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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Director, Office of Nuclear Material Safety and Safeguards
11555 Rockville Pike
Rockville, MD 20852

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

SUBJECT: HONEYWELL METROPOLIS WORKS RESPONSE TO RAIs FOR THE ENVIRONMENTAL REPORT

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 October 25, 2017, the USNRC provided to Honeywell Requests for Additional Information (RAI) on the following section of the License Application:

- Section 9.1 Environmental Report

This letter transmits Honeywell's responses to the subject RAIs. To the extent that Honeywell has identified the need for changes to the submitted ER, the enclosed RAI responses include the proposed changes in the form of mark-ups of the affected text. Please note that Honeywell intends to include the proposed changes in a future revision of the ER, as appropriate.

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 Mark Wolf, Nuclear Compliance Director, at (618) 309-5013.

Sincerely,

Jeff Fulks
Plant Manager

Enclosure 1 – Responses to RAIs on Section 9.1 Environmental Report of the MTW License Renewal Application

cc: Attention: Tilda Liu
U.S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Ave. NE, Suite 1200
Atlanta, GA 30303-1257

NMSS20

Honeywell Metropolis Works
USNRC Source Materials License SUB-526
Docket No. 40-3392

License Renewal Application
Responses to Requests for Additional Information
Environmental Report

PA-1

The figures in the ER should show the site and restricted area boundaries in relation to site features. Provide a figure similar to ER Figure 1.0-1, "MTW Site Map," of the 1000-acre site that has a larger scale and clearly shows the Metropolis Works (MTW) site boundary and the MTW restricted area boundary. The figure should depict the following (they can be shown on multiple figures, as long as the figures also include the boundaries of the MTW site and restricted area):

- any MTW facilities outside the restricted area (for example, ER Section 2.1.2.3.8, "Groundwater Monitoring," mentions an inactive landfill and associated ground water monitoring)
- the four creeks on the property (mentioned in ER Section 3.4.1, "Surface Water"), the effluent ditch, and any other drainage channels (see RAI – SW-1)
- wetlands on the property (mentioned in ER Section 3.5.2.4, "Floodplains and Wetlands")
- locations of the outfalls

Response:

The requested information has been provided as follows:

- Revised Figure 1.0-1 to include the MTW site boundary.
- Revised Figure 3.0-1 to include the MTW site boundary, restricted area boundary, and inactive landfill area.
- Newly added Figure 3.4-3 includes the geographic distribution of the four streams and site outfalls.
- Newly added Figure 3.5-1 illustrates the on-site National Wetlands Inventory (NWI) wetlands.

The figures are included as Attachment 1 to this RAI response.

Planned Environmental Report Revision

- **Section 1.3** – Replace Figure 1.0-1 with the attached.
- **Section 3.0** - Replace Figure 3.0-1 with the attached.
- **Section 3.4.8.3.1**, 4th paragraph, as follows:
  "In March 2016, the IEPA approved an environmental land use control (ELUC) for portions of MTW (Figure 3.4-3)."
- **Section 3.5.2.4,** revise 2nd paragraph, as follows:

Based on a review of USFWS National Wetland Inventory (NWI) maps of the site, four wetlands are mapped on the site. One PFO1Ah (Palustrine, Forested, Broad-Leaved Deciduous, Temporary Flooded, Diked/Impounded) wetland, is located on the banks of the Ohio River and southeast portion of the site. This wetland has a total area of 114.30 acres within the property boundary. A second wetland, classified as PFO1A (Palustrine, Forested, Broad-Leaved Deciduous, Temporary Flooded) is located on the southwest portion of the property and has a total area of 130.80 acres within the property boundary. The NWI identifies two wetlands features as located within the restricted area. These features are identified as freshwater ponds, one PUSCx (palustrine, unconsolidated shore, seasonally flooded, excavated), totaling 3.92 acres and one PUBHx (palustrine, unconsolidated bottom, permanently flooded, excavated), totaling 3.25 acres. The ponds are identified by NWI as in the location of the existing settling ponds on the site. The NWI identifies four streams as located within the property boundary. These features are discussed in Section 3.5.2.5 (Figure 3.5-1).

RAI – PA-2

Planned and previous upgrades (since 2005) are listed in ER Section 1.1, "Purpose and Need for the Proposed Action." These upgrades include the completion of the surface treatment facility, replacement of the oil-cooled rectifiers with water-cooled rectifiers, addition of a new cooling tower, addition of a new sewage treatment facility, seismic/tornado protection upgrades, and treatment upgrades planned for the Environmental Protection Facility (EPF) to comply with fluoride discharge limits. However, the ER does not indicate the bases for these upgrades and how the upgrades modified the associated environmental impacts. As specifically noted for each item below, discuss the environmental impacts associated with these upgrades, quantifying where possible. Positive impacts should also be included.
The following information is needed for each of these upgrades.

A. Provide the reason(s) for adding the surface treatment facility to the EPF. Describe how its operation has affected environmental impacts.

B. Provide the reason(s) for the replacement of the oil-cooled rectifiers with water-cooled rectifiers (such as for aging management). Identify what improvements in environmental impacts were gained with their installation.

C. Identify the reason(s) for installing a new cooling tower to cool the waste heat from the new rectifiers. For example, did the new tower replace a previous cooling tower to address aging management considerations? Describe and quantify how the discharge temperature changed as compared to previous operations and the resulting environmental impacts.

D. Identify any changes in environmental impacts (including positive impacts) associated with the new sewage treatment facility and identify why a new sewage treatment facility was constructed.

E. ER Section 2.1.3, "Mitigating Measures," indicates that solids, including fluorides and uranium, are settled out in Pond D and in the future, will be treated with enhanced removal processes in the EPF before release of the effluent to the Ohio River. Describe and quantify how adverse environmental impacts will be reduced with the EPF treatment upgrades, including reduced risk to ground water contamination and possible reduction in contaminant concentrations discharged to the Ohio River.

Response:

The following is the MTW response to this RAI:

A. The surface treatment facility (STF) was added to control the pH, and remove residual suspended solids from the effluent flow coming out of EPF. The pH range controlled at the STF is 6 to 9. It also is equipped with a diversion system: the process monitors for pH and Solids and automatically diverts flow to the Effluent Tanks, U-845/846. The process is sampled every 6 hours for ppm Fluorides and is manually diverted to Effluent Tanks, U-845/846 if out of spec. This facility is working as designed and has provided positive environmental impacts by reducing fluoride and pH excursions leaving the plant through the permitted outfalls.

B. The oil cooled rectifiers were replaced by the water-cooled rectifiers because the oil cooled rectifiers had reached the end of their useful life. Water cooled rectifiers were chosen to eliminate the use of oil in the coolers and this provided a beneficial environmental impact.

C. The new cooling tower was added to ensure that adequate cooling capacity was available to provide the rectifiers with the correct operating temperatures. The following provides a description of the cooling tower system at the GF2 plant: The GF2 area

cooling towers use water to cool the rectifier industrial water system via heat exchangers. The system is comprised of two cooling towers that share common water supply and return headers. Each tower has two fans that are belt driven by a single motor. The cold-water supply from the cooling tower (CTS) is pumped to the heat exchanger via a single pump that has an in-line spare. The heat exchanger also has an in-line spare. Heated water from the exchanger returns to the cooling towers (CTR). The water level in each cooling tower is control by a mechanical float. The conductivity and chemical treatment for the cooling tower system are controlled by the chemical treatment skid. Water from the cooling tower system exchanges heat with the industrial water system at the heat exchanger. However, it does not mix with the industrial water system. Properly treated cooling water may have a faint blue color as part of the chemical treatment. The industrial water system uses a treated water solution to cool the GF2 area rectifiers. The industrial water system is cooled by the GF2 area cooling towers via the heat exchanger. Warm IWR from the hot well tank is pumped to the heat exchanger via a single pump that has an in-line spare. The heat exchanger also has an in-line spare. Cooled IWS from the exchanger is used to cool the rectifiers through a common header. The IWR from the rectifiers returns to the hot well tank via a different common header. Water additions to the industrial water system are controlled by a mechanical float in the hot well. The net impact on the discharge temperature is minimal since the water in both the closed loop side that cools the rectifiers and the cooling tower side of the system recycle the water except for make-up for evaporation. There might be a small amount of overflow at times due to faulty valves or to flush the closed loop side, but it is very minimal compared to the overall water discharge for the site. This provides an overall positive impact to the environment by using less water for cooling the rectifiers.

D. The new sewage treatment plant has improved the MTW ability to treat the sewage generated from the plant and ensure compliance with our NPDES permit. The old sewage plant was outdated and had ran past its useful life. Additionally, new NPDES requirements were to take effect during 2014. The existing sewer treatment plant was not adequate to meet the new NPDES requirements. The old ImHoff system was removed and the new system installed near the location of the ImHoff. The following provides an overview of the project to install the new system: MTW has installed a package treatment system. The following items were completed as part of the project: A lift station for the influent was installed. The package wastewater treatment plant was installed. A composite sample station to meet the NPDES requirements was installed. A flow measurement device (with local recording capability) was installed. The design flow (55,000 gallons per day) is based on the flow rates associated with high plant population during the 2012/2013 seismic upgrades. The updated NPDES permit dictates the remainder of the design basis. The lift station was installed just south of the drum crusher building (BD-34) at the western edge. To leave the lift station in the plant fences, a minor modification was made to the inner fence. The lift station consists of two pumps

that are locally controlled via level switches to pump influent to the new treatment facility. Audible and visual local alarms give indication of pump problems and high level. The new wastewater treatment facility was installed south of the long-term cylinder storage area. Again, to ensure proper maintenance of the facility, the inner Fenceline was moved for easy access. The facility was vendor supplied and installed on site. The process consists of a surge tank (equalization tank) that will help regulate incoming flow and accept high flow rates. Solids will break down via aerobic digestion in the aeration chamber. The contents will flow to a settling area where solids settle and will recycle back to the beginning of the aeration chamber as well as a percentage back to the sludge holding tank. The sludge holding tank will be pumped off periodically to promote healthy digestion of solids. The effluent of the settling chambers (clarifiers) will move through a flow measurement system, a UV sanitizer and finally through a channel that has sampling capabilities. Backup power (via on-site power generation) will be provided to both the lift station and treatment facility. The new sewer treatment plant provides a positive impact to the environment by ensuring that the water leaving the plant and going to outfall 002 is within the MTW NPDES permit limits.

E. The NPDES Permit issued by the IEPA establishes discharge limits from EPF to the main outfall 002: Monthly Average <15 ppm F & <15 mg/l TSS, Daily Max <30 ppm F & <30 mg/l TSS, & pH range is 6-9. Most solids that are in D-Pond were pumped out there before STF was installed. In 2015, the plant installed several projects that increased the plants control and assisted in meeting these limits. Projects include: Improved Lime Feed System (provides reliable and controlled lime into the system to capture fluorides), Equalization Tank (provides a steady flow of waste alkaline liquors to achieve steady state operations), Sodium Aluminate (provides fluoride polishing; small flow of sodium aluminate can reduce fluorides to < 15 ppm F) and Improved pH control system. These changes have assisted the plant in staying compliant with the NPDES Permit. Since these projects have been implemented, MTW has stopped discharging to D-Pond and are pumping the effluent stream directly to the EPF weir. If any of the values are out of spec, the flow is diverted to the effluent tanks, U-845/846 to be reworked through the system before being discharged to the weir. Uranium falls out in the EPF system and is sent to the CaF2 Dryer. The dry CaF2 is shipped out maintaining an average ppm Uranium of less than 313 ppm. The discharge flow at STF (the surface treatment facility) is also monitored for ppm Uranium daily. The environmental impacts associated with this improvement are discussed above.

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None

RAI – PA-3

NUREG-1748, Section 6.2.1.2, "Proposed Action," states that the applicant should provide a detailed description of the proposed action. Honeywell should provide enough information to provide a basis for the environmental analysis. Describe other potential major upgrades or mitigation systems that are anticipated over the 40-year license period that could have environmental or mitigative impacts, including those that could occur as part of aging management, and their possible environmental impacts.

Response:

As discussed in ER Section 3.4.8.3.2, MTW's existing RCRA permit addresses the investigation of underground process sewers associated with the Gaseous F_2 Building and Green Salt South Pad and a work plan for investigation has been approved. The investigation results, when available, could indicate the need for remediation activities under the RCRA permit and potentially some mitigation measures applicable to structures (e.g., sewer, sumps) and procedures supporting MTW to address the potential for releases into soil and groundwater.

Over the past 10 years, Honeywell has invested more than $100 million on projects that directly support health, safety and the environment (Honeywell 2017d). Honeywell anticipates expenditures of at least $10 million a year supporting health, safety and the environment projects (Honeywell 2017d); however, no major upgrades are anticipated for the proposed license renewal term. No major mitigation systems are anticipated.

As discussed in the Introduction, Item 6 of the Justification for a 40-yr license term included with the February 8, 2017 LRA submittal (Honeywell 2017a):

> MTW conducts an extensive "turnaround" on an approximately annual basis, which allows for equipment inspection, maintenance, repair and testing. Thus, material degradation and aging issues at MTW can be dealt with throughout the facility lifetime. Honeywell implements maintenance management functions to ensure the structures, systems and components are maintained as necessary to ensure PFAP [Plant Feature and Procedures] are available and reliable to perform their safety function(s) when needed. Maintenance of PFAP, and any items that may affect the function of PFAP, encompasses planned testing and preventative maintenance, corrective maintenance, surveillance, monitoring, and functional testing. Because Honeywell will submit annual reports summarizing specified facility changes and updates of the ISA Summary to USNRC for approval, USNRC staff will be aware of changes due to material degradation or aging throughout the lifetime of the facility.
>
> Honeywell's analysis of its configuration management statistics demonstrates that the number of configuration changes, including improvements, upgrades and corrective maintenance activities, has been steadily growing over the last ten years. This upward trend should be attributed to enhanced attention and active management of material

degradation and aging. Therefore, as indicated.by USNRC staff in SECY-06-0186, material degradation and aging issues do not affect the proposed license term.

