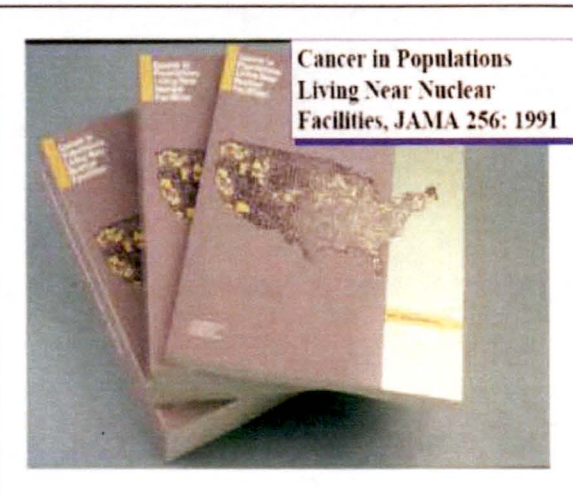




# **Analysis of Cancer Risks in Populations Living Near Nuclear Facilities: Pilot Studies Next Steps**

Terry Brock  
Office of Nuclear Regulatory Research  
EDO Briefing



## Background

- Staff identified need for contemporary cancer epidemiology information for responding to recurrent stakeholder concerns
- Staff have been using the sentinel 1990 National Cancer Institute (NCI) report “Cancer in Populations Living Near Nuclear Facilities” to help answer these questions



## National Cancer Institute (NCI)

- Looked at 16 different types of cancers
- Three Control Counties for each study county

<http://dceg.cancer.gov/about/organization/programs-ebp/reb/fact-sheet-mortality-risk>

National Cancer Institute

### FactSheet

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
National Institutes of Health

#### No Excess Mortality Risk Found in Counties with Nuclear Facilities

A National Cancer Institute (NCI) survey published in the *Journal of the American Medical Association*, March 20, 1991, showed no general increased risk of death from cancer for people living in 107 U.S. counties containing or closely adjacent to 62 nuclear facilities. The facilities in the survey had all begun operation before 1982. Included were 52 commercial nuclear power plants, nine Department of Energy research and weapons plants, and one commercial fuel reprocessing plant. The survey examined deaths from 16 types of cancer, including leukemia. In the counties with nuclear facilities, cancer death rates before and after the startup of the facilities were compared with cancer rates in 292 similar counties without nuclear facilities (control counties).

## What did the NCI study find?

- No Excess Mortality Risk Found in Counties with Nuclear Facilities
- Showed no general increased risk of death from cancer for people living in 107 U.S. counties containing or closely adjacent to 62 nuclear facilities.

| Overall Relative Risks |                |               |
|------------------------|----------------|---------------|
| Disease                | Before Startup | After Startup |
| Leukemia               |                |               |
| - Childhood            | 1.08           | 1.03          |
| - All Ages             | 1.02           | 0.98          |

Jablon et al, *JAMA* 265:1403-1408, 1991

Time Pattern



# Why is NRC Sponsoring an Update?

- User-need request from NSIR, NRR, NRO, RI, and OPA
- To provide stakeholders with the **latest cancer epidemiology information**
- Develop an approach to assess cancer risk in **geographic areas smaller than the county level**
- Account for **off-site dose**
- Study **cancer incidence** (occurrence or morbidity)





## Recent International Studies

- Public concerns are not unique to the U.S.
  - Germany (2008)
  - Spain (2009)
  - Switzerland (2011)
  - Great Britain (2011)
  - France (2012)
  - Canada (2013)



Studies generally found no increased cancer risk attributable to the facilities

# Timeline



- 2007 – Staff request for update
  - User-need from NSIR, NRR, NRO, OPA, and RI
  - Offered interagency agreement to NCI to update report
    - After many discussions/meetings, NCI declined to take on project
- 2008 – Started work with Oak Ridge Associated Universities' Center for Epidemiologic Research
  - Staff established external peer-review panel to review ORAU's work



## Timeline cont.



- 2009 – NRC Chairman questioned ORAU selection
- 2010 – Selected the National Academy of Sciences (NAS) to perform update
  - Phased Approach
- 2012 – NAS Phase 1 report complete (\$1 M)
  - Recommended two study designs and pilot studies at seven sites
  - Staff communicated plans to Commission to move forward with the pilot studies
  - Provided an approach that met our initial request to build on NCI methods (i.e., dosimetry, incidence, and smaller geographic regions)
- 2014 – Pilot Planning Project complete (\$0.5 M)
  - NAS reported that to execute the pilot would be very expensive to complete with limited usefulness of pilot results for estimating risks (\$8 M and 3.5 years)

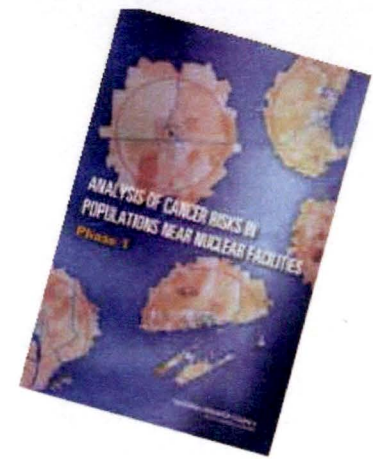
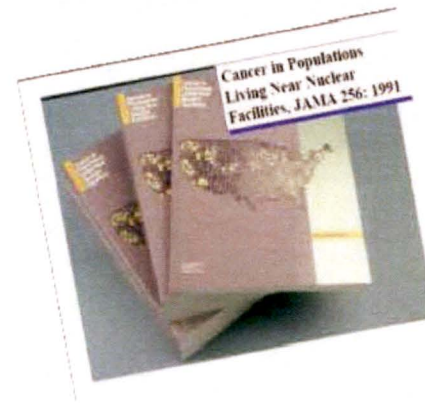




## Timeline cont.

- Today - DECISION POINT
- 
- ~2019 – Complete Pilot Execution
    - NAS emphasized the limited usefulness of results
  - ~2023 – Complete balance of plants for staff to have usable risk estimates

## Bottom-line



- Continuing with NAS through the pilot and nation-wide studies could take ~8-10 more years and tens of million of dollars to complete before staff has NAS endorsed risk estimates
- Staff requested NAS to try alternate approach

## NAS Alternate Approach

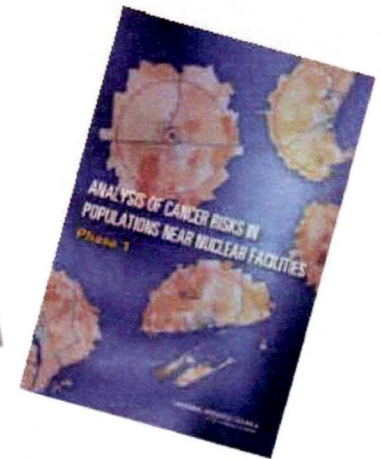
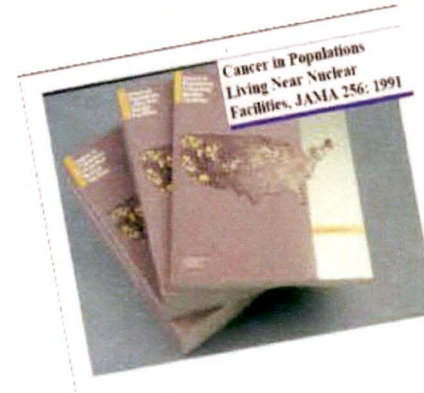


- Focus on case-control study to reduce scope, time, and costs
  - Study design considered more robust than ecologic
- Perform study of enough sites to provide statistically significant results that NRC can use to communicate cancer risks at the end of the study
  - Results need to be generalizable to the fleet



# NAS Alternate Approach Proposal

- 54 months (4.5 years)
- Need at least 7 sites
  - Probably do not use most of the original pilot sites
    - Different selection criteria
  - Select new sites based on adequacy of cancer registries
- Reconvene the Pilot Planning Committee
  - \$200-300k for 9 months
  - Select sites with enough statistical power to draw conclusions about cancer risk
    - Develop test hypothesis
  - Provide cost estimate to complete final study (final cost unknown at this time)
- Perform final analysis



## **Additional Approach**

- The U.S. National Council on Radiation Protection and Measurements (NCRP)
  - Unsolicited proposal to provide 20-25 year follow-up to NCI study at a much reduced time (2-3 years at ~\$1 million)
  - Updated NCI report by NCRP would still be useful to staff in communicating cancer mortality risks, but lack the additional information asked for when project started



# Additional Approach Pros

## Cancer in Populations Living Near Nuclear Facilities - UPDATE

| San Onofre                   | 1950-1967 (Before Start-Up) |      |          |      |          | 1968-1984 (After Start Up) |      |          |      |          | 1968-2004 (After Start Up) |      |          |      |          |
|------------------------------|-----------------------------|------|----------|------|----------|----------------------------|------|----------|------|----------|----------------------------|------|----------|------|----------|
|                              | Study                       |      | Controls |      | Relative | Study                      |      | Controls |      | Relative | Study                      |      | Controls |      | Relative |
|                              | Obs                         | SMR  | Obs      | SMR  | RR       | Obs                        | SMR  | Obs      | SMR  | RR       | Obs                        | SMR  | Obs      | SMR  | RR       |
| Leukemia and Aleukemia       | 1796                        | 1.00 | 928      | 0.93 | 1.07     | 3,536                      | 0.97 | 1729     | 1.01 | 0.97     | 10,315                     | 1.00 | 4,733    | 0.96 | 1.04     |
| Childhood Cancer (age < 10)  | 623                         | 1.12 | 291      | 1.01 | 1.11     | 521                        | 1.09 | 282      | 1.17 | 0.93     | 1,039                      | 1.11 | 526      | 1.04 | 1.07     |
| Childhood Leukemia (age <10) | 310                         | 1.13 | 135      | 0.95 | 1.19     | 229                        | 1.07 | 124      | 1.15 | 0.93     | 433                        | 1.17 | 205      | 1.04 | 1.12     |

Study Counties: Orange, CA and San Diego, CA  
Control Counties: Santa Barbara, CA, San Bernadino, CA and Ventura, CA

Comment: RR's higher before start up than after

| Dresden                      | 1950-1960 (Before Start-Up) |      |          |      |          | 1961-1984 (After Start Up) |      |          |      |          | 1961-2004 (After Start Up) |      |          |      |          |
|------------------------------|-----------------------------|------|----------|------|----------|----------------------------|------|----------|------|----------|----------------------------|------|----------|------|----------|
|                              | Study                       |      | Controls |      | Relative | Study                      |      | Controls |      | Relative | Study                      |      | Controls |      | Relative |
|                              | Obs                         | SMR  | Obs      | SMR  | RR       | Obs                        | SMR  | Obs      | SMR  | RR       | Obs                        | SMR  | Obs      | SMR  | RR       |
| Leukemia and Aleukemia       | 125                         | 0.94 | 338      | 1.07 | 0.88     | 407                        | 0.95 | 1005     | 1.03 | 0.92     | 977                        | 1.00 | 2,086    | 1.00 | 1.00     |
| Childhood Cancer (age < 10)  | 41                          | 1.01 | 99       | 1.06 | 0.94     | 92                         | 1.06 | 187      | 1.12 | 0.95     | 130                        | 0.98 | 255      | 1.08 | 0.91     |
| Childhood Leukemia (age <10) | 19                          | 0.95 | 55       | 1.20 | 0.79     | 32                         | 0.79 | 78       | 0.99 | 0.80     | 48                         | 0.87 | 93       | 0.91 | 0.95     |

Study Counties: Grundy IL, Will IL  
Control Counties: Woodford IL, Jefferson WI, Cass IN, Winnebago IL, Porter IN, McHenry IL

Comment: All RRs below 1.0 whether before or after startup

| Millstone                    | 1950-1970 (Before Start-Up) |      |          |      |          | 1971-1984 (After Start Up) |      |          |      |          | 1971-2004 (After Start Up) |      |          |      |          |
|------------------------------|-----------------------------|------|----------|------|----------|----------------------------|------|----------|------|----------|----------------------------|------|----------|------|----------|
|                              | Study                       |      | Controls |      | Relative | Study                      |      | Controls |      | Relative | Study                      |      | Controls |      | Relative |
|                              | Obs                         | SMR  | Obs      | SMR  | RR       | Obs                        | SMR  | Obs      | SMR  | RR       | Obs                        | SMR  | Obs      | SMR  | RR       |
| Leukemia and Aleukemia       | 246                         | 0.90 | 1,101    | 0.88 | 1.02     | 223                        | 0.98 | 929      | 0.95 | 1.03     | 595                        | 0.96 | 2,459    | 0.94 | 1.03     |
| Childhood Cancer (age < 10)  | 66                          | 0.93 | 273      | 0.97 | 0.95     | 30                         | 1.13 | 70       | 0.73 | 1.56     | 45                         | 0.95 | 130      | 0.72 | 1.32     |
| Childhood Leukemia (age <10) | 33                          | 0.94 | 138      | 0.99 | 0.95     | 17                         | 1.45 | 34       | 0.79 | 1.83     | 22                         | 1.18 | 60       | 0.84 | 1.40     |

Study County: New London CT  
Control Counties: Worcester MA, Litchfield CT, Tolland CT

Comment: High RR of death related to incidence before startup. Jablon 1990



## **Additional Approach Pros**

- NCRP is an independent organization chartered by Congress to support radiation protection by providing independent scientific analysis, information, and recommendations that represent the consensus of leading scientists
- Original NCI Principle Investigator is now at NCRP and will lead the study
- NCRP already has access to the files
  - No start-up costs
- Most importantly >> staff will have updated cancer information to communicate to stakeholders in the short-term!

## **Additional Approach Cons**

- No incidence analysis
- No smaller geographic units of study
  - County versus Census tracts
  - No dosimetry
- Only funding option is an unsolicited grant proposal
  - Current internal NRC guidance will not allow receipt of unsolicited grant proposals
  - No planned open solicitation for grant proposals

## **Next Steps**

- TA brief on current status(Near-term)
  - Already sent-up a CA note on the results of the NAS pilot planning project
- Develop SECY paper informing Commission of next steps (Summer)



FOR: The Commissioners

FROM: Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

SUBJECT: RESULTS OF THE ANALYSIS OF CANCER RISKS IN POPULATIONS  
NEAR NUCLEAR FACILITIES: PHASE 2 PILOT PLANNING PROJECT  
AND NEXT STEPS

PURPOSE:

The purpose of this paper is to update the U.S. Nuclear Regulatory Commission (NRC) on the analysis of cancer risks in populations near nuclear facilities study and staff plans for the next steps.

BACKGROUND:

Each commercial nuclear power plant and fuel cycle facility that the NRC regulates is authorized to release radioactive materials to the environment as specified in the regulations and licensing documents, in compliance with dose limits for members of the public and concentration limits for liquid and gaseous effluent releases. The staff has concluded that offsite doses to individual members of the public as a result of these routine releases are a small fraction of the Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection against Radiation," specifically 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public is also generally less than 1 percent of the amount of radiation the average U.S. citizen receives in a year from all background sources. Nonetheless, some stakeholders have continued to express concerns about the potential effect of these releases on the health of residents living near nuclear facilities.

CONTACT: Terry Brock, RES/DSA  
301-251-7487

These concerns are not new or unique to the United States. Since 2008, Canada, France, Germany, Great Britain, Spain, and Switzerland have all conducted epidemiological studies near nuclear facilities within their borders to address public health concerns. These studies have generally found no association between facility operations and increased cancer risks to the public that are attributable to the releases. For example, the German study did find an association of increased childhood leukemia risk within 5 kilometers of the facilities; however, upon examination of the offsite exposures, the authors concluded the increased risk could not be attributable to releases from the facilities<sup>1</sup>.

To help address these stakeholder concerns, the staff has been using the 1990 NCI study, "Cancer in Populations Living near Nuclear Facilities" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15035A630), and other more recent epidemiological reports conducted by various State health departments when communicating on cancer mortality in populations near nuclear power facilities. The staff relies on credible health studies to augment its discussions about the NRC's robust regulatory programs to keep offsite doses as low as is reasonably achievable (ALARA) by providing public health information that directly applies to the health outcomes that are often of concern (i.e., cancer). However, the 1990 NCI report is now more than 25 years old, and the staff recognized an update would allow the staff to provide contemporary cancer information to populations near NRC-licensed nuclear facilities.

The staff originally requested NCI to provide the update; however they were unable to provide staff to support the study and these types of studies were no longer in their research focus. NCI still supports the original report and has a fact sheet on the study that is publicly available on their web site at <http://dceg.cancer.gov/about/organization/programs-ebp/reb/fact-sheet-mortality-risk>.

In April 2010, the NRC requested the National Academy of Sciences (NAS) perform a study on cancer risks in populations living near NRC-licensed facilities to update the 1990 NCI study. NRC and NAS decided to divide the study into phases. In Phase 1, NAS explored the feasibility of conducting an updated study by developing modern methods to perform the analysis. This was documented in the 2012 report, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1" (ADAMS Accession No. ML15035A132). The staff communicated the results of the Phase 1 study and the NAS recommendations for the second phase pilot studies in SECY-12-0136, "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities Study" (ADAMS Accession No. ML12249A121). In Phase 2, NAS would conduct pilot studies to determine the ability to practically apply the Phase 1 methods at seven sites recommended by the NAS committee: Dresden (in Illinois), Millstone (in Connecticut), Oyster Creek (in New Jersey), Haddam Neck (decommissioned; in Connecticut), Big Rock Point (decommissioned; in Michigan), San Onofre (in California), and Nuclear Fuel Services (in Tennessee). NAS specifically recommended the pilot study examine two study designs: a population study of cancer diagnosis and mortality rates for multiple cancer types and all age groups, down to the census-tract level, and a case control study of childhood cancers in children born within a fixed distance of a nuclear facility<sup>2</sup>. Upon completion of the proposed Phase 2

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<sup>1</sup> Kaatsch P, et al. "Leukaemia in Young Children Living in the Vicinity of German Nuclear Power Plants," *International Journal of Cancer*, 2008 Feb 15; 122(4):721-6.

<sup>2</sup> The population-based study design uses a geographical area as the unit of observation (e.g., census tract as proposed by NAS, county as used in the 1990 NCI report, ZIP Code) and uses an aggregate analysis that looks at a study factor (exposure) and an outcome factor (disease or death) measured in the geographical area at the same time. This study can show possible associations between exposure and disease. The case-control study design compares the prevalence of risk factors or exposures in a series of

pilot studies, NAS was to determine whether further study is practical on a nationwide scale, and the NRC staff was charged with determining whether to perform the studies at all NRC-licensed facilities (i.e., balance of operating nuclear power plants and fuel-cycle facilities).

NAS split the Phase 2 pilot study into a pilot planning project and a pilot execution project. This paper describes staff's evaluation of the NAS pilot planning project report, "Analysis of Cancer Risks in Nuclear Facilities: Phase 2 Pilot Planning" (ADAMS Accession No.: ML15035A135) and staff plans for the next steps.

#### DISCUSSION:

##### *NAS: Phase 2 Pilot Planning Project Results*

NAS stated in the pilot planning report that the pilot studies are meant to determine the practicality of implementing the methods and study designs recommended in Phase 1. NAS also said the interpretation and communication of risk estimates from the pilot study, if reported, should be done with "great caution". It emphasized that any data collected during the pilot study would have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples. Furthermore, any decision to proceed with a full scope study should be based solely on conclusions related to practicality and not on risk estimates. NAS also highlighted that the population-based study at the census tract level had significant issues. Staff interpreted that this study design may not be feasible. NAS also communicated to staff that the execution phase of the pilot study will require "significant resources" to complete. (39 months and cost \$8 million).

After staff members reviewed the pilot planning report and execution phase proposal, they do not believe it is worthwhile to complete the pilot study, given the NAS position regarding the limited usefulness of the results to draw conclusions about the pilot plants (or just as importantly, single facilities), the long duration and high cost of the pilot study, and the long duration of subsequent studies. In addition, the staff estimates that it may take NAS 8 to 10 years from now to complete the pilot and the nation-wide studies before NRC has final cancer risk results to share with NRC stakeholders—the original intent of the project. That would possibly prolong the study to 2025, 15 years after the start of the project with NAS.

##### *NAS Alternate Approach*

Staff expressed concerns to NAS about the usefulness of the pilot study results in communicating cancer risks to stakeholders and the overall study duration. Staff requested that NAS focus on providing final results for the next phase of the study to shorten the study time. Specifically, staff asked NAS to focus on the Phase 1 recommended case-control study design and perform an analysis of a sample of facilities in the United States to draw statistically valid and generalizable results to the entire fleet. In response, NAS proposed that the pilot planning committee reconvene to examine our request for the alternate approach at an additional \$200,000 for a 9-month study. After the new review, NAS estimated another 50 months to complete the alternate approach at an uncertain cost.



*U.S. National Council on Radiation Protection and Measurements (NCRP) Approach*

In an unsolicited proposal, NCRP offered to directly update the 1990 NCI study report within a shorter time frame and cost (approximately 2 to 3 years and \$2.5 million). The NCRP update would be a more modest initiative. NCRP would use the same methods in the 1990 study—a countywide population-based study design, and would be able to provide final results in a reasonable time period to meet the original staff goal of having updated information. The NCRP is in a unique position to update the study because the original 1990 NCI data set and software resides with them, reducing significant start-up time and costs for a new entity to perform the update. Additionally, the NCRP's lead investigator used to work for NCI where he designed, directed, and completed the original 1990 study. The results of the NCRP update would be a consensus report going through their scientific committee and peer-review process. The staff will ask NCRP to update the report with new results for certain NRC facilities not operational or considered at the time of the 1990 study using the same NCI approach of studying population risks at the county level (e.g., Nuclear Fuel Services in Tennessee, Braidwood and Byron Nuclear Generating Stations in Illinois). The staff also plans to ask NCRP upon completion of the update if further study should be done viz-a-viz the NAS Phase 1 case-control study design—generally considered a more robust design.

CONCLUSION:

After considering the two NAS and NCRP approaches, the staff plans to proceed with NCRP in updating the 1990 NCI study. NCRP would provide a useful report in a shorter time frame with a known completion date and budget. The NCRP update will be more modest than what NRC asked NAS to consider in a new update, but a direct update would be adequate for staff to discuss cancer risks rather than pursuing the lengthy options of either NAS approaches. The staff may re-engage NAS to perform the case-control study design if the NCRP results suggest a follow-up is needed.

RESOURCES:

The planned NCRP approach to the study will take 2-3 years to complete and will cost approximately \$2.5 million dollars. For FY15, \$110,000 was budgeted; no money was budgeted in FY16. For 2017, the staff will request a nominal amount. Future funds will come from the operating reactor budget line to initiate the proposed project through the Planning, Budget, and Performance Management process. Full funding for this project is uncertain.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

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The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

**ADAMS Accession No.: ML15141A404**

|        |             |              |                |           |           |
|--------|-------------|--------------|----------------|-----------|-----------|
| OFFICE | RES/DSA/RPB | Tech Editing | BC:RES/DSA/RPB | D:RES/DSA | R-I       |
| NAME   | T. Brock    | QTE          | R. Tadesse     | M. Case   | D. Dorman |
| DATE   | 05/21/15    | 05/26/15     | 05/21/15       | / /       | / /       |
| OFFICE | D:NMSS      | D:NRR        | D:NSIR         | D:NRO     | D:CFO     |
| NAME   | C. Haney    | W. Dean      | B. Holian      | G. Tracy  | M. Wylie  |
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| OFFICE | D:OGC       | D:OPA        | D:ADM          | D:RES     |           |
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| DATE   | / /         | / /          | / /            | / /       |           |

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From: Garry, Steven  
To: (b)(6)  
Subject: Fw: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
Date: Wednesday, June 24, 2015 1:20:25 PM  
Attachments: FW ACTION Y020150186 Review Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations.msg

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From: Garry, Steven  
Sent: Monday, June 22, 2015 1:15 PM  
To: Smith, Micheal  
Subject: FW: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

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From: Mail Delivery System [MAILER-DAEMON@mail2.nrc.gov]  
Sent: Monday, June 22, 2015 1:13 PM  
To: Mrs8@nrc.gov  
Subject: Undeliverable: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Delivery has failed to these recipients or groups:

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A problem occurred while delivering this message to this email address. Try sending this message again. If the problem continues, please contact your helpdesk.

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Generating server: mail2.nrc.gov

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Remote Server returned '< #5.0.0 smtp; 5.1.2 - Bad destination host 'DNS Hard Error looking up nrc.gov (MX): NXDomain' (delivery attempts: 0)>'

Original message headers:

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by mail2-private.nrc.gov with ESMTP; 22 Jun 2015 13:13:24 -0400  
X-IronPort-AV: E=Sophos;i="5.13.660,1427774400";  
d="scan'208";a="189393461"  
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(172.17.48.11) with Microsoft SMTP Server (TLS) id 15.0.1044.25; Mon, 22 Jun  
2015 13:13:21 -0400  
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HQPWMSMRS05.nrc.gov ([fe80::b4cb:8372:3877:ad79%22]) with mapi id  
15.00.1044.021; Mon, 22 Jun 2015 13:13:21 -0400

From: "Garry, Steven" <Steven.Garry@nrc.gov>  
To: "Mrs8@nrc.gov" <Mrs8@nrc.gov>  
Subject: FW: ACTION: Y020150186: Review & Concurrence of Info SECY  
Paper-Results of the Analysis of Cancer Risk Populations  
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Paper-Results of the Analysis of Cancer Risk Populations  
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Date: Mon, 22 Jun 2015 17:13:21 +0000  
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References: <9ed80b22e34b41329e5371534efe23f0@HQPWMSMRS03.nrc.gov>  
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MIME-Version: 1.0

**NOT FOR PUBLIC RELEASE**

Below is the link to the cancer study comm plan with Q&As. It is not expected that there will be any changes.

[View ADAMS P8 Properties ML15244A833](#)

[Open ADAMS P8 Document \(Communications Plan - Analysis of Cancer Risks in Populations Living Near Nuclear Facilities-Project Closeout\)](#)

**NOT FOR PUBLIC RELEASE:** The SECY paper is here: [ML15141A404](#)



## No Excess Mortality Risk Found in Counties with Nuclear Facilities

A National Cancer Institute (NCI) survey published in the *Journal of the American Medical Association*, March 20, 1991, showed no general increased risk of death from cancer for people living in 107 U.S. counties containing or closely adjacent to 62 nuclear facilities. The facilities in the survey had all begun operation before 1982. Included were 52 commercial nuclear power plants, nine Department of Energy research and weapons plants, and one commercial fuel reprocessing plant. The survey examined deaths from 16 types of cancer, including leukemia. In the counties with nuclear facilities, cancer death rates before and after the startup of the facilities were compared with cancer rates in 292 similar counties without nuclear facilities (control counties).

The NCI survey showed that, in comparison with the control counties, some of the study counties had higher rates of certain cancers and some had lower rates, either before or after the facilities came into service. None of the differences that were observed could be linked with the presence of nuclear facilities. "From the data at hand, there was no convincing evidence of any increased risk of death from any of the cancers we surveyed due to living near nuclear facilities," said John Boice, Sc.D., who was chief of NCI's Radiation Epidemiology Branch at the time of the survey.

He cautioned, however, that the counties may be too large to detect risks present only in limited areas around the plants. "No study can prove the absence of an effect," said Dr. Boice, "but if any excess cancer risk due to radiation pollution is present in counties with nuclear facilities, the risk is too small to be detected by the methods used."

The survey, conducted by Seymour Jabon, Zdenek Hrubec, Sc.D., B.J. Stone, Ph.D., and Dr. Boice, was begun in 1987 for scientific purposes in response to American public health concerns, and after a British survey of cancer mortality in areas around nuclear installations in the United Kingdom showed an excess of childhood leukemia deaths near some facilities.<sup>1</sup> No increases in total cancer mortality were found in the

<sup>1</sup> "Cancer Near Nuclear Installations," David Forman, Paula Cook-Mozaffari, Sarah Darby, et al. *Nature*, October 8, 1987.



X 3 0 1 1

British study, and other smaller surveys of cancer deaths around nuclear facilities in the United States and the United Kingdom have yielded conflicting results.

The NCI scientists studied more than 900,000 cancer deaths in the study counties using county mortality records collected from 1950 to 1984. The researchers evaluated changes in mortality rates for 16 types of cancer in these counties from 1950 until each facility began operation and from the start of operation until 1984. For four facilities in two states (Iowa and Connecticut), cancer incidence data were also available. Data on cancer incidence in these counties resembled the county's mortality data patterns.

For each of the 107 study counties, three counties that had populations similar in income, education, and other socioeconomic factors, but did not have or were not near nuclear facilities, were chosen for comparison. The study and control counties were within the same geographic region and usually within the same state. Over 1.8 million cancer deaths were studied in the control counties.

The numbers of cancer deaths in the study counties and in the control counties were analyzed and compared to determine the relative risk (RR) of dying of cancer for persons living near a nuclear facility. A relative risk of 1.00 means that the risk of dying of cancer was the same in the study and control counties; any number below 1.00 indicates that the overall risk was lower in the study county than in the control county; and any number greater than 1.00 indicates a higher risk in the study county. For example, an RR of 1.04 would indicate that there was a 4 percent higher risk of cancer death in the study county. Conversely, an RR of 0.93 would indicate a 7 percent lower risk in the study county.

For childhood leukemia in children from birth through age 9 years, the overall RR comparing study and control counties before the startup of the nuclear facilities was 1.08; after startup the RR was 1.03. These data indicate that the risk of childhood leukemia in the study counties was slightly greater before startup of the nuclear facilities than after. The risk of dying of childhood cancers other than leukemia increased slightly from an RR of 0.94 before the plants began operation to an RR of 0.99 after the plants began operating.

For leukemia at all ages, the RRs were 1.02 before startup and 0.98 after startup. For other cancer at all ages, the RRs were essentially the same: 1.00 before startup and 1.01 after startup. These results provide no evidence that the presence of nuclear facilities influenced cancer death rates in the study counties.



## **Questions and Answers**

### **National Cancer Institute (NCI) Survey Cancer Mortality in Populations Living Near Nuclear Facilities**

#### **1. Which nuclear facilities were included in the survey?**

Only major nuclear facilities that are or once were in operation and went into service before 1982 were included in the survey. All 52 commercial nuclear power facilities in the United States that started before 1982 were included. A facility may include more than one reactor.

In addition to the commercial nuclear power facilities, nine U.S. Department of Energy (DOE) nuclear installations and one commercial fuel reprocessing plant were included. These facilities do not generate electrical power for commercial use.

Facilities such as small research reactors at universities were not included. See the Appendix for a complete list of facilities.

#### **2. Why were the DOE facilities included?**

In the British study that helped to prompt this survey, an excess of childhood leukemias was found mainly around nuclear installations that were involved in the enrichment, fabrication, and reprocessing of nuclear fuel or research and development of nuclear weapons. The DOE facilities included in the study are similar to these British facilities.

Also, some DOE installations have been operating since 1943, which is longer than any commercial nuclear power plant in the United States. The first commercial nuclear power plant began operation in 1957.

The DOE facilities were evaluated both as part of the total group of nuclear facilities and separately.

#### **3. Which counties were included in the survey?**

All counties with a major nuclear facility that is or once was in operation and went into service before 1982 were included in the survey as study counties. Other adjacent counties that contain one-fifth of the land that lies within a 10-mile radius of these facilities were also included as study counties. In total, 107 counties were identified as study counties. See the Appendix for a complete list.

For each study county, three control counties within the same geographic region that do not have or are not near nuclear facilities were identified for comparison. Control counties were chosen that were the most similar to study counties based on population size and socioeconomic characteristics such as race and income.

#### **4. What were the 16 types of cancer surveyed?**

The following 16 types of cancer were surveyed: leukemia; all cancers other than leukemia (as a group); Hodgkin lymphoma; lymphomas other than Hodgkin lymphoma; multiple myeloma; cancers of the digestive organs (as a group and separately), including cancer of the stomach, colon and rectum, and liver; cancer of the trachea, bronchus, and lung; female breast cancer; thyroid cancer; cancer of the bone and joints; bladder cancer; brain and other central nervous system cancer; and other benign or unspecified tumors.

#### **5. Why was childhood leukemia a special focus of the analysis?**

The excess risk identified in the British study pertained to leukemia deaths among persons under the age of 25. Leukemia is one of the major cancers induced by high doses of radiation and may occur as soon as 2 years after exposure. Other cancers associated with high-dose radiation may not develop until 10 years after exposure.

Studies have also suggested that children are more sensitive to the cancer-producing effects of radiation than adults. Children may spend more time in and around the home than parents, whose jobs may take them to other areas. They are also more likely to come in close contact with the soil, upon which radioactive releases may have been deposited following discharges from the facilities.



**6. Why were cancer deaths (mortality) compared instead of the number of cancer cases that occurred (incidence)?**

Although data on cancer incidence (the number of newly diagnosed cases in a given period of time) could provide a more complete evaluation of the possible impact of living near nuclear facilities, cancer incidence data for the entire Nation do not exist. The reporting of county mortality data by state provides nationwide data that can show important geographic and time-related patterns of cancer. In past NCI studies, mortality data have proven useful in developing clues about the causes of cancer and in targeting areas for future research.

Cancer incidence data were available in two states (Iowa and Connecticut) for four facilities. The cancer registries that provided this information were among those that participate in the NCI Surveillance, Epidemiology, and End Results Program and are of high quality. Survey results using cancer incidence data resembled results using cancer mortality data.

**7. Did any individual county or plant have an excess risk of cancer death?**

Overall, the risks for childhood leukemia, adult leukemia, and all cancers were about the same in the counties with nuclear installations as in the control counties. The areas around some facilities appeared to have higher risks of leukemia while others had lower risks. Generally, however, the differences are not large and are consistent with the random variations seen when making many comparisons based on geographic data.

The county surrounding the Millstone Power Plant located in New London, Connecticut, had a significant excess of cases of leukemia in children under 10 years of age (shown in incidence statistics) in comparison to its control counties. The RR was 3.04 after startup of the facility. Upon review, the excess risk shown using incidence data arose partly from comparison with significantly low cancer rates in the control counties rather than from a high rate in the study county.

No other excesses of childhood leukemia were found that could be linked to any of the nuclear facilities. Further, three facilities—San Onofre in Orange County and San Diego County, California; Quad Cities in Rock Island County and Whiteside County, Illinois; and Vermont Yankee in Windham County, Vermont—were marked by significant deficits in the RR for leukemia death at 10 to 19 years of age. The RRs were 0.75, 0.24, and 0.09, respectively.

**8. Is it possible that "chance" could explain some of the high or low relative risks observed in the survey?**

Due to the large scope of the study and the many comparisons made, it could be expected that a number of "statistically significant" increased or decreased RRs would be observed due to chance alone. Further, significant variations in rates might also result from underlying differences in other cancer risk factors that have nothing to do with the presence of nuclear facilities. The prevalence of important risk factors, such as cigarette smoking and diet, might be the cause of many of the observed differences in cancer rates between study and control counties. As expected, comparisons of cancer rates in study and control counties showed substantial variation, but there was no general tendency for cancer rates to be higher after nuclear facilities began operating than before operation began.

**9. Did the counties with DOE facilities, individually or as a group, have an increased risk of cancer for the surrounding counties?**

The findings for the DOE facilities were similar to those for the electricity-generating plants. There was no overall suggestion of cancer excesses that could be attributed to the presence of the DOE nuclear facilities. The lone commercial fuel reprocessing plant was included in the overall evaluation of DOE facilities.

For these counties, the RRs for childhood leukemia (ages birth to 9 years) were 1.45 before the facilities began operation and 1.06 after opening. For all other childhood cancers, the RRs were 1.06 and 0.95 before and after operation began, respectively. For leukemia at all ages, the RRs were 1.07 before startup and 0.96 after startup. For other cancer at all ages, the RRs were essentially the same, 1.06 before startup and 1.04 after startup.



**10. Why was the study based on the county as the geographic unit?**

The data for a study based on counties were readily available for the entire United States. NCI and the U.S. Environmental Protection Agency have prepared detailed data on cancer mortality by county since 1950. Population data, which are needed to calculate cancer rates, are also available by county. Thus, the county was the smallest geographic unit for which nationwide data could be quickly evaluated.

**11. Have similar county-based studies been valuable in the past?**

Yes, surveys using methods that analyze county mortality patterns have been used effectively several times by NCI. Based on findings from NCI "cancer maps" constructed from county mortality statistics, a clustering of lung cancer deaths was seen among residents of counties along the southern Atlantic coast. Across the United States, counties with shipyard industries were found to have elevated rates of lung cancer deaths, particularly in men. Subsequent indepth studies of the high-risk areas linked the excess lung cancer deaths to asbestos and cigarette smoke exposure in shipyards, especially during World War II.

In another study, mortality rates from lung cancer were found to be elevated among men and women living in counties with smelters and refineries that emitted arsenic. A previous NCI study had shown arsenic to cause lung cancer in smelter workers who were heavily exposed to the substance. Further analytical study of counties with smelters showed an elevated risk of lung cancer associated with residential exposure to arsenic released by smelters into the local environment.

The county mortality surveys are often considered a first step toward directing future research efforts. These surveys also have their limitations. The county may be too large to detect risks present only in limited areas, death certificates are sometimes not accurate regarding the actual cause of death, and exposures to individuals are unknown.

**12. Would a study based on smaller geographic units be feasible?**

Mortality and population data are not available on a national basis for areas smaller than counties. The data required for studies of small areas, such as cities or neighborhoods, are collected at the state or local level when they are available.

Using the existing county mortality data, the survey took 3 years to complete. A national survey using data for areas smaller than counties would take much longer.

**13. Were the study design and results reviewed?**

In addition to internal review, the design of the study was evaluated by an expert team of scientists from outside the U.S. Government who also reviewed the entire intramural research program of the Radiation Epidemiology Branch in the Division of Cancer Etiology (DCE), NCI.

Because of the importance of clarifying any potential health hazards associated with living near nuclear facilities, a special advisory group was also established to help evaluate the study results. The advisory group consisted of selected members of DCE's Board of Scientific Counselors as well as other scientists from outside the U.S. Government with expertise in radiation epidemiology.

**14. What levels of radiation might be expected from the normal operation of most of the nuclear facilities studied?**

Reported radioactive releases from monitored emissions of nuclear facilities in the United States show very low radiation exposure to the surrounding populations. Maximum individual radiation doses from these plants are reported to be less than 5 millirem annually, or less than 5 percent of what is received annually from natural background sources of radiation, such as cosmic rays and radon. Levels this low are believed to be too small to result in detectable harm. However, there have been high releases of radioactive emissions from some facilities, such as the Hanford facility (Benton, Franklin, and Grant Counties, Washington).

It is important to distinguish between a major release of radioactivity from a reactor accident, such as the accident at Chernobyl in the former Soviet Union, and the small amounts of radiation that are likely to be emitted by nuclear facilities under normal operation.

**15. Will there be more research on the possible hazards of living near nuclear facilities?**

The NCI county mortality survey is only the initial step in evaluating the possible hazards of living near nuclear facilities. The study provides background information that will complement that from other studies being conducted or planned by the Centers for Disease Control and Prevention, various state health departments, and other groups. Information gained from this survey and other ongoing projects will guide future research efforts.

In its consensus statement, the ad hoc advisory committee that reviewed and evaluated this study has also recommended areas for further research.

The complete three-volume report titled *Cancer in Populations Living Near Nuclear Facilities* can be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325. The GPO stock number is 017-042-00276-1.



**Appendix**  
**Facilities and Counties Included in the Study**

| State         | County      | Study Facility                   | Year of Startup |
|---------------|-------------|----------------------------------|-----------------|
| Alabama       | Houston     | Farley                           | 1977            |
|               | Lawrence    | Browns Ferry                     | 1973            |
|               | Limestone   | Browns Ferry                     | 1973            |
| Arkansas      | Pope        | Arkansas                         | 1974            |
| California    | Amador      | Rancho Seco                      | 1974            |
|               | Humboldt    | Humboldt Bay                     | 1963            |
|               | Orange      | San Onofre                       | 1967            |
|               | Sacramento  | Rancho Seco                      | 1974            |
|               | San Diego   | San Onofre                       | 1967            |
|               | San Joaquin | Rancho Seco                      | 1974            |
| Colorado      | Boulder     | Fort St. Vrain                   | 1976            |
|               |             | *Rocky Flats                     | 1953            |
|               | Jefferson   | *Rocky Flats                     | 1953            |
|               | Larimer     | Fort St. Vrain                   | 1976            |
|               | Weld        | Fort St. Vrain                   | 1976            |
| Connecticut   | Middlesex   | Haddam Neck                      | 1967            |
|               | New London  | Millstone                        | 1970            |
| Delaware      | New Castle  | Salem                            | 1976            |
| Florida       | Citrus      | Crystal River                    | 1977            |
|               | Dade        | Turkey Point                     | 1972            |
|               | St. Lucie   | St. Lucie                        | 1976            |
| Georgia       | Appling     | Hatch                            | 1974            |
|               | Burke       | *Savannah River                  | 1950            |
|               | Early       | Farley                           | 1977            |
|               | Toombs      | Hatch                            | 1974            |
| Idaho         | Bingham     | *Idaho National Engineering Lab. | 1949            |
|               | Butte       | *Idaho National Engineering Lab. | 1949            |
|               | Jefferson   | *Idaho National Engineering Lab. | 1949            |
| Illinois      | Grundy      | Dresden                          | 1960            |
|               | Lake        | Zion                             | 1972            |
|               | Rock Island | Quad Cities                      | 1972            |
|               | Whiteside   | Quad Cities                      | 1972            |
|               | Will        | Dresden                          | 1960            |
| Iowa          | Benton      | Duane Arnold                     | 1974            |
|               | Harrison    | Fort Calhoun                     | 1973            |
|               | Linn        | Duane Arnold                     | 1974            |
| Kentucky      | Ballard     | *Paducah Gas. Diff.              | 1950            |
|               | McCracken   | *Paducah Gas. Diff.              | 1950            |
| Maine         | Lincoln     | Maine Yankee                     | 1972            |
|               | Sagadahoc   | Maine Yankee                     | 1972            |
| Maryland      | Calvert     | Calvert Cliffs                   | 1974            |
| Massachusetts | Berkshire   | Yankee Rowe                      | 1960            |
|               | Franklin    | Vermont Yankee                   | 1972            |
|               |             | Yankee Rowe                      | 1960            |
|               | Plymouth    | Pilgrim                          | 1972            |
| Michigan      | Berrien     | Cook                             | 1975            |
|               | Charlevoix  | Big Rock Point                   | 1962            |
|               | Emmet       | Big Rock Point                   | 1962            |
|               | Monroe      | Fermi                            | 1963            |
|               | Vanburen    | Palisades                        | 1971            |



|                |               |                               |      |
|----------------|---------------|-------------------------------|------|
| Minnesota      | Goodhue       | Prairie Island                | 1973 |
|                | Sherburne     | Monticello                    | 1971 |
|                | Wright        | Monticello                    | 1971 |
| Missouri       | Atchinson     | Cooper Station                | 1974 |
| Nebraska       | Gage          | Hallam                        | 1962 |
|                | Lancaster     | Hallam                        | 1962 |
|                | Nemaha        | Cooper Station                | 1974 |
|                | Richardson    | Cooper Station                | 1974 |
|                | Washington    | Fort Calhoun                  | 1973 |
| New Hampshire  | Cheshire      | Vermont Yankee                | 1972 |
| New Jersey     | Ocean         | Oyster Creek                  | 1969 |
|                | Salem         | Salem                         | 1976 |
| New York       | Cattaraugus   | **Nuclear Fuel Services       | 1966 |
|                | Oswego        | Nine Mile Point/Fitzpatrick   | 1969 |
|                | Rockland      | Indian Point                  | 1962 |
|                | Wayne         | GINNA                         | 1969 |
|                | Westchester   | Indian Point                  | 1962 |
| North Carolina | Brunswick     | Brunswick                     | 1975 |
|                | Gaston        | McGuire                       | 1981 |
|                | Lincoln       | McGuire                       | 1981 |
|                | Mecklenburg   | McGuire                       | 1981 |
| Ohio           | Butler        | *Fernald                      | 1951 |
|                |               | *Mound                        | 1947 |
|                | Hamilton      | *Fernald                      | 1951 |
|                | Montgomery    | *Mound                        | 1947 |
|                | Ottawa        | Davis Besse                   | 1977 |
|                | Pike          | *Portsmouth Gaseous Diffusion | 1952 |
|                | Warren        | *Mound                        | 1947 |
| Oregon         | Columbia      | Trojan                        | 1975 |
| Pennsylvania   | Beaver        | Shippingport/Beaver Valley    | 1957 |
|                | Dauphin       | Three Mile Island             | 1974 |
|                | Lancaster     | Peach Bottom                  | 1974 |
|                |               | Three Mile Island             | 1974 |
|                | York          | Peach Bottom                  | 1974 |
|                |               | Three Mile Island             | 1974 |
| South Carolina | Aiken         | *Savannah River               | 1950 |
|                | Barnwell      | *Savannah River               | 1950 |
|                | Chesterfield  | Robinson                      | 1970 |
|                | Darlington    | Robinson                      | 1970 |
|                | Oconee        | Oconee                        | 1973 |
|                | Pickens       | Oconee                        | 1973 |
| South Dakota   | Lincoln       | Pathfinder                    | 1964 |
|                | Minnehaha     | Pathfinder                    | 1964 |
| Tennessee      | Anderson      | *Oak Ridge                    | 1943 |
|                | Hamilton      | Sequoyah                      | 1980 |
|                | Roane         | *Oak Ridge                    | 1943 |
| Virginia       | Caroline      | North Anna                    | 1978 |
|                | Hanover       | North Anna                    | 1978 |
|                | Isle of Wight | Surry                         | 1972 |
|                | Louisa        | North Anna                    | 1978 |
|                | Surry         | Surry                         | 1972 |
| Vermont        | Windham       | Vermont Yankee                | 1972 |

|               |  |   |  |
|---------------|--|---|--|
| Washington    | Benton<br>Cowlitz<br>Franklin<br>Grant                       | *Hanford<br>Trojan<br>*Hanford<br>*Hanford  | 1943<br>1975<br>1943<br>1943                         |
| Wisconsin     | Kenosha<br>Kewaunee<br><br>Manitowoc<br><br>Pierce<br>Vernon | Zion<br>Kewaunee<br>Point Beach<br>Kewaunee<br>Point Beach<br>Prairie Island<br>La Crosse (Genoa) | 1972<br>1973<br>1970<br>1973<br>1970<br>1973<br>1967 |
| West Virginia | Hancock  | Shippingport/Beaver<br>Valley   | 1957   |

\*Department of Energy facility

\*\*Commercial fuel reprocessing plant

# # #

#### Related NCI materials and Web pages:

- Radioactive I-131 from Fallout Web Page (<http://www.cancer.gov/cancertopics/causes/i131>)

#### How can we help?

We offer comprehensive research-based information for patients and their families, health professionals, cancer researchers, advocates, and the public.

- **Call** NCI's Cancer Information Service at 1-800-4-CANCER (1-800-422-6237)
- **Visit** us at <http://www.cancer.gov> or <http://www.cancer.gov/espanol>
- **Chat** using LiveHelp, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>
- **E-mail** us at [cancergovstaff@mail.nih.gov](mailto:cancergovstaff@mail.nih.gov)
- **Order** publications at <http://www.cancer.gov/publications> or by calling 1-800-4-CANCER
- **Get help** with quitting smoking at 1-877-44U-QUIT (1-877-448-7848)

**This fact sheet was reviewed on 4/19/11**

FOR: The Commissioners

FROM: Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

SUBJECT: RESULTS OF THE ANALYSIS OF CANCER RISKS IN POPULATIONS  
NEAR NUCLEAR FACILITIES: PHASE 2 PILOT PLANNING PROJECT  
AND STUDY STATUS

PURPOSE:

The purpose of this paper is to update the Commission on the analysis of cancer risks in populations near nuclear facilities study and study status. This paper does not address any new commitments or resource implications.

BACKGROUND:

Each commercial nuclear power plant and fuel cycle facility that the NRC regulates is authorized to release radioactive materials to the environment as specified in the regulations and licensing documents, in compliance with dose limits for members of the public and concentration limits for liquid and gaseous effluent releases. The staff has concluded that offsite doses to individual members of the public as a result of these routine releases are a small fraction of the dose limits specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation," specifically 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public is also generally less than 1 percent of the amount of radiation the average U.S. citizen receives in a year from all background sources. Nonetheless, some stakeholders have continued to express concerns about the potential effect of these releases on the health of residents living near nuclear facilities.

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These concerns are not new or unique to the United States. Since 2008, Canada, France, Germany, Great Britain, Spain, and Switzerland have all conducted epidemiological studies near nuclear facilities within their borders to address public health concerns. These studies have generally found no association between facility operations and increased cancer risks to the public that are attributable to the releases. ~~For example, the German study did find an association of increased childhood leukemia risk within 5 kilometers of the facilities; however, upon examination of the offsite exposures, the authors concluded the increased risk could not be attributable to releases from the facilities<sup>1</sup>.~~

To help address these stakeholder concerns, the staff has been using the 1990 National Cancer Institute (NCI) study, "Cancer in Populations Living near Nuclear Facilities" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15035A630), and other more recent epidemiological reports conducted by various State health departments when communicating with the public on cancer mortality in populations near nuclear power facilities. The staff relies on credible health studies to augment its discussions about the NRC's robust regulatory programs to keep offsite doses as low as is reasonably achievable (ALARA) by providing public health information that directly applies to the health outcomes that are often of concern (i.e., cancer). However, the 1990 NCI report is now more than 25 years old, and the staff recognized that an update to this data would allow the staff to provide more contemporary cancer information on populations living near NRC-licensed nuclear facilities.

Staff originally requested that NCI to provide the update. However they were unable to provide staff to support the study and they indicated these types of studies were no longer in their research focus. NCI still supports the original report and has a fact sheet on the study that is publicly available on their web site at: <http://dceg.cancer.gov/about/organization/programs-ebp/reb/fact-sheet-mortality-risk>.

In April 2010, the NRC requested the National Academy of Sciences (NAS) perform a study on cancer risks in populations living near NRC-licensed facilities to update the 1990 NCI study. NRC and NAS decided to divide the study into phases. In Phase 1, NAS explored the feasibility of conducting an updated study by developing modern methods to perform the analysis. This was documented in the 2012 report, "Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 1" (ADAMS Accession No. ML15035A132). The staff communicated the results of the Phase 1 study and the NAS recommendations for the second phase pilot studies in SECY-12-0136, "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities Study" (ADAMS Accession No. ML12249A121). In Phase 2, NAS would conduct pilot studies to determine the ability to practically apply the Phase 1 methods at seven sites recommended by the NAS committee: Dresden (in Illinois), Millstone (in Connecticut), Oyster Creek (in New Jersey), Haddam Neck (decommissioned; in Connecticut), Big Rock Point (decommissioned; in Michigan), San Onofre (in California), and Nuclear Fuel Services (in Tennessee). NAS selected these sites because they provide a good sampling of facilities in six States with different operating histories, population sizes, and levels of complexity in data retrieval from the State cancer registries. NAS specifically recommended the pilot study examine two study designs: a population study of cancer diagnosis and mortality rates for multiple cancer types and all age groups, down to the census-tract level (sub-divisions of a county), and a case control study of childhood cancers in children born within a fixed distance of a nuclear facility<sup>2</sup>. Upon completion of the proposed Phase 2 pilot studies, NAS was to

<sup>1</sup> Kaatsch P, et al. "Leukaemia in Young Children Living in the Vicinity of German Nuclear Power Plants," *International Journal of Cancer*, 2008 Feb 15; 122(4):721-6.

<sup>2</sup> The population-based study design uses a geographical area as the unit of observation (e.g., census tract



determine whether further study is practical on a nationwide scale, and the NRC staff was charged with determining whether to perform the studies at all NRC-licensed facilities (i.e., balance of operating nuclear power plants and fuel-cycle facilities).

NAS split the Phase 2 pilot study into a pilot planning project and a pilot execution project. This paper describes staff's evaluation of the NAS pilot planning project report, "Analysis of Cancer Risks Near Nuclear Facilities: Phase 2 Pilot Planning" (ADAMS Accession No.: ML15035A135) and study status.

#### DISCUSSION:

##### *NAS: Phase 2 Pilot Planning Project Results*

NAS stated in the pilot planning report that the pilot studies are meant to determine the practicality of implementing the methods and study designs recommended in Phase 1. NAS also said the interpretation and communication of risk estimates from the pilot study, ~~if reported~~, should be done with "great caution." It emphasized that any data collected during the pilot study would have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples. Furthermore, any decision to proceed with a full scope study should be based solely on conclusions related to practicality and not on risk estimates, since the risk estimates are inherently imprecise. NAS also highlighted that the population-based study at the census tract level had significant issues. Staff interpreted that the population-based census tract study design may not be feasible. NAS also communicated to staff that the execution phase of the pilot study will require "significant resources" to complete (39 months and cost \$8 million).

In addition, the staff estimates that it may take NAS 8 to 10 years ~~from now~~ to complete the pilot and the subsequent nation-wide studies before NRC has final cancer risk results to share with NRC stakeholders—the original intent of the project. That would possibly prolong the study to 2025, 15 years after the start of the project with NAS. After staff members reviewed the pilot planning report and execution phase proposal, ~~they staff~~ do not believe it is worthwhile to complete the pilot study, given the NAS position regarding the limited usefulness of the results to draw conclusions about the pilot plants (or just as importantly, single facilities), the long duration and high cost of the pilot study, and the long duration of subsequent studies.

##### *NAS Alternate Approach*

Staff expressed concerns to NAS about the lack of usefulness of the pilot study results in communicating cancer risks to stakeholders and the overall study duration. Staff requested that NAS focus on providing final results for the next phase of the study to shorten the study time. Specifically, staff asked NAS to focus on the Phase 1 recommended case-control study design and perform an analysis of a sample of facilities in the United States to draw statistically valid and generalizable results to the entire fleet. In response, NAS proposed that the pilot planning committee reconvene to examine our request for the alternate approach at an additional

**Comment [SG]:** The intent of this sentence is unclear to me. What is the meaning of "perform an analysis of a sample of facilities..." Is this in lieu of the case control study of childhood cancers in children?

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as proposed by NAS, county as used in the 1990 NCI report, ZIP Code) and uses an aggregate analysis that looks at a study factor (exposure) and an outcome factor (disease or death) measured in the geographical area at the same time. This study can show possible associations between exposure and disease. The case-control study design compares the prevalence of risk factors or exposures in a series of diseased study subjects (cases) with the prevalence of risk factors or exposures in a series of disease-free study subjects (controls).

\$200,000 for a 9-month study. After the new review, NAS estimated another 50 months to complete the alternate approach at an uncertain cost.

*U.S. National Council on Radiation Protection and Measurements (NCRP) Approach*

In an unsolicited proposal, the NCRP offered to directly update the 1990 NCI study report within a shorter time frame and cost (staff estimates approximately 2 to 3 years and \$2.5 million). The NCRP is an organization chartered by the U.S. Congress as the National Council on Radiation Protection and Measurements. The Charter of the Council (Public Law 88-376) states its objectives to include: collect, analyze, develop and disseminate in the public interest information and recommendations about (a) protection against radiation and (b) radiation measurements, quantities and units, particularly those concerned with radiation protection.

NCRP offered to directly update the 1990 NCI study report within a shorter time frame and cost (staff estimates approximately 2 to 3 years and \$2.5 million). The NCRP update would be a more modest initiative. Instead of the NAS recommended two study designs, NCRP would use the same methods used in the 1990 study—a countywide population-based study design, and would be able to provide final results in a reasonable time period to meet the original staff goal of having updated information. The NCRP's lead investigator used to work for NCI where he designed, directed, and completed the original 1990 study.

The results of the NCRP update would be a consensus report going through their scientific committee and peer-review process. The staff would ask NCRP to update the report with new results for certain NRC facilities not operational or considered at the time of the 1990 study using the same NCI approach of studying population risks at the county level (e.g., Nuclear Fuel Services in Tennessee, Braidwood and Byron Nuclear Generating Stations in Illinois). The staff would ask NCRP upon completion of the update if further study should be done utilizing the NAS Phase 1 case-control study design—generally considered a more robust design.

CONCLUSION:

After considering the three options above, staff felt the NCRP was a reasonable option to move forward. However, due to the current budget environment, the staff has decided to not move forward with this project at this time. The NRC staff initiated this project in an effort to be responsive to stakeholders concerns about cancer risks; however, the current budget environment has required the agency to prioritize its spending to focus on activities directly related to protecting public health and safety (e.g., inspections and licensing). The uncertainty in the NRC budget for the foreseeable future precludes the agency from spending any additional funds on this project.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research



COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

**ADAMS Accession No.: ML15141A404**

|        |             |              |                |           |           |
|--------|-------------|--------------|----------------|-----------|-----------|
| OFFICE | RES/DSA/RPB | Tech Editing | BC:RES/DSA/RPB | D:RES/DSA | R-I       |
| NAME   | T. Brock    | QTE          | R. Tadesse     | M. Case   | D. Dorman |
| DATE   | 06/18/15    | 05/26/15     | 06/19/15       | 06/19/15  | / /       |
| OFFICE | D:NMSS      | D:NRR        | D:NSIR         | D:NRO     | D:OGC     |
| NAME   | C. Haney    | W. Dean      | B. Holian      | G. Tracy  | M. Doane  |
| DATE   | / /         | / /          | / /            | / /       | / /       |
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| NAME   | E. Brenner  | B. Sheron    |                |           |           |
| DATE   | / /         | / /          | / /            | / /       |           |

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**ANALYSIS OF CANCER RISKS IN POPULATIONS  
LIVING NEAR NUCLEAR FACILITIES, REV. 2**

**Introduction**

The objective of this communication plan is to outline the U.S. Nuclear Regulatory Commission (NRC) strategy for communicating the goals and key messages regarding the agency's request to the National Academy of Sciences (NAS) to evaluate the feasibility of conducting a new study analyzing cancer risks in NRC-licensed nuclear facilities with external and internal stakeholders.

**Goals**

This plan will help the NRC accomplish effective communications with internal and external stakeholders regarding the potential project of updating to the National Cancer Institute (NCI) report by undertaking the following tasks:

- **Promote** effective communications with internal and external stakeholders in a timely, consistent, and understandable manner.
- **Inform** all stakeholders that NRC and NAS carry out studies using processes designed to promote independence, transparency, objectivity, and technical rigor.
- **Identify** opportunities for educating the public regarding the impact of nuclear facilities on cancer mortality and incidence risk for populations surrounding those facilities.

**Key Messages**

The NRC will communicate the following four key messages to all stakeholders:

- (1) **The NRC has asked the NAS to evaluate the feasibility of a new study on cancer mortality and incidence risks in populations living near NRC-licensed and proposed nuclear facilities to update the 1990 NCI report on "Cancer Risks in Populations near Nuclear Facilities." NRC staff uses the NCI report to inform concerned stakeholder that cancer mortality rates are not elevated in these populations. However, the report is over 20 years old, additional facilities have come on-line, and analysis methods and cancer data registries have improved.**
- (2) **The NRC requested that the NAS study the feasibility of developing scientifically defensible methods to evaluate cancer incidence rates, as well as exploring how to divide the study areas around licensed and proposed nuclear facilities into geographical units smaller than the counties used in the NCI report so the results are more applicable to those populations that live closer to NRC-licensed facilities.**



- (3) **The NAS has completed the Phase 1 feasibility study, and briefed the NRC staff on March 26, 2012. The NRC staff is reviewing the Phase 1 report and will determine whether to perform a Phase 2 cancer study to include populations that live in the vicinity of past, present, and proposed nuclear facilities. The Phase 1 study provided two different study designs that focus on childhood cancers and all common cancers in the total population. The report highlighted the many scientific limitations of performing low-dose and low-population epidemiology studies around NRC-licensed facilities**
- (4) **The NAS study process is independent of NRC, transparent, objective, and technically rigorous, ensuring that the new study will be comprehensive and scientifically sound.**

Appendix A to this document includes further discussion that elaborates on each of these key messages, and Appendix B provides responses to inquiries expected from the general public, congressional staff, the media, and other stakeholders. The appendices also include additional information for stakeholders who may be more familiar with these topics, such as elected officials, Federal and State Government officials, public interest groups, and certain members of the media.

## **Background**

The NRC staff has used a 1990 study conducted by the NCI, "Cancer in Populations Living Near Nuclear Facilities," as a valuable risk communication tool for addressing stakeholder concerns about cancer mortality attributable to the operation of nuclear power facilities. Stakeholders often ask the staff about perceived elevated cancer rates in populations working or residing near NRC-licensed nuclear facilities, including power reactors and fuel cycle facilities (e.g., fuel enrichment and fabrication plants). The staff uses this report as a scientifically defensible resource to aid in assuring stakeholders that cancer mortality rates are not elevated in counties that contain or are adjacent to nuclear power and fuel cycle facilities. However, the analyses in the NCI report focus on cancer deaths, and the general public is often also interested in a perceived increase in cancer incidence (i.e., being diagnosed with cancer, but not necessarily dying from the disease). Additionally, the report is almost 20 years old and more modern analysis methods combined with up-to-date information sources will better reflect the risk to current populations living near past and present licensed nuclear facilities. The NRC believes it is also beneficial to perform analyses at potential future facilities to establish a baseline cancer risk for these sites. The NRC has asked the NAS to undertake this project to determine the feasibility of performing such an update.

In the original report, NCI scientists studied more than 900,000 cancer deaths from 1950–1984, using mortality records collected from counties that contain nuclear facilities. The researchers evaluated changes in mortality rates for 16 types of cancer in these counties from 1950 to 1982 or until each facility began operation. Cancer incidence information was only available for four facilities located in Iowa and Connecticut, due to the lack of this type of data being collected. The NCI report showed no statistical increased risk of death from cancer for people living in the

107 U.S. counties containing or closely adjacent to 62 nuclear facilities, including all of the nuclear power reactors operational before 1982.

The objective of the new study is to provide the NRC with an analysis of the latest cancer mortality and incidence data for populations living near NRC-licensed or proposed nuclear power and fuel-cycle facilities. This study will provide the staff with the most current scientific information for responding to stakeholder concerns related to cancer mortality and incidence rates for populations that live near past, present, and proposed nuclear facilities. The NAS study process and protocols are expected to produce a high quality report.

The NAS project will evaluate the feasibility of studying cancer incidence to address the desire of stakeholders for this type of information. Cancer incidence data collected by the NCI's Surveillance, Epidemiology, and End Results program are limited to specific geographic regions within the United States. Other national, state, and county cancer surveillance programs collect cancer incidence data, and the NAS project is expected to assess these for inclusion in the overall analysis.

#### **Audience/Stakeholders**

##### **Internal**

- Commission
- Office of the Executive Director for Operations (OEDO)
- Advisory Committee on Reactor Safety (ACRS)
- Office of the General Counsel (OGC)
- Office of Congressional Affairs (OCA)
- Office of International Programs (OIP)

##### **External**

- Congress
- Federal agencies<sup>1</sup>
- Institute for Nuclear Power Operations
- Electric Power Research Institute
- Nuclear Energy Institute
- Conference of Radiation Control Program Directors

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<sup>1</sup> U.S. Department of Homeland Security/Domestic Nuclear Detection Office, U.S. Department of Defense, U.S. Department of Energy/National Nuclear Security Administration, U.S. Department of Transportation, U.S. Environmental Protection Agency, U.S. Food and Drug Administration, U.S. Department of Health and Human Services, and U.S. Department of State.



- Office of Public Affairs (OPA)
- Office of Nuclear Regulatory Research (RES)
- Office of New Reactors (NRO)
- Office of Nuclear Reactor Regulation (NRR)
- Office of Nuclear Security and Incident Response (NSIR)
- Office of Federal State Materials and Environmental Management Programs (FSME)
- 
- Office of Nuclear Material Safety and Safeguards (NMSS)
- Regions I-IV
- Organization of Agreement States
- Agreement States
- news media (e.g., *Inside NRC*)
- International Atomic Energy Agency
- nuclear regulators of other countries
- residents living near nuclear power plants
- State and local governments
- public interest groups (e.g., Union of Concerned Scientists)
- academic and professional organizations (e.g., Health Physics Society, American Nuclear Society)
- NRC licensees

### Communication Team

The Communication Team will assist the project manager as needed in developing uniform and accurate messages, initiating communication vehicles, and coordinating implementation plans for this project.

| <u>Position</u>      | <u>Name</u>        | <u>Organization</u> | <u>Telephone Number</u> |
|----------------------|--------------------|---------------------|-------------------------|
| <i>Team Leader</i>   | Terry Brock        | RES                 | (301) 251-7487          |
| <i>NMSS Lead</i>     | Greg Chapman       | NMSS                | (301) 492-3106          |
| <i>NRR Lead</i>      | Steven Garry       | NRR                 | (301) 415-2766          |
| <i>NRO Lead</i>      | Jean-Claude Dehmel | NRO                 | (301) 415-6619          |
| <i>NSIR Lead</i>     | Trish Milligan     | NSIR                | (301) 415-2223          |
| <i>Region I Lead</i> | Ron Nimitz         | RI                  | (610) 337-5267          |

|                                     |                 |      |                |
|-------------------------------------|-----------------|------|----------------|
| <i>Region II Lead</i>               | Gena Woodruff   | RII  | (404) 997-4739 |
| <i>Region III Lead</i>              | John Cassidy    | RIII | (630) 829-9667 |
| <i>Region IV Lead</i>               | Don Stearns     | RIV  | (817) 200-1176 |
| <i>State Liaison Lead</i>           | Stephen Salomon | FSME | (301) 415-2368 |
| <i>Legal Lead</i>                   | Beth Mizuno     | OGC  | (301) 415-3122 |
| <i>Public Affairs Lead</i>          | David McIntyre  | OPA  | (301) 415-8206 |
| <i>International Programs Lead</i>  | Andrea Jones    | OIP  | (301) 415-2309 |
| <i>Congressional Affairs Lead</i>   | Gene Dacus      | OCA  | (301) 415-1697 |
| <i>Congressional Affairs Backup</i> | Jenny Weil      | OCA  | (301) 415-1691 |
| <i>OEDO Lead</i>                    | Lance Rakovan   | OEDO | (301) 415-2589 |

### **Communication Tools**

| <b><u>Tool</u></b>                    | <b><u>Description/Purpose</u></b>  |
|---------------------------------------|--|
| External Web Site                     | The NRC's external Web page will note the issuance of the study and provide a link to the NAS study web page. It will also contain a link to the NCI Web page for the original NCI study along with other related publicly available documents.  |
| Internal Briefings                    | The Communication Team will conduct internal briefings at various points in the process to keep internal stakeholders informed of its activities and messages. The members of the Regional Communication Team will be responsible for coordinating communication within their regions. |
| Weekly Highlights and EDO Daily Notes | The weekly highlights and/or EDO Daily Notes will report on significant milestones.  |
| Internet E-Mail                       | The Communication Team will e-mail significant information on the status of the study and deliverables to internal stakeholders.   |
| Commissioners' Assistants Notes       | Commissioners' Assistants Notes will be used to communicate to the Commission information about public meetings, study status, and other items of significant interest.  |



| <u>Tool</u>                            | <u>Description/Purpose</u>  |
|--|---|
| Commissioner Interactions              | The Communication Team will coordinate and assist in preparing briefing materials for the interactions of Commissioners with various stakeholders.  |
| Public Meetings                        | If necessary, the staff will conduct public meetings to discuss the final study report.   |
| Issuance of Significant Correspondence | The project manager will coordinate the issuance of correspondence with key internal and external stakeholders. Before the agency sends any significant external correspondence related to the study, the Communication Team will receive notification. The Communication Team will coordinate with OPA when preparing press releases and interacting with the media. |
| Congressional Communications           | OCA will coordinate all communication with Congress.  |
| Media Communications                   | OPA will coordinate all communication with the media.   |

#### **Communications Activities**

| <u>Activity</u>  | <u>Responsibility</u> | <u>Date Planned</u> | <u>Date Completed</u> |
|--|-----------------------|---------------------|-----------------------|
| Press release on NRC request of the NAS to perform the study | RES                   | 04/07/2010          | 04/07/2010            |
| Present study objectives to the National Academy of Sciences | RES                   | 04/26/10            | 04/26/2010            |
| Public kickoff meeting                                       | RES, NAS              | February 2011       | 02/24/2011            |
| Communication team meeting                                   | RES                   | 02/22/2012          | 02/22/2012            |
| Briefing on Cancer Study-Phase 1 report                      | NAS                   | 03/26/2012          | 03/26/2012            |

|  |     |            |            |
|--|-----|------------|------------|
| Public release Cancer Study<br>Phase 1 report                            | NAS | 03/29/2012 | 03/29/2012 |
| Submit Phase 1 document to<br>Program offices for Review                 | RES | 04/13/2012 | 04/13/2012 |
| Commissioner's TA briefing   | RES | 5/24/2012  | 05/24/2012 |
| Epidemiology Course  | RES | 07/16/2012 | 07/16/2012 |
| Information Paper to the<br>Commission with staff decision on<br>Phase 2 | RES | 09/28/2012 |            |

### **Communication Challenges**

The Communication Team is likely to encounter challenges in the following two areas while implementing this plan:

(1) Effective Communication with the General Public

The results of this study will be of significant interest to the general public, particularly those members of the general public who live within the counties analyzed in the study. All NRC-produced materials must take into account the limited technical background of some stakeholders and the sensitivity of issues relating to cancer. In addition, various stakeholder groups have expressed concern with perceived elevated cancer risks in populations that live near nuclear facilities. The Communication Team will take appropriate steps to address this challenge using risk communication techniques.

