

Honeywell

THE POWER OF CONNECTED

Performance Materials & Technologies

2768 North U.S. 45 Road

P.O. Box 430

Metropolis, IL 62960

www.honeywell.com

June 13, 2019

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U.S. Nuclear Regulatory Commission

Director, Office of Nuclear Material Safety and Safeguards

11555 Rockville Pike

Rockville, MD 20852

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

SUBJECT: HONEYWELL RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION FOR LICENSE RENEWAL FOR HONEYWELL METROPOLIS WORKS FACILITY IN METROPOLIS, ILLINOIS

On February 9, 2017 Honeywell Metropolis Works submitted to the USNRC an application for renewal of USNRC Source Materials License SUB-526; the application also included the submittal of an Environmental Report (ER). On April 15, 2019 the USNRC provided to Honeywell Requests for Additional Information (RAI) on the MTW License renewal.

This letter transmits Honeywell's final responses to the Additional RAIs. We hope that you find the enclosed materials to be complete and that our responses are helpful in furthering your review of Honeywell's License Renewal Application. If you have questions or comments regarding this submittal, please contact Mr. Sean Patterson, Regulatory Affairs Manager, at (618) 524-6341.

Sincerely,



Jon Price

Acting Plant Manager

Enclosure 1 – Final Responses to Additional RAIs on the MTW License Renewal Application

Cc: David Titinski
US NRC
11555 Rockville Pike
Rockville, MD 20852

NM5520

**REQUEST FOR ADDITIONAL INFORMATION FOR LICENSE RENEWAL FOR
HONEYWELL METROPOLIS WORKS FACILITY IN METROPOLIS, ILLINOIS**

RAI A – Chemical Safety Event Analysis

1. The response to Request for Additional Information (RAI) 6-15 stated that “Honeywell does not have a specific safety analysis that provides an evaluation of the hazards of feeding Uranium Hexafluoride (UF₆) from cylinders into the Feed Materials Building (FMB).” The response to RAI 6-16 stated “Honeywell has not specifically evaluated an accident scenario involving the movement of a filled cylinder in the cylinder yard or other areas of the plant.”

These responses specifically identified two operations involving large quantities of UF₆ that have not been analyzed for the consequences of failure or accidents.

Provide additional information on the hazards analysis (e.g., information from the Integrated Safety Analyses (ISA) of Honeywell operations that were not analyzed nor included in the License Renewal Application (LRA) or ISA Summary (ISAS) for the two operations identified. The development of this information should follow the ISA methodology as committed to in the LRA and ISAs. Alternatively, provide a commitment (that could be implemented as a license condition) that Honeywell will verify that an ISA has been prepared, including the identification of the appropriate Plant Feature and Procedure (PFAP), prior to performing the unanalyzed operations with licensed material.

Pursuant to Title 10 of the *Code of Federal Regulations (10 CFR)*, Section 40.32(c), the applicant's proposed equipment, facilities and procedures must be adequate to protect health and minimize danger to life or property. Additionally, 10 CFR Paragraph 40.31(j)(3)(ii) requires an applicant to identify the type of accidents for which protective actions may be needed in the emergency plan.

Section 14, Accident Analyses, of Regulatory Guide 3.55 (Standard Format and Content for the Health and Safety Sections of LRAs for Uranium Hexafluoride Production) states that the types of accidents considered and their potential impact on occupational safety and the environment should be summarized.

2. RAI 6-5 questioned a statement in the ISAs (Section 4.2) that “Maintenance problems were not evaluated since the consequences are not considered to be a safety issue.” The Honeywell response to RAI 6-5 stated “Honeywell will revise the text in section 4.2 of the ISAs to clarify the intent related to maintenance problems in a future revision.”

