PMD 13-P1.74A

File / dossier : 8.01.07
Date: 2013-08-12
Edocs: 4184177

Supplementary Information
Oral Intervention

Presentation from
Glenn R. Sutton

In the Matter of

Ontario Power Generation Inc.

Proposed Environmental Impact Statement for OPG's Deep Geological Repository (DGR) Project for Low and Intermediate Level Waste

Joint Review Panel

September 16 to October 12, 2013

Renseignements supplémentaires
Intervention orale

Présentation par
Glenn R. Sutton

À l'égard de

Ontario Power Generation Inc.

Étude proposée pour l'énoncé des incidences environnementales pour l'Installation de stockage de déchets radioactifs à faible et moyenne activité dans des couches géologiques profondes

Commission d'examen conjoint

16 septembre au 12 octobre 2013

Canada

L. L. W. & I. L. W Waste Management Study Investigation

Municipality of Kincardine / Ontario Power Generation
Zwilag Facility Switzerland
Nagra Program Switzerland
Centre de l'Aube Facility France
S.F.R Facility Sweden

October 26 to November 2/2002

Project Goals

- To review best practices in Low & Intermediate waste management practices.
- To discuss governmental approval processes & talk with local officials
- To ascertain public consultation methodologies

Zwilag facility Switzerland (AM)

Zwilag facility Switzerland

- State of the art low, medium & high level interim facility designed for a 25 year period , with a ten year renewal period.(medical & industrial waste also processed).
- Owned & operated by the four Swiss nuclear plants (3000 mega watts similar to Bruce - B-).
- Local mayor sits on the board of directors.
- Facility approved by plebiscite process and any future changes must be done in accordance with a plebiscite.
- Facility includes material sorting, conditioning & incineration for L.L.W. dry storage containers for high level fuel .
- 29 employees work at the Zwilag facility.
- Facility is an above ground modern industrial building located in a rural area.
- Zwilag is in an area that is familiar with Nuclear issues.
- Nuclear Laboratories adjacent to facility with 1200 employees.
- $500 million Swiss francs to develop.
- Public referendum for approval (participation by Green party as well as local citizens).
- Annual testing of Water, Air & Food for radiological levels. Note in all discussions safety was paramount to all issues.

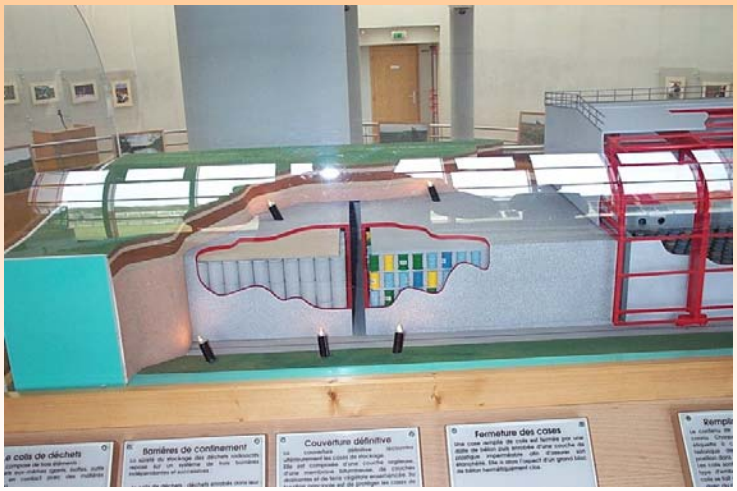
Switzerland L,L,W Final disposal facility (PM)

- NAGRA (utility owned consortium for studying & selecting the long term facility for low & medium nuclear waste)
- Proposed sites based upon the geological suitability (Wellenberg was selected site)
- Waste to originate from operating ,medical and decommissioned plants.
- Retrievability of waste is possible in principle , however not financially viable.
- Safety & Geological reports sent to public.
- 10 % of electorate toured model facility.
- Area plebiscite defeated proposal , 70 % voter turnout (Green party funded opposition & conducted an anti nuclear campaign)
- Core area approval high , but concerns from outlying area.

