UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

October 8, 2015

EN 51283
NMED No 150426

Mr. Jim Pritchett
Plant Manager
Honeywell Metropolis Works
P.O. Box 430
Metropolis, IL 62960

SUBJECT: HONEYWELL INTERNATIONAL, INC. – NUCLEAR REGULATORY COMMISSION SPECIAL INSPECTION REPORT 40-3392/2015-007 AND NOTICE OF VIOLATION

Dear Mr. Pritchett:

This letter refers to the special inspection (SI) conducted at the Honeywell Metropolis Works facility in Metropolis, Illinois. The purpose of the SI was to inspect and assess the facts and circumstances involving a uranium hexafluoride (UF_6) release from the Feed Materials Building (FMB) that occurred on August 1, 2015. This event was reported to the Nuclear Regulatory Commission (NRC) Operations Center on August 1, 2015 (EN 51283) in accordance with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40.35(f), for making an Alert emergency declaration.

Based on preliminary information provided by the licensee, the NRC staff determined the event involved unexpected and potentially significant system interactions and responses, and the SI was the appropriate level of regulatory response to obtain additional information to fully assess the event (see Enclosure 3). The SI objectives were to: (1) determine the sequence of events that led to the unplanned release of UF_6 from the FMB, (2) verify the licensee properly classified the event and made required notifications, (3) assess the licensee's actions to mitigate the release, (4) validate the licensee's estimate of the amount of material released, (5) review the results of air samples and other radiation surveys, and (6) evaluate the licensee's development and implementation of immediate corrective actions.

The SI consisted of facility walkdowns, selective examinations of relevant procedures and records, interviews with plant personnel, and observations of training and testing that were implemented as immediate corrective actions for the event. The enclosed report documents the results of the SI. The inspection results were discussed with you and other members of your staff at an exit meeting held on September 10, and October 7, 2015.

Based on the results of the inspection, the NRC staff has determined that one Severity Level IV violation of NRC requirements occurred. This violation involved an incorrect action to issue a shelter-in-place Protective Action Recommendation to the public and was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html).

The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the enclosed inspection report. The violation is being cited as a Notice because it is considered self-revealing.

The NRC staff has concluded that information regarding the reason for the violation and the corrective actions taken to prevent recurrence is already adequately addressed in this report. Therefore, you are not required to respond to this letter unless the description herein does not accurately reflect your corrective actions or position. In that case, if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In addition, the NRC staff also identified an apparent violation (AV) involving the failure to follow your line breaking procedure. The AV is being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. Since the NRC staff has not made a final determination in this matter, no Notice of Violation is being issued for this inspection finding at this time. In addition, please be advised that the characterization of the AV described in the enclosed inspection report may change as a result of further NRC review.

You will be advised by separate correspondence of the results of our deliberations on this matter. No response regarding this AV is required at this time.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures 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.

Thank you for your cooperation. If you have any questions, please call me at (404) 997-4700.

Sincerely,

/RA/

Mark S. Lesser, Director
Division of Fuel Facility Inspection

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

Enclosures: (See page 3)

Enclosures:
1. Notice of Violation
2. NRC Inspection Report No. 40-3392/2015-007
   w/Attachment: Supplemental Information
3. SIT Charter

cc: (See page 4)

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Docket No. 40-3392
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Enclosures: (See page 3)

☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE

ADAMS: ☒ Yes ACCESSION NUMBER: ML15281A286 ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	RII:DFFI	RII:DFFI	RII:DFI				
SIGNATURE	CRead	DHartland	MSykes				
NAME	CRead	DHartland	MSykes				
DATE	10/8/2015	10/8/2015	10/8/2015	10/ /2015	10/ /2015	10/ /2015	10/ /2015
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\DFFI\REPORTS\DRAFT INSPECTION REPORT FOLDER\HONEYWELL\2015\SIT 8-1-15\2015-007 FINAL.DOCX

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Letter to Mr. Jim Pritchett from Mark S. Lesser dated October 8, 2015

SUBJECT: HONEYWELL INTERNATIONAL, INC. – NUCLEAR REGULATORY COMMISSION SPECIAL INSPECTION REPORT 40-3392/2015-007 AND NOTICE OF VIOLATION

DISTRIBUTION:
B. Smith, NMSS
M. Sykes, RII
T. Liu, NMSS
B. Reilly, NMSS
D. Hartland, RII

NOTICE OF VIOLATION

Honeywell Metropolis Works
Metropolis, IL

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

During an NRC inspection conducted August 2-14, 2015, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> License Condition 18 of NRC License No. SUB-526, Amendment No. 11, states, in part, that the licensee shall conduct authorized activities at the Honeywell Metropolis Works Facility in accordance with the statements, representations and conditions of the Emergence Response Plan (ERP).
>
> Section 7.1 of the ERP requires, in part, that the licensee maintain a set of Emergency Plan Implementing Procedures that implement the requirements of the ERP, including requirements for completing required notifications.
>
> Step 2.1.2 of Procedure MTW-ADM-EPIP-0002, "Emergency Classification and Notification," defines an Alert as an incident that has led or could lead to a release to the environment of radioactive or other hazardous material, but the release is not expected to require a response by an offsite organization to protect persons offsite. Step 4.1.2 of Procedure MTW-ADM-EPIP-0002 requires that the Incident Commander (IC), following recognition or notification of a possible emergency condition, initiate all immediate actions needed to ensure the safety of plant employees and the public.
>
> Contrary to the above, on August 1, 2015, upon proper recognition and declaration of an Alert condition, the IC failed to ensure that correct immediate actions were initiated in that a shelter-in-place Protective Action Recommendation was issued, although no response by an offsite organization was required to protect the public.

This is a Severity Level IV violation (Section 6.2).