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None

RAI – PA-4

10 CFR 20.1406(c) requires that "Licensees shall, to the extent practical, conduct operations to minimize the introduction of residual radioactivity into the site, including the subsurface, in accordance with the existing radiation protection requirements in Subpart B and radiological criteria for license termination in Subpart E of this part." Clarify how the facility operations and procedures minimize subsurface contamination and facilitate decommissioning.

Response:

Honeywell operates the facility using good ALARA practices to minimize subsurface contamination and reduce employee and environmental exposure to radioactive materials. Specifically, MTW has a procedure (Decommissioning Planning) that requires that any work on the facility, the surface or subsurface of the MTW requires an evaluation be performed of the potential impacts to the decommissioning of the MTW. This information is documented in the Decommissioning Planning Worksheet. This worksheet estimates the volume and contamination levels of the material being disturbed on the MTW site. The message at the top of the worksheet states:

> "*Complete this form in the event that a spill or other incident resulted in an uncharacteristic release of radioactivity to the site environment, or a change to be instituted may generate greater than 200 ft3 of non-routine radioactive waste that is anticipated to remain on site at the time of Decommissioning (including, but not limited to, soil removed during excavation activities and/or demolished structures and process equipment). If unsure as to whether a change or incident will affect decommissioning planning, complete this form. In all cases, attach this form to the corresponding RFC/ITCA.*"

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None

RAI – PA-5

Potential contamination concerns associated with the process sewers (as mentioned in ER Section 3.4.8.3.2) highlight the importance of being able to find and monitor subsurface contamination, especially in light of a 40-year operational period. Identify whether and how monitoring programs have been or would be modified to meet the requirements of 10 CFR 20.1406(c) and 10 CFR 20.1501(a) and (b) and the guidance in Regulatory Guide 4.22. Please provide any documentation available now that describes monitoring and surveys related to these requirements.

Response:

As discussed in ER Section 3.4.8.3.2, MTW's existing RCRA permit addresses the investigation of underground process sewers associated with the Gaseous F_2 Building and Green Salt South Pad and a work plan for investigation has been approved. The investigation results, when available, could indicate the need for remediation activities under the RCRA permit and potentially some mitigation measures applicable to structures (e.g., sewer, sumps) and procedures supporting MTW to address the potential for releases into soil and groundwater.

The MTW monitoring programs are conducted in accordance with the requirements of 10 CFR 20.1406(c) and 10 CFR 20.1501(a) and (b). Honeywell operates the facility using good ALARA practices to minimize subsurface contamination and to reduce employee and environmental exposure to radioactive materials. Additionally, MTW has a procedure (Decommissioning Planning) that requires that any work on the facility, the surface or subsurface of the MTW requires an evaluation of the potential impacts to the decommissioning of the MTW. This information is documented in the Decommissioning Planning Worksheet. This worksheet estimates the volume and contamination levels of the material being disturbed on the MTW site. The message at the top of the worksheet states:

> *"Complete this form in the event that a spill or other incident resulted in an uncharacteristic release of radioactivity to the site environment, or a change to be instituted may generate greater than 200 ft3 of non-routine radioactive waste that is anticipated to remain on site at the time of Decommissioning (including, but not limited to, soil removed during excavation activities and/or demolished structures and process equipment). If unsure as to whether a change or incident will affect decommissioning planning, complete this form. In all cases, attach this form to the corresponding RFC/ITCA."*

Planned Environmental Report Revision

None

RAI – PA-6

ER Section 1.0, "Introduction," states that the MTW site is located about 1 mile west of Metropolis and ER Sections 3.2, "Transportation," and 3.10.4, "Transportation Resources," state that it is 2 miles from Metropolis. Resolve this discrepancy, giving more detail on the measurement (i.e., from the center of the restricted area to the boundary of Metropolis, from the eastern boundary of the restricted area or the site).

Response:

The distance from the Northeast corner of the outer fence to the Metropolis, IL city limits is 1,294 feet.

Planned Environmental Report Revision

Revise text in ER Section 1.0, first paragraph, as follows: "MTW is located at 2768 North U.S. 45 Road, approximately 1300 feet from the northeast corner of the outer fence to the city limits of Metropolis (Figure 1.0-1 and 1.0-2)."

RAI – PA-7

ER Section 3.1.2 states that the restricted area is 59 acres. The NRC's 2006 EA and 2007 TER state that it is 54 acres. Clarify the acreage and, if the acreage has changed since 2007, identify the reason for the change.

Response:

The ER presents a refinement of the restricted area acreage as measured from the outer perimeter fence. This refinement was achieved with the use of updated software (e.g. ESRI's ArcGIS) and methodologies, which has allowed for a more accurate assessment of the restricted area than previously available. The restricted area is approximately 59 acres.

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None

RAI – PA-8

ER Section 3.1.3 states that the buried natural gas transmission line crosses the property about 60 feet north of the administration building. The NRC's 2006 EA, "Environmental Assessment for Renewal of NRC License No. SUB-526 for the Honeywell Specialty Materials Metropolis

Work Facility," had stated that it is located 500 feet north of the administration building. Clarify this apparent discrepancy.

Response:

The correct distance is 500 feet.

Planned Environmental Report Revision

Section 3.1.3 will be revised to include the correct distance.

RAI – PA-9

The ER makes different references to 'ponds.' These references include uranium settling ponds (or settling ponds or ponds 3 and 4), EPF ponds, Ponds B – E (also called the Calcium Fluoride (CaF_2) ponds, RCRA (Resource Conservation and Recovery Act) ponds and settling ponds), and surface impoundments. Other references are made to 'ponds,' such as on page 3-9 of the ER ("...Additional samples obtained from borings drilled in May 2010 on the berms between the ponds..."), that are unclear as to which ponds are being referenced. Clarify the use of terminology for referencing the names of ponds in the ER.

Response:

The terms uranium settling ponds and ponds 3 and 4 all refer to uranium settling ponds 3 and 4. The terms EPF ponds, Ponds B – E, CaF_2 ponds, CaF_2 settling ponds and RCRA ponds all refer to CaF_2 Ponds B – E. The use of "settling ponds in Section 1.1 and 4.6.6 refers to the CaF_2 settling ponds and "settling ponds" in Section 5.0 is in reference to both CaF_2 and uranium settling ponds.

The ER was searched for "pond" and "surface impoundment" and clarifications have been added as appropriate. The following specific terminology is now used:

- uranium settling pond 3
- uranium settling pond 4
- CaF_2 Pond B
- CaF_2 Pond C
- CaF_2 Pond D
- CaF_2 Pond E

Planned Environmental Report Revision

Revisions applicable to this RAI response will be made to the following ER sections:

1. 1.1
2. 1.3
3. 2.1.2.1.3
4. 2.1.2.2.3
5. 2.1.2.3.8
6. 2.1.3
7. 3.3.2
8. 3.4.1
9. 3.4.8
10. 3.4.8.3.1
11. Table 3.4-4
12. 3.12.3
13. 4.4.1.2
14. 4.6.6
15. 5.0
16. 7.1
17. 8.2

RAI – PA-10

The ER and license renewal application do not identify the types of different filters used at MTW. These filters are mentioned for several production processes. NUREG-1748 Section 6.4.6, "Air Quality Impacts," states that applicants should provide information about air emissions and related controls. To clarify how certain aspects of the production process and environmental controls work, and assist the NRC in assessing the potential impacts from air emissions, identify the types (e.g., HEPA) and general efficiencies of filters in use at MTW. In particular, the following excerpts from the ER contain references to filters that should be clarified.

A. ER Section 2.1.2.1.7 states the following: "Feed containing high levels of sodium or potassium is leached with H_2SO_4. Uranium feed is removed from the rinse solution by filtration and transferred to the ore preparation system. The filtered rinse solution is pumped to uranium settling ponds 3 and 4, and some particulates are released to the atmosphere. Feeds with acceptable purity levels are calcined, crushed, and classified to produce solid particles, which are processed in fluidized bed reactors. Ventilation air from the FMB is filtered through dust collectors before release to the atmosphere." Identify the type of filtration used to remove the uranium feed from the rinse solution. Identify the type of filtration used to filter the ventilation air from the FMB.
B. ER Section 2.1.2.1.9 states the following: "The hot (455°C [851°F]) reactor off gas is filtered and scrubbed with water, then with KOH solution before release to the atmosphere." Identify or explain how the reactor off gas is filtered.

C. ER Section 2.1.2.1.10 states the following: "The reactor effluent gas stream containing the UF_6 product is passed through two filters in series and three cold traps in series." Identify the type of filters used to treat the reactor effluent gas stream.

Response:

In response to A, B, and C above the following provides an overview of the ventilation and filtration activities associated with the operation of the MTW:

A. The uranium feed is filtered from the rinse solution using a rotary vacuum drum process. Uranium processing areas that produce dusts, mists, or fumes containing uranium or other toxic materials are provided with dust collectors and/or scrubbers to reduce employee or environmental exposure to levels that are as low as is reasonably achievable (ALARA). The design efficiency of the fabric filter baghouses is greater than 95% efficiency each. Providing two, and sometimes three gaseous cleanup systems in series allows a decontamination factor of greater than 10^4. (Note: The Wet Process dust collector consists of a single stage).

B. Reduction off-gases consist of H_2S, hydrogen, nitrogen and metallic sulfides. These are processed through a gas-fired incinerator to burn off the excess hydrogen and convert H_2S and other sulfides. The off-gas is run through a sintered metal filter bowl to remove the particulates from the stream. The stream is processed through a gas fired incinerator to produce SO_2 which then exits the incinerator stack. Hydrofluorinator off-gases are twice scrubbed with water and then scrubbed with KOH to remove fluorides. The weak acidic HF liquors and spent KOH are transferred to the EPF for treatment.

C. The gas is passed through 2 sintered metal filters to remove particulates and then it flows to the tertiary cold traps and then to a caustic scrubbing system. In the caustic scrubbing system, the residual gas stream is contacted, in several vessels, with a potassium hydroxide (KOH) solution. The KOH solution removes essentially all of the remaining fluoride-bearing components of the gas stream. The remaining air is then vented to the atmosphere through a stack. The stack is continuously monitored to measure the quantity of uranium discharged to the atmosphere.

In addition to analysis of the stack samples, operating personnel monitor the pressure drop across the dust collectors to assure proper operation. Samples are also analyzed from the off-gas scrubbers as required to control emissions. Additional samples, visual observation, and precautions are taken as necessary to ensure effective performance of the pollution abatement equipment.

Stacks that contain non-radiological emissions are required to have an approved operating permit from the Illinois Environmental Protection Agency (IEPA). Each emission source is operated in accordance with the IEPA Air Permit.

Planned Environmental Report Revision

None

RAI – ALT-1

Section 102(2)(E) of Title 1 of NEPA states that government agencies shall "...study, develop, and describe appropriate alternatives to recommended courses of action in any proposal...." One reasonable alternative that the NRC will be considering is a license renewal period of less than 40 years, such as continuing with the current 10-year license renewal periods, or considering an alternative renewal period between 10 and 40 years. Describe environmental impacts associated with operations occurring over a period of less than 40 years. The NRC understands that for many resource areas the impacts may be proportional because impacts associated with the Proposed Action are in many cases annualized. In this case, a broader statement covering multiple resource areas can be provided.

Response:

The assessment of MTW's operational impacts of being small for all resource areas would not change for a shorter license term. Considered within the assessment resulting in small impacts is MTW's compliance with regulatory and permit limits. The assessment also considered the potential for impacts to accumulate within the environment. Most of the environmental impacts of MTW operations do not accumulate over time beyond a short duration. The table below lists the resource areas and their potential for accumulation of impacts as drawn from ER discussions. For example, due to air currents and flow of the Ohio River, any pollutants in air and water discharges are dispersed and would only accumulate in a limited area and only if the pollutant was not easily degraded by ambient conditions, sunlight, and precipitation such as radioisotopes and metals.

Table RAI ALT-1-1
Potential for Accumulation of Impacts

Resource Area	Accumulation potential comments	Accumulation component Yes/No
Land use	Land use for the plant and to support the plant is not anticipated to increase or decrease through the duration of the proposed license term.	No
Transportation	Transportation impacts are a function of increases in traffic which is viewed against	No

Resource Area	Accumulation potential comments	Accumulation component Yes/No
	daily and/or peak hour traffic. Injuries and fatalities from transportation are estimated based on miles traveled which do accumulate; however, the probability of an accident occurring does not accumulate.	
Geology and Soils	Impacts to soils due to soil disturbance would be per event (e.g., maintenance activity, remediation of CaF_2 Ponds) and application of BMPs to control soil erosion and implementation of the stormwater management controls. Potential for accumulation of pollutants within soils and sediment.	Yes
Water Resources – Surface water	Use: MTW does not use surface water for process or potable water. Quality: Surface water discharges are governed by daily and monthly discharge limits and discharges are quickly mixed upon discharge into the Ohio River.	No
Water Resources - Groundwater	Use: MTW uses permitted onsite wells for process and potable water, the aquifer withdrawals would be recharged. Quality: historical rather than ongoing operations have resulted in groundwater contamination, monitoring is ongoing and remediation activities planned as required.	No
Ecological Resources	Potential for accumulation of pollutants in vegetation, sediment, and soil.	Yes
Air Quality	Releases maintained within monthly, quarterly, and annual limits. Releases would disperse rather than accumulate in air.	No
Noise	Noise impacts are a function of increases in sound level against daily (day and night) levels.	No
Historic and Cultural Resources	No cultural or historical resources present and no new operations-related construction outside of current development footprint is planned.	No
Visual and Scenic Resources	Impacts are already established with the existing structures, no new construction is anticipated other than remediation activities associated with legacy operations.	No
Socioeconomic Impacts	Continued annual tax payments by Honeywell could result in accumulation of positive	Yes, but indirect

Resource Area	Accumulation potential comments	Accumulation component Yes/No
	impacts such as in an accumulation of tax revenues enabling installation of local infrastructure.	beneficial
Environmental Justice	Changes in community demographic characteristics could be identified in census between the year of license renewal and 40 years in the future; however, because no significant offsite environmental impacts will be created by the license renewal of MTW no disproportionately high and adverse impacts or effects on members of the public, including minority and, low-income and subsistence populations, would result from the license renewal.	No
Public and Occupational Health	Occupational exposures limits are protective of health for acute and chronic exposure; Potential for accumulation of pollutants in offsite vegetation, sediment, and soil.	Yes
Waste Management	Land disposal of waste will result in an accumulation of land acreage in waste disposal. The impact is measured against available capacity. Provided state and federal agencies permit/license facilities and facility expansions to keep up with local, regional, and national demand, the impact would not be significant.	Yes

MTW's environmental controls and procedures would maintain regulated radiological and non-radiological releases and effluents within permit and regulatory limits. Honeywell's monitoring program is designed to monitor accumulation in sediment, vegetation, and soil surrounding MTW as indicated in ER Table 2.1-6 and ER Figure 2.1-4. The monitoring results from 2010-2014 are presented in Tables 2.1-10, 2.1-11, and 2.1-12 and discussed in Sections 3.11.4 and 4.4. Results do not indicate consistent year-to-year increasing trends. Honeywell prepared Tables RAI ALT-1-2, RAI ALT-1-3, RAI ALT-1-4 comparing environmental monitoring results for 2000 – 2003 presented in the 2005 ER (Honeywell 2005) and 2010 – 2014 in the ER. A comparison of these two sets of results a decade apart further illustrates that the surrounding area is not experiencing an accumulation of radioactive material and fluoride releases.

