads/infrastructure

No

Major Component Replacement



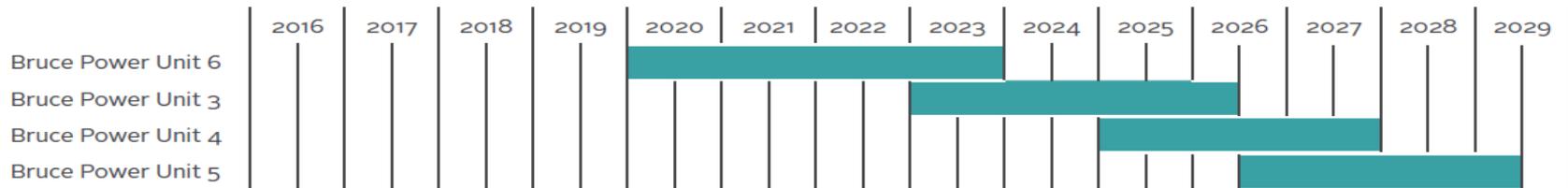
Refurbishment Schedule

Ontario's LTEP outlines the continued role for nuclear in the province with the refurbishment of the units at the Bruce and Darlington sites.

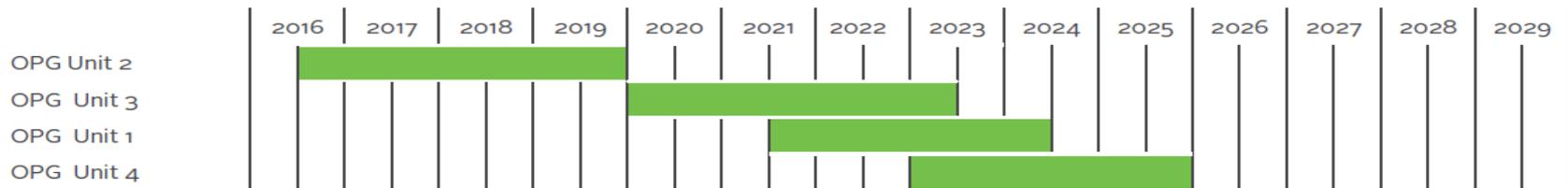
The successful refurbishment of Ontario's nuclear fleet will require investment in Units 3 to 8 at Bruce Power and Units 1 to 4 at Darlington between 2016 and 2033.

Overlap of Bruce Power and Darlington Refurbishment Schedules

BRUCE POWER REFURBISHMENT SCHEDULE



DARLINGTON REFURBISHMENT SCHEDULE



Cooperation or Competition

The LTEP states, “The government will encourage the province’s two nuclear operators, Bruce Power and OPG, to find ways of finding ratepayer savings through leveraging economies of scale in the areas of refurbishment and operations. This could include arrangements with suppliers, procurement of materials, shared training, lessons learned, labour arrangements and asset management strategies.” This cannot be accomplished without collaboration.

Keys Supplier Arrangements

- Tooling agreement with ATS Automation Tooling Systems Inc. for the supply of automated tooling systems and related services .
- Agreement with Laker Energy Products to start the process to secure key long-lead reactor components including end fittings, liners and feeder pipes.
- BWXT to commence process for steam generator design and manufacturing for nuclear life extensions on the Bruce site.