However, during the operation of the Honeywell facility under the current license, there have been reportable events, some related to maintenance activities, with releases or potential releases of UF₆. The NRC staff needs additional information to determine if and how the following events which did (or may have the potential to) release license material

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were considered in the evaluation of accident scenarios for the ISA at the Honeywell facility:

- October 26, 2014 there was a leak of UF₆ in the FMB that occurred during the routine sublimation and draining of a cold trap (ML14301A0050).
- Release of UF₆ during cold trap valve decontamination (occurred 2/2014, some personnel given emergency care for exposure)
- Release of UF₆ from a cold trap because of weld cracks (occurred 10/2014, ML16019A334)
- Release of UF₆ from the low boiler condensers (occurred in 8/2015 - ML15281A286)
- Releases of NH₄ or UF₆ as a result of loss of offsite power (occurred 2011 – no detection capability)
- Significant buildup (2 stacks ~10 feet high) of combustible material near buildings containing licensed material (occurred 3/2014, ML14135A460)

Provide additional information on how the identified events above that did (or may have the potential to) release license material were considered in the accident analyses that supports the development of the ISAs and the License Renewal Application (LRA). This includes any resultant accident sequences or PFAPs that were considered based on those events. Alternatively, provide a commitment (that will be implemented as a license condition) that Honeywell will verify that these events have been evaluated for any potential impact to the ISA and the LRA, before resumption of full operation.

Section 11.5 of the LRA states that Honeywell implements a program of audits, and inspections to verify that plant operations, maintenance activities (et. al.) are conducted safely and in accordance with applicable safety requirements, license conditions and written procedures. Section 11.6 of the LRA states that Honeywell must prepare an investigation report for incidents resulting in personnel injury, equipment damage, or effects on the environment or members or the public.

Pursuant to 10 CFR 40.32(c), the applicant's proposed equipment, facilities and procedures must be adequate to protect health and minimize danger to life or property. Additionally, 10 CFR 40.31(j)(3)(ii) requires an applicant to identify the type of accidents for which protective actions may be needed in the emergency plan.

Section 14, Accident Analyses, of Regulatory Guide 3.55 (Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production) states that the types of accidents considered and their potential impact on occupational safety and the environment should be summarized.

Response

The response to this RAI consists of 2 parts as described below:

Part A1 – Regarding the original response to RAI 6-16, Honeywell would like to clarify that the original MTW ISA did include an analysis of potential fire events involving the forklift used for transporting filled UF6 cylinders. See the response to RAI D below.

Honeywell commits to performing specific accident analyses for feeding uranium hexafluoride (UF6) from a cylinder back into the Feed Materials Building, and for movement of filled UF6 cylinders within the plant. These accident analyses will be completed prior to restart of UF6 production. Also, any identified PFAPs resulting from the accident analyses will be implemented prior to the introduction of UF6 into the system. If the results of the analyses meet the criteria for inclusion in the ISA Summary, the new accident scenarios and evaluations will be included in an update to the ISA Summary prior to the start of operations.

Part A2 – Honeywell is committed to evaluating the October 26, 2014, August 1, 2015 and February 26, 2014 events, which resulted in the uncontrolled release of licensed material. Prior to the start of production of UF6 the events will be evaluated for impact to current accident sequences, and if necessary, new accident sequences will be added to the ISA Summary.

Note that the October events listed above in the RAI represent the same event (cold trap release in October 2014); therefore, one evaluation will be completed for those two items.

The following events will not be evaluated because there was not a release of licensed material associated with these events. Further information is provided under the bullets listed below.

- The 2011 releases of NH₄ or UF₆ because of loss of offsite power (no detection capability)
 - The MTW site experienced a loss of offsite power due to a downed tree during a storm. The plant production process shut down as designed in a fail-safe condition. Coinciding with the loss of offsite power, an electrical overload occurred on the main computer/electrical uninterrupted power supply (UPS) due to an air conditioning unit being plugged into a UPS-supported panel. The MTW site was without power to the UPS loads, which included electrically-powered emergency preparedness and digital control system (DCS) operator controller capabilities. The MTW site was in the process of aligning the UPS loads to the standby diesel generator (which was already running in standby) when offsite power was restored. Corrective actions were completed to ensure the employees have an awareness of the Management of Change procedure. The Management of Change procedure MTW-ADM-REG-0120 was revised to facilitate reviews and approvals of emergency changes and ensure safety of personnel and equipment integrity. Lastly, organizational changes were

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implemented to combine the Radiation Protection and the Regulatory Affairs departments to improve the effectiveness and regulatory compliance of the Management of Change program. This event did not result in the release of licensed material and is not expected to impact existing accident sequences or result in the addition of new accident sequences to the ISA.

