



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET SW SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

December 17, 2003

NMED No. 030735

Mr. Rory J. O'Kane  
Plant Manager  
Honeywell Specialty Chemicals  
P.O. Box 430  
Metropolis, IL 62690

SUBJECT: NRC INSPECTION REPORT 40-3392/2003-007 AND NOTICE OF VIOLATION

Dear Mr. O'Kane:

This report refers to the special inspection conducted on October 6 through November 26, 2003, at the Honeywell Specialty Chemicals facility. The purpose of the inspection was to review the circumstances regarding recent events involving chemical releases and to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection on November 26, 2003, the NRC inspectors discussed the findings with members of your staff.

The inspection consisted of an examination of activities conducted under the license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of the license. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations of activities in progress, and interviews with personnel.

Based on the results of this inspection, the NRC has determined that two Severity Level IV violations of NRC requirements occurred. The violations were evaluated in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG 1600, which is included on the NRC's web site at <http://www.nrc.gov/what-we-do/regulatory/enforcement.html>.

The violations are cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding the violations are described in the subject inspection report. The violations involved failure to conduct plant operations in accordance with written Standard Operating Procedure Manuals. The violations and other similar issues discussed in the report indicate that management expectations regarding procedural adherence were not clear and had eroded through acceptance of site practices that contradicted procedural directions. Similar issues were identified during the NRC's followup to an event that occurred in 1998.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to

determine whether further enforcement action is necessary to ensure compliance with regulatory requirements. Please address in your response to the violations why the corrective actions taken in response to issues identified after the 1998 event were not effective in preventing the more recent problems.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA/

Jay L. Henson, Chief  
 Fuel Facility Inspection Branch 2  
 Division of Fuel Facility Inspection

Docket No. 40-3392  
 License No. SUB-526

- Enclosures: 1. Notice of Violation  
 2. Inspection Report 40-3392/2003-007

cc w/encls:  
 Gary Wright  
 Illinois Department of Nuclear Safety

Distribution w/encl:

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 L. Reyes, RII  
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 RII Enf. Coordinator  
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DATE	12/12/03	12/11/03	12/11/03	12/11/03	12/16/03	12/ /2003	12/ /2003
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
PUBLIC DOCUMENT	YES NO						

## NOTICE OF VIOLATION

Honeywell Specialty Chemicals  
Metropolis, Illinois

Docket No. 40-3392  
License No. SUB-526

During an NRC inspection conducted on October 6 through November 26, 2003, two violations of NRC requirements were identified. In accordance with NUREG-1600, "General Statement of Policy and Procedure for NRC Enforcement Actions," the violations are listed below.

License Condition 10 of NRC License No. SUB-526, Amendment No. 15, authorizes, in part, the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 7 of the license application dated January 30, 2003.

1. Chapter 2, Section 2.6 of the application, dated January 30, 2003, requires that "plant operations shall be conducted in accordance with written Standard Operating Procedure Manuals." Each manual provides detailed instructions for proper operation of each Production unit, and includes information pertaining to, in part, hazardous chemicals handled in the unit.

Contrary to the above, on September 30, 2003, an operation was not conducted in accordance with written "Standard Operating Procedure Manuals." Specifically, the licensee's staff conducted an operation to remove a blockage from the Distillation Production unit without detailed instructions provided from "Standard Operating Procedure Manuals."

This is a Severity Level IV violation (Supplement VI). (VIO 40-3392/2003-007-02)

2. Chapter 2, Section 2.6 of the application, dated January 30, 2003, requires that "plant operations shall be conducted in accordance with written Standard Operating Procedure Manuals." The licensee's Standard Operating Procedure Manuals includes the Procedure "Continuous Operations."

Step 4.3.23 of Procedure "Continuous Operations," dated February 2003, requires, in part, that evacuation line (PP-8) valves on all fill spots be closed prior to closing the fill spot product (PP-16) valve of the spot presently being filled. The procedure then required that the PP-16 valve be closed and the PP-8 valve opened when the cylinder was filled.

Contrary to the above, on August 31, 2003, licensee staff did not close the evacuation line (PP-8) valve for fill spot No. 4 prior to closing the fill spot product (PP-16) valve and opening the PP-8 valve for the spot that was filled (No. 2). As a result, due to a loose pigtail fitting on the No. 4 fill position, a small uranium hexafluoride release occurred.

