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

January 30, 2015

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

SUBJECT: HONEYWELL METROPOLIS WORKS – NUCLEAR REGULATORY COMMISSION INTEGRATED INSPECTION REPORT 40-3392/2014-005

Dear Mr. Pritchett:

This letter refers to the inspections conducted during the fourth quarter from October 1 through December 31, 2014, at the Honeywell Metropolis Works facility in Metropolis, Illinois. The purpose of the inspections was to determine whether activities authorized under the license were conducted safely and in accordance with Nuclear Regulatory Commission (NRC) requirements. The enclosed report presents the results of the inspections. At the conclusion of the inspections, the results were discussed with members of your staff at exit meetings held on January 28, 2015, for this integrated inspection report.

During the inspections, the staff examined activities conducted under your license, as they relate to public health and safety, in order to confirm compliance with the Commission's rules and regulations and with the conditions of your license. The inspections consisted of facility walk-downs; selective examinations of relevant procedures and records; interviews with plant personnel; and plant observations. Throughout the inspections, observations were discussed with your managers and staff. The inspections included followup of an event involving a uranium hexafluoride release that occurred in the Feeds Material Building on October 26, 2014.

Based on the results of these inspections, the NRC identified one apparent violation involving the failure to declare an Alert during the release. The apparent violation (AV) is being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. Since the NRC 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 apparent violation 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) 997-4628.

Sincerely,

/RA/
James A. Hickey, Chief
Projects Branch 1
Division of Fuel Facility Inspection

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

Enclosure:
. NRC Inspection Report No. 40-3392/2014-005
w/Attachment: Supplemental Information

cc: (See page 3)

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cc: (See page 3)

DISTRIBUTION:
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OFFICE	RII:DFFI	RII:DFFI	RII:DFI				
SIGNATURE	/RA/	/RA/	JHickey for				
NAME	DHartland	CRead	LPitts				
DATE	1/26/2015	1/23/2015	1/26/2015	2/ /2015	2/ /2015	2/ /2015	2/ /2015
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cc:
Jonathan Monken, Director
Emergency Management Agency
Division of Nuclear Safety
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Springfield, IL 62704

Brigadier General John W. Heltzel, Director
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Metropolis, IL 62960-0716

U.S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.:	40-3392
License No.:	SUB-526
Report No.:	40-3392/2014-005
Licensee:	Honeywell International, Inc.
Facility:	Metropolis Works (MTW)
Location:	Metropolis, IL 62960
Dates:	October 1 through December 31, 2014
Inspectors:	D. Hartland, Senior Fuel Facility Inspector L. Pitts, Senior Fuel Facility Inspector C. Read, Fuel Facility Inspector
Approved by:	James A. Hickey, Chief Projects Branch 1 Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

Honeywell Metropolis Works
NRC Integrated Inspection Report 40-3392/2014-005

Routine, announced inspections were conducted by regional inspectors during normal shifts and backshifts in the areas of event followup. The inspectors evaluated safety significant activities, conducted tours of the facility, interviewed personnel, and reviewed facility documents. The inspections addressed the following aspects of the program as outlined below.

Event Followup

The inspectors determined that, in general, the licensee's Emergency Response Team (ERT) members performed their roles and responsibilities as described in the licensee's Emergency Plan Implementing Procedures (EPIPs) to mitigate an uranium hexafluoride release that occurred on October 26, 2014. However, an apparent violation was identified for the failure to declare an Alert during the release. The significance of the violation is under review and will be determined at a later date. An unresolved item was also identified regarding review of the licensee's completed investigation into the cause of the crack in Primary Cold Trap 3B and subsequent corrective actions. Event Notification 50594 and Confirmatory Action Letter EA-14-183 are closed.

Attachment

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

REPORT DETAILS

Summary of Plant Status

The Honeywell Metropolis Works (licensee) 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). The facility was operated throughout the period without major incident with exception of an event that occurred on October 26, 2014, involving a UF_6 leak in the FMB.

A. Event Followup

1. Response to Release in Feeds Material Building (Inspection Procedures (IPs) 88075 and 88051)

   a. Inspection Scope and Observations

   The inspectors followed up on an event involving a UF_6 leak in the FMB that included a detailed review of numerous records and interviews of both on-site and off-site personnel who were present during the event.

   On October 26, at approximately 7:20 p.m. CST, licensee operators identified a leak of UF_6 from a heated cold trap inside the FMB. The leak occurred during a routine sublimation and draining of a cold trap. A cold trap is a large tank where UF_6 accumulates and is cooled and solidified, it can be heated later and drained during normal plant operations. Operations noticed a haze in the FMB and an operator confirmed the leak by donning a respirator and observing the conditions on the fourth floor of the FMB.