Centre de l`Aube France

- Second generation long term low & short term intermediate nuclear waste facility.
- 70 % of Hydro in France is nuclear generated .
- 58 nuclear reactors in France generate 70,000 mega watts of power.
- Three barrier facility , containers in concrete containers in vault packed in concrete , with a water proof liner , with final cover of clay burm.
- Facility designed for 300 years to match the radioactive decay life of L,L,W.
- Approval to store 1,000,000m3 of L,L,W.
- Supercompactor on site to process L,L,W drums and some waste conditioning on site.
- The site accepts 12,000 cubic meters per year, with a 50 year design life.
- Again this facility is an above ground concept located in rural France.
- All nuclear waste material is in a national data base and bar codes are used when material is received at the facility.

Three local Mayors, note limited initial contact by the French nuclear agency when facility commissioned , however a high level of support (90 %) exists today due to the good safety record & economic benefits generated by the facility.
Note prior to the facility being constructed a poll indicated that 85 % of the population did not support the concept.
All Mayors noted that the lack of support was due to lack of information about the nuclear industry and the fear of losing farmland.


Barrières de confinement
Couverture définitive
Fermeture des cases

SKB Facility Sweden

- Underground L,L,W & I,L,W long term facility.
- SKB is owned 51 % by the Swedish power authority & 49 % by other generators.
- Sweden's Nuclear program has 11 N,P units with output similar to Canada.
- Facility is mined 50 meters under the Baltic with limited ground water infiltration.
- Material transportation is by sea and unloaded by special lift vehicle and driven into the mined facility
- The facility capacity is 60,000 cubic meters (20,000 used to date) & the site receives 500 cubic meters per year .
- Site development cost is 100 million dollars .(note rural setting for the waste facility & reactors)
- All Nuclear waste in Sweden is in a regulated data base and is checked by bar code & rad level at site when received.
- All material is compacted & solidified at the generation stations prior to transport to SKB.

Facility underground is designed for future expansion (Current 4.5 kilom of tunnels, capacity designed until 2020 then 50 year expansion available).
20,000 people tour the facility annually.
A separate engineered landfill site for Very Low Level waste is also on the adjacent site
A referendum was not done for the L,L,W site .
Local level of government has a special community study committee that meets on a regular basis and looks at safety and best practices issues.
The County level of government has 71 councillors coupled with 49 councillors at the community level.
In Sweden a referendum is advice , not binding act

General Trends

- Technology generally includes incineration , compaction ,concrete liners & water collection systems.
- L,L,W & I,L,W can be contained in the same facility .
- In all areas safety was paramount resulting in excellent safety records in all facilities
- Community consultation has resulted in a more informed public.
- All facilities are good examples for their respective circumstances , however the proposed Western Waste Management Facility may have different combinations of all sites visited.
- In essence these three Countries are more mature in Nuclear waste management and are addressing the solutions for long term care.

Forward Community Plan

- Safety and Geological studies to be completed by April 2003.
- Socio -Economic plan to be started in early 2003.
- Community discussions & consultations in 2003 .

CHEM-NUCLEAR SYSTEMS, LLC

LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT FACILITY

BARNWELL, SOUTH CAROLINA

Chem-Nuclear Facts

- **Chem-Nuclear Systems, LLC is a wholly-owned subsidiary of Duratek, Inc., a world-wide leader in radioactive waste management services.**
- **The Barnwell County Council and the South Carolina State Development Board were instrumental in recruiting Chem-Nuclear to Barnwell.**
- **Chem-Nuclear's Barnwell LLRW Management Facility has operated continuously with no regulatory shutdowns since operations began in 1971.**
- **The site is 235 acres deeded to the State of South Carolina and leased to Chem-Nuclear for disposal operations as required by state and federal law.**

Chem-Nuclear Facts (cont'd)

