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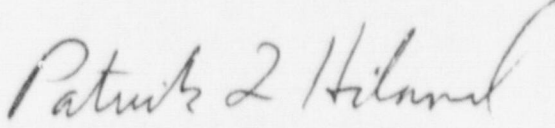
Licensee: AlliedSignal, Inc.

Facility: AlliedSignal Metropolis Works

Location: Metropolis Works

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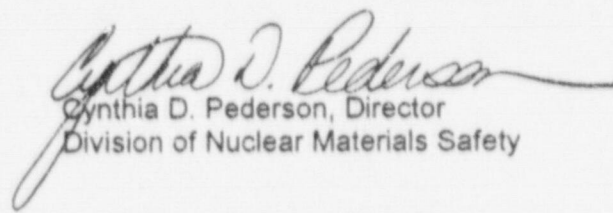
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EXECUTIVE SUMMARY

AlliedSignal, Inc.
NRC Inspection Report 040-3392/98002(DNMS)

During the performance of a routine (weekly) maintenance activity on January 27, 1998, a small amount of uranium hexafluoride (UF_6) was unexpectedly released from the process system in the Feed Materials Building at the AlliedSignal Metropolis Works. When released to atmosphere, UF_6 quickly reacts with moisture in the air to form hydrofluoric acid. As a direct result of the release, the three persons involved in the maintenance activity received minor injuries, and the licensee activated the AlliedSignal Radiological Contingency Plan (RCP). Three classifications for radiological emergencies were defined in the RCP and included in order of increasing significance a PLANT EMERGENCY, ALERT, and SITE AREA EMERGENCY. The unexpected release on January 27 met the criteria for an ALERT declaration.

The radiological and chemical consequences to plant staff from the event were minor and well within the applicable NRC requirements. The minor chemical burns or skin irritations received by the three workers were effectively treated onsite. No radiological or chemical consequences to members of the general public resulted from this event.

The licensee promptly entered the RCP and quickly ensured the release had been secured. Implementation of all required actions by the response procedures was not completed, due to communication problems regarding information that the release met the pre-established ALERT criteria. In addition, some important procedural steps were not performed due to a lack of clear guidance from AlliedSignal management regarding the expectations on procedural implementation. Failure to follow the existing procedures or provide clear communications during the initial response to the event resulted in a delay in recognizing the event met the ALERT action level, the site emergency siren was not sounded, and several pieces of ventilation equipment that could have spread the release were left operating.

The licensee conducted an incident investigation in accordance with established plant procedures, and the initial root cause determination attributed the event to a "lack of procedural knowledge on behalf of the operator." The Augmented Inspection Team (AIT) concluded that the licensee's root cause determination was narrowly focused and did not integrate available information regarding procedural adequacy and adherence. The AIT concluded that a root cause for the ALERT event was a lack of effective management guidance or clear expectations for utilizing plant procedures. The AIT's conclusion was based on a comparison of existing procedural requirements and interviews with plant staff regarding the actual practices used at the facility. The applicable operating procedure, maintenance instructions, and emergency instructions were not clear on specific directions or precautions to be taken during high risk activities. The AIT concluded that without effective corrective actions there was a potential for recurrence of a similar event.

During the inspection period, the AIT observed timely response to issues identified by the licensee and the inspectors, and a reasonable approach was presented at the exit meeting to both short-term and long-term corrective actions.

Report Details

1.0 Purpose of Augmented Team Inspection

Following initial review of a January 27, 1998, release of uranium hexafluoride event, the NRC formed an Augmented Inspection Team (AIT) to examine the circumstances surrounding the event. The AIT Charter included evaluations of plant equipment performance, plant personnel response to the event, the effectiveness of the licensee's root cause investigation, and the effectiveness of the corrective actions. The AIT Charter is included as Attachment 1 to this report.

2.0 System Description

Four low boiler condensers were located on the sixth floor of the Feed Materials Building. The condensers were part of the distillation plant in which crude uranium hexafluoride (UF_6) was purified. The four low boiler condensers were used to remove impurities with vaporization temperatures below that of UF_6 from the process stream. Typically, only one of the four condensers was operating. In addition to the steam lines for the stream on the tube side of each condenser, there were UF_6 supply and return lines, an impurities line (PP-5) for removing the vapor-phase impurities, and a vacuum line for evacuating the shell side of each condenser when it was washed. Each of the UF_6 lines had double isolation valves and were attached to a common manifold to provide the licensee flexibility in operations. An evacuation line was also connected to each of the UF_6 lines, which could be valved in to evacuate the lines prior to washing the condenser. As a result, there were a number of available vacuum sources for each condenser. Finally, each condenser had a blind flange which could be opened for attaching air or water lines during cleaning.

3.0 Event Description [Chapter Item No. 1]

The event description and sequence of events were independently developed and validated by the inspectors using the following information:

- Review of control room logs and emergency response logs.
- Interviews with personnel directly involved with the release; personnel involved with the emergency response; and, personnel who normally perform similar activities at the site.
- Observation of the licensee's emergency response critique held directly after the event during the afternoon of January 27.

(A detailed sequence of events is included as Attachment 2 to this inspection report.)

On January 27 at approximately 7:30 a.m., an assistant operator and two maintenance mechanics began an evolution on the sixth floor of the Feed Materials Building (FMB) to restore the Number 2 Low Boiler Condenser to service. The evolution entailed installing a blind flange for the air line connection, removing couplings used for drying the condenser after washing, replacing the normal spool pieces, and reconnecting various process lines for the condenser. At the time of the morning break (about 10:00 a.m.), all but one service line (the PP-5 impurities line) had been reconnected without incident.

After the morning break, at approximately 10:20 to 10:30 a.m., the assistant operator and the two mechanics began to reconnect the PP-5 line. The assistant operator closed

the inboard isolation valve on the operating condenser (Number 4) and checked the other condensers to ensure the inboard isolation valves for the PP-5 lines for those condensers were also closed. The assistant operator then allowed the PP-5 lines and manifold to evacuate for some minutes, after which the assistant operator called the FMB control room to verify loss of flow through the PP-5 header control valve, which was located on the fourth floor of the FMB.

The assistant operator then proceeded to close the outboard isolation valve on the PP-5 line for Number 4 Low Boiler Condenser and open the inboard valve on the PP-5 line for the Number 2 Low Boiler Condenser in order to evacuate the section of line in between the valve and a blank at the flange above the condenser. The blank had been installed the previous Friday (January 24, 1998), when the condenser was initially evacuated and prepared for washing to remove contaminants which had built up (accreted) in the condenser. While the section of line was evacuating, the assistant operator finished putting on personal protective equipment (PPE) required for breaking a line which could contain a hazardous material. The PPE, required by the procedure in the Distillation Manual, included a chemical suit (boots, pants, and jacket), neoprene gloves and a full-face respirator. The maintenance mechanics had suited up in their protective gear while the assistant operator was performing the valving operations.

