Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 25-H2.67A

Date: 2025-06-18

Supplementary Information

Presentation from Dr. Sunil Nijhawan

Renseignements supplémentaires

Présentation de Dr. Sunil Nijhawan

In the matter of the

Ontario Power Generation Inc.

Application to renew power reactor operating licence for the Darlington Nuclear Generating Station

Commission Public Hearing Part-2

June 24-26, 2025

À l'égard d'

Ontario Power Generation Inc.

Demande concernant le renouvellement du permis d'exploitation d'un réacteur de puissance pour la centrale nucléaire de Darlington

Audience publique de la Commission Partie-2

24-26 juin 2025

Document ID: DAMZHJW66V33-166150894-2008

Canada

An unprecedented 30 year license extension application for Darlington Nuclear is contrary to Science & public interests

Sunil Nijhawan, Ph.d. P.Eng

Darlington Relicensing hearings 25 June 2025

Summary

Given the lessons of TMI, Chernobyl, Fukushima and others the Darlington reactor design is practically obsolete in ability to reduce risk just by the competent operational staff we have and undoubtedly needs serious upgrades to existing hardware. We have not built a new CANDU in 30 years. Five ‘new’ reactor designs that followed Darlington have failed in the market. Over a billion dollars in ‘development’ wasted. Let us seriously weigh engineering and scientific facts above defensive posturing and propaganda.

Canadian nuclear industry safety culture is at a dangerous, unprecedented low. It is not just a severe lack of training, motivation and qualified supervision – it also is the revolving door with the industry and attraction of post retirement consulting opportunities with ‘friends’ they serve and finance.

There really should be no compulsion for staff to support and Commission to grant every application by the industry. They are required by law to put scientific facts before personal and corporate interests. Public safety cannot be ignored. Past errors must be corrected.

TRUTHS WE KNOW NOW

The most painful lessons that we may learn from reviews of the Fukushima disaster relate to the failure of regulators, designers and utilities in better retrofitting existing, operating reactors in a timely manner to withstand and mitigate known severe accident related challenges to reactor core and containment integrity.

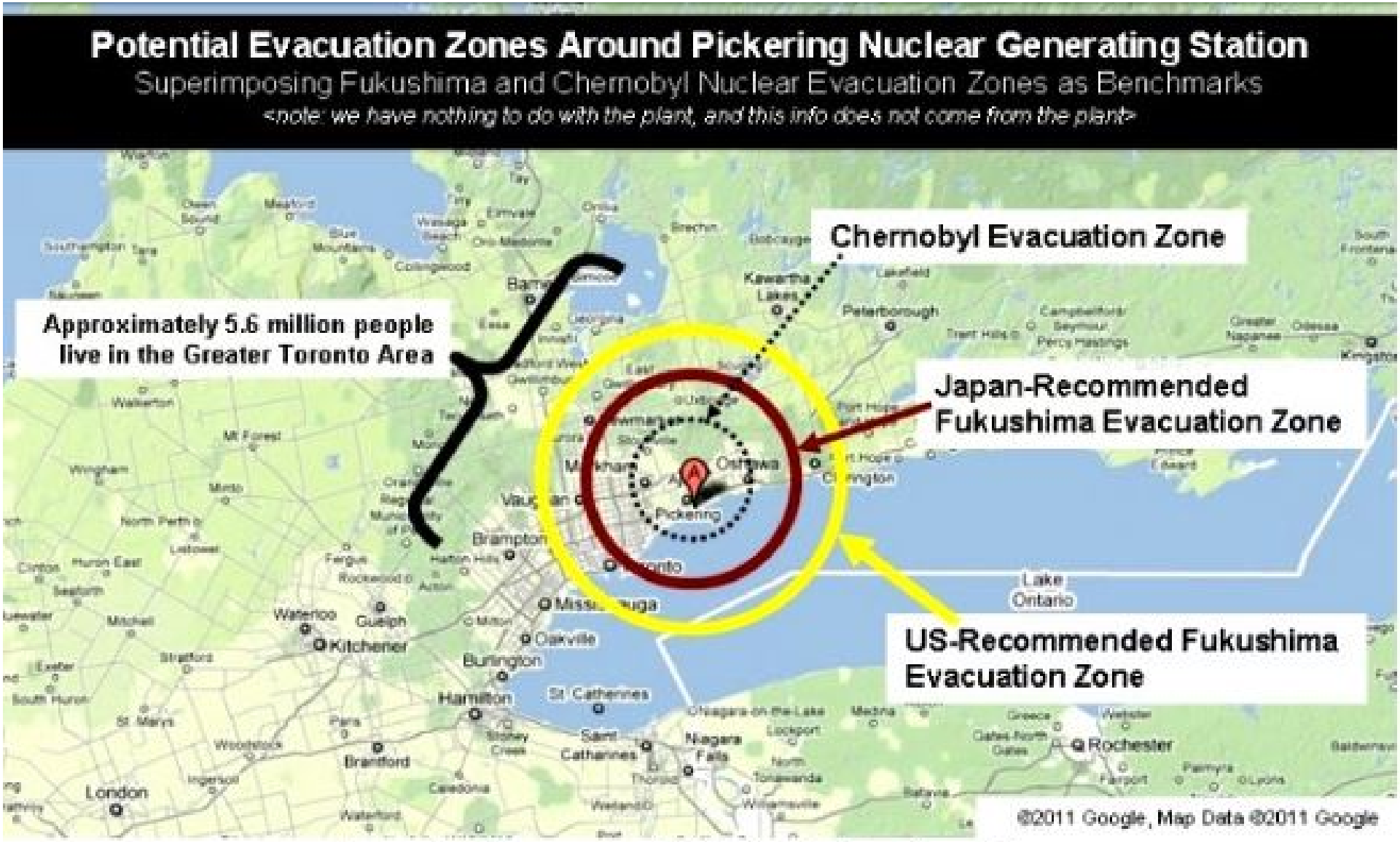
- PHWR reactors present very special severe accident mitigation capabilities as well as challenges due to their specific design features.
- A number of PHWR inherent design features may lend favourably to mitigation of some portions of severe accidents but they have no natural, inbuilt ability to universally extend their design advantages to severe accidents.

- After 40 years of doing severe accident related assessments of CANDU reactors, a number of us have proposed design enhancements to reduce risk. Industry does not want to do anything substantial. Staff misrepresents facts routinely; obfuscates; ignores known problems.

Why OPG application is irresponsible & will hurt Canada?

1. Darlington reactors are of an ageing, obsolete CANDU design (albeit with expensive fuel channels and feeders of old design) with long recognized design errors requiring serious upgrades in hardware and safety measures. Retubing is just a small part of it.
2. CNSC, as currently structured and managed, does not have qualified personnel to assess risk from power reactor accidents and safeguard public interests. Industry misrepresentations of basic engineering facts and an intransigent expectation of CNSC acquiescence is dangerous and must be reviewed periodically
3. CNSC staff has, since 2015, purposedly & blatantly misrepresented severe accident source terms - (fission product releases and hydrogen explosion potential) following a core damage accident; and knowingly supported weak emergency preparedness measures in violation of elementary engineering data, IAEA guidelines, provincial and national interests.
4. CNSC has ignored concrete lessons learned from Fukushima and worldwide design review of CANDU reactors , their operation and regulation; the biggest of which was that it must stop colluding with the industry and educate/train its workforce. This regulatory body is similarly in firm capture of industry and acts in defiance of many norms in safety assurance and legislated obligations.
5. CNSC just relicensed Darlington Waste Management Facility (dry fuel storage) ignoring major safety concerns.
6. Presence of unsafe, new BWRX reactors lacking basic safety features we live by, in the courtyard of reactors with 500 times than norm leakier containments poses additional risks.
7. No reactor in the world gets a 30 year license; what are we now a banana republic?
8. CNSC cannot play with the future of my country by removing future effective oversight.

