

Lockheed Martin Corporation Sandia National Laboratories

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CAP 1400 Independent Verification & Validation

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NUCLEAR ENERGY & GLOBAL SECURITY



T E C H N O L O G I E S

Sandia is a multiprogram laboratory operated by Sandia Corporation, a
Lockheed Martin Company,
for the United States Department of Energy's National Nuclear Security
Administration



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Note to reviewers, this presentation
is a subset of one that completed
R&A, see SAND #

Why Independent Verification & Validation (IV&V)?

- **The consequences from a severe accident at a nuclear power plant can be unacceptably large**
 - **Loss of life, injury**
 - **Damage to the environment**
 - **Property loss**
 - **Remediation costs**
 - **Fines**
 - **Damage to reputation**

Why IV&V?

- **The CAP1400 program is extending the reactor design significantly beyond its AP600 roots**
 - **Safety margins were reduced when the AP600 was scaled up to the AP1000**
 - **How much safety margin remains?**
 - **How much safety margin is adequate?**
 - **Will the CAP1400 operate safely?**

Why IV&V?

- **The CAP1400 is first of its kind**
 - new design, beyond state-of-the-art
 - lacks a long-term operating record
 - data and analyses cannot be 100% accurate (uncertainties exist)
 - decisions and interpretations have a significant impact on performance
- **How can safety be assured?**

Why IV&V?

- **IV&V is an in-depth critique of data, assumptions, calculations, uncertainties, extrapolations, alternate interpretations, methodology, acceptance criteria, and conclusions**
- **IV&V confirms the adequacy of work**
- **IV&V relies on people with technical expertise representing the spectrum of knowledge and experience in the subject to be reviewed**
- **IV&V reviewers are independent from the work being reviewed**

Why IV&V?

- **Increases confidence and acceptance by the scientific community, governmental bodies, and public**
- **Considered critical to establishing a reliable body of research and knowledge**
- **Passes judgment on technical adequacy**
- **Identifies aspects that are incorrect or need amplification**
- **Catches errors and weaknesses before they are implemented in a design**

Without IV&V risk of failure is increased

Value of IV&V

- Relies on the independence and qualifications of the reviewers
- Sandia is uniquely qualified to lead IV&V of CAP1400, for example
 - Sandia conducting AP1000 accident progression analyses using MELCOR for another customer
 - Sandia concerned scaling AP1000 may affect heat flux through reactor vessel to passive cooling system

With IV&V risk of failure is decreased

- Increases confidence and acceptance by the scientific community, governmental bodies, and public
- Considered critical to establishing a reliable body of research and knowledge
- Passes judgment on technical adequacy
- Identifies aspects that are incorrect or need amplification
- Catches errors and weaknesses before they are implemented in a design

***Sandia is uniquely qualified to assist with
IV&V of the CAP1400***