RP Strategy Considerations

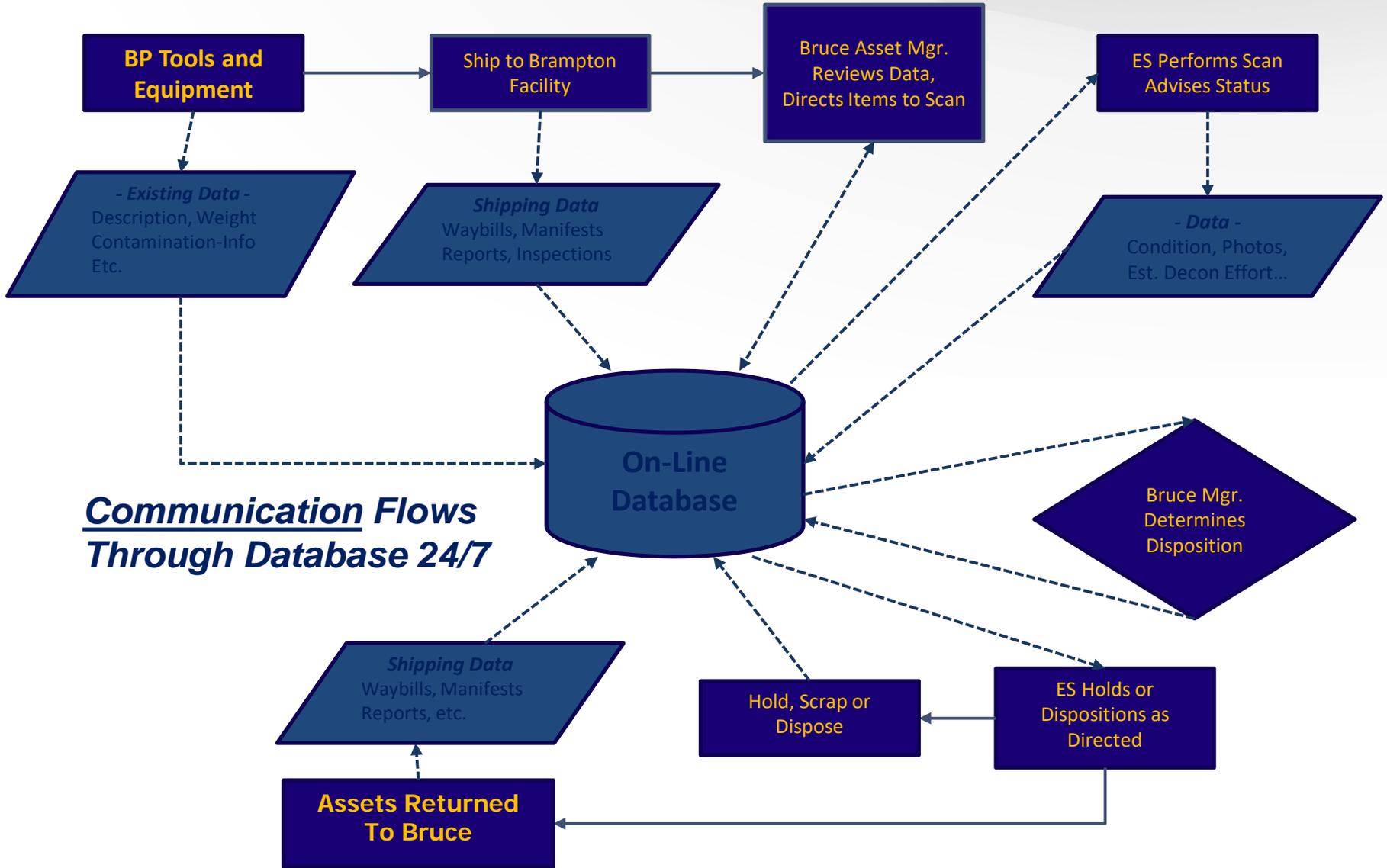
Support needs to be provided to further define and develop the RP plans and strategies including schedule integration:

- Project RP Plan
 - Resource Strategy
 - Project ALARA Plan
 - Sub plans and contingencies: significantly different source term from 1&2 but similar to Pt Lepreau but the tools are different
 - Tooling Design inputs, integrated shielding
- Dosimetry Services
- Instrumentation
- PPE Supply and Laundry Services
- Rad Shipping and Transport packages
- Tritium Mitigation Plan
- Vault Decontamination Plan

