## NRCExecSec Resource

**From:** Timothy Margulies <t.margulies@gmail.com>
**Sent:** Tuesday, July 23, 2019 12:12 PM
**To:** NRCExecSec Resource
**Subject:** [External_Sender] File Transmittal
**Attachments:** nuclearriskcompareRII.1.pdf

This message sends to a later version of the previously sent file.
There's always more to do... Thank-you for your attention to this matter.

**History & Regulation of Peaceful Uses of Atomic Power**

President Eisenhower's Speech: *Atoms for Peace* [Dec. 8, 1953]

Atomic Energy Act [1954]

Reactor Safeguards Committee [1947] Advisory Committee of Reactor Safeguards [1953]

International Atomic Energy Agency [1957]

Shippingport, Pennsylvania First Peacetime Power Reactor [1958]

Brookhaven Study Severe Accidents (WASH-740) [1957]

Price-Anderson Liability Act [1957]

National Environmental Policy Act [1970]

Nuclear Regulatory Commission Created [1974]

WASH-1400 Nuclear Power Risks (Rasmussen Report) [1975]

Risk Assessment Review Group [Lewis Report, 1978]

*Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants* [1980]

Nuclear Waste Policy Act [1982]

Safety Goals Policy Statement [1986]

NUREG-1150 Accident Risks for 5 plant designs [1990]

Generic Environmental Impact for License Renewal NUREG-1437 [2012]

License Renewals: Independent Plant Examinations (Probabilistic Risk Assessment)

H. A. Watson at Bell Labs is credited with development and an application first to an intercontinental ballistic missile system in 1962 which spread in the following years to other aerospace missiles preceding further use in civil aviation, in the commercial nuclear industry in 1975 Reactor Safety Study, and in chemical industries.

The Flood Control Act of 1939 initiated a Federal policy of Cost-benefit analysis to assess water resource projects to help decide whether or not a project provides sufficient benefits to justify the cost of allocating public funds. In particular, "the benefits to whomever they accrue [be] in excess of the estimated costs.

Executive Order 12866 in the United States requires benefit-cost analysis for any new regulation that is "economically significant," which is defined as having "an annual effect on the economy of $100 million or more or adversely affect[ing] in a material way the economy, a sector of the economy, productivity, ..[1993]. This was amended by E.O. 13258 and E.O. 13422. Executive Order 13497, signed January 30, 2009, revoked those amendments.