This is a Severity Level IV violation (Supplement VI). (VIO 40-3392/2003-007-03)

Pursuant to the provisions of 10 CFR, Part 2.201, Honeywell Specialty Chemicals is hereby required to submit a written statement or explanation to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, with a copy to the

Regional Administrator, Region II, Sam Nunn Federal Center, 61 Forsyth Street SW, Suite 23T85, Atlanta, Georgia, 30303-8931, within 30 days of the date of the letter transmitting this

Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for the violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations; and (4) the date when full compliance will be achieved. Your Notice of Violation response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm.html> (the Public Electronic Reading Room). If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 17th day of December 2003.

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No. 40-3392

License No. SUB-526

Report No. 40-3392/2003-007 (DFFI)

Licensee: Honeywell International, Inc.

Facility: Metropolis Works

Location: P. O. Box 430  
Metropolis, IL 62960

Dates: October 6, through November 26, 2003

Inspectors: David J. Hartland, Senior Fuel Facility Inspector,  
Region II

Bruce L. Bartlett, Senior Resident Inspector,  
Paducah Gaseous Diffusion Plant, Region II

Merritt N. Baker, Senior Fuel Facility Inspector,  
Headquarters

Manuel G. Crespo, Fuel Facility Inspector, Region II

Jose Jimenez, Inspector-in-Training, Region II

Approved By: Jay L. Henson, Chief  
Fuel Facility Inspection Branch 2  
Division of Fuel Facility Inspection

## EXECUTIVE SUMMARY

Honeywell International, Inc  
NRC Inspection Report 40-3392/2003-007 (DFFI)

The purpose of the special inspection was to review the circumstances regarding recent events involving chemical releases.

- The inspectors confirmed that the licensee's investigation into an event involving a spill of hydrofluoric acid was accurate and that appropriate root causes and corrective actions were identified. However, the inspectors noted that several examples of failure to follow plant procedures occurred including failure to drain the vaporizer prior to performing the dip tube maintenance, failure to amend the process modification form when the scope of work changed, and failure to provide the required personnel protective equipment for removal of the dip tube.

The inspectors determined that the event did not have the potential to affect the safety of radioactive material and thus, did not present an increased radiation risk to workers. Therefore, no enforcement action is being taken for the three examples of failure to adhere to plant procedures. However, the inspectors noted that the issues, when reviewed in conjunction with other issues in this report, exemplified that management expectations regarding procedural adherence were not clear and had eroded through acceptance of site practices that contradicted procedural directions (Paragraph 2.a).

- The licensee's response to a release of antimony pentafluoride was adequate to ensure employee and public health and safety. However, the licensee's root cause analysis did not identify that failure to follow procedural requirements was a root cause. Also, the licensee's initial corrective actions in terms of operator training were inadequate to communicate management's expectations for procedural compliance. In addition, an inspector followup item (IFI) was identified to review the licensee's modifications to the group operator training program. The inspectors determined that the event did not have the potential to affect the safety of radioactive material and thus, did not present an increased radiation risk to workers. Therefore, no enforcement action is being taken (Paragraph 2.b).
- The inspectors determined that the operators' entry into a uranium hexafluoride (UF<sub>6</sub>) cloud was unnecessary to terminate a pigtail release event and involved an unnecessary intake of UF<sub>6</sub> which resulted in an uptake below licensee investigation levels and significantly below NRC regulatory limits. The inspectors also concluded that there were previous similar events for which the licensee failed to take full advantage of lessons learned or to institute adequate corrective actions. One IFI was identified to followup on licensee actions to enhance their corrective action system. In addition, the use of UF<sub>6</sub> as a leak test media was a poor practice and overall procedural adherence was weak. Two violations were identified for failure to conduct operations in accordance with written "Standard Operating Procedure Manuals" (Paragraph 2.c).

- The inspectors noted similarities between issues identified during the recent events and an event that occurred in 1998. In both cases, the inspectors identified that the licensee's initial investigation did not identify that management expectations regarding procedural adherence were not clear and had eroded through acceptance of site practices that contradicted procedural directions. The inspectors noted that the implementation of corrective actions to the 1998 event was short-lived due to an apparent lack of senior management continuity. To address the inspectors issues, the licensee intended to increase management/Quality Assurance oversight to ensure management expectations regarding procedural adherence were being communicated (Paragraph 2.d).

Attachment:

Partial List of Persons Contacted

Inspection Procedures Used

Licensee Documents Reviewed

Items Opened, Closed, and Discussed

List of Acronyms Used

## REPORT DETAILS

### 1. Summary of Plant Status

During much of the inspection period, the plant was in an extended outage due to recent operational events and performance of maintenance activities. Maintenance activities and minor plant processes were conducted without incident or unusual occurrences. Green salt operations in the Feed Materials Building were resumed on November 10, and fluorination was restarted on November 21.

