

December 14, 1999

Dr. Yoon I. Chang
[]
Argonne National Laboratory-East
9700 South Cass Avenue
Argonne, IL 60439-4832

EA-1999-10

Subject: Preliminary Notice of Violation (NTS-CH-AA-ANLE-ANLE-1999-0005 and
NTS-CH-AA-ANLE-ANLE-1999-0006)

Dear Dr. Chang:

This letter refers to the Department of Energy's (DOE) evaluation of several events occurring in 1998 and 1999, involving the failure to control radioactive material and unplanned and uncontrolled personnel contamination events at the Argonne National Laboratory-East (ANL-E or the Laboratory) site. The Laboratory attributed these events to a number of causes, including personnel error, legacy contamination and management problems.

DOE's Office of Enforcement and Investigation reviewed the circumstances and potential consequences of each of these events during a site visit on July 21-22, 1999, and issued an Investigation Summary Report which was transmitted to the Laboratory on October 19, 1999. An Enforcement Conference was held on November 19, 1999, in Germantown, Maryland, with you and members of your staff. A Conference Summary Report is enclosed. Prior to the Conference, by a letter dated November 11, 1999, you transmitted a Response, including Appendices, to the Investigation Summary Report. This material has been reviewed and placed in the docket file for this proceeding. Based on our evaluation of these events, DOE has concluded that violations of the Occupational Radiation Protection Rule (10 CFR 835) occurred. The violations are described in the enclosed Preliminary Notice of Violation (PNOV).

The enclosed PNOV describes violations that involve multiple failures to (1) conduct approved work activities in accordance with ANL-E's established radiation protection work procedures; (2) adequately monitor for radioactive material; (3) post and control access to radiological areas; and (4) implement effective corrective actions.

The violations described in Section I of the enclosed PNOV occurred on June 25, 1998, when four ANL-E personnel were contaminated, and one person received an uptake of [radioactive material] while inspecting a waste sodium loop that had been in storage for many years. The Operations Review Team formed by the Laboratory developed a comprehensive critique of the event, finding multiple failures to follow procedures over

the two days of the evolution. Programmatic breakdowns take place when several related occurrences take place with a common root cause and when multiple failures occur in a single event. In this case, as discussed in the October 19, 1999, Investigation Summary Report, work was conducted in violation of Laboratory radiation safety requirements despite surveys that identified the presence of loose radioactive contamination. Multiple failures to implement established radiological work control processes were identified, including inadequate work planning, including the failure to develop a Radiation Work Plan and hold a pre-job briefing, inadequate radiation work controls during work including the failure to wear appropriate protective clothing and failure to stop work when it became clear that loose contamination was identified. Further, inadequate radiological monitoring of personnel allowed contaminated personnel to leave the radiological area without detection. Neither the workers, nor the supervisor, nor the health physicist assigned to the work task over a two-day period exercised stop-work authority during the entire evolution.

The violations associated with this event are of significant concern to DOE because they represent multiple failures to implement your established work processes necessary to ensure worker protection from unplanned and uncontrolled radiation exposures. In addition, they could have resulted in substantial exposures to personnel. Therefore, in accordance with the criteria described in the Enforcement Policy (10 CFR 820, Appendix A), these violations have been classified as a Severity Level II problem.

The violations described in Section II of the enclosed PNOV occurred on June 10, 1999, when three workers, including a health physicist and a technician who happened to be in the area, were contaminated when a source custodian attempted to leak test a sealed source. Although the source was stored in a lead pig in a room known to contain radioactive sources, multiple failures of the Laboratory's procedural protocols occurred, including a failure to develop a work plan to perform the work and a failure to use protective clothing appropriate to the task undertaken. Since all three workers received uptakes of [radioactive material], it is fortuitous that personnel exposures were not more significant given the amount of radioactive material involved. These multiple failures to plan, authorize, implement and control radiological work in accordance with your established work control procedures are a significant regulatory concern. Therefore, the violations associated with this event have also been categorized as a Severity Level II problem.

In both of these events, ANL-E failed to comprehensively identify the root cause of each of these events and, thus, failed to develop corrective actions that were likely to prevent such programmatic failures in the future. Even at the November 19, 1999, Enforcement Conference, there was a reluctance to acknowledge the full dimension of these issues. Instead, problems were characterized as a series of individual personnel errors. Of particular concern to DOE is evidence that suggests your radiation protection staff may lack adequate management support to exercise their stop-work authority when the circumstances warrant it.