At 10:36 a.m., the assistant operator throttled the inboard isolation valve for the PP-5 line on the Number 2 Low Boiler Condenser while the mechanics removed two bolts from the flange and loosened a third in preparation for removing the blank, which had been inserted the previous Friday. Upon loosening the third bolt and cracking the flange, pressurized uranium hexafluoride sprayed out of the flange onto the three workers. There was enough UF_6 to overcome the capacity of a vacuum hose which the assistant operator held in one hand next to the flange to capture "puffs" of UF_6 .

In response to the release, one of the involved maintenance mechanics proceeded to a plant phone next to the condensers and announced that there had been a release on the sixth floor of the FMB over the public address (PA) system. That mechanic, who indicated the PA announcement did not appear to be audible, then proceeded to a phone on the fifth floor to announce the release over the PA system again. The same mechanic then exited the building and washed (decontaminated) under a safety shower on a pad directly outside the stairwell on the distillation side of the FMB.

While the first mechanic was announcing the release, the second mechanic remained near the condensers to aid the assistant operator in controlling the release. The assistant operator closed the PP-5 inboard valve and the second mechanic replaced and tightened the bolts on the flange. These actions apparently ended the release. The assistant operator and the second mechanic then evacuated the sixth floor condenser area. The second mechanic left the building and showered on the pad outside the FMB. The assistant operator proceeded to the control room on the second floor, removed the contaminated PPE, and reported on the status of the release to the Control Room Officer.

While the operator and mechanic were responding, at 10:37 a.m., plant staff initiated the " UF_6 Release Control Procedure." A control room operator sounded the FMB building evacuation alarm and turned the radiation warning lights on. The emergency officers and staff identified in the licensee's Radiological Contingency Plan reported to their assigned positions to direct the response. The two mechanics were treated for hydrofluoric acid burns with zephrene chloride solution outside the FMB and were then

sent to the site dispensary for continued treatment. The assistant operator was directed by the Control Room Officer to report to the dispensary for treatment of redness (skin irritation or minor burn) around the ears and facial area. This part of the face was not covered by the full-face respirator. All injured personnel were eventually released from the dispensary to return to work.

At approximately 10:43 a.m., the Chief Officer made a call to the local responders (911) to provide a notification and update on the status of the release. The Chief Officer indicated that no offsite assistance was required.

At approximately 10:48 a.m., the first reentry team entered the distillation-process side of the FMB, attired in chemical suits and self-contained breathing apparatus (SCBA) units. The team members verified the Number 2 Low Boiler Condenser and PP-5 flange had been isolated. The team checked the flange bolts to ensure a tight seal. No further release was noted. At approximately 10:50 a.m., the accountability of all personnel onsite was complete. A second reentry team entered the distillation area after the first and also verified the equipment to be secure. Visibility in the distillation area had essentially been restored. At 11:04 a.m., the "all clear" was given which allowed personnel to reenter the FMB wearing half-face respirators.

The Chief Officer provided notifications of an Alert to the Illinois Department of Nuclear Safety (11:17 a.m.) and the NRC (11:18 a.m.).

At approximately 12:45 p.m., in recovery from the event, an operator evacuated the PP-5 line to the blanked flange on the Number 2 Low Boiler Condenser by opening the inboard isolation valve. At approximately 1:20 p.m., an operator and two mechanics removed the bolts and opened the flange, then removed the blank from the PP-5 line, returning the Number 2 Low Boiler Condenser to service. (The Teflon gasket around the blank had to be pried loose because of the vacuum on the line side of the flange.)

4.0 Immediate Actions During and Following Event [Chapter Item No. 2]

The inspectors reviewed the immediate actions taken by the licensee in response to the release. The review consisted of the following information:

- Review of control room logs and emergency response logs.
- Interviews with personnel directly involved with the release and selected personnel involved with the emergency response.
- Observation of the licensee's emergency response critique held directly after the event during the afternoon of January 27.

Directly after the release occurred, the assistant operator involved closed the inboard isolation valve for the Number 2 Low Boiler Condenser while one of two maintenance mechanics tightened the bolts on the flange through which the UF_6 had sprayed. These actions essentially secured the source of the release, although the residual UF_6 which had been released initially continued to react with moisture in the air to form hydrofluoric acid (HF) vapors which reduced the visibility in the area. The other mechanic pulled his full-face respirator aside to make a call over the PA system from a telephone on the sixth floor near the condensers. That mechanic then proceeded to the fifth floor, where an additional call was made, before exiting the building. These calls alerted the control room operators and foremen that a release had occurred. As a result, the control room

operators initiated the licensee's "UF₆ Release Control Procedure." This procedure was Appendix A of the licensee's Radiological Contingency Plan (RCP).

The FMB evacuation alarms were sounded, the building was evacuated, and the control room and control point staffed in accordance with the RCP. Accountability for all staff onsite was accomplished in a timely manner; however, there were some activities identified in the RCP and the "Instructions for UF₆ Release Control," dated June 6, 1991, posted near the alarm panel in the control room, which were not accomplished. The FMB control room personnel did not sound the site disaster siren. Failure to sound the disaster siren could have impacted personnel in other areas of the site; however, the timely accountability of site personnel indicated failure to sound the site disaster siren did not have a large impact for this event. In addition, the distillation exhaust fan and other FMB exhaust fans were not shut down. The failure to shut down the exhaust fans meant contaminated air and vapor from the sixth floor continued to be circulated to other floors of the FMB during the event. Finally, the mudball feed and water supply, located on the opposite side of the FMB was not shut down.

Hazardous material reentry teams of two individuals each suited up. Two teams were sent in to observe the status of the release. The first team verified that the Number 2 Low Boiler Condenser and PP-5 flange were secure. The second reentry team verified the status of the equipment and that the visibility in the area had been restored. After verification by the Radiation Officer, the "all clear" was given and personnel were allowed back into the FMB with half-face respirators (a precaution for any elevated airborne uranium levels resulting from the release).

The licensee's emergency response personnel provided prompt and effective treatment of the injured workers onsite. The two mechanics were decontaminated in a shower directly outside the FMB. Zephrene chloride solution for treating the burns or skin irritations was quickly applied. The injured mechanics were then transported to the site dispensary. The assistant operator bypassed the control point by reporting directly to the control room. The assistant operator believed at the time that a report to the control room on the status of the release was more critical than going through the decontamination process at the control point. However, the removal of contaminated PPE in the control room could have caused additional personnel to become contaminated. The assistant operator was directed to report to the dispensary for treatment of the redness around the ears and that portion of the face not covered by the respirator face mask. Because the assistant operator bypassed the control point, contamination in the assistant operator's hair from the release had to be removed in the dispensary. At the dispensary, zephrene chloride and calcium gluconate treatments were continued under the observation of the site nurse in consultation with the licensee's contract physician. The injured personnel were later released after the reddening of the skin had disappeared.