   Emergency responders implemented emergency procedures that included sounding the plant emergency alarm, shutting down all processes, declaring a “Plant Emergency,” and accounting for all personnel. Plant emergency responders were dispatched to identify and mitigate the source of the leak. Emergency responders isolated the cold trap and switched it to cooling mode which subsequently solidified the contents. After insulation was removed, the cause of the leak was identified as a crack in a seal weld between the body and head of the cold trap. An “all clear” was declared by Honeywell at 2:16 a.m. CST on October 27. As interim corrective actions, the licensee maintained the cold trap in the cooling mode below atmospheric pressure, restricted access to the area only to personnel donning a full-face respirator, and performed periodic monitoring to verify the leak was isolated. No significant injuries were reported.

   Inspectors were dispatched to the facility to independently assess the licensee’s response. 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 October 26, 2014, at 5:14 p.m. CST, licensee operators stopped cold trap operations and began heating Primary Cold Trap (PCT) 3B.
   - At 5:46 p.m., PCT 3B pressure is above atmospheric pressure.
   - At 7:04 p.m., operators open PCT 3B drain valve and begin draining contents.

- At 7:20 p.m., operators identified a UF_6 leak from PCT 3B.
- At 7:22 p.m., operators closed PCT 3B drain valve.
- At 7:36 p.m., operators completed actions in Attachment A of MTW-ADM-EPIP-0009, "Chemical Release Control," which included activating plant emergency siren and FMB evacuation alarm, initiating the control room safe haven pressurization system, and placing all FMB systems in a safe condition.
- At 7:40 p.m., accountability of plant staff was completed and the incident commander declared a Plant Emergency after assessing the event by characterizing that some hydrogen fluoride (HF) was visible coming from the top of the building.
- At 7:42 p.m., emergency responders activated spray towers and directed sprays at the windows and on the roof to mitigate the release from outside the FMB.
- At 8:01 p.m., emergency responders donned safety gear and re-entered the facility to complete the switch of PCT 3B to cooling mode to mitigate the release.
- At 8:03 p.m., the licensee completed initial notifications to Metropolis and Massac County EMS.
- At 8:14 p.m., PCT 3B pressure was reduced to below atmospheric pressure.
- At 8:25 p.m., emergency operators reported that the area was mostly clear of smoke after placing a vacuum hose in service to capture vaporized UF_6.
- At 8:27 p.m., a local resident made an inquiry to the NRC Headquarters Operator Officer (HOO) regarding the ongoing event.
- At 8:32 p.m., an NRC Region II branch chief, who was responding to the call from the local resident to the HOO, made initial contact with licensee management regarding the ongoing event.
- At 8:41 p.m., emergency responders turned off the mitigation towers.
- At 10:10 p.m., emergency responders identified a crack in the seal weld between the body and the head of PCT 3B after removing some insulation.
- On October 27, at 2:16 a.m., after an inspection of the FMB was conducted by health physics staff and a recovery plan was developed, the plant emergency was terminated.
- On November 5, the licensee agreed with the NRC findings and subsequently reported its failure to properly classify the October 26 event as an Alert [NRC Event Notification 50594].

The inspectors determined that, in general, the licensee's Emergency Response Team (ERT) members performed their roles and responsibilities as described in the licensee's Emergency Plan Implementing Procedures (EPIPs) to mitigate the leak. However, after performing interviews with personnel and reviewing available evidence, including licensee camera views and cellphone videos provide by local residents on social media, the inspectors identified that the ERT did not properly classify the event.

The inspectors noted that the UF_6 vaporized and interacted with moisture in the FMB air (humidity) allowing the UF_6 to convert to uranyl fluoride (UO_2F_2) (yellow powder) and HF (hydrogen fluoride). The NRC inspectors observed and confirmed 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 cold trap leak occurred on the fourth floor of the FMB. A thin layer of UO_2F_2 powder was also present throughout the distillation side of the fourth and fifth floors.

The inspectors noted during review of camera views in the FMB, that a cloud of HF developed and existed for a period of time on the distillation side of the fourth, fifth, and sixth floors of the FMB until the leak was stopped. The HF readily reacted exothermically with moisture to form hydrofluoric acid. The interaction of HF with the atmosphere generally results in the cloud increasing altitude as it further interacts.

Camera views of the outside of the FMB showed HF being released from windows on those floors. However, there were no views from the FMB roof, where an additional release point of HF was located. Videos available on social media provided by local residents showed the plume being released from the roof and traveling from southeast to northwest across the plant site toward the fence line before the mitigation sprays were activated. Interviews with security guards located outside of the protected area who were able to view the release from the same vantage point as the public confirmed what was shown on social media.

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 that conclusion is as follows:

- The inspectors reviewed the licensee's calculations on the amount of UF_6 and HF released and its subsequent plume estimate. The inspectors concluded that the licensee's estimate of approximately 6 pounds of UF_6, which would result in less than two pounds of HF released, was reasonable. Additionally, the NRC performed its own independent plume model based on the estimated amount released which confirmed the licensee's results that a significant concentration of HF did not reach the fence line. See Figure 1. HF detectors mounted on the fence did not detect any measurable increase in HF concentration but were not located optimally to detect this release. Figure 1 also shows the approximate locations of the HF fence line detectors in relation to the plume. Figure 2 shows the HF detector readings.