(2) Public Perceptions of the NRC and the NAS

Communications regarding this study should address the frequent misconception among some stakeholders that the NRC promotes the use of nuclear power (i.e., to generate electricity). In addition, communication efforts must stress the NAS was established by Congress to provide scientific information and advice to the government, and that any NAS report will reflect the Academy's best judgment.

### **Evaluation and Monitoring**

As needed, the Communication Team will monitor correspondence regarding this study to ensure consistency with the key messages and to determine if further key messages are

needed. As needed, the Communication Team will assess the degree of success that key messages and talking points have with the target stakeholder audience.

The Team Leader will brief key staff as needed regarding revisions to the messages, talking points, or guidance based on immediate concerns or questions asked by the stakeholder audience.

### **Updates and Revisions**

If major revisions to this plan or its key messages are necessary, the Team Leader will ensure that a formal revision is made and placed in the Agencywide Documents Access and Management System and on the internal communications Web page. The Team Leader will also determine the need for updates to the questions and answers in Appendix B to this plan. These updates will not constitute a revision to this plan.

### **Final Closeout**

At the conclusion of the study, the Team Leader will prepare a brief closeout statement about the challenges and successes related to the communication plan and attach it to the end of the last draft.



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**ADAMS Accession No.: ML120760183**

|        |                |             |                 |           |          |
|--------|----------------|-------------|-----------------|-----------|----------|
| OFFICE | RES/DSA/RPB    | RES/DSA/PRB | BC:RES/DSA/PRB  | D:RES/DSA | D:RES    |
| NAME   | M. Humberstone | T. Brock    | S. Bush-Goddard | K. Gibson | J. Uhle  |
| DATE   | 03/19/12       | 03/19/12    | 03/19/12        | 04/12/12  | 05/15/12 |

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**Appendix A  
Expanded Key Messages**

**Note:** These messages are written as if NAS will be completing this study. NRC staff analysis of the feasibility study is ongoing and a decision on completion is ongoing.

- (1) The National Academy of Sciences (NAS) has conducted a scoping study to determine the feasibility of a new study on cancer mortality and incidence risks in populations living near NRC-licensed and proposed nuclear facilities for the US Nuclear Regulatory Commission (NRC). The 1990 National Cancer Institute (NCI) report concluded that cancer mortality rates are not elevated in these populations.**
  - The 1990 NCI report showed no general increased risk of death from cancer for people living in the 107 U.S. counties containing or closely adjacent to 62 nuclear facilities operational before 1982.
  - The report showed that, in comparison with the control counties, some of the study counties had higher mortality rates of certain cancers and some had lower rates, either before or after the facilities came into service. None of the observed differences could be linked to the presence of nuclear facilities.
  - If approved, the scope of the new study covers the past and present nuclear facilities regulated by the NRC. In addition, the study will consider potential future facilities to establish a baseline mortality and incidence cancer risk for the site. The new study excludes all of the U.S. Department of Energy facilities in the original study because they are not licensed by the NRC.
- (2) The NRC has requested NAS to evaluate cancer incidence rates, as well as explore how to divide the study areas around the facilities into geographical units smaller than the counties used in the NCI reports.**
  - The NAS is expected to investigate cancer incidence of populations surrounding nuclear facilities by collecting data from individual State databases. The quality and format of each State's databases are likely to vary.
    - When NCI conducted its 1990 study, cancer incidence information was only available for counties adjacent to four facilities located in Iowa and Connecticut. The limited cancer incidence data for these counties resembled the counties' mortality data patterns.
- (3) The NAS study includes populations that live in the vicinity of past, present and proposed nuclear facilities. This information is useful to the NRC in understanding the cancer risk for populations living near those facilities.**

- The new study will include facilities in the following life-cycle phases: facilities in the process of being decommissioned or that have been decommissioned, and reactors that are currently in operation. In addition, studies will be performed at potential future facilities to establish a baseline cancer risk for the site.
- The 1990 NCI report has provided valuable information to stakeholders. The NAS project will provide updated scientific information on cancer mortality in a transparent manner to keep the public informed and to earn and maintain public trust.

**(4) The NAS study process is independent, transparent, objective, and technically rigorous, ensuring that the new study will be comprehensive and accurate.**

- While the NRC will provide information to the NAS, the Academy has full autonomy in deciding how best to meet the NRC's request.
- The NAS will hold several public meetings in the project's first phase, allowing the public and interest groups to provide input and information on conducting the study.



## **Appendix B Questions and Answers**

**Note:** These messages are written as if NAS will be completing this study. NRC staff analysis of the feasibility study is ongoing and a decision on completion is ongoing.

### **Q1. Why has the US Nuclear Regulatory Commission (NRC) asked the National Academy of Sciences (NAS) to conduct this study now?**

A1. This study will provide the NRC staff with the most current scientific information for responding to stakeholder concerns related to cancer mortality and incidence rates for populations that live near past, present, and proposed nuclear power facilities. The NRC staff has used a 1990 study conducted by the National Cancer Institute (NCI), "Cancer in Populations Living Near Nuclear Facilities," as a valuable risk communication tool for addressing stakeholder concerns about cancer mortality attributable to the operation of nuclear power facilities. However, the NCI report is almost 20 years old and a new study needs to be performed to reflect the current populations living near nuclear power facilities. In addition, the analyses in the NCI report focus on cancer deaths, and the general public is often also interested in cancer incidence (e.g., being diagnosed with cancer, but not necessarily dying from the disease). Therefore, the NAS project will also assess cancer incidence in addition to mortality.

### **Q2. Why is NAS, rather than NCI, conducting this follow-up study to NCI's 1990 work?**

A2. The NRC staff approached NCI management about performing a new study under contract to the NRC, but because of staffing limitations, NCI was unable to commit resources for this activity for the foreseeable future. NAS will draw its project team from a wide range of technical experts, which could include NCI members.

### **Q3. Which nuclear facilities are included in the study?**

A3. The NRC intends NAS to study all NRC-licensed nuclear power reactors and fuel cycle facilities (e.g., fuel enrichment and fabrication plants) that are or were in operation in the United States, however this will depend on the phase 1 results and NRC staff review.

The 1990 NCI report included all 52 commercial nuclear power facilities in the United States that that started operation before 1982. Preliminary information indicates that 25 new reactor sites have begun operation since 1982. The 25 new reactor sites will also be included in the study. Researchers are identifying the study and control populations for these sites for inclusion in the cancer mortality study.

### **Q4. Which geographical areas will be included in the study?**

A4. The study will cover those geographical areas that contain past, present, and, future NRC-licensed nuclear power or fuel cycle facility. The NAS project will also examine how modern



analysis methods can account for geographical areas smaller than the counties used in the NCI study. The phase 1 report should recommend the best approach.

**Q5. How does the NAS project consider cancer incidence (occurrence)?**

A5. The NAS is expected to gather cancer incidence data from individual States health databases. When NCI conducted its 1990 study, cancer incidence information was only available for counties adjacent to four facilities located in Iowa and Connecticut. The limited cancer incidence data for these counties resembled the counties' mortality data patterns.

**Q6. Does the NRC suspect that cancer mortality rates are elevated around nuclear power plants?**

A6. The NCI study found no general increased risk of death from cancer for people living near nuclear facilities. The NRC expects NAS to test the hypothesis that there is no difference in cancer rates between those populations that live near nuclear power facilities and those that do not. Any epidemiology findings have to be interpreted in the context of the strictly regulated and very low off-site radiation doses from routine nuclear facility operations.

**Q7. How can I be sure that the nuclear power plant is not causing cancer? If I lived near a power plant, how might I be exposed to radiation? For example, if my house is 2 miles away from a reactor, am I being exposed whenever I am at my house?**

A7. In the previous study NCI found no increased risk of cancer in those people who lived in counties near nuclear facilities. Nuclear facilities release very small regulated amounts of radioactivity, at very slow rates into the environment. The amounts released are strictly controlled within limits set by the NRC and the U.S. Environmental Protection Agency. Any exposures that may occur are below the established safety limits. The radioactive emissions from nuclear power plants only contribute a very small fraction ( $1/1000^{\text{th}}$ ) of our yearly total radiation exposure (approximately 0.1 percent). For comparison, your radiation exposure from natural radiation sources in soil and rocks, radon gas in homes, radiation from space, and other sources that are naturally found within the human body contributes to approximately 50 percent or 500 times more radiation than from nuclear facilities. The other half of your yearly exposure (also 500 times more radiation than nuclear facilities) is from man-made sources, such as consumer products, medical procedures, and to a much lesser extent, industrial sources.

**Q8. Which age groups are included in the study?**

A8. The NRC expects the NAS project to analyze cancer incidence and mortality rate data for the following age groups: 0-4 years, 5-9 years, 10-19 years, 20-39 years, 40-59 years, and 60 years and older.

**Q9. Will the study address cancer rates from leukemia in children near nuclear facilities?**

A9. Yes. The study will address leukemia in all age groups, including children (0–5 years).

**Q10. I live near a nuclear power plant and my husband died of cancer. Will this study prove that living near the plant caused the cancer?**

A10. No, the study is designed to survey trends in populations and does not evaluate the cause of individual cases. However, the study does give us an indication if the cancer rates of populations near nuclear facilities are the same, greater, or less than what is expected.

**Q11. Are such studies able to detect population health effects from industrial sources?**

A11. Yes. NCI has effectively used county-based studies in the past to study cancer mortality rates. For example, NCI has used county-based studies to show elevated rates of lung cancer deaths in counties with shipyard industries and in counties with arsenic-emitting smelters and refineries.

**Q12. Are past studies, such as the French and German studies on childhood leukemia and radiation from nuclear power plants, being considered?**

A12. Yes, these studies were considered by the phase 1 expert committee when writing their recommendations in the phase 1 report.

**Q13. Why do some local cancer studies around some nuclear plants show increased cancer rates and some show no increase?**

A13. Numerous local cancer studies that have been performed by local groups near nuclear plants show an increase in cancer. These local studies are sometimes based on small populations or groups and may or may not be influenced by local confounding factors, such as eating habits, cigarette smoking, and chemical exposures. In addition, some studies may not be using scientifically accepted epidemiology methods and as such may not be credible. Any local cancer studies should be submitted to the State Health Department, or to the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry.

However, the NRC has evaluated the radiation levels from radioactive effluents and radiation from nuclear power plants and found that the levels are very low. Therefore, even with a conservative linear, no-threshold assumption, the corresponding cancer risk is very low.

**Q14. Will the study design be reviewed?**

A14. The NAS study protocols (<http://www.nationalacademies.org/studycommitteprocess.pdf>) include procedures for rigorous review of the project's findings.



**Q15. How will the NRC be certain that this study includes all proposed sites for nuclear power facilities?**

A15. Representatives from several NRC program offices reviewed the list of decommissioned, operating, and proposed sites and found it to be accurate at the time the information was submitted to the study contractor for analysis. The staff plans to perform additional checks of the proposed site list during the conduct of this study.

**Q16. What types of cancer are evaluated in this study and why is the study only looking at 16 types?**

A16. This study may evaluate mortality rates from the following types of cancer that are linked to radiation exposure (radiogenic) and total cancer mortality.

- leukemia and aleukemia
- all solid cancers excluding leukemia
- Hodgkin's disease
- other lymphoma (including non-Hodgkin's lymphoma)
- multiple myeloma
- digestive organ
  - stomach
  - colon
  - rectum
  - liver (primary)
- trachea, bronchus, and lung
- prostate, uterine, and ovarian
- breast (female)
- thyroid
- bone and joint
- bladder
- brain and other central nervous system
- benign, in situ, and unspecified neoplasms

**Q17. How will the NRC consider this resulting data in new reactor reviews and relicensing decisions?**

A17. The NRC will use the results of the study to answer recurring questions from our stakeholders during the public comment period for regulatory actions. If necessary the results could prompt further review of both new reactor and existing regulations to ensure the effluent and direct radiation exposure dose limits adequately protect public health and safety.

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- 5 -

**Q18. What will the NRC do if the results indicate an increase in cancer risk in some populations that live near a specific nuclear facility?**

A18. While the NAS project is still in its formative stages, the NRC expects any increases in cancer risk will first be assessed against the levels of radiation dose attributable to strictly regulated radioactive materials released during plant operation, as well as any public radiation dose that might result from the releases. This data would assist NAS in examining any relationship between the study results and potential radiation exposures of the public at individual plants. Furthermore, the public radiation doses from operating plants are significantly below the radiation safety dose limits set to protect the public and are a small fraction of dose received from natural background. If there continues to be a concern then more refined epidemiology studies can be performed (e.g., case-control study).

**Q19. I live near a nuclear power plant or in one of the studied counties. Will I be contacted during this study for information? Will my family or personal medical information be protected during this study or during a cancer incidence study?**

A19. The NAS study process includes opportunities for the public to contribute, but the data used in this study will be obtained from anonymous state and national sources. These data do not contain personal identifying information making it impossible to determine to whom the medical information belongs.

**Q20. Why did the NRC switch from Oak Ridge Associated Universities (ORAU) to NAS as a study provider after one year of work?**

A20. Recently, the staff has reconsidered using ORAU to do the work due to the possibility of high public interest in the topic and the importance of the project to the agency. This action was not an indication of any deficiencies in the technical quality of ORAU's work, but more of ensuring the investigator brings a broad social and national policy perspective to the study. As such, the staff chose the NAS to perform the study.

**Q21. What is the status of the project and how will the NRC decide on Phase 2 and has funding been reserved?**

A21. NAS released the phase 1 report on March 29, 2012. The NRC will review and consider the phase 1 report and recommendations to determine the next step for phase 2 of the study. However, as with our regulatory process there are a number of ways we can proceed. Staff will review the document, discuss and determine if there are any policy issues that may warrant Commission involvement in the decision-making for phase 2. If so, one of the approaches would be to develop a SECY paper with options. If not, staff will make the decision on phase 2 and work with NAS as appropriate. Funding for phase 2 has been reserved.

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Appendix B



**Q22. How does the NRC ensure the validity of the licensee's reporting of off-site doses and environmental monitoring results?**

A22. The licensee is required to establish, implement, and maintain an acceptable effluent and environmental monitoring program. As such the licensee has the primary responsibility to ensure conformance with all applicable requirements in the area of effluent and environmental monitoring. The NRC performs selective inspections of the program to validate that the licensee is implementing such a program and that public doses are maintained well below regulatory requirements and are in fact as low as reasonably achievable. The following points illustrate this approach:

- 1) NRC has imposed strict regulatory requirements for conduct of both station effluent monitoring control and environmental monitoring. These requirements are designed to ensure licensee doses to members of the public are well below regulatory limits and are as low as reasonably achievable. Consequently, licensees are obligated to establish, implement, and maintain programs to sample, monitor, evaluate, and control effluents. The licensee is also required to collect and analyze environment samples to detect activity associated with facility operations. The sampling program is designed to review exposure pathways and sampling results. The environmental monitoring program is designed to provide a check on the station effluents control program.
- 2) The NRC has established reporting requirements that require the licensee to report effluent and or environmental monitoring issues as established in program requirements. NRC initiates appropriate reviews and evaluation of the reports and conducts follow-up inspections as appropriate.
- 3) The NRC conducts routine inspections in a variety of ways. The NRC maintains an onsite resident inspection staff that selectively and routinely reviews on-going activities to become aware of issues that may impact effluent or environmental monitoring including public dose. For example the residents review corrective action documents to evaluate potential impact on the effluents control program. The residents also review radiation monitors for indication of releases. During their inspections residents also look for potential unmonitored release paths.
- 4) The NRC also uses specialist inspectors, independent of the resident staff, to conduct periodic onsite inspections of both effluent release and environmental monitoring programs to ensure the licensee conforms with applicable requirements. As part of this review, NRC inspectors also review ground water controls. The inspectors evaluate the adequacy of quality assurance of measurements to ensure measurements are of appropriate quality and that the licensee is implementing a robust quality assurance program for its measurements.



- 5) The NRC routinely reviews secondary evaluations conducted as part of the licensees' quality assurance programs (e.g., audits and assessments) as well as independent measurements conducted by other regulatory entities (e.g., state monitoring programs).
- 6) In addition, and as necessary, the NRC conducts independent confirmatory sampling to validate the accuracy of licensee measurements.
- 7) Information provided to the NRC by a licensee must be complete and accurate in all material respects. Submitting falsified information to the NRC is considered a violation of the regulations and will have severe implications. (For additional information, please refer to the [Enforcement Policy](#).)



# **Analysis of Cancer Risks in Populations Living Near Nuclear Facilities**

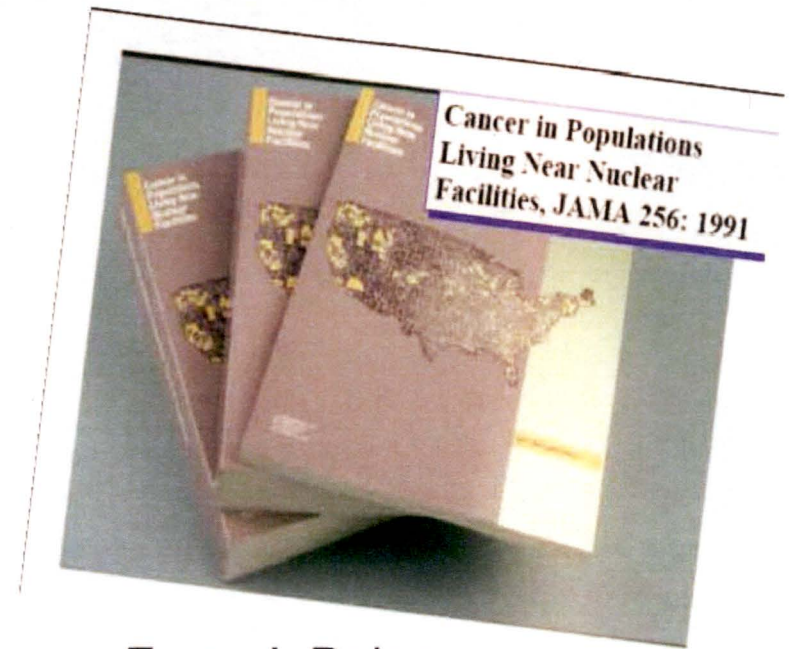
Terry Brock

Office of Nuclear Regulatory Research  
EMERGENCY PREPAREDNESS (EP)  
COUNTERPART MEETING

July 15, 2014

# Background

- Staff identified need for contemporary cancer epidemiology information for responding to recurrent stakeholder concerns
- Staff have been using the sentinel 1990 National Cancer Institute (NCI) report “Cancer in Populations Living Near Nuclear Facilities” to help answer these questions



From J. Boice



# National Cancer Institute (NCI)

- Looked at 16 different types of cancers
- Three Control Counties for each study county
- <http://www.cancer.gov/cancertopics/factsheet/Risk/nuclear-facilities>

National Cancer Institute  
at the National Institutes of Health

# What did the NCI study find?

- NCI conclusion for 1990 study:
  - No Excess Mortality Risk Found in Counties with Nuclear Facilities
  - Showed no general increased risk of death from cancer for people living in 107 U.S. counties containing or closely adjacent to 62 nuclear facilities.

| Overall Relative Risks |                |               |
|------------------------|----------------|---------------|
| Disease                | Before Startup | After Startup |
| Leukemia               |                |               |
| - Childhood            | 1.08           | 1.03          |
| - All Ages             | 1.02           | 0.98          |

Jablon et al, *JAMA* 265:1403-1408, 1991

Time Pattern

From J. Boice

# Why is NRC sponsoring an update?

- Provide stakeholders with the **latest cancer epidemiology information**
- Develop an approach to assess cancer risk in **geographic areas smaller than the county level**
- Account for **off-site dose**
- Study **cancer incidence** (occurrence or morbidity)



\*Review Suspended by Applicant

\*\* COI Application Amended by Applicant to ESP on 03/25/2010



# Who's conducting the study?

- **The National Academy of Science**
  - Established in 1863 to address the government's need for an independent advisor on scientific matters



## Recent International Studies

- Public concerns are not unique to the U.S.
  - Germany (2008)
  - Spain (2009)
  - Switzerland (2011)
  - Great Britain (2011)
  - France (2012)
  - Canada (2013)



## **Charge to NAS**

- NRC staff approached the Academies to update the 1990 National Cancer Institute study
- The NRC and Academies agreed to carry out a two-phase study:
  - Phase 1: Scoping study to identify scientifically sound approaches for carrying out the cancer risk assessment (the subject of this brief)
  - Phase 2: Cancer risk assessment informed by Phase 1 results



# Phase 1 Committee Membership

**John E. Burris**, Chair, Burroughs Wellcome  
Fund

**John C. Bailer, III**, University of Chicago  
(retired)

**Harold L. Beck**, Environmental Measurements  
Laboratory (retired)

**Andre Bouville**, National Cancer Institute  
(retired)

**Phaedra S. Corso**, University of Georgia

**Patricia J. Culligan**, Columbia University

**Paul M. DeLuca, Jr.**, University of Wisconsin

**Raymond A. Guilmette**, Lovelace Respiratory  
Research Institute

**George M. Hornberger**, Vanderbilt Institute for  
Energy and Environment

**Margaret Karagas**, Dartmouth University

**Roger E. Kasperson**, Clark University (retired)

**James E. Klaunig**, Indiana University

**Timothy Mousseau**, University of South  
Carolina

**Sharon B. Murphy**, University of Texas Health  
Science Center (retired)

**Roy E. Shore**, Radiation Effects Research  
Foundation

**Daniel O. Stram**, University of Southern  
California

**Margot Tirmarche**, Institute of Radiation  
Protection and Nuclear Safety

**Lance Waller**, Emory University

**Gayle E. Woloschak**, Northwestern University

**Jeffrey J. Wong**, California Environmental  
Protection Agency

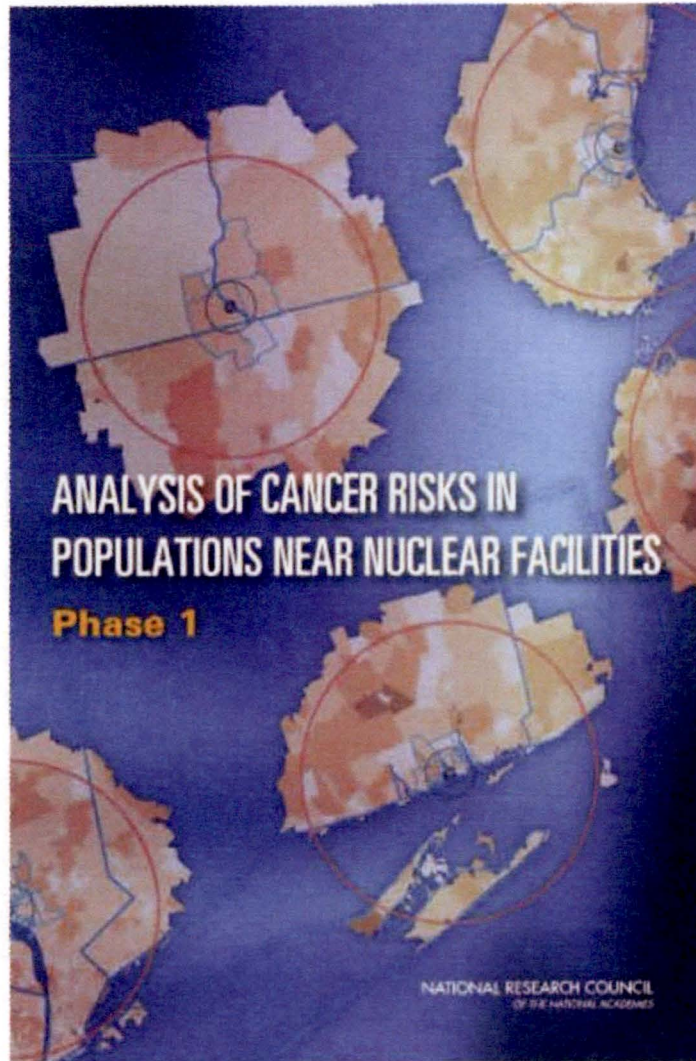
# Phase 1 Information Gathering Efforts

- Expert opinions of committee members
- Public Meetings
  - 5 public information gathering meetings across the U.S.
  - 1 additional public meeting for NFS
- Briefings from subject-matter experts
- Nuclear site visits
  - NRC and licensee facilitated tours of Dresden, SONGS, and NFS
- Public comments
- Literature and report reviews
- Letter-requests to offices that collect health and other information
- Phone and other communications
- Original analyses





# Phase 1 Results

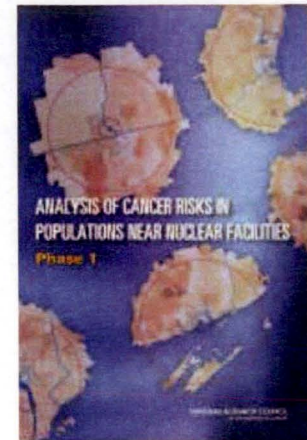


- In ADAMS at ML120860057



# NAS Phase 1 Results

- **NAS Key Messages to NRC**
  - Several challenges for carrying out the epidemiology studies
  - Several approaches possible
  - Effluent releases suitable for dosimetry
  - Two study designs recommended
  - Pilot study needed
  - Stakeholder engagement important

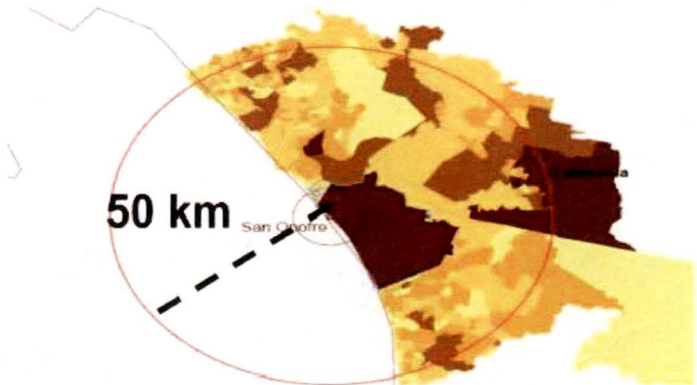


# NAS Recommendation 1

**Should the U.S. Nuclear Regulatory Commission decide to proceed with an epidemiology study of cancer risks in populations near nuclear facilities, the committee recommends that this investigation be carried out by conducting the following two studies, subject to the feasibility assessment described in Recommendation 2:**

1. An ecologic study of multiple cancer types of populations living near nuclear facilities;

1. A record-linkage based case-control study of cancers in children born near nuclear facilities.



**Absorbed doses to individual organs will be estimated for those living/born within approximately 50 km of nuclear facilities.**

## **NAS Recommendation 1 (cont.)**

**Questions such studies could answer:**

Ecologic: Are observed cancer incidence/mortality rates higher in census tracts with higher estimated exposures (as estimated from reported releases from the nuclear facility)?

Record-based case-control: Among children born within 50 km of a nuclear facility, are pediatric cancers associated with higher exposure at maternal residence at time of birth?



## NAS Recommendation 2

**A pilot study should be carried out to assess the feasibility of the committee-recommended dose assessment and epidemiology studies and to estimate the required time and resources.**

Suggested sites for pilot

Dresden, Illinois

Millstone, Connecticut

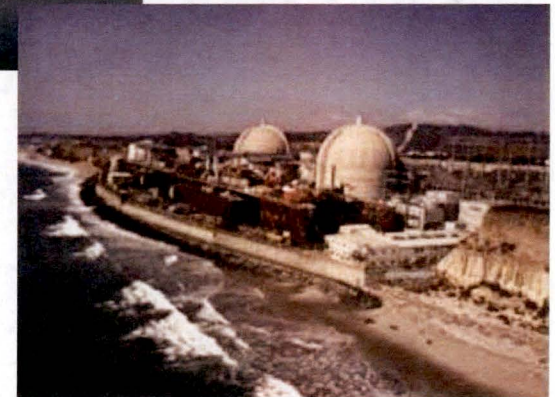
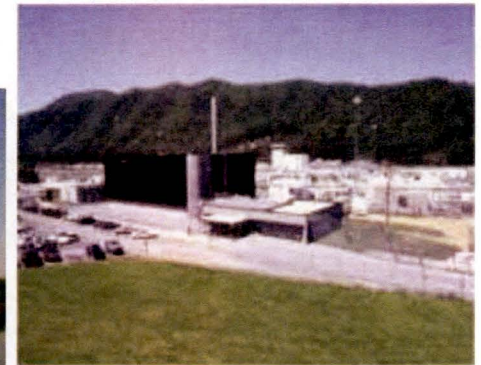
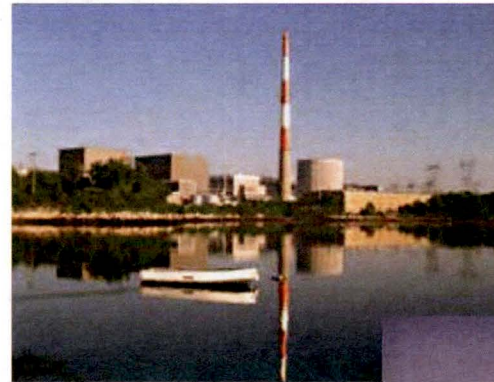
Oyster Creek, New Jersey

Haddam Neck , Connecticut

Big Rock Point, Michigan

San Onofre, California

Nuclear Fuel Services, Tennessee



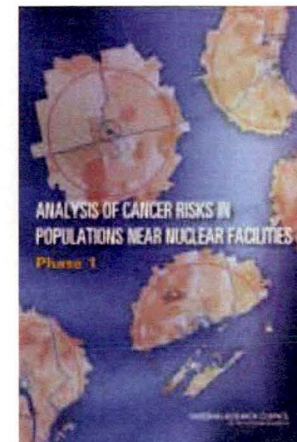
## NAS Recommendation 3



The epidemiology studies should include processes for involving and communicating with stakeholders. A plan for stakeholder engagement should be developed prior to the initiation of data gathering and analysis for these studies.



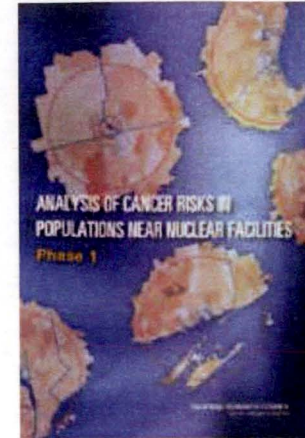
# Report Highlights



- A risk-projection model with no epidemiological study was considered
- The 1990 NCI county based study design was not recommended to be repeated
- States have very diverse tumor registries at different stages of development
- Finding effluent records prior to 1976 can be a challenge
- Uranium recovery facilities are not recommended to be studied—too sparsely populated



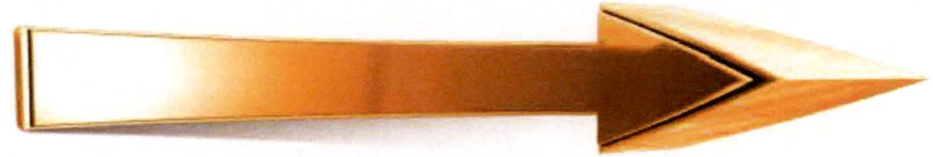
# Report Highlights



- Many technical challenges to performing these types of studies
  - low population sizes
  - low estimated doses = low risks
  - low statistical power
  - extremely large sample sizes are required

## **Report Highlights**

- These studies can help address public concerns about cancer risks
- Demonstrate NRC's commitment to working constructively with our stakeholders



## Path Forward

- Proceeding with the pilot studies
- Communicated to the Commission in SECY 12-0136
- Initial delay because of sequester – funding approved to start pilot studies last September (2-3 year effort)





# Pilot Planning Activities

- Appointing the study committee;
- Identifying the processes for selecting qualified individuals and/or organizations to perform the technical tasks;
- Assessing the availability and quality of release and weather data;
- Investigating the use of existing dose-estimation models or the need to create a new model;

## Pilot Planning Activities cont.



- Identifying state requirements for data sharing and transfer of health information;
- Obtaining Institutional Review Board approvals for the study, as appropriate; and
- Identifying key stakeholders and assessing their concerns, perceptions, and knowledge.

# Pilot Execution Activities



- Obtaining data on weather and nuclear facility airborne and waterborne releases turning the information into computer files that can be used for dose estimation;
- Using the computer model identified or developed in the planning phase to estimate absorbed doses to individual organs from monitored releases;
- Obtaining cancer incidence and mortality data at the census tract level to determine whether the population study can be carried out;



## Pilot Execution Activities cont.



- Linking birth registration and cancer incidence data to identify eligible cases of childhood cancers and matched controls to determine whether the case control study can be carried out;
- Developing processes for public participation and for communicating with key stakeholders identified in the planning phase.

**THANK  
YOU**

# Backup Slides



# **Public Comments to NAS**

**75** total comments

- **55** (73%) from individuals
- **12** (16%) from NGOs
- **3** (4%) from professional/industry
- **3** (4%) from university
- **2** (3%) from State and Tribal Government

## **Public Comments to NAS cont.**

- **40** (53%) want NRC to continue with Phase 2
- **22** (30%) did not express an opinion on whether to proceed
- **13** (17%) did not want NRC to continue with Phase 2
- **24** (32%) comments related to doing the pilot at San Onofre

# NAS Pilot Planning Cmt

- **JONATHAN SAMET**, Chair  
University of Southern  
California
- **HAROLD BECK**  
Independent Consultant
- **STEVEN M. BECKER**  
Old Dominion University
- **ANDRE BOUVILLE**  
National Cancer Institute  
(retired)
- **JEAN D. BRENDER**  
Texas A&M Health Science  
Center
- **R. WILLIAM FIELD**  
University of Iowa
- **DANIEL O. STRAM**  
University of Southern  
California
- **MARGOT TIRMARCHE**  
Nuclear Safety Authority of  
France
- **JONATHAN C. WAKEFIELD**  
University of Washington



**From:** [Brock, Terry](#)  
**To:** [Pearson, Alayna](#)  
**Cc:** [Garry, Steven](#)  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
**Date:** Tuesday, June 23, 2015 10:57:37 AM

---

Yes, office level concurrence is requested. Steve Garry is the NRR POC.

Thanks,

Terry

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop TWFN-10

phone: 301-415-1793

**From:** Pearson, Alayna

**Sent:** Tuesday, June 23, 2015 8:55 AM

**To:** Brock, Terry

**Subject:** FW: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Good Morning-

Is office level concurrence required for the subject SECY?

Thanks,

*Alayna Pearson*

Technical Assistant

Division of Risk Assessment

Office of Nuclear Reactor Regulation

Phone: (301)415-1096

---

**From:** RidsNrrMailCenter Resource

**Sent:** Tuesday, June 23, 2015 7:31 AM

**To:** Pearson, Alayna

**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

The incoming SECY indicated Office; however, you can ask the contact

[Terry.brock@nrc.gov](mailto:Terry.brock@nrc.gov) if office level is required.

Leslie A. Hill, Management Analyst

NRC/NRR/PMDA

301-415-2158

*"Go out on the limb, that's where the fruit is."*

[Leslie.Hill@nrc.gov](mailto:Leslie.Hill@nrc.gov)



---

**From:** Pearson, Alayna  
**Sent:** Monday, June 22, 2015 4:03 PM  
**To:** RidsNrrMailCenter Resource  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
Does this require division or office level concurrence?

---

**From:** RidsNrrMailCenter Resource  
**Sent:** Monday, June 22, 2015 6:32 AM  
**To:** RidsNrrDra Resource; Richards, Karen  
**Cc:** Pearson, Alayna; Garry, Steven  
**Subject:** ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
**Importance:** High  
The following action has been assigned to DRA  
Title: Review and Concurrence on SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps  
**Due date:** 06/25/15

[View ADAMS P8 Properties ML15173A010](#)  
[Open ADAMS P8 Document \(Y020150186 - Review and Concurrence on SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps\)](#)

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**From:** Gaskins, Kimberly  
**Sent:** Friday, June 19, 2015 2:02 PM  
**To:** RidsOpaMail Resource; RidsRgn1MailCenter Resource; RidsNmssOd Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource; RidsOgcMailCenter Resource  
**Cc:** Brock, Terry; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Ford, Jennifer; Ramsey, Kevin; Milligan, Patricia; Hinson, Charles; Garry, Steven; Mizuno, Beth; Burnell, Scott; Nimitz, Ronald  
**Subject:** RE: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
All,

Please concur no later than COB June 25<sup>th</sup>. Please contact Terry Brock at [Terry.brock@nrc.gov](mailto:Terry.brock@nrc.gov) with any questions or comments concerning this document.  
Thank you  
Kim

---

**From:** Gaskins, Kimberly  
**Sent:** Friday, June 19, 2015 1:57 PM  
**To:** RidsOpaMail Resource; RidsRgn1MailCenter Resource; RidsNmssOd Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource; RidsOgcMailCenter Resource  
**Cc:** Brock, Terry; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Ford, Jennifer; Ramsey, Kevin; Milligan, Patricia; Hinson, Charles; Garry, Steven; Mizuno, Beth; Burnell, Scott; Nimitz, Ronald  
**Subject:** Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

MEMORANDUM TO: Those on the Attached List

FROM: M. Case

SUBJECT: SECY-RESULTS OF THE ANALYSIS OF CANCER RISKS  
IN POPULATION NEAR NUCLEAR FACILITIES:  
PHASE 2 PILOT PLANNING PROJECT AND NEXT STEPS

[View ADAMS P8 Properties ML15141A343](#)

[Open ADAMS P8 Package \(SECY - Results of the Analysis of Cancer Risks in Populations  
Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps\)](#)



**From:** [Brock, Terry](#)  
**To:** [Garry, Steven](#)  
**Subject:** RE: Cancer study  
**Date:** Thursday, July 10, 2014 1:06:35 PM

---

#### Update for One Million U.S. Radiation Workers and Veterans

- Continued support from NRC through the DOE's Low Dose Research program to evaluate cancer risks of the early nuclear power worker and industrial radiography cohorts
- Staff is participating on NCRP Scientific Committee 6-9: U.S. Radiation Workers and Nuclear Weapons Test Participants Radiation Dose Assessment
- Providing REIRS data occupational dose data to support for the studies

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

---

**From:** Garry, Steven  
**Sent:** Thursday, July 10, 2014 11:22 AM  
**To:** Brock, Terry  
**Subject:** Cancer study

Terry,  
Sorry to ask again, but I am preparing Undine's slides for the NEI HP Forum, and I need to know if I should up in a slide on the cancer study, or if you or someone else is specifically addressing the cancer study at the NEI HP Forum.

If I put in a slide for Undine, do you have anything specific you want discussed?

Steve

April 24, 2012

MEMORANDUM TO: Those on the Attached List

FROM: Brian W. Sheron, Director /RA/  
Office of Nuclear Regulatory Research

SUBJECT: REQUEST FOR REVIEW OF THE NATIONAL ACADEMY OF  
SCIENCES REPORT "ANALYSIS OF CANCER RISKS IN  
POPULATIONS LIVING NEAR NUCLEAR FACILITIES:  
PHASE 1" AND USER NEED NSIR-2007-001 UPDATE

This memorandum is to inform you that I am requesting your office's review and comment on the Nuclear Regulatory Commission (NRC)-sponsored National Academy of Sciences (NAS) report, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I", (ML120860057). This report is in support of User Need NSIR-2007-001 (ML071550069) to provide an update to the 1990 National Cancer Institute (NCI) report, "Cancer in Populations near Nuclear Facilities." The Office of Nuclear Security and Incident Response made the User Need request with concurrences from the Office of Nuclear Reactor Regulation, Office of New Reactors, Office of Public Affairs, and Region I. The NRC staff use the NCI report as a valuable risk communication tool for addressing stakeholder concerns about cancer mortality attributable to the operation of nuclear power facilities. Stakeholders often ask the staff about perceived elevated cancer rates in populations working or residing near NRC-licensed nuclear facilities, including power reactors and fuel cycle facilities (e.g., fuel enrichment and fabrication plants). The staff uses this report as a scientifically defensible resource to aid in assuring stakeholders that cancer mortality rates are consistently not elevated in counties that contain or are adjacent to nuclear power and fuel cycle facilities. The report is over 20 years old, and more modern analysis methods combined with up-to-date information sources will better reflect the risk to current populations living near NRC-licensed nuclear facilities.

The Office of Nuclear Regulatory Research (RES) originally contracted with the Center for Epidemiologic Research at Oak Ridge Associated Universities (ORAU) to perform the study. However, due to strong public interest in the study staff reconsidered using ORAU to do the work and contracted with the U.S. National Academy of Sciences (NAS) instead. This action was not an indication of any deficiencies in the technical quality of ORAU's work, but more of ensuring the investigator brought a broad social and national policy perspective to the study. As such, the staff chose the NAS to perform the study.

CONTACT: Terry Brock, RES/DSA  
(301) 251-7487

The NAS and NRC agreed to perform the study in two phases. In Phase 1—the report subject of this memorandum— NAS provided a scoping study that developed approaches to study cancer risks in populations living near nuclear power and fuel cycle facilities licensed by the NRC. The information contained in this report summarizes NAS' work and recommendations on pilot studies for the next phase of the study. Through this review we are evaluating the report to provide input to a possible SECY paper for Commission consideration on the next steps. The NRC is to use the results of the Phase 1 study to decide on whether or not to proceed with Phase 2 of actually performing a pilot study of a select number of plants. Your staff comments will help in this decision.

We have identified staff in your offices that have been associated with the project and suggest that they take the lead in reviewing the document for your organization—your identified staffs are on distribution for this memo and have been sent an e-mail to inform them of this request. Please provide comments back to my staff by three weeks from the date of this memorandum to support a forthcoming Commissioner Technical Assistants briefing. Comments may be submitted by e-mail.

Please feel free to contact Terry Brock of my staff at 301-251-7487 or [Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov) if you have any questions or cannot accommodate this schedule.



MEMORANDUM TO THOSE ON THE ATTACHED LIST DATED:

SUBJECT: REQUEST FOR REVIEW OF THE NATIONAL ACADEMY OF SCIENCES  
REPORT "ANALYSIS OF CANCER RISKS IN POPULATIONS LIVING NEAR  
NUCLEAR FACILITIES: PHASE 1"

Eliot J. Brenner, Director, Office of Public Affairs  
Elmo E. Collins, Administrator, Region IV  
William Dean, Administrator, Region I  
Margaret M. Doane, Director, Office of International  
Programs  
Catherine Haney, Director, Office of Nuclear Material  
Safety and Safeguards  
Michael R. Johnson, Director, Office of New Reactors  
  
Eric J. Leeds, Director, Office of Nuclear Reactor  
Regulation  
Victor McCree, Administrator, Region II  
Cynthia D. Peterson, Acting Administrator, Region III  
Marian L. Zabler, Acting General Counsel, Office of  
the General Counsel  
Rebecca L. Schmidt, Director, Office of Congressional  
Affairs  
James T. Wiggins, Director, Office of Nuclear Security  
and Incident Response  
Mark A. Sartorius, Director, Office of Federal and  
State Materials and Environmental Management  
Programs

RidsOpaMail Resource  
RidsRgn4MailCenter Resource  
RidsRgn1MailCenter Resource  
RidsOipMailCenter Resource  
  
RidsNmssOd Resource  
  
RidsNroOd Resource (I)  
RidsNroMailCenter Resource (A)  
RidsNrrOd Resource (I)  
RidsNrrMailCenter Resource (A)  
RidsRgn2MailCenter Resource  
RidsRgn3MailCenter Resource  
RidsOgcMailCenter Resource  
  
RidsOcaMailCenter Resource  
  
RidsNsirOd Resource (I)  
RidsNsirMailCenter Resource (A)  
RidsFsmeOd Resource (A)

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Please feel free to contact Terry Brock of my staff at 301-251-7487 or [Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov) if you have any questions or cannot accommodate this schedule.

**DISTRIBUTION:**

|                   |                   |                  |                    |
|-------------------|-------------------|------------------|--------------------|
| G. Chapman, NMSS  | S. Garry, NRR     | R. Conatser, NRR | J. Dehmel, NRO     |
| P. Milligan, NSIR | R. Nimitz, RI     | J. Cassidy, RII  | D. Stearns, RIV    |
| S. Salomon, FSME  | B. Mizuno, OGC    | D. McIntyre, OPA | A. Jones, OIP      |
| G. Dacus, OCA     | J. Weil, OCA      | L. Rakovan, EDO  | G. Woodruff, RIIS. |
| Burnell, OPA      | W. von Till, FSME | H. Cruz, NRR     |                    |

**ADAMS Pkg Accession No.: ML12103A350**

|        |             |                 |               |         |
|--------|-------------|-----------------|---------------|---------|
| OFFICE | RES/DSA/RPB | BC: RES/DSA/RPB | D:RES/DSA     | D:RES   |
| NAME   | TBrock      | SBush-Goddard   | KHalveyGibson | BSheron |
| DATE   | 4/13/12     | 4/13 /12        | 4/16/12       | 4/24/12 |

**OFFICIAL RECORD COPY**

**From:** Garry, Steven  
**Sent:** 22 Jun 2015 17:13:21 +0000  
**To:** Mrs8@nnrc.gov  
**Subject:** FW: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
**Importance:** High

hi Mike, I just arrived in San Diego for the REEW conference. Would you download the draft secy paper from the link below and email it back to me? I cannot access it unless I get logged in to nrc dot gov using Citrix. So it's easier if you would just download it in email and attachment back to me thank you have a good week Steve

---

From: RidsNrrMailCenter Resource  
Sent: Monday, June 22, 2015 6:31 AM  
To: RidsNrrDra Resource; Richards, Karen  
Cc: Pearson, Alayna; Garry, Steven  
Subject: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

The following action has been assigned to DRA

Title: Review and Concurrence on SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps

Due date: 06/25/15

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Open ADAMS P8 Document (Y020150186 - Review and Concurrence on SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps)<[https://adamsxt.nrc.gov/WorkplaceXT/getContent?objectStoreName=Main.\\_\\_\\_\\_.Library&id=current&vsId=%7b64504986-6C31-4070-9FE6-114A662A651B%7d&objectType=document](https://adamsxt.nrc.gov/WorkplaceXT/getContent?objectStoreName=Main.____.Library&id=current&vsId=%7b64504986-6C31-4070-9FE6-114A662A651B%7d&objectType=document)>

From: Gaskins, Kimberly  
Sent: Friday, June 19, 2015 2:02 PM  
To: RidsOpaMail Resource; RidsRgn1MailCenter Resource; RidsNmssOd Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource; RidsOgeMailCenter Resource  
Cc: Brock, Terry; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Ford, Jennifer; Ramsey, Kevin; Milligan, Patricia; Hinson, Charles; Garry, Steven; Mizuno, Beth; Burnell, Scott; Nimitz, Ronald  
Subject: RE: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

All,

Please concur no later than COB June 25th. Please contact Terry Brock at [Terry.brock@nrc.gov](mailto:Terry.brock@nrc.gov) with any questions or comments concerning this document.

Thank you  
Kim



From: Gaskins, Kimberly

Sent: Friday, June 19, 2015 1:57 PM

To: RidsOpaMail Resource; RidsRgn1MailCenter Resource; RidsNmssOd Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource; RidsOgcMailCenter Resource

Cc: Brock, Terry; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Ford, Jennifer; Ramsey, Kevin;

Milligan, Patricia; Hinson, Charles; Garry, Steven; Mizuno, Beth; Burnell, Scott; Nimitz, Ronald

Subject: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

MEMORANDUM TO: Those on the Attached List

FROM: M. Case

SUBJECT: SECY-RESULTS OF THE ANALYSIS OF CANCER RISKS  
IN POPULATION NEAR NUCLEAR FACILITIES:  
PHASE 2 PILOT PLANNING PROJECT AND NEXT STEPS

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Open ADAMS P8 Package (SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next

Steps)<[https://adamsxt.nrc.gov/WorkplaceXT/getContent?objectStoreName=Main.\\_\\_\\_\\_.Library&id=current&vsId=%7bE5EC5E30-E849-4B9B-8C79-3D0C789BE6E8%7d&objectType=document](https://adamsxt.nrc.gov/WorkplaceXT/getContent?objectStoreName=Main.____.Library&id=current&vsId=%7bE5EC5E30-E849-4B9B-8C79-3D0C789BE6E8%7d&objectType=document)>

**From:** Garry, Steven  
**Sent:** 22 Jun 2015 18:11:29 +0000  
**To:** (b)(6)  
**Subject:** FW: draft secy  
**Attachments:** Draft SECY-Results of the Analysis of Cancer Risk.docx

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From: Smith, Micheal  
Sent: Monday, June 22, 2015 1:21 PM  
To: Garry, Steven  
Subject: draft secy

Here you go.  
Just FYI I will be leaving today around 2:40

FOR: The Commissioners

FROM: Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

SUBJECT: RESULTS OF THE ANALYSIS OF CANCER RISKS IN POPULATIONS  
NEAR NUCLEAR FACILITIES: PHASE 2 PILOT PLANNING PROJECT  
AND STUDY STATUS

PURPOSE:

The purpose of this paper is to update the Commission on the analysis of cancer risks in populations near nuclear facilities study and study status. This paper does not address any new commitments or resource implications.

BACKGROUND:

Each commercial nuclear power plant and fuel cycle facility that the NRC regulates is authorized to release radioactive materials to the environment as specified in the regulations and licensing documents, in compliance with dose limits for members of the public and concentration limits for liquid and gaseous effluent releases. The staff has concluded that offsite doses to individual members of the public as a result of these routine releases are a small fraction of the dose limits specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation," specifically 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public is also generally less than 1 percent of the amount of radiation the average U.S. citizen receives in a year from all background sources. Nonetheless, some stakeholders have continued to express concerns about the potential effect of these releases on the health of residents living near nuclear facilities.

CONTACT: Terry Brock, RES/DSA  
301-251-7487



These concerns are not new or unique to the United States. Since 2008, Canada, France, Germany, Great Britain, Spain, and Switzerland have all conducted epidemiological studies near nuclear facilities within their borders to address public health concerns. These studies have generally found no association between facility operations and increased cancer risks to the public that are attributable to the releases. For example, the German study did find an association of increased childhood leukemia risk within 5 kilometers of the facilities; however, upon examination of the offsite exposures, the authors concluded the increased risk could not be attributable to releases from the facilities<sup>1</sup>.

To help address these stakeholder concerns, the staff has been using the 1990 National Cancer Institute (NCI) study, "Cancer in Populations Living near Nuclear Facilities" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15035A630), and other more recent epidemiological reports conducted by various State health departments when communicating with the public on cancer mortality in populations near nuclear power facilities. The staff relies on credible health studies to augment its discussions about the NRC's robust regulatory programs to keep offsite doses as low as is reasonably achievable (ALARA) by providing public health information that directly applies to the health outcomes that are often of concern (i.e., cancer). However, the 1990 NCI report is now more than 25 years old, and the staff recognized that an update to this data would allow the staff to provide more contemporary cancer information on populations living near NRC-licensed nuclear facilities.

Staff originally requested that NCI to provide the update. However they were unable to provide staff to support the study and they indicated these types of studies were no longer in their research focus. NCI still supports the original report and has a fact sheet on the study that is publicly available on their web site at: <http://dceg.cancer.gov/about/organization/programs-ebp/reb/fact-sheet-mortality-risk>.

In April 2010, the NRC requested the National Academy of Sciences (NAS) perform a study on cancer risks in populations living near NRC-licensed facilities to update the 1990 NCI study. NRC and NAS decided to divide the study into phases. In Phase 1, NAS explored the feasibility of conducting an updated study by developing modern methods to perform the analysis. This was documented in the 2012 report, "Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 1" (ADAMS Accession No. ML15035A132). The staff communicated the results of the Phase 1 study and the NAS recommendations for the second phase pilot studies in SECY-12-0136, "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities Study" (ADAMS Accession No. ML12249A121). In Phase 2, NAS would conduct pilot studies to determine the ability to practically apply the Phase 1 methods at seven sites recommended by the NAS committee: Dresden (in Illinois), Millstone (in Connecticut), Oyster Creek (in New Jersey), Haddam Neck (decommissioned; in Connecticut), Big Rock Point (decommissioned; in Michigan), San Onofre (in California), and Nuclear Fuel Services (in Tennessee). NAS selected these sites because they provide a good sampling of facilities in six States with different operating histories, population sizes, and levels of complexity in data retrieval from the State cancer registries. NAS specifically recommended the pilot study examine two study designs: a population study of cancer diagnosis and mortality rates for multiple cancer types and all age groups, down to the census-tract level, and a case control study of childhood cancers in children born within a fixed distance of a nuclear facility<sup>2</sup>. Upon

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<sup>1</sup> Kaatsch P, et al. "Leukaemia in Young Children Living in the Vicinity of German Nuclear Power Plants," *International Journal of Cancer*, 2008 Feb 15; 122(4):721-6.

<sup>2</sup> The population-based study design uses a geographical area as the unit of observation (e.g., census tract as proposed by NAS, county as used in the 1990 NCI report, ZIP Code) and uses an aggregate analysis



completion of the proposed Phase 2 pilot studies, NAS was to determine whether further study is practical on a nationwide scale, and the NRC staff was charged with determining whether to perform the studies at all NRC-licensed facilities (i.e., balance of operating nuclear power plants and fuel-cycle facilities).

NAS split the Phase 2 pilot study into a pilot planning project and a pilot execution project. This paper describes staff's evaluation of the NAS pilot planning project report, "Analysis of Cancer Risks Near Nuclear Facilities: Phase 2 Pilot Planning" (ADAMS Accession No.: ML15035A135) and study status.

#### DISCUSSION:

##### *NAS: Phase 2 Pilot Planning Project Results*

NAS stated in the pilot planning report that the pilot studies are meant to determine the practicality of implementing the methods and study designs recommended in Phase 1. NAS also said the interpretation and communication of risk estimates from the pilot study, if reported, should be done with "great caution." It emphasized that any data collected during the pilot study would have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples. Furthermore, any decision to proceed with a full scope study should be based solely on conclusions related to practicality and not on risk estimates. NAS also highlighted that the population-based study at the census tract level had significant issues. Staff interpreted that the population-based census tract study design may not be feasible. NAS also communicated to staff that the execution phase of the pilot study will require "significant resources" to complete (39 months and cost \$8 million).

In addition, the staff estimates that it may take NAS 8 to 10 years from now to complete the pilot and the subsequent nation-wide studies before NRC has final cancer risk results to share with NRC stakeholders—the original intent of the project. That would possibly prolong the study to 2025, 15 years after the start of the project with NAS. After staff members reviewed the pilot planning report and execution phase proposal, they do not believe it is worthwhile to complete the pilot study, given the NAS position regarding the limited usefulness of the results to draw conclusions about the pilot plants (or just as importantly, single facilities), the long duration and high cost of the pilot study, and the long duration of subsequent studies.

##### *NAS Alternate Approach*

Staff expressed concerns to NAS about the usefulness of the pilot study results in communicating cancer risks to stakeholders and the overall study duration. Staff requested that NAS focus on providing final results for the next phase of the study to shorten the study time. Specifically, staff asked NAS to focus on the Phase 1 recommended case-control study design and perform an analysis of a sample of facilities in the United States to draw statistically valid and generalizable results to the entire fleet. In response, NAS proposed that the pilot planning committee reconvene to examine our request for the alternate approach at an additional

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that looks at a study factor (exposure) and an outcome factor (disease or death) measured in the geographical area at the same time. This study can show possible associations between exposure and disease. The case-control study design compares the prevalence of risk factors or exposures in a series of diseased study subjects (cases) with the prevalence of risk factors or exposures in a series of disease-free study subjects (controls).



\$200,000 for a 9-month study. After the new review, NAS estimated another 50 months to complete the alternate approach at an uncertain cost.

*U.S. National Council on Radiation Protection and Measurements (NCRP) Approach*

The NCRP is an organization chartered by the U.S. Congress as the National Council on Radiation Protection and Measurements. The Charter of the Council (Public Law 88-376) states its objectives to include: collect, analyze, develop and disseminate in the public interest information and recommendations about (a) protection against radiation and (b) radiation measurements, quantities and units, particularly those concerned with radiation protection.

NCRP offered to directly update the 1990 NCI study report within a shorter time frame and cost (staff estimates approximately 2 to 3 years and \$2.5 million). The NCRP update would be a more modest initiative. Instead of the NAS recommended two study designs, NCRP would use the same methods used in the 1990 study—a countywide population-based study design, and would be able to provide final results in a reasonable time period to meet the original staff goal of having updated information. The NCRP's lead investigator used to work for NCI where he designed, directed, and completed the original 1990 study.

The results of the NCRP update would be a consensus report going through their scientific committee and peer-review process. The staff would ask NCRP to update the report with new results for certain NRC facilities not operational or considered at the time of the 1990 study using the same NCI approach of studying population risks at the county level (e.g., Nuclear Fuel Services in Tennessee, Braidwood and Byron Nuclear Generating Stations in Illinois). The staff would ask NCRP upon completion of the update if further study should be done utilizing the NAS Phase 1 case-control study design—generally considered a more robust design.

CONCLUSION:

After considering the three options above, staff felt the NCRP was a reasonable option to move forward. However, due to the current budget environment, the staff has decided to not move forward with this project at this time. The NRC staff initiated this project in an effort to be responsive to stakeholders concerns about cancer risks; however, the current budget environment has required the agency to prioritize its spending to focus on activities directly related to protecting public health and safety (e.g., inspections and licensing). The uncertainty in the NRC budget for the foreseeable future precludes the agency from spending any additional funds on this project.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research



COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

**ADAMS Accession No.: ML15141A404**

|        |             |              |                |           |           |
|--------|-------------|--------------|----------------|-----------|-----------|
| OFFICE | RES/DSA/RPB | Tech Editing | BC:RES/DSA/RPB | D:RES/DSA | R-I       |
| NAME   | T. Brock    | QTE          | R. Tadesse     | M. Case   | D. Dorman |
| DATE   | 06/18/15    | 05/26/15     | 06/19/15       | 06/19/15  | / /       |
| OFFICE | D:NMSS      | D:NRR        | D:NSIR         | D:NRO     | D:OGC     |
| NAME   | C. Haney    | W. Dean      | B. Holian      | G. Tracy  | M. Doane  |
| DATE   | / /         | / /          | / /            | / /       | / /       |
| OFFICE | D:OPA       | D:RES        |                |           |           |
| NAME   | E. Brenner  | B. Sheron    |                |           |           |
| DATE   | / /         | / /          | / /            | / /       |           |

OFFICIAL RECORD COPY

From: [Garry, Steven](#)  
To: [\(b\)\(6\)](#)  
Subject: FW: draft secy  
Date: Monday, June 22, 2015 2:11:30 PM  
Attachments: Draft SECY-Results of the Analysis of Cancer Risk.docx

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From: Smith, Micheal  
Sent: Monday, June 22, 2015 1:21 PM  
To: Garry, Steven  
Subject: draft secy

Here you go.  
Just FYI I will be leaving today around 2:40

Roger Johnson, PhD  
Professor Emeritus  
2840 Calle Heraldo  
San Clemente, CA 92673  
(b)(6)  
949-218-1337

Dear Dr. Johnson,

Thank you for your e-mail of January 13, 2012 addressing your concerns about the San Onofre Nuclear Generating Station (SONGS) and the forthcoming National Academy of Sciences (NAS) pilot studies on cancer risks in populations near nuclear facilities. You asked six specific questions that are answered in the enclosure. The U.S. Nuclear Regulatory Commission (NRC) encourages interested parties to communicate with us on issues of mutual concern. In regards to your general concern about NAS' independence, I assure you that NRC cannot and will not interfere with NAS' independence. As you know, NAS is non-profit society of distinguished scholars, established by an Act of Congress and charged with providing independent advice to the nation on matters related to science and technology. -in performing studies for study sponsors I suggest you read More information on the the NAS Study Process can be found on-line at <http://www.nationalacademies.org/studyprocess/index.html> .

Detailed answers to your six specific questions are provided in the enclosure. You asked six specific questions that are answered in the enclosure. This in addition to our direct response to your questions may answer many of your concerns.

Sincerely,

Chairman Allison M. ~~MacFarlane~~ Macfarlane



Enclosure

Q1. Will the NRC agree not to be involved in any way in the selection of scientists and staff members for this study? This assurance would include nominations, recommendations, interviews, and selection of all personnel as well as the avoidance of any written or informal exchanges with the NAS.

A1. Yes, the NRC has not and will not be involved with the selection of scientists and staff. The NRC selected the NAS to perform the study because of their independence. The NAS study process is independent of NRC, transparent, objective, and technically rigorous, ensuring that the new study will be comprehensive and scientifically sound. This includes NAS' independence in the selection of committee members. To the extent that NAS requests NRC assistance in any portion of the study, the agency will respond in a manner that maintains the independent nature of the NAS research.

Q2. Will the NRC agree not to be involved in any way in the scope and design of the study? That would mean the NAS methods and procedures will be carried out without any kind of input or review by the NRC.

A2. Yes, the NRC will not instruct the NAS on the scope and design of the study. The NRC is funding the NAS study as designed by the NAS. The independent NAS Phase 1 study committee study has already recommended an approach and study designs for the pilot studies. These recommendations are being used to determine their feasibility through the pilot studies. The Phase 1 report is available on-line for free at [http://www.nap.edu/catalog.php?record\\_id=13388#toc](http://www.nap.edu/catalog.php?record_id=13388#toc). To the extent that NAS requests NRC assistance in any portion of the study, the agency will respond in a manner that maintains the independent nature of the NAS research.

Q3. Will the NRC agree not to be involved in any way in the analysis or interpretation of data? This would mean that the NRC would have no advance knowledge of the results before they are made public and that the NRC would have no advanced knowledge of the results before they are made public and that the NRC would not be involved in any way in writing of the report or its conclusions.

A3. Yes, the NRC will abide by the existing NAS research process regarding interaction with the NRC prior to public release of the study results (see earlier link to the NAS study process website).

Q4. If the NAS indeed fails to find any cancer effects, will the NRC refrain from placing an unscientific spin on the data by claiming that such results prove that NPP do not cause cancer? As a scientist, I am sure you know that researchers can never prove the null hypothesis. If no statistically significant effects are found, the only possible conclusion is that the study failed to find an effect. It would not prove that there are no effects.

A4. A4. The NRC will use the results from the study in a scientific manner in the context of the report. has consistently stated only that the available evidence shows no excess cancer mortality risk in communities near U.S. nuclear power plants attributable due to the regulated



~~discharge of radioactive effluents. Ongoing U.S. nuclear power plant oversight, including environmental sampling, indicates any releases of radioactive materials would result in public doses that represent a miniscule fraction of the dose from naturally occurring radiation and below any radiation protection dose limits where excess cancers would not expected to be observed epidemiologically. This supports the NRC's consistent statement of an appropriate working hypothesis — any effect on cancer risk from nuclear power plant releases is very likely too small to be measurable.~~ Once the NAS study is complete the NRC's statements will accurately reflect the study's findings.

Q5. Since the NRC has already chosen to speculate that nothing will be found, may I ask you to speculate on what the NRC position would be if a cancer effect is discovered? Obviously this pilot study would have to be expanded but that is not the reply I am seeking. The results of this study will probably not be available until 2015, and if further research is recommended it is possible that the issue could be tied up until the next decade. If there is a cancer effect, what are the policy implications for the future of nuclear power? People (especially children) may have been suffering from the NPP emissions for decades already and it would be unconscionable to

A5. ~~The NRC has not speculated on the results of the cancer study. The NRC has communicated with the public expectations based on information from the Phase I study to disclose publicly the difficulty that NAS foresees in obtaining conclusive data from studies with low statistical power. NRC spokespeople have consistently stated that if the NAS study indicates a possible increase in public cancer risk attributable to the regulated effluent releases from commercial nuclear power plant operation, the agency will determine if and how its regulations (and therefore plant operation) can be modified to maintain public health and safety.~~

Q6. As a follow-up on the important issue of public safety, may I quote from the NRC Mission Statement which says the mission of the NRC is "...to ensure the adequate protection of public health and safety, promote the common defense and security, and to protect the environment." This clearly means that the NRC is charged with all safety aspects of nuclear power plants especially including public health and protection of the environment. Instead of addressing these issues, the public has seen the NRC avoid such issues. For example, all the NRC hearings in this area have been narrowly focused on engineering questions, the assumption being that nuclear power plants are automatically "safe" if it can be shown that the engineering designs are correct. At the start of each meeting, an NRC spokesman states clearly that they will not entertain any questions other than technical questions about nuclear engineering. There are at least a dozen major questions of nuclear power plant safety, and the NRC restricts all discussion to only one: engineering. ??????????When will the NRC holdings about the public health or environmental contamination? ?????????????????? When will it hold hearings about seismic dangers? (I hope you read the new report a few days ago in which scientists now say that fault lines in California may connect and cause a megaquake: <http://articles.latimes.com/2013/jan/09/science/la-sci-big-earthquakes-30130110>) Why does the NRC ignore important safety issues related waste storage, terrorism, human error, sabotage, and other issues which could make nuclear power plants unsafe? If the NRC does not wish to



deal with its charge of public safety, please tell me what other government agencies are authorized to regulate the nuclear power industry.