### 2. Review of Recent Events

#### a. Hydrofluoric Acid Spill (88025)

##### (1) Inspection Scope

The inspector conducted interviews with plant personnel and reviewed the licensee's emergency response, investigation, and corrective actions to an event involving a spill of hydrofluoric acid (HF) that resulted in injuries to a maintenance mechanic.

##### (2) Observations and Findings

On September 9, 2003, while a maintenance mechanic was inserting a new dip tube into the South Pad Vaporizer, a cloud of HF vapor, described as about the diameter of the mechanic's torso, flowed out of the open end of the tube and impacted the mechanic's face and chest under his face shield. The replacement tube had apparently been staged in the sun for several minutes and was warmer than the HF vaporization temperature, which caused the HF inside the tube to boil.

Water was immediately administered by individuals present at the scene, and the emergency response team was called for over the plant public address system. The team arrived and started administering first aid. An ambulance then transported the individual to an off-site hospital for further treatment. The individual suffered chemical burns to the face and irritation to his upper respiratory system.

The inspectors reviewed the licensee's investigation into the event and performed an independent assessment by reviewing records and conducting interviews with personnel involved. The inspectors confirmed that the licensee's investigation was accurate and that appropriate root causes and corrective actions were identified.

The mechanic was replacing the dip tube as part of a project to replace several sections of liquid HF piping in the plant. The original scope of work for the South Pad Vaporizer did not include the replacement of the tube but involved the connection of new piping to flanges on top of it. A single special work permit had been issued to define the safety requirements for the tasks, including the required personnel protective equipment (PPE) (apron, face shield, and gloves). The inspector noted that separate special work permits had been issued for work on other vaporizers, which included the replacement of the dip tubes (i.e., A/B and D/E vaporizers). Those vaporizers were emptied prior to installing new dip tubes, and a chemical hood was worn by the mechanic(s) performing the work.



While other vaporizers were drained, the workers decided to keep liquid HF in the South Pad Vaporizer. This operation constituted the first time that work was performed on a vaporizer containing liquid HF. Procedure 4.3.3 in the South Fluorine Plant Procedure Manual included steps for draining the South Pad Vaporizer if work to be done during the shutdown required it. The licensee staff left the HF in the vaporizer because they believed that the original scope of work did not require the HF to be drained. In addition, they also wanted to use the HF to perform leak testing after the maintenance activities were complete.

On September 8, the shift maintenance supervisor identified that the South Pad Vaporizer was equipped with a dip tube, which was not shown on Drawing MTW-A4072, and a decision was made to replace the tube. At the daily planning meeting on the following day, concerns were expressed regarding working on the vaporizer containing liquid HF. It was felt that the dip tube could be safely replaced by cooling the contents below the HF vaporization temperature and maintaining a negative pressure in the head space of the vaporizer. Maintenance personnel took some additional precautions during removal of the old dip tube by utilizing a mobile crane to ensure that the mechanic was at a safe distance from the nozzle. However, that precaution was not taken during installation of the new tube.

The licensee staff failed to reclassify the safety impact as the scope of the HF piping replacement task changed, including the need to reassess whether to drain the HF from the vaporizer as described by Procedure 4.3.3. Also, since licensee staff failed to amend the PT-101 (Process Modification) form that was issued for the original work scope, an opportunity for additional safety reviews was missed.

In addition, the special work permit for the South Pad Vaporizer was not revised to provide additional PPE, even though the scope of work had changed to include replacement of the dip tube. The Honeywell Metropolis Works Employee Safety Handbook required that a chemical hood be worn for repairing leaks at HF vaporizers or repairing HF leaks in liquid HF lines to vaporizers. Step 4.1 of Procedure SA98-17, "Breaking Lines/Clearing Blockages," specified the use of protective equipment identical to the Honeywell Metropolis Works Employee Safety Handbook.

As a corrective action, the licensee staff performed reviews of system process hazard analyses and procedures and updated them as necessary to ensure they were current. The licensee also provided training to plant staff with emphasis on the implementation of the process modification procedure requirements. In addition, for the short term, plant safety personnel were required to review all special work permits involving maintenance line breaks.

(3) Conclusions

The inspectors confirmed that the licensee's investigation was accurate and that appropriate root causes and corrective actions were identified. However, the inspectors noted that several examples of failure to follow plant procedures including failure to drain the vaporizer prior to performing the dip tube maintenance, failure to amend the process modification form when the scope of work changed, and failure to provide the required PPE for removal of the dip tube.

