

nwmo

NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES



NWMO Transportation Technical Work Program

Huron-Kinloss Nuclear Waste Community Advisory Committee

Chris Hatton, Director, Repository Design and Development

May, 2016

Interim Storage

- Used nuclear fuel is currently safely managed in facilities licensed for interim storage at nuclear reactor sites



Gentilly (Québec)



Point Lepreau (New Brunswick)



Used Fuel Dry Storage at OPG
Western Waste Management Facility
(Ontario)

Used Nuclear Fuel Transportation

- Highly regulated with an excellent safety record
- Robust package designs based on international standards & testing
- Road and rail are currently being studied as possible modes
- APM repository operations assumed to start in 2035
- Transportation timeframe approximately 38 years
 - Average of 2 trucks per day; or
 - Average of 5 rail shipments per month



Safety Framework

- Transportation of used nuclear fuel is jointly regulated by the Canadian Nuclear Safety Commission and Transport Canada

Transport Canada

- Transportation of Dangerous Goods Regulations (TDG)
- Sets transport requirements for all 9 classes of dangerous goods

Canadian Nuclear Safety Commission

- Covers Class 7 Radioactive Materials
- Sets transport packaging requirements
- Packaging and Transport of Nuclear Substances Regulations (PTNSR)
- Based on IAEA Standards

- IAEA standards are based on years of research

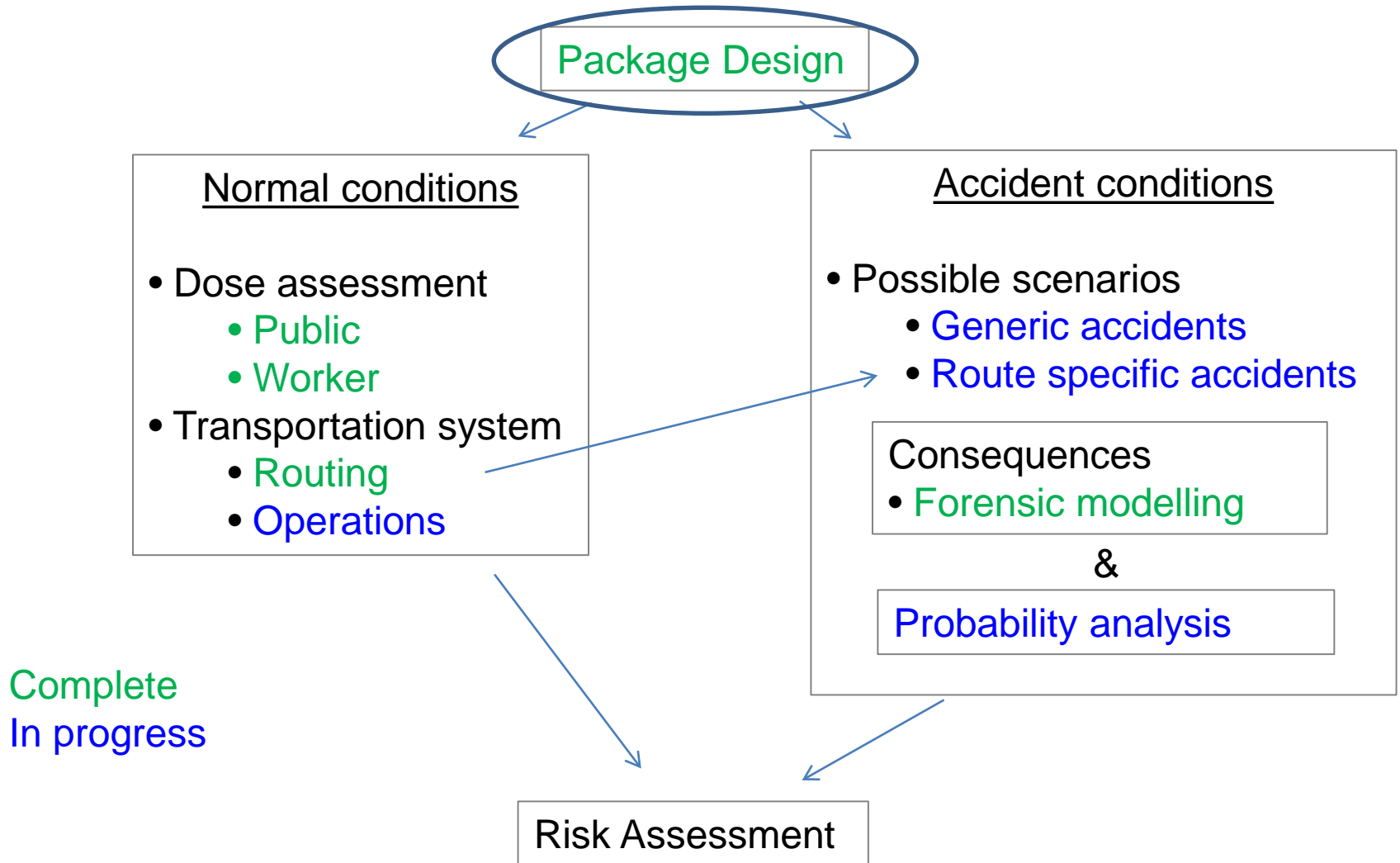
and safe international experience:

