

SAFETY EVALUATION REPORT
RENEWAL OF SOURCE MATERIALS LICENSE SUB-526 FOR
HONEYWELL INTERNATIONAL, INC.,
HONEYWELL METROPOLIS WORKS, METROPOLIS, ILLINOIS
DOCKET NUMBER 40-3392

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LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ALARA	As Low as Is Reasonably Achievable
ALI	Annual Limit on Intake
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
Atm	Atmospheres
BOD	Biological Oxygen Demand
CaF ₂	Calcium Fluoride
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
DAC	Derived Air Concentration
DCE	Decommissioning Cost Estimate
DDE	Deep Dose Equivalent
DFP	Decommissioning Funding Plan
EA	Environmental Assessment
EL	Evaluation Level
ELUC	Environmental and Land Use Control
EPA	United States Environmental Protection Agency
EPF	Environmental Protection Facility
ER	Environmental Report
ERP	Emergency Response Plan
ERT	Emergency Response Team
DOE	United States Department of Energy
F	Fahrenheit
F ₂	Fluorine
FMB	Feed Materials Building
Ft ³	Cubic Feet
FHA	Fire Hazard Analyses
FONSI	Finding of No Significant Impact
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
gpm	gallons per minute
HF	Hydrofluoric Acid
HP	Health Physics
HS&E	Health, Safety, and Environmental
ICRP	International Commission on Radiological Protection
IEPA	Illinois Environmental Protection Agency
IL	Investigation Level
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
ITCA	Incident Tracking and Corrective Action
KeV	Kilo-electron Volts
KOH	Potassium Hydroxide
KPA	Kinetic Phosphorescence Analyzer
LC	License Condition
LFL	Lower Flammability Level
LPR	Licensee Performance Review
LRA	License Renewal Application

MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MC&A	Material Control and Accounting
MM	Management Measure
MCi	Millicurie
mRem	Millirem
MSv	Milli-Sievert
MTW	Metropolis Works or Metropolis Plant
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NMMSS	Nuclear Materials Management Safeguards System
NMSZ	New Madrid Seismic Zone
NRC	United States Nuclear Regulatory Commission
NSP	Nuclear Services Procedure
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	U.S. Occupational Safety and Health Administration
PFAP	Plant Features and Procedures
PHA	Process Hazards Analysis (es)
P&IDs	Process and Instrumentation Diagrams
PM	Preventative Maintenance
PPE	Personal Protective Equipment
PSI	Process Safety Information
psig	pounds per square inch (gauge)
PSM	Process Safety Management
RAI	Request for Additional Information
RCRA	Resource Conservation and Recovery Act
REIRS	Radiation Exposure Information Reporting System
RG	Regulatory Guide
RP	Radiation Protection
RSO	Radiation Safety Officer
SDR	Safety Demonstration Report
SER	Safety Evaluation Report
SRP	Standard Review Plan
TEDE	Total Effective Dose Equivalent
TER	Technical Evaluation Report
UF ₄	Uranium Tetrafluoride
UF ₆	Uranium Hexafluoride
UO ₂	Uranium Dioxide
WBC	Whole Body Count

EXECUTIVE SUMMARY

This report documents the U.S. Nuclear Regulatory Commission (NRC) staff's safety and safeguards evaluation of the Honeywell Metropolis Works (MTW) application for renewal of a Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40 license. Honeywell International, Inc. (Honeywell, the licensee or applicant) is the holder of a source materials license, Materials License No. SUB-526, issued by the NRC, pursuant to 10 CFR Part 40. Originally issued on December 17, 1958, the license has previously been renewed nine times, most recently on May 11, 2007 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML062140687) (Reference 88). License SUB-526 authorizes Honeywell MTW facility to convert uranium ore into pure uranium hexafluoride, via the dry conversion process, for use in enrichment operations.

By letter dated February 8, 2017 (ADAMS Accession No. ML17048A263) (Reference 2), Honeywell submitted a license renewal application (LRA) for a 40-year term for its MTW facility, located in Metropolis, Illinois. The LRA was subsequently revised and supplemented by letters dated September 20, 2017 (ADAMS Accession No. ML17268A153) (Reference 12), October 8, 2018 (ADAMS Accession No. ML18284A332) (Reference 4), July 9, 2019 (ADAMS Accession No. ML19192A168) (Reference 156) and December 19, 2019 (ADAMS Accession No. ML19357A061) (Reference 61). The December 19, 2019 version of the LRA is a standalone document that integrates the information provided in Honeywell's responses to the NRC staff's requests for additional information. This version of the LRA is referred to hereafter as "the revised LRA."

Although the authorized activities are essentially unchanged from the most recent renewal, the content and format of the revised LRA provided by Honeywell has changed. In previous license renewal requests, Honeywell used the LRA format presented in Regulatory Guide (RG) 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985 (Reference 74), which provided for a two-part LRA. For this renewal request, Honeywell adopted the format of NUREG-1520, "Standard Review Plan for Fuel Cycle Facilities License Applications," (Reference 98) to capture the changes to the MTW licensing basis that have occurred since its May 27, 2005 LRA (ADAMS Accession No. ML052310382) (Reference 5).

The NUREG-1520 format is suitable for presenting the performance of an integrated safety analysis (ISA) and the implementation of an ISA summary. Notably, Honeywell developed an LRA format that incorporates elements of RG 3.55 and NUREG-1520 because:

(1) RG 3.55 describes the Safety Demonstration Report, which is not included in the revised LRA, (2) RG 3.55 does not describe the ISA process, which is included in the revised LRA, (3) RG 3.55 does not acknowledge the risk assessments and the ongoing programmatic improvements that implement the MTW ISA Summary, whereas (4) NUREG-1520 describes how to conduct an ISA and to develop an ISA Summary. Where conflicts between the guidance for content of license applications provided in RG 3.55 and NUREG-1520 were identified, Honeywell used the guidance provided in NUREG-1520, as appropriate to a 10 CFR Part 40 licensee implementing an integrated safety analysis (ISA) and an ISA summary.

In the revised LRA (Reference 61), Honeywell follows the guidance of RG 3.55 (Reference 74, Introduction) and identifies those performance requirements to which it commits. Honeywell's commitments are underlined and italicized in the revised LRA (Reference 61). The

commitments that comprise the safety basis, as that term is defined in the LRA, are marked in the LRA with an asterisk. These commitments are not to be construed as license conditions.

The NRC's license renewal review evaluates the potential adverse impacts of continued operation of the facility to the worker and public health and safety, under both normal operating and accident conditions. The NRC's review also evaluates the adequacy of Honeywell's physical protection, material control and accounting, management organization, administrative programs, and whether the licensee's financial qualifications provide for the safe operation and eventual decommissioning of the facility.

The NRC staff evaluated the safety and environmental aspects of the revised LRA to determine whether Honeywell's application meets the specific requirements in 10 CFR Part 40, "Domestic Licensing of Source Material," and 10 CFR Part 20, "Standards for Protection Against Radiation." The acceptance criteria for licensing and renewal of a source material facility are located in 10 CFR 40.31, "Applications for specific licenses," which identifies the general information that is required in an application. In addition to meeting the requirements of 10 CFR 40.31, applicants must demonstrate compliance with 10 CFR 40.32, "General requirements for issuance of specific licenses," before the Commission will approve the application. The NRC staff also prepared a separate Environmental Assessment/Finding of No Significant Impact to consider the environmental impacts of the proposed action, in accordance with the National Environmental Policy Act (NEPA).

The NRC staff conducted its safety evaluation of the ISA and the ISA Summary under the applicable sections of NUREG-1520, Revision 2 "Standard Review Plan for Fuel Cycle Facilities License Applications" (Reference 98, dated June 2015). The NRC staff reviewed the revised LRA for Honeywell's uranium conversion facility, licensed under 10 CFR Part 40, using the criteria set forth in RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production" (Reference 74, dated April 1985). However, for the sections of the revised LRA related to the accident analyses of the ISA, the staff applied the guidance in NUREG-1520, which was referenced in the revised LRA. The staff evaluated the ERP against RG 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities" (Reference 115).

The NRC staff finds Honeywell's revised LRA provides reasonable assurance that the activities to be authorized at the MTW facility by the issuance of a renewed license meet the requirements of 10 CFR Part 40, including the specific requirements of 10 CFR 40.31 and 10 CFR 40.32(a)-(c). Therefore, issuance of the renewed license will not constitute an undue risk to public health and safety.

The NRC staff finds the Materials License SUB-526 for the MTW facility should be renewed for a 40-year term. The renewed license will be issued as Amendment 14 to License SUB-526. In addition, Honeywell is subject to the license conditions discussed in this SER and detailed in its license.

CHAPTER 1 GENERAL INFORMATION

By letter dated February 8, 2017 (ADAMS Accession No. ML17048A263) (Reference 2), Honeywell submitted an LRA for its MTW facility, located in Metropolis, Illinois. Honeywell is the holder of a source materials license, Materials License No. SUB-526, issued by the NRC pursuant to 10 CFR Part 40. Originally issued on December 17, 1958, the license has been renewed nine times, most recently on May 11, 2007 (ADAMS Accession No. ML062140687) (Reference 88). License SUB-526 authorizes the Honeywell MTW facility to convert uranium ore into pure uranium hexafluoride (UF₆) via the dry conversion process, for use in enrichment operations (Reference 27). The LRA, revised and supplemented by letters dated September 20, 2017 (ADAMS Accession No. ML17268A153) (Reference 12), October 8, 2018 (ADAMS Accession No. ML18284A332) (Reference 4), July 9, 2019 (ADAMS Accession No. ML19192A168) (Reference 156), and December 19, 2019 (ADAMS Accession No. ML19357A061) (Reference 61), requested a renewal term of 40 years. The December 19, 2019 version of the LRA is a standalone document that integrated Honeywell's responses to the NRC staff's request for additional information.

Although Honeywell's authorized activities are essentially unchanged since its last license renewal, the format of its revised LRA was changed. In prior renewal requests, Honeywell used the two-part LRA format presented in RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985 (Reference 74). Since the submittal of the May 2005 LRA (Reference 5), Honeywell adopted an ISA and ISA summary that includes technical information previously captured in a Safety Demonstration Report (SDR). The SDR was removed and is no longer part of the revised LRA. The underlying technical information supporting the application that was previously contained in the SDR was moved to the Honeywell ISA and ISA summary. Honeywell adopted the general format of NUREG-1520, Revision 2, "Standard Review Plan for Fuel Cycle Facilities License Applications" (Reference 98) in the revised LRA because of these changes to the MTW licensing basis.

NUREG-1520 describes the licensing acceptance criteria that are used to evaluate license applications for fuel cycle facilities. NUREG-1520 describes the longstanding health, safety, and environmental-protection requirements of 10 CFR Part 20, "Standards for Protection against Radiation," and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," as well as the accident-safety requirements in Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material," of 10 CFR Part 70.

The regulations in 10 CFR Part 70, Subpart H, include requirements for performance by the applicant of an ISA, and NUREG-1520 provides guidance for performance of the ISA and for the NRC staff's review of an applicant's revised LRA and ISA Summary. Because Honeywell is a 10 CFR Part 40 licensee, 10 CFR Part 70 is not applicable to Honeywell's activities at the MTW site. However, Honeywell conducted an ISA to demonstrate that it has identified accidents for which protective actions may be needed, in accordance with 10 CFR 40.31(j)(3). Honeywell's ISA was originally developed to describe the safety controls in place to prevent and/or mitigate the identified accident sequences presented in the May 27, 2005 LRA. Honeywell later developed an ISA summary to document the results of the accident analyses and provided the ISA summary to the NRC for review and approval (ADAMS Accession No. ML082770112) (Reference 7, dated September 30, 2008). The NRC approved Honeywell's ISA Summary,

finding it demonstrates compliance with the requirement to analyze accidents under 10 CFR 40.31(j)(3) (ADAMS Accession No. ML090650525) (Reference 91, dated March 26, 2009).

NUREG-1520 includes specific guidance for review of an LRA that contains an ISA summary; however, it is not directly applicable to the review of a license renewal for a Part 40 source material conversion facility such as MTW. Consequently, Honeywell used both guidance documents, RG 3.55 and NUREG-1520, in presenting and evaluating the contents of the revised LRA. Honeywell selected the NUREG-1520 format to describe the ISA and ISA Summary in its revised LRA, to the extent appropriate to a 10 CFR Part 40 licensee. Honeywell stated its LRA format that uses both RG 3.55 and NUREG-1520 is more appropriate for the following reasons: (a) the RG 3.55 format, which includes a SDR, does not describe the ISA process, and (b) the RG 3.55 format does not provide guidance on analyzing risk insights and ongoing programmatic improvements that result when the MTW ISA Summary is implemented. Although Honeywell generally followed the format in NUREG-1520 for the ISA and ISA-related sections, other parts of its revised LRA follow the format in RG 3.55.

The NRC staff conducted safety and environmental evaluations of Honeywell's revised LRA (Reference 61) to assess whether it meets the specific requirements set forth in 10 CFR Part 40, "Domestic Licensing of Source Material" and 10 CFR Part 20, "Standards for Protection Against Radiation." The acceptance criteria for renewal of a source material facility are in 10 CFR 40.31, "Applications for specific licenses," which identifies the general information that must be in the application. The revised LRA must also comply with 10 CFR 40.32, "General requirements for issuance of specific licenses," in order for the NRC staff to approve the 40-year license renewal request. The NRC's safety findings are presented in this SER. A separate Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) was prepared to address the environmental impacts of the proposed license renewal.

Consistent with the requirements of 10 CFR 40.43, "Renewal of licenses," and 10 CFR 40.45, "Commission action on application to renew or amend," Honeywell's source materials license may be renewed when the NRC finds:

- The application is for a purpose authorized by the Atomic Energy Act;
- The applicant is qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property;
- The applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property;
- The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public;
- The application is filed on NRC Form 313; and
- The application is otherwise in accordance with 10 CFR 40.31, "Applications for specific licenses," and meets the applicable criteria of 10 CFR 40.32, "General requirements for issuance of specific licenses."

The revised LRA (Reference 61) identifies two types of information. The first type is what Honeywell calls “license conditions,” (i.e., those portions of the application that Honeywell used to address the “performance requirements to which the applicant proposes to commit”) as described in the introduction section of RG 3.55 (Reference 74). Honeywell underlined and italicized text in the revised LRA (Reference 61) to highlight those portions of the application that are commitments as derived from RG 3.55; these commitments are not to be construed as license conditions. Commitments that Honeywell identifies as comprising the safety basis are marked in the revised LRA with an asterisk. The safety basis in the revised LRA is incorporated into the license as part of License Condition 20A. Honeywell also included detailed safety information/descriptive information in the application to explain the commitments.

The NRC staff conducted its safety evaluation, as described below, in accordance with (1) the sections of NUREG-1520, Revision 2 “Standard Review Plan for Fuel Cycle Facilities License Applications,” published in June 2015 (Reference 98) that are applicable to the staff’s review of the ISA and the ISA Summary, (2) the guidance for review of a 10 CFR Part 40 uranium conversion facility LRA set forth in RG 3.55, “Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production,” published in April 1985 (except for the sections of the revised LRA related to the accident analyses (i.e., the ISA) in which NUREG-1520 has been used), and (3) RG 3.67, “Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities,” published in April 2011 (Reference 93).

1.1 Facility and Process Overview

1.1.1 PURPOSE OF REVIEW

The NRC staff reviewed the facility and process description to assess whether Honeywell’s license renewal application met the requirements of 10 CFR 40.43, “Renewal of licenses,” 10 CFR 40.45, “Commission action on applications to renew or amend,” 10 CFR 40.31, “Application for specific licenses,” and 10 CFR 40.32, “General requirements for issuance of specific licenses.” The NRC staff evaluated whether the revised LRA adequately describes the site layout and summarizes the licensee’s conversion process, using the criteria in RG 3.55.

1.1.2 STAFF REVIEW AND ANALYSIS

The LRA submitted February 8, 2017, as supplemented, provided the NRC staff the information to support this review. Chapter 1 of the revised LRA and the MTW Environmental Report (ER) (Reference 13) describe the site and facility, including the uranium conversion process, utilities and support systems, and locations of buildings on the MTW site for UF₆ conversion and related support services. Chapter 1 of the revised LRA also includes a discussion of the authorized activities at the Honeywell MTW facility.

1.1.3 FACILITY AND PROCESS DESCRIPTION

Consistent with Section 1.5, “Authorized Activities” of NRC RG 3.55, “Standard Format and Content for the Health and Safety of License Renewal Applications for Uranium Hexafluoride Production,” published in April 1985, Honeywell described a summary of all activities, locations, and types of processes in which licensed material will be used. The significant on-site processes at the Honeywell MTW facility are discussed below.

1.1.3.1 Sampling and Storage

The plant receives uranium ore concentrates (in 55-gallon drums) from uranium mills via rail car or common carrier (truck). The samples are taken of the uranium ore concentrates in the Sampling Plant (except hard or wet ore) to obtain statistically-significant analytical samples in accordance with industry standards. Each lot of concentrates is weighed and stored on storage pads until accountability procedures and the uranium and impurity analyses are completed.

1.1.3.2 Pre-Treatment Facility

Uranium compounds from the uranium recovery processes contain contaminants that must be minimized before the concentrates are converted into UF_6 . The method of pretreatment is a two-stage sulfuric acid leach followed by aqueous ammonia precipitation. After precipitation, the uranium-bearing solids settled and are filtered into a calciner prior to introduction into the Ore Preparation process. The pre-treatment facility is also equipped to process ore concentrates that have absorbed moisture or become hard. Drums containing hard or wet material cannot be processed through the normal drum dumping station.

1.1.3.3 Ore Concentrate Preparation

Incoming ore concentrates are charged into the system through a drum dumping station and then a calciner. Following processing in the calciner, the ore concentrates are blended, agglomerated, dried, crushed and sized for uniformity. In the agglomeration step, water, sulfuric acid, magnesium hydroxide, and/or sodium hydroxide are used depending on the concentrate characteristics. Dusts and fumes from this process are controlled by use of dust collectors.

1.1.3.4 Reduction

The sized uranium concentrates enter one of two fluid-bed reactors (reducers). In the reductor, the mixed uranium oxides (U_3O_8) are reduced to uranium dioxide (UO_2) form utilizing hydrogen. A liquid hydrogen system is the source of hydrogen. This system is located within a gated enclosure south of the Maintenance building and consists of a cryogenic storage tank and vaporizers. This system is owned and maintained by a vendor. Outside the fencing of the liquid hydrogen system, a nitrogen/hydrogen mixing station provides the appropriate fluidizing and reactive gas mixtures to the Green Salt reducers. The reductor off-gas (principally nitrogen, water vapor, hydrogen and hydrogen sulfide) passes through filters to remove particulate uranium and residual gas is incinerated to convert the hydrogen sulfide into sulfur dioxide and water, and to burn the excess hydrogen.

1.1.3.5 Hydrofluorination

The uranium dioxide from the reductor is fed into one of two fluid bed hydrofluorinators operated in series; two trains are available for operation. A counter-current flow of anhydrous hydrofluoric acid (HF) fluidizing gas, supplied from on-site rail cars, converts the uranium dioxide into uranium tetrafluoride (UF_4). Through a system of vaporizers and heat exchangers the HF is changed to a gaseous form and brought to the proper reaction temperature before being introduced into the fluid-bed reactors. The off-gas is filtered to remove particulate uranium and scrubbed with water and a potassium hydroxide solution to remove HF before being vented to the atmosphere. The HF scrubber liquors are pH-adjusted and treated to remove fluoride. This waste fluoride is subsequently converted into a recyclable synthetic calcium fluoride (CaF_2) product.

1.1.3.6 Fluorination

The UF_4 is fed into a fluid-bed fluorinator that also contains inert bed material. Elemental fluorine is used as the fluidizing gas to convert solid UF_4 to gaseous UF_6 , which is volatilized from the fluorinator. A cobalt catalyst may be used to enhance the reactivity and improve the fluorine yields. The cobalt is added during Ore Preparation. Some residual uranium non-volatile impurities and uranium daughter products remain in the bed material, which is recycled and reused until the buildup of contaminants prohibits further use. The bed material is then retired for radioactive decay and subsequently shipped to a contractor for reprocessing of the uranium. The volatilized gas containing UF_6 , excess fluorine, and HF is passed through a series of filters for particulate removal, and through a series of cold traps for UF_6 de-sublimation.

1.1.3.7 Cold Traps and Off-Gas Cleanup

The bulk of the UF_6 is desublimated in a series of primary cold traps which are operated at approximately -20 deg F to 0 deg F. The secondary and tertiary traps operate at lower temperatures and remove essentially all of the remaining UF_6 . The secondary and tertiary cold traps are not essential for the process. One or both could be bypassed without adversely affecting the operation. Crude UF_6 is removed from the cold traps intermittently following liquefaction by heating, and then transferred to still feed tanks to await purification by fractional distillation.

Uncondensed gas from the cold traps, consisting of F_2 , air, HF, N_2 and traces of UF_6 , is routed into scrubbers where contact with potassium hydroxide solution removes fluorides and traces of uranium prior to release to the atmosphere. The spent scrubbing solutions are routed through Wet Process, where the potassium diuranate is precipitated and filtered. The filtrate (spent potassium hydroxide [KOH]) is sent to the Environmental Protection Facility (EPF) where it is regenerated and subsequently reused. The potassium diuranate is further treated and the uranium is then re-introduced into the Ore Preparation process.

1.1.3.8 Distillation and Product Packaging

Crude UF_6 from the still feed tanks is fed into a low boiler distillation column. The UF_6 that has been stripped of low-boiling impurities is then fed into a high boiler distillation column where high boiling impurities are eliminated. The product, which meets or exceeds purity requirements, is condensed and packaged into approved product cylinders. Gaseous effluents from this process are fed back to the fluorination step and are treated along with the fluorination off-gas. Honeywell establishes administrative controls to limit the risks of any incidents involving handling of filled UF_6 cylinders as follows:

- Filled cylinders are lifted only to the height necessary to provide clearance over any cylinders located in the intervening fill spots (e.g., the cylinder diameter plus a safety margin determined by the crane operator following approved procedures).
- Cylinders are then moved horizontally approximately 50 yards (45.72 meters) (depending on the originating fill spot) for final product weight determination.
- Following final weight determination, cylinders are lifted several feet vertically and approximately ten feet horizontally for placement on a mobile storage buggy, which is

then moved approximately 150 yards (91.44 meters) to a designated storage/cooling area.

- Filled UF₆ cylinders are stored on the mobile storage buggy for four or more days to allow for complete solidification of the UF₆ product prior to shipment or transfer to a designated cylinder storage area. Honeywell stated it has applied engineering and procedural controls to the UF₆ cylinder filling process to reduce the likelihood that a product cylinder could be overfilled during routine plant operations. To reduce the potential hazards associated with heating and sampling of UF₆ cylinders, Honeywell implements the following controls:
 - MTW typically uses the UF₆ continuous sampling system to obtain required UF₆ samples between the high boiler column and the product take-off control valve, thus reducing the need for UF₆ cylinder sampling.
 - When a sample must be drawn from a UF₆ cylinder, MTW confirms the cylinder weight prior to heating.
 - If the cylinder weight exceeds administrative limits established in Honeywell's written procedures, Honeywell notifies the NRC of planned remedial actions, prior to cylinder heating.

1.1.3.9 Uranium Recovery

Different types of uranium-bearing liquors are processed in Wet Process/Uranium Recovery to recover as much uranium as possible. These liquors include Feed Materials Building (FMB) and cylinder wash liquors, rainwater from certain storage pads, and Fluorination scrubber liquors. Regardless of the origin of the uranium-bearing liquors, the uranium is precipitated from solution by pH adjustment, separated from the solution using rotary drum vacuum filtration at the Pond Muds Calciner, and drummed for future use in Ore Preparation. The liquors in each case are treated in the EPF to remove fluorides and then discharged into the plant effluent. Fluorination scrubbing liquors, which contain potassium diuranate solids, may be shipped to a mill for toll reprocessing.

1.1.3.10 Cylinder Wash Facility

Periodically, UF₆ product cylinders must be washed and pressure-tested to assure that there has been no significant degradation of design integrity and to comply with the recertification requirements of American National Standards Institute (ANSI) N14.1, "Packaging of Uranium Hexafluoride for Transport". The cylinders are washed with sodium carbonate or sodium hydroxide solution to recover uranium. The leach liquors are then filtered and the uranium-bearing liquid transferred to the uranium recovery facility. The filter residue, which contains daughter products of uranium, principally ²³⁴Th and ²³⁴Pa, is stored on-site and eventually disposed of at a licensed waste disposal facility.

1.1.3.11 Hydrocarbon Controls

Honeywell employs controls to reduce hydrocarbon contamination of the UF₆ cold trap systems and the UF₆ product cylinders, including:

- Production of UF₆ in a closed system;

- Implementation of system design features to trap and eliminate oil contamination from system components;
- Implementation of administrative controls and degreasing procedures during system maintenance;
- Control, cleaning, and inspection of Honeywell-owned UF_6 cylinders in accordance with the revision of ANSI N14.1 effective at the time of inspection; and
- Certification that customer-owned cylinders are compliant with ANSI N14.1.

1.1.3.12 Authorized Uses

In Chapter 1 of the revised LRA, Honeywell described the authorized activities using licensed material. The details of UF_6 conversion and other activities are described in Section 1.5 of the revised LRA. The renewed license would authorize Honeywell to perform the following activities at the MTW:

- a. Convert natural uranium ore concentrates to UF_6 ; and
- b. Use specified sealed and unsealed sources for calibrating, testing, and measurement.

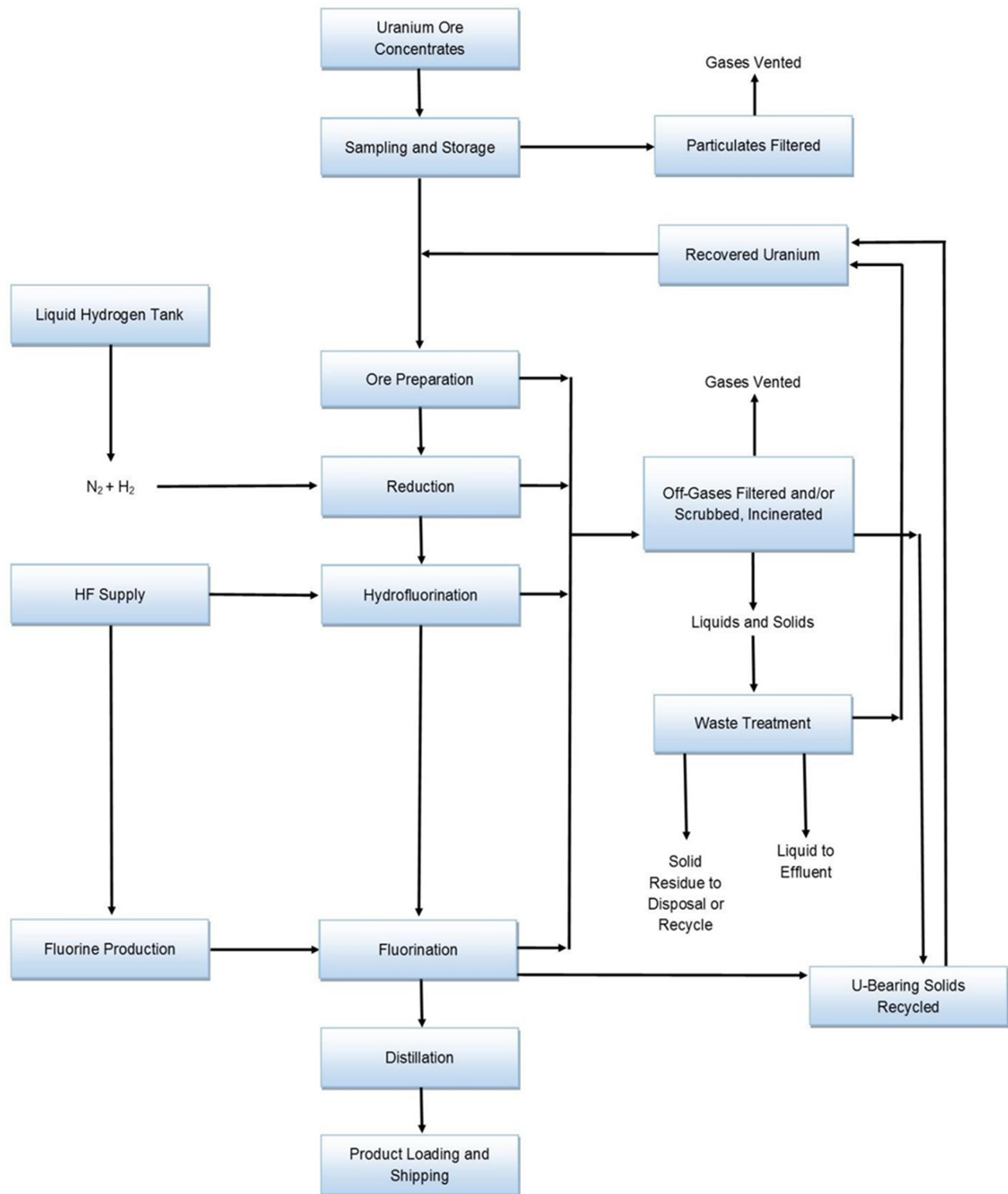
The process steps used by Honeywell in the production of UF_6 from uranium ore concentrates are illustrated in Figure 1-1 and include:

- Receiving ore concentrates;
- Sampling ore concentrates;
- Charging ore concentrates into the UF_6 conversion process through a drum dumping station and calciner;
- Blending, agglomerating, drying, crushing, and sizing ore concentrates to a uniform particle called “prepared feed”;
- Processing prepared feed through fluid bed reductors where uranium is reduced to the dioxide form utilizing hydrogen;
- Feeding uranium dioxide from the reductor into fluid bed hydrofluorinators. Each pair of hydrofluorinators, operated in series, provides a countercurrent flow of anhydrous HF to convert the uranium dioxide into UF_4 ;
- Feeding the UF_4 into a fluid bed fluorinator that also contains an inert fluidizing matrix (CaF_2) to convert the UF_4 into gaseous UF_6 , which is volatilized from the fluorinator;
- Passing the volatilized UF_6 gas, which also contains excess fluorine and HF, through a series of filters for particulate removal, and through a series of cold traps for UF_6 collection;

- Intermittently removing crude UF₆ from the cold traps following liquefaction by heating, and then transferring it to still feed tanks to await purification by fractional distillation;
- Feeding crude UF₆ from the still feed tanks through a low boiler distillation column, and then a high boiler distillation column for final product purification;
- Packaging the product UF₆ into cylinders approved by the responsible regulatory authority; and
- Shipping the product UF₆ off-site.

These uses are identical to the uses authorized in license amendment 13 (Reference 27) which was the most recent version of the license prior to this renewal.

Figure 1-1 Schematic of the Conversion Process at Honeywell MTW



The NRC staff reviewed the information stating the activity for which the source material and calibration sources will be used. The NRC staff determined the licensee provided a description for each activity or process in which the licensee proposes to possess, use and store source material or calibration sources. Therefore, the NRC staff finds that the licensee meets the requirements of 10 CFR 40.31 and 10 CFR 40.32.

1.1.3.13 Evaluation Findings

The information in the license application, as supplemented, along with the ISA summary contains a summary of all activities, locations, and types of process in which source material are to be used. The NRC staff concludes that Honeywell demonstrates compliance with 10 CFR 40.31 (j)(2), "Applications for specific licenses" and 10 CFR 40.32 (c), "General requirements for issuance of specific licenses" because the information provided in this section provides a summary of all activities, locations and types of processes in which source material is used, and is consistent with Section 1.5, "Authorized Activities", of RG 3.55.