The inspectors determined that the event did not have the potential to affect the safety of radioactive material and, thus, did not present an increased radiation risk to workers. Therefore, no enforcement action is being taken for the three examples of failure to adhere to plant procedures. However, the inspectors noted that the issues, when reviewed in conjunction other issues in this report, exemplified that management expectations regarding procedural adherence were not clear and had eroded through acceptance of site practices that contradicted procedural directions.

b. Antimony Pentafluoride Release (TI 2600/003 and 88010)

(1) Inspection Scope

The inspector conducted interviews with plant personnel and reviewed the licensee's emergency response, investigation, and corrective actions in response to an event involving a release of antimony pentafluoride ( $\text{SbF}_5$ ).

(2) Observations and Findings

Early in the morning on September 12, 2003, a chemical release of  $\text{SbF}_5$  from the Fluorine Products Building occurred. The chemical release created a plume that traveled past the rear fence line of the facility. When the plume was observed to be traveling beyond the fence line, the licensee staff declared a site Alert, which was reportable to the NRC.

Shortly thereafter, the licensee's emergency response team was able to isolate the source of the leak by closing the drain valves of the  $\text{SbF}_5$  product tank (U-44) and the sample port. No one was injured as a result of the event. The licensee determined that environmental impact of the chemical release was not significant, as HF concentration at the fence line was estimated to be a factor of ten less than the threshold limit value for short term exposure (three parts per million).

The inspectors reviewed the licensee's emergency response to the event by reviewing the time line of events and interviewing operators regarding the actions taken that day. The inspectors did not identify any issues with the licensee's response in mitigating the chemical release.

The licensee's investigation identified three root causes for the event: the inability to determine the amount of  $\text{SbF}_5$  in the reboiler (U-77), the inadequate sampling procedure, and the inadequate training and experience of the operator. These results were compared with the inspectors' assessment, which were deduced from interviews with operators and reviews of the process system and operating procedure.

The sampling procedure stated that the level for U-44 (determined through a sight glass) was to be used to determine the amount of material currently in the system. The procedure to purify (reboil) the  $\text{SbF}_5$  stated that the sight glass was to be used to determine how much material was drained into U-77 and how much was still in U-44. The operator on shift during this event could not determine the level in U-44 due to a cloudy sight glass. The inspectors verified that determining the amount of  $\text{SbF}_5$  in U-77 was not possible if the level in U-44 was not visible.

At that point, the inspectors determined that the operator should have ceased operation and contacted his supervisor for instruction. Instead, the operator assumed that the  $\text{SbF}_5$  had reboiled back into U-44 and proceeded to take a sample. Upon opening the sample port drain valve,  $\text{SbF}_5$  from U-77 began billowing out under pressure, forming a cloud that eventually was vented out of the building's scrubber stack. The operator was wearing the appropriate PPE and was able to safely evacuate the area and report the leak.

The licensee's investigation recommended that the contents of U-77 be directly measured by a load cell. A load cell would have allowed the operator to confirm that U-77 was empty prior to opening the sample port drain valve, thereby eliminating any confusion as to the contents of the tank. The licensee's investigation also recommended that the procedure be modified to include more safety precautions, including a verification that U-77 was at a negative pressure prior to opening the sample port drain valve. This check would ensure that material in the reboiler was not under pressure when the sample valve was opened.

While these revisions would enhance the procedure, the inspectors noted that the procedure as written, if followed, would have prevented the release, a conclusion not derived by the licensee's investigation. The inspectors determined that adherence to two procedural requirements would have averted the event: the verification of the contents of U-44 (not performed due to the cloudy sight glass) and the shutting of the block valve between the reactor output and U-77 (a concluding step in the reboiling process which would have prevented flow from U-44 to U-77). These observations indicated to the inspectors that a failure to adequately follow the procedure was also a root cause.

Due to the intended revisions to the procedures, retraining for the operators in the fluorine products building was performed. The retraining was also part of the corrective actions in response to the event. The inspectors observed a mock training session (all training had already been completed) and noted that the training was not conducted with the new procedure revision, which had not been issued yet. Instead, the training was a walkdown of the process with attention given to the intended changes in the routine operation of the equipment.

The inspectors observed that the training did not provide the expected emphasis on compliance with the operating procedures. The inspectors concluded that licensee management's expectation with regard to procedure compliance was not adequately demonstrated to the employees of the Fluorine Products Building through these training sessions.

