

NRC's Public Meeting on the SOARCA Draft Report at Peach Bottom, Delta PA

2/22/2012

Scott D. Portzline
Three Mile Island Alert
Security Consultant

Summary

1. The conclusions as represented by the NRC Office of Public Relations are misleading.
2. The NRC has not clearly emphasized that SOARCA limited its simulations to a select group of scenarios.
3. SOARCA does not include many aspects of nuclear accidents which would severely alter the outcomes and conclusions.

Summary

4. The MELCOR software has numerous shortcomings and SOARCA should caution its readers that divergent results can easily be created.
5. The NRC has not attempted to correct these misconceptions in the media.
6. The NRC has a history of questionable or faulty probabilistic risk assessments.
7. There has never been a timely evacuation order at any of the world's nuclear accidents.

Point 1


Fox News Headline


Nuclear accidents pose little risk to health, NRC says


Published February 02, 2012 / Reuters



U.S. NUCLEAR REGULATORY COMMISSION

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The risk to public health from a severe nuclear power plant accident in the [United States](#) is "very small" because reactor operators should have time to prevent core damage and reduce the release of radioactive materials, U.S. nuclear regulators said in a study on Wednesday.

Misleading Conclusion

- “SOARCA analyzed the potential consequences of severe accidents at the Surry Power Station near Surry, Va. and the Peach Bottom Atomic Power Station near Delta, Pa.”

NRC Press Release 2/1/12

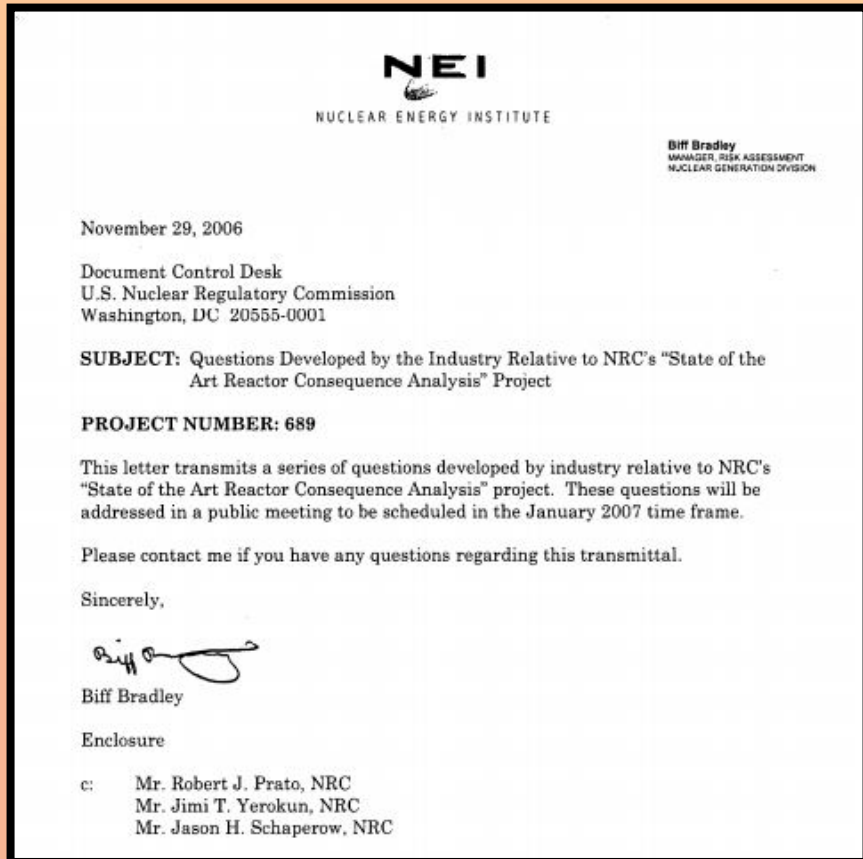
- Should have included the phrase “a few select severe accident scenarios”
- No attempts to correct the erroneous headlines as NRC does for article casting a bad impression

Point 2

RE: Scenarios

#10 What if all sequences that survive the screening process are those that result in an intact containment?