Notifications to the local response organizations (via 911) and offsite agencies were made in a timely manner. The 911 telephone call was made approximately five minutes into the event, at which point the Chief Officer indicated no support from offsite responders was necessary. The NRC and the Illinois Department of Nuclear Safety were notified within one hour of the event. Although the event was reported as an ALERT, the actual determination of the event status was not made during the event. Only one response officer saw wisps of vapor leaving the sixth floor of the FMB (the licensee's criterion for classifying a release as an ALERT), and that individual did not clearly report the observation until the critique. The response officer stated that he had

become involved with the response for the injured personnel and felt that the appropriate response actions (such as evacuation, establishment of the control point, etc.) were underway, so the information was not provided to the Chief Control Officer, who had responsibility for upgrading the event to an ALERT. As a result, none of the participants in the response knew that the criteria for upgrading to an ALERT had been met. The poor communication of the event declaration was evident during the critique where significant confusion was observed among the participants regarding whether the event was a PLANT EMERGENCY or an ALERT.

4.1 Conclusion

The licensee made a prompt entry into its Radiological Contingency Plan and quickly ensured the release had been secured. The accountability of personnel onsite and notifications of offsite agencies were performed in a timely manner. Injured personnel were treated promptly and effectively. The licensee made a prompt entry into the UF₆ release procedure; however, specific actions required by the "Instructions for UF₆ Release Control," to limit the potential consequences of a UF₆ release were not accomplished. In addition, the actual classification of the event as an ALERT was not effectively communicated to personnel onsite.

5.0 **Licensee Analysis of Root Cause [Chapter Item No. 3]**

The inspector's evaluation of the licensee's root cause investigation included a review of the "draft" root cause investigation (Attachment 3) which was not finalized at the end of the inspection, due to the unavailability of a key participant in the January 27 ALERT event. (One of the individuals involved was on medical leave for an unrelated illness.) In addition, the inspectors reviewed the preliminary "Incident and Spill Report" prepared in accordance with Metropolis Plant Policy S-1, "Incident Investigation," dated January 15, 1996.

A preliminary incident investigation report was prepared on January 27. That preliminary incident report directed that an "in-depth" investigation be performed. At the time of the exit meeting on February 6, the licensee had not yet finalized the root cause investigation pending an additional interview. The licensee's root cause investigation concluded the root cause of the ALERT was improper operator performance due to a "lack of procedure knowledge" during the conduct of restoring the low boiler condenser to service.

The licensee's proposed short-term corrective actions included: revising procedure to turn off "Hastings Heater" during all Low Boiler Condenser maintenance changeouts, retraining all distillation operators on the "Low Boiler Condenser Wash and Hook-Up" procedure, refresher training for all officers in RCP requirements for ALERT and SITE AREA EMERGENCY, revise "Instructions for UF₆ Release Control" to reflect current practice, re-instruct Health Physics officers on upgrade of release to ALERT, and refresher training for maintenance personnel in line breaking procedures.

Proposed long-term corrective actions included: re-instruct all personnel on decontamination procedures, reporting requirements and respirator removal in contaminated areas, evaluate the Feed Materials building sirens after new PA system installed, audit UF₆ procedure in Fluorination and Distillation regarding line breaking to ensure procedures reflect current practices, revise the operating manuals to reflect PPE as stated in the Employee Safety Handbook, update the employee safety handbook,

evaluate PPE to protect side of face, and install windsocks in area for wind direction determination.

The short-term and long-term corrective actions addressed a number of the causal factors identified by the licensee during the incident investigation. At the time of the AIT exit meeting on February 6, the licensee had not integrated all causal factors in their root cause determination. The licensee's draft incident investigation was narrowly focused on one individual's actions and concluded the cause for the ALERT event was a lack of operator procedure knowledge. However, the inspectors' noted that an additional root cause for the January 27 event, and the resultant failures to implement site procedures, was a lack of effective management guidance regarding procedural adherence and use at the facility. In addition, the inspectors could not rule out the remote possibility that the PP-5 process line was partially plugged by solid UF₆, since it was not clear how long the pipe insulation had been removed.

5.1 Conclusion

The inspector's concluded that the licensee conducted their root cause analysis in accordance with established plant policy procedures. The licensee's analysis and root cause determination were consistent with the inspectors' assessment that failure of site personnel to follow procedural instructions along with inadequate procedural guidance were causal factors for the January 27 ALERT. However, based on the results of interviews and review of procedural usage and adequacy discussed in Section 4.0, 6.0, and 10.0 of this report, the inspectors concluded that an additional root cause was a lack of effective management guidance or clear expectations for utilizing plant procedures.

6.0 **Radiation and Chemical Protection [Chapter Item No. 4]**

The inspectors evaluated the adequacy and appropriateness of the radiation and chemical protection precautions taken by the licensee. As a direct result of this incident, three licensee employees received HF burns to different parts of their body. Specifically, all of the injured received burns to the face and head and one worker also burned his left arm and elbow. The inspectors reviewed the PPE procedural requirements defined for this type of work. Additionally, because two of the injured employees were maintenance personnel, general maintenance line breaking procedures were reviewed. All of the procedures were reviewed to determine the adequacy of the radiation and chemical PPE that were required. The inspectors also conducted interviews and evaluated if the persons working in the area during the event were wearing the required PPE.

The activities involved with the "blank" removal were governed by Section 10 of the Distillation Manual, "Vessel Washing Procedures." Section 10.4.2(5) of that procedure defined the proper safety gear to be worn by operations personnel during procedure performance. Specifically, the procedure required neoprene boots, acid coat and pants, neoprene gloves and a full-face respirator.

Line breaking procedures were important because the procedures defined the safety precautions required to perform work including the PPE requirements. Maintenance personnel usually have a set of PPE requirements when line breaking was being performed. At the AlliedSignal plant, maintenance personnel used the Employee Safety Handbook, 1995 revision, to define the line breaking PPE requirements. This handbook

required a complete acid resistant suit, gauntlet-type chemical protective gloves taped to jacket sleeves, chemical protective boots high enough to be covered by chemical protective pants, and a gas mask [full-face respirator]. There were no documented requirements to wear any other device to protect the head area from chemical sprays.

Based on interviews with plant personnel performing the blank removal operations on January 27, and with plant personnel that routinely performed this operation, the general procedure for both operations and maintenance personnel was to only wear the PPE required in the vessel washing procedure. On the day of the release, all three personnel were only wearing the PPE required in the vessel washing procedure, and none had taped their gloves to the sleeves of the acid suit as required for line breaking as part of the employee safety handbook.