Also, as part of the licensee's revisions to the procedures, experienced operators were consulted to ensure that the actual practices in the field were captured. The inspectors reviewed the revisions to the procedure to verify that certain activities mentioned by operators interviewed were included. The inspectors found several examples of minor practices that occurred frequently in day-to-day operations that were not included in the list of revisions to the procedure, including steps taken to remove plugs from the system. This observation provided another example of the lack of management's expectations regarding procedure quality/adherence being communicated to the employees.

Finally, the licensee's investigation acknowledged that the operator, although qualified according to their training program, lacked sufficient quality training and experience for the  $\text{SbF}_5$  process. The operator's position was that of a "group," or substitute, operator, a type of position that is utilized in all areas of the plant. Upon review of the group operators' training program, the inspectors noted significant weaknesses in the qualification and training of those operators at the plant.

Group operators could be qualified for up to seven different positions; however, they worked the positions only when the full-time workers were unavailable. Therefore, group operators were generally less experienced in the positions for which they were qualified. The inspector also noted that on-the-job training could be performed by qualified, yet inexperienced, group operators. The operator involved in the event was apparently trained by other group operators which impacted the quality of the on-the-job training he received.

The inspector also noted that the qualifications of a group operator were good for one year after qualifying for the position. The qualification period appeared excessive for an operator that could be qualified for up to seven duties. In addition, no refresher training was required for group operators prior to working a job for which they were qualified but may not have performed for an extended period of time.

The licensee was aware of the deficiencies and had begun renegotiations with the union (since the program was detailed in the union contract) to strengthen the training program of the facility. Details regarding how the program was going to be modified were still being finalized at the time of this inspection. Licensee actions to address deficiencies in the group operator training program will be tracked as inspector follow-up item (IFI) 40-3392/2003-007-01.

Upon further review, the inspectors determined that the event did not have the potential to affect the safety of radioactive material and thus, did not present an increased radiation risk to workers. Therefore, no enforcement action is being taken for the failure to adhere to plant procedures which would have prevented the event from occurring. However, the inspectors noted that the issues identified, when reviewed in conjunction with other issues discussed in this report, exemplify that management expectations regarding procedural adherence was not clear and had eroded through acceptance of site practices that contradicted procedural directions.

### (3) Conclusions

The licensee's response to the event was adequate to ensure employee and public health and safety. However, the licensee's root cause analysis did not identify that procedure adherence was a root cause. Also, the licensee's initial corrective actions in terms of operator training were inadequate to communicate management's expectations for procedural compliance. In addition, an IFI was opened to review the licensee's modifications to the group operator training program. The inspectors determined that the event did not have the potential to affect the safety of radioactive material and thus, did not present an increased radiation risk to workers. Therefore, no enforcement action is being taken.

d. Release of Uranium Hexafluoride From Pigtail (TI 2600/003 and 88005)

(1) Inspection Scope

The inspectors assessed the licensee's root cause analysis and corrective actions for a release of uranium hexafluoride (UF<sub>6</sub>) from a cylinder pigtail.

(2) Observations and Findings

On September 30, 2003, plant operators observed a leak of UF<sub>6</sub> coming from the connection line (referred to as the pigtail) to the No. 4 cylinder fill position. One nearby operator responded to the release after first donning his half-face respirator. Another operator and the Shift Supervisor responded from the control room after first donning their half-face respirators when the leak detection system actuated. The operators closed a valve and attempted to tighten the fill connection before leaving the Feeds Material Building (FMB). The leak was isolated after approximately one minute.

Each cylinder fill position had a source of vacuum so that UF<sub>6</sub> could be removed from the pigtail and other piping as necessary. The source of the vacuum for each position was through a valve (PP-8) to a common header that was tied to cold traps. Lines from other process areas also received their vacuum source from the cold traps. The operator had previously prepared the cylinder in the No. 4 fill position for filling and left the PP-8 valve open for that position as required by the applicable procedure.

Subsequently, while clearing a possible blockage in another portion of the process, he briefly opened the PP-6 valve to gain access to the same vacuum line. Liquid UF<sub>6</sub> entered the vacuum line, flashed into vapor, and quickly overwhelmed the negative pressure, causing the line to become briefly pressurized. Some of the UF<sub>6</sub> gas escaped from the system at the No. 4 cylinder pigtail connection due to an apparent cross-threaded fitting.