More RP Strategy Considerations

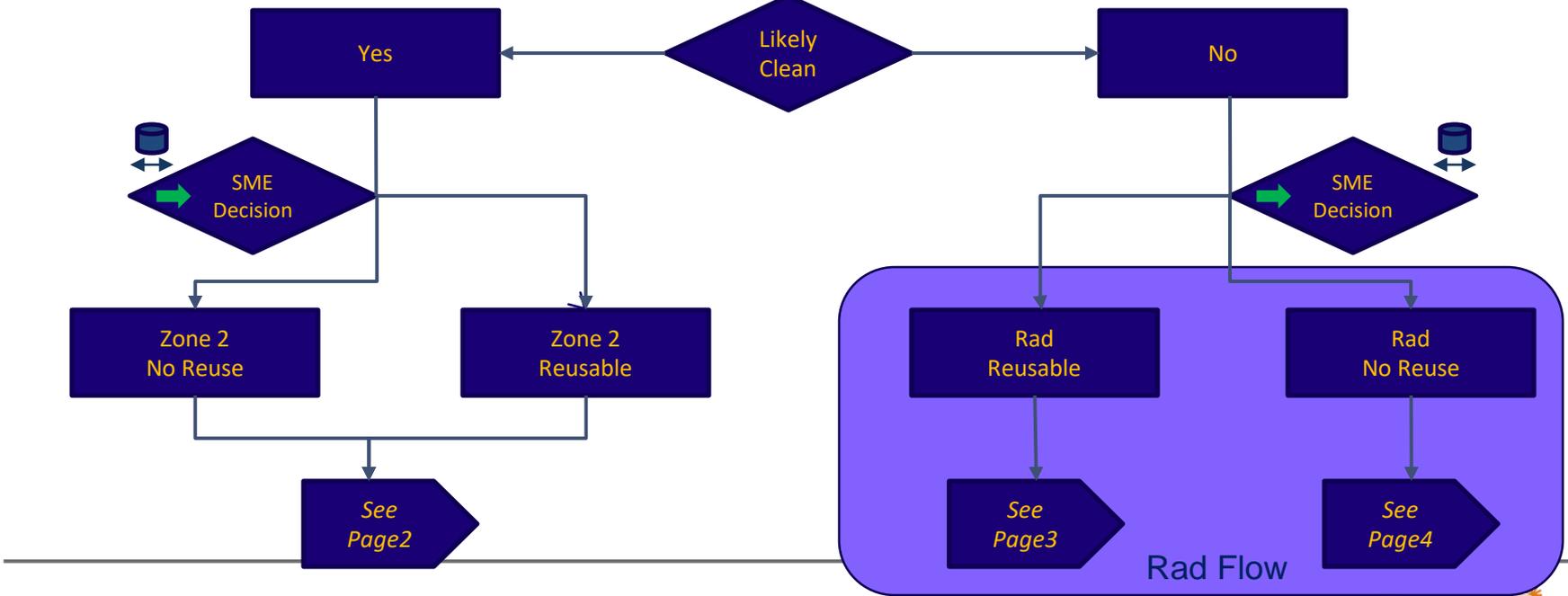
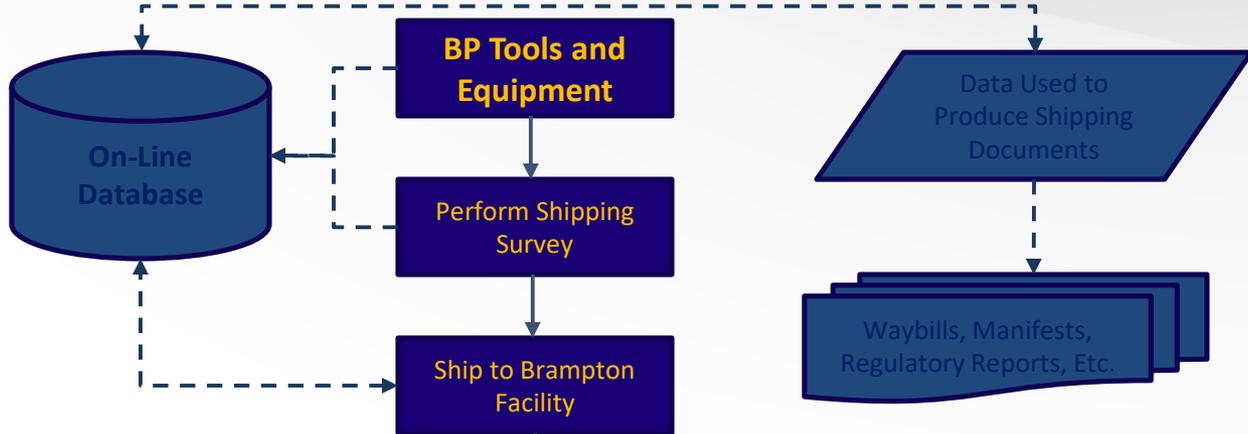
- RAB Rezoning Plan
- Source Term Monitoring and Mitigation Plan
 - PHT Chemical Decon, ALPHA program
- Material Control, Decontamination and Demobilization Plan
- Contamination Control Plan
- Contractor RP Training Plan
- Teledosimetry Plan
 - hardware, software, Training and contingencies
- Audio and Video Communications Plan
- Infrastructure requirements
 - Overlapping units, Overlapping stations
- New technologies integration
 - Radiography Plan or PAUT?
- Waste Minimization Plan and Support
- Oversight/QA/Audit/Self Assessment Plan