The inspectors determined that the full-face respirators worn by the plant personnel involved in the release appeared to have adequately protected the involved employees from any significant radioactive intake.

6.1 Conclusion

The type of PPE that the employees were wearing at the time of the January, 27 release appeared compatible with the environment it was used in; however, plant personnel did not fully comply with the line breaking procedure for PPE requirements. Furthermore, it appeared that a weakness in the PPE requirements existed in that no additional protection was provided or required to protect the head area of the employee. In general, the full-face respirator only protected the face and does not appear to adequately protect the rest of the head area from chemical sprays.

7.0 **Radiological and Chemical Consequences [Chapter Item No. 5]**

The inspectors evaluated the radiological and chemical consequences of the release to plant staff and members of the general public. The evaluation was based on:

- Interviews with the injured personnel, emergency response personnel, and plant nurse.
- Observation of the sixth floor of the FMB on the afternoon of the release.
- Review of onsite and offsite air sampling results.
- Review of uranium bioassay (urinalysis) results.
- Review of survey results for the sixth floor of the FMB.

7.1 Radiological Consequences

Plant staff involved with the release and emergency response, as well as other personnel in the FMB during the time of the release, provided urine samples at approximately 3:00 p.m. on the afternoon of the release. Fourteen samples were provided. Analysis of the urine samples indicated only one worker received a minor intake. A conservative calculation of the intake (assuming all the uranium was from the urine and none from contamination; which appeared possible based on a follow-up sample) was 1 millirem. This intake would be a small fraction of the annual limit on intake for soluble uranium specified in 10 CFR 20 which equates to 5000 millirem. Any intake likely resulted from the worker removing a respirator to make a phone call in the area near the release point.

As a result of elevated levels of airborne radioactivity in the FMB, the licensee required use of half-face respirators in the facility for up to 17 hours after the release. The respirator requirement was relaxed after air samples from the FMB yielded results which were below the licensee's action level (30 percent of the Derived Air Concentration).

The maximum airborne uranium concentration at any of the fence-line and environmental air sampling stations, located around the site and at the nearest neighbor's residence, was 2×10^{-14} microcuries per milliliter. This is less than 1.0 percent of the annual average concentration allowed under 10 CFR 20 for uranium hexafluoride (3×10^{-12} microcuries per milliliter). Based on the environmental air sampling results, the inspectors concluded that there were no indications that radiological effluents from the release extended beyond the fence line at the plant. Thus, there appeared to be no radiological consequences to members of the public from airborne uranium due to the release.

Finally, observation of the area and a review of surveys for the sixth floor after the release indicated that the radiological contamination from the release was limited to the Number 2 Low Boiler Condenser. None of the survey results for the floor, windows, or other equipment in the area exceeded the licensee's action level for clean up.

7.2 Chemical Consequences

The intake of soluble uranium, in terms of mass which is the determining factor for chemical toxicity to the kidneys, for the one worker identified above was conservatively calculated to be 0.84 milligrams. This is less than 10 percent of the weekly 10 CFR 20 limit of 10 milligrams of soluble uranium, thus well below the threshold at which transient damage to the kidney would be expected.

Three workers received minor burns or irritations to the ears and facial area not covered by the respirator face mask. In addition, one worker received a burn to the left forearm and elbow from hydrofluoric acid (a byproduct of the release). The workers were treated onsite in a timely manner with zephthine chloride and calcium gluconate and were released from observation after the reddening of the skin from the exposures had disappeared.

Discussions with emergency response staff indicated there were no visual observations of a hydrofluoric acid plume outside the FMB during the release. One supervisor noticed a slight wisp of "smoke" coming from a sixth floor window during the release which dissipated well before it reached the nearest fence line. These visual observations appeared to correlate with the airborne uranium sampling results, although uranium typically falls out of any plume relatively quickly because of its mass. In addition, no members of the public notified the licensee of any respiratory irritation. Thus, the inspectors concluded that the vapor from the release did not reach the fence line and did not impact any members of the general public.

7.3 Conclusion

The radiological and chemical consequences to plant staff from the event were minor and well within the applicable NRC requirements. Three workers received minor chemical burns or skin irritations which were effectively treated onsite. There appeared to be no radiological or chemical consequences to members of the general public.

8.0 Similar or Precursor Events [Chapter Item No. 6]

The inspectors reviewed available information over the past several years to determine if similar or precursor events had occurred at the Metropolis Works Facility. The inspectors reviewed the following historical events which had resulted in activation of the licensee's emergency plan:

- May 24, 1995, SITE AREA EMERGENCY due to the release of about 2,000 pounds of iodine pentafluoride with a resultant release of about 1,000 pounds of HF. The cause was attributed to inadequate engineering design.
- February 3, 1996, ALERT due to a small release of UF_6 (200 grams) due to personnel error.
- September 9, 1996, ALERT due to small UF_6 release in basement of feeds building due to inadequate procedure.
- December 16, 1996, ALERT due to small UF_6 release caused by personnel error.

In addition to the emergency plan activation events noted above, the inspectors reviewed licensee "Incident and Spill Reports" for 1996 and 1997. Reports identified by the inspectors which had similar causal factors to the January 27 ALERT included the following:

- March 27, 1996, liquid sulphur spill due to personnel valving error.
- July 8, 1996, UF_6 spill onto the sixth floor of the Feed Materials Building from the low boiler condensers due to personnel error (lack of hot torque).
- July 26, 1996, "near miss" incident involving unexpected spill of sulfuric acid due to personnel communication error.

The inspectors' review of the above events indicated that personnel error during performance of assigned tasks was a dominant causal factor (iodine pentafluoride release was attributed to inadequate engineering design). For each of the events reviewed, the licensee implemented corrective actions to prevent recurrence. The inspectors were unable to identify a specific precursor that would have predicted the January 27 ALERT event; however, one general theme was the recurring causal factor of mis-communication or failure to meet performance expectations.

Another readily available source of information identifying precursor events was the licensee's monthly "First Aid Cases" report. The inspectors reviewed the monthly First Aid reports between April and December 1997 and noted about ten examples of first-aid treatment due to inadequate PPE. For the cases reviewed, the inspectors noted that the PPE, if required, was inadequate to prevent minor chemical burns to the hands and facial areas of personnel involved. The monthly First Aid report contained a brief summary of the incident and corrective action (with completion date). The First Aid report was prepared for senior management review, and the inspectors noted the report was routinely discussed with the craft's union representatives. The monthly First Aid report appeared to be a positive resource for the licensee to identify precursors to prevent more significant events.