The licensee estimated that approximately three grams of UF<sub>6</sub> leaked through the fitting and entered the FMB. A cloud of UF<sub>6</sub> vapor briefly migrated to all floors of the FMB but it quickly dissipated. In addition, a small vapor cloud was briefly seen outside of the FMB but it too quickly dissipated. No activation of the licensee's emergency response organization was required.

Urine sample results of the three operators indicated that one operator had an uptake of 35 micrograms per liter of uranium ( $\mu\text{g U/L}$ ), another operator had an uptake of 18  $\mu\text{g U/L}$ , and the third had an uptake of 2  $\mu\text{g U/L}$ , all below the licensee's investigation level. The operators' total exposure was significantly less than regulatory limits.

The inspectors noted that by the time the leak was discovered, the source of the leak had already been isolated. The operators' entry into the UF<sub>6</sub> cloud was unnecessary to terminate the event and involved an unnecessary intake of UF<sub>6</sub>. The inspectors noted that the licensee did not provide specific guidance to plant staff regarding expectations for mitigating chemical releases. The licensee appeared to rely on the judgement of individuals to determine if they could take immediate action to mitigate a release without putting themselves at risk. In response, licensee management provided guidance to

plant staff that required a half-face respirator for escape, a full-face respirator to investigate, a self-contained breathing apparatus to mitigate a release.

The licensee's initial root causes of the event were the low volume of available vacuum and the loose pigtail fitting. The licensee also determined that procedural guidance did not exist for removing the blockage from the process piping.

License Condition 10 of NRC License No. SUB-526, Amendment No. 15, authorized in part, the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 7 of the license application dated January 30, 2003. Chapter 2, Section 2.6 of the application, dated January 30, 2003, required that "Plant operations shall be conducted in accordance with written "Standard Operating Procedure Manuals." Each manual provided detailed instructions for proper operation of each Production unit, and included information pertaining to, in part, hazardous chemicals handled in the unit. Contrary to the above, on September 30, 2003, licensee staff conducted an operation to remove blockage from the Distillation Production unit without detailed instructions provided from "Standard Operating Procedure Manuals." This is a violation (VIO 40-3392/2003-007-02).

The inspectors determined that there had been three previous similar occurrences to the pigtail release over the last two years. All releases were of a minor amount of material with no personnel injuries. During the follow up to a release that occurred after the August 31, 2003 event, the inspectors determined that licensee personnel failed to follow procedure. Step 4.3.23 of the Continuous Operations Procedure required, in part, that the evacuation line (PP-8) valves be closed on all fill spots prior to closing the fill spot evacuation (PP-16) valve of the spot being presently filled. The procedure then required that PP-16 be closed and the PP-8 valve opened when the cylinder was filled.

Performing this action resulted in a brief pressurization of the vacuum source header with UF<sub>6</sub>, which was similar to the September 30, 2003 event. However, the operator did not close the PP-8 to the No. 4 fill position prior to opening the PP-8 valve to the No. 2 position, where the cylinder fill had been completed. Due to a loose pigtail fitting on the No. 4 fill position, a small release occurred. The licensee did not identify the failure to follow the procedure during their assessment of the August 31, 2003 release and attributed the release to a loose fitting and poor vacuum.

License Condition 10 of NRC License No. SUB-526, Amendment No. 15, authorized in part, the use of licensed materials in accordance with the statements, representations, and conditions in Chapters 1 through 7 of the license application dated January 30, 2003. Chapter 2, Section 2.6 of the application, dated January 30, 2003, required that "Plant operations shall be conducted in accordance with written Standard Operating Procedure Manuals." The licensee's Standard Operating Procedure Manuals included the "Continuous Operations" Procedure.

Step 4.3.23 of Procedure, "Continuous Operations," dated February 2003, stated, in part, that the evacuation line (PP-8) valves be closed on all fill spots prior to closing the fill spot product (PP-16) valve of the fill spot presently being filled. The procedure then required that the PP-16 valve be closed and the PP-8 valve opened when the cylinder

was filled. Contrary to the above, on August 31, 2003, the licensee staff failed to close the PP-8 valve for the No. 4 fill spot prior to closing PP-16 and opening the PP-8 valve at the spot that had been filled (No. 2 fill spot). This event is a violation (VIO) 40-3392/2003-007-03.

As corrective action, licensee staff reviewed and enhanced procedures, as necessary. As part of those reviews, experienced operators were consulted to ensure that the actual practices in the field were captured. The inspector reviewed the changes to the procedure to verify that certain activities mentioned by operators interviewed were included. The inspectors noted that Step 4.3.3.9 of the Continuous Operations Procedure required that the operators connect the pigtail to the cylinder valve, and then in Step 4.3.3.12 of the procedure, the operators connected the pigtail to the fill connection.