1.1.4 SITE DESCRIPTION

Consistent with Section 1.2, "Site Locations," of NRC RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985, Honeywell described the location of the plant site including where licensed activities will be conducted. Drawing MTW-4781, included with the application (Reference 2) maps the buildings where UF₆ conversion and related chemical processing support services take place. The drawing also shows the location of the restricted area fence and provides distances of public facilities of interest from MTW.

The MTW ER describes the MTW site and its environs. A summary of the site description follows:

1.1.4.1 Geographical

MTW is located on approximately 1000 acres of land in Massac County at the southern tip of Illinois. The primary site perimeter is formed by U.S. Highway 45 to the north, the Ohio River to the south, an industrial coal blending plant to the west and privately owned, developed land to the east. Plant operations are conducted in a fenced restricted area (as defined at 10 CFR 20.1003) covering approximately 59 acres in the north-central portion of the site. The licensee also owns approximately 100 acres of land directly across U.S. Highway 45. The plant site is located in gently rolling hills, typical of Southern Illinois, and is bounded on the south by the Ohio River flood plain. The surface water drains from the site south into the Ohio River. The flood plain lies between the restricted area and the Ohio River and was cultivated in the past. The property is no longer farmed and is returning to more natural vegetation.

1.1.4.2 Demographical

The plant site is in a predominantly agricultural area. Within a two-mile radius of the plant, approximately 68 percent of the land is undeveloped (e.g., cropland, forest, or wetland) and the remainder is developed. Table 1-2 of the revised LRA presents the populations and population densities of Massac County, IL, neighboring McCracken County, KY, and the surrounding 50-mile radius. Table 1-3 of the revised LRA provides a summary of population data for communities in the surrounding area. Figures 1.3 and 1.4 of the revised LRA present the population distribution within a 50-mile radius of MTW. The nearest residence is located

approximately 1,850 feet north-northeast of the FMB. The nearest school is located approximately two miles east-northeast of the FMB. The Protective Action Recommendations provided in the Emergency Response Plan are limited to shelter-in-place only; no provisions are required for evacuation of the near-site public.

1.1.4.3 Meteorological

Due to the location of the site at the southern tip of Illinois, the climate is more characteristic of Kentucky than of Illinois. Because of a slight moderating influence of the Ohio River, the absolute temperature range is smaller than that found in much of Illinois, the region has two predominant weather patterns that define the winter and summer circulation regimes. Winter is characterized by evenly distributed precipitation events and moderate diurnal changes in temperature. During the summer, frontal and pressure systems generally pass north of the region, resulting in a more tranquil weather pattern over the area. The average annual dry bulb temperature from 1995 through 2014 was 58 degrees Fahrenheit, with the warmest month being July (78.6 degrees Fahrenheit) and the coolest being January (35.4 degrees Fahrenheit). The minimum and maximum temperatures during this period were 8 degrees and 108 degrees Fahrenheit, respectively. The average annual precipitation for the 1995 through 2014 period was 49.8 inches. Snowfall during this period averaged 8.7 inches per year. During much of the average winter, the ground remains unfrozen. Recent data indicate that the seven county area averages 70 thunderstorm days per year. The MTWER presents a wind rose based on data collected at Paducah for the years 1993 through 2014. The average wind speed for this period was 5.8 knots. Figure 1.5 of the revised LRA reproduces the wind rose from the MTW Environmental Report.

1.1.4.4 Hydrological

1.1.4.4.1 Groundwater

Within the site area, deposits of alluvium and loess do not yield enough water for domestic use. When saturated by precipitation, these formations transmit water to the underlying aquifers of the Pleistocene and Pliocene series. The mixed gravel, sand and clay of the Pleistocene and Pliocene series is the principal aquifer for domestic use. Domestic wells may be bored to a depth of 120 feet before encountering the Porter's Creek Clay formation. The shallowest aquifer adequate for most industrial needs is the Mississippian limestone, which occurs at a depth of 300 to 500 feet. The Metropolis Plant water supply is pumped from wells bored into the Mississippian limestone. The total capacity of these four wells is greater than 4500 gallons per minute and is significantly greater than normal operating requirements of the facility. The Illinois Department of Public Health administers the drinking water regulations of the U.S. Environmental Protection Agency (EPA). The required analyses and frequencies of testing are determined by the Department of Public Health based on the results obtained from previous analyses. The results of the most recent testing for lead, copper, volatile organic chemicals, herbicides/pesticides, and inorganics/metals indicate that the water meets current EPA standards.

There are no other private water users within the boundaries of the site. Public water use is obtained from the Massac County Water District (county residents) and the City of Metropolis. The Plant's routine Resource Conservation and Recovery Act (RCRA) groundwater monitoring network consists of ten wells. One well is used for groundwater surface elevation determination only. Other groundwater monitoring wells are installed and sampled as necessary to satisfy additional monitoring requirements established by the Illinois EPA.

1.1.4.4.2 Surface Water

There are no surface streams within the boundaries of the site; however, there are several natural water drainage concourses that carry rainwater run-off toward the Ohio River. Most surface streams outside the site boundary are used for recreation and for watering livestock. Numerous farm ponds and lakes are located throughout the area. The Ohio River, bounds the site on the south, provides for barge transportation, commercial and sport fishing and serves as a source of water supply for Paducah, Kentucky, located eleven miles upstream of the site. The river is approximately 3000 feet wide with a normal pool elevation of 290 feet above mean sea level (msl). River flow is regulated by flood control structures, the nearest being lock and dam No. 52 at Brookport, Illinois, about seven miles upstream from the site.

Although flooding is an annual event, flood waters have never reached the plant site. While the 1937 flood reached an elevation of 342 feet (102.4 meters), the probable elevation of a 100-year flood (1 in 100 chance of occurring in each year) in the area is 337 feet (102.7 meters). The plant site elevation is approximately 375 feet (114.3 meters), thus considerably above the most extreme flood level projected.

1.1.4.5 Seismological

The Metropolis Works facility is located within the area of significant influence of the New Madrid Seismic Zone (NMSZ), an area with the highest seismicity in the United States east of the Rocky Mountains. Although smaller faults exist in Illinois, Eastern Tennessee and Southern Indiana, the NMSZ represents the controlling mechanism for maximum ground shaking intensities. The greatest earthquake hazards affecting the site are those associated with the NMSZ.

The MTW ISA Summary (Reference 14) provides additional information regarding seismological characteristics of the site and measures implemented to address seismic hazards.

1.1.4.6 Geological

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 mean sea level. Within the restricted area, the maximum variation in elevation is about 10 feet. 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. Figure 1.6 of the revised LRA presents a geologic map of the site along the Ohio River and a cross-section of geologic deposits underlying the MTW site.

1.1.5 EVALUATION FINDINGS

The NRC staff reviewed the general site description and process description of Honeywell MTW and concludes that Honeywell adequately described its site and processes providing the NRC staff with an overall understanding of the relationships between the facility features and associated functions. In addition, the NRC staff finds that the site description in the revised LRA, as supplemented is consistent with Honeywell's ISA Summary, ERP and ER. The NRC staff reviewed these documents and concludes that Honeywell complies with the requirements of 10 CFR 40.31, "Applications for specific licenses," and 10 CFR 40.32(c). The information

provided in this section provides a description of the plant site location and is consistent with Section 1.2, "Site Location", of RG 3.55. Additionally, the activities, locations and types of processes in which source material are used are consistent with Section 1.5 "Authorized Activities" of RG 3.55.

1.2 Institutional Information

1.2.1 PURPOSE OF REVIEW

The NRC staff reviewed the institutional information to establish whether the revised LRA included adequate details identifying the applicant, the applicant's characteristics, and the proposed activity.

1.2.2 STAFF REVIEW AND ANALYSIS

1.2.2.1 Corporate Identity and Ownership

Consistent with Section 1.1, "Name, Address, and Corporate Information," of NRC RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985, Honeywell described information regarding the corporation the owns the licensed facility. Honeywell MTW facility is located at 2768 North US 45 Road, Metropolis, IL 62960. The facility is owned and operated by units of Honeywell International, Inc., which is incorporated in the State of Delaware. Corporate headquarters are in Morris Plains, New Jersey. The Plant Manager is the senior manager at the MTW plant site and reports directly to executive officers in Honeywell's corporate offices.

1.2.2.2 Material Characteristics and Possession Limits

Consistent with Section 1.4, "Possession Limits," of NRC RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985, Honeywell described the types, quantities, and forms of licensed material to be permitted at this site. This information includes the removal of Cesium (Cs) -137 in fixed gauges manufactured by Ronan Engineering Company. Chapter 4 of this SER contains the NRC staff's evaluation of and approval with removing these materials from the license. The licensed material is defined as follows in Table 1-1 of the revised LRA:

Table 1-1 Material Characteristics and Possession Limits

Type of Licensed Material	Possession Limit	Physical and/or Chemical Form
Natural uranium	68 million kilograms (150 million pounds)	Yellowcake, U ₃ O ₈ , UO ₂ , UF ₄ , and UF ₆ , chemical intermediates of these compounds
Depleted Uranium	68 kilograms (150 pounds)	Depleted Uranium
Cs – 137	300 milliCuries (mCi)	Sealed radioactive sources
Any licensed material between atomic Numbers 3-83	2 mCi	Sealed and unsealed radioactive sources
Any licensed material between atomic Numbers 84-95	1 microcurie	Sealed and unsealed radioactive sources

The NRC staff reviewed the description of the licensed material and determined that the licensee provided the names, amounts, physical forms, and quantities possessed under this license, including raw materials, products, and wastes. Therefore, the NRC staff finds that the licensee meets the requirement of 10 CFR 40.31.

1.2.2.4 Special Exemptions or Special Authorizations

In this section of the SER, the License Conditions (LCs) in Materials License SUB-526, Amendment 13 (Reference 27) are identified. The modifications to existing LCs, the deletion of LCs that are no longer applicable, the renewal of regulatory exemptions that are memorialized as LCs, and the addition of new LCs are described below. The staff finds that the LCs documented in Materials License SUB-526, Amendment 14 (Reference 115) provide the technical justification for the renewal of the Honeywell license for a term of 40 years.

License Condition 6. Byproduct Source, and/or Special Nuclear

- A. Natural Uranium
- B. Depleted Uranium
- C. Cs-137

LC-6A, LC-6B, and LC-6C are retained in License SUB-526, Amendment 14.

- D. Cs-137 in Ronan Sealed Sources

LC-6D is deleted. See SER section 4.2.1.3.a. The Ronan Gauges were transferred to a licensed gauge manufacturer as of November 5, 2009 (Reference 38) and are no longer used by Honeywell.

- E. Any licensed material between atomic numbers 1-100

LC-6E is modified. LC-6E is modified to allow any licensed material with atomic numbers between 3 and 83. LC-6F is added to allow any licensed material with atomic numbers between 84 and 95. The split in atomic numbers reflects the changes in possession limits for sealed and unsealed radioactive sources in the revised LRA at Section 1.3 and Table 1.1. LC-6E and LC-6F allow Honeywell to continue to possess and use sources for calibration purposes. See SER Section 4.2.2.3, "Radioactivity Measurement Instrumentation" for a discussion related to calibration sources.

LC-6E is revised to state: "Any licensed material between atomic numbers 3-83." This was added to recognize the split in possession limits for sealed and unsealed radioactive sources as noted in the modified LC-6E.

LC-6F is added and states: "Any licensed material between atomic number 84-5." This was added to recognize the split in possession limits for sealed and unsealed radioactive sources as noted in modified LC-6E.

License Condition 7. Chemical and/or Physical Form

A. Yellow cake, U_3O_8 , UO_2 , UO_3 , UF_4 , UF_6 , and chemical intermediates of these compounds

B. U_3O_8 , UO_2 , UF_4 , and UF_6

C. Sealed sources

LC-7A, LC-7B, and LC-7C are retained in License SUB-526, Amendment 14.

D. Sealed source Ronan Engineering Company Model SA-1 Source Holder, Source Model CDC.700

LC-7D is deleted. See SER section 4.2.1.3.

E. Sealed and unsealed radioactive sources

The text of LC-7E is unchanged.

F. Sealed and unsealed radioactive sources

LC-7F is added to reflect the split in possession limits for sealed and unsealed radioactive sources with atomic numbers between 84-95. The split in possession limits was added to LC-6E and LC-6F

License Condition 8. Maximum amount that Licensee May Possess at Any One Time Under This License

A. 68 million kg (150 million lbs.),

B. 68 kg (150 lbs.)

C. 300 mCi

LC-8A, LC-8B, and LC-8C are retained in License SUB-526, Amendment 14.

D. No single source to exceed the maximum activity specified in the certificate of registration issued by the (NRC or Commission) or an Agreement State

LC-8D is deleted. See SER section 4.2.1.3.

E. 2 mCi total

In License SUB-526, Amendment 14, LC-8E is modified to allow any licensed material with atomic numbers between 3-83. The split in atomic numbers reflects the changes in possession limits for sealed and unsealed radioactive sources in the LRA at Section 1.3 and Table 1.1. This change allows Honeywell to continue to possess and use sources for calibration purposes. See SER Section 4.2.2.3, "Radioactivity Measurement Instrumentation" for a discussion related to calibration sources.

LC-8E is revised as follows:

E. 2 mCi total

LC-8F is added and reads as follows.

F. 1 microcurie total

In License SUB-526, Amendment 14, LC-8F is added to allow any licensed material with atomic numbers between 84-95. The split in atomic numbers reflects the changes in possession limits for sealed and unsealed radioactive sources in the revised LRA at Section 1.3 and Table 1.1. This change allows Honeywell to continue to possess and use sources for calibration purposes. See SER Section 4.2.2.3, "Radioactivity Measurement Instrumentation" for a discussion related to calibration sources.

License Condition 9. Licensed material described in the current LC-7D in Amendment 13 was used, for measurement level, in fixed gauging devices that were registered either with the NRC under 10 CFR 32.210 or with an Agreement state, and were distributed in accordance with a Commission or Agreement State specific license authorizing distribution to persons specifically authorized by a Commission or Agreement State license to receive, possess, and use the devices.

LC-9 is deleted. See SER section 4.2.1.3.

License Condition 10. Licensed material as defined in LC-6, D, and E shall be used by, or under the supervision of, individuals who have received the training described in the letter dated December 27, 2006. The licensee shall maintain records of individuals designated as users for three (3) years following the last use of licensed material by the individual.

LC-10 is modified to remove references to LC-6D and add LC-6F. See SER section 4.2.1.3. LC-10 is modified in SUB-526, Amendment 14 as follows:

Licensed material as defined in LC-6E and LC-6F, shall be used by, or under the supervision of, individuals who have received the training described in the licensee's

letter dated December 27, 2006. The licensee shall maintain records of individuals designated as users for three (3) years following the last use of licensed material by the individual.

License Condition 11. The Health Physics Supervisor for this license shall carry out the duties and responsibilities with regards to fixed gauging devices described in Appendix F of NUREG-1556, Volume 4.

LC-11 is deleted. See SER section 4.2.1.3.

License Condition 12.

- A. Sealed sources shall be tested for leakage and/or contamination except as specified in Paragraphs D and E below, and at intervals not to exceed the intervals specified in the certificate of registration issued by the NRC under 10 CFR 32.210 or by an Agreement State.
- B. Notwithstanding Paragraph A of this condition, sealed sources designed to primarily emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed three (3) months.
- C. In the absence of a certificate from a transferor indicating that a leak test has been made within the intervals specified in the certificate of registration issued by the NRC under 10 CFR 32.210 or by an Agreement State, prior to the transfer, a sealed source received from another person shall not be put into use until tested and the test results received.
- D. Sealed sources need not be tested if they contain only hydrogen-3, or they contain only a radioactive gas, or the half-life of the isotope is thirty (30) days or less, or they contain not more than 100 microcuries of beta and/or gamma emitting material, or not more than 10 microcuries of alpha emitting material.
- E. Sealed sources need not be tested if they are in storage and are not being used. However, when they are removed from storage for use or transferred to another person and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than ten (10) years without being tested for leakage and/or contamination.
- F. The leak test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the NRC in accordance with 10 CFR 30.50(b)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within five (5) days of the date the leak test result is known with the appropriate NRC Regional Office, referenced in Appendix D of 10 CFR Part 20. The report shall specify the source involved, the test results, and corrective action taken.

- G. Tests for leakage and/or contamination, including leak test sample collection and analysis, shall be performed by the licensee or other persons specifically licensed by the NRC or an Agreement State to perform such services.
- H. Records of leak test results shall be kept in units of microcuries and shall be maintained for five (5) years.

LC-12 is deleted. See SER section 4.2.1.3.

License Condition 13. Sealed sources containing licensed material shall not be opened or sources removed from source holders by the licensee, except as specifically authorized by license from the NRC or an Agreement State.

LC-13 is deleted. See SER section 4.2.1.3.

License Condition 14.

The licensee shall conduct a physical inventory every six (6) months, or at other intervals approved by the NRC, to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for five (5) years from the date of each inventory and shall include the radionuclides, quantities, manufacturer's name and model numbers, and the date of the inventory.

- A. Each gauge shall be tested for the proper operation of the on-off mechanism (shutter) and indicator, if any, at intervals not to exceed six (6) months; or at such longer intervals as specified in the certificate of registration issued by the NRC pursuant to 10 CFR 32.210 or the equivalent regulations of an Agreement State.
- B. Gauges that are stored, not being used, and have the shutter lock mechanism in a locked position, are exempted from this periodic test. However, they shall be tested before use.
- C. The following services shall not be performed by the licensee: installation, initial radiation surveys, relocation, removal from service, dismantling, alignment, replacement, or disposal of the sealed source and non-routine maintenance or repair of components related to the radiological safety of the gauge (i.e., the sealed source, the source holder, source drive mechanism, on-off mechanism [shutter], shutter control, shielding). These services shall be performed only by persons specifically licensed by the NRC or an Agreement State to perform such services.

LC-14 is deleted. See SER section 4.2.1.3.

License Condition 15.

The licensee may initially mount a gauge if permitted by the certificate of registration issued by the NRC or an Agreement State and under the following conditions:

- A. the gauge must be mounted in accordance with written instructions provided by the manufacturer;
- B. the gauge must be mounted in a location compatible with the "Conditions of Normal Use," and "Limitations and/or Other Considerations of Use," in the certificate of registration issued by the Commission or an Agreement State;
- C. the on-off mechanism (shutter) must be locked in the off position, if applicable, or the source must be otherwise fully shielded;
- D. the gauge must be received in good condition (i.e., package was not damaged); and
- E. the gauge must not require any modification to fit in the proposed location.

LC-15 is deleted. See SER section 4.2.1.3.

License Condition 16.

Mounting does not include electrical connection, activation or operation of the gauge. The source must remain fully shielded, and the gauge may not be used until it is installed and made operational by a person specifically licensed by the NRC or an Agreement State to perform such operations.

- A. The licensee may maintain, repair, or replace device components that are not related to the radiological safety of the device containing byproduct material and that do not result in the potential for any portion of the body to come into contact with the primary beam or in increased radiation levels in accessible areas.
- B. The licensee may not maintain, repair, or replace any of the following device components: the sealed source; the source holder; source drive mechanism; on-off mechanism (shutter); shutter control; or shielding; or any other component related to the radiological safety of the device, except as provided otherwise by specific condition of this license.
- C. Prior to initial use and after installation, relocation, dismantling, alignment, or any other activity involving the source or removal of the shielding, the licensee shall assure that a radiological survey is performed to determine radiation levels in accessible areas around, above, and below the gauge with the shutter open. This survey shall only be performed by persons authorized to perform such services by the NRC or an Agreement State.
- D. The licensee shall operate each device containing licensed material within the manufacturer's specified temperature and environmental limits such that the shielding and shutter mechanism of the source holder are not compromised.

- E. The licensee shall assure that the shutter mechanism of each device is locked in the closed position during periods when a portion of an individual's body may be subject to the direct radiation beam. The licensee shall review and modify, as appropriate, its "lock-out" procedures whenever a new device is obtained to incorporate the device manufacturer's recommendations.

LC-16 is deleted. See SER section 4.2.1.3.

License Condition 17.

Authorized place of use: The licensee's existing facilities at Honeywell Metropolis Works, Highway 45 North, Metropolis, Illinois.

LC-17 is maintained and unchanged.

License Condition 18.

The preamble to LC-18 in License SUB-526, Amendment 13 stated: The licensee shall conduct authorized activities at the Honeywell Metropolis Works Facility in accordance with the statements, representations, and conditions in the following documents. Where a document is undated, the respective reference is to the current version of the particular document. The current version of the document includes any revisions that have been made in accordance with the approved configuration management process as described in LC-18, Item J.

The preamble to LC-18 has been clarified in SUB-526, Amendment 14 as follows:

The licensee shall conduct authorized activities at the Honeywell Metropolis Works Facility in accordance with the statements and representations in the current version of the documents listed in LC-18 at A, C, H, and M.

- A. LC-18A in SUB-526, Amendment 13 stated: License Application dated May 12, 2006, as supplemented by letters dated March 20, 2007, May 12, 2008, July 12, 2010, and February 15, 2011.

The reference to the LA is modified to remove the dates of prior LAs. The process for making changes to the LA is in LC-20A and LC-20C. For this reason, it is no longer appropriate to identify specific dated versions of the LA in LC-18. LC-18A is retained and modified in SUB-526, Amendment 14 as follows:

License Application (LA).

- B. Safety Demonstration Report;

The Safety Demonstration Report is deleted as a standalone document and is integrated into the LA and the ISA summary. Honeywell submitted a one-part LA similar to the format in NUREG-1520. See discussion of Safety Demonstration Report disposition in Section 1 and Section 3.2 of the SER.

- C. Emergency Response Plan (ERP);

No change in LC-18C in SUB-526, Amendment 14.

- D. ISA Summary;

ISA Summary is deleted from the list of documents in LC-18. As discussed in Chapter 3, Honeywell uses its ISA Summary to document how it complies with the requirements of 10 CFR 40.31(j)(3). The ISA Summary itself does not contain regulatory commitments. Further, LC-20B requires Honeywell to maintain the ISA and ISA Summary. Therefore, the staff determined that it is not necessary to maintain a separate license condition requiring that authorized activities be in accordance with the ISA summary.

- E. Site Reclamation Cost Estimate for Metropolis Plant;

Condition 18-E is deleted. Decommissioning funding plans are required under 10 CFR 40.36(d)(2) and therefore are not required as a LC.

- F. Amendment Request dated December 27, 2006, to possess and use sealed sources;

LC-18F is deleted. See SER section 4.2.1.3

- G. [Deleted]

This condition was listed as deleted in Amendment 13 of the license.

- H. LC-18H in License SUB-526, Amendment 13 stated: Amendment Request dated July 17, 2008, as supplemented by letters dated October 1, 2008, and December 3, 2008, regarding the required process for filling small UF₆ cylinders;

LC-18H is retained in License SUB-526, Amendment 14 without changes. LC-18H identifies Honeywell's commitment in the LA to follow the process for filling small UF₆ cylinders. The procedures and process for filling small UF₆ cylinders are necessary for the safe operations of the MTW facility. The reference numbers for the documents listed in the LC are 152, 153, and 154, respectively. The documentation of the approval of the amendment request can be found in Reference 155.

- I. Amendment Request dated March 27, 2009, as supplemented by letters dated May 11 and July 21, 2009, regarding changes to the facility's surface contamination levels;

LC-18I is deleted. See SER section 4.2.1.3

- J. Amendment Request dated July 12, 2010 and supplemented on February 15, 2011, regarding process description of the facility's configuration control system; and

LC-18J is deleted. The language in a prior amendment, dated July 12, 2010 and supplemented on February 15, 2011, is removed. Section 11.1, Configuration Management of the revised LRA describes the procedures to evaluate, implement, and track proposed changes to the site, structures, processes, systems, components, computer programs, and activities of personnel. The change process defined in the configuration management program is incorporated into LC-20. The NRC staff determined that this commitment, which will be governed by the change process in LC-20, is sufficient and LC-18J is no longer required.

- K. Amendment Request dated December 2, 2010, as supplemented by letters dated February 25, 2011, and March 4, 2011, regarding surface impoundment decommission plan, with Condition 30 below.

LC-18K is deleted. See the discussion of LC-30 below.

- L. Exemption Request dated September 7, 2017, as supplemented by letter dated November 9, 2017, regarding an exemption from the reporting requirements in 10 CFR 40.60(b)(3), discussed in Condition 31 below.

LC-18L is deleted. The exemption from the reporting requirements in 10 CFR 40.60(b)(3) is granted and memorialized in LC-31. The technical analysis supporting the deletion of LC-18L and the renewal of this exemption as LC-31 is found in SER Section 4.2.1.3.b.

- M. LC-18M in License SUB-526, Amendment 13 stated: Amendment Request dated February 12, 2018, as supplemented by letter dated March 16, 2018, regarding physical security modification to the Vehicle Barrier System to facilitate removal of pond material.

LC-18M is modified to require pre-approval of physical security modifications to the Vehicle Barrier System before removal of pond material. LC-18M is retained and modified in SUB-526, Amendment 14 as follows:

Amendment Request dated February 12, 2018, as supplemented by letter dated March 16, 2018, stipulates that pre-approval of physical security modifications to the Vehicle Barrier System must be obtained from the NRC before removal of pond material.

License Condition 19.

Within 180 days of the issuance of the renewed license, all Plant Features and Procedures (to be designated Plant Features and Procedures [PFAP]) shall be developed and implemented within the ISA. The implementation shall include the Configuration Management Program, and Facility Change Process.

LC-19 is deleted. LC-19 describes requirements for the development and implementation of PFAPs during the 2007 renewal. The actions were completed. Therefore LC-19 is no longer applicable.

License Condition 20.

LC-20 in License SUB-526, Amendment 13 stated: For changes to the site, structures, processes, systems, components, computer programs, and activities of personnel within the identified PFAP and safety control boundaries that do not require prior NRC approval, Honeywell shall prepare and submit to the NRC, within 30 days after the end of the calendar year in which the change was implemented, a brief summary of all such changes. For all changes that affect the Metropolis Works Facility ISA, Honeywell shall submit to the NRC, within 30 days after the end of the calendar year in which the changes were implemented, either a revised ISA summary or revised ISA summary pages, as appropriate.

LC-20 in SUB-526, Amendment 14 is revised. LC-20A and LC-20B state the criteria the Licensee must use to determine when changes to the LA and ISA summary are permissible without prior NRC approval. LC-20C states the process to be used if prior NRC approval is needed. Further discussion of LC-20 can be found in Chapter 11.2.1 of the SER. Honeywell MTW must implement the change process in LC-20A and LC-20B by December 31, 2020. Honeywell shall not make use of this change process until the procedures implementing the change process are completed.

LC-20A identifies the criteria to apply in determining whether changes to the LA require NRC's pre-approval. In addition, Honeywell MTW may not make changes to the LA prior to this LC being implemented. The implementation of the LC must be completed by December 31, 2020. The LC also requires the licensee to submit a report to the NRC within 30 days after the end of the calendar year in which the change was implemented as per Section 11.1.3.3 "Report of Changes to USNRC" of the LA. Additional discussion of LC-20 can be found in Chapter 11.2.1 of the SER.

LC-20B requires Honeywell to maintain an ISA and ISA summary, as committed to in Chapter 3 of the LA. The section also identifies the criteria to apply in determining whether changes to the ISA Summary require NRC's prior approval. The LC also requires the licensee to submit a report to the NRC within 30 days after the end of the calendar year in which the change was implemented as per Section 11.1.3.3 "Report of Changes to USNRC" of the LA.

LC-20C is added to describe the types of changes to the LA or ISA Summary that require an amendment to the license. For any changes to LA Sections 11.1.3.1, 11.1.3.2, or 11.1.3.3, Honeywell must submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44.

LC-20 is modified in SUB-526, Amendment 14 as follows:

- A. Change Process for the LA** – Italicized/underlined language in the LA indicates Honeywell's commitments, as that term is used in Section 11.1.3.2 of the LA. The commitments that comprise the safety basis, as that term is defined in the LA, are

marked in the LA with an asterisk. Honeywell may not make changes to the LA, without prior NRC approval, if the changes:

- 1) Reduce the effectiveness of Honeywell's commitments as identified in the LA;
- 2) Modify methodologies and associated assumptions used in developing the safety basis;
- 3) Modify the safety basis as identified in the LA; or
- 4) Conflict with existing license conditions.

Commitments in the LA are not to be construed as license conditions.

Changes to the LA, which the licensee determines do not require prior NRC approval, must be summarized in a report submitted to the NRC. Section 11.1.3.3 "Report of Changes to USNRC" of the LA requires the licensee to submit the report to the NRC within 30 days after the end of the calendar year in which the change was implemented. Honeywell shall not make use of this change process until the procedures implementing the change process are completed. Implementation of this LC shall be completed by December 31, 2020.

B. Change Process for the ISA Summary. Honeywell shall maintain an ISA and ISA summary, as committed to in Chapter 3 of the LA. Honeywell may implement changes to the ISA Summary without prior NRC approval, if the change does not:

- 1) Create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements specified in 10 CFR 70.61 and that have not previously been described in the MTW ISA Summary;
- 2) Use new processes, technologies, or control systems for which Honeywell has no prior experience;
- 3) Remove, without at least an equivalent replacement of the safety function, one of the Plant Features and Procedures (PFAP) that is listed in the MTW ISA Summary and is necessary for compliance with the performance requirements of 10 CFR 70.61;
- 4) Alter any PFAP, as listed in the MTW ISA Summary, that is the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61; or
- 5) Create any condition or configuration that is otherwise prohibited by license condition or order.

Changes to the ISA Summary, which the licensee determines do not require prior NRC approval, must be summarized in a report submitted to the NRC. Section 11.1.3.3 "Report of Changes to USNRC" of the LA requires the licensee submit the

report to the NRC within 30 days after the end of the calendar year in which the change was implemented. Honeywell shall not make use of this change process until the procedures implementing the change process are completed. Implementation of this LC shall be completed December 31, 2020.

- C. Proposed changes to the LA or the ISA Summary that do not meet the criteria in LC-20A or LC-20B require the licensee to submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44. In addition, proposed changes to the criteria in Section 11.1.3.1, Section 11.1.3.2, or Section 11.1.3.3 require the licensee to submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44. Proposed changes requiring an amendment shall not be implemented until NRC approval is granted.

License Condition 21.

LC-21 in License SUB-526, Amendment 13 stated: Honeywell shall, within 10 days of receipt of source material, report to the Nuclear Materials Management Safeguards System's (NMMSS) database, the shipper's values of the natural uranium. Shipper's values shall be reported (Blocks 1 through 27s of DOE/NRC Form 741) as required in Section 2.1.1 of NUREG/BR-0006 (Reference 99). The final quantity determination, as agreed upon with the supplier, shall be reported to the NMMSS database within 10 days of the date on which the agreement is finalized.

LC-21 is retained and modified in Amendment 14 to state that Honeywell is granted an exemption from compliance with the "receipts" requirement in 10 CFR 40.64(a) because an alternative reporting requirement has been implemented. The LC-21 is also modified to correct a typographical error in the spelling out of the NMMSS acronym. Discussion of the technical analysis that serves as the basis for the renewal of the exemption documented in LC-21 is in SER Section 12.2.2.

LC-21 is revised in SUB-526, Amendment 14 as follows:

Honeywell is granted an exemption from the "receipts" requirement in 10 CFR 40.64(a) and must implement the following alternative: Honeywell shall, within 10 days of receipt of source material, report to the NMMSS, the shipper's values of the natural uranium. Shipper's values shall be reported (Blocks 1 through 27s of DOE/NRC Form 741) as stated in Section 2.1.1 of NUREG/BR-0006. The final quantity determination, as agreed upon with the supplier, shall be reported to the NMMSS database within 10 days of the date on which the agreement is finalized.

License Condition 22.

LC-22 in License SUB-526, Amendment 13 stated: The licensee is granted an exemption from the requirements of 10 CFR 20.1902 (a) and 10 CFR 20.1904(a), as described in Section 1.7.1 of its License Renewal Application (LRA).