- Drop onto unyielding surface
- Drop onto solid pin
- 800° C all-engulfing fire
- Underwater submersion

- Safety is insured by the robust transportation package

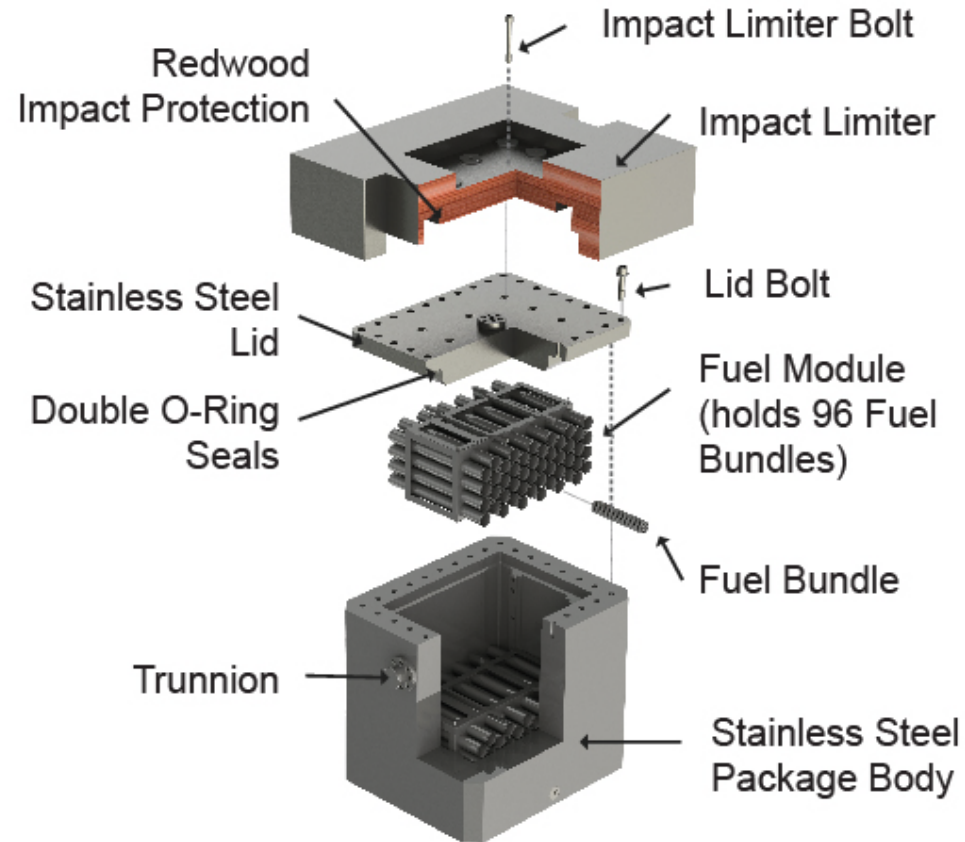


Transportation Work Program Roadmap



Used Fuel Transport Package

- **Meets proven Canadian regulations and International standards for design & safety (CNSC and IAEA)**
- **Safety is built into the package** - Certified by CNSC in 2013 as meeting all safety regulations
- **Package can withstand severe accident conditions** without releasing its radioactive contents



- **Unloaded Package Weight: ~ 30 tonnes**
- **Loaded Package Weight: ~ 35 tonnes**