In interviews with the operators, the inspectors determined that they preferred to connect the pigtail to the fill connection first and then connect the pigtail to the cylinder valve. The inspectors noted that enhancement was not included in the revisions made to the procedures. This provided another example of the lack of management's expectations regarding procedure quality/adherence being communicated to the employees.

The inspectors noted that the licensee's investigation of the September 30, 2003, event did not flag the previous events as precursors/adverse trend. The inspectors determined that this may have been because their corrective action system was fragmented. The inspectors noted that incident reports that were generated were inputted into one of several different data bases maintained separately by the Health Physics, Safety, Environmental, or TOP Managers. These separate data bases prevented the licensee from performing any formal adverse trend analyses. The licensee had planned to centralize and automate the corrective action system to enhance their ability to perform such analyses. This action will be tracked as an inspector follow-up item (IFI 40-3392/2003-007-04).

The inspectors also identified a weakness in the licensee's methodology for leak-testing pigtail connections. Section 13.3.8.10, of the Honeywell Application, dated November 2002, stated, in part, "prior to filling each UF<sub>6</sub> product cylinder, the cylinder line "pigtail" is thoroughly inspected, new gaskets installed, and the "pigtail" leak tested before proceeding with filling the cylinder." Step 4.3.14 of the Continuous Operations Procedure required, in part, to "perform a smoke check by slowly cracking open the valve from the fill spot product fill line (PP-16) to the cylinder pigtail and, if necessary, repair any leaks. The cylinder is ready to fill if there are no leaks, or when all leaks have been stopped."

Interviews with operators and managers determined that even though the intent of Section 13.3.8.10 of the license was to prevent the inadvertent release of UF<sub>6</sub>, Step 4.3.14 of the procedure used UF<sub>6</sub> to check for leaks. This meant that each time the pigtail failed the leak test, a small cloud of UF<sub>6</sub> vapor was released. The inspectors noted two recent examples of leaks identified through the use of UF<sub>6</sub> as a test media:

- April 6, 2003, Pigtail release when filling was started to the cylinder.
- June 10, 2003, Pigtail release due to cylinder bonnet nut crack.

As a short-term measure to address this issue, the licensee revised the procedure to leak-test the connections by pulling a vacuum. In the long-term, the licensee intended to revise the procedure to perform a pressure check using an inert gas.

(3) Conclusions

The inspectors determined that the operators' entry into the UF<sub>6</sub> cloud was unnecessary to terminate the pigtail release event and involved an unnecessary intake of UF<sub>6</sub>. The inspectors also concluded that there were previous similar events for which the licensee failed to take full advantage of lessons learned or to institute adequate corrective actions. One IFI was identified to followup on licensee actions to enhance their corrective action system. In addition, the use of UF<sub>6</sub> as a leak test media was a poor practice, and overall procedural adherence was weak. Two violations were identified for failure to conduct operations in accordance with written "Standard Operating Procedure Manuals."

d. Corrective Actions to 1998 Event (88005)

(1) Inspection Scope

The inspectors reviewed corrective actions to an event that occurred in 1998 to determine why issues regarding procedural adherence recurred during the recent events.

(2) Observations and Findings

Early in 1998, the NRC performed augmented inspection team and followup review inspections as documented in Inspection Reports 40-3392/1998-002 and 1998-003, respectively, in response to a small UF<sub>6</sub> release in the FMB. The inspectors noted several similarities between issues identified during those inspections and the most recent events.

In each case, the inspectors identified examples of failure to follow plant procedures and failure to wear required PPE. More importantly, as in 1998, the inspectors also identified that the licensee's initial investigation did not identify that management expectations regarding procedural adherence was not clear and had eroded through acceptance of site practices that contradicted procedural directions.

As a corrective action to those issues in 1998, operating procedures were reviewed to ensure they reflected current practice. In addition, the Quality Assurance (QA) Department was assigned additional audits in operations to ensure procedural adherence. An outside contractor was also brought in to perform audits every six months to assure adherence to procedures and license requirements. To address deficiencies in the training program, the licensee revised the program to use operators with appropriate skills for on-the-job training instead of overtime seniority.



However, the inspectors noted that the implementation of those corrective actions was short-lived due to an apparent lack of senior management continuity. In response to the more recent inspector observations regarding lack of clear management expectations regarding adherence to procedures, management revised plant policies to document those expectations and intended to increase management/QA oversight of activities to ensure that the policy was being followed. In the short-term, procedures were also required to be in-hand.