DOE is issuing the enclosed PNOV in response to these violations. Although ANL-E is exempt from civil penalties by statute, because of the safety significance of the two contamination events, DOE would have issued a Proposed Imposition of Civil Penalty in this case in the amount of \$110,000 (\$55,000 for each Severity Level II violation). DOE has concluded that no mitigation would be warranted for the violations described in the PNOV regarding self-identification and reporting or the implementation of corrective actions to prevent recurrence. In particular, DOE notes that ANL-E failed to identify the programmatic nature of these violations and to report them into the EH-Enforcement Noncompliance Tracking System (NTS) in a timely manner. In fact, the sodium loop contamination event and material control events were not identified as regulatory noncompliances by ANL-E, despite a contrary recommendation from the Laboratory PAAA Review Committee to the senior Laboratory manager responsible for the program.

The violations described in Section III of the PNOV involve numerous examples of the failure to control radioactive material at the site. Four specific incidents were selected for closer evaluation because they were indicative of a broader systemic and programmatic problem. In three of the examples identified in the Investigation Summary Report, the material was discovered in uncontrolled areas on the site, including storage rooms and cabinets. In one example, the material was in fact transported offsite to Oak Ridge, where it was discovered by the receiver to be contaminated.

Based on our review of these incidents, it is clear that these were not isolated, unrelated instances of the loss of control of radioactive material. Rather, it appears to result in part from a reluctance to pursue the identification of uncontrolled material at the site when the facts are developed to indicate it may be present. A further causal factor may be the lack of independence of health physics personnel which prevents them from pursuing information within their purview.

DOE understands that, under some circumstances, radioactive material may be identified in uncontrolled areas that would not be identified by reasonable, routine survey programs (i.e., for legacy materials). However, in this case radioactive material was found in various areas of personnel access, such as lockers and cabinets, that should have been identified in a more timely fashion. DOE recognizes that you are now in the process of developing a systematic survey of your facilities to assure that all radiological materials on site are identified and controlled. In view of this initiative, DOE has concluded that it is appropriate to exercise its discretion and classify these violations as a Severity Level III problem.

You are required to respond to this letter and to follow the instructions specified in the enclosed PNOV when preparing your response. Your response should document any additional specific actions taken to date. Corrective actions will be tracked in the NTS. You should enter into the NTS (1) any additional actions you plan to prevent recurrence and (2) the anticipated completion dates of such actions. With respect to the corrective actions described in Section III of the PNOV, you are required to provide to the Manager of the Chicago Operations Office, within thirty (30) days of the issuance of this PNOV, your plan and schedule for completion of the systematic facility survey you are implementing.

Sincerely,



David Michaels, PhD., MPH.
Assistant Secretary
Environment, Safety and Health

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Enclosures:
Preliminary Notice of Violation
Enforcement Conference Summary
List of Attendees

cc: M. Zacchero, EH-1
K. Christopher, EH-10
H. Wilchins, EH-10
S. Zobel, EH-10
D. Stadler, EH-2
O. Pearson, EH-3
J. Fitzgerald, EH-5
M. Krebs, SC-1
M. Johnson, SC-80
R. Schwartz, SC-83
R. San Martin, DOE-CH
C. Zook, DOE-CH-ARG
E. Jascewsky, DOE-CH-ARG PAAA Coordinator
R. Purucker, DOE-CH-ARG PAAA Coordinator
W. Hannum, ANL-E PAAA Coordinator
R. Azzaro, DNFSB
Docket Clerk, EH-10

PRELIMINARY NOTICE OF VIOLATION

NTS-CH-AA-ANLE-ANLE-1999-0005

NTS-CH-AA-ANLE-ANLE-1999-0006

University of Chicago
Argonne National Laboratory-East

EA-1999-10

As a result of the Department of Energy's (DOE) evaluation of the events and circumstances associated with the implementation of administrative controls for maintaining radiation exposures as low as reasonably achievable (ALARA), controlling radiological work, and the identification and control of radioactive materials by the University of Chicago (UC) at various Argonne National Laboratory-East (ANL-E) facilities, violations of DOE nuclear safety requirements were identified. In accordance with 10 CFR 820, Appendix A, "General Statement of Enforcement Policy," DOE is issuing this Preliminary Notice of Violation. The particular violations are set forth below.

I. SODIUM LOOP EVALUATION EVENT

- A. 10 CFR 835.1001(b) requires that for specific activities where use of physical design features are demonstrated to be impractical, administrative controls and procedural requirements shall be used to maintain exposures ALARA.

Contrary to the above, during June 23-25, 1998, administrative controls and procedural requirements were not used to maintain exposures ALARA in that—

1. ANL-E Radiation Control Manual Chapter 5-03, "Conduct of Radiological Work," Article 322, dated August 18, 1995, requires a job-specific radiation work permit (RWP) to be used to control nonroutine operations.