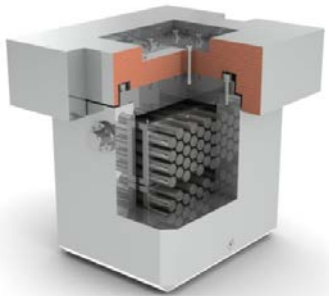
APM Transportation Video: Excerpt



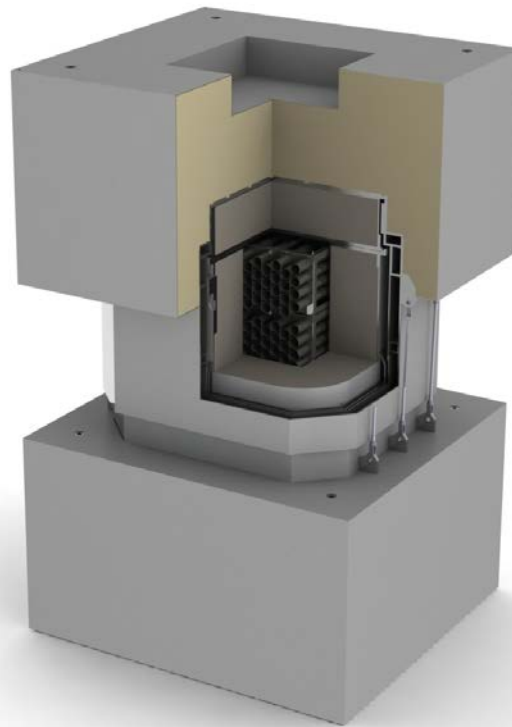
Transportation Packages

Used Fuel Transportation Package (UFTP) 35 tonnes

Licensed to transport
OPG style modules



Dry Storage Container Transportation Package (DSC-TP) 100 tonnes



Basket Transportation Package (BTP) 30 tonnes

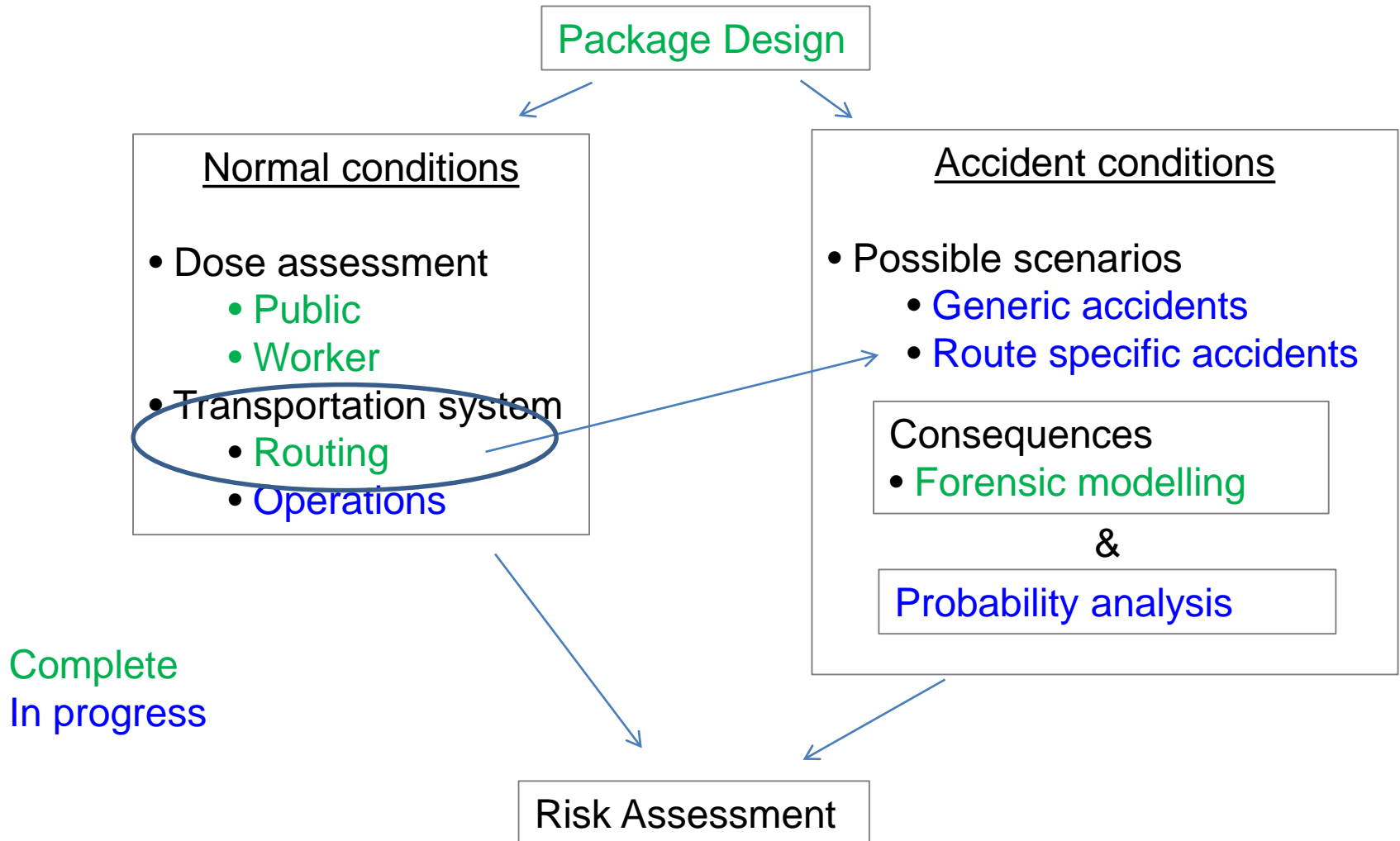
Under development for
AECL style baskets