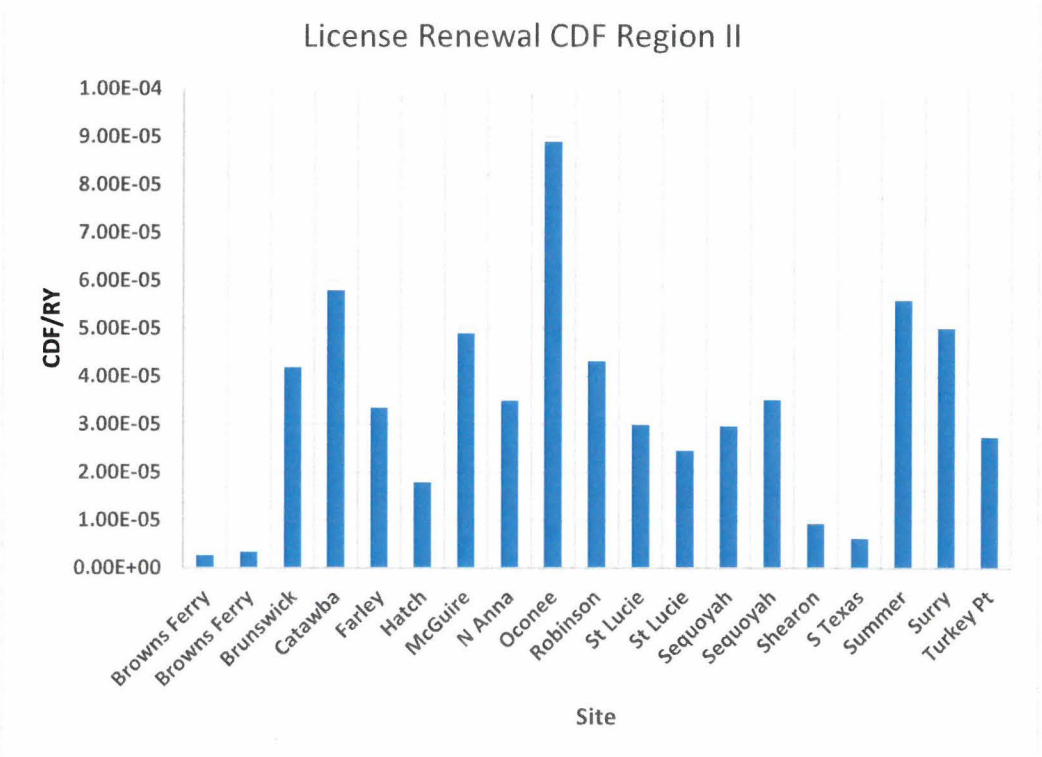
Nureg 1150 Assessment

| Plant | Units | Power Mwe | Containment |
|---|---|---|---|
| Surry | 2 | 788 | Dry sub-atmospheric |
| Peach Bottom | 1 | 1065 | Mark I |
| Sequoyah | 2 | 1148 | Ice condenser |
| Grand Gulf | 1 | 1250 | Mark III |
| Zion | 2 | 1100 | Prestressed concrete, steel lined dry |

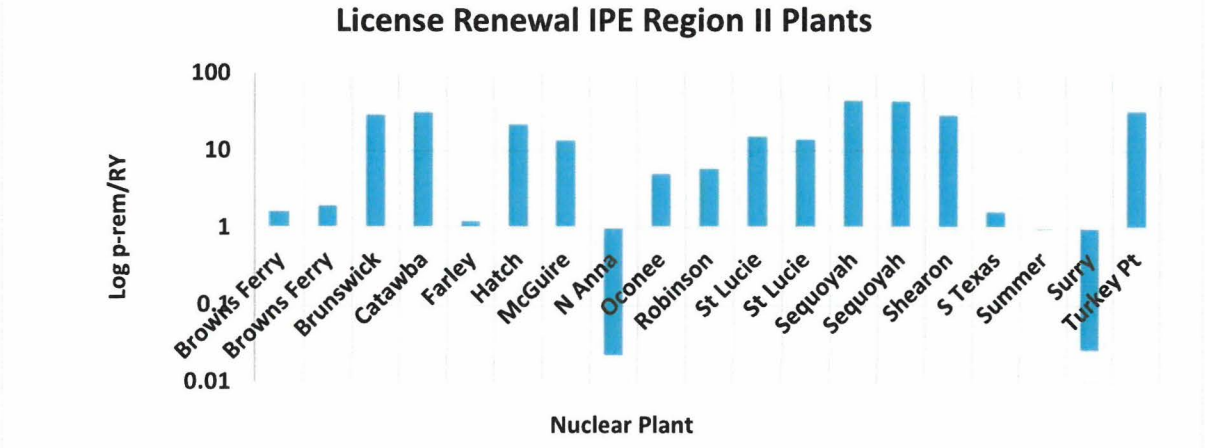
| Plant | Type | Coolant Injection | Heat Removal | Diesels | Battery Time Hr |
|---|---|---|---|---|---|
| Surry | PWR 3 loop | 3 | 2 | 2 | 2 |
| Peach Bottom | BWR-4 | 7 | 3 | 4 | 12 |
| Sequoyah | PWR-4 loop | 3 | 2 | 4 | 2 |
| Grand Gulf | BWR-6 | 9 | 3 | 2 | 12 |
| Zion | PWR-4 loop | 3 | 2 | 5 | |

| Plant | CDF/RY | Maximum Early Fatalities |
|---|---|---|
| Surry | 3.00E-05 | 1000 |
| Peach Bottom | 3.00E-06 | 3 |
| Sequoyah | 4.00E-05 | 3000 |
| Grand Gulf | 3.00E-06 | 30 |
| Zion | 2.00E-04 | 10000 |