The NRC has concluded that information regarding the reason for the violation and the corrective actions taken to prevent recurrence are adequately addressed in the enclosed report. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation," include the EA number, and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator Region II within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you choose to respond, 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. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

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

Dated this 8th day of October, 2015

U.S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	40-3392
License No.:	SUB-526
Report No.:	40-3392/2015-007
Licensee:	Honeywell International, Inc.
Facility:	Metropolis Works (MTW)
Location:	Metropolis, IL 62960
Dates:	August 2-14, 2015
Inspectors:	D. Hartland, Senior Fuel Facility Inspector C. Read, Fuel Facility Inspector
Approved by:	M. Lesser, Director Division of Fuel Facility Inspection

Enclosure 2

EXECUTIVE SUMMARY

Honeywell International, Inc.
NRC Special Inspection Report 40-3392/2015-007
August 2-14, 2015

The Honeywell Metropolis Works uranium conversion facility is located on a 1,100 acre site (60 acres within the fence line) near Metropolis, IL. The licensee is authorized to possess 150 million pounds of natural uranium ore and to convert this material to uranium hexafluoride (UF_6). The uranium conversion process occurs in the Feed Materials Building (FMB).

On August 1, 2015, the licensee experienced a UF_6 release from the No. 4 Low Boiler Condenser (LBC). Distillation operators were evacuating UF_6 from the low boiler system in preparation for restoring the No. 4 LBC from a maintenance activity. The release occurred when the distillation assistant operator began the evacuation of the No. 2 LBC to provide an alternate vacuum source for the No. 4 LBC restoration by opening the inboard isolation valve to the vacuum system line. The vacuum system, referred to as PP-6, includes multiple headers that connect the components of the low boiler system to the cold traps.

Each of the LBCs share a common PP-6 header and, once the No. 2 LBC was aligned to the header, UF_6 was inadvertently charged into the No. 4 LBC through a PP-6 inboard isolation valve that was leaking through. A leaking isolation valve and three improperly secured temporary flanges provided a release path for UF_6 to be released from the distillation system. As the operator was leaving the area, UF_6 smoke began filling the sixth floor of the distillation side of the FMB and migrated outside the FMB through primarily the building ridge vent.

The Incident Commander classified the event as an Alert due to the visible cloud escaping from the FMB. Review of the environmental sampling data, the removable contamination surveys, and the videos of the release confirmed that the Alert declaration was appropriate and no significant concentrations of licensed material migrated beyond the plant boundary. However, a violation of NRC requirements was identified for incorrectly implementing a shelter-in-place Protective Action Recommendation (PAR) for members of the public within a 1.3 mile radius of the plant. An Alert, as defined by Emergency Response Plan and emergency plan implementing procedures, is not expected to require a response by an offsite organization to protect persons offsite and, therefore, does not require a PAR.

The immediate actions taken by the licensee's emergency responders were timely and effective to minimize and mitigate the leak. Appropriate precautions were taken by plant personnel when responding to the release including the use of appropriate personnel protective equipment (PPE) for the conditions encountered. Air monitoring samples and radiation surveys were taken in a timely and thorough manner and the results did not exceed regulatory limits.

The inspectors determined that the licensee performed an adequate root cause investigation and implemented the appropriate immediate corrective actions prior to restarting the distillation process. The licensee identified primary causes including inadequate vacuum on PP-6, leaking isolation valves on the No. 4 LBC, and line breaking activities that were left incomplete.

As a result, the inspectors identified an apparent violation for failure to follow Procedure MTW-SAF-LS-0007, Line Breaking/Equipment Opening, which, in part, required that where line breaking was followed by a period of down time, such as the replacement of equipment, breaks in the system be properly capped with blind flanges for the duration of the out-of-service period.

The inspectors noted that there were no workers in the area during the release, and responders donned appropriate PPE. However, the inspectors determined that had worker(s) been in the immediate vicinity of the release point, a significant exposure to hazardous chemicals could have occurred.

Attachment

Key Persons Contacted
Inspection Procedures Used
List of Items Opened, Closed, and Discussed
Figures

REPORT DETAILS

A. Event Timeline

On August 1, 2015, Honeywell International, Inc. (licensee) experienced a uranium hexafluoride (UF_6) release from the No. 4 Low Boiler Condenser (LBC). Distillation operators had begun the process of evacuating the low boiler system in preparation for restoring the No. 4 LBC from a maintenance activity. The release occurred when the distillation assistant operator began the evacuation of the No. 2 LBC to provide an alternate vacuum source for the No. 4 LBC restoration by opening the inboard isolation valve to the vacuum system line. The vacuum system, referred to as PP-6, includes multiple headers that connect the components of the low boiler system to the cold traps. See Figure 1 for a simplified diagram of the Low Boiler System.

Each of the LBCs share a common PP-6 header and, once the No. 2 LBC was aligned to the header, UF_6 was inadvertently charged into the No. 4 LBC through a PP-6 inboard isolation valve that was leaking through. A leaking isolation valve and three improperly secured temporary flanges provided a release path for UF_6 to be released from the distillation system. As the operator was leaving the area, UF_6 smoke began filling the sixth floor of the distillation side of the Feed Materials Building (FMB) and migrated outside the the building through primarily the building ridge vent.

The NRC dispatched inspectors to the facility to independently assess the circumstances regarding the event and licensee's response activities. The inspectors used Inspection Procedure (IP) 88003, Reactive Inspection for Events at Fuel Cycle Facilities Program, and IP 88020, Operational Safety, during this inspection.

The timeline of the event, including actions to mitigate the release, was developed from information gathered from multiple sources by the inspectors and is as follows:

- On July 31, 2015, at 5:00 p.m. CDT, a distillation operator tested the PP-6 vacuum line and determined that it was partially plugged but adequate as a vacuum source.

- From 5:10 to 5:45 p.m., maintenance performed line breaks on the No. 4 LBC. Work was stopped after a small amount of smoke was released during two breaks. Maintenance left the blank flanges partially installed (four-bolted) at that time.

- On August 1, 2015, at 3:15 a.m., operations started to drain UF_6 from the distillation system in preparation for restoring the No. 4 LBC.

- At 4:43 p.m., operations began isolating the low boiler system.