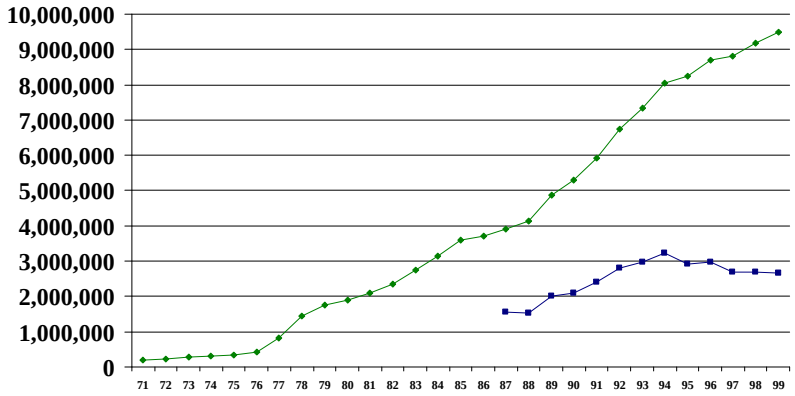
- **Chem-Nuclear generates over $600,000 per year in Barnwell County taxes through vehicle taxes, real property taxes, and business license taxes.**
- **Chem-Nuclear enjoys strong community support largely due to an open door policy and exceptional safety record.**
- **Two-thirds of the radioactivity disposed of at the Barnwell Low-Level Radioactive Waste Facility has already decayed.**
- **Chem-Nuclear donated a rare wetlands area, Craig Pond, to the South Carolina Heritage Trust to be preserved in its pristine state.**

Aerial of Trenches at Barnwell Site

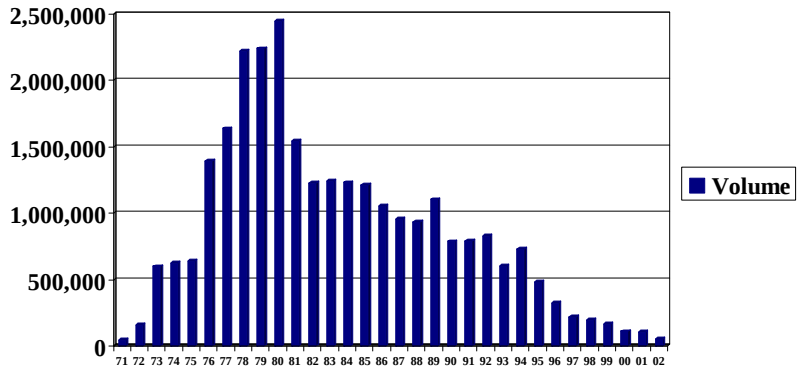
Atlantic Compact Legislation

- **Chem-Nuclear disposal operations under Budget & Control Board rate control with 29% margin on allowable cost**
- **$12 million available for Barnwell County economic development when SC joined the compact**
- **Barnwell County receives $2 million/year from disposal operations**
- **SC generators get 33% rebate**
- **SC disposal revenue goes to Children's Education Endowment Fund (30% scholarships; 70% infrastructure)**