## Regional Commercial Nuclear Power Risk Perspectives

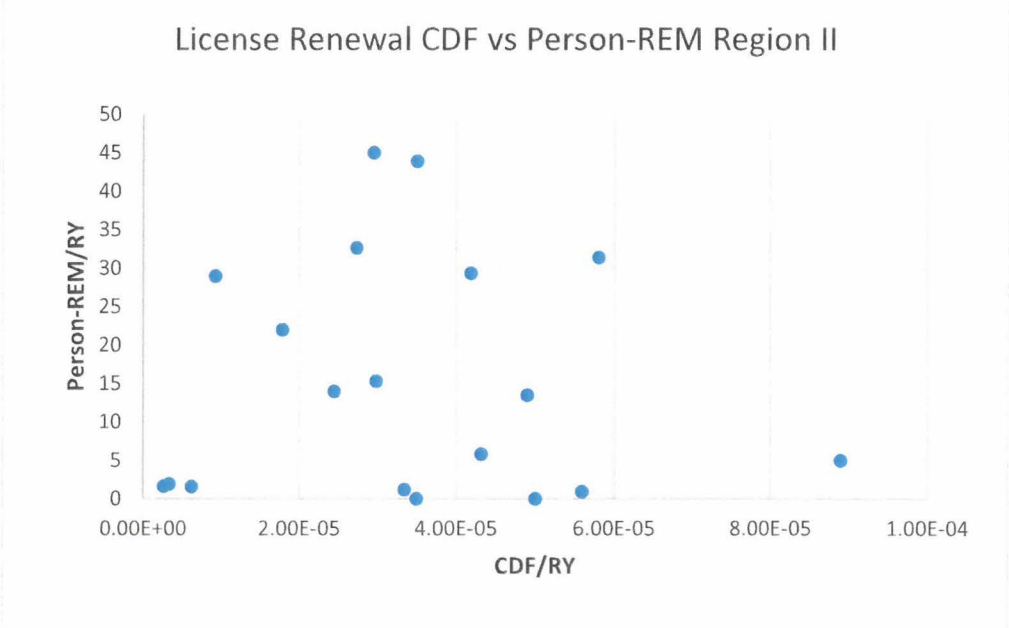


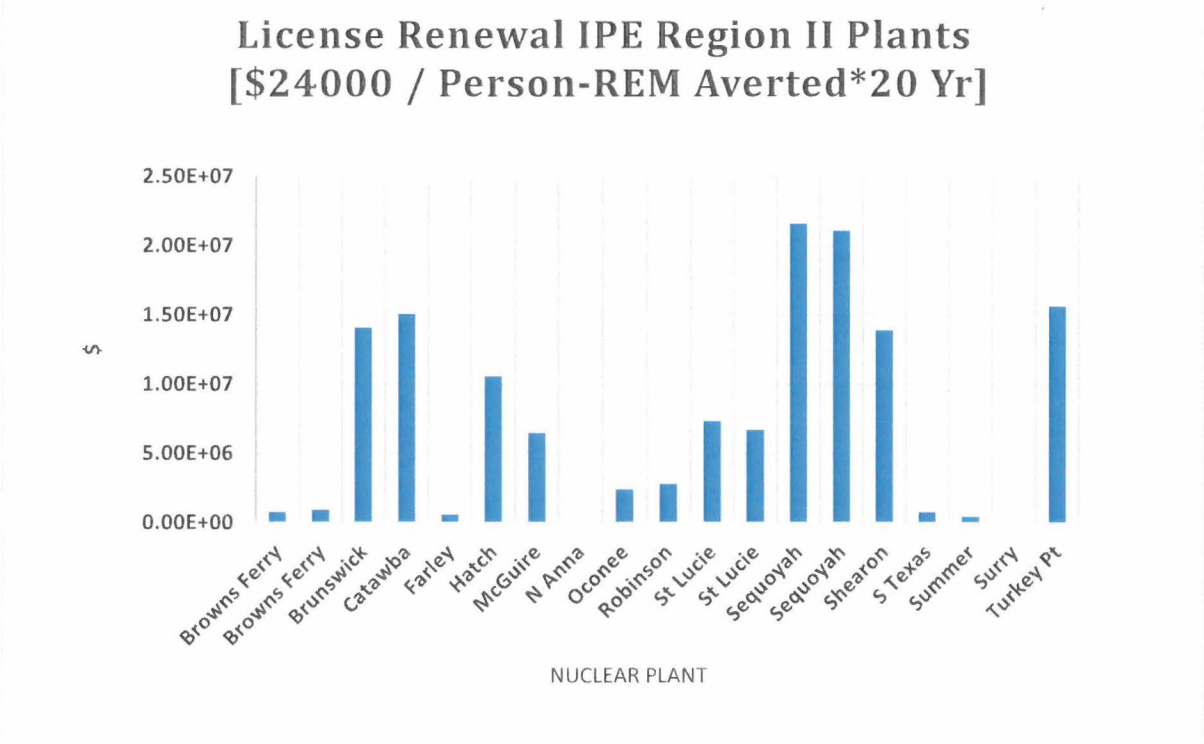

CDF = Core Damage Frequency; RY=Reactor Year