Nuclear Energy Institute letter to NRC on how SOARCA will handle certain parameters - November 2006



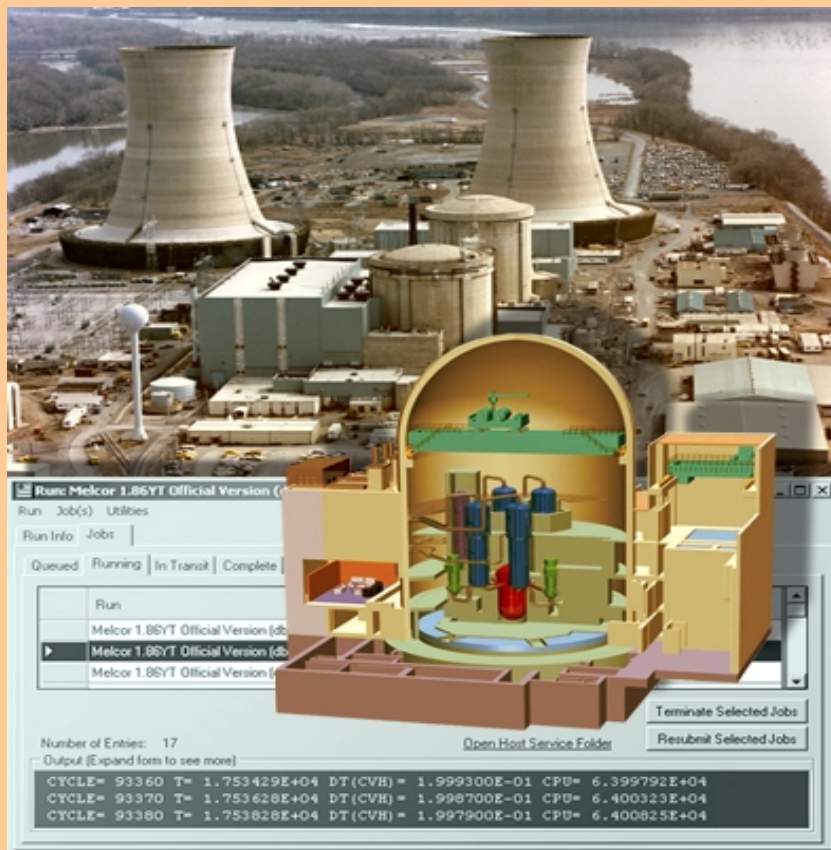
Real-World

None of these real-world nuclear accidents, prior to its occurrence, would have been predicted, or simulated by MELCOR.

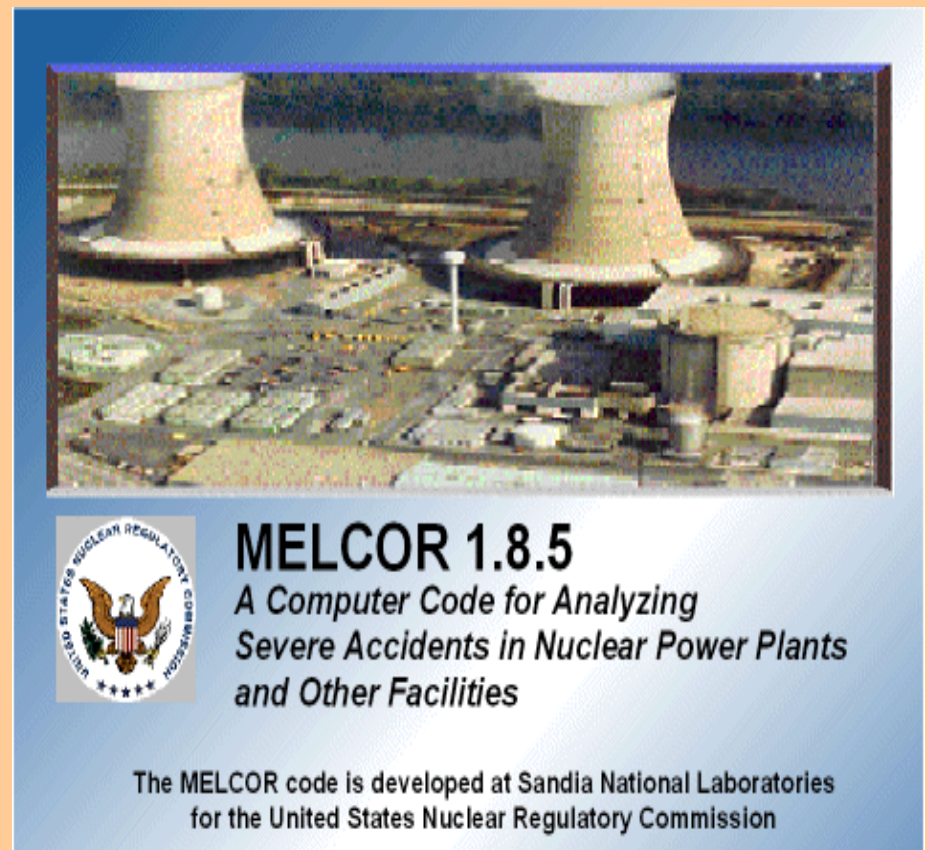
Three Mile Island – Windscale – Chernobyl - Fukushima



Three Mile Island apparently is the poster child for MELCOR



MELCOR web page



software CD cover

Point 3

The people of TMI know that...

