

**Perspectives on Analysis of Cancer Risk in Populations Living Near Nuclear Facilities**

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**NAS BEIR VII Perspective (2006)**

- The total body of relevant research...provides compelling reasons to believe that risks associated with low doses of low-LET radiation are no greater than expected on the basis of the LNT model.
- At doses less than 40 times the average yearly background exposure (100 mSv), statistical limitations make it difficult to evaluate cancer risk in humans.
- In general, additional ecological studies of persons exposed to low levels of radiation from environmental sources are not recommended.



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**Challenges with Descriptive (Ecological) Studies**

- Lack of specific information on individuals within a population
- Difficulty in adequately addressing confounding factors
- Variability in data accuracy and completeness
- Population migration or movement
- Low statistical power



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### NPP Programs for Monitoring and Controlling Public Dose

- Radiological Effluent Monitoring & Control
  - Radioactivity in Gaseous & Liquid Effluents
  - Direct Radiation Exposure
  - Doses to maximally exposed people (infant, child, teen or adult)
- Radiological Environmental Monitoring
  - Monitoring results for all principal exposure pathways
- Land Use Census
  - Determine maximally exposed people




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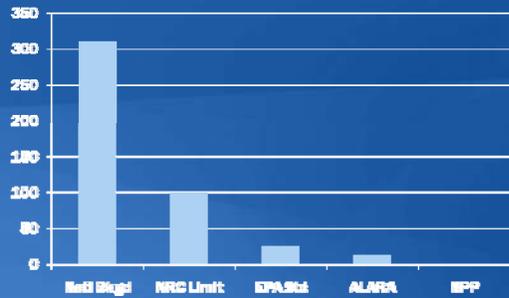
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### Annual Dose (mrem)




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### Populations Living Around Nuclear Power Plants (2000 Census Data)

Distance	Population
▪ Total	
– 0-2 miles	– 65,239
– 0-5 miles	– 588,667
– 0-10 miles	– 2,795,411
▪ Range (individual plants)	
– 0-2 miles	– 0 – 7,694
– 0-5 miles	– 2 – 67,154
– 0-10 miles	– 1,882 – 201,321




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### Population Member Perspective

- Broad range of people -some of whom are directly and personally affected
- Expectations and preconceptions vary widely
- Trust and confidence challenges are prominent due to the context –nuclear energy, radiation, and cancer



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### Suggestions

- Recognize and communicate up front the inherent difficulties and limitations
- Assess validity and uncertainty in dose estimate data
- Assess the significance of confounders
- Estimate the statistical power and uncertainties
- Clearly and fully explain the rationale for going forward –or not



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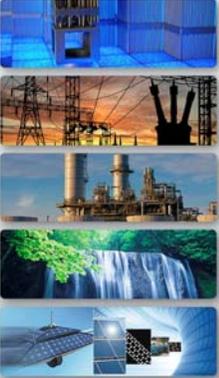
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**EPRI** | ELECTRIC POWER RESEARCH INSTITUTE

**EPRI Evaluation of Proposed Study on Cancer in Populations Living Near Nuclear Facilities**

Phung Tran, Senior Project Manager

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### EPRI Low-Dose Radiation Health Effects Program

- Enhance scientific understanding of low-dose health effects by supporting basic research
- Collaborate with and review results from global research institutes to develop an integrated understanding of health effects



Previous publication:

Dauer, L. et al., *Review and Evaluation of Updated Research on the Health Effects Associated with Low-Dose Ionising Radiation*. Radiation Protection Dosimetry, Vol. 140, No. 2, pp. 103–136 (2010).

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### EPRI Review of NAS Cancer Study

#### Objectives

- Provide technical suggestions for study design.
- Engage stakeholders to ensure a robust study is performed that recognizes statistical limitations and confounders.

#### Approach

- Form scientific review committee.
- Review 1990 National Cancer Institute study and more recent studies.
- Identify specific recommendations for study design.
- Develop white paper for stakeholder discussion.

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### EPRI Scientific Review Committee

- P. Tran - EPRI Senior Project Manager
- A. Brooks – Radiobiology/Internal Emitters
- L. Dauer – NPP Experience/Medical Effects
- H. Grogan – Environmental Risk Assessment/Dosimetry
- C. Heath – Epidemiology (former CDC)
- D. Hoel - Epidemiology/Risk Assessment
- W. Morgan – Radiobiology/Low Dose Specialist
- W. Wendland – NPP Experience/Effluents

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### Key Considerations

- Epidemiological End Points
- Epidemiological Study Design
- Epidemiological Groupings
- Data Gathering Techniques
- Relating Small Radiation Dose to Cancer Risk is Difficult
- Exposure Assessment
- Confounders
- Basis for Risk Communication

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