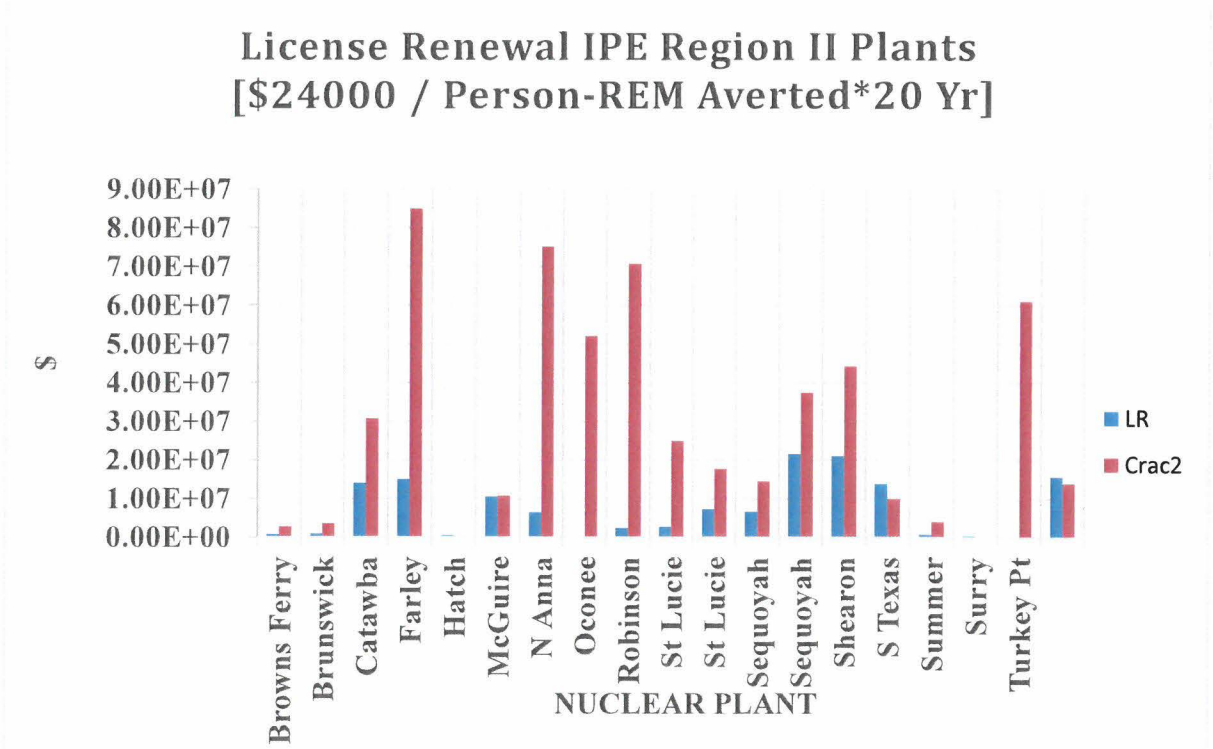


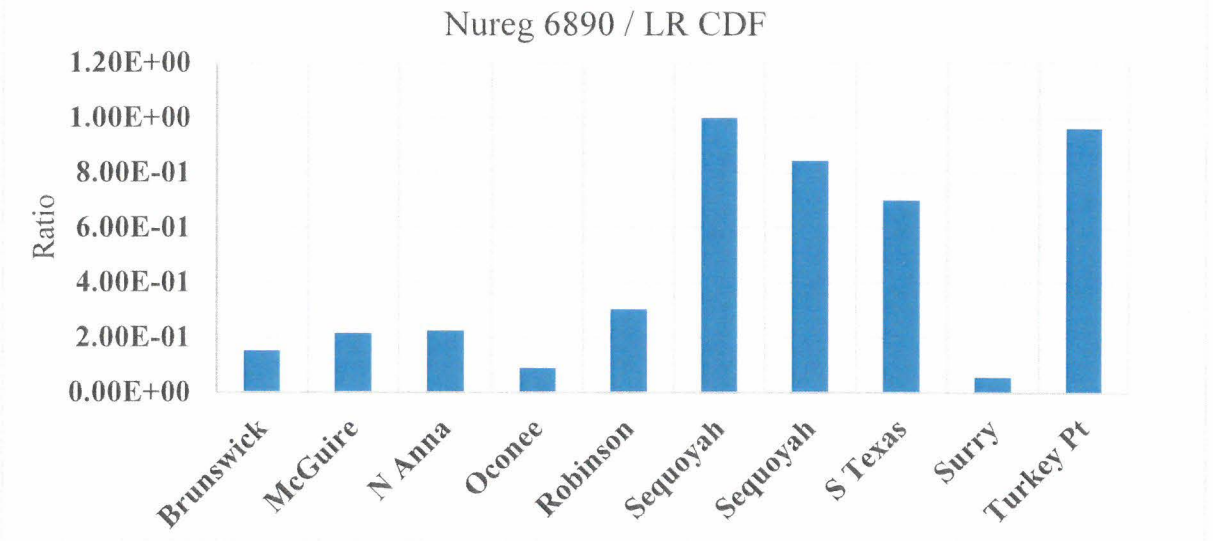

IPE=Independent Plant Examination

1 Person-REM=100 Person-Sievert