Simplified Project Plan



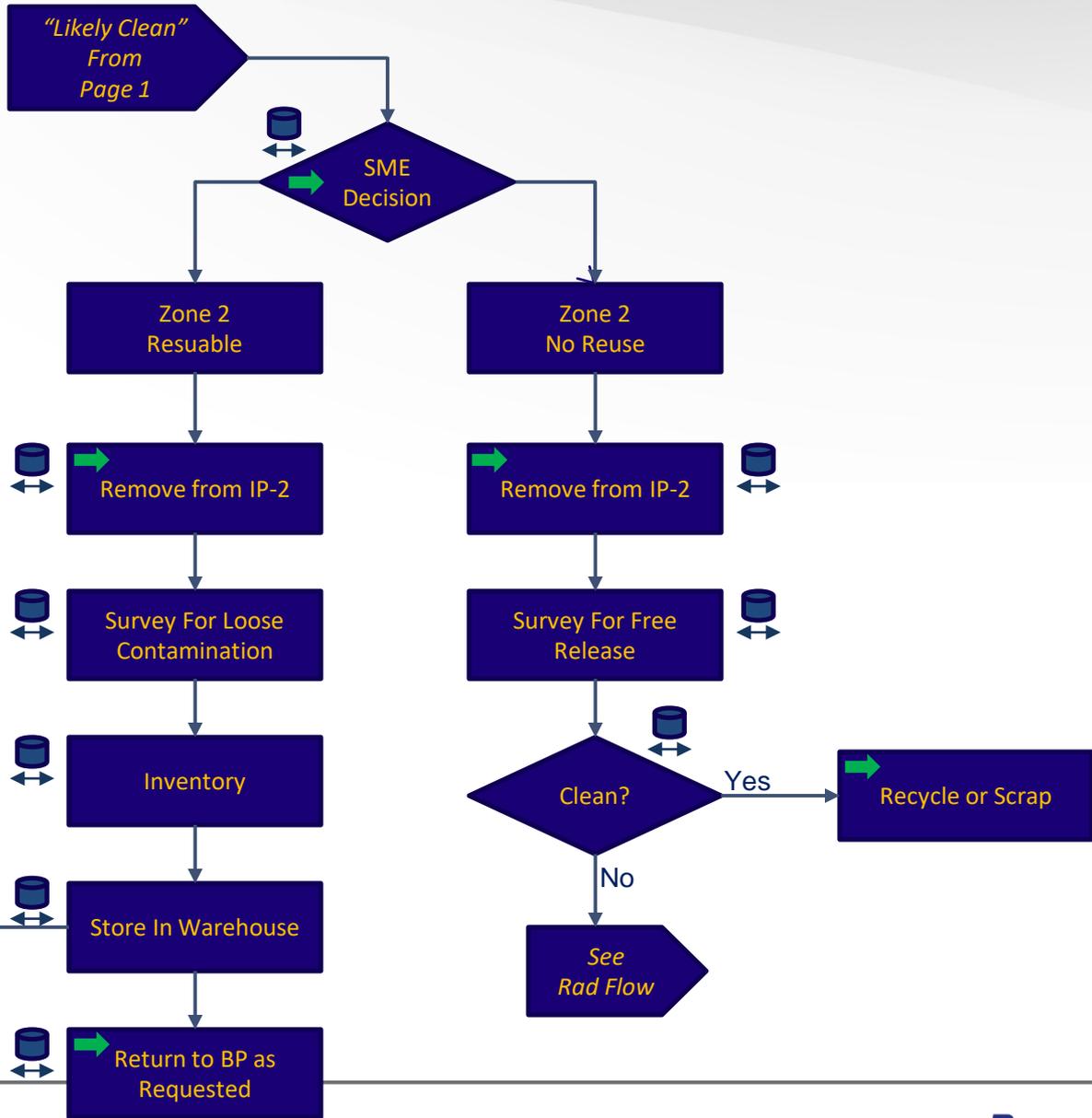
Project Goal: Reduce OPG Waste, Maximize Assets Returned to Service