As indicated in Table RAI ATL-1-1 shown above, waste management impacts have the potential to accumulate. Land dedicated to land disposal of MTW wastes both radiological and non-radiological could be estimated based on the annual average generation rate multiplied by the number of years of the renewal license term. However, land disposal capacity is anticipated to

keep pace with regional and national needs for the proposed 40-year term. A license renewal term of less than 40 years would likewise be anticipated to have available disposal capacity and result in insignificant waste management impacts.

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None

Table RAI ALT-1-2. Sediment Monitoring Annual Averages, 2000 – 2003 and 2010–2014 for Offsite Sample Locations

	Location	2000	2001	2002	2003	2010	2011	2012	2013	2014
Uranium (ppm)	Lamb Farm Lake	1.99	4.03	1.60	0.72	0.29	0.63	1.13	2.55	0.97
	Ohio River, opposite MTW	1.07	3.38	0.80	0.24	0.12	0.28	0.34	0.78	1.12
	MTW outflow	4.30	5.4	4.53	0.65	0.43	13.82	23.75	0.68	2.30
	Brookport Dam	0.73	2.78	0.54	0.18	0.07	0.19	0.71	1.00	0.57
	Joppa boat ramp	0.88	1.27	0.51	0.25	0.09	0.29	0.44	0.55	0.76
	Lindsay Lake	1.79	1.84	0.78	0.61	0.09	0.56	0.91	1.45	0.79
	Oak Glenn Lake	0.93	8.85	1.04	1.35	0.22	0.42	0.49	1.65	1.09
Fluoride (ppm)	Lamb Farm Lake	5.85	6.25	15.55	4.49	5.34	0.94	1.35	1.20	1.79
	Ohio River, opposite MTW	16.83	12.91	20.87	6.57	9.90	5.07	0.55	0.24	2.30
	MTW outflow	81.34	21.31	54.87	15.24	161.65	7.21	6.10	0.54	8.15
	Brookport Dam	21.13	13.20	21.36	7.44	6.83	1.62	1.19	0.50	0.84
	Joppa boat ramp	23.0	16.99	19.89	8.15	12.28	1.75	1.32	0.29	1.70
	Lindsay Lake	7.65	6.11	9.73	4.05	0.99	1.64	0.57	1.80	2.90
	Oak Glenn Lake	15.16	5.82	13.01	3.72	1.84	1.03	1.36	2.10	0.54

Note: Detection limits are fluoride, .005 mg/L; uranium, .025 micrograms per gram of soil, sediment, or vegetation (µg/g).
Source: Honeywell 2005 Table 2.1-11 and ER Table 2.1-10.

Table RAI ALT-1-3. Soil Monitoring Annual Averages, 2000 – 2003 and 2010–2014 for Offsite Sample Locations

	Location	2000	2001	2002	2003	2010	2011	2012	2013	2014
Uranium (ppm)	Lamb farm	1.94	1.52	2.36	1.38	0.96	1.36	1.09	1.45	1.07
	Brubaker farm	1.65	2.61	3.08	0.66	1.94	0.55	1.2	1.23	1.09
	Texaco station	1.82	2.42	2.24	0.65	1.90	0.72	1.1	1.3	1.09
	IL Power Equipment Station	1.56	1.77	4.53	1.17	1.23	0.46	0.97	1.2	1.11
	Reiniking property	1.81	1.43	1.19	0.90	6.65	0.70	1.17	1.35	2.15
	Metropolis Municipal Airport	3.42	1.33	3.61	0.90	1.10	2.50	1.75	2	2.10
	Maple Grove School	1.06	1.23	0.80	0.49	1.32	1.19	0.91	0.8	0.79
	Nearest residence	NR	NR	NR	NR	5.21	6.84	8.5	7.3	9
Fluoride (ppm)	Lamb farm	12.56	6.1	27.92	4.41	4.49	1.61	1.85	4.95	1.31
	Brubaker farm	8.34	4.55	13.40	3.74	37.31	1.10	0.615	1.35	0.52
	Texaco station	26.39	4.76	11.28	3.44	3.74	24.61	0.91	0.89	0.16
	IL Power Equipment Station	8.67	4.90	25.43	3.83	4.38	2.63	0.56	2.08	0.87
	Reiniking property	28.43	5.21	10.82	3.42	3.55	3.88	2.35	2	1.4
	Metropolis Municipal Airport	16.02	4.78	10.26	3.03	2.83	2.22	2.2	1.3	1.6
	Maple Grove School	11.15	4.77	10.38	2.91	3.62	1.22	2.9	0.89	1.575
	Nearest residence	NR	NR	NR	NR	1.10	1.69	1.25	2.6	1.8

Note: Detection limits are fluoride, 0.005 mg/L; uranium, 0.025 µg/g.
NR=not reported
Source: Honeywell 2005 Table 2.1-13 and ER Table 2.1-12.

Table RAI ALT-1-4. Vegetation Monitoring Annual Averages, 2000 – 2003 and 2010–2014 for Offsite Sample Locations

	Location	2000	2001	2002	2003	2010	2011	2012	2013	2014
Uranium (ppm)	Lamb farm	6.31	10.60	1.66	1.24	4.46	18.62	0.08	0.46	0.15
	Brubaker farm	6.75	14.69	1.61	0.63	3.83	15.61	NR	0.25	0.36
	Texaco station	3.22	1.63	2.11	1.86	3.39	11.90	0.27	0.14	0.14
	IL Power Equipment Station	2.22	5.91	2.06	0.75	2.26	22.04	0.18	0.28	0.19
	Reiniking property	1.75	7.98	1.06	0.83	2.17	9.76	0.07	0.21	1.00
	Metropolis Municipal Airport	1.25	0.80	1.09	0.58	4.00	4.12	0.26	0.16	0.54
	Maple Grove School	0.93	0.58	0.73	1.01	4.87	19.12	0.23	0.20	0.08
	Nearest residence	NR	NR	NR	NR	1.40	16.48	2.00	7.90	0.83
Fluoride (ppm)	Lamb farm	23	22.87	35.84	26.69	23.32	4.09	694.00	34.50	177.20
	Brubaker farm	10.8	22.33	31.26	23.67	12.12	7.94	1660.00	24.55	232.00
	Texaco station	10.45	22.65	35.26	21.96	12.22	8.65	1665.00	43.00	232.00
	IL Power Equipment Station	8.45	22.46	28.36	19.92	13.43	7.97	1640.00	1365.00	310.00
	Reiniking property	24.65	40.79	33.5	22	13.30	7.43	696.50	9.30	214.00
	Metropolis Municipal Airport	13.55	20.67	42.88	20.60	11.54	35.39	1240.00	16.80	351.00
	Maple Grove School	14.85	22.34	28.79	21.39	12.76	11.53	264.00	3.65	55.48
	Nearest residence	NR	NR	NR	NR	28.42	47.24	1200.00	30.50	335.00

Note: Detection limits are fluoride, 0.005 mg/L; uranium, 0.10 µg/g.
NR=not reported
Source: Honeywell 2005 Table 2.1-14 and ER Table 2.1-11.

RAI – ALT-2

ER Section 2.1.1 on the No Action Alternative states that "...Honeywell would begin the process of license termination in accordance with 10 CFR 40.42." ER Section 2.1.4 on decontamination and decommissioning states that "...Honeywell will decommission MTW...." State whether decommissioning under the Proposed Action as described in ER Section 2.1.4 will follow the same process as that stated for the No Action Alternative as described in ER Section 2.1.1. If there are any differences in the decommissioning approach depending on the alternative, state and explain these differences.

Response:

Decommissioning of MTW would follow 10 CFR 40.42 whether decommissioning is initiated because of the current license not being renewed (i.e., the no-action alternative) or during a renewed license term (i.e., the proposed action). As stated in Application for Renewal of USNRC Source Materials License SUB-526 Section 10.0, Decommissioning, "At the end of the plant life, the facility and site shall be decommissioned in accordance with an NRC-approved decommissioning plan."

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Section 2.1.4 Decontamination and Decommissioning

Decommissioning of MTW would be in accordance with 10 CFR 40.42. At the end of the plant life and prior to termination of license SUB-526, Honeywell will decommission the facility and the site in accordance with an NRC-approved decommissioning plan. The overall objective of the decommissioning is to remediate MTW to an unrestricted use condition that corresponds to a calculated dose to the public that is less than 25 mrem/yr. from applicable pathways. The former MTW property can then be used without any restrictions. The 25 mrem/yr. dose limit is codified at 10 CFR 20.1402, "Radiological Criteria for Unrestricted Use."

RAI – LU-1

ER Section 3.5, "Ecological Resources," states that the restricted area covers about 5 percent of the license area and the remaining 95 percent of the property has remained "mostly undeveloped." Clarify what is meant by "mostly." Is this referring to the approximately 100 acres of cropland on MTW property on the other side of U.S. Highway 45? If not, what other parts of the property have been developed and for what purpose? In addition, describe the inactive landfill, including its size, history, current status, and the type of wastes it contains (e.g., demolition and debris).

Response:

The Multi-Resolution Land Consortium's National Land Cover Database 2011 was used to further characterize land use land cover within the property boundary. Approximately 16 percent of the site is classified as being developed, with the remaining 84 percent undeveloped, with the largest land use land cover classification being deciduous forest at approximately 67 percent. Specific land use land cover details for the MTW site are provided in the table below (see Table RAI LU-1 below).

The onsite inactive landfill, located in the northeast portion of the property, is approximately 11 acres. It received waste from around 1959 to 1998 and disposal took place on an as-needed basis. The waste included approximately 10,000 drums (barrels), which according to historical data was determined to have been empty at the time of disposal. Honeywell is currently working with the Illinois Environmental Protection Agency to certify closure of the landfill. Groundwater near the landfill is being monitored quarterly as part of the Landfill Monitoring Well Program, which includes eight monitoring wells (see Section 2.1.2.3.8).

Table RAI LU-1. Land Use Land Cover on the MTW Site

Land Use Land Cover Category	Percentage
Open Water	1.63
Developed	16.12
Open Space	*9.44*
Low Intensity	*1.16*
Medium Intensity	*1.87*
High Intensity	*3.64*
Barren Land (Rock/Sand/Clay)	0.14
Deciduous Forest	66.96
Pasture/Hay	2.41
Cultivated Crops	5.99
Woody Wetlands	6.75

(MRLC 2016)

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None

RAI – LU-2

ER Section 3.4.8.3.1, "Chlorinated Solvent/Arsenic Area," states that the Illinois Environmental Protection Agency (IEPA) approved an evaluation indicating that the risks to ground water were below regulatory thresholds and no additional investigation or remediation was necessary. In March 2016, the IEPA approved an environmental land use control (ELUC) for portions of MTW, and the ELUC would be attached to the property deed. The ELUC contains limitations on how the property could be used in the future. The boundary of the ELUC should be shown so that the geographic extent of land use restrictions (i.e., impacts) are easily identifiable by the public. Identify on a map the boundaries of the ELUC.

Response:

The geographic extent of the ELCU was added to Figure 3.4-3 and a reference to Figure 3.4-3 was added to Section 3.4.8.3.1.

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Change Section 3.4.8.3.1, 4th paragraph, as follows:

In August 2014, the IEPA approved an evaluation indicating the risks associated with the residual groundwater impacts were below regulatory thresholds and no additional investigation or remediation was necessary. In March 2016, the IEPA approved an environmental land use control (ELUC) for portions of MTW (Figure 3.4-3). The ELUC will be attached to the property deed and places the limitations listed below on the property.

RAI – TRN-1

ER Section 4.2, "Transportation Impacts," only addresses the radiological impacts associated with transporting radioactive materials. The discussion of impacts should also address non-radiological impacts of transportation accidents or incidents, involving the transport of workers, input chemicals, byproducts, and waste. Provide a description of any onsite or offsite transportation accidents that have occurred that were associated with the operations at Honeywell, as well as response/cleanup measures that were taken. Note whether any injuries or fatalities occurred. If none, state so. Provide a summary of the consequences of truck and rail accidents that could occur that are associated with ammonia, hydrogen fluoride, potassium hydroxide, sodium hydroxide, sulfuric acid, and liquid hydrogen and the hazards associated with each of these chemicals. Identify required and voluntary mitigation measures that industry uses to mitigate the occurrence and consequences of these type of accidents.

Response:

RAI TRN-1 requests information on four topics related to transportation impacts. These topics are addressed separately below.

Non-radiological impacts of transportation accidents or incidents, involving the transport of workers, input chemicals, byproducts, and waste:

The addition of MTW workers' commuting vehicles and truck shipments would increase traffic on local roadways. The additional traffic could increase the occurrence of accidents. Honeywell estimated the vehicles arriving and departing MTW daily and the annual miles traveled by commuting vehicles and truck shipments to assess transportation impacts.