- At 5:44 p.m., an assistant operator opened the PP-6 inboard valve on the No. 2 LBC in preparation for establishing an alternate vacuum source for restoring the No. 4 LBC. UF_6 began to leak from the No. 4 LBC. The assistant operator did not notice the leak as he left the area.

- At 5:47 p.m., the Shift Superintendent observed smoke on control room cameras on the sixth floor of the FMB on the distillation side.

- At 5:48 p.m., the chemical release detector on the distillation side of the sixth floor alarmed in the control room.

- At 5:49 p.m., the first mitigation spray tower was activated from the control room.

- At 5:50 p.m., the plant emergency siren and FMB evacuation alarm were activated and ongoing FMB operations were placed in a safe condition.

- At 6:00 p.m., the Incident Commander (IC) declared an Alert.

- At approximately 6:01 p.m., the rapid notify to local residents to shelter-in-place was activated.

- At 6:04 p.m., the IC activated a second mitigation spray from a local tower platform after another tower failed to operate properly on demand.

- At 6:06 p.m., a third mitigation tower was activated.

- At 7:08 p.m., the licensee made a notification to the NRC Headquarters Operations Officer regarding the Alert declaration.

- At 7:10 p.m., responders plugged a pipe fitting on a No. 2 LBC blank flange, stopping the leak.

- At 7:31 p.m., sixth floor distillation was clear of smoke.

- At 7:33 p.m., the mitigation towers were turned off.

- At 7:38 p.m., the rapid notify to local residents lifting the shelter-in-place was activated.

- At 8:32 p.m., the Alert declaration was terminated.

B. <u>Event Classification and Notifications</u>

The inspectors confirmed that the on-duty shift superintendent promptly assumed IC responsibility for safely mitigating the emergency. The IC properly classified the event as an Alert per the guidance in the Emergency Response Plan (ERP) and Emergency Plan Implementing Procedures (EPIPs). This was based on visual observation of the plume escaping the southeast end of the FMB from windows and the roof ridge vent, which is directly above the LBCs on the distillation side, but remained inside the plant boundary.

The plume was generated by vaporized UF_6 interacting with moisture in the FMB air (humidity), converting the UF_6 to uranyl fluoride (UO_2F_2 , yellow powder) and hydrogen fluoride (HF). The inspectors observed and confirmed that the UO_2F_2 deposits were contained within the FMB and were visible within a two to three foot radius of the area where the LBC leak occurred on the sixth floor of the FMB.

The inspectors noted during their review of video recordings in the FMB that a thick cloud of HF developed and existed for a period of time on the distillation side of the sixth floor of the FMB until the leak was stopped. The HF readily reacts exothermically with moisture to form hydrofluoric acid. The interaction of HF with the atmosphere generally results in the cloud increasing in altitude as it further interacts.

The inspectors determined that any UF_6/HF that travelled beyond the fence line would have been of such low concentration as to pose no safety hazard requiring response by offsite organizations to protect the public. The bases for this conclusion is as follows:

- Video recordings that provided views from the outside of the FMB showed HF being released from windows on the sixth floor and the ridge vent of the building roof. The plume traveled in a southwesterly direction across the plant site towards the fence line (See Figure 2). The inspectors confirmed from the recordings that, after the mitigation spray towers were activated, the plume was substantially reduced.

- The inspectors reviewed the licensee's calculations of the amount of UF_6 and HF released and its subsequent plume estimate. The inspectors concluded that the licensee's estimate of approximately 12 pounds (lbs.) of UF_6, which would result in less than 3 pounds of HF released, was reasonable as discussed in Section D. Additionally, the inspectors performed independent plume modeling based on the estimated amount released which confirmed that a significant concentration of HF did not reach the fence line. See Figure 2.

- HF detectors mounted downwind of the release did not detect any measurable increase in HF concentration but were not located in a position such that they would have detected the plume.

- The inspectors reviewed weekly radioactive air monitoring reports for the fence line and found that the activity results were within Honeywell license limits. The "fence line" radiation readings were taken when the licensee removed target filters from sample locations permanently installed on the fence and scanned them for radiation. Although a reading was above the licensee's administrative limit which required an investigation to be conducted, it was well below any regulatory limits and within the range of historical levels for minor process upsets. Figure 2 shows the location of the air monitors. The elevated reading was from Sample Point 10 which was relatively downwind from the FMB.

- The licensee took radiation surveys of various areas inside the plant boundary downwind of the release and did not detect any radiation readings above background.

Based on the inspectors' review of the environmental sampling data, the removable contamination surveys, and the videos of the release, the inspectors concluded that an Alert was the appropriate classification of the event and that no significant concentrations of licensed material migrated beyond the plant boundary.

However, at approximately 6:01 p.m. CDT, a protective action recommendation (PAR) order was issued by the licensee for local residents to shelter-in-place although there was no indication of an offsite release. The PAR order was subsequently lifted at 7:48 p.m. CDT after the emergency response team confirmed that the leak had been secured.

Introduction: The inspectors identified a Severity Level IV violation of Condition 18 of License SUB-526 for incorrectly issuing a shelter-in-place PAR to the public. Specifically, the licensee issued the PAR even though conditions did not warrant it and it was not included as a typical action in the licensee's ERP and EPIP for an Alert declaration.

Description: The NRC reviewed records and interviewed the IC and security officers who were involved in the decision to implement the shelter-in-place PAR. The PAR appears to have been implemented due to an apparent miscommunication between the two parties. The IC was the first emergency responder to arrive at the command post and was on a platform troubleshooting a malfunctioning mitigation spray tower when the miscommunication occurred. The IC radioed the security guard to request activation of the "rapid notify" to plant management, but the shelter-in-place PAR to the public was activated instead by the security officer.