Evacuation zones we need if we don't fix reactors



Evacuation Zones around Pickering Nuclear Power Plant

ESTIMATE BY NORWEGIANS OF FISSION PRODUCT DISPERSION FROM SEVERE ACCIDENT AT LENINGRAD RBMK NPP 900 km away

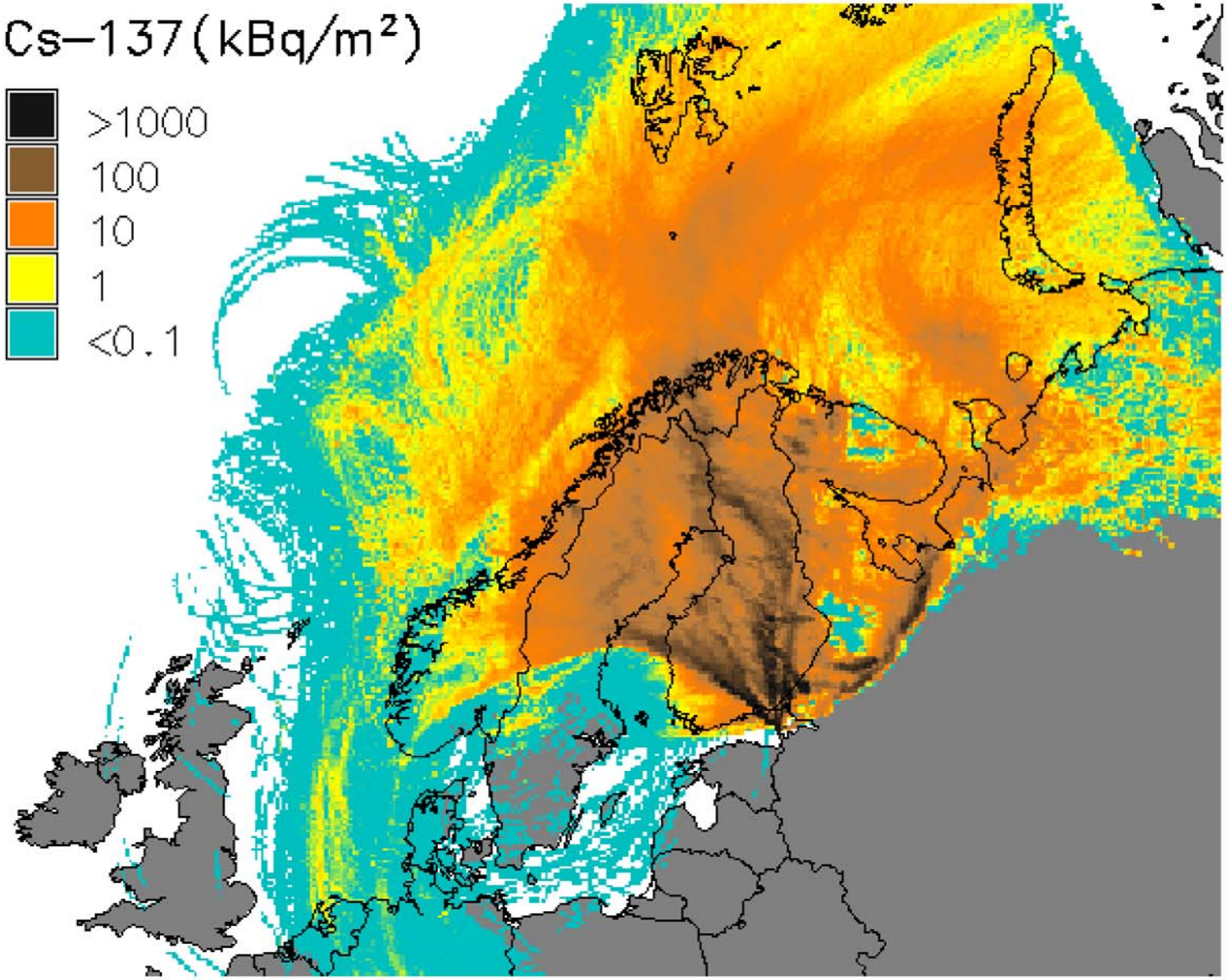


Figure 3: *Large scale deposition map for scenario BIII*

SOURCE TERM

IN INTEREST OF THEIR CITIZENS THE NORWEGIAN REGULATORS CONSIDERED A SOURCE TERM **1250 TIMES MORE** THAN THE FRAUDULENT SOURCE TERM MANUFACTURED AND PROMOTED BY CNSC

3.2 Accident scenario B

RBMK catastrophic scenario: beyond design-basis accident with a large fraction of fuel damage.

The radiological characteristics are based on measured/calculated releases (Tab.2) from a real accident (Chernobyl accident, 1986) [4]. 25% of the total release is transferred within the first day of the accident.

Table 2: *Accident Scenario B: source term [7].*

Parameter	Description
Release Position:	59.83 N, 28.03 E
Isotopes:	^{134}Cs, ^{137}Cs, ^{89}Sr, ^{90}Sr
Release time:	10 days from the accident start
Total release for ^{134}Cs:	8.17E+16 Bq
Total release for ^{137}Cs:	1.25E+17 Bq
Total release for ^{89}Sr:	9.89E+16 Bq
Total release for ^{90}Sr:	9.00E+15 Bq
Cylinder base:	1200 m
Cylinder top:	2500 m
Cylinder radius:	100 m

FRAUDULENT CNSC Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures

Fission product group	Release fraction[1]
Noble gases (e.g., xenon)	4.12×10^{-1}
Halogens (e.g., iodine)	1.52×10^{-3}
Alkali metals (e.g., cesium)	1.52×10^{-3}
Alkaline earths	2.30×10^{-8}
Refractory metals	2.53×10^{-4}
Lanthanides	8.51×10^{-9}
Actinides	5.16×10^{-8}
Barium	1.68×10^{-7}

Isotope	Fission Product Releases (becquerels)			
	Chernobyl	Fukushima	GLR	GLR x 4
Cesium-134	5.90×10^{16}	1.80×10^{16}	3.20×10^{13}	1.28×10^{14}
Cesium-137	6.20×10^{16}	1.50×10^{16}	1.00×10^{14}	4.00×10^{14}
Iodine-131	1.50×10^{18}	1.60×10^{17}	4.40×10^{15}	1.76×10^{16}

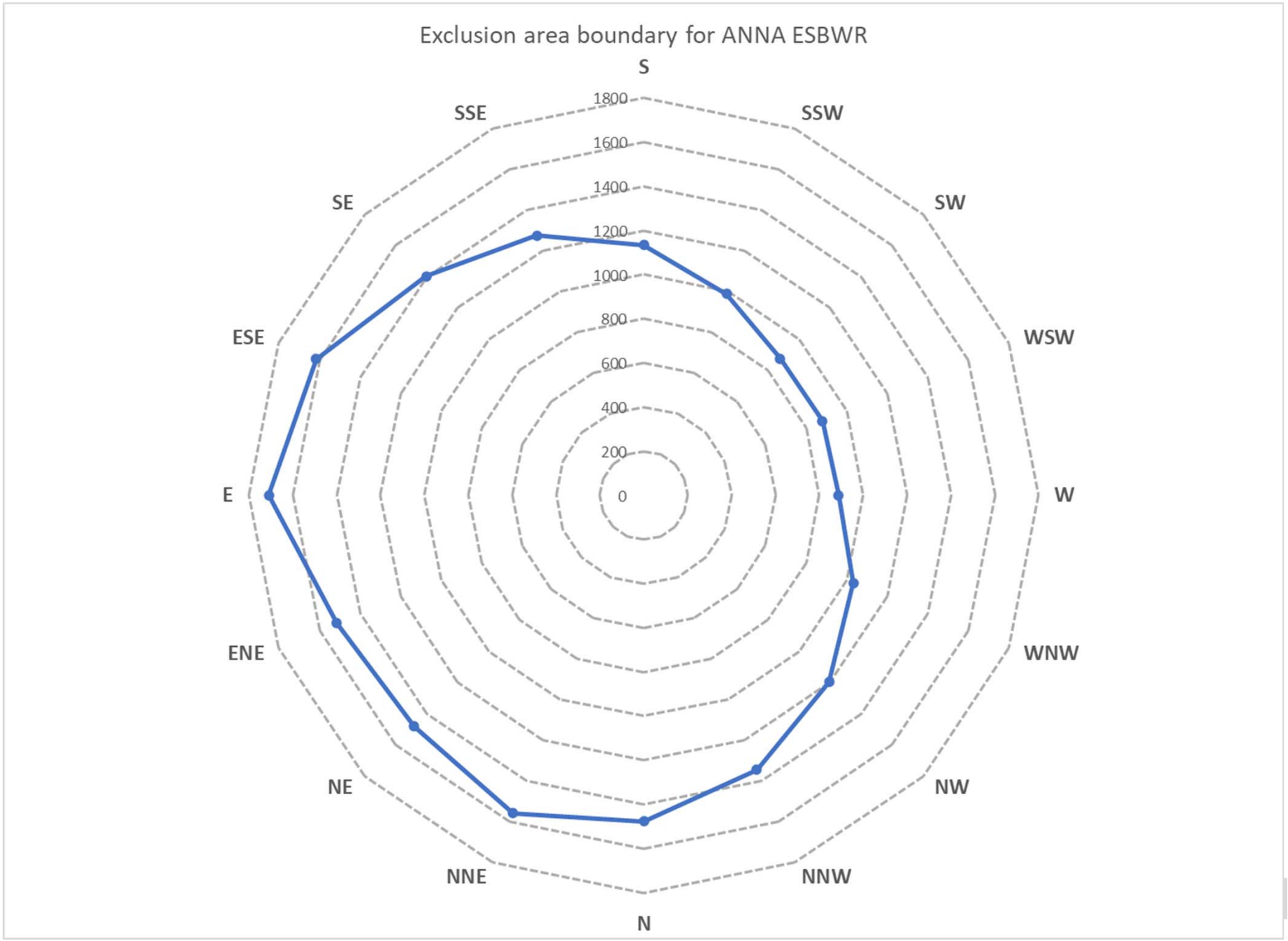
FACTS ABOUT A SEVERE ACCIDENT PROGRESSION

1. A SEVERE CORE DAMAGE ACCIDENT IS A PLAUSIBLE EVENT
2. FUEL GETS HOT IN A SEVERE ACCIDENT
3. RELAESE RATES OF FISSION PRODUCTS ARE HIGH AT HIGH TEMPERATURES
4. RELEASE RATE OF CS-137 COULD BE 1% PER MINUTE AT 1600^{o}C SO A LARGE FRACTION WILL RELEASE FROM FUEL AND DEBRIS INTO CALANDRIA IN A COUPLE OF HOURS
5. CALANDRIA RELEASES END UP IN THE CONTAINMENT IMMEDIATELY AND UNATTENEUATED
6. CONTAINMENT IS CLOSE TO ATMOSHERIC AT ONSET OF CORE DAMAGE AND WILL PRESSURIZE DUE TO FURTHER ENERGY RELEASE INTO IT
7. MULTI UNIT CONTAINMENT IS LEAKY; HAS AN UPTO 48% MASS PER DAY LEAKAGE RATE AT DESIGN PRESSURE.
8. CONTAINMENT WILL PRESSURIZE TO GREATER THAN DESIGN PRESSURE EASILY (0.5 Atm for VACUUM BUILDING; 0.9 Atm for RB)
9. DARLINGTON REACTOR VESSELS ATTACHED TO THE CONTAINMENT PRESSURE BOUNDARY