- The March 2014 buildup of combustible material near buildings containing licensed material (ML14135A460)
 - Combustible material (discarded pallets) were stacked next to the Bed Material/Filter Fines Building that contained 55-gallon drums of Bed Fines (CaF₂), uranium ore (U₃O₈), and greensalt (UF₄) and discovered by NRC representatives during a site walkdown. After a discussion with the NRC representatives on the site walkdown, immediate action was taken to relocate the pallets away from the building, as required by the site combustible loading procedures. Corrective actions were completed to retrain site workers on the pallet storage requirements. The site addressed the accumulation of pallets identified in the violation by establishing a new waste profile with an appropriate disposal vendor and maintaining a priority for pallet disposal. This event did not result in the release of licensed material and is not expected to impact existing accident sequences or result in the addition of new accident sequences to the ISA.

RAI B –Safety Demonstration Report

The response to RAI 6-9 stated “The information in the Safety Demonstration Report (SDR) Section 6.3 and the ISAs Section 6.3 were based on professional knowledge of the hazards associated with the operations at the Metropolis Works (MTW). No standard methodology was used to develop this table. This table was the standard 10 CFR Part 40 safety analysis prior to implementation of the ISA methodology. Honeywell intends to delete this section from the ISAs following the issuance of the renewed license.”

The NRC is considering the content of the LRA and the ISA Summary in order to make a licensing decision regarding renewal. This includes the safety features described in Section 6.3 of the ISA. Please clarify how any changes to the ISA Summary Section 6.3 will be evaluated under your configuration management program as stated in Chapter 11 of the LRA.

Pursuant to 10 CFR Section 40.32(c), the applicant's proposed equipment, facilities and procedures must be adequate to protect health and minimize danger to life or property. Additionally, 10 CFR Paragraph 40.31(j)(3)(ii) requires an applicant to identify the type of accidents for which protective actions may be needed in the emergency plan and 10 CFR Paragraph 40.32(j)(3)(v) states that the emergency plan should include a brief description of the means and equipment for mitigating the consequences of each type of accident, including those

provided to protect workers onsite, and a description of the program for maintaining the equipment.

Section 14, Accident Analyses, of Regulatory Guide 3.55 (Standard Format and Content for the Health and Safety Sections of License Renewal Applications (LRA) for Uranium Hexafluoride Production) states that the types of accidents considered and their potential impact on occupational safety and the environment should be summarized.

Response

Honeywell has developed the MTW ISA Summary based primarily on the guidance provided in NUREG-1520. NUREG-1520, Section 3.4.3.2 identifies the “content elements” for an acceptable ISA Summary (for a 10 CFR Part 70 licensee). Except for the content that arises from implementation of the ISA process, much of the current content of MTW ISA Summary Section 6.3 is not included within the suggested “content elements.”

Much of the content of MTW ISA Summary Section 6.3 pre-dates the development of the MTW ISA and ISA Summary. This material was developed to support MTW's previous (2005) license renewal application which was developed using the guidance of Regulatory Guide 3.55 and was subsequently transferred into the MTW ISA. The license renewal application developed under RG 3.55 did not rely on a structured analysis of process hazards and preventive and mitigative features as has been performed in the MTW ISA. Therefore, the content of MTW ISA Summary Section 6.3 requires further review and possible alternative disposition because the content:

- May not be related to NRC-licensed material;
- May not be related to intermediate or high consequence events as would be expected for the content of an ISA Summary; or
- May be redundant with other portions of the MTW ISA Summary (e.g., identification of Plant Features and Procedures (PFAPs)).