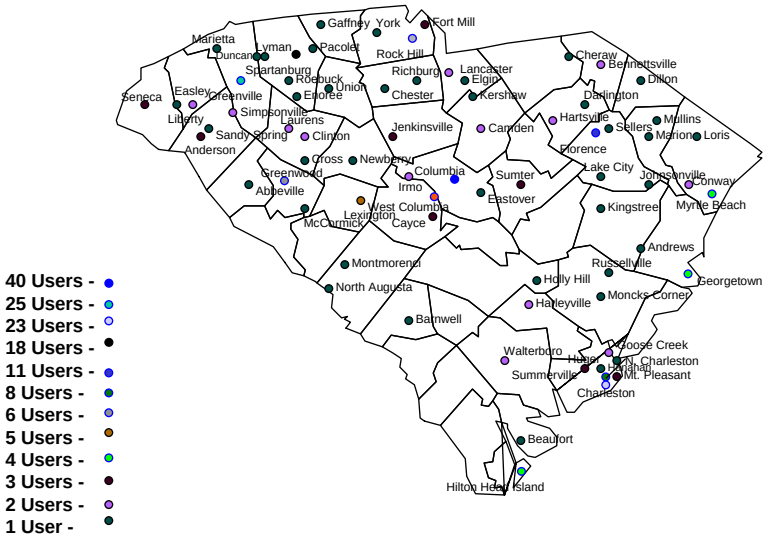
Barnwell Radioactivity



Barnwell Disposal Volumes



Radioactive Material Users in South Carolina



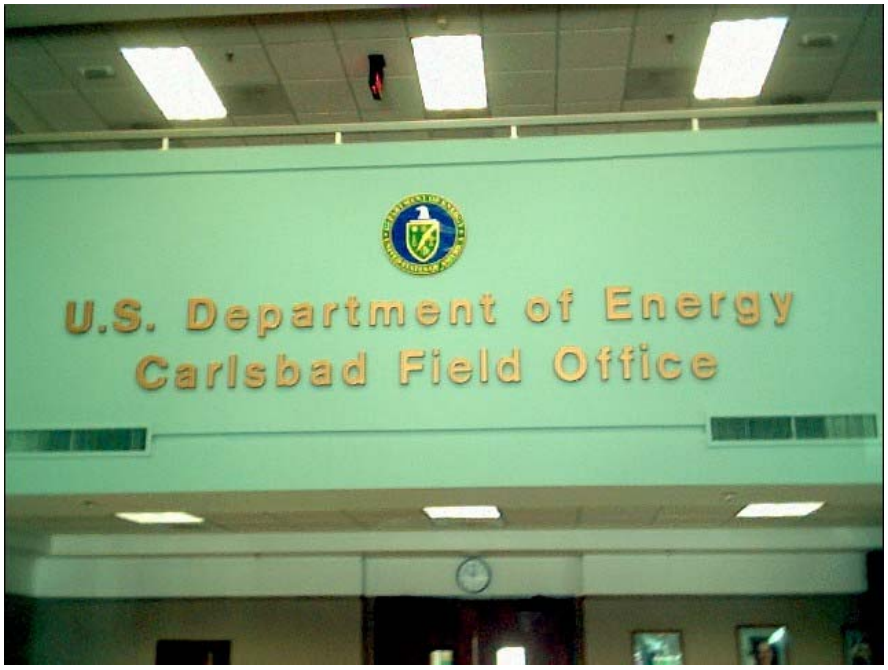
Some of the Thousands of Uses and Benefits of Radioactive Material in our Everyday Lives

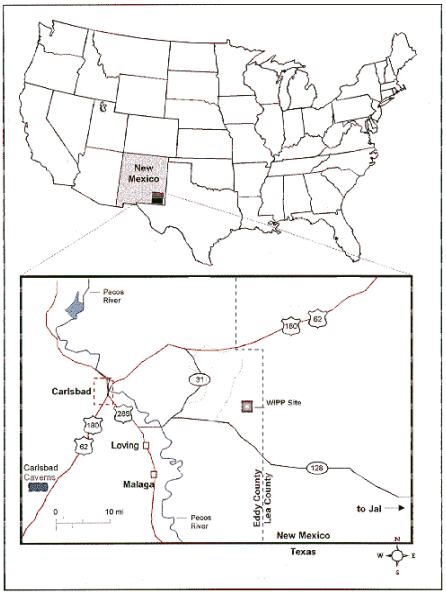
Safety	•	smoke detectors
	•	elimination of static electricity - textile, paper industry, etc.
	•	sterilization - medical and hygiene supplies, gypsy moth, fruit flies, tsetse fly
	•	radiography of welds on bridges, bank vaults, race cars, etc.
	•	food irradiation - spices, fruit, meat
Agriculture	•	research leading to improved fertilizer, pesticides, fungicides seeds - yields, disease resistance

Some of the Thousands of Uses and Benefits of Radioactive Material in our Everyday Lives