Contaminated Material Flow - Detail

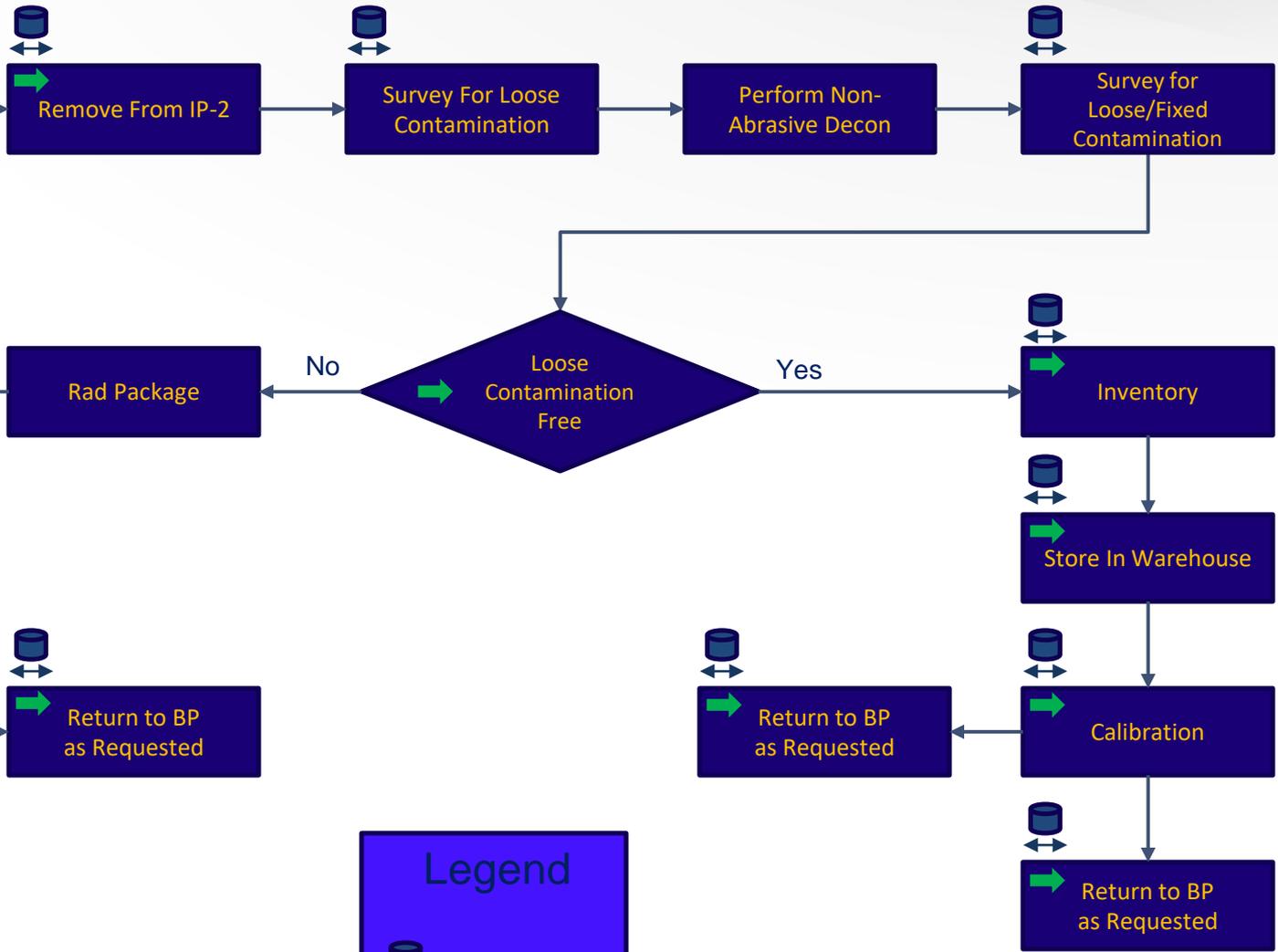


Legend

-  Data I/O
-  Action Initiated By Bruce

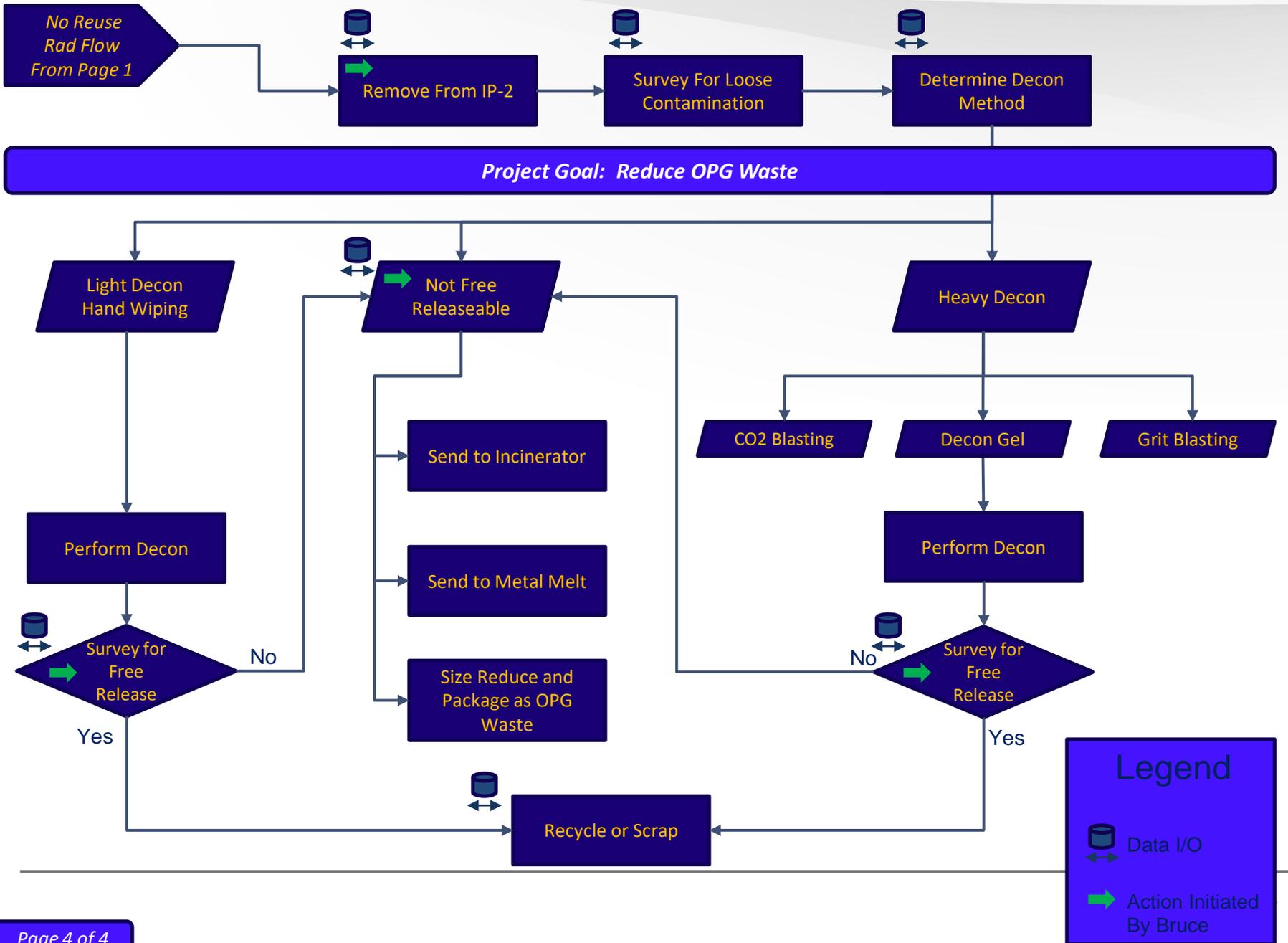


Reusable
Rad Flow
From Page 1



Legend

- Data I/O
- Action Initiated By Bruce



Key RP Supplier Arrangements

- TBD
- Potential for significant partnerships with existing and new suppliers for RP Tools, technologies and services over the next 24+ months
- Not your typical arrangements.....multi-billion/multi-year project
- Allows for amortization of innovative initiatives over decades



Questions?