8.1 Conclusion

The inspectors concluded that there was a potential for recurrence of similar events until effective corrective actions were implemented for the causal factors involved in the

January 27 ALERT. The licensee had not established effective guidance on the expectations or requirements for procedural usage. The licensee was tracking and reviewing some precursor events on a routine basis and had in place an investigation and reporting system that included a detailed root cause assessment with proposed corrective action requirements. The licensee was evaluating enhancements to PPE requirements based on precursor events.

9.0 Management Oversight [Chapter Item No. 7]

The inspectors evaluated the oversight provided by AlliedSignal management following the January 27 ALERT declaration and subsequent investigation activities. The review included the inspectors' observations of activities immediately following the ALERT declaration, observations of licensee oversight during the initial stages of event investigation, and the licensee's assessment presented at the February 6 exit meeting.

In general, the oversight of follow-up activities and reaction to issues identified was performed under the direction of AlliedSignal senior management. The initial critique of the event, conducted on January 27, was performed under the oversight of the acting plant manager and other cognizant managers that were directly involved in the emergency response. The licensee's decision to conduct a detailed incident investigation was prompt, and the lead for conducting the investigation was given to an experienced senior site supervisor.

During the onsite inspections conducted January 27-30 and on February 6, the inspectors routinely interfaced with AlliedSignal senior management to discuss on-going inspection results and to resolve emerging issues. AlliedSignal management was responsive to problems identified by the licensee's investigation, and to the problems identified by the inspectors. At the conclusion of the inspection, the licensee had developed a reasonable set of proposed corrective actions to address both general and specific causal factors.

9.1 Conclusion

During the inspection period, the inspectors observed timely response to issues identified by the licensee and the inspectors, and a reasonable approach was presented at the exit meeting to both short-term and long-term corrective actions.

10.0 Procedural Adherence and Adequacy [Chapter Item No. 8]

In addition to the PPE procedural requirements discussed in Section 6.0, the applicable work procedures were reviewed to determine the technical adequacy with respect to the work being performed, whether the personnel involved were adequately trained and qualified to use the procedures and if the procedures were followed.

The licensee's, "Vessel Washing Procedure," dated February 1997, was reviewed to determine its effectiveness. Specifically, the procedural steps directly related to the blank removal work were reviewed, and two procedural deficiencies were noted. The first, regarding the PPE, is discussed in Section 6.1 of this inspection report and involved the failure of personnel to properly wear PPE. The second procedural deficiency regarded the step to shut down the "Hastings Heater" during the blank removal. In the beginning of the procedure, a note required the distillation Hastings Heater be shut down during line openings on the UF₆ low boiler condensers. That same

precaution was not clearly applicable to Section 10.4.9, while returning the low boiler condenser to service. The Hastings Heater unit's intake was on the sixth floor and the concern with the unit remaining in operation during the line break evolution was that any inadvertent release of material on the sixth floor could be spread to the entire building.

The inspectors reviewed training records and spoke with cognizant personnel in the training group to evaluate the training status of the individuals (assistant operator and mechanics) involved in the January 27 ALERT. Based on the information reviewed, all of the involved individuals were trained to perform the condenser wash evolution, and the individuals' training qualifications were current.

In addition to the noted procedural inadequacies, several procedure compliance deficiencies were also noted. First, personnel did not strictly adhere to the line evacuation time requirements specified in the procedure. The procedure defined evacuation times of 15-20 or 10-15 minutes depending on the specific step involved. Interviews with plant personnel indicated that only about five minutes of line evacuation was the normal practice. Second, the procedure required (Section 10.4.9 (5)(f)) both the inboard and outboard valves on the impurities line to be closed prior to removing the blank. The valves were left open while the blank was removed on January 27, and were routinely left open during the blank removal operation. Finally, during the emergency response, the distillation Hastings Heater was not shut down. The Hastings heater was a likely cause for the spread of contamination since the other air system, which is larger, was also left on.

10.1 Conclusion

The operating procedure was not clear on certain high risk activities performed in the plant. Additionally, procedural compliance appeared to be an issue not only during this specific evolution but routinely when this job was performed.

11.0 **Exit Interview**

The team met with licensee representatives (identified below) during a public meeting on February 6, 1998, and summarized the purpose of the AIT, AIT charter items, and inspection findings. The team discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the team during the inspection. The exit meeting slides used by the inspectors and AlliedSignal are included as Attachment 4.

Attachments: 1. Augmented Inspection Team Charter
2. Sequence of Events
3. AlliedSignal Incident Report
4. Exit Meeting Slides

PERSONNEL CONTACTED

AlliedSignal

Perry Gasperini, Acting Plant Manager
Marshal Shephard, Manager, Environmental and Regulatory Affairs
Larry Bruce, Environmental Supervisor
Calvin Blanden, Operations Team Leader
Hugh Roberts, Safety and Health Physics Supervisor

U. S. Nuclear Regulatory Commission

Cynthia D. Pederson, Director, Division of Nuclear Materials Safety (DNMS), RIII
Patrick L. Hiland, Chief, Fuel Cycle Branch, DNMS, RIII
John M. Jacobson, Resident Inspector, RIII
Walter Schwink, Section Lead, Fuel Cycle Operating Branch, NMSS
Garrett Smith, Chemical Safety Specialist Inspector, NMSS

LIST OF ACRONYMS USED

AIT	Augmented Inspection Team
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Material Safety
FMB	Feed Materials Building
HF	Hydrofluoric Acid
NMSS	Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
PA	Public Address System
PPE	Personal Protective Equipment
RCP	Radiological Contingency Plan
SCBA	Self-contained Breathing Apparatus
UF ₆	Uranium Hexafluoride

Augmented Inspection Team Charter - AlliedSignal - Metropolis, Illinois

Examine the circumstances surrounding the HF release event at the AlliedSignal - Metropolis Works facility on January 27, 1998, including, but not limited to the following:

1. Develop and validate a chronological sequence of events and activities occurring just before and after the HF release event and determine what the plant conditions were at the time of the event.
2. Evaluate the licensee's actions during and following the event; including their immediate response to the event, implementation of the emergency plans and procedures, event reporting, follow-up actions, and management response.
3. Evaluate the extent of the licensee's analysis and determination of the root cause for the event and the initial evaluation of appropriate corrective actions.
4. Evaluate the adequacy and appropriateness of radiation and chemical protection precautions taken by the licensee.
5. Evaluate the radiological and chemical consequences of the event to both the plant staff and the general public.
6. Evaluate the potential for a similar event to occur and determine if there were any precursor events and how these were dealt with.
7. Assess the licensee management oversight of the follow-up to the event and their reaction to the issues and problems identified.
8. Determine whether the procedure used during the maintenance activity was technically adequate for the job, the personnel were adequately trained in the procedure's use and if the procedure was being followed.