A6. The NRC conducts its business in accordance with the statutory requirements of the Atomic Energy Act. By statute, the NRC ensures reasonable assurance of adequate protection of public health and safety, and the environment, by establishing its regulations governing the safety aspects of nuclear power facilities while providing the public with a reliable source of electrical power. If a nuclear power plant is meeting the NRC's regulations, then the agency considers the plant to be operating safely. ~~The NRC's onsite inspectors at every plant, supplemented by experts in our regional and headquarters offices, examine and review plant performance on an ongoing basis to ensure the plants meet the agency's requirements.~~ Each year, the NRC's review processes include hundreds of public meetings on a variety of highly technical matters, both at agency headquarters and in communities near nuclear power plants. It's not possible to bring NRC experts on every subject to every meeting, so the agency follows well-established procedures to tailor the meeting to the topic at hand, ensuring the public can observe the process and ask the NRC staff questions. ~~These meetings cover a wide range of topics, including environmental reviews, seismic research (as was recently discussed at the Diablo Canyon plant), and annual discussions of overall plant performance. Category 1 meetings are between the NRC and one other party — typically a licensee of the NRC, a vendor, or an applicant or potential applicant for a license. The public can observe these meetings and has the opportunity to ask questions of the NRC after the business portion of the meeting, but doesn't participate in the discussion itself. Category 2 meetings are between the NRC and a number of individuals representing groups such as licensees, vendors, other federal agencies, or non-governmental organizations to conduct a discussion with the designated group. The public can observe the meeting and ask questions of the NRC, but again, doesn't participate in the discussion itself. Category 3 meetings are fully engaged discussions between the NRC and the public (as well as stakeholders that might include other government agencies, the industry and others).~~ Public participation is actively sought at this type of meeting, which has the widest participation opportunities and is specifically tailored for the public to comment or ask questions. The NRC's website includes information on everything under the agency's jurisdiction, including safely and securely storing spent nuclear fuel (<http://www.nrc.gov/waste/spent-fuel-storage/wcd.html>) and requirements for keeping nuclear power plants secure from attack or sabotage (e.g. <http://www.nrc.gov/security/post-911.html> <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/cyber-security-bg.html> and <http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0314/> ).



FOR: The Commissioners

FROM: R. W. Borchardt  
Executive Director for Operations

SUBJECT: NEXT STEPS FOR THE ANALYSIS OF CANCER RISKS IN  
POPULATIONS NEAR NUCLEAR FACILITIES STUDY

PURPOSE:

The purpose of this paper is to inform the Commission of staff plans for the next steps of the Nuclear Regulatory Commission (NRC)-sponsored Analysis of Cancer Risks in Populations near Nuclear Facilities study.

SUMMARY:

In April 2010, the NRC staff requested the National Academy of Sciences (NAS) to perform a new study on cancer mortality and incidence risks in populations living near NRC-licensed facilities to update the 1990 National Cancer Institute (NCI) report on "Cancer Risks in Populations near Nuclear Facilities." NAS agreed to do the study in two phases. In Phase 1, NAS developed scientifically sound methods to perform the study and published its report on March 28, 2012. The staff's next step has been to proceed with the NAS-recommended approach to determine the feasibility of the Phase 1 methods through pilot studies at seven NAS committee-recommended sites: Dresden in Illinois, Millstone in Connecticut, Oyster Creek in New Jersey, Haddam Neck (decommissioned) in Connecticut, Big Rock Point (decommissioned) in Michigan, San Onofre in California, and Nuclear Fuel Services in Tennessee. Upon completion of the pilot studies, the NRC staff will determine whether to perform the studies at all NRC-licensed facilities.

CONTACT: Terry Brock, RES/DSA  
301-251-7487

BACKGROUND:

Each commercial nuclear power plant and fuel cycle facility that the NRC regulates is authorized to release small amounts of radioactive materials to the environment as specified in the regulations and the licensing documents for the facility. For nuclear power plants, NRC regulations and licenses require each licensee to establish and maintain a program for monitoring radioactive effluents (Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.36a (Editor note: there is a missing "a" in 50.36a, and this missing "a" [not a parenthetical (a)]), "Technical Specifications on Effluents from Nuclear Power Reactors," and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion 'As Low as Is Reasonably Achievable,' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents." Section IV.B of 10 CFR Part 50, Appendix I, NRC regulations in 10 CFR 50.36a requires licensees to report these effluents in an annual radioactive effluent release report, ~~(10 CFR 50.36a). Licensees submit their reports to the NRC with content and format in accordance with Regulatory Guide 1.21, Revision 2, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," issued June 2009. These reports conclude that releases result in~~ offsite doses ~~that are a small fraction of the dose limits for to~~ individual members of the public ~~(10 CFR 20.1301(a) and (e)) are a small fraction of the 10 CFR 20 Standards For Protection Against Radiation limits specified in 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public and is also generally less than 1% of the amount of radiation the~~ average U.S. citizen receives in a year from all background sources. Nonetheless, some communities have expressed recurrent concerns about the potential effect of these releases on the health of residents living near nuclear facilities.

To help address these stakeholder concerns, the staff uses the 1990 NCI report as a risk communication tool on cancer mortality in populations near nuclear power facilities. The staff relies on credible health studies to augment its discussions about the NRC's robust regulatory programs to keep offsite doses as low as is reasonably achievable (ALARA) by providing public health information that directly applies to the health outcomes that are often of concern (i.e., cancer). However, the 1990 NCI report is now more than 20 years old, and more modern analysis methods, combined with up-to-date information sources, will better reflect the risk to current populations living near NRC-licensed nuclear facilities. These concerns are not new or unique to the United States. Since 2008, France, Germany, Great Britain, Spain, and Switzerland have all conducted epidemiology<sup>1</sup> studies of populations near nuclear facilities within their borders to address public health concerns.

The NRC originally contracted with the Center for Epidemiologic Research at Oak Ridge Associated Universities (ORAU) to perform the update to the 1990 NCI study. However, because of strong public interest in the research, the staff reconsidered using ORAU and contracted with NAS instead. This action is not an indication of any deficiencies in the technical quality of ORAU's work, but a way of ensuring that the study's investigator brought a broad social and national policy perspective to the work. As such, the staff chose NAS to perform the study. NAS agreed to take a two-phase approach. In Phase 1, NAS performed a scoping study that developed approaches to evaluate cancer risks in populations living near nuclear power and fuel cycle facilities licensed by the NRC. The Phase 1 committee was charged with developing methodological approaches for assessing offsite radiation dose and methodological

<sup>1</sup> Epidemiology is the study of the distribution of illness, injury, and disability within a population.



approaches for assessing cancer epidemiology. In Phase 2, if NRC chooses, NAS would perform the cancer risk assessment using the study methods developed in Phase 1.

#### DISCUSSION:

The NAS committee, in its "Analysis of Cancer Risk in Populations near Nuclear Facilities—Phase 1" report (ADAMS Accession No.ML12254A165), provided the NRC with three findings and three recommendations for staff consideration.

The committee's first finding identified four key limitations for performing epidemiological studies around NRC-licensed facilities:

- uneven availability and quality of data on cancer mortality and incidence at geographic levels smaller than a county
- uneven availability and quality of data on nuclear facility effluent releases
- inability to reliably capture information on population mobility, risk factors, and potential confounding factors
- low expected statistical power<sup>2</sup>

In its second finding, the committee concluded there are several study designs (see below) that could be used to perform a cancer risk assessment around nuclear facilities. Interestingly, the committee considered a nonepidemiological approach by calculating a cancer risk projection assessment—essentially a radiation dose assessment taken to the next step of calculating cancer risk. However, the committee rejected this approach because it predicted public credibility challenges since the cancer risk assessment would be based on the same dose data that staff use and often have challenges with in communicating levels of risk to the public.

The committee's third finding concluded that facility data on effluent release, direct exposure, and meteorology can be used to obtain estimates of annual variations in dose as a function of distance and direction from nuclear facilities. Each facility will need to be individually evaluated to determine the quality and availability of data since they vary in design, operation history, and location. To perform the dose assessment, computer models have been developed to estimate absorbed doses from airborne and waterborne radioactive effluent releases.

The NAS committee concluded that environmental monitoring data have limited usefulness for estimating absorbed doses from effluent releases because most of the results are below detection limits. To perform the dose assessment, computer models have been developed to estimate absorbed doses from airborne and waterborne radioactive effluent releases.

The committee's first recommendation to the NRC is to perform two types of epidemiology studies—an ecologic study of multiple cancer types of all populations living near nuclear facilities and a specific record-linkage-based, case-control study of cancers in children born near nuclear facilities<sup>3</sup>. These two study designs combine dose assessments with the ability to

<sup>2</sup> Statistical power is typically determined before the study starts and tells the researcher how big of a sample size is needed to detect a certain level of a health effect.



analyze many different cancer types, while also specifically looking at the potential for increased rates of children's cancer in the case-control study.

In its second recommendation, the committee proposes pilot studies be performed at seven sites to determine the feasibility of performing the study designs and to estimate the required time and resources.

NAS's suggested sites for the pilot study:

- Dresden Nuclear Power Station, Morris, IL
- Millstone Power Station, Waterford, CT
- Oyster Creek Nuclear Generating Station, Forked River, NJ
- Haddam Neck (decommissioned), Haddam Neck, CT
- Big Rock Point Nuclear Power Plant (decommissioned), Charlevoix, MI
- San Onofre Nuclear Generating Station, San Clemente, CA
- Nuclear Fuel Services, Erwin, TN

The committee selected these sites because they provide a good sampling of facilities in six States with different operating histories, population sizes, and levels of complexity in data retrieval from the State cancer registries. The State cancer registries for these sites are at different levels of maturation and have different approval protocols for accessing the cancer incidence and mortality data needed for the assessment.

The staff concurs with the NAS committee recommended agreed to the seven sites because most of the cost for the pilot studies is in the initial establishment of a new study committee and set-up of the Phase 1 methods and software. The incremental cost for each additional facility in the pilot study was not estimated to be that significant in comparison to the information to be gained on the feasibility of this research (e.g., performing the pilot studies at only three or five of the seven recommended sites).

In its third recommendation, NAS stated that a plan for stakeholder engagement should be developed before the initiation of data gathering and analysis for these studies. It also emphasized the importance of early stakeholder involvement when conducting the next phase. This includes providing avenues for stakeholder engagement similar to what was done for Phase 1 by allowing members of the public to speak at committee meetings, creating a study e-mail list to inform interested parties of study status and forthcoming events, and establishing a study Web page.

Along with the findings and recommendations, the committee provided in its report a comprehensive review of the issues and challenges of performing epidemiology studies around nuclear facilities. The report identified one of the biggest challenges as the inability of the recommended study designs to detect health effects at the very low offsite radiation doses to members of the public from NRC-licensed facilities. The committee opted not to calculate the sample sizes needed to detect health effects at the low offsite doses from these facilities (dose equivalents < 0.01 millisieverts (mSv) per year (or 1 millirems (mrem) per year) because, as

---

<sup>3</sup> The ecologic study design uses a geographical area as the unit of observation (e.g., census tract, county, ZIP Code) and uses an aggregate analysis that looks at a study factor (exposure) and an outcome factor (disease or death) measured in the geographical area at the same time. This study can show possible associations between exposure and disease. The case-control study design compares the prevalence of risk factors or exposures in a series of diseased study subjects (cases) with the prevalence of risk factors or exposures in a series of disease-free study subjects (controls).



stated in the report, "...the numbers of exposed persons required to find a possible association would be truly enormous."

The committee, instead, opted to perform statistical power calculations that ruled out a certain level of risk associated with doses in the range of 0.5 to 1.0 sieverts (Sv) (50 to 100 rem), which is much larger than the low doses the general public received from the operations of NRC-licensed facilities. This particular technical detail confirms the staff position that at the low offsite doses from these facilities, researchers would not expect to observe any increased cancer risks in the populations surrounding these facilities. Nevertheless, the staff recognizes the risk communication challenges of conveying this message to the public ~~that started this effort in the first place~~. As recent international studies indicate, epidemiology studies can be an important tool for allaying public health concerns, even with these known limitations. Additionally, the committee assessed the feasibility of performing health studies around uranium recovery facilities, and it recommended not studying these sites because of the sparse populations involved.

The staff did not agree with the ~~part of the the first~~ NAS finding ~~pertaining to that referenced~~ the uneven availability and ~~lack of~~ quality of data on nuclear facility effluent releases. The NRC requires licensees to have a quality control program for effluent and environmental monitoring programs, which the agency routinely inspects. The staff believes these monitoring programs generally are of good quality, and ~~staff are it is highly~~ confident that a complete set of effluent data is available for licensed facilities (and decommissioned sites), ~~although s-~~Some of the data may be on microfilm or microfiche. As a result, it may take time to retrieve, but the NRC expects that all information is available.

NAS solicited comments on the Phase 1 report ~~during for~~ a 2-month public review period. The intent of the review period was to provide ~~public NAS~~ feedback on ~~what~~ stakeholder's ~~views~~ ~~thought~~ of the proposed methods ~~assuming if~~ the NRC decided to proceed with the next phase. The comments were not intended to change the committee's report.

NAS received 74 comments from the public. The sources of comments varied from individual members of the public (73 percent), nongovernment organizations (NGOs) (16 percent), professional societies and industry organizations (4 percent), universities (4 percent) and State and tribal governments (3 percent).

One professional society and two industry organizations provided comments to NAS ~~on about~~ the Phase 1 report. These organizations included the Health Physics Society (HPS), the Nuclear Energy Institute (NEI), and the Energy and Power Research Institute (EPRI). All three respondents complimented the Phase 1 study committee in its effort. HPS and NEI emphasized the limitations stated in the Phase 1 report and recommended that the NRC not proceed with Phase 2 of the study. HPS, NEI, and EPRI all expressed concerns that the proposed study, with its significant limitations, would be very expensive and of limited usefulness because of its low statistical power.

A majority of the comments (59 percent or 44 comments) favorably endorsed and encouraged the NRC to proceed with the next phase of the study. Another 18 percent of the comments (13) recommended that the NRC not proceed with Phase 2 of the study. Finally, 23 percent of the comments (17) did not provide a recommendation either way on whether the NRC should proceed with Phase 2.

#### CONCLUSION:

The NRC staff recommends that the NRC plans to proceed with the pilot studies to complete the feasibility portion of this research as recommended by NAS. The staff intends to learn if the recommended study designs can be performed at a reasonable cost, effort, and if they provide useful information to discuss public health concerns with NRC stakeholders. Once the pilot studies are complete, the staff will determine if the agency should proceed with a study of all licensed facilities.

#### RESOURCES:

The staff estimate for the pilot study will take 2.5 years and \$2 million to complete. The staff has budgeted in each of fiscal years 2013 and 2014. Staff will request additional funding beyond 2014, if needed, through the Planning, Budget, and Performance Management process. After the pilot studies, the staff will review the results, effort, and costs to determine if the study should be expanded to all NRC-licensed facilities

#### COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

R. W. Borchardt  
Executive Director  
for Operations



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R. W. Borchardt  
Executive Director  
for Operations

ADAMS Accession No.: ML12249A121

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**From:** Garry, Steven  
**Sent:** Monday, April 05, 2010 2:38 PM  
**To:** Shoop, Undine; Brown, Frederick  
**Cc:** Conatser, Richard; Pedersen, Roger  
**Subject:** Cancer Study Communication Team

Today, the Office of Research (Terry Brock) updated the Communication Team on the Cancer Study. RES has decided to have the National Academies of Science (NAS) perform the study. The NAS has a Nuclear Radiation Studies Board, led by former Commissioner Meserve.

On Tuesday, April 6th, RES will be briefing the Office Directors and Regional Administrations/Sr. staff on the study plan. The study will be both cancer mortality and cancer incidence.

On April 26th, Brian Sheron will give a presentation to NAS and a brief summary of the statement of work to be completed. Also in attendance will be legislative staffers for Rep. Edward Markey, and others. RES expect a grant to NAS will be issued in June/July, and they will do a scoping review over the following 8-9 months, including public meetings in California and Massachusetts. Phase II will be the actual study conducted over the next 2-3 years.

Steve

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**From:** Shoop, Undine  
**Sent:** Tuesday, April 06, 2010 12:50 PM  
**To:** Pedersen, Roger; Conatser, Richard  
**Cc:** Ramey-Smith, Ann; Garry, Steven  
**Subject:** FW: Cancer Risk Study - Press Release tomorrow

FYI

**From:** Brown, Frederick  
**Sent:** Tuesday, April 06, 2010 12:45 PM  
**To:** Ashley, MaryAnn; Cartwright, William; Elliott, Robert; Fields, Leslie; Franovich, Rani; Kobetz, Timothy; McHale, John; Shoop, Undine; Thorp, John; Weerakkody, Sunil; Anderson, Shaun  
**Cc:** Cheok, Michael  
**Subject:** FW: Cancer Risk Study - Press Release tomorrow

**From:** Cheok, Michael  
**Sent:** Tuesday, April 06, 2010 11:29 AM  
**To:** Grobe, Jack; Leeds, Eric; Boger, Bruce  
**Cc:** Brown, Frederick; Bahadur, Sher; Blount, Tom; Cunningham, Mark; Evans, Michele; Ferrell, Kimberly; Galloway, Melanie; Giltter, Joseph; Weerakkody, Sunil; McGinty, Tim; Lund, Louise; Nelson, Robert; Quay, Theodore; Ruland, William; Skeen, David; Givvines, Mary; Hiland, Patrick; Holian, Brian; Howe, Allen; Lee, Samson  
**Subject:** FYI: Cancer Risk Study - Press Release tomorrow

I attended the Cancer Risk Press Release VTC for NRR this morning. The Office of Research (Brian Sheron) updated the ODs/RAs (mostly designees) on an upcoming study on the analysis of cancer risk in populations living near nuclear power facilities. This study will update a 1990 National cancer Institute report "Cancer in Populations Living Near Nuclear Facilities." The reason RES called this VTC is because there will a press release tomorrow (4/7) on this issue, in particular, the NRC's request of the National Academy of Sciences (NAS) to perform this study. RES expects a lot of stakeholder interest and wanted to provide staff and managers with information to respond to questions as necessary. Brian will also be presenting the study objectives at a public NAS meeting on 4/26, and he expects congressional interest at that meeting. The study will take 2 to 3 years to complete (after a 9-12 month scoping study).

**Study Objectives:**

- evaluate whether cancer risk is different for populations living near NPPs - past, present, and future .
- include cancer occurrence (previous study only included cancer mortalities)
- develop approach to assess cancer risk in geographic areas that are smaller than the county level
- evaluate the study results in the context of off-site doses from normal Rx operations.

(Note that NMSS may request that the study be expanded to include fuel cycle facilities.)

A multi-office (including regions) communication team was established. Steve Garry is the NRR rep on the team. RES plans to hold workshops for HQ and regional staff on study results (and include fact sheets on the web) as they become available.



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**From:** Garry, Steven  
**Sent:** Tuesday, July 06, 2010 9:07 AM  
**To:** Shoop, Undine; Conatser, Richard  
**Subject:** FW: Cancer study  
**Attachments:** Congresswoman Lois Capps and Mothers For Peace.pdf

**From:** Garry, Steven  
**Sent:** Tuesday, July 06, 2010 8:56 AM  
**To:** Dricks, Victor; Uselding, Lara  
**Cc:** Werner, Greg; Carson, Louis; Brock, Terry  
**Subject:** Cancer study

Hi Lara and Victor (Region IV OPA)

It was very nice meeting you, and having the opportunity to work with you (with dinner!).

At the Diablo Canyon EOC poster session, I spoke with 2 different groups that we need to follow-up with:

- 1) Mothers For Peace (primarily Jane Swanson), and
- 2) District Representative Greg Haas. Greg is a technical assistant to the Honorable Lois Capps, California Representative (CA-23). (I've attached his business card.)

They were previously unaware, but are now VERY interested in the upcoming cancer study that the NRC is funding and that the National Academy of Science is going to perform. They think a cancer study should have been done pre-operational, and as a follow-up study, so "it's about time."

I told them about the NAS web page (see below – NRC contact is Dr. Terry Brock). I promised to send them a link to the NAS web page. As Terry has said, NAS is interested in obtaining any "local" information on cancer rates near any facility. Greg Haas and Jane Swanson want to read about the proposed cancer study, and they may want to submit their local information on cancer rates near Diablo (although they acknowledged they did not have any specific data, just anecdotal information).

I am asking you whether you (OPA) want to get back to them, or if you would like Region IV HPs, or Dr. Brock, or myself to contact them?

Best regards,

Steve Garry  
Sr. Health Physicist, NRR/DIRS  
301-415-2766

**From:** Brock, Terry  
**Sent:** Tuesday, June 29, 2010 4:06 PM  
**To:** Garry, Steven  
**Subject:** cancer study contact

Hello Steve,

I'm glad to hear you have received some interest in the cancer study during your meeting at Diablo Canyon. At this stage of the study we (NRC) are still working on administrative details with the National Academy of Sciences (NAS) to get started later this summer. Once started, the NAS will set-up a web page to receive comments from all stakeholders to be considered by the study committee. In the meanwhile, the NAS has put a web page up for the study here describing our request >> <http://dels.nas.edu/global/nrsb/NRCAnnouncement>. The NAS study contact is Dr. Kevin Crowley and stakeholders can reach him at [KCrowley@nas.edu](mailto:KCrowley@nas.edu).

Terry

Terry Brock, Ph.D.  
U.S. Nuclear Regulatory Commission  
301-251-7487

Rep. Lois Capps

GREG HAAS  
District Representative

Hon. Lois Capps (CA 33)  
1411 Marsh Street, Suite 205  
San Luis Obispo, CA 93401

Phone 805/546-2348  
Fax 805/546-5368  
Email: greg.haas@congress.gov

301 E. Carmelo St., Suite A  
Santa Barbara, CA 93101  
805/232-4710  
[www.house.gov/capps](http://www.house.gov/capps)



San Luis Obispo Mothers for Peace  
P.O. Box 3608  
San Luis Obispo, CA 93403  
[www.mothersforpeace.org](http://www.mothersforpeace.org)

## NEWS RELEASE

For Immediate Release  
May 27, 2010

Contacts: Jane Swanson  
Janeslo@kcbx.net  
(805) 595-2605  
cell (805) 440-1359

## MOTHERS FOR PEACE CHALLENGE LICENSE RENEWAL

On May 26, 2010, in San Luis Obispo, a three member Atomic Safety and Licensing Board (ASLB) from the Nuclear Regulatory Commission (NRC) heard arguments from San Luis Obispo Mothers for Peace (SLOMFP) on their legal challenge to Pacific Gas and Electric Company's (PG&E's) application for a 20-year extension of its operating licenses for the Diablo Canyon nuclear plant.

The current operating licenses for Diablo Canyon's two nuclear reactors expire in 2024 and 2025, respectively. PG&E has applied to continue operations until 2044/2045.

SLOMFP's attorney, Diane Curran, described the issues that SLOMFP wants resolved before PG&E's license can be extended. Attorneys for PG&E opposed a hearing on any of SLOMFP's concerns, while attorneys for the NRC's technical staff would agree to a limited hearing on only a portion of one issue.

Curran argued that PG&E has failed to show its license renewal application satisfies federal laws that protect public health and safety and the environment in 5 important respects:

- PG&E has failed to demonstrate the ability to safely manage the aging plant, which was designed in the 1960's, and constructed between the late 1960's and the early 1980's. NRC inspection reports document an "adverse trend" of chronic errors in the management of safety equipment at Diablo Canyon. SLOMFP is concerned that PG&E's inability to identify and correct current problems in a timely and effective way will be repeated in the license renewal term, when detecting aging effects like corrosion and degradation will be even more challenging.
- PG&E's application lacks crucial information on the seismic risks to Diablo, given that studies of the Shoreline Fault, identified in 2008, are

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**From:** Garry, Steven  
**Sent:** Wednesday, September 01, 2010 4:26 PM  
**To:** Weil, Jenny; Burnell, Scott  
**Cc:** Shoop, Undine  
**Subject:** FW: NAS Cancer Risk Study Website Launch

Hi Jenny and Scott,

As you see below, the National Academy of Science (NAS) has their web page updated with the NAS Cancer Study information.

Earlier this summer, at the Diablo Canyon EOC poster session, I spoke with 2 different groups that we follow-uped with:

- 1) Mothers For Peace (primarily Jane Swanson), and
- 2) District Representative Greg Haas. Greg is a technical assistant to the Honorable Lois Capps, California Representative (CA-23).

After the Diablo Canyon EOC meeting, you provided them with some information on the NAS Cancer Study, but before NAS had their web page updated. If you haven't already, you might consider updating Jane and Greg with this new info.

Thanks

Steve Garry  
Sr. HP, DIRS

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Wednesday, September 01, 2010 12:03 PM  
**To:** Allison Cuevas; Annie Caputo; Arjun Makhijani; Art Reardon; Barbara O'Neal; Bill Freebairn; Bonnie Richter; Brian O'Connell; Sheron, Brian; Cindy Folkes; Conrad Miller; Cynthia and Joseph Sauer; Daniel J. Strom; Damon, Dennis; Derek Hagemeyer; Diane D'Arrigo (dianed@nirs.org); Donna Cragle; Doreen Hill; Farrell Callahan; Frank Currier; Jeffery Patterson; Jerry Bonanno; Julie Reardon; LC M ; Leigh Garten; Lewis Cuthbert; Lynn Ehrle; Marcia Marks; Marth Linet; Mary Lampert; Mary Olson; Mary Reardon; Marshall, Michael; Michal Freedhoff; Michele Boyd; Coleman, Neil; Paul Gunter; Ralph Anderson; Robert P. Shaw; Rochelle Beckers; Roger Witherspoon; Burnell, Scott; Shirley Vaine; Garry, Steven; Steve Wing; Brock, Terry; Yongsoo Hwang  
**Subject:** NAS Cancer Risk Study Website Launch

Dear interested parties,

September 1<sup>st</sup> marks the beginning of phase 1 of the study, Analysis of Cancer Risks in Populations near Nuclear Facilities. Throughout the study, we will regularly post updates and written materials to a dedicated webpage, to aid in disseminating this information to the public. The webpage can be found here:

<http://www.nationalacademies.org/CancerRiskStudy>

As the study commences, we are seeking nominations of individuals with applicable technical expertise and experience for membership on the study committee. Please visit the above-mentioned webpage for more information on submitting nominations, the study task and background, as well as general information about the National Academy of Sciences study process.

Erin Wingo  
Senior Program Assistant  
Nuclear and Radiation Studies Board  
(202) 334-3088  
ewing02@hhs.edu



---

**From:** Garry, Steven  
**Sent:** Thursday, September 02, 2010 3:15 PM  
**To:** Conatser, Richard; Pedersen, Roger; Shoop, Undine  
**Subject:** FW: cancer study update  
**Attachments:** cancer-opa-090110.pdf

Fyi

Steve

**From:** Brock, Terry  
**Sent:** Thursday, September 02, 2010 3:04 PM  
**To:** Damon, Dennis; Garry, Steven; Clement, Richard; Milligan, Patricia; Nimitz, Ronald; Woodruff, Gena; Orth, Steven; Stearns, Don; Virgilio, Rosetta; Mizuno, Beth; Burnell, Scott; Jones, Andrea; Dacus, Eugene; Weil, Jenny; Bagley, Susan  
**Cc:** Anzenberg, Vered; Bush-Goddard, Stephanie  
**Subject:** cancer study update

Greetings all cancer study communication team members:

Yesterday the National Academy of Sciences (NAS) started the nomination process to select committee members for the cancer study. See attached OPA press release.

We expect the selection process to take approximately 2-3 months. The first public meeting of the to-be established committee is slated for Jan. 2011. Once the committee is established I'll hold another meeting to discuss the members and the path forward for the study. In the meanwhile, take a look at the NAS website for the study at <http://dels.nas.edu/global/nrsb/CancerRisk>

Let me know if you have any questions.

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

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**From:** Conatser, Richard  
**Sent:** Thursday, February 09, 2012 5:58 AM  
**To:** Shoop, Undine  
**Subject:** FW: Cancer Risk Report fact checking materials  
**Attachments:** Fact checking materials to the USNRC, February 2, 2012.pdf

Undine,

RES has asked me to look at the effluent information I provided for the cancer study. How do you want to proceed?

Richard

**From:** Brock, Terry  
**Sent:** Wednesday, February 08, 2012 4:12 PM  
**To:** VonTill, Bill; Chapman, Gregory; Garry, Steven; Conatser, Richard  
**Cc:** Bush-Goddard, Stephanie  
**Subject:** Cancer Risk Report fact checking materials

Gentleman,

As promised here is the excerpt from the NAS phase 1 cancer study that they want us to fact check. It's only 28 pages, not the original 60 – 80 they thought they were sending over, so the review should not be that onerous. I would like to have your comments and suggested text back by COB Wednesday February 22, 2012 so we don't impact NAS' publication deadline. My Division Director is sending a formal request to your Division Directors asking for you to specifically review the document and to get credit too!

Thanks for your help on the project so far and your review. Let me know if you have any questions.

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

### 3.1 EFFLUENT RELEASES FROM NUCLEAR PLANTS

The operation of nuclear plants produces large quantities of radioactive materials (Appendix A). Quantities of radioactive materials are most readily expressed in terms of activity, defined as the rate of radioactive decay of that material. Activity is usually expressed in units of becquerels (abbreviated Bq; 1 Bq = 1 decay per second) or curies (abbreviated Ci; 1 Ci =  $3.7 \times 10^{10}$  [37 billion] decays per second). An operating nuclear reactor can contain on the order of  $10^{14}$  Ci of activity excluding very-short-lived radionuclides (NCRP, 1987). Most of this activity is the result of fission of the reactor fuel (see Appendix A).

A small fraction<sup>1</sup> of this activity is typically emitted to the environment each year as a result of normal plant operations. Radioactive effluents are released in gaseous, liquid, and particulate form. They originate from several sources within a nuclear plant:

- Fission of residual uranium contained on the exterior of the fuel rods, referred to as *tramp uranium*.
- Leaks from failed fuel rods.
- Diffusion of radioactive gases through intact fuel rods.
- Activation of materials in the cooling water.
- Erosion and entrainment of activated materials from pipes, valves, and pumps in the cooling system.
- Leaks from pumps, valves, and seals in the plant.

Effluent releases from nuclear plants are permitted under regulations promulgated by the U.S. Nuclear Regulatory Commission (USNRC), but they must be controlled, monitored, and reported to regulatory authorities. Appendix C describes USNRC requirements for reporting effluents from nuclear plants.

---

<sup>1</sup> As will be shown elsewhere in this chapter (see Figures 3.1 - 3.4), operating nuclear plants currently release a few curies to a few hundred curies of activity per year to the environment. However, some plants emitted several hundred thousand curies of activity per year to the environment in the past.



1 Nuclear plant licensees are required to report emissions of radionuclides to the environment  
2 to the USNRC on a semi-annual basis. Because nuclear power plants are industrial sites, plant  
3 licensees also are subject to environmental reporting requirements mandated by the federal and  
4 state regulatory agencies. These include industrial waste discharges (Clean Water Act), air  
5 emissions (Clean Air Act), chemical inventory reporting (Emergency Planning Community Right-  
6 to-Know Act), hazardous waste disposal (Resource Conservation and Recovery Act), storage  
7 tank management, and spill prevention (Oil Pollution Act).

8  
9 The radioactive isotope carbon-14, which is not shown in the tables, is released in sizeable  
10 quantities by reactors of all types (see Appendix A), and it has been estimated by some to make  
11 a relatively large contribution to population dose (Kahn et al. 1985; NEA, 2003). Effluent  
12 releases of this radionuclide have not been required to be reported to the USNRC in the past.  
13 However, starting in 2011, plant licensees are required to estimate and report releases of this  
14 radionuclide to the USNRC. Additional discussion of the carbon-14 contribution to dose is  
15 provided in Chapter 4.

### 3.2.1 Availability of Information on Effluent Releases

With one exception, fuel-cycle facility licensees are required to summarize effluent releases on a quarterly basis and report these releases to the USNRC (or to agreement-state regulators<sup>2</sup>) on a semiannual basis. The exception is for licensees of gaseous diffusion plants (e.g., the Paducah Gaseous Diffusion Plant; see Table 1.2 in Chapter 1). Prior to 2008, licensees were required to report their effluent releases on a quarterly basis. From 2008 onward, licensees are only required to report their effluent releases when they renew their facility operating licenses. However, annual reporting of effluent releases to the U.S. Environmental Protection Agency is required to meet the 40 CFR 61<sup>3</sup> requirements. In cases where unplanned releases have occurred, such releases would need to be taken into account when making dose estimates for an epidemiology study.

To the committee's knowledge, data on radioactive effluent releases from individual fuel-cycle facilities have not been compiled into summary form. Consequently, it will be necessary to obtain this information for each facility, either through ADAMS or from plant licensees directly, for use in an epidemiology study.

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<sup>2</sup> Under the USNRC's agreement state program, states can assume authority to license and regulate certain activities within their borders, including the production and utilization of byproduct materials (radioisotopes), source materials (uranium and thorium), and certain quantities of special nuclear materials. Under the agreement-state program, Utah has assumed the authority to license and regulate the White Mesa Mill in Blanding, Utah (see Table 1.2 in Chapter 1).

<sup>3</sup> National Emission Standards for Hazardous Air Pollutants.

### 3.3.1 Atmospheric Monitoring

For environmental pathways associated with gaseous releases, monitoring usually involves air sampling and TLD<sup>4</sup> measurements at various locations in the vicinity of the plant, in addition to the monitoring of foodstuffs (see Section 3.3.3), to determine if radioactive effluent releases are detectable in the environment. Typically, air sampling measurements are made at a minimum of five stations: three stations near the plant boundary in the direction of prevailing winds (i.e., downwind); one in the vicinity of a nearby community likely to have the greatest chance of radiation exposure; and one at a control location 15 to 30 km distant in the opposite direction of prevailing winds (i.e., upwind).

Several types of analyses are carried out on the air samples: Radiiodine is measured weekly, and gross beta activity of particulates (captured on filters) is also measured weekly. Analyses to identify gamma-emitting radionuclides are made quarterly on composite samples. Typically, radionuclide concentrations measured in air samples at downwind stations are compatible with those at the control station. That is, normal operations of a plant do not result in measurable radionuclide concentrations in air, even though the measurement techniques are quite sensitive and can identify occurrences of releases at distance.

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<sup>4</sup> Thermoluminescent dosimeters contain inorganic crystalline materials, typically calcium fluoride (CaF) and lithium fluoride (LiF), that record exposure to ionizing radiation.



### 3.3.3 Foodstuff Monitoring

Nuclear plant licensees are required to monitor for radioactivity in foodstuffs that are grown in the vicinity of their plants. This includes monitoring for radioactivity in milk, fish and invertebrates, food products (e.g., corn and other grains), and broad-leaf vegetables. The following sampling and analysis activities are required:

- Milk: Samples from milking animals at three locations within 5 km of having the highest dose potential and one sample from milking animals at a control location. The samples must be analyzed for gamma isotopes and iodine-131.
- Fish and invertebrates: Samples of each commercially and recreationally important species in the vicinity of plant discharge areas as well as samples in areas outside the influence of plant discharges. The edible portions of samples must be analyzed for gamma isotopes.
- Food products: One sample of each principal class of food products from areas irrigated with water into which liquid effluents have been discharged. The edible portions must be analyzed for gamma isotopes.
- Broad leaf vegetables: If milk sampling is not performed,<sup>5</sup> three different kinds of broad leaf vegetables must be sampled and analyzed for gamma isotopes and iodine-131. Additionally, samples of broad leaf vegetables grown 15-30 km distant from the plant in the least prevalent wind direction must also be analyzed for gamma isotopes and iodine-131.

Some nuclear plant have arranged with local landowners to sample from their property. In some cases, licensees have established gardens on plant sites to obtain necessary samples.

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<sup>5</sup> Not all nuclear plants are located in proximity to dairy farms.

### 3.3.4 Direct Radiation Monitoring

Direct radiation exposure primarily occurs as a result of external irradiation from radioactive materials released into the atmosphere (mainly noble gases), deposited on the ground (mainly iodine and particulates), or contained in surface water and sediments (lakes or streams). Direct exposure can also occur as a result of exposure to external irradiation from radioactive waste and fuel stored onsite and from induced radioactivity in BWR turbines. Exposure to direct radiation from onsite sources would only be a concern for plant workers and persons living close to the plant boundary.

The USNRC provides guidance on, but does not specify, the type, number of measurements and frequency of measurements for monitoring direct radiation from airborne emissions around a facility, including deposited radioactivity (USNRC, 1977b; NRC, 1978). Each facility develops its own site-specific sampling plan subject to approval by the USNRC (e.g., Dresden, 2010 REMP report).

TLD measurements are generally made at several dozen locations in rings around the plant boundary, at about 5-10 km from the boundary, and at one or more distant "control" locations. Figure 3.15 shows the arrangement of environmental monitoring stations around the Millstone Point Nuclear Power Station. Plants may supplement or substitute the passive detectors at some locations by active detectors such as continuous monitors (e.g., high pressure ionization chambers [HPIC] or scintillation detectors). The passive detectors generally are measured (and replaced) quarterly, whereas the active detectors, if used, provide real-time data. The inner ring is generally located close to the site boundary, whereas the outer ring is generally located at a distance of about 5-10 km from the boundary. Additional dosimeters may be placed at locations of special interest, such as more highly populated areas or in prevailing downwind areas.

## A

### ORIGIN OF RADIOACTIVITY IN NUCLEAR PLANTS

Nuclear power reactors<sup>6</sup> are fueled with uranium that is slightly enriched in the isotope uranium-235.<sup>7</sup> This isotope is capable of sustaining a controlled nuclear chain reaction that is necessary for production of electrical energy. The chain reaction results in the production of neutrons that induce radioactivity in the fuel, cooling water, and structural components of the reactor.

Radioactivity is induced primarily through processes involving the capture of neutrons by uranium atoms in the fuel. *Fission* occurs when the nucleus of a uranium-235 atom (and less commonly a uranium-238 atom) captures a neutron, becomes unstable, and splits into two and (infrequently) three<sup>8</sup> lighter nuclei; these nuclei are referred to as *fission products*. Uranium fission produces a bimodal mass distribution of fission products shown in Figure A.1. The most common fission products have mass numbers around 90 and 137 (for example, strontium-90 and cesium-137).

The fission products produced in a nuclear power reactor span the periodic table. They include:

- Noble gases, for example krypton-85 and xenon-133.
- Halogens, for example iodide-131.
- Alkali metals, for example cesium-137.
- Alkaline earth metals, for example strontium-90.
- Less commonly, hydrogen-3, more commonly referred to as *tritium* (T), from ternary fission of uranium atoms.

Neutron capture can also induce radioactivity through the *transmutation* of one chemical element into another. The transmutation process results in the emission of nuclear particles

---

<sup>6</sup> The terms *nuclear power reactors* and *nuclear power plants* refer to reactors that are used on a commercial basis to produce electricity. Such reactors typically generate on the order of 1000 megawatts of electrical power and 3000 megawatts of thermal power.

<sup>7</sup> Natural uranium contains about 99.3 percent uranium-238 and 0.7 percent uranium-235. The fuel used in power reactors is typically enriched in uranium-235 to levels of 3-5 percent.

<sup>8</sup> Referred to as *ternary fission*.



(e.g., protons) and radiation from the nucleus. Some transmutation reactions and products of significance in power reactors include the following:

- Production of nitrogen-16 through the capture of a neutron by the nucleus of an oxygen atom: oxygen-16 + neutron  $\rightarrow$  nitrogen-16 + proton (abbreviated as  $^{16}\text{O}(n,p)^{16}\text{N}$ ). Nitrogen-16 has a short (7 second) half life and is primarily a hazard to workers at nuclear plants.
- Production of carbon-14 through the capture of neutrons by the nuclei of nitrogen, oxygen, or carbon atoms:  $^{14}\text{N}(n,p)^{14}\text{C}$ ;  $^{13}\text{C}(n,\gamma)^{14}\text{C}$ ;  $^{17}\text{O}(n,\alpha)^{14}\text{C}$ .
- Production of tritium (T) by the capture of a neutron by the nucleus of a boron atom:  $^{10}\text{B}(n,2\alpha)\text{T}$ . This is an important reaction in pressurized water reactors, which use boron in cooling water to control reactivity.
- Production of tritium through capture of a neutron by a deuterium atom that is naturally present in the cooling water of a reactor.

Neutron capture can also induce radioactivity through *activation*. The capture of a neutron excites the nucleus, which quickly decays to a less energetic state through the emission of radiation. Some activation reactions and products of significance in power reactors include the following:

- Production of cobalt-60 from cobalt-59 through the reaction  $^{59}\text{Co}(n, \gamma)^{60}\text{Co}$ .
- Production of iron-55 from iron-54 through the reaction  $^{54}\text{Fe}(n, \gamma)^{55}\text{Fe}$ .

Cobalt-60 and iron-55 are common activation products in the structural components of reactors.

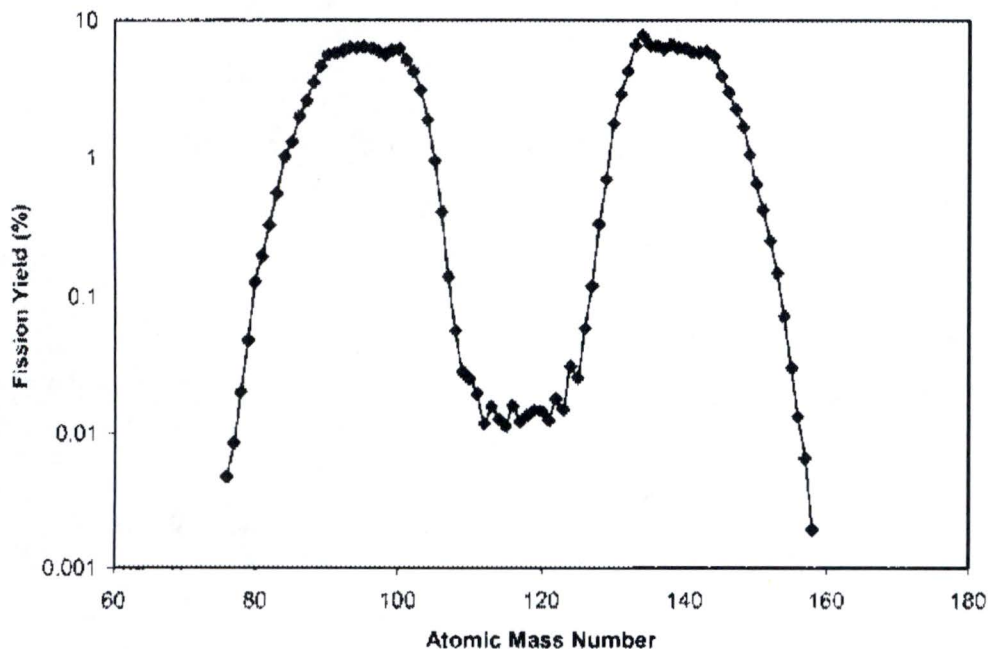


Figure A.1 Mass distributions resulting from fission of uranium-235 by thermal neutrons.  
 SOURCE: Data from Joint Evaluated Fission and Fusion File, Incident-neutron data, <http://www-nds.iaea.org/exfor/endf00.htm>, 2 October 2006; see <http://www-nds.iaea.org/sgnucdat/c1.htm>.

The isotopes produced by these neutron capture processes are almost always radioactive. Their decay involves the emission of alpha, beta, and gamma radiation, to produce both radioactive and non-radioactive *daughter products*. A decay reaction of particular importance in nuclear power reactors is the following:

$^{238}\text{U}(n, \gamma)^{239}\text{U} \rightarrow ^{239}\text{Np} + \beta^- \rightarrow ^{239}\text{Pu} + \beta^-$ . This reaction produces plutonium-239 by uranium-238 neutron capture followed by two beta decays.

The particles and other radiation emitted during neutron capture can interact with atoms in the fuel, coolant and reactor structures to produce additional radioactivity. For example, the interaction of energetic electrons with materials in the reactor results in the emission of photons known as *bremstrahlung*. This radiation appears as a faint blue glow when electrons interact with cooling water in the reactor and spent fuel pools.

## B

### ORIGIN OF RADIOACTIVITY IN FUEL-CYCLE FACILITIES

Fuel-cycle facilities are involved in the extraction and processing of uranium to produce fuel for nuclear reactors. Consequently, the most important radioactive effluent releases from these facilities involve uranium and its decay products (Figure B.1). Releases are dominated by the decay products for uranium-238 because of its much higher concentration in natural uranium. Decay products of particular significance include thorium-230, radium-226, and radon (Table B.1).

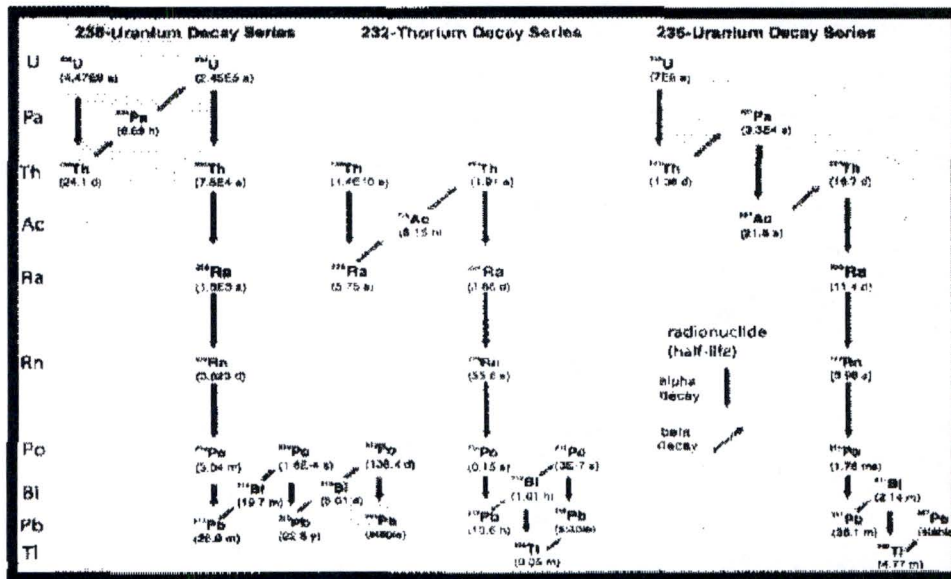


Figure B.1. Schematic illustration of the uranium-235, Thorium-232, and uranium-238 decay chains showing decay modes (i.e., alpha or beta decay), half lives, and progeny. SOURCE: U.S. Geological Survey.

[http://gulfsci.usgs.gov/tampabay/data/2\\_biogeochem/images/decaychain.gif](http://gulfsci.usgs.gov/tampabay/data/2_biogeochem/images/decaychain.gif)



1      **TABLE B.1 Typical Effluent Releases from Fuel-Cycle Facilities**

| Facility type             | Typical radioactive effluents   |
|---------------------------|---|
| Mining (in-situ leaching) | Uranium, radon, and progeny   |
| Milling                   | Uranium, radon, and progeny   |
| Conversion                | Uranium, radium-226, thorium-230  |
| Enrichment                | Natural uranium, uranium-235, thorium-230, technetium-99, neptunium-237, plutonium-239, 240 |
| Fuel Fabrication          | Uranium-234, 235, 236, 238  |

2  
3      The uranium decay products are removed during the milling process<sup>9</sup> and disposed of onsite  
4 as *mill tailings* (Figure B.2), which are potential sources of radioactive particulate and radon gas  
5 effluent releases from these facilities.

6  
7      Additional radioactive effluent releases have been reported from enrichment facilities. These  
8 include cesium-137, technetium-99, as well as a number of actinide isotopes, most notably  
9 uranium-236, neptunium-237, and plutonium-239/240. These isotopes are produced by fission  
10 and neutron capture reactions (these reactions are described in the next section). Their  
11 presence in an effluent release indicates that the facility has processed uranium that was  
12 previously irradiated in a nuclear reactor.<sup>10</sup>

13  
14  
15  
16  
17  
18  
19  
20  

---

<sup>9</sup> However, the decay products "grow back" into the uranium with time, especially thorium and protactinium (the first two isotopes in the uranium-235 and -238 decay chains; see Figure 2) because of their short half lives.

<sup>10</sup> For example, recycled uranium (i.e., uranium obtained from reprocessing spent nuclear fuel) was enriched at the Paducah Gaseous Diffusion Plant between 1953 and 1975. This plant is still reporting releases of radioactive effluents from this recycled uranium.

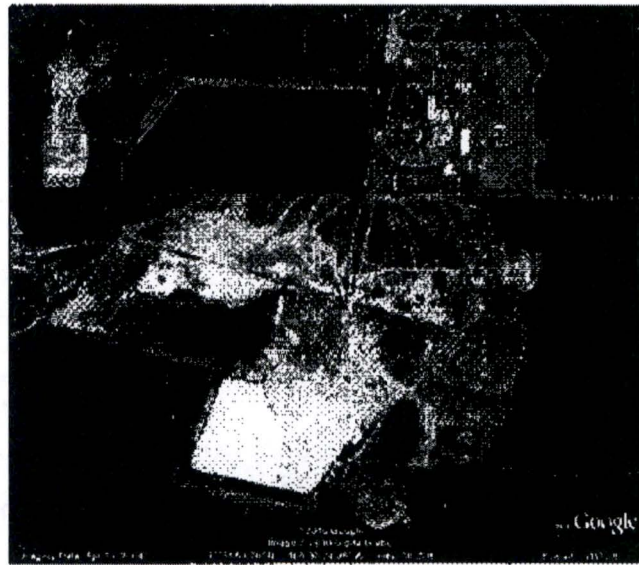


FIGURE B.2. Aerial view of the White Mesa Uranium Mill near Blanding, Utah. The mill facilities can be seen in the upper right quadrant of the photo. The filled and active mill tailings ponds cells occupy most of the remainder of the photo. SOURCE: Elise A. Striz (USNRC) presentation at the Atlanta committee meeting.

C

**REGULATION OF EFFLUENT RELEASES**

Effluent from nuclear facilities is permitted under regulations promulgated by the U.S. Nuclear Regulatory Commission (USNRC), though is controlled, monitored, and reported to authorities. These following requirements are intended to keep public exposures from radioactive effluent releases at levels that are as low as reasonably achievable (ALARA).

Title 10, Part 20 of the Code of Federal Regulations (10 CFR 20, Standards for Protection Against Radiation) establishes public dose limits for radioactive releases from nuclear plants. Specifically, Subpart D (Radiation Dose Limits for Individual Members of the Public) requires that nuclear plant licensees conduct operations so that:

- The total effective dose equivalent<sup>11</sup> to individual members of the public does not exceed 0.1 rem (1 mSv) in a year; and
- The dose in any unrestricted area<sup>12</sup> from external sources does not exceed 0.002 rem (0.02 millisievert) in any one hour.

However, a licensee may apply for authorization to operate up to an annual dose limit of 0.5 rem (5 mSv) for an individual member of the public if there is a demonstrated need for the elevated exposures.

To show compliance with these dose limits, licensees are required to survey radiation levels in unrestricted and controlled areas, as well as in the effluents released in these areas. The licensee must demonstrate that the total effective dose equivalent to the individual likely to receive the highest dose from the plant does not exceed the annual dose limit noted above; this

---

<sup>11</sup> Total effective dose equivalent (TEDE) expresses the dose received by an individual in terms of a uniform whole-body dose, even though that actual dose may have been received by a particular organ or part of the body. The use of TEDE allows for comparisons of exposure risks for different kinds and levels of exposures.

<sup>12</sup> Defined in NUREG-1301 and NUREG-1302 as "any area at or beyond the Site Boundary access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the Site Boundary used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes."



1 demonstration can be made either by measurement or calculation. Alternatively, the licensee  
2 can demonstrate that the annual average concentrations of radioactive material released in  
3 gaseous and liquid effluents at the boundary of the unrestricted area do not exceed  
4 radionuclide-specific values provided in the regulations,<sup>13</sup> and also that an individual  
5 continuously present in an unrestricted area would receive a dose not to exceed 0.002 rem  
6 (0.02 mSv) in an hour and 0.05 rem (0.5 mSv) in a year.

7  
8 There are additional regulations on the control of effluent releases for nuclear power plants  
9 in 10 CFR 50, Part 50.34a (*Design objectives for equipment to control releases of radioactive*  
10 *material in effluents*) requires licensees to estimate:

- 11  
12 (i) The quantity of each of the principal radionuclides expected to be released  
13 annually to unrestricted areas in liquid effluents produced during normal reactor  
14 operations; and  
15 (ii) The quantity of each of the principal radionuclides of the gases, halides, and  
16 particulates expected to be released annually to unrestricted areas in gaseous  
17 effluents produced during normal reactor operations.

18  
19 Part 50.36a (*Technical specifications on effluents from nuclear power reactors*) requires  
20 licensees to establish and follow procedures for the control of effluents. This Part also  
21 establishes an expectation that "the licensee will exert its best efforts to keep levels of  
22 radioactive material in effluents as low as is reasonably achievable."<sup>14</sup>

23  
24 The release requirements for radioactive effluents are based on the calculated doses to  
25 members of the public from the effluents, and not on the total volume or type of radioactive  
26 material discharged. Thus, licensees have the discretion to control effluent releases in a manner  
27 that allows for plant specific discharge streams, as well as the local setting of the plant.  
28 Compliance with 10 CFR 50.36a and Appendix I of 10 CFR 50 is established in a Licensee's

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<sup>13</sup> These values are provided in Table 2 of Appendix B in 10 CFR 20.

<sup>14</sup> Appendix I in 10 CFR 50 establishes the numerical objectives for ALARA. For gaseous pathways, the objectives are 10 millirads for gamma radiation or 20 millirads for beta radiation at any location near ground level which could be occupied by individuals in unrestricted areas. For liquid pathways, the objectives are 3 millirems to the total body or 10 millirems to any organ for any individual in an unrestricted area from all pathways of exposure.

1 radiological effluent release technical specifications (RETS), as based on dose calculations to a  
2 hypothetical maximally exposed member of the public living near the nuclear power plant.

3  
4 Regulations promulgated by the U.S. Environmental Protection Agency place additional  
5 requirements on releases from all fuel cycle facilities. The regulations in 40 CFR 190  
6 (Environmental Radiation Protection Standards for Nuclear Power Operations), Subpart 10  
7 (Standards for Normal Operations) place annual limits of 0.025 rem (0.25 mSv) to the whole  
8 body, 0.075 rem (0.75 mSv) to the thyroid, and 0.025 rem (0.25 mSv) to any other organ of any  
9 member of the public as the result of planned discharges of radioactive materials, excluding  
10 radon and its progeny, to the general environment from uranium fuel cycle operations and of  
11 exposures to radiation from these operations.

12  
13 The USNRC imposes additional release requirements for liquid effluents that are provided in  
14 10 CFR 50.36a and detailed in Appendix I of 10 CFR 50. For liquid releases, the following dose  
15 controls apply:

16 *1. Liquid effluents shall not produce doses to any member of the public of more than 3*  
17 *mrem to the total body or 10 mrem to any organ in a year.*

18  
19 *2. During any calendar quarter, the dose from liquid effluents shall be limited to less than*  
20 *or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ.*

21 In addition to dose controls to members of the public from liquid effluents, there are also  
22 controls on the rate at which radioactive material can be released. (Note from Trish: I haven't  
23 yet found these controls for liquid releases).

**D**

**RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)**

Under federal regulations, all nuclear power plants have stringent environmental monitoring programs to ensure there are no negative effects from plant operations. The U.S. Nuclear Regulatory Commission (USNRC) requires licensees to begin these programs at nuclear plant sites at least three years before the plant starts operating. Because radiation is naturally present in the environment, the pre-operational monitoring is designed to establish a baseline the company later will use to ensure that the plant's impact on the environment remains minimal. The USNRC requires nuclear plants to submit a report each year on the results of their monitoring programs.

The Nuclear Regulatory Commission requires the operators of nuclear power plants to sample air at various locations in the vicinity of the plants to determine if releases are detectable in the environment off site. The environmental monitoring system is covered under the Radiological Environmental Monitoring Program (REMP): typically, measurements are made at five stations: 3 at stations near the plant boundary in the direction of most likely wind transport; 1 in the vicinity of a community likely to have the greatest chance of exposure; and 1 at control location 15 to 30 km distant in the upwind direction of prevailing winds (NUREG 1301). Radiiodine is measured weekly and gross beta activity of particulates captured on filters is also measured weekly. Analyses to identify gamma-emitting radionuclides are done on composite samples quarterly.

The results of licensee's effluent release program, which provides estimates of the public health impact of the releases, and radiological environmental monitoring program must be reported annually to the NRC. Both reports are available to the public via the NRC website. Historical reports are available electronically in the NRC system from about 2000 to the present. Prior to that, reports are available only in microfiche.

For a waterborne exposure pathway a sampling and analysis program shown in Table C.1 is recommended.



1 TABLE C.1 Water Sampling and Analysis Recommendations

2

| Sample                  | Number of Representative Samples & Sample Locations  | Sampling & Collection Frequency   | Type and Frequency of Analysis  |
|-------------------------|--|---|---|
| Surface water           | one sample upstream (Wa1), one sample downstream (Wa2)   | composite sample over 1-month period  | gamma isotopic analysis monthly; composite for tritium analysis quarterly   |
| Groundwater             | samples from one or two sources (Wb1, Wb2) only if likely to be affected   | quarterly   | gamma isotopic and tritium analysis quarterly   |
| Drinking water          | one sample of each of one to three (Wc1 – Wc3) of the nearest water supplies that could be affected by its discharge; one sample from a control location (Wc4) | composite sample over 2-week period when I-131 analysis is performed; monthly composite otherwise | I-131 analysis on each composite when the dose calculated for the consumption of the water is greater than 1 mrem per year. Composite for gross beta and gamma isotopic analyses monthly. Composite for tritium analysis quarterly. |
| Sediment from shoreline | One sample from downstream area with existing or potential recreational value (Wd1)  | Semiannually  | Gamma isotopic analysis semiannually  |

3 *Notes on Table:*

4 a. Gamma isotopic analysis means the identification and quantification of gamma-emitting  
5 radionuclides that may be attributable to the effluents from the facility.

6 b. The "upstream sample" shall be taken at a distance beyond significant influence of the  
7 discharge. The "downstream sample" shall be taken in an area beyond but near the mixing zone.  
8 "Upstream" samples in an estuary must be taken far enough upstream to be beyond the plant  
9 influence. Salt water shall be sampled only when the receiving water is utilized for recreational  
10 activities.

11 c. A composite sample is one in which the quantity (aliquot) of liquid sampled is proportional  
12 to the quantity of flowing liquid and in which the method of sampling employed results in a  
13 specimen that is representative of the liquid flow. In this program composite sample aliquots shall  
14 be collected at time intervals that are very short (e.g., hourly) relative to the compositing period  
15 (e.g., monthly) in order to assure obtaining a representative sample.

16 d. Groundwater samples shall be taken when this source is tapped for drinking or irrigation  
17 purposes in areas where the hydraulic gradient or recharge properties are suitable for  
18 contamination.

1 SOURCE: Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent  
2 Controls for PWRs, Generic Letter 89-01, Supplement No. 1, April 1991, U.S. NRC, NUREG-  
3 1301.

4  
5 The RETS require that the licensee submit:

- 6  
7 1. An annual radiological environmental monitoring report which is designed to assess the  
8 impact of radiological effluent releases into the environment; and  
9 2. A Special Report within 30 days of discovery of the event if predetermined levels of  
10 radioactivity are exceeded.

11  
12 The NRC also requires that the licensee participate in an Interlaboratory Comparison  
13 Program to ensure the accuracy and precision of the licensee's data.

14  
15 The REMP has allowed licensees significant flexibility to make changes to their programs  
16 without prior NRC approval. The historical trend has been to reduce the scope of the program  
17 as a result of continued non-detection of radioactivity. There appears to be no guidance from  
18 NRC on when the program might need to be expanded.

**E**

**Radiological Effluent Technical Specifications (RETS) Program**

The U.S. Nuclear Regulatory Commission (USNRC) requires that operators of nuclear power plants and fuel cycle facilities monitor and report on releases of radioactive effluents. The monitoring and reporting system is specified in the Radiological Effluent Technical Specifications (RETS) program.

RETS requires the licensee to monitor effluent releases at every significant release point at the facility. Effluent monitoring consists of continuous measurements of some effluent streams; periodic measurement of radioactive particles trapped on filters, and measurement of samples from effluents released in batches. Detailed information about the RETS program for a given plant is contained in the licensee's Offsite Dose Calculational Manual (ODCM), which is part of an operator's application for an USNRC license. The USNRC also requires that the licensee participate in an Inter-laboratory Comparison Program to ensure the accuracy and precision of the licensee's data and also to carry out computational checks, data validation activities, and audits by USNRC personnel.

Methods for estimating gaseous and liquid effluent dispersions from nuclear plants are described in Regulatory Guides 1.111 (Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors) (USNRC 1977b) and Regulatory Guide 1.113 (Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for The Purpose of Implementing Appendix I) (USNRC, 1977c), whereas methods used to derive the radionuclide concentrations in foodstuffs from the air and water concentrations are described in Regulatory Guide 1.109 (Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I) (USNRC, 1977a). Guidance to calculate the annual doses to humans from effluent releases from nuclear plants is also included in Regulatory Guide 1.109.

Regulatory Guide 4.16 (Monitoring and Reporting Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Cycle Facilities) indicates that estimates of exposures resulting from effluent releases from nuclear fuel cycle facilities also should be calculated



1 consistent with the applicable guidance in Regulatory Guide 1.109. Alternatively, nuclear facility  
2 licensees can use Guide 4.20 (Constraint on Releases of Airborne Radioactive Material to the  
3 Environment for Licensees Other than Power Reactors) for estimating exposures from gaseous  
4 releases. Of course, the nuclides of interest for exposures from nuclear fuel cycle facilities differ  
5 from those for nuclear plants (Chapter xx). The use of EPA approved codes (e.g., COMPLY) is  
6 accepted by the USNRC and are generally used by fuel cycle facilities to demonstrate  
7 compliance with direct exposure limits. These codes are generally conservative and  
8 overestimate exposures. Since external exposures from fuel cycle facilities are essentially  
9 negligible compared to internal exposures, current models available in the literature are entirely  
10 sufficient. Similarly, current models are also sufficient for direct radiation exposure from stored  
11 waste, tailings piles, depleted-uranium canisters.

### 12 13 **Effluent Monitoring at Nuclear Plants**

14  
15 Regulatory Guide 1.21 (Measuring, Evaluating, and Reporting Radioactive Material in Liquid  
16 and Gaseous Effluents and Solid Waste) provides regulatory guidance for sampling and  
17 analysis of effluents from USNRC-licensed nuclear plants. Guidance to plant licensees on  
18 sampling and analysis methods and frequencies are provided in NUREG-1301 for Pressurized  
19 Water Reactors and NUREG-1302 for Boiling Water Reactors. These documents contain  
20 guidance on:

- 21
- 22 • *Effluent monitoring instrumentation: Locations of monitoring instrumentation with respect*  
23 *to plant effluent systems, minimum number of operable channels, and surveillance*  
24 *(inspection) requirements.*
  - 25 • *Effluent monitoring: Sampling and analysis frequency, type of analysis, and detection*  
26 *limits.*

27  
28 Site-specific monitoring programs can deviate from the guidance in these NUREGs with  
29 appropriate justifications and approvals.

30  
31 Licensees are required to monitor all locations at the plant at which >1 percent of activity is  
32 discharged as

- liquid effluent
- noble gases into the atmosphere
- anything else into the atmosphere.

These locations are referred to as *significant release points* and include vents and stacks for gaseous effluents and liquid waste discharge points for liquid effluents. Releases are assessed using a combination of sample analyses, radiation monitoring, and flow, tank level, and system pressure indications, as appropriate, to ensure that the amount of radioactive material is not underestimated.

Licensees are also required to monitor unplanned leaks and spills. If such leaks and spills result in offsite releases, then the magnitude of the releases must be estimated and reported to the USNRC along with the releases from routine operations. If the leak or spill occurs onsite, then a bounding analysis can be used to assess the potential offsite hazard.

Continuous effluent releases are typically monitored by measuring gross radioactivity<sup>15</sup> with a continuously indicating radiation monitoring system such as a sodium iodide detector. These gross measurements can be used to activate alarms and terminate effluent releases if radioactivity levels exceed allowable limits. These continuous measurements are combined with analyses of physical samples (e.g. particulate materials trapped on filters or air samples) from the effluent stream to obtain quantitative estimates of the radionuclide concentrations in the effluent stream. Such samples are usually taken at specified frequencies, the value of which depends on the expected variability of radioactivity in the effluent stream.

Batch effluent releases are sampled prior to purging or venting. Certain radionuclides, referred to as "hard-to-detect" radionuclides (e.g., iron-55, strontium-89, and strontium-90), may be analyzed after the release takes place. "Continuously indicating" radiation monitoring equipment may be used during the release to verify the representativeness of the grab sample or to more fully characterize the release.

---

<sup>15</sup> Gross radioactivity is typically reported in counts per unit time and does not include any quantitative information about the concentrations of radioactive isotopes in the effluent streams.