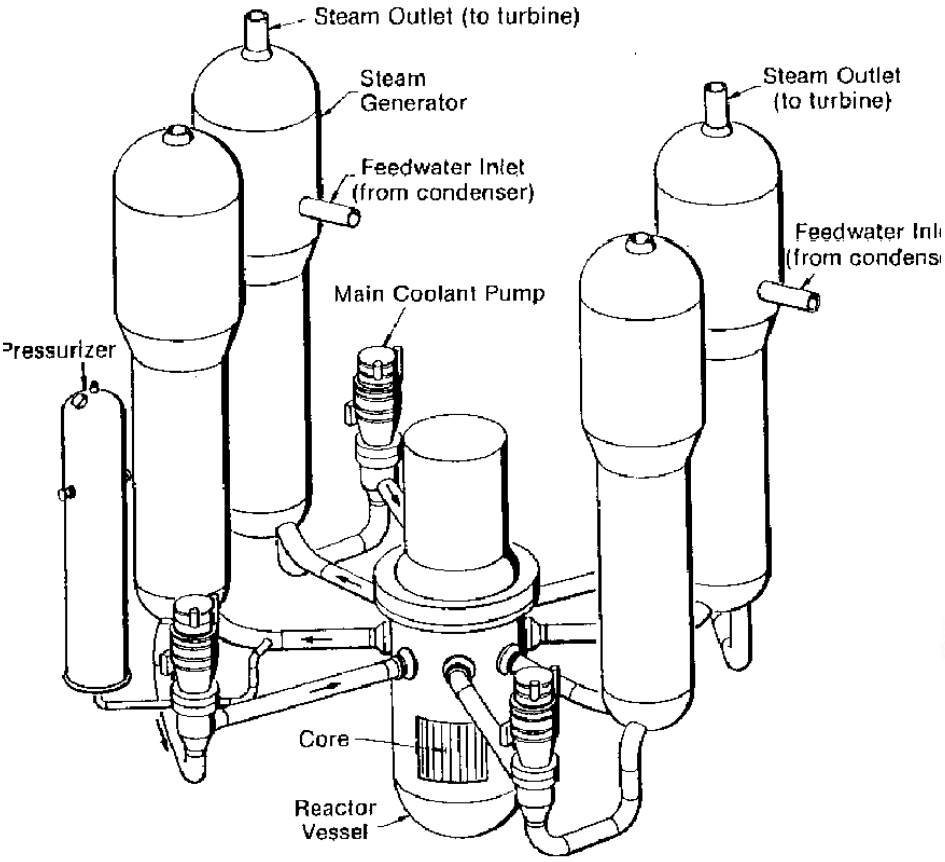
FACTS ABOUT A SEVERE ACCIDENT PROGRESSION

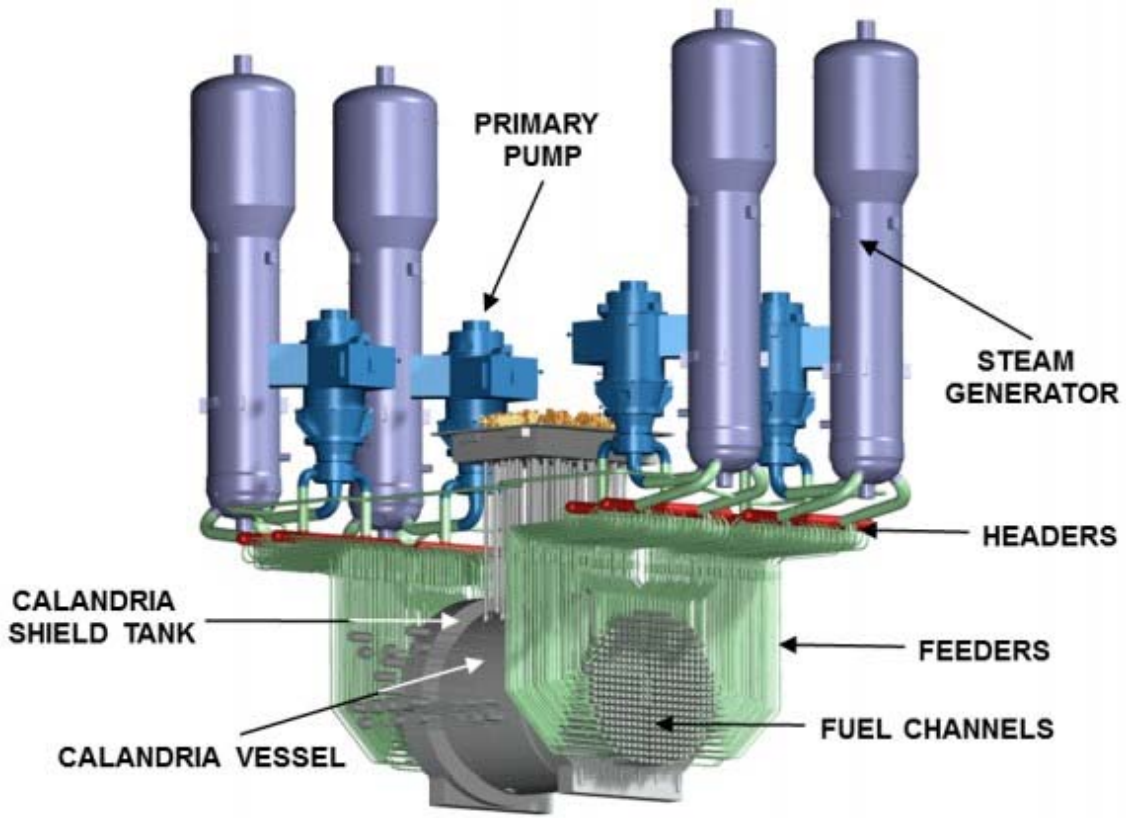
11. MORE THAN LIKELY A LARGE FRACTION OF FISSION PRODUCTS WILL RELEASE FROM CONTAINMENT TO ENVIRONMENT
12. 'HYDROGEN' PRODUCTION FROM FEEDERS ADDS TO 'HYDROGEN' FROM FUEL CHANNEL AND IS HIGHER THAN PREVIOUSLY ANTICIPATED
13. COMBUSTIBLE 'HYDROGEN' WILL BE LIKELY TRAPPED IN REACTOR VAULTS IN BRUCE/DARLINGTON
14. ASSERTION OF SMALLER RELEASES THAN 1% OVER THE TOTAL ACCIDENT DURATION IS UNFOUNDED AND IRRESPONSIBLE
15. ASSERTIONS OF 4-5 ORDERS OF MAGNITUDE LOWER RELEASE THAN REGULATORY LIMIT OF 100 TBQ ARE PATENTLY INCORRECT AND FRIGHTENING DISPLAY OF DISTORTED THINKING
16. CNSC SHOULD RECONSIDER THE EFFECT ON PUBLIC SAFETY SUCH ILL-ADVISED DECISIONS (TO ENDORSE SUCH STUDIES) CAN HAVE.
17. M/U REACTORS POSE MORE RISK THAN CLAIMED IN PSA STUDIES AND SHOULD BE UPGRADED WITH SUPPORT OF INTELLIGENT AND THOGHTFUL ANALYSES, NOT HAND WAVING