Used at:

- Gentilly
- Pt. Lepreau
- Chalk River
- Whiteshell



Transportation Work Program Roadmap



Transportation Assessments

“Can a transportation route be identified or developed for the safe and secure transportation of used nuclear fuel to the site from the locations at which it is stored?”

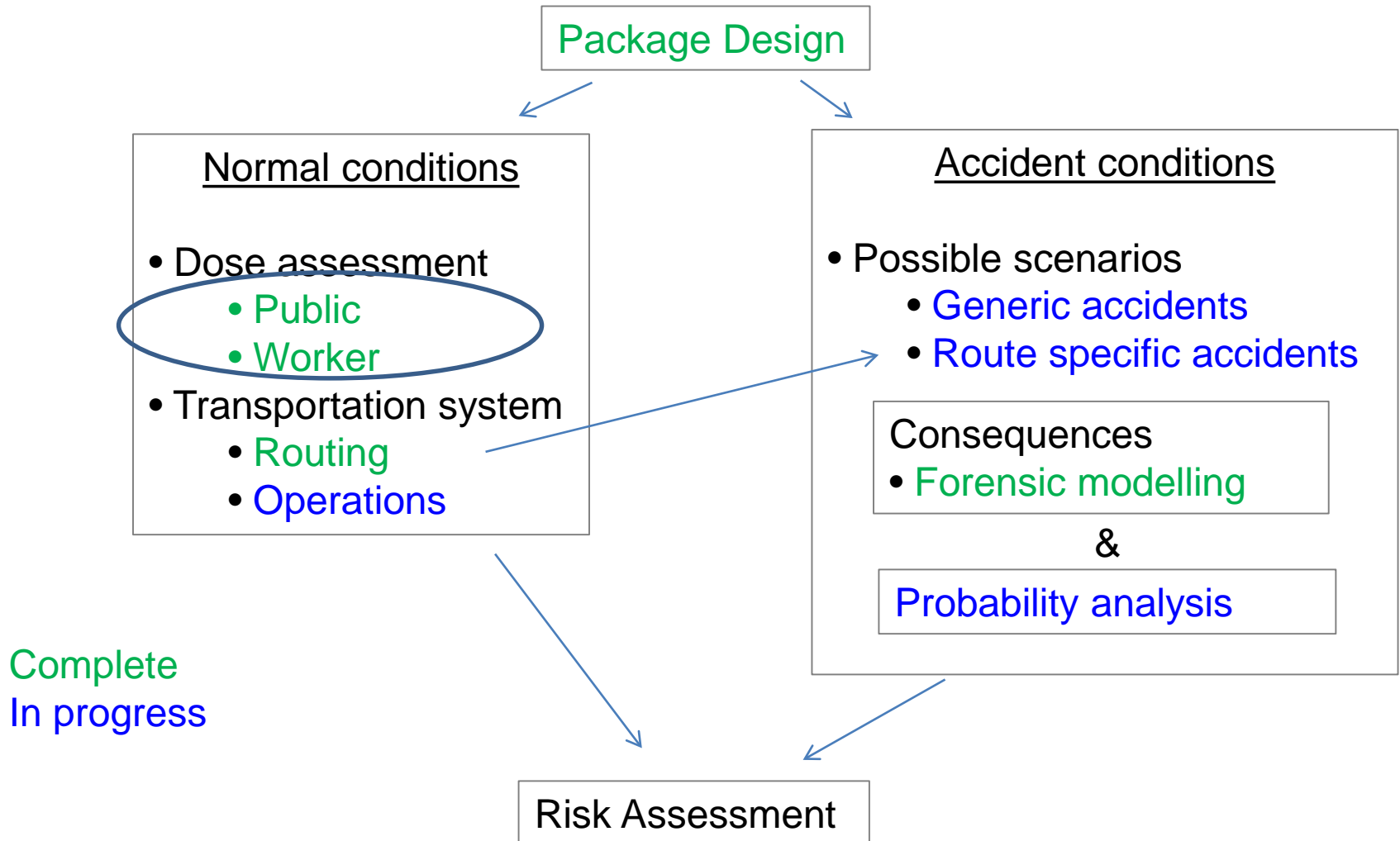
Step 3 Phase 1 Transportation Assessment Approach