- The inspectors reviewed weekly radioactive air monitoring reports for the fence line and nearest residence, and found that the activity results were within the 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 readings were above the licensee's administrative limit which required an investigation to be conducted, they were well below any regulatory limits and within the range of historical levels. Figure 3 shows the readings taken after the event. Figure 4 shows historically levels that were the result of minor operational upsets. Figure 5 shows the location of the air monitors (one, Fo-9, was relatively downwind from the FMB).

- The Illinois Emergency Management Agency collected their targets from monitors located outside the fence (one was relatively downwind from the FMB) which indicated no elevated radiation readings. See Figure 6.

- The licensee conducted radiation surveys on nearby private property downwind of the release with the consent of from the property owner and did not detect any radiation readings above background. See Figure 7.

- Results of fluorine testing of off-site vegetation samples, including samples from the location of the private property owner, did not indicate evidence of HF. See Figure 8. The figure shows that the results were low as compared to recent routine sample results.

Based on a detailed review of numerous records and interviews of both on-site and off-site personnel who were present during the event, the inspectors found that the licensee did not recognize that the HF released from the FMB warranted an emergency classification of "Alert." Section 3.2.2 of the Emergency Response Plan (ERP) defined an Alert, in part, as an event that deviated from normal operating conditions creating a hazardous environment requiring an emergency response to mitigate a hazardous situation that either initiated or migrated outside of plant buildings and stayed within the restricted area or inner fence line.

The inspectors determined that the event met the criteria provided in the ERP and Emergency Plan Implementing Procedure (EPIP) EPIP-002, "Emergency Classification And Notification," Alert criteria of "events have occurred or are in progress that could lead to a release of UF_6 with the potential for the UF_6 release cloud to be heavily visible outside the immediate release area, outside of buildings or moving toward fence lines. No response by offsite organizations is necessary to protect the public."

The inspectors determined that there were a number of factors that contributed to the failure to declare the event as an Alert:

- The release occurred after dark, and the glare from bright lights around the FMB reduced visibility when looking above the lights.
- The release was from the top of the FMB which was not visible from site cameras.
- Site cameras also did not provide views of the plant down-wind of the FMB.
- The Incident Commander (IC) made the event declaration from a poor vantage point from the command post upwind of the release point.
- There was inadequate guidance in EPIPs regarding the monitoring performed by the Radiation Safety Officer (RSO) who was responsible for making the recommendation regarding the event declaration to the IC.
- Security officers located outside the facility were in a much better position to observe and provide vital information to the ERT but were not trained to assess and provide input to the ERT regarding releases.

The licensee agreed with the NRC findings and subsequently reported its failure to properly classify the October 26 event to the NRC at 2:04 p.m. EST on November 5 [NRC Event Notification 50594].

The NRC issued a Confirmatory Action Letter (EA-14-183) dated November 7, 2014 (ML14311A670), which detailed the corrective actions the licensee agreed to complete prior to resuming FMB operations. The licensee initiated an internal investigation to determine the root causes and evaluate the emergency response for the October 26, 2014, UF_6 release. Prior to resuming production, the licensee agreed to discuss the results of its investigation of the classification of the event and proposed corrective actions with the NRC. The licensee also agreed to review and revise its emergency preparedness procedures, if necessary, and conduct appropriate training to provide assurance that events can be classified correctly and appropriate emergency response

actions can be implemented. The license also agreed to demonstrate effective implementation of the emergency preparedness procedures and training during an NRC inspected exercise.

The licensee determined the cause of the misclassification was due to inadequate visual observation on the part of both the RSO and IC. The location of the control point, while adequate from an Emergency Response point of view, did not offer a full view of the incident to facilitate a visual observation based on prevailing winds. Deficiencies were also identified in the EPIPs with regards to event classification examples in use at the time that resulted in a nonconservative interpretation of the criteria.

In response, the licensee revised applicable EPIPs to clarify criteria for declaring an alert. Procedures were revised to better address the actions of the IC and RSO when classifying an emergency, and to add the requirement to reassess the classification upon any change in condition or additional observation to both positions. Two mitigation towers were also identified as the most appropriate safety features for exterior coverage of the FMB and were modified to change the default settings. Control Room officers and operators were trained to initiate mitigation spray towers upon initial discovery of a chemical release in the FMB to ensure a timely activation of the system.

The inspectors reviewed the procedure revisions and observed the conduct of the licensee's emergency exercise on November 12, 2014. The inspectors concluded that the licensee demonstrated effective implementation of the licensee's revised EPIPs and training including implementation of enhanced guidance for characterizing events for classification. NRC management notified licensee management of these results on November 12, and the licensee resumed licensed operations the following day. The NRC formally closed EA-14-183 in a letter to the licensee dated November 25, 2014 (ML14329A1810).