Step 2.1.2 of Procedure MTW-ADM-EPIP-0002, "Emergency Classification and Notification," defines an Alert as an incident that has led or could lead to a release to the environment of radioactive or other hazardous material, but the release is not expected to require a response by an offsite organization to protect persons offsite. Step 4.1.2 of Procedure MTW-ADM-EPIP-0002 requires that the Incident Commander (IC), following recognition or notification of a possible emergency condition, initiate all immediate actions needed to ensure the safety of plant employees and the public.

The NRC determined that the licensee correctly classified the event as an Alert due to the hazardous material that migrated outside the FMB, but stayed within the restricted area of the plant. However, the shelter-in-place PAR was unwarranted as no response to protect offsite persons was required.

Analysis: Assessment of the event includes classification, assessment of the impact of the release of radioactivity, and implementation of PARs as necessary. The inspectors determined that the failure to properly assess the event is a violation of License Condition 18. Specifically, the licensee failed to follow their ERP and EPIP when they issued an unnecessary shelter-in-place PAR.

The violation was determined to be more than minor and similar to the example in the *NRC Enforcement Policy,* paragraph 6.2.d.6, as an example of a licensee failing to meet or implement more than one emergency planning standard involving assessment and notification during an Alert declaration. Specifically, the licensee incorrectly notified the public to take unnecessary protective actions following apparent miscommunications between the IC and security officers.

As corrective action, the licensee revised the appropriate EPIPs to provide separate color-coded guidance to the IC and security officers regarding required notifications (i.e., plant management recall and/or local resident shelter-in-place PAR) when an Alert or Site Area Emergency is declared. The ICs and security officers were also provided training, including table-top exercises, to demonstrate the ability to implement the enhanced procedures. The training also stressed that the ICs need to be focused on their responsibilities to provide "command and control" of the emergency response and delegate other duties (e.g., troubleshooting of malfunctioning equipment) to the appropriate team members. The inspectors reviewed the procedure revisions and observed a training session and found them to be adequate.

Enforcement: License Condition 18 of NRC License No. SUB-526, Amendment No. 11, states, in part, that the licensee shall conduct authorized activities at the Honeywell Metropolis Works Facility in accordance with the statements, representations, and conditions in the ERP.

Section 7.1 of the ERP requires, in part, that the licensee maintain a set of EPIPs that implement the requirements of the ERP, including requirements for completing required notifications. Step 2.1.2 of Procedure MTW-ADM-EPIP-0002, "Emergency Classification and Notification," defines an Alert as an incident that has led or could lead to a release to the environment of radioactive or other hazardous material, but the release is not expected to require a response by an offsite organization to protect persons offsite. Step 4.1.2 of Procedure MTW-ADM-EPIP-0002 requires that the IC, following recognition or notification of a possible emergency condition, initiate all immediate actions needed to ensure the safety of plant employees and the public.

Contrary to the above, on August 1, 2015, upon proper recognition and declaration of an Alert condition, the IC failed to ensure that correct immediate actions were initiated in that a shelter-in-place Protective Action Recommendation was issued, although no response by an offsite organization was required to protect the public. This is a Severity Level IV violation (VIO 40-3392/2015-007-01, Unnecessary Shelter-in-Place Issued During Event).

C. Actions to Mitigate The Release

After reviewing records and performing interviews, the inspectors determined that, in general, the licensee's ERT members performed their roles and responsibilities as described in the licensee's EPIPs to mitigate the leak.

The release was first noticed by the Operations Shift Superintendent when he observed a haze on sixth floor distillation on the FMB control room video screen. The sixth floor distillation chemical detector sounded shortly thereafter. The Shift Superintendent went to the sixth floor and confirmed the release through the window on the distillation door. The Shift Superintendent then returned to the control room and directed the spray towers to be activated from the tower control panel in the FMB control room. The Shift Superintendent then assumed the role of IC and activated the ERT, plant sirens, and FMB red lights, and ordered a plant census. Two additional spray towers were subsequently brought online.

The first emergency responders appropriately donned Level B personal protective equipment (PPE), isolated the No. 2 LBC by closing the inboard PP-6 valve, and determined that the leak was coming out of connections on the No. 4 LBC. The second set of responders found that the leak was coming out of a pipe fitting connected to a blind flange on the No. 2 LBC. The responders plugged the fitting, and the haze in the room started to dissipate. Once the room was clear of haze, the IC downgraded the event to a plant emergency.

The inspectors reviewed the licensee's implementation of personnel exposure and contamination controls. The inspectors reviewed records and interviewed licensee personnel. The inspectors determined that personnel took appropriate precautions when responding to the release including the use of appropriate PPE.

The inspectors reviewed bioassay results for licensee personnel who were present during the event and provided samples. One worker had enough of an intake to trigger a plant investigation, but this intake was well below regulatory limits.

D. Estimate of UF_6 Released

The inspectors reviewed the licensee's estimate of the mass of UF_6 released on August 1, 2015, from the No. 4 LBC. The licensee calculated the total UF_6 mass released using three sources of data:

- Airborne uranium concentration data was determined based on the readings taken from the stationary air samplers present in the FMB. The concentration of uranium was multiplied by the total air volume, taking into account the volume of each room and air exchange rate. Based on airborne measurements, the licensee calculated that the UF_6 mass released was 2.91 lbs.

- The amount of uranium deposited was determined by taking smear samples on the flanges that leaked, on the floor under the release points, and on top of the No. 4 LBC to determine the deposition of material. The radioactivity results were multiplied by a conservative estimate of the area in which they covered. Based on deposited uranium, the licensee calculated that the UF_6 mass deposited was 8.83 lbs.

- The uranium released from the FMB by the building equipment blowers was calculated by multiplying the exhaust flow rate by the airborne concentration. The licensee calculated that the UF_6 mass released from the blowers was 0.30 lbs.

The sum of the three sources was used as the total amount of UF_6 released during the event. This was calculated to be 12.04 lbs, which converts to around 3 lbs of HF. The inspectors interviewed Health Physics staff and determined that their sampling practices during and following the event were adequate. The inspectors reviewed the calculation and bases and determined that they were adequate and conservative. Using this information, the inspectors performed an independent plume model based on the estimated amount released and determined that a significant concentration of HF did not reach the fence line as discussed in Section B of this report.