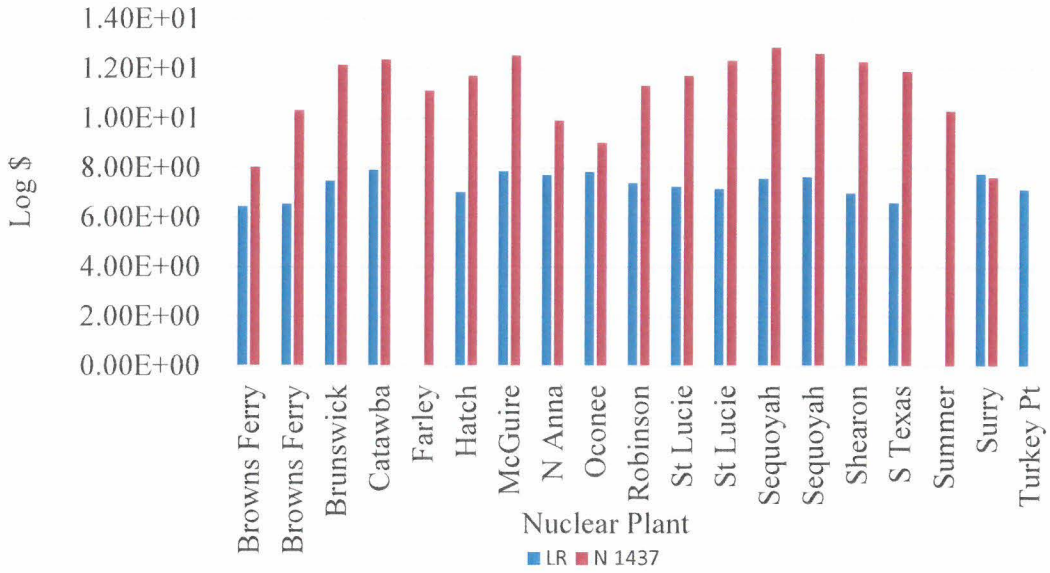

License Renewal CDF vs Person-REM Region II
Person-REM/RY
50
45
40
35
30
25
20
15
10
5
0
0.00E+00
2.00E-05
4.00E-05
6.00E-05
8.00E-05
1.00E-04
CDF/RY