The PCT 3B remained out of service pending completion of the licensee's investigation into the cause of the weld failure. The licensee determined that other cold traps were not impacted as PCT 3B was of a unique design and did not affect the other traps. The inspectors' review of the licensee's completed investigation and subsequent corrective actions is an unresolved item (URI 40-3392/2014-005-01).

Introduction: The NRC identified an apparent violation of License Condition 18 for the failure to properly classify the event.

Description: Through a detailed review of numerous records and interviews of both on-site and off-site personnel who were present during the event, the NRC inspection found that Honeywell did not recognize that the HF released from the FMB on October 26, 2014, warranted an emergency classification of "Alert." Section 3.2.2 of the ERP defined an "Alert," in part, as event that deviated from normal operating conditions creating a hazardous environment requiring an emergency response to mitigate a hazardous situation that either initiated or migrated outside of plant buildings and stayed within the restricted area or inner fence line. No response by offsite organizations was necessary to protect the public.

Analysis: The inspectors determined the failure to properly classify the event is a violation of License Condition 18. As a result of not properly classifying the event, the licensee failed the make the required notification within one hour to the NRC Operations center as required by Section 3.2.2 of the Emergency Response Plan.

The violation was determined to be more than minor and similar to the example in the *NRC Enforcement Policy,* paragraph 6.6.c.1, as an example of failure to correctly classify and declare the event during an actual Alert emergency.

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 3.2.2 of the ERP defines an "Alert," in part, as an event that deviates from normal operating conditions creating a hazardous environment requiring an emergency response to mitigate a hazardous situation that either initiated or migrated outside of plant buildings and stayed within the restricted area or inner fence line.

Contrary to the above, on October 26, 2014, licensee emergency responders failed to declare an Alert in response to an HF release from the FMB which resulted in a hazardous situation that migrated outside of the FMB and stayed within the restricted area or inner fence line. This is an apparent violation. (AV 40-3392/2014-005-02, Failure to Declare Alert)

b. Conclusion

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 release. However, an apparent violation was identified for the failure to declare an Alert during the release. The significance of the violation is under review and will be determined at a later date. A URI was also identified regarding review of the licensee's completed investigation into the cause of the crack in the cold trap and subsequent corrective actions. Event Notification 50594 and Confirmatory Action Letter EA-14-183 are closed.

B. Exit Meeting

The inspection scope and results were presented to members of the licensee's staff at various meetings throughout the inspection period and were summarized on January 28, 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

40-3392/2014-005-01	URI	Review of the licensee's completed investigation into the cause of the crack in the cold trap and subsequent corrective actions
40-3392/2014-005-02	AV	Failure to Declare Alert during October 26, 2014 event

Opened/Closed

EA-14-183	CAL	Actions to address failure to declare Alert during October 26, 2014 event
Event Notification 50594	EN	Failure to properly classify the October 26, 2014 event as an Alert