1        Table D.1 summarizes the guidance on sampling and analyzing gaseous and liquid waste.  
2        The guidance specifies analyses type, minimum sampling frequencies, and lower limits of  
3        detection for each type of release. The requirements for PWRs in NUREG-1302 are similar, but  
4        some of the specified sampling points are different owing to the different design of these plants.  
5        Table E.1 footnotes list the principal radionuclides that should be measured by the monitoring  
6        program.  
7  
8



1 TABLE E.1 Radioactive Gaseous Waste Sampling and Analysis Program

2

|         | Release type                   | Sampling frequency                              | Minimum analysis frequency                      | Type of activity analysis                                    | Lower limit of detection <sup>f</sup> (μCi/ml) |
|---------|--------------------------------|---|---|--|--|
| Gaseous | Offgas treatment system        | Monthly<br>Grab sample                          | Monthly   | Principal gamma emitters <sup>a</sup>                        | $1 \times 10^{-4}$                             |
|         | Containment purge or vent      | Prior to each purge <sup>b</sup><br>Grab sample | Prior to each purge <sup>b</sup><br><br>Monthly | Principal gamma emitters <sup>a</sup><br><br>Tritium (oxide) | $1 \times 10^{-4}$<br>$1 \times 10^{-8}$       |
|         | Other gaseous release points   | Monthly <sup>b, c</sup><br>Grab sample          | Monthly <sup>b</sup>                            | Principal gamma emitters <sup>a</sup><br>Tritium (oxide)     | $1 \times 10^{-4}$<br>$1 \times 10^{-6}$       |
|         | All release types listed above | Continuous <sup>d</sup>                         | Weekly <sup>e</sup><br>Charcoal sample          | Iodine-131   | $1 \times 10^{-12}$                            |
|         |                                | Continuous <sup>d</sup>                         | Weekly <sup>e</sup><br>Particulate sample       | Principal gamma emitters <sup>a</sup>                        | $1 \times 10^{-11}$                            |
|         |                                | Continuous <sup>d</sup>                         | Monthly<br>Composite particulate analysis       | Gross alpha  | $1 \times 10^{-11}$                            |
|         |                                | Continuous <sup>d</sup>                         | Quarterly<br>Composite particulate sample       | Strontium-89<br>Strontium-90                                 | $1 \times 10^{-11}$                            |
|         |                                | Continuous <sup>d</sup>                         | Noble gas                                       | Noble gases  | $1 \times 10^{-6}$                             |

|        |  |  |   |  |                    |
|--------|--|--|---|--|--------------------|
|        |  |  | monitor   | Gross beta or gamma                            |                    |
| Liquid | <b>Batch Waste<sup>9</sup><br/>Release<br/>Tanks</b> | Each Batch – completed prior to each release                           | Each Batch – completed prior to each release      | Principal Gamma Emitters <sup>†</sup>          | $5 \times 10^{-7}$ |
|        |  |  |   | I-131  | $1 \times 10^{-6}$ |
|        | a.   | Each Batch – completed prior to each release; at least one per 31 days | At least one per 31 days                          | Dissolved and Entrained Gases (Gamma Emitters) | $1 \times 10^{-5}$ |
|        | b.   | Each Batch – completed prior to each release                           | Composite <sup>†</sup> – at least one per 31 days | H-3  | $1 \times 10^{-5}$ |
|        |  |  |   | Gross Alpha                                    | $1 \times 10^{-7}$ |
|        | c.   | Each Batch – completed prior to each release                           | Composite – at least one per 92 days              | Sr-89; Sr-90                                   | $5 \times 10^{-8}$ |
|        |  |  |   | Fe-55  | $1 \times 10^{-6}$ |
|        | <b>Continuous</b>                                    | Continuous <sup>†</sup>  | Composite – at least one per 7 days               | Principal Gamma Emitters                       | $5 \times 10^{-7}$ |
|        |  |  |   | I-131  | $1 \times 10^{-6}$ |
|        | a.   | Grab Sample – at least one per 31 days                                 | At least one per 31 days                          | Dissolved and Entrained Gases (Gamma Emitters) | $1 \times 10^{-5}$ |

|  |    |            |  |              |                    |
|--|----|------------|--|--------------|--------------------|
|  | b. | Continuous | Composite –<br>at least one<br>per 31 days | H-3          | $1 \times 10^{-5}$ |
|  |    |            |  | Gross Alpha  | $1 \times 10^{-7}$ |
|  | c. | Continuous | Composite –<br>at least one<br>per 92 days | Sr-89, Sr-90 | $5 \times 10^{-8}$ |
|  |    |            |  | Fe-55        | $1 \times 10^{-8}$ |

1 NOTES:

2 <sup>a</sup> Includes Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases; Mn-54, Fe-59, Co-  
3 58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, Ce-141, and Ce-144 in iodine and particulate releases;  
4 other gamma peaks that are identifiable must also be analyzed and reported.

5 <sup>b</sup> Sampling and analysis shall also be performed following shutdown, startup, or a thermal power change  
6 exceeding 15 percent of rated thermal power within a 1-hour period.

7 <sup>c</sup> Tritium grab samples shall be taken at least once every 7 days from the ventilation exhaust from the  
8 spent fuel pool area whenever spent fuel is in the spent fuel pool.

9 <sup>d</sup> Guidance concerning the sample flow rate. See Table 4.11-2 footnotes in NUREG-1302 for details.

10 <sup>e</sup> Detailed guidance concerning sampling. See Table 4.11-2 footnotes in NUREG-1302 for details.

11 <sup>f</sup> The LLD is defined, for purposes of these controls, as the smallest concentration of radioactive material  
12 in a sample that will yield a net count, above system background, that will be detected with 95%  
13 probability with only 5% probability of falsely concluding that a blank observation represents a "real"  
14 signal.

15 <sup>g</sup> A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses,  
16 each batch shall be isolated, and then thoroughly mixed by a method described in the ODCM to assure  
17 representative sampling.

18 <sup>h</sup> The principal gamma emitters for which the Lower Limit Detection (LLD) control applies include the  
19 following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141. Ce-144  
20 shall also be measured, but with an LLD of  $5 \times 10^{-6}$ . This list does not mean that only these nuclides are  
21 to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides,  
22 shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to  
23 Control 6.9.1.4 in the format outlined in Regulatory Guide 1.21, Appendix B, Revision 1, June 1974.

24 <sup>i</sup> A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid  
25 waste discharged and in which the method of sampling employed results in a specimen that is  
26 representative of the liquids released.

27 <sup>j</sup> A continuous release is the discharge of liquid wastes of a nondiscrete volume, e.g., from a volume of a  
28 system that has an input flow during the continuous release. To be representative of the quantities and  
29 concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in  
30 proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the  
31 composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent  
32 release.

33

34 SOURCE: NUREG-1302, Table 4.11-2.

35



## Effluent Monitoring at Fuel-Cycle Facilities

Requirements for monitoring effluent releases from front-end nuclear fuel cycle facilities are contained in the following regulations:

- 10 CFR 40.65 (*Effluent Monitoring Reporting Requirements*) applies to "Part 40" fuel cycle facilities. These include in-situ leaching facilities, milling facilities, and uranium conversion and de-conversion<sup>16</sup> facilities.
- 10 CFR 70.59 (*Effluent Monitoring Reporting Requirements*) applies to "Part 70" fuel cycle facilities. These include nuclear fuel fabrication plants as well as laser enrichment and centrifuge enrichment plants.
- 10 CFR 76.35(g) (*Contents of an Application*) applies to "Part 76" fuel cycle facilities. These are the Paducah and Portsmouth Gaseous Diffusion Plants. Because the plants are owned by the U.S. Department of Energy,<sup>17</sup> they are subject to the regulations promulgated by the U.S. Environmental Protection Agency in 40 CFR 61 (*National Emission Standards for Hazardous Air Pollutants*), Subpart H (*National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities*) and Subpart Q (*National Emission Standard for Radon Emissions from Department of Energy Facilities*).

### Milling Facilities

Guidance specifically for milling facility effluent monitoring is provided in Regulatory Guide 4.14. This guide recommends that a program of soil, water, air, vegetation, food, and fish sampling be initiated at least 12 months prior to the construction of the milling facility. The guide also recommends that an operational monitoring program be conducted during construction and

---

<sup>16</sup> A new uranium de-conversion and fluorine extraction processing facility is planned for construction near Hobbs, New Mexico. This facility will de-convert depleted uranium hexafluoride tails from the enrichment process into a uranium oxide waste product for eventual disposal and will recover fluorine for commercial resale.

<sup>17</sup> These U.S. Government-owned plants are leased to USEC, a private corporation.

1 after the commencement of milling operations. The recommended operational monitoring  
2 program includes the following elements:

- 3
- 4 • Sampling and analysis for natural uranium, thorium-230, radium-226, and lead-210  
5 particulates from facility stacks.
- 6 • Sampling and analysis for natural uranium, thorium-230, radium-226, and lead-210  
7 particulates in air from three locations at or near the site boundaries in sectors that are  
8 expected to have the highest concentrations of airborne particulates; from one or more  
9 locations at the closest residence(s) or occupy-able structure(s); and from one control  
10 location.
- 11 • Sampling and analysis for radon gas at five or more locations that were used for air  
12 particulate sampling.
- 13 • Measurement of direct radiation at five or more locations that were used for air  
14 particulate sampling.
- 15

#### 16 **Other Fuel-Cycle Facilities**

17  
18 Guidance for monitoring program other front-end facilities (e.g. conversion, enrichment, fuel  
19 fabrication) is provided in Regulatory Guide 4.16. This guide it is recommends that licensees:

- 20
- 21 • Establish a sampling program that is sufficient to determine quantities and average  
22 concentrations of radioactive material discharges from the facility.
- 23 • Establish sampling and monitoring methods for points within the facilities that  
24 cumulatively contribute 90 percent or more of the total radioactivity releases and 90  
25 percent or more of the total estimated offsite exposures from these releases.
- 26 • Use continuous monitoring methods for determining releases of gaseous effluents from  
27 process systems that have particulate or gaseous materials that can be easily dispersed.
- 28 • Use grab-sampling methods to confirm releases at points that are continuously  
29 monitored.
- 30

31 Requirements for conducting an effluent monitoring program at the DOE-owned gaseous  
32 diffusion plants are provided in 40 CFR 61, Subpart H. This subpart requires radionuclide  
33 emission measurements to be made at all release points that have a potential to discharge

1 radionuclides into the air in quantities that could cause an effective dose equivalent in excess of  
2 0.1 mrem per year to any member of the public. Confirmatory measurements are required for  
3 other release points that have a potential to release radionuclides into the air. The subpart also  
4 contains specific requirements for measurement and analysis procedures using approved  
5 methods and for quality assurance.

6

7

8



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**From:** Garry, Steven  
**Sent:** Thursday, March 29, 2012 11:12 AM  
**To:** Bell, Stephen; Bonser, Brian; Brock, Terry; Bush-Goddard, Stephanie; Carson, Louis; Cassidy, John; Clemons-Webb, Candace; Conatser, Richard; Dickson, Billy; Dickson, Elijah; Dionne, Bruce; Dykes, Carmen; Furia, Joseph; Garry, Steven; Go, Tony; Graves, Chris; Greene, Natasha; Griffis, Jeff; Hamilton, Ruben; Henderson, Pamela; Jimenez, Manuel; Kellner, Robert; Kuzo, George; Lavera, Ronald; Lewis, Doris; Loo, Wade; Lynn, Henry; Mahlahla, Latonya; Mccoppin, Michael; Mitchell, Mark; Moslak, Thomas; Myers, Valerie; Nielsen, Adam; Nimitz, Ronald; Noggle, James; O'Donnell, John J; Pedersen, Roger; Phalen, Martin; Pursley, William; Ricketson, Larry; Rivera, Jonathan X; Roach, Edward; Rolph, Ronald; Saba, Mohammad; Schaaf, Robert; Schaffer, Steven; Shaffer, Vered; Shoop, Undine; Stearns, Don; Sun, Casper; Tomon, John; Werner, Greg  
**Subject:** FW: REPORT RELEASE: Cancer Risk Assessment: Phase I  
**Attachments:** NAS Phase I Feasibility Study Briefing - March 26 2012.ppt

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Thursday, March 29, 2012 11:02 AM  
**Subject:** REPORT RELEASE: Cancer Risk Assessment: Phase I

Dear interested parties,

The report on the *Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1* has been released and is available for download here: [http://www.nap.edu/catalog.php?record\\_id=13388](http://www.nap.edu/catalog.php?record_id=13388)

Starting April 1, the report will be open for a 60 day public comment period. The comments received from interested parties about the report's proposed methodologies will be used to inform the design of the next phase of the study. Comments can be submitted to the project email ([crs@nas.edu](mailto:crs@nas.edu)) or via fax (202-334-3077). Comments will be placed in the project's public access file, which can be made available to the public upon request.

If you have any trouble downloading the report, feel free to contact us through the project email ([crs@nas.edu](mailto:crs@nas.edu)).

---

**From:** Conatser, Richard  
**Sent:** Monday, May 14, 2012 9:30 AM  
**To:** Shoop, Undine  
**Cc:** Meighan, Sean; Garry, Steven  
**Subject:** Comments on the NAS Cancer Study  
**Attachments:** 120509\_RLC\_Comments on NAS Cancer Study\_Phase I\_For Yellow Ticket.docx

Undine,

Here are my comments on the NAS Cancer Study. Please forward these to Terry Brock so that he may compile them with other NRC comments. I believe this information should be sufficient to close the yellow ticket. Please contact me if you have questions or if you need additional information.

Thanks,

**Richard L. Conatser**

Health Physicist

Nuclear Regulatory Commission

11555 Rockville Pike | Rockville, MD 20852

Tel: 301-415-4039 | Mobile: (b)(6)

Richard.Conatser@NRC.gov

## Comments on NAS Cancer Study, Phase I Report

ADAMS ML120860057

By Richard L. Conatser

NRC/NRR/DRA/AHPB

14-May-12

| # | Page | Affected Text  | Comment  |
|---|------|--|--|
| 1 | S.1  | <i>Uneven availability and quality of data on nuclear facility effluent releases. Effluent release data may not be available ...</i>   | The NRC has high confidence that a complete set of effluent data is available. Some of the data may be on microfilm or microfiche, and as a result, may take time to retrieve, but it is expected that all information is available.   |
| 2 | S.1  | <i>Uneven availability and quality of data on nuclear facility effluent releases. Effluent release data may not be available and data quality may be poor for some nuclear facilities.</i> | This gives the impression that the data has low quality. There are NRC regulations regarding the quality of the data, so this sentence could (or does) convey to the reader that licensees were not in compliance with NRC regulations. I do not think that is what the authors intended to say. I believe this sentence intended to say that the quality of the microfiche/microfilm that contains the reports may be questionable. You may wish to reword this sentence to clarify the intent. |
| 3 | S.2  | <i>Low expected statistical power.</i>   | You may wish to include some additional summary information here about the range(s) of doses that some previous studies have historically linked to cancer mortality or morbidity to provide some context to the (doses from radioactive effluents proposed by the) current NAS study.   |
| 4 | S.2  | <i>Doses resulting from monitored and reported radioactive effluent releases from nuclear facilities are expected to be low.</i>   | This seems to say that the doses from unmonitored and/or unreported releases may be high. In fact, any doses from unmonitored and/or unreported releases are expected to be a small fraction of the monitored and reported releases. As a result, the words "monitored and reported" have no value in this sentence. Indeed these words could suggest to the reader that unmonitored or unreported doses may not be low. Consider deleting the words "monitored and reported."                   |



|    |     |   |  |
|----|-----|---|--|
| 5  | F.2 | Additionally, 10 CFR 50.36(a)(2) requires licensees to submit annual reports specifying the principal radionuclides released in liquid and gaseous effluents.   | Change the reference to the regulation to "... 10 CFR 50.36a(a)(2) ..."  |
| 6  | F.2 | radiological effluent release technical specifications (RETS),  | Editorial: You may choose to delete the word "release" since it is redundant when used with the word effluent. This appears elsewhere in the document as well. Deal with the globally in the document as you see fit. Editorial.   |
| 7  | F.2 | ...place annual limits of 0.025 rem (0.25 mSv) to the whole body, 0.075 rem (0.75 mSv) to the thyroid, and 0.025 rem (0.25 mSv) to any other organ of any member of the public as the result of planned discharges of radioactive materials, excluding radon and its progeny, to... | The applicability of 40 CFR 190 includes doses received as a result of operations which are part of the nuclear fuel cycle. As a result, it includes both planned and unplanned (or abnormal) discharges. So either (1) delete the word "planned" or (2) add the words "and unplanned," or (3) use the words from the applicability section of 40 CFR 190. |
| 8  | G.1 | Methods for estimating airborne and liquid effluent dispersions from nuclear plants are described in Regulatory Guides 1.111  | RG 1.111 is for airborne only. Delete "and liquid."  |
| 9  | G.2 | Title 10, Part 50 of the Code of federal Regulations (10 CFR 50.36(a)(2) requires licensees to report the principal radionuclides in effluent releases.   | Should be "10 CFR 50.36a(a)(2)"  |
| 10 | H.1 | Radioiodine is measured weekly and gross beta activity of particulates captured on filters is measured quarterly...   | Please check this frequency. Radioiodine and gross beta activity of particulates captured on filters are measured weekly.  |
| 11 | H.1 | Analyses to identify gamma-emitting radionuclides are done on composite samples   | Please check this frequency. Analyses to identify gamma-emitting radionuclides are done on composite samples quarterly.  |

|    |      |  |   |
|----|------|--|---|
|    |      | weekly.  |   |
| 12 | H.1  | The RETS require that the licensee submit  | Did you mean to say "REMP"? The items in the bullet list are typically associated with REMP.  |
| 13 | H.2  | one sample of each of on to three (Wc1 – Wc3) of the nearest water supplies that could be affected by              | Editorial. Should be as follows:<br>"one sample of each of one to three (Wc1 – Wc3) of the nearest water supplies that could be affected by"  |
| 14 | H.2  | <b>TABLE H.1</b> Water Sampling and Analysis Recommendations   | Footnotes are listed at the bottom of the table, but no footnote references appear in the table. Add footnote references in the table that match the footnotes at the bottom of the page.   |
| 15 | 2.45 | <b>FIGURE 2.1</b> Noble gas releases from (A) BWRs and (B) PWRs in 2008. SOURCE: Daugherty and Conaster (2008)     | Should be spelled "Conatser"  |
| 16 | 2.48 | <b>FIGURE 2.2</b> Iodine-131 releases from (A) BWRs and (B) PWRs in 2008. SOURCE: Daugherty and Conaster (2008)    | Should be spelled "Conatser"  |
| 17 | 2.51 | <b>FIGURE 2.3</b> Particulate releases from (A) BWRs and (B) PWRs in 2008. SOURCE: Daugherty and Conaster (2008)   | Should be spelled "Conatser"  |
| 18 | 2.54 | <b>FIGURE 2.4</b> Tritium (H-3) releases from (A) BWRs and (B) PWRs in 2008. SOURCE: Daugherty and Conaster (2008) | Should be spelled "Conatser"  |
| 19 | 2.6  | The committee was not able to locate many of the reports for these plants, especially prior to 1975, ...           | I assisted in the retrieval of a few of these reports from microfiche. It was a time-consuming task, and there was simply not enough time allowed to retrieve all of the reports. It is expected that all reports can be located on microfiche, but it will take much more time than was allotted during the NAS Phase 1 report. I recommend rewording this to say, "Retrieval of historical reports from microfiche is a time-consuming task, and because a limited amount of time was available during the Phase 1 Study, the |



|    |      |  |  |
|----|------|--|--|
|    |      |  | <p>committee was not able to locate many of the reports for these plants, especially prior to 1975. Provided sufficient time is allowed for a thorough search of the records, there is reason to believe that all of the reports can be made available to the committee."</p> <p>As an alternative to the above wording, the text at left could be treated the same as is done on page 2.13 (for fuel cycle facilities). There it says, "the availability of effluent release data prior to the mid 1970s is unclear."</p>   |
| 20 | 2.6  | ..., and some of the reports on microfiche were not legible.                                       | <p>Most of the reports provided were legible, and for those reports there would be no problem with a dose reconstruction. On the other hand, some portions of some of the reports were not legible, but other portions of those reports were completely legible. Generally, when copies were poor, the illegibility affected only one calendar quarter's data for a particular radionuclide. The other 3 calendar quarters' data for that nuclide were typically legible. As a result it becomes a question of how much data is required for a reasonable dose reconstruction. In reality, in any particular year at any site, even though 20-40 radionuclides may be reported in the annual effluent reports, 90% (or more) of the dose to the members of the public is due to the contributions of only about 12 nuclides. As a result, I would suggest that a reasonable dose reconstruction could most likely be conducted even when using the annual reports that were partially illegible.</p> <p>As a result, please consider rewording the text at left as follows:</p> <p>"Some portions of some of the reports on microfiche were not legible, and this would be a challenge for any dose reconstruction. If a dose reconstruction were conducted using partially illegible reports, the resulting reconstructed doses could potentially provide a reasonable estimate of the doses to nearby populations, even though there would be more total uncertainty with the dose estimates."</p> |
| 21 | 2.10 | ...groundwater monitoring within a licensee's site is only required if the groundwater is used for | <p>Revise as follows:</p> <p>"Undetected liquid leakage that enters the</p>  |



|    |      |  |  |
|----|------|--|--|
|    |      | drinking or irrigation purposes.   | <p>subsurface can frequently remain undetected for long periods of time because the existing groundwater monitoring requirements only apply once a leak is detected or if the groundwater is used for drinking or irrigation purposes."</p> <p>This change is requested because the statement at left only reflects the REMP ODCM requirement for groundwater monitoring. Other NRC requirements also exist, and those requirements do require licensees to monitor the groundwater. For example, 10 CFR 50.36a requires licensees to report effluents discharged to offsite areas in an annual report to the NRC. If a licensee has had a spill or leak on site, the licensee has an obligation to report those releases as an effluent in the year in which it is discharged to an offsite area. This requires some monitoring, and the monitoring would be required regardless of whether the groundwater was used for drinking water or irrigation purposes. Additionally, 10 CFR 50.75g requires licenses to maintain records important for decommissioning. If a leak or spill were to occur, a licensee has an obligation to perform the monitoring required by 10 CFR 50.75g. This monitoring is required regardless of whether the groundwater is used for drinking water or irrigation purposes. Additionally, 10 CFR 20.1501 requires adequate surveys.</p> |
| 22 | 2.10 | These measurements are generally not sensitive enough to detect increases above background levels except at locations close to plant boundaries. | <p>This makes it sound like the TLDs don't work except close to the site boundary. I suggest rewording as follows:</p> <p>"TLDs are sensitive enough to detect small increases above background levels, but because typical radiation exposures from power plants are so small, the power plant's contributions to the measured doses are often indistinguishable from background except at locations close to the site boundary."</p>   |
| 23 | 2.15 | ...and sediments are analyzed for gamma-emitting isotopes.   | <p>Consider adding a sentence at the end which says:</p> <p>"Groundwater and drinking water samples may also be analyzed for some hard-to-detect nuclides such as Sr-90 and Fe-55."</p>  |
| 24 | 2.16 | ...were found to be above  | The use of the word "limits" may cause confusion.  |

|    |      |  |  |
|----|------|--|--|
|    |      | the detectable limits.   | Suggest rewording as follows:<br>"... were detected."  |
| 25 | 2.16 | radioisotope concentrations were below detection limits in the vast majority of instances.   | The use of the word "limits" may cause confusion. Suggest rewording as follows:<br>"... radioisotope concentrations were not detected in the vast majority of instances."  |
| 26 | 2.17 | In fact, most measurements are below detection limits.   | The use of the word "limits" may cause confusion. Suggest rewording as follows:<br>"In fact, most measurements indicate no radionuclides are detected."  |
| 27 | 2.19 | Consequently, the passive monitoring systems around nuclear plants cannot be used to quantify increases in exposure resulting from routine effluent releases and therefore cannot be used to validate estimated population doses.  | I know what you are trying to say, but this seems to indicate the TLD monitoring around the power plants can't quantify increases due to routine effluents. However, one could argue that a step increase in effluents of 10 to 15 mrem per year would be detectable by TLDs. Consider clarifying the intent by replacing the text at the left with a statement similar to the one below.<br><br>"Consequently, effluent doses would have to be more than 5-10 mrem per year to be detected by TLDs. Because doses from routine effluent are typically much lower than that, TLDs can only provide an upper bound (of approximately 5-10 mrem per year) for validating estimated population doses."<br><br>You discuss this to a limited degree on page 3.23 (in the last paragraph before section 3.7). This may indicate there is some duplication between the discussions on pages 3.23 and 2.19. |
| 28 | 2.20 | Continuous air sampling measurements generally have lower limits of detection that are below the levels of airborne particulates and iodine that actually occur as a result of plant releases during normal operations. Consequently, such measurements are generally not useful for validating specific calculations of air activities. | The use of the word "limits" may cause confusion. Suggest rewording as follows:<br><br>The levels of airborne particulates and iodine released during normal operations is typically below the detection sensitivity of the continuous air sampling measurements. As a result, these measurements can only provide an upper bound for validating estimated population doses."  |



|    |      |  |  |
|----|------|--|--|
|    |      | and possible ground contamination, based on measured release rates   |  |
| 29 | 2.23 | Almost all environmental measurements reported by facilities are either below the minimum detection limits or are not sensitive enough to allow for the development of adequate dose estimates.  | The use of the word "limits" may cause confusion. Suggest rewording as shown in previous comments.   |
| 30 | 2.23 | Data from environmental monitoring that are above minimum detection limits can,  | The use of the word "limits" may cause confusion. Suggest rewording as shown in previous comments.   |
| 31 | 2.25 | Daugherty, N., and R. Conaster (2008) Radioactive Effluents from Nuclear Plants: Annual Report 2008. Washington, DC: Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.   | Should be "Conatser"   |
| 32 | 2.31 | NOTE: MDL = minimum detection limit.   | Please check to see if this is the correct acronym. Usually MDL means minimum detectable level.  |
| 33 | 3.4  | Upper bound values of parameters such as the time spent at the location of maximum exposure or the consumption rates of local foodstuffs are used to demonstrate that there is no doubt that the calculated doses are below the dose limits or standards, and, therefore, that there is no need to evaluate the uncertainties in the calculated doses. | <p>You may want to add a sentence at the end of this paragraph that links this discussion to the doses listed in the Annual Radioactive Effluent Release Reports. For example, you may wish to add something like the following:</p> <p>"This is why the doses reported to the NRC in the licensee's Annual Radioactive Effluent Release Reports (ARERRs) are typically overestimates of actual exposures. In the 1970s and 1980s, licensees often used very conservative, bounding assumptions when estimating radioactive releases because the primary purpose was to demonstrate compliance with the NRC design objectives and limits. The resulting dose estimates in the ARERRs often reported more dose than actually received by individuals. As a result, there are two major contributions to the decreases in radioactive effluents during the last 30 years: (1) the actual</p> |



|    |      |  |   |
|----|------|--|---|
|    |      |  | amount of materials released has decreased (due to better fuel performance), and (2) the practice of using overly conservative estimates to calculate radioactive releases has been reduced or curtailed."  |
| 34 | 3.6  | Nevertheless, in recent years the estimated MEI doses are mostly less than 1 mrem/yr (Daugherty and Conaster, 2008),   | Should be "Conatser."   |
| 35 | 3.19 | The discussion of natural background radiation is limited to the USA.  | It may be appropriate to mention other very high natural background areas (e.g., Iran) to demonstrate that global natural background can be over 1000 (or 10,000) mrem per year, and that to date no correlation has been made between increases in cancer incidence at these very high natural background areas. |
| 36 | 3.25 | Daugherty, N., and R. Conaster, 2008. Radioactive Effluents from Nuclear Plants: Annual Report 2008. Washington, DC: Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. | Should be "Conatser."   |

---

**From:** Cruz, Holly  
**Sent:** Tuesday, September 11, 2012 3:38 PM  
**To:** Craver, Patti  
**Cc:** Garry, Steven; Shoop, Undine; Pearson, Alayna  
**Subject:** FW: ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

Thanks, Patti!

Steve/Undine-Please see below.

Thanks for your help.

Holly

Holly Cruz, Project Manager  
Licensing Processes Branch (PLPB)  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation  
Phone: (301) 415-1053  
Location: O12F12  
M/S: O12E1  
email: holly.cruz@nrc.gov



**From:** RidsNrrMailCenter Resource  
**Sent:** Tuesday, September 11, 2012 3:34 PM  
**To:** RidsNrrDra Resource  
**Cc:** Pearson, Alayna; Cruz, Holly  
**Subject:** ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

Attached is an action item from RES seeking office concurrence on SECY paper entitled, "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities", by COB September 23, 2012.

I will issue the yellow ticket once the TAC number has been assigned.

Thanks,  
Patti

**From:** Pope, Tia  
**Sent:** Tuesday, September 11, 2012 3:07 PM  
**To:** Milligan, Patricia; Garry, Steven; Dehmel, Jean-Claude; Nimitz, Ronald; Chapman, Gregory; Burnell, Scott; Mizuno, Beth; Salomon, Stephen; RidsOgcMailCenter Resource; RidsOpaMail Resource; RidsFsmeDilrllb Resource; RidsRgn1MailCenter Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource  
**Cc:** Brock, Terry  
**Subject:** ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

Attached for your review and concurrence is the Information SECY paper entitled, "Next steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities" study (ML12249A121). We have identified staff in your offices that have been associated with the project and suggest that they take the lead in reviewing the document for your organization—your identified staffs are listed below and CC on this e-mail. They have been sent an e-mail to inform them of this request. Please provide concurrences back to RES by COB Monday, September 23, 2012. If you have any questions please contact Terry Brock / RES at [tab2@nrc.gov](mailto:tab2@nrc.gov) or 301-251-7487.

Cognizant Staff

NSIR – Patricia Milligan  
NRR – Steven Garry  
NRO – Jean Claude Dehmel  
RI – Ronald Nimitz  
NMSS – Gregory Chapman  
FSME – Stephen Salomon  
OPA – Scott Burnell  
OGC – Beth Mizuno

View ADAMS P8 Properties ML12249A121

Open ADAMS P8 Document (SECY - Next Steps for the Analysis of Cancer Risks in Populations Near Nuclear Facilities Study)



***Tia Pope***

*RES/DSA*

*C-3 A03 (301) 251-7499*

*Mailstop- 3A 07m*

*[tia.pope@nrc.gov](mailto:tia.pope@nrc.gov)*



---

**From:** Shoop, Undine  
**Sent:** Friday, October 12, 2012 6:06 PM  
**To:** Glitter, Joseph; Lee, Samson  
**Cc:** Tate, Travis  
**Subject:** FW: cancer study update - SECY paper and Next Phase  
**Attachments:** Draft Cancer\_study\_ph2\_edit.docx

FYI

**From:** Garry, Steven  
**Sent:** Friday, October 12, 2012 8:38 AM  
**To:** Noggle, James; Bonser, Brian; Dickson, Billy; Drake, James; Werner, Greg  
**Cc:** Shoop, Undine; Pedersen, Roger; Conatser, Richard; Clemons-Webb, Candace; Jimenez, Manuel; McCoppin, Michael; Brock, Terry  
**Subject:** RE: cancer study update - SECY paper and Next Phase

Cancer study press release:

The OPA Press Release has not been finalized, but here is an unofficial DRAFT that OPA is still working on. I will send the final Press Release as soon as they finish editing it.

Steve

**From:** Garry, Steven  
**Sent:** Friday, October 12, 2012 7:52 AM  
**To:** Noggle, James; Bonser, Brian; Dickson, Billy; Drake, James; Werner, Greg  
**Cc:** Shoop, Undine; Pedersen, Roger; Conatser, Richard; Clemons-Webb, Candace; Jimenez, Manuel; McCoppin, Michael; Brock, Terry  
**Subject:** FW: cancer study update - SECY paper and Next Phase

Hi Jim, Brian, Billy, Jim and Greg,

As you know, there are two types of cancer studies beginning:

- 1) A cancer study of the public
- 2) A cancer study of nuclear workers (both DOE workers and nuclear power plant workers)

This email is updating you on the cancer study of the public (populations living near nuclear facilities; i.e., the National Academy of Science (NAS) cancer study of the public). You may get questions on the SECY paper (attached) and the press release (draft attached) that are being released today (Friday 10/12/2012) (see more info below).

Update:

For the cancer study of the public, NAS has completed a paperwork "feasibility" study of whether a cancer study could be done. NAS has recommended, that yes, a cancer study can be done. However, instead of doing a full blown study on all the nuclear plants, that instead NAS first do a "pilot" study of cancers in the public near 6 nuclear power plants and one fuel processing facility (Nuclear Fuel Services in Region II). The pilot study will be done over the next 2.5 years.

Details:

The Office of Research has written a SECY paper to the Commission that will be publicly released today (Friday, 10/12/12). The SECY information paper tells the Commission what the staff plans to do (i.e., we don't have to wait for Commission review and vote). The Office of Public Affairs is also putting out a press release telling the public that NRC is working with NAS and the "pilot" cancer study is proceeding. The pilot study for cancer in the public will do 2 different types of cancer studies, 1) cancer in the general populations living near the facilities and 2) a child cancer study.

PS: Worker Cancer Study

In addition, here is a quick update on the Worker Cancer Study

Plans for the worker cancer study are just now getting started. The worker study is called the "million-man" study and has now been funded by DOE with NRC support, so we will have upcoming meetings you may hear about to discuss/plan this worker study.

Steve

**From:** Brock, Terry

**Sent:** Thursday, October 11, 2012 9:20 AM

**To:** Weil, Jenny; Woodruff, Gena; Dacus, Eugene; Salomon, Stephen; Milligan, Patricia; Garry, Steven; Smith, James; Chapman, Gregory; Nimitz, Ronald; Stearns, Don; Cassidy, John; Burnell, Scott; Mizuno, Beth; Jones, Andrea; Dehmelt, Jean-Claude

**Cc:** Tomon, John; Bush-Goddard, Stephanie; Cai, June

**Subject:** cancer study update - SECY paper and Next Phase

Hi All,

RES has completed the Information SECY paper informing the Commission that staff is pursuing the next phase of the cancer study. In the next phase, NAS will use the methods developed in Phase 1 to perform pilot studies at the seven sites they recommended (listed below). This effort should take approximately 2.5 years. You can access the SECY by clicking on the link below (the paper will be publicly available on Friday 10/12/12). Thanks to all that have helped contact the affected licensees and State folks.

[View ADAMS P8 Properties ML12249A121](#)

[Open ADAMS P8 Document \(SECY - Next Steps for the Analysis of Cancer Risks in Populations Near Nuclear Facilities Study\)](#)

Region I

- Millstone Power Station, Waterford, CT
- Haddam Neck (decommissioned), Haddam Neck, CT
- Oyster Creek Nuclear Generating Station, Forked River, NJ

Region II

- Nuclear Fuel Services, Erwin, TN (operating uranium fuel fabrication facility)

Region III

- Big Rock Point Nuclear Power Plant (decommissioned), Charlevoix, MI
- Dresden Nuclear Power Station, Morris, IL

Region IV

- San Onofre Nuclear Generating Station, San Clemente, CA

Call or e-mail if you have additional questions

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487



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# OPA

## DRAFT PRESS RELEASE

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### NRC WORKING WITH NATIONAL ACADEMY OF SCIENCES ON PILOT OF NRC-SPONSORED CANCER RISK STUDY

The Nuclear Regulatory Commission staff is implementing a National Academy of Sciences (NAS) committee's recommendations to study cancer risk in populations around six U.S. nuclear power plant sites and a nuclear fuel facility. This pilot effort, which NAS will carry out, will help the NRC determine whether to continue the study at the remaining U.S. reactor and certain fuel cycle sites.

The pilot effort, described in the staff's update to the agency's five Commissioners, will examine each site with two types of epidemiological studies. The first will examine multiple cancer types in populations living near the facilities; the second will be a case-control study of cancers in children born near the facilities. The six reactor sites are:

- Dresden Nuclear Power Station, Morris, Ill.
- Millstone Power Station, Waterford, Conn.
- Oyster Creek Nuclear Generating Station, Forked River, N.J.
- Haddam Neck (decommissioned), Haddam Neck, Conn.

- Big Rock Point Nuclear Power Plant (decommissioned), Charlevoix, Mich.
- San Onofre Nuclear Generating Station, San Clemente, Calif.

The Dresden, Millstone and San Onofre sites include both operating reactors and a decommissioned reactor. The pilot effort will also study Nuclear Fuel Services in Erwin, Tenn. The Academy recommended these sites because they provide a good sampling of facilities with different operating histories, population sizes, and levels of complexity in data retrieval from the relevant state cancer registries.

The NRC is working with the Academy to begin work on the pilot studies in the next three months. The effort is expected to continue at least into 2014 and cost approximately \$2 million. The Academy will work with interested parties near the sites prior to gathering information and beginning the necessary analyses.

The NRC/NAS effort's overall aim is to update the 1990 U.S. National Institutes of Health – National Cancer Institute (NCI) report, "Cancer in Populations Living Near Nuclear Facilities." The NRC has used the 1990 NCI report as a primary resource when communicating with the public about cancer mortality risk in counties that contain or are adjacent to nuclear power facilities. NAS used Phase 1 of the study to develop a scientifically appropriate method for providing contemporary examining the most up-to-date cancer information in populations living near NRC-licensed nuclear facilities. .

###

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**From:** Shoop, Undine  
**Sent:** Monday, September 24, 2012 3:12 PM  
**To:** Lee, Samson  
**Cc:** Richards, Karen  
**Subject:** Concurrence on the SECY paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"  
**Attachments:** Garry comments on draft cancer study SECY paper.docx

Sam,

AHPB recommends concurrence with the attached comments. If you agree, please send concurrence to Terry Brock and cc Holly Cruz. This will close out Yellow ticket 020120253.

Undine Shoop  
Chief, Health Physics and Human Performance Branch  
Division of Risk Assessment  
Office of Nuclear Reactor Regulation  
301-415-2063



FOR: The Commissioners

FROM: R. W. Borchardt  
Executive Director for Operations

SUBJECT: NEXT STEPS FOR THE ANALYSIS OF CANCER RISKS IN  
POPULATIONS NEAR NUCLEAR FACILITIES STUDY

PURPOSE:

The purpose of this paper is to inform the Commission of staff plans for the next steps of the Nuclear Regulatory Commission (NRC)-sponsored Analysis of Cancer Risks in Populations near Nuclear Facilities study.

SUMMARY:

In April 2010, the NRC staff requested the National Academy of Sciences (NAS) to perform a new study on cancer mortality and incidence risks in populations living near NRC-licensed facilities to update the 1990 National Cancer Institute (NCI) report on "Cancer Risks in Populations near Nuclear Facilities." NAS agreed to do the study in two phases. In Phase 1, NAS developed scientifically sound methods to perform the study and published its report on March 28, 2012. The staff's next step has been to proceed with the NAS-recommended approach to determine the feasibility of the Phase 1 methods through pilot studies at seven NAS committee-recommended sites: Dresden in Illinois, Millstone in Connecticut, Oyster Creek in New Jersey, Haddam Neck (decommissioned) in Connecticut, Big Rock Point (decommissioned) in Michigan, San Onofre in California, and Nuclear Fuel Services in Tennessee. Upon completion of the pilot studies, the NRC staff will determine whether to perform the studies at all NRC-licensed facilities.

CONTACT: Terry Brock, RES/DSA  
301-251-7487

**BACKGROUND:**

Each commercial nuclear power plant and fuel cycle facility that the NRC regulates is authorized to release small amounts of radioactive materials to the environment as specified in the regulations and the

licensing documents for the facility. For nuclear power plants, NRC regulations and licenses require each

licensee to establish and maintain a program for monitoring radioactive effluents (Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.36a (Editor note: there is a missing "a" in 50.36a and this missing "a" [not a parenthetical (a)], "Technical Specifications on Effluents from Nuclear Power Reactors," and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion 'As Low as Is Reasonably Achievable,' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents." Section IV-B of 10 CFR Part 50, Appendix I. NRC regulations in 10 CFR 50.36a requires licensees to report these effluents in an annual radioactive effluent release report, (10 CFR 50.36a). Licensees submit their reports to the NRC with content and format in accordance with Regulatory Guide 1.21, Revision 2, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," issued June 2000. These reports conclude that releases result in offsite doses that are a small fraction of the dose limits for to individual members of the public (10 CFR 20.1301(a) and (e)) are a small fraction of the 10 CFR 20 Standards For Protection Against Radiation limits specified in 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public and is also generally less than 1% of the amount of radiation the average U.S. citizen receives in a year from all background sources. Nonetheless, some communities have expressed recurrent concerns about the potential effect of these releases on the health of residents living near nuclear facilities.

To help address these stakeholder concerns, the staff uses the 1990 NCI report as a risk communication tool on cancer mortality in populations near nuclear power facilities. The staff relies on credible health studies to augment its discussions about the NRC's robust regulatory programs to keep offsite doses as low as is reasonably achievable (ALARA) by providing public health information that directly applies to the health outcomes that are often of concern (i.e., cancer). However, the 1990 NCI report is now more than 20 years old, and more modern analysis methods, combined with up-to-date information sources, will better reflect the risk to current populations living near NRC-licensed nuclear facilities. These concerns are not new or unique to the United States. Since 2008, France, Germany, Great Britain, Spain, and Switzerland have all conducted epidemiology<sup>1</sup> studies of populations near nuclear facilities within their borders to address public health concerns.

The NRC originally contracted with the Center for Epidemiologic Research at Oak Ridge Associated Universities (ORAU) to perform the update to the 1990 NCI study. However, because of strong public interest in the research, the staff reconsidered using ORAU and contracted with NAS instead. This action is not an indication of any deficiencies in the technical quality of ORAU's work, but a way of ensuring that the study's investigator brought a broad social and national policy perspective to the work. As such, the staff chose NAS to perform the study. NAS agreed to take a two-phase approach. In Phase 1, NAS performed a scoping study that developed approaches to evaluate cancer risks in populations living near nuclear power and fuel cycle facilities licensed by the NRC. The Phase 1 committee was charged with developing methodological approaches for assessing offsite radiation dose and methodological

<sup>1</sup> Epidemiology is the study of the distribution of illness, injury, and disability within a population.



approaches for assessing cancer epidemiology. In Phase 2, if NRC chooses, NAS would perform the cancer risk assessment using the study methods developed in Phase 1.

### DISCUSSION:

The NAS committee, in its "Analysis of Cancer Risk in Populations near Nuclear Facilities—Phase 1" report (ADAMS Accession No. ML12254A165), provided the NRC with three findings and three recommendations for staff consideration.

The committee's first finding identified four key limitations for performing epidemiological studies around NRC-licensed facilities:

- uneven availability and quality of data on cancer mortality and incidence at geographic levels smaller than a county
- uneven availability and quality of data on nuclear facility effluent releases
- inability to reliably capture information on population mobility, risk factors, and potential confounding factors
- low expected statistical power<sup>2</sup>

In its second finding, the committee concluded there are several study designs (see below) that could be used to perform a cancer risk assessment around nuclear facilities. Interestingly, the committee considered a nonepidemiological approach by calculating a cancer risk projection assessment—essentially a radiation dose assessment taken to the next step of calculating cancer risk. However, the committee rejected this approach because it predicted public credibility challenges since the cancer risk assessment would be based on the same dose data that staff use and often have challenges with in communicating levels of risk to the public.

The committee's third finding concluded that facility data on effluent release, direct exposure, and meteorology can be used to obtain estimates of annual variations in dose as a function of distance and direction from nuclear facilities. Each facility will need to be individually evaluated to determine the quality and availability of data since they vary in design, operation history, and location. To perform the dose assessment, computer models have been developed to estimate absorbed doses from airborne and waterborne radioactive effluent releases.

The NAS committee concluded that environmental monitoring data have limited usefulness for estimating absorbed doses from effluent releases because most of the results are below detection limits. ~~To perform the dose assessment, computer models have been developed to estimate absorbed doses from airborne and waterborne radioactive effluent releases.~~

The committee's first recommendation to the NRC is to perform two types of epidemiology studies—an ecologic study of multiple cancer types of all populations living near nuclear

<sup>2</sup> Statistical power is typically determined before the study starts and tells the researcher how big of a sample size is needed to detect a certain level of a health effect.



facilities and a specific record-linkage-based, case-control study of cancers in children born near nuclear facilities<sup>3</sup>. These two study designs combine dose assessments with the ability to analyze many different cancer types, while also specifically looking at the potential for increased rates of children's cancer in the case-control study.

In its second recommendation, the committee proposes pilot studies be performed at seven sites to determine the feasibility of performing the study designs and to estimate the required time and resources.

NAS's suggested sites for the pilot study:

- Dresden Nuclear Power Station, Morris, IL
- Millstone Power Station, Waterford, CT
- Oyster Creek Nuclear Generating Station, Forked River, NJ
- Haddam Neck (decommissioned), Haddam Neck, CT
- Big Rock Point Nuclear Power Plant (decommissioned), Charlevoix, MI
- San Onofre Nuclear Generating Station, San Clemente, CA
- Nuclear Fuel Services, Erwin, TN

The committee selected these sites because they provide a good sampling of facilities in six States with different operating histories, population sizes, and levels of complexity in data retrieval from the State cancer registries. The State cancer registries for these sites are at different levels of maturation and have different approval protocols for accessing the cancer incidence and mortality data needed for the assessment.

The staff agreed to the seven sites because most of the cost for the pilot studies is in the initial establishment of a new study committee and set-up of the Phase 1 methods and software. The incremental cost for each additional facility in the pilot study was not estimated to be that significant in comparison to the information to be gained on the feasibility of this research (e.g., performing the pilot studies at only three or five of the seven recommended sites).

In its third recommendation, NAS stated that a plan for stakeholder engagement should be developed before the initiation of data gathering and analysis for these studies. It also emphasized the importance of early stakeholder involvement when conducting the next phase. This includes providing avenues for stakeholder engagement similar to what was done for Phase 1 by *allowing members of the public to speak at committee meetings, creating a study e-mail list to inform interested parties of study status and forthcoming events, and establishing a study Web page*.

Along with the findings and recommendations, the committee provided in its report a comprehensive review of the issues and challenges of performing epidemiology studies around nuclear facilities. The report identified one of the biggest challenges as the inability of the recommended study designs to detect health effects at the very low offsite radiation doses to members of the public from NRC-licensed facilities. The committee opted not to calculate the sample sizes needed to detect health effects at the low offsite doses from these facilities (dose

<sup>3</sup> The ecologic study design uses a geographical area as the unit of observation (e.g., census tract, county, ZIP Code) and uses an aggregate analysis that looks at a study factor (exposure) and an outcome factor (disease or death) measured in the geographical area at the same time. This study can show possible associations between exposure and disease. The case-control study design compares the prevalence of risk factors or exposures in a series of diseased study subjects (cases) with the prevalence of risk factors or exposures in a series of disease-free study subjects (controls).



equivalents < 0.01 millisieverts (mSv) per year (or 1 millirems (mrem) per year) because, as stated in the report, "...the numbers of exposed persons required to find a possible association would be truly enormous."

The committee, instead, opted to perform statistical power calculations that ruled out a certain level of risk associated with doses in the range of 0.5 to 1.0 sieverts (Sv) (50 to 100 rem), which is much larger than the low doses the general public received from the operations of NRC-licensed facilities. This particular technical detail confirms the staff position that at the low offsite doses from these facilities, researchers would not expect to observe any increased cancer risks in the populations surrounding these facilities. Nevertheless, the staff recognizes the risk communication challenges of conveying this message to the public that started this effort in the first place. As recent international studies indicate, epidemiology studies can be an important tool for allaying public health concerns, even with these known limitations. Additionally, the committee assessed the feasibility of performing health studies around uranium recovery facilities, and it recommended not studying these sites because of the sparse populations involved.

The staff did not agree with the part of the the first NAS finding pertaining to that referenced the uneven availability and lack of quality of data on nuclear facility effluent releases. The NRC requires licensees to have a quality control program for effluent and environmental monitoring programs, which the agency routinely inspects. The staff believes these monitoring programs generally are of good quality, and staff are it is highly confident that a complete set of effluent data is available for licensed facilities (and decommissioned sites), although s—Some of the data may be on microfilm or microfiche. As a result, it may take time to retrieve, but the NRC expects that all information is available.

NAS solicited comments on the Phase 1 report during for a 2-month public review period. The intent of the review period was to provide public NAS feedback on what stakeholder's views thought of the proposed methods assuming if the NRC decided to proceed with the next phase. The comments were not intended to change the committee's report.

NAS received 74 comments from the public. The sources of comments varied from individual members of the public (73 percent), nongovernment organizations (NGOs) (16 percent), professional societies and industry organizations (4 percent), universities (4 percent) and State and tribal governments (3 percent).

One professional society and two industry organizations provided comments to NAS on about the Phase 1 report. These organizations included the Health Physics Society (HPS), the Nuclear Energy Institute (NEI), and the Energy and Power Research Institute (EPRI). All three respondents complimented the Phase 1 study committee in its effort. HPS and NEI emphasized the limitations stated in the Phase 1 report and recommended that the NRC not proceed with Phase 2 of the study. HPS, NEI, and EPRI all expressed concerns that the proposed study, with its significant limitations, would be very expensive and of limited usefulness because of its low statistical power.

A majority of the comments (59 percent or 44 comments) favorably endorsed and encouraged the NRC to proceed with the next phase of the study. Another 18 percent of the comments (13) recommended that the NRC not proceed with Phase 2 of the study. Finally, 23 percent of the comments (17) did not provide a recommendation either way on whether the NRC should proceed with Phase 2.

CONCLUSION:

The NRC staff plans to proceed with the pilot studies to complete the feasibility portion of this research as recommended by NAS. The staff intends to learn if the recommended study designs can be performed at a reasonable cost, effort, and if they provide useful information to discuss public health concerns with NRC stakeholders. Once the pilot studies are complete, the staff will determine if the agency should proceed with a study of all licensed facilities.

RESOURCES:

The staff estimate for the pilot study will take 2.5 years and \$2 million to complete. The staff has budgeted in each of fiscal years 2013 and 2014. Staff will request additional funding beyond 2014, if needed, through the Planning, Budget, and Performance Management process. After the pilot studies, the staff will review the results, effort, and costs to determine if the study should be expanded to all NRC-licensed facilities.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

R. W. Borchardt  
Executive Director  
for Operations



RESOURCES:

The staff estimate for the pilot study will take 2.5 years and \$2 million to complete. The staff has budgeted in each of fiscal years 2013 and 2014. Staff will request additional funding beyond 2014, if needed, through the Planning, Budget, and Performance Management process. After the pilot studies, the staff will review the results, effort, and costs to determine if the study should be expanded to all NRC-licensed facilities.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

R. W. Borchardt  
Executive Director  
for Operations

ADAMS Accession No.: ML12249A121

WITS / EDATS: SECY

|        |             |              |                |           |               |
|--------|-------------|--------------|----------------|-----------|---------------|
| OFFICE | RES/DSA/RPB | Tech Editing | BC:RES/DSA/RPB | D:RES/DSA | D:FSME        |
| NAME   | TBrock      | QTE          | SBush-Goddard  | KGibson   | MSatorious    |
| DATE   | 09/04/12    | 09/04/12     | 09/05/12       | 09/11/12  | / /12         |
| OFFICE | D:NMSS      | D:NRR        | D:NSIR         | D:NRO     | D:CFO         |
| NAME   | CHaney      | ELeeds       | JWiggins       | GTracy    | JDyer         |
| DATE   | / /12       | / /12        | / /12          | / /12     | / /12         |
| OFFICE | D:OGC       | D:OPA        | R-I            | D:RES     | EDO           |
| NAME   | MZobler     | EBrenner     | WDean          | BSheron   | R.W.Borchardt |
| DATE   | / /12       | / /12        | / /12          | / /12     | / /12         |

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**From:** Shoop, Undine  
**Sent:** Thursday, June 18, 2015 1:42 PM  
**To:** Giitter, Joseph; Lee, Samson  
**Subject:** FW: Cancer Study Update RE: Heads-UP: Cancer Study Secy Paper coming

FYI – The cancer study that RES has been working on is being killed.

**From:** Garry, Steven  
**Sent:** Thursday, June 18, 2015 1:10 PM  
**To:** Shoop, Undine  
**Subject:** Fw: Cancer Study Update RE: Heads-UP: Cancer Study Secy Paper coming

fyi, as discussed, we are proposing to discontinue the cancer study.

Steve

**From:** Brock, Terry  
**Sent:** Thursday, June 18, 2015 1:05 PM  
**To:** Mizuno, Beth; Burnell, Scott; Milligan, Patricia; Garry, Steven; Nimitz, Ronald; Ramsey, Kevin; Hinson, Charles; Ford, Jennifer  
**Cc:** Tadesse, Rebecca  
**Subject:** Cancer Study Update RE: Heads-UP: Cancer Study Secy Paper coming

All,

First off, thank you all for reviewing the cancer study SECY paper and getting your office concurrences. Late last week, senior management told us that the cancer study will not be moving forward because of the current budget issues impacting the agency. As a result, I have to redraft the SECY paper telling the Commission our plans to not move forward. In turn, I will have to ask for your office concurrences again in the short-term with this new direction. I plan to get the new paper out by next week. Again, thanks again for your review and comments on the original SECY paper. If you have any questions please e-mail or call me next week at my new TWFN number at 301-415-1793—I am currently between offices as we move from Church Street.

Terry

**From:** Brock, Terry  
**Sent:** Monday, June 01, 2015 10:02 AM  
**To:** Mizuno, Beth; Burnell, Scott; Milligan, Patricia; Garry, Steven; Nimitz, Ronald; Ramsey, Kevin; Hinson, Charles; Ford, Jennifer  
**Cc:** Tadesse, Rebecca  
**Subject:** Heads-UP: Cancer Study Secy Paper coming

Hi All,

The cancer study Secy paper on the next steps will be on its way today for your office concurrence >> link below if you want to get a jump start. I identified you as the cognizant staff on the project for review of the paper. We're looking for a June 10th concurrence date so it can be in front of the Commission during budget deliberations later this month.

[View ADAMS P8 Properties ML15141A343](#)

Open ADAMS P8 Package (SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps)

Since we last spoke, RES has briefed the EDO and informed your Deputy Office Directors on our plan to use the National Council on Radiation Protection and Measurements to do a direct update of the 1990 NCI study. NAS proved to be too expensive and take too long to finish the study to have useful results. Below are the talking points we conveyed to your upper management. I'm briefing the Commissioners' CAs on Wed 6/10/15 from 2-3 PM in the OWFN 18th Floor Conference room if you want to attend.

-----  
Staff plans for the next steps of the Cancer Study

- Staff plans to sole-source with the congressionally chartered U.S. National Council on Radiation Protection and Measurements (NCRP) to provide a direct update to the 1990 National Cancer Institute (NCI) Cancer Study in approximately 2.5 years for 2.5 million dollars.
- The update through NCRP would be a more modest approach than what was proposed by the National Academies, however NCRP will provide final results in a reasonable time frame at a reduced cost.
- Discussed NCRP sole-source with the Business Advisory Center and received support for this approach.
- Staff plans to communicate the NCRP approach to the Commission through a CA brief and Information SECY paper.
- SECY paper will go out for a two week office concurrence the first week of June to provide to the Commission by the end of June.
- Staff on the cancer risk study team in each office will be notified of the paper and requested by RES to review for the office.
- Concurrently RES will work with the BAC to establish the contracting mechanism with NCRP.

Thx.  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487



---

**From:** Garry, Steven  
**Sent:** Thursday, September 03, 2015 1:46 PM  
**To:** Shoop, Undine  
**Cc:** Pedersen, Roger; Smith, Micheal; Jimenez, Manuel; Garmon-Candelaria, David  
**Subject:** Cancer study  
**Attachments:** SECY 15-0104 Cancel Cancer Study ML15141A404.docx

Undine,

We just finished a conference call with Terry Brock RES on the cancellation of the cancer study. They have a master plan as follows:

**First, this info is not to be released outside of NRC ahead of time.**

On Tuesday, Sept 8th, here is the schedule:

9 am Brian Sheron calls NAS and tells them of the cancellation.  
9:30 am Terry Brock sends emails go out to RSLOs  
10 am Scott Burnell sends email out to public stakeholders and NEI  
10:30 am Press release on cancelling study

Attached is the SECY paper 15-0104 cancelling the study (EDO memo to the Commission).  
[ML15141A404](#)

Steve

---

**From:** Garry, Steven  
**Sent:** Tuesday, April 27, 2010 7:43 AM  
**To:** Conatser, Richard; Pedersen, Roger; Brock, Terry; Bush-Goddard, Stephanie; Milligan, Patricia  
**Cc:** Shoop, Undine  
**Subject:** Public comments on Cancer study, notes taken from NRC briefing to National Academy of Sciences  
**Attachments:** Public Comments on NAS Cancer Study Briefing.doc

fyi, attached are my notes. There are some spelling errors as I did not get correct spelling of names. If anyone can correct these, or add to the notes, pls do so that we can be accurate and more prepared for next time.

Thanks

Steve

**Public Comments on NAS Cancer Study Briefing**  
**4/26/2009**

Ed Markey's staff member "Neshal"

- In 2004, Sauer's contacted Markey's office
- In 2005, Markey wrote to NRC
- people don't die in same location as where they were exposed
- county wide study, not in operation????

EPW staffer (Ann Padudo) for Senator Anoff?

- it's natural for people to be driven to find causes for illness/cancer, an example is autism, where a study was published linking vaccines to autism (implied more harm than good from an inadequate study or faulty conclusions)
- extracting medical radiation exposures from the nuclear plant exposures would be difficult
- the study would not be a causal study, you would't be able to tell why the cancers occurred
- population dose calculations and fence post maximally exposed person

Cynthia and Sara Saurer

- environmentally induced cancer
- includes ground water leaks
- lived in high risk corridor, implied it was between Braidwood and Byron
- lawsuit to get protective actions, Shirley Cavannah
- something is making people sick
- we need to change philosophy from "permissible levels" to "safe levels"
- cancers around Zion plant are decreasing since plant has been shut down for 10 years

Diane D'Arrigo – NIRS LLW

- NAS and NRC have bias toward nuclear power
- NIRS will be watching NAS

Mary Olson – NIRS SE Regional Coordinator, Ashville, NC

- NCI study performed too early before cancers developed and mortality occurred
- environmental justice concern, impact on both high and low financial groups
- Jim Crow restrictions (Negro civil rights restrictions) prevented washing of hands after nuclear work, affecting black families by mixing clothes together for washing)
- NRC performed 1990 risk assessment NUREG saying that 100 mrem/yr produces a cancer risk of 1 in 288, and that was for standard man, and did not include more susceptible children, and we incorrectly apply the risk assessment to children
- local studies of children show massive increases in childhood cancer

Conrad Miller – Physicians for Life

- Dresden-Braidwood Burmuda triangle
- Chernobyl deaths, 980,000 deaths worldwide
- if no leaks, or no radiation, then no deaths would occur



- skeptical of the quality of effluent data

#### Cindi Vockers – Beyond Nuclear

- book published by New York Academies on epidemiology studies and radiation illness, etc
- 5,000 epidemiology studies were reviewed
- showed that chronic low dose causes cancer the same as acute high doses
- plant effluent data is not adequate
- people are already suffering, so don't waste money on new nuclear facilities
- maximum sensitivity, maximum damaged and maximum exposed

#### Paul Gunter Beyond Nuclear

- the proposed updated cancer study is long overdue
- concern that impartiality is already muddled, cited a 2007 reference to NAS encouraging the development of nuclear power
- HE GAVE ME A HEADS UP on the city of Wilmington that is downstream of Braidwood, and there have been instances when the plant did not warn the city to isolate its water intake during tritium releases. Paul is also concerned that environmental monitoring does not capture the impact of batch releases.

#### Arjun Makhijani IEER

- has studied Savannah River Site, Savannah River and Vogtle nuclear plant
- there is some, but not much ground water monitoring data
- the cancer study needs to study each plant separately, due to regional/local confounding factors; including
  - each plant's effluents can vary by 2 or 3 orders of magnitude from other plants and from year to year
  - regional influences including race, culture, smoking, benzene, mercury
  - environmental justice, plants located in either rural, poor cultures or wealthy cultures around lakes
  - synergistic effects of confounding factors
- we need H-3 air sampling included in REMP

#### Steven Wing

- we need to build on existing studies, such as German epidemiology studies
- we need to focus on children
- we need to focus on 0-6 miles from plants
- we need to evaluate each plant's local exposure pathways

#### Dan Strom

- he's a member of NCRP and co-author of NCRP-160
- 2.5 million people receive more than 2 rem/yr TEDE from radon
- direct radiation background varies by location by over a factor of 2, from 40 – 100 mrem/yr

---

**From:** Brock, Terry  
**Sent:** Tuesday, July 06, 2010 9:48 AM  
**To:** Garry, Steven; Burnell, Scott; Weil, Jenny  
**Cc:** Shoop, Undine  
**Subject:** RE: Cancer study

Steve,

The e-mail looks ok to me. I've included Scott Burnell OPA and Jenny Weil from OCA since you plan on communicating with someone from a congressional office.

Jenny, Do you have any comments?

Terry

**From:** Garry, Steven  
**Sent:** Tuesday, July 06, 2010 9:41 AM  
**To:** Shoop, Undine; Brock, Terry  
**Subject:** FW: Cancer study

Undine and Terry,

Here is an email chain from Region IV OPA, suggesting that I go ahead and contact the interested members of the public at Diablo Canyon. Would you take a look at the draft email below, and provide me comments or additional detail?

Thanks

Steve

\*\*\*\*\*

**From:** Dricks, Victor  
**Sent:** Tuesday, July 06, 2010 9:00 AM  
**To:** Garry, Steven; Uselding, Lara  
**Subject:** RE: Cancer study

It would be best for you to get back to her. Thanks.

**From:** Garry, Steven  
**Sent:** Tuesday, July 06, 2010 7:56 AM  
**To:** Dricks, Victor; Uselding, Lara  
**Cc:** Werner, Greg; Carson, Louis; Brock, Terry  
**Subject:** Cancer study

Hi Lara and Victor (Region IV OPA)

It was very nice meeting you, and having the opportunity to work with you (with dinner!).

At the Diablo Canyon EOC poster session, I spoke with 2 different groups that we need to follow-up with:

- 1) Mothers For Peace (primarily Jane Swanson), and

- 2) District Representative Greg Haas. Greg is a technical assistant to the Honorable Lois Capps, California Representative (CA-23). (I've attached his business card.)

They were previously unaware, but are now VERY interested in the upcoming cancer study that the NRC is funding and that the National Academy of Science is going to perform. They think a cancer study should have been done pre-operational, and as a follow-up study, so "it's about time."

I told them about the NAS web page (see below – NRC contact is Dr. Terry Brock). I promised to send them a link to the NAS web page. As Terry has said, NAS is interested in obtaining any "local" information on cancer rates near any facility. Greg Haas and Jane Swanson want to read about the proposed cancer study, and they may want to submit their local information on cancer rates near Diablo (although they acknowledged they did not have any specific data, just anecdotal information).

I am asking you whether you (OPA) want to get back to them, or if you would like Region IV HPs, or Dr. Brock, or myself to contact them?

Best regards,

Steve Garry  
Sr. Health Physicist, NRR/DIRS  
301-415-2766

**From:** Brock, Terry  
**Sent:** Tuesday, June 29, 2010 4:06 PM  
**To:** Garry, Steven  
**Subject:** cancer study contact

Hello Steve,

I'm glad to hear you have received some interest in the cancer study during your meeting at Diablo Canyon. At this stage of the study we (NRC) are still working on administrative details with the National Academy of Sciences (NAS) to get started later this summer. Once started, the NAS will set-up a web page to receive comments from all stakeholders to be considered by the study committee. In the meanwhile, the NAS has put a web page up for the study here describing our request >> <http://dels.nas.edu/global/nrsb/NRCAnnouncement>. The NAS study contact is Dr. Kevin Crowley and stakeholders can reach him at [KCrowley@nas.edu](mailto:KCrowley@nas.edu).

Terry

Terry Brock, Ph.D.  
U.S. Nuclear Regulatory Commission  
301-251-7487

.....  
DRAFT EMAIL BELOW TO GREG HAAS and JANE SWANSON  
.....

Mr. Greg Haas, District Representative [Hon. Lois Capps]  
Ms. Jane Swanson [ Spokesperson Mothers For Peace]

Hi Greg and Jane,



I enjoyed meeting and talking with you at the Diablo Canyon annual assessment meeting on June 29<sup>th</sup>. Thank you for your interest and excitement in the upcoming cancer study near nuclear power plants. We too are excited to have an independent study performed. We expect that the cancer study will be initiated later this year.

As requested, here is the link to information available to date on the cancer study that will be performed under the direction of the National Academy of Science:

<http://dels.nas.edu/global/nrsb/NRCAnnouncement>

The NAS study contact is Dr. Kevin Crowley and you can reach him at [KCrowley@nas.edu](mailto:KCrowley@nas.edu).

Our NRC Project Manager for this study is Dr. Terry Brock.

Terry can be reached at 301-251-7487.

His email address is [Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov).

You are very welcome to contact Dr. Brock, myself, or anyone else involved in this study, including Dr. Kevin Crowley of the NAS. We appreciate your sincere interest, and look forward to initiating and completing the study.

Steve Garry, Certified Health Physicist  
Sr. Health Physicist  
Nuclear Regulatory Commission  
301-415-2766

---

**From:** Brock, Terry  
**Sent:** Tuesday, July 06, 2010 10:08 AM  
**To:** Garry, Steven  
**Cc:** Shoop, Undine; Weil, Jenny; Burnell, Scott  
**Subject:** RE: Cancer study

Steve,

It looks like OCA will communicate with the congressman's office. Scott may want to communicate with MOP. Let's wait to hear back from him—he'll be in the office tomorrow, but has been checking e-mails while out. Regardless, great work on the outreach for the study.

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Weil, Jenny  
**Sent:** Tuesday, July 06, 2010 9:59 AM  
**To:** Brock, Terry; Garry, Steven; Burnell, Scott  
**Cc:** Shoop, Undine  
**Subject:** RE: Cancer study

Hi Terry,

Thanks for passing along this information. I knew that Greg chatted with staff at the meeting about other topics, but didn't know he wanted more information on the cancer study. OCA will respond and provide him with the information he is seeking.

Jenny

**From:** Brock, Terry  
**Sent:** Tuesday, July 06, 2010 9:48 AM  
**To:** Garry, Steven; Burnell, Scott; Weil, Jenny  
**Cc:** Shoop, Undine  
**Subject:** RE: Cancer study

Steve,

The e-mail looks ok to me. I've included Scott Burnell OPA and Jenny Weil from OCA since you plan on communicating with someone from a congressional office.

Jenny, Do you have any comments?

Terry

**From:** Garry, Steven  
**Sent:** Tuesday, July 06, 2010 9:41 AM

**To:** Shoop, Undine; Brock, Terry  
**Subject:** FW: Cancer study

Undine and Terry,

Here is an email chain from Region IV OPA, suggesting that I go ahead and contact the interested members of the public at Diablo Canyon. Would you take a look at the draft email below, and provide me comments or additional detail?

Thanks

Steve

\*\*\*\*\*  
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**Sent:** Tuesday, July 06, 2010 9:00 AM  
**To:** Garry, Steven; Uselding, Lara  
**Subject:** RE: Cancer study

It would be best for you to get back to her. Thanks.