The LC-22 is revised to describe the exemption from 10 CFR 20.1902(a) and 10 CFR 20.1904(a). Honeywell requested that the condition be removed. However, since LC-22 memorializes an exemption, it needs to remain in the license as a LC. A

discussion of the technical analysis that serves as the basis for the renewal of this exemption is found in SER Section 4.2.1.3.b.

LC-22 is revised in SUB-526, Amendment 14 as follows:

The licensee is granted an exemption from the requirements of 10 CFR 20.1902(a) requiring the posting of warning signs in individual radiation areas within the facility and 10 CFR 20.1904(a) requiring labeling of containers of natural uranium and the resulting intermediates and byproducts of uranium processing operations. Instead of posting radiation areas and containers individually, the licensee will establish one or more areas within, or congruent with the restricted area, and to post all entrance or access points to these area(s) with signs bearing the standard radiation trefoil and the words:

**CAUTION RADIATION AREA
RADIOACTIVE MATERIAL AREA**

*Any area or container in this plant (or "beyond this point") may
contain radioactive materials*

License Condition 23.

The average concentration of uranium in calcium fluoride released to each commercial organization, for any consecutive 12-month period, shall not exceed 212 pCi/gram.

LC-23 is deleted. The limits on average concentration of uranium in calcium fluoride are in Section 9.2.2.1 of the LA and do not need to be listed in a specific license condition.

License Condition 24.

The licensee shall maintain and execute the response measures in the ERP. Any changes to the ERP are subject to the 10 CFR 40.35(f) requirements.

LC-24 is deleted. The requirements to maintain and execute the response measures in the ERP are a regulatory requirement in Part 40.35(f) and do not need to be contained in a specific license condition. The commitment to maintain and execute the response measures in the ERP are in Section 8.1 of the LA.

License Condition 25.

At intervals not to exceed 3 years, the licensee must submit, for NRC review, an updated cost estimate for decommissioning. After resolution of any NRC comments on the estimate, a signed original of the financial instrument reflecting an amount sufficient to cover the approved cost estimate must be provided to the NRC.

LC-25 is deleted. The updating of the cost estimates for decommissioning is required by 10 CFR 40.36. The commitment to update the cost estimate for decommissioning is provided in Section 10.1 of the LA.

License Condition 26. [Deleted]

LC-26 was listed as deleted in Amendment 13 of the license.

License Condition 27. [Deleted]

LC-27 was listed as deleted in in Amendment 13 of the license.

License Condition 28.

LC-28 in License SUB-526, Amendment 13 stated: Notwithstanding, the Derived Air Concentration (DAC) and Annual Limit on Intake (ALI) listed in Appendix B to 10 CFR Part 20, the licensee may use adjusted DAC values and adjusted ALI values listed in International Commission on Radiological Protection (ICRP) Publication 68 (Annals of the ICRP, Volume 24, No. 4).

LC-28 is retained and revised. The text of the LC-28 is revised to indicate that the use of alternative methodology is granted by exemption. The technical analyses supporting the renewal of this exemption are found in SER Section 4.2.1.3b.

LC-28 is revised in SUB-526, Amendment 14 as follows:

The licensee is granted an exemption from using the Derived Air Concentrations (DACs) and Annual Limits on Intake (ALIs) listed in Appendix B to 10 CFR Part 20 to calculate occupational exposures to radionuclides. As the alternative to the DACs and ALIs in Appendix B, the licensee must use adjusted DAC values and adjusted ALI values listed in ICRP Publication 68 (Annals of the ICRP, Volume 24, No. 4).

License Condition 29.

LC-29 in License SUB-526, Amendment 13 stated: Notwithstanding, the organ dose weighting factors in 10 CFR Part 20.1003, the licensee may use the tissue weighting factors listed in ICRP Publication 60 (Annals of ICRP, Volume 21, No. 1-3) for effective dose assessments listed in ICRP Publication 68 methodologies.

The LC-29 is retained. The text of LC-29 is revised to memorialize the grant of the exemption by the NRC. The technical analyses supporting renewal of this exemption are found in SER Section 4.2.1.3b.

LC-29 is revised in SUB-526, Amendment 14 as follows:

The licensee is granted an exemption from calculating effective dose assessments using the organ dose weighting factors in 10 CFR 20.1003. As the alternative to the organ dose weighting factors in 10 CFR 20.1003, the licensee must use the tissue weighting factors listed in ICRP Publication 60 (Annals of the ICRP, Volume 21, No. 1-3) for effective dose assessments listed in ICRP Publication 68 methodologies.

License Condition 30.

LC-30 in Amendment 13 to the license stated: Before proceeding with implementation of the pond closure actions proposed in the LAR dated December 2, 2010, and as supplemented by letters dated February 25, 2011, and March 4, 2011, Honeywell shall obtain additional samples and isotopic analyses of pond material from each of the four ponds in order to comply with the number of sample locations calculated in accordance with the guidelines of Multi-Agency Radiation Survey and Site Investigation Manual.

Honeywell shall not proceed with pond closure until the results of the sampling have been provided to the NRC and the NRC staff has verified that the contents of the submittal are acceptable. NRC acceptance of the pond closure plan is with respect to NRC regulations and Honeywell shall continue to be obligated to comply with all federal and state laws and regulations governing the ponds.

Honeywell decided to remove the materials from the ponds and dispose of the material off-site, rather than leaving the materials in place as it had requested in the original license amendment request. LC-30 was added as part of Amendment 13. Honeywell plans to excavate the ponds and transport the material to a licensed off-site facility for disposal. Honeywell described the materials in ponds B, C, D and E as falling within the definition of unimportant quantities under 10 CFR 40.31(a).

The NRC analyzed the characteristics of the pond materials and the disposal plan and determined the materials meets the definition of “unimportant quantities”. For these reasons, the staff finds additional regulatory actions are not required for Honeywell to remove the material from MTW. Honeywell stated by letter dated July 19, 2019 (Reference 15), that a provision for soil sampling following the pond remediation will be included in Honeywell's next Decommissioning Cost Estimate. Honeywell will remove all the material in Ponds B, C, D, and E and dispose of the material offsite. For these reasons, the restrictions in LC-30 for the decommissioning of the ponds are no longer applicable.

LC-30 is deleted.

License Condition 31.

LC-31 in License SUB-526, Amendment 13 stated: Notwithstanding the requirements of 10 CFR 40.60(b)(3), the licensee is granted an exemption from the requirement to notify the NRC within 24 hours of an unplanned medical treatment of an individual with spreadable contamination on the individual's clothing or body at the onsite medical facility. The licensee commits to maintain a log of contaminated workers treated at the onsite medical facility and provide the information for NRC inspection upon request.

Honeywell requested that the LC-31 be removed because the exemption is referenced in the revised LRA. However, the NRC memorializes exemptions granted under 10 CFR 40.14 in a licensee's Part 40 License. For this reason, the LC-31 is retained in the License SUB-526, Amendment 14. The technical analyses supporting the renewal of this exemption are found in SER Section 4.2.1.3b.

LC-31 is revised in SUB-526, Amendment 14 as follows:

The licensee is granted an exemption from the full requirements of 10 CFR 40.60(b)(3). Specifically, the licensee is granted an exemption from the requirement to notify the NRC within 24 hours of an unplanned medical treatment of an individual with spreadable contamination on the individual's clothing or body at the on-site medical facility. The licensee commits to maintain a log of contaminated workers treated at the on-site medical facility and provide the information for NRC inspection upon request.

New License Conditions are added to License SUB-526, Amendment 14:

License Condition 32 in Amendment 14 of License SUB-526 states:

Honeywell shall notify the NRC within 30 days of its decision to resume full operations. Prior to restarting the production of UF₆, Honeywell shall implement an Emergency Response Plan that contains emergency planning requirements that are equivalent to those in Revision 9 of the Emergency Response Plan for MTW.

Honeywell requested the imposition of a LC that stipulates that an emergency plan that is equivalent to Revision 9 of the ERP (Reference 18), which was in place when the plant was operating, be required to be re-instituted after a decision is made to resume full operations at the facility. Section 8.2 of the SER provides the details of the staff's review of the ERP.

License Condition 33 in Amendment 14 of License SUB-526 states:

Honeywell shall maintain a security program in accordance with Compensatory Measures Order (EA 02-025) dated March 25, 2002, as approved and amended.

Honeywell requested the addition of this condition to the License. The NRC staff reviewed the addition of LC-33 and determined it meets the requirements of the Compensatory Measures Order EA 02-025. The staff's evaluation of LC-33 is in Section 13.2 of the SER.

License Condition 34 in Amendment 14 of License SUB-526 states:

The Licensee shall meet the following requirements with respect to impacts on cultural resources:

- A. Disturbances Associated with Proposed NRC-Regulated Activities and Identification of Cultural Resources:** *The licensee shall not undertake ground-disturbing activities on its property that are related to a pending or potential NRC licensing action without prior NRC approval. The NRC will assess the proposed activities in accordance with Section 106 of the National Historic Preservation Act of 1966 and its implementing regulations in consultation with American Indian Tribes that might attach religious and cultural significance to affected historic resources and the Illinois State Historic Preservation Office (SHPO), as appropriate. If the NRC's initial assessment of the proposed ground-disturbing activities determines further investigation is needed, the licensee, in consultation with the NRC, shall conduct a cultural resources inventory of the area of potential effect (APE). The inventory shall be based on information from literature searches, available information on places of significance to consulting American Indian Tribes, the results of any existing surveys, and if needed, the results of new surveys.*
- A. Unevaluated Resources:** *When ground disturbance could affect unevaluated historic or cultural resources within the APE for the proposed licensing action, the licensee shall avoid direct and indirect impacts until the unevaluated resource is evaluated in accordance with 36 CFR Part 800 in consultation with consulting American Indian Tribes, the Illinois SHPO, and the NRC, as appropriate.*

- C. *Unanticipated Discoveries and Human Remains:*** *In the event a previously unknown cultural resource is discovered during ground disturbance activities on any portion of the Honeywell-owned property, the licensee shall cease work to avoid direct or indirect impacts until the cultural resource is evaluated in accordance with 36 CFR Part 800 in consultation with consulting American Indian Tribes, the Illinois SHPO, and the NRC, as appropriate. Native American human remains, funerary objects, sacred objects, or items of cultural patrimony found on the Honeywell property shall be handled respectfully, in accordance with the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).*

Background on the addition of LC-34 is in Chapter 14.2 of the SER.

License Condition 35 in Amendment 14 of License SUB-526 states:

- A. *Honeywell shall perform specific accident analyses prior to the re-start of UF₆ production at the Honeywell MTW that adhere to the configuration management program. This program is described in detail in Chapter 11 and in the ISA methodology section of Chapter 3 of the revised LRA. The analyses shall include the analysis of past and potential accidents, and accidents with the potential to reoccur, and shall include these specific accidents and hazards:*
- 1) the feed operations for UF₆ from a cylinder back into the feed materials building;*
 - 2) the movement of filled UF₆ cylinders within the plant;*
 - 3) a leak of UF₆ in the FMB that occurred on October 26, 2014 during the routine sublimation and draining of a cold trap;*
 - 4) the release of UF₆ during a cold trap valve decontamination that occurred in February 2014;*
 - 5) the release of UF₆ from the low boiler condensers that occurred in August 2015;*
 - 6) the hazards, consequences, and safety controls described in Section 6.3 of the ISA Summary;*
 - 7) the potential for releases of NH₄ or UF₆ after the loss of offsite power, and*
 - 8) the potential for significant buildup of combustible material near buildings.*
 - 9) the processes involving potassium hydroxide (KOH), sodium hydroxide (NaOH), magnesium hydroxide (MgOH) and sulfuric acid when mixed with licensed material.*
- B. *Integrated safety analysis team qualifications. To assure the adequacy of the integrated safety analysis, the analyses in (A) must be performed by a team with expertise in engineering and process operations. The team shall include at least one person who has experience and knowledge specific to each process being evaluated, and persons who have experience in radiation safety, fire safety, and chemical process safety. One member of the team must be knowledgeable in the specific integrated safety analysis methodology being used.*

LC 35 is fully discussed in SER Section 3.3.1.2 "Integrated Safety Analyses."

License Condition 36 in Amendment 14 of License SUB-526 states:

By December 31, 2020, Honeywell shall revise its ISA Summary and MTW's procedures for PHA process and configuration management to require that potential accident scenarios involving maintenance activity and facility personnel are evaluated in the ISA.

Discussion of the rationale for the addition of this LC-36 is in SER Section 3.3.1.4 "Integrated Safety Analyses Summary."

1.2.2.6 License Renewal Period

Consistent with Section 1.3, "License Number and Period of License," of the NRC's RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985, the technical basis for a 40-year license term for the renewal of License SUB-526 is presented below.

The Honeywell MTW plant was constructed in its present location to supply UF₆ to the U.S. Atomic Energy Commission (AEC) under a five-year contract (1959-1964). Initial operations at the site were authorized by Source Materials License No. C-4493 issued on December 17, 1958. License No. C-4493 authorized the possession of, source material for the production of UF₆. In January 1962, the license was renewed and renamed SUB-526. Table 1-2 contains the chronological history of the source materials license.

Table 1-2 Chronological History of the Source Materials License

License No.	Issuance Date	Renewal Date	Comments
C-4493	December 17, 1958		Original License was issued to Allied Chemical by AEC.
		December 1959	
		December 1960	
		December 1962	
SUB-526	January 1962		
		February 1965	
		February 1968	
		August 1977	
		May 1985	
		June 1995	In 2000, Honeywell acquired Allied Chemical.
		May 11, 2007	

By letter dated February 8, 2017 (Reference 2), Honeywell submitted its LRA, which requested a 40-year renewal period for its MTW facility.

BACKGROUND

Section 103(c) of the Atomic Energy Act ("Commercial Licenses") gives the Commission discretion in setting license terms for the possession and use of source and special nuclear material. Specifically, in this regard, the Act states:

Each such license shall be issued for a specific period, as determined by the Commission, depending on the type of activity to be licensed, but not exceeding forty years, and may be renewed upon expiration of such period.

As stated by the Commission in a May 21, 1991, *Federal Register* notice, “the term for a materials licenses is a matter of Commission discretion and is not established either by statute or regulation” (Reference 36). The Commission has exercised this discretion on various occasions over the years. For example, on June 19, 1990, the Commission issued a notice extending license terms of operating uranium hexafluoride facilities under 10 CFR Part 40 and fuel fabrication facilities under 10 CFR Part 70 from 5 years to 10 years (Reference 49).

In SECY-06-0186 (Reference 122), the NRC staff sought Commission approval of its recommendation to implement maximum license terms of 40 years for license renewals and new applications for facilities required to submit integrated safety analysis (ISA) summaries, in accordance with 10 CFR Part 70, Subpart H. In SECY-06-0186, the staff explained that considerations in recommending whether license terms should be extended included decommissioning funding, environmental effects, facility changes and safety bases, and material degradation and aging. In “Staff Requirements - SECY-06-0186 (Reference 121), the Commission approved the staff’s recommendation.

Shortly thereafter, the staff recommended, and the Commission approved, a rulemaking to amend 10 CFR Part 40 to require certain new and existing uranium conversion and deconversion facilities to meet similar requirements as in 10 CFR Part 70, Subpart H (See SECY-07-0146 (Reference 157) and SRM-SECY-07-0146 (Reference 123)). In SRM SECY-07-0146, the Commission directed that “[i]f new applications are submitted before the completion of the rulemaking, the staff shall impose 10 CFR Part 70, Subpart H, performance requirements as part of the licensing basis for the application review.” This rulemaking was, however, terminated in January 2016 in SRM-COMSECY-15-0002 (Reference 158), based on the conclusion that it was unnecessary to incorporate 10 CFR Part 70 requirements into 10 CFR Part 40.

In 2012, the staff issued a 40-year license to International Isotopes, a Part 40 de-conversion facility (Reference 159). Consistent with SRM-SECY-07-0146, the license included a condition requiring compliance with 10 CFR Part 70, Subpart H pending completion of the planned 10 CFR Part 40 rulemaking to implement ISA requirements for certain source materials facilities. As the only example of a 40-year term Part 40 license, the staff looked to International Isotopes as precedent and the related Commission direction described above in considering Honeywell MTW’s request for a 40-year renewal term.

As a Part 40 licensee, Honeywell is not required to follow 10 CFR Part 70 ISA-related regulatory requirements, though like International Isotopes, Honeywell performed an ISA and submitted an ISA Summary for the MTW facility with its revised LRA (Reference 61). Honeywell’s ISA and ISA Summary are informed by the technically relevant requirements in 10 CFR Part 70, Subpart H and the guidance provided in NUREG-1520, “Standard Review Plan for Fuel Cycle Facilities License Applications,” Revision 2.

DISCUSSION

As detailed below, the staff evaluated Honeywell’s existing programs that address material degradation and aging issues, chemical process safety, corrosion prevention, and environmental qualification programs to determine the appropriate license renewal term for the Honeywell MTW facility. Additional factors the staff considered in its safety evaluation and findings that support a 40-year license term are summarized below in this chapter and are discussed fully the remaining chapters of the SER. Based on its review, the NRC staff

determined that Honeywell's license duration period can be extended for 40 years without adverse impacts on public health and safety related to the regulatory requirements of 10 CFR Part 40.

Decommissioning Funding:

A review of decommissioning financial assurance is required during license renewal and new amendment reviews. Since 2003, licensees must update their cost estimates for decommissioning every 3 years. This decommissioning cost estimate is reviewed by the staff and a conclusion with respect to 10 CFR 40.36 "Financial assurance and recordkeeping for decommissioning" is documented after the completion of each review. The triennial updates provide sufficiently frequent reviews for the NRC staff to determine the adequacy of Honeywell's decommissioning funding and funding mechanisms. Therefore, the staff finds reasonable assurance that Honeywell will satisfy the decommissioning funding requirements in 10 CFR 40.36 for a 40-year renewal term.

Environmental Effects:

The NEPA requires a Federal agency evaluate the cumulative effects from the combination of individually minor actions. The NRC's regulations at 10 CFR Part 51 implement Section 102(2) of NEPA. Section 51.60 of 10 CFR provides the requirements that an applicant for a new materials license or a materials licensee seeking a license renewal must meet, including the requirement to submit an ER. The NRC's regulations at 10 CFR 51.20 through 10 CFR 51.25 provide the criteria to the NRC staff for determining whether to prepare an Environmental Impact Statement (EIS), an Environmental Assessment (EA), or finding of no significant impact. Honeywell has evaluated the potential environmental effects of the renewal of the MTW license for an additional term of 40 years in its ER (Reference 13). The staff prepared an EA (Reference 144) and concluded that in accordance with 10 CFR 51.32, "Finding of no significant impact," is appropriate.

Material Degradation and Aging:

The staff evaluated whether Honeywell's management measures program provides reasonable assurance that authorized activities will maintain compliance with Honeywell's license and the regulatory requirements for material degradation and aging for the duration of the 40-year license. The management measures program described in Chapter 11 of the revised LRA include maintenance, configuration management, procedures, incident investigation, audit and assessment. The staff finds these management measures, combined with the ability of Honeywell's managers and workers to halt operations without the need for a scheduled outage, will allow Honeywell to actively manage equipment subject to material degradation and aging. Honeywell is also required, by license condition, to prepare an annual update of its ISA summary and license application. Therefore, the NRC finds reasonable assurance that its oversight programs will allow it to identify material degradation or aging throughout the 40-year license term and adequately protect health and minimize danger to life or property.

Compliance History:

The NRC staff evaluated the compliance history of Honeywell's MTW facility since the last renewal to assess whether the inspections and enforcement history supports issuing a renewed license for 40 years.

The NRC categorizes safety-significant violations as Severity Level I, II, or III under the NRC's Enforcement Policy (Reference 149). Violations of minor significance and violations determined to be of Severity Level IV are not included in this compliance assessment due to their very low safety significance. MTW had no Severity Level I violations. However, the NRC violations issued to Honeywell since 2007 were considered during this review.

For the period of 2007 to 2019, the NRC issued four escalated enforcement actions for Honeywell Metropolis Works. A summary of the violations and their resolution is included below.

Enforcement Action 09-074: On September 2, 2009, the NRC issued a Notice of Violation (NOV) to Honeywell for the failure of a health physics technician to conduct monthly airflow measurements of 20 chemical fume hoods located throughout the licensee's facility. Additionally, the licensee failed to maintain information that was complete and accurate in all material respects. Specifically, the health physics technician deliberately falsified radiological survey records for 20 laboratory fume hoods to indicate that air flow velocity measurements had been conducted, when in fact the measurements had not been conducted. The violations were disposition as a Severity Level III Problem (ADAMS Accession No. ML092460165) (Reference 127). The NRC followed-up the licensee's corrective actions for this enforcement action and closed the associated violations in Inspection Report 2010-006 (ADAMS Accession No. ML103190401) (Reference 128).

Enforcement Action-12-157: On October 10, 2012, the NRC issued a Confirmatory Order to Honeywell (ADAMS Accession No. ML12289A800) (Reference 109) to formalize the corrective actions committed to in the Confirmatory Action Letter (CAL) issued on July 13, 2012. In addition, Honeywell committed to: (1) complete an evaluation of external events and their safety basis, (2) document the design basis for the proposed modifications, (3) develop, implement, and have available for inspection quality assurance measures for the modifications, (4) implement the modifications before seeking to resume NRC-licensed operations, (5) demonstrate the adequacy of the revised emergency response plan by conducting an on-site exercise, and (6) submit a revised ISA Summary no later than six months after resuming licensed operations. This enforcement action was issued in lieu of a notice of violation for: (1) the failure to identify all relevant accident sequences related to credible seismic events and tornadoes that could result in large UF₆ releases for which protective actions may be needed as required by 10 CFR 40.31(j)(3), and (2) the failure to provide complete and accurate information related to Honeywell Metropolis Work's Emergency Response Plan as required by 10 CFR 40.9(a). The Confirmatory Order superseded the CAL issued on July 13, 2012. Licensee actions implemented to comply with this Order involved significant improvements to facility structures, systems, and components to mitigate the consequences of natural phenomena hazards, specifically earthquake and tornado events. The NRC reviewed licensee's corrective actions to comply with this enforcement

action and closed the Confirmatory Order, authorizing Honeywell to resume full licensed operations on July 2, 2013 (ADAMS Accession No. ML13183A336) (Reference 129).

Enforcement Action-15-015: On April 20, 2015, the NRC issued an NOV for a Severity Level-III violation because on October 26, 2014, licensee emergency responders failed to declare an Alert in response to a hydrofluoric acid release from the FMB which resulted in a hazardous situation that migrated outside of the FMB and stayed within the restricted area or inner fence line. The NRC followed-up the licensee's corrective actions for this enforcement action and closed the associated violation in Inspection Report 2015-006 (ADAMS Accession No. ML15110A228) (Reference 130).

Enforcement Action-14-114: On March 11, 2015, the NRC issued a Confirmatory Order to Honeywell (ADAMS Accession No. ML15055A094) (Reference 131) to reflect commitments agreed to during an alternative dispute resolution mediation session conducted on December 9, 2014. The Confirmatory Order arose out of an incident involving a former employee of a Honeywell contractor, who was terminated for, in part, notifying both Honeywell and the Honeywell contractor, that the employee smelled alcohol on the employee's immediate supervisor's breath during duty hours. As a summary, Honeywell committed to: (1) conduct presentations and training to its employees regarding the policy for raising employee concerns, (2) addressing safety issues, and management response to employee concerns, (3) modify existing processes and develop new processes that provide for ongoing support for employee protection requirements, and (4) review and update its Safety Conscious Work Environment policy and incorporate aspects of the NRC's Safety Culture Policy, as appropriate. In exchange, the NRC agreed to not pursue any further enforcement action. The NRC followed-up the licensee's corrective actions for this enforcement action and closed the associated violations in Inspection Report 2016-002 (ADAMS Accession No. ML16116A253) (Reference 132).

The NRC conducted inspections at MTW to evaluate the corrective actions undertaken in response to the escalated enforcement actions. The NRC found that corrective actions undertaken by Honeywell brought the licensee into compliance with regulatory requirements.

The NRC has continued to implement the core inspection program for uranium conversion facilities at Honeywell since the last renewal. (NRC Inspector Manual Chapter (IMC)-2600, "Fuel Cycle Facility Operational Safety and Safeguards Inspection Program.") (Reference 133). The NRC evaluated Honeywell's regulatory performance through the implementation of routine inspection activities and the periodic Licensee Performance Review (LPR) process described in IMC-2604 to determine compliance with Part 40 requirements. The inspection program and performance assessment process identified some areas needing improvement based on performance trends. The NRC adjusted the inspection program to increase the level of oversight by implementing supplemental inspections beyond the core inspection program and conducting performance reviews at a higher frequency. The NRC was able to successfully close the areas needing improvement and return the facility to the nominal inspection effort established in the core inspection program in 2014. Since 2014, the NRC has not identified any deficiencies in Honeywell's performance areas at the MTW facility or any performance areas needing improvement. Overall, the NRC determined that Honeywell has conducted activities safely and securely, providing reasonable assurance of adequate protection to public health and safety, and security.

Facility Change and Safety Basis:

To assess the risks associated with accidents involving licensed material, Honeywell MTW has conducted and maintained an integrated safety analysis which is informed by the technically relevant requirements derived from Subpart H to 10 CFR Part 70 and the guidance provided in NUREG-1520. In Chapter 3 of the revised LRA (Reference 61), Honeywell stated that although MTW is not licensed under 10 CFR Part 70, Honeywell has previously conducted an ISA to provide a structured analysis of MTW site hazards and the safety controls applied to prevent, and/or mitigate the consequences of the identified accident sequences. The ISA performed by MTW demonstrates that the requirements of 10 CFR Part 40.31(j)(3), which pertains to the identification of each type of accident for which protective actions may be needed accident analysis/mitigation issues to be addressed for emergency planning purposes are met. The ISA is also consistent with Chapter 14 of RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production" (Reference 74) which states:

"The types of accidents considered and their potential impact on occupational safety and the environment should be summarized."

License condition 20B in renewed license SUB-526, Amendment 14 requires:

Change Process for the ISA Summary. Honeywell shall maintain an ISA and ISA summary, as committed to in Chapter 3 of the LA. Honeywell may implement changes to the ISA Summary without prior NRC approval, if the change does not:

- 1) Create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements specified in 10 CFR 70.61 and that have not previously been described in the MTW ISA Summary;
- 2) Use new processes, technologies, or control systems for which Honeywell has no prior experience;
- 3) Remove, without at least an equivalent replacement of the safety function, one of the Plant Features and Procedures (PFAP) that is listed in the MTW ISA Summary and is necessary for compliance with the performance requirements of 10 CFR 70.61;
- 4) Alter any PFAP, as listed in the MTW ISA Summary, that is the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61: or
- 5) Create any condition or configuration that is otherwise prohibited by license condition or order.

Changes to the ISA Summary, which the licensee determines do not require prior NRC approval, must be summarized in a report submitted to the NRC. Section 11.1.3.3 "Report of Changes to USNRC" of the LA requires the licensee submit the report to the NRC within 30 days after the end of the calendar year in which the change was implemented. Honeywell shall not make use of this change process until the procedures

implementing the change process are completed. Implementation of this LC shall be completed December 31, 2020.

License condition 20C in renewed license SUB-526, Amendment 14 requires:

Proposed changes to the LA or the ISA Summary that do not meet the criteria in LC-20A or LC-20B require the licensee to submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44. In addition, proposed changes to the criteria in Section 11.1.3.1, Section 11.1.3.2, or Section 11.1.3.3 require the licensee to submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44. Proposed changes requiring an amendment shall not be implemented until NRC approval is granted.

The ISA Summary was prepared by Honeywell to demonstrate compliance with 10 CFR Part 40. In addition, Honeywell is required to keep its ISA summary up-to-date and provide an annual update to NRC as mandated in LC- 20B. The annual ISA Summary update provides an efficient way for the NRC to review the facility safety basis through inspection. The safety basis of the facility would continue to be effectively reviewed by the NRC staff on an on-going basis during the 40-year renewal period.

1.2.3 EVALUATION FINDINGS

The NRC staff reviewed the institutional information provided by Honeywell which follows Chapter 1, "Standard Conditions and Special Authorizations" of RG 3.55. The NRC staff finds the applicant adequately described and documented the (a) name, address and corporate information, (b) site location, (c) license number and period of license, (d) possession limits, and (f) exemptions and special authorizations.

The staff finds the information in the revised LRA meets the requirements of 10 CFR 40.31, "Applications for specific licenses" and 40.32 "General requirements for issuance of specific licenses" with respect to the institutional information provided in Chapter 1 of the revised LRA.

The NRC staff has determined that Honeywell's license duration period can be extended for 40 years without adverse impacts on public health and safety related to the regulatory requirements of 10 CFR Part 40.

1.3 Site Description

1.3.1 PURPOSE OF REVIEW

The purpose of the review is to determine whether the information in Honeywell's revised LRA adequately described the geographical, demographical, meteorological, hydrological, seismological, and geological characteristics of the site and surrounding area.

1.3.2 STAFF REVIEW AND ANALYSES

Consistent with Section 1.2, "Site Location" of NRC RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985, Honeywell provided site description information in its ER and ISA Summary. NRC regulations at 10 CFR 40.31(j)(3)(i) require a brief description of the licensee's facility and area near the site. The NRC staff reviewed the site description to assess

whether the information in Honeywell's revised LRA adequately described the geographical, demographical, meteorological, hydrological, seismological, and geological characteristics of the site and surrounding area.

1.3.2.1 Site Geography

Honeywell's revised LRA describes the site location, major nearby highways, nearby bodies of water, and significant geographic features such as the flood plain. The site is located 2 miles west, outside, of city limits of Metropolis, IL, within Massac County at the southern tip of Illinois, bordering the State of Kentucky. The geographical location of the site is shown in Figure 1-2 below.

Figure 1-2 Location of Honeywell Metropolis Works Plant Site



1.3.2.2 Demographical Information

Honeywell's revised LRA provides the populations and population densities of Massac County, IL, neighboring McCracken County, KY, and the surrounding 50-mile radius, and a summary of population data for communities in the surrounding area. In addition, it presented the population distribution within a 50-mile radius of MTW. The plant site is in a predominantly agricultural

area. Within a two-mile radius of the plant, approximately 68 percent of the land is undeveloped (e.g., cropland, forest, or wetland) and the remainder is developed.

The Protective Action Recommendations provided in the ERP are limited to shelter-in-place only; no provisions are required for evacuation of the near-site public.

1.3.2.3 Meteorology

Honeywell's revised LRA describes weather patterns including temperatures, precipitations, primary wind directions and average wind speeds. In addition, it describes annual amounts and forms of precipitation and severe weather conditions in the nearby area.

1.3.2.4 Hydrology

Honeywell's revised LRA describes the characteristics of nearby bodies of water, depth to the water table, groundwater flow, the uppermost aquifer, and potential flooding events.

1.3.2.5 Seismology

Honeywell's revised LRA describes that the greatest earthquake hazards affecting the site are those associated with New Madrid Seismic Zone (NMSZ). MTW is located within the area of NMSZ, an area considered to feature the highest seismicity in the United States east of the Rocky Mountains. In its ISA Summary, Honeywell provides additional seismological characteristics and associated measures that it had implemented to address the seismic hazards.

1.3.2.6 Geology

Honeywell's revised LRA describes the characteristics of topography, bedrock, soil types, and elevations relative to the sea level.

1.3.3 EVALUATION FINDINGS

Consistent with Section 1.2, "Site Location" of NRC RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985, and 10 CFR 40.31(j)(3)(i), Honeywell provided a site description information in Section 1.10 of the revised LRA. The NRC staff reviewed the site description to assess whether the information in Honeywell's revised LRA adequately described the geographical, demographical, meteorological, hydrological, seismological, and geological characteristics of the site and surrounding area. The NRC staff verified that the site description is consistent with the information used as a basis for the environmental report, and ISA summary.