3. INSPECTION PROCEDURES USED

88051	Evaluation of Exercises and Drills
88075	Event Followup

Attachment

Figure 1: NRC Plume Model with Approximate Location of HF Detectors

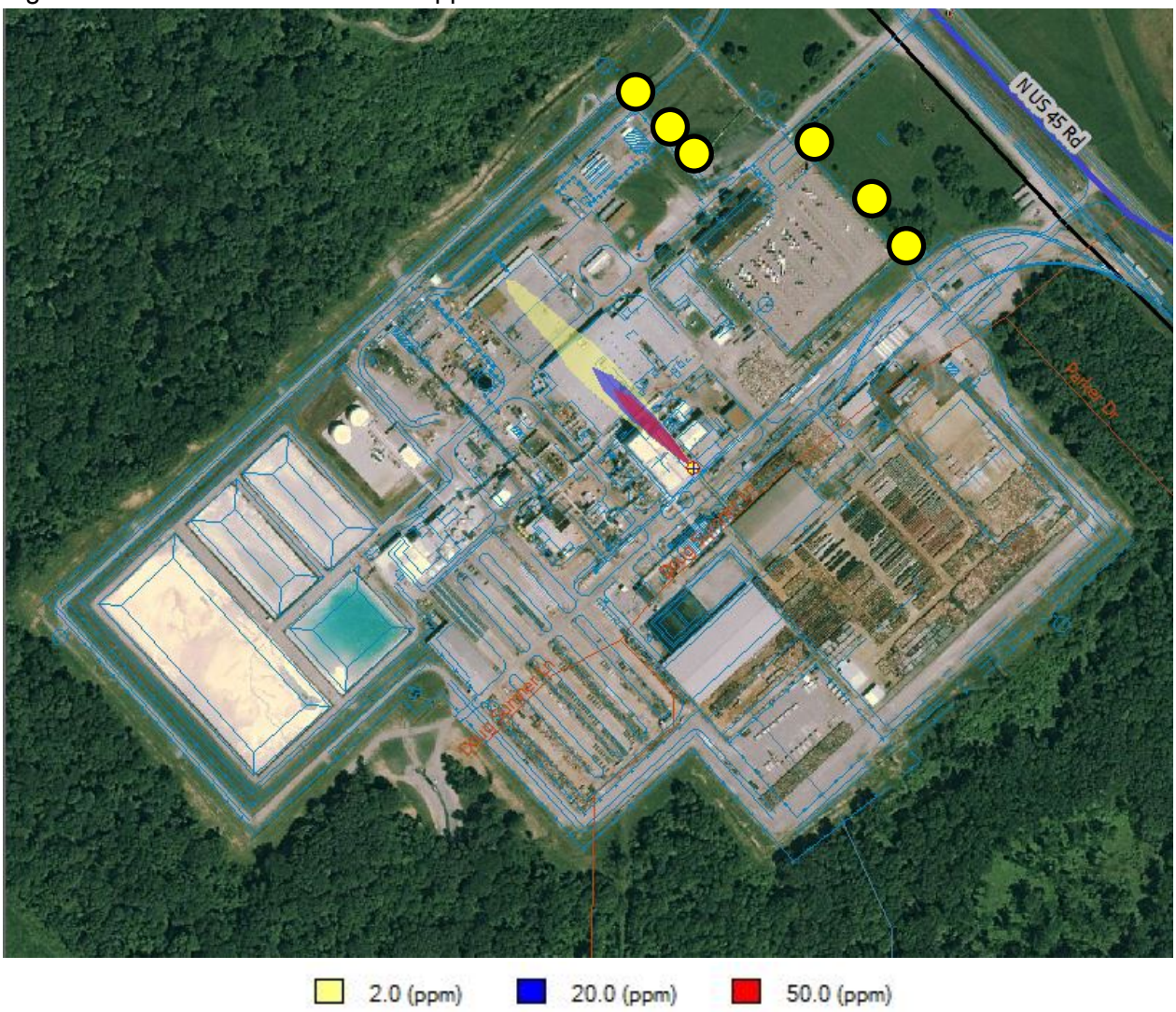
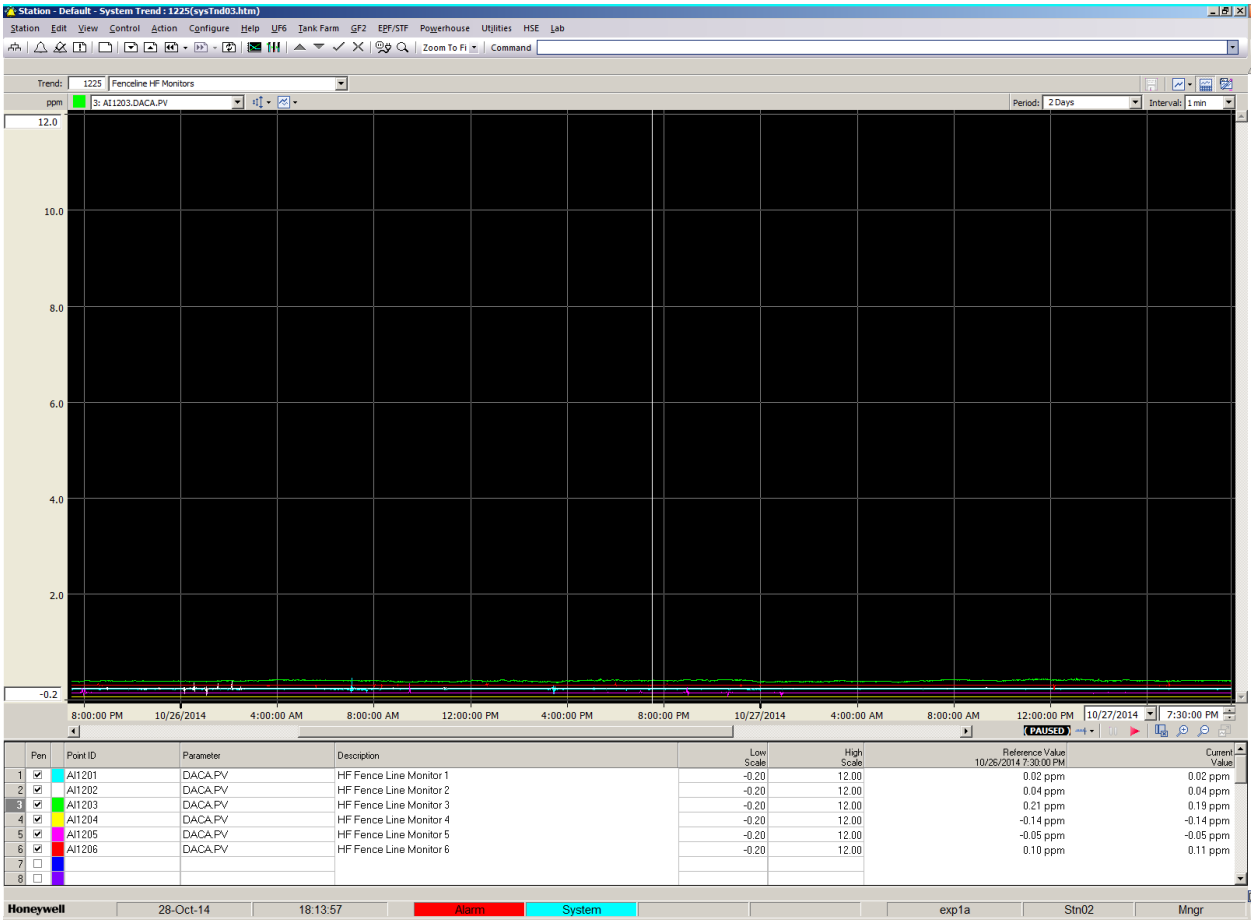