Honeywell intends to review MTW ISA Summary Section 6.3 to identify that portion of the content that is consistent with the guidance provided in NUREG-1520. That portion of the content that is inconsistent with the content guidance of NUREG-1520 will be deleted from the ISA Summary and dispositioned to other MTW safety program documents (e.g., Process Safety Management program documents or plant procedures). That portion of the content that is consistent with the content guidance of NUREG-1520 (e.g., content related to PFAPs) will be retained in the MTW ISA Summary, either in Section 6.3 or in another section as determined appropriate.

The changes to the ISA Summary Section 6.3 will be made consistent with the requirements of MTW's configuration management program as outlined in Section 11 of the License Renewal Application.

RAI C

The response to RAI 3-5 included summary information which showed how the 21 accident sequences from the original ISA were eliminated from further evaluation based on “acceptable risk”. Additionally, a table was provided which provided an overview of the original accident sequences and contained the identification of the consequence category for each event.

Please confirm that the consequence category indicated in the table was based on “unmitigated” consequences. (i.e., no credit taken for any type of mitigative feature or action (PFAP or not)). If the consequence category for any sequence considered the mitigative effect of a feature or action, please justify why Honeywell determined those accident sequences had acceptable risk and did not require PFAPs.

Pursuant to 10 CFR 40.32(c), the applicant’s proposed equipment, facilities and procedures must be adequate to protect health and minimize danger to life or property. Additionally, 10 CFR 40.31(j)(3)(ii) requires an applicant to identify the type of accidents for which protective actions may be needed in the emergency plan and 10 CFR 40.32(j)(3)(v) states that the emergency plan should include a brief description of the means and equipment for mitigating the consequences of each type of accident, including those provided to protect workers onsite, and a description of the program for maintaining the equipment.

Section 14, Accident Analyses, of Regulatory Guide 3.55 (Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production) states that the types of accidents considered and their potential impact on occupational safety and the environment should be summarized.

Response

The consequence category indicated in the Table 9.1 from the MTW response to RAI 3-5 were based on “unmitigated” consequences (i.e., no credit taken for any type of mitigative feature or action (PFAP or not)).

RAI D: Technical Justification Related to Fire Accident Sequences and PFAPs

Section 7.3 of the LRA stated: “The ISA process provides an analysis of the likelihood and consequences of fire-related incidents affecting licensed materials at MTW. There are no PFAP related to fire-initiated events at MTW.”

Section 4.3.2 of the ISA summary (Worker Exposure Assumptions) stated that: “Another assumption made in conducting consequence severity analysis is that for releases precipitated by a fire event, only public exposure was considered in consequence severity; worker exposures were not considered. Fires of sufficient magnitude to generate chemical/radiological release must have either caused failure of a mechanical system/component or involve substantive

combustibles containing uranic content. In either case, the space would be untenable for unprotected workers.”

Please describe if/how the ISA considered potential fire related accident sequences that could have intermediate or high consequences for chemical or radiological release to unprotected workers outside of spaces considered to be untenable.

Pursuant to 10 CFR 40.32(c), the applicant's proposed equipment, facilities and procedures must be adequate to protect health and minimize danger to life or property. Additionally, 10 CFR 40.31(j)(3)(ii) requires an applicant to identify the type of accidents for which protective actions may be needed in the emergency plan and 10 CFR 40.32(j)(3)(v) states that the emergency plan should include a brief description of the means and equipment for mitigating the consequences of each type of accident, including those provided to protect workers onsite, and a description of the program for maintaining the equipment.

Section 14, Accident Analyses, of Regulatory Guide 3.55 (Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production) states that the types of accidents considered and their potential impact on occupational safety and the environment should be summarized.