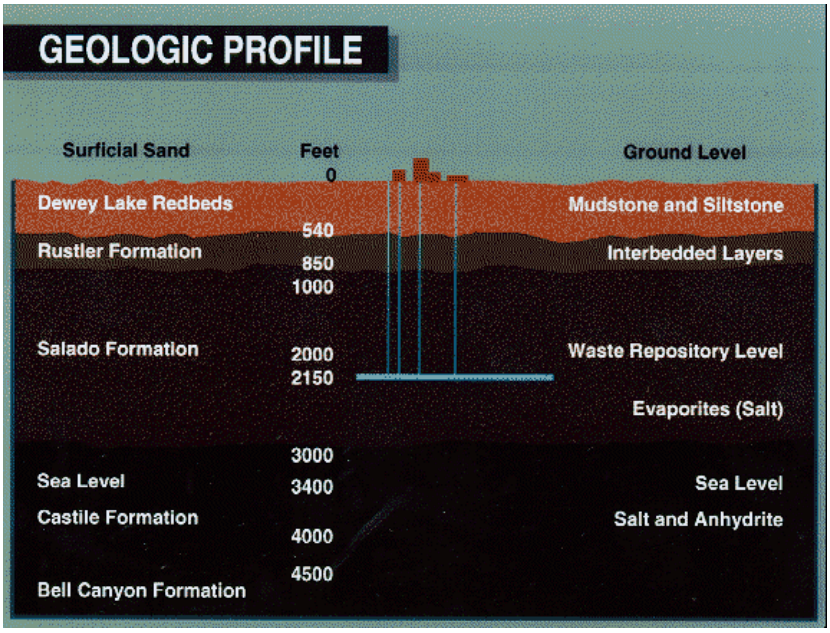
Electricity	Approx. 60% of SC electricity is from nuclear power	
Medicine	•	radiation treatments for cancer therapy
	•	nuclear medicine such as soft tissue and tumor imaging
	•	pathology & laboratory - invitro diagnostics
	•	new pharmaceuticals - >80% of all new drugs
Industrial	•	density - food and packaging industries
	•	thickness - paper, glass, tape, etc.
	•	vulcanized rubber - tires and insulation, etc.
	•	detect wear - machine tools, blast furnaces, engines, etc.
	•	level gauges - tanks, food containers, etc.
Research	•	all scientific fields


AT CHEM-NUCLEAR SYSTEMS
"Safety is looking good!"
WE AIM
FOR ZERO INJURIES
HOURS WORKED SINCE LAST LOST TIME INJURY
BARNWELL OPERATION 1499073
In Memory of Jim Salter, Safety & Loss Control Manager

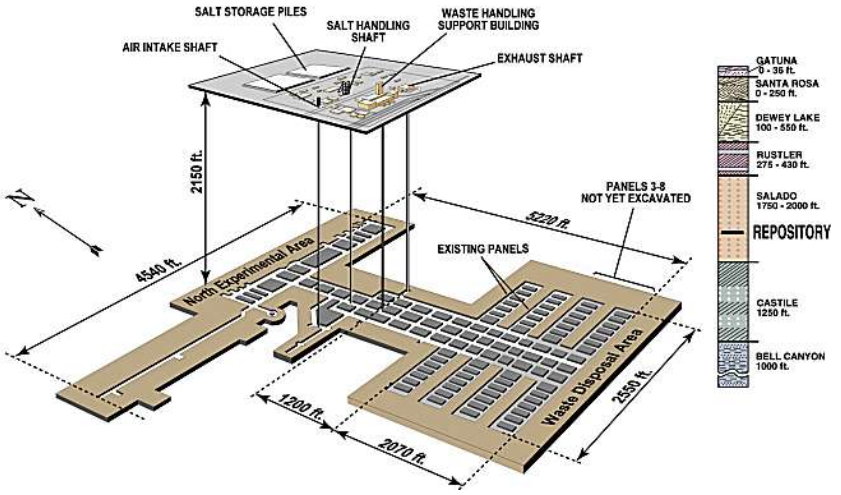

U.S. Department of Energy
Carlsbad Field Office


New Mexico
Pecos River
62
180
31
Carlsbad
285
WIPP Site
180
62
Loving
Carlsbad Caverns
Malaga
128
0
10 mi
Pecos River
Eddy County
Lea County
to Jal
New Mexico
Texas
N
W
E
S


Waste Isolation Pilot Plant


GEOLOGIC PROFILE
Surficial Sand
Feet
0
Ground Level
Dewey Lake Redbeds
Mudstone and Siltstone
540
Rustler Formation
Interbedded Layers
850
1000
Salado Formation
2000
Waste Repository Level
2150
Evaporites (Salt)
3000
Sea Level
3400
Sea Level
Castile Formation
Salt and Anhydrite
4000
4500
Bell Canyon Formation