1.8 KM EXCLUSION AREA BOUNDARY FOR ANNA ESBWR!

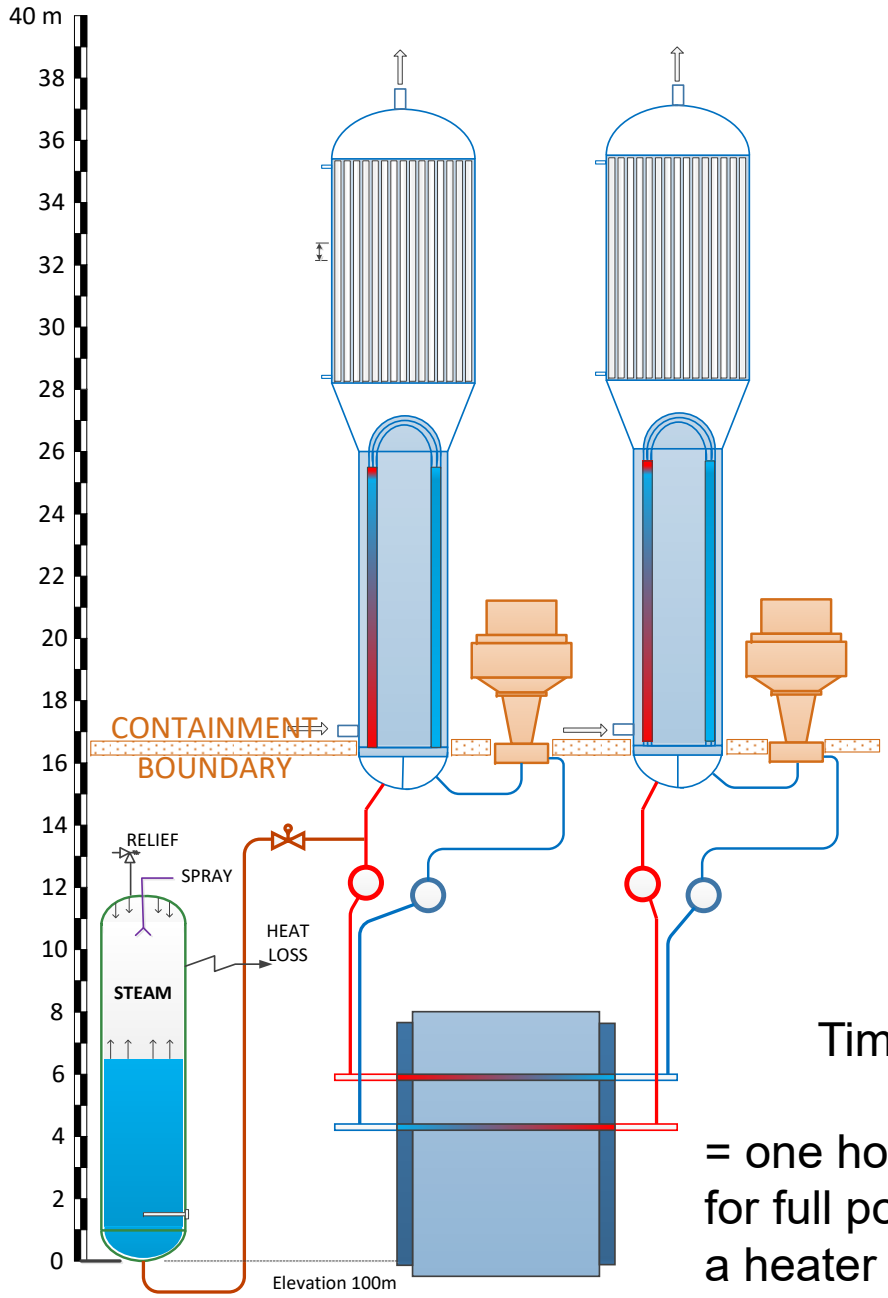


LOAD SHARING AMONG BOILERS IN A PWR & PHWR





DARLINGTON / BRUCE PRESSURIZER BELOW CORE



Boiler tube D_2O volume
65 m^3 in 4 boilers

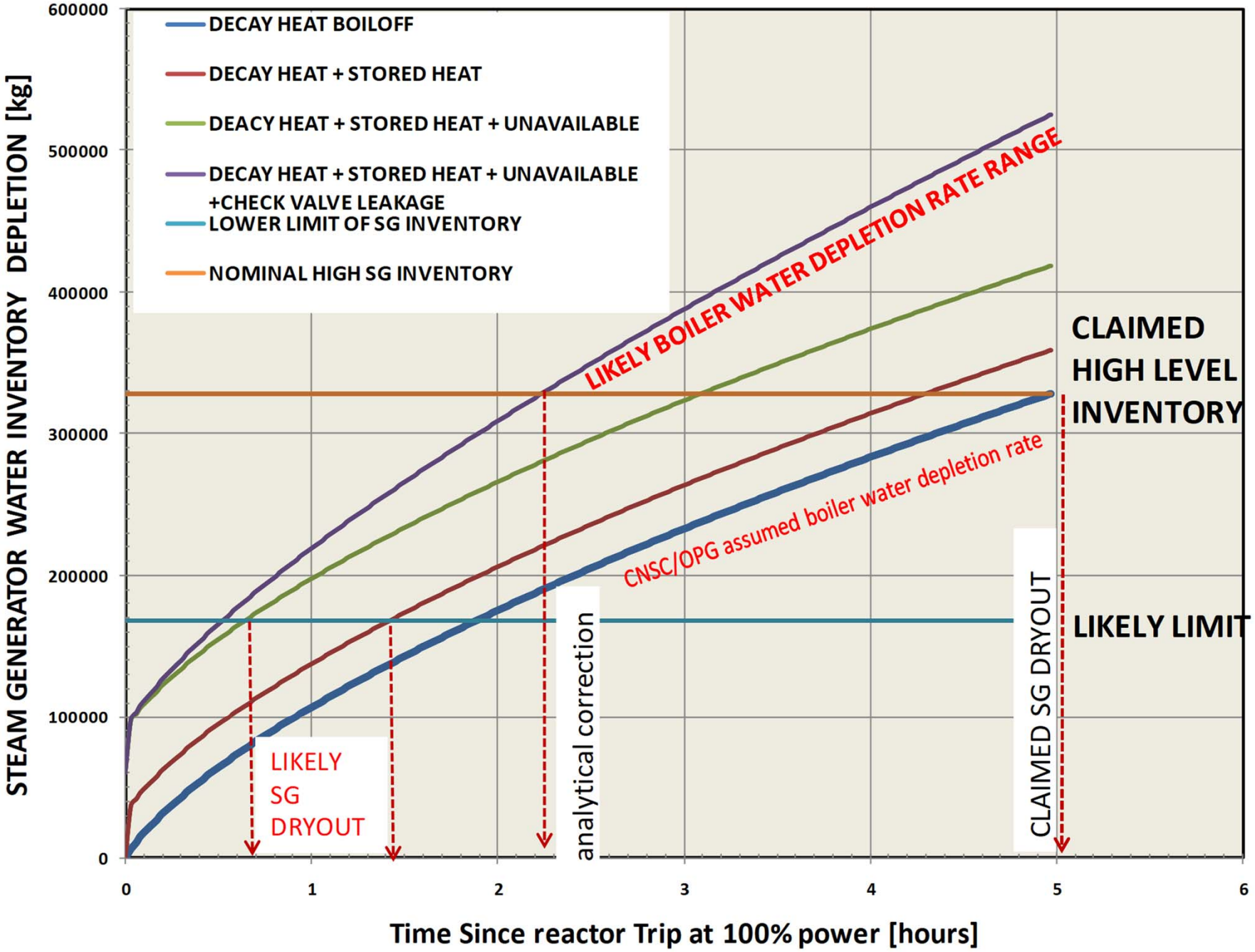
65% of boiler tube D_2O can be suctioned into the pressurizer upon it's steam collapse

Darlington Pressurizer volume 63.7 m^3

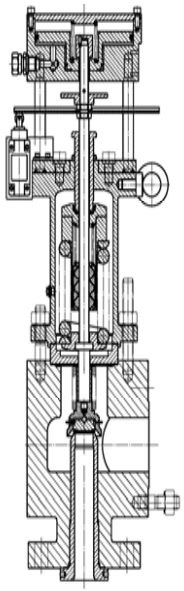
Time~=(Vol/V_g) / (Heater_Q/h_{fg})

= one hour for 10 m^3 suction of HTS fluid for full power operation of pressurizer with a heater set at 200 kW)

Very little time before we lose the reactor after SBO



C6 HTS OVER-PRESSURE PROTECTION



VENT CONDENSER RELIEF VALVES
RV 29 1.03 MPa
VENT CONDENSER
TO D_2O COLLECTION
GASEOUS EFFLUENT
3332 P22 63332-HS 22
DEGASSER CONDENSER RELIEF VALVES
RV 11,21 10.06 MPa
TO D_2O COLLECTION
TO/FROM D_2O STORAGE TANK
TO D_2O COLLECTION
FROM PURIFICATION RETURN
PV 10 63332-HS10
3332 PV16 63332-HS 16
LCV 8,15 63332-LCV 8,15
DEGASSER COOLER
DEGASSER CONDENSER TANK
HEATERS
TO AND FROM EAST HEAT TRANSPORT SYSTEM OUTLET HEADERS
3332 PV 47,48 10.86 MPag STEAM RELIEF VALVES
STEAM BLEED VALVES
63332 PCV 5,6
PV 12,13
PV 3,4
LIQUID RELIEF VALVES 10.24 MPag
PRESSURIZER
PV 9
HEATERS
PV 7
HEAT TRANSPORT CIRCUIT ISOLATION VALVES
FCV 8,26
DEGAS FLOW CONTROL VALVE
FROM PUMP DISCHARGE VIA PURIFICATION RETURN
63332 PCV 24,25
SPRAY CONTROL VALVE
To D2O Sorage Tank
FEED PUMPS
FEED VALVES 63331 LCV 11,12
63331 LCV 13,22
TO PUMP SUCTION VIA PURIFICATION RETURN
GLAND SEAL SYSTEM
FROM D_2O STORAGE TRANSFER AND RECOVERY SYSTEM
3331 PV25
63331 LCV 14,15
BLEED VALVES
FROM PUMP DISCHARGE VIA PURIFICATION RETURN

- flow restriction orifice or coil
- pressure relief

Overpressure from a feedwater line break

FROM PICKERING SAFETY REPORT

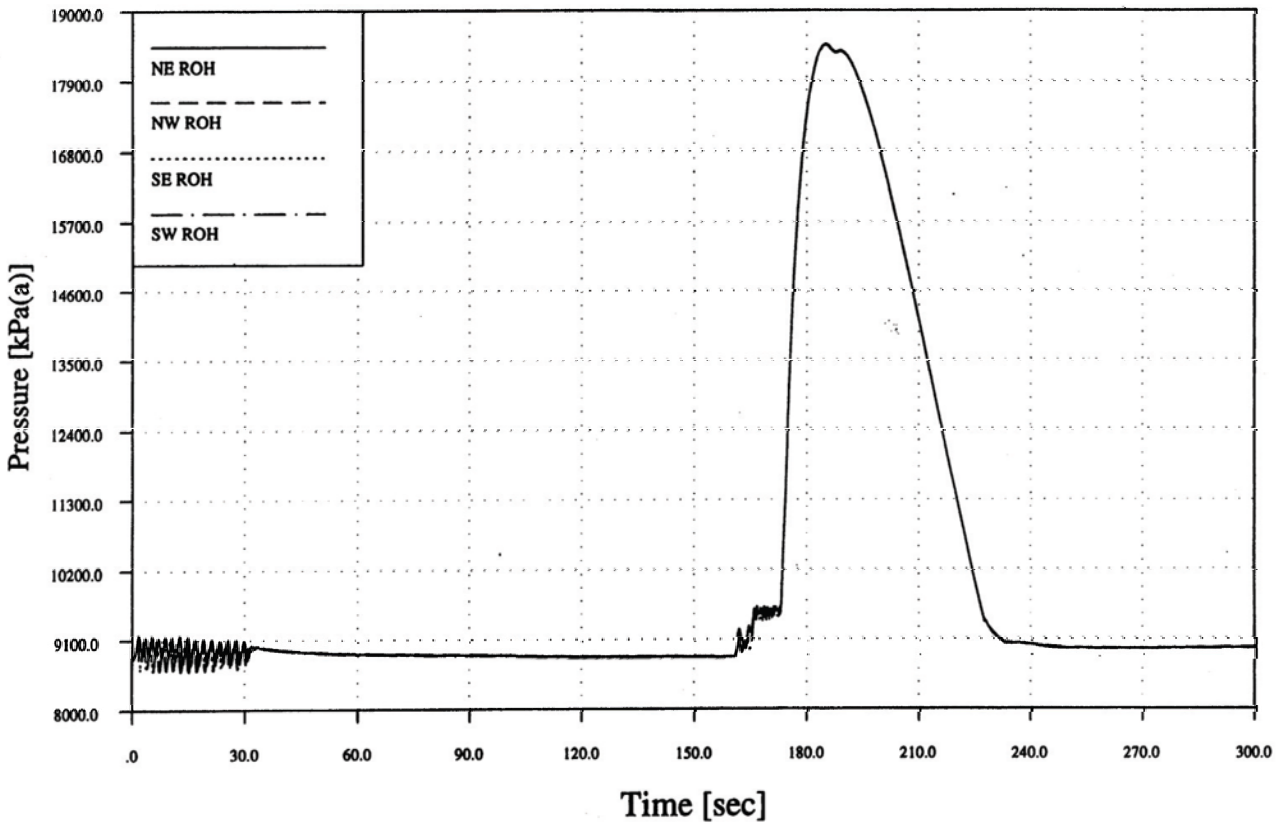
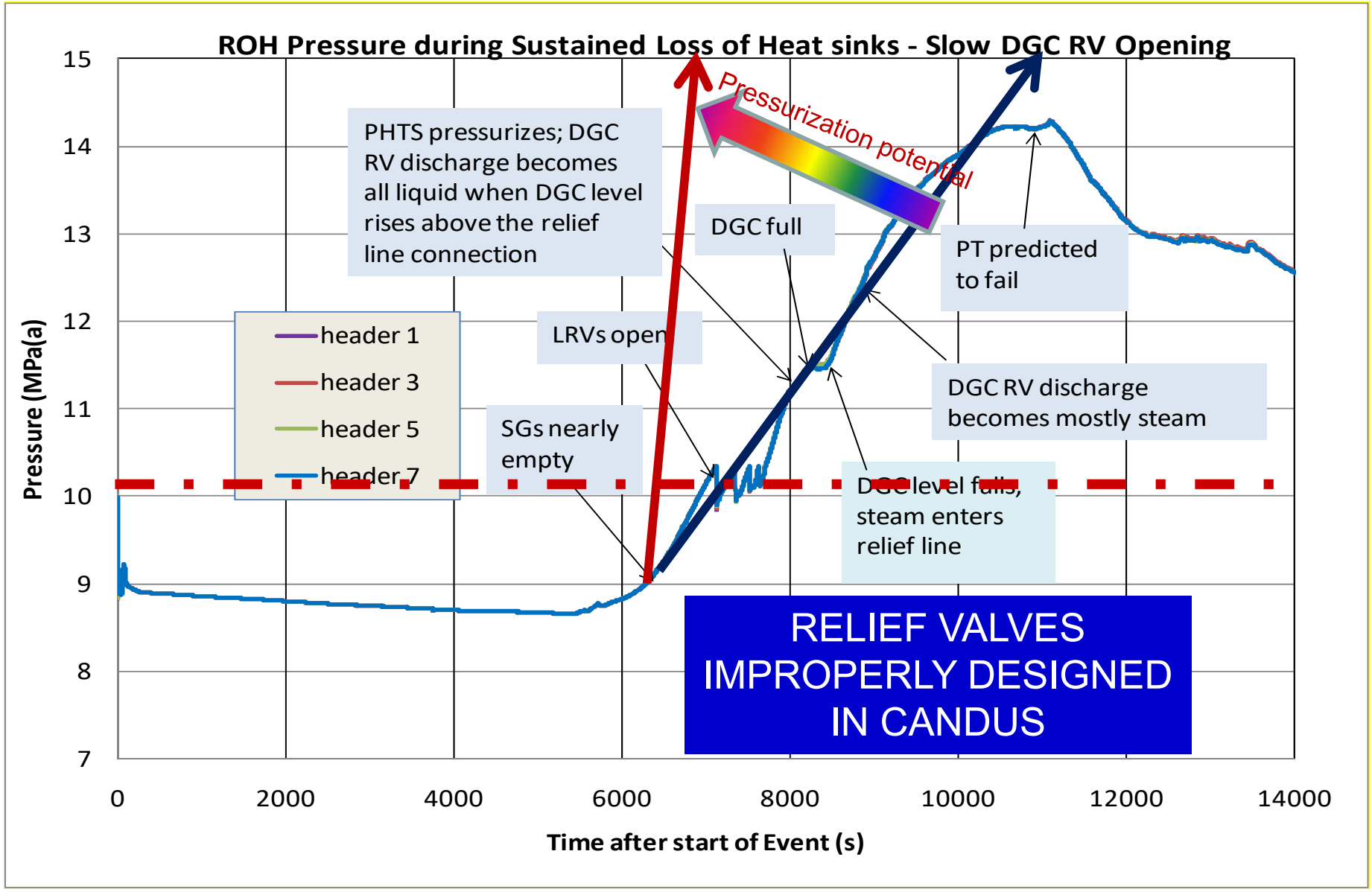


Figure 7-17 - ROH Pressures Following a Total Loss of Feedwater at 77% FP with Unit Class IV Power Maintained Following Reactor Trip

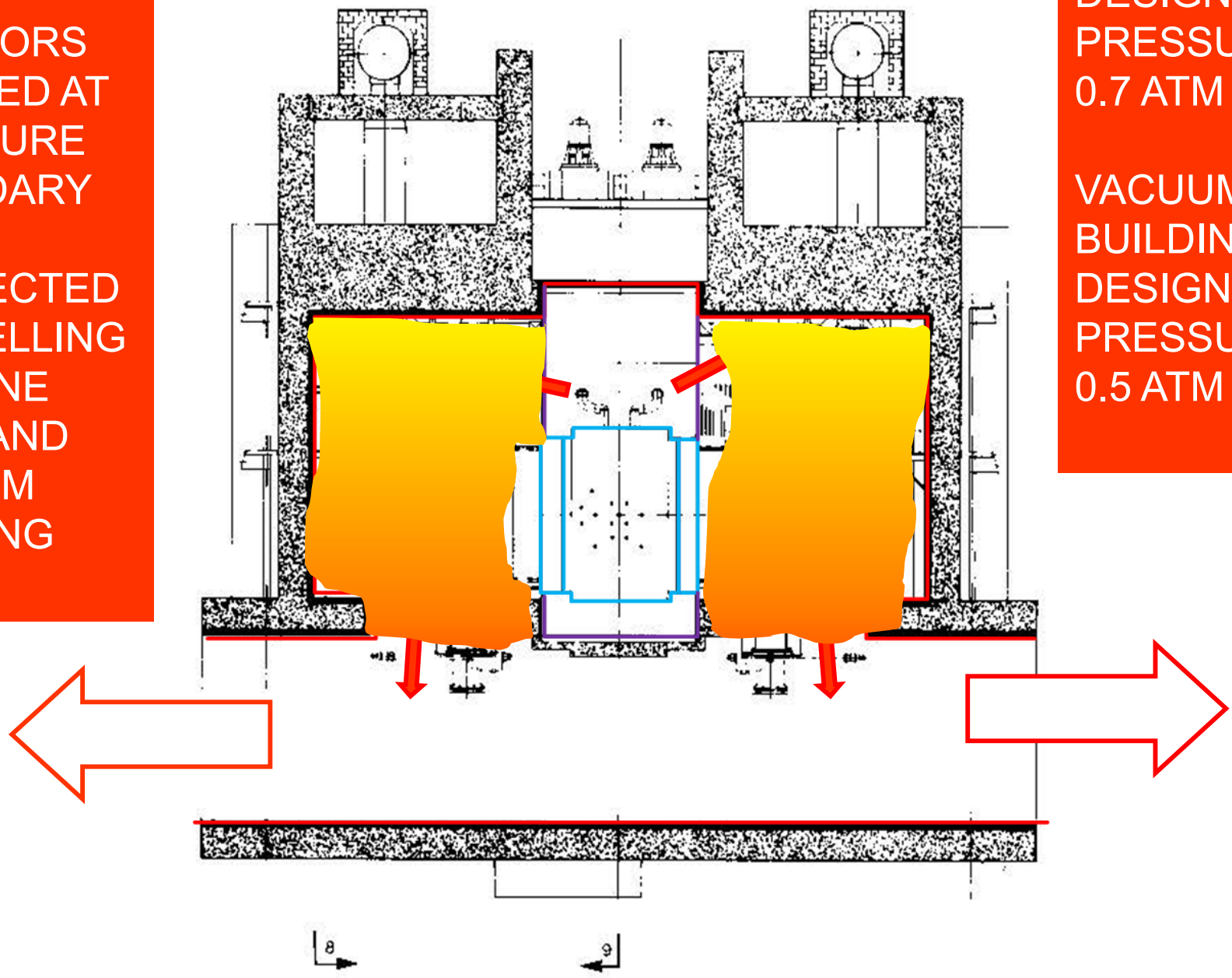
EXAMPLE OF UNDESIRABLE RESPONSE – CANDU 6; SAME EXPECTED FOR DARLINGTON



Source : AECL 2011

Multi Unit reactor building

FOUR REACTORS LOCATED AT PRESSURE BOUNDARY INTER-CONNECTED BY FUELLING MACHINE DUCT AND VACUUM BUILDING

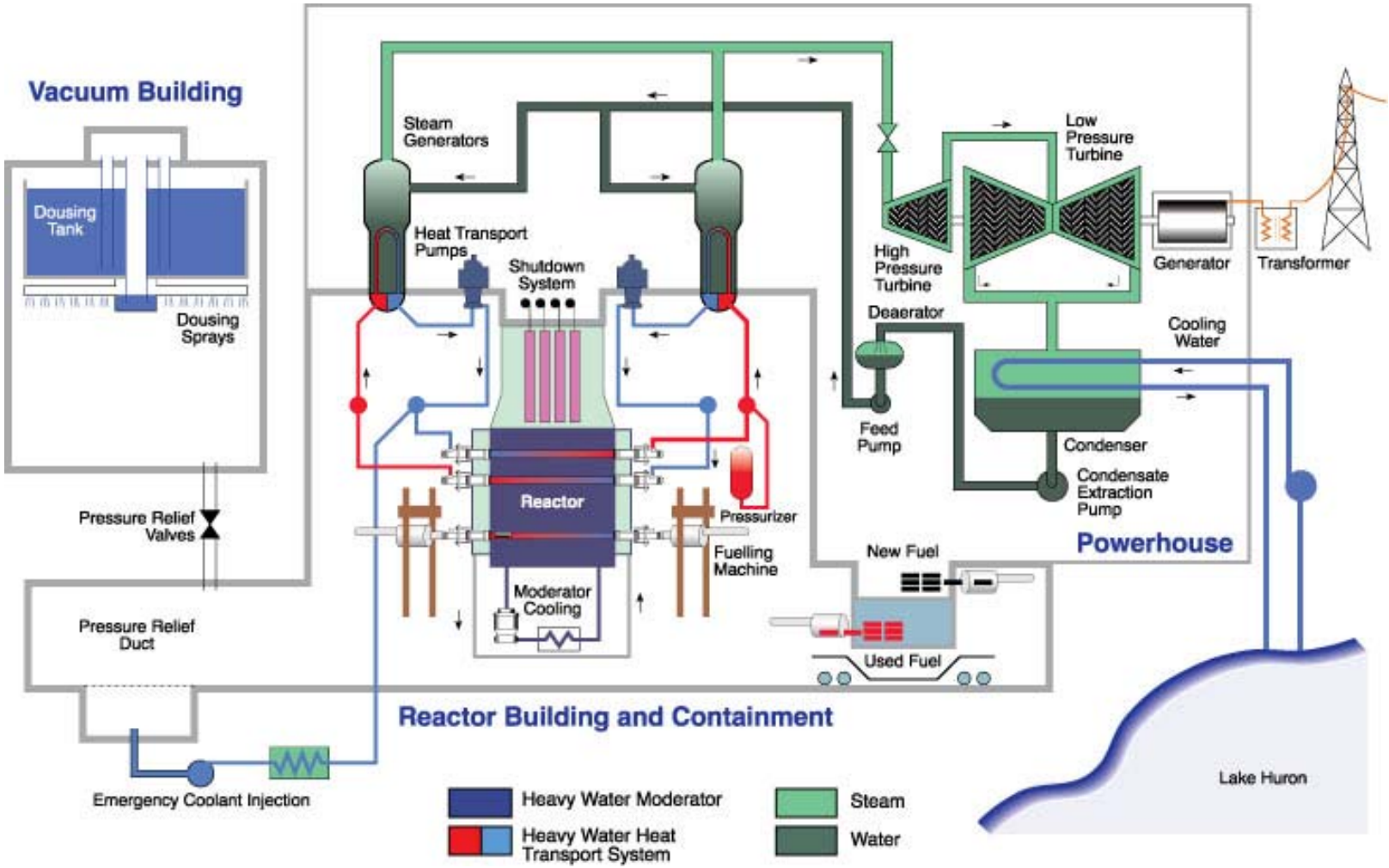


DESIGN PRESSURE 0.7 ATM

VACUUM BUILDING DESIGN PRESSURE 0.5 ATM

MULTI UNIT CONTAINMENTS ARE WEAK

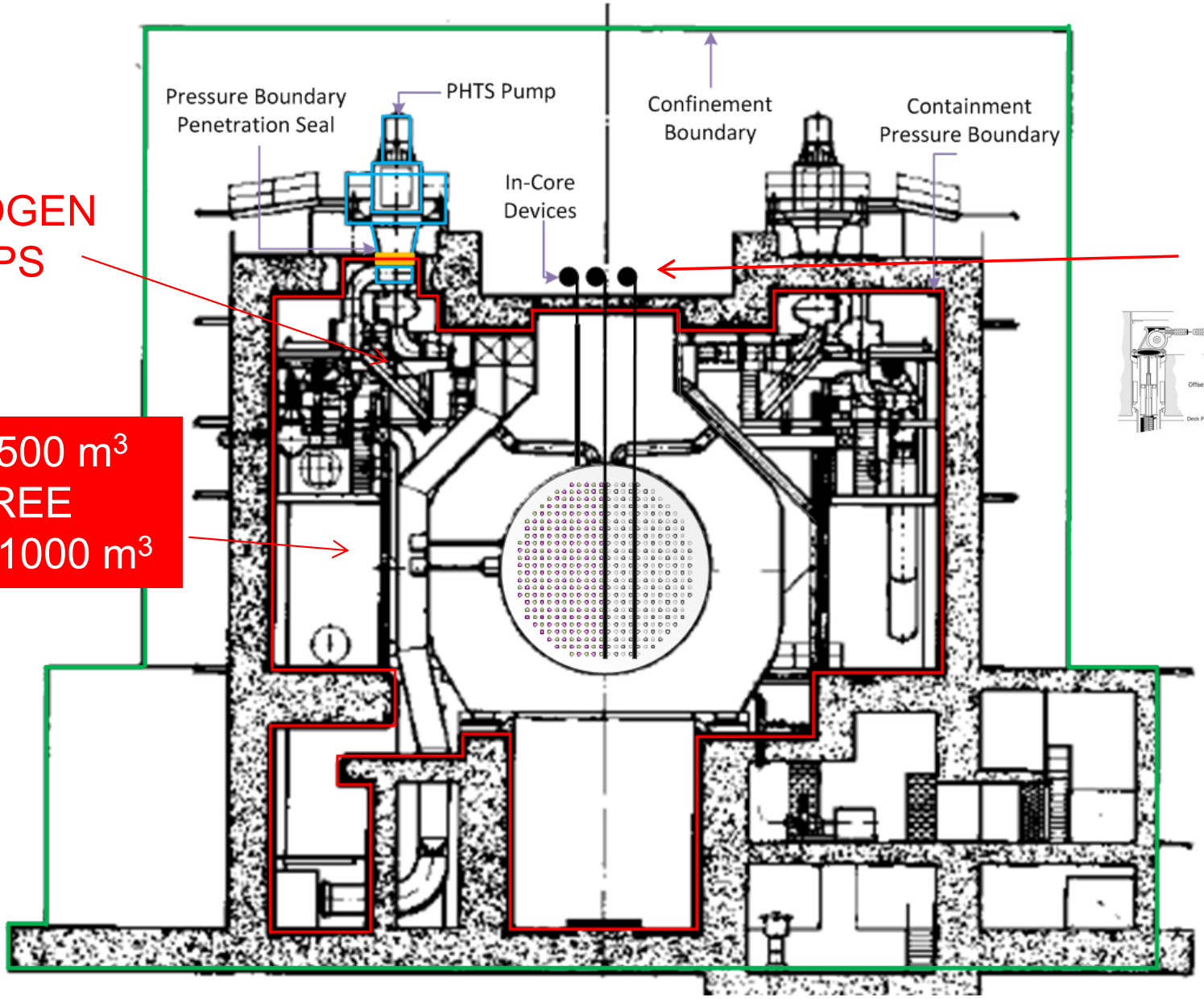
MANY COMPONENTS ARE OUTSIDE CONTAINMENT

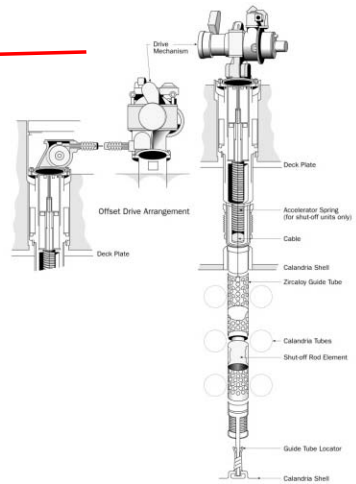


VULNERABLE LOW PRESSURE CONTAINMENT WITH SMALL REACTOR BUILDINGS, POOR D_2 MIXING

HYDROGEN TRAPS

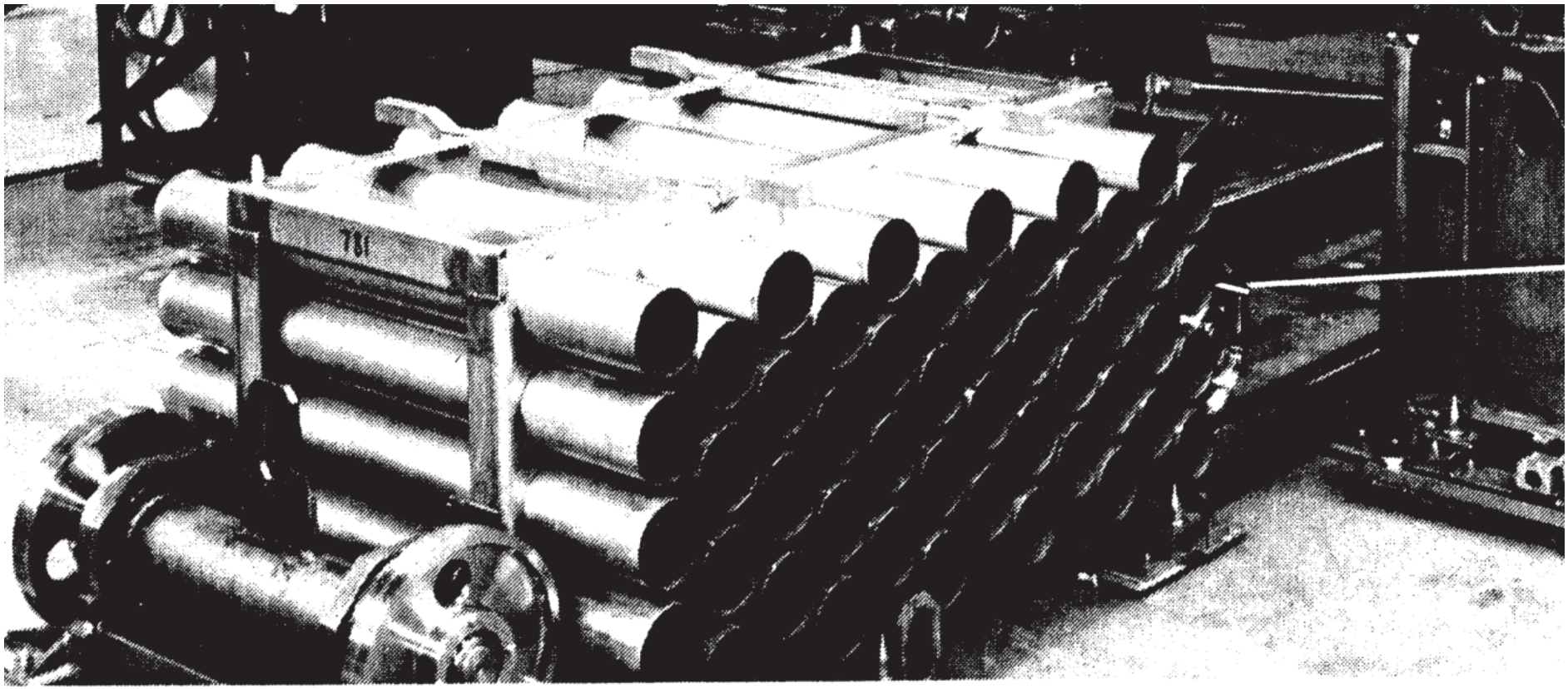
VAULT 13,500 m^3
UNIT FREE VOLUME 21000 m^3



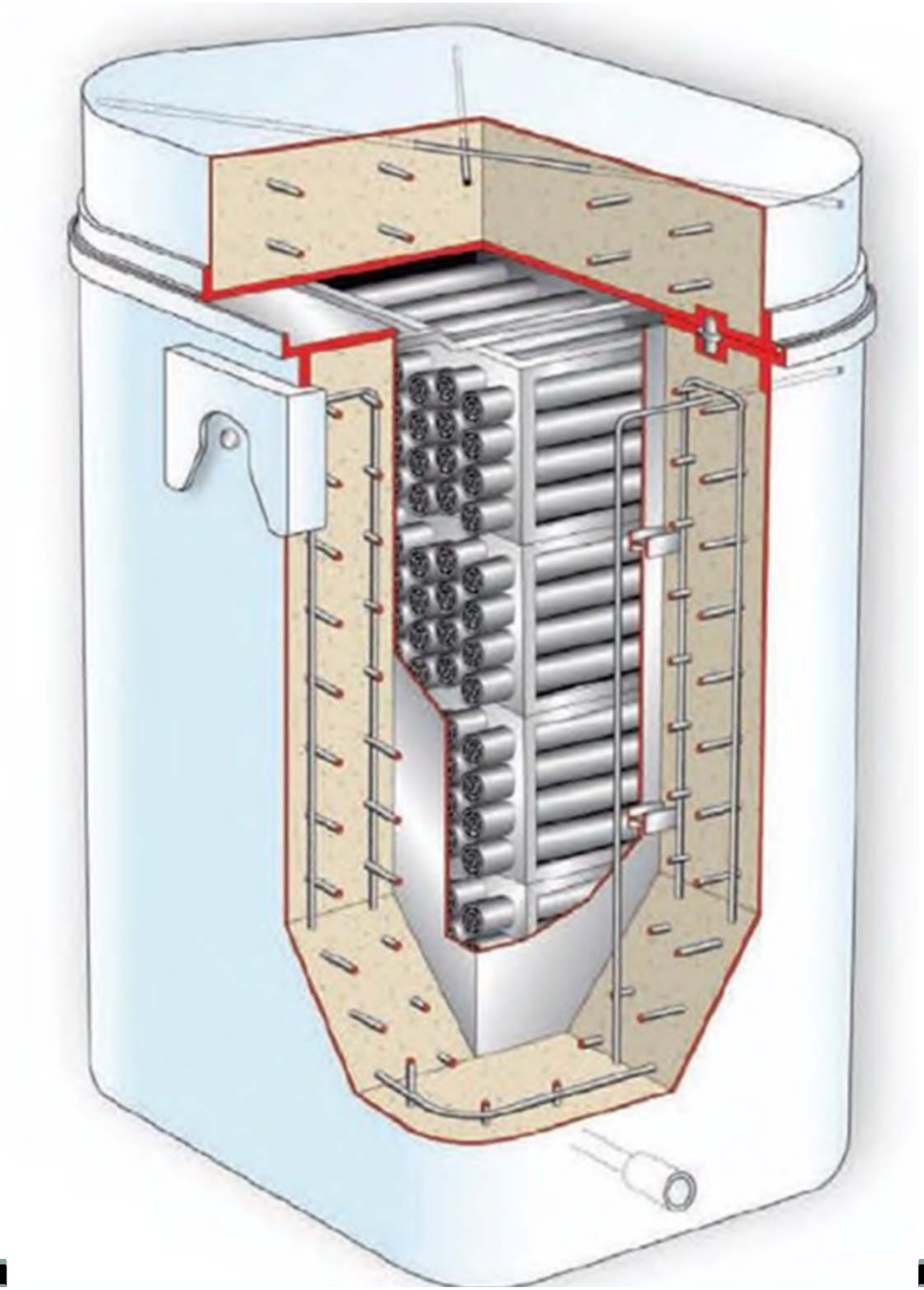


Total free volume 96,000 m^3 for 4 units, 69000 m^3 in vacuum building, max design pressure 48 kPa(g) at VB

FUEL MODULE WITH 96 BUNDLES 2 TO A TUBE



UNMONITORED DRY STORAGE CASK



DIRECT EXPULSION OF BUILDING AIR

‘HYDROGEN’ ISSUE IS MORE CRITICAL FOR PHWRs THAN LWRs

Feeders are LARGE sources of flammable Deuterium

Material	Low carbon Low Cr steel (max 0.4%; actual as low as 0.04%) SA106- Grade B
Length	> 10,000 m (960 feeders)
Diameter	~2”, 2.5”,3”,3.5” non standard ID
Thickness	~5.6 to 8.1 mm
Area	> 2000 m^2
Mass	~> 120,000 kg

- Literally scores have been replaced due to actual or incipient cracking at bends
- Internal and external corrosion; thinning
- New simulations indicate very high oxidation under LOCA/LOECI and severe core damage accidents

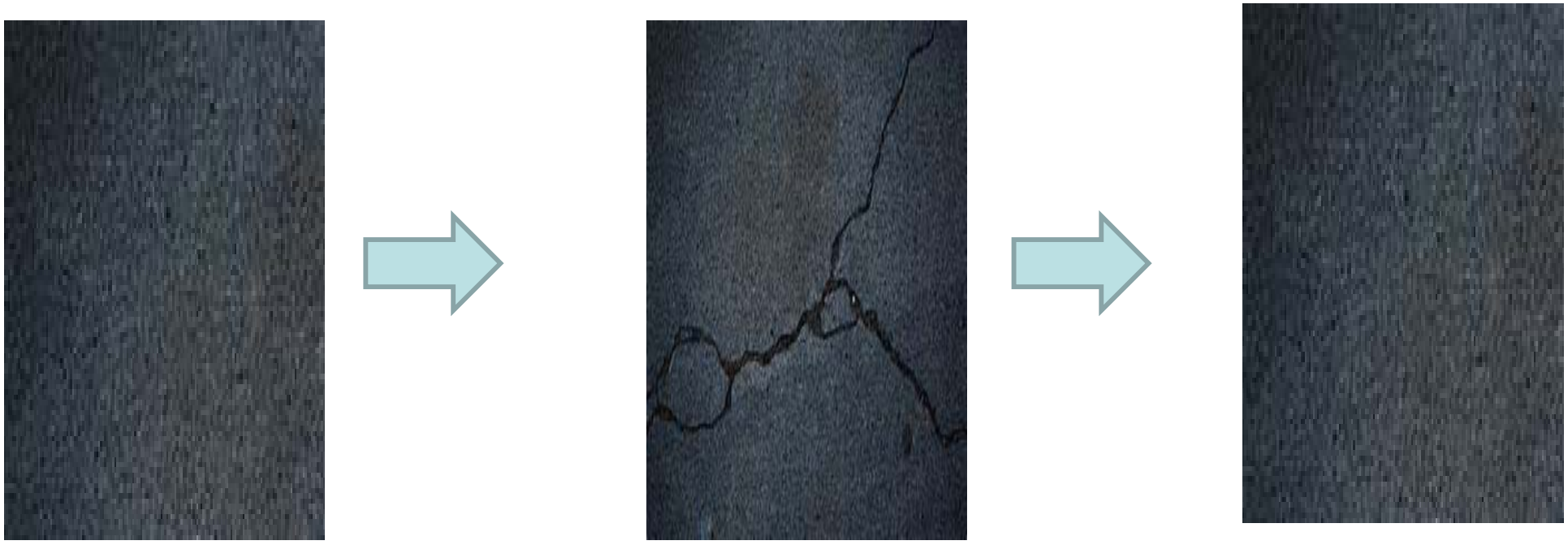
CORRODED FEEDERS

HYDROGEN GENERATION AND CONTROL IS AN IMPORTANT ISSUE IN CANDUs

- PHWRs inherently have significantly more Zircaloy than other reactors (CANDU 6 – 44300 kg, VVR 1000 - 24287kg TVSA) .
- PHWRs have more steel available for high temperature oxidation
  - (1700 m^2 in CANDU 6 feeders vs ~ 100 m^2 in a typical PWR)
- PHWRs have more propensity for oxidation with air during core degradation and immediate release of hydrogen into containment
  - Up to 85% more reaction heat than in steam
  - Experiments show that formation of protective coatings of Zr causes peel-off of oxide layer
  - UO2 oxidation to U3O7 and U3O8 lowers fuel melting point
  - Volatilization of certain fission products such as Ru.
  - Reactor accidents in steam and hydrogen may release negligible Ruthenium.
- Typically Installed hydrogen mitigation measures (igniters) not entirely appropriate or adequate for severe accident mitigation and as we go through a re-examination of the Hydrogen issue we must recognize that Deuterium is the gas under question.
- So as we review hydrogen mitigation measures, it is important to understand that most design basis and severe accidents will lead to production of DEUTERIUM, not HYDROGEN.

LYING ABOUT CONTAINMENT FAILURE MODES TO HARE COMMISSION

Analysis of reinforced concrete structures suggests these will crack and leak (enhanced leakage) if pressurized slowly, and that the leakage will terminate once the pressure is relieved. An irreversible rupture (gross leakage) may occur if the containment is subject to extreme overpressure. (**NK38-NR-REP-73760-10002)**



Actual failure mode as from US Sandia tests

Examples of Potential Design Enhancements

1. Passive makeup by steam driven auxiliary feedwater pumps; de-aerator control enhancements for automatic provision of coolant to boilers
2. HTS overpressure protection enhancements for avoidance of uncontrolled ruptures
3. High pressure makeup of HTS inventory loss by boiloff; improved reliability of loop isolation; means for HTS depressurization
4. Calandria vessel overpressure protection enhancements for avoidance of deliberate voiding ; Moderator makeup.
5. Calandria vessel structural design enhancements for retention of core debris
6. Calandria vault overpressure protection enhancements for avoidance of structural failure
7. Calandria vault heat removal capacity enhancements for retention of debris in CV
8. Containment penetration reinforcement for avoidance of overpressure failures
9. Containment pressure suppression improvements: intelligent dousing, local sprays and external support to coolers

Examples of Potential Design Enhancements

10. Containment dousing water pool use for core debris heat sink purposes in CV and RV.
11. Instrumentation enhancements for detection of important accident parameters
12. Better PARS with alternate heat sinks and modulated recombination
13. Filtered venting from containment for avoidance of imminent structural failures
14. Emergency low pressure hookups for water and power to safety critical systems. (Water makeup to the boilers, reactor cooling system, moderator system , reactor vault)
15. Improved Class 1 batteries., better definition of anticipated loads over prolonged periods of loss of AC power.
16. External water makeup to a stranded fuelling machine after a LOCA
17. External water makeup and heat removal from the spent fuel bay
18. Off-site measurements of releases and correlating them to source terms; and development of dose prediction tools at unmonitored locations

I BELIEVE THAT IT IS UNFORTUNATELY A FACT THAT…

1. Canada is sleep-walking towards a nuclear power reactor disaster of horrific proportions. My country cannot afford an avoidable catastrophe.
2. CNSC is diligently and irreverently clearing a path for us in the direction of a nuclear disaster and like in Fukushima will bear no responsibility and feign ignorance when it happens. Look at the history of regulatory interactions of Japanese regulator with TEPCO before Fukushima.
3. Public Safety is being compromised openly, in defiance of clear scientific and engineering facts and with arrogance and impunity.
4. CNSC is a bloated organization with little technical acumen in power reactor safety; in firm capture by the power industry; dances to its beat and staff is seemingly scared of not meeting the industry expectations of obedience as organization draws ~70% of funding from utilities.
5. CNSC has become a mouthpiece for the nuclear power industry interests and a promotor of these interests.
6. A well-oiled revolving door exists between the CNSC staff / management and power industry. From ex CNSC President down to SMEs who saved industry millions by not insisting on effective design upgrades after Fukushima.

7. Commission members are typically lay persons; largely ignorant of reactor safety issues and are goaded into rubber stamping all staff recommendations which in turn are mere carbon copies of industry wishes that are mere profit driven.
8. A gatekeeper, now called a ‘commission registrar’ shields the Commission members from warnings of erroneous submissions by the industry or any technical dialogue outside of meetings.
9. There is no technical oversight of CNSC as there is of NRC in the US; no separation of rulemaking & rule enforcement.
10. CNSC is part of the same ministry that promotes nuclear energy.
11. There is little rule-based governance; norms are bent at will and in interest of utility wishes and convenience. Numerous examples available.
12. Alternate Truths are created regularly and on purpose. EX: 100 TBQ/5hr.
13. Even unavoidable staff admissions of challenges to reactor integrity due to design errors / design deficiencies by licensees are ignored on purpose or presented with a contrived rosy outcome, technical gibberish or fog.

14. Great lack of transparency in spite of slogans to the contrary.
15. Frequent actions that compromise reactor and public safety in defiance of slogans to the contrary ‘We shall never compromise reactor safety’.
16. Level of nuclear issues related scientific research and technical assessments in the country is abysmal as all technical issues that plague reactors have been declared irrelevant in a hurry to support licensee and staff interests.
17. Public access to information is made more difficult by the day, and large part of regulatory correspondence and historic documents is hidden or scattered amongst multiple websites. Go look at NRC’s ADAMs for inspiration.
18. Known design issues that affect reactor safety in reactors designed 50 years ago are regularly shoved under the rug; known new issues are sugar coated and downplayed; certain staff initiatives to act in public interest are quashed.
19. Public involvement is perfunctory and treated as an inconvenient obligatory burden with mere morsels given out in ‘participant funding’ with zero review.
20. CNSC management regularly presents unsupportable positions to public; has long created alternate realities and ignores public outcry in unison w utilities.
21. CNSC staff have put out, with great fanfare, reports that distort response of reactors to accidents and recommended to Emergency Management Organizations fission product source terms that are ~ 500 times smaller than used by the rest of the world. As a result, first responders will die as will public.

22. EMOs have been encouraged to present KI pills as ‘radiation pills’ . All they do is reduce by a little degree absorption ONLY of radioactive Iodine only IF TAKEN WELL IN ADVANCE of a reactor accident. This is an irresponsible ploy that is used to justify inaction on other fronts.

23. Recommendations to public to save themselves are ridiculous as best . Here is one from NB Power :

15.	advice on potassium iodine prophylaxis (KI pills, eat dulse, take a kelp pill, swig some cough medicine which may contain iodine, or eat some iodized salt)	

24. CNSC staff has never recommended denial of a license application or made any substantive changes. Ever longer-term licenses have suddenly become the norm.

25. CNSC staff regularly uses compliant contractors that create supportive stories or fog which are then turned into fabled truths.

26. Revolving door : CNSC staff and management work for utilities after retirement or even before.

26. There is still an opportunity to act and that will require political intervention, hearings and more active supervision by the parliament.

Points of reference / Fact Checking offending information on CANDU severe accidents

1. CNSC Study of Consequences of a Hypothetical Severe Nuclear Accident and Effectiveness of Mitigation Measures
2. CNSC Study of Severe Accident Progression Without Operator Action – Reflecting OPG position on accident progression / consequences and time available to operator to take mitigation actions
3. Utility positions on accident progression, reactor vulnerabilities and effectiveness of EMEs
4. Perfunctory closure by CNSC of already toothless Fukushima Action Items
5. Disposition of long standing CANDU design error issues with CNSC (overpressure protection)
6. Disposition of 2015 severe accident related design enhancement suggestions by industry through its surrogate COG
7. New licensing issues - LOCA+LOECC hydrogen source term + others
8. Obsolete severe accident progression analysis analytical methods still in use
9. New information on design specifics (low pressurizer in Bruce and Darlington) that kill EME effectiveness and hasten accident progression
10. Information provided to the EMO for emergency planning severely understates risk profiles
11. General arrogance and lack of resilience engineering in the industry
12. Fact checking certain CNSC staff pronouncements at hearings.
13. Arrogance, capture and collusion at CNSC – a danger to nation's right to safety

Progress in CANDU severe accident issues

- Fukushima reviews by the industry have increased the awareness of the potential of a CANDU severe core damage but not understanding of its implications
- Some newly planned mitigating measures like emergency hookups will partly reduce the likelihood of progression to a severe core damage but are not passive or well thought through
- Some long planned measures like PARS and Containment Venting will help reduce consequences but implementation is dangerously incomplete and backup analyses are questionable
- Significant resistance to understanding, acceptance and targeting of inherent reactor design deficiencies by the utility management
- Restructuring of CANDU nuclear industry has affected progress and granting of long term licenses by the ever so collusive CNSC has further retarded progress towards risk reduction from ageing and obsolete reactors
- Significant opportunities exist in further reducing risk to owners and the public but regulatory actions have a negative effect
- Little progress in enhancing analytical capabilities to help identify and quantify vulnerabilities; justify and introduce new risk reduction measures.

OPG/CNSC STATION BLACKOUT SCENARIO PREDICTIONS

MAJOR CONCLUSIONS THAT ARE MOSTLY INCORRECT AND TECHNICALLY IMPOSSIBLE BY A LARGE MARGIN

1. Steam generators remain an effective heat sink for 5 hours

2. Steam generator emergency cooling system can add another 7 hours of cooling. Gravity feed from deaerator adds many more hours.

3. A core collapse at 11 hrs cools the core for extended period of time.

4. Gross structural failure modelled as a minor containment breech (1 m^2) late in the game.

5. Only <0.2% of fission products are released into the atmosphere in 24 hours. Nothing released to atmosphere between 7 and 25 hrs.

6. A totally unbelievable scenario. It just cannot happen. Operators will handle it.

Summary of CNSC Actions that hinder safety

- Feeble and antiquated regulations and rules
- No Standard Review Plans or equivalent directives.
- No separation of rule making and rule enforcement. Ever changing ‘rules’.
- Regularly bypass existing rules and regulations by invoking a legislation flaw
- Create new agreements with licensees on safety evaluation in violation of common sense, engineering principles and past practices.
- Deny credibility of a severe core damage accident in a CANDU reactor.
- Ignore Risk Assessment Studies undertaken by the nuclear industry worldwide.
- Ignore world practices.
- Weak internal technical expertise and dependence upon industry sponsored consultants.
- Suppress internal dissent and discourage technical publication by staff.
- Publish meaningless self congratulatory reports, almost on weekly basis
- Produce misleading and technically flawed videos.
- Produce misleading and blatantly false ‘analytical reports’.
- Promote false hypotheses and pretend to know better.
- Accept un-substantiated claims by industry.
- Ignore basic science
- Accept any and all industry submissions without serious question.
- Aggressively deny validity of any external inputs.

Summary of CNSC Actions that hinder safety

- Pretend that reactors are inherently safe and insist that they require no serious upgrades.
- Promote myths about CANDU superiority and call self ‘World Class’ , ‘World Leader’.
- Make a lot of noise about Fukushima action Items that only required plans to make plans.
- Punish small operators of nuclear gauges and ignore blatant infractions by power reactor industry (Alpha contaminations at Bruce, Darlington)
- Assume the role of an industry spokesman and promoter.
- Write to foreign entities to stop accepting papers from citizens that criticize CNSC actions / inactions / lies.
- Verbally threaten and marginalize interveners at public hearings
- Grant long term licences in defiance of public expectations and ignoring incomplete submissions and faulty arguments by the industry.
- Defend both design and safe operation instead of questioning it
- Independent reviews of safety work only by ‘bought’ consultants.
- Fire protection only exception in ISR as it required independent reviews by independent consultants by law.

CANDU SEVERE ACCIDENT MITIGATION ISSUES

- Operating CANDU reactors did not consider severe accidents in the design basis.
- Multi unit CANDUs especially vulnerable to EME failures, containment failures
- No provisions for HTS depressurization after SBO. No super high pressure water addition to HTS.
- Engineered voiding of calandria vessel accelerates severe core damage
- Significantly higher sources of Deuterium and hydrogen from large amounts of steel and Zircaloy.
- Enhanced potential for steam explosions due to melt relocations pathways
- Overpressure protection in ALL relevant reactor systems (PHTS, Calandria, Shield Tank, Containment) inadequate and challenging for a manageable recovery
- Onset of a severe core damage in a CANDU reactor puts activity directly into the containment. There is no holding of activity in a vessel like in a PWR.

CANDU SEVERE ACCIDENT MITIGATION ISSUES

- Calandria vessel likely cannot contain debris and can fail catastrophically.
- Inadequate instrumentation for core damage monitoring and control.
- Darlington/Bruce reactor vault failures from hydrogen explosions likely
- Current PARS inadequate and potentially dangerous.
- No operator training / simulators for severe accidents.
- Severe accident simulation methods are outdated, crude and inadequate. Black box users.
- No significant design changes implemented. Known problems ignored.
- Current SAMGs are inadequate. Many emergency hookups not implemented
- Extremely high risk potential from external events and sabotage.

Examples of past Staff misrepresentations

Videos

PATSY THOMSON' s misrepresentations on CANDU SA DOSES

Darlington – 2015-11-04 – page 36

Ramzi Jammal's misrepresentations on SOURCE TERM in CNSC STUDY of 100 TBq Cs-137

Darlington – 2015-11-03- page 25

Gerry Frappier's misrepresentations on STEEL OXIDATION

SIMPLE FACTS ON CANDU STEEL OXIDATION

VIKTOROV' s misrepresentations ON STEEL OXIDATION

Victorov misleading on H2/D2- HARWOOD,VIKTOROV @ DARLINGTON 2015