**From:** Garry, Steven  
**Sent:** Tuesday, July 06, 2010 7:56 AM  
**To:** Dricks, Victor; Uselding, Lara  
**Cc:** Werner, Greg; Carson, Louis; Brock, Terry  
**Subject:** Cancer study

Hi Lara and Victor (Region IV OPA)

It was very nice meeting you, and having the opportunity to work with you (with dinner!).

At the Diablo Canyon EOC poster session, I spoke with 2 different groups that we need to follow-up with:

- 1) Mothers For Peace (primarily Jane Swanson), and
- 2) District Representative Greg Haas. Greg is a technical assistant to the Honorable Lois Capps, California Representative (CA-23). (I've attached his business card.)

They were previously unaware, but are now VERY interested in the upcoming cancer study that the NRC is funding and that the National Academy of Science is going to perform. They think a cancer study should have been done pre-operational, and as a follow-up study, so "it's about time."

I told them about the NAS web page (see below – NRC contact is Dr. Terry Brock). I promised to send them a link to the NAS web page. As Terry has said, NAS is interested in obtaining any "local" information on cancer rates near any facility. Greg Haas and Jane Swanson want to read about the proposed cancer study, and they may want to submit their local information on cancer rates near Diablo (although they acknowledged they did not have any specific data, just anecdotal information).

I am asking you whether you (OPA) want to get back to them, or if you would like Region IV HPs, or Dr. Brock, or myself to contact them?

Best regards,

Steve Garry  
Sr. Health Physicist, NRR/DIRS  
301-415-2766



**From:** Brock, Terry  
**Sent:** Tuesday, June 29, 2010 4:06 PM  
**To:** Garry, Steven  
**Subject:** cancer study contact

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I'm glad to hear you have received some interest in the cancer study during your meeting at Diablo Canyon. At this stage of the study we (NRC) are still working on administrative details with the National Academy of Sciences (NAS) to get started later this summer. Once started, the NAS will set-up a web page to receive comments from all stakeholders to be considered by the study committee. In the meanwhile, the NAS has put a web page up for the study here describing our request >> <http://dels.nas.edu/global/nrsb/NRCAnnouncement>. The NAS study contact is Dr. Kevin Crowley and stakeholders can reach him at [KCrowley@nas.edu](mailto:KCrowley@nas.edu).

Terry

Terry Brock, Ph.D.  
U.S. Nuclear Regulatory Commission  
301-251-7487

.....  
DRAFT EMAIL BELOW TO GREG HAAS and JANE SWANSON  
.....

Mr. Greg Haas, District Representative [Hon. Lois Capps]  
Ms. Jane Swanson [ Spokesperson Mothers For Peace]

Hi Greg and Jane,

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As requested, here is the link to information available to date on the cancer study that will be performed under the direction of the National Academy of Science:

<http://dels.nas.edu/global/nrsb/NRCAnnouncement>.

The NAS study contact is Dr. Kevin Crowley and you can reach him at [KCrowley@nas.edu](mailto:KCrowley@nas.edu).

Our NRC Project Manager for this study is Dr. Terry Brock.  
Terry can be reached at 301-251-7487.  
His email address is [Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov).

You are very welcome to contact Dr. Brock, myself, or anyone else involved in this study, including Dr. Kevin Crowley of the NAS. We appreciate your sincere interest, and look forward to initiating and completing the study.

Steve Garry, Certified Health Physicist  
Sr. Health Physicist  
Nuclear Regulatory Commission

301-415-2766

---

**From:** Garry, Steven  
**Sent:** Monday, February 07, 2011 9:30 AM  
**To:** Shoop, Undine; Pedersen, Roger; Conatser, Richard; Clemons-Webb, Candace; Jimenez, Manuel; Henderson, Pamela; Nimitz, Ronald; Noggle, James; Bonser, Brian; Kuzo, George; Dickson, Billy; Werner, Greg; Carson, Louis  
**Cc:** Garry, Steven  
**Subject:** fyi - Cancer study update

Fyi, on January 24<sup>th</sup>, 2011 Terry Brock from Research gave the us (the NRC cancer study communications committee) an update on the cancer study. Here are the highlights.

1. NAS has selected tentatively their committee members:  
<http://dels.nas.edu/global/nrsb/CancerRisk>
2. Feb 22<sup>nd</sup>, from 10 am – 11:30 am, Dr. John Boyce is giving NRC staff a seminar in the Auditorium on the previous epidemiology (EPI) study, on EPI studies in general and how EPI studies are used in setting radiation standards. It will also be video teleconferenced to the regions.
3. NAS meeting on Feb 24<sup>th</sup> and 25<sup>th</sup>. First morning is meet and greet so closed to public. After that, public meeting in the afternoon, and 2<sup>nd</sup> morning is NRC presentation on goals, objectives, etc led by Office of Research, and 2<sup>nd</sup> afternoon is review of the old study led by Dr. John Boyce who led the old study and open microphone for NGOs.

*At the request of the U.S. Nuclear Regulatory Commission (USNRC), the National Academy of Sciences is carrying out an assessment of cancer risks in populations living near USNRC-licensed nuclear facilities. This assessment will be carried out in two consecutive phases. A Phase 1 scoping study will identify scientifically sound approaches for carrying out an epidemiological study of cancer risks. This scoping study will begin on September 1, 2010, and will last for 15 months. The result of this Phase 1 study will be used to inform the design of the cancer risk assessment, which will be carried out in a future Phase 2 study.*

4. RIC session, March 10, Brian Shearon et al will have an International RIC session and he will mention NAS cancer study.
  - a. Kevin Crawley (sp?) NAS director on cancer study
  - b. Ed Maher – HPS president
  - c. Tom Cochran – NIRS
  - d. Ralph Andersen – NEI
  - e. Ed Wiles – Connecticut State EPI staff member
5. Phase I is a feasibility study, ongoing now, and ends on December 1, 2011. *A Phase 1 scoping study will identify scientifically sound approaches for carrying out an epidemiological study of cancer risks. This scoping study will begin on September 1, 2010, and will last for 15 months.*
  - a. Phase I consists of 2 parts:
    - i. Dose assessment piece – look at effluent releases and doses, possibly reconstruct doses
    - ii. EPI study design – what can be done, where to get cancer data, look at existing cancer data collected by Oak Ridge in the last 2 years before Oak Ridge study got cancelled by Chairman Jaczko.
    - iii. February 2012 issue a Phase I report.



6. *The result of this Phase 1 study will be used to inform the design of the cancer risk assessment, which will be carried out in a future Phase 2 study.*
  - a. Develop a new NAS membership group.
  - b. Look at correlating estimated doses with cancer EPI data
  - c. Hold public meetings:
    - i. Boston to look at Reactors
    - ii. Atlanta to look at Fuel Cycle facilities
    - iii. Los Angeles to look at EPI study
    - iv. Chicago – unspecified.

---

**From:** Shoop, Undine  
**Sent:** Tuesday, March 29, 2011 9:13 AM  
**To:** Hardies, Robert  
**Subject:** FW: REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

**From:** Conatser, Richard  
**Sent:** Monday, March 28, 2011 4:10 PM  
**To:** Brock, Terry  
**Cc:** Shoop, Undine  
**Subject:** RE: REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

Terry,

Here are my comments.

Slide 5 – you may want to include 10 CFR 50 Appendix I, Section IV that talks about the bases for REMP and RETS monitoring and surveillance programs.

Slide 9 says "Hypothetical individual." The individuals are not always hypothetical. The NRC actually encourages use of real individuals. (This also applies to Slide #28).

I think slide 21 is correct, but it is not clear. I think this is an example for the Vogtle plant. I think it intends to say that manmade nuclides were detected as a result of Chernobyl, and no other nuclides have been detected. You may want to clarify the intent of this slide.

Slide 22 is not a real good example because of the shift in the TLD results in 1992. This shift is most likely due to a change in methods of measurement (and is not indicative of real changes in doses). You may need to be prepared to address any questions about this.

Slide 28 says REMP is a good characterization of direct radiation. You may want to add that it is a good validation of the effluent control program. (See also the comment regarding "hypothetical Individual" on Slide 9 above).

Slide 29, Should be "Annual Radioactive Effluent Release Report" in item #1 on this slide.

Slide 29, Should be "Annual Radiological Environmental Operating Report" in item #2 on this slide.

Richard

**From:** Brock, Terry  
**Sent:** Monday, March 28, 2011 3:33 PM  
**To:** Brock, Terry; Garry, Steven; Conatser, Richard; Clement, Richard; Nimitz, Ronald  
**Cc:** Burnell, Scott; Schaffer, Steven  
**Subject:** RE: REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

Hi All,

I was wondering if anyone had comments on the slides I forwarded about two weeks ago. I've heard back from Ron.

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Brock, Terry  
**Sent:** Monday, March 14, 2011 2:22 PM  
**To:** Garry, Steven; Conatser, Richard; Clement, Richard; Nimitz, Ronald  
**Cc:** Schaffer, Steven; Burnell, Scott; Milligan, Patricia; Bush-Goddard, Stephanie; Shaffer, Vered  
**Subject:** REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

All,

The next NAS cancer study committee meeting is scheduled for April 18-19 in Chicago to specifically address off-site doses from routine reactor operations and the availability of cancer registries for incidence studies. On the former issue, the NAS asked NRC to give a presentation on the RETS/REMP program. Luckily for me Steve Schaffer has joined RES and I have asked him to prepare and present the attached slides at the upcoming public meeting. Steve did a dry-run of this talk with NAS staff last January and they felt it hit the right level of information for the committee. As you know, the committee was established to explicitly consider off-site doses before recommending a health study design. An important piece of this consideration is for the committee to have a clear sense of NRC's program to keep off-site doses ALARA from routine operations and the pertinent information resources available to them.

From you I would like a technical review of the slides and to let us know if we're missing anything that the committee should know about. I would like to have comments back by **Friday, March 25, 2011**. Please let me know if there are any problems with this date.

Many thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487



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**From:** Conatser, Richard  
**Sent:** Monday, April 04, 2011 3:51 PM  
**To:** Shoop, Undine  
**Cc:** Garry, Steven  
**Subject:** FW: REQUEST: NAS meeting call-in  
**Attachments:** agendadraft4-4.pdf

Here's a request from RES.

**From:** Brock, Terry  
**Sent:** Monday, April 04, 2011 3:46 PM  
**To:** Garry, Steven; Conatser, Richard  
**Subject:** REQUEST: NAS meeting call-in

Steve/Richard,

Attached is the agenda for the upcoming cancer study meeting in Chicago on 4/18. Please note in the afternoon there is a dosimetry working group session that will discuss offsite dose assessment and environmental monitoring.

Would one or both of you be available from 2-4 ET (1-3 CT) to serve as an additional resource to the committee? Let me know and I will set-up the bridge-line.

Thanks,  
Terry

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

Nuclear and Radiation Studies Board

500 Fifth Street, NW  
Washington, DC 20001  
Phone: 202 334-3066  
Fax: 202 334-3077  
[www.nationalacademies.org](http://www.nationalacademies.org)

## **Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1**

**Second Committee Meeting: April 18, 2011**

**Chicago, Illinois**

The Chicago Marriott Southwest at Burr Ridge  
1200 Burr Ridge Parkway  
Burr Ridge, IL 60527

**Agenda Draft: April 4, 2011**

### **Monday, April 18**

- |          |  |
|----------|--|
| 9:25 am  | <b>Call to order and welcome</b><br><i>John Burris, committee chair</i>  |
| 9:30 am  | <b>U.S.NRC's program for keeping nuclear power plant offsite doses as low as reasonably achievable (ALARA)</b><br><i>Steven Schaffer, Ph.D., Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission</i> |
| 9:50 am  | <b>Background on environmental monitoring and population exposures</b><br><i>TBD</i>   |
| 10:10 am | <b>Health concerns and data around the Illinois nuclear power plants</b><br><i>Joseph Sauer, MD</i>  |
| 10:30 am | <b>Questions and general discussion</b>  |
| 10:50 am | <b>BREAK</b>   |
| 11:00 am | <b>Background on cancer registries</b><br><i>TBD</i>   |
| 11:20 am | <b>Background on childhood cancer registries</b><br><i>Julie Ross, University of Minnesota</i>   |
| 11:40 am | <b>Questions and general discussion</b>  |
| 11:55 am | <b>Introduction to working group sessions</b>  |
| 12:00 pm | <b>Plenary sessions conclude</b>   |

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

## WORKING GROUP CONCURRENT SESSIONS: OPEN TO THE PUBLIC Rooms TBD

### Dosimetry working group

*Led by Andre Bouville, National Cancer Institute (retired)*

*Invited expert: John Till, Radiological Assessments Corporation*

- |         |  |
|---------|--|
| 1:00 pm | Discussion of plenary sessions   |
| 1:10 pm | Technical details on nuclear power plant offsite dose assessment       |
| 2:00 pm | BREAK  |
| 2:10 pm | Technical details on environmental monitoring and population exposures |
| 2:50 pm | Discussion   |
| 3:00 pm | BREAK  |
| 3:15 pm | Dose reconstruction methods  |
| 5:00 pm | Working group session concludes  |

### Registry working group

*Led by Margaret Karagas, Dartmouth Medical School*

*Invited expert: Julie Ross, University of Minnesota*

- |         |   |
|---------|---|
| 1:00 pm | Cancer Registries   |
| 1:30 pm | Childhood cancer registries<br><i>Julie Ross, University of Minnesota</i> |
| 2:00 pm | BREAK   |
| 2:10 pm | General Discussion  |
| 3:00 pm | BREAK   |

### Epidemiology and Statistics working group

*Led by Roy Shore, Radiation Effects Research Foundation*

*Invited expert: Martha Linet, National Cancer Institute*

- |         |  |
|---------|--|
| 3:15 pm | Introduction of the speaker and panel<br><i>Rania Kosti, program officer</i> |
| 3:20 pm | Title TBD<br><i>Roy Shore, Radiation Effects Research Foundation</i>         |
| 3:40 pm | General Discussion   |
| 5:00 pm | Working Groups conclude  |



# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

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## DATA GATHERING SESSION: OPEN TO THE PUBLIC, location TBD

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7:30 pm

- Opening remarks  
*John Burris, committee chair;*
- Importance of public outreach to the study
- Public comments (signup sheet provided in the room)

9:00 pm

Adjourn data-gathering session open to the public

---

**From:** Brock, Terry  
**Sent:** Tuesday, August 23, 2011 4:48 PM  
**To:** Conatser, Richard  
**Cc:** Klementowicz, Stephen; Shoop, Undine  
**Subject:** RE: request from the dosimetry working group; NAS study

Thanks Richard. I'll communicate this to the committee and see if this does the trick.

Thanks again,  
Terry

---

**From:** Conatser, Richard  
**Sent:** Tuesday, August 23, 2011 7:51 AM  
**To:** Brock, Terry  
**Cc:** Klementowicz, Stephen; Shoop, Undine  
**Subject:** RE: request from the dosimetry working group; NAS study

Terry,

I can give you a quick answer here in hopes it answers your question. RG 1.109, Rev 0, was published in 1976. It contains NRC guidance which outlines calculation of MEI doses. Rev 1 was published in 1977, and you can see in the third paragraph of Section B, "Discussion," it says:

*"In providing guidance to implement section II of [10 CFR 50] Appendix I, the NRC staff has made use of the maximum exposed individual approach."*

So the concept of the MEI has been around certainly since the mid-70's, and I would suspect it was present even before that time. Oyster Creek went "commercial" in December 1969, so there are no annual reports before 1969. Although all the details of the first few years (i.e., 1969 to about 1975) are not immediately accessible, after 1975 MEI was the concept.

Because the concept of the MEI has been part of the regulatory framework so long, some licensees may not dwell on that fact in the annual reports. In fact, some licensees may not mention MEI at all. That is not a concern since the regulatory framework requires that level of detail to be contained in the ODCM (which is the basis for the Annual Effluent Reports). All the details do not have to be in the Annual Reports, but the details have to be in the ODCM. The concept of the ODCM was created in the late 1970s. Even though some licensees may not mention the term "MEI" in the annual reports that you read today, the MEI has certainly been the concept since the mid-70's, and I suspect it was the concept before that.

If NAS really needs a more in-depth answer about the history of the MEI between the years 1970 to 1975, let me know and we can accommodate that.

Thanks,

**Richard L. Conatser**  
Health Physicist  
Nuclear Regulatory Commission  
301-415-4039  
Richard.Conatser@NRC.gov

**From:** Brock, Terry  
**Sent:** Monday, August 22, 2011 4:57 PM  
**To:** Klementowicz, Stephen; Conatser, Richard  
**Subject:** FW: request from the dosimetry working group; NAS study

Hi Steve/Richard,

I have a historical question from the NAS cancer risk study committee that you may be able to answer.

"One member says that he looked through all the effluent reports they got from NRC but many of them did not mention MEI doses at all. It is not clear whether they were even required to report MEI doses in the 1970s. When were MEI doses first required to be reported and is there any summary of annual MEI doses going back to the 1970s that NRC is aware of."

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487



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**From:** Miller, Geoffrey  
**Sent:** Monday, September 19, 2011 3:18 PM  
**To:** Miller, Ed  
**Cc:** Brock, Terry; Shoop, Undine; Conatser, Richard  
**Subject:** RE: NAS Cancer Study and Annual Reports -- Oyster Creek

Ed,

I believe the below question related to Oyster Creek was intended for you.

Thanks,

Geoff  
RIV/DRP/B

**From:** Conatser, Richard  
**Sent:** Monday, September 19, 2011 1:09 PM  
**To:** Miller, Geoffrey  
**Cc:** Brock, Terry; Shoop, Undine  
**Subject:** NAS Cancer Study and Annual Reports -- Oyster Creek

Geoffrey,

The National Academy of Science (NAS) is conducting a cancer study at the request of the NRC. The NAS has requested a copy of the **Annual Radiological Environmental Operating Report** for environmental measurements done in 1979.

I looked through the legacy library and was unable to locate this document. Could you request a copy from the licensee? Please copy Terry Brock on your response. If you have any questions, please contact Terry Brock or me.

Thanks,

**Richard L. Conatser**  
Health Physicist  
Nuclear Regulatory Commission  
301-415-4039  
Richard.Conatser@NRC.gov

---

**From:** Brock, Terry  
**Sent:** Monday, September 26, 2011 3:35 PM  
**To:** Parker, Carleen; Conatser, Richard  
**Cc:** Shoop, Undine; Chernoff, Harold  
**Subject:** RE: NAS Cancer Study and Annual Reports -- Millstone

Hi Carleen,

Thanks for your clarifying comments/questions. It seems to me that the 1976 Millstone 2 report would be more fruitful than the limited 1975 data for 6 days of operations. I would expect that Millstone did submit two semi-annual reports in 1976 since I've found these reports for other sites during these years.

So, yes please contact the Millstone folks and request both semi-annual reports for 1976.

Thanks,  
Terry  
Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

---

**From:** Sanders, Carleen  
**Sent:** Wednesday, September 21, 2011 2:47 PM  
**To:** Conatser, Richard  
**Cc:** Brock, Terry; Shoop, Undine; Chernoff, Harold  
**Subject:** RE: NAS Cancer Study and Annual Reports -- Millstone

Afternoon,

I would like to clarify what you are looking for/trying to find for Millstone. Under the current TS requirements Millstone is required to submit an Annual Radiological Environmental Operating Report. However, an Annual Radiological Environmental Operating Report may not have been required in 1975.

In 1975 Millstone Unit 2 received its operating license on September 26 and commenced operation on December 26. In 1975 Millstone Unit 3 was not operating. In 1975 it is my understanding that Millstone 1 had a possession only license (until 1986), although the Millstone 1 PM in FSME may have more information on this. In accordance with Millstone Unit 2's TSs the specific requirement for the Annual Radiological Environmental Operating Report (TS 6.9.1.6a) was not added until the 90's.

Do you know if an Annual Radiological Environmental Operating Report would have been submitted to the NRC for 1975? Are you looking for information pertaining to a specific unit? If Unit 2 was the only unit operating in 1975 and it was only operating for 6 days, would any valuable information be gained from the 1975 Annual Radiological Environmental Operating Report, if it exists?

If you are still interested in me contacting the licensee I can do that.

Thanks!  
Carleen

**From:** Conatser, Richard  
**Sent:** Monday, September 19, 2011 2:23 PM  
**To:** Sanders, Carleen  
**Cc:** Brock, Terry; Shoop, Undine  
**Subject:** NAS Cancer Study and Annual Reports -- Millstone

Carleen,

The National Academy of Science (NAS) is conducting a cancer study at the request of the NRC. The NAS has requested a copy of the **Annual Radiological Environmental Operating Report** for environmental measurements done at Millstone in 1975.

I looked through the legacy library and was unable to locate this document. Could you request a copy from the licensee? Please copy Terry Brock on your response. If you have any questions, please contact Terry Brock or me.

Thanks,

**Richard L. Conatser**  
Health Physicist  
Nuclear Regulatory Commission  
301-415-4039  
[Richard.Conatser@NRC.gov](mailto:Richard.Conatser@NRC.gov)



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**From:** Shoop, Undine  
**Sent:** Thursday, March 17, 2011 3:00 PM  
**To:** Conatser, Richard  
**Subject:** RE: REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

Richard,

I don't have any comments on it and it seemed understandable to me but I think you are better able to suggest any changes.

Undine

**From:** Conatser, Richard  
**Sent:** Thursday, March 17, 2011 9:58 AM  
**To:** Shoop, Undine  
**Subject:** FW: REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

Undine,

I got this request from RES. Let me know what you think.

Thanks,  
Richard

**From:** Brock, Terry  
**Sent:** Monday, March 14, 2011 2:22 PM  
**To:** Garry, Steven; Conatser, Richard; Clement, Richard; Nimitz, Ronald  
**Cc:** Schaffer, Steven; Burnell, Scott; Milligan, Patricia; Bush-Goddard, Stephanie; Shaffer, Vered  
**Subject:** REQUEST: Review RETS/REMP cancer study slides for next NAS meeting

All,

The next NAS cancer study committee meeting is scheduled for April 18-19 in Chicago to specifically address off-site doses from routine reactor operations and the availability of cancer registries for incidence studies. On the former issue, the NAS asked NRC to give a presentation on the RETS/REMP program. Luckily for me Steve Schaffer has joined RES and I have asked him to prepare and present the attached slides at the upcoming public meeting. Steve did a dry-run of this talk with NAS staff last January and they felt it hit the right level of information for the committee. As you know, the committee was established to explicitly consider off-site doses before recommending a health study design. An important piece of this consideration is for the committee to have a clear sense of NRC's program to keep off-site doses ALARA from routine operations and the pertinent information resources available to them.

From you I would like a technical review of the slides and to let us know if we're missing anything that the committee should know about. I would like to have comments back by **Friday, March 25, 2011**. Please let me know if there are any problems with this date.

Many thanks,  
Terry

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

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**From:** Conatser, Richard  
**Sent:** Monday, September 19, 2011 1:54 PM  
**To:** Tam, Peter  
**Cc:** Brock, Terry; Shoop, Undine  
**Subject:** NAS Cancer Study and Annual Reports

Pete,

The National Academy of Science (NAS) is conducting a cancer study at the request of the NRC. They have requested a copy of the **Semiannual Radioactive Effluent Release Reports** for 1979 calendar year effluents. That includes the report for 1<sup>st</sup> half of 1979 and the report for the second half of 1979.

The NAS has also requested a copy of the **Annual Radiological Environmental Operating Report** for environmental measurements done in 1979.

I looked through the legacy library and was unable to locate these documents. Please copy Terry Brock on your response. If you have any questions, please contact Terry Brock or me.

Thanks,

**Richard L. Conatser**  
Health Physicist  
Nuclear Regulatory Commission  
301-415-4039  
Richard.Conatser@NRC.gov



---

**From:** Conatser, Richard  
**Sent:** Monday, September 19, 2011 2:09 PM  
**To:** Miller, Geoffrey  
**Cc:** Brock, Terry; Shoop, Undine  
**Subject:** NAS Cancer Study and Annual Reports -- Oyster Creek

Geoffrey,

The National Academy of Science (NAS) is conducting a cancer study at the request of the NRC. The NAS has requested a copy of the **Annual Radiological Environmental Operating Report** for environmental measurements done in 1979.

I looked through the legacy library and was unable to locate this document. Could you request a copy from the licensee? Please copy Terry Brock on your response. If you have any questions, please contact Terry Brock or me.

Thanks,

**Richard L. Conatser**  
Health Physicist  
Nuclear Regulatory Commission  
301-415-4039  
Richard.Conatser@NRC.gov

---

**From:** Conatser, Richard  
**Sent:** Monday, September 19, 2011 2:23 PM  
**To:** Parker, Carleen  
**Cc:** Brock, Terry; Shoop, Undine  
**Subject:** NAS Cancer Study and Annual Reports -- Millstone

Carleen,

The National Academy of Science (NAS) is conducting a cancer study at the request of the NRC. The NAS has requested a copy of the **Annual Radiological Environmental Operating Report** for environmental measurements done at Millstone in 1975.

I looked through the legacy library and was unable to locate this document. Could you request a copy from the licensee? Please copy Terry Brock on your response. If you have any questions, please contact Terry Brock or me.

Thanks,

**Richard L. Conatser**  
Health Physicist  
Nuclear Regulatory Commission  
301-415-4039  
[Richard.Conatser@NRC.gov](mailto:Richard.Conatser@NRC.gov)

---

**From:** Conatser, Richard  
**Sent:** Tuesday, February 21, 2012 2:37 PM  
**To:** Shoop, Undine  
**Cc:** Jimenez, Manuel  
**Subject:** RE: ACTION: Cancer Risk Study - Phase 1  
**Attachments:** 120216\_RLC\_RLC Comments on the cancer study\_Fact Verification.docx

Undine,

Here are our comments.

Richard

---

**From:** Shoop, Undine  
**Sent:** Wednesday, February 15, 2012 6:13 PM  
**To:** Conatser, Richard; Jimenez, Manuel  
**Cc:** Pedersen, Roger; Garry, Steven  
**Subject:** FW: ACTION: Cancer Risk Study - Phase 1

Slight adjustment based on the incoming which I did not fully read before assigning this. Richard and Manny please review this and provide consolidated comments to me by noon on the 21<sup>st</sup> so that I can get them up to Joe and he can respond by the 22.

Thanks,  
Undine

---

**From:** RidsNrrMailCenter Resource  
**Sent:** Friday, February 10, 2012 4:46 PM  
**To:** RidsNrrDra Resource  
**Cc:** Shoop, Undine; Heida, Bruce  
**Subject:** ACTION: Cancer Risk Study - Phase 1

Attached is an action item from RES seeking NRR comments on NAS Report "Analysis of Cancer Risk in Populations Near Nuclear Facilities – Phase 1," by February 22, 2012.

I will issue the yellow ticket once the TAC number has been assigned.

Thanks,  
Patti

---

**From:** Pope, Tia  
**Sent:** Friday, February 10, 2012 4:10 PM  
**To:** RidsFsmeOd Resource; RidsNrrMailCenter Resource; RidsNmssOd Resource; Brock, Terry  
**Subject:** Cancer Risk Study - Phase 1



---

**From:** Glitter, Joseph  
**Sent:** Tuesday, February 21, 2012 6:23 PM  
**To:** Shoop, Undine; Lee, Samson; Pope, Tia  
**Cc:** Richards, Karen  
**Subject:** RE: ACTION: Concurrence needed - ACTION: Cancer Risk Study - Phase 1

Undine—The comments look good to me.

**From:** Shoop, Undine  
**Sent:** Tuesday, February 21, 2012 6:14 PM  
**To:** Glitter, Joseph; Lee, Samson  
**Cc:** Richards, Karen  
**Subject:** ACTION: Concurrence needed - ACTION: Cancer Risk Study - Phase 1  
**Importance:** High

Joe and Sam,

AHPB reviewed the document and has several comments which are provided in the attached. If you agree, please forward this to Tia Pope. This is due on the 22. In the below e-mail it indicates that a YT would be assigned to this but I do not recall and cannot find a YT for this action.

Undine

**From:** RidsNrrMailCenter Resource  
**Sent:** Friday, February 10, 2012 4:46 PM  
**To:** RidsNrrDra Resource  
**Cc:** Shoop, Undine; Heida, Bruce  
**Subject:** ACTION: Cancer Risk Study - Phase 1

Attached is an action item from RES seeking NRR comments on NAS Report "Analysis of Cancer Risk in Populations Near Nuclear Facilities – Phase 1," by February 22, 2012.

I will issue the yellow ticket once the TAC number has been assigned.

Thanks,  
Patti

**From:** Pope, Tia  
**Sent:** Friday, February 10, 2012 4:10 PM  
**To:** RidsFsmeOd Resource; RidsNrrMailCenter Resource; RidsNmssOd Resource; Brock, Terry  
**Subject:** Cancer Risk Study - Phase 1

---

**From:** Brock, Terry  
**Sent:** Friday, March 02, 2012 11:05 AM  
**To:** Pedersen, Roger; Cool, Donald; Richter, Brian; DeCicco, Joseph  
**Cc:** Cruz, Holly; Bush-Goddard, Stephanie; Diaz, Marilyn X; Sherbini, Sami; Shoop, Undine  
**Subject:** RE: REQUEST: Review draft cancer risk article for Bulletin of Atomic Scientists

Thanks Roger.

I've heard the "no safe" dose canard in relation to BEIR VII many times too. The irony is that the BEIR committee was never charged with determining "safe doses", "tolerable doses", "acceptable doses", etc. And nowhere in BEIR VII is the word safe used to describe radiation health effects. As you know so well, those types of determinations are more in the policy and value judgment realm that ICRP/NCRP/NRC employs in establishing the system of radiation protection.

Thanks again,  
Terry

**From:** Pedersen, Roger  
**Sent:** Friday, March 02, 2012 10:58 AM  
**To:** Brock, Terry; Cool, Donald; Richter, Brian; DeCicco, Joseph  
**Cc:** Cruz, Holly; Bush-Goddard, Stephanie; Diaz, Marilyn; Sherbini, Sami; Shoop, Undine  
**Subject:** RE: REQUEST: Review draft cancer risk article for Bulletin of Atomic Scientists

Terry,

One statement that I've heard from external stakeholders is that BEIR VII shows that there is "no safe level of radiation, since all radiation dose (even minute doses) can cause cancer." My counter to this has been that BEIR VII report confirmed that the linear response of radiation health effects is measurable to around 10 rem, and reaffirmed the advisability of assuming LNT below that. Even if we assume LNT is correct all the way to 0.0 dose, it means that a "minute dose" would result in a *minute increase* in the risk of cancer. It may head off some issues if this paper could stress this last point (maybe on page 3?).

Also, you should delete the penultimate sentence in the paragraph at the top of page 5. ICRP 60 (1990) did include a lower recommend annual dose limit for members of the public (from 500 mrem to 100 mrem) as well as a lower occupational dose limit. This was one part of the ICRP 60 recommendations NRC adopted in the 1991 Part 20 change.

**From:** Brock, Terry  
**Sent:** Thursday, March 01, 2012 10:42 AM  
**To:** Cool, Donald; Pedersen, Roger; Richter, Brian; DeCicco, Joseph  
**Cc:** Cruz, Holly; Bush-Goddard, Stephanie; Diaz, Marilyn; Sherbini, Sami  
**Subject:** REQUEST: Review draft cancer risk article for Bulletin of Atomic Scientists

Hi All,

Per our conversation, the EDO assigned RES the task of writing an article for a forthcoming edition of the Bulletin of Atomic Scientist that will focus on low dose radiation cancer risk—The EDO also wanted us to get feedback from other NRC folks on what we put together (hence your lucky selection). Specifically, the Bulletin editors asked for an NRC perspective on how we use cancer risk information in our regulatory programs. Sami and I chose to cover the system of radiation protection and how the agency does value-impact analysis (cost-benefit analysis) including the basis for the \$2,000/person-rem value. The article is limited to 2,500 words, so the read shouldn't be that onerous. We're

also on a tight publishing deadline so I would ask that you get back to us by this COB Friday or noon on Monday at the latest.

Thanks in advance for your review,

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487



---

**From:** Cruz, Holly  
**Sent:** Thursday, April 19, 2012 8:30 AM  
**To:** Shoop, Undine  
**Subject:** RE: REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

Thanks for forwarding, Undine. Will forward as soon as FAST issues the YT.

Thanks again,

Holly

---

**From:** Shoop, Undine  
**Sent:** Wednesday, April 18, 2012 8:45 PM  
**To:** Cruz, Holly  
**Subject:** FW: REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

Holly,

I haven't seen an official request for this yet, but can I get a TAC number so that we can start reviewing it?

Thanks,  
Undine

---

**From:** Garry, Steven  
**Sent:** Thursday, April 12, 2012 1:07 PM  
**To:** Shoop, Undine  
**Cc:** Conatser, Richard  
**Subject:** FW: REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

Undine,

This is an advanced notice from RES of a request to review the National Academy of Science Cancer Study report, draft phase I.

Steve

---

**From:** Brock, Terry  
**Sent:** Thursday, April 12, 2012 12:07 PM  
**To:** Brock, Terry; Cassidy, John; Burnell, Scott; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Salomon, Stephen; Burnell, Scott  
**Subject:** REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

All,

This is a heads-up that RES will be sending out a formal memo request for review and comment on the NAS Phase 1 Cancer Risk Study in the next couple of days. You all have been identified as the POC for your organizations in the memo. We're asking for comments back by Monday, May 7, 2012. Once I get the comments I'll put a meeting together to talk about next steps.

The NAS report, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I" is available in ADAMS at ML120860057 .

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

---

**From:** Cruz, Holly  
**Sent:** Thursday, April 19, 2012 1:19 PM  
**To:** Conatser, Richard; Garry, Steven  
**Cc:** Shoop, Undine; Heida, Bruce  
**Subject:** RE: Request for YT re: NRR/DRA Review of NAS Phase 1 Cancer Risk Study

Please note the YT and TAC below:

Y020120096  
TAC ME8451

Thanks for your help,

Holly

---

**From:** Craver, Patti  
**Sent:** Thursday, April 19, 2012 1:17 PM  
**To:** Cruz, Holly; FAST Resource  
**Cc:** Shoop, Undine; Conatser, Richard; Garry, Steven; Heida, Bruce  
**Subject:** RE: Request for YT re: NRR/DRA Review of NAS Phase 1 Cancer Risk Study

Holly,

Yellow ticket 020120096 with TAC number ME8451 has been issued.

Thanks,  
Patti

---

**From:** Cruz, Holly  
**Sent:** Thursday, April 19, 2012 8:29 AM  
**To:** FAST Resource  
**Cc:** Shoop, Undine; Conatser, Richard; Garry, Steven; Heida, Bruce; Craver, Patti  
**Subject:** Request for YT re: NRR/DRA Review of NAS Phase 1 Cancer Risk Study

Hi Patti,

Please assign a YT to DRA, as follows:

**Purpose:** NRR/DRA Review of **NAS Phase 1 Cancer Risk Study**  
**ADAMS Accession No:** ML120860057  
**Due:** 5/7/12  
**Assigned to:** DRA  
**PA Code:** 114151BA

Please let me know if you need anything further. If possible, could you please let me know when this YT has been established so that I can forward the TAC to the staff?

Thanks so much!

Holly



Holly Cruz, Project Manager  
Licensing Processes Branch (PLPB)  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation  
Phone: (301) 415-1053  
Location: O12F12  
M/S: O12E1  
email: [holly.cruz@nrc.gov](mailto:holly.cruz@nrc.gov)

**From:** Brock, Terry  
**Sent:** Thursday, April 12, 2012 12:07 PM  
**To:** Brock, Terry; Cassidy, John; Burnell, Scott; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Salomon, Stephen; Burnell, Scott  
**Subject:** REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

All,

This is a heads-up that RES will be sending out a formal memo request for review and comment on the NAS Phase 1 Cancer Risk Study in the next couple of days. You all have been identified as the POC for your organizations in the memo. We're asking for comments back by Monday, May 7, 2012. Once I get the comments I'll put a meeting together to talk about next steps.

The NAS report, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I" is available in ADAMS at ML120860057 .

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

---

**From:** Shoop, Undine  
**Sent:** Tuesday, May 15, 2012 11:05 AM  
**To:** Giitter, Joseph; Lee, Samson  
**Cc:** Richards, Karen  
**Subject:** FW: Yellow Ticket: Y020120096 NRR review of draft Phase I National Academy of Science cancer study  
**Attachments:** 120509\_RLC\_Comments on NAS Cancer Study\_Phase I\_For Yellow Ticket.docx; S Garry comments on NAS cancer study.docx; 120509\_SCM\_Comments on NAS Cancer Study\_Phase I\_For Yellow Ticket.docx

Joe and Sam,

Attached are AHPB comments on the NAS phase 1 study. If you agree with our comments, please send them to Holly Cruz, Kathy Gibson, Terry Brock, and Stephanie Bush-Goddard.

Thanks,  
Undine

**From:** Garry, Steven  
**Sent:** Monday, May 14, 2012 4:57 PM  
**To:** Shoop, Undine  
**Cc:** Conatser, Richard; Meighan, Sean  
**Subject:** Yellow Ticket: Y020120096 NRR review of draft Phase I National Academy of Science cancer study

Undine,

As requested and assigned in Yellow Ticket 020120096, attached are 3 sets of comments on the NAS Phase I cancer study from the AHPB staff (Richard Conatser, Sean Meighan, and myself).

Steve Garry  
301-415-2766  
NRR / DRA / AHPB

**From:** Craver, Patti  
**Sent:** Wednesday, May 02, 2012 1:13 PM  
**To:** Cruz, Holly; FAST Resource  
**Cc:** Garry, Steven; Shoop, Undine; Conatser, Richard  
**Subject:** RE: Request to change date of YT: Y020120096

Done!

Thanks,  
Patti

**From:** Cruz, Holly  
**Sent:** Wednesday, May 02, 2012 12:49 PM  
**To:** FAST Resource

**Cc:** Craver, Patti; Garry, Steven; Shoop, Undine; Conatser, Richard  
**Subject:** Request to change date of YT: Y020120096

Hi Patti,

Could you please change the due date of Y020120096, TAC ME8451 to May 15<sup>th</sup>, per the change in the RES memo noted below?

Thanks for your help.

Holly

Holly Cruz, Project Manager  
Licensing Processes Branch (PLPB)  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation  
Phone: (301) 415-1053  
Location: O12F12  
M/S: O12E1  
email: holly.cruz@nrc.gov



**From:** Garry, Steven  
**Sent:** Wednesday, May 02, 2012 12:12 PM  
**To:** Shoop, Undine; Cruz, Holly; Conatser, Richard  
**Subject:** FW: REQUEST: NEW DUE DATE review and comment on the NAS Phase 1 Cancer Risk Study

Holly,

Can you revise the Yellow Ticket Y0120096 due date from May 7<sup>th</sup> to May 15<sup>th</sup> per the email below? (see attached yellow ticket).

Thanks

Steve Garry

**From:** Brock, Terry  
**Sent:** Wednesday, April 25, 2012 3:04 PM  
**To:** Brock, Terry; Cassidy, John; Burnell, Scott; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Salomon, Stephen; Burnell, Scott  
**Subject:** REQUEST: NEW DUE DATE review and comment on the NAS Phase 1 Cancer Risk Study

All,

RES sent out the official memo requesting comments on the NAS Phase 1 cancer study report to your respective offices with a new due date of Tuesday, May 15.

Thanks for your continued support,



Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Brock, Terry

**Sent:** Thursday, April 12, 2012 12:07 PM

**To:** Brock, Terry; Cassidy, John; Burnell, Scott; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Salomon, Stephen; Burnell, Scott

**Subject:** REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

All,

This is a heads-up that RES will be sending out a formal memo request for review and comment on the NAS Phase 1 Cancer Risk Study in the next couple of days. You all have been identified as the POC for your organizations in the memo. We're asking for comments back by Monday, May 7, 2012. Once I get the comments I'll put a meeting together to talk about next steps.

The NAS report, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I" is available in ADAMS at ML120860057 .

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

---

**From:** Giitter, Joseph  
**Sent:** Tuesday, May 15, 2012 2:33 PM  
**To:** Shoop, Undine; Lee, Samson  
**Cc:** Richards, Karen  
**Subject:** RE: Yellow Ticket: Y020120096 NRR review of draft Phase I National Academy of Science cancer study

Good comments. I have a couple of clarifying questions on some of them when you have some time.

**From:** Shoop, Undine  
**Sent:** Tuesday, May 15, 2012 11:05 AM  
**To:** Giitter, Joseph; Lee, Samson  
**Cc:** Richards, Karen  
**Subject:** FW: Yellow Ticket: Y020120096 NRR review of draft Phase I National Academy of Science cancer study

Joe and Sam,

Attached are AHPB comments on the NAS phase 1 study. If you agree with our comments, please send them to Holly Cruz, Kathy Gibson, Terry Brock, and Stephanie Bush-Goddard.

Thanks,  
Undine

**From:** Garry, Steven  
**Sent:** Monday, May 14, 2012 4:57 PM  
**To:** Shoop, Undine  
**Cc:** Conatser, Richard; Meighan, Sean  
**Subject:** Yellow Ticket: Y020120096 NRR review of draft Phase I National Academy of Science cancer study

Undine,

As requested and assigned in Yellow Ticket 020120096, attached are 3 sets of comments on the NAS Phase I cancer study from the AHPB staff (Richard Conatser, Sean Meighan, and myself).

Steve Garry  
301-415-2766  
NRR / DRA / AHPB

**From:** Craver, Patti  
**Sent:** Wednesday, May 02, 2012 1:13 PM  
**To:** Cruz, Holly; FAST Resource  
**Cc:** Garry, Steven; Shoop, Undine; Conatser, Richard  
**Subject:** RE: Request to change date of YT: Y020120096

Done!

Thanks,  
Patti

**From:** Cruz, Holly  
**Sent:** Wednesday, May 02, 2012 12:49 PM  
**To:** FAST Resource  
**Cc:** Craver, Patti; Garry, Steven; Shoop, Undine; Conatser, Richard  
**Subject:** Request to change date of YT: Y020120096

Hi Patti,

Could you please change the due date of Y020120096, TAC ME8451 to May 15<sup>th</sup>, per the change in the RES memo noted below?

Thanks for your help.

Holly

Holly Cruz, Project Manager  
Licensing Processes Branch (PLPB)  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation  
Phone: (301) 415-1053  
Location: O12F12  
M/S: O12E1  
email: holly.cruz@nrc.gov



**From:** Garry, Steven  
**Sent:** Wednesday, May 02, 2012 12:12 PM  
**To:** Shoop, Undine; Cruz, Holly; Conatser, Richard  
**Subject:** FW: REQUEST: NEW DUE DATE review and comment on the NAS Phase 1 Cancer Risk Study

Holly,

Can you revise the Yellow Ticket Y0120096 due date from May 7<sup>th</sup> to May 15<sup>th</sup> per the email below? (see attached yellow ticket).

Thanks

Steve Garry

**From:** Brock, Terry  
**Sent:** Wednesday, April 25, 2012 3:04 PM  
**To:** Brock, Terry; Cassidy, John; Burnell, Scott; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Salomon, Stephen; Burnell, Scott  
**Subject:** REQUEST: NEW DUE DATE review and comment on the NAS Phase 1 Cancer Risk Study

All,



RES sent out the official memo requesting comments on the NAS Phase 1 cancer study report to your respective offices with a new due date of Tuesday, May 15.

Thanks for your continued support,

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Brock, Terry

**Sent:** Thursday, April 12, 2012 12:07 PM

**To:** Brock, Terry; Cassidy, John; Burnell, Scott; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Salomon, Stephen; Burnell, Scott

**Subject:** REQUEST: review and comment on the NAS Phase 1 Cancer Risk Study

All,

This is a heads-up that RES will be sending out a formal memo request for review and comment on the NAS Phase 1 Cancer Risk Study in the next couple of days. You all have been identified as the POC for your organizations in the memo. We're asking for comments back by Monday, May 7, 2012. Once I get the comments I'll put a meeting together to talk about next steps.

The NAS report, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I" is available in ADAMS at ML120860057 .

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

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**From:** Shoop, Undine  
**Sent:** Monday, September 10, 2012 6:44 PM  
**To:** Garry, Steven  
**Subject:** RE: Heads-up: Cancer Study Info SECY paper coming for your review and office concurrence

Thanks!

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**From:** Garry, Steven  
**Sent:** Monday, September 10, 2012 9:55 AM  
**To:** Shoop, Undine  
**Subject:** FW: Heads-up: Cancer Study Info SECY paper coming for your review and office concurrence

fyi

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**From:** Brock, Terry  
**Sent:** Monday, September 10, 2012 9:46 AM  
**To:** Milligan, Patricia; Garry, Steven; Dehmel, Jean-Claude; Chapman, Gregory; Nimitz, Ronald; Salomon, Stephen; Burnell, Scott  
**Cc:** Tomon, John  
**Subject:** Heads-up: Cancer Study Info SECY paper coming for your review and office concurrence

Hi All,

This is a heads-up that the cancer study Information SECY paper is coming your way today or tomorrow for your review and office concurrence. We're asking for a two week turn around, so I suggest you take a look at it before it is assigned to you by your respective front offices. It's only about 5 pages so it should not be that time-consuming to digest. As we discussed at our team meetings, the paper informs the Commission of the NAS-Phase 1 results and our plans to proceed with the pilot studies at the seven NAS-recommended sites.

Once the paper is with the Commission we'll begin engaging with NAS to start the next phase—barring a commissioner requesting a vote this should happen late October. Once we reengage with NAS and get the new grant in place they will address the NRC staff comments on phase 1 and the public comments before proceeding with the next phase.

Thanks for your continued support.

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

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**From:** Garry, Steven  
**Sent:** Tuesday, September 18, 2012 3:34 PM  
**To:** Shoop, Undine  
**Subject:** RE: ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"  
**Attachments:** Garry comments on draft cancer study SECY paper.docx

Undine,

Undine,

Attached are my review comments for Yellow Ticket Y020120253, Review draft SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities" (TAC ME9522).

I recommend concurrence with comment.

Thanks

Steve

**From:** Richards, Karen  
**Sent:** Wednesday, September 12, 2012 1:37 PM  
**To:** Shoop, Undine  
**Cc:** Garry, Steven  
**Subject:** RE: ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

Tac No. ME9522

**From:** Shoop, Undine  
**Sent:** Wednesday, September 12, 2012 12:56 PM  
**To:** Richards, Karen  
**Cc:** Garry, Steven  
**Subject:** RE: ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

We can't start the review without a TAC number which we have not received yet.

**From:** Richards, Karen  
**Sent:** Wednesday, September 12, 2012 11:33 AM  
**To:** Shoop, Undine  
**Cc:** Garry, Steven  
**Subject:** FW: ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

FYI this came in as a Yellow ticket 020120253 Due September 24

**From:** RidsNrrOd Resource  
**Sent:** Wednesday, September 12, 2012 9:25 AM



**To:** Richards, Karen

**Subject:** FW: ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

**From:** Pope, Tia

**Sent:** Tuesday, September 11, 2012 4:13 PM

**To:** Satorius, Mark; RidsFsmeOd Resource; Haney, Catherine; RidsNmssOd Resource; RidsNrrOd Resource; RidsNsirOd Resource; RidsOcfMailCenter Resource; Leeds, Eric; Wiggins, Jim; Tracy, Glenn; Dyer, Jim; Zobler, Marian; Brenner, Eliot; Dean, Bill; RidsOgcMailCenter Resource

**Subject:** ACTION: Review SECY Paper "Next Steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities"

Attached for your review and concurrence is the Information SECY paper entitled, "Next steps for the Analysis of Cancer Risks in Populations near Nuclear Facilities" study (ML12249A121). We have identified staff in your offices that have been associated with the project and suggest that they take the lead in reviewing the document for your organization—your identified staffs are listed below and CC on this e-mail. They have been sent an e-mail to inform them of this request. Please provide concurrences back to RES by COB Monday, September 24, 2012. If you have any questions please contact Terry Brock / RES at [tab2@nrc.gov](mailto:tab2@nrc.gov) or 301-251-7487.

Cognizant Staff

NSIR – Patricia Milligan  
NRR – Steven Garry  
NRO – Jean Claude Dehmel  
RI – Ronald Nimitz  
NMSS – Gregory Chapman  
FSME – Stephen Salomon  
OPA – Scott Burnell  
OGC – Beth Mizuno

[View ADAMS P8 Properties ML12249A121](#)

[Open ADAMS P8 Document \(SECY - Next Steps for the Analysis of Cancer Risks in Populations Near Nuclear Facilities Study\)](#)



***Tia Pope***

*RES/DSA*

*C-3 A03 (301) 251-7499*

*Mailstop- 3A 07m*

*[tia.pope@nrc.gov](mailto:tia.pope@nrc.gov)*

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**From:** Garry, Steven  
**Sent:** Wednesday, December 18, 2013 11:23 AM  
**To:** Anagnostopoulos, Harold; Bell, Stephen; Bolling, Lloyd; Bonser, Brian; Brock, Terry; Bush-Goddard, Stephanie; Carson, Louis; Cassidy, John; Clemons-Webb, Candace; Conatser, Richard; Dickson, Billy; Dickson, Elijah; Dionne, Bruce; Drake, James; Dykes, Carmen; Furia, Joseph; Garry, Steven; Go, Tony; Greene, Natasha; Griffis, Jeff; Hamilton, Ruben; Hernandez, Pete; Hinson, Charles; Jimenez, Manuel; Kellner, Robert; Lavera, Ronald; Lewis, Doris; Loo, Wade; Lynn, Henry; Mahlahla, Latonya; Mccoppin, Michael; Mitchell, Mark; Moslak, Thomas; Myers, Valerie; Nielsen, Adam; Nimitz, Ronald; Noggle, James; O'Donnell, John J; Pedersen, Roger; Phalen, Martin; Pursley, William; R1DRSPSB2CAL RESOURCE; Ricketson, Larry; Rivera, Jonathan X; Rolph, Ronald; Saba, Mohammad; Schaaf, Robert; Shaffer, Vered; Shoop, Undine; Sun, Casper; Tomon, John; Werner, Greg  
**Subject:** Update on the Cancer Study

Hi everyone,

As you know, NRC is funding the National Academy of Sciences (NAS) to do a cancer study of the public around nuclear plants.

Phase 1: Evaluation phase (completed): NAS says they can do a study, and recommended a "pilot" study of a few facilities.

Phase 2: Pilot Study: This phase has now re-started after being delayed due to budgetary constraints. For full info, see the communication plan attached, but basically, NAS is now in the planning stage of the pilot study, and will get back to us on estimated costs before executing the plan.

Here's the NRC fact sheet:

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-analys-cancer-risk-study.html>

Also, the NRC Communication Plan on the Cancer Study is attached, but here are the key messages.

Steve

#### Key Messages

1. In September 2013 the NRC directed the NAS to begin the second phase of a study on cancer mortality and incidence risks in populations living near seven NRC-licensed facilities. The NAS will create an up-to-date version of the 1990 U.S. National Institutes of Health-National Cancer Institute (NCI) report, "Cancer in Populations Living Near Nuclear Facilities—including a more thorough examination of cancer incidence.

2. In Phase 1, NAS developed approaches to evaluate cancer risks in populations living near NRC-licensed nuclear power and fuel cycle facilities. NAS developed methodological approaches for assessing offsite radiation dose and methodological approaches for assessing cancer epidemiology. The Phase 1 report identified two scientifically sound approaches for carrying out the assessment of cancer risks, and recommended a pilot study. The pilot study, referred to as Phase 2 Pilot, was



recommended because of the technical challenges associated with carrying out

3. The committee recommended carrying out the cancer risk assessment through two types of epidemiology studies—an ecologic study of multiple cancer types of populations living near nuclear facilities and a case-control study of cancers in children born near nuclear facilities. These two study designs combine dose assessments with the ability to analyze many different cancer types, while also specifically focusing on children's cancer in the case-control study.

4. The committee proposed pilot studies at seven sites to determine the feasibility of performing the study designs on a larger scale. The NRC accepted NAS' suggested pilot study sites:

- ☐ Dresden Nuclear Power Station, Morris, IL (2 BWRs, 1 BWR shutdown)
- ☐ Millstone Power Station, Waterford, CT (2 PWRs, 1 BWR shutdown)
- ☐ Oyster Creek Nuclear Generating Station, Forked River, NJ (1 BWR)
- ☐ Haddam Neck (decommissioned), Haddam Neck, CT (1 PWR)
- ☐ Big Rock Point Nuclear Power Plant (decommissioned), Charlevoix, MI (1 BWR)
- ☐ San Onofre Nuclear Generating Station, San Clemente, CA (2 permanently shut down PWRs, 1 decommissioned PWR )
- ☐ Nuclear Fuel Services, Erwin, TN (operating uranium fuel fabrication facility)



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**From:** Shoop, Undine  
**Sent:** Wednesday, June 24, 2015 6:52 PM  
**To:** Uhle, Jennifer  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Thanks Jen!

**From:** Uhle, Jennifer  
**Sent:** Wednesday, June 24, 2015 6:50 PM  
**To:** Shoop, Undine; Lee, Samson  
**Cc:** Pearson, Alayna; Glitter, Joseph  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Concur. There are some grammar/word selection suggestions:

Suggestion: staff recognized that an update to this data would allow the staff **to evaluate** more contemporary cancer information **for** populations living near NRC-licensed nuclear facilities.

NAS was to determine whether further study is practical on a nationwide scale, and **the NRC staff was charged** with determining whether to perform the studies at all NRC-licensed facilities (i.e., balance of operating nuclear power plants and fuel-cycle facilities).

Seems we are saying after the pilots, NAS would then determine... and NRC would then be charged with ...

ML15035A135)and need a space

NAS also communicated to staff I would say to **the** staff

After staff members reviewed the pilot planning report and execution phase proposal, they do not believe it is worthwhile to complete the pilot study,

I would say: Upon reviewing the pilot ....., the staff does not believe ...

(e.g., inspections and licensing). You may want to use these terms: rulemaking, licensing, oversight, enforcement

**From:** Shoop, Undine  
**Sent:** Wednesday, June 24, 2015 6:19 PM  
**To:** Uhle, Jennifer; Lee, Samson  
**Cc:** Pearson, Alayna; Glitter, Joseph  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Hi Jennifer,

We did not get a package for concurrence and I share your frustration with obtaining the document because it's hidden. If you go to the bottom e-mail in this chain from Kim Gaskins, it has the ADAMS hyperlink for the paper. If you want us to print it and bring you a copy, let me know.

Thanks,  
Undine

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**From:** Uhle, Jennifer  
**Sent:** Wednesday, June 24, 2015 6:15 PM  
**To:** Lee, Samson  
**Cc:** Pearson, Alayna; Glitter, Joseph; Shoop, Undine  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Sam, the ADAMS numbers only get to a 2 page cover sheet. I cannot find the document. I read the document before concurring and of course consider your recommendation of concurrence. Next time, when you guys want concurrence, please drop the package off in my inbox. Easier to track (and remember this way). Right now, I need the document and like I said I cannot find it in ADAMS. Jennifer

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**From:** Lee, Samson  
**Sent:** Tuesday, June 23, 2015 4:29 PM  
**To:** Uhle, Jennifer  
**Cc:** Pearson, Alayna; Glitter, Joseph; Shoop, Undine; Evans, Michele; Dean, Bill; Brock, Terry  
**Subject:** RE: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

Jennifer,

Undine has talked with you earlier today. DRA recommends concurrence. Please send NRR concurrence to Terry Brock if you agree. This closes YT for DRA.

Thanks,  
Sam

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**From:** Shoop, Undine  
**Sent:** Tuesday, June 23, 2015 11:24 AM  
**To:** Glitter, Joseph; Lee, Samson  
**Cc:** Pearson, Alayna  
**Subject:** ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations  
**Importance:** High

Joe and Sam,

This paper was minimally modified from the previous version to modify the conclusion. The new conclusion states that the staff has decided not to move forward with this study given the limited budgetary resources. I recommend that we concur on the paper. Because the YT told us to provide a recommendation to the OD for concurrence, I recommend that you send the Bill a recommendation to concur on the paper. I'll see if I can catch Jennifer after the NRR/RES meeting at 1 to let her know about it since previously the YT said to concur at the DD level for the office.

Thanks,  
Undine

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**From:** Pearson, Alayna  
**Sent:** Monday, June 22, 2015 7:53 AM  
**To:** Shoop, Undine  
**Subject:** FW: ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk



Populations

**Importance:** High

The action below has been assigned to DRA. Steve was cc'd, so he should already be aware.

**From:** RidsNrrMailCenter Resource

**Sent:** Monday, June 22, 2015 6:32 AM

**To:** RidsNrrDra Resource; Richards, Karen

**Cc:** Pearson, Alayna; Garry, Steven

**Subject:** ACTION: Y020150186: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

**Importance:** High

The following action has been assigned to DRA

Title: Review and Concurrence on SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps

**Due date:** 06/25/15

[View ADAMS P8 Properties ML15173A010](#)

[Open ADAMS P8 Document \(Y020150186 - Review and Concurrence on SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps\)](#)

**From:** Gaskins, Kimberly

**Sent:** Friday, June 19, 2015 2:02 PM

**To:** RidsOpaMail Resource; RidsRgn1MailCenter Resource; RidsNmssOd Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource; RidsOgcMailCenter Resource

**Cc:** Brock, Terry; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Ford, Jennifer; Ramsey, Kevin; Milligan, Patricia; Hinson, Charles; Garry, Steven; Mizuno, Beth; Burnell, Scott; Nimitz, Ronald

**Subject:** RE: Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

All,

Please concur no later than COB June 25<sup>th</sup>. Please contact Terry Brock at [Terry.brock@nrc.gov](mailto:Terry.brock@nrc.gov) with any questions or comments concerning this document.

Thank you

Kim

**From:** Gaskins, Kimberly

**Sent:** Friday, June 19, 2015 1:57 PM

**To:** RidsOpaMail Resource; RidsRgn1MailCenter Resource; RidsNmssOd Resource; RidsNroMailCenter Resource; RidsNrrMailCenter Resource; RidsNsirMailCenter Resource; RidsOgcMailCenter Resource

**Cc:** Brock, Terry; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Ford, Jennifer; Ramsey, Kevin; Milligan, Patricia; Hinson, Charles; Garry, Steven; Mizuno, Beth; Burnell, Scott; Nimitz, Ronald

**Subject:** Review & Concurrence of Info SECY Paper-Results of the Analysis of Cancer Risk Populations

MEMORANDUM TO: Those on the Attached List



FROM:

M. Case

SUBJECT:

SECY-RESULTS OF THE ANALYSIS OF CANCER RISKS  
IN POPULATION NEAR NUCLEAR FACILITIES:  
PHASE 2 PILOT PLANNING PROJECT AND NEXT STEPS

[View ADAMS P8 Properties ML15141A343](#)

[Open ADAMS P8 Package \(SECY - Results of the Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning Project and Next Steps\)](#)

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**From:** Garry, Steven  
**Sent:** Tuesday, August 11, 2015 1:01 PM  
**To:** Shoop, Undine  
**Subject:** FW: UPDATE SECY paper for Cancer Study  
**Attachments:** cancer study SECY.docx

**Importance:** High

Fyi, RESEARCH has been working with the Commissioners, and are proposing an approach to do a quick update to the cancer study. It appears that either the NCRP (or another entity) would do the update, IF THERE IS MONEY for the quick update. See excerpted conclusion below (my highlights). The full draft SECY is attached also, but they are not asking for our concurrence on it, since they are working at the Commissioner/EDO and Office Director level on the proposal.

Steve

**CONCLUSION:**

After considering the approaches described above, the staff intends to proceed with updating the 1990 NCI study. Such an approach would be able to provide final results in a reasonable time period to meet the original staff goal of having updated information. The staff acknowledges that this update will be more modest than what NRC asked NAS to consider in a new update, but we have affirmed with our colleagues in NSIR, NRR, NRO, and OPA that a direct update would be both adequate and desirable for staff to discuss cancer risks with the public. The more modest scope is also consistent with the direction of the Commission in its response to the Project Aim 2020 Report, particularly with maintaining a "balanced perspective of the significance of the activity." The staff would ensure that such an update would include new results for NRC facilities not operational or considered at the time of the 1990 study (e.g., Nuclear Fuel Services in Tennessee, Braidwood and Byron Nuclear Generating Stations in Illinois). The staff plans to engage the Office of Administration to ensure all procurement processes are followed **to determine if NCRP or another entity** would be the best to complete the NCI update.

**From:** Brock, Terry  
**Sent:** Tuesday, August 11, 2015 12:32 PM  
**To:** Milligan, Patricia <Patricia.Milligan@nrc.gov>; Garry, Steven <Steven.Garry@nrc.gov>; Ramsey, Kevin <Kevin.Ramsey@nrc.gov>; Burnell, Scott <Scott.Burnell@nrc.gov>; Nimitz, Ronald <Ronald.Nimitz@nrc.gov>; Hinson, Charles <Charles.Hinson@nrc.gov>; Mizuno, Beth <Beth.Mizuno@nrc.gov>  
**Cc:** Weil, Jenny <Jenny.Weil@nrc.gov>  
**Subject:** UPDATE SECY paper for Cancer Study  
**Importance:** High

Hi All,

FYI: No action needed. Your management has been informed already.

As a reminder, you've concurred on two versions of the paper that recommended going forward with the more modest NCRP approach to update the NCI study and the second version to cancel the project completely due to budget constraints. Since then, it has been the subject of much negotiation among Brian, the 17<sup>th</sup>, and the 18<sup>th</sup> floors. Brian has even been to every Commission office to tell them about this version of the paper.

Most of the paper is the same (as far as telling the story). What is different is the Conclusion and Resource section. The punch line of the conclusion section is that we (the NRC) are going to proceed with small scale version of the Cancer Study which involves a "simple" update of the 1990 NCI Study. The punch line of the resource section is that it probably won't start until FY 17 for budgetary reasons (and may not proceed at all if the budget is unattainable).

Thanks

Terry



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**From:** Pearson, Alayna  
**Sent:** Tuesday, August 25, 2015 8:44 AM  
**To:** Shoop, Undine  
**Subject:** FYI- Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

FYI

**From:** RidsNrrMailCenter Resource  
**Sent:** Monday, August 24, 2015 5:35 PM  
**To:** Anderson, Shaun <Shaun.Anderson@nrc.gov>; Lian, Jocelyn <Jocelyn.Lian@nrc.gov>; Pearson, Alayna <Alayna.Pearson@nrc.gov>; Moore, Ross <Ross.Moore@nrc.gov>; Orf, Tracy <Tracy.Orf@nrc.gov>; Schmitt, Ronald <Ronald.Schmitt@nrc.gov>; Mahoney, Michael <Michael.Mahoney@nrc.gov>; Proffitt, Andrew <Andrew.Proffitt@nrc.gov>  
**Cc:** Wertz, Trent <Trent.Wertz@nrc.gov>  
**Subject:** FW: Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

**From:** Akstulewicz, Brenda  
**Sent:** Monday, August 24, 2015 3:09 PM  
**To:** Bellinger, Alesha <Alesha.Bellinger@nrc.gov>; EDO Distribution <EDODistribution@nrc.gov>; Ellmers, Glenn <Glenn.Ellmers@nrc.gov>; Giitter, Rebecca <Rebecca.Giitter@nrc.gov>; Gonzalez, Hipolito <Hipolito.Gonzalez@nrc.gov>; Hackett, Edwin <Edwin.Hackett@nrc.gov>; Julian, Emile <Emile.Julian@nrc.gov>; Meador, Sherry <Sherry.Meador@nrc.gov>; OCA Distribution <OCADistribution@nrc.gov>; OPA TNT <OPA TNT@nrc.gov>; Riddick, Nicole <Nicole.Riddick@nrc.gov>; RidsAdmMailCenter Resource <RidsAdmMailCenter.Resource@nrc.gov>; RidsAslbpManagement Resource <RidsAslbpManagement.Resource@nrc.gov>; RidsCsoMailCenter Resource <RidsCsoMailCenter.Resource@nrc.gov>; RidsHrMailCenter Resource <RidsHrMailCenter.Resource@nrc.gov>; RidsNmssOd Resource <RidsNmssOd.Resource@nrc.gov>; RidsNroMailCenter Resource <RidsNroMailCenter.Resource@nrc.gov>; RidsNrrMailCenter Resource <RidsNrrMailCenter.Resource@nrc.gov>; RidsNsirOd Resource <RidsNsirOd.Resource@nrc.gov>; RidsOcaaMailCenter Resource <RidsOcaaMailCenter.Resource@nrc.gov>; RidsOcfoMailCenter Resource <RidsOcfoMailCenter.Resource@nrc.gov>; RidsOeMailCenter Resource <RidsOeMailCenter.Resource@nrc.gov>; RidsOgcMailCenter Resource <RidsOgcMailCenter.Resource@nrc.gov>; RidsOigMailCenter Resource <RidsOigMailCenter.Resource@nrc.gov>; RidsOipMailCenter Resource <RidsOipMailCenter.Resource@nrc.gov>; RidsOIS Resource <RidsOIS.Resource@nrc.gov>; RidsResOd Resource <RidsResOd.Resource@nrc.gov>; RidsRgn1MailCenter Resource <RidsRgn1MailCenter.resource@nrc.gov>; RidsRgn2MailCenter Resource <RidsRgn2MailCenter.Resource@nrc.gov>; RidsRgn3MailCenter Resource <RidsRgn3MailCenter.Resource@nrc.gov>; RidsRgn4MailCenter Resource <RidsRgn4MailCenter.Resource@nrc.gov>; RidsSbcrMailCenter Resource <RidsSbcrMailCenter.Resource@nrc.gov>; Shea, Pamela <Pamela.Shea@nrc.gov>; Svinicki, Kristine <Kristine.Svinicki@nrc.gov>; Wellock, Thomas <Thomas.Wellock@nrc.gov>  
**Cc:** Jimenez, Patricia <Patricia.Jimenez@nrc.gov>; Temp, SECY <SECY.Temp@nrc.gov>  
**Subject:** Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

Greetings,

This is to inform you that **SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study** {[ML15141343](#)}, is available for your information and use.

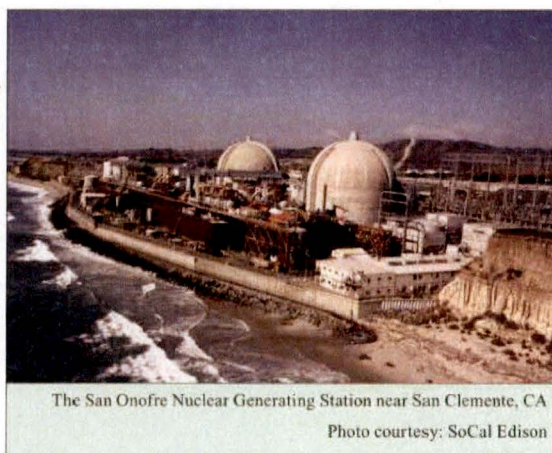


## Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1

Studies of health effects in populations (epidemiologic studies) could provide clues for a potential association between living near nuclear power plants and other nuclear facilities and risk of cancer. However, such studies are challenging because of incomplete data on occurrences of cancer and cancer deaths in geographic areas of interest (i.e., smaller than the county level), incomplete information on radioactive releases from nuclear facilities during early years of operation, and other factors. Moreover, because radioactive releases are generally low, any risks would be expected to be small and difficult to detect with statistical certainty. This report identifies two health study designs deemed suitable for assessing cancer risks in populations near nuclear facilities, having both scientific merit and the ability to address some public concerns. A pilot study would be needed to determine whether either or both of the two recommended study designs are feasible to implement on a large scale and to assess the required time and resources.