E. Radiation and Air Sample Survey Results

As discussed in Section B, the inspectors reviewed weekly radioactive air monitoring reports for the fence line, and found that the activity results were within Honeywell license limits. Although one reading was above the licensee's administrative limit which required an investigation to be conducted, it was well below any regulatory limits and within the range of historical levels for minor upset conditions. The licensee took radiation surveys of various areas inside the plant property downwind of the release and did not detect any radiation readings above background. The HF detectors downwind did not detect any measurable increase in HF concentration but were not located in a position such that they would have detected the plume.

The inspectors reviewed survey data and discussed the sampling methods with Health Physics staff. The inspectors confirmed that surveys were taken in a timely and thorough manner and confirmed that the data was within regulatory limits. Based on the review of the environmental sampling data, the removable contamination surveys, the videos of the release, and the independent plume modeling performed the inspectors concluded that no significant concentrations of licensed material migrated beyond the plant boundary as discussed in Section B of this report.

F. Root Cause and Corrective Actions

The No. 4 LBC was taken offline on July 9, 2015, and was scheduled to be washed. Because of the location and function of the LBCs within the distillation system, they accumulate contaminates. As the contaminants build up inside the LBCs, they become less efficient, thereby creating the need for the wash.

On July 31, 2015, licensee personnel attempted to reassemble the LBC. Prior to initiating the line breaks required for reassembly, distillation operators tested the PP-6 header vacuum source because they had ongoing problems with blockages. The operators verified that there was sufficient vacuum to support the line break activities.

At the beginning of the line breaks and, as a practice to reduce heat stress, maintenance workers removed four bolts each from all the eight-bolt flanges before putting on full PPE (full-face respirator, chemical suits, hood, and rubber gloves). This practice was used to protect workers due to elevated temperatures on the floor. There were five connections (UF_6 line breaks) that were required to be made for reassembly of the LBC.

Licensee personnel were able to successfully complete three of those connections. However, while removing two of the flanges to install the spool pieces, a small amount of UF_6 was released. This UF_6 overcame the vacuum hose that was present to capture incidental releases. For those connections, the flange blanks were re-installed and again, as a practice to reduce heat stress, four-bolts were reinserted and secured snug tight. Workers intended to return later with reduced PPE to insert the remaining four bolts and torque them.

The maintenance activity was approaching shift change, and oncoming maintenance resources were diverted to an emergent job without completing the flange connections. The following day, operators began to evacuate the No. 2 LBC in preparation to use the low boiler column as an alternate vacuum source for the No. 4 LBC due to the blockage in the PP-6 header. The operators assumed that all eight bolts on the flanges of No. 4 LBC had been installed and torqued. When an operator opened the PP-6 inboard valve on the No. 2 LBC, UF_6 was inadvertently charged into the No. 4 LBC through a No. 4 LBC PP-6 inboard isolation valve that was leaking through, as the LBCs share a common header. A leaking isolation valve on a blank flange and three improperly secured flanges led to four release points on the vessel (See Figure 1).

The licensee identified the primary causes of the event to be:

- Inadequate vacuum on PP-6: The PP-6 header on the sixth floor in distillation was the primary means to evacuate the LBCs. Operators believed that the test on the line performed on July 31 demonstrated that it had adequate vacuum at the time, but it may not have had adequate capacity.

- Line breaking activities were left incomplete: The UF_6 line break flanges were left “four-bolted” on July 31. The job was left in a “holding pattern” pending the resolution by operations for establishing better vacuum to complete the line break activities.

- Lack of recognition by operations that the No. 4 LBC was not in a safe configuration. Operators should have verified that the flanges were secured prior to opening the PP-6 valve on the No. 2 LBC.

- Leaking PP-6 inboard isolation valve on No. 4 LBC: At the time the PP-6 valve on the No. 2 LBC was opened, the PP-6 valve on the No. 4 LBC was believed to be closed. It apparently leaked by, allowing UF_6 into the No. 4 LBC. The licensee performed a post-incident inspection of the valve which showed a considerable amount of UO_2F_2 and contaminates that had built-up on the valve. This build-up prevented the valve from seating properly.

- Leaking isolation valve used on No. 4 LBC: The licensee performed a post-incident inspection on an isolation valve attached to one of the blind flanges and determined that it could hold pressure if oriented exactly in the closed position. However, the nut that connected the handle to the stem was loose, and the valve could "free-wheel" past the stop points. Slightly over-rotating the handle would open the valve.

The inspectors noted that the licensee had not implemented a routine preventative maintenance (PM) activity to check the seats on LBC valves despite the potential they could become fouled by the contaminants in the system. As immediate corrective actions prior to restart of the distillation system, the licensee replaced the No. 4 PP-6 inboard isolation valve that was leaking by and washed out the blocked vacuum piping. The licensee also intended to develop a periodic PM activity to check the LBC valve seats for contaminants.

The licensee also revised its line breaking procedure to reinforce standards for initiating and completing line breaks including the elimination of the "four-bolting process." The licensee also enhanced the conduct and documentation of operations/maintenance shift turnovers to ensure that ongoing activities are appropriately carried over from shift-to-shift.

Introduction: The inspectors noted that the licensee did not comply with Procedure MTW-SAF-LS-0007, Line Breaking/Equipment Opening, which, in part, required that where line breaking was followed by a period of down time, such as the replacement of equipment, breaks in the system be properly capped with blind flanges for the duration of the out-of-service period.

Description: The inspectors reviewed records and interviewed licensee personnel who were involved with the maintenance activity on the No. 4 LBC prior to the UF_6 release on August 1, 2015. The inspectors also reviewed the root cause analysis performed by the licensee. The inspectors found that the licensee did not follow procedure MTW-SAF-LS-0007 prior to the event. Specifically, on July 31, 2015, blind flanges on the out-of-service condenser were connected with less than the full number of bolts during a maintenance evolution. Maintenance personnel left the system in that state and began working on another task.