The inspectors observed implementation of the corrective actions during resumption of operations in the FMB. No significant deficiencies were identified.

(3) Conclusions

The inspectors noted similarities between issues identified during the recent events and an event that occurred in 1998. In both cases, the inspectors identified that the licensee's initial investigation did not identify that management expectations regarding procedural adherence was not clear and had eroded through acceptance of site practices that contradicted procedural directions. The inspector noted that the implementation of corrective actions taken in 1998 was short-lived due to an apparent lack of senior management continuity. To address the inspectors' issues, the licensee intended to increase management/QA oversight to ensure management expectations regarding procedural adherence were being followed.

3. Exit Meeting Summary

The inspector presented the inspection results to members of the plant staff and management at the conclusion of the inspection on November 26, 2003. The plant staff acknowledged the findings presented. The inspector asked the plant staff whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

## ATTACHMENT

### 1. PARTIAL LIST OF PERSONS CONTACTED

#### Honeywell Specialty Chemicals

- \*R. O’Kane, Plant Manager
- W. Becht, Maintenance Manager
- \*P. Bryan, Nuclear Fuel Manager
- \*M. Ginzel, Health Physics Manager
- \*J. Malanowski, Engineering Manager
- \*D. Mays, Environmental and Regulatory Affairs Manager

\* Denotes those present at the exit meeting on November 26, 2003.

### 2. INSPECTION PROCEDURES USED

TI 2600/003	Operations
88003	Reactive Inspection for Events at Fuel Cycle Facilities Program
88005	Management Organization and Controls
88010	Training
88025	Maintenance

### 3. LICENSEE DOCUMENTS REVIEWED

- Procedure 4.3.3, “Whole Plant Shutdown”
- Incident Report Form #23106
- TOP Report 03-092
- PT-101 # 646
- Special Work Permit # GRNSLT-01034
- Honeywell Metropolis Works Employee Safety Handbook (revised 1999)
- Procedure SA98-17, “Breaking Lines/Clearing Blockages”
- Lockout/Tagout Procedure SA94-02
- Policy PT-101, “Process Modification Procedure”
- Procedure SA98-12, “Specific Chemicals”
- Process Hazard Analyses for Fluorine Products and Tank Farm
- Initial Incident Report Form, 03-524, dated September 30,2003, “Pigtail release at the Number 4 Fill Spot Connect”
- Initial Incident Report Form 03-523, dated August 31, 2003, “Pigtail release at the Number 4 fill spot connect”
- Initial Incident Report Form 03-511, dated April 6, 2003, “Pigtail release when filling was started”
- Initial Incident Report Form 02-524, dated March 15, 2002, “Pigtail release”
- TOP Incident Investigation Report Number 03-094, dated September 30, 2003, “UF<sub>6</sub> Release at Fill Connection”
- “Procedure for Bioassay Sampling”
- Policy Number PD-4, “Process Area “Checklist Selection”
- Policy Number S-1, “Incident Investigation;”
- Drawing 510155, Revision F, “Feed Material Building Distillation”
- Drawing 516038, Revision M, “Feed Material Building Distillation”
- Procedure “Continuous Operations”

#### 4. ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
40-3392/2003-007-01	Open	IFI - Licensee actions to address deficiencies in the group operator training program (Paragraph 2.b).
40-3392/2003-007-02	Open	VIO - Licensee staff conducted an operation to remove blockage from the Distillation Production unit without detailed instructions provided from "Standard Operating Procedure Manuals." (Paragraph 2.c)
40-3392/2003-007-03	Open	VIO - Licensee staff failed to close the evacuation line (PP-8) valve for the No. 4 fill spot prior to closing PP-16 and opening the PP-8 valve at the spot that had been filled (No. 2 fill spot). (Paragraph 2.c)
40-3392/2003-007-04	Open	IFI - Licensee actions to centralize and automate the corrective action system to enhance their ability to perform adverse trend analyses (Paragraph 2.c).

#### 5. LIST OF ACRONYMS USED

ADAMS	Agency Document Access and Management System
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Material Safety
FMB	Feed Materials Building
HF	Hydrofluoric Acid
IFI	Inspector Follow-up Item
IP	Inspection Procedure
No.	Number
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PPE	Personnel Protective Equipment
QA	Quality Assurance
SbF <sub>5</sub>	Antimony Pentafluoride
TI	Temporary Instruction
UF <sub>6</sub>	Uranium Hexafluoride
μg/L	micrograms per liter
VIO	Violation