However, no RWP was prepared or used for the inspection of the sodium loop, including the removal of radiation protection barriers, a nonroutine operation.

2. ANL-E Radiation Control Manual Chapter 5-03, "Conduct of Radiological Work," Article 325, dated August 18, 1995, states protective clothing (PC) shall be worn when handling contaminated materials with removable contamination levels in excess of 1,000 dpm/100 cm² beta gamma radiation.

However, contaminated materials with removable contamination levels in excess of 1,000 dpm/100 cm² beta gamma radiation were present yet no PCs were worn by any of the participants during the sodium loop inspection.

3. ANL-E Radiation Control Manual Chapter 5-13, "External Dosimetry," dated August 2, 1995, states all "badged" persons must wear their personal dosimeters in radiologically controlled areas.

However, two personnel involved in the sodium loop inspection who were assigned radiation dosimeters failed to wear their dosimetry when they entered a posted radiation area.

- B. 10 CFR 835.404(a) states that appropriate controls shall be maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions.

Contrary to the above, during June 23-25, 1998, appropriate controls were not maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions in that workers who became contaminated on their skin and clothing during the sodium loop inspection were allowed to leave the radiological area without identifying skin contamination.

Collectively, these violations represent a Severity Level II problem.
Civil Penalty - \$55,000 (Remitted)

II. SEALED SOURCE LEAK TESTING EVENT

- A. 10 CFR 835.1001(b) requires that for specific activities where use of physical design features are demonstrated to be impractical, administrative controls and procedural requirements shall be used to maintain exposures ALARA.

Contrary to the above, on June 10, 1999, administrative controls and procedural requirements were not used to maintain exposures ALARA in that—

1. ANL-E Radiological Control Manual Chapter 5-24, "Radiation Work Permits," dated May 27, 1999, states that an RWP is required when the radiological conditions are not yet characterized and are likely to be of significance. ANL-E Radiological Control Manual Chapter 5-03, "Conduct of Radiological Work," dated August 18, 1995, Article 322 states an RWP shall be the job-specific authorization for performing work in radiological areas.

However, an RWP was not utilized to control the leak testing of several uncharacterized sealed sources in Room [number], a posted radiological area.

2. ANL-E Health Physics Procedure HPP-301, "Integrity Testing of Sealed Radioactive Sources," Revision 1, dated March 25, 1997, Step 6.1 states that if the total dose rate on contact is likely to equal or exceed 1,000 mR/hr then follow Step 6.4. Step 6.4 requires indirect techniques for integrity testing and states "**IN NO CASE SHOULD A DIRECT SMEAR OF THE SOURCE BE PERFORMED.**"

However, the HPT measured an exposure rate approaching 2,000 mR/hr at the opening of a sealed source's lead container, thus indicating a contact exposure rate greater 1,000 mR/hr, yet the HPT performed a direct smear of that sealed source.

3. ANL-E Health Physics Procedure HPP-301, "Integrity Testing of Sealed Radioactive Sources," Revision 1, dated March 25, 1997, Steps 6.3.1, 6.3.2, and 6.4 directs the sealed source custodian and HPT to develop appropriate leak test procedures.

However, an appropriate leak test procedure was not developed nor was any other additional procedure, guidance, or instruction on what constituted an appropriate leak test procedure, or how to prepare one, available.

4. ANL-E Health Physics Procedure HPP-501, "Assessment of Personnel Radiation Exposure During Nonroutine Conditions," Revision 2, dated October 18, 1991, Step 6.3.4 requires that, for the evaluation of a dose from an airborne radioactivity hazard, each potentially affected individual's dosimetry be collected and processed.

However, Health Physics Procedure HPP-501 was inadequate in that it did not specify how quickly an individual's dosimetry was to be collected following a nonroutine condition hence the dosimeters for the HPT, sealed source custodian, and instrument technician were collected and processed at the regularly scheduled monthly interval.

- B. 10 CFR 835.401(a)(2) states that monitoring of areas shall be performed to document radiological conditions in the workplace.
10 CFR 835.401(a)(4) states that monitoring of areas shall be performed to detect the gradual buildup of radioactive material in the workplace.

Contrary to the above, monitoring of areas was not performed to document radiological conditions or to detect the gradual buildup of radioactive material in the workplace in that quarterly contamination surveys of Room [number] were not performed during the first half of 1999. During that time, radioactive material from a leaking sealed source contaminated Room [number].