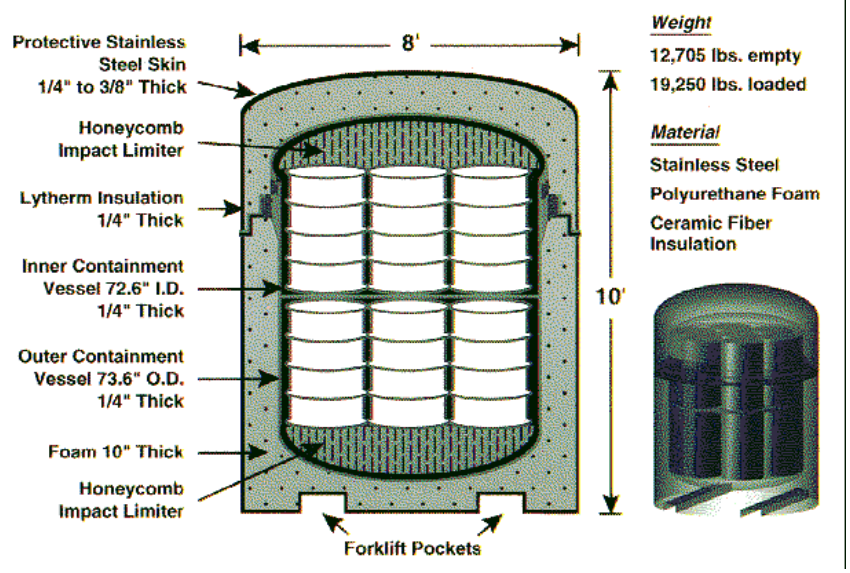
WIPP Facility and Stratigraphic Sequence



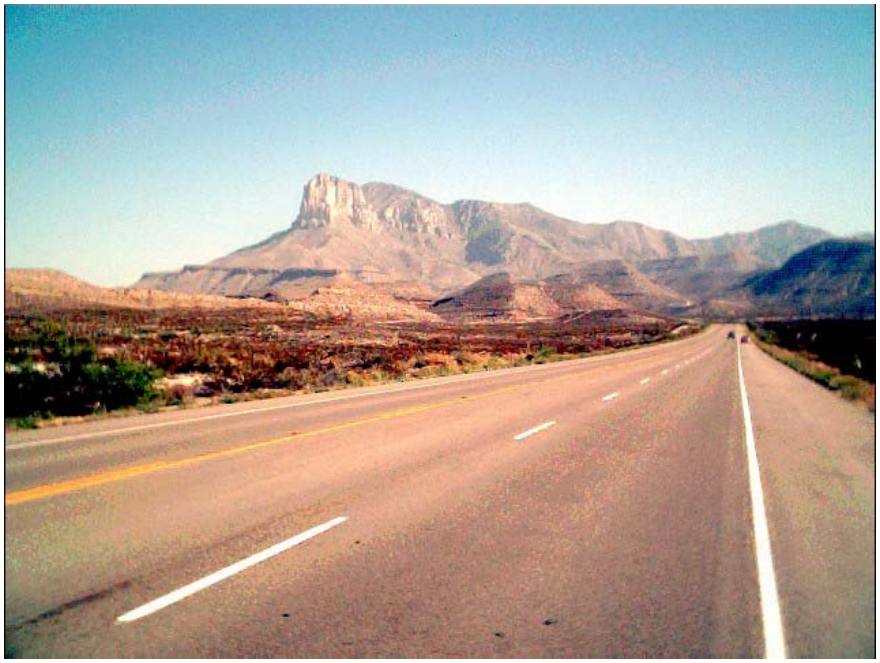
WIPP location
26 miles southeast of Carlsbad, NM

WIPP's first waste shipment
March 26, 1999

TRUPACT-II


Protective Stainless Steel Skin 1/4" to 3/8" Thick
Honeycomb Impact Limiter
Lytherm Insulation 1/4" Thick
Inner Containment Vessel 72.6" I.D. 1/4" Thick
Outer Containment Vessel 73.6" O.D. 1/4" Thick
Foam 10" Thick
Honeycomb Impact Limiter
8'
10'
Forklift Pockets
Weight
12,705 lbs. empty
19,250 lbs. loaded
Material
Stainless Steel
Polyurethane Foam
Ceramic Fiber Insulation