As indicated in Section 3.10.1, MTW employs 237 and as further discussed in Section 3.10.1 Honeywell does not anticipate a significant expansion in employment for the proposed license renewal term. Of the 237 employees, 62 percent reside in Kentucky and another 27 percent reside in Metropolis or Brookport, Illinois. The employees residing in Kentucky, Metropolis, and Brookport, a total of 89 percent or 211 employees, commute to MTW via US 45 northbound when arriving and southbound when leaving.

The shipments of feed materials, process chemicals, wastes, and byproducts anticipated for MTW operations during the license renewal term are presented in Table 4.2-1.

Table 4.2-1
Annual Shipments Anticipated for MTW Operations during License Renewal Term

Material	Mode	Annual Shipments	Frequency	Origin or Destination
Uranium ore	Truck; International shipping plus truck	700	1-2 per day	Wyoming; Saskatchewan, Canada; International (other than Canada)
Ammonium Hydroxide	Truck	9	2 per quarter	Granite City, IL
Hydrogen fluoride	Rail	88	2-4 rail cars per week	Geismer, LA
Potassium Hydroxide	Rail	12	1 per month	Ashtabula, OH or Charleston, TN
Sodium Hydroxide	Truck	22	2 per month	St. Louis, MO
Sulfuric acid	Truck	63	1-2 per week	Clarksville, TN

Material	Mode	Annual Shipments	Frequency	Origin or Destination
Liquid hydrogen	Truck	30	1 per week	McIntosh, AL
Potassium Bifluoride	International shipping plus truck	1	1 per year	Baltimore, MD
Synthetic CaF_2	Truck	84	1-2 per week	St. Genevieve, MO
Filter fines for Ur recovery	Truck	56	1 per week	Blanding, UT
Radwaste	Rail	6 (rail cars)	1-2 per quarter	Clive, Utah
Radwaste	Rail	47 (rail cars)	2-3 month	Grand View, ID
Hazardous waste	Truck	4	1 per Quarter	Various
Municipal solid waste	Truck	112	2 per week	Southern IL landfill
Universal waste	Truck	4	1 per Quarter	Various
Nonhazardous waste	Truck	4	1 per Quarter	Various

To evaluate the impacts of the proposed transportation on local traffic, Honeywell compared the estimated traffic attributable to MTW operation to existing traffic volumes. The current daily traffic count for US 45 at the MTW entrance is 2,052 for northbound traffic and 2,103 for southbound traffic. The hourly count data indicates consistent traffic flow during daytime hours and IDOT (2015) calculated a peak hour traffic at approximately 9%. The total daily traffic count includes 297 trucks. (IDOT 2015) The contribution of the 211 MTW employees arriving from the south plus eight truck shipments (assuming shipments would arrive evenly from the north and south) is approximately 10 percent of the daily directional traffic. Given that US 45 has a functional roadway classification of major collector (IDOT 2015) and Honeywell is not proposing changes that would increase traffic volumes, MTW continued operations would have minimal impact to traffic congestion. Therefore, the impact of MTW operations on local roadways is small.

The potential non-radiological impacts from traffic accidents were also considered. Honeywell estimated commuting mileage based on employee residence zip code groupings. Truck shipments detailed in Table 4.2-1 were used to estimate annual mileage. Some shipments to and from MTW are made by rail. Rail mileage was also estimated. Table 4.2-2 presents the estimated mileage and potential injuries and fatalities based on 2015 national rates. As shown in Table 4.2-2, travel related to MTW operations would have a small impact as measured by injuries and fatalities due to highway and rail accidents.

Table 4.2-2
Estimated Highway and Rail Injuries and Fatalities

Parameter	Annual Mileage	Annual Injuries	Annual Fatalities
Commuting	1,970,000	3.04	0.043
Truck shipment (all)	1,930,000		
Rail shipment	309,000	0.034	0.001

Notes: Highway injuries based on 2015 injury rate of 78 per 100 million miles traveled published by the Bureau of Transportation Statistics (BTS 2017a). Highway fatalities based on 2015 fatality rate of 1.1 per 100 million miles traveled published by BTS (BTS 2017b). Rail injuries and fatalities are based on rail accident rate and non-fatal injury and fatality counts for 2015 published by the Federal Railroad Administration (FRA 2017).

MTW operations would involve the transport of hazardous materials. ER Section 2.1 discusses the manufacturing process and Table 2.1-1 lists the industrial chemicals used by MTW. Based on the table of reportable quantities (49 CFR 172.101 Appendix A), the transport of hydrogen fluoride would present the greatest hazard in the event of a release. The accident risk and consequences to human health from transportation accidents involving 70 percent hydrogen fluoride was analyzed by DOE (DOE 2004, Section 5.2.3.3). In DOE's analysis, releases of the quantities transported by truck or rail could result in upwards of 3,000 permanent health effects under certain meteorological conditions and in an urban setting. The transport of anhydrous hydrogen fluoride with its greater concentration could involve greater consequences. However, as discussed by DOE (2004) the probability of such accidents is very low, a 1 in 10,000 chance of occurrence for hydrogen fluoride for truck shipments with rail shipments being about five times less likely. The estimated mileage for transport of hydrogen fluoride over the 40-year proposed license renewal term is approximately 2,110,000, which is less than the mileage used by the DOE analysis of 3,000,000. MTW's shipments of anhydrous hydrogen fluoride are anticipated to arrive by rail.

A query of the Pipeline Hazardous Materials Safety Administration's incident reports database for accidents involving ammonia indicated that only one highway or rail incident occurring in 2010-2016 has involved a fatality (1 fatality) or injury (2 injuries) attributable to the hazardous material. No incidents involving hydrogen fluoride have occurred. (PHMSA 2017)

Onsite or offsite transportation accidents:

No transportation crash-related accidents associated with MTW operations have occurred from 2010 to date. Two transportation-related incidents occurred, one in 2015 and another in 2017.

On 09/20/15 a uranium ore truck caught fire outside the MTW fence; the trailer carrying the uranium ore drums was not compromised. There were no injuries or fatalities. The truck driver called 911 to respond to the fire. MTW security staff observed the truck fire and issued an Alert. Massac County and Metropolis City fire departments responded and extinguished the fire.

In January 2017, a drum of calcined recovered ore (CRO) material leaked in transit. No injuries or fatalities resulted. The amount of CRO that leaked from the drum was estimated to be less than 2 pounds. Visible signs of contamination were observed on the floor of the trailer and the undercarriage. Honeywell notified the National Response Center. Based on the type and the estimated amount of material that leaked from the drum, NRC concluded that there was reasonable assurance that the leakage did not result in significant safety consequences to the public. NRC issued a Notice of Violation (NOV 40-3392-2017-003) for this incident. (NRC 2017)

Cleanup and decontamination were performed by the receiving facility, Energy Fuels, and a decontamination survey was conducted by the state regulatory agency (NRC 2017). Honeywell conducted a root cause analysis and implemented corrective actions including procedure revision and retraining (Honeywell 2017b). NRC has now closed the NOV because of Honeywell's corrective action implementation. A more detailed description of the incident included in the NOV (NRC 2017) is provided below.

> On January 6, 2017, Honeywell's sampling plant operators (SPOs) loaded a total of 55 drums of CRO into an exclusive use transport trailer. On January 10, 2017, the trailer was shipped from Honeywell MTW to Energy Fuels, Inc., in Blanding, Utah, as UN 2912, Radioactive Material, Low Specific Activity (LSA) group LSA-1. For the purposes of this shipment, the trailer was considered the conveyance per the definitions in 49 CFR. On January 12, 2017, Honeywell was notified by the recipient that upon removing the drums from the trailer, there were visible signs of contamination onto the floor of the trailer and on the exterior undercarriage of the trailer. The plastic lining laid on the trailer bed (by procedure a plastic liner is installed on the trailer floor to minimize the potential for contamination on the trailer floor during the loading process) was found ripped in the location of the visible contamination. The contamination was attributed to leakage from one of the loaded drums as a result of corrosion on the bottom of the drum. On January 12, 2017, Energy Fuels, Inc. decontaminated the trailer after removing all the drums. Honeywell notified the National Response Center and the regional NRC office (Region II) of the event.
>
> Honeywell's investigation estimated that less than two pounds of CRO material exited the drum; however, Honeywell was not able to determine how much material was left in the transport trailer and how much material exited the trailer. The Utah Division of Waste Management and Radiation Control performed a contamination survey after Energy

Fuels had removed the drums, the damaged plastic, and decontaminated the trailer. Direct frisking determined fixed contamination of 1,470 disintegrations per minute (dpm)/100 cm^2 on the undercarriage of the trailer, and 29,400 dpm/100 cm^2 on the floor of the trailer with removable contamination of 287 dpm/100 cm^2.

Summary of Consequences and Chemical Hazards:

As presented in the table below, the process chemicals used for MTW operations involve inhalation and contact hazards for persons exposed in the event of a transportation accident that involves a release of the material. The consequences are dependent on the release quantity, meteorological conditions that could spread contamination or promote reactivity, and the location of the accident in relation to human population. The consequences of a release of hydrogen fluoride are discussed above. Also as mentioned above, the probability of a severe transportation accident is very low.

Table RAI TRN-1-1. Hazard Information for MTW Process Chemicals

Material	DOT Hazard Class	NFPA Health Rating	Human Health Hazard, Acute Exposure
Ammonium Hydroxide	8, Corrosive	3	Ammonium Hydroxide is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. The extent of injury produced by exposure to ammonium hydroxide depends on the duration of the exposure, the concentration of the liquid or vapor and the depth of inhalation.
Anhydrous hydrogen fluoride	8, Corrosive	4	Inhalation and contact hazard, consequences are dependent on release quantity, population density, and meteorological conditions. Acute health effects include irritation of the skin, eyes, mucous membranes, and respiratory tract; accumulation of fluid in the lungs (pulmonary edema); nausea and vomiting; gastric pain; irregular heart rate (cardiac arrhythmia); tissue destruction and burns; low blood calcium (hypocalcemia); and possibly death.
Potassium hydroxide, solution	8, Corrosive	3	Primarily a contact exposure route with exposure of respiratory system via mist. Health effects include severe lesions and burns. Dust or mist exposures may cause eye or respiratory system irritation.

Material	DOT Hazard Class	NFPA Health Rating	Human Health Hazard, Acute Exposure
Potassium difluoride	8, Corrosive	3	Primarily a contact hazard. Corrosive to tissues and can cause severe burns and systemic effects. In case of fire, decomposition product can include hydrogen fluoride.
Sodium hydroxide, solution	8, Corrosive	3	Primarily a contact hazard. Can cause severe burns in all tissues that come in contact with it. Inhalation of low levels of sodium hydroxide as aerosols may cause irritation of the nose, throat, and respiratory airways.
Sulfuric acid	8, Corrosive	3	Inhalation and contact hazard. Highly reactive and produces toxic fumes. Consequences are dependent on release quantity, population density, and meteorological conditions. Corrosive to all body tissues. Inhalation of vapor may cause serious lung damage. Contact with eyes may result in total loss of vision. Skin contact may produce severe necrosis. Fatal in small doses.
Liquid hydrogen	2.1, Flammable gas 2.1 T75, TP5 318	3	Forms explosive mixtures with air. Produces vapor cloud. Inhalation and contact hazard. Consequences are dependent on release quantity, population density, and meteorological conditions. Contact with liquid may cause cold burns/frostbite. Asphyxiant in high concentrations.

Sources: ASTDR 2002, 2004; CDC 2011; CDC 2017a, 2017b; Honeywell 2017c; NOAA 2017a, 2017b, NOAA 2017c; Praxair 2016

DOT (U.S. Department of Transportation) Hazard Class 49 CFR 172.101 Appendix A, 49 CFR 173.2,

NFPA (National Fire Protection Association) Health Rating: 3 = Short exposure could cause serious temporary or moderate residual injury; 4 = Very short exposure could cause death or major residual injury.

Mitigation Measures:

The DOT has established regulations for the transport of freight in the US. The regulations 49 CFR Parts 100–180 address packaging, quantity limitations, labeling of containers, and placarding of transport vehicles. The regulations also address safety through driver qualifications, routing, incident reporting, and emergency preparedness. Roles and responsibilities of shippers, carriers, first responders, and applicable state and federal agencies are established in these regulations or by other coordination actions to ensure prompt response

and support is provided for incidents involving releases of hazardous (including radioactive) materials during transport. NRC regulations address shipping of radioactive materials with safety requirements and container requirements/certifications to further ensure the safe transport of radioactive materials. DOT records of incidents involving hazardous material transport indicate that in 2015 only 317 incidents, less than 2 percent, were accident-related (i.e., involving a vehicular accident or derailment) (BTS 2017c).

MTW has procedures in place that govern the packaging, loading, and inspection of shipping containers and loads prior to shipment. MTW also uses dedicated rail cars and trailers for much of its shipping. Use of dedicated equipment under the control of MTW allows for more control over the condition and maintenance of the transport equipment.

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(1) Insert the response under Non-radiological impacts of transportation accidents or incidents, involving the transport of workers, input chemicals, byproducts, and waste as new section 4.2.1, Non-radiological Impacts.

(2) Insert the following abbreviated text from the onsite and offsite transportation accidents response above in the new Section 4.2.1 following the non-radiological impacts discussion.

> No transportation crash-related accidents associated with MTW operations have occurred since 2010. Two transportation related incidents occurred, one in 2015 and another in 2017. In 2015 a truck carrying uranium ore caught fire outside the MTW fence; the trailer carrying the drums of uranium ore was not compromised. There were no injuries or fatalities. In 2017, a drum of calcined recovered ore material leaked in transit. No injuries or fatalities resulted. (NRC 2017)

(3) Insert the response under Mitigation Measures as the last discussion under the new section 4.2.1.