The UF_6 release occurred the following day when the common vacuum header connected to the LBCs was pressurized. The UF_6 was released out of the unsecured flanges and through an open valve on one of the flanges. Properly securing the flanges and ensuring the isolation valve was closed could have prevented or mitigated the release.

Analysis: The inspectors determined the failure to follow the line breaking procedure is a violation of License Condition 18. Following the procedure could have prevented or mitigated the UF_6 release on August 1, 2015.

The violation was determined to be more than minor and similar to the example in the *NRC Enforcement Policy,* paragraph 6.2.c.4, as an example of a significant increase in the

likelihood of a consequence commensurate with a 10 CFR Part 70 intermediate consequence (i.e., injury) occurs to workers. The inspectors noted that there were no workers in the area during the release, and responders donned appropriate PPE. However, the inspectors performed a risk analysis and determined that had a worker been in the immediate vicinity of the release point (within five feet) at the outset of the release, an intake of greater 10 mg of uranium could have occurred in less than five seconds if the worker was not wearing respiratory protection, which was considered an intermediate consequence by the licensee's Integrated Safety Analysis Summary.

Enforcement: License Condition 18 of NRC License No. SUB-526, Amendment No. 11, states, in part, that the licensee shall conduct authorized activities at the Honeywell Metropolis Works Facility in accordance with the statements, representations and conditions of the license application dated May 12, 2006, as supplemented by letters dated March 20, 2007, May 12, 2008, July 12, 2010, and February 15, 2011.

Section 2.6.1 of the license application requires the licensee to establish a process to identify those process operations that require procedural guidance to ensure proper execution and require that these process operations be conducted in accordance with approved procedures.

Step 6.4 of Licensee procedure MTW-SAF-LS-0007, Line Breaking/Equipment Opening, requires, in part, to ensure hazards are controlled if a system is to be left unattended after it is opened. Furthermore, it requires that where line breaking is followed by a period of down time, such as the replacement of equipment, properly cap the breaks in the system with blind flanges for the duration of the out-of-service period.

Contrary to the above, on July 31, 2015, the No. 4 LBC was left unattended after it was opened, and hazards were not properly controlled. Specifically, line breaking on the No. 4 LBC was followed by a period of down time when the blind flanges on the system were not properly secured. This provided a release pathway for UF_6 and contributed to the event on August 1, 2015. This is an apparent violation (AV 40-3392/2015-007-02, Failure to Follow Line Breaking Procedure)

G. Exit Meeting

The inspection scope and results were presented to members of the licensee's staff during various meetings throughout the inspection period and were summarized on September 10, and October 7, 2015, with J. Pritchett, Plant Manager, and other members of the licensee's staff. No dissenting comments were received from the licensee. Proprietary information was discussed but not included in the report.

SUPPLEMENTAL INFORMATION

1. KEY POINTS OF CONTACT

Name	Title
D. Bilski	Security Manager
D. Craig	Operation Manager
J. Cybulski	Site Service Manager
R. Lindberg	Health Physics Specialist
L. Litinski	Regulatory Affairs
S. Patterson	Regulatory Affairs Manager
J. Pritchett	Plant Manager
E. Robinson	Operations Specialist
J. Smith	Maintenance Manager
M. Wolf	Nuclear Compliance Director

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

VIO 40-3392/2015-007-01	Unnecessary Shelter-in-Place Issued During Event
AV 40-3392/2015-007-02	Failure to Follow Line Breaking Procedure

3. INSPECTION PROCEDURES USED

IP 88003	Reactive Inspection for Events at Fuel Cycle Facilities Program
IP 88020	Operational Safety

4. DOCUMENTS REVIEWED

Records:
Air Monitoring Reports for Fenceline Samples taken July 29, 2015 and August 1, 2015
Air Activity Data for Feed Materials Building Sampled August 2, 2015
Removable contamination survey data taken August 1, 2015
Emergency response checklists for the release
Bioassay data for workers who provided samples following the August 1, 2015 event

Procedures:
MTW-ADM-EPIP-0002, Emergency Classification and Notifications, Revision (Rev.) 12
MTW-ADM-EPIP-0003, Crisis Management and Incident Command Staff Responsibilities, Rev. 7
MTW-ADM-EPIP-0009, Chemical Release Control, Rev. 5
MTW-ADM-HP-0101, Bioassay Sampling, Rev. 1
MTW-SAF-LS-0007, Line Breaking / Equipment Opening, Rev. 3
MTW-SOP-DIS-0200, “Distillation Operation,” Rev. 27
MTW-SOP-DIS-0710, Vessel Washing,” Rev. 2

Condition Reports Review:
IR-15-2152, MTW Incident Investigation Report, UF_6 Release at No 4 Low Boiler Condenser dated August 14, 2015
IR-15-2158, Emergency Response Critique Items dated August 1, 2015

Other Documents:
Safety Demonstration Report Rev. 21
Application for Renewal of License Rev., dated October 8, 2013
MTW P&IDs for Low Boiler System and vacuum lines