- Transportation assessments contain two major components:
 - 1) A description of the regulatory oversight, including how the requirements are being met
 - 2) A desktop analysis of transportation logistics assuming available transport infrastructure

Step 3 Phase 1 Transportation Assessment Findings

- Assessments did not identify a preferred mode or route, or commit to specific operational details related to a future transportation system
- Such activities will be addressed in future dialogue with federal, provincial, and local authorities, and communities along the potential transportation routes as a large group with a shared interest
- Step 3 Phase 1 Preliminary Assessments found that the repository would be accessible by truck and railroad using existing roadways and railways.
 - It is assumed the necessary connecting road, railway, and intermodal infrastructure would be constructed, thereby providing access from existing transportation infrastructure to the repository.
 - Improvements, if required, to the transportation and intermodal infrastructure would be reviewed in detail in Phase 2 studies, should the community continue in the site selection process.

Transportation Work Program Roadmap

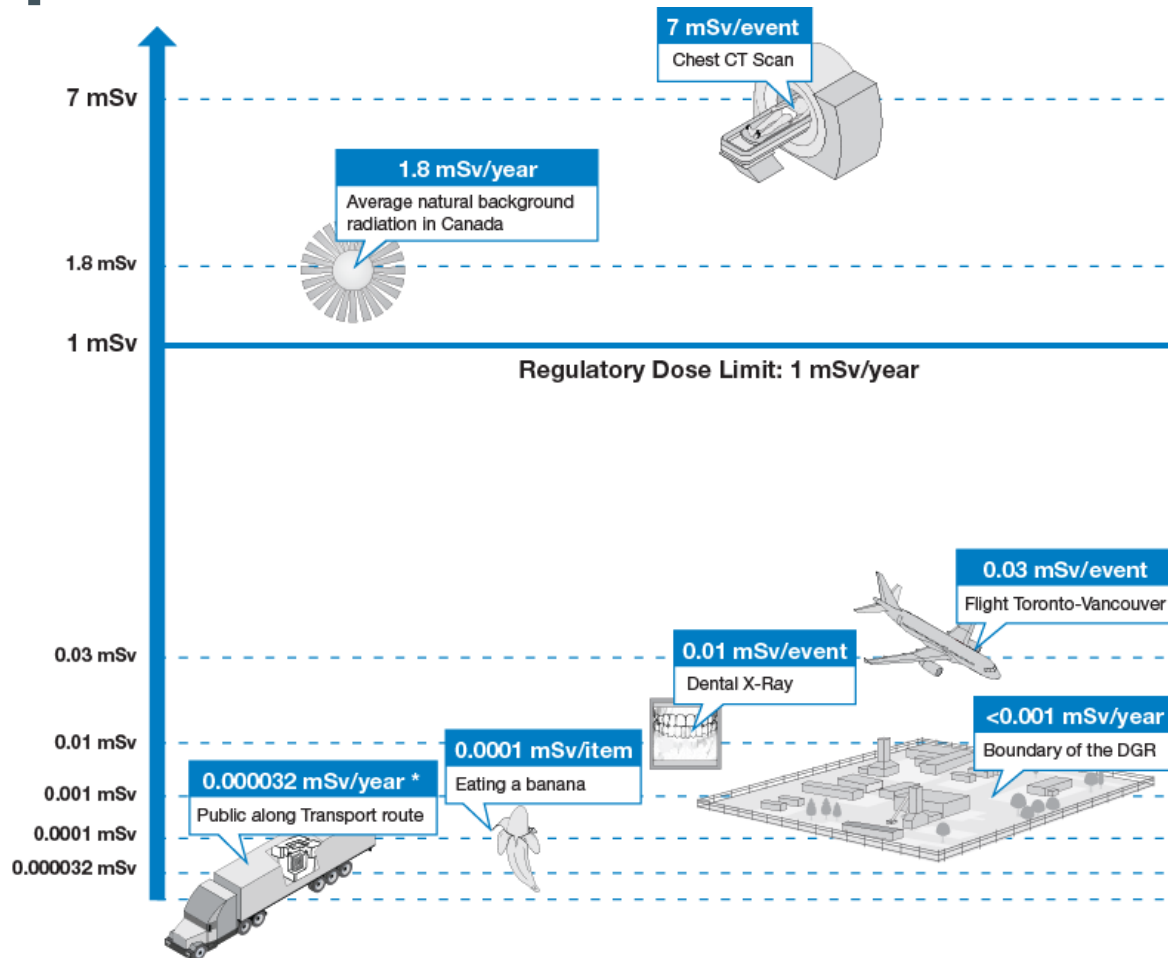


Generic Transportation Dose Assessment

- The NWMO prepared a generic radiological dose study that looked at:
 - residents along the transport route
 - persons sharing the transport route
 - persons sharing rest stops
 - Worker dose

The study concludes that dose to workers and the public during various transport scenarios was significantly below the CNSC regulatory limit of 1 mSv / year