Sequence of Events

AlliedSignal ALERT January 27, 1998

NOTE: The times provided in the following chronology are approximate and were based on results from several interviews and a review of event response logs. The time is listed using a 24-hour clock. The units are hours:minutes, unless otherwise noted.

<u>Time</u>	<u>Description of Event</u>
7:30	Distillation assistant operator and two maintenance mechanics began evolution on sixth floor of the Feed Materials Building (FMB) to restore the Number 2 Low Boiler Condenser to service. Replaced blind flange and couplings on all but one service line (PP-5) prior to morning break with no incident.
10:00	Morning Break
10:20	<p>Initiated completion of evolution. Assistant operator closed inboard isolation valve on operating condenser (Number 4) and checked other condensers to assure inboard isolation valves were closed.</p> <p>Evacuated PP-5 lines and manifold for some minutes.</p> <p>Assistant operator called control room to verify loss of flow through PP-5 control valve on fourth floor of FMB.</p> <p>Assistant operator closed outboard isolation valve on PP-5 line for Number 4 Low Boiler Condenser and opened inboard valve on PP-5 line for Number 2 Low Boiler Condenser to evacuate line in between valve and the blank at the condenser flange.</p> <p>Assistant operator finished putting on chemical suit, gloves and full-face respirator. Maintenance mechanics were already suited up in their protective gear.</p>
10:36	<p>Assistant operator throttled PP-5 inboard isolation valve for Number 2 Low Boiler Condenser while mechanics removed two bolts from flange and loosened a third. Upon loosening the third and cracking the flange, pressurized uranium hexafluoride sprayed out of the flange onto the three workers.</p> <p>One maintenance mechanic used phone next to condensers and then a phone on the fifth floor to announce the release over the public address system. Exited the building and washed under safety shower outside.</p> <p>Second maintenance mechanic remained near condensers to aid operator in controlling release. Operator closed PP-5 inboard valve and mechanic replaced and tightened bolts on flange which secured release.</p>
10:37	"Uranium Hexafluoride Release Control Procedure" initiated. Building evacuation alarms sounded. Second mechanic left building and showered on pad outside

FMB. Assistant operator proceeded to control room, removed personal protective equipment, and reported on status of release to Control Room Officer.

10:40 Mechanics treated for hydrofluoric acid burns with zephrene chloride solution on pad outside FMB and sent to site dispensary. Assistant operator told to report to dispensary for treatment of redness around ears and facial area not covered by respirator face mask.

10:43 Call to local responders made to provide notification and update on status of release. No offsite assistance required.

10:45 Mechanics brought to dispensary. Assistant operator reported to dispensary. Zephrene chloride treatment for burns continued for 20 minutes; followed by calcium gluconate treatment.

10:48 First reentry team entered Distillation Area, attired in chemical suits and self-contained breathing apparatus (SCBA) units, and verified valving and status of flange bolts on Number 2 Low Boiler Condenser on sixth floor. No further release noted.

10:50 Accountability of all personnel onsite accomplished.

11:00 Second reentry team entered Distillation Area and verified secure status of equipment.

11:04 All clear given for reentry to FMB with half-face respirators.

11:17 Illinois Department of Nuclear Safety notified of ALERT.

11:18 NRC notified of ALERT.

12:45 Operator evacuated PP-5 line to the blanked flange on Number 2 Low Boiler Condenser again by opening inboard isolation valve.

13:00 All injured personnel released from dispensary to return to work by this time.

13:20 Operator and two mechanics cracked the flange and removed the blank from the PP-5 line, returning the condenser to service. Teflon gasket around blank had to be pried loose because of the vacuum on the line side of the flange.

15:00 Sixteen individuals (14 site personnel and 2 contractors) potentially exposed during the release submitted urine samples for analysis. One potential intake identified.

AlliedSignal Draft Incident Investigation

Attachment 3

Incident

A Uranium Hexafluoride release of 33 grams occurred on 1/27/98. The release developed while Maintenance personnel were removing a blank on the impurities take off line (PP-5) during routine maintenance. The blank had been installed between the #2 Low Boiler condenser and the Inboard Valve on the PP-5 line. The release occurred at approximately 10:39 and was deemed "under control" shortly thereafter. The "all clear" was sounded at 11:04 a.m. The release was classified as an Alert due to the observation of a small amount of vapor exiting the 6th floor at the southeast corner of the UF₆ building.

Sequence of Events

- 10:38 a.m. Notification of UF₆ Release on PA System
- 10:39 a.m. UF₆ building siren sounds
- 10:43 a.m. Notification to 911
- 10:47 a.m. Call back from Sheriff/confirming ESDA notification
- 10:50 a.m. Wind conditions noted @ 5.7 miles/hour out of E/NE
- 10:53 a.m. Release under control
- 11:17 a.m. Notification of IDNS
- 11:18 a.m. Notification of NRC Operations Center
- 11:18 a.m. Region III NRC notified
- 1:00 p.m. Critique of incident

Injuries

Three employees received minor HF skin irritations from the release. All three employees were wearing personal protective equipment (PPE). All were treated by plant first-aid personnel on-site and returned to work.

Air Dispersion Modeling

Air dispersion modeling was performed using the Safer System and Atmospheric conditions at the time of the release. Calculations of the worst case possible for the release was used to determine the distance a release might have traveled. In the worst case, the release did not approach the fence line.

Exposures

Urine samples were requested from 16 people. One required resample; however, no over-exposures were determined. Fence line, nearest resident, and airport air samples were also analyzed with no difference from normal.

Discussion

This incident occurred when two maintenance mechanics were in the final stage of hooking up the #2 Low Boiler Condenser for service by removing the blank on the impurities line (PP-5). A production distillation operator was present with a vacuum hose during the work.

The UF₆ release occurred when the 3rd bolt on the flange was loosened to remove the blank. This blank had been installed on Friday, January 23 on 2nd shift without incident. This release was classified as an ALERT due to an observation of a small amount of vapor exiting the 6th floor at the southeast corner window. A UF₆ haze was visible on all floors; but not observed exiting any other building openings.

The incident report circulated on January 27 indicated that maintenance personnel were removing the flange bolts at the same time that the production operator was

opening the inboard valve on PP5. Later on January 28, during a review to determine the sequence of events, personnel then indicated that the inboard valve was opened prior to blank removal as outlined in the Distillation Operations Manual, "Hooking up a Condenser for Service", Step 5e.

The impurities line blank was installed on Friday, January 23. The line had a very strong vacuum and the steam tracing/insulation was sufficient. The production operator indicates that the vacuum was so strong he had to close the inboard valve for maintenance mechanics to install the blank. When the 3rd flange bolt was loosened on Tuesday, January 27, all three employees indicated the UF₆ was under pressure and "shot out" from above the blank. The mechanics removed the insulation blanket from the flange just prior to removing the blank; therefore, there was good heat transfer to the area of the flange. Later on January 27, mechanics and an operator following the operation manual procedure removed the blank without incident. The vacuum on PP5 was so strong at this time, the blank had to be pried away from the pipe flange.