- C. 10 CFR 835.404(g) states that protective clothing shall be required for entry to areas in which removable contamination exists at levels exceeding those specified in 10 CFR 835 Appendix D.

Contrary to the above, protective clothing was required for entry to areas in which removable contamination existed at levels exceeding those specified in 10 CFR 835 Appendix D in that on June 10, 1999, Room [number] had removable beta gamma radiation contamination present exceeding Appendix D levels and neither the HPT, the sealed source custodian, nor the instrument technician wore protective clothing before entering Room [number].

- D. 10 CFR 835.404(b) states that appropriate controls shall be maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions.

Contrary to the above, appropriate controls were not maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions in that on June 10, 1999, upon leaving Room [number] neither the HPT, the source custodian, nor the instrument technician surveyed themselves for contamination and subsequently transferred removable contamination to Room [number], the hallway outside of Rooms [number] and [number], and the path to the Health Physics laboratory on another floor.

Collectively, these violations represent a Severity Level II problem.
Civil Penalty - \$55,000 (Remitted)

III. LOSS OF CONTROL OF RADIOACTIVE MATERIAL EVENTS

10 CFR 835.401(b) requires that area monitoring in the workplace shall be routinely performed, as necessary, to identify and control potential sources of personnel exposure to radiation and/or radioactive material.

10 CFR 835.601(a) states that radioactive items or containers of radioactive materials shall be individually labeled if adequate warning is not provided by control measures and required posting.

Contrary to the above, area monitoring in the workplace was not routinely performed, as necessary, to identify and control potential sources of personnel exposure to radiation and/or radioactive material, nor were radioactive items or containers of radioactive materials individually labeled if adequate warning was not provided by control measures and posting in that—

- A. In October 1998, contaminated tissue with 46,000 dpm/100 cm² beta gamma radiation, and a package with three bottles of radioactive material reading 3,000 dpm/100 cm² beta gamma radiation were discovered in a clean trash dumpster. These radioactive materials were combined with clean trash after researchers cleaned their offices, which were not controlled areas.

- B. In January 1998, two plastic bags labeled radioactive material were discovered in an uncontrolled area of Building 205. Surveys of cabinets in this area also identified fixed contamination of 45,000 dpm/100 cm² beta gamma radiation. In February 1999, also in Building 205, radioactive materials were discovered in six uncontrolled storage areas and in one laboratory. Surveys of the discovered items identified contamination ranging from 50,000 to 200,000 dpm/100 cm² beta gamma radiation.
- C. In April 1999, a worker activated a radiation monitor alarm after unknowingly handling a contaminated gate valve located in an uncontrolled area in Building 203. The valve was not labeled and was subsequently surveyed and determined to have 43,000 dpm/100 cm² beta gamma radiation.
- D. In July 1999, a shipment of [metal] was removed from an uncontrolled precious metals vault and shipped offsite to a recycler. The recycler surveyed the [metal] and discovered 2,700,000 dpm of fixed alpha radiation contamination and 6,000 dpm of removable alpha radiation contamination.

Collectively, these violations represent a Severity Level III problem.

Pursuant to the provisions of 10 CFR 820.24, the UC is hereby required within 30 days of the date of this Preliminary Notice of Violation to submit a written statement or explanation to the Director, Office of Enforcement and Investigation, Attention: Office of the Docketing Clerk, P.O. Box 2225, Germantown, MD 20874-2225. Copies should also be sent to the Manager, DOE-Argonne Area Group; to the Manager, DOE-Chicago Operations Office; and to the cognizant DOE Secretarial Office for the facility that is the subject of this Preliminary Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation" and should include the following for each violation: (1) admission or denial of the alleged violation; (2) the reasons for the violations if admitted or, if denied, the reasons they are not correct; and (3) the corrective actions that have been taken and the results achieved. The contractor will enter the following into the Noncompliance Tracking System: the corrective actions that have been or will be taken to avoid further violations and the target completion dates when full compliance will be achieved. In the event the violations set forth in this Preliminary Notice of Violation are admitted, this Notice will constitute a Final Notice of Violation in compliance with the requirements of 10 CFR 820.25.

Sincerely,



David Michaels, PhD., MPH.
Assistant Secretary
Environment, Safety and Health

Dated at Washington, DC,
this 14th day of December 1999

**ENFORCEMENT CONFERENCE SUMMARY
RADIATION PROTECTION ISSUES
NTS-CH-AA-ANLE-ANLE-1999-0005 and -0006
November 19, 1999**

On November 19, 1999, the Department of Energy's (DOE) Office of Enforcement and Investigation (EH-Enforcement) held an informal enforcement conference with the University of Chicago (UC). This conference was held to discuss concerns identified in the Noncompliance Tracking System (NTS) reports identified above and in the DOE Investigation Summary Report issued to UC on October 19, 1999. Attached to this conference summary is a listing of the conference participants and attendees. The UC had already provided information to be considered in DOE's deliberations and to clarify statements in the Investigation Summary Report; these documents will be incorporated into the docket file.