CHAPTER 2 ORGANIZATION AND ADMINISTRATION

2.1 Purpose of Review

The purpose of the review of the applicant's organization and administration is to ensure that the proposed management hierarchy and policies will provide reasonable assurance that the licensee plans, implements, and controls site activities in a manner that ensures the safety of workers, the public, and the environment. The review also ensures that the applicant has identified and provided adequate qualification descriptions for key management positions.

2.2 Staff Review and Analysis

In license renewal requests prior to 2017, Honeywell followed the two-part LRA format in RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985 (Reference 74). Honeywell relied on the guidance in RG 3.55 and NUREG-1520, "Standard Review Plan for Fuel Cycle Facilities License Applications," published in June 2015 (Reference 98) in the preparation of the revised LRA for the following reasons: a) the RG 3.55 format, which includes a Safety Demonstration Report, does not describe the ISA process, b) the RG 3.55 format does not provide guidance on analyzing risk insights and ongoing programmatic improvements that result when the MTW ISA Summary is implemented, and c) NUREG-1520 provides guidance for assessing the performance of the ISA and for the review of an applicant's license application and ISA summary. Although Honeywell followed the general format in NUREG-1520 for the ISA and ISA-related sections, other parts of its revised LRA follow the format in RG 3.55, as appropriate.

The information listed in Chapter 2 of RG 3.55 was used by Honeywell to organize Chapters 2, 4 and 11 of the revised LRA. The sections in Chapter 2 of the revised LRA include: a) RG 3.55 Section 2.1, organization responsibilities and authority, and b) RG 3.55 Section 2.2, personnel education and experience requirements. These sections have been evaluated by the NRC staff using RG 3.55.

Honeywell also included sections in Chapter 2 entitled (a) Implementation of the health, safety and environmental (HSE) functions, (b) management measures, and (c) off-site emergency response resources.

The terminology "Implementation of HSE functions" is taken from Chapter 2 of NUREG-1520 but supports the demonstration of compliance with the regulatory requirements of 10 CFR 40.31 (j) (3), (vii), (viii), (viii) and (ix), and 10 CFR 40.32 (b). Implementation of HSE functions relate to a management system and administrative procedures for the effective implementation of HSE functions concerning the applicant's corporate organization, qualifications of the staff, and adequacy of the proposed equipment, facilities, and procedures to provide adequate safety for workers, the public, and the environment.

The discussion of management measures that is evaluated in Chapter 11 of the SER, includes the information discussed from RG 3.55: 2.4 "Approval Authority for Personnel Selection; 2.5 "Training"; 2.6 "Operating Procedures"; 2.7 "Internal Audits and Inspections, 2.8 "Investigation and Reporting", and 2.9, "Records".

Chapter 2.3, "Safety Review Committee" from RG 3.55 is evaluated in SER Section 4.2.1.1.b, "ALARA Committee".

The staff evaluated the information in the revised LRA against the Standard Format and Content guidance found in RG 3.55 and discusses it in this chapter of the Safety Evaluation Report (SER).

2.2.1 ORGANIZATIONAL RESPONSIBILITIES AND AUTHORITY

The MTW is owned and operated by Honeywell International, Inc., with its corporate headquarters located in Morris Plains, New Jersey. The top-ranking member of management at the plant site is the Plant Manager. The Plant Manager reports to business unit executives in Honeywell's corporate offices. All personnel permanently assigned to the site report through a chain of command to the Plant Manager. The HSE manager holds overall authority for implementation of the industrial HS&E functions on the MTW site, including development of appropriate HS&E procedures using the site procedures and control process as described in Section 11 of the revised LRA. The lines of authority for production, maintenance, and engineering functions are independent of those for industrial safety, radiological safety, auditing, and regulatory affairs. Independence is important to assure that there is separation of authority from managers responsible for safety and those responsible for production. The revised LRA provides an organizational chart illustrating the components of the MTW organization.

The NRC staff determined the revised LRA adequately described the specific organizational groups at MTW that are responsible for managing the maintenance, operations, regulatory compliance, and ISA, as well as the environmental, chemical and industrial safety programs for licensed activities. Honeywell's revised LRA, Figure 2.1, "MTW Organizational Chart" (Reference 61) illustrates that managerial responsibilities at the facility are divided to assure organizational independence between safety and production at the facility.

2.2.2 PERSONNEL EDUCATION AND EXPERIENCE REQUIREMENTS

The revised LRA provides information related to the qualifications and experience for specified staff positions. The plant manager has the responsibility for the safe, efficient, and reliable operation of the facility. The plant manager delegates these responsibilities through staff managers. The revised LRA also specifies the education level and experience that required for each position.

The nuclear compliance director is a safety related position which is responsible for providing technical leadership, functional oversight, and coordinating expert support for the radiation safety, nuclear culture development, emergency response programs, and management systems for the site. In conjunction with the plant manager, the nuclear compliance director represents the site in contacts with regulatory agencies, the local community, and industry advocacy groups.

The regulatory affairs manager is safety related position which responsible for monitoring the development and implementation of plant programs and activities to ensure they meet applicable regulatory and licensing requirements. The regulatory affairs manager oversees the activities of the audits and inspections and corrective action programs and manages Honeywell's interface with regulatory agencies. This individual provides management oversight for development and implementation of the radiation protection program and monitors compliance with related NRC regulatory and licensing requirements. The regulatory affairs

manager is also responsible for ensuring the ISA and ISA summary are developed, maintained, and revised in a manner consistent with applicable NRC regulatory and licensing requirements, adapted as necessary to reflect site-specific considerations. Responsibilities also include management and implementation of the emergency response and fire protection programs.

The maintenance manager is an operations related position responsible for process and facility maintenance activities, including preventative and corrective maintenance, and management of the maintenance staff.

The technology manager is an operations related position responsible for overseeing the activities of the process engineering staff in development and implementation of plant design changes and maintenance of the design status, consistent with applicable codes and standards. The technology manager provides oversight for the design change process using the configuration management system described in Section 11.0 of the revised LRA. Also, the technology manager is responsible for implementation of the process safety management (PSM) program at the MTW site. The operations manager is responsible for managing production functions associated with Honeywell's uranium processing operations, including maintaining compliance with applicable regulatory and license requirements.

Based on the descriptions of the management positions and manager's responsibilities provided in the revised LRA, the NRC staff concludes that safety functions are maintained independently of the operations component. This is consistent with the guidance in Chapter 2.1 of RG 3.55. These components are parallel to one another in the MTW organization. The staff finds the regulatory component establishes procedures to evaluate the effectiveness of the safety-related program and to monitor compliance with it. The staff also finds the regulatory component operates independently of other organizational groups

Based on the review discussed above, the NRC staff finds that Honeywell clearly defined the qualifications, responsibilities and authorities of key supervisory and management positions responsible for the protection of HSE.

2.2.2.1 Implementation of HSE Functions

The HSE manager holds overall authority for implementation of the industrial HSE functions on the MTW site, including development of appropriate HSE procedures using the site procedure development and control process as described in Section 11.0 of the revised LRA. The HSE manager has authority to shut down operations in situations that appear to be unsafe. Following the identification of root causes and the completion of corrective actions after a shutdown, a Honeywell supervisor may approve restart of operations. The regulatory affairs manager exercises the same authority over radiological safety functions. All employees on-site have the right and responsibility to identify potentially unsafe conditions, stop work, and report the unsafe conditions to the responsible supervisor, the HSE organization, or site leadership. Honeywell establishes and maintains procedures to ensure effective implementation of this process.

All employees and contractor personnel working on-site have the responsibility and right to initiate a "stop work" process when a safety or health concern is identified and should follow the project or facility procedures for the safety of the workplace and work activities. Employees are trained to notify the designated supervisor when a concern or questionable safety practice or condition arises. Contractors also receive orientation training on their responsibility to report personnel safety and health concerns.

Based on the review of the implementation of HSE functions, the staff determined that the authority of the HSE manager and regulatory affairs manager is clearly defined. The licensee clearly stated the HSE manager has the authority to shut down operations that may be unsafe and all employees have the responsibility to identify unsafe conditions, stop work and report the unsafe conditions to their supervisors.

2.2.3 MANAGEMENT MEASURES

Chapter 11.0 of the revised LRA describes the management measures that are applied to Plant Features and Procedures (PFAP) as identified in the MTW ISA Summary. The NRC staff provides a detailed review of Honeywell's management measures in Chapter 11 of this SER.

2.2.4 OFFSITE EMERGENCY RESPONSE RESOURCES

Honeywell maintains written agreements to assure the availability of offsite emergency response support for site emergencies. Honeywell maintains these agreements in accordance with the MTW Emergency Response Plan. Chapter 8.0 of the SER discusses the staff's review of offsite emergency response resources.

- Honeywell commits to implement the management measures identified in the MTW ISA Summary to ensure the reliability and availability of PFAP. These commitments are referenced in the renewed license SUB-526, Amendment 14 in LC-20. Chapter 11.0 of this SER provides a more detailed evaluation of the management measures.
- The applicant maintains written agreements to assure the availability of off-site emergency response support for site emergencies, in accordance with the Honeywell MTW Emergency Response Plan (Reference 31). Chapter 8.0 of this SER provides a more detailed evaluation of this area.

2.3 Evaluation Findings

Honeywell adopted the general format in NUREG-1520 because of changes made to the MTW licensing basis in the introduction chapter of the revised LRA. Although Honeywell used the relevant portions of NUREG-1520, the revised LRA also made use of the formatting and organization described in RG 3.55.

The information listed in Chapter 2 of RG 3.55 is presented in Chapters 2, 4 and 11 of the revised LRA. The sections in Chapter 2 of the revised LRA, as derived from RG 3.55 include a) RG 3.55 Section 2.1, organization responsibilities and authority, and b) RG 3.55 Section 2.2, personnel education and experience requirements. These sections have been evaluated by the NRC staff using RG 3.55.

Honeywell also included sections in Chapter 2 entitled (a) Implementation of HSE Functions, (b) management measures, and (c) off-site emergency response resources. Management measures and offsite emergency response resources have been evaluated in Chapters 11 and 8 of the SER respectively.

The terminology "Implementation of HSE functions" is taken from Chapter 2 of NUREG-1520 but supports the demonstration of compliance with the regulatory requirements of 10 CFR 40.31 (j) (3), (vii), (viii), (viii) and (ix), and 10 CFR 40.32 (b). Implementation of HSE functions relate to a management system and administrative procedures for the effective

implementation of HS&E functions concerning the applicant's corporate organization, qualifications of the staff, and adequacy of the proposed equipment, facilities, and procedures to provide adequate safety for workers, the public, and the environment. This information, along with the remainder of the information in Chapter 2 of the revised LRA, is similar to the information that is included in Section 2.4.3 "Acceptance Criteria" of NUREG-1520.

To the extent that conflicts exist between the guidance for content of license applications provided in RG 3.55 and NUREG-1520, Honeywell used the guidance provided in NUREG-1520, to the extent appropriate to a 10 CFR Part 40 licensee.

Since RG 3.55 does not contain acceptance criteria, the staff used the acceptance criteria in Chapter 2 of NUREG-1520 in its review of the organization and administration of Honeywell MTW. These acceptance criteria, although written to address requirements for 10 CFR Part 70, are similar to those that are needed to demonstrate compliance with the management, organizational and training requirements in the sections of 10 CFR Part 40.31 and 40.32 mentioned above.

Based on the review, the NRC staff finds that the licensee described its organizational and management policies for providing adequate safety management and management measures for the safe operation of the facility. The staff concludes that Honeywell has an acceptable organization with appropriate administrative policies, with sufficient and competent resources to provide for the safe operation of the facility, under both normal and abnormal conditions. Furthermore, the NRC staff finds that Honeywell MTW management and staff are qualified by reason of training and experience to use the source material for the purpose requested in accordance with 10 CFR 40.31(j) (3), (vii), (viii), (viii) and (ix) and 10 CFR 40.32(b).

CHAPTER 3 INTEGRATED SAFETY ANALYSIS

3.1 Purpose of Review

Honeywell included an ISA and ISA Summary in its license renewal application (LRA) to demonstrate that it meets the requirements of 10 CFR Part 40. Specifically, 10 CFR 40.31(j)(3)(ii) requires applicants for a Part 40 license to identify each type of accident for which protective actions may be needed. The staff assessed whether the Integrated Safety Analysis program and specifically the ISA Summary (Reference 14) submitted as part of the revised LRA (Reference 61) properly identified and evaluated potential accidents involving licensed materials, as required by NRC regulations. The revised LRA does not contain an SDR (Reference 52), which was formerly required by LC-18 of Amendment 13 of the license.

3.2 Regulatory Requirements

The U.S. Nuclear Regulatory Commission (NRC) staff evaluated the Honeywell International, Inc. (Honeywell) ISA program as described in the revised LRA (Reference 61) and ISA Summary (Reference 14) to determine whether Honeywell meets the regulatory requirements.

To assess the risks associated with accidents involving licensed materials as required by 10 CFR 40.31(j)(3), Honeywell conducted and maintains its ISA. In preparing the ISA and ISA Summary Honeywell relied on the technically relevant requirements of Subpart H of 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material" (Ref. 1) and the guidance in NUREG-1520, "Standard Review Plan for Fuel Cycle Facilities License Applications" (Reference 98). Although the Honeywell Metropolis Works Facility (MTW) is not licensed under 10 CFR Part 70, Honeywell previously conducted an ISA to provide (1) a structured analysis of MTW site hazards, and (2) the safety controls applied to prevent and/or mitigate the identified accident sequences (Reference 56).

This section addresses MTW's ISA methods and commitments. Section 11.0 of this SER provides a discussion of Honeywell's process for reviewing and approving changes to the MTW ISA Summary.

The NRC's regulations in 10 CFR 40.32(c) require that an applicant's proposed equipment, facilities and procedures adequately protect health and minimize danger to life or property. Also, 10 CFR 40.32(d) requires that issuance of a license not be inimical to the common defense and security or to the health and safety of the public.

License Condition 18B in Amendment 13 of the license required that the authorized activities at the Honeywell MTW facilities meet the statements, representations and conditions of the SDR. Honeywell did not submit an SDR in the revised LRA and therefore it is deleted from the current license. However, the statements, representations, and conditions in the SDR were incorporated into the revised LRA and ISA Summary.

License Condition 18D in Amendment 13 of the license required that authorized activities at the Honeywell Metropolis Works Facility (MTW) meet the statements, representations and conditions of the ISA Summary (or as revised by the approved configuration control system as described in LC-18J). As stated in SER Section 1.2.2.5, LC-18B and LC-18D were deleted from Amendment 14 of the license.

LC-18D is deleted and is replaced by LC-20B and LC-20C. The new LC-20B of SUB-526, Amendment 14 of the license states:

Change Process for the ISA Summary. Honeywell shall maintain an ISA and ISA summary, as committed to in Chapter 3 of the LA. Honeywell may implement changes to the ISA Summary without prior NRC approval, if the change does not:

- 1) Create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements specified in 10 CFR 70.61 and that have not previously been described in the MTW ISA Summary;
- 2) Use new processes, technologies, or control systems for which Honeywell has no prior experience;
- 3) Remove, without at least an equivalent replacement of the safety function, one of the Plant Features and Procedures (PFAP) that is listed in the MTW ISA Summary and is necessary for compliance with the performance requirements of 10 CFR 70.61;
- 4) Alter any PFAP, as listed in the MTW ISA Summary, that is the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61; or
- 5) Create any condition or configuration that is otherwise prohibited by license condition or order.

Changes to the ISA Summary, which the licensee determines do not require prior NRC approval, must be summarized in a report submitted to the NRC. Section 11.1.3.3 “Report of Changes to USNRC” of the LA requires the licensee submit the report to the NRC within 30 days after the end of the calendar year in which the change was implemented. Honeywell shall not make use of this change process until the procedures implementing the change process are completed. Implementation of this LC shall be completed December 31, 2020.

License condition 20C in renewed license SUB-526, Amendment 14 requires:

Proposed changes to the LA or the ISA Summary that do not meet the criteria in LC-20A or 20B require the licensee to submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44. In addition, proposed changes to the criteria in Section 11.1.3.1, Section 11.1.3.2, or Section 11.1.3.3 require the licensee to submit an application to the NRC to amend the license, in compliance with the requirements of 10 CFR 40.44. Proposed changes requiring an amendment shall not be implemented until NRC approval is granted.

3.3 Staff Review and Analysis

The staff reviewed Chapter 3, “Integrated Safety Analysis,” of the application (Reference 61), the Honeywell MTW ISA Summary, process hazard analyses, procedures, and process safety information. The staff also reviewed the applicant’s (1) 2015 SDR (Reference 52) and compared it with the information provided in the ISA Summary and revised LRA; (2) responses

to the NRC's requests for additional information (RAIs), (3) inspection reports, and (4) previous annual updates to the applicant's ISA Summary to verify that technical justifications and analyses, commitments, and process safety information originally contained in these documents were properly integrated into the revised LRA and ISA summary. The staff also conducted on-site horizontal and vertical slice reviews of ISA-related documents. These on-site reviews evaluated the procedures in place to conduct process hazard analyses, to implement safety controls, to audit the ISA program, and to document justifications for the exclusion of accident sequences from the ISA. This review assessed whether the ISA methodology implemented by Honeywell demonstrates compliance with 10 CFR 40.31(j)(3), 10 CFR 40.32(c), and LC-20B.

An ISA identifies potential accident sequences in the facility's operations, designates safety controls to either prevent such accidents or mitigate their consequences to an acceptable level, and describes management measures to provide reasonable assurance of the availability and reliability of those safety controls. The applicant refers to those safety controls as Plant Features and Procedures (PFAPs) and reports them in its ISA Summary.

The following sections provide the results of the staff's review.

3.3.1 SAFETY PROGRAM

Chapter 3 of the revised LRA, "Integrated Safety Analysis," describes the applicant's ISA methods and commitments to assess the risks associated with accidents involving licensed material. These methods and commitments constitute the applicant's safety program and include process safety information, ISA, management measures, and the ISA Summary.

The staff reviewed the application to determine whether Honeywell has a safety program that complies with 10 CFR 40.31(j)(3), 10 CFR 40.32(c), and LC-20B. The staff finds that the applicant established and maintains a safety program which describes the equipment, facilities and procedures. Additionally, the staff finds the safety program described in the revised LRA adequately protects health and minimizes danger to life or property. The staff finds the safety program at the MTW facility, in combination with LC-20B, which requires that Honeywell prepare and maintain an ISA and ISA summary, demonstrate Honeywell's compliance with 10 CFR 40.32(c).

The three elements of the safety program are: process safety information, integrated safety analysis, and management measures.

3.3.1.1 *Process Safety Information*

The staff reviewed the revised LRA to determine whether the applicant compiled and maintains up-to-date process safety information that demonstrates compliance with 10 CFR 40.32(c) and LC-20B. Review of the ISA Summary, RAI responses, and inspection reports, as well as extensive on-site reviews confirmed that Honeywell has compiled written information on proposed equipment and facilities of the MTW facility including: (1) the hazards of all materials used or produced in the processes, (2) the technology of the processes, and (3) the equipment used in the processes. Furthermore, the applicant commits to maintaining written elements of process safety information in Section 3.2.1 of the revised LRA (Reference 61). The staff finds that the process safety information in the application and LC-20B, which requires Honeywell to maintain and update an ISA and ISA summary, demonstrate compliance with 10 CFR 40.32(c). The staff finds reasonable assurance that Honeywell will continue to compile and maintain up-to-date process safety information throughout the license renewal period.

3.3.1.2 ISA

The staff reviewed the revised LRA to determine whether the applicant performed and maintains an ISA that demonstrates compliance with 10 CFR 40.31(3)(j) and 10 CFR 40.32(c) and that Honeywell will continue to maintain the ISA as required by LC-20B, SUB-526, Amendment 14. The staff finds that the applicant maintains a process hazards analysis (PHA) team led by a PHA Team Leader, who receives standardized corporate training. The staff also finds that the revised LRA and the ISA Summary have not yet evaluated potential accidents for all processes performed at MTW. For example, processes described in the 2015 SDR (Reference 52) and in Section 6.3 of the ISA Summary (Reference 14) involve the exposure of workers to hazardous chemicals mixed with licensed material. The staff finds these processes were not analyzed in the ISA (Reference 14). The staff has added LC-35A to identify specific accident analyses Honeywell must perform, prior to the re-start of UF₆ production at MTW (see discussion of LC-35 below).

Honeywell stated in Section 3.3 of the revised LRA (Reference 61) that licensed operations will not restart until the required analyses and implementation of identified protective measures are fully completed and reported to the NRC. The applicant further stated that changes to Section 6.3 in the ISA Summary will be performed in accordance with its configuration management program, as described in Chapter 11 of the revised LRA.

Chapter 3 of the revised LRA contains the commitment to maintain an accurate and up-to-date ISA using the configuration management process, as described in Chapter 11, "Management Measures" of the application. The staff finds Chapter 3 of the revised LRA adequately discusses the procedures and criteria for changing the ISA. In addition, the applicant commits to a configuration management process in Section 11.1.3.1 of the revised LRA (Reference 61) that addresses the following changes:

The creation of new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements specified in 10 CFR 70.61 and that have not previously been described in the MTW ISA Summary;

The use of new processes, technologies, or control systems for which the applicant has no prior experience;

The removal, without at least an equivalent replacement of the safety function, of a PFAP that is listed in the MTW ISA Summary and is necessary for compliance with the performance requirements of 10 CFR 70.61; or

The alteration of any PFAP, as listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61, and the creation of any condition or configuration that is otherwise prohibited by license condition or order.

Although the applicant applied for a license under 10 CFR Part 40, Section 3.3 of the revised LRA (Reference 61) states the ISA is implemented using the performance requirements of 10 CFR 70.61. The 10 CFR Part 70 performance requirements establish accident consequence levels and accident likelihoods that must be mitigated or prevented. The revised LRA at Section 2.2.3 states the regulatory affairs manager is responsible for "ensuring the ISA and ISA Summary are developed, maintained, and revised in a manner consistent with applicable NRC

regulatory and licensing requirements, adapted as necessary to reflect site-specific considerations.”

The staff is adding LC-35 to provide reasonable assurance that Honeywell will maintain an updated ISA, as committed to in the revised LRA.

LC-35 in Amendment 14, SUB-526 states:

- (A) Honeywell shall perform specific accident analyses prior to the re-start of UF₆ production at the Honeywell MTW that adhere to the configuration management program. This program is described in detail in the ISA methodology section of Chapter 3 and in Chapter 11 of the revised LRA. The analyses shall include the analysis of past and potential accidents, and accidents with the potential to reoccur, and shall include these specific accidents and hazards:
- 1) the feed operations for UF₆ from a cylinder back into the feed materials building;
 - 2) the movement of filled UF₆ cylinders within the plant;
 - 3) a leak of UF₆ in the FMB that occurred on October 26, 2014 during the routine sublimation and draining of a cold trap;
 - 4) the release of UF₆ during a cold trap valve decontamination that occurred in February 2014;
 - 5) the release of UF₆ from the low boiler condensers that occurred in August 2015;
 - 6) the hazards, consequences, and safety controls described in Section 6.3 of the ISA Summary;
 - 7) the potential for releases of NH₄ or UF₆ after the loss of offsite power, and
 - 8) the potential for significant buildup of combustible material near buildings.
 - 9) the processes involving potassium hydroxide (KOH), sodium hydroxide (NaOH), magnesium hydroxide (MgOH) and sulfuric acid when mixed with licensed material.
- (B) Integrated safety analysis team qualifications. To assure the adequacy of the integrated safety analysis, the analyses in (A) must be performed by a team with expertise in engineering and process operations. The team shall include at least one person who has experience and knowledge specific to each process being evaluated, and persons who have experience in radiation safety, fire safety, and chemical process safety. One member of the team must be knowledgeable in the specific integrated safety analysis methodology being used.

The staff also finds that Honeywell must revise its PHA process and configuration management program to evaluate potential accident scenarios involving maintenance problems and facility personnel in the ISA. For example, Section 4.2, “Process Hazard Analysis Method,” of the ISA summary states, “Maintenance problems or industrial personnel accidents were not evaluated since the consequences are not considered to be a safety issue.” The staff points out that maintenance problems can introduce process deviations involving licensed materials and that these deviations should be evaluated as part of the configuration management process. For these reasons, the staff has included LC-36 in License SUB-526. The LC-36 requires that no later than December 31, 2020, Honeywell shall revise its ISA Summary and MTW’s procedures for PHA process and configuration management to require that potential accident scenarios involving maintenance problems and facility personnel be evaluated in the ISA.

LC-36 in Amendment 14, SUB-526 states:

By December 31, 2020, Honeywell shall revise its ISA Summary and MTW's procedures for PHA process and configuration management to require that potential accident scenarios involving maintenance activity and facility personnel are evaluated in the ISA.

3.3.1.3 Management Measures

Section 11.0, "Management Measures," of this SER provides the remaining details of the staff's review of the management measures program and configuration management process.

3.3.1.4 ISA Summary

The staff reviewed the revised LRA to determine whether the applicant developed and maintains an ISA Summary that demonstrates compliance with 10 CFR 40.32(c) and the requirements in LC-20A and LC-20B of Amendment 14 to the license. The staff's review of the ISA Summary focused on the adequacy of the equipment, facilities, and procedures to develop and maintain the ISA Summary and implement the ISA methodology, including the designation of PFAPs and management measures.

Honeywell states that the regulatory affairs manager is responsible for maintaining the ISA Summary (Section 2.2.3 of the revised LRA). The regulatory affairs manager is responsible for ensuring the ISA and ISA Summary are developed, maintained, and revised in a manner consistent with applicable NRC regulatory and licensing requirements (Section 2.2.3 of the revised LRA). The staff finds the applicant incorporated the results of the ISA into the ISA Summary. The ISA Summary describes the ISA methodology, identifies process hazards, credible accident scenarios, the consequences and likelihoods of those scenarios, and the PFAPs that are needed to prevent or mitigate accident sequences to an acceptable level.

The staff finds that the ISA Summary and the addition of LC-35A, LC-35B, and LC-36, demonstrate Honeywell's compliance with 10 CFR 40.31(3)(j) and 10 CFR 40.32(c). LC-35A requires that Honeywell perform specific accident analyses prior to the re-start of UF₆ production at the Honeywell MTW that adhere to the configuration management program. The required integrated safety analysis team qualifications are located in LC-35B. LC-36 requires that by December 31, 2020, Honeywell shall revise its ISA Summary and the procedures for the PHA process and configuration management.

The staff finds that Honeywell's proposed equipment, facilities and procedures; its commitments in the application that address procedures for the PHA process and configuration management, process hazards analysis, and accident scenarios; and LC-35A, LC-35B, and LC-36 provide reasonable assurance of adequate protection of public health and minimize danger to life or property.

3.4 Evaluation Findings

The staff finds that although the applicant established an acceptable ISA program, Honeywell has not yet evaluated potential accidents for all processes performed at MTW. For these reasons, the staff imposes LC-35A, LC-35B, and LC-36, in addition to LC-20B. These LCs and the revised LRA provide reasonable assurance that the applicant has: (1) established and will maintain a safety program, (2) compiles and maintains up-to-date process safety information,

(3) has and will continue to perform and maintain an ISA, (4) and has proposed equipment, facilities and procedures in the ISA Summary that are adequate to protect health and minimize danger to life or property.

CHAPTER 4 RADIATION PROTECTION

4.1 Purpose of Review

The U.S. Nuclear Regulatory Commission's (NRC) staff conducted this review to determine whether the radiation protection program described in the Metropolis Works (MTW) license renewal application (LRA) is adequate to protect the radiological health and safety of workers and to verify that the licensee has stated its policy for keeping occupational exposures As Low as Reasonably Achievable (ALARA). Approval of an LRA requires that the proposed equipment and facilities are adequate to protect the health and safety of the public and the environment, and that the applicant's proposed procedures are adequate to protect public health and minimize danger to life or property.

4.2 Staff Review and Analysis

The applicable regulatory requirements for this review are found in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 40, "Domestic Licensing of Source Material." Specifically, 10 CFR 40.32 provides the general requirements for issuance of specific licenses. Paragraph 40.32(b) of 10 CFR requires that the applicant be qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property. Paragraph 40.32(c) of 10 CFR requires the applicants proposed equipment, facilities, and procedures are adequate to protect health and minimize danger to life or property. Paragraph 40.32(d) of 10 CFR requires that issuance of a license not be inimical to the common defense and security or to the health and safety of the public.

Title 10 CFR Part 20, "Standards for Protection Against Radiation," establish standards for protection against radiation resulting from activities conducted under licenses issued by the NRC. The purpose of the regulations is to control the receipt, possession, use, transfer, and disposal of licensed material by any licensee in such a manner that the total dose to an individual (including doses resulting from licensed and unlicensed radioactive material and from radiation sources other than background radiation) does not exceed the standards for protection against radiation prescribed in the regulations.

In this chapter of the SER the NRC staff evaluates whether the radiation protection program at MTW described in the revised LRA meets the requirements of 10 CFR 40.32(b)(c) and (d) and 10 CFR Part 20.

The information supporting the staff's review of the radiation safety program at MTW is located in section 4 of the revised LRA (Reference 61). In a response to a Request for Additional Information (RAI) (Reference 3) Honeywell requested the removal or revision of certain LCs (Reference 4). Honeywell explained the LCs were no longer applicable because the information and procedures they pertained to were incorporated into the LRA (Reference 2). The NRC staff discusses these LCs and its rationale for their removal in SER Chapter 4.2.1.3. Honeywell has not proposed significant changes to its radiation protection program. In addition, Honeywell commits to maintaining the elements of the program during the 40-year term of the license, and these program elements are evaluated in this chapter of the SER.

The NRC staff evaluated MTW's radiation protection program against the NRC's regulations at 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations."

The regulations in this part establish requirements for notices, instructions, and reports by licensees to individual participating in NRC licensed and regulated activities. The staff finds the format and content of the revised LRA (Reference 61) is generally consistent with RG 3.55, “Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production,” (Reference 74). The staff reviewed the program description in LRA to assess whether the format and content of the administrative procedures for ALARA Policy and Radiation Work Permit Procedures and the Technical Requirements are consistent the recommendations in Chapter 3 of RG 3.55. Section 4.2.1 of this Safety Evaluation Report (SER) addresses the staff’s evaluation on Administrative Requirements, and Section 4.2.2, on Technical Requirements. Consideration for the guidance found in NUREG-1520, Standard Review Plan for Fuel Cycle Facilities (Reference 98), was reviewed and addressed where applicable.

4.2.1 ADMINISTRATIVE PRACTICES

General requirements for a Part 40 license in 10 CFR 40.32(b) require an applicant be qualified to use source material by training and experience. Paragraph 40.32(c) of 10 CFR requires an applicant’s proposed equipment, facilities, and procedures be adequate to protect health and minimize danger to life or property.

The acceptance criteria in RG 3.55 (Reference 74) are divided into two categories. The first category, Special Administrative Requirements, states the LRA should include:

- An ALARA policy, and
- Radiation Work Permit procedures.

The second category of acceptance criteria, Technical Requirements provides that an applicant’s radiation protection program should describe:

- Restricted area access control,
- Ventilation,
- Work area sampling,
- Radioactivity measurement instrumentation,
- Radiation exposures, and
- Surface contamination.

The staff reviewed the applicant’s policy and program commitments to maintain occupational radiation exposures and radioactive contamination in effluents ALARA. The staff reviewed how the policy is implemented against the NRC’s regulations and guidance. The staff evaluated whether the information in Honeywell’s policy and program commitments provided in the LRA is consistent with the criteria in RG 3.55.

4.2.1.1 ALARA Policy

The NRC’s regulations at 10 CFR 20.1101(a), Radiation protection programs, require that each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with Part 20, Subpart B.