(4) Insert the following text at the end of the Radiological Impacts section (now numbered 4.2.2):

> As mentioned in Section 4.2.1, in 2017, a drum of calcined recovered ore material leaked in transit and the leak was discovered at the destination. The amount of calcined recovered ore that leaked from the drum was estimated to be less than 2 pounds. Visible signs of contamination on the truck's undercarriage was observed. Based on the type and the estimated amount of material that leaked from the drum, NRC concluded that there was reasonable assurance that the leakage did not result in significant safety consequences to the public. (NRC 2017)

(5) Introduce potassium bifluoride as electrolyte in Section 2.1.2.1.10, Fluorination

(6) Add potassium bifuoride maximum storage quantity of 20,000 lbs. to Table 2.1-1.

Modify Table 2.1-1 table note:
95% vol. in U-467, shipments received in the anhydrous form

RAI – TRN-2

NUREG-1748, Section 3.4.6, "Environmental Impacts," states that transportation effects should be analyzed, including increased traffic. The ER provides information on the number of uranium ore shipments, but does not identify numbers of shipments, and mode of shipment, for other materials. Provide the number, frequency, and types of truck and rail shipments, both to and from the site, of input materials, byproducts, and wastes that are in addition to the 650 uranium ore shipments received each year. If the number of shipments varies, provide a range and an indication of the lower and upper bounds anticipated. These shipments should be identified by material or waste type, mode of transport, and destination. Identify if the number of these shipments is expected to change over the 40-year period, and whether these shipments are reflective of past operations.

Response:

Table 4.2-1 as included in the response to RAI TRN – 1 above presents the feedstock, chemicals used in the process, waste, and by-products that would be used under the proposed action and the anticipated number of annual shipments and their frequency. The annual anticipated shipments for the proposed 40-year license term were developed based on past operations, primarily 2014-2016. The years 2015 and 2016 are reflective of the anticipated production levels for the proposed 40-year license term. The production level for 2014 was a higher production level and including that year accounts for fluctuation to higher production levels. The materials are also identified by mode of shipment and the origin/destination based on current operations.

Planned Environmental Report Revision

Included in the revisions for RAI TRN-1

RAI – GEO-1

ER Section 3.3.1, "Regional Geology," states, "The MTW site is located in the northern section of the Coastal Plains physiographic province and is underlain by deposits of Mesozoic age and younger." This sentence is confusing. Clarify if the site is underlain by deposits of Paleozoic age and younger, or that it is underlain by deposits of Quaternary age and older. Provide a more accurate summary of the stratigraphy underlying the site. Provide the following reference that is the primary source for the geology discussion in the ER:
Honeywell 2015. Response Notice of Deficiency of RCRA Waiver Modification, U.S. EPA ID No. ILD 006 278 170. October 28, 2015.

Response:

Regional geologic descriptions were updated from the USGS information for clarification. Site specific descriptions will be moved to Section 3.3.2, Local Geology and Terrain. Reference Honeywell 2015 will not be used. Geologic descriptions were revised to be consistent with the more current references described in RAI GEO-2.

Planned Environmental Report Revision

The following provides the new sections that will be revised in the ER:

3.3 Geology and Soils

3.3.1 Geology

The topography of the MTW site is relatively flat. Southern Illinois has gently rolling hills, with MTW site terrain between 300 and 380 feet (91 and 116 meters) above msl. Within the restricted area, the maximum variation in elevation is about 10 feet. (Figure 1.0-1).

The site is located at the northern end of the Mississippi Embayment, a depositional basin filled in with sediments 40 to 100 million years old that overlie older (300 to 600 million-year-old) bedrock. Surface soils at the Metropolis facility consist of silty loam and silty clay loam which have low permeability and poor drainage. The underlying unconsolidated surface deposits are approximately 24 to 27 meters (80 to 90 feet) thick and consist of sediments from three types of depositional environments. (NRC 2006) Figure 3.3-2 presents a geologic map and cross section running along the Ohio River, showing the various geologic deposits underlying the MTW site. (Nelson, et al.2008)

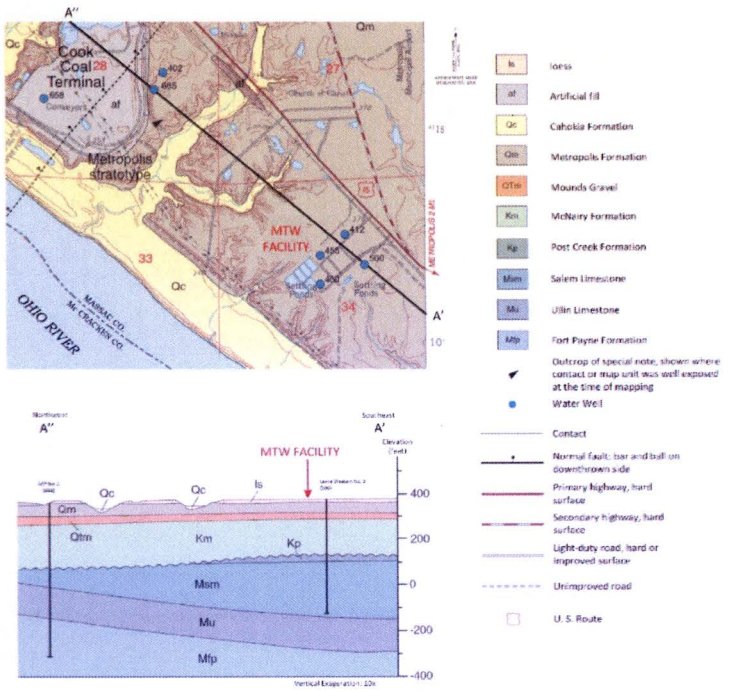
Alluvial deposits consisting of sand, silt or clay and localized sandy gravel deposits are found along the Ohio River. Locally, the MTW site and much of the surrounding region overlies approximately a few meters of Quaternary loess. Surficial geologic maps (Figure 3.3-2) developed by the Illinois State Geological Survey (ISGS) exclude this loess veneer and show the area of the site to overlie the Metropolis Formation, consisting of clay-rich silty sand and sandy silt, ranging in thickness from 6 to 17 meters (20 to 50 feet). (Nelson et al.,20`08) The deeply weathered, poorly sorted, and burrowed alluvial sediments of the Metropolis Formation is interpreted as fluvial sediments that occupied an under fit valley ancestral to the modern Ohio. The Metropolis Formation underlies the Mounds Gravel, comprised of gravel and sand 11 to 20 meters (35 to 65 feet) thick. The Mounds Gravel is interpreted as deposits of large, braided rivers that were in part ancestral to the modern Tennessee River. Groundwater monitoring wells at the MTW site are completed in the Mounds Gravel. (NRC 2006)

Bedrock underlying the unconsolidated Mounds Gravel surface deposits consists of Tertiary Porter's Creek Clay, Cretaceous McNairy Formation sandstones and shales, and Mississippian limestones and sandstones. The McNairy Formation sands, silt and clay are approximately of 40 to 49 meters (130 to 160 feet) thick. The Mississippian St. Louis Limestone is approximately

24 meters (80 feet) thick and occurs at an approximate depth of 152 meters (500 feet). (Nelson, et al. 2008)

3.3.2 Seismic

As shown in Figure 3.3-1, MTW is located within the northern portion of the New Madrid seismic zone. Many earthquakes have occurred in northeastern Arkansas and southeastern Missouri in association with the New Madrid seismic zone. The major historic earthquakes felt in this area were from the 1811–1812 series of New Madrid earthquakes, whose epicenter was approximately 97 kilometers (60 miles) southwest of MTW. The strongest of these earthquakes was estimated to have produced a modified Mercalli Intensity (MMI) IX earthquake (i.e., a seismic event capable of causing considerable damage to well-built buildings, moving houses off their foundations, breaking some underground pipes, cracking the ground and causing serious damage to reservoirs) at Metropolis, Illinois. (Honeywell 2005)



(Nelson, et.al. 2008)

Figure 3.3-2
Geologic Map and Cross Section A'-A''

References: Nelson, et. al. (Nelson, W.J., and J.M. Masters), 2008, Geology of Joppa Quadrangle, Massac County, Illinois: Illinois State Geological Survey, Illinois Geologic Quadrangle Map, IGQ Joppa-G, 2 sheets, 1:24,000; report, 11 p.

RAI – GEO-2

ER Section 3.3.1 contains descriptions of strata that are inconsistent with the following Illinois State Geological Survey quadrangle maps:

1. Nelson, W.J., and J.M. Masters, 2008, Geology of Joppa Quadrangle. Massac County, Illinois. Illinois Geologic Quadrangle Map IGQ Joppa-G. Illinois Department of Natural Resources. Illinois State Geological Survey (ISGS) (Sheets 1 and 2 of 2) and

2. Nelson, W.J., J.M. Masters, and L.R. Follmer, 2002, Surficial Geology Map, Metropolis Quadrangle, Massac County, Illinois: Illinois Geological Quadrangle Map, IGQ Metropolis-SG, 1:24,000 (2 sheets).

The first reference (Nelson and Masters 2008) includes a stratigraphic/structural cross section that intersects the MTW site and was developed using logs from a water well on the site. Accordingly, the NRC considers these references to be definitive unless Honeywell provides valid reasons for using different descriptions. The ER should use geologic nomenclature and descriptions that are consistent with the nomenclature and descriptions in these studies, or the ER should describe discrepancies and justify the terms used in the ER. The following clarifications are needed:

A. ER Section 3.3.1, p. 3-8, makes no mention of the Metropolis or the Mounds Formations. However, both are clearly identified under the site as significant marker beds by the ISGS Joppa Quadrangle. Clarify the apparent inconsistency of the ER with the ISGS map.

B. ER Section 3.3.1, p. 3-8, states that the first limestone is the St. Louis Formation. This is inconsistent with the name applied to that unit by the above-referenced ISGS Quadrangles. Clarify the apparent inconsistency of the names for the first limestone.

C. ER Section 3.3.1, p. 3-9, states that "a sand deposit approximately 35 to 65 feet thick..." is "outwash from a distal valley train of the Mackinaw Member of the Henry Formation." However, this is inconsistent with the name applied to that unit by the ISGS Quadrangles. The proper designation appears to be the Mounds Formation, which, as opposed to the Quaternary Henry Formation, is Tertiary in age sequence. Clarify why the unit is named Mackinaw in the ER as opposed to the Mounds Formation.

D. ER Section 3.3.1, p. 3-9, suggests that the next unit overlying the aforementioned "sand deposit" is the Carmi Member of the Equality Formation. However, this is inconsistent

with the name applied to that unit by the ISGS Quadrangles. The proper designation appears to be the Metropolis Formation. Clarify if this unit should be called the Carmi Member of the Equality Formation or the Metropolis Formation.

E. ER Section 3.3.1, p. 3-9, indicates the presence of "a 70-foot gray to black lignitic shale or siltstone sequence known as the Levings Member. This formation is unconformably underlain by a limestone of Mississippian age, believed to be the St. Louis limestone." However, the ISGS Joppa and Metropolis Quadrangle maps and cross sections do not identify a Levings Member; rather, the Post Creek Formation is depicted to separate the McNairy formation from the underlying limestones of Mississippian age. In addition, the references describe the Post Creek Formation as largely gravel as opposed to black lignitic shale.

   Moreover, the limestone unit described in ER Section 3.3.1 is widely interpreted to be the Mississippian Salem Limestone. The St. Louis Limestone, which typically conformably overlies the Salem Limestone, is identified in the ISGS Joppa Quadrangle map (Nelson and Masters 2008) to the west of a north-south oriented fault that itself is to the west of the site. However, the Joppa Quadrangle map does not identify the St. Louis formation in the strata underlying the MTW footprint. The Metropolis Quadrangle map suggests that the St. Louis Formation does not occur immediately to the east of the MTW site. Rather, it only can be observed roughly 2 miles to the north of the city of Metropolis. Clarify whether this unit should be called the St. Louis Limestone or the Salem Limestone.

Response:

Due to inconsistencies with the referenced report, Reference Honeywell 2015 will not be used. Geologic descriptions from the 2009 Environmental Assessment (NRC 2009) were compared to the 2008 ISGS Joppa Quadrangle (Nelson and Masters 2008) and the section has been revised to maintain consistency with the most current published geologic map. Figure 3.3-2 has been replaced with cross sections from the 2008 ISGS Joppa Quadrangle.

Planned Environmental Report Revision

See attached revisions to Sections 3.3.1 and 3.3.2. that have been provided as part of RAI-GEO-1

RAI – GEO-3

ER Section 3.4.7, "Local Groundwater," p. 3-19, first paragraph, identifies the Mounds Gravel under the site as the first aquifer. However, the Mounds Gravel is not identified in the geology descriptions in ER Section 3.3, "Geology and Soils." Provide consistent terminology and nomenclature between ER Sections 3.3 and 3.4, "Water Resources."

Response:

The response to RAI-GEO-1 replaced Section 3.3.1 and includes the identification of the Mounds Gravel and consistent terminology between ER Sections 3.3 and 3.4.

Planned Environmental Report Revision

See response to RAI-GEO-1.

RAI – SW-1

ER Section 3.4.1 states that there are four intermittent creeks that drain the MTW site property to the Ohio River. The ER also refers to an "effluent ditch." The NRC's 2006 EA refers to a "natural drainage ditch" and "intermittent drainage channel." Clarify the nature of the four creeks. If these ditches are other features apart from the creeks, indicate them in the figure(s) requested in RAI – PA-1.

Response:

See response for RAI- PA-1 for revisions to Figure 3.4-3 showing the intermittent creek locations. These intermittent creeks are the "intermittent drainage channel" and "natural drainage ditch" referred to in the ER and in the 2006 EA. No other ditches apart from the creeks are present.

Planned Environmental Report Revision

None

RAI – SW-2

ER Tables 3.4-3a through 3.4-3f provide NPDES monitoring data for Outfall 002, with each of these tables identifying the maximum and average values observed on an annual basis. ER Table 2.1-5, "Summary of Outfall 002 Monitoring," provides a summary of Outfall 002 monitoring data. The average values in Table 2.1-5 correspond to the values in Tables 3.4-3a through 3.4-3f. The maximum values, however, do not correspond. Identify the reason for the apparent discrepancy, or correct the tables so that the maximum values agree, as applicable.