The question of whether there are cancer risks associated with living near a nuclear facility is of great interest to the public, especially those living closest to the facilities. Today, the United States has 104 operating nuclear reactors and 13 fuel cycle facilities that are regulated by the U.S. Nuclear Regulatory

Commission (USNRC). Airborne and waterborne emissions of radioactive materials from the facilities' normal operations (called effluents) can expose nearby populations to ionizing radiation. This radiation could elevate the risk of cancer in the exposed populations. The USNRC has been using the results of a 1990 National Cancer Institute (NCI) survey as its primary resource for communicating with the public about cancer risks near the nuclear facilities it regulates. The NCI study concluded that "if nuclear facilities posed a risk to neighboring populations, the risk was too small to be detected by a survey such as this one." However, that study is now outdated and has recognized limitations.



The San Onofre Nuclear Generating Station near San Clemente, CA

Photo courtesy: SoCal Edison

The USNRC requested that the National Academy of Sciences provide a de novo assessment of methodologies for carrying out cancer risk assessments in populations near USNRC-licensed nuclear facilities. The result of this Phase 1 study will be used to inform the design of

the cancer risk assessment that would be carried out in Phase 2.

### The Challenges of Assessing Cancer Risks

The availability and access to quality data is one of the main challenges for carrying out an assessment of cancer risks in populations near nuclear facilities. These challenges include:

- *Uneven availability and quality of data on cancer deaths and incidence at geographic levels smaller than a county.* Cancer death and incidence are tracked by individual states, and the availability and quality of data vary from state to state. In general, cancer mortality data are available electronically since about 1970, but subject address



at time of death is not captured until much later in some states (In the absence of subject address at time of death, mortality data cannot be geo-coded at levels of geographic interest for a population health effects study, such as census tracts.) Cancer incidence data of known quality are generally available from about 1995, although such data are available for earlier times in some states. These data include address at time of diagnosis and have been widely geo-coded.

- *Uneven availability and quality of data on nuclear facility effluent releases.* Effluent release data may not be available and data quality may be poor for some nuclear facilities, especially during early years of facility operations. Effluent releases from many nuclear facilities were much higher in the past and their radionuclide compositions have changed over time. Uncertainties in dose estimates may be much higher in years when effluent releases were highest.
- *Inability to reliably capture information on population mobility, risk factors, and potential confounding factors.* There is no centralized source of information on residential histories or lifestyle characteristics of individuals who live in the United States. The U.S. Census provides decadal snapshots of some population characteristics, including population size and distribution with respect to age, race/ethnicity, gender, educational level, and income. However, data on population lifestyle risk factors, including exposure to cigarette smoking and access to healthcare, are limited to state-level health surveys and are not consistently available from state to state at the same level of resolution.
- *Low expected statistical power.* Radiation doses from monitored and reported radioactive effluent releases from nuclear facilities are expected to be low. As a consequence, studies of health effects in populations living near nuclear facilities may not have adequate statistical power to detect increases in cancer risks arising from these monitored and reported releases, which are presumed to be small.

### Study Designs Considered

An assessment of cancer risks in populations living near nuclear facilities could be carried out using several different study designs, each of which has advantages and disadvantages for estimating cancer risks. Study designs include:

- *Risk-projection models* estimate cancer risks by combining estimates of population radiation dose or dose surrogate (e.g., distance and direction

from a nuclear facility) with what is known about radiation and cancer risk from studies of other exposed populations, for example, Japanese atomic bombing survivors.

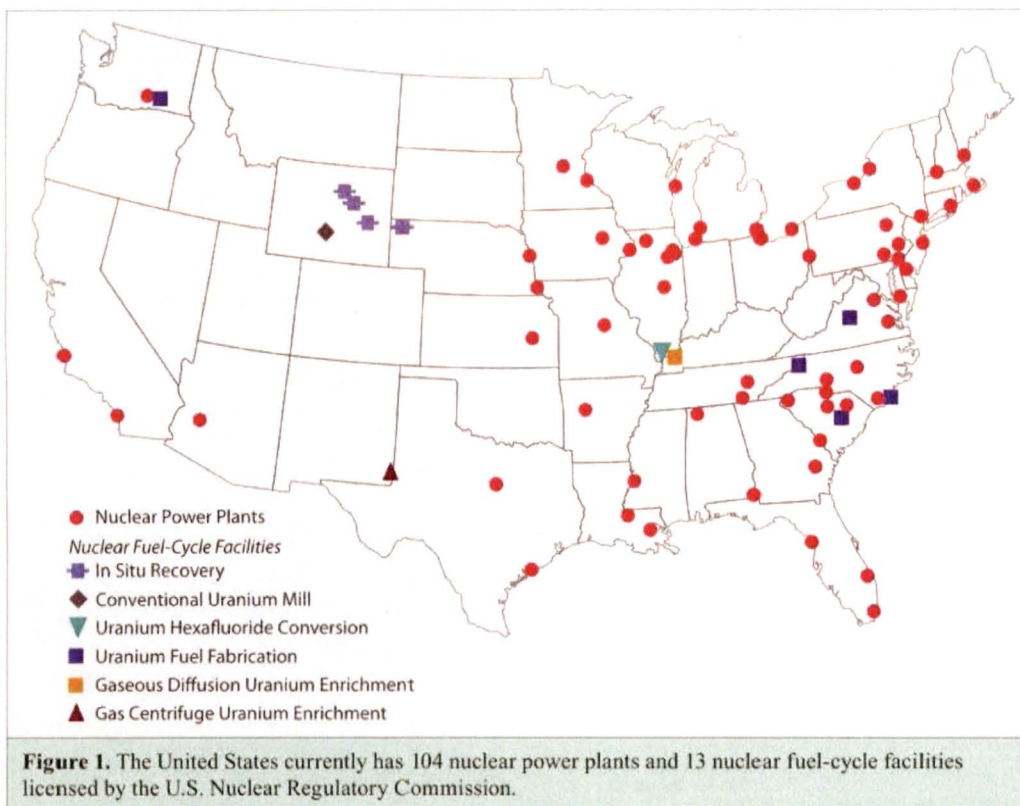
- *Ecologic studies* estimate cancer risks by comparing observed cancer incidence/mortality rates in populations, considered as a group rather than as individuals, as a function of average radiation doses/dose surrogates for those populations.
- *Cohort studies* estimate cancer risks by following individuals for a specified period of time to determine the rate or risk of cancer as a function of doses/dose surrogates. In a *prospective* cohort study, subjects are followed from the present to a future time; in a *retrospective* cohort study, subjects are followed from a past time to a more recent time, usually via available records.
- *Case-control studies* estimate cancer risks by comparing radiation dose/dose surrogates between individuals selected because they have (cases) or do not have (controls) cancer.

In the absence of information on residential history, most studies make assumptions about relevant exposures based on information about location of residence at one time point in the lifetime of the study cases, such as place of residence at time of birth, or place of residence at time of diagnosis or death, with the equivalent time for controls. This single time point of place of residence may not be the most relevant one regarding radiation exposures from nuclear facilities. Studies that are based on individuals, such as cohort and case-control studies, can potentially provide stronger evidence for or against an association between radiation exposure and cancer compared to an ecologic study. However, such studies are likely to involve fewer cancer cases than an ecologic study due to the effort involved in subject selection and data collection. The required effort could be reduced by partnering with existing multistate cancer studies that have already linked cancer and birth registration data.

### Dose Reconstruction in Support of Studies of Population Health Effects

Studies of health effects that make assumptions about exposure based solely on the distance of a person's place of residence from the nuclear facility (the closer one lives to a nuclear facility, the more exposed) can be improved by incorporating actual dose estimates into the risk analyses. Data on radioactive effluent releases, direct exposure, and weather data (e.g., the direction of prevailing winds) collected by nuclear facility





associations between (i) cancer and distance/direction from the nuclear facility and (ii) cancer and estimated radiation dose, both at the census tract level.

The **record-linkage based case-control study** should assess the association of childhood cancers (diagnosed at younger than 15 years of age) in relation to maternal residential proximity at the time of birth of the child under study, among those whose address at time of delivery was within a 50-kilometer radius of a

licensees, if available, are likely to be sufficiently accurate to develop rough estimates of annual doses that adequately reflect variations as a function of distance and direction. Existing or newly developed computer models could be used to obtain rough estimates of doses to support an epidemiology study.

### Recommended Studies of Health Effects

Should the U.S. Nuclear Regulatory Commission decide to proceed with epidemiologic studies of cancer risks in populations near nuclear facilities, the committee recommended two study designs: (1) an ecologic study of multiple cancer types of populations living near nuclear facilities; (2) a record-linkage based case-control study of pediatric cancers in children born near nuclear facilities.

The **ecologic study** should assess cancer incidence and mortality of relatively common cancer types in populations within approximately 50 kilometers (30 miles) of nuclear facilities for the operational histories of those facilities to the extent allowed by available data. A study zone of this size would incorporate both the most potentially exposed as well as essentially unexposed regions to be used for comparison purposes. A sub-analysis should specifically be carried out for highly radiogenic cancers such as leukemia in children. The study should examine

nuclear facility. The study period for individual facilities should be based on the quality and availability of cancer incidence information in each state. Controls born within the same 50-kilometer radius as the cases should be selected from birth records to match cases on birth year at a minimum. Absorbed doses/dose surrogates should be based on address of the mother's place of residence at time of delivery, as determined from birth records.

These recommended studies are complementary in that each addresses different aspects of cancer risks and could be carried out individually or together. The ecologic study would provide a broad assessment of population cancer risks over the operational histories of nuclear facilities to the extent allowed by available data. The record-linkage based case-control study would provide an assessment of early life exposure to radiation and cancer risk during more recent operating periods of nuclear facilities, and it would provide more focused analysis than is possible by the ecologic study.

### Need for a Pilot Study

In order to assess the feasibility of the recommended epidemiologic studies on a large scale and to estimate the required time and resources, the committee recommended that a pilot study be carried out. The committee recommends that these six nuclear power plants and one



fuel cycle facility become part of the pilot study: Dresden (Illinois), Millstone (Connecticut), Oyster Creek (New Jersey), Haddam Neck (Connecticut), Big Rock Point (Michigan), San Onofre (California), and Nuclear Fuel Services (Tennessee). These facilities are good candidates to evaluate study feasibility because they represent both currently operating and decommissioned facilities that started operation in different time points and with some variation in: a) the population size in close proximity, b) quality and maturity of cancer registration, c) level of complexity for registry's research approval processes and research support. The pilot study would focus on:

- Collecting effluent release and weather data for the 7 nuclear facilities.
- Development of a computer model to obtain dose estimates as a function of distance (0 to 50 kilometers from the plant) and direction for each of these seven facilities.
- Retrieving of cancer incidence and mortality data at the census tract level within 50 kilometers of these seven facilities to assess feasibility of the recommended ecologic study.

- Conferring with investigators who are conducting linkages of cancer and birth registration data to identify eligible cases of pediatric cancers and matched controls to assess feasibility of the recommended record based case-control study. Where such linkages are not already in place, link birth registration and cancer incidence data to identify eligible cases of pediatric cancers and matched controls.

### **Stakeholder Engagement**

Stakeholder engagement is an essential element of any risk assessment process that addresses important public interests and seeks to have maximum acceptance of the results. If a Phase 2 study goes forward, efforts should be made to:

- Identify key stakeholders and stakeholder groups with whom engagement is essential.
- Assess stakeholder concerns, perceptions and knowledge.
- Communicate the questions that the Phase 2 study can address, its strengths and limitations and its results in forms that are useful to different stakeholder groups.

**Read or purchase this report and locate information on related reports at**  
<http://dels.nas.edu/nrsb>

**Committee on Cancer Risks Assessment:** **John E. Burris** (*Chair*), Burroughs Wellcome Fund, Research Triangle, NC; **John C. Bailar, III**, University of Chicago (*retired*), Washington, DC; **Harold L. Beck**, Environmental Measurements Laboratory (*retired*), New York; **Andre Bouville**, National Cancer Institute (*retired*), Bethesda, MD; **Phaedra S. Corso**, University of Georgia, Athens; **Patricia J. Culligan**, Columbia University, New York; **Paul M. DeLuca, Jr.**, University of Wisconsin, Madison; **Raymond A. Guilmette**, Lovelace Respiratory Research Institute, Albuquerque, NM; **George M. Hornberger**, Vanderbilt Institute for Energy and Environment, Nashville, TN; **Margaret Karagas**, Dartmouth College, Hanover, NH; **Roger Kasperson**, Clark University (*retired*), Washington, DC; **James E. Klaunig**, Indiana University, Bloomington; **Timothy Mousseau**, University of South Carolina, Columbia; **Sharon B. Murphy**, University of Texas Health Science Center (*retired*), Washington, DC; **Roy E. Shore**, Radiation Effects Research Foundation, Hiroshima, Japan; **Daniel O. Stram**, University of Southern California, Los Angeles; **Margot Tirmarche**, Institute of Radiation Protection and Nuclear Safety, France; **Lance Waller**, Emory University, Atlanta, GA; **Gayle E. Woloschak**, Northwestern University, Chicago; **Jeffrey J. Wong**, California Environmental Protection Agency, Sacramento; **Kevin D. Crowley** (*Study Director*), **Ourania Kosti** (*Program Officer*), **Timothy A. Bouley** (*Research Associate*), **Shaunteé Whetstone** (*Senior Program Assistant*), **Erin Wingo** (*Communications Liaison*), **National Research Council**.

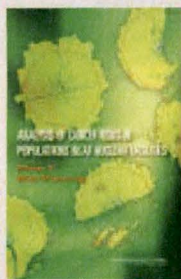
The National Academies appointed the above committee of experts to address the specific task requested by the U.S. Nuclear Regulatory Commission. The members volunteered their time for this activity; their report is peer-reviewed and the final product approved by both the committee members and the National Academies. This report brief was prepared by the National Research Council based on the committee's report.



For more information, contact the Nuclear and Radiation Studies Board at (202) 334-3066 or visit <http://dels.nas.edu/nrsb>. Copies of *Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1* are available from the National Academies Press, 500 Fifth Street, NW, Washington, D.C. 20001; (800) 624-6242; [www.nap.edu](http://www.nap.edu).

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## Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 2 Pilot Planning


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**From:** Palmrose, Donald  
**Sent:** 7 Jul 2015 15:38:01 +0000  
**To:** Imboden, Stacey  
**Subject:** RE: Cancer Study to be Cancelled

It is in Section 5.9.3.2 where at the end of this subsection the prior cancer study is mentioned (but that was the completed NCI study). The NAS study one was more for the comment responses like in Fermi FEIS Vol 3 page E-213. Sorry if my memory was misdirecting where I may have been alluding to something in the main report.

**From:** Imboden, Stacey  
**Sent:** Tuesday, July 07, 2015 11:18 AM  
**To:** Palmrose, Donald  
**Subject:** RE: Cancer Study to be Cancelled

Don, What section of the EIS is this mentioned in? I skimmed 6.1.5 for PSEG just now and didn't see it. Is this something that would fall in your section?

Stacey

---

**From:** Palmrose, Donald  
**Sent:** Tuesday, June 16, 2015 4:43 PM  
**To:** Kugler, Andrew  
**Cc:** Dixon-Herrity, Jennifer; McCoppin, Michael; Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Subject:** RE: Cancer Study to be Cancelled

I will reach out to Terry Brock of RES but I would have to research your other questions. I suspect there was a SECY asking the Commission to do this study (search to occur tomorrow....).  
Don

**From:** Kugler, Andrew  
**Sent:** Tuesday, June 16, 2015 4:08 PM  
**To:** Palmrose, Donald; Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Cc:** Dixon-Herrity, Jennifer; McCoppin, Michael  
**Subject:** RE: Cancer Study to be Cancelled

Don

That's unfortunate. I was looking forward to seeing the results of this study. The NCI study to which we typically point is now more than 20 years old and, as I recall, relied on data that is now more the 30 years old. So having an updated study would have been very useful.

Will you be touching base with RES regarding the contents of the paper?

I'm also trying to remember the original driver behind the new study – the Commission? Congress? Is there someone to whom we're going to have to answer if we pull the plug?

Andy

**From:** Palmrose, Donald  
**Sent:** Tuesday, June 16, 2015 4:02 PM  
**To:** Kugler, Andrew; Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Cc:** Dixon-Herrity, Jennifer; McCoppin, Michael  
**Subject:** RE: Cancer Study to be Cancelled

Andy,

Yes, I read the DSEA note but it is not really very surprising.

The last I heard from talking to the RES PM, NAS was looking for useful data for cancer morbidity and mortality around the six sites, but it was likely too tough to find. As something Dan Mussatti is likely very keen on, there is also a good % of the population moving into and out of an area. The study was likely finding how to figure that cohort into the study was also too much to accomplish.

The question for us in the EISs is does this really change anything. Please note that we were mentioning this study as ongoing in the EISs.

Probably a good time to reach out to RES to see what is going to be in the paper to the Commission.

Thanks,  
Don

**From:** Kugler, Andrew  
**Sent:** Tuesday, June 16, 2015 3:52 PM  
**To:** Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Cc:** Palmrose, Donald; Dixon-Herrity, Jennifer  
**Subject:** Cancer Study to be Cancelled

All

I saw the following as a note from one of the management meetings:

Research is writing a paper to the Commission recommending that the cancer risk study be terminated.

I included Don on this email, although I suspect he will have already heard this. I'd be interested to hear more about the reasons behind the recommendation. We've already sunk a lot into this study and I suspect NAS won't be happy if we pull the plug.

Andy

**From:** Brock, Terry  
**Sent:** 30 Jun 2015 10:54:05 -0400  
**To:** Palmrose, Donald  
**Subject:** Emailing: NAS Cancer Risk Phase 2 Pilot Planning Report.pdf  
**Attachments:** NAS Cancer Risk Phase 2 Pilot Planning Report.pdf

The attachment is publicly available as ML15035A135.

Don,

For your records . . . Attached is the NAS Cancer Study Phase 2 Pilot Planning Report.  
Terry



**From:** Palmrose, Donald  
**Sent:** 17 Jun 2015 17:19:37 +0000  
**To:** Williamson, Alicia  
**Subject:** FW: Notes from Management/DSEA ADM Meeting

Outside of Scope

**From:** Griggs, Alicia  
**Sent:** Tuesday, June 16, 2015 3:36 PM  
**To:** NRO\_DSEA Distribution  
**Subject:** Notes from Management/DSEA ADM Meeting

Hello all,

Please see the notes from the weekly Management and DSEA ADM Meeting for this week.

NRC:

- 


Outside of Scope

- 

Research is writing a paper to the Commission recommending that the cancer risk study be terminated

Outside of Scope

Outside of Scope



Thanks,  
Alicia

**From:** Palmrose, Donald  
**Sent:** 17 Jun 2015 15:11:15 +0000  
**To:** Kugler, Andrew  
**Subject:** RE: Cancer Study to be Cancelled

Yes (as I thought in my previous email.... Thanks for confirming). I'll let everyone know at one of the weekly meetings as to what is going on once I have time to talk to Terry.

**From:** Kugler, Andrew  
**Sent:** Wednesday, June 17, 2015 6:35 AM  
**To:** Palmrose, Donald  
**Subject:** RE: Cancer Study to be Cancelled

SECY-12-0136 seems to indicate that the effort was staff-initiated. It makes no mention of either Congress or the Commission requesting it. I suspect Terry will know off hand.

Andy

**From:** Palmrose, Donald  
**Sent:** Tuesday, June 16, 2015 4:43 PM  
**To:** Kugler, Andrew  
**Cc:** Dixon-Herrity, Jennifer; McCoppin, Michael; Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Subject:** RE: Cancer Study to be Cancelled

I will reach out to Terry Brock of RES but I would have to research your other questions. I suspect there was a SECY asking the Commission to do this study (search to occur tomorrow....).  
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**Cc:** Dixon-Herrity, Jennifer; McCoppin, Michael  
**Subject:** RE: Cancer Study to be Cancelled

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Andy



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**Sent:** Tuesday, June 16, 2015 4:02 PM  
**To:** Kugler, Andrew; Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Cc:** Dixon-Herrity, Jennifer; McCoppin, Michael  
**Subject:** RE: Cancer Study to be Cancelled

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Thanks,  
Don

**From:** Kugler, Andrew  
**Sent:** Tuesday, June 16, 2015 3:52 PM  
**To:** Cushing, Jack; Imboden, Stacey; Jung, Ian  
**Cc:** Palmrose, Donald; Dixon-Herrity, Jennifer  
**Subject:** Cancer Study to be Cancelled

All

I saw the following as a note from one of the management meetings:

Research is writing a paper to the Commission recommending that the cancer risk study be terminated.

I included Don on this email, although I suspect he will have already heard this. I'd be interested to hear more about the reasons behind the recommendation. We've already sunk a lot into this study and I suspect NAS won't be happy if we pull the plug.

Andy

**From:** Palmrose, Donald  
**Sent:** 15 Jan 2015 20:39:57 +0000  
**To:** Mccoppin, Michael  
**Subject:** RE: REQUEST: pls provid a cancer study team member from your group

I would go with one of the HPs (CHP if possible).  
Don

---

**From:** McCoppin, Michael  
**Sent:** Thursday, January 15, 2015 3:18 PM  
**To:** Palmrose, Donald  
**Subject:** FW: REQUEST: pls provid a cancer study team member from your group

Don...would you like to support or should I ask on of the HPs?

---

**From:** Brock, Terry  
**Sent:** Thursday, January 15, 2015 3:13 PM  
**To:** McCoppin, Michael  
**Cc:** Tadesse, Rebecca  
**Subject:** REQUEST: pls provid a cancer study team member from your group

Hi Mike,

I hope all is well. The cancer study is starting to heat up again and I need someone from your group to be on the team. Jean-Claude, then Richard were the last two NRO blokes on the team and they were both very helpful in the thinking for this study. The commitment is minimal. I'll need your staff to attend a couple of meetings, read a report, and comment/concur on an upcoming SECY paper. Thanks for your help and let me know if you have any questions.

Best,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Palmrose, Donald  
**Sent:** 24 Oct 2012 19:42:39 +0000  
**To:** Burton, William  
**Cc:** Cushing, Jack;Kugler, Andrew  
**Subject:** Next steps in NAS study of cancer risks to populations near nuclear facilities  
**Attachments:** 2012-0136scy.pdf

The attachment is publicly available at  
[www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0136secy.pdf](http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0136secy.pdf).

Butch,

The attached SECY describes the next steps RES is having the NAS perform as a pilot of the methodology for determining cancer risks near nuclear facilities. If you see a benefit, please distribute to the EnvPMs. Because of the two year time frame of the pilot study at seven sites, I do not anticipate an impact on the EISs we are currently working on.

Thanks,  
Don

Donald Palmrose, PhD  
Sr. Project Manager  
NRO/DSEA/RENV  
301-415-3803  
T7-F38



**From:** Palmrose, Donald  
**Sent:** 24 Oct 2012 18:50:17 +0000  
**To:** Kamboj, Sunita  
**Subject:** RE: Next steps for the analysis of cancer risks in populations near nuclear facilities

Sorry Sunita, while RES is the NRC office with responsibility for the project, this was given from the beginning to the National Academy of Science (NAS) to perform. NAS selects the experts to conduct the work. I do not know if the NAS Phase 1 committee needs any more assistance.  
Don

---

**From:** Kamboj, Sunita [mailto:skamboj@anl.gov]  
**Sent:** Wednesday, October 24, 2012 2:30 PM  
**To:** Palmrose, Donald  
**Subject:** RE: Next steps for the analysis of cancer risks in populations near nuclear facilities

Don,

Thanks for sharing this.

It seems NRC is going to conduct a two year pilot study at seven sites, do they need any help?

Sunita

---

**From:** Palmrose, Donald [mailto:Donald.Palmrose@nrc.gov]  
**Sent:** Wednesday, October 24, 2012 12:44 PM  
**To:** eva.hickey@pnnl.gov; mangerrp@ornl.gov; Greg Hofer; Napier, Bruce A; Kamboj, Sunita; Stoetzel, Gregory A  
**Cc:** Cushing, John; Kugler, Andrew Joseph  
**Subject:** Next steps for the analysis of cancer risks in populations near nuclear facilities

All,

I am sending the attached SECY to you as a professional courtesy since you are addressing or did address the radiological impacts in a new reactor EIS. This is only for your information so you are aware what is happening in a topic of high public interest and does not require any action at this time.

Thanks,  
Don

**Donald Palmrose, PhD**  
Sr. Project Manager  
Environmental Technical Support Branch  
Division of Site Safety and Environmental Analysis  
Office of New Reactors  
U.S. Nuclear Regulatory Commission  
Mail Stop T7-E18  
Washington, DC 20555  
Work Phone: 301-415-3803  
Fax: 301-415-5397

[donald.palmrose@nrc.gov](mailto:donald.palmrose@nrc.gov)

**From:** Palmrose, Donald  
**Sent:** 24 Oct 2012 17:32:50 +0000  
**To:** Mccoppin, Michael  
**Subject:** FW: Next steps for the analysis of cancer risks in populations near nuclear facilities  
**Attachments:** 2012-0136scy.pdf

The attachment is publicly available at  
[www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0136secy.pdf](http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0136secy.pdf).

Mike,

In case you want to pass on to your staff:

The attached SECY was recently made public and outlines the next step in the NAS study of cancer risks near nuclear facilities. Basically, NAS will perform a pilot study of the proposed methodologies at seven sites and would take 2-3 years to complete.

Thanks,  
Don

Donald Palmrose, PhD  
Sr. Project Manager  
NRO/DSEA/RENV  
301-415-3803  
T7-F38



**From:** Rod Adams  
**To:** Burnell, Scott  
**Cc:** Brenner, Eliot  
**Subject:** [External\_Sender] Re: [External\_Sender] NAS cancer study  
**Date:** Tuesday, September 08, 2015 7:12:38 PM

---

Scott:

Sorry, I should have looked to see that you were listed as the CONTACT for the following press release:

<http://www.nrc.gov/reading-rm/doc-collections/news/2015/15-055.pdf>

As I asked Eliot, can the NRC release NAS estimates of the costs and schedule for the proposed study?

The release indicates that the work was impractical and budgets were a concern.

Rod

On Sep 8, 2015, at 6:07 PM, Brenner, Eliot <[Eliot.Brenner@nrc.gov](mailto:Eliot.Brenner@nrc.gov)> wrote:

I am in kuala lumpur. Scott may have some information.

----- Original Message -----

From: Rod Adams [[mailto:rod\\_adams@atomicinsights.com](mailto:rod_adams@atomicinsights.com)]  
Sent: Wednesday, September 09, 2015 04:32 AM  
To: Brenner, Eliot  
Subject: [External\_Sender] NAS cancer study

Eliot

Can you release any estimates of the cost and schedule proposed by NAS of the cancelled cancer study?

Rod Adams

**From:** [Burnell, Scott](#)  
**To:** [Wittick, Susan](#)  
**Subject:** Re: Cancer Study  
**Date:** Tuesday, September 08, 2015 5:37:33 PM  
**Attachments:** [image001.png](#)

---

The short answer is no, unless another party provides the funding.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

**From:** Wittick, Susan  
**Sent:** Tuesday, September 08, 2015 05:35 PM  
**To:** Burnell, Scott  
**Subject:** Cancer Study

Scott,

Do you know if the NAS will continue the study even though NRC has withdrawn?  
(Canada's CNSC called immediately with this inquiry!)

Thanks,

*Susan*

Susan Wittick  
International Relations Specialist  
Office of International Programs  
O: 301-415-1055  
C: (b)(6)  
Office: OWFN/04-C08  
Mail Stop: OWFN/04-E21

 **U.S.NRC**  
United States Nuclear Regulatory Commission  
*Protecting People and the Environment*

**From:** [Burnell, Scott](#)  
**To:** [Harrington, Holly](#)  
**Cc:** [Hannah, Roger](#); [Ledford, Joey](#); [Sheehan, Neil](#)  
**Subject:** TNT  
**Date:** Tuesday, September 08, 2015 4:06:00 PM

---

CANCER RISK STUDY – OPA responded to queries from Platts, Energy Daily, the New London (Conn.) Day, the Asbury Park (NJ) Press, the Cape Cod Times and the Greenville (Tenn.) Sun regarding today's press release on the cancellation of the cancer risk study. Articles are expected tomorrow. OPA also fielded calls from stakeholders near the proposed pilot study sites.



**From:** [Burnell, Scott](#)  
**To:** [Sheehan, Neil](#)  
**Subject:** RE: Question re: cancer study  
**Date:** Tuesday, September 08, 2015 3:20:00 PM

---

Judy Benson? Thanks, really appreciate it. Been a crazy afternoon with hearing prep.

**From:** Sheehan, Neil  
**Sent:** Tuesday, September 08, 2015 3:09 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Question re: cancer study

I just talked to The Day, too.

**From:** Burnell, Scott  
**Sent:** Tuesday, September 08, 2015 2:56 PM  
**To:** Sheehan, Neil <[Neil.Sheehan@nrc.gov](mailto:Neil.Sheehan@nrc.gov)>  
**Subject:** RE: Question re: cancer study

Ok, then I'll just add the paper to my TNT. Thanks.

**From:** Sheehan, Neil  
**Sent:** Tuesday, September 08, 2015 2:55 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Question re: cancer study

All pretty basic stuff covered by the comm plan

**From:** Burnell, Scott  
**Sent:** Tuesday, September 08, 2015 2:49 PM  
**To:** Sheehan, Neil <[Neil.Sheehan@nrc.gov](mailto:Neil.Sheehan@nrc.gov)>  
**Subject:** RE: Question re: cancer study

And no other Qs from her? Apparently she called around 12:45. Thanks.

**From:** Sheehan, Neil  
**Sent:** Tuesday, September 08, 2015 2:47 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Question re: cancer study

Yes

**From:** Burnell, Scott  
**Sent:** Tuesday, September 08, 2015 2:47 PM  
**To:** Sheehan, Neil <[Neil.Sheehan@nrc.gov](mailto:Neil.Sheehan@nrc.gov)>  
**Subject:** RE: Question re: cancer study

Kristine? Just trying to avoid duplication of effort.

**From:** Sheehan, Neil  
**Sent:** Tuesday, September 08, 2015 2:46 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Question re: cancer study

No, from the Cape Cod Times

**From:** Burnell, Scott  
**Sent:** Tuesday, September 08, 2015 2:46 PM  
**To:** Sheehan, Neil <[Neil.Sheehan@nrc.gov](mailto:Neil.Sheehan@nrc.gov)>  
**Subject:** RE: Question re: cancer study

Was this Q from Michael Riley @ the APP?

**From:** Sheehan, Neil  
**Sent:** Tuesday, September 08, 2015 2:01 PM  
**To:** Brock, Terry <[Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov)>; Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Question re: cancer study

Thanks!

**From:** Brock, Terry  
**Sent:** Tuesday, September 08, 2015 1:56 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>; Sheehan, Neil <[Neil.Sheehan@nrc.gov](mailto:Neil.Sheehan@nrc.gov)>  
**Subject:** RE: Question re: cancer study

\$1.5 M

Phase 1 : \$1 M

Phase 2 Pilot Planning: \$0.5 M

**From:** Burnell, Scott

**Sent:** Tuesday, September 08, 2015 1:33 PM

**To:** Sheehan, Neil; Brock, Terry

**Subject:** Re: Question re: cancer study

**Importance:** High

Terry, what's the \$ figure to date?

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

**From:** Sheehan, Neil

**Sent:** Tuesday, September 08, 2015 01:11 PM

**To:** Burnell, Scott

**Subject:** Question re: cancer study

Scott,

I've been asked how much the agency has spent to date on the study. Do you have that? I didn't see it in the comm plan or SECY paper.

Neil



**From:** [Burnell, Scott](#)  
**To:** [Beattie, Jeff](#)  
**Subject:** RE: Cancer study cancellation  
**Date:** Tuesday, September 08, 2015 2:53:00 PM  
**Attachments:** [image002.png](#)

---

Hi Jeff,

It's a final decision. Staff resource estimates play into budget planning, and therefore not publicly available. Thanks.

Scott

**From:** Beattie, Jeff [mailto:Jeff.Beattie@ihs.com]  
**Sent:** Tuesday, September 08, 2015 2:50 PM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Subject:** [External\_Sender] Cancer study cancellation

Hi Scott:

2 quick questions please on the cancellation announced today....

- 1.) Why is the "Resources" section of the SECY, and thus the attachment, non-public?
- 2.) Is this a final decision? Staff is not asking the commissioners to approve this decision right?

Thanks!

Jeff



[Information. Analytics. Expertise.](#)

Jeffrey E. Eaton  
reporter  
IHS The Energy Daily  
1300 Conn. Avenue NW | Washington, DC, 20036  
Phone: 202 481 9659 | cell: (b)(6)  
[jeff@ihs.com](#)

**From:** [Burnell, Scott](#)  
**To:** [Ken Little](#); [Hannah, Roger](#)  
**Subject:** RE: Follow-Up Questions/Greeneville Sun  
**Date:** Tuesday, September 08, 2015 12:42:00 PM  
**Attachments:** [SECY 15 0104.pdf](#)

This attachment is publicly available as  
ML15141A404.

Hi Ken;

The first link in the press release goes to the staff paper (attached for your convenience) that explains the decision in detail, including costs (page 3 of the paper). The NCI study is still a valid examination of cancer mortality, while the NAS approach would have also analyzed cancer incidence. As we said in the press release, the available evidence regarding monitored releases and environmental sampling continues to point to the conclusion that releases, if and when they occur, are too small to cause observable increases in cancer risk near the facilities.

Thanks.

Scott

-----Original Message-----

From: Ken Little [<mailto:ken.little@greenevillesun.com>]  
Sent: Tuesday, September 08, 2015 12:34 PM  
To: Hannah, Roger <[Roger.Hannah@nrc.gov](mailto:Roger.Hannah@nrc.gov)>; Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
Subject: [External\_Sender] Follow-Up Questions/Greeneville Sun

Rioger, Scott: I have a few follow-up questions:

- Who had the final say in this decision? Is it top NRC brass, Congress or the Obama administration?
- Is the NRC comfortable still going with conclusions of the 1990 study?
- How much are the "prohibitively high" cost estimates for completing the study by the end of the decade?

Thanks,

Ken Little

(b)(6)

**From:** [Burnell, Scott](#)  
**To:** [Rugani, Lauren \(LRugani@nas.edu\)](#); [Kostu, Ourania](#); [Crowley, Kevin \(KCrowley@nas.edu\)](#)  
**Bcc:** [Brock, Terry](#); [Sheron, Brian](#)  
**Subject:** Cancer risk study paper  
**Date:** Tuesday, September 08, 2015 9:38:00 AM  
**Attachments:** [SECY 15 0104.pdf](#)

---

Good morning everyone;

As discussed on our phone call, here is the paper. Rania, Lauren – you'll be BCCd on my email in about 20 minutes. PLEASE redistribute that immediately to your e-mail list for those interested in the study. Thanks very much.

Scott



**From:** [Hart, Ken](#)  
**To:** [Dacus, Eugene](#); [Colgary, James](#); [Brenner, Eliot](#); [Harrington, Holly](#); [McIntyre, David](#); [Burnell, Scott](#)  
**Subject:** Public Release of SECY-15-0104  
**Date:** Tuesday, September 08, 2015 8:22:27 AM  
**Attachments:** [SP-15-0104.docx](#)

---

As a heads up, SECY-15-0104 is being released to the public today (without the enclosure). A copy is attached for your reference.

Thanks, Ken

**From:** [Burnell, Scott](#)  
**To:** [McIntyre, David](#); [Conley, Maureen](#); [Screnci, Diane](#); [Sheehan, Neil](#); [Hannah, Roger](#); [Ledford, Joey](#); [Mithyng, Viktoria](#); [Chandrabhil, Prema](#); [Dicks, Victor](#); [Uselding, Lara](#)  
**Subject:** Cancer study decision rollout  
**Date:** Wednesday, September 02, 2015 2:55:00 PM

---

Hello all;

We're currently scheduled to issue the press release the morning of the 8<sup>th</sup>. I hope to have the comm plan to you tomorrow (even though I'm not here tomorrow or Friday), and of course I'll be available to take questions that day. If you have e-mails for groups or individuals near the proposed pilot study sites who'd be interested in the decision, please pass them along before Monday morning. Thanks.

Scott

**From:** [Burnell, Scott](#)  
**To:** [Mitlyng, Viktoria](#); [Chandrathil, Prema](#)  
**Subject:** RE: Cancer study communication activities  
**Date:** Tuesday, September 01, 2015 2:49:00 PM

---

I was going to give everyone a head's up tomorrow in any case.

---

**From:** Mitlyng, Viktoria

**Sent:** Tuesday, September 01, 2015 2:47 PM

**To:** Brock, Terry <Terry.Brock@nrc.gov>; Chandrathil, Prema <Prema.Chandrathil@nrc.gov>; Milligan, Patricia <Patricia.Milligan@nrc.gov>; Heck, Jared <Jared.Heck@nrc.gov>; Ramsey, Kevin <Kevin.Ramsey@nrc.gov>; Garry, Steven <Steven.Garry@nrc.gov>; Hinson, Charles <Charles.Hinson@nrc.gov>; Nimitz, Ronald <Ronald.Nimitz@nrc.gov>; Woodruff, Gena <Gena.Woodruff@nrc.gov>; Cassidy, John <John.Cassidy@nrc.gov>; Stearns, Don <Don.Stearns@nrc.gov>; Lopas, Sarah <Sarah.Lopas@nrc.gov>; Mizuno, Beth <Beth.Mizuno@nrc.gov>; Burnell, Scott <Scott.Burnell@nrc.gov>; Weil, Jenny <Jenny.Weil@nrc.gov>; Pelchat, John <John.Pelchat@nrc.gov>; Tifft, Doug <Doug.Tifft@nrc.gov>; McNamara, Nancy <Nancy.McNamara@nrc.gov>; Maier, Bill <Bill.Maier@nrc.gov>; McGrady-Finneran, Patricia <Patricia.McGrady-Finneran@nrc.gov>; Logaras, Harral <Harral.Logaras@nrc.gov>; Lea, Edwin <Edwin.Lea@nrc.gov>; Barker, Allan <Allan.Barker@nrc.gov>; Tadesse, Rebecca <Rebecca.Tadesse@nrc.gov>; Rakovan, Lance <Lance.Rakovan@nrc.gov>

**Subject:** RE: Cancer study communication activities

Thanks so much, Harral! -Vika

-----Original Appointment-----

**From:** Logaras, Harral **On Behalf Of** Brock, Terry

**Sent:** Tuesday, September 01, 2015 1:16 PM

**To:** Mitlyng, Viktoria; Chandrathil, Prema; Milligan, Patricia; Heck, Jared; Ramsey, Kevin; Garry, Steven; Hinson, Charles; Nimitz, Ronald; Woodruff, Gena; Cassidy, John; Stearns, Don; Lopas, Sarah; Mizuno, Beth; Burnell, Scott; Weil, Jenny; Pelchat, John; Tifft, Doug; McNamara, Nancy; Maier, Bill; McGrady-Finneran, Patricia; Logaras, Harral; Lea, Edwin; Barker, Allan; Tadesse, Rebecca; Rakovan, Lance

**Subject:** FW: Cancer study communication activities

**When:** Thursday, September 03, 2015 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** HQ-TWFN-06C01-20p

Vika and Prema, It looks like something is about to break on the Cancer Study. This just came my way through our HQ person, Sarah Lopas. I'll let you know what happens...



Harral

-----Original Appointment-----

**From:** Brock, Terry

**Sent:** Tuesday, September 01, 2015 12:43 PM

**To:** Brock, Terry; Milligan, Patricia; Ramsey, Kevin; Garry, Steven; Hinson, Charles; Nimitz, Ronald; Woodruff, Gena; Cassidy, John; Stearns, Don; Lopas, Sarah; Mizuno, Beth; Burnell, Scott; Weil, Jenny; Pelchat, John; Tifft, Doug; McNamara, Nancy; Maier, Bill; McGrady-Finneran, Patricia; Logaras, Harral; Lea, Edwin; Barker, Allan; Tadesse, Rebecca; Rakovan, Lance

**Subject:** Cancer study communication activities

**When:** Thursday, September 03, 2015 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** HQ-TWFN-06C01-20p

All,

This meeting is to coordinate the message to our stakeholders about the forthcoming public release of the SECY paper on the cancelling of the cancer study. I'll send the communication plan soon for our discussion and sequencing of notifications. Bridge-line info below:

**Passcodes/Pin codes:**

Participant passcode: (b)(6)

For security reasons, the passcode will be required to join the conference.

**Dial in numbers:**

**Country**

**Toll Numbers**

**Freephone/  
Toll Free Number**

USA

888-989-7692

Thanks,

Terry

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop TWFN-10

phone: 301-415-1793

**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** Fw: Looks good, an edit for consideration, we think ending this way is a stronger message. Thanks for sharing. EOM  
**Date:** Tuesday, September 01, 2015 9:38:34 AM  
**Attachments:** [Cancer study end.docx](#)

---

Let me know if the attachment didn't make it.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

**From:** Baggett, Steven  
**Sent:** Monday, August 31, 2015 01:37 PM  
**To:** Burnell, Scott  
**Cc:** Brenner, Eliot  
**Subject:** Looks good, an edit for consideration, we think ending this way is a stronger message. Thanks for sharing. EOM



# OPA DRAFT

(Source: RES)

---

## NRC ENDS WORK ON NATIONAL ACADEMY OF SCIENCES

### CANCER RISK PILOT STUDY

The NRC is ceasing work [link to SECY page if this link isn't live] on a National Academy of Sciences (NAS) pilot study (Phase 1 and Phase 2) [link to NAS reports] of cancer risks in populations near U.S. nuclear power facilities. The NRC determined that continuing the work was impractical, given the significant amount of time and resources needed and the agency's current budget constraints.

The NRC continues to find U.S. nuclear power plants comply with strict requirements that limit radiation releases from routine operations. The NRC and state agencies regularly analyze environmental samples from near the plants. These analyses show the releases, when they occur, are too small to cause observable increases in cancer risk near the facilities.

"We're balancing the desire to provide updated answers on cancer risk with our responsibility to use Congressionally-provided funds as wisely as possible," said Brian Sheron, director of the NRC's Office of Nuclear Regulatory Research. "The NAS estimates it would be at least the end of the decade before they would possibly have answers for us, and the costs of completing the study were prohibitively high."

The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the

effort to date.

###

**From:** [Burnell, Scott](#)  
**To:** [Ostroff, James](#)  
**Bcc:** [Brock, Terry](#)  
**Subject:** RE: Question re "NAS study"  
**Date:** Monday, August 31, 2015 3:41:00 PM  
**Attachments:** [image001.png](#)

---

Hi Jim;

Nothing to report at this time. Whenever we have a decision there'll be a press release, as has been the case so far. Thanks.

Sott

**From:** Ostroff, James [mailto:james.ostroff@platts.com]  
**Sent:** Monday, August 31, 2015 3:37 PM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Subject:** [External\_Sender] Question re "NAS study"

Hi Scott,

I'm writing to check whether there have been any new developments regarding to the National Academy of Sciences pilot study on the cancer risk to people living near seven US nuclear facilities.

Last December you noted that staff was reviewing a report NAS had sent to the Commission and was waiting for the Academy to send estimates on the time and funds needed for the study. At the time, you noted that once all of this info. was received and reviewed, staff would update the Commission of a path forward.

I'd appreciate if you'd let me know that status of this study; whether the Commission has taken any steps or authorized any activities to advance the study.

Many thanks,  
--Jim

Jim Ostroff  
Senior Editor, Platts Nuclear Publications



1200 G St NW, 10th Floor, Washington, DC 20005  
202 383-2249  
[james.ostroff@platts.com](mailto:james.ostroff@platts.com)



~~CONFIDENTIAL~~

**From:** [Burnell, Scott](#)  
**To:** [Tadesse, Rebecca](#)  
**Subject:** Fw: Cancer SECY Comm Plan  
**Date:** Monday, August 31, 2015 3:21:04 PM  
**Attachments:** [cancer\\_study\\_comm\\_plan\\_2015\\_Closeout\\_0831.docx](#)

---

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Burnell, Scott  
**Sent:** Monday, August 31, 2015 09:28 AM  
**To:** Brock, Terry; Pope, Tia; Gaskins, Kimberly  
**Subject:** RE: Cancer SECY Comm Plan

I concur for OPA with the edits in the attached document.

**From:** Brock, Terry  
**Sent:** Monday, August 31, 2015 8:41 AM  
**To:** Pope, Tia <[Tia.Pope@nrc.gov](mailto:Tia.Pope@nrc.gov)>; Gaskins, Kimberly <[Kimberly.Gaskins@nrc.gov](mailto:Kimberly.Gaskins@nrc.gov)>  
**Cc:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** Cancer SECY Comm Plan

Tia,

Would you please put this concurrence package together. We have a short leash on this since we need to have it ready for agency consumption by 9-7-15 for the public release of our decision on the cancer study..

Scott, please provide Tia your OPA concurrence.

Thanks  
Terry

## COMMUNICATIONS PLAN

### ANALYSIS OF CANCER RISKS IN POPULATIONS LIVING NEAR NUCLEAR FACILITIES-PROJECT CLOSEOUT

#### Introduction

The objective of this communication plan is to outline the US Nuclear Regulatory Commission's (NRC) strategy for communicating the key messages regarding the agency's closeout of the Analysis of Cancer Risks in Populations Living Near Nuclear Facilities study.

#### Key Messages

The NRC will communicate the following key messages to all stakeholders:

1. The NRC staff reviewed the National Academy of Sciences (NAS) Pilot Planning Project Report and Pilot Execution Proposal. The pilot project's duration, cost, and lack of useful results for communicating cancer risks preclude the agency from devoting further resources to this effort in the NRC's current budget environment.
2. The methods developed by NAS in Phase 1, and discussed further in the pilot planning project are publicly available for other agencies or organizations to use.
3. The staff will continue to monitor international and national studies in this area to determine if any future work in this area is warranted.

#### Communication Schedule

| Action   | Date              |
|--|-------------------|
| Inform NAS of Plans to cancel the study  | Time T – 09/08/15 |
| Inform external stakeholders <ul style="list-style-type: none"><li>• NCRP</li><li>• NEI</li><li>• HPS</li><li>• States</li><li>• NFS</li><li>• Congress</li><li>• Other Stakeholders</li></ul> | T+ 30 minutes     |
| Press Release / SECY-15-0104 Made Public   | T + 90 minutes    |



## Questions and Answers

### **Q1. Why is the NRC abandoning the National Academies suggested research methods?**

A1. The NAS Phase 2 Pilot planning report called out several challenges to ~~completing~~ obtaininf useful results from the pilot study, not least of which was the work "may not have adequate statistical power to detect the presumed small increases in cancer risks arising from... monitored and reported releases." Given the uncertainty in the usability of the pilot results and the high cost and duration of the pilot (39 months and \$8 million), the staff finds that the NAS proposal is not timely and the costs are excessive. The NAS approach remains publicly available for those who have the resources and time to carry it out.

### **Q2. Why does the NRC think the cost of the study is more important than giving the public the best information about cancer risks from nuclear power?**

A2. The NRC must balance the need to provide updated information with the agency's responsibility to use taxpayer funds as wisely as possible. The methods proposed by NAS are publicly available and can be performed by any other entity willing to support the study. The NAS Phase I report called out several challenges to ~~completing the study~~ obtaining useful results, not least of which was the work "may not have adequate statistical power to detect the presumed small increases in cancer risks arising from... monitored and reported releases." The NAS Phase 2 report explicitly stated the proposed pilot was "not a small-scale study of analysis of risks around the pilot nuclear facilities." The Phase 2 report also explicitly warned that "any data collected during the pilot study will have *limited use for estimating cancer risks* in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." These drawbacks, when considered alongside the significant time and resources estimated for the pilot study, argue against continuing the project in the current budget environment.

### **Q3. Why should the public trust the NRC when it's abandoning a truly independent look at cancer risk?**

A3. The original 1990 NCI study was conducted by researchers independent of the NRC. Any future NRC efforts in this area will ensure researcher independence and any final product will undergo independent peer review. The agency carried out this entire effort with the NAS in full view of the public.

### **Q4. Does the NRC suspect that cancer mortality rates are elevated around nuclear power plants?**

A4. The study would test the basic premise that there is no difference in cancer rates near nuclear power plants compared to populations further away.

The staff believes the low doses from the routine operations of NRC-licensed facilities are

too small to cause observable elevated rates of cancer near the facilities. The NAS Phase 1 committee's decision to not calculate sample sizes based on actual off-site doses confirms the staff position that at the low offsite doses from these facilities, researchers would not expect to observe any increased cancer risks in the populations surrounding these facilities attributed to the regulated release of radioactive effluents.

**Q5. How does the NRC ensure the validity of the licensee's reporting of off-site doses and environmental monitoring results?**

A5. The licensee is required to establish, implement, and maintain an acceptable effluent and environmental monitoring program. As such the licensee has the primary responsibility to ensure conformance with all applicable requirements in the area of effluent and environmental monitoring. The NRC performs selective inspections of the program to validate that the licensee is implementing such a program and that public doses are maintained well below regulatory requirements and are in fact as low as reasonably achievable. The following points illustrate this approach:

- 1) NRC has imposed strict regulatory requirements for conduct of both station effluent monitoring control and environmental monitoring. These requirements are designed to ensure licensee doses to members of the public are well below regulatory limits and are as low as reasonably achievable. Consequently, licensees are obligated to establish, implement, and maintain programs to sample, monitor, evaluate, and control effluents. The licensee is also required to collect and analyze environment samples to detect activity associated with facility operations. The sampling program is designed to review exposure pathways and sampling results. The environmental monitoring program is designed to provide a check on the station effluents control program.
- 2) The NRC has established reporting requirements that require the licensee to report effluent and or environmental monitoring issues as established in program requirements. NRC initiates appropriate reviews and evaluation of the reports and conducts follow-up inspections as appropriate.
- 3) The NRC conducts routine inspections in a variety of ways. The NRC maintains an onsite resident inspection staff that selectively and routinely reviews on-going activities to become aware of issues that may impact effluent or environmental monitoring including public dose. For example the residents review corrective action documents to evaluate potential impact on the effluents control program. The residents also review radiation monitors for indication of releases. During their inspections residents also look for potential unmonitored release paths.
- 4) The NRC also uses specialist inspectors, independent of the resident staff, to conduct periodic onsite inspections of both effluent release and environmental monitoring programs to ensure the licensee conforms with applicable requirements.



As part of this review, NRC inspectors also review ground water controls. The inspectors evaluate the adequacy of quality assurance of measurements to ensure they are of appropriate quality and that the licensee is implementing a robust quality assurance program.

- 5) The NRC routinely reviews secondary evaluations conducted as part of the licensees' quality assurance programs (e.g., audits and assessments) as well as independent measurements conducted by other regulatory entities (e.g., state monitoring programs).
- 6) In addition, and as necessary, the NRC conducts independent confirmatory sampling to validate the accuracy of licensee measurements.
- 7) Information provided to the NRC by a licensee must be complete and accurate in all material respects. Submitting falsified information to the NRC is considered a violation of the regulations and will have severe implications. (For additional information, please refer to the Enforcement Policy.)

### Communication Team

The Communication Team will assist the Team Leader as needed in developing uniform and accurate messages, initiating communication vehicles, and coordinating implementation plans for this project. The members of the Regional Communication Team will be responsible for coordinating communication within their regions.

| <u>Position</u>               | <u>Name</u>    | <u>Organization</u> | <u>Telephone Number</u> |
|-------------------------------|----------------|---------------------|-------------------------|
| <i>Team Leader</i>            | Terry Brock    | RES                 | (301) 415-1793          |
| <i>NMSS Lead</i>              | Kevin Ramsey   | NMSS                | (301) 415-7506          |
| <i>NRR Lead</i>               | Steven Garry   | NRR                 | (301) 415-2766          |
| <i>NRO Lead</i>               | Charles Hinson | NRO                 | (301) 415-6619          |
| <i>NSIR Lead</i>              | Trish Milligan | NSIR                | (301) 415-2223          |
| <i>Region I Lead</i>          | Ron Nimitz     | RI                  | (610) 337-5267          |
| <i>Region II Lead</i>         | Gena Woodruff  | RII                 | (404) 997-4739          |
| <i>Region III Lead</i>        | John Cassidy   | RIII                | (630) 829-9667          |
| <i>Region IV Lead</i>         | Don Stearns    | RIV                 | (817) 200-1176          |
| <i>State Liaison Lead</i>     | Sarah Lopas    | NMSS                | (301) 415-5192          |
| <i>Legal Lead</i>             | Beth Mizuno    | OGC                 | (301) 415-3122          |
| <i>Public Affairs Lead</i>    | Scott Burnell  | OPA                 | (301) 415-8204          |
| <i>International Programs</i> | Andrea Jones   | OIP                 | (301) 415-2309          |
| <i>Congressional Affairs</i>  | Jenny Weil     | OCA                 | (301) 415-1691          |
| <i>OEDO Lead</i>              | Lance Rakovan  | OEDO                | (301) 415-2589          |



## Background

Each commercial nuclear power plant and fuel cycle facility that the Nuclear Regulatory Commission (NRC) regulates is authorized to release radioactive materials to the environment and expose the public and workers to radiation. These releases and exposures must comply with regulations and licensing documents, including dose limits for members of the public and concentration limits for liquid and gaseous effluent releases, as well as ensure doses are as low as reasonably achievable (ALARA). The staff has concluded that offsite doses to individual members of the public as a result of these routine releases are ALARA and a small fraction of the dose limits specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20, "Standards for Protection Against Radiation," specifically 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public is also generally less than 1 percent of the amount of radiation the average U.S. citizen receives in a year from all background and medical sources. Nonetheless, some stakeholders have continued to express concerns about the potential effect of these releases on the health of residents living near nuclear facilities. Further information on earlier steps in the Cancer Risk Study is available on the NRC public website: <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-analys-cancer-risk-study.html>.

## ADAMS Accession No.:

| OFFICE | RES/DSA/RPB | OPA                               | BC:RES/DSA/PRB | D:RES/DSA            | D:RES   |
|--------|-------------|-----------------------------------|----------------|----------------------|---------|
| NAME   | TBrock      | SBurnell                          | RTadessee      | SCoffin for<br>MCase | BSheron |
| DATE   | 08/26/15    | <del>03/19/15</del> 08/31/15<br>5 | 08/28/15       | 08/28/15             |         |

**From:** [Burnell, Scott](#)  
**To:** [Baggett, Steven](#); [Gilles, Nanette](#)  
**Cc:** [Brenner, Eliot](#)  
**Subject:** Cancer risk study press release  
**Date:** Monday, August 31, 2015 11:32:00 AM  
**Attachments:** [Cancer\\_study\\_end.docx](#)

---

Good morning, Steve & Nan;

Here's the current draft of the press release announcing the end of the study. The whole thing is set to go public on the 8<sup>th</sup>, so we'd like to have this ready to go by the end of the week. Thanks.

Scott

# OPA DRAFT

(Source: RES)

---

## NRC ENDS WORK ON NATIONAL ACADEMY OF SCIENCES CANCER RISK PILOT STUDY

The NRC is ceasing work [link to SECY page if this link isn't live] on a National Academy of Sciences (NAS) pilot study of cancer risks in populations near U.S. nuclear power facilities. The NRC determined that continuing the work was impractical, given the significant amount of time and resources needed and the agency's current budget constraints.

The NRC continues to find U.S. nuclear power plants comply with strict requirements that limit radiation releases from routine operations. The NRC and state agencies regularly analyze environmental samples from near the plants. These analyses show the releases, when they occur, are too small to cause observable increases in cancer risk near the facilities.

"We're balancing the desire to provide updated answers on cancer risk with our responsibility to use Congressionally-provided funds as wisely as possible," said Brian Sheron, director of the NRC's Office of Nuclear Regulatory Research. "The NAS estimates it would be at least the end of the decade before they would possibly have answers for us, and the costs of completing the study were prohibitively high."



The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

###

**From:** [Burnell, Scott](#)  
**To:** [Tadesse, Rebecca](#)  
**Subject:** RE: ACTION: Late Breaking Request for One Pager on Cancer Risk Study.docx  
**Date:** Monday, August 31, 2015 10:27:00 AM

---

This is for the House hearing, I'm sure. Existing key messages/Q&A from the comm plan can be condensed into one page, I think.

-----Original Message-----

From: Tadesse, Rebecca  
Sent: Monday, August 31, 2015 10:26 AM  
To: Burnell, Scott <Scott.Burnell@nrc.gov>  
Subject: FW: ACTION: Late Breaking Request for One Pager on Cancer Risk Study.docx

Any thought on this?

Rebecca Tadesse, Chief  
Radiation Protection Branch  
Division of Systems Analysis  
Office of Nuclear Regulatory Research  
301-415-1824

-----Original Message-----

From: Brock, Terry  
Sent: Monday, August 31, 2015 7:51 AM  
To: Tadesse, Rebecca  
Subject: RE: ACTION: Late Breaking Request for One Pager on Cancer Risk Study.docx

For your review

-----Original Message-----

From: Tadesse, Rebecca  
Sent: Thursday, August 27, 2015 1:12 PM  
To: Rini, Brett; Brock, Terry  
Cc: Armstrong, Kenneth; Coffin, Stephanie  
Subject: Re: ACTION: Late Breaking Request for One Pager on Cancer Risk Study.docx

Yes we can

Sent from an NRC BlackBerry  
Rebecca Tadesse

(b)(6)

----- Original Message -----

From: Rini, Brett  
Sent: Thursday, August 27, 2015 01:02 PM  
To: Tadesse, Rebecca; Brock, Terry  
Cc: Armstrong, Kenneth; Coffin, Stephanie  
Subject: ACTION: Late Breaking Request for One Pager on Cancer Risk Study.docx

RPB,

Incoming action to update 1-pager on the Cancer Study now that it's canceled. Can you provide an update by 9/1, following the new format?

Thanks,

Brett

-----Original Message-----

From: Rihm, Roger

Sent: Thursday, August 27, 2015 10:28 AM

To: Rini, Brett <Brett.Rini@nrc.gov>

Cc: Ammon, Bernice <Bernice.Ammon@nrc.gov>

Subject: ACTION: Late Breaking Request for One Pager on Cancer Risk Study.docx

Importance: High

Per my voice mail. Please update old one pager using new format (attached) to reflect the soon-to-be-announced cancellation of the cancer study.

Run this past Bernice Ammon in OGC before submitting to me.

Can we get this by 9/2/15?

Thanks!



**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#); [Tadesse, Rebecca](#)  
**Subject:** RE: cancer draft letter to Crowley  
**Date:** Monday, August 31, 2015 9:31:00 AM

---

I'm fine with that.

**From:** Brock, Terry  
**Sent:** Monday, August 31, 2015 9:30 AM  
**To:** Tadesse, Rebecca <[Rebecca.Tadesse@nrc.gov](mailto:Rebecca.Tadesse@nrc.gov)>; Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** cancer draft letter to Crowley

Rebecca/Scott,

Weber put in a line in the SECY about staff writing a letter to Crowley directly telling him of the end to the cancer study. I drafted the attached. Too short,? any other points / thoughts to add.

Terry

**From:** [Sheron, Brian](#)  
**To:** [Burnell, Scott](#); [Brenner, Eliot](#)  
**Subject:** Re: NAS press release  
**Date:** Sunday, August 30, 2015 10:16:15 AM

---

Scott, the attached draft looks fine.

---

**From:** Burnell, Scott  
**Sent:** Saturday, August 29, 2015 6:10 PM  
**To:** Brenner, Eliot; Sheron, Brian  
**Subject:** Re: NAS press release

Brian;

I've attached the latest version.

Here's our latest take on the problematic graf:

The NAS, while stating the overall approach was scientifically sound, has pointed out the pilot study would focus on validating the research methods. The latest NAS proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

How would you go about phrasing that sort of statement? Thanks.

Scott ✓

---

**From:** Brenner, Eliot  
**Sent:** Saturday, August 29, 2015 5:36 PM  
**To:** Sheron, Brian  
**Cc:** Burnell, Scott  
**Subject:** RE: NAS press release

Brian: we understand your point. What we're after is addressing all the audiences that will be interested in this issue, particularly those agency critics who are very liable to attempt to get traction in the media by saying that the agency bailed on the study because it would show risk. What we would like to do is pre-empt that with a simple declarative statement that the pilot was intended to validate study methods but would not address risk.

I have asked scott to send you the latest version of the press release, in which we picked up your edits, and without the last paragraph to see if you are OK with it sans language on the risk point.. And I have asked him to take one more stab at a declarative statement that you can live with. Sorry to take up your weekend or time off with this.

I was just up your way listening to a concert by the guy I bought my mandolin from. You would have liked the stuff. They even did "you ain't goin' nowhere."

Eliot

**From:** Sheron, Brian  
**Sent:** Saturday, August 29, 2015 1:31 PM  
**To:** Brenner, Eliot  
**Cc:** Burnell, Scott  
**Subject:** Re: NAS press release

Eliot, I agree that the NAS said the would be difficult to extrapolate the results from the 7 pilot plants to the fleet. But that was never their intent. The pilot was intended simply to show whether or not the study could be practically implemented. I do not want to make any statement in which I imply that the NAS study was canceled because of uncertainty related to the pilot.

I told Scott that we cancelled it because it was just going to be too expensive and take too long to do enough plants to get statistically meaningful results. For some reason he is reluctant to say what is the truth.

However, I do not want his release going out with me being quoted, becuse if it does, I could see the NAS issuing a release saying I totally misinterpreted what they were telling us.

All I'm asking is that we issue a press release that accurately states why we cancelled the NAS study. Namely, it was going to be too expensive, take too long, and given the current Agency budget situation, we do not have the funding for it.

**From:** Brenner, Eliot  
**Sent:** Friday, August 28, 2015 9:46 AM  
**To:** Sheron, Brian  
**Cc:** Burnell, Scott  
**Subject:** NAS press release

Brian: I've talked with Scott and reviewed the release as it went to your shop and then came back. We've worked in all of your edits but would make a suggestion for the final paragraph. The reason being, it makes it clear that the NAS itself said the pilot would be difficult to extrapolate to the whole universe or even the subject plants. I believe that's worth pointing out pre-emptively before the NAS goes complaining to the Hill that it's not going to get a contract.



Try this paragraph on and let Scott know if you're good with it. I'm going to be out a good part of the day t

(b)(6)

The NAS, while stating the study's approach was scientifically sound, has repeatedly described technical issues with obtaining useful results. In particular, the latest NAS proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

Eliot

Director, Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
Rockville, Md.  
301-415-8200

**From:** [Burnell, Scott](#)  
**To:** [Brenner, Eliot](#); [Sheron, Brian](#)  
**Subject:** Re: NAS press release  
**Date:** Saturday, August 29, 2015 6:10:40 PM  
**Attachments:** [Cancer\\_study\\_end\\_0829.docx](#)

---

Brian;

I've attached the latest version.

Here's our latest take on the problematic graf:

The NAS, while stating the overall approach was scientifically sound, has pointed out the pilot study would focus on validating the research methods. The latest NAS proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

How would you go about phrasing that sort of statement? Thanks.

Scott

**From:** Brenner, Eliot  
**Sent:** Saturday, August 29, 2015 5:36 PM  
**To:** Sheron, Brian  
**Cc:** Burnell, Scott  
**Subject:** RE: NAS press release

Brian: we understand your point. What we're after is addressing all the audiences that will be interested in this issue, particularly those agency critics who are very liable to attempt to get traction in the media by saying that the agency bailed on the study because it would show risk. What we would like to do is pre-empt that with a simple declarative statement that the pilot was intended to validate study methods but would not address risk.

I have asked scott to send you the latest version of the press release, in which we picked up your edits, and without the last paragraph to see if you are OK with it sans language on the risk point.. And I have asked him to take one more stab at a declarative statement that you can live with. Sorry to take up your weekend or time off with this.

I was just up your way listening to a concert by the guy I bought my mandolin from. You would have liked the stuff. They even did "you ain't goin' nowhere."

Eliot

**From:** Sheron, Brian  
**Sent:** Saturday, August 29, 2015 1:31 PM  
**To:** Brenner, Eliot  
**Cc:** Burnell, Scott  
**Subject:** Re: NAS press release

Eliot, I agree that the NAS said the would be difficult to extrapolate the results from the 7 pilot plants to the fleet. But that was never their intent. The pilot was intended simply to show whether or not the study could be practically implemented. I do not want to make any statement in which I imply that the NAS study was canceled because of uncertainty related to the pilot.

I told Scott that we cancelled it because it was just going to be too expensive and take too long to do enough plants to get statistically meaningful results. For some reason he is reluctant to say what is the truth.

However, I do not want his release going out with me being quoted, becuse if it does, I could see the NAS issuing a release saying I totally misinterpreted what they were telling us.

All I'm asking is that we issue a press release that accurately states why we cancelled the NAS study. Namely, it was going to be too expensive, take too long, and given the current Agency budget situation, we do not have the funding for it.

**From:** Brenner, Eliot  
**Sent:** Friday, August 28, 2015 9:46 AM  
**To:** Sheron, Brian  
**Cc:** Burnell, Scott  
**Subject:** NAS press release

Brian: I've talked with Scott and reviewed the release as it went to your shop and then came back. We've worked in all of your edits but would make a suggestion for the final paragraph. The reason being, it makes it clear that the NAS itself said the pilot would be difficult to extrapolate to the whole universe or even the subject plants. I believe that's worth pointing out pre-emptively before the NAS goes complaining to the Hill that it's not going to get a contract.

Try this paragraph on and let Scott know if you're good with it. I'm going to be out a good part of the day (b)(6)

(b)(6)

The NAS, while stating the study's approach was scientifically sound, has repeatedly described technical issues with obtaining useful results. In particular, the latest NAS



proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

Eliot

Director, Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
Rockville, Md.  
301-415-8200

# OPA DRAFT

(Source: RES)

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## NRC ENDS WORK ON NATIONAL ACADEMY OF SCIENCES

### CANCER RISK PILOT STUDY

The NRC is ceasing work [link to SECY page if this link isn't live] on a National Academy of Sciences (NAS) pilot study of cancer risks in populations near U.S. nuclear power facilities. The NRC determined that continuing the work was impractical, given the significant amount of time and resources needed and the agency's current budget constraints.