Response

The original ISA did consider potential fire related accident sequences that could have intermediate or high consequences for chemical or radiological release to unprotected workers outside of spaces considered to be untenable. The following is an excerpt of the evaluation that was performed in the original ISA – Revision 9 on 10/31/12 – Chapter 11.0 – “Fire Protection and External Events”. Because this evaluated accident sequence was a low consequence event with acceptable risk it was not carried forward to the ISA Summary.

11.3 Fire Hazard Analysis

The most recent fire hazards analysis was conducted in 2011.

The only fire with the potential for producing consequences approaching the severity levels given in 10CFR70.61 is a fire resulting from a forklift fuel tank failure. The forklift used for lifting and transporting full product cylinders has a 65-gallon diesel fuel tank. The distance from the fuel tank to the nearest end of the cylinder in the lift rig is approximately 125 inches. Failure of this tank due to a leak or puncture results in a fire of limited extent due to the relative small pool (spill) area from the leak. A more limiting case, with respect to heat output, would be the catastrophic failure of the tank. The resulting pool area is approximated by the following (Ref. NUREG-0570, June 1979, “Toxic Vapor Concentrations in the Control Room Following a Postulated Accidental Release”):

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$$A(t) = \pi \left\{ r_o^2 + 2t \left[\frac{g V_o (\rho_l - \rho)}{\pi \rho_l} \right]^{1/2} \right\}$$

where:

$$V_o = \pi r_o^3$$

r_o = initial radius of the spill (cm). Assumed to be $(V_o/\pi)^{1/3}$

g = gravitational constant = 981 (cm/sec²)

V_o = volume of the spill (cm³)

ρ_l = density of the liquid (g/cm³) = 0.827 gm/cc

ρ = density of air (g/cm³) = 0.00113 g/cc @ 104°F

t = time (sec)

The spill area is assumed to increase until a minimum spill thickness of 1 cm is reached.

Based on the above formulation, the maximum spill area is 267 ft² with a radius of 9.2 ft. Since the product cylinder is approximately 10 feet from the fuel tank, this fire would not challenge the integrity of the cylinder.

As a limiting case, it is assumed that the spill is directly below the product cylinder and confined to an area of approximately 4' x 10' (the approximate footprint of the product cylinder). Note that this assumption requires an unrealistic spill depth of 2.6 in. In this case, the resulting fire was evaluated using the methodology given in NUREG-1805, "Fire Dynamics Tools (FDTs): Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program," Final Report, December 2004. The evaluation using this methodology gave the following results:

Heat release = 6964 Btu/sec,

Burn time = 22.5 min,

Flame Height = 16.5 ft using the method of Thomas

= 19.9 ft using the method of Heskestad

The crucial result relative to cylinder failure is the burn time. The provisions of 49 CFR Part 173, Subpart L (DOT regulations) require that each UF₆ cylinder be designed, fabricated, inspected, tested, and marked in accordance with the various engineering standards that were in effect at the time the cylinder was manufactured. The DOT requirements are intended to maintain the safety of shipments during both routine and accident conditions. These requirements specify, in part, that a cylinder must be designed so that it will withstand a 30-minute thermal test equivalent to being engulfed in a hydrocarbon fuel/air fire having an average temperature of at least 800°C (1,475°F) without rupture of the containment system. Based on this design requirement, the postulated fire will not affect the transport cylinder since the burn time is significantly shorter even using a very conservative pool depth of 2.6 inches. Since the unmitigated fire does not result in any consequences, no specific PFAP are required.

11.4 Fire Protection Summary

Since the combustible loading at the MTW site is low, the probability of a fire that could result in consequences approaching the severity levels given in 10CFR70.61 is extremely remote. On this basis, the initiating index was assumed to be (-2) which corresponds to no failures of this type at this facility in 30 years. The mitigative feature failure index for this event was assumed to be (-2) corresponding to an enhanced administrative control. This makes the Likelihood index -4, with a likelihood category of 2 and a consequence category of 1. This equates to a risk index of 2 which is an acceptable risk with no PFAPs required. Because this was considered to be a low consequence event, it was not included in the ISA Summary.