Chapter 4.4 of the Honeywell LRA describes the features of the ALARA program including management and employee involvement in carrying out the policy. The MTW ALARA program features are: (1) a written management commitment, (2) the conduct of formal, regular audits of the program, (3) the establishment of a well supervised and defined radiation protection capability for appropriate supervisors and technicians that provided all personnel the authority to stop work to ensure safety, (4) an appropriately trained workforce, (5) an appropriate authority invested in health physics personnel, and (6) the consideration of plant modifications to reduce personnel doses, as necessary.

The Honeywell MTW demonstrated its ALARA policy commitments by addressing the following subject areas.

4.2.1.1.a. Management Commitment

Paragraph 20.1101(a) of 10 CFR requires the development and implementation of a Radiation Protection Program commensurate with the scope of the program. This regulation requires the involvement of management to ensure the policy of minimizing exposure and protection of health and the environment are fundamental to the work carried out by the applicant and instilled in the workforce. Section 4 of the LRA includes a written management commitment to maintaining employee and environmental radiation exposures ALARA. In Chapter 4.1, Honeywell commits to providing sufficient manpower, resources, and equipment to assure an effective radiation protection program. The organizational commitment to develop and maintain an effective ALARA program is emphasized in the job descriptions of senior management in Chapter 2.2. MTW's management commitment to the ALARA program is demonstrated through a written policy statement in Chapter 4.4.1 of the LRA.

In responding to RAI 4-3 regarding the dissemination of this policy statement, Honeywell stated it would disseminate the ALARA policy through its comprehensive training program, which includes initial and annual refresher training (Reference 3). Honeywell also stated the charter for the ALARA Committee identifies strategic goals and deliverables that are consistent with the NRC's RG 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable, (Reference 100), which describes methods and procedures that are acceptable for maintaining radiation exposures to occupational workers and the public ALARA (Reference 3).

Section 2.2 of the LRA provides a discussion of the responsibilities of key personnel. The plant manager assumes responsibility for the safe, efficient, and reliable operation of the facility, which includes process safety, industrial safety, and radiological safety. This responsibility is carried out by delegating to appropriate authority in senior staff management. The nuclear compliance director is responsible for providing technical leadership, nuclear culture development, and coordinating expert support for radiation safety. The regulatory affairs manager is responsible for monitoring the development and implementation of plant programs to ensure they meet regulatory and licensing requirements. The regulatory affairs manager also oversees the activities of the Audits and Inspections Programs, and the Corrective Action Program. The regulatory affairs manager is responsible for interfacing with various regulatory agencies.

4.2.1.1.a.1. Findings

Honeywell MTW has developed and maintains an effective ALARA policy with a committed and involved management that works with hourly staff to maintain occupational exposures ALARA. The NRC staff concludes that Honeywell MTW's ALARA Policy will continue to satisfy the requirements in 10 CFR 20.1101(a) during the renewed license term. For these reasons, the NRC staff finds that Honeywell MTW's management commitment to the ALARA Policy acceptable.

4.2.1.1.b. ALARA Committee

Paragraph 20.1101(c) of 10 CFR, "Radiation protection programs," requires that each licensee shall, at least annually, review the content of its radiation protection program and its implementation. As a part of the ALARA Program, Honeywell MTW established an ALARA Committee, which provides review and oversight of facility operations to ensure that occupational radiation exposures and effluent releases of radioactive material are effectively controlled, as described in Chapter 4.4.2 of the LRA. The committee includes the Plant Manager, the Regulatory Affairs Manager, selected department managers, as well as selected hourly Honeywell MTW plant staff, and meets at least quarterly. The ALARA Committee uses the guidance provided in RG 8.10, (Reference 100), and 8.37, "ALARA Levels for Effluents from Materials Facilities" (Reference 78).

The structure of the ALARA Committee is designed to promote interaction between the health physics and operations staffs. Responsibilities of the committee include:

- a. Reviewing site radiological operating performance on a quarterly basis;
- b. Reviewing operations and exposure records to determine where exposures may be reduced;
- c. Reviewing employee training and methods for utilizing information on-the-job to keep exposures ALARA; and
- d. Reviewing potential modifications of procedures and equipment when changes will reduce exposure at reasonable cost.

Chapter 4.4.1 of the LRA states that formal program audits of Honeywell MTW's ALARA program are conducted annually. In its response to RAI 4-2 requesting an explanation of which employees participate in the audit, what areas are reviewed, what managers review the resulting report, and who is informed of the report (Reference 3). Honeywell responded that personnel are assigned to conduct reviews and audits by the regulatory affairs manager (Reference 3). Auditors conduct the audit using approved procedures and checklists; however, they bear no responsibility for the function and area they audit. Reviewers document findings and brief affected supervisors, including the regulatory affairs manager and health physics supervisor, on pertinent issues. Findings are entered into the facility Incident Tracking and Corrective Action (ITCA) Program, for tracking and to ensure proper closure. Honeywell MTW may assign external personnel (corporate or vendor) to perform selected audits and inspections. Findings from these external audits and inspections are handled in the same manner as internal audits and inspections.

4.2.1.1.b.1. Findings

Honeywell MTW established a well-structured approach to the ALARA program review, which includes management and line staff. Formal audits of the program are conducted at least annually. Audit results are reviewed by an ALARA Committee, which includes management and staff members. The audit reviews procedures, as well as any occupational exposures. The ITCA Program is an effective mechanism to monitor items requiring longer term resolution. The NRC staff concludes that Honeywell MTW's ALARA Policy will continue to satisfy the requirements in 10 CFR 20.1101(c) during the renewed license term. Therefore, the NRC staff finds that Honeywell MTW's ALARA Committee and Program Review acceptable.

4.2.1.1.c. Trained and Qualified Organization

Paragraph 40.32(b) of 10 CFR requires that each application for a specific license shall be qualified by reason of training and experience to use the source material for the purpose requested in such a manner as to protect health and minimize danger to life and property. Section 19.12 of 10 CFR, "Instructions to workers," identifies basic training criteria for all individuals, who in the course of their employment, are likely to receive in a year an occupational dose in excess of 100 millirem (mRem).

The NRC staff reviewed the applicant's organization and personnel qualifications, as described in Chapter 11.3, Training and Qualification of the LRA. An LRA should sufficiently describe an adequately staffed and trained organization, appropriate procedures and approval authority, and necessary equipment and documentation to ensure protection of health and the environment relative to the material or process requested.

Honeywell MTW established a training program to ensure all personnel on site are trained to work safely and possess the knowledge of appropriate actions to take during an emergency, as discussed in Section 4.7, Radiation Safety Training of the LRA. Employees are trained commensurate with the work assignment and the risk involved. All new employees receive the following training:

- a. Indoctrination in plant safety procedures and the proper use of personal protective equipment;
- b. Radiation safety training, to the extent appropriate, following the guidance of 10 CFR 19.12, "Instruction to workers." Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure (Reference 82)," and RG 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure (Reference 80);"
- c. Safety Conscious Work Environment and Employee rights and Responsibilities, and
- d. Environmental safety training, including waste handling and disposal.

Refresher training is required annually and provides continuing training in safety hazards and proper radiation protection procedures through annual radiation safety presentations and is described in Section 4.7.2 of the LRA. Chapter 11.3 of the LRA describes in further detail the training and qualification program, including the selection of instructors, testing and feedback, retraining requirements, and records retention procedures. Chapter 11.3 of the LRA also describes the additional training for employees and contractors, including plant operator training, the training of maintenance personnel, contractor training, chemical and industrial safety training, and emergency response training.

The regulatory affairs manager at MTW is responsible for monitoring the development and implementation of plant programs and activities to ensure regulatory and license requirements are met, as described in Chapter 2.2.3 of the LRA. This position oversees specifically: (1) the development and implementation of the radiation protection program and monitors compliance with NRC regulatory and licensing requirements, and (2) the supervision of Health Physics Technicians and implementation of the Emergency Response and Fire Protection Programs. The regulatory affairs manager position requires a 4-year degree or equivalent experience in engineering, science, or related discipline. The position also requires at least 8 years of experience in the chemical or nuclear industry, with 2 years in nuclear fuel cycle and management and supervisory experience. The regulatory affairs manager has authority to shut down operations as they pertain to radiological safety. The health physics (HP) supervisor provides direct supervision to HP technicians and reports to the regulatory affairs manager. Chapter 4.5 of the LRA states that the HP supervisor requires a 4-year degree in engineering, science, or related discipline and four years of health physics or related experience.

Honeywell MTW does not identify a radiation safety officer (RSO) in its LRA, though several RGs cited in the application refer to the position. The NRC staff issued RAI 4-1 requesting clarification of any individual or position equivalent to an RSO. Honeywell responded that the responsibilities of the RSO are shared by the regulatory affairs manager and the HP supervisor (Reference 3). A description of the responsibilities stated the regulatory affairs manager provides management oversight for the radiation protection program. The HP supervisor is responsible for supervising day-to-day implementation of the program by technicians, specialists, and for coordinating with operations and maintenance. The regulatory affairs manager has shut down authority for operations that appear to be unsafe. While all employees have rights and responsibilities to identify and report any unsafe condition, the "stop work" process is structured to be initiated by the responsible supervisor. The regulatory affairs manager has authority to make that determination on his/her own.

In its response to the NRC staff's RAIs, Honeywell revised Chapters 2.2.3 and 4.2 of the application to clarify the roles of the regulatory affairs manager and the HP supervisor (Reference 4). Honeywell stated in Chapter 2.2.3 of a revision to application that the regulatory affairs manager provides oversight for development and implementation of the radiation protection program and monitors compliance with NRC regulatory and licensing requirements (Reference 4). Chapter 4.2 of the application states the health physics supervisor has primary responsibility for the technical adequacy and correctness of the radiation protection and ALARA programs, as well as responsibility for monitoring and supervising these programs (Reference 4).

4.2.1.1.c.1. Findings

Honeywell MTW established a training program commensurate with the scope of licensed activities and personnel activities. All on-site staff receive general training on the radiation protection and ALARA programs and employees with specialized functions receive additional training. Section 4.41 of the LRA states training is repeated annually and Honeywell commits to training identified in RGs 8.13 and 8.29. The NRC staff concludes that Honeywell MTW's program for training of the workforce will continue to satisfy the requirements in 10 CFR 40.32 (b). Therefore, the NRC staff finds Honeywell MTW's training program acceptable.

4.2.1.2 Radiation Work Permit Procedures

Section 20.1101(b) of 10 CFR, "Radiation protection programs, requires each licensee use to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to the members of the public that are ALARA. Honeywell MTW has established written procedures governing the development and implementation of its plant procedures. Honeywell MTW develops and maintains written procedures to guide implementation of the program in accordance with regulatory and license requirements and accepted guidance.

Honeywell provides descriptions of the content and the requirements of the Radiation Protection Program in an administrative procedure, MTW-ADM-HP-0100 (Reference 44). Written procedures govern a variety of plant activities, including administrative management processes, plant operations, maintenance, health physics, environmental, laboratory, and safety activities. Nuclear Service Procedures (NSP) are procedures that provide direction for the manipulation or operation of a system or component affecting licensed material. Nuclear Service Procedures are typically developed by an engineer with management oversight and then reviewed and approved in accordance with configuration management processes described in Chapter 11.1 of the LRA. Each NSP is reviewed by Safety, Environmental, and Health Physics personnel to ensure that pertinent issues related to their responsibilities are addressed. Section 11.4.2 of the LRA, each NSP is reviewed and recertified annually by the appropriate management entity.

Conducting certain maintenance operations requires that personnel enter areas housing uranium bearing tanks or vessels containing licensed material where potential exposure rates exceed 5 millirem per hour (mRem/hr). Chapter 4.6 of the LRA describes the permit system and its written procedures at Honeywell MTW which are implemented to ensure work assignments are performed safely. Permits are issued for a specific job and duration to provide instruction on job procedure, equipment necessary, precautions to monitor and minimize occupational exposures. HP personnel are required, by procedure, to be present whenever entry is made into containment structures of any kind, where the potential exists for exposure to airborne radioactivity. The permit system used will include, at a minimum:

- a. Preparation of the permit by the responsible individual with assistance, as required from HP personnel;
- b. Delineation on the permit of specific instructions regarding the task, the necessary safety precautions, and any safety equipment required;
- c. Appropriate monitoring of the affected space; and
- d. Approval and acknowledgement signatures.

Honeywell stated that, following elimination of the radiological hazard, the permit shall be terminated and routed for retention in accordance with plant procedures. Records associated with the permit system include completed permits and records of area entries.

4.2.1.2.a Findings

Honeywell MTW has established a strong program for the development of written procedures that incorporate engineering controls with the goal of minimizing personnel exposures in keeping with ALARA policy. Honeywell reviews procedures on an annual basis to evaluate for improvements and ensure best practices are incorporated. The NRC staff concludes that

Honeywell MTW's program for the use of written procedures will continue to satisfy the requirements in 10 CFR 20.1101(b) during the renewed license term. Therefore, the NRC staff finds that Honeywell MTW's use of written procedures and engineering controls to be acceptable.

4.2.1.3 Removal of Existing License Conditions Related to Radiation Protection and Renewal of Regulatory Exemptions Documented as License Conditions Related to Radiation Protection

4.2.1.3.a Removal of Existing License Conditions Related to Radiation Protection

On October 8, 2018, Honeywell requested the removal of license conditions 6D, 7D, 8D, 11, 12A-H, 13, 14A-C, 15A-E, 16A-E, and 18F on Amendment 13 of the license (Reference 50). The license amendment request was to eliminate conditions that are no longer applicable (Reference 4). Changes documented in this chapter of the SER are specific to the radiation protection program.

1. Removal of License Conditions 6D, 7D, 8D, 11, 12A-H, 13, 14A-C, 15A-E, 16A-E, and 18F for Ronan Gauges containing radioactive materials. On December 27, 2006, MTW submitted a licensing amendment request (Reference 37) to add two fixed radioactive gauges containing radiological sources manufactured by the Ronan Engineering Company. On April 5, 2007, the NRC staff approved Amendment 17, which allowed the acquisition and use of the radioactive gauges (Reference 71). On May 11, 2007, the NRC staff renewed Honeywell's license for a 10-year term (Reference 88). Honeywell's renewed license, labeled Materials License SUB-526, Amendment 0 (Reference 89), incorporated the license conditions approved in Amendment 17; however, some license conditions were renumbered. See Table 4.1. Additional license conditions were added to license SUB-526, Amendment 0 (Reference 89).

Table 4.1 License Condition Crosswalk

License Conditions on Amendment 0 (May 2007 License Renewal)	License Conditions on Amendment 17 (April 2007)	Specification
6D	6D	Identified specific byproduct material
7D	7D	Specified the form and gauge model
8D	8D	Limited the maximum activity to be possessed
9	18	Specified the requirement for the registration of the byproduct material under Subpart D of the Sealed Source and Device Registration, in accordance with 10 CFR Section 32.210
10	19	Renumbered
11	20	Assigned responsibility for carrying out the responsibilities in Appendix F of NUREG-1556, Volume 4 to the Health Physics Supervisor
12 (A-H)	21 (A-H)	Leak Test Requirements (Appendix I)
13	22	LC specified that sources may not be opened or removed from their source holders
14 (A-C)	23 (A-C)	Source Inventory Requirements added (Appendix H)

15 (A-E)	24 (A-E)	Conformance to Registration Certificate authorized procedures (Appendix H)
16 (A-E)	25 (A-E)	Operating Procedures (Appendix H)
18 (F)	18 (F)	Citation of Amendment 17 of previous license (before 2007 renewal) to possess and use gauges.

The radioactive Ronan gauges containing radiological sources were installed by the manufacturer, Ronan Engineering Company, and put into service in 2007. Honeywell terminated the use of the gauges and returned the sources to the manufacturer on November 11, 2009 (Reference 38). License conditions concerning these sources and gauges were not removed from the License, SUB-526 after they were returned. The condition referring to the materials and gauges remain on Amendment 13 to the license, which is the most recent amendment to the MTW license (Reference 27). Honeywell requested removal of the LCs addressing the use of materials and Ronan gauges because they are no longer present at MTW (Reference 50).

Table 4.2 License Condition Changes In Amendment 14

License Conditions	Action	Technical Justification
6D, 7D, 8D, 11, 12A-H, 13, 14A-C, 15A-E, 16A-E, 18F	Remove	<u>These license commitments are no longer applicable.</u> These conditions were documented in the license issued on April 5, 2007 with the approval of License Amendment 17 (Reference 71) and were carried forward in the previous renewal in 2007 (Reference 88). The Ronan Gauges transferred to a licensed gauge manufacturer as of November 5, 2009 (Reference 38).
10	Revise	The Ronan Gauges transferred to a licensed gauge manufacturer as of November 5, 2009 (Reference 38). License Condition 10 is revised to remove the reference to material item 6D from the license. LC 10 is revised as follows: Licensed material, as defined in LC-6E and LC-6F, shall be used by, or under the supervision of individuals who have received the training described in the licensee's letter dated December 27, 2006 (Reference 37). The licensee shall maintain records of the individuals designated as users, for a period of three (3) years following the last use of licensed material by the individual.

The NRC staff reviewed the facts concerning these LCs: (1) Honeywell is no longer in possession of the sources, (2) the sources were returned to the manufacturer in 2009, and (3) Honeywell requested and justified the removal of the LCs 6D, 7D, 8D, 11, 12A-H, 13, 14A-C, 15A-E, 16A-E, and 18F. These outdated LCs will be eliminated from the license to be issued with this renewal, as SUB-526, Amendment 14; they will be listed on the license as "Deleted." Table 4.2 of the SER lists the LCs deleted from the license. The NRC staff finds the request is in accordance with the NRC's regulations and is acceptable.

2. Surface Contamination Limits. In March 2009 (Reference 39), Honeywell submitted a license amendment request to revise the surface contamination levels for uranium and its daughter products in its license to be consistent with the guidelines in RG 8.30, "Health Physics Surveys for Uranium Recovery Facilities," (Reference 85). This amendment request was approved by the NRC staff on August 6, 2009, as Materials License SUB-526,

Amendment 5 (Reference 92) and documented as LC-18I. The license amendment was issued with the renewal on May 11, 2007, as SUB-526, Amendment 0 (Reference 89).

The surface contamination limits in LC-18I are fully described in the revised LRA at Chapter 4.9.4, Surface Contamination Surveys, where Honeywell commits to monitor and control areas within the restricted area for contamination and decontaminate appropriately. On October 8, 2018, Honeywell requested the deletion of LC-18I because its commitments and procedures are supported by a technical justification and this information is incorporated into the LRA at Chapter 4.9.4, (Reference 61). The NRC staff finds that LC-18I is not necessary because Honeywell's commitments and procedures in Chapter 4.9.4 of the LRA will serve to monitor and control surface contamination. These procedures are consistent with RG 3.55, Controlled Areas and are in accordance with regulations and therefore the NRC finds them acceptable. License Condition 18I is listed on Materials License SUB-526, Amendment 14 as "Deleted."

3. Calcium Fluoride Concentration. The NRC staff approved a limit on the concentration of radioactivity that could be recycled and sold on January 23, 1992 (Reference 76). Chapter 1 of the revised LRA describes the Uranium Hexafluoride (UF₆) production process at Section 1.5, Authorized Activities (Reference 61). During Hydrofluorination, Uranium Dioxide is converted into Uranium Tetrafluoride along with a recyclable byproduct, Calcium Fluoride (CaF₂). CaF₂ contains natural uranium and is slightly radioactive. The NRC approved this the concentration limit as a license condition in 1992 and the condition was carried forward on the Materials License SUB-526 through the renewal in May 11, 2007. It is currently LC-23, in Amendment 13 of the license (Reference 89).

Honeywell provides as commitments, its procedures for handling radioactive liquid and solid waste in Chapter 9.2.2 of the revised LRA. The revised LRA states that prior to offering synthetic CaF₂ for recycling, Honeywell limits the average concentration of uranium in calcium fluoride released to each commercial organization, for any consecutive 12-month period, to less than 212 pCi/gram. On October 8, 2018, Honeywell requested LC-23 be deleted because the commitments and procedures are supported by a technical justification and this information is incorporated into the LRA at Section 9.2.2 (Reference 50). The staff finds that LC-23 may be removed because Honeywell's commitments to conduct all authorized activities at MTW using the procedures described in Chapter 9.2.2 and are subject to the change process in LC-20. Staff finds the commitments in the LRA to be acceptable. LC-23 is listed on the Materials License SUB-526, Amendment 14 as "Deleted" (Reference 115).

4.2.1.3.a.1 Findings

Honeywell requested the deletion of LCs 6D, 7D, 8D, 11, 12A-H, 13, 14A-C, 15A-E, 16A-E, and 18F because the sources identified in the conditions are no longer used by Honeywell MTW. The removal of LC-18I and LC-23 was requested by the licensee because the subject matters of these license conditions have been included as commitments in the revised LRA (Reference 61). The staff reviewed the technical justifications for the removal of the LCs and as described above, concludes they are acceptable.

4.2.1.3.b Renewal of Regulatory Exemptions Documented as LCs Related to Radiation Protection

1. Radiological Hazard Posting/Radioactive Material Labeling. In 2007, MTW requested a specific exemption under 10 CFR 40.14 from 10 CFR 20.1902(a) requiring the posting of warning signs in individual radiation areas within the facility and 10 CFR 20.1904(a) requiring labeling of containers of natural uranium and the resulting intermediates and byproducts of uranium processing operations. Instead of posting each radiation area individually, as specified in 10 CFR 20.1902(a), Honeywell requested permission to establish one or more areas either within, or congruent with the restricted area, and to post all entrance or access points to these area(s) with signs bearing the standard radiation trefoil and the words:

CAUTION RADIATION AREA
RADIOACTIVE MATERIAL AREA
Any area or container in this plant (or “beyond this point”)
may contain radioactive materials.

The September 18, 2007 request (Reference 1) was approved by the NRC staff on November 2, 2007 (Reference 90). The exemption was listed as LC-22.

In Chapter 1.8.1 of the revised LRA (Reference 61), MTW requested renewal of the exemption. LC-22 is described in Chapter 4.10.1.2 of the revised LRA, Radiation Areas.

The licensee employed the alternative signage and labeling practices approved in 2007 without negative effects to workers or harm to the public health and safety during the past 12 years. The NRC inspectors observed these alternative practices during the course of routine inspections and the NRC staff concludes the alternative signage and labeling practices have been used effectively.

The NRC staff evaluated the exemption using the requirements in 10 CFR 20.2301. Section 20.2301 of 10 CFR states that the NRC “may, upon application by a licensee or upon its own initiative, grant an exemption from the requirements of the regulations in this part if it determines the exemption is authorized by law and would not result in undue hazard to life or property.” Based on this evaluation the staff determined:

Authorized by Law

MTW requested an exemption from the requirements of 10 CFR 20.1902 (a), as the regulations apply to posting of Individual Radiation Areas within the facility. Specifically, in lieu of posting individual radiation areas as specified in 10 CFR 20.1902(a), MTW has requested to be allowed to establish one or more areas either within, or congruent with the restricted area, and to post all entrance or access points to these area(s) with signs related to identifying a radiation area. The NRC staff determined that granting of the licensee’s proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission’s regulations. Therefore, the exemption is authorized by law.

No Undue Hazard to Life or Property

The licensee has employed these alternative signage and labeling practices approved in 2007 without negative effects to workers or harm to the public health and safety during the past 12 years. The NRC inspectors have observed these practices during routine inspections and the NRC staff concludes the alternative signage and labeling practices have been used effectively. Therefore, there is no undue hazard to life or property.

The staff finds continuation of the exemption for the 40-year renewal period to be acceptable.

The exemption language is modified to refer to the revised LRA and is documented as LC-22 in Amendment 14, as follows:

The licensee is granted an exemption from the requirements of 10 CFR 20.1902(a) requiring the posting of warning signs in individual radiation areas within the facility and 10 CFR 20.1904(a) requiring labeling of containers of natural uranium and the resulting intermediates and byproducts of uranium processing operations. Instead of posting radiation areas and containers individually, the licensee will establish one or more areas within, or congruent with the restricted area, and to post one post all entrance or access points to these area(s) with signs bearing the standard radiation trefoil and the words:

CAUTION RADIATION AREA
RADIOACTIVE MATERIAL AREA
Any area or container in this plant (or "beyond this point")
may contain radioactive materials

1. Exemption of MTW from parts of 10 CFR Part 20 and Adoption of International Council on Radiation Protection (ICRP) Methodologies. By letter dated October 5, 2011 (Reference 40), Honeywell requested an exemption under 10 CFR 20.2301 from a portion of the requirements in 10 CFR 20 Appendix B and 10 CFR 20.100. These regulations require that the licensee calculate occupational dose assessments at MTW by employing (1) the specific Derived Air Concentrations (DACs) and Annual Limits on Intake (ALIs) tabulated in Appendix B, and (2) the Organ Dose Weighting Factors listed in 10 CFR 20.1003. The exemption request sought authorization to allow MTW to use the alternative DAC and ALI values listed in ICRP Publication 68, Annals of the ICRP, Volume 24, Number 4, 1994 (Reference 64) and the Organ Dose Weighting Factors in ICRP 60 (Reference 63) for occupational dose assessment.

Honeywell's exemption request was consistent with Commission's direction in SRM-SECY-99-07, dated April 21, 1999 (Reference 84) authorizing the approval of exemptions of Part 20 regulations on a case-by-case basis. The staff reviewed the exemption request and granted the exemption after finding the alternative DAC and ALI values listed in International Commission on Radiation Protection (ICRP) Publication 68, Annals of the ICRP, Volume 24, Number 4, 1994 (Reference 64) and the Organ Dose Weighting Factors in ICRP 60 (Reference 63) for occupational dose assessments to be equivalent to the requirements in 10 CFR 20 Appendix B and 10 CFR 20.100. The staff found the alternative occupational dose limits provide reasonable assurance that workers will be adequately protected. The exemptions were documented in License SUB-526, Amendment 13 as LC-28 and LC-29 on June 13, 2012 (Reference 94).

In Chapter 1.8.1 of the revised LRA (Reference 2), Honeywell requested renewal of the exemption from the requirements in 10 CFR 20 Appendix B and 10 CFR 20.100. The licensee has used the alternative DACs and ALIs to calculate occupational exposures to radionuclides during the past 12 years without increasing occupational exposures or decreasing the public health and safety. This commitment is fully described in Chapter 4.9.1 of the application, Determination of Personnel Doses. Staff reviewed the substance of this exemption request as part of its review of the revised LRA. Honeywell continues to use the guidance in the International Council on Radiation Protection (ICRP) Methodologies.

The NRC staff evaluated the request to renew the exemption using the requirements in 10 CFR 20.2301. Section 20.2301 of 10 CFR states that the NRC “may, upon application by a licensee or upon its own initiative, grant an exemption from the requirements of the regulations in this part if it determines the exemption is authorized by law and would not result in undue hazard to life or property.” Based on this evaluation the staff determined:

Authorized by Law

This action changes the methodology by which the licensee assesses the internal dose of its workers and staff to an improved method that is recommended by the international scientific community. This exemption does not change, in any way, the NRC dose limits with which the licensee must comply for its workers and/or members of the public. The NRC staff has determined that granting of the licensee’s proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission’s regulations. Therefore, the exemption is authorized by law.

No Undue Hazard to Life or Property

The underlying purpose of 10 CFR Part 20 is to ensure that occupational workers and members of the public are protected from radiation; that their doses, as a result of licensed activities, are within prescribed limits; and that their doses are as low as reasonably achievable (ALARA). This exemption is in accordance with the ALARA principle, international standards on radiation protection, and does not conflict with established NRC dose limits. No new accident precursors are created by this exemption to allow modification to the values used to assess internal dose. In view of the above, there is no significant increase in the risk to workers or members of the public as a result of this action. Therefore, there is no endangerment to life or property.

Staff finds renewing the exemption for the 40-year renewal period to be acceptable. LC-28 and LC-29 will be renewed in Amendment 14, as stated below:

LC-28.

The licensee is granted an exemption from using the Derived Air Concentrations (DACs) and Annual Limits on Intake (ALIs) listed in Appendix B to 10 CFR Part 20 to calculate occupational exposures to radionuclides. As the alternative to the DACs and ALIs in Appendix B, the licensee must use adjusted DAC values and adjusted ALI values listed in ICRP Publication 68 (Annals of the ICRP, Volume 24, No. 4).

LC-29.

The licensee is granted an exemption from calculating effective dose assessments using the organ dose weighting factors in 10 CFR 20.1003. As the alternative to the organ dose weighting factors in 10 CFR Part 20.1003, the licensee must use the tissue weighting factors listed in ICRP Publication 60 (Annals of the ICRP, Volume 21, No. 1-3) for effective dose assessments listed in ICRP Publication 68 methodologies.

3. Twenty-four Hour Reporting Requirement for Medical Treatment of Contaminated Individuals. Honeywell requested a specific exemption under 10 CFR 40.14 from the requirements of 10 CFR 40.60(b)(3) by letter dated September 7, 2017 (Reference 46). The regulation requires a licensee notify the NRC, within 24 hours, after discovery of an event requiring unplanned medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual's clothing or body. Honeywell MTW requested an exemption from the 24-hour reporting requirement in situations when an individual is treated at its on-site medical facility. MTW supplemented the request by providing detailed exemption language (Reference 48). This request was approved on January 30, 2018 (Reference 106) and was documented as LC-31 and LC-18L by Amendment 12 to License SUB-526. Because the request was submitted during the staff review of the renewal application, Honeywell included the exemption request in Chapter 1.8.1 of the LRA submitted on October 8, 2018 (Reference 49). This commitment is further described in Chapter 11.6.2 of the application, Reports.

Paragraph 40.14(a) of 10 CFR authorizes the Commission to exempt regulatory requirements if the staff determines that the exemption is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest.

Authorized by Law

The NRC staff has determined that granting the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, other laws, or the Commission's regulations. Therefore, the NRC staff concludes that the requested exemption is authorized by law.

Common Defense and Security

The NRC staff determined that an exemption from the requirement to report within 24 hours any unplanned medical treatments at Honeywell MTW's on-site facility will not endanger life or property or the common defense and security. Honeywell MTW has established radiological or contamination-controlled areas that are designed to safely contain radioactive material contamination that may occur as a result of operations or maintenance activities within a restricted area with no public access. The on-site medical facility and routes an injured worker would take to get to the facility are not accessible to the public. In addition, Honeywell MTW uses trained and qualified radiation safety personnel who have appropriate equipment readily available. While the exemption request would eliminate the 24-hour reporting requirement for events requiring on-site treatment, Honeywell MTW will continue to maintain its log of contaminated workers treated at the on-site medical facility and will provide this information to NRC for inspection upon request. The elimination of the 24-hour reporting requirement also does not involve information or activities that could potentially impact

the common defense and security of the United States. Rather, the exemption requested is administrative in nature and would reduce the number of licensee actions caused by an event that requires unplanned medical treatment of an individual with spreadable radioactive contamination at the on-site medical facility. Based on its review, the NRC staff concludes that granting this exemption request would not endanger life or property or the common defense and security.

In the Public Interest

The NRC staff determined that granting Honeywell's exemption is otherwise in the public interest because it promotes regulatory efficiency by relieving Honeywell MTW from a reporting requirement that the NRC staff has determined is not needed, given the site-specific conditions and programs described above, without undue risk to public health and safety since it does not impact Honeywell's operations and/or safety programs. The exemption would relieve Honeywell MTW from generating reports within 24 hours of certain medical events and the NRC staff from receiving and processing these reports, thereby allowing regulatory resources to be focused on other activities.