The NRC continues to find U.S. nuclear power plants comply with strict requirements that limit radiation releases from routine operations. The NRC and state agencies regularly analyze environmental samples from near the plants. These analyses show the releases, when they occur, are too small to cause observable increases in cancer risk near the facilities.

"We're balancing the desire to provide updated answers on cancer risk with our responsibility to use Congressionally-provided funds as wisely as possible," said Brian Sheron, director of the NRC's Office of Nuclear Regulatory Research. "The NAS estimates it would be at least the end of the decade before they would possibly have answers for us, and the costs of completing the study were prohibitively high."

The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

###



**From:** [Brenner, Eliot](#)  
**To:** [Burnell, Scott](#)  
**Subject:** RE: NAS press release  
**Date:** Saturday, August 29, 2015 5:37:28 PM

---

OK. wait a decent interval, send him the edited press release to make sure he is OK with it without the last graf.....and offer him the language below to get his take on it.

Eliot

**From:** Burnell, Scott  
**Sent:** Saturday, August 29, 2015 4:14 PM  
**To:** Brenner, Eliot  
**Subject:** Re: NAS press release

How about this?

"The NAS, while stating the overall approach was scientifically sound, has pointed out the pilot study would focus on validating the research methods. The latest NAS proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

---

**From:** Burnell, Scott  
**Sent:** Saturday, August 29, 2015 2:02 PM  
**To:** Brenner, Eliot  
**Subject:** Re: NAS press release

Perhaps we could try one more time --

"The quote from the NAS report is meant to ensure the public clearly understands the pilot study would not answer the risk question."

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Burnell, Scott  
**Sent:** Saturday, August 29, 2015 01:49 PM  
**To:** Brenner, Eliot

**Subject:** Fw: NAS press release

I'll work with the EDO's office Monday.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

**From:** Sheron, Brian

**Sent:** Saturday, August 29, 2015 01:30 PM

**To:** Brenner, Eliot

**Cc:** Burnell, Scott

**Subject:** Re: NAS press release

Eliot, I agree that the NAS said the would be difficult to extrapolate the results from the 7 pilot plants to the fleet. But that was never their intent. The pilot was intended simply to show whether or not the study could be practically implemented. I do not want to make any statement in which I imply that the NAS study was canceled because of uncertainty related to the pilot.

I told Scott that we cancelled it because it was just going to be too expensive and take too long to do enough plants to get statistically meaningful results. For some reason he is reluctant to say what is the truth.

However, I do not want his release going out with me being quoted, becuse if it does, I could see the NAS issuing a release saying I totally misinterpreted what they were telling us.

All I'm asking is that we issue a press release that accurately states why we cancelled the NAS study. Namely, it was going to be too expensive, take too long, and given the current Agency budget situation, we do not have the funding for it.

**From:** Brenner, Eliot

**Sent:** Friday, August 28, 2015 9:46 AM

**To:** Sheron, Brian

**Cc:** Burnell, Scott

**Subject:** NAS press release

Brian: I've talked with Scott and reviewed the release as it went to your shop and then came back. We've worked in all of your edits but would make a suggestion for the final paragraph. The reason being, it makes it clear that the NAS itself said the pilot would be

difficult to extrapolate to the whole universe or even the subject plants. I believe that's worth pointing out pre-emptively before the NAS goes complaining to the Hill that it's not going to get a contract.

Try this paragraph on and let Scott know if you're good with it. I'm going to be out a good part of the day (b)(6)

(b)(6)

The NAS, while stating the study's approach was scientifically sound, has repeatedly described technical issues with obtaining useful results. In particular, the latest NAS proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

Eliot

Director, Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
Rockville, Md.  
301-415-8200



**From:** Brenner, Eliot  
**To:** Burnell, Scott  
**Subject:** Re: NAS press release  
**Date:** Saturday, August 29, 2015 3:06:01 PM

---

Scott: is how Brian described the situation accurate? Would he be open to NAS criticism with that paragraph?

On: 29 August 2015 14:02, "Burnell, Scott" <Scott.Burnell@nrc.gov> wrote:  
Perhaps we could try one more time --

"The quote from the NAS report is meant to ensure the public clearly understands the pilot study would not answer the risk question."

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Burnell, Scott  
**Sent:** Saturday, August 29, 2015 01:49 PM  
**To:** Brenner, Eliot  
**Subject:** Fw: NAS press release

I'll work with the EDO's office Monday.

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Sheron, Brian  
**Sent:** Saturday, August 29, 2015 01:30 PM  
**To:** Brenner, Eliot  
**Cc:** Burnell, Scott  
**Subject:** Re: NAS press release

Eliot, I agree that the NAS said the would be difficult to extrapolate the results from the 7 pilot plants to the fleet. But that was never their intent. The pilot was intended simply to show whether or not the study could be practically implemented. I do not want to make any statement in which I imply that the NAS study was canceled because of uncertainty related to the pilot.

I told Scott that we cancelled it because it was just going to be too expensive and take too long to do enough plants to get statistically meaningful results. For some reason he is reluctant to say what is the truth.

However, I do not want his release going out with me being quoted, because if it does, I could see the NAS issuing a release saying I totally misinterpreted what they were telling us.

All I'm asking is that we issue a press release that accurately states why we cancelled the NAS study. Namely, it was going to be too expensive, take too long, and given the current Agency budget situation, we do not have the funding for it.

**From:** Brenner, Eliot  
**Sent:** Friday, August 28, 2015 9:46 AM  
**To:** Sheron, Brian  
**Cc:** Burnell, Scott  
**Subject:** NAS press release

Brian: I've talked with Scott and reviewed the release as it went to your shop and then came back. We've worked in all of your edits but would make a suggestion for the final paragraph. The reason being, it makes it clear that the NAS itself said the pilot would be difficult to extrapolate to the whole universe or even the subject plants. I believe that's worth pointing out pre-emptively before the NAS goes complaining to the Hill that it's not going to get a contract.

Try this paragraph on and let Scott know if you're good with it. I'm going to be out a good part of the day (b)(6)

(b)(6)

The NAS, while stating the study's approach was scientifically sound, has repeatedly described technical issues with obtaining useful results. In particular, the latest NAS proposal said: "any data collected during the pilot study will have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." The NAS proposed study methods are available in public reports on Phase 1 and Phase 2 of the effort to date.

Eliot

Director, Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
Rockville, Md.  
301-415-8200

**From:** [Brenner, Eliot](#)  
**To:** [Burnell, Scott](#)  
**Subject:** RE: nas press release  
**Date:** Friday, August 28, 2015 9:37:30 AM

---

Ok. I am going to send him a note in a second, copy you, and ask him to work with you if he has further concerns. I will point out that the language provides us some leverage should NAS complain about the loss of a contract.

**From:** Burnell, Scott  
**Sent:** Friday, August 28, 2015 9:32 AM  
**To:** Brenner, Eliot  
**Subject:** Re: nas press release

His hangup was "challenges to completing the study."

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Brenner, Eliot  
**Sent:** Friday, August 28, 2015 09:27 AM  
**To:** Burnell, Scott  
**Subject:** Re: nas press release

Was he trying to ditch the final Graf entirely?

On: 28 August 2015 09:11, "Burnell, Scott" <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)> wrote:  
Here's the SECY language:

NAS stated in the pilot planning report that the pilot studies are meant to determine the practicality of implementing the methods and study designs recommended in Phase 1. It emphasized that any data collected during the pilot study would have limited use for estimating cancer risks in populations near each of the nuclear facilities, or for the seven nuclear facilities combined, because of the imprecision inherent in estimates from small samples. NAS also cautioned that any decision to proceed with a full scope study should be based solely on conclusions related to practicality and not on risk estimates.

I still feel the current last graf is justified, but perhaps if you suggest the following change to Brian we can work around his issues with my approach:

The NAS, while stating the study's approach was scientifically sound, has repeatedly described technical issues with obtaining useful results. In particular, the latest NAS proposal said: "any data..."



**From:** Brenner, Eliot  
**Sent:** Friday, August 28, 2015 8:20 AM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** nas press release

Scott: I've read the last paragraph of the release as it existed yesterday afternoon in the DPR drive, and seen Brian's comments. I would prefer to keep Brian quoted in the release and don't see any reason not to accommodate his comments. If I am reading the existing paragraph correctly what you are interested in keeping in the language about NAS noting difficulties. Right? Off the top of my head I would think that's something we can save for talking points in response to questions. The news here is that we are doing something, and the NAS proposal was going to take too long, cost too much, and not necessary produce data that could be translated to the universe of reactors. Right?

I am around this morning, but have to (b)(6) between about 10:30 and 12:30.

Eliot

Director, Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
Rockville, Md.  
301-415-8200

**From:** Burnell, Scott  
**To:** Brenner, Eliot; (b)(6)  
**Subject:** FW: Cancer Study Press Release  
**Date:** Friday, August 28, 2015 8:29:18 AM  
**Attachments:** NAS.pdf

---

Yes, I should have said "scan." I'll call in a few

**From:** Brenner, Eliot  
**Sent:** Thursday, August 27, 2015 6:47 PM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Subject:** Re: Cancer Study Press Release

Sure, but we have to have Brian comfortable. Send me the release to look at in the morning.  
Thanks.

On: 27 August 2015 17:20, "Burnell, Scott" <Scott.Burnell@nrc.gov> wrote:  
Hope you have some time tomorrow to talk.

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Sheron, Brian  
**Sent:** Thursday, August 27, 2015 05:19 PM  
**To:** Burnell, Scott  
**Cc:** Coffin, Stephanie; Case, Michael; West, Steven  
**Subject:** RE: Cancer Study Press Release

Scott, I still do not agree with the last paragraph. As written, it implies that NAS considers not being able to draw conclusions from the pilot study is a challenge. They never said it was a challenge. They simply said they did not think that looking at 7 plants would provide sufficient statistical power to draw any conclusions.

As we discussed, the reason that we decided to stop the study is that due to the high costs, the long times it would take to complete, and the current budget constraints on the Agency, it was determined to be impractical to continue the study. This is what you need to say if you want to quote me and get my concurrence.

**From:** Burnell, Scott  
**Sent:** Thursday, August 27, 2015 3:50 PM  
**To:** Sheron, Brian <Brian.Sheron@nrc.gov>  
**Cc:** Coffin, Stephanie <Stephanie.Coffin@nrc.gov>; Case, Michael <Michael.Case@nrc.gov>; West, Steven <Steven.West@nrc.gov>  
**Subject:** RE: Cancer Study Press Release

I've incorporated the high points from our conversation. How's this version look?

**From:** Sheron, Brian

**Sent:** Thursday, August 27, 2015 2:47 PM

**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>

**Cc:** Coffin, Stephanie <[Stephanie.Coffin@nrc.gov](mailto:Stephanie.Coffin@nrc.gov)>; Case, Michael <[Michael.Case@nrc.gov](mailto:Michael.Case@nrc.gov)>; West, Steven <[Steven.West@nrc.gov](mailto:Steven.West@nrc.gov)>

**Subject:** Cancer Study Press Release

We've got comments. Changes needed before I can concur.



**From:** [Burnell, Scott](#)  
**To:** [Sheron, Brian](#)  
**Cc:** [Coffin, Stephanie](#); [Case, Michael](#); [West, Steven](#)  
**Subject:** RE: Cancer Study Press Release  
**Date:** Thursday, August 27, 2015 2:47:00 PM

---

I'll be right over.

**From:** Sheron, Brian  
**Sent:** Thursday, August 27, 2015 2:47 PM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Cc:** Coffin, Stephanie <Stephanie.Coffin@nrc.gov>; Case, Michael <Michael.Case@nrc.gov>; West, Steven <Steven.West@nrc.gov>  
**Subject:** Cancer Study Press Release

We've got comments. Changes needed before I can concur.

**From:** [Burnell, Scott](#)  
**To:** [Brenner, Eliot](#)  
**Subject:** RE: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study  
**Date:** Tuesday, August 25, 2015 3:56:39 PM

---

Resolved anyway, thanks.

**From:** Brenner, Eliot  
**Sent:** Tuesday, August 25, 2015 3:47 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** Re: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

Nope!

---

On: 25 August 2015 08:57, "Burnell, Scott" <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)> wrote:  
Eliot;

Are you available for a call around 9:30? Thanks.

Scott

**From:** Harrington, Holly  
**Sent:** Tuesday, August 25, 2015 8:57 AM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

If you feel this needs Eliot's involvement, please reach out to him.

Holly Harrington  
Senior Level Advisor  
Office of Public Affairs  
U.S. Nuclear Regulatory Commission

301-415-8203

**From:** Burnell, Scott  
**Sent:** Tuesday, August 25, 2015 8:54 AM  
**To:** Harrington, Holly  
**Subject:** RE: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

I'd like to discuss this at 9:30, please.

**From:** Harrington, Holly  
**Sent:** Tuesday, August 25, 2015 8:53 AM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>; McIntyre, David <[David.McIntyre@nrc.gov](mailto:David.McIntyre@nrc.gov)>  
**Subject:** RE: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

It looks logical to have a press release on this. Perhaps a blog post more fully explaining the issue as well? I have a 9 a.m. and should be back by 9:30

Holly Harrington  
Senior Level Advisor  
Office of Public Affairs  
U.S. Nuclear Regulatory Commission

301-415-8203

**From:** Burnell, Scott  
**Sent:** Tuesday, August 25, 2015 7:44 AM  
**To:** Harrington, Holly; McIntyre, David  
**Subject:** FW: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

I'd like to hear your thoughts after Holly gets back from the 8:30.

**From:** Sheron, Brian  
**Sent:** Tuesday, August 25, 2015 7:39 AM  
**To:** Chen, Yen-Ju <[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)>; West, Steven <[Steven.West@nrc.gov](mailto:Steven.West@nrc.gov)>  
**Cc:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>; Case, Michael <[Michael.Case@nrc.gov](mailto:Michael.Case@nrc.gov)>; Coffin, Stephanie <[Stephanie.Coffin@nrc.gov](mailto:Stephanie.Coffin@nrc.gov)>; Tadesse, Rebecca <[Rebecca.Tadesse@nrc.gov](mailto:Rebecca.Tadesse@nrc.gov)>; Brock, Terry <[Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov)>  
**Subject:** RE: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

I will discuss with staff at my morning staff meeting. Steve suggested, and I agree, that a press release is probably the way to go. I will have Terry work with Scott to craft one. I want to call Kevin Crowley at NAS first so he hears it from me rather than read it in a press release.

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 5:26 PM  
**To:** Sheron, Brian <[Brian.Sheron@nrc.gov](mailto:Brian.Sheron@nrc.gov)>; West, Steven <[Steven.West@nrc.gov](mailto:Steven.West@nrc.gov)>  
**Cc:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study



The cancer study paper will become public on Sept 8...the day after Labor Day. Mike is asking about our plan in reaching out to stakeholders (NAS, NCRP, NEI, HPS, States, public around Braidwood and NFS, etc.). We will need to work out a communication strategy/plan. I cc Scott on this email.

**From:** Weber, Michael  
**Sent:** Monday, August 24, 2015 4:47 PM  
**To:** Chen, Yen-Ju <[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)>  
**Cc:** West, Steven <[Steven.West@nrc.gov](mailto:Steven.West@nrc.gov)>  
**Subject:** Response/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

...And other public stakeholders (NEI, HPS, States, public around Braidwood and NFS,...).

Thanks

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 04:42 PM  
**To:** Weber, Michael  
**Subject:** RE: Response - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

I understand that RES is working to talk with NAS ...they asked about the public date. I will make sure that RES also reach out to NCRP.

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**Sent:** Monday, August 24, 2015 4:39 PM  
**To:** Chen, Yen-Ju <[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)>  
**Subject:** Response - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

Thanks. Are we reaching out proactively to stakeholders (including NAS and NCRP)?

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 04:21 PM  
**To:** Sheron, Brian; West, Steven  
**Cc:** Rini, Brett; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Brock, Terry; Weber, Michael  
**Subject:** FYI: Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

The cancer study paper (SECY-15-0104) is being distributed. Note that it will be publicly available on Sept 8.

**From:** Akstulewicz, Brenda  
**Sent:** Monday, August 24, 2015 3:09 PM  
**To:** Bellinger, Alesha <[Alesha.Bellinger@nrc.gov](mailto:Alesha.Bellinger@nrc.gov)>; EDO Distribution <[EDODistribution@nrc.gov](mailto:EDODistribution@nrc.gov)>; Ellmers, Glenn <[Glenn.Ellmers@nrc.gov](mailto:Glenn.Ellmers@nrc.gov)>; Giitter, Rebecca <[Rebecca.Giitter@nrc.gov](mailto:Rebecca.Giitter@nrc.gov)>; Gonzalez, Hipolito <[Hipolito.Gonzalez@nrc.gov](mailto:Hipolito.Gonzalez@nrc.gov)>; Hackett, Edwin <[Edwin.Hackett@nrc.gov](mailto:Edwin.Hackett@nrc.gov)>; Julian, Emile

<Emile.Julian@nrc.gov>; Meador, Sherry <Sherry.Meador@nrc.gov>; OCA Distribution  
<OCADistribution@nrc.gov>; OPA\_TNT <OPA\_TNT@nrc.gov>; Riddick, Nicole  
<Nicole.Riddick@nrc.gov>; RidsAdmMailCenter Resource <RidsAdmMailCenter.Resource@nrc.gov>;  
RidsAslbpManagement Resource <RidsAslbpManagement.Resource@nrc.gov>; RidsCsoMailCenter  
Resource <RidsCsoMailCenter.Resource@nrc.gov>; RidsHrMailCenter Resource  
<RidsHrMailCenter.Resource@nrc.gov>; RidsNmssOd Resource <RidsNmssOd.Resource@nrc.gov>;  
RidsNroMailCenter Resource <RidsNroMailCenter.Resource@nrc.gov>; RidsNrrMailCenter Resource  
<RidsNrrMailCenter.Resource@nrc.gov>; RidsNsirOd Resource <RidsNsirOd.Resource@nrc.gov>;  
RidsOcaaMailCenter Resource <RidsOcaaMailCenter.Resource@nrc.gov>; RidsOcoMailCenter  
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<RidsOeMailCenter.Resource@nrc.gov>; RidsOgcMailCenter Resource  
<RidsOgcMailCenter.Resource@nrc.gov>; RidsOigMailCenter Resource  
<RidsOigMailCenter.Resource@nrc.gov>; RidsOipMailCenter Resource  
<RidsOipMailCenter.Resource@nrc.gov>; RidsOIS Resource <RidsOIS.Resource@nrc.gov>;  
RidsResOd Resource <RidsResOd.Resource@nrc.gov>; RidsRgn1MailCenter Resource  
<RidsRgn1MailCenter.Resource@nrc.gov>; RidsRgn2MailCenter Resource  
<RidsRgn2MailCenter.Resource@nrc.gov>; RidsRgn3MailCenter Resource  
<RidsRgn3MailCenter.Resource@nrc.gov>; RidsRgn4MailCenter Resource  
<RidsRgn4MailCenter.Resource@nrc.gov>; RidsSbcrMailCenter Resource  
<RidsSbcrMailCenter.Resource@nrc.gov>; Shea, Pamela <Pamela.Shea@nrc.gov>; Svinicki, Kristine  
<Kristine.Svinicki@nrc.gov>; Wellock, Thomas <Thomas.Wellock@nrc.gov>  
**Cc:** Jimenez, Patricia <Patricia.Jimenez@nrc.gov>; Temp, SECY <SECY.Temp@nrc.gov>

**Subject:** Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear  
Facilities Study

Greetings,

This is to inform you that **SECY-15-0104: Analysis of Cancer Risks in Populations Near  
Nuclear Facilities Study** {[ML15141343](#)}, is available for your information and use.

Hard copies are being distributed to each Commission Office and OGC; all others –  
electronic distribution only.

This paper will be publicly available, September 8, 2015. Please do not distribute the  
paper outside the agency prior to its release.

Best regards,  
Brenda

*Brenda Uhotulewicz*  
Office of the Secretary  
Nuclear Regulatory Commission  
301-415-1968  
[Brenda.Uhotulewicz@nrc.gov](mailto:Brenda.Uhotulewicz@nrc.gov)

W

Go Nationals!





**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** RE: Cancer study press release  
**Date:** Tuesday, August 25, 2015 3:45:00 PM

---

OK.

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 3:45 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Cancer study press release

With Management. Try to get in front of Brian tomorrow.

**From:** Burnell, Scott  
**Sent:** Tuesday, August 25, 2015 3:45 PM  
**To:** Brock, Terry  
**Subject:** RE: Cancer study press release

Where are we at on finalizing the comm plan? I realized earlier today this would come out the day before the House oversight hearing, so I want to get the "approved" Q&A into the Chairman's prep package ASAP.

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 2:49 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** RE: Cancer study press release

Yep. Some are also the Liaison folks, but only about half.

Terry

**From:** Burnell, Scott  
**Sent:** Tuesday, August 25, 2015 2:45 PM  
**To:** Brock, Terry  
**Subject:** RE: Cancer study press release

RP directors as in non-NRC. Agreement State staff? We can work something out.

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 2:40 PM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>; McGrady-Finneran, Patricia <[Patricia.McGrady-Finneran@nrc.gov](mailto:Patricia.McGrady-Finneran@nrc.gov)>  
**Cc:** Tadesse, Rebecca <[Rebecca.Tadesse@nrc.gov](mailto:Rebecca.Tadesse@nrc.gov)>  
**Subject:** RE: Cancer study press release

Scott, The SLOs cover about 50% of the OAS RP Directors. The RP directors will have a keen interest in this info since they will likely be called about it. Is there any way we can

include all State program RP folks to ensure complete coverage in the release?

Terry

**From:** Burnell, Scott  
**Sent:** Tuesday, August 25, 2015 2:37 PM  
**To:** Brock, Terry; McGrady-Finneran, Patricia  
**Cc:** Tadesse, Rebecca  
**Subject:** Re: Cancer study press release

Hi all;

OPA's existing procedure sends the press release internally an hour before it's public, specifically so OCA and the SLOs can make their notifications.

Scott

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 02:30 PM  
**To:** McGrady-Finneran, Patricia  
**Cc:** Burnell, Scott; Tadesse, Rebecca  
**Subject:** Cancer study press release

Hi Patricia,

Good to talk to you. So the plan is we will distribute the cancer study press release to the State Liaison and OAS Radiation Protection Directors via the designated State list server the morning of September 8 prior to NRC releasing the press release. Sound like a plan?

Terry

**From:** McGrady-Finneran, Patricia  
**Sent:** Tuesday, August 25, 2015 2:02 PM  
**To:** Brock, Terry  
**Subject:** Hey Information Man!

Hi Terrino!

I called and left a voice mail message earlier. Paul said you needed my help regarding sending something out via LYRIS list servers. If you can fill me in this afternoon. There's a good chance I'll be out tomorrow (b)(6) and I want to be able to fill in the person who will actually be emailing your message out-so get back to me please.



*Protecting People and the Environment*

**Patricia McGrady-Finneran**

Project Manager, USNRC

Office of Nuclear Material Safety and Safeguards (NMSS)

Division of Materials Safety, States, Tribal and Rulemaking (DMSSTR)

Federal, State and Tribal Liaison Branch (FSTLB)

[Patricia.McGrady-Finneran@nrc.gov](mailto:Patricia.McGrady-Finneran@nrc.gov)

Phone: (301) 415-2326



**From:** Burnell, Scott  
**To:** Brock, Terry  
**Subject:** Re: cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx  
**Date:** Tuesday, August 25, 2015 1:23:36 PM

---

Thought I tried that one too, I'll check again after I finish with a Korean TV crew.

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 01:22 PM  
**To:** Burnell, Scott  
**Subject:** RE: cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx

They took it down, I squawked, and they put it here >>

<http://dceg.cancer.gov/about/organization/programs-ebp/reb/fact-sheet-mortality-risk>

**From:** Burnell, Scott  
**Sent:** Tuesday, August 25, 2015 1:11 PM  
**To:** Brock, Terry  
**Subject:** RE: cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx

Links to the 1990 NCI study pages are dead, can't find anything in Google except IAEA, etc.

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 10:01 AM  
**To:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>  
**Subject:** cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx

Draft comm plan and final secy

**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** RE: cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx  
**Date:** Tuesday, August 25, 2015 10:11:00 AM  
**Attachments:** [cancer\\_study\\_comm\\_plan\\_2015\\_Closeout\\_srb.docx](#)

---

Few minor suggestions on comm plan, working on press release.

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 10:01 AM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Subject:** cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx

Draft comm plan and final secy

## COMMUNICATIONS PLAN

### ANALYSIS OF CANCER RISKS IN POPULATIONS LIVING NEAR NUCLEAR FACILITIES-PROJECT CLOSEOUT

#### Introduction

The objective of this communication plan is to outline the US Nuclear Regulatory Commission's (NRC) strategy for communicating the key messages regarding the agency's ~~cancellation~~-closeout of the Analysis of Cancer Risks in Populations Living Near Nuclear Facilities study.

#### Key Messages

The NRC will communicate the following key messages to all stakeholders:

1. The NRC staff reviewed the National Academy of Sciences (NAS) Pilot Planning Project Report and Pilot Execution Proposal. The pilot project's duration, cost, and lack of useful results for communicating cancer risks preclude the agency from devoting further resources to this effort in the NRC's current operating budget.
2. The methods developed by NAS in Phase 1, and discussed further in the pilot planning project are publicly available for other agencies or organizations to use.
3. The staff will continue to monitor international and national studies in this area to determine if any future work in this area is warranted.

#### Communication Schedule

| Action   | Date                        |
|--|-----------------------------|
| Inform NAS of Plans to cancel the study  | 08/27/2015Time T – 09/08/15 |
| Inform external stakeholders <ul style="list-style-type: none"><li>• NCRP</li><li>• NEI</li><li>• HPS</li><li>• States</li><li>• NFS</li><li>• Congress</li><li>• Other Stakeholders</li></ul> | By 09/07/2015T+ 30 minutes  |
| Press Release / SECY-15-0104 Made Public   | 09/08/2015T + 90 minutes    |



## Questions and Answers

### **Q1. Why is the NRC abandoning the National Academies suggested research methods?**

A1. The NAS approach remains publicly available for those who have the resources and time to carry it out. The NRC's current path forward enables research on safety-significant topics for licensing, inspection, enforcement, and rulemaking. The NAS Phase I report called out several challenges to completing the study, not least of which was the work "may not have adequate statistical power to detect the presumed small increases in cancer risks arising from... monitored and reported releases."

### **Q2. Why does the NRC think the cost of the study is more important than giving the public the best information about cancer risks from nuclear power?**

A2. The NRC must appropriately balance the need to provide updated information with the agency's responsibility to use taxpayer funds as wisely as possible. The methods proposed by NAS are publicly available and can be performed by any other entity willing to support the study. The NAS Phase I report called out several challenges to completing the study, not least of which was the work "may not have adequate statistical power to detect the presumed small increases in cancer risks arising from... monitored and reported releases." The NAS Phase 2 report explicitly stated the proposed pilot was "not a small-scale study of analysis of risks around the pilot nuclear facilities." The Phase 2 report also explicitly warned that "any data collected during the pilot study will have *limited use for estimating cancer risks* in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples." These drawbacks, when considered alongside the significant time and resources estimated for the pilot study, argue against continuing the project in the current budget environment.

### **Q3. Why should the public trust the NRC when it's abandoning a truly independent look at cancer risk?**

A3. The original 1990 NCI study was conducted by researchers independent of the NRC. Any future NRC efforts in this area will ensure researcher independence and any final product will undergo independent peer review. The agency carried out this entire effort with the NAS in full view of the public.

### **Q4. Does the NRC suspect that cancer mortality rates are elevated around nuclear power plants?**

A4. The study would tests the basic premise that there is no difference in cancer rates near nuclear power plants compared to populations further away.

The staff believes the low doses from the routine operations of NRC-licensed facilities are too small to cause observable elevated rates of cancer near the facilities. The NAS Phase 1 committee's decision to not calculate sample sizes based on actual off-site doses confirms the staff position that at the low offsite doses from these facilities, researchers would not

expect to observe any increased cancer risks in the populations surrounding these facilities attributed to the regulated release of radioactive effluents.

**Q14Q5. How does the NRC ensure the validity of the licensee's reporting of off-site doses and environmental monitoring results?**

A14A5. The licensee is required to establish, implement, and maintain an acceptable effluent and environmental monitoring program. As such the licensee has the primary responsibility to ensure conformance with all applicable requirements in the area of effluent and environmental monitoring. The NRC performs selective inspections of the program to validate that the licensee is implementing such a program and that public doses are maintained well below regulatory requirements and are in fact as low as reasonably achievable. The following points illustrate this approach:

- 1) NRC has imposed strict regulatory requirements for conduct of both station effluent monitoring control and environmental monitoring. These requirements are designed to ensure licensee doses to members of the public are well below regulatory limits and are as low as reasonably achievable. Consequently, licensees are obligated to establish, implement, and maintain programs to sample, monitor, evaluate, and control effluents. The licensee is also required to collect and analyze environment samples to detect activity associated with facility operations. The sampling program is designed to review exposure pathways and sampling results. The environmental monitoring program is designed to provide a check on the station effluents control program.
- 2) The NRC has established reporting requirements that require the licensee to report effluent and or environmental monitoring issues as established in program requirements. NRC initiates appropriate reviews and evaluation of the reports and conducts follow-up inspections as appropriate.
- 3) The NRC conducts routine inspections in a variety of ways. The NRC maintains an onsite resident inspection staff that selectively and routinely reviews on-going activities to become aware of issues that may impact effluent or environmental monitoring including public dose. For example the residents review corrective action documents to evaluate potential impact on the effluents control program. The residents also review radiation monitors for indication of releases. During their inspections residents also look for potential unmonitored release paths.
- 4) The NRC also uses specialist inspectors, independent of the resident staff, to conduct periodic onsite inspections of both effluent release and environmental monitoring programs to ensure the licensee conforms with applicable requirements. As part of this review, NRC inspectors also review ground water controls. The inspectors evaluate the adequacy of quality assurance of measurements to ensure they are of appropriate quality and that the licensee is implementing a robust quality



assurance program.

- 5) The NRC routinely reviews secondary evaluations conducted as part of the licensees' quality assurance programs (e.g., audits and assessments) as well as independent measurements conducted by other regulatory entities (e.g., state monitoring programs).
- 6) In addition, and as necessary, the NRC conducts independent confirmatory sampling to validate the accuracy of licensee measurements.
- 7) Information provided to the NRC by a licensee must be complete and accurate in all material respects. Submitting falsified information to the NRC is considered a violation of the regulations and will have severe implications. (For additional information, please refer to the Enforcement Policy.)

### Communication Team

The Communication Team will assist the Team Leader as needed in developing uniform and accurate messages, initiating communication vehicles, and coordinating implementation plans for this project. The members of the Regional Communication Team will be responsible for coordinating communication within their regions.

| <b><u>Position</u></b>        | <b><u>Name</u></b> | <b><u>Organization</u></b> | <b><u>Telephone Number</u></b> |
|-------------------------------|--------------------|----------------------------|--------------------------------|
| <i>Team Leader</i>            | Terry Brock        | RES                        | (301) 415-1793                 |
| <i>NMSS Lead</i>              | Kevin Ramsey       | NMSS                       | (301) 415-7506                 |
| <i>NRR Lead</i>               | Steven Garry       | NRR                        | (301) 415-2766                 |
| <i>NRO Lead</i>               | Charles Hinson     | NRO                        | (301) 415-6619                 |
| <i>NSIR Lead</i>              | Trish Milligan     | NSIR                       | (301) 415-2223                 |
| <i>Region I Lead</i>          | Ron Nimitz         | RI                         | (610) 337-5267                 |
| <i>Region II Lead</i>         | Gena Woodruff      | RII                        | (404) 997-4739                 |
| <i>Region III Lead</i>        | John Cassidy       | RIII                       | (630) 829-9667                 |
| <i>Region IV Lead</i>         | Don Stearns        | RIV                        | (817) 200-1176                 |
| <i>State Liaison Lead</i>     | June Cai           | NMSS                       | (301) 415-5192                 |
| <i>Legal Lead</i>             | Beth Mizuno        | OGC                        | (301) 415-3122                 |
| <i>Public Affairs Lead</i>    | Scott Burnell      | OPA                        | (301) 415-8204                 |
| <i>International Programs</i> | Andrea Jones       | OIP                        | (301) 415-2309                 |
| <i>Congressional Affairs</i>  | Jenny Weil         | OCA                        | (301) 415-1691                 |
| <i>OEDO Lead</i>              | Lance Rakovan      | OEDO                       | (301) 415-2589                 |

### Background



Each commercial nuclear power plant and fuel cycle facility that the Nuclear Regulatory Commission (NRC) regulates is authorized to release radioactive materials to the environment and expose the public and workers to radiation. These releases and exposures must comply with regulations and licensing documents, including dose limits for members of the public and concentration limits for liquid and gaseous effluent releases, as well as ensure doses are as low as reasonably achievable (ALARA). The staff has concluded that offsite doses to individual members of the public as a result of these routine releases are ALARA and a small fraction of the dose limits specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20, "Standards for Protection Against Radiation," specifically 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public is also generally less than 1 percent of the amount of radiation the average U.S. citizen receives in a year from all background and medical sources. Nonetheless, some stakeholders have continued to express concerns about the potential effect of these releases on the health of residents living near nuclear facilities. Further information on earlier steps in the Cancer Risk Study is available on the NRC public website: <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-analys-cancer-risk-study.html>.

**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** RE: cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx  
**Date:** Tuesday, August 25, 2015 10:01:00 AM

---

Thanks.

**From:** Brock, Terry  
**Sent:** Tuesday, August 25, 2015 10:01 AM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Subject:** cancer\_study\_comm\_plan\_2015\_Closeout\_1.docx

Draft comm plan and final secy

**From:** [Burnell, Scott](#)  
**To:** [Harrington, Holly](#); [McIntyre, David](#)  
**Subject:** FW: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study  
**Date:** Tuesday, August 25, 2015 7:44:00 AM

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**Cc:** Burnell, Scott <[Scott.Burnell@nrc.gov](mailto:Scott.Burnell@nrc.gov)>; Case, Michael <[Michael.Case@nrc.gov](mailto:Michael.Case@nrc.gov)>; Coffin, Stephanie <[Stephanie.Coffin@nrc.gov](mailto:Stephanie.Coffin@nrc.gov)>; Tadesse, Rebecca <[Rebecca.Tadesse@nrc.gov](mailto:Rebecca.Tadesse@nrc.gov)>; Brock, Terry <[Terry.Brock@nrc.gov](mailto:Terry.Brock@nrc.gov)>  
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**Subject:** Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

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Thanks

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 04:42 PM



**To:** Weber, Michael

**Subject:** RE: Response - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

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**To:** Chen, Yen-Ju <[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)>

**Subject:** Response - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

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**Sent:** Monday, August 24, 2015 04:21 PM

**To:** Sheron, Brian; West, Steven

**Cc:** Rini, Brett; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Brock, Terry; Weber, Michael

**Subject:** FYI: Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

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**From:** Akstulewicz, Brenda

**Sent:** Monday, August 24, 2015 3:09 PM

**To:** Bellinger, Alesha <[Alesha.Bellinger@nrc.gov](mailto:Alesha.Bellinger@nrc.gov)>; EDO Distribution <[EDODistribution@nrc.gov](mailto:EDODistribution@nrc.gov)>; Ellmers, Glenn <[Glenn.Ellmers@nrc.gov](mailto:Glenn.Ellmers@nrc.gov)>; Giitter, Rebecca <[Rebecca.Giitter@nrc.gov](mailto:Rebecca.Giitter@nrc.gov)>; Gonzalez, Hipolito <[Hipolito.Gonzalez@nrc.gov](mailto:Hipolito.Gonzalez@nrc.gov)>; Hackett, Edwin <[Edwin.Hackett@nrc.gov](mailto:Edwin.Hackett@nrc.gov)>; Julian, Emile <[Emile.Julian@nrc.gov](mailto:Emile.Julian@nrc.gov)>; Meador, Sherry <[Sherry.Meador@nrc.gov](mailto:Sherry.Meador@nrc.gov)>; OCA Distribution <[OCADistribution@nrc.gov](mailto:OCADistribution@nrc.gov)>; OPA\_TNT <[OPA\\_TNT@nrc.gov](mailto:OPA_TNT@nrc.gov)>; Riddick, Nicole <[Nicole.Riddick@nrc.gov](mailto:Nicole.Riddick@nrc.gov)>; RidsAdmMailCenter Resource <[RidsAdmMailCenter.Resource@nrc.gov](mailto:RidsAdmMailCenter.Resource@nrc.gov)>; RidsAslbpManagement Resource <[RidsAslbpManagement.Resource@nrc.gov](mailto:RidsAslbpManagement.Resource@nrc.gov)>; RidsCsoMailCenter Resource <[RidsCsoMailCenter.Resource@nrc.gov](mailto:RidsCsoMailCenter.Resource@nrc.gov)>; RidsHrMailCenter Resource <[RidsHrMailCenter.Resource@nrc.gov](mailto:RidsHrMailCenter.Resource@nrc.gov)>; RidsNmssOd Resource <[RidsNmssOd.Resource@nrc.gov](mailto:RidsNmssOd.Resource@nrc.gov)>; RidsNroMailCenter Resource <[RidsNroMailCenter.Resource@nrc.gov](mailto:RidsNroMailCenter.Resource@nrc.gov)>; RidsNrrMailCenter Resource <[RidsNrrMailCenter.Resource@nrc.gov](mailto:RidsNrrMailCenter.Resource@nrc.gov)>; RidsNsirOd Resource <[RidsNsirOd.Resource@nrc.gov](mailto:RidsNsirOd.Resource@nrc.gov)>; RidsOcaaMailCenter Resource <[RidsOcaaMailCenter.Resource@nrc.gov](mailto:RidsOcaaMailCenter.Resource@nrc.gov)>; RidsOcfoMailCenter Resource <[RidsOcfoMailCenter.Resource@nrc.gov](mailto:RidsOcfoMailCenter.Resource@nrc.gov)>; RidsOeMailCenter Resource <[RidsOeMailCenter.Resource@nrc.gov](mailto:RidsOeMailCenter.Resource@nrc.gov)>; RidsOgcMailCenter Resource <[RidsOgcMailCenter.Resource@nrc.gov](mailto:RidsOgcMailCenter.Resource@nrc.gov)>; RidsOigMailCenter Resource <[RidsOigMailCenter.Resource@nrc.gov](mailto:RidsOigMailCenter.Resource@nrc.gov)>; RidsOipMailCenter Resource <[RidsOipMailCenter.Resource@nrc.gov](mailto:RidsOipMailCenter.Resource@nrc.gov)>; RidsOIS Resource <[RidsOIS.Resource@nrc.gov](mailto:RidsOIS.Resource@nrc.gov)>; RidsResOd Resource <[RidsResOd.Resource@nrc.gov](mailto:RidsResOd.Resource@nrc.gov)>; RidsRgn1MailCenter Resource <[RidsRgn1MailCenter.Resource@nrc.gov](mailto:RidsRgn1MailCenter.Resource@nrc.gov)>; RidsRgn2MailCenter Resource <[RidsRgn2MailCenter.Resource@nrc.gov](mailto:RidsRgn2MailCenter.Resource@nrc.gov)>; RidsRgn3MailCenter Resource

<RidsRgn3MailCenter.Resource@nrc.gov>; RidsRgn4MailCenter Resource  
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<RidsSbcrMailCenter.Resource@nrc.gov>; Shea, Pamela <Pamela.Shea@nrc.gov>; Svinicki, Kristine  
<Kristine.Svinicki@nrc.gov>; Wellock, Thomas <Thomas.Wellock@nrc.gov>  
**Cc:** Jimenez, Patricia <Patricia.Jimenez@nrc.gov>; Temp, SECY <SECY.Temp@nrc.gov>  
**Subject:** Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear  
Facilities Study

Greetings,

This is to inform you that **SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study** {[ML15141343](#)}, is available for your information and use.

Hard copies are being distributed to each Commission Office and OGC; all others –  
electronic distribution only.

This paper will be publicly available, September 8, 2015. Please do not distribute the  
paper outside the agency prior to its release.

Best regards,  
Brenda

*Brenda Alkotulewicz*  
*Office of the Secretary*  
*Nuclear Regulatory Commission*  
*301-415-1968*  
[Brenda.Alkotulewicz@nrc.gov](mailto:Brenda.Alkotulewicz@nrc.gov)



**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** Fw: Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study  
**Date:** Monday, August 24, 2015 5:27:37 PM

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Fyi

Sent from an NRC Blackberry

Scott Burnell

(b)(6)

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 05:26 PM  
**To:** Sheron, Brian; West, Steven  
**Cc:** Burnell, Scott  
**Subject:** Query/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

The cancer study paper will become public on Sept 8...the day after Labor Day. Mike is asking about our plan in reaching out to stakeholders (NAS, NCRP, NEI, HPS, States, public around Braidwood and NFS, etc.). We will need to work out a communication strategy/plan. I cc Scott on this email.

**From:** Weber, Michael  
**Sent:** Monday, August 24, 2015 4:47 PM  
**To:** Chen, Yen-Ju <[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)>  
**Cc:** West, Steven <[Steven.West@nrc.gov](mailto:Steven.West@nrc.gov)>  
**Subject:** Response/Action - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

...And other public stakeholders (NEI, HPS, States, public around Braidwood and NFS,...).

Thanks

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 04:42 PM  
**To:** Weber, Michael  
**Subject:** RE: Response - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

I understand that RES is working to talk with NAS...they asked about the public date. I will make sure that RES also reach out to NCRP.

**From:** Weber, Michael  
**Sent:** Monday, August 24, 2015 4:39 PM  
**To:** Chen, Yen-Ju <[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)>  
**Subject:** Response - Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations



Near Nuclear Facilities Study

Thanks. Are we reaching out proactively to stakeholders (including NAS and NCRP)?

**From:** Chen, Yen-Ju  
**Sent:** Monday, August 24, 2015 04:21 PM  
**To:** Sheron, Brian; West, Steven  
**Cc:** Rini, Brett; Coffin, Stephanie; Case, Michael; Tadesse, Rebecca; Brock, Terry; Weber, Michael  
**Subject:** FYI: Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

The cancer study paper (SECY-15-0104) is being distributed. Note that it will be publicly available on Sept 8.

**From:** Akstulewicz, Brenda  
**Sent:** Monday, August 24, 2015 3:09 PM  
**To:** Bellinger, Alesha <[Alesha.Bellinger@nrc.gov](mailto:Alesha.Bellinger@nrc.gov)>; EDO Distribution <[EDODistribution@nrc.gov](mailto:EDODistribution@nrc.gov)>; Ellmers, Glenn <[Glenn.Ellmers@nrc.gov](mailto:Glenn.Ellmers@nrc.gov)>; Giitter, Rebecca <[Rebecca.Giitter@nrc.gov](mailto:Rebecca.Giitter@nrc.gov)>; Gonzalez, Hipolito <[Hipolito.Gonzalez@nrc.gov](mailto:Hipolito.Gonzalez@nrc.gov)>; Hackett, Edwin <[Edwin.Hackett@nrc.gov](mailto:Edwin.Hackett@nrc.gov)>; Julian, Emile <[Emile.Julian@nrc.gov](mailto:Emile.Julian@nrc.gov)>; Meador, Sherry <[Sherry.Meador@nrc.gov](mailto:Sherry.Meador@nrc.gov)>; OCA Distribution <[OCADistribution@nrc.gov](mailto:OCADistribution@nrc.gov)>; OPA TNT <[OPA\\_TNT@nrc.gov](mailto:OPA_TNT@nrc.gov)>; Riddick, Nicole <[Nicole.Riddick@nrc.gov](mailto:Nicole.Riddick@nrc.gov)>; RidsAdmMailCenter Resource <[RidsAdmMailCenter.Resource@nrc.gov](mailto:RidsAdmMailCenter.Resource@nrc.gov)>; RidsAslbpManagement Resource <[RidsAslbpManagement.Resource@nrc.gov](mailto:RidsAslbpManagement.Resource@nrc.gov)>; RidsCsoMailCenter Resource <[RidsCsoMailCenter.Resource@nrc.gov](mailto:RidsCsoMailCenter.Resource@nrc.gov)>; RidsHrMailCenter Resource <[RidsHrMailCenter.Resource@nrc.gov](mailto:RidsHrMailCenter.Resource@nrc.gov)>; RidsNmssOd Resource <[RidsNmssOd.Resource@nrc.gov](mailto:RidsNmssOd.Resource@nrc.gov)>; RidsNroMailCenter Resource <[RidsNroMailCenter.Resource@nrc.gov](mailto:RidsNroMailCenter.Resource@nrc.gov)>; RidsNrrMailCenter Resource <[RidsNrrMailCenter.Resource@nrc.gov](mailto:RidsNrrMailCenter.Resource@nrc.gov)>; RidsNsirOd Resource <[RidsNsirOd.Resource@nrc.gov](mailto:RidsNsirOd.Resource@nrc.gov)>; RidsOcaaMailCenter Resource <[RidsOcaaMailCenter.Resource@nrc.gov](mailto:RidsOcaaMailCenter.Resource@nrc.gov)>; RidsOcfoMailCenter Resource <[RidsOcfoMailCenter.Resource@nrc.gov](mailto:RidsOcfoMailCenter.Resource@nrc.gov)>; RidsOeMailCenter Resource <[RidsOeMailCenter.Resource@nrc.gov](mailto:RidsOeMailCenter.Resource@nrc.gov)>; RidsOgcMailCenter Resource <[RidsOgcMailCenter.Resource@nrc.gov](mailto:RidsOgcMailCenter.Resource@nrc.gov)>; RidsOigMailCenter Resource <[RidsOigMailCenter.Resource@nrc.gov](mailto:RidsOigMailCenter.Resource@nrc.gov)>; RidsOipMailCenter Resource <[RidsOipMailCenter.Resource@nrc.gov](mailto:RidsOipMailCenter.Resource@nrc.gov)>; RidsOIS Resource <[RidsOIS.Resource@nrc.gov](mailto:RidsOIS.Resource@nrc.gov)>; RidsResOd Resource <[RidsResOd.Resource@nrc.gov](mailto:RidsResOd.Resource@nrc.gov)>; RidsRgn1MailCenter Resource <[RidsRgn1MailCenter.Resource@nrc.gov](mailto:RidsRgn1MailCenter.Resource@nrc.gov)>; RidsRgn2MailCenter Resource <[RidsRgn2MailCenter.Resource@nrc.gov](mailto:RidsRgn2MailCenter.Resource@nrc.gov)>; RidsRgn3MailCenter Resource <[RidsRgn3MailCenter.Resource@nrc.gov](mailto:RidsRgn3MailCenter.Resource@nrc.gov)>; RidsRgn4MailCenter Resource <[RidsRgn4MailCenter.Resource@nrc.gov](mailto:RidsRgn4MailCenter.Resource@nrc.gov)>; RidsSbcrMailCenter Resource <[RidsSbcrMailCenter.Resource@nrc.gov](mailto:RidsSbcrMailCenter.Resource@nrc.gov)>; Shea, Pamela <[Pamela.Shea@nrc.gov](mailto:Pamela.Shea@nrc.gov)>; Svinicki, Kristine <[Kristine.Svinicki@nrc.gov](mailto:Kristine.Svinicki@nrc.gov)>; Wellock, Thomas <[Thomas.Wellock@nrc.gov](mailto:Thomas.Wellock@nrc.gov)>  
**Cc:** Jimenez, Patricia <[Patricia.Jimenez@nrc.gov](mailto:Patricia.Jimenez@nrc.gov)>; Temp, SECY <[SECY.Temp@nrc.gov](mailto:SECY.Temp@nrc.gov)>  
**Subject:** Electronic Distribution SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study

Greetings,

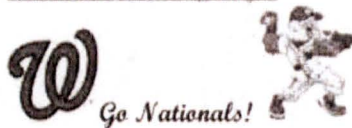
This is to inform you that **SECY-15-0104: Analysis of Cancer Risks in Populations Near Nuclear Facilities Study** {[ML15141343](#)}, is available for your information and use.

Hard copies are being distributed to each Commission Office and OGC; all others – electronic distribution only.

This paper will be publicly available, September 8, 2015. Please do not distribute the paper outside the agency prior to its release.

Best regards,  
Brenda

*Brenda Akstulewicz*  
*Office of the Secretary*  
*Nuclear Regulatory Commission*  
*301-415-1968*  
[Brenda.Akstulewicz@nrc.gov](mailto:Brenda.Akstulewicz@nrc.gov)



**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** RE: Update: Cancer Study  
**Date:** Monday, August 24, 2015 12:26:00 PM

---

I'm taking another look at the new Q&A to see what we can work with.

**From:** Brock, Terry  
**Sent:** Monday, August 24, 2015 12:22 PM  
**To:** Milligan, Patricia <Patricia.Milligan@nrc.gov>; Burnell, Scott <Scott.Burnell@nrc.gov>; Garry, Steven <Steven.Garry@nrc.gov>; Nimitz, Ronald <Ronald.Nimitz@nrc.gov>; Hinson, Charles <Charles.Hinson@nrc.gov>; Weil, Jenny <Jenny.Weil@nrc.gov>; Ramsey, Kevin <Kevin.Ramsey@nrc.gov>; Jones, Andrea <Andrea.Jones2@nrc.gov>; Mizuno, Beth <Beth.Mizuno@nrc.gov>; Cassidy, John <John.Cassidy@nrc.gov>; Stearns, Don <Don.Stearns@nrc.gov>; Woodruff, Gena <Gena.Woodruff@nrc.gov>  
**Cc:** Tadesse, Rebecca <Rebecca.Tadesse@nrc.gov>  
**Subject:** Update: Cancer Study

Hi All,

This is to inform you all that the cancer study has been canceled. Three of the four Commissioners specifically lined out the study from the budget. We had some back and forth with the OEDO about the SECY paper and we ended up not going forward with either the NAS or NCRP approaches. The final paper signed out by the EDO is here [ML15141A404](#)

At this point, I will be working with Scott (OPA) to work on the messaging for when the paper is made public in about ten days. We still have to communicate our decision with NAS, so please do not communicate this decision outside the agency until the Commission has an opportunity to read the paper and it's made public.

Thanks,  
Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop TWFN-10  
phone: 301-415-1793



**From:** [Weber, Michael](#)  
**To:** [Satorius, Mark](#); [Johnson, Michael](#); [Ash, Darren](#)  
**Cc:** [Brenner, Eliot](#); [Pham, Bo](#); [Chen, Yen-Ju](#); [Foster, Jack](#)  
**Subject:** FYI - MINI-STAFF MEETING ITEMS  
**Date:** Thursday, August 20, 2015 6:51:38 AM  
**Attachments:** [image001.png](#)

Good morning. Houman, Ilka, and I will be departing for Outside of Scope  
Outside of Scope at 0730, so I am sharing several items for your awareness that I would  
have raised at our events/mini-staff meeting this morning. Outside of Scope

Outside of Scope

- Outside of Scope

- **National Cancer Risk Study** – As indicated in my email late yesterday afternoon, Brian is working on some alternative language for the conclusion of the SECY paper on the National Cancer Risk Study, which I can support. In his absence today and tomorrow, Steve West should be working this text with the partner offices to seek alignment.

- Outside of Scope
- 

Outside of Scope

Thanks,

*Mike*

Michael Weber  
Deputy Executive Director for Materials, Waste, Research,  
State, Tribal, and Compliance Programs  
U.S. Nuclear Regulatory Commission

301-415-1705  
Mail Stop O16E15



DELIVERING OUR FUTURE

**From:** [Burnell, Scott](#)  
**To:** [Brock, Terry](#)  
**Subject:** RE: cancer\_study\_comm\_plan\_2015\_srb  
**Date:** Monday, August 17, 2015 9:25:00 AM  
**Attachments:** [cancer\\_study\\_comm\\_plan\\_Q817\\_srb.docx](#)

---

How's this? I slimmed the document down to just the Q&A for convenience's sake.

**From:** Brock, Terry  
**Sent:** Monday, August 10, 2015 12:34 PM  
**To:** Burnell, Scott <Scott.Burnell@nrc.gov>  
**Subject:** cancer\_study\_comm\_plan\_2015\_srb

Straw responses to your three new Q's. Let's chat.. these need help.



**Appendix A  
Questions and  
Answers**

**Q1. Why has the U.S. Nuclear Regulatory Commission (NRC) decided to conduct this study now?**

A1. This study will provide the NRC staff with the most current scientific information for responding to stakeholder concerns related to cancer mortality and incidence rates for populations that live near past, present, and proposed nuclear power facilities. The NRC staff has used a 1990 study conducted by the National Cancer Institute (NCI), "Cancer in Populations Living near Nuclear Facilities," as a valuable risk communication tool for addressing stakeholder concerns about cancer mortality attributable to the operation of nuclear power facilities. However, the NCI report is over 25 years old and a new study needs to be performed to reflect the current populations living near nuclear power facilities. In addition, the analyses in the NCI report focus on cancer deaths, and the general public is often also interested in cancer incidence (e.g., being diagnosed with cancer, but not necessarily dying from the disease).

**Q2. Why isn't NCI conducting this follow-up to their 1990 work?**

A2. The NRC staff approached NCI management in [2007?] about performing a new study under contract to the NRC, but because of staffing limitations, NCI was unable to commit resources for this activity for the foreseeable future.

**Q3. Why is the NRC abandoning the National Academies suggested research methods?**

A3. The staff concluded the NAS approach remains publicly available for those who have the resources and time to carry it out would take too long to complete and cost too much money in this current budget environment. An The NRC's current path forward on examining cancer risk alternate approach was deemed necessary to will still be provide an updated responsive to stakeholder concerns. The NRC's approach provides the update while avoiding impacts to research on not foregoing safety-significant topics for activities such as licensing, inspection, enforcement, and rulemaking.

**Q4. Why does the NRC think the cost of the study is more important than giving the public the best information about cancer risks from nuclear power?**

A4. The NRC's current approach has to prioritize activities in this tight budget environment appropriately balances the need to provide updated information as promptly as possible with the agency's responsibility to use taxpayer funds as wisely as possible. The methods proposed by NAS are publicly available and can be performed by any other entity willing to perform the study.

**Q5. Why should the public trust the NRC when it's abandoning a truly independent look at cancer risk?**

A5. The NRC's current approach will ensure the independence of the researchers involved and the final product will undergo independent peer review. The entire effort has and will continue to be carried out in full view of the public, is an independent agency that routinely makes independent calls on safety. Any entity selected to complete the study will involve some sort of peer review.

**Q3. Which additional nuclear facilities could be included in the study?**

A3. The NRC is to study all NRC-licensed nuclear power reactors and fuel cycle facilities (e.g., fuel enrichment and fabrication plants) that are in operation in the United States.

The 1990 NCI report included all 52 commercial nuclear power facilities in the United States that that started operation before 1982. Preliminary information indicates that 25 new reactor sites have begun operation since 1982. The 25 new reactor sites and fuel cycle facilities will also be included in the study.

**Q4. Does the NRC suspect that cancer mortality rates are elevated around nuclear power plants?**

A4. The study tests the basic premise that there is no difference in cancer rates near nuclear power plants compared to populations further away.

The staff does not believe the low doses from the routine operations of NRC-licensed facilities would result in are too small to cause observable elevated rates of cancer near the facilities in the populations. The NAS Phase 1 committee's decision to not calculate sample sizes based on actual off-site doses confirms the staff position that at the low offsite doses from these facilities, researchers would not expect to observe any increased cancer risks in the populations surrounding these facilities attributed to the regulated release of radioactive effluents. Nevertheless, the staff believes that despite these potential limitations and expected outcomes, the studies would be helpful to address public health concerns and are therefore still worthwhile to pursue.

**Q5. How can I be sure that the nuclear power plant is not causing cancer? If I lived near a power plant, how might I be exposed to radiation? For example, if my house is 2 miles away from a reactor, am I being exposed whenever I am at my house?**

A5. In the previous study NCI found no increased risk of cancer in those people who lived in counties near nuclear facilities. Nuclear facilities release very small regulated amounts of radioactivity, at very slow rates into the environment. The amounts released are strictly controlled within limits set by the NRC and the U.S. Environmental Protection Agency. Any exposures that may occur are below the established safety limits. The radioactive emissions from nuclear power plants only contribute a very small fraction (1/1000<sup>th</sup>) of our

yearly total radiation exposure (approximately 0.1 percent). For comparison, your radiation exposure from natural radiation sources in soil and rocks, radon gas in homes, radiation from space, and other sources that are naturally found within the human body contributes to approximately 50 percent or 500 times more radiation than from nuclear facilities. The other half of your yearly exposure (also 500 times more radiation than nuclear facilities) is from man-made sources, such as consumer products, medical procedures, and to a much lesser extent, industrial sources.

**Q6. Will the study address cancer rates from leukemia in children near nuclear facilities?**

A6. Yes. The study will address leukemia in all age groups, including children (0–5 years).

**Commented [B51]:** Strictly true? Should we explain the NCRP approach is overall mortality, not broken down by age?

**Q7. I live near a nuclear power plant and my husband died of cancer. Will this study prove that living near the plant caused the cancer?**

A7. No, the study is designed to survey trends in populations and does not evaluate the cause of individual cases. However, the study does give us an indication if the cancer rates of populations near nuclear facilities are the same, greater, or less than what is expected.

**Q8. Are such studies able to detect population health effects from industrial sources?**

A8. Yes. NCI has effectively used county-based studies in the past to study cancer mortality rates. For example, NCI has used county-based studies to show elevated rates of lung cancer deaths in counties with shipyard industries and in counties with arsenic-emitting smelters and refineries.

**Q9. Were past studies, such as the French and German studies on childhood leukemia and radiation from nuclear power plants, being considered?**

A9. Yes, these studies are considered in any literature review of this subject matter.

**Q10. Why some local cancer studies around some nuclear plants show increased cancer rates and some show no increase?**

A10. Numerous local cancer studies that have been performed by local groups near nuclear plants ~~have done studies that could suggest~~ show an increase in cancer ~~risk~~. These local studies are sometimes based on small populations or groups and ~~may or may not~~ could be influenced by local confounding factors, such as eating habits, cigarette smoking, and chemical exposures. In addition, some studies may not be using scientifically accepted epidemiology methods and as such may not be credible. Any local cancer studies should be submitted to the relevant State's Health Department, or to the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry.

However, the NRC has evaluated the radiation levels from radioactive effluents and radiation from nuclear power plants and found that the levels are very low. Therefore,



even with a conservative linear, no-threshold assumption, the corresponding cancer risk is very low.

**Q11. How will the NRC consider this resulting data in new reactor reviews and relicensing decisions?**

A11. The NRC will use the results of the study to answer recurring questions from our stakeholders during the public comment period for regulatory actions. If necessary the results could prompt further review of both new reactor and existing regulations to ensure the effluent and direct radiation exposure dose limits adequately protect public health and safety.

**Q12. What will the NRC do if the results indicate an increase in cancer risk in some populations that live near a specific nuclear facility?**

A12. While the project is still ongoing, the NRC expects any data suggesting increases in cancer risk will first be assessed against the levels of radiation doses attributable to strictly regulated radioactive materials released during plant operation, as well as any public radiation dose that might result from the releases. This data assessment would assist in ~~examining~~ any relationship between the study results and potential radiation exposures of the public at individual plants. Furthermore, the public radiation doses from operating plants are significantly below the radiation safety dose limits set to protect the public and are a small fraction of dose received from natural background. If there continues to be a concern then more refined epidemiology studies can be performed (e.g., case-control study).

**Q13. I live near a nuclear power plant or in near of the proposed pilot study sites. Will I be contacted during this study for information? Will my family or personal medical information be protected during this study or during a cancer incidence study?**

A13. The data used in this study will be obtained from anonymous state and national sources. These data do not contain personal identifying information making it impossible to determine to whom the medical information belongs.

**Q14. How does the NRC ensure the validity of the licensee's reporting of off-site doses and environmental monitoring results?**

A14. The licensee is required to establish, implement, and maintain an acceptable effluent and environmental monitoring program. As such the licensee has the primary responsibility to ensure conformance with all applicable requirements in the area of effluent and environmental monitoring. The NRC performs selective inspections of the program to validate that the licensee is implementing such a program and that public doses are maintained well below regulatory requirements and are in fact as low as reasonably achievable. The following points illustrate

this approach:

- 1) NRC has imposed strict regulatory requirements for conduct of both station effluent monitoring control and environmental monitoring. These requirements are designed to ensure licensee doses to members of the public are well below regulatory limits and are as low as reasonably achievable. Consequently, licensees are obligated to establish, implement, and maintain programs to sample, monitor, evaluate, and control effluents. The licensee is also required to collect and analyze environment samples to detect activity associated with facility operations. The sampling program is designed to review exposure pathways and sampling results. The environmental monitoring program is designed to provide a check on the station effluents control program.
- 2) The NRC has established reporting requirements that require the licensee to report effluent and or environmental monitoring issues as established in program requirements. NRC initiates appropriate reviews and evaluation of the reports and conducts follow-up inspections as appropriate.
- 3) The NRC conducts routine inspections in a variety of ways. The NRC maintains an onsite resident inspection staff that selectively and routinely reviews on-going activities to become aware of issues that may impact effluent or environmental monitoring including public dose. For example the residents review corrective action documents to evaluate potential impact on the effluents control program. The residents also review radiation monitors for indication of releases. During their inspections residents also look for potential unmonitored release paths.
- 4) The NRC also uses specialist inspectors, independent of the resident staff, to conduct periodic onsite inspections of both effluent release and environmental monitoring programs to ensure the licensee conforms with applicable requirements. As part of this review, NRC inspectors also review ground water controls. The inspectors evaluate the adequacy of quality assurance of measurements to ensure they are of appropriate quality and that the licensee is implementing a robust quality assurance program.
- 5) The NRC routinely reviews secondary evaluations conducted as part of the licensees' quality assurance programs (e.g., audits and assessments) as well as independent measurements conducted by other regulatory entities (e.g., state monitoring programs).
- 6) In addition, and as necessary, the NRC conducts independent confirmatory sampling to validate the accuracy of licensee measurements.
- 7) Information provided to the NRC by a licensee must be complete and accurate in all material respects. Submitting falsified information to the NRC is considered a violation of the regulations and will have severe implications. (For additional information, please refer to the Enforcement Policy.)

**From:** [Ledford, Joey](#)  
**To:** [Harrington, Holly](#); [Brenner, Eliot](#)  
**Cc:** [Hannah, Roger](#)  
**Subject:** TNT  
**Date:** Thursday, August 13, 2015 2:13:18 PM  
**Attachments:** [image001.png](#)

Outside of Scope

NFS – The Greeneville (Tenn.) Sun contacted Region II OPA and asked for an update on the proposed cancer study at nuclear facilities across the country, including NFS. The reporter was advised that the staff continues to evaluate options on how to conduct such a study and will soon be informing the Commission of its plans.

**Joey Ledford**  
**Public Affairs Officer**  
**Region II -- Atlanta, Ga.**  
**O: 404.997.4416**  
**C:** (b)(6)  
[joey.ledford@nrc.gov](mailto:joey.ledford@nrc.gov)





**From:** [Burnell, Scott](#)  
**To:** [Barbara A O'Neal](#)  
**Cc:** [Brenner, Eliot](#)  
**Bcc:** [Brock, Terry](#)  
**Subject:** Re: Analysis of Cancer Risks in Populations Near Nuclear Facilities  
**Date:** Tuesday, July 21, 2015 1:59:37 PM

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Hello Ms. O'Neal;

The staff continues to examine the NAS report on the steps for carrying out the pilot studies. We'll publicly announce any decisions once they've been reached. Thank you.

Scott Burnell  
Public Affairs Officer  
Nuclear Regulatory Commission

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From: Barbara A O'Neal <(b)(6)>  
Sent: Tuesday, July 21, 2015 9:35 AM  
To: Burnell, Scott  
Subject: [External\_Sender] Analysis of Cancer Risks in Populations Near Nuclear Facilities

Scott:

We have not heard anything about the National Academy of Sciences Cancer Pilot Study since last year. Could you please tell us what the status is? Am getting some questions from the community about it.

We are specifically interested in the study involving Nuclear Fuel Services, Inc. -- a 57-year-old fuel cycle facility recently fined by the State of Tennessee for mislabeling hazardous waste -- not once, but three times.

<http://wjhl.com/2015/07/09/nfs-fined-for-mislabeling-hazardous-waste>

Thank you,  
Barbara O'Neal  
f/Erwin Citizens Awareness Network, Inc.  
Erwin, TN

**From:** Scott Burnell  
**To:** Brenner, Eliot  
**Subject:** [External\_Sender] RE: RE: cancer study  
**Date:** Tuesday, July 14, 2015 8:17:11 AM

---

Two years once the money was available -- the item is zeroed out in the current request, I'm told.

Sent via the Samsung Galaxy S® 5 ACTIVE™, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Brenner, Eliot" <Eliot.Brenner@nrc.gov>  
**Date:** 07/14/2015 8:05 AM (GMT-05:00)  
**To:** Scott Burnell (b)(6), "Burnell, Scott" <Scott.Burnell@nrc.gov>  
**Subject:** RE: RE: cancer study

Brian said it would take two years.

**From:** Scott Burnell [mailto:(b)(6)]  
**Sent:** Tuesday, July 14, 2015 7:49 AM  
**To:** Brenner, Eliot; Burnell, Scott  
**Subject:** [External\_Sender] RE: cancer study

If we go the route Brian suggests, it's still several years before we get updated mortality numbers, instead of the incidence numbers from the NAS process. We can communicate either path; I expect heavy criticism from the expected sources for anything other than the NAS plan.

It seems the meeting room we were kicked out of yesterday was used for the final Iran session this morning -- pics from the NYT article match the decor. :-)

Sent via the Samsung Galaxy S® 5 ACTIVE™, an AT&T 4G LTE smartphone

----- Original message -----

**From:** "Brenner, Eliot" <Eliot.Brenner@nrc.gov>  
**Date:** 07/13/2015 3:20 PM (GMT-05:00)  
**To:** "Burnell, Scott" <Scott.Burnell@nrc.gov>, Scott Burnell (b)(6) >  
**Subject:** cancer study

FYI: Brian Sheron called me today, first to show off a new electric banjo, and second to tell me that someone associated with the 1990 cancer study has offered for a small amount of money (\$2m) to update it. He was looking for my backing to push back against Mike Weber who, he said, has been going around saying the NAS study is dead. On the premise that something with some data, albeit mortality data rather than incidence data, is better than saying that the agency killed off the NAS study, I said I was for having something.

If you have thoughts to the contrary you should let me know.

Hope you're avoiding the barricades and staying away from the TV trucks.