Figure 2: Hydrogen Fluoride Fenceline Monitor Readings



	Pen	Point ID	Parameter	Description	Low Scale	High Scale	Reference Value 10/26/2014 7:30:00 PM	Current Value
1	☑	AI1201	DACA.PV	HF Fence Line Monitor 1	-0.20	12.00	0.02 ppm	0.02 ppm
2	☑	AI1202	DACA.PV	HF Fence Line Monitor 2	-0.20	12.00	0.04 ppm	0.04 ppm
3	☑	AI1203	DACA.PV	HF Fence Line Monitor 3	-0.20	12.00	0.21 ppm	0.19 ppm
4	☑	AI1204	DACA.PV	HF Fence Line Monitor 4	-0.20	12.00	-0.14 ppm	-0.14 ppm
5	☑	AI1205	DACA.PV	HF Fence Line Monitor 5	-0.20	12.00	-0.05 ppm	-0.05 ppm
6	☑	AI1206	DACA.PV	HF Fence Line Monitor 6	-0.20	12.00	0.10 ppm	0.11 ppm
7	☐							
8	☐							

Figure 3: Honeywell Weekly Air Monitoring Report Collected October 27, 2014

Air Monitoring Report

Fenceline Samples and Nearest Residence

Date: 10/27/2014 **Week No: 44**

Collected By: jkk **Analyzed By:** jp

Sample Point	Time (Hrs)	Volume (Ft3)	ug F- /Filter	ug F- / m3	ug U/ Filter	uCi U/ml	
6	123.2	14784	0.0	0.000	0.44	7.19E-16	
8	123.2	14784	0.0	0.000	3.86	6.24E-15	
9	123.3	14796	0.2	0.000	73.58	1.19E-13	*
10	123.3	14796	0.1	0.000	9.56	1.54E-14	
11	123.2	14784	0.1	0.000	3.03	4.90E-15	
12	123.3	14796	0.0	0.000	2.36	3.82E-15	
13	123.2	14784	0.0	0.000	3.86	6.24E-15	
NR-7	123.2	295680	--------	--------	88.00	7.12E-15	

Nearest Residence:

NR-7a Sample Point is = 23.72% of NRC Limit

[NRC Limit is 3.0E-14]

Fence Line:

Average Uranium in Air at Fence Point #9,#10, #12 and #13 = 180.50% Plant Investigation

(Plant Investigation Limit is 2.0E-14)

Comments: all pumps running

cc: Supervisor of Health Physics
Supervisor of Health Physics Technicians
Health Physics Specialist
Fluorimeter Lab

27-Oct-14

Page 1 of 1

Figure 4: Historical Elevated Readings from Minor Upset Conditions

Sample Date	Elevated Fallout Sample Location	Sample Concentration (uCi/ml)	Cause of Elevated Concentration
01/26/2005	#13, North	1.01E-13	B Coke Box Oxide Vacuum Cleaner
04/19/2006	#13, North	1.15E-13	Drum Inverter Dust Collector
01/10/2007	#13, North	9.72E-14	UF4 Vacuum Cleaner Drum Inverter Dust Collector B-1 Filter Drain Line
01/17/2007	#9, West	8.37E-14	Ash Vacuum Dust Collector A Reductor Blower
04/01/2009	#9, West	7.78E-14	UF4 Dust Collector Operational Upset
06/24/2009	#13, North	9.33E-14	Ore Blender UF4 Filter work A Coke Box
07/29/2009	#13, North	8.57E-14	Drum Inverter Dust Collector
09/16/2009	#10, South	1.94E-13	Ore Blender B UF4 Filter and Grate Activity
11/11/2009	#12, East	1.30E-13	Legacy Waste Project (Railcar Loading)
11/18/2009	#12, East	1.32E-13	Legacy Waste Project (Railcar Loading)
01/20/2010	#12, East	8.90E-14	Legacy Waste Project (Railcar Loading)
10/17/2012	#10, South	1.00E-13	Drum Repackaging at Drum Shredder
11/07/2012	#10, South	8.31E-14	Drum Repackaging at Drum Shredder
11/14/2012	#10, South	1.13E-13	Drum Repackaging at Drum Shredder
11/21/2012	#10, South	2.61E-13	Drum Repackaging at Drum Shredder
11/28/2012	#10, South	8.83E-14	Drum Repackaging at Drum Shredder
12/12/2012	#10, South	1.06E-13	Drum Repackaging at Drum Shredder
12/19/2012	#10, South	1.19E-13	Drum Repackaging at Drum Shredder
01/09/2013	#10, South	8.23E-14	Drum Repackaging at Drum Shredder