The NTS reports and enforcement conference concerned an apparent multi-year trend of radiation safety and radiological work control deficiencies at Argonne National Laboratory-East. This was evidenced by a series of incidents concerning the loss of control of radioactive materials in that contaminated or radioactive items were discovered outside of controlled areas; and two events where significant breakdowns in radiological work controls occurred resulting in multiple personnel contaminations, internal uptakes of radioactive material by four employees, and the uncontrolled spread of radioactive material.

R. Keith Christopher, Director, EH-Enforcement, opened the conference by providing an overview of the conference's purpose. EH-Enforcement staff then summarized the 10 CFR 835 concerns derived from the October 19, 1999, Investigation Summary Report.

The UC began by stating it was going through a learning process with respect to Price-Anderson Amendments Act activities and reporting noncompliances to DOE's Noncompliance Tracking System (NTS). EH-Enforcement responded that, since 1996, there were numerous means available for understanding the Enforcement program but the UC did not appear to take advantage of any of them, in contrast to the majority of the DOE contractor community.

The UC then began a discussion of each event summarized in the Investigation Summary Report. For the four loss of control events, UC stated that these were isolated, unrelated events where three of the four events were due, in part, to inadvertent personnel error, and that UC's defense-in-depth radiation survey program discovered these radioactive items before they left the Laboratory site. The fourth incident, involving a precious metal item sent to a reclamation facility, did represent a

procedural error. EH-Enforcement disagreed with UC's determination that these events did not constitute a programmatic breakdown and highlighted their similarities. EH-Enforcement did acknowledge UC's current effort to survey all Laboratory areas, both active and those used for storage, for unidentified radioactive materials.

The UC then discussed the two contamination events. It stated that a radiological work permit (RWP) was not needed for moving the sodium coolant loop to a clean area since that was not considered "work." EH-Enforcement explained to UC how that aspect of the sodium coolant loop inspection did constitute "work" and, therefore should have been controlled by an RWP as required by UC's radiation protection procedures. When asked why this event was not reported to the NTS, the UC stated it utilized a reporting threshold that was, mistakenly, too high. Again, EH-Enforcement responded that the UC had apparently not taken advantage of resources available since 1996 to explain and understand DOE's Enforcement program. For the sealed source leak testing event, the UC was asked if the safety lapses that occurred were due to a breakdown in Conduct of Operations practices or to poor procedures; the UC replied it was not sure. The UC was then asked why the Health Physics technicians (HPTs) involved in the sodium coolant loop and sealed source events did not perceive any potential hazards as the events progressed. The response was that hazard recognition was not an HPT's responsibility but that of whoever is responsible for the work to be conducted. EH-Enforcement explained that hazard recognition is an integral part of an HPT's duties at other DOE sites. EH-Enforcement also explained to the UC its concern, based on the July 1999 assessment of UC's noncompliance reporting and tracking program, regarding an apparent lack of Laboratory management support for an HPT's stop work authority. The UC denied any lack of support.

Mr. Christopher concluded the conference and stated that DOE would consider the information presented in conjunction with the evidence obtained through its assessment and investigation, and would conclude over the next several weeks of deliberation whether, or to what degree, enforcement action should be taken.

**Enforcement Conference
Argonne National Laboratory-E**

Radiological Control Deficiencies

List of Attendees

DOE-EH Enforcement

R. Keith Christopher, Director
Howard Wilchins, Senior Litigator
Steven Zobel, Enforcement Specialist
Hank George, Technical Advisor
Steve Hosford, Technical Advisor

DOE-SC

Milton Johnson, Associate Director, SC-80
Dave Michlewicz, Engineer, SC-82
Van Nguyen, Acting Director, SC-83
Ray Schwartz, DOE PAAA Coordinator, SC-83
Stan Staten, ESH&I , SC-10

DOE Chicago

Bob San Martin, Manager
A. Creig Zook, Assistant Manager
Roxanne Purucker, DOE PAAA Coordinator
Edward Jascewsky, DOE PAAA Coordinator

Argonne National Laboratory-East

Art Sussman, []
Yoon Chang, []
William Hannum, []
Robert A. Wynveen, []
Carol Bernstein, []