License Renewal IPE Region II Plants
[$24000 / Person-REM Averted*20 Yr]
$
2.50E+07
2.00E+07
1.50E+07
1.00E+07
5.00E+06
0.00E+00
Browns Ferry
Browns Ferry
Brunswick
Catawba
Farley
Hatch
McGuire
N Anna
Oconee
Robinson
St Lucie
St Lucie
Sequoyah
Sequoyah
Shearon
S Texas
Summer
Surry
Turkey Pt
NUCLEAR PLANT

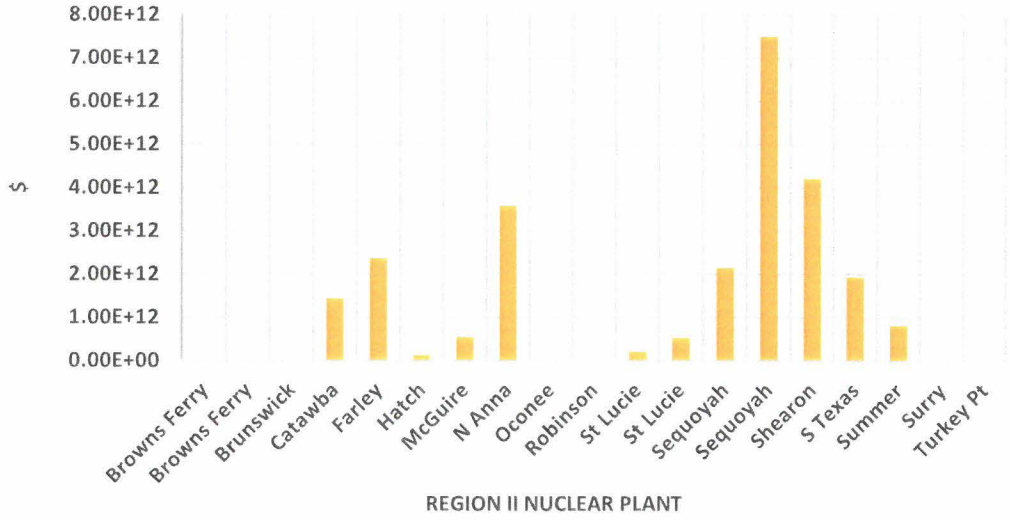

License Renewal IPE Region II Plants
[$24000 / Person-REM Averted*20 Yr]
$
9.00E+07
8.00E+07
7.00E+07
6.00E+07
5.00E+07
4.00E+07
3.00E+07
2.00E+07
1.00E+07
0.00E+00
LR
Crac2
Browns Ferry
Brunswick
Catawba
Farley
Hatch
McGuire
N Anna
Oconee
Robinson
St Lucie
St Lucie
Sequoyah
Sequoyah
Shearon
S Texas
Summer
Surry
Turkey Pt
NUCLEAR PLANT


Nureg 6890 / LR CDF
Ratio
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
Brunswick
McGuire
N Anna
Oconee
Robinson
Sequoyah
Sequoyah
S Texas
Surry
Turkey Pt

## License Renewal IPE vs Nureg 1437 Region II Plants




## License Renewal IPE CDF; Nureg 1437 Person-REM
## [$24000 / Person-REM Averted*20 Yr ]



References:

*UNITED STATES NUCLEAR POWER SAFETY RISK*, Filename: NuclearPerspectives1234567p [Submittal to USNRC, June 1, 2108].

*Severe Accident Modeling for Design Objectives: Prevention or Mitigation*, Filename: TurkeyPtUnitsSevere Accident [Submittal to USNRC Jan. 17, 2019]

*Generic Environmental Impact for License Renewal* [NUREG/CR 1437, 2012]