In reviewing the shift foreman's report, it is noted that the approximate time he observed the operator closing the impurities (PP5) valves on the #4 LBC (on line condenser) until he noticed a haze on the 4th floor was only a short time. When asked on the next day the sequence of events all the employees indicated that it was at least 15 minutes of time before the blank was removed. Given this information along with the report from the foreperson, indicates that either the operator was not aware of why it was necessary to wait 15 minutes or he forgot about the time.

Root Cause

The Root Cause of the release of 33 grams of UF₆ was a lack of procedure knowledge on behalf of the operator. The operator apparently did not know that he was to allow the pipe section between the PP5 flange and the PP5 inboard valve to purge for 10 to 15 minutes. Through a sequence review, the operator could not have allowed the pipe section between the PP5 flange and the PP5 inboard valve to evacuate for the 10 to 15 minutes required by the procedure.^{*} This was further verified by the proper performance of the procedure three hours after the UF₆ release, without incident.

Critique

There were minor inconsistencies in the implementation of the Radiological contingency Plan, wearing of personal protective equipment, and performance of standard operating procedures. Some of the positive aspects include:

- Moved control point to better area for response effort.
- Used ER van for response effort.
- FA responders were timely in their response.
- FA responders were well organized and knowledgeable treating injuries.
- Decon set up immediately on South Pad.
- Cart from distillation door was moved to control point for needed PPE.
- Mechanics mitigated release by tightening down bolts on flange prior to leaving area.

^{*} Licensee requires one more interview with operator. Operator presently having surgery.

Recommendation/Corrective Actions

> Short - Term

Timing

- Change procedure for "Hastings Heater" to be turned off during all LB condenser maintenance changeouts. Complete/pending PT-101
- Retrain all distillation operators on "Low Boiler Condenser Wash & Hook-Up" procedure. 2/13/98
- Retrain all officers in RCP requirements for "Alert" and "Site Area Emergency". 2/28/98
- Revise "Instructions for UF₆ Release Control" to reflect current practice. 3/1/98
- Re-instruct Health Physics officers on upgrade of release to "Alert". Complete
- Retrain maintenance personnel in line breaking procedures. 4/1/98

> Long - Term

Timing

- Re-instruct all personnel on decontamination procedures/ reporting requirements and respirator removal in contaminated area. 4/1/98
- Evaluate FM Building sirens after new PA System installed. 4/1/98

- Review UF₆ procedure in Fluorination & Distillation on line breaking to ensure they reflect current practices (audit by operator/prioritize list). 10/1/98
- Revise each operating manual to reflect PPE as stated in the "Employee Safety Handbook". 1/1/99
- Update "Employee Safety Handbook". 1/1/99
- Evaluate PPE to protect side of face. 10/1/99
- Install windsocks in area for wind direction determination. 6/1/98

Exit Meeting Slides
and Attendance Sheet

AGENDA
AUGMENTED INSPECTION TEAM
EXIT MEETING
FEBRUARY 6, 1998

I. OPENING REMARKS - PAT HILAND, CHIEF
FUEL CYCLE BRANCH, RIII

II. INSPECTION RESULTS

JOHN JACOBSON - RESIDENT INSPECTOR, RIII

GARRETT SMITH - CHEMICAL SAFETY
SPECIALIST, NMSS

PAT HILAND - BRANCH CHIEF, RIII

III. LICENSEE COMMENTS / QUESTIONS

IV. CLOSING REMARKS

- CINDY PEDERSON, DIRECTOR
DIVISION OF NUCLEAR MATERIAL SAFETY, RIII

AIT CHARTER

1. CHRONOLOGY OF EVENTS
2. RADIOLOGICAL AND CHEMICAL CONSEQUENCES
3. IMMEDIATE ACTIONS DURING AND FOLLOWING EVENT
4. RADIATION AND CHEMICAL PROTECTION
5. PROCEDURE EXPECTATIONS
6. POTENTIAL FOR SIMILAR EVENT
7. MANAGEMENT OVERSIGHT AND FOLLOW-UP
8. LICENSEE ANALYSIS AND ROOT CAUSE DETERMINATION

CHRONOLOGY OF EVENTS

- 07:30am BEGAN EVOLUTION ON SIXTH FLOOR OF THE
FEED MATERIALS BUILDING TO RESTORE A LOW
BOILER CONDENSER TO SERVICE
- 10:00am MORNING BREAK
- 10:20am WORKERS BEGAN PROCEDURE TO RECONNECT
THE FINAL LINE FOR THE LOW BOILER
CONDENSER
- 10:36am INBOARD ISOLATION VALVE THROTTLED WHILE
MECHANICS REMOVED BOLTS FROM A 'BLANK' IN
THE FLANGE - PRESSURIZED URANIUM
HEXAFLUORIDE (UF_6) SPRAYED OUT ONTO
THREE WORKERS
- 10:37am URANIUM HEXAFLUORIDE RELEASE CONTROL
PROCEDURE INITIATED
- 10:43am CALL TO LOCAL RESPONDERS MADE TO PROVIDE
NOTIFICATION AND UPDATE ON STATUS OF
RELEASE - NO OFFSITE ASSISTANCE
- 10:50am ACCOUNTABILITY OF ALL ONSITE PERSONNEL
COMPLETE
- 11:04am ALL CLEAR GIVEN FOR REENTRY
- 11:18am ILLINOIS DEPARTMENT OF NUCLEAR SAFETY AND
NUCLEAR REGULATORY COMMISSION NOTIFIED
OF 'ALERT' DECLARATION

RADIOLOGICAL AND CHEMICAL CONSEQUENCES

- MINOR INTAKE OF SOLUBLE URANIUM FOR ONE WORKER
- ELEVATED LEVELS OF AIRBORNE URANIUM IN FEED MATERIALS BUILDING
- NO INDICATIONS OF RADIOACTIVE MATERIALS BEYOND SITE FENCE
- THREE WORKERS RECEIVED MINOR HYDROFLUORIC ACID (HF) BURNS
- NO INDICATIONS OF HYDROFLUORIC ACID VAPORS BEYOND SITE FENCE

IMMEDIATE ACTIONS DURING AND FOLLOWING EVENT

- WORKERS TAKE PROMPT ACTIONS TO STOP RELEASE AND START RESPONSE
- ENTRY INTO RELEASE CONTROL PROCEDURE WITH MINOR DEVIATIONS
- ALERT DECLARED WITH TIMELY NOTIFICATIONS OF OFFSITE AGENCIES
- PROMPT AND EFFECTIVE TREATMENT OF INJURED PERSONNEL
- RESPIRATORY PROTECTION REQUIRED WITHIN THE FEED MATERIALS BUILDING UNTIL ACCEPTABLE AIR SAMPLES OBTAINED
- SUBSEQUENTLY RESTORED SYSTEM TO SERVICE WITH NO RELEASE
- PERFORMED APPROPRIATE FOLLOW-UP SAMPLING AND SURVEYS