The NRC granted Honeywell the exemption from the 10 CFR 40.60(b)(3) requirements on January 30, 2018 (Reference 106). The staff documented the exemption in LC-18L and LC-31 in Amendment 13 to License SUB-526. The NRC staff finds that during the 40-year license renewal term the activities authorized by the issuance of this exemption are in compliance with law, will not endanger life or property or the common defense and security, and are in the interest of the public. LC-31 is renewed in Amendment 14 of the license and states:

The licensee is granted an exemption from the full requirements of 10 CFR 40.60(b)(3). Specifically, the licensee is granted an exemption from the requirement to notify the NRC within 24 hours of an unplanned medical treatment of an individual with spreadable contamination on the individual's clothing or body at the on-site medical facility. The licensee commits to maintain a log of contaminated workers treated at the on-site medical facility and provide the information for NRC inspection upon request.

4.2.1.3.b.1 Findings

The NRC staff reviewed the request to renew three regulatory exemptions for the duration of the renewed 40-year license under the criteria of 10 CFR 20.2301 and 10 CFR 40.14. The staff finds the renewal of the exemptions for the 40-year term is acceptable and documented them as LC-22, LC-28, LC-29, and LC-31.

4.2.1.4 Conclusions

In 10 CFR 20.1101(a), it requires that a licensee develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this part. Based on its review of the licensee's commitments contained in the Honeywell revised LRA, the NRC staff finds that Honeywell MTW's Radiation Protection Program provides reasonable assurance that it will continue to satisfy these requirements. Honeywell stated that it commits to ensuring that the release of radioactive material and the exposure to ionizing radiation be kept ALARA. The NRC staff finds that these commitments provide reasonable assurance that during the renewed license term the

procedural controls will satisfy the requirements of 10 CFR 20.1101(b) and adequately protect health and minimize danger to life and property as required by 10 CFR 40.32(c).

The revised LRA describes a radiation protection program appropriate for possession, handling, and procedures for use of materials described. The revised LRA describes an adequate organizational structure, providing appropriate oversight of materials, ensuring the radiation safety organization is adequately trained and staffed, with sufficient independence to safely carry out work, and annually reviewed by key management personnel as required by 10 CFR 20.1101(c). The ALARA policy is consistent with the guidance of RG 8.10, "Operating Philosophy for Maintaining Occupational and Public Radiation Exposures as Low as is Reasonably Achievable," (Reference 100), to which Honeywell commits.

The NRC staff concludes that Honeywell MTW's Radiation Protection Program would continue to satisfy the requirements in 10 CFR 20.1101(a) during the renewed license term. Therefore, the NRC staff finds that Honeywell MTW's Radiation Protection Program is acceptable.

4.2.2 TECHNICAL REQUIREMENTS

The NRC staff reviewed the applicant's ALARA policy and program commitments for keeping occupational radiation exposures and radioactive contamination in effluents ALARA, and the implementation of the policy against the regulatory requirements in 10 CFR 40.32 and 10 CFR Part 20 and the guidance in Section 3.2 of RG 3.55 (Reference 74). The following discussion identifies each area reviewed and provides the NRC staff's evaluation as to whether the information provided by the licensee meets the relevant criterion.

4.2.2.1 Restricted Area – Access Control

The NRC's regulations at 10 CFR 40.32(c) requires that an applicant's proposed equipment, facilities, and procedures are adequate to protect health and minimize danger to life and property. The staff evaluated personnel access controls and the radiation protection aspects of an established Restricted Area. This section of the SER does not evaluate physical security requirements, which are addressed in Chapter 13 of this report.

The Restricted Area includes the area within the inner security fence, including the Administration Building that lies within the security checkpoint, as described in the revised LRA at Chapter 4.10.3, Restricted Area – Access Control. Access to the Restricted Area is monitored by the Security Force. Training and security authorization are required to obtain access to restricted areas of the plant. The licensee responded to the NRC staff's request for additional information on the management and control of personnel access and the means for ensuring that only qualified and trained individuals enter controlled areas in RAI 4-6 (Reference 3). Security personnel permit unescorted access for an individual only if the individual has met training and security requirements. Radiation safety training is required for an individual to have unescorted access to the restricted area. Personnel security badges are color coded for quick visual verification of the level of training completed and the level of access authorized, whether the individual is a licensee's staff member, a visitor, or a contractor. Escorted access may be granted to visitors or contractors after complete necessary training. For access to specific areas, respiratory protection training may be required. Section 20.1902 of 10 CFR, "Posting requirements," specifies requirements for posting warnings in radiation areas, high radiation areas, very high radiation areas, and airborne radioactivity areas. There are no very high radiation areas at Honeywell MTW.

Posting and labeling of controlled areas at Honeywell MTW are as follows:

- a. Restricted Area and Radioactive Material Area: Honeywell MTW has designated the entire Restricted Area as Radiation Area and Radioactive Material Area, in accordance with the exemption description in Chapter 4.2.1.3.b of this SER. The restricted area is the area within the inner security fence and includes the Administration Building. Honeywell MTW does not post individual areas or rooms within the Restricted Area, due to the impractical nature of posting areas where containers of natural uranium may be present.
- b. Radiation Area: The Radiation Area posting is indicated at all entrance or access points, which is authorized for convenience. Honeywell MTW uses yellow and magenta floor markings around process equipment at a distance sufficient to enclose the area where an individual could receive a Deep Dose Equivalent (DDE) corresponding to 5 mRem/hr, identifying a radiation area as defined by 10 CFR 20.1003.
- c. Airborne Radioactivity Area: Honeywell MTW provides postings for Airborne Radioactivity Areas as defined by 10 CFR 20.1003. Airborne Radioactivity Area postings are in accordance with 10 CFR 20.1902(d) and are augmented by flashing red lights to alert personnel to the hazard when present.
- d. High Radiation Area: Honeywell MTW provides postings for High Radiation Areas as defined in 10 CFR 20.1003. Postings are in accordance with 10 CFR 20.1902(b) and access controls are consistent with 10 CFR 20.1601. Section 4.10.1.4 of the revised LRA states that High Radiation Areas are controlled in accordance with 10 CFR 20.1602.

Area postings clearly define the radiologic hazards present in specific areas. Areas requiring the use of respiratory protection equipment are designated using both postings and flashing red lights and are described in Section 4.10.1.3 of the revised LRA, Airborne Radioactivity Areas. Control and survey frequency of the above areas are described in revised LRA Section 4.9.4.1, Table, 4-1, Surface Contamination Control.

4.2.2.1.a. Findings

Honeywell MTW has an access control program that properly controls authorized access to the operational area of the facility. Posting requirements are consistent with the regulations of 10 CFR 20.1902. The NRC staff concludes that Honeywell's Access Control Program will continue to satisfy the requirements in 10 CFR 40.32 (b). Therefore, the NRC staff finds that Honeywell MTW's access control program to be acceptable.

4.2.2.2 Radiation Survey Programs

The NRC staff reviewed Honeywell MTW's radiation survey and monitoring program commitments against the criteria in 10 CFR 20.1501(a)(1) and (2). The regulation states that a licensee will make surveys of areas that may be necessary for the licensee to comply with the regulations in Part 20, including measuring (i) the magnitude and extent of radiation levels, (ii) concentrations or quantities of residual radioactivity, and (iii) the potential radiological hazards of the radiation levels and residual radioactivity detected. Honeywell MTW uses written procedures to direct the performance of surveys and monitoring in the workplace, including performance of radiation surveys, contamination surveys, airborne radioactivity surveys, and

monitoring of external and internal dose to personnel in section 4.9 of the revised LRA. The NRC staff evaluated whether the information provided by the applicant meets the criterion and the staff finding are provided below.

4.2.2.2.a. Radiation and Surface Contamination Surveys

Honeywell MTW conducts routine gamma radiation surveys, consistent with guidance provided in Section 2.4 of RG 8.30, "Health Physics Surveys in Uranium Recovery Facilities," (Reference 85). General gamma radiation surveys are conducted, quarterly in known radiation areas, and semiannually in areas where radioactive materials are used, processed, or stored. These surveys are used to identify areas requiring posting and changes in radiological conditions. Radiation survey results are considered by the ALARA Committee as described in section 4.4.2 of the revised LRA.

Contamination monitoring and control of areas within the Restricted Area are designated as follows:

- a. Controlled Areas: Plant areas where uranium is processed and could be present in unencapsulated form.
- b. Intermediate Areas: Production areas for non-radioactive fluorine-based chemicals and plant support facilities.
- c. Uncontrolled Areas: Plant areas where food may be consumed, such as locker rooms and entrance/exit areas from the plant.

Areas within the Honeywell MTW site are designated by the categories in Table 4-1:

Table 4-1 Surface Contamination Control

Uncontrolled Areas	Intermediate Areas	Controlled Areas
Plant areas where food may be consumed, locker rooms, and entrance/exit areas	Production areas for non-radioactive fluorine-based chemicals and plant support areas	Plant areas in which uranium is processed and could be present in unencapsulated form
Removable Contamination Action Level: 200 dpm/100cm ² (alpha)	Removable Contamination Action Level: 200 dpm/100cm ² (alpha)	Removable Contamination Action Level: 75,000 dpm/100cm ² (alpha)
Survey Frequency: Weekly	Survey Frequency: Quarterly	Survey Frequency: Monthly

Areas found that exceed the specified action level are scheduled for decontamination and a follow-up survey to ensure successful decontamination is conducted. To limit the likelihood of personnel intakes radioactive material within authorized eating and smoking areas, Honeywell MTW established written procedures to control cleanliness, eating, or smoking. Procedural requirements are reinforced through periodic safety training.

Paragraph 20.1101(b) of 10 CFR requires to the extent practical, the use of procedures and engineering controls based on sound radiation protection principles to achieve occupational doses and doses to the public that are ALARA. The consideration of and planning to minimize the spread of contamination is part of good radiation protection. Honeywell MTW provides

change rooms to facilitate donning, removal, and storage of protective clothing. Honeywell MTW requires the use of this clothing in designated areas, which consist of lab coats, shoe covers, coveralls, and gloves. Personnel exiting the change rooms must pass through a personnel monitoring station before exiting. Additional protective clothing and equipment may be required for activities that could potentially expose the employee to hazardous chemicals. Administrative controls establish protective equipment requirements for each job.

Paragraph 20.1501(a)(2)(i) and (ii) of 10 CFR requires that each licensee make surveys that are reasonable to evaluate the magnitude and extent of radiation levels and the concentrations or quantities of residual radioactivity. Honeywell MTW policy requires all individuals who have entered the restricted area to perform personal contamination monitoring. At a minimum, this includes hand and foot frisking. Survey instrumentation is stationed at all exits for personnel monitoring. Health physics personnel survey all articles used in uranium process areas to ensure they are eligible for release for unrestricted use using the criteria specified in Table 2 of RG 8.30, "Health Physics Surveys for Uranium Recovery Facilities," (Reference 85). Transport vehicles are surveyed prior to exiting the restricted area.

4.2.2.2.a.1. Findings

The Honeywell MTW revised LRA does not propose significant changes to its radiation survey and monitoring programs, which have been successfully implemented for many years. Based on the staff's evaluation of MTW's commitments to follow written procedures and regulatory guidance, the staff finds the application provides reasonable assurance that the proposed equipment and procedures to be used in the radiation survey and monitoring programs will continue to adequately protect health and minimize danger to life and property as required by 10 CFR 40.32(c). Therefore, the NRC staff finds that these programs are acceptable.

4.2.2.2.b. Ventilation and Airborne Radioactivity Sampling

Section 4.9.2 of the revised LRA describes the airborne sampling program and supplements Section 4.8.1 which describes MTW's ventilation system. Most of the uranium processing equipment is housed in the Feed Materials Building (FMB), where essentially all steps in manufacturing UF₆ are conducted. The primary measure Honeywell uses to maintain internal exposures ALARA at MTW is to confine source material within process vessels. The ventilation system of the FMB consists of a series of fresh air intakes units and a series of window fans and roof vents. Honeywell MTW's Standard Operating Procedure MTW-SOP-HP-0201, "Determination of Airborne Radioactivity," (Reference 75) provides direction on air sampling processes and actions to be taken based on the results. The FMB Control Room has a separate air conditioning system. The Control Room is maintained under a slight positive pressure during a UF₆ release and has fresh air intakes located outside the UF₆ process building. Honeywell provides workroom air sampling in this area. Operating personnel monitor the operation of pollution control equipment. Additional samples, visual observation, and other precautions shall be taken as necessary to ensure effective performance of pollution control equipment.

Honeywell MTW establishes a system to sample operating exhaust points to determine uranium content. It conducts an extensive air sampling program, of both fixed and portable sampling, to identify early indications of degradation of the confinement systems. Fixed air samplers are positioned in breathing zones, consistent with the guidance of RG 8.25, "Air Sampling in the Workplace," (Reference 75). The sampling rate is 40 cubic feet per hour, consistent with radiation protection and occupational health standards as defined in ICRP 68 (Reference 64).

Two action levels have been established for use with monitoring of air concentration and radioactivity. At 30 percent of the DAC the area is posted as an airborne radioactivity area. At 1 DAC, from any single air sample, due to an unplanned event, a formal investigation is initiated. One DAC of Class M natural uranium is determined to be 3×10^{-10} microcuries per milliliter (uCi/ml), in accordance with ICRP 68. Thirty percent of the DAC is 9×10^{-11} uCi/ml.

The NRC staff requested clarification on the level of airborne contamination, or administrative level, at which employees are required to wear respiratory protection. Honeywell MTW responded in RAI 4-9 (Reference 3) that when the average airborne activity exceeds 30 percent of the DAC value, the area is posted as an Airborne Radioactivity Area (ARA). Posting of an area as an ARA requires the use of respiratory protection for entry.

Section 9.2 of the revised LRA states that Honeywell MTW establishes controls on facility effluents consistent with the requirements of 10 CFR 20.1101(d) to ensure the individual member of the public who is likely to receive the highest dose is not expected to receive a Total Effective Dose Equivalent (TEDE) exceeding 10mRem (0.1 mSv) per year from Honeywell MTW gaseous emissions.

Results from the Radiological Environmental Monitoring Program (air and water) are reviewed weekly by Health Physics. The environmental information is utilized to perform trend analysis. Undesirable trends are reported to plant management via ALARA committee meetings, audits, or immediately depending on the severity of the condition.

4.2.2.2.b.1. Findings

Honeywell MTW has established an airborne survey monitoring program commensurate with the scope of licensed activities and personnel activities. Honeywell has established written procedures for the proper use of survey equipment, airborne contamination limits, and survey frequencies that are adequate to protect health and keep occupational exposure ALARA. The Honeywell MTW revised LRA at Chapter 9 does not propose significant changes to the radiation survey and monitoring programs, which have been successfully implemented for many years. Based on the staff's evaluation of MTW's commitments in Chapter 9 to follow written procedures and regulatory guidance, the staff finds the revised LRA provides reasonable assurance that the survey and monitoring program will continue to adequately protect health and minimize danger to life and property as required by 10 CFR 40.32(c). Therefore, the NRC staff finds that these programs are acceptable.

4.2.2.2.c. Respiratory Protection Program

Paragraph 40.32(c) of 10 CFR states if the applicant's proposed equipment, facilities, and procedures are adequate to protect health and minimize danger to life and property and the other requirements of 10 CFR 40.32 are met, a specific license will be approved. Section 20.1701 of 10 CFR states that each licensee shall use process or other engineering controls to control the concentration of radioactive material in the air, to the extent practical. The NRC staff reviewed Honeywell's revised LRA for commitments in the conduct of the respiratory protection program. This section assesses Honeywell MTW's approach to the use of respiratory protection equipment, the means of qualifying an employee for use of a respirator, and finally equipment selection.

Section 4.8.2 of the revised LRA describes the Honeywell MTW Respiratory Protection Program. The primary method of maintaining internal exposures ALARA is through confinement of material within process vessels. Action levels, described in the preceding section, dictate the actions taken to minimize internal exposures. Written procedures are in place to prescribe when respirator usage is required for radiological protection. Honeywell provided its MTW procedure, MTW-ADM-HP-0113, "Respiratory Protection Program," (Reference 42) to the NRC staff for review, and the staff has found it to be consistent with RG 8.15, "Acceptable Programs for Respiratory Protection," (Reference 83). The NRC staff notes that this procedure includes direction on qualification, testing, training, fit-testing, maintenance, and storage.

The respiratory protection program calls for shared responsibilities between the Health Physics and Safety Departments. This program is overseen by a Respirator Program Administrator who is required to have a bachelor's degree in one of the sciences and at least 3 years of experience in safety or health physics, including respiratory protection. There are other assigned support personnel for maintenance, recordkeeping, and repair. A nurse practitioner or physician's assistant may perform the medical examination of a program candidate, but only a physician will approve and certify personnel for the program. In addition, the physician will periodically review the implementation of the program.

Only National Institute of Occupational Safety and Health approved respiratory equipment is being utilized at Honeywell MTW. Each employee who may be required to wear a respirator is medically evaluated and approved by a physician. Respirator users are required to be re-examined and certified every 12 months. Employees are fit-tested, instructed in proper fitting and field testing. Training and quantitative fit-testing are conducted annually for each respirator-qualified employee. Respiratory protective equipment is available at strategic locations throughout the plant for immediate use. Honeywell MTW determines individual doses using the results of bioassay assessments, discounting respiratory protection factors. Records are maintained regarding testing, training, and maintenance of the respiratory protection program.

4.2.2.2.c.1. Findings

Honeywell MTW has a well-established respiratory protection program to go along with a documented airborne radioactivity sampling program, described in Chapter 4.2.2.1 of this chapter. The respiratory protection program is based on written procedures, consistent with 10 CFR 20.1101(b), and has been used and evaluated over several years. The NRC staff also found that the written procedures are consistent with RG 8.15, "Acceptable Programs for Respiratory Protection," (Reference 83). The NRC staff concludes that Honeywell MTW's respiratory protection program will continue to satisfy the requirements in 10 CFR 40.32(b) and 10 CFR 20.1502. Therefore, the NRC staff finds that Honeywell MTW's respiratory protection program to be acceptable.

4.2.2.3. Radioactivity Measurement Instrumentation

Section 4.3.2 of the revised LRA discusses equipment and instrumentation, both fixed and portable. The applicant states that an adequate number of radiation detection instruments will be available to ensure that proper radiation surveys can be performed. Selection criteria for portable and laboratory counting equipment will be based on the types of radiation detected, maintenance requirements, ruggedness, interchangeability, and the upper and lower limits of detection. These are identified in Table 4.2 of the revised LRA, Radiological Monitoring Instruments, and are calibrated as recommended by the manufacturer.

Natural uranium processed at Honeywell MTW is primarily an alpha particle emitter. This material also emits detectable beta and gamma radiations. Although MTW possesses the instrumentation to detect alpha particles, Geiger-Mueller detectors are the most sensitive and efficient for quick detection of potential contamination, strictly as a qualitative result. Quantitative alpha detection is employed for routine contamination surveys and radioactive material shipment surveys. Sufficient instrumentation is maintained, primarily stored in the health physics offices, to assure an effective radiological monitoring capability.

Section 4.9.2 of the revised LRA, Airborne Radioactivity Sampling, states that Honeywell MTW utilizes fixed and portable work area air samplers in areas where radioactive materials are handled or processed when operations could expose workers to inhalation quantities of radioactive material exceeding 10 percent of DAC. The NRC staff requested explanation for a determination regarding when portable air samplers are deployed. Honeywell responded in RAI 4-11 that portable air samplers are used in non-routine situations when individuals may be exposed to significant quantities of un-encapsulated uranium, when fixed samplers are not available in the area (Reference 3). Honeywell MTW establishes plant requirements for the use of portable air samplers in MTW-SOP-HP-0201, 'Determination of Airborne Activity,' (Reference 41).

Section 4.3.2 of the revised LRA states that instrument calibration is performed by qualified vendors or trained health physics technicians. The NRC staff requested clarification regarding when vendors or in-house technicians are used. Honeywell MTW responded in RAI 4-11 that offsite vendors are typically used when monitoring equipment requires maintenance or when manipulation of higher activity sealed sources are required (Reference 3). Honeywell MTW stated installed air sampling equipment, sample analysis equipment, and low-level contamination monitoring equipment are typically calibrated using in-house resources (Reference 3). In all cases, calibration is performed in accordance with approved plant procedures following manufacturer's specifications. The base instruction Honeywell MTW uses for direction of calibration of instruments is MTW-SOP-HP-0230, 'Calibration and Test of Portable Radiation Detection Instruments,' (Reference 45). Additional plant procedures are maintained for specific detection equipment.

Kinetic Phosphorescence Analysis (KPA) is a very sensitive analytical method for the detection of uranium in aqueous solutions. It is used for detecting uranium concentrations in biological and environmental systems at extremely low levels. Honeywell MTW uses KPA for several applications, including assessment of internal dose and potential uranium uptake in environmental samples, such as vegetation, water, and soil. This process is well described in Honeywell MTW's Standard Operating Procedure MTW-SOP-HP-0213, "Kinetic Phosphorometric Determination of Uranium," (Reference 47). Sample preparation is key to useful analysis. Honeywell MTW maintains training for eight staff members in KPA processing, which is used daily, and processes 10-12,000 samples on an annual basis.

4.2.2.3.1. Findings

The NRC staff finds Honeywell MTW has established a survey and monitoring program commensurate with the scope of licensed activities and personnel activities. Honeywell has established written procedures for the proper use of survey equipment, surface contamination limits, and survey frequencies that are adequate to protect health and keep occupational exposure ALARA. Honeywell possesses an adequate amount of fixed and portable equipment for the work conducted, ensuring calibration is properly maintained. Release criteria are consistent with RG 8.30, "Health Physics Surveys in Uranium Recovery Facilities," (Reference

85). The NRC staff concludes that Honeywell MTW's radiation survey and monitoring program will continue to satisfy the requirements in 10 CFR 40.32(b) and 10 CFR 20.1501(a). Therefore, the NRC staff finds that Honeywell MTW's survey and monitoring program to be acceptable.

4.2.2.4 Radiation Exposures

Paragraph 40.32(c) of 10 CFR states if the applicant's proposed equipment, facilities, and procedures are adequate to protect health and minimize danger to life and property and the other requirements of 10 CFR 40.32 are met, a specific license will be approved.

Section 20.1502 of 10 CFR states that each licensee shall monitor exposure to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of Part 20. The NRC staff reviewed Honeywell's revised LRA for commitments to conduct programs for determining, validating, and controlling occupational exposures. This section addresses Honeywell MTW's means of assessing radiation dose, both externally and internally. Administrative exposure limits are identified in Section 4.9 of the revised LRA, as well as the actions to be taken, if these occupational dose limits levels are exceeded.

4.2.2.4.1 External Exposure and Monitoring

Monitoring of external occupational exposure is described in Section 4.9.1 of the revised LRA. Honeywell MTW has written procedures in MTW-ADM-HP-0100, "Radiological Protection Program," (Reference 44), which define the general rules for working within the Restricted Area, to include Personal Protective Equipment, posting and labeling, and dosimetry requirements. The procedures state that the HP office will evaluate staff assignments and the need for dosimetry based on potential exposure that might be received on the job. These procedures describe how dosimetry is worn and when it will be worn. Honeywell MTW implements an external dosimetry program that includes the following features:

- a. Use of a Honeywell MTW-issued personnel dosimeter by each individual who enters an area where external exposures are likely to exceed 10 percent of the applicable dose limits as established in 10 CFR 20;
- b. Processing of personnel dosimeters by a dosimetry processor holding current National Voluntary Laboratory Accreditation Program (NVLAP);
- c. Notification of Health Physics by the processor of any external dose exceeding administrative control levels established by the ALARA Committee; and
- d. For any external doses exceeding the administrative control levels established by the ALARA Committee, completion of an investigation to determine the source of the exposure and corrective actions to prevent further exposures exceeding administrative control levels.

In response to NRC staff's RAI 4-5, which requested details regarding the dosimetry used and the associated program structure, Honeywell MTW responded that the dosimeter used is an optically stimulated dosimeter provided by an NVLAP-accredited vendor, Landauer, that provides, processes, and reports the measured external dose (Reference 3). Radiation significant to external dose emitted from uranium and their progeny fall within the sensitive range of this dosimeter. The dosimeter is sensitive to photon radiation energies from 5 kilo-electron volts (KeV) to 40 mega-electron volts (MeV) and beta particle energies from 150 KeV to 10 MeV. The minimum reportable dose for photons and beta particles is 1 mRem

and 10 mRem, respectively. Dosimetry is routinely issued to employees at the beginning of the calendar month and collected at the end of the month. These are then sent to Landauer for processing and analysis. Honeywell MTW does not normally use pocket ionization chambers as a means of a temporary dose record, because they are not sensitive to radiation emitted from materials processed at MTW.

The NRC staff requested the Administrative Control Levels (ACL) for external exposure in RAI 4-4, Honeywell responded (Reference 3):

- a. TEDE:
 - o 375 mRem per calendar quarter
 - o 1125 mRem per calendar year
- b. DDE:
 - o 125 mRem per calendar month
 - o 375 mRem per calendar quarter

MTW's Health Physics department is notified by the dosimetry processor of any external dose exceeding these administrative limits. The department will initiate and support an investigation that is conducted by the individual's manager. The investigation will determine the source of elevated exposure and if corrective actions are required.

Honeywell MTW procedures describe dosimetry requirements for a Declared Pregnant Woman (DPW). The MTW policy for issuing dosimetry to a DPW is consistent with 10 CFR 20.1208. Relevant plant procedures provide for a form to be completed if a woman decides to declare her pregnancy and will restrict exposure consistent with regulations (100 mRem). If she decides not to declare her pregnancy, her exposure limit will remain at 5,000 mRem. A woman who decides to declare will still be subject to the ACLs in place for all employees.

The external exposure data for years 2012 through 2016 shows that annual exposures are typically less than 10 percent of the TEDE and consistent with the ACL set by the ALARA Committee, no employee exceeded 1 Rem per year.

4.2.2.4.2. Internal Exposure and Monitoring

Section 4.9.1 of the revised LRA describes the basis of inclusion in the internal monitoring program and action thresholds. Typical Whole Body Counting techniques (e.g., lung counting) are not effective to the analysis of low-level exposures to natural uranium compounds processed by Honeywell MTW. For this reason, bioassay and air sampling programs are used to accomplish the internal exposure evaluations. Internal exposures are determined primarily through implementation of the bioassay program, including both routine and special urinary sampling and analysis.

The uranium concentration, contained within the urinary bioassay samples, is determined by using the plant procedure MTW-HP-SOP-0213 (Reference 47), which Honeywell provided to the NRC staff for review. KPA is a sensitive method of detecting trace amounts of uranium in low-level samples measuring laser-induced phosphorescence emitted from a sample compared to a known standard to determine concentration. Results of the analysis are interpreted using methodologies consistent with RG 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program" (Reference 79) and NUREG/CR-4884, "Interpretation of Bioassay Measurements" (Reference 70) along with ICRP Publications 30, 66, and 68. The

cumulative intakes and the dose associated with intakes are documented with personal information within a database used to prepare information necessary for distribution to the employees and submission to the NRC Radiation Exposure Information and Reporting System.

All individuals who routinely access areas where unsealed quantities of uranium are used or processed are included in the bioassay program, which includes the following features:

- a. Sample Collection
 - Bioassay samples cannot be collected while wearing plant clothing.
 - Four types of bioassay samples:
 - Baseline samples, which would be taken prior to employment;
 - Routine samples;
 - Special exposure samples; and
 - Exit samples
- b. Routine urinalysis on an established schedule;
- c. Special urinalysis following specified events and evolution;
- d. As established evaluation level in which a repeat sample is collected; and
- e. An established Investigation Level (IL) which requires investigation upon the exceedance of the threshold.

In section 4.9.1 of the revised LRA, Honeywell MTW commits to using an outside contractor for applicable analysis if the initial investigation indicates a possible Committed Effective Dose Equivalent exceeding 5 Rem.

In response to NRC staff's RAI 4-8 (Reference 3), Honeywell MTW identified the established schedule for routine urinalysis:

- a. Hourly employees are required to provide a bioassay sample twice monthly.
- b. Salaried staff, routinely working inside the restricted area will provide a bioassay sample monthly. Administrative staff will provide bioassay on a case basis.

In response to NRC staff's RAI 4-4 (Reference 3), requesting ACLs for internal exposure, Honeywell MTW responded:

- a. Evaluation Level (EL): 2 percent of the ALI
- b. IL: 10 percent for Type M and S material

Special bioassay samples are required if a routine sample is determined to exceed the EL. Honeywell MTW has established an EL and an IL corresponding to 2 percent and 10 percent, respectively, of the defined ALI. Follow-up samples are taken, and an evaluation conducted to determine an intake, if the results exceed the IL. If the bioassay result exceeds the IL, bioassay samples will be collected until the sample results are less than the IL. Work restrictions are implemented if an intake exceeds the weekly limit of 10 mg for soluble uranium or 30 percent of the applicable ALI. There is no difference in the method of sample collection between a routine or special bioassay, other than the priority of evaluation, by precedence.

In RAI 4-8, the NRC staff requested that Honeywell clarify language in LRA Section 4.9.1 that stated: “following confined space entries where employees might exceed the DAC, and following UF₆ release, employees are encouraged to submit urine samples at the start of the next shift” (Reference 3). Honeywell MTW explained that the language means a sample may be collected at more optimal time, rather than immediately following the event, when uptake results might exhibit a high degree of variability (Reference 3).

4.2.2.4.a. Findings

Honeywell MTW has a well-established personnel monitoring program in place, which includes an external monitoring program that uses a dosimeter and processor from an independent vendor, described in section 4.9.1 of the revised LRA. Additionally, Honeywell conducts an internal monitoring program on-site. These programs are based on written procedures that are consistent with 10 CFR 20.1101(b), and have been used and evaluated over several years. Results of the analysis are interpreted using methodologies consistent with RG 8.9, “Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program” (Reference 79). The NRC staff concludes that Honeywell MTW’s radiation personnel monitoring program will continue to satisfy the requirements in 10 CFR 40.32(b) and 10 CFR 20.1502. Therefore, the NRC staff finds that Honeywell MTW’s personnel monitoring program to be acceptable.

4.2.2.5 Conclusions

As stated in 10 CFR 20.1101(b), the licensee is required to use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses to members and doses to members of the public that are ALARA. The NRC staff reviewed the systems for exposure controls, which include external and internal radiation exposures, air sampling program, bioassay program, control of surface contamination, radiation survey and monitoring program, and respiratory protection. The NRC staff finds that the systems for limiting workers’ external and internal exposures, which include area control, survey frequency, monitoring programs, and respiratory equipment are acceptable and commensurate with the scope of licensed activities. Additionally, staff finds the technical requirements of 10 CFR 20.1101(b) have been adequately addressed in the submittal and are consistent with RG 3.55 (Reference 74). Based on the NRC staff’s evaluation of Honeywell MTW’s commitments in Section 4.9 of the revised LRA, the staff finds that the LRA provides reasonable assurance that the proposed equipment and procedures to be used in the radiation survey and monitoring programs will continue to adequately protect health and minimize danger to life and property as required by 10 CFR 40.32(c). Therefore, the NRC staff finds that these programs are acceptable.

4.2.3 ADDITIONAL PROGRAM REQUIREMENTS

Subpart L—Records of 10 CFR Part 20, requires the licensee to maintain records of the radiation protection program, including the provisions of the program, survey records, audits and other records. Subpart M—Reports of 10 CFR Part 20, requires the licensee make reports and notifications, including theft or loss, notification of incidents, and other reports.

Section 4.11 of the revised LRA states that Honeywell MTW implements a program to ensure that the proper production, storage, and retention of records, relevant to radiation protection activities, including occupational exposure of personnel to radiation, releases of radioactive materials to the environment, staff training, instrument calibrations, safety review committee meetings, and other pertinent activities in such a manner as to demonstrate compliance with

NRC license conditions and regulations. In this section, Honeywell MTW describes records and reports that relate directly to radiation exposure of employees and/or members of the public. Honeywell MTW also retains other records that relate indirectly to personnel exposure. Retention periods for these records are also described in section 4.11 of the revised LRA section. The NRC staff reviewed the applicant's additional program commitments against the acceptance criteria in NUREG-1520, Section 4.4.9.3 (Reference 98).

The NRC staff evaluated whether the information provided by the applicant is consistent with the criterion in NUREG-1520 and presents its assessment below.

- a. Honeywell MTW maintains records of the radiation protection program (including program provisions, audits, and reviews of the program content and implementation), radiation survey results (air sampling, bioassays, external-exposure data from monitoring of individuals, internal intakes of radioactive material), and results of its corrective action program referrals, radiation work permits (RWPs), and planned special exposures;
 - 1) Radiation Exposure Records. The following are retained indefinitely, unless otherwise authorized:
 - Personnel and environmental dosimetry results;
 - Bioassay results (urinalysis and whole body counting);
 - Environmental measurements (air, soil, sediment, water, and vegetation);
 - Events reportable to the NRC.
 - 2) Records Supporting Exposure Evaluations. The following are retained a minimum of five years:
 - Radiological surveys;
 - Contamination survey results;
 - Daily gaseous and liquid effluent measurements;
 - Daily workroom air activity measurements;
 - Fence line air sampling data; and
 - Health physics instrument calibration records.
 - 3) Other Records and Reports. The following reports and records are maintained a minimum of five years:
 - ALARA Committee Meeting Minutes;
 - Health Physics Audit Reports;
 - Semi-annual Radiological Environmental Report; and
 - Health Physics Instrument Calibration.

- b. Honeywell MTW established a program to report to the NRC, within the time specified in regulations, incidents specified in 10 CFR 20.2202, "Notifications of Incidents." Honeywell commits at Section 11.6.2 of the revised LRA to prepare and submit to the NRC an annual report required by 10 CFR 20.2206.

In revised LRA, Section 4.11.5, Honeywell MTW commits to notifying the NRC of events involving radiation or radioactive materials in accordance with 10 CFR 19.13, 10 CFR 20.2202, 10 CFR 20.2203, 10 CFR 20.2206, and 10 CFR 40.60. Honeywell commits that reports will be made to the NRC Headquarters Operations Center and pertinent local or state agencies. Honeywell does not propose changes to the Radiation Protection recordkeeping and reporting commitments. The staff's evaluated the commitments in the revised LRA against the acceptance criteria in Section 4.4.9.3 of NUREG-1520. The staff finds the commitments provide reasonable assurance that Honeywell will continue to comply with 10 CFR 20.2202, 10 CFR 20.2206 and 10 CFR 40.60. Therefore, the NRC staff finds that these program commitments are acceptable.

4.3 Evaluation Findings

Based on the review, the NRC staff finds that the applicant has committed to maintaining an acceptable Radiation Protection Program that includes the following elements:

- an effective, documented program to ensure that occupational radiological exposures are ALARA;
- an organization with adequate qualification requirements for the radiation protection personnel;
- approved, written radiation protection procedures and RWPs for radiation protection activities radiation protection training for all personnel who have access to restricted areas;
- radiation protection training for all personnel who have access to restricted areas;
- a program to control airborne concentrations of radioactive material with engineering controls and respiratory protection;
- a radiation survey and monitoring program that includes requirements for controlling radiological contamination within the facility and monitoring of external and internal radiation exposures; and
- other programs to maintain records, report to the NRC in accordance with 10 CFR Part 20 and 10 CFR Part 40 and appropriately respond to, investigate, and prevent incidents and accidents involving radiological exposures or uncontrolled releases of radioactive material.

The applicant demonstrates a commitment to an operating philosophy consistent with RG 8.10 (Reference 100). The staff finds that the commitments to an effective ALARA program are acceptable because the relevant procedures are based upon sound radiation protection principles and demonstrate occupational doses and doses to members of the public that are ALARA, as required by 10 CFR 20.1101(b). Therefore, the NRC staff finds that Honeywell

MTW's Radiation Protection Program is acceptable. The NRC staff concludes that there is reasonable assurance, that during the 40-year license term, the applicant's radiation protection program will continue to meet the applicable requirements of 10 CFR Parts 19, 20, and 40, as discussed in Section 4.2.

CHAPTER 5 NUCLEAR CRITICALITY SAFETY

Honeywell MTW is a source material facility licensed under Title 10 CFR Part 40. As such, the facility does not process materials requiring nuclear criticality controls, nor possess special nuclear material (SNM) other than check sources used for calibration licensed by the Agreement State. In particular, 10 CFR Part 40 does not contain criticality requirements for source material due to the absence of enriched material. The NRC staff notes that Honeywell MTW does not have a Nuclear Criticality Safety (NCS) program or procedures. Honeywell is not authorized to possess SNM under the NRC's source materials license and, therefore, is not required to implement an NCS program. Because there are no nuclear criticality concerns present at Honeywell MTW, nuclear criticality safety requirements do not apply for the MTW facility.

CHAPTER 6 CHEMICAL PROCESS SAFETY

6.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the LRA including the facility and process description to determine whether the revised LRA (Reference 61) submitted by Honeywell met the requirements of 10 CFR 40.43, "Renewal of Licenses," 10 CFR 40.45, "Commission action on applications to renew or amend," 10 CFR 40.31, "Application for specific licenses," and 10 CFR 40.32, "General requirements for issuance of specific licenses." The purpose of the chemical process safety review was to determine that the Honeywell MTW facility adequately protects workers, the public, and the environment against chemical hazards of licensed material and hazardous chemicals produced from licensed material. The licensee must also protect against facility conditions or operator actions that can affect the safety of licensed materials and thus present an increased radiological risk.

6.2 Staff Review and Analysis

The NRC staff conducted the chemical safety review to ensure that the licensee has the qualified personnel, equipment, facilities and procedures to protect workers, the public, and the environment from chemical hazards under NRC's regulatory jurisdiction.

The regulatory criteria for this review are in 10 CFR 40.32. The specific criteria of relevance for chemical safety are 40.32(b), (c), and (d):

The applicant is qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property.

The applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property.

The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

The uranium conversion operations at MTW involves chemical processing and can present chemical hazards that impact workers and the public health and thus presents a danger to life or property. NRC has regulatory authority over chemical hazards produced from licensed material and facility conditions (including chemical hazards) that affect the safety of licensed material (Reference 140).

Chapter 6.0 of Honeywell's revised LRA (Reference 61) discusses personnel qualification as well as equipment, facilities and procedures that make up its program for identifying and managing chemical hazards that are under NRC's regulatory authority.

Section 6.2.1 of the revised LRA presents an overview of chemical hazards and identifies the MTW licensed operations that are considered to present the greater level of chemical hazard that is under NRC's regulatory jurisdiction. Section 6.2.2 presents the staff review of the Honeywell license application submittal against the applicable regulatory requirements.

The overall evaluation of the personnel qualifications, equipment, facilities and procedures is presented in Section 6.3 of the revised LRA.

6.2.1 OVERVIEW OF MTW OPERATIONS AND CHEMICAL HAZARDS UNDER NRC REGULATORY JURISDICTION.

This review and analysis of the Honeywell chemical safety program is based on commitments made in the revised LRA (Reference 61), and information provided in responses to requests for additional information (Reference 3) and supplemented by information obtained from a review of its integrated safety analysis (ISA) Summary (Reference 14) that is updated annually. This review was further informed by an examination of Honeywell procedures and safety program documents that are related to the chemical safety program at the facility (Reference 139).

The review examined the nature of the operations at the MTW which converts yellow cake (U_3O_8) that is received in 55-gallon drums to high purity uranium hexafluoride (UF_6) that is loaded into cylinders which meet the requirements of American National Standards Institute (ANSI) N14.1, "Packaging of Uranium Hexafluoride for Transport". The major objective of this aspect of the review was to obtain insight into the relative chemical risks of the various portions of the MTW operations.

The major process steps are shown in Figure 1.1 of the revised LRA. Hydrogen is used in the uranium reduction reactor. Anhydrous hydrofluoric acid (HF) is used directly in the process for the hydrofluorination reaction (i.e., the production of uranium tetrafluoride [UF_4]), but it is also used to produce fluorine gas (F_2) which is used in the fluorination reaction (i.e., the production of UF_6 from UF_4).

The ore pre-treatment and preparation operations are conducted at atmospheric pressure. The reduction and hydrofluorination operations which involve the use of hydrogen and HF respectively are conducted at relatively low pressures (~ 1-2 atm pressure). The fluorination operation which produces UF_6 involves the use of F_2 and is conducted at sub atmospheric pressure. The cold trap operates at sub-atmospheric pressure when UF_6 is being trapped (i.e., cold operations) and above atmospheric pressure (a few atm) when the UF_6 is liquefied for cold trap draining. The UF_6 distillation (i.e., UF_6 purification) operation is conducted at moderate pressures (5 – 6 atm). The UF_6 cylinder pressure is above atmospheric pressure while the cylinders are being filled but the cylinder pressure becomes sub-atmospheric as the cylinders cool and the UF_6 solidifies. UF_6 vapor pressure at ambient temperatures is a few psia or a fraction of an atmosphere.

Additional insight into the hazards of the various chemicals used in the MTW operations is gained by examining the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) standardized health hazard statements designed to communicate information about the hazards of chemical substances. Chemicals have GHS hazard statements that are specific to the chemical of interest.

The staff prepared Table 6.1 to gain insight into the relative hazards of the various parts of the MTW operations. The Table presents the Classification and Labeling of Chemicals Global Harmonized System (GHS) hazard statements for the chemicals used in MTW operations. The GHS system for classifying and labeling hazards was developed by the United Nations and adopted by U.S. Occupational Safety and Health Administration (Reference 141). The staff used the GESTIS database as the source for information on the reactive and toxic characteristics for a wide range of chemicals (Reference 142). The table shows hazard

statements for three different exposure pathways with the greater hazards (e.g., potential fatality) near the top of the table and less serious hazards (e.g., irritation) at the bottom of the table. The table shows that UF₆, HF and F₂ present the greatest hazards (i.e., potential fatality).

The major hazard of UF₆ is the HF that is produced when the material reacts with water (liquid or atmospheric moisture). Uranium hexafluoride is more reactive in the liquid state than it is in the solid state. The liquid state only occurs at temperatures greater than 147 ° F.

Table 6.1 Summary of GHS Hazard Statements for MTW Chemicals

Hazard Statements for MTW Chemicals						
Inhalation Exposure			Dermal Exposure		Ocular Exposure	
Hazard Statement	Chemical	Hazard Statement	Chemical	Hazard Statement	Chemical	
H 330 Fatal if inhaled	UF ₆ , HF, F ₂	H 310 Fatal in contact with skin	HF			
		H 314 causes severe burns and eye damage	HF, F ₂ , NH ₄ OH, KOH, NaOH, H ₂ SO ₄	H 314 causes severe burns and eye damage	HF, F ₂ , NH ₄ OH, KOH, NaOH, H ₂ SO ₄	
H 335 may cause respiratory irritation	NH ₄ OH					

The GESTIS database contained information for UF₆ that discussed the potential for “explosive” reactions if contacted by alcohols or aromatic hydrocarbons and “dangerous” reactions with fluorine, organic substances, concentrated acids, water. The database also contained information on F₂ that discussed the potential for “explosive” reactions with hydrogen fluoride, ammonia, reducing agents, nitric acids and various organic materials, and “dangerous” reactions with water and a spectrum of organic materials. The databases contained information for HF that discussed “explosive” reactions with metal and “dangerous” reactions with organic substances.

This review of information on pressures of the various MTW process operations, information on the chemicals used in the various MTW operation, information on the uranium chemical form (e.g., U₃O₈, UF₄, UF₆) and the uranium phase (e.g., solid, liquid, vapor) and information on the nature of the chemical toxicity and reactive hazards for the various chemicals involved in MTW operations indicate that liquid UF₆ operations (i.e., cold trap draining, distillation, cylinder filling) present the greater chemical hazards that are under NRC’s regulatory jurisdiction. The chemical hazards of operations involving other forms of uranium (e.g., uranium oxides, UF₄) with other chemicals (e.g., NaOH, H₂SO₄) present lower hazards.

6.2.2 REVIEW AND ANALYSIS OF HONEYWELL SUBMITTALS

Section 6.2.2.1 of this SER presents the NRC staff’s review of equipment and facilities which is measured against the criteria presented in 10 CFR 40.32(c). Section 6.3.2.2 presents the staff review of personnel qualifications and procedures which is evaluated against the criteria presented in 10 CFR 40.32(b) and (c).

The staff's overall evaluation of the personnel qualifications, equipment, facilities and procedures is presented in Section 6.2.3.

NUREG-1601 "Chemical Process Safety at Fuel Cycle Facilities" (Reference 143) was used to guide this review. The document identifies "the basic information needed to properly evaluate chemical process safety" of fuel cycle facilities regulated under 10 CFR Parts 40. The document identifies acceptable methods for identifying and evaluating chemical hazards and provides guidance for assessing the adequacy of the licensee's proposed equipment and facilities. The document also identifies and discusses activities commonly included in safety programs.

6.2.2.1 Equipment and Facilities

Section 2.4, Design Basis of NUREG-1601 states that assurance of chemical safety within a facility begins with a good-design basis. The NUREG describes design features, for example, physical barriers and mitigative features, built into equipment and the facility to prevent or mitigate the consequences of releases. The discussion and examples were used to guide the staff's review and assessment of Honeywell equipment and facilities.

Many equipment and facility features are located in the main uranium processing building and the Feed Materials Building (FMB). These features contribute to chemical safety by reducing the likelihood of a release or reducing the consequences of a release. Most of these equipment and facility features are discussed in the ISA Summary, primarily Section 6.3. The major equipment and facility features that are relevant to managing chemical hazards under NRC's regulatory jurisdiction are:

Features that reduce the likelihood of a release including:

- Most of the FMB uranium processing operations are conducted at low pressure (mostly about 1 atm) which reduces the potential for large releases of process material. Only the operations involving liquid and vapor UF₆ (e.g., cold trap liquefaction, UF₆ distillation, UF₆ cylinder filling) are at higher pressures and these are at moderate pressures (~ 100 psia) (Reference 14).
- The major UF₆ conversion vessels are fabricated in accordance with American Society of Mechanical Engineers (ASME) codes and ANSI standards which reduce the potential for vessel failure resulting in a release (Reference 14).
- The FMB has design features to accommodate natural phenomena including earthquakes and high winds including tornado missiles. The features to withstand natural phenomena were upgraded in 2013 and are discussed in the annual facility change report for that year (Reference 10).

Features that reduce the consequences of hazardous chemical release including:

- Operations including those involving liquid UF₆ are monitored and controlled from a central control room (Reference 14). The various operations can be shut down from this control room. This remote monitoring and control reduce the potential for worker exposure in the immediate area of a release and reduces the potential for worker exposure when responding to a chemical hazard event. The control room has two fresh

air intakes located outside each end of the UF₆ processing building and can be maintained at a slight positive pressure during a UF₆ release in order to protect control room workers (revised LRA, Section 4.8.1). The control room can also be used to activate and control high volume water sprays to reduce the consequences of a chemical release. There are six high volume water sprays located on towers that can be directed at a release to mitigate release consequences including that of HF that could be produced following a UF₆ release (Reference 14).

- The general ventilation system for the UF₆ process area consists of a series of fresh-air intake units and a series of window and roof exhaust fans. Airflow is sufficient to complete air change-out approximately once every five minutes (Reference 14).
- The basement and first three floors of the UF₆ portion of the FMB were modified to form a containment zone designed to prevent ground level releases of UF₆ in the event there are releases inside this containment zone. This containment zone is discharged through a roof stack. The elevated discharge of released material reduces the consequences of any release to offsite personnel. The exit stairwells are enclosed and can be pressurized to provide contamination free egress from the building. This information is detailed in the revised LRA, Section 9.2.1 (Reference 61).
- There are multiple automated isolation valves throughout the FMB that can be used to isolate hazards material that is under NRC's regulatory authority, particularly UF₆.

The staff finds these features to be consistent with the preventive and mitigative principles and examples presented in Section 2.4 of NUREG-1601. These Honeywell features are identified in safety analysis documents (i.e., ISA Summary). For specific accident sequences analyzed in the ISA, these features can be controls relied on to achieve chemical safety performance objectives, that is, plant features and procedures (PFAPs) which are discussed in Section 6.2.2.5 of this Chapter of the SER. These additional controls also provide defense in depth to prevent or mitigate the consequences from accident sequences. The features also contribute to chemical safety for accident sequences that are not documented in the ISA Summary. The NRC staff concludes that Honeywell demonstrated that its equipment and facilities provide reasonable assurance of the protection of health and minimization of danger to life or property from chemical hazards, under NRC's regulatory jurisdiction.

6.2.2.2 Procedures and Personnel Qualification

The criteria for approval of a license application established in 10 CFR 40.32 include the finding of adequate procedures and adequate personnel qualification to protect health and minimize danger to life or property.

In conducting the review of procedures and personnel qualifications that support chemical safety, the NRC staff examined information about procedures and personnel qualifications in seven areas that are considered important when evaluating chemical process safety at fuel cycle facilities. The seven areas are drawn from NUREG-1601, "Chemical Process Safety at Fuel Cycle Facilities" (Reference 143) which is a document that provides guidance for chemical safety programs at fuel cycle facilities regulated under 10 CFR Parts 40 and 70. The document identifies the type of information that should be considered when evaluating chemical process safety at an NRC-regulated fuel cycle facility.

The seven areas examined in this review are identified in Table 6.2. The table identifies where these topics are discussed in NUREG-1601 and where the relevant information is presented in the Honeywell license renewal application.

For each review area, the staff examined the commitments in the revised LRA, the description of the activity or the product of such activity available plant documents (e.g., plant procedures, audit reports, incident investigation reports) and the qualification of any key personnel identified in the LRA or the plant procedures as being responsible for specific activities.

Table 6.2 Chemical Safety Review Areas

Chemical Safety Review Area	NUREG-1601	Section of LRA^{a, b}
Process Safety Information	2.1	3.2
Hazard identification and assessment	2.2-2.5	3.2.2 and 3.3
Identification of controls	2.5	3.3
Training and procedures	2.6.2, 2.6.3, 2.6.4	11.3.2, 11.4
Configuration management	2.6.5	11.1
Inspections and audits	2.6.8	11.5
Incident investigation	2.6.7	11.6

Note a: Personnel qualification information that is relevant to many review areas is presented in Section 2.0 of the revised LRA.

Note b: Training and procedures, configuration management, inspections and audits, and incident investigations are discussed in Chapter 11 of the revised LRA (Management Measures) (Reference 23). These activities, notably, the MTW management of change procedure, the right of approval, and PFAP management procedures assist in improving the overall safe operations of the facility, as is stated in the response to RAI 6-17 (Reference 23).

The first four review areas identify and analyze chemical hazards and then implement controls for managing the chemical hazards. These are:

- Process Safety Information
- Hazard identification and assessment
- Identification of Controls
- Training and Procedures

The next three review areas facilitate the maintenance and improvement of hazard identification, analysis and control elements. These are:

- Configuration management (i.e., change control)
- Inspections and Audits
- Incident Investigation

The NRC staff's overall conclusions about the adequacy of procedures and personnel qualifications for providing adequate protection of public health and minimization of danger to life or property from chemical hazards that are under NRC's regulatory jurisdiction are discussed in Section 6.3 of the SER.

The chemical hazard identification and assessment review was coordinated with the broader hazard identification and assessment effort discussed in Chapter 3 of this SER, ISA.

The assessment of training and procedures, configuration management, inspections and audits, and incident investigations as it relates to chemical hazards under NRC's regulatory authority was coordinated with the review of management measures for a broader spectrum of hazards (i.e., radiological, chemical, fire). This broader review of management measures is discussed in Chapter 11 of this SER.

6.2.2.3 Process Safety Information

Process safety information is technical information that supports process hazards analysis (PHA)/ISA. Examples include design information, process and instrumentation diagrams, previous PHAs/ISA summary, reactivity and toxicity information for chemicals involved in the specific operation, previous events, equipment supplier recommendations for service and inspection.

LRA Commitment to Process Safety Information (PSI)

Section 3.2.1 of the revised LRA states that Honeywell develops and maintains written elements of PSI and identifies examples of elements of PSI including information on the hazards of materials used or produced in the process; description of process technology including operating parameters and limits; equipment descriptions, materials of construction, codes and standards used for design and construction. This type of PSI facilitates chemical safety activities including hazard identification and analysis, the development of operating and maintenance procedures, and incident investigation. The Honeywell examples of process safety information (Section 3.2) are comparable to the process safety information identified in Section 2.1 of NUREG-1601.

Section 2.2 of the revised LRA identifies minimum qualifications for the Nuclear Compliance Director and the Regulatory Affairs Manager who have oversight and monitoring roles to assure compliance with licensing requirements which include the development and maintenance of PSI for operations under NRC's regulatory jurisdiction.

Plant Procedures for Developing and Maintaining PSI

The staff reviewed Honeywell's procedures for developing and maintaining PSI. The staff documented the results of the review of this internal procedure review in a staff memorandum (Reference 139).

Assessment of Procedures and Personnel Qualifications for PSI Identification and Maintenance

The commitment to prepare and maintain process safety information in the revised LRA, Section 3.2.1, identifies information that is consistent with the type of PSI information identified in NUREG-1601. The NRC staff finds reasonable assurance that Honeywell's commitments and procedures for preparing and maintain PSI provide for the protection of health and

minimization of danger to life or property from chemical hazards that are under NRC's regulatory jurisdiction.

The qualifications of plant personnel including the Nuclear Compliance Director and the Regulatory Affairs Manager are acceptable for monitoring compliance with PSI commitments and procedures. The staff finds reasonable assurance that Honeywell personnel qualifications provide for the protection of health and minimization of danger to life or property from chemical hazards, that are under NRC's regulatory jurisdiction.

6.2.2.4 Hazard Identification and Assessment

The staff's review focused on the scope and nature of Honeywell's hazard identification and analysis processes. These processes are important in managing chemical hazards. The NRC staff finds Honeywell's data on the likelihood and consequences of events in the LRA provide a basis for assessing chemical risk.

LRA Commitment to Hazard Identification and Assessment

Chapter 3 of the revised LRA discusses Honeywell's commitment to the identification and analysis of hazards. Section 3.1 states that the purpose of the ISA is "to assess the risks associated with accidents involving licensed materials". Section 3.2.2 states that Honeywell performs and maintains the ISA using methods described in NUREG-1513, "Integrated Safety Analysis Guidance Document (Reference 73). Conducting an ISA using the guidance in NUREG-1513 is identified as being acceptable in Section 2.5.1 of NUREG-1601 (Reference 143).

In response to the NRC staff's chemical safety request for additional information (RAI) 6-5 which asked about the phases of operations considered in the ISA summary, (Reference 73) Honeywell stated that the ISA considers all phases of operation, including maintenance activities, for the hazards that are under the regulatory jurisdiction of the NRC. The response also stated that Honeywell would revise Section 4.2 of the ISA Summary to clarify the intent related to maintenance problems in a future revision. (Note: No change in revised LRA)

In response to Chemical Safety RAI 6-6 which asked whether Honeywell's ISA considered reactive hazards, (Reference 23) Honeywell stated that the ISA systematically considers chemical reactivity as well as toxic hazards as a normal course of the ISA analysis

In response to Chemical Safety RAI 6-10 which asked about exposure pathways considered in the ISA summary, (Reference 26) Honeywell discussed how the ISA considers applicable acute chemical exposure pathways including dermal and ocular exposure. Section 3.2.2 of the revised LRA states that the ISA evaluates credible exposure pathways.

Section 2.2 of the revised LRA identifies minimum qualifications for the plant manager, the nuclear compliance director, the technology manager and the operations manager who are assigned important roles in the approval of the PHA/ISA.

Section 11.3.2.5 of the revised LRA identifies the training requirements for PHA team leaders, which include training in the MTW ISA process. The PHA team leaders are required to have chemical industry experience, training in PHA methodologies and dispersion modeling, refresher training as required by Honeywell Processing Safety Management (PSM) procedures and must have actively participated in a PHA. Training for ISA team leaders includes

knowledge of ISA methodologies as defined in NUREG-1513, experience in chemical process engineering or radiological safety, an understating of PSM requirements, and familiarity with process operations and site hazards.

Plant Procedures for Hazard Identification and Assessment

The staff reviewed Honeywell procedure for conducting hazard identification and assessment. The results of this internal procedure review are documented in a staff memorandum on its in-office review of Honeywell documents related to chemical safety (Reference 139).

Review of ISA Summary

The NRC staff reviewed ISA Summary to examine the chemical hazard sequences that are identified and analyzed.

The ISA Summary, Section 7 (Reference 14) identified four accident sequences that involve chemical exposure hazards that are not caused by a natural phenomenon event. These are FL-2 (contact of hydrocarbon with F_2 or UF_6), DI-3 (UF_6 release due to overpressure failure of UF_6 cylinder), DI-4 (UF_6 release due to pigtail failure) and DI-6 (UF_6 release due to drop of filled product cylinder).

The ISA Summary also identified two chemical exposure hazards under NRCs' regulatory authority that involve natural phenomena. These are EE-EQ-1 (structural failures leading to a release of UF_6 from the FMB) and EE-TOR-1 (tornado missile impacting UF_6 piping or equipment in FMB).

In addition to reviewing accident sequences involving chemical hazards that are presented in the ISA Summary, the NRC staff asked if an ISA summary had been prepared for two specific operations that involve significant inventories of UF_6 (Chemical Safety RAIs 6-15 and 6-16) (Reference 103). Honeywell stated that the ISA had not evaluated the hazards of feeding UF_6 from cylinders into the FMB process equipment or the movement of filled cylinders in the cylinder yard or other areas of the plant. The response also stated that Honeywell was developing analyses of these operations. (Reference 23). In its revised LRA, Section 3.2.2 Honeywell stated that it will only initiate licensed UF_6 production after completion of the required analysis and implementation of identified protective measures. LC-35 and LC-36 were added to the license to require that the analyses be performed and submitted to the NRC by December 31, 2020.

Review of Accident Consequence Calculations

The staff reviewed Honeywell calculations which estimated the consequences of accidents involving chemical hazards under NRC's regulatory authority. The results of this review are documented in a staff memorandum on its in-office review of Honeywell documents related to chemical safety (Reference 139).

Assessment of Procedures and Personnel Qualifications for Chemical Hazard Identification and Assessment

In Sections 3.1 and 3.2 of the revised LRA, Honeywell commits to conduct and maintain an ISA, which identifies and analyzes hazards, including the analysis of chemical hazards. In the revised LRA Honeywell also commits to maintaining the safety program element in its ISA in the

Section 3.1 of the revised LRA. Honeywell stated the commitments in Section 3.1 of the LRA were made in order to demonstrate Honeywell's compliance with 10 CFR 40.32, and are consistent with the technically relevant sections of Subpart H of 10 CFR Part 70.

Honeywell commits to adopt and comply with acute chemical exposure performance requirements of 10 CFR 70.61 in Section 3.3.5 of the revised LRA. The MTW ISA presents the radiological and chemical consequence severity limits defined by 10 CFR 70.61 for the high and intermediate consequence categories. Each applicable hazardous chemical must be evaluated against the chemical exposure standards in 10 CFR 70.61 to determine exposures that could: (a) endanger the life of a worker; (b) lead to irreversible or other serious long-lasting health effects to an individual; and (c) cause mild transient health effects to an individual. Per NUREG-1520 acceptable exposure standards include the Emergency Response Planning Guidelines (ERPG) established by the American Industrial Hygiene Association and the Acute Exposure Guideline Levels (AEGL) established by the National Advisory Committee for Acute Guideline Levels. for Hazardous Substances

Honeywell's process for conducting an PHA/ISA is described in Section 3 of the revised LRA. The ISA Summary and Honeywell Administrative Procedures are consistent with methods found in the staff guidance in NUREG-1513. Therefore, the NRC staff finds the licensee's PHA/ISA process and ISA Summary and Honeywell Administrative Procedures to be acceptable. The NRC staff reviewed the estimates of sequence likelihood and the consequences chemical events documented in the ISA Summary. The NRC staff determined that the risk estimate was reasonable, that is, that the risk was not underestimated.

The absence of an evaluation of the hazards of feeding UF₆ from cylinders into the Feed Materials Building (FMB) and an evaluation of an accident scenario involving the movement of a filled cylinder in the cylinder yard or other areas of the plant were identified by the NRC staff in RAIs 6-15 and 6-16 (Reference 23). Honeywell will perform an accident analyses of this scenario prior to restart as stated in LC-35A.

Honeywell develops and maintains one or more site procedures governing development and maintenance of the ISA and the ISA Summary. Honeywell initiates and processes updates to the ISA and ISA Summary using the configuration management process described in Section 11.0 of the revised LRA. LC-20B requires Honeywell to maintain an ISA and ISA Summary, as committed to in Chapter 3 of the LA. The maintenance of the ISA and ISA Summary provides reasonable assurance that the procedures used for conducting a PHA/ISA protect the health and safety of the workers and the public and minimize the danger to life or property from chemical hazards that are under NRC's regulatory authority.

The NRC staff examined the qualifications of the Plant Manager, the Nuclear Compliance Director, the Technology Manager and the Operations Manager and the training required for all PHA/ISA leaders assigned important roles in the preparation or approval of ISA summary. The NRC staff finds with reasonable assurance that personnel qualifications of Honeywell's managers and the training of PHA/ISA leaders provides for the protection of health and minimization of danger to life or property from chemical hazards, that are under NRC's regulatory jurisdiction.

6.2.2.5 Identification of Controls

Controls are engineered features or administrative measures that are designed to prevent or reduce the likelihood of an accident sequence or reduce the consequences of an accident

sequence. Honeywell uses the term “safety feature” for controls not necessary to achieve the performance requirements of 70.61 and “PFAPs” for controls identified as being necessary to achieve the performance requirements of 70.61.

LRA Commitment

Section 3.2.2 of the revised LRA (Reference 61) discusses Honeywell’s commitment to comply with 10 CFR 70.61 and to use the guidance of NUREG-1601 and NUREG-1520, as a way of complying with 10 CFR 40.32. Honeywell commits to using PFAP controls where necessary to meet the performance requirements of 10 CFR 70.61. This process for identifying PFAPs is consistent with the process for identifying items relied on for safety, which are acceptable for Subpart H licensees in Section 3.4.3.2(5) of NUREG-1520. The staff considers NUREG-1520 to be the relevant review guidance.

Section 2.2 of the revised LRA identifies minimum qualifications for the Nuclear Compliance Director and the Regulatory Affairs Manager who have oversight and monitoring roles to assure compliance with licensing requirements including the identification of appropriate controls for the license material operations. The section also identifies minimum requirements for the Health, Safety, and Environmental (HSE) Manager who is responsible for chemical safety programs and the Operations Manager who is responsible for managing production functions and compliance with regulatory and license requirements.

Plant Procedures for Identification of Controls

The staff reviewed Honeywell procedures for identifying controls. The results of this internal procedure review are documented in a staff memorandum on its in-office review of Honeywell documents related to chemical safety (Reference 139).

Review of Identified Controls

The staff reviewed the PFAP controls identified in the ISA Summary for those accident sequences identified as involving chemical hazards: FL-2, DI-3, DI-4 and DI-6. Each of the sequences have a PFAP intended to reduce the likelihood of the accident sequence. The accident sequence involving a pig-tail failure have PFAPs designed to limit the consequences of such a failure. The accident sequences that involve the release from a liquid UF₆ cylinder (sequences DI-3, DI-4 and DI-6) have engineered features PFAPs that are more reliable than administrative controls. Based on this review, the staff considers the chemical safety controls to be reasonable for accident sequences involving chemical hazards.

Assessment of Procedures and Personnel Qualifications for Identification of Chemical Safety Controls

In Section 3 of the revised LRA, in the ISA Summary, and in Honeywell’s Procedures, the licensee committed to identify chemical safety controls that are consistent with the performance requirements in 10 CFR 70.61. The NRC staff specifically assessed Honeywell’s commitments (1) to meet the performance requirements derived from 10 CFR 70.61(c), (2) to verify that a valid ISA has been conducted for operations under NRC’s regulatory authority, and (3) to verify that any controls identified are implemented before the operation is performed. The NRC staff finds reasonable assurance that Honeywell procedures provide for the protection of health and minimization of danger to life or property from chemical hazards, that are under NRC’s regulatory authority.

The nuclear compliance director, the regulatory affairs manager, the HSE manager and the operations manager play important roles in the review and approval of controls necessary to meet the performance requirements derived from 10 CFR 70.61. The NRC staff finds reasonable assurance that Honeywell's personnel are properly qualified and provide for the protection of health and minimization of danger to life or property from chemical hazards, that are under NRC's regulatory authority.

6.2.2.6 Training and Procedures

The implementation of controls by the licensee are necessary to meet the performance requirements from 10 CFR Part 70.61 that Honeywell has committed to in Section 3.2.2 of the revised LRA (Reference 61). Controls are implemented through operator and maintenance worker training and the development and implementation of operations and maintenance procedures.

While the NRC staff's review here focuses on training and procedures relevant to chemical safety, the review also assessed training and procedures related to management measures. See the discussion in Chapter 11 of this SER.

LRA Commitment to Training and Procedures

Section 11.3.2.2 of the revised LRA (Reference 61) describes how operator training includes "operating limits and safety features (including PFAP)" and "chemical and radiological safe work practices". It also states that continuing training is provided to maintain proficiency in specific knowledge and skill related activities. Section 11.3.2.3 describes training of maintenance personnel including preventative maintenance and a variety of safety topics.

Section 11.4 of the revised LRA describes procedures, how they are developed, reviewed, revised and used. Section 11.4.1 identifies Nuclear Safety procedures as those procedures that provide directions for operation of a system affecting licensed material and these procedures address chemical safety concerns where necessary. Section 11.4.2 states that Safety, Environmental and Health Physics personnel review each Nuclear Safety procedure (NSP) to ensure all pertinent issues related to their responsibilities are addressed. Section 11.4.2 also states that management-approved recommendations from the hazard assessment team that impact an NSP will be inserted into the NSP.

Section 2.2 of the revised LRA identifies minimum qualifications for the nuclear compliance director and the regulatory affairs manager who have oversight and monitoring roles to assure compliance with licensing requirements. These include the training of workers and the development and use of procedures for license material operations. The section also identifies minimum requirements for the HSE manager who is responsible for chemical safety programs, the maintenance manager who is responsible for process and facility maintenance activities, and the operations manager who is responsible for managing production functions and compliance with regulatory and license requirements.

Assessment of Procedures and Personnel Qualification for Implementation of Training and Procedures

The commitments to implement an employee training and qualification program are discussed in revised LRA at Section 11.3 and to use written procedures to address operating procedure

preparation, review, revision, approval, implementation, control, and cancellation are discussed in Section 11.4. The NRC staff finds reasonable assurance that the employee training and qualification program and its procedures for implementation training and procedures to provide for the protection of health and the minimization of danger to life or property from chemical hazards, that are under the NRC's regulatory jurisdiction.

The staff also finds that the qualifications of the individuals responsible for the development and implementation of training and procedures including the nuclear compliance director, the regulatory affairs manager, the HSE manager, the maintenance manager and the operations manager provide the staff with reasonable assurance that Honeywell personnel qualifications contribute to the protection of health and minimization of danger to life or property from chemical hazards that are under NRC's regulatory jurisdiction.

6.2.2.7 Configuration Management (Change Control)

Configuration Management is a process that provides oversight and control of changes to assure that the impacts of the change on health and safety are considered and that the change is implemented with appropriate training and procedures.

While the review discussed here focused on configuration management relevant to chemical safety, the review was coordinated with the review of configuration management related to management measures, as discussed in Chapter 11 of this SER.

LRA Commitment to Configuration Management (Change Control)

Section 11.1 of the revised LRA (Reference 61) describes Honeywell's commitment for configuration management. LC-20A and LC-20B provide the criteria Honeywell must follow in order to make changes to the LRA and ISA Summary without prior NRC approval. LC-20C states that Honeywell must request and obtain an amendment from the NRC for changes that do not meet the criteria in LC-20A and LC-20B. LC-20C also requires that the licensee submit an application for an amendment in order to change the change process in Sections 11.1.3.1, 11.1.3.2 and 11.1.3.3 of the LA.

Section 2.2 of the revised LRA identifies minimum qualifications for the nuclear compliance director and the regulatory affairs manager who have oversight and monitoring roles to assure compliance with licensing requirements which includes the configuration management program.

Plant Procedures for Configuration Management (Change Control)

The staff reviewed Honeywell procedure for configuration management. The results of this internal procedure review are documented in a staff memorandum on its in-office review of Honeywell documents related to chemical safety (Reference 139).

Assessment of Procedures and Personnel Qualifications for Configuration Management

The commitments to implement configuration management in Section 11.1 of the revised LRA provide the NRC staff with reasonable assurance that configuration management procedures provide adequate protection of health and the minimize danger to life or property from chemical hazards that are under NRC's regulatory authority.

The qualifications of the individuals responsible for the implementation of configuration management including the Nuclear Compliance Director and the Regulatory Affairs Manager provide the staff with reasonable assurance that Honeywell staff qualifications are sufficient for the protection of health and minimization of danger to life or property from chemical hazards that are under NRC's regulatory authority.

6.2.2.8 Inspections and Audits

Inspections and audits provide management with feedback on the performance of their safety program.

While the review discussed focused on inspections and audits relevant to chemical safety, the staff's review was coordinated with the review of audits related to management measures, as discussed in Chapter 11 of this SER.

LRA Commitment to Inspections and Audits

The revised LRA at Section 11.5 describes Honeywell's commitment to audits and inspection. The application states that there are procedures for implementing the audit/inspection program. The audits include examination of training and qualification, procedures and records. Procedures identify which audit findings require documentation. Honeywell retains independent auditors from external organizations as necessary to assure appropriate technical expertise is applied to various audits and inspections. The discussion states that the regulatory affairs manager has primary responsibility for the inspection and audit program.

The description of Honeywell's audit program is consistent with the characteristics of an acceptable audit and inspection program identified in Section 2.6.8 of NUREG-1601 (Reference 143). Section 11.5 of the revised LRA (Reference 61) states its audits and inspections include chemical hazards under NRC regulatory authority and will be conducted in accordance with applicable regulatory requirements, license conditions, and written procedures.

Section 2.2.3 of the revised LRA states the minimum qualifications for the regulatory affairs manager, who has primary responsibility for the inspection and audit program

Plant Procedures for Inspections and Audits

The staff reviewed Honeywell's written procedures for conducting inspections and audits. The results of this internal procedure review are documented in a staff memorandum on its in-office review of Honeywell documents related to chemical safety (Reference 139).

Assessment of Procedures and Personnel Qualifications for Inspections and Audits

Honeywell commits to conduct audits and inspections in Section 11.5 of the revised LRA. In addition, the Regulatory Affairs Manager is responsible for the overall management of the inspection and audit program. The NRC staff finds reasonable assurance because the inspection and audit procedures and oversight process are consistent with applicable guidance in NUREG-1601 that provide for protection of health and the minimization of danger to life or property from chemical hazards that are under NRC's regulatory authority.

6.2.1.1 Incident Investigation

Incident investigations are conducted to understand the effectiveness and potential shortcomings of the facility safety program. While the review discussed here focused on incident investigation relevant to chemical safety, the review was coordinated with the review of incident investigation related to management measures discussed in Chapter 11 of this SER.

LRA Commitment to Incident Investigation

Honeywell's program for incident investigation is described in Section 11.6.1 of the revised LRA (Reference 61). The revised LRA states that potential hazards (near misses) require a written report. Investigation reports are required for events involving personnel injury, equipment damage, or effects on the environment or members of the public. An investigation team includes a trained investigator and may include safety or health physics personnel and other resources as needed. Honeywell application calls for in-depth investigation with the report including incident description, results, causes and recommended corrective actions.

Section 2.6.7 of NUREG-1601 (Reference 143) provides guidance on the characteristics of an acceptable incident investigation program. The commitments in Section 11.6 of the revised LRA are consistent with the characteristics identified in Section 2.6.7 of NUREG-1601.

Section 11.6.1 of the revised LRA states that the HSE Manager and Regulatory Affairs Managers are responsible for ensuring the proper and timely completion of required investigations, unless otherwise assigned by the Plant Manager. The minimum qualifications for these individuals are identified in Sections 2.2.4 and 2.2.3 of the revised LRA.

Incident Investigation Procedures

The staff reviewed Honeywell procedure for incident investigation. The results of this internal procedure review are documented in a staff memorandum on its in-office review of Honeywell documents related to chemical safety (Reference 139).

Assessment of Procedures and Personnel Qualifications for Incident Investigations

Honeywell commits to reporting incidents, providing written reports of potential hazards, and conducting incident investigation of injury, damage and environmental effects in Section 11.6 of the LRA. The staff finds the incident investigation procedures are consistent with the guidance in NUREG-1601 and provide reasonable assurance for the protection of health and the minimization of danger to life or property

6.2.3 EVALUATION FINDINGS

6.2.3.1 Applicant Qualification

The NRC staff finds reasonable assurance the applicant is qualified, by reason of training and experience, to use the licensed source material for the purpose requested in such manner as to protect health and minimize danger to life or property from chemical hazards under NRC's regulatory authority. The staff bases its findings on the reviews of personnel qualifications of individuals assigned to key roles in the Chemical Safety Review Areas examined in Section 6.2.2.2 of the SER. The individuals with key roles in the review areas are summarized in Table 6.3. Table 6.3 also includes: (1) the minimum qualifications for management personnel who are responsible for implementing the MTW safety programs, and (2) the training requirements for the PHA/ISA leader and operations and maintenance personnel.

6.2.3.2 Equipment and Facilities

The NRC staff's review evaluated the process that allows facility operators to shut down operations remotely and the features that mitigate the effects of hazardous material releases (e.g., spray towers). The staff finds reasonable assurance the proposed equipment and facilities are adequate to protect health and minimize danger to life and property from chemical hazards under NRC's regulatory jurisdiction. The bases for the staff's conclusion are presented in the NRC's in-office review (Reference 139) and discussed in Section 6.2.2.1 of this SER. The staff's in-office review identified features that provided primary and secondary containment of the more hazardous license material, particularly UF₆.

6.2.3.3 Procedures

The NRC staff finds reasonable assurance the applicant's procedures are adequate to protect health and minimize danger to life and property from chemical hazards that are under NRC's regulatory authority. This conclusion is based on the staff's review of Honeywell's system of Nuclear Safety Procedures for operation of systems, components or equipment affecting licensed material. It is also based on the staff review of a variety of procedures used to identify and manage chemical hazards and monitor and maintain the program that identifies and manages these hazards. The spectrum of procedures was examined in an in-office review that is documented in Reference 139 and summarized in Section 6.2.2.2 of this SER. These include administrative procedures that define the facets of the MTW safety programs, including hazard identification and analysis and procedures for operations and maintenance activities.

6.2.3.4 Conclusion

The staff concludes there is reasonable assurance that the chemical safety related criteria of 10 CFR 40.32 have been met because the staff finds that: (1) Honeywell's personnel are qualified by reason of training and experience to use the source material for the purpose requested in such a manner as to protect health and minimize danger to life or property from chemical hazards under NRC's regulatory jurisdiction and (2) Honeywell's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property from chemical hazards under NRC's regulatory authority.

The staff finding is based on the staff's review and evaluation of Honeywell's commitments made in the LRA, the staff's review of Honeywell's equipment and facilities that contribute to the prevention and mitigation of chemical events, the staff's review of Honeywell procedures to implement the commitments, and the staff's review of some products produced by the safety program, most notably the ISA Summary information and incident investigation reports.

Table 6.3 Summary of Individuals with Key Roles Relevant to Chemical Safety and Minimum Qualifications identified in the LRA

Position	Elements of Chemical Safety Program						
	Process Safety Information	Hazard Identification and	Identification of Controls	Training and Procedures	Configuration Management	Inspections and Audits	Incident Investigation
Plant Manager		X					
Nuclear Compliance Director	X	X	X	X	X		
Regulatory Affairs Manager	X		X	X	X	X	X
Health, Safety and Environmental Manager			X	X			X
Maintenance Manager				X			
Technology Manager		X					
Operations Manager		X	X	X			
PHA/ISA Leader		X					
Incident Investigator		X					
employees				X			

CHAPTER 7 FIRE SAFETY

7.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review to determine, with reasonable assurance, that the health and safety of the public will be protected from fires and explosions, in accordance with 10 CFR 40.32(d). In addition, the NRC staff verified that the information relevant to fire safety previously contained in the SDR (Reference 52) has been successfully incorporated into the revised LRA, as the SDR is no longer be included as part of the application.

7.2 Staff Review and Analysis

The fire protection review was performed relative to the requirements in 10 CFR 40.32(d) and the guidance provided in Section 9.7 of RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," published in April 1985 (Reference 74).

7.2.1 FACILITY DESIGN AND FIRE PROTECTION

7.2.1.1 Licensee Submittal

All process areas within the Honeywell MTW are constructed of non-flammable material (concrete and steel). The facility was constructed in 1956 in accordance with the codes and standards in effect at the time. Sprinkler systems are present in the maintenance shop and storerooms, which contain combustible or flammable materials. The facility has eight fire hydrants. Six hydrants are supplied by a 250,000-gallon water tank, used for fire-fighting and chemical mitigation. The water tank is heated in winter. Two hydrants are supplied by the well water system on site. If the fire water tank is unavailable, sufficient amounts of fire water can be supplied directly by the well water system. Honeywell's fire safety management system is described in the Chapter 7 of the revised LRA (Reference 61).

The water-based fire protection systems are supplied by a fire pump. The fire pump has a 1000 gallons per minute (gpm) capacity at 100 pounds per square inch (gauge) and is outfitted with a primary electric motor, as well as a backup diesel motor. Should both the primary and backup motors fail, the water-based fire protection systems can be modified to draw water from the well on-site. A jockey pump maintains pressure in the fire mains. The fire pump is routinely tested and maintained in accordance with plant procedures. The NRC staff has reviewed the procedures, which detail the weekly, monthly, quarterly, semi-annual, and annual inspection and testing schedule for the fire protection system and finds them acceptable. The fire main installation is in accordance with National Fire Protection Association (NFPA) 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances" (Reference 67).

The facility is equipped with two manual wet standpipes, located in the north and south stairwells of the Feed Materials Building (FMB). The two standpipes have a combined capacity of 750 gpm. The system can be supplemented by the fire department connection. The standpipes are installed in accordance with NFPA 14, "Standard for the Installation of Standpipe and Hose Systems" (Reference 69).

Portable fire extinguishers are available throughout the facility. Distribution and maintenance of the fire extinguishers is done in accordance with NFPA 10, "Standard for Portable Fire Extinguishers" (Reference 68).

There are two locations in the Honeywell MTW, the FMB Distributed Control Center System room and the Modular Laboratory Building, which are outfitted with FM200 inert, gaseous fire suppression systems.

7.2.1.2. Staff Evaluation

Consistent with the requirements in 10 CFR Part 40 and the guidance presented in RG 3.55, the licensee has adequately described the fire protection considerations used in the design of the facility. The NRC staff has determined that the facility construction and fire protection systems are adequate to prevent the spread of fire between fire areas and the fire water capacity is sufficiently sized to meet the requirements of the facility. Applicable NFPA codes were adhered to during the installation of the fire main and standpipes.

Based on the information presented in Section 7.2.1 of Honeywell's revised LRA, the NRC staff concludes that the LRA meets the applicable regulations and is consistent with applicable guidance as they relate to facility design and fire protection.

7.2.2 PROCESS FIRE SAFETY

7.2.2.1 Licensee Submittal

The licensee discusses process fire safety in LA Section 7.3, "Process Fire Safety." The Integrated Safety Analysis (ISA) provides an evaluation of the consequences and risk associated with fire-related events. There are no Plant Features and Procedures needed to mitigate fire-related accident sequences. Furthermore, no fire scenarios with only on-site consequences were considered because the purpose of the ISA is to identify and evaluate potential accidents for emergency planning purposes, in accordance with 10 CFR 40.31(j)(1)(ii) and 40.31(j)(3).

Areas where flammable or combustible materials are stored are equipped with sprinklers systems. Seismically induced shutoff valves are provided in the natural gas supply lines to prevent a significant fire or explosion. The facility has a liquid hydrogen tank with a capacity of 18,000 gallons located south of the maintenance building. The tank is within a locked, gated enclosure to prevent tampering and workers from introducing ignition sources. There are four gas analyzers around the tank that are set to shut down the hydrogen supply automatically when 45 percent of the Lower Flammability Limit (LFL) is detected. The LFL is the lowest concentration at which a flammable mixture can be ignited. The NRC staff observed, during the license renewal review site visit conducted on August 16, 2017, that many signs are posted around the gated area warning staff of the flammability hazard and restricting use of electronics and cigarettes in the area, as well as restrictions on the placement of combustible materials. The hydrogen gas is used at various stages in the facility. In areas where hydrogen gas is used, gas analyzers are similarly used to signal a buildup of gas and shutdown the hydrogen supply.

7.2.2.2 Staff Evaluation

Consistent with the requirements in 10 CFR Part 40 and the guidance presented in RG 3.55, the licensee has adequately described the procedures for storage of combustibles. Flammable gases are a significant fire and explosion hazard at the facility. The NRC staff finds that the use of shutoff valves, gas analyzers, and the combustible control program are an acceptable means to protect against the risk of fires and explosions from flammable gases.

Based on the information presented in Section 7.2.2 of Honeywell's revised LRA, the NRC staff concludes that the LRA meets the applicable regulations and is consistent with applicable guidance as they relate to process fire safety.

7.2.3 FIRE SAFETY MANAGEMENT MEASURES

7.2.3.1 Licensee Submittal

The licensee discusses management measures related to fire safety in revised LRA Section 7.1, "Fire Safety Management Measures." The management measures include facility organization; inspection, testing, and maintenance of fire protection systems; fire prevention and combustible controls; and emergency response and pre-fire plans. The emergency response capabilities of the facility are addressed in Section 7.2.5, "Emergency Response and Training," of this SER.

7.2.3.1.1 Fire Safety Organization

In Section 7.1.1, "Fire Safety Administration" of the revised LRA, it states that the fire protection program is under the control of the Regulatory Affairs Manager. In response to NRC staff's request for additional information (RAI) dated November 7, 2017 (Reference 105), Honeywell stated (Reference 23) in RAI 7-1, that the Regulatory Affairs Manager is required to possess a degree in an engineering-related discipline and to be familiar with fire protection and NFPA requirements (Reference 23).

7.2.3.1.2 Inspection, Testing, and Maintenance of Fire Protection Systems

The licensee describes the inspection, testing, and maintenance of fire protection systems in LA Section 7.1.3, "Inspection, Testing, and Maintenance." In response to NRC staff's RAI 7-3, the licensee stated that the inspection, testing, and maintenance program is described in plant procedures (Reference 23). The NRC staff reviewed the applicable procedures, which detail the type and frequency of the testing and maintenance to be performed on fire protection systems (e.g. sprinklers, hydrants, standpipes, etc.) and found them to be adequate. In addition to facility inspection and testing, the insurance carrier for the facility performs inspections of the facility fire protection systems routinely. As stated in the previous section, maintenance of the portable fire extinguishers is performed in accordance with NFPA 10.

7.2.3.1.3 Fire Prevention

The licensee describes the fire prevention program in revised LRA Section 7.1.2, "Fire Prevention." In response to RAI 7-5, the licensee stated that the combustible control program is described in plant procedures (Reference 23). These procedures describe the plant staff responsibilities for implementing the combustible control program and detail the combustible control program requirements. The NRC staff reviewed the procedures and found them to be adequate. The facility conducts routine combustible control audits to ensure that the plant

procedures are being adhered to. In response to RAI 7-2, the licensee stated that it has a system for the issuance of hot work permits that is described in plant procedures. The procedures include a description of the plant staff responsibilities for implementing the hot work permit system and details the requirements of the permit system. The hot work permit system requires the issuance of a permit and verification checklists that must be completed at various stages before and after the hot work. The procedure also implements the NFPA 51B, "Standard for Fire Prevention during Welding, Cutting, and Other Hot Work," (Reference 66) decision tree for determining if hot work should be authorized. The NRC staff reviewed these procedures and found them to be adequate.

7.2.3.2 Staff Evaluation

Consistent with the requirements in 10 CFR Part 40 and the guidance presented in RG 3.55, the licensee has detailed the qualifications of the person responsible for implementing the fire protection program; the inspection, testing, and maintenance program; and the fire prevention program. Management measures relating to maintenance and testing of fire protection system, as well as relating to the hot work permit system, are codified in plant procedures.

Based on the information presented in Section 7.2.3, the NRC staff concludes that the application meets the applicable regulations and is consistent with applicable guidance as they relate to fire safety management measures.

7.2.4 FIRE HAZARDS ANALYSIS

7.2.4.1 Licensee Submittal

The licensee performed a Fire Hazards Analysis (FHA) to analyze the fire hazards at the facility. The NRC staff reviewed the FHA as provided by Honeywell MTW. The fire hazards are analyzed in the FHA by building, along with the associated protection measures for the specific building being discussed. The FHA is updated when plant configuration changes are made that would alter the results. The FHA is conducted by an analyst with appropriate experience in fire protection.

7.2.4.2 Staff Evaluation

Consistent with the requirements in 10 CFR Part 40 and the guidance presented in RG 3.55, the licensee has adequately analyzed the fire hazards at the facility and is committed to maintaining the FHA if the plant configuration changes. Based on the information presented in Section 7.2.4 of Honeywell's revised LRA regarding the discussion of the fire safety protection measures and the preparation and maintenance of the FHA by an appropriately trained analyst, the NRC staff concludes that it meets the applicable regulations and is consistent with applicable guidance as they relate to the FHA.

7.2.5 EMERGENCY RESPONSE AND TRAINING

7.2.5.1 Licensee Submittal

The Honeywell MTW facility has an on-site Emergency Response Team (ERT) equipped to respond to incipient fires. For fires that exceed the capacity of the ERT, Honeywell has agreements with the fire departments from Massac County and the City of Metropolis to provide assistance with on-site emergency response. The City of Metropolis Fire Department is located

2.5 miles from the facility, and the Massac County Fire Department is located 4 miles from the facility. Honeywell has provided the pre-fire plans for the MTW facility to the offsite fire departments. The fire departments received training and guidance concerning the chemical hazards present at the facility.

All Honeywell employees are required to attend monthly safety meetings and receive annual training on fire identification and response. New hires and contractors are given fire hazards awareness and response training. In response to RAIs 7-4 and 7-5, the applicant indicated that members of the on-site ERT receive additional training as part of the annual training that all employees receive (Reference 23).

7.2.5.2 Staff Evaluation

Consistent with the requirements in 10 CFR Part 40 and the guidance presented in RG 3.55, the applicant has adequately described the training of the staff and the ERT and the firefighting capabilities of the plant. The annual training provided to staff is adequate to provide a base knowledge of fire hazards and fire prevention methods. The additional training provided to members of the ERT is adequate to meet the objective of extinguishing incipient fires. Based on the information presented in Section 7.2.5 of Honeywell's revised LRA, the NRC staff concludes that the described emergency response and training meets the applicable regulations.

7.3 Evaluation Findings

As discussed above, the NRC staff reviewed Honeywell's application considering facility design and fire protection, process fire safety, management measures, the fire hazard analysis, and emergency response and training. On the basis of this review, the NRC staff has determined that the fire protection program presented by the applicant meets the requirements in 10 CFR Part 40.

CHAPTER 8 EMERGENCY MANAGEMENT

8.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a review to determine whether the Honeywell Metropolis Works (MTW) facility's emergency management program continues to adequately protect public health and safety and the environment in the event of an emergency.

Pursuant to 10 CFR 40.31(j)(1)(ii), an emergency plan must address the response to radiological hazards of an accidental release of source material and any chemical hazards directly related to the release. Emergency plans must also include the information specified in 10 CFR 40.31(j)(3)(i) through (xiii). The NRC staff used the guidance in RG 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," published in April 2011 (Reference 93), to review Honeywell's emergency management program against the acceptance criteria in 10 CFR 40.31(j)(3)(i) through (xiii).

8.2 Staff Review and Analysis

The NRC staff notes no changes were made to the Honeywell MTW Emergency Response Plant (ERP) being proposed in Honeywell's revised LRA. Honeywell is authorized to make changes without prior NRC approval pursuant to 10 CFR 40.35(f), if the changes do not decrease the emergency plan's effectiveness. Typically, changes to ERP are made during annual reviews of the program and submitted to the NRC. The NRC staff reviews and/or inspects these changes to verify that they are authorized under the regulation.

After the NRC staff had begun its review of the Honeywell application, Honeywell submitted Revision 9 to the MTW ERP on September 7, 2017 (Reference 18). Paragraph 40.35 (f) of 10 CFR states, in relevant part, "The licensee may change the [emergency] plan without Commission approval if the changes do not decrease the effectiveness of the plan. The licensee shall furnish the change to the Director, Office of Nuclear Material Safety and Safeguards, by an appropriate method listed in 10 CFR 40.5, and to affected offsite response organizations, within six months after the change is made." The NRC staff reviewed Honeywell's MTW's ERP, Revision 9 and found the changes were made in accordance with 10 CFR 40.35(f).

On June 25, 2018, Honeywell provided Revision 10 to the MTW ERP identifying changes that had been made on January 19, 2018 (Reference 31). Revision 10 to the MTW ERP reflects changes made as a result of the ongoing "ready-idle" plant status. Revision 10 of the ERP will be in place only for the duration of MTW's ready-idle status. Honeywell stated that, prior to restart of the MTW [at an unspecified date in the future], it will revise and implement its ERP to be equivalent to Revision 9 (Reference 31).

The NRC staff had also reviewed and approved the MTW ERP, dated May 27, 2005 (Reference 6), during the last license renewal completed on May 11, 2007 (Reference 71). Revision 4 of the MTW ERP, dated May 14, 2013, was submitted by letter dated June 5, 2013 (Reference 9). Revision 4 of the MTW ERP addressed modifications performed at Honeywell, which were required by the Confirmatory Order issued by the NRC on October 15, 2012 (Reference 95). The NRC staff found the changes to the Revision 4 of the MTW ERP to be in conformity to the requirements in the Order and documented this finding in the NRC Technical Evaluation Report

dated June 25, 2013 (Reference 97). Based on its reviews of the current MTW ERP (Revision 10) and previous licensing actions approving revisions to the MTW ERP, the NRC staff made the following findings:

- The plan provides an adequate description of the facility and site, the area near the site, and the licensed activities;
- The plan provides an adequate description of the general types of accidents identified in the Integrated Safety Analysis summary for which protective actions may be needed;
- The plan provides an adequate emergency classification scheme for those accidents;
- The plan provides an adequate description of the means to detect accidents and alert the operating staff;
- The plan provides an adequate description of the measures and equipment to be used for safe shutdown and mitigation of consequences;
- The plan provides an adequate description of the procedures to be used to assess releases of hazardous material;
- The plan provides an adequate description of the emergency response organization (ERO) including responsibilities for planning, implementing, and controlling emergency preparedness activities;
- The plan provides an adequate description of notification and coordination procedures which includes how important decisions will be made promptly and effectively;
- The plan provides an adequate description of the information to be communicated during an emergency;
- The plan provides an adequate description of the frequency, performance objectives, and plans for ERO training;
- The plan provides an adequate description of plans to restore the facility and recover after an emergency;
- The plan includes adequate commitments to conducting drills and exercises, and
- The plan includes a certification that Honeywell has met its responsibilities under the Emergency Planning and Community Right-To-Know Act of 1986.

8.3 Evaluation Findings

In Revision 10 of the ERP, Honeywell committed to maintaining and executing an emergency plan for responding to releases of hazardous material incident to licensed activities during the ready idle status of MTW. The NRC staff evaluated Revision 10 of the Honeywell MTW ERP and finds that it meets the requirements of 10 CFR 40.31(j)(1)(ii) and 40.31(j)(3)(i) through (xiii).

By letter dated October 8, 2018 (Reference 4) Honeywell supplemented its LRA and requested the addition of a License Condition (LC) to its materials license, SUB-526. LC-32 memorializes Honeywell's obligations before it may resume full operations.

Honeywell shall notify the NRC within 30 days of its decision to resume full operations. Prior to restarting the production of UF₆, the licensee Honeywell shall implement an emergency response plan that contains emergency planning requirements that are equivalent to those in Revision 9 of the Emergency Response Plan for MTW.

The NRC staff finds that Revision 10 of the Honeywell MTW ERP plan is acceptable during "ready-idle". The implementation of an ERP consistent with LC-32, after MTW leaves "ready-idle" plant status, will provide reasonable assurance the facility's emergency management program continues to adequately protect public health and safety and the environment in the event of an emergency

CHAPTER 9 ENVIRONMENTAL SAFETY – RADIOLOGICAL AND NON-RADIOLOGICAL

9.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review to determine whether Honeywell's environmental protection measures are adequate to protect public health and safety and the environment, as required by 10 CFR Part 20, "Standards for Protection Against Radiation," and 10 CFR Part 40, "Domestic Licensing of Source Material."

The regulations in 10 CFR Parts 20 and 40 provide requirements for environmental controls, monitoring and reporting for radiation protection. Honeywell must satisfy the following regulatory requirements regarding environmental protection:

- 10 CFR Part 20, Subpart B, "Radiation Protection Programs," Subpart D, "Radiation Dose Limits for Individual Members of the Public," Subpart E, "Radiological Criteria for License Termination," and Subpart F, "Surveys and Monitoring," all of which specify the effluent control and treatment measures necessary to meet the dose limits and dose constraints for members of the public, where Subpart F also states the survey requirements. Subpart K, "Waste Disposal," specifies the waste disposal requirements; Subpart L, "Records," specifies the records requirements; and Subpart M, "Reports," specifies the reporting requirements.
- 10 CFR 40.65, "Effluent Monitoring Reporting Requirements," which requires semi-annual reports to the NRC that specify the quantity and types of radionuclides released in liquid and gaseous effluents;
- 10 CFR 40.43 and 40.31(f) concerning the requirement to provide an environmental report (pursuant to the NRC's National Environment Protection Agency (NEPA) - implementing regulations in 10 CFR Part 51) with a license renewal application (LRA).

As applicable for the areas of review in Parts 20 and 51, the staff also referred to guidance in Section 9.4.3 of NUREG-1520, "Standard Review Plan for Fuel Cycle Facilities License Applications," Revision 2 (Reference 98). The staff also referred to RG 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production" (Reference 74).

9.2 Staff Review and Analysis

The NRC staff's evaluation includes three main areas of review: the environmental report, effluent and environmental controls and monitoring, the ISA Summary, and Chapter 11 of the revised LRA "management measures." In performing this review, the NRC staff used the guidance in Chapter 9 of NUREG-1520 (Reference 98). The information to support this review was obtained from Honeywell's LRA dated February 8, 2017 (Reference 2), an on-site review conducted on June 1, 2017, at the Honeywell MTW facility, and additional information submitted by Honeywell by letters dated January 22, 2018 (Reference 24) and April 2, 2018 (Reference 29). The final version of the Honeywell revised LRA was submitted on December 19, 2019 (Reference 61).

9.2.1 ENVIRONMENTAL REPORT

Honeywell submitted an Environmental Report (ER) (Reference 13) as part of the LRA (Reference 2) and later submitted responses, dated January 22, 2018 (Reference 24), and April 2, 2018 (Reference 29) to the NRC's request for additional information (RAI) regarding the ER. The NRC staff used the