Operations
Begin
WIPP



- **APPENDIX A**
- **State of Michigan**
- **LOW-LEVEL RADIOACTIVE WASTE AUTHORITY ACT (EXCERPT)**
Act 204 of 1987

333.26210 Final siting criteria; establishment; minimum requirement.

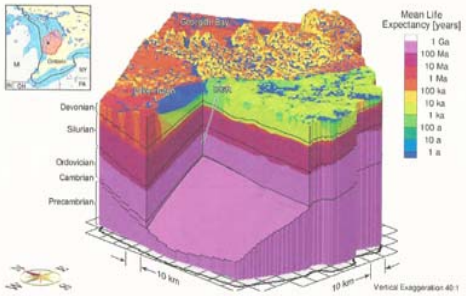
- Sec. 10.
- The authority shall establish final siting criteria that at a minimum excludes a candidate site that is any of the following:
- (a) Located in a 500-year floodplain.
- (b) Located over a sole source aquifer.
- (c) Located 1 mile or less from a fault where tectonic movement has occurred within the 10,000 years preceding the effective date of this act.
- (d) Not sufficiently large to assure that an isolation distance of 3,000 feet or more from the disposal unit and adjacent property lines is available.
- (e) Has wetlands within the boundaries of the candidate site as defined in part 303 (wetland protection) of the natural resources and environmental protection act, Act No. 451 of the Public Acts of 1994, being sections 324.30301 to 324.30323 of the Michigan Compiled Laws.

- (f) An environmental area or a high risk area as defined in part 323 (shorelands protection and management) of Act No. 451 of the Public Acts of 1994, being sections 324.32301 to 324.32315 of the Michigan Compiled Laws.
- (g) A floodway designated under part 31 (water resources protection) of Act No. 451 of the Public Acts of 1994, being sections 324.3101 to 324.3119 of the Michigan Compiled Laws.
- (h) Located where the hydrogeology beneath the site discharges groundwater to the land surface within 3,000 feet of the boundaries of the candidate site.
- Located within 10 miles of Lake Michigan, Lake Superior, Lake Huron, Lake Erie, Saint Marys river, Detroit river, St. Clair river, or lake St. Clair. **This subdivision shall not apply to a site that is located at or adjacent to a nuclear power generating facility.**
- History**:** 1987, Act 204, Imd. Eff. Dec. 22, 1987 ;-- Am. 1996, Act 68, Imd. Eff. Feb. 26, 1996

OPG's DEEP GEOLOGIC REPOSITORY PROJECT For Low & Intermediate Level Waste

FRAC3DVS-OPG – Solute Transport

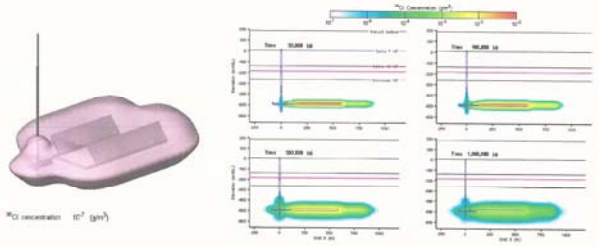
The mean life expectancy (MLE), which is a measure of the time that it will take a solute to migrate to a point of groundwater discharge, is estimated to be greater than 100 million years.



23

OPG's DEEP GEOLOGIC REPOSITORY PROJECT For Low & Intermediate Level Waste

FRAC3DVS-OPG – Example Results



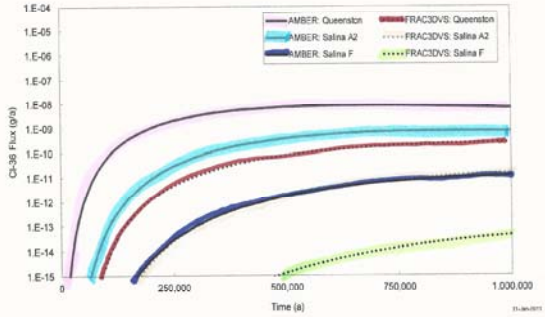
Concentration of Cl-36 around repository as a function of time, assuming instant resaturation and instant release

72

AMBER DGR – Verification (2)

Model Comparison: AMBER with FRAC3DVS-OPG

- Cl-36 flux through shaft and geosphere
- AMBER results are conservative, as expected



116