Figure 5: NRC Plume Model with Approximate Location of Air Monitors

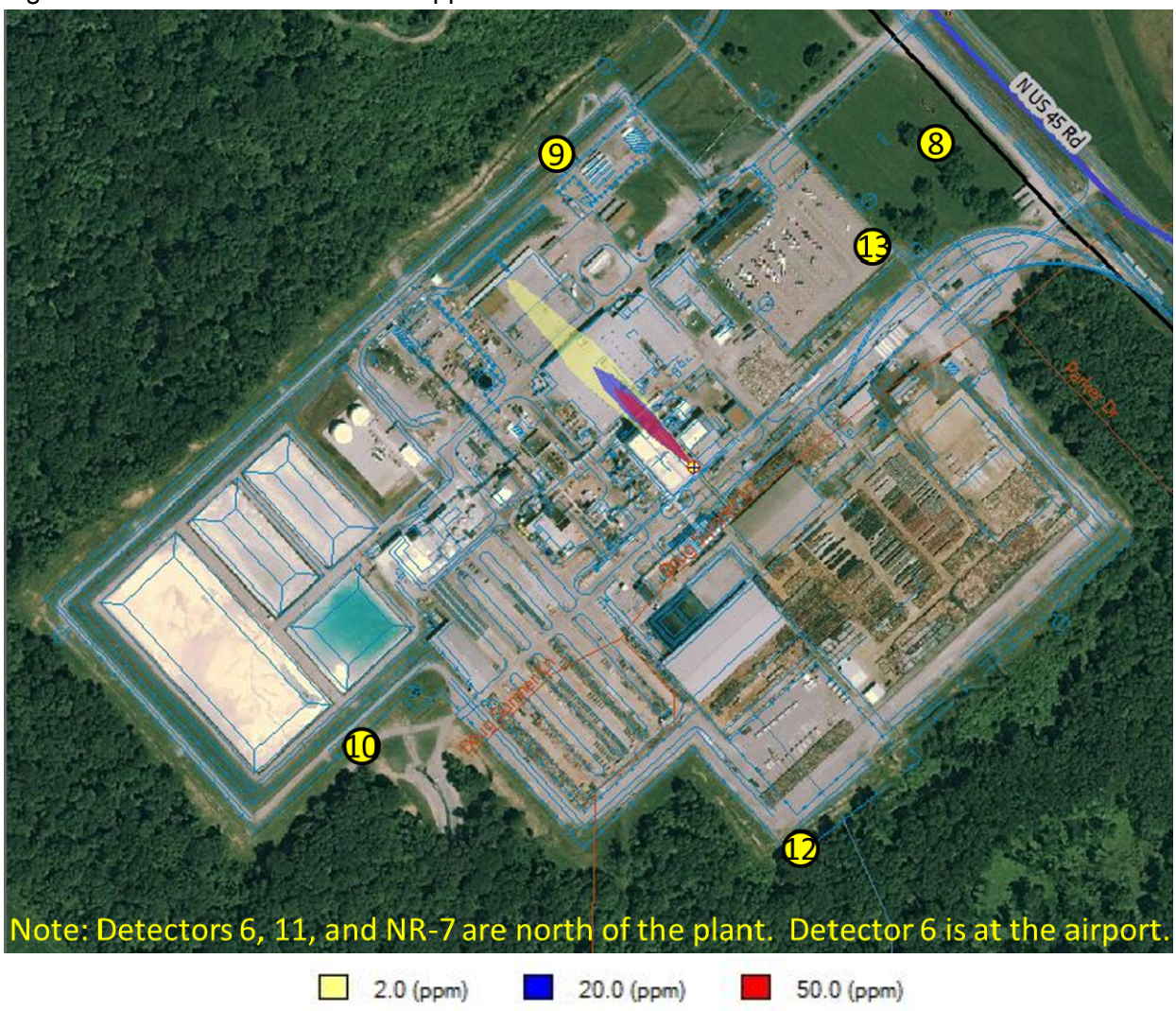


Figure 6: Illinois Emergency Management Authority Sample Results (source: IEMA Bureau of Radiation Safety; "Summary of Analytical Results: Environmental Monitoring for Radionuclides in the Environs of Honeywell Metropolis Works"; November 5, 2014)