- Things don't happen the way you'd think they would!!
e.g. -- A lone TMI licensee employee, acting on his own, deliberately caused one of the releases. No evacuation order or shelter in place order was made.
- Confusion prolongs - mitigation efforts, exacerbates radioactive releases, delays communications, and fosters a reluctance to order an evacuation, and for some citizens, it actually creates a reluctance to evacuate.
- Confusion cannot be accurately modeled by a computer simulation because of its thousands of possibilities. Intelligence may be advanced, but confusion knows no bounds. (bounding is a term used to limit a set of parameters) Operators exacerbated mitigation efforts and interfered with safety equipment at TMI.

Examples of unexpected events from TMI not accounted for in this study

- Due to the falsification of reactor leak rates, the reactor drain tank was already nearly full at the start of the event – early transport of radioactivity.
- Drain lines were already opened to the auxiliary bldg. – early transport of radioactivity.
- Evidence suggests a reactor coolant pump on loop A ran backwards for a time. – unexpected transport...
- Steam Generator A steam tubes destroyed as the result of the events rather than a triggering event. – alters sequence...
- Coolant pump cavitation may contribute to “core hold up” causing the additional and prolonged generation of hydrogen and radioactive steam. – explosive, and source term size
- Certain safety systems were disabled prior to the accident. – alters sequence of events and expectations

Unexpected Early Release

- The mitigated and unmitigated accident consequences of SOARCA hasn't account for the aforementioned conditions which could lead to an early release – earlier than SOARCA has indicated.
- A small opening or pathway can result in a dangerous release.

Point 4

State of the Art

- Means: “pertaining to highest level of development at the time.” – in this case, computer modeling
- Humans can recognize the defects of this analytical method (MELCOR) and can list the reasons for its failures and shortcomings.
- Computer coding is not a substitute for the understanding of good physics or for good scenario creation.
- *MELCOR does not meet DOE Quality Assurance Standards for Safety Software*

The Coming Crisis in Computational Science

Los Alamos National Laboratory

- New codes are more complex and more ambitious but not as closely coupled to experiments and theory.
- Better physics is much more important than better computer science.
- Computational science has to develop the same professional integrity as theoretical and experimental science.

User Dependent

- The ability to simulate an accident sequence will be highly dependent on the code user. The user must select the appropriate nodalization and provide the appropriate models for phenomena that are important for the accident sequence to be simulated.

MELCOR Analysis of the TMI-2 Accident*

Many things can be wrong with a computer generated prediction

- Experimental and theoretical science are mature methodologies but computational science is not.
- Code could have bugs in either the models or the solution methods that result in answers that are incorrect.
- Models in the code could be incomplete or not applicable to problem or have wrong data.
- User could be inexperienced, not know how to use the code correctly.
 - Crater analysis of the Columbia Shuttle damage
 - Sonoluminescence / cold fusion

Los Alamos National Laboratory

Uncertainty Analyses Using the MELCOR

Severe Accident Analysis Code

by Sandia National Laboratories

- “The ability to use a computer code such as MELCOR for prediction of severe accident progression is best early in the accident and becomes progressively less certain later in the accident.
- This is due both to the accumulation of uncertainty in calculation, and through the addition of severe accident phenomena with their associated uncertainty to the calculation.”

continued

- “The TMI-2 analyses provide a good demonstration of this principle. The Phase 1 results were predicted fairly easily, although there is some uncertainty as to what the RCS inventory would be as a function of time.
- The phase 2 calculation demonstrates the ability to generate divergent results, due to the addition of **highly non-linear processes** such as core oxidation and counter-current limited flow in the pressurizer drain line.
- Without the known ‘correct answer’ of plant data from the accident, it would be easy to generate different consequences ranging from minimal to a highly damaged core.”

Point 5

NRC promised to correct mis-representations on a previous Reactor Safety Study 1/18/79

Accident Probabilities: The Commission accepts the Review Group Report's conclusion that absolute values of the risks presented by WASH-1400 should not be used uncritically either in the regulatory process or for public policy purposes and has taken and will continue to take steps to assure that any such use in the past will be corrected as appropriate. In particular, in light of the Review Group conclusions on accident probabilities, the Commission does not regard as reliable the Reactor Safety Study's numerical estimate of the overall risk of reactor accident.

Communication with the Congress and the Public: Commission correspondence and statements involving WASH-1400 are being reviewed and corrective action as necessary will be taken.