Response:

Table 2.1-5 erroneously reported the maximum average value for the year, not the maximum value. Table 2.1-5 will be corrected.

Planned Environmental Report Revision

Change Table 2.1-5 as follows:

Table 2.1-5
Summary of Outfall 002 Monitoring

Parameter	Units	2010		2011		2012		2013		2014	
		Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
Flow rate	MGD[a]	6.53	3.51	6.03	3.00	3.92	1.92	7.04	2.22	4.13	2.87
Uranium	mg/L[b]	17.05	1.75	12.61	1.32	6.14	1.02	8.27	0.84	9.00	1.15
pH[c]		8.21	7.47	8.22	7.17	7.07	6.61	8.22	7.03	7.86	7.11
Temperature	°C	[d]	[d]	24.2	20.34	24.8	20.54	22.00	18.28	21.90	19.73
Total fluorides	mg/L[b]	15.96	3.28	8.90	3.12	11.60	3.06	26.00	3.96	28.00	4.98
TSS	mg/L[b]	15.00	3.49	11.00	3.55	72.00	4.63	149.00	11.17	6.00	1.65
BOD	mg/L[b]	37.00	6.22	18.00	4.65	29.00	7.73	21.00	5.49	33.00	7.79

a. Millions of gallons per day.

b. Milligrams per liter.

c. Maximum deviation from pH of 7.

d. This parameter in this location not monitored until 2011.

RAI – GW-1

ER Chapter 4, "Environmental Impacts," does not address ground water impacts, although ER Sections 3.4.7 and 3.4.8, "Groundwater Monitoring," contain some relevant information. As part of its environmental review, the NRC needs to determine impacts on ground water use and quality. Therefore, the NRC requests that the following information be provided to determine these impacts:

A. Verify that the flow rates for Outfall 002, provided in ER Table 2.1-5, reflect ground water consumptive use. If this flow rate does not reflect ground water consumptive use, provide the annual or daily rate of ground water withdrawal needed for the MTW site for a period of 40 years. State whether ground water consumptive use would be proportional to any process output changes that would support the growth multipliers provided in ER Table 4.6-3, "Growth Multiplier for Each Year as a Multiple of the Base Value."

B. ER Section 3.4.8.3.1 states that portions of the MTW site would have long-term restricted use due to contamination from chlorinated solvents and arsenic from "historic activities." Describe these historic activities and indicate whether they were related to past uranium processing at the site or whether they are from previous industrial activities prior to the beginning of uranium processing activities. If the historic activities were related to past uranium processing, describe the activities, what caused the

contamination, and the measures taken to stop the activities from causing contamination.

C. ER Section 3.4.8.3.2 describes an ongoing investigation of possible contamination from underground process sewers and structures. Describe the location of these sewers and structures on the site and their role in the process at the MTW, including the source and type of effluents going into them. Provide an updated status of these investigations and identify the possible contaminants.

Response:

A. Daily groundwater withdrawal volumes and flow rates from the deep groundwater wells for the years 2012 to 2014 were obtained from MTW. Groundwater withdrawals for the years 2010 and 2011 were not reported. Below is a comparison of the reported groundwater withdrawals from the 4 deep production wells.

Parameter	Units	2012		2013		2014	
		Max.	Avg.	Max.	Avg.	Max.	Avg.
002 Flow Rate (Table 2.5-1)	MGD[a]	3.92	1.92	7.04	2.22	4.13	2.87
Production Rate[b]	MGD[a]	4.33	3.34	3.96	3.15	3.96	3.76
a. Millions of gallons per day. b. Combined deep groundwater production well withdrawal							

In all cases, the average groundwater withdrawal rate exceeds the average Outfall 002 flow rate, while the maximum recorded flow rate from Outfall 002 exceeds the groundwater withdrawal rate, therefore, there is no correlation between groundwater withdrawal rate (consumptive use) and flow rate from Outfall 002.
The 4 deep production wells have a total withdrawal capacity of 4.87 MGD. Additional capacity for the groundwater production wells beyond 4.87 MGD is not expected.

B. The historic activities on the MTW site are associated with the historic onsite landfill, an old wood treating facility ("Old Creosoter Area"), and the main plant area sewers. The onsite landfill and Old Creosoter Area are located on the MTW property, but not within the production facility boundaries. Both areas have had final covers installed under US EPA oversight and are in monitoring programs per the MTW RCRA Part B Permit. The main plant area sewers and associated groundwater contamination is discussed in part C below. (IEPA 2015b)

C. The D&E Cell Room is located within the gaseous fluoride (GF2) building, north side. The Green Salt South Pad (G/S South Pad Sump) is located on the south side of the Feed Materials Building (FM Building). Facilities serviced by the process sewer system are the lab, GF2 buildings, powerhouse, dealkization building (no longer used), and

treated wastewater from the EPF weir (permitted wastewater treatment system). Underground process sewers are used to carry non-contact cooling water and condensates to NPDES permitted Outfall 002 without treatment. Additionally, process wastewater from the GF2 building generally consists of weak hydrofluoric acids and metals. Those sumps and trenches, in particular the concrete sumps in the D&E cell room, were replaced to prevent leakage to the storm sewer. Investigations of potential impacts from these locations were approved in 2016 by the IEPA with groundwater monitoring commenced in the 2nd quarter of 2016 and will continue for 8 quarters. Additional inspections were conducted to find other areas of reduced integrity, and those locations identified were repaired or replaced. No further action is planned except for the continuation of groundwater monitoring.

Planned Environmental Report Revision

None

RAI – AIR-1

Decommissioning of the MTW facility is a reasonably foreseeable future action regardless of how long the facility operates. In addition, NUREG-1748, Section 3.4.4, "Alternatives to the Proposed Action," states that "the no-action alternative must be addressed." Decommissioning activities would need to be initiated if the NRC were to deny the license renewal. Therefore, decommissioning activities and their potential impacts need to be addressed in the EA. ER Section 2.1.4 describes the general process for decommissioning, but the ER does not identify potential environmental impacts that would occur associated with this process. Identify air quality impacts associated with decommissioning the MTW and how they would be mitigated. The discussion should describe the types of emissions from specific activities and equipment. Describe any specific mitigation measures and best management practices.

Response:

Decommissioning activities and their potential environmental impacts would be addressed in detail in a Decommissioning Plan submitted by Honeywell to the NRC for review and approval at the time of actual decommissioning. Included in this Decommissioning Plan would be a description of the potential impact of decommissioning on air quality, and how those potential impacts would be managed or mitigated by Honeywell.

Construction activities associated with decommissioning might impact air quality through dust caused by equipment or emissions from construction equipment. Releases to the air associated with the demolition of structures might impact air quality through particulate emissions. A detailed assessment would be completed at the time decommissioning is being planned.

When submitted to the NRC, the Decommissioning Plan would describe the air emissions control measures that would be implemented. Emissions from plant equipment as a result of

plant operations would have ceased, and subsequent emissions related to decommissioning are likely to be of less significance and of limited duration. Work practices to reduce or eliminate air emissions would be required of the decommissioning contractor. Equipment selected for decommissioning operations would require review and approval by Honeywell, and best management practices would be employed to reduce or eliminate those emissions. Overall, decommissioning operations would likely not alter the existing air quality and would comply with the NAAQS.

Planned Environmental Report Revision

Section 2.4 will be revised to include the RAI Air-1 response above and the new text will be inserted prior to the last paragraph of in section 2.4.

RAI – SOC-1

ER Section 3.10.1, "Socioeconomics," states that the MTW site employs 237 people as of February 2016. Provide updated employment levels (e.g., as of February 2017), given that layoffs have recently occurred to reflect the most recent condition of employment levels. In addition, employment levels tend to fluctuate depending on the operating status of the MTW. Employment levels have a direct socioeconomic impact on the local communities. To accurately assess socioeconomic impacts, distinguish between the number of direct employees and the number of contractors. Indicate whether the number of employees and/or contractors varies cyclically (e.g., between normal operations and maintenance outages) and, if so, provide the approximately number of employees and contractors during each stage. To bound the analysis, identify the approximate maximum numbers of employees and contractors if MTW were operating at the maximum permitted capacity.

Response:

The current number of employees at the site as of February 2017, is 193 people with 105 contractors. During full operational mode, the MTW employs 269 fulltime employees and 157 contractor personnel. The annual shutdown (ASD) typically has an increase in contractor personnel depending on the amount of work required during the ASD. For example, during the ASD in 2016 there were over 200 contractors on site and during the ASD in 2017, there was no significant increase in contractor personnel.

Planned Environmental Report Revision

None

RAI – EJ-1

ER Section 3.10.6.2, "Environmental Justice Evaluation," and Figure 3.10-3, "Low-Income Populations," identify two low-income block groups, but the ER does not include further analysis

as no significant impacts are anticipated in general. Because there are block groups that meet the environmental justice criteria, the NRC would like to further identify any mitigation measures that Honeywell might already be performing, or plans to perform, that would be available to persons from within these low-income block groups.

Response:

As noted in the RAI, there are no anticipated impacts to low-income populations identified in Section 3.10.6.2. Therefore, mitigation measures are not required. However, Honeywell is an active member of the Metropolis Chamber of Commerce and donates to its Annual Silent Auction. MTW Honeywell also donates firefighting equipment every year to the local fire department that serves all community residents. From a workforce perspective, Honeywell employees support local charities, such as Telethon of the Stars, which is a local charity that assists disabled children and adults. Honeywell employees also have the opportunity to donate to the Honeywell Hometown Solutions, which is a fund that is used to fund disaster relief in Honeywell locations. This fund supports employees that need assistance because of a natural disaster or other catastrophic event.

Planned Environmental Report Revision

None.

RAI – POH-1

ER Table 3.11-1, "Occupational Dose," identifies the dose to workers at the MTW. Clarify whether this dose represents only monitored workers or all workers. Identify where in the MTW site radiation doses to workers are most likely to occur.

Response:

The radiation dose numbers in ER Table 3.11-1 represent only the monitored workers. Workers can be exposed to radiation doses anywhere within the restricted area. Areas of special concern are the FMB and the Sampling plant.

Planned Environmental Report Revision

None

RAI – POH-2

As stated in ER Section 4.6.4, "Non-Radiological Air Quality Impacts," the use of ammonia (NH_3) has been discontinued and replaced by liquid hydrogen supplied by a contractor. However, ER Section 2.1.2.1.13, Industrial Chemical Storage," and Table 2.1-1, "Bounding Quantities of Industrial Chemicals Used in the Conversion Process at MTW," state that NH_3 is

still stored on site, and Table 2.1-3, "Discharge Direction, Stack Height, Flow, and Annual Uranium Emissions, 2010-2014," shows there were emissions of NH_3 in 2014. The ER does not state how ammonia might still be used at MTW, such as in ore preparation. Clarify whether the use of NH_3 was discontinued and whether NH_3 will continue to be stored on site and for what purpose throughout the requested licensing period of 40 years. If ammonia is still being used, described how this chemical is being used in the manufacturing process.

Response:

The use of anhydrous Ammonia has been discontinued. Aqueous Ammonia (Ammonium Hydroxide) is stored on site and is used in the wet process operations for pH adjustment.

Planned Environmental Report Revision

None

RAI – POH-3

As part of the development of the EA, the NRC will verify the results obtained from the use of CAP-88 to determine public dose. Provide an electronic copy of sample input and output files for determining individual and population doses. The NRC does not need all input and output files for its environmental reviews.

Response:

Input and output data files for dose calculated to the maximally exposed individual have been uploaded onto the Daptiv Site under CAP88.zip files. This file includes the individual case and the collective dose to the population in a 50-mile radius.

Planned Environmental Report Revision

None

RAI – POH-4

ER Chapter 4 does not address doses to the maximally exposed individual and surrounding population at the MTW site for the proposed action. Comparing ER Table 3.4-3f, "NPDES Monitoring Data – Outfall 002 Total Uranium (U_3O_8)," to the 2006 EA Table 2.5, "Summary of NPDES requirements and monitoring results for process wastewater and final effluent at NPDES Outfall 002 for the period 2000 to 2004," liquid effluent monitoring data in the ER indicate more than a ten-fold increase in average uranium concentrations at Outfall 002, since the 2006 relicensing. This could indicate a significant increase in the collective radiation dose associated with liquid effluent releases from the MTW facility. Further, the 2006 EA relied on a 1995 analysis, and this analysis should be updated to reflect current dose estimation methods. Provide a dose analysis from aqueous releases to the maximally exposed individual and

surrounding population, based on potential liquid releases for the proposed 40-year relicensing period and expected population growth.

Response:

Source data for Table 3.4-3f, *NPDES Monitoring Data – Outfall 002 Total Uranium (U_3O_8),* was reviewed and it was determined that Table 3.4-3f contains an erroneous dataset. Therefore, the table shall be updated with the corrected data in a subsequent revision to the environmental report. The correct dataset is as follows:

Monitoring Period	Annual Average Quantity[a]	Maximum Concentration[b]	Annual Average Concentration[b]	Minimum Concentration[b]
2010	17.114	3.627	0.586	0.007
2011	13.365	2.056	0.507	0.012
2012	5.914	2.060	0.331	0.006
2013	6.265	3.907	0.352	0.015
2014	10.307	1.942	0.339	0.017

(Honeywell 2016b)

a. Quantities in pounds per day
b. Quantities in mg/L

The dose to the maximally exposed individual from aqueous releases may be determined using methodology defined in a calculation entitled *Liquid Effluent Offsite Dose Sensitivity Study* prepared by ENERCON in 2010 (ENERCON 2010a). Honeywell's current license application stipulates that "The investigation level for uranium in the liquid effluent shall be 1.0 ppm Uranium as a monthly average." Historically, average uranium concentrations have remained below this investigation level as indicated in the corrected dataset. The referenced calculation concludes that an annual release of uranium at an average concentration of 1.0 ppm would result in 0.004 mrem per year to the maximally exposed individual. This value is used as an upper bound for each year of the 40-year relicensing period.