RADIATION AND CHEMICAL PROTECTION

- PROCEDURE SPECIFIED PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR OPERATIONS PERSONNEL AS FOLLOWS:
 - NEOPRENE BOOTS AND GLOVES
 - ACID COAT AND PANTS
 - FULL FACE RESPIRATOR

- ALLIEDSIGNAL EMPLOYEE SAFETY HANDBOOK REQUIRED THE ABOVE PPE **PLUS** THE FOLLOWING WHEN BREAKING LINES:
 - CHEMICAL PROTECTIVE GLOVES TAPED TO JACKET SLEEVES

- THERE WERE NO ADDITIONAL REQUIREMENTS TO PROTECT THE HEAD AREA, OTHER THAN A FULL FACE RESPIRATOR

- EMPLOYEES INVOLVED WERE ONLY WEARING PPE REQUIRED IN THE VESSEL WASH PROCEDURE

PROCEDURE EXPECTATIONS

- PROCEDURAL DEFICIENCIES
 - DID NOT SPECIFY APPROPRIATE LEVEL OF PPE AS DEFINED IN THE ALLIEDSIGNAL EMPLOYEE SAFETY HANDBOOK
 - NOT CLEAR REGARDING THE "HASTINGS HEATER" TO BE SHUT DOWN PRIOR TO REMOVING THE "BLANK"
- PROCEDURAL COMPLIANCE DEFICIENCIES
 - PERSONNEL DO NOT STRICTLY ADHERE TO THE EVACUATION TIME REQUIREMENTS OUTLINED IN THE PROCEDURE
 - THE PROCEDURE REQUIRED BOTH THE INBOARD AND OUTBOARD VALVES ON THE IMPURITIES LINE TO BE CLOSED PRIOR TO REMOVING THE BLANK. THE VALVES WERE LEFT OPEN WHILE THE BLANK WAS REMOVED
 - DURING EMERGENCY RESPONSE, PLANT PERSONNEL NOTED THAT THE DISTILLATION HASTINGS HEATER WAS NOT SHUT DOWN

POTENTIAL FOR SIMILAR EVENT

- FOUR EMERGENCY RESPONSE/RADIOLOGICAL CONTINGENCY PLAN ACTIVATIONS AT ALERT LEVEL OR HIGHER IN PAST THREE YEARS
- MARCH 24, 1996, LIQUID SULFUR SPILLED OUT ONTO FLOOR DUE TO FAILURE TO VALVE OUT STEAM SUPPLY
 - WORKER FAILED TO LOCK OUT STEAM SUPPLY VALVE
- JULY 8, 1996, UF_6 / HF SPILL ON 6TH FLOOR FROM LOW BOILER CONDENSER FLANGE
 - LACK OF HOT TORQUE ON FLANGE BOLTS - COMMUNICATIONS
- JULY 26, 1996, "NEAR MISS" INCIDENT INVOLVING AN UNEXPECTED SPILL OF SULFURIC ACID
 - WORKER NOT FAMILIAR WITH VALVING
- FIRST AID REPORTS BETWEEN APRIL AND DECEMBER 1997
 - SEVERAL FIRST AID TREATMENTS WERE FOR HF "SUNBURNS"

MANAGEMENT RESPONSE FOLLOWING THE EVENT

- RECOGNIZED SIGNIFICANCE OF EVENT
 - CONCLUDED SIGNIFICANT

- PROMPT CRITIQUE WITH SENIOR MANAGEMENT
 - NOTED DISCREPANCIES

- PRELIMINARY REPORT ISSUED
 - ADEQUATE DETAIL

- PROMPT INTERVIEWS
 - INVOLVED PERSONNEL

- ROOT CAUSE ASSIGNMENT
 - SENIOR SUPERVISOR

LICENSEE ANALYSIS AND ROOT CAUSE DETERMINATION

- INCIDENT RECOGNIZED AS SIGNIFICANT
 - INVESTIGATION ASSIGNED
- INVESTIGATION REVIEWED AVAILABLE INFORMATION
- ROOT CAUSES APPEAR REASONABLE
- POSSIBLE CAUSES

Presentation

NRC Public Meeting

February 6, 1998

 **AlliedSignal**
Fluorine Products

What We Need To Do Going Forward

➤ Short-Term

- ➡ Retrain Distillation operators on procedure
- ➡ Refresher training for all officers in RCP requirements for "Alert" and "Site Area Emergency"
- ➡ Refresher training for Maintenance personnel in line breaking procedures

➤ Long-Term

- ➡ Reinstruct all personnel on decontamination procedures
- ➡ Review all Fluorination & Distillation line breaking procedures
- ➡ Revise operating manuals to reflect PPE as stated in "Employee Safety Handbook"

Compensatory Activities

Immediate

- No line breaking of low boiler condenser until training complete
- Revise procedure "Low Boiler Condenser Wash" before the next low boiler condenser is changed out
- Insist on taping of gloves or protective sleeve

What Worked Well

- Alarms/TV Monitors
- Emergency Response
- Minimizing Release
 - ➡ No Over Exposure to Employees
 - ➡ No Impact to the Community
- Proper First Aid Treatment
- Timely Notifications

AIT Exit Meeting Attendance Sheet

February 6, 1998

Name	Affiliation
Cindy Pederson	NRC/RIII
Pat Hiland	NRC/RIII
John Jacobson	NRC/RIII
Walt Schwink	NRC/NMSS
Garrett Smith	NRC/NMSS
Percy Gasperini	AlliedSignal
Larry Bruce	AlliedSignal
Marshall Shephard	AlliedSignal
Calvin L. Blanden	AlliedSignal
Hugh G. Roberts	AlliedSignal
W. E. Sykes	USEC/LMUS
Larry L. Jackson	USEC/LMUS
Kenny Myers	AlliedSignal
Jean Easley	Allied Citizen Comm.
Don Heine, Sr.	AlliedSignal retiree
Jim Modglin	Massal Co. Commissioner and Allied Citizens Comm.
Ronald Yates	AlliedSignal retiree
James E. Pirtle	AlliedSignal retiree
James E. Pratte	AlliedSignal retiree
Louis Hillibrand	AlliedSignal retiree
Donald Green	President OCAW Local 7-669
Jim Myrick	Prod. Rep. OCAW Local 7-669
Dan Milam	Metropolis Planet
John Schwegmaa	Private citizen