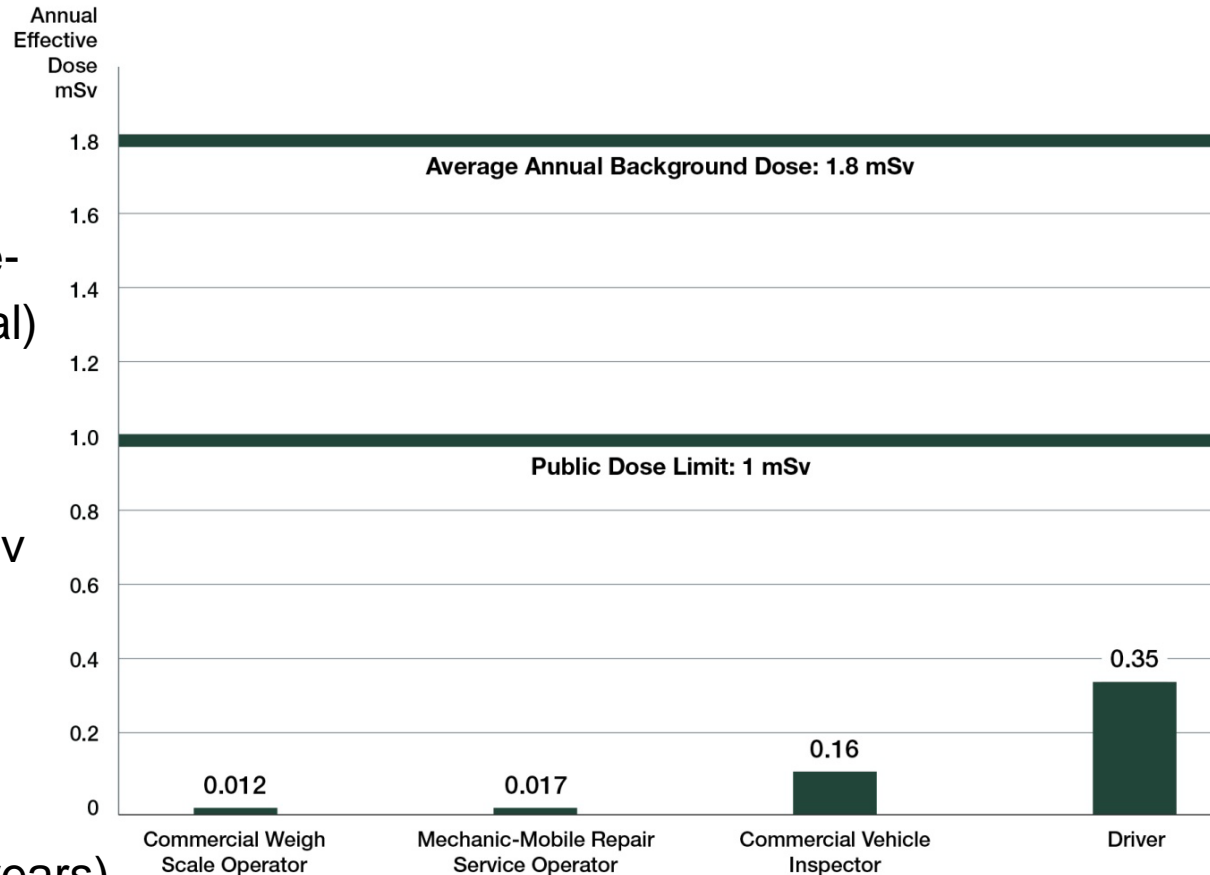
Comparisons



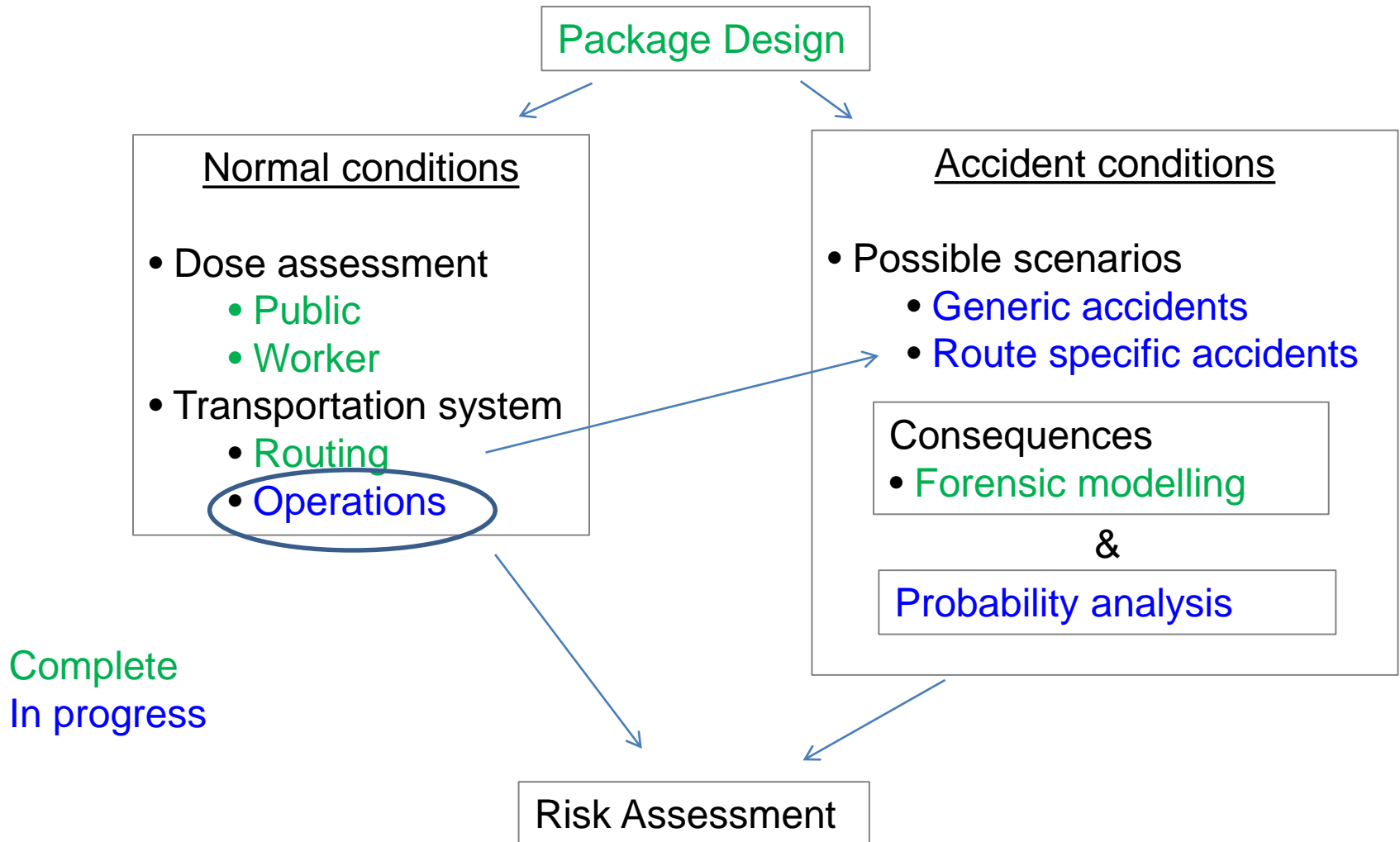
*The calculated dose to a member of the public along the route is 0.000032 mSv per year for a person located at 30 m from the route experiencing all 620 truck shipments or all 62 rail shipments. For more information on NWMO's Generic Transportation Dose Assessment please visit: http://www.nwmo.ca/uploads_managed/MediaFiles/2018_nwmotr-2012-06generictransportationdoseassessmentr0a.pdf

Comparison of Worker Doses

- Worker dose exposure scenarios examined in Canadian context
- Dose to workers from gate-to-gate (departure to arrival) examined
- Occupational doses range between 0.012 to 0.35 mSv per year; therefore below the public limit (i.e., non-NEW) (Nuclear Energy Worker dose limit: 50 mSv/year, 100 mSv/5 years)