Section 3.10.6 of the 2017 Environmental Report describes the demographic data for Massac and McCracken counties. It is determined that population levels of both counties remain consistent over the 40-year relicensing period therefore, a population level equivalent to the 2010 determination may be assumed for each subsequent year. The determination concluded that the area within a 50-mile radius of the Honeywell facility contained approximately 528,000 people as documented in table 3.10-1. Using this information, the dose to the maximally exposed individual from aqueous releases is determined to be < 0.004 mrem per year and the dose to the surrounding population is < 2 person-rem/year for each year of the 40-year relicensing period as determined below.

$$Dose_{Population} = Dose_{MEI} \times Population$$

$$Dose_{Population} = (0.004\,mrem/year)\left(\frac{1\,rem}{1000\,mrem}\right)\times 528{,}000\,persons$$

$$Dose_{Population} = 2\,person-rem/year$$

Planned Environmental Report Revision

Table 3.4 – 3f will be revised as follow:

Table 3.4-3f
NPDES Monitoring Data – Outfall 002 Total Uranium (U_3O_8)

Monitoring Period	Annual Average Quantity[a]	Maximum Concentration[b]	Annual Average Concentration[b]	Minimum Concentration[b]
2010	17.114	3.627	0.586	0.007
2011	13.365	2.056	0.507	0.012
2012	5.914	2.060	0.331	0.006
2013	6.265	3.907	0.352	0.015
2014	10.307	1.942	0.339	0.017

(Honeywell 2016b)

a. Quantities in pounds per day
b. Quantities in mg/L

RAI – WM-1

ER Table 3.12-1, "Radioactive Waste Generation," identifies radioactive waste generation amounts from 2010 to 2014. In 2010 and 2011, the amount of waste generated was several times greater than the amounts in 2012–2014, with 2013 being particularly low. Identify the reason for the variability in waste generation rates over this period. During the site visit conducted by NRC from May 30 through June 1, Honeywell personnel stated that waste generation rates for 2015 and 2016 would be more representative of future waste generation. Identify the waste generation rates for 2015 and 2016 and confirm whether the range in these rates over these years would be reflective of future waste generation rates. Identify any potential future MTW projects that might cause a large increase in radioactive waste generation, including over a 40-year license period.

Response:

The plant was down to complete seismic upgrades during 2012-2013. Most of the seismic upgrades were started in the fall of 2012 and completed in the spring of 2013 and that lead to the waste generation amounts being lower in the years 2012 and 2013 year. The plant did not

start back up until the winter of 2013 and the plant was also in a union dispute which caused lower production and less waste in 2014. During 2015 MTW disposed of 127,500 cubic feet of low level radioactive waste and in 2016 MTW disposed of 141,297 cubic feet of low level radioactive waste. MTW does not expect any projects that might cause a large increase in radioactive waste generation.

Planned Environmental Report Revision

None

RAI – WM-2

ER Section 3.12.4, "Mixed Waste," notes that the amount of mixed (i.e., radioactive and hazardous) waste generated each year from 2010 to 2014 was "quite variable." Explain why there is such variability, and whether the range in these mixed waste generation rates would bound, or generally be indicative of, future annual mixed waste generation. During the site visit conducted by NRC from May 30 through June 1, Honeywell personnel stated that waste generation rates for 2015 and 2016 would be more representative of future waste generation. Identify the mixed waste generation rates for 2015 and 2016. Identify any potential future MTW projects that might cause a large increase in mixed waste generation, including over a 40-year license period.

Response:

During 2010 - 2011 there was a significant amount of mixed waste that was disposed of during this period due to a special order from the IEPA for disposal of legacy KOH drums containing Selenium and Chromium. During 2012-2013 the plant was down to complete seismic upgrades. Most of the seismic upgrades were started in the fall of 2012 and completed in the spring of 2013 and that lead to the waste generation amounts being lower in the years 2012 and 2013. The plant did not start back up until the winter of 2013 and the plant was also in a union dispute which caused lower production and less waste in 2014. There were no mixed wastes that were shipped off-site during 2015 and 2016. MTW does not expect any projects that might cause a large increase in radioactive waste generation

Planned Environmental Report Revision

None

RAI – WM-3

ER Section 3.12.3, "RCRA Hazardous Waste," gives a range of 13,000 to 27,000 pounds of hazardous waste generated annually from 2010 to 2014. During the site visit conducted by NRC from May 30 through June 1, Honeywell personnel stated that waste generation rates for 2015 and 2016 would be more representative of future waste generation. Identify the hazardous waste generation rates for 2015 and 2016. Explain the reason for the variability from 2010 to

2014 (and in 2015 and 2016, if applicable) and whether the range in these hazardous generation rates (including for 2015 and 2016) would bound, or generally be indicative of, future annual hazardous waste generation, including over a 40-year license period.

Response:

The plant had a significant effort to dispose of all hazardous waste during the period of 2010 to 2012. Then during 2012-2013 the plant was shut down to complete seismic upgrades. Most of the plant seismic upgrades were started in the fall of 2012 and completed in the spring of 2013 and that lead to the waste generation amounts being lower in the years 2012 and 2013. The plant did not start back up until the winter of 2013 and the plant was also in a union dispute which caused lower production and less waste in 2014. There was 12,275 pounds of hazardous wastes shipped during calendar year 2015 and 9,900 pounds shipped during 2016. These quantities are indicative of the annual hazardous waste generation in the future. MTW does not expect any projects that might cause a large increase in radioactive waste generation

Planned Environmental Report Revision

None

RAI – WM-4

As noted in NUREG-1748, Section 5.4.13, "Waste Management Impacts," RCRA regulations require a waste minimization plan for each owner/operator. ER Section 3.12, "Waste Management," does not state whether there is a waste minimization plan for the MTW. Identify whether Honeywell has a waste minimization plan for MTW operations (the plan does not need to be provided).

Response:

The MTW does not have a waste minimization plan. However, this facility recycles KOH Muds and reclaims both KOH and Uranium, which are then reused in the production of uranium hexafluoride. Additionally, MTW has a procedure that requires that all trash is sorted and segregated based on its radioactivity.

Planned Environmental Report Revision

None

RAI – WM-5

In Revision 1 of the Decommissioning Cost Estimate, dated April 20, 2016, Honeywell assumed that derived concentration guideline levels (DCGLs) would be the same as those developed for Sequoyah Fuels (110 picocuries per gram). Explain why development of DCGLs would be

necessary to comply with the 10 CFR 20.1402 release criteria, and why the Sequoyah DCGLs would be a bounding assumption for developing waste estimates for decommissioning. Clarify that Honeywell would develop DCGLs based on site-specific conditions at the MTW.

Response:

In Revision 1 of the Decommissioning Cost Estimate (DCE) dated April 20, 2016, Honeywell assumed that a reasonable derived concentration guideline levels (DCGLs) would be 110 picocuries per gram. The value of 110 picocuries per gram for the Sequoyah Fuels was based on a dose modeling analysis. It was submitted to the NRC, and subsequently approved by NRC for decommissioning the Sequoyah Fuels site.

Although the chemical process of uranium ore conversion at the Sequoyah Fuels varied from the chemical process at the Metropolis Works, both facilities converted uranium oxide (U3O8) to uranium hexafluoride (UF6). Because of the similarities in site conversion processes, the assumption in revision 1 of the DCE is a reasonable assumption, leading to NRC approval of the Revision 1 of DCE.

Honeywell agrees that a site-specific DCGL will be required to comply with 10 CFR 20.1402. DCGLs are developed based on a detailed dose modeling evaluation that includes many site-specific properties. The dose modeling scenario and subsequent DCGLs for the Metropolis Works will be developed and submitted at the time that a decommissioning plan is required for the Metropolis Works. Until that process occurs, the DCGLs submitted to and approved by NRC for a comparable uranium conversion facility provide an acceptable bounding assumption.

Planned Environmental Report Revision

None

RAI – MIT-1

As described in NUREG-1748, Section, 3.4.7, "Mitigation Measures," the EA should identify mitigation measures. In ER Section 5.0, "Mitigation Measures," Honeywell provides 'mitigation measures' related to the closure of the ponds, and other process-related controls and mechanisms to reduce environmental impacts. Describe any other mitigation measures that are anticipated that would be required by the NRC license or other environmental permitting mechanisms that would be needed to conduct operations for an additional 40 years.

Response:

In addition to the remediation of the CaF_2 Ponds, MTW's existing RCRA permit also addresses the investigation of underground process sewers associated with the Gaseous F_2 Building and Green Salt South Pad (ER Section 3.4.8.3.2), parts of the operations area. The investigation results could indicate the need for mitigation measures to address potential releases and remediation activities.

In addition to the engineering controls and design features discussed in Section 5.0 as measures to mitigate and minimize environmental impacts, MTW also implements a required stormwater pollution prevention plan (ER Section 2.1.2.2.6) and minimizes land disposal of wastes by marketing its byproduct CaF_2 (ER Section 3.12). To ensure that MTW's engineering controls and design features are maintained to perform their functions to protect workers and the environment from radioactive and chemical releases, Honeywell implements maintenance management functions, encompassing planned testing and preventative maintenance, corrective maintenance, surveillance, monitoring, and functional testing (Honeywell 2017a, Introduction Item 6).

MTW will continue to obtain and comply with any required environmental permits as well as seek renewal of its existing environmental permits. MTW will continue to comply with NRC license requirements and any new applicable NRC regulations. Now, no other environmental permits are anticipated for the proposed license renewal term.

Planned Environmental Report Revision

To incorporate the information under RAI MIT-1 as well as RAI PA-9, make the following revisions.

5.0 MITIGATION MEASURES

Releases of radiological or non-radiological constituents to the air, water, and soil create environmental impacts. MTW has implemented mitigation measures to minimize the environmental impacts associated with MTW operations. Treatment processes are used to lower the level of contaminants in the effluent streams released to the Ohio River. In addition to a sanitary wastewater treatment system, processes to mitigate uranium releases and fluoride releases are utilized at MTW. The process for mitigating fluoride liquid releases was upgraded in 2017. This upgrade at the EPF increased the efficiency of removing contaminants in accordance with the pending NDPES permit discharge limits. The EPF upgrade will allow MTW to remove CaF_2 Pond D from service and close it, along with CaF_2 Ponds B, C, and E previously removed from service upon the expiration of a waiver from minimum technology requirements as required by Condition II.F of the current RCRA permit (#B-65R2-M-17). The wastewater stream is monitored prior to release through a permitted NPDES outfall. (IEPA 2015a; IEPA 2015e)

Honeywell also operates a series of settling tanks at MTW to recover uranium whose liquid is transferred to uranium settling ponds 3 and 4 for additional settling of uranium solids. The further clarified liquid is monitored prior to release through a permitted NPDES outfall (IEPA 2015a).

In addition to the remediation of the CaF_2 Ponds, MTW's existing RCRA permit also addresses the investigation of underground process sewers associated with the Gaseous F_2 Building and Green Salt South Pad, parts of the operations area. The investigation results could indicate the need for mitigation measures to address potential releases and remediation activities.

To reduce gaseous emissions that could contain significant quantities of uranium or hazardous chemicals, dust collectors and scrubbers are operated in series. Each emission source is operated in accordance with an operating permit issued by the IEPA. Operational and administrative controls are used to shut down and repair the emission source to prevent violation of the air permit or excessive concentrations.

MTW also implements a required stormwater pollution prevention plan and minimizes land disposal of wastes by marketing its byproduct CaF_2. To ensure that MTW's engineering controls and design features are maintained to perform their functions to protect workers and the environment from radioactive and chemical releases, Honeywell implements maintenance management functions, encompassing planned testing and preventative maintenance, corrective maintenance, surveillance, monitoring, and functional testing.

ADDITIONAL PLANNED ER REVISIONS

It was discovered that Tables 2.1-8 and 2.1-7 contain incorrect data. The radium and thorium MDC from the MTW commercial laboratory was used for much of the data within the table. Furthermore, the raw data from the MTW commercial laboratory reports is not representative of the nuclide concentrations measured at the NR-7. The NR-7 radium and thorium concentrations were computed from the commercial laboratory data by correcting for the following parameters:

- ¼ of the filter was analyzed
- The volume of acid the filters were dissolved in. (1300 ml)
- The volume of air drawn through the NR-7 sample point

Tables 2.1-8 and 2.1-7 have been revised and are included as Attachment 3 to this ER RAI response.