Figure 1: Simplified Diagram of the Low Boiler System and Release Points

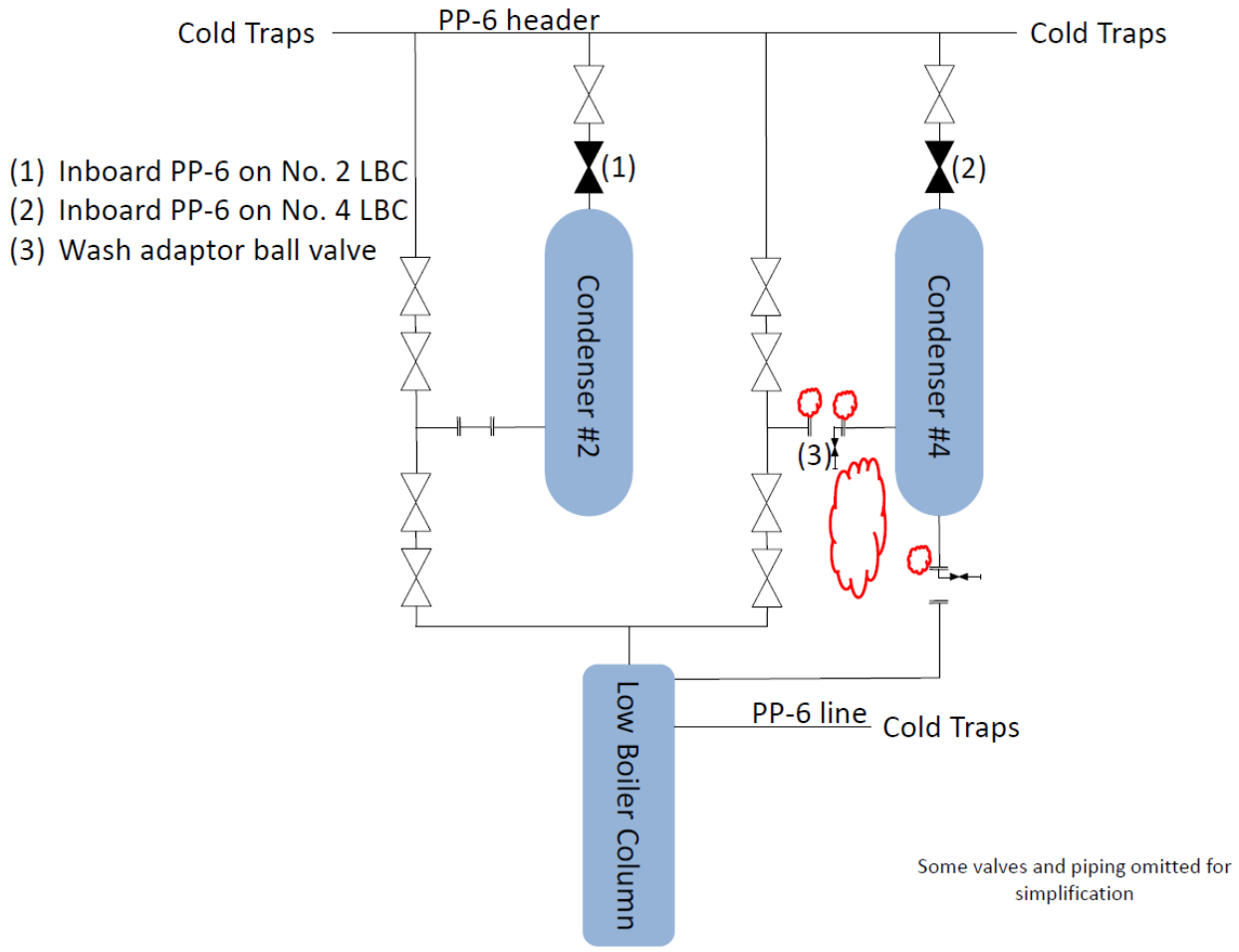
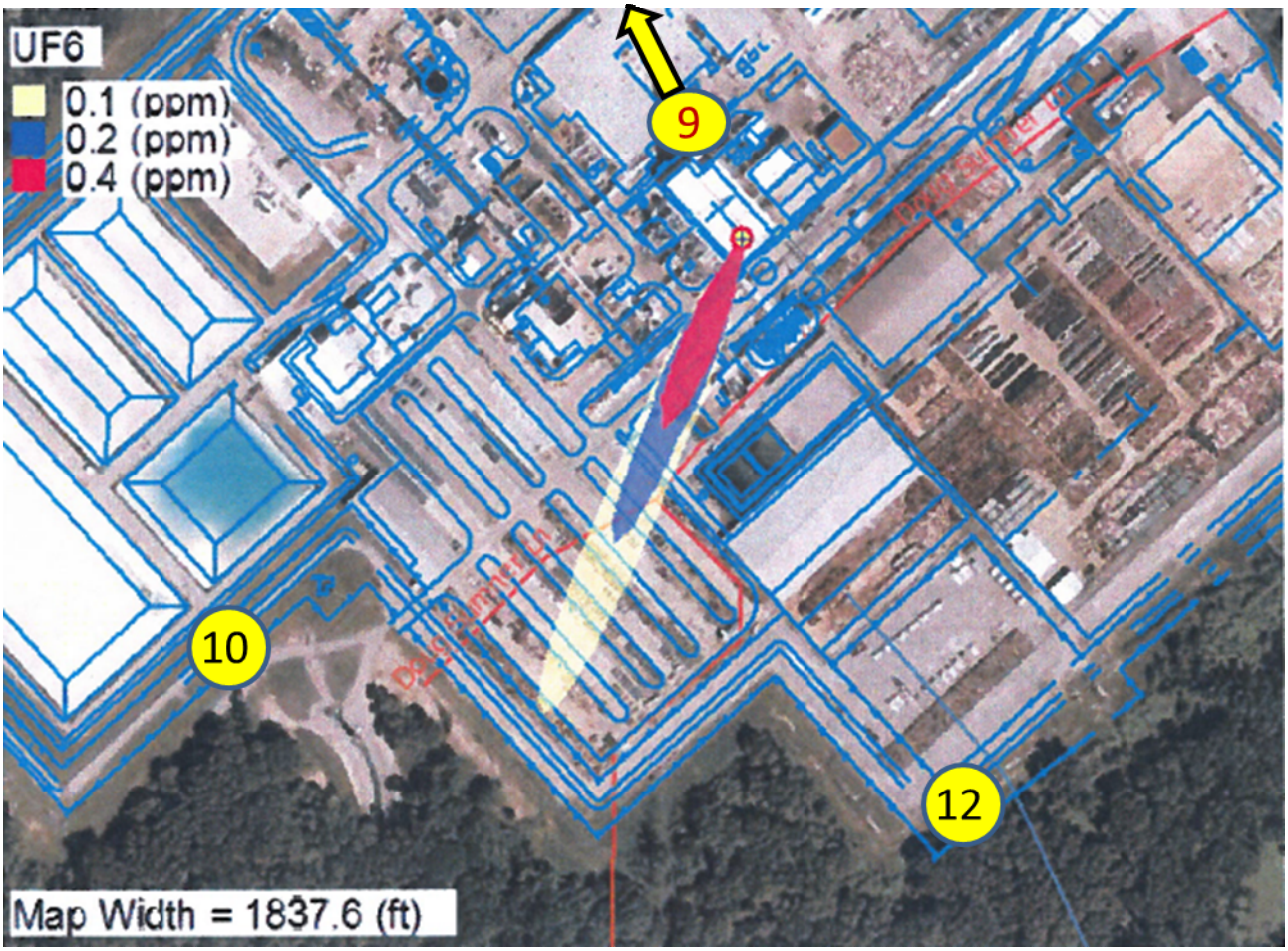