IEMA Gross Alpha and Gross Beta Results for Air Particulate Filters Collected from October 20, 2014 through October 27, 2014

Location	Nuclide	Result	Uncertainty*	Nuclide	Result	Uncertainty*
Airport	Alpha	2.3	0.8	Beta	40.3	2.9
Nearest Resident	Alpha	3.9	1.0	Beta	35.0	2.7
North Ave.	Alpha	2.1	0.8	Beta	41.6	2.8
Massac County Hospital	Alpha	3.4	0.9	Beta	37.7	2.8
Dorothy Miller Park	Alpha	2.0	0.8	Beta	38.4	2.8

* expanded counting uncertainty (k=1.96)

IEMA Average Gross Alpha and Gross Beta Results for Air Particulate Filters Collected from July 2013 through August 2014

Location	Nuclide	Average	Minimum	Maximum
Airport	Alpha	3.1	0.1	8.6
Nearest Resident	Alpha	5.7	1.2	27.1
North Ave.	Alpha	2.5	0.8	6.8
Massac County Hospital	Alpha	2.6	0.7	7.8
Dorothy Miller Park	Alpha	2.6	0.1	7.3

Location	Nuclide	Average	Minimum	Maximum
Airport	Beta	27.3	4.4	44.4
Nearest Resident	Beta	31.1	13.2	62.8
North Ave.	Beta	26.5	10.7	42.5
Massac County Hospital	Beta	26.1	9.3	47.0
Dorothy Miller Park	Beta	26.6	9.6	42.9

Note: An Environmental Monitoring Station was moved from the water treatment plant to Dorothy Miller Park in November 2013. Therefore, results for Dorothy Miller Park cover the period from November 2013 through August 2014.

Figure 7: Honeywell Radiological Survey Results at Nearby Residence

RADIOLOGICAL SURVEY AT [redacted]

DATE/TIME: 10/27/2014 1650
METER: LUDLUM MODEL 9
SERIAL #: 271652
PROBE: 44-9-3
PROBE SERIAL #: PR295825
CALIBRATION DUE: 4/10/2015
EFFICIENCY: 31.72%

INSTRUMENT BACKGROUND: 101 cpm (OPEN AIR, GENERAL AREA)

COMMENTS: DIRECT SURVEY PERFORMED IN THE FOLLOWING AREAS AS REQUESTED BY THE OWNER OF THE RESIDENCE:
1) ~6 FT^2 AREA ON ROOFTOP OF BARN LOCATED EAST OF HOUSE
2) ~6 FT^2 AREA ON ROOFTOP OF BARN LOCATED SOUTH OF HOUSE
3) HAY BALE LOCATED EAST OF BARN LOCATED EAST OF HOUSE
ALL DIRECT SURVEY READINGS WERE CONSISTANT WITH BACKGROUND LEVELS IN THE AREA.

VEGATATION SAMPLES WERE COLLECTED AT THE FOLLOWING LOCATIONS:
1) HAY FROM THE HAY BALE LOCATED AS DESCRIBED ABOVE
2) GRASS FROM OPEN AREA SOUTH OF THE BARN LOCATED SOUTH OF THE HOUSE
3) GRASS FROM THE AREA ON THE SOUTH EAST EDGE OF THE PROPERTY, ADJACENT TO THE HONEYWELL GATE.

SURVEY PERFORMED BY: ROSS LINDBERG

Figure 8: Results of Fluorine Testing of Off-Site Vegetation Samples

SampleID	Collection Date	Location Description	Fluoride (ppm)
L56646-1	10/8/2013	Lamb Farm	2
L56646-2	10/8/2013	Brubaker Farm	46
L56646-3	10/8/2013	Texaco Station	73
L56646-4	10/8/2013	Illinois Power Equipment Station	30
L56646-5	10/8/2013	Reineking Property	13
L56646-6	10/8/2013	Metropolis Airport	31
L56646-7	10/8/2013	Maple Grove School	4.2
L58779-1	4/1/2014	Lamb Farm	350
L58779-2	4/1/2014	Brubaker Farm	440
L58779-3	4/1/2014	Texaco Station	450
L58779-4	4/1/2014	Illinois Power Equipment Station	310
L58779-5	4/1/2014	Reineking Property	420
L58779-6	4/1/2014	Metropolis Airport	630
L58779-7	4/1/2014	Maple Grove School	110
L60892-1	10/27/2014	[redacted] - Grass South of South Barn	11
L60892-2	10/27/2014	[redacted] - Grass South East Edge of Property	42
L60892-3	10/27/2014	[redacted] - East Hay Bale	12