Attachment 1 – Revised Figures

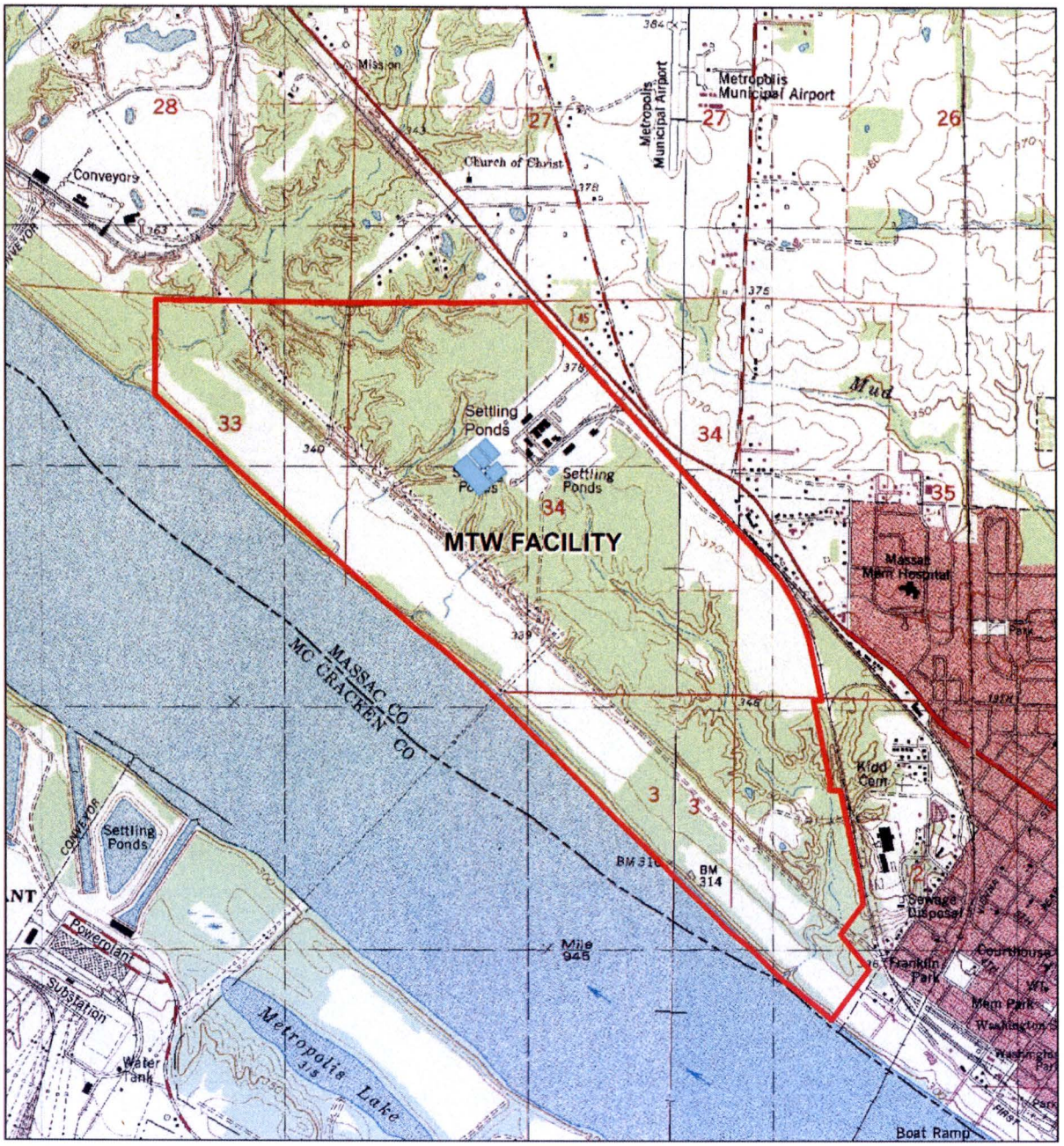


Figure 1.0-1 MTW Facility Location

Figure 3.0-1 Site Features

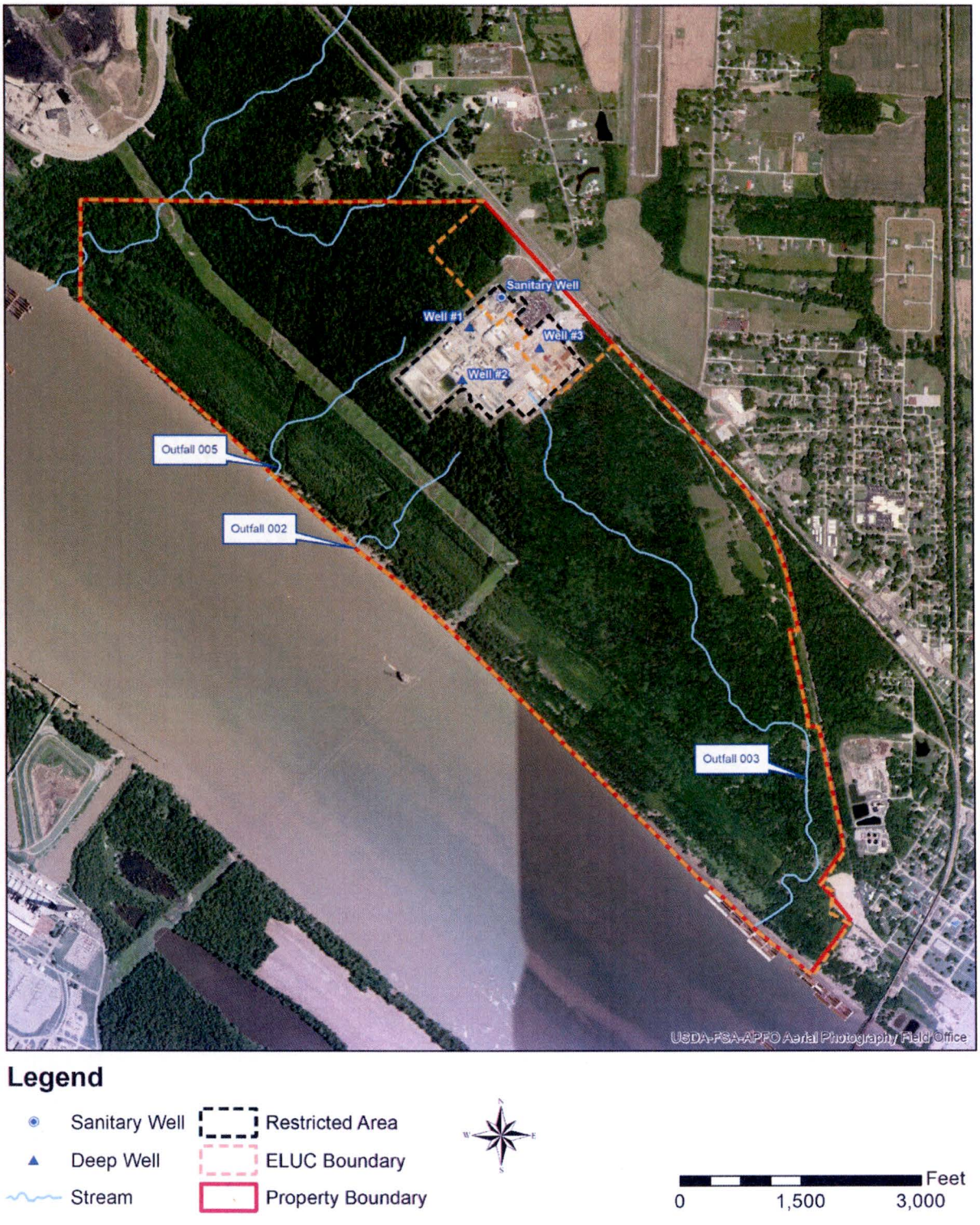


Figure 3.4-3 MTW ELUC Boundary

Figure 3.5-1 MTW Wetlands and Watersheds

Attachment 2 – Updated References

The following references will be added to Section 9.0 of the ER:

ATSDR (Agency for Toxic Substances and Disease Registry). 2002. Fact Sheet: Sodium Hydroxide.

ATSDR 2004. ToxGuide for Ammonia NH_3.

BTS (U.S. Department of Transportation, Bureau of Transportation Statistics) 2017a. Injury Rates for Selected Modes: 2000-2014, 2015. Retrieved from https://www.bts.gov/content/injury-rates-selected-modes-2000–2014-2015. Accessed November 16, 2017.

BTS 2017b. Fatality Rates for Selected Modes of Transportation: 1990-2015. Retrieved from https://www.bts.gov/content/fatality-rates-select-highway-modes-transportation-1990-2015. Accessed November 15, 2017.

BTS 2017c. Freight Facts & Figures 2017. Retrieved from https://www.bts.gov/bts-publications/freight-facts-and-figures/freight-facts-figures-2017-chapter-6-safety-energy-and . Accessed November 17, 2017.

CDC (Centers for Disease Control). 2011. NISOH 1988 OSHA PEL Project Documentation: Potassium Hydro. Retrieved from https://www.cdc.gov/niosh/pel88/1310-58.html. Accessed November 20, 2017.

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ENERCON 2010a. Liquid Effluent Offsite Dose Sensitivity Study – Calc. No. E-MTW-004, May 7, 2010.

FRA (U.S. Department of Transportation, Federal Railroad Administration) 2017. Railroad Safety Information. Retrieved from https://safetydata.fra.dot.gov/OfficeofSafety/Default.aspx. Accessed November 17, 2017.

Honeywell 2005. Environmental Report Renewal of Source Material License SUB-526 for Honeywell Specialty Materials Metropolis Works. May 25, 2005.

Honeywell 2017a. Justification for Forty-Year License Term, License Renewal Application for Metropolis Works. February 8, 2017.

Honeywell 2017b. Reply to a Notice of Violation and Nuclear Regulatory Commission Integrated Inspection Report 40-3392/2017-003. August 23, 2017.

Honeywell 2017c. Safety Data Sheet: Potassium Bifluoride. Retrieved from https://www.honeywellmsds.com/ehswww/hon/result/result_index.jsp?P_LANGU=E&P_SYS=1&P_SSN=*&C001=MSDS&C997=C100%3B*%2BC101%3BSDS_*%2BC102%3B*%2B1001&C100=*&C101=*&C102=*&C005=&C038=10649797&C008=&C006=HON&C018=TRUE+&C028=TRUE+&C013=. Accessed November 21, 2017.

Honeywell 2017d. Message from the Plant Manager. Retrieved from http://www.honeywell-metropolisworks.com/message-from-the-plant-manager. Accessed December 4, 2017.

IDOT (Illinois Department of Transportation). 2015. Traffic Count Database System. Retrieved from http://idot.ms2soft.com/tcds/tsearch.asp?loc=Idot&mod= Accessed November 13, 2017.

NOAA (National Oceanic and Atmospheric Administration). 2017a. CAMEO Chemicals: Potassium Hydroxide, Solution. Retrieved from https://cameochemicals.noaa.gov/report?key=CH9013. Accessed November 19, 2017.

NOAA 2017b. CAMEO Chemicals: Sodium Hydroxide, Solution. Retrieved from https://cameochemicals.noaa.gov/report?key=CH1499. Accessed November 20, 2017.

NOAA 2017c. CAMEO Chemicals: Sulfuric Acid. Retrieved from https://cameochemicals.noaa.gov/report?key=CH1593. Accessed November 20, 2017.

NRC (U.S. Nuclear Regulatory Commission). 2017. Honeywell Metropolis Works – Notice of Violation and Nuclear Regulatory Commission Integrated Inspection Report 40-3392/2017-003. July 28, 2017.

PHMSA (**SOURCE:** U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration), data searches of the Office of Hazardous Materials Safety, Hazardous Materials Information System Database, available at www.phmsa.dot.gov/hazmat/library/data-stats as of May 2017.

Praxair. 2016. Safety Data Sheet: Hydrogen, refrigerated liquid. Retrieved from http://www.praxair.com/-/media/documents/sds/hydrogen/liquid-hydrogen-gas-h2-safety-data-sheet-sds-p4603.pdf?la=en. Accessed November 20, 2017.

Attachment 3 – Revised Tables 2.1-7 and 2.1-8

Table 2.1-7
Environmental Air Sampling Averages

Year	Sample Station Number							
	6	8	9	10	11	12	13	NR-7
Fluorides (ug/m3)								
2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2011	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2014	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Uranium (uCi/ml)								
2010	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2011	1.050E-15	9.12E-15	4.12E-15	6.19E-15	4.39E-15	5.73E-15	1.12E-14	5.31E-15
2012	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2014	2.090E-12	1.11E-14	1.05E-14	1.01E-14	8.62E-15	9.43E-15	1.72E-14	5.82E-15
Ra-226 (uCi/ml)								
2010	8.80E-17	1.22E-16	6.48E-17	7.91E-17	3.19E-07	1.27E-16	9.94E-17	3.68E-25
2011	2.08E-16	1.28E-16	1.28E-16	1.09E-16	8.28E-17	5.64E-17	1.15E-16	1.10E-17
2012	5.50E-17	5.33E-17	4.81E-17	6.71E-17	8.18E-17	5.56E-17	5.93E-17	2.99E-25
2013	6.40E-17	1.17E-16	1.58E-16	7.12E-17	6.86E-17	2.30E-16	1.01E-16	2.63E-22
2014	6.68E-17	1.51E-16	1.38E-16	7.07E-17	7.79E-17	9.52E-17	1.27E-16	2.75E-17
Th-230 (uCi/ml)								
2010	1.01E-16	1.21E-16	7.90E-17	1.60E-16	1.10E-16	2.50E-16	2.04E-16	6.73E-25
2011	8.74E-17	1.73E-16	1.06E-16	1.60E-16	8.05E-17	1.34E-16	1.39E-16	3.48E-17
2012	4.69E-17	1.59E-16	9.69E-17	2.14E-16	1.24E-16	2.78E-16	1.91E-16	4.30E-25
2013	7.86E-17	1.04E-16	7.97E-17	1.55E-16	8.70E-17	1.38E-16	9.46E-17	1.78E-22
2014	7.58E-17	1.36E-16	8.62E-17	2.21E-16	8.49E-17	2.87E-16	1.82E-16	5.29E-17

Note: The detection limit for uranium is <1E-16 µCi/ml; minimum detection limits required in MTW's source material license SUB-526 have been met

Table 2.1-8
Environmental Air Sampling Quarterly Results for NR-7

Year	Quarter	Concentration		
		U(NAT) µCi/ml	Ra-226 µCi/ml	Th-230 µCi/ml
2010	1Q	6.35E-15	2.28E-25	9.37E-25
	2Q	1.55E-14	5.82E-25	9.37E-25
	3Q	6.18E-15	2.25E-26	3.84E-25
	4Q	2.81E-15	6.40E-25	4.34E-25
2011	1Q	4.95E-15	1.45E-25	7.85E-25
	2Q	9.11E-15	2.36E-25	9.49E-25
	3Q	3.11E-15	4.40E-17	1.39E-16
	4Q	4.05E-15	3.76E-25	6.93E-25
2012	1Q	8.52E-15	1.33E-25	1.28E-25
	2Q	6.72E-15	3.77E-25	7.78E-25
	3Q	1.81E-15	4.63E-25	3.99E-25
	4Q	3.27E-15	2.23E-25	4.13E-25
2013	1Q	2.38E-15	3.04E-22	2.89E-22
	2Q	2.45E-15	1.24E-22	7.34E-23
	3Q	1.45E-15	3.17E-22	1.66E-22
	4Q	3.15E-15	3.05E-22	1.83E-22
2014	1Q	4.93E-15	3.88E-17	7.08E-17
	2Q	9.66E-15	4.40E-17	7.48E-17
	3Q	2.44E-15	2.05E-17	5.46E-17
	4Q	5.88E-15	6.70E-18	1.15E-17

Note: The detection limit for uranium is <1E-16 µCi/ml; minimum detection limits required in MTW's source material license SUB-526 have been met.