Figure 2: NRC Plume Model with Approximate Location of Air Monitors



August 4, 2015

MEMORANDUM TO: David J. Hartland, Senior Fuel Facility Inspector
Projects Branch 1
Division of Fuel Facility Inspection

FROM: Victor M. McCree ***/RA/ L. Wert for***
Regional Administrator

SUBJECT: SPECIAL INSPECTION CHARTER TO EVALUATE RELEASE OF URANIUM HEXAFLUORIDE AT HONEYWELL METROPOLIS WORKS

This memorandum confirms the establishment of a Special Inspection (SI) at Honeywell Metropolis Works (MTW) to inspect and assess the facts and circumstances surrounding the August 1, 2015, unplanned release of uranium hexafluoride (UF_6).

The issue was reported to the U.S. Nuclear Regulatory Commission (NRC) Operations Center on August 1, 2015 (Event # 51283), under a one-hour report per the licensee's emergency plan required by 10 CFR 40.35(f), for an alert declared due to an UF_6 release. You are the inspection lead and should report your status directly to me. Mr. Carey Read is assigned to assist in completing the objectives of the charter.

Regional Office Instruction No. 0704, "Documenting Management Directive 8.3, NRC Incident Investigation Program, Reactive Team Inspection Decisions in the Division of Fuel Facility Inspection," Revision 3, was used to evaluate the level of NRC response for this operational event. Based on deterministic criteria, the event involved a valve failure that resulted in an unplanned release of UF_6, due to unexpected system interaction, for which a reactive inspection would be considered. The NRC determined that the appropriate level of response was to conduct an SI to evaluate the licensee's identification of the initial issue, decision-making in response to the event, and the immediate corrective actions taken in response to the conditions identified.

The inspection and report will be performed in accordance with the guidance of Inspection Procedure (IP) 88003 "Reactive Inspection for Events at Fuel Cycle Facilities," and the applicable provisions of IP 88020 "Operational Safety," and will be consistent with Management Directive 8.3 and Inspection Manual Chapter 2600. The report will be issued within 30 days of the completion of the inspection.

CONTACTS: Marvin D. Sykes, RII/DFFI
404-997-4628

Mark S. Lesser, RII/DFFI
404-997-4700

Enclosure 3

A copy of the Charter is enclosed for your use. The objectives of the inspection are to gather information and make appropriate findings, and conclusions, in the areas listed in the Charter. These results will be used as a basis for any necessary followup action. As indicated in the Charter, the foremost objectives are to determine the safety implications and adequacy of the licensee's immediate corrective actions for the issues that resulted in the event.

You should notify Region II management of any potential generic issues identified as a result of this event for discussion with the Office of Nuclear Material Safety and Safeguards. Safety or security concerns identified, that are not directly related to the event, should be reported to the Region II office for appropriate action.

This Charter may be modified should you develop significant new information that warrants review.

Enclosure:
Inspection Charter

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

cc: M. Satorius, EDO
M. Weber, DEDMRT
C. Haney, NMSS
S. Moore, NMSS
T. Liu, NMSS
V. McCree, RII
L. Wert, RII
M. Lesser, RII
C. Evans, RII
M. Sykes, RII
C. Read, RII

Inspection Charter
Honeywell Metropolis Works
Unplanned Release

Event

On August 1, 2015, the Honeywell Metropolis Works Plant declared an ALERT due to an ongoing uranium hexafluoride (UF_6) release. The source of the leak was from the condensing system in the distillation process within the Feed Materials Building (FMB). The licensee employed a mitigating strategy using vacuum and plugging the leak, as well as initiating water spray towers external to the FMB.

A Protective Action Recommendation (PAR) order was issued, and subsequently lifted, for local residents to shelter-in-place although there was no indication of an offsite release. There were no worker injuries, and all onsite personnel were promptly accounted for.

Objectives

The objectives of the inspection are to: (1) review the facts surrounding the unplanned UF_6 release; (2) assess the licensee's response; (3) evaluate the licensee's basis for immediate and long term corrective actions to prevent recurrence; and (4) assess the licensee's progress in determining a root cause. To accomplish these objectives, the following tasks will be completed.

1. Determine the sequence of events that led to the unplanned release of UF_6 from the FMB.

2. Verify that the licensee classified the event, and carried out notification of offsite personnel, as well as State and local government agencies, in accordance with emergency procedures and regulatory requirements, including PARs.

3. Verify that the licensee's actions to mitigate the release and stop the release of licensed material were performed in accordance with licensee procedures. Evaluate the licensee's implementation of personnel exposure and contamination controls.

4. Validate the licensee's estimate of the licensed material released and verify that the released material remained within the plant boundary.

5. Examine the performance of the plant boundary hydrofluoric acid (HF) detection system to verify it was operational at the time of release. Review the results of air-sampling and other confirmatory surveys that were used to determine the spread of released licensed material.

6. Review the licensee's development and implementation of immediate corrective actions.

Documentation

Document the inspection findings and conclusions in an inspection report within 30 days of the completion of the inspection.