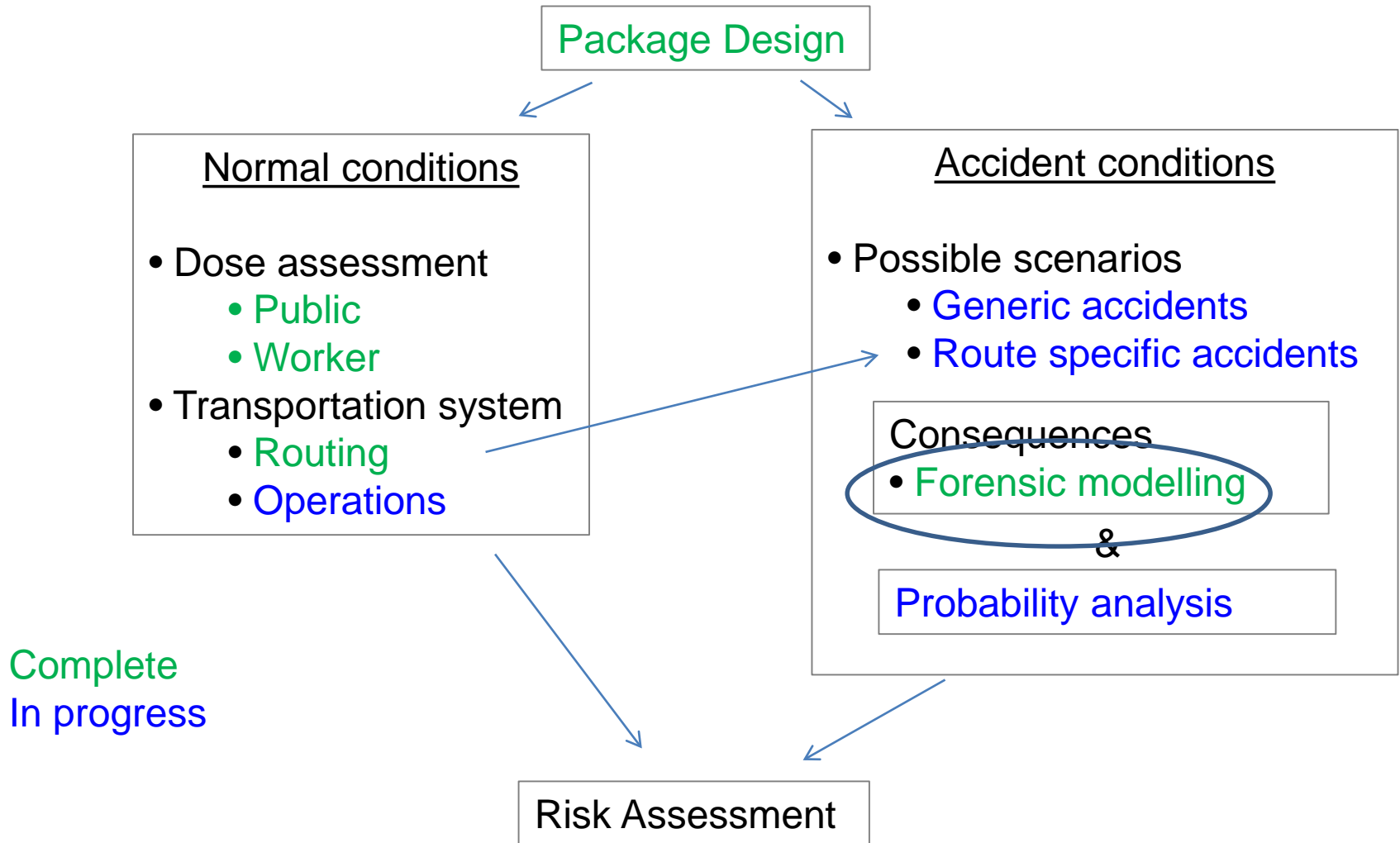
Transportation Work Program Roadmap



Operations

- Complete operational concepts plan for road and rail transportation from all seven points of origin to each of the Phase 2 siting communities
- Complete report on relative technical merits for road and rail transportation from all seven points of origin to each of the Phase 2 siting communities

Transportation Work Program Roadmap



Possible Scenarios and Forensic Modelling

- Develop and test computer simulations of transportation packages under extreme impact and fire accident conditions

Fire Simulation Modelling