Eliot

Eliot Brenner  
Director, Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
Rockville, MD 30852  
301-415-8200



<image001.png><NFS IR 2015-006 SIT.PDF>

**From:** Brenner, Eliot  
**To:** Burnell, Scott; Harrington, Holly  
**Subject:** RE: Cancer risk study SECY edits  
**Date:** Monday, June 22, 2015 3:44:00 PM

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Fine by me. Thanks for following the issue.

**From:** Burnell, Scott  
**Sent:** Monday, June 22, 2015 3:43 PM  
**To:** Brenner, Eliot; Harrington, Holly  
**Subject:** Cancer risk study SECY edits

Eliot, Holly;

We're on concurrence for the SECY, and in reviewing it I think we should suggest the following language (in red) for the conclusion:

CONCLUSION:

After considering the three options above, staff felt the NCRP was a reasonable option to move forward. However, due to the current budget environment, the staff has decided to not move forward with this project at this time. The NRC staff initiated this project in an effort to be responsive to stakeholders concerns about cancer risks; however, the current budget environment has required the agency to prioritize its spending to focus on activities directly related to protecting public health and safety (e.g., inspections and licensing). The uncertainty in the NRC budget for the foreseeable future precludes the agency from spending any additional funds on this project.

The NAS Phase 1 report remains publicly available for consideration by groups interested in performing similar work. The NRC will retain the NAS and NCRP approaches to inform any future consideration of the topic.

I think that could play a small role in blunting criticism that we're abandoning the issue.

Your thoughts?

Scott

**From:** [Brenner, Eliot](#)  
**To:** [Baggett, Steven](#); [Harrington, Holly](#)  
**Subject:** Re: NAS Cancer Study - FYI  
**Date:** Thursday, June 11, 2015 7:31:25 PM

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Yes, Scott's on it. Thanks. It won't be well received in some quarters.

On: 11 June 2015 18:50, "Baggett, Steven" wrote:

Eliot, Holly,

Are you aware that staff is positioned (not sure about timing), to not approve NAS to continue with the next phase of the cancer study? This may generate some press interest. The Office of Research will notify NAS, Rebecca Tadesse may be able to help, if you are not aware.



**From:** [Brock, Terry](#)  
**To:** [Burnell, Scott B](#)  
**Subject:** FW: draft cancer risk secy 2015.docx  
**Date:** Tuesday, May 26, 2015 2:08:03 PM  
**Attachments:** [cancer risk secy 2015.docx](#)

---

thx

**From:** Brock, Terry  
**Sent:** Tuesday, May 26, 2015 9:44 AM  
**To:** Case, Michael; Coffin, Stephanie  
**Cc:** Tadesse, Rebecca  
**Subject:** draft cancer risk secy 2015.docx  
Here's a draft to share with Brian. Rebecca has reviewed and concurred. I haven't received QTE comments yet-- I expect those later today.  
Terry

FOR: The Commissioners

FROM: Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

SUBJECT: RESULTS OF THE NATIONAL ACADEMY OF SCIENCES' ANALYSIS  
OF CANCER RISKS IN POPULATIONS NEAR NUCLEAR FACILITIES:  
PHASE 2 PILOT PLANNING PROJECT AND STAFF NEXT STEPS

PURPOSE:

*The purpose of this paper is to update the Commission on the NRC-sponsored, National Academy of Sciences' (NAS) Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 2 Pilot Planning Project and staff plans for the next steps.*

SUMMARY:

In April 2010, the NRC staff requested NAS to perform a study on cancer risks in populations living near NRC-licensed facilities to update the 1990 National Cancer Institute (NCI) report on —Cancer Risks in Populations near Nuclear Facilities. The NAS study was to be performed in Phases. Phase 1 was completed in 2012 with a recommendation for pilot studies. NAS split the pilot studies into a planning and execution phase. The planning phase report was completed in late December 2014. NAS emphasized in the pilot planning report that the pilot studies are meant to determine the practicality of implementing the methods and study designs recommended in Phase 1. NAS also said that the interpretation and communication of risk estimates from the pilot study, if reported, should be done with great caution. NAS emphasized any data collected during the pilot study would have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples. Any decision to proceed with additional study should be based solely on conclusions

CONTACT: Terry Brock, RES/DSA  
301-251-7487



related to practicality and not on risk estimates. NAS communicated to staff that the execution phase of the pilot study will require significant resources to complete--39 months and \$8 million. Due to these limitations of the NAS pilot studies, staff plans an alternate, but more modest, approach to perform a timelier update of the original NCI report with the congressionally-chartered U.S. National Council on Radiation Protection and Measurements (NCRP).

#### BACKGROUND:

Each commercial nuclear power plant and fuel cycle facility that the NRC regulates is authorized to release radioactive materials to the environment as specified in the regulations and licensing documents, in compliance with dose limits for members of the public and concentration limits for liquid and gaseous effluent releases. The staff has concluded that offsite doses to individual members of the public as a result of these routine releases are a small fraction of the 10 CFR Part 20 —Standards For Protection Against Radiation limits specified in 10 CFR 20.1301(a) and (e). The offsite dose to the highest exposed member of the public is also generally less than 1% of the amount of radiation the average U.S. citizen receives in a year from all background sources. Nonetheless, some stakeholders have expressed recurrent concerns about the potential effect of these releases on the health of residents living near nuclear facilities. These concerns are not new or unique to the United States. Since 2008, Canada, France, Germany, Great Britain, Spain, and Switzerland have all conducted epidemiology studies of populations near nuclear facilities within their borders to address public health concerns. These studies have generally found no association between facility operations and increased cancer risks to the public that are attributable to the releases. For example, the German study did find an association of increased childhood leukemia risk within 5 km of the facilities; however, upon examination of the off-site exposures the authors concluded the increased risk could not be attributable to releases from the facilities<sup>1</sup>.

To help address these stakeholder concerns, the staff has been using the 1990 National Cancer Institute (NCI) study, "Cancer in Populations Living Near Nuclear Facilities (ML15035A630) and other more recent epidemiology reports conducted by various State Health Departments when communicating on cancer mortality in populations near nuclear power facilities. The staff relies on credible health studies to augment its discussions about the NRC's robust regulatory programs to keep offsite doses as low as is reasonably achievable (ALARA) by providing public health information that directly applies to the health outcomes that are often of concern (i.e., cancer). However, the 1990 NCI report is now more than 25 years old, an update is needed for staff to provide contemporary cancer information to populations near NRC-licensed nuclear facilities.

In April 2010, NRC requested the National Academy of Sciences (NAS) perform a study on cancer risks in populations living near NRC-licensed facilities to update the 1990 National Cancer Institute (NCI) study. NRC and NAS decided to divide the study into phases. In Phase 1, NAS explored the feasibility of conducting an updated study by developing modern methods to perform the analysis. This was documented in the 2012 report "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1" (ML15035A132). The staff communicated the results of the Phase 1 study and the NAS recommendations for the second phase pilot studies in SECY-12-0136. The second phase would consist of conducting pilot studies to determine the ability to practically apply the Phase 1 methods at seven sites recommended by the NAS committee: Dresden in Illinois, Millstone in Connecticut, Oyster Creek in New Jersey, Haddam

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<sup>1</sup> Kaatsch P, et al. Leukaemia in young children living in the vicinity of German nuclear power plants. Int J Cancer. 2008 Feb 15;122(4):721-6.



Neck (decommissioned) in Connecticut, Big Rock Point (decommissioned) in Michigan, San Onofre in California, and Nuclear Fuel Services in Tennessee. The Phase 1 committee specifically recommended the pilot study examine two study designs: a population study of cancer diagnosis and mortality rates for multiple cancer types and all age groups, down to the census-tract level, and a "case control" study of childhood cancers in children born within a fixed distance of a nuclear facility<sup>2</sup>.

Upon completion of the proposed Phase 2 pilot studies, NAS was to determine whether further study is practical on a nation-wide scale, and the NRC staff would determine whether to perform the studies at all NRC-licensed facilities (i.e., balance of operating nuclear power plants and fuel-cycle facilities). NAS split the Phase 2 pilot study into a pilot planning project and a pilot execution project. This paper describes the significant results of the NAS pilot planning project report, "Analysis of Cancer Risks in Nuclear Facilities: Phase 2 Pilot Planning" (ML15035A135) and staff plans for the next steps.

## DISCUSSION:

### *NAS: Phase 2 Pilot Planning Project Results*

NAS emphasized in the pilot planning report that the pilot studies are meant to determine the practicality of implementing the methods and study designs recommended in Phase 1. NAS also said that the interpretation and communication of risk estimates from the pilot study, if reported, should be done with great caution. They emphasized that any data collected during the pilot study would have limited use for estimating cancer risks in populations near each of the nuclear facilities or for the seven nuclear facilities combined because of the imprecision inherent in estimates from small samples. Further, any decision to proceed with a full scope study should be based solely on conclusions related to practicality and not on risk estimates. NAS also highlighted that the population-based study at the census tract level had significant issues. Staff interpreted that this study design may not be feasible.

NAS communicated to staff that the execution phase of the pilot study will require significant resources to complete. The NAS estimated in the execution phase proposal that it would take them 39 months and cost \$8 million to complete the pilot studies ().

After staff review of NAS' pilot planning report and execution phase proposal they do not believe it is worthwhile to complete the pilot study, given the NAS position regarding the limited usefulness of the results to draw conclusions about the pilot plants (or just as importantly, single facilities), the long duration of the pilot study, and the long-duration of subsequent studies. The staff estimates that it may take NAS eight to ten years to complete the pilot and follow-up studies before NRC has final cancer risk results to share with our stakeholders—the original intent of the project. That would possibly prolong the study to 2025, fifteen years after the start of the project with NAS.

### *NAS Alternate Approach*

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<sup>2</sup>The population-based study design uses a geographical area as the unit of observation (e.g., census tract as proposed by NAS, county as used in the 1990 NCI report, ZIP Code) and uses an aggregate analysis that looks at a study factor (exposure) and an outcome factor (disease or death) measured in the geographical area at the same time. This study can show possible associations between exposure and disease. The case-control study design compares the prevalence of risk factors or exposures in a series of diseased study subjects (cases) with the prevalence of risk factors or exposures in a series of disease-free study subjects (controls). The case-control study design is generally considered a more robust study design than the population-based study.



Staff expressed our concerns to NAS about the usefulness of the pilot study results in communicating cancer risks to our stakeholders and the overall study duration. Staff requested that NAS focus on providing final results for the next phase of the study to shorten the study time. Specifically, staff asked NAS to focus on the Phase 1 recommended "case-control" study design and perform an analysis of a sample of facilities in the United States to draw statistically valid and generalizable results to the entire fleet. The staff omitted the population based study design at the census-tract level from future NAS consideration given the pilot planning committee's multiple concerns about the potential feasibility of this study design. In response, NAS proposed that the pilot planning committee reconvene to examine our request for the alternate approach at an additional \$200,000 for a 9 month study. Additionally, NAS provided a preliminary time estimate of another 50 months to complete the study with final results for staff use at an uncertain cost.

#### *U.S. National Council on Radiation Protection and Measurements (NCRP) Approach*

The NCRP offered to staff to directly update the 1990 NCI study report within a shorter time frame and cost than the NAS proposals (approximately 2-3 years and 2.5 million dollars). The NCRP update would be a more modest initiative than what NRC asked the NAS to consider. NCRP would use the same methods in the 1990 study—a county-wide population based study design, but would be able to provide final results in a reasonable time period to meet the original staff goal of having updated information. The NCRP is in a unique position to update the study since the original 1990 NCI data set and software resides with them, reducing significant start-up time and costs for a new entity to perform the update. Additionally, the NCRP's lead investigator used to work for NCI where he designed, directed, and completed the original 1990 study. The results of the NCRP update would be a consensus report going through their scientific committee and peer-review process. The staff will ask NCRP to update the report with new results for certain NRC facilities not operational or considered at the time of the 1990 study using the same NCI approach of studying population risks at the county level. The staff also plans to ask NCRP upon completion of the update if further study should be done viz-a-viz the NAS Phase 1 case-control study design—generally considered a more robust design.

As far as NCI directly performing the update, the staff originally requested NCI to provide the update; however they were unable to provide staff to support the study and these types of studies were no longer in their research focus. NCI still supports the original report and has a fact sheet on the study that is publicly available on their web site at <http://dceg.cancer.gov/about/organization/programs-ebp/reb/fact-sheet-mortality-risk>.

#### CONCLUSION:

After considering the two NAS and NCRP approaches the staff plans to proceed with the NCRP in updating the 1990 NCI study. NCRP would provide a final report in a shorter time frame with a known completion date and budget. The NCRP approach will be a more modest update than what NRC asked NAS to consider, but a direct update would be adequate for staff to discuss cancer risks when combined with the NRC's robust regulatory program to keep offsite doses ALARA. The staff may re-engage NAS to perform the case-control study design for follow-up research if deemed necessary after the NCRP update is complete.

#### RESOURCES:

The planned NCRP approach to the study will take 2-3 years to complete and will cost approximately \$2 million dollars. For 2016, the Commission zeroed out the budget for the study for higher priority work. Future funds will come from the operating reactor budget line to initiate the proposed project through the Planning, Budget, and Performance Management process.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

cc: C. Hinson  
P. Milligan  
S. Garry  
S. Burnell  
R. Nimitz  
K. Ramsey



RESOURCE:

The planned NCRP approach to the study will take 2-3 years to complete and will cost approximately \$2 million dollars. For 2016, the Commission zeroed out the budget for the study for higher priority work. Future funds will come from the operating reactor budget line to initiate the proposed project through the Planning, Budget, and Performance Management process.

Brian W. Sheron, Director  
Office of Nuclear Regulatory Research

cc: C. Hinson  
P. Milligan  
S. Garry  
S. Burnell  
R. Nimitz  
K. Ramsey

**ADAMS Accession No.: ML15141A404**

|        |             |              |                |           |           |
|--------|-------------|--------------|----------------|-----------|-----------|
| OFFICE | RES/DSA/RPB | Tech Editing | BC:RES/DSA/RPB | D:RES/DSA | R-I       |
| NAME   | T. Brock    | QTE          | R. Tadesse     | M. Case   | D. Dorman |
| DATE   | 05/21/15    | / /          | 05/21/15       | / /       | / /       |
| OFFICE | D:NMSS      | D:NRR        | D:NSIR         | D:NRO     | D:CFO     |
| NAME   | C. Haney    | W. Dean      | B. Holian      | G. Tracy  | M. Wylie  |
| DATE   | / /         | / /          | / /            | / /       | / /       |
| OFFICE | D:OGC       | D:OPA        | D:RES          |           |           |
| NAME   | M. Doane    | E. Brenner   | B. Sheron      |           |           |
| DATE   | / /         | / /          | / /            |           |           |

OFFICIAL RECORD COPY

**From:** [Ledford, Joey](#)  
**To:** [Burnell, Scott B](#)  
**Subject:** RE: Cancer study  
**Date:** Monday, April 06, 2015 2:01:27 PM  
**Attachments:** [image001.png](#)

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Thanks

**From:** Burnell, Scott  
**Sent:** Monday, April 06, 2015 1:57 PM  
**To:** Ledford, Joey  
**Subject:** RE: Cancer study  
Nothing further for now, we're still considering the NAS information.

**From:** Ledford, Joey  
**Sent:** Monday, April 06, 2015 1:40 PM  
**To:** Burnell, Scott  
**Subject:** Cancer study  
Scott: The Greeneville Tennessee Sun is again asking me once about the cancer study.  
Can I safely assume we have no new updates?

Cheers,

**Joey Ledford**  
**Public Affairs Officer**  
**Region II -- Atlanta, Ga.**

**O: 404.997.4416**

**C:** (b)(6)

[joey.ledford@nrc.gov](mailto:joey.ledford@nrc.gov)



**From:** Brock, Terry  
**To:** Burnell, Scott B  
**Subject:** RE: Question regarding funding for the National Academy of Sciences cancer study Phase 2  
**Date:** Thursday, March 26, 2015 9:36:34 AM

---

ok

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** Burnell, Scott

**Sent:** Thursday, March 26, 2015 9:12 AM

**To:** Brock, Terry

**Subject:** FW: Question regarding funding for the National Academy of Sciences cancer study Phase 2

Hi Terry;

How about:

"The staff continues to consider the NAS proposal. The staff expects to update the Commission on a path forward later this spring."

OK?

Scott

**From:** r johnson [mailto:(b)(6)]

**Sent:** Wednesday, March 25, 2015 4:50 PM

**To:** Burnell, Scott

**Subject:** Question regarding funding for the National Academy of Sciences cancer study Phase 2

Dear Scott Burnell,

*I wonder if you could provide me with an update regarding funding for the rest of the Phase 2 cancer study proposed by the National Academy of Sciences. My understanding is that their report came out in December and was submitted to the USNRC in January for funding of the execution phase. I would appreciate any information about when the NRC plans to make its decision, and in the mean time is there any reason why they would not fund this important study?*

Many thanks,

Roger Johnson, PhD

Professor Emeritus

San Clemente, CA

**R. Johnson**



**From:** [Brock, Terry](#)  
**To:** [Dricks, Victor L](#)  
**Cc:** [Burnell, Scott B](#)  
**Subject:** NRC Response to SONGS letter on cancer study  
**Date:** Thursday, January 31, 2013 9:35:16 AM  
**Attachments:** [Roger Johnson SONGS response.docx](#)  
[brock enclosure.docx](#)

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Hi Victor,

As discussed, attached is the cover letter and response to Dr. Johnson's questions, re: SONGS and the cancer risk study. Scott Burnell and I with NRR input are ready to go with this version but wanted to make you aware of the letter and to solicit your feedback. Thanks for reviewing today.

Terry

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** Brock, Terry  
**Sent:** Wednesday, January 30, 2013 10:03 AM  
**To:** Pope, Tia  
**Subject:** Incoming SONGS letter request  
Please add to the SONGS response package.

Thanks,

Terry

Q1. Will the NRC agree not to be involved in any way in the selection of scientists and staff members for this study? This assurance would include nominations, recommendations, interviews, and selection of all personnel as well as the avoidance of any written or informal exchanges with the NAS.

A1. The U.S. Nuclear Regulatory Commission (NRC) selected the National Academy of Sciences (NAS) to perform the study because of the organization's reputation for scientific rigor and independence. The NAS study process is completely independent from the NRC; it is transparent, objective, and technically rigorous and will ensure that the study will be comprehensive and scientifically sound. The NAS selects committee members independently. If the NAS requests NRC assistance in any portion of the study, the agency will respond in a way that maintains the independence of NAS research.

Q2. Will the NRC agree not to be involved in any way in the scope and design of the study? That would mean the NAS methods and procedures will be carried out without any kind of input or review by the NRC.

A2. The independent NAS Phase 1 study committee has already recommended an approach and designs for the pilot studies. The feasibility of these approaches are being determined through pilot studies. The Phase 1 report is available online to the public at [http://www.nap.edu/catalog.php?record\\_id=13388#toc](http://www.nap.edu/catalog.php?record_id=13388#toc). If the NAS requests NRC assistance in any portion of the study, the agency will respond in a way that maintains the independence of NAS research.

Q3. Will the NRC agree not to be involved in any way in the analysis or interpretation of data? This would mean that the NRC would have no advance knowledge of the results before they are made public and that the NRC would not be involved in any way in writing of the report or its conclusions.

A3. The NRC will abide by the existing NAS research process regarding interaction with the NRC prior to public release of the study results. For more information, see the link to the NAS study process Web site <http://www.nationalacademies.org/studyprocess/index.html>.

Q4. If the NAS indeed fails to find any cancer effects, will the NRC refrain from placing an unscientific spin on the data by claiming that such results prove that NPP do not cause cancer? As a scientist, I am sure you know that researchers can never prove the null hypothesis. If no statistically significant effects are found, the only possible conclusion is that the study failed to find an effect. It would not prove that there are no effects.

A4. The NRC has consistently stated only that the available evidence shows no excess cancer mortality risk in communities near U.S. nuclear power plants attributable to the regulated discharge of radioactive effluents. Ongoing U.S. nuclear power plant oversight, including environmental sampling, indicates any releases of radioactive materials would result in public



doses that represent a miniscule fraction of the dose from naturally occurring radiation and below any radiation protection dose limits where excess cancers would not be expected to be observed epidemiologically. This supports the NRC's consistent statement of an appropriate working hypothesis—any effect on cancer risk from nuclear power plant releases is very likely too small to be measurable. Once the NAS study is complete, the NRC will make statements that accurately reflect the study's findings.

Q5. Since the NRC has already chosen to speculate that nothing will be found, may I ask you to speculate on what the NRC position would be if a cancer effect is discovered? Obviously this pilot study would have to be expanded but that is not the reply I am seeking. The results of this study will probably not be available until 2015, and if further research is recommended it is possible that the issue could be tied up until the next decade. If there is a cancer effect, what are the policy implications for the future of nuclear power? People (especially children) may have been suffering from the NPP emissions for decades already and it would be unconscionable to not to take action, especially since the charge of the NRC is to protect public safety.

A5. NRC spokespeople have consistently stated that if the NAS study indicates a possible increase in public cancer risk attributable to the regulated effluent releases from commercial nuclear power plant operation, the agency will determine if and how it can modify regulations to maintain public health and safety.

Q6. As a follow-up on the important issue of public safety, may I quote from the NRC Mission Statement which says the mission of the NRC is "...to ensure the adequate protection of public health and safety, promote the common defense and security, and to protect the environment." This clearly means that the NRC is charged with all safety aspects of nuclear power plants especially including public health and protection of the environment. Instead of addressing these issues, the public has seen the NRC avoid such issues. For example, all the NRC hearings in this area have been narrowly focused on engineering questions, the assumption being that nuclear power plants are automatically "safe" if it can be shown that the engineering designs are correct. At the start of each meeting, an NRC spokesman states clearly that they will not entertain any questions other than technical questions about nuclear engineering. There are at least a dozen major questions of nuclear power plant safety, and the NRC restricts all discussion to only one: engineering. When will the NRC hold hearings about the public health or environmental contamination? When will it hold hearings about seismic dangers? (I hope you read the new report a few days ago in which scientists now say that fault lines in California may connect and cause a megaquake: <http://articles.latimes.com/2013/jan/09/science/la-sci-big-earthquakes-30130110>.) Why does the NRC ignore important safety issues related (sic) waste storage, terrorism, human error, sabotage, and other issues which could make nuclear power plants unsafe? If the NRC does not wish to deal with its charge of public safety, please tell me what other government agencies are authorized to regulate the nuclear power industry.

A6. If a nuclear power plant is meeting the NRC's regulations, then the agency considers the plant to be operating safely. The NRC assigns full-time, onsite inspectors to every nuclear power plant. The NRC supplements this onsite oversight by also assigning experts at the



agency's regional and headquarters offices to examine and review plant performance on an ongoing basis. This ensures that the plants are continuously meeting the agency's requirements for operation. Each year, the NRC's review processes include hundreds of public meetings on a variety of highly technical matters, both at agency headquarters and in communities near nuclear power plants. It is not possible for the NRC to bring NRC experts on every subject topical to nuclear safety and operation to every public meeting; the agency follows well-established procedures to tailor the meeting to the topic at hand. This ensures that the public can observe the process and ask the NRC staff experts present the questions that the experts are most qualified to answer. These meetings cover a wide range of topics, including environmental reviews, seismic research (as was recently discussed at the Diablo Canyon plant), and annual discussions of overall plant performance. Below is a description of the three categories of NRC meetings and the level of public participation available at each meeting.

- Category 1 meetings are between the NRC and one other party—typically a licensee of the NRC, a vendor, an applicant, or a potential applicant for a license. The public can observe these meetings and has the opportunity to ask questions of the NRC after the business portion of the meeting; however, the public cannot participate in the discussion itself.
- Category 2 meetings are between the NRC and a number of individuals representing groups such as licensees, vendors, other Federal agencies, or nongovernmental organizations. The public can observe the meeting and ask questions of the NRC; however, the public cannot participate in the discussion itself.
- Category 3 meetings are fully engaged discussions between the NRC and the public (as well as stakeholders that might include other Government agencies, the industry, and others). The NRC actively seeks public participation at this type of meeting. Category 3 meetings offer the widest participation opportunity for the public. The NRC has specifically tailored these meetings for the public to make comments or ask questions.

The NRC's Web site includes information on everything under the agency's jurisdiction, including safely and securely storing spent nuclear fuel (<http://www.nrc.gov/waste/spent-fuel-storage/wcd.html>) and requirements for keeping nuclear power plants secure from attack or sabotage (e.g. <http://www.nrc.gov/security/post-911.html> <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/cyber-security-bq.html> and <http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0314/>).

Roger Johnson, PhD  
Professor Emeritus  
2840 Calle Heraldo  
San Clemente, CA 92673  
(b)(6)  
(949) 218-1337

Dear Dr. Johnson,

Thank you for your e-mail of January 13, 2012, expressing concerns about the San Onofre Nuclear Generating Station (SONGS) and the forthcoming National Academy of Sciences (NAS) pilot studies on cancer risks in populations near nuclear facilities.

The U.S. Nuclear Regulatory Commission (NRC) encourages individuals and groups to communicate with the agency on issues of mutual concern. You asked six specific questions; the agency has answered each of these questions in the enclosure to this letter. In addition to your six specific questions, you also expressed a general concern about NAS's ability to perform an unbiased study. For more information, I suggest you read about the NAS study process at <http://www.nationalacademies.org/studyprocess/index.html>. This NAS information, in addition to the NRC's direct response to your questions, may answer many of your concerns.

Sincerely,

Brian S. Sheron, Director  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission

Enclosure:  
As stated

Roger Johnson, PhD  
Professor Emeritus  
2840 Calle Heraldo  
San Clemente, CA 92673

(b)(6)

(949) 218-1337

Dear Dr. Johnson,

Thank you for your e-mail of January 13, 2012, expressing concerns about the San Onofre Nuclear Generating Station (SONGS) and the forthcoming National Academy of Sciences (NAS) pilot studies on cancer risks in populations near nuclear facilities.

The U.S. Nuclear Regulatory Commission (NRC) encourages individuals and groups to communicate with the agency on issues of mutual concern. You asked six specific questions; the agency has answered each of these questions in the enclosure to this letter. In addition to your six specific questions, you also expressed a general concern about NAS's ability to perform an unbiased study. For more information, I suggest you read about the NAS study process at <http://www.nationalacademies.org/studyprocess/index.html>. This NAS information, in addition to the NRC's direct response to your questions, may answer many of your concerns.

Sincerely,

Brian S. Sheron, Director  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission

Enclosure:  
As stated

**ADAMS Accession No.:**

|        |             |          |                |            |         |
|--------|-------------|----------|----------------|------------|---------|
| OFFICE | RES/DSA/RPB | QTE      | RES/DSA/RPB:BC | RES/DSA: D | RES:D   |
| NAME   | TBrock      | E-mail   | SBGoddard      | KGibson    | BSheron |
| DATE   | 01/29/13    | 01/30/13 | 01/30/13       | / /13      | / /13   |

**OFFICIAL RECORD COPY**



**From:** [Wingo, Erin](#)  
**To:** [Burnell, Scott B](#)  
**Subject:** RE: Cancer Risk Assessment: Phase I Report Update  
**Date:** Thursday, March 22, 2012 3:25:10 PM

---

Hi Scott,  
Unfortunately I will be tied up in a committee meeting all day Monday. You will be able to discuss press releases and so forth with Kevin, however.  
Erin

**From:** Burnell, Scott [mailto:Scott.Burnell@nrc.gov]  
**Sent:** Thursday, March 22, 2012 2:45 PM  
**To:** Wingo, Erin  
**Subject:** RE: Cancer Risk Assessment: Phase I Report Update

Hi Erin;  
Will you be at the briefing Monday? I was hoping to go over press releases and such with you and Kevin. Thanks.  
Scott

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Thursday, March 22, 2012 2:40 PM  
**Subject:** Cancer Risk Assessment: Phase I Report Update

Dear interested parties,

The report entitled Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I will be officially released one week from today, on Thursday, March 29 at 11:00 am. At that time, the report will be available for download from the National Academies Press website. We will send you the link to the report via this listserv when the report is released. In addition, we will provide information about the 60-day public comment period for the report, which will occur after its release.

Sincerely,

Erin Wingo  
Communications Liaison

**From:** Brock, Terry  
**To:** McIntyre, David T; Burnell, Scott R  
**Cc:** HARRINGTON, HOLLY M; Brenner, Eliot B; TOMON, JOHN J; Diaz, Marilyn X  
**Subject:** RE: cancer risk report pre-release announcement  
**Date:** Thursday, March 22, 2012 1:12:22 PM

---

Who is handling the NRC press release?

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** McIntyre, David  
**Sent:** Thursday, March 22, 2012 12:28 PM  
**To:** Brock, Terry; Burnell, Scott  
**Cc:** Harrington, Holly; Brenner, Eliot  
**Subject:** FW: cancer risk report pre-release announcement  
FYI. Scott will be attending the Monday morning briefing by NAS for Brian Sheron, as it conflicts with the FSME staff meeting for me.

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Thursday, March 22, 2012 12:28 PM  
**To:** McIntyre, David  
**Subject:** cancer risk report pre-release announcement

Hi Dave,

I just wanted to give you a heads up that we will be alerting our interested parties listserv today about next week's report release.

Here's the language we intend to use:

Dear interested parties,

The report entitled Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I will be officially released one week from today, on Thursday, March 29 at 11:00 am. At that time, the report will be available for download from the National Academies Press website. We will send you the link to the report via this listserv when the report is released. I will also send you information about the 60-day public comment period for the report, which will occur after its release.

Best,

Erin

---

Erin Wingo  
Senior Program Assistant  
Nuclear and Radiation Studies Board  
(202) 334-3066  
[ewingo@nas.edu](mailto:ewingo@nas.edu)

**From:** [McIntyre, David](#)  
**To:** [Burnell, Scott R](#)  
**Subject:** RE: REMINDER: NAS CANCER STUDY BRIEFING TO BRIAN SHERON  
**Date:** Wednesday, March 21, 2012 4:43:56 PM

---

Show-off?

**From:** Burnell, Scott  
**Sent:** Wednesday, March 21, 2012 4:43 PM  
**To:** McIntyre, David  
**Subject:** Re: REMINDER: NAS CANCER STUDY BRIEFING TO BRIAN SHERON  
In fact, I'll try to attend in person.

Sent from an NRC Blackberry  
Scott Burnell

(b)(6)

**From:** McIntyre, David  
**To:** Burnell, Scott  
**Sent:** Wed Mar 21 16:41:26 2012  
**Subject:** FW: REMINDER: NAS CANCER STUDY BRIEFING TO BRIAN SHERON

An inconvenient time, given the FSME senior staff meeting at 0930, and I should be there because of the Colorado kerfuffle. Will you be able to listen in?

---

**From:** Diaz, Marilyn  
**Sent:** Wednesday, March 21, 2012 4:05 PM  
**To:** Flory, Shirley; Sheron, Brian; Holian, Brian; Weber, Michael; Leeds, Eric; Johnson, Michael; Wiggins, Jim; Haney, Catherine; Satorius, Mark; McCree, Victor; Pederson, Cynthia; Collins, Elmo; Brenner, Eliot; Schmidt, Rebecca; Cassidy, John; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; Virgilio, Rosetta; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Dean, Bill; Brock, Terry; Gibson, Kathy; Scott, Michael  
**Cc:** Buckley, Patricia; Bailey, Marissa; Smith, Brian; Dickson, Billy; Screnci, Diane; Sheehan, Neil; R1DRSCAL RESOURCE; Dapas, Marc; Uhle, Jennifer; Caniano, Roy; Campbell, Vivian; Freeman, Denise; Fleischmann, Trevor; R4Meeting Resource; Tannenbaum, Anita; Vogel, Anton; Blount, Tom; Mehrhoff, Vivian; Werner, Greg; Carson, Louis; Alldredge, Casey; Greene, Natasha; Ricketson, Larry; O'Donnell, John; Ramsey, Kevin; Castleman, Patrick; Pope, Tia  
**Subject:** REMINDER: NAS CANCER STUDY BRIEFING TO BRIAN SHERON

REMINDER: NAS BRIEFING TO BRIAN SHERON ON THE CANCER STUDY  
PHASE I RESULTS NEXT MONDAY MARCH 26

IF YOU WANT TO JOIN THE MEETING VIA VTC, PLEASE CONTACT  
SHIRLEY FLORY.

-----Original Appointment-----

**From:** Flory, Shirley  
**Sent:** Friday, February 24, 2012 10:38 AM  
**To:** Flory, Shirley; Sheron, Brian; Holian, Brian; Weber, Michael; Leeds, Eric; Johnson, Michael; Wiggins, Jim; Haney, Catherine; Satorius, Mark; McCree,



Victor; Pederson, Cynthia; Collins, Elmo; Brenner, Eliot; Schmidt, Rebecca; Cassidy, John; Chapman, Gregory; Dacus, Eugene; Dehmel, Jean-Claude; Garry, Steven; Jones, Andrea; McIntyre, David; Milligan, Patricia; Mizuno, Beth; Nimitz, Ronald; Stearns, Don; Virgilio, Rosetta; VonTill, Bill; Weil, Jenny; Woodruff, Gena; Rakovan, Lance; Diaz, Marilyn; Bush-Goddard, Stephanie; Humberstone, Matthew; Conatser, Richard; Tomon, John; Dean, Bill; Brock, Terry; Gibson, Kathy; Scott, Michael

**Cc:** Buckley, Patricia; Bailey, Marissa; Smith, Brian; Dickson, Billy; Screnci, Diane; Sheehan, Neil; R1DRSCAL RESOURCE; Dapas, Marc; Uhle, Jennifer; Caniano, Roy; Campbell, Vivian; Freeman, Denise; Fleischmann, Trevor; R4Meeting Resource; Tannenbaum, Anita; Vogel, Anton; Blount, Tom; Mehrhoff, Vivian; Werner, Greg; Carson, Louis; Alldredge, Casey; Greene, Natasha; Ricketson, Larry; O'Donnell, John; Ramsey, Kevin; Castleman, Patrick; Pope, Tia

**Subject:** RE-SCHEDULING OF THE NAS CANCER STUDY BRIEFING TO BRIAN SHERON

**When:** Monday, March 26, 2012 10:00 AM-11:30 AM (GMT-05:00) Eastern Time (US & Canada).

**Where:** CSB 6B1 - Bridge Lline: 888-997-8507, Passcode: (b)(6)

**Importance:** High

When: Monday, March 26, 2012 10:00 AM-11:30 AM (GMT-05:00) Eastern Time (US & Canada).

Where: CSB 6B1 - Bridge Lline: 888-997-8507, Passcode: (b)(6)

Note: The GMT offset above does not reflect daylight saving time adjustments.

\*~\*~\*~\*~\*~\*~\*~\*~\*~\*

NOTE: THIS MEETING WAS ORIGINALLY SCHEDULED FOR MONDAY, MARCH 12. NAS WAS UNABLE TO GET FINAL SIGNATURE ON THE REPORT IN TIME TO HOLD THE BRIEFING. THE BRIEFING FOR BRIAN SHERON IS BEING RE-SCHEDULED FOR MONDAY, MARCH 26..

BRIDGE LINE: 888-997-8507, PASSCODE: (b)(6)

Thanks – Shirley (301-251-7400)

PURPOSE: NAS (K. Crowley) Briefing to Brian Sheron on the Results of the Analysis of cancer Risk in Populations Near Nuclear Facilities – Phase I Study

VTC will be set up for Regions and other offices that request it at HQ and the satellite locations.

Contacts: Shirley Flory/Tia Pope

**From:** Diaz, Marilyn  
**To:** Diaz, Marilyn X; Burnell, Scott R; CASSIDY, JOHN G; CHAPMAN, GREGORY C; DACUS, EUGENE; Dehmel, Jean-Claude; GARRY, STEVEN M; JONES, ANDREA R; McIntyre, David I; MILLIGAN, PATRICIA A; MIZUNO, BETH N; NIMITZ, RONALD L; Stearns, Don L; Virgilio, Rosetta; VonTill, Bill W; KUHMANN, JENNY W; Crespo, Manuel; WOODRUFF, GENA Y; RAKOVAN, LANCE J; BUSH-GODDARD, STEPHANIE P; HUMBERSTONE, MATTHEW J; Conatser, Richard; TOMON, JOHN J; BROCK, TERRY A  
**Subject:** FYI: Cancer Study Communication Team  
**Date:** Wednesday, March 14, 2012 9:30:38 AM

---

All,

NAS will not be presenting tomorrow. John Burris will not present the results of the Cancer Study at the RIC, his talk was cancelled due to the cancellation of Monday's briefing.

Note that the report briefing is being re-scheduled for **Monday, March 26.**

Thanks,

**Marilyn Diaz**

U.S. Nuclear Regulatory Commission

Chemical Engineer

RES/DSA/HEB

CSB3-A20

(301)492-3172

**From:** [McIntyre, David](#)  
**To:** [Diaz, Marilyn X](#); [Burnell, Scott B](#)  
**Cc:** [BROCK, TERRY A](#)  
**Subject:** RE: NAS Cancer Study-Press Release  
**Date:** Monday, March 12, 2012 1:31:05 PM

---

Thanks! And *\*sigh of relief\** as this is going to be a busy enough week as it is!

**From:** Diaz, Marilyn  
**Sent:** Monday, March 12, 2012 1:30 PM  
**To:** Burnell, Scott; McIntyre, David  
**Cc:** Brock, Terry  
**Subject:** NAS Cancer Study-Press Release

Hi guys,

Just to let you know, NAS had last minute changes to make to the report, Phase 1 report won't go out this week.

We'll let you know of the new date soon.

Thanks

**Marilyn Diaz**

U.S. Nuclear Regulatory Commission  
Chemical Engineer  
RES/DSA/HEB  
CSB3-A20  
(301)492-3172

**From:** Brock, Terry  
**Sent:** Wednesday, March 07, 2012 10:58 AM  
**To:** Burnell, Scott; Diaz, Marilyn; McIntyre, David; Wingo, Erin  
**Cc:** Tomon, John  
**Subject:** RE: NAS Cancer Study-Press Release

Hi Scott,

This was as starting point, what else should we add? Please do your magic. Erin, have you all created the press release for next week's release?

Thanks,

Terry

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Burnell, Scott  
**Sent:** Wednesday, March 07, 2012 10:45 AM  
**To:** Diaz, Marilyn; McIntyre, David; Wingo, Erin  
**Cc:** Brock, Terry; Tomon, John  
**Subject:** RE: NAS Cancer Study-Press Release

Hello all;

Jumping in while Dave's out – Do you have anything beyond the phrasing below? And are we planning an NRC press release in conjunction with NAS (as has been the case before)? Thanks.

Scott



**From:** Diaz, Marilyn  
**Sent:** Wednesday, March 07, 2012 10:43 AM  
**To:** McIntyre, David  
**Cc:** Burnell, Scott; Brock, Terry; Tomon, John  
**Subject:** NAS Cancer Study-Press Release

Dave,

I heard in your voicemail that you're going to be out of the office until Monday. This may be ahead of time but as we are getting closer to NAS Cancer Study Report release, the RIC and NAS briefing on the Report there are several things we need to coordinate. I'm helping Terry Brock with this project and so we have drafted a write up for next week's press release. Please revise it as you may see fit and you'll need to coordinate with the NAS OPA person before--she is Erin Wingo at [EWingo@nas.edu](mailto:EWingo@nas.edu). "On March 14, 2012, the National Academy of Sciences (NAS) will make the results of the NRC-sponsored feasibility study: "Analysis of Cancer Risk in Populations near Nuclear Facilities—Phase 1" publicly available. The NRC will review and consider the Phase 1 report and recommendations to determine the next step for phase 2 of the study. The study is publically available on the NAS website at [www.nas.edu](http://www.nas.edu)."

Thanks,

**Marilyn Diaz**

U.S. Nuclear Regulatory Commission  
Office of Nuclear Regulatory Research  
Washington D.C. 20555  
Mail Stop CSB-3A07  
(301)492-3172

**From:** Weber, Michael  
**To:** Sheron, Brian  
**Cc:** Powell, Amy; BOWMAN, GREGORY T; Burnell, Scott B; Leeds, Eric; Satorius, Mark; Pederson, Cynthia D; Virgilio, Martin; WITTICK, BRIAN D  
**Subject:** RESPONSE - Cancer Risk Assessment: Chicago Meeting Agenda and Location  
**Date:** Tuesday, April 05, 2011 11:52:54 AM

---

Thanks, Brian

**From:** Sheron, Brian  
**Sent:** Tuesday, April 05, 2011 11:49 AM  
**To:** Weber, Michael  
**Subject:** FW: Cancer Risk Assessment: Chicago Meeting Agenda and Location

FYI, NAS Cancer Risks Committee is having their first information collection meeting at various sites around the country in Chicago. Agenda is attached. Note that Joseph Sauer is making a presentation. Dr. Sauer's daughter contracted brain cancer, and I was told her oncologist told the family it was caused by releases from Braidwood. Dr. Sauer also says he did an epidemiological study of cancer incidence in the vicinity of Braidwood and claims to see and increased incidence. We have asked for his study so we can see what he did and how he arrived at his conclusions, and my understanding is that he has not provided it. Hopefully the Committee will press him to submit it.

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Monday, April 04, 2011 3:34 PM  
**Subject:** Cancer Risk Assessment: Chicago Meeting Agenda and Location  
Dear interested parties,

The April 18<sup>th</sup> committee meeting of the study, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1," will take place at the Marriott Chicago Southwest – Burr Ridge, located at 1200 Burr Ridge Parkway, Burr Ridge, IL 60527. (<http://www.marriott.com/hotels/travel/chisw-chicago-marriott-southwest-at-burr-ridge/>)

Members of the public are welcome to attend the data-gathering sessions of this meeting, which will include full committee sessions as well as small working group sessions. There will also be an evening public comment session. These sessions will all also be webcast. Please see an early draft of the agenda attached. *This agenda is subject to change, and we will be following up with updates as necessary.* For more information on this meeting and the study in general, please see our website (<http://www.nationalacademies.org/cancerriskstudy>). Please direct any inquiries and comments to the project email: [crs@nas.edu](mailto:crs@nas.edu)

**From:** [Mitlyng, Viktoria](#)  
**To:** [Hayden, Elizabeth](#); [Chandrathil, Prema](#)  
**Cc:** [Burnell, Scott B](#)  
**Subject:** RE: Chicago trip?  
**Date:** Monday, April 04, 2011 4:08:20 PM

---

He already sent her an e-mail. Hopefully, she'll get back to me. If not, I'll have to track her down.

-----Original Message-----

From: Hayden, Elizabeth  
Sent: Monday, April 04, 2011 3:07 PM  
To: Mitlyng, Viktoria; Chandrathil, Prema  
Cc: Burnell, Scott  
Subject: RE: Chicago trip?

OK. Thanks. I'll ask Scott to give you the name of the appropriate contact for the meeting.

Beth Hayden  
Senior Advisor  
Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
--- Protecting People and the Environment  
301-415-8202  
[elizabeth.hayden@nrc.gov](mailto:elizabeth.hayden@nrc.gov)

-----Original Message-----

From: Mitlyng, Viktoria  
Sent: Monday, April 04, 2011 11:47 AM  
To: Hayden, Elizabeth; Chandrathil, Prema  
Subject: RE: Chicago trip?

Absolutely! I'll be there. Vika

-----Original Message-----

From: Hayden, Elizabeth  
Sent: Monday, April 04, 2011 8:50 AM  
To: Mitlyng, Viktoria; Chandrathil, Prema  
Subject: FW: Chicago trip?  
Importance: High

I know this is high public meeting season, but also know that Jan is coming in to help, so could someone from the region cover this meeting in Chicago on April 18?

Beth Hayden  
Senior Advisor  
Office of Public Affairs  
U.S. Nuclear Regulatory Commission  
--- Protecting People and the Environment  
301-415-8202  
[elizabeth.hayden@nrc.gov](mailto:elizabeth.hayden@nrc.gov)

-----Original Message-----

From: Burnell, Scott



Sent: Monday, April 04, 2011 9:26 AM  
To: Hayden, Elizabeth; Chandrathil, Prema; Mitlyng, Viktoria  
Subject: FW: Chicago trip?  
Importance: High

Good Morning, all;

RES would like OPA support at the Chicago meeting of the NAS panel on Monday the 18th. Any thoughts on how to handle this?

Scott

-----Original Message-----

From: Brock, Terry  
Sent: Monday, April 04, 2011 9:19 AM  
To: Burnell, Scott; Bush-Goddard, Stephanie  
Subject: RE: Chicago trip?

Steve Shaffer and I are going. I would certainly appreciate your presence, or someone from RIII could cover. I have a gut feeling we are going to get questions about the Japanese events and would prefer OPA to cover those.

The 2nd committee meeting will be held from April 18-19 at the Chicago Marriott Southwest at Burr Ridge. The link is below.

<http://www.marriott.com/hotels/travel/chisw-chicago-marriott-southwest-at-burr-ridge/>

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

-----Original Message-----

From: Burnell, Scott  
Sent: Monday, April 04, 2011 8:23 AM  
To: Brock, Terry; Bush-Goddard, Stephanie  
Subject: Chicago trip?  
Importance: High

Terry, Stephanie;

Before I forget again, who's going to Chicago for the NAS meeting and do you expect to need OPA support?  
Thanks.

Scott

**From:** [Wingo, Erin](#)  
**Subject:** Cancer Risk Assessment: Chicago Meeting Agenda and Location  
**Date:** Monday, April 04, 2011 3:33:53 PM  
**Attachments:** [CRSagenda-draft4-4.pdf](#)

---

Dear interested parties,

The April 18<sup>th</sup> committee meeting of the study, "Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1," will take place at the Marriott Chicago Southwest – Burr Ridge, located at 1200 Burr Ridge Parkway, Burr Ridge, IL 60527. (<http://www.marriott.com/hotels/travel/chisw-chicago-marriott-southwest-at-burr-ridge/>)

Members of the public are welcome to attend the data-gathering sessions of this meeting, which will include full committee sessions as well as small working group sessions. There will also be an evening public comment session. These sessions will all also be webcast. Please see an early draft of the agenda attached. This agenda is subject to change, and we will be following up with updates as necessary. For more information on this meeting and the study in general, please see our website (<http://www.nationalacademies.org/cancerriskstudy>). Please direct any inquiries and comments to the project email: [crs@nas.edu](mailto:crs@nas.edu)

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

Nuclear and Radiation Studies Board

500 Fifth Street, NW  
Washington, DC 20001  
Phone: 202 334-3066  
Fax: 202 334-3077  
[www.nationalacademies.org](http://www.nationalacademies.org)

## **Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase 1**

**Second Committee Meeting: April 18, 2011**

**Chicago, Illinois**

The Chicago Marriott Southwest at Burr Ridge  
1200 Burr Ridge Parkway  
Burr Ridge, IL 60527

**Agenda Draft: April 4, 2011**

### **Monday, April 18**

- |          |  |
|----------|--|
| 9:25 am  | <b>Call to order and welcome</b><br><i>John Burris, committee chair</i>  |
| 9:30 am  | <b>U.S.NRC's program for keeping nuclear power plant offsite doses as low as reasonably achievable (ALARA)</b><br><i>Steven Schaffer, Ph.D., Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission</i> |
| 9:50 am  | <b>Background on environmental monitoring and population exposures</b><br><i>TBD</i>   |
| 10:10 am | <b>Health concerns and data around the Illinois nuclear power plants</b><br><i>Joseph Sauer, MD</i>  |
| 10:30 am | <b>Questions and general discussion</b>  |
| 10:50 am | <b>BREAK</b>   |
| 11:00 am | <b>Background on cancer registries</b><br><i>TBD</i>   |
| 11:20 am | <b>Background on childhood cancer registries</b><br><i>Julie Ross, University of Minnesota</i>   |
| 11:40 am | <b>Questions and general discussion</b>  |
| 11:55 am | <b>Introduction to working group sessions</b>  |
| 12:00 pm | <b>Plenary sessions conclude</b>   |



# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

## WORKING GROUP CONCURRENT SESSIONS: OPEN TO THE PUBLIC Rooms TBD

### Dosimetry working group

*Led by Andre Bouville, National Cancer Institute (retired)*

*Invited expert: John Till, Radiological Assessments Corporation*

- |         |  |
|---------|--|
| 1:00 pm | Discussion of plenary sessions   |
| 1:10 pm | Technical details on nuclear power plant offsite dose assessment       |
| 2:00 pm | BREAK  |
| 2:10 pm | Technical details on environmental monitoring and population exposures |
| 2:50 pm | Discussion   |
| 3:00 pm | BREAK  |
| 3:15 pm | Dose reconstruction methods  |
| 5:00 pm | Working group session concludes  |

### Registry working group

*Led by Margaret Karagas, Dartmouth Medical School*

*Invited expert: Julie Ross, University of Minnesota*

- |         |   |
|---------|---|
| 1:00 pm | Cancer Registries   |
| 1:30 pm | Childhood cancer registries<br><i>Julie Ross, University of Minnesota</i> |
| 2:00 pm | BREAK   |
| 2:10 pm | General Discussion  |
| 3:00 pm | BREAK   |

### Epidemiology and Statistics working group

*Led by Roy Shore, Radiation Effects Research Foundation*

*Invited expert: Martha Linet, National Cancer Institute*

- |         |  |
|---------|--|
| 3:15 pm | Introduction of the speaker and panel<br><i>Rania Kosti, program officer</i> |
| 3:20 pm | Title TBD<br><i>Roy Shore, Radiation Effects Research Foundation</i>         |
| 3:40 pm | General Discussion   |
| 5:00 pm | Working Groups conclude  |

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

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## DATA GATHERING SESSION: OPEN TO THE PUBLIC, location TBD

---

7:30 pm

- **Opening remarks**  
*John Burris, committee chair;*
- **Importance of public outreach to the study**
- **Public comments (signup sheet provided in the room)**

9:00 pm

**Adjourn data-gathering session open to the public**

**From:** [Wingo, Erin](#)  
**To:** [Burnell, Scott R](#)  
**Cc:** [BROCK, TERRY A](#)  
**Subject:** RE: cancer press release #2  
**Date:** Monday, April 04, 2011 3:19:34 PM

---

Also, please note in your notice that this agenda is an early draft and is subject to change. Thanks!

**From:** Burnell, Scott [mailto:Scott.Burnell@nrc.gov]  
**Sent:** Monday, April 04, 2011 3:18 PM  
**To:** Wingo, Erin  
**Cc:** Brock, Terry  
**Subject:** RE: cancer press release #2  
Thanks!

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Monday, April 04, 2011 3:13 PM  
**To:** Burnell, Scott  
**Cc:** Brock, Terry  
**Subject:** RE: cancer press release #2  
Scott,  
Here's the link: <http://dels.nas.edu/resources/static-assets/nrsb/agenda/agendadraft4-4.pdf>  
Erin

**From:** Burnell, Scott [mailto:Scott.Burnell@nrc.gov]  
**Sent:** Monday, April 04, 2011 2:01 PM  
**To:** Wingo, Erin  
**Cc:** Brock, Terry  
**Subject:** RE: cancer press release #2  
Hi Erin;  
Yes please, do send along the link and I'll include it.  
Scott

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Monday, April 04, 2011 1:36 PM  
**To:** Burnell, Scott  
**Subject:** RE: cancer press release #2  
Hi Scott,  
Yes, we're hoping to shoot an announcement off this afternoon, but we're waiting for a draft of the public agenda to be completed before we can send it out. The purpose of this would be to announce the location and make the agenda known. The message you attached seems to be in sync with that. Once we have an agenda, I can upload it to our site and give you the link to insert in your announcement if you'd like.  
Erin

**From:** Burnell, Scott [mailto:Scott.Burnell@nrc.gov]  
**Sent:** Monday, April 04, 2011 1:29 PM  
**To:** Wingo, Erin  
**Subject:** FW: cancer press release #2  
**Importance:** High  
Hi again, Erin;

Are you going to make a separate announcement about the Chicago meeting in the immediate future? We can revise our earlier release along the lines of the attached document if you are. Thanks.  
Scott



**From:** [Wingo, Erin](#)  
**To:** [Burnell, Scott B](#)  
**Cc:** [BROCK, TERRY A](#)  
**Subject:** RE: Cancer risk study update?  
**Date:** Thursday, October 28, 2010 10:13:38 AM

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Hi Scott,

Sorry for the delayed response. You are correct that we are past the point of public contributions for committee nominations. Kevin and other staff officers are currently researching nominees and working toward a provisional nominations slate. We're aiming to submit the nominations slate to our division at the end of November. Once this has been provisionally approved, we will post the committee list for public comment. We'll keep you updated as this process continues to move, but right now we're basically just sorting through nominations. Let me know if you have further questions.

Erin

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**From:** Burnell, Scott [mailto:Scott.Burnell@nrc.gov]  
**Sent:** Wednesday, October 27, 2010 11:18 AM  
**To:** Wingo, Erin  
**Cc:** Brock, Terry  
**Subject:** Cancer risk study update?

Good Morning, Erin;

If I remember correctly, we're well past the end date for people to submit their names for the "first phase" panel. Where do things stand at this point? Thanks.

Scott

**From:** [Weil, Jenny](#)  
**To:** [GARRY, STEVEN M](#); [Burnell, Scott B](#)  
**Subject:** RE: NAS Cancer Risk Study Website Launch  
**Date:** Wednesday, September 01, 2010 4:39:59 PM

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Thanks Steve,

I have been updating Greg, including sending him the press release that went out earlier today.

Regards,

Jenny

**From:** Garry, Steven  
**Sent:** Wednesday, September 01, 2010 4:26 PM  
**To:** Weil, Jenny; Burnell, Scott  
**Cc:** Shoop, Undine  
**Subject:** FW: NAS Cancer Risk Study Website Launch

Hi Jenny and Scott,

As you see below, the National Academy of Science (NAS) has their web page updated with the NAS Cancer Study information.

Earlier this summer, at the Diablo Canyon EOC poster session, I spoke with 2 different groups that we follow-uped with:

- 1) Mothers For Peace (primarily Jane Swanson), and
- 2) District Representative Greg Haas. Greg is a technical assistant to the Honorable Lois Capps, California Representative (CA-23).

After the Diablo Canyon EOC meeting, you provided them with some information on the NAS Cancer Study, but before NAS had their web page updated. If you haven't already, you might consider updating Jane and Greg with this new info.

Thanks

Steve Garry

Sr. HP, DIRS

**From:** Wingo, Erin [<mailto:EWingo@nas.edu>]  
**Sent:** Wednesday, September 01, 2010 12:03 PM  
**To:** Allison Cuevas; Annie Caputo; Arjun Makhijani; Art Reardon; Barbara O'Neal; Bill Freebairn; Bonnie Richter; Brian O'Connell; Sheron, Brian; Cindy Folkes; Conrad Miller; Cynthia and Joseph Sauer; Daniel J. Strom; Damon, Dennis; Derek Hagemeyer; Diane D'Arrigo ([dianed@nirs.org](mailto:dianed@nirs.org)); Donna Cragle; Doreen Hill; Farrell Callahan; Frank Currier; Jeffery Patterson; Jerry Bonanno; Julie Reardon; LC M ; Leigh Garten; Lewis Cuthbert; Lynn Ehrle; Marcia Marks; Marth Linet; Mary Lampert; Mary Olson; Mary Reardon; Marshall, Michael; Michal Freedhoff; Michele Boyd; Coleman, Neil; Paul Gunter; Ralph Anderson; Robert P. Shaw; Rochelle Beckers; Roger Witherspoon; Burnell, Scott; Shirley Vaine; Garry, Steven; Steve Wing; Brock, Terry; Yongsoo Hwang  
**Subject:** NAS Cancer Risk Study Website Launch

Dear interested parties,

September 1<sup>st</sup> marks the beginning of phase 1 of the study, *Analysis of Cancer Risks in Populations near Nuclear Facilities*. Throughout the study, we will regularly post updates and written materials to a dedicated webpage, to aid in disseminating this information to the public. The webpage can be found here: <http://www.nationalacademies.org/CancerRiskStudy>.

As the study commences, we are seeking nominations of individuals with applicable technical expertise and experience for membership on the study committee. Please visit the above-mentioned webpage for more information on submitting nominations, the study task and background, as well as general information about the National Academy of Sciences study process.

---

Erin Wingo  
Senior Program Assistant  
Nuclear and Radiation Studies Board





**From:** [Wingo, Erin](#)  
**To:** [Burnell, Scott R](#)  
**Subject:** RE: NAS Cancer Risk Study Website Launch  
**Date:** Wednesday, September 01, 2010 12:09:29 PM

---

Yes, we are live.

**From:** Burnell, Scott [mailto:Scott.Burnell@nrc.gov]  
**Sent:** Wednesday, September 01, 2010 12:09 PM  
**To:** Wingo, Erin  
**Subject:** RE: NAS Cancer Risk Study Website Launch  
So I can consider this the notice of your press release going live?

**From:** Wingo, Erin [mailto:EWingo@nas.edu]  
**Sent:** Wednesday, September 01, 2010 12:03 PM  
**To:** Allison Cuevas; Annie Caputo; Arjun Makhijani; Art Reardon; Barbara O'Neal; Bill Freebairn; Bonnie Richter; Brian O'Connell; Sheron, Brian; Cindy Folkes; Conrad Miller; Cynthia and Joseph Sauer; Daniel J. Strom; Damon, Dennis; Derek Hagemeyer; Diane D'Arrigo (dianed@nirs.org); Donna Cragle; Doreen Hill; Farrell Callahan; Frank Currier; Jeffery Patterson; Jerry Bonanno; Julie Reardon; LC M ; Leigh Garten; Lewis Cuthbert; Lynn Ehrle; Marcia Marks; Marth Linet; Mary Lampert; Mary Olson; Mary Reardon; Marshall, Michael; Michal Freedhoff; Michele Boyd; Coleman, Neil; Paul Gunter; Ralph Anderson; Robert P. Shaw; Rochelle Beckers; Roger Witherspoon; Burnell, Scott; Shirley Vaine; Garry, Steven; Steve Wing; Brock, Terry; Yongsoo Hwang  
**Subject:** NAS Cancer Risk Study Website Launch  
Dear interested parties,

September 1<sup>st</sup> marks the beginning of phase 1 of the study, Analysis of Cancer Risks in Populations near Nuclear Facilities. Throughout the study, we will regularly post updates and written materials to a dedicated webpage, to aid in disseminating this information to the public. The webpage can be found here: <http://www.nationalacademies.org/CancerRiskStudy>.

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---

Erin Wingo  
Senior Program Assistant  
Nuclear and Radiation Studies Board  
(202) 334-3066  
[erwingo@nas.edu](mailto:erwingo@nas.edu)

**From:** [Wingo, Erin](#)  
**To:** [BROCK, TERRY A](#); [Burnell, Scott R](#)  
**Subject:** RE: cancer risk study website launch announcement  
**Date:** Tuesday, August 31, 2010 3:24:30 PM

---

Yes! I'm sorry, Terry. I meant to update that before sending it out to you both, but I pulled an earlier version instead. I will send out the correct version tomorrow. I also just updated the applicable website pages with the proper institution title.

Thanks,  
Erin

**From:** Brock, Terry [mailto:Terry.Brock@nrc.gov]

**Sent:** Tuesday, August 31, 2010 3:23 PM

**To:** Burnell, Scott; Wingo, Erin

**Subject:** RE: cancer risk study website launch announcement

Ok with me. However, we've been using NAS instead of National Academies. Can you use NAS?

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** Burnell, Scott

**Sent:** Tuesday, August 31, 2010 3:13 PM

**To:** Wingo, Erin; Brock, Terry

**Subject:** RE: cancer risk study website launch announcement

I'm fine with that language.

**From:** Wingo, Erin [mailto:EWingo@nas.edu]

**Sent:** Tuesday, August 31, 2010 3:05 PM

**To:** Burnell, Scott; Brock, Terry

**Subject:** cancer risk study website launch announcement

Terry and Scott:

Tomorrow we will be announcing to our interested parties list the launch of our website, and supplementary to that, our call for committee nominations. Here is the language we are intending to send out for your information:

Dear interested parties,

September 1<sup>st</sup> marks the beginning of phase 1 of the study, Analysis of Cancer Risks in Populations near Nuclear Facilities. Throughout the study, we will regularly post updates and written materials to a dedicated webpage, to aid in disseminating this information to the public. The webpage can be found here:

<http://www.nationalacademies.org/CancerRiskStudy>.

As the study commences, we are seeking nominations of individuals with applicable technical expertise and experience for membership on the study committee. Please visit the above-mentioned webpage for more information on submitting nominations, the study task and background, as well as general information about the National Academies study process.

Let me know if you have any questions or concerns.

Thanks,  
Erin

**From:** [Brock, Terry](#)  
**To:** [Burnell, Scott R](#)  
**Subject:** RE: NAS or NA?  
**Date:** Tuesday, August 31, 2010 2:49:01 PM

---

I meant, please use NAS.

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Brock, Terry  
**Sent:** Tuesday, August 31, 2010 2:48 PM  
**To:** Burnell, Scott  
**Subject:** FW: NAS or NA?  
NAS please?

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Crowley, Kevin [mailto:KCrowley@nas.edu]  
**Sent:** Tuesday, August 31, 2010 2:46 PM  
**To:** Brock, Terry  
**Subject:** RE: NAS or NA?  
That is not a problem. We can change to NAS.

**From:** Brock, Terry [mailto:Terry.Brock@nrc.gov]  
**Sent:** Tuesday, August 31, 2010 2:47 PM  
**To:** Crowley, Kevin  
**Cc:** Burnell, Scott  
**Subject:** NAS or NA?  
Kevin,

Your forthcoming press release uses National Academies instead of NAS. Both of us have been using NAS since the April press release. Is it too late to continue using NAS to reduce potential confusion? The project is technically under NAS right?

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Burnell, Scott  
**Sent:** Tuesday, August 31, 2010 1:43 PM  
**To:** Brock, Terry  
**Subject:** RE: Cancer study-NAS call for nominations  
National Academies is straight from their press release language. \*shrug\*  
**From:** Brock, Terry



**Sent:** Tuesday, August 31, 2010 1:43 PM

**To:** Burnell, Scott

**Subject:** RE: Cancer study-NAS call for nominations

One last thing. Let's use National Academy of Sciences (NAS) instead of NA. OK?

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** Burnell, Scott

**Sent:** Tuesday, August 31, 2010 1:04 PM

**To:** Brock, Terry

**Subject:** RE: Cancer study-NAS call for nominations

Thanks!

**From:** Brock, Terry

**Sent:** Tuesday, August 31, 2010 1:04 PM

**To:** Burnell, Scott; Bush-Goddard, Stephanie

**Subject:** RE: Cancer study-NAS call for nominations

Yes

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

U.S. Nuclear Regulatory Commission

Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** Burnell, Scott

**Sent:** Tuesday, August 31, 2010 12:34 PM

**To:** Brock, Terry; Bush-Goddard, Stephanie

**Subject:** RE: Cancer study-NAS call for nominations

Can I take this as Brian's approval?

**From:** Sheron, Brian

**Sent:** Tuesday, August 31, 2010 11:45 AM

**To:** Brock, Terry

**Cc:** Lyons, James; Gibson, Kathy; Valentin, Andrea; Bush-Goddard, Stephanie; Burnell, Scott

**Subject:** RE: Cancer study-NAS call for nominations

Thanks for the update.

**From:** Brock, Terry

**Sent:** Tuesday, August 31, 2010 10:18 AM

**To:** Sheron, Brian

**Cc:** Lyons, James; Gibson, Kathy; Valentin, Andrea; Bush-Goddard, Stephanie; Burnell, Scott

**Subject:** Cancer study-NAS call for nominations

**Importance:** High

Brian,

The NAS will be soliciting cancer study committee members starting tomorrow for the entire month of September. Attached is the press release that our OPA is planning to release tomorrow (coordinated with NAS). The plan is for a month long solicitation and then another one to two months to select the candidates. The first meeting will take place in January depending on how long the committee selection takes and the number of contentions they have to address for whoever they select.

Thanks,

Terry

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Burnell, Scott  
**Sent:** Tuesday, August 31, 2010 7:49 AM  
**To:** Brock, Terry; Bush-Goddard, Stephanie  
**Subject:** NAS call for noms  
**Importance:** High  
Terry, Stephanie;

I need a quick concurrence on this so we can try and issue our release together with NAS.  
Thanks.  
Scott

**From:** Brock, Terry  
**To:** Burnell, Scott B  
**Subject:** RE: Cancer study-NAS call for nominations  
**Date:** Tuesday, August 31, 2010 1:44:04 PM

---

ok

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Burnell, Scott  
**Sent:** Tuesday, August 31, 2010 1:43 PM  
**To:** Brock, Terry  
**Subject:** RE: Cancer study-NAS call for nominations  
National Academies is straight from their press release language. \*shrug\*

**From:** Brock, Terry  
**Sent:** Tuesday, August 31, 2010 1:43 PM  
**To:** Burnell, Scott  
**Subject:** RE: Cancer study-NAS call for nominations  
One last thing. Let's use National Academy of Sciences (NAS) instead of NA. OK?  
Terry Brock, Ph.D.

Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Burnell, Scott  
**Sent:** Tuesday, August 31, 2010 1:04 PM  
**To:** Brock, Terry  
**Subject:** RE: Cancer study-NAS call for nominations  
Thanks!

**From:** Brock, Terry  
**Sent:** Tuesday, August 31, 2010 1:04 PM  
**To:** Burnell, Scott; Bush-Goddard, Stephanie  
**Subject:** RE: Cancer study-NAS call for nominations  
Yes

Terry Brock, Ph.D.  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington D.C. 20555  
Mail Stop CSB-3A07  
phone: 301-251-7487

**From:** Burnell, Scott  
**Sent:** Tuesday, August 31, 2010 12:34 PM  
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**Subject:** RE: Cancer study-NAS call for nominations  
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**From:** Sheron, Brian



**Sent:** Tuesday, August 31, 2010 11:45 AM

**To:** Brock, Terry

**Cc:** Lyons, James; Gibson, Kathy; Valentin, Andrea; Bush-Goddard, Stephanie; Burnell, Scott

**Subject:** RE: Cancer study-NAS call for nominations

Thanks for the update.

**From:** Brock, Terry

**Sent:** Tuesday, August 31, 2010 10:18 AM

**To:** Sheron, Brian

**Cc:** Lyons, James; Gibson, Kathy; Valentin, Andrea; Bush-Goddard, Stephanie; Burnell, Scott

**Subject:** Cancer study-NAS call for nominations

**Importance:** High

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Terry

Terry Brock, Ph.D.

Office of Nuclear Regulatory Research

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Washington D.C. 20555

Mail Stop CSB-3A07

phone: 301-251-7487

**From:** Burnell, Scott

**Sent:** Tuesday, August 31, 2010 7:49 AM

**To:** Brock, Terry; Bush-Goddard, Stephanie

**Subject:** NAS call for noms

**Importance:** High

Terry, Stephanie;

I need a quick concurrence on this so we can try and issue our release together with NAS.

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Scott