Point 6

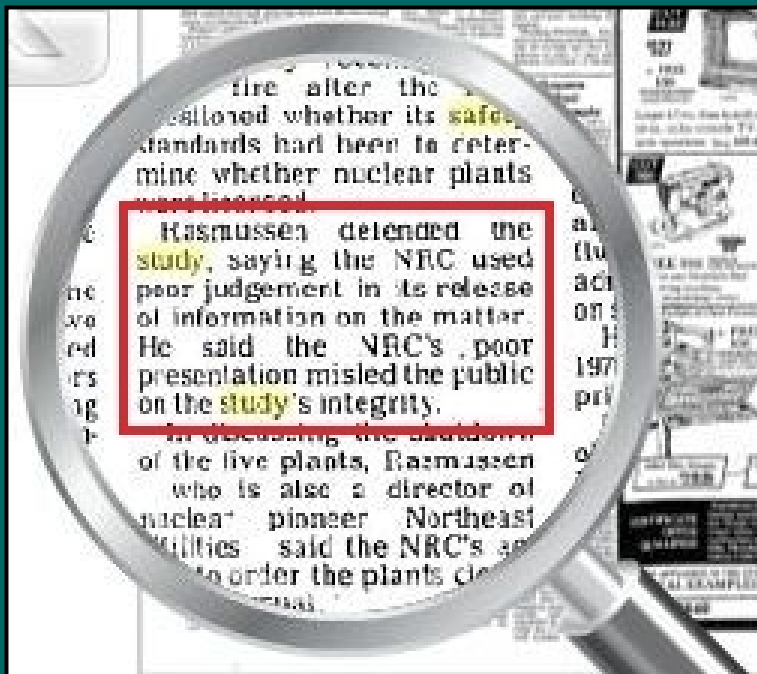
NRC withdraws a Consequences Report

- Just two months prior to the TMI accident the NRC was forced to disavow its accreditation of another Reactor Safety Study (probability risk analysis) known as the WASH 1400 a/k/a the Rasmussen Report.
- “The Commission withdraws any explicit or implicit past endorsement of the Executive Summary [of WASH 1400]”

January 18, 1979 NRC Policy Statement
- The report had stated the probability of an accident was one in a million per reactor per year. Then came TMI.

March 28th 1979 –TMI Accident

RSS author defends the study



Tyron PA Daily Herald 3/28/79

US aides see risk of meltdown



NY Times

NRC withdrawal statement continued

- “The executive summary of the Reactor Safety Study is a poor description of the contents of the report, should not be portrayed as such, and has lent itself to misuse in the discussion of reactor risks.
- The executive summary does not adequately indicate the full extent of the consequences of reactor accidents and does not sufficiently emphasize the uncertainties involved in the calculations of their probability.
- As a result, the reader may be left with a misplaced confidence in the validity of the risk estimates.”

NRC withdrawal statement continued

“The press release at the time of publication said that the report is ‘the culmination of the most comprehensive risk assessment of nuclear power plants made to date. The objectives of the study were to make a realistic assessment providing an objective and meaningful estimate of the present risks associated with the operation of present day light water reactors in the United States.’ ”

All is not well

- This study would be analogous to a report on auto crashes coming out of Detroit where scenarios can be written in which all safety systems -- the brakes, the headlights, the electrical systems, the steering and even the air bags are rendered inoperable, yet somehow the car ends up crashing into a mountain of pillows and no one is injured.
- The sponsor of such a study can claim that they created scenarios where extremely unlikely failures occur simultaneously, and even then, no one is harmed. That may sound impressive but its completely invalid for real world events.

Point 7

No Timely Evacuations

- There has never been a timely evacuation or a timely evacuation order issued at any of the world's nuclear accidents.
- 100% failure rate.
- The evacuation projections are purely wishful thinking.
- Therefore: SOARCA is not based on reality.

Three Mile Island – Windscale – Chernobyl - Fukushima



END

Nuclear Energy Institute Mis-represents Conclusion

- <http://www.opposingviews.com/i/society/environment/preview-cnns-report-vermont-yankee>
- “Just a few weeks ago, the independent NRC released its State of the Art Reactor Consequences Analyses or SOARCA. Its conclusions are encouraging:

The study found there was ‘essentially zero risk’ to the public of early fatalities due to radiation exposure following a severe accident.”

Nuclear Energy Institute Mis-represents Conclusion

<http://safetyfirst.nei.org/safety-and-security/nrc-study-finds-severe-accidents-progress-slowly-safety-measures-effective/>

“Severe accidents at nuclear energy facilities would unfold more slowly and potential releases of radioactive material would be much smaller than earlier studies indicated, the NRC concludes in a new report.”

Nuclear Energy Institute Mis-represents Conclusion

<http://neinuclearnotes.blogspot.com/2012/02/soarca-and-decreasing-risk-of-death.html>

The study found there was 'essentially zero risk' to the public of early fatalities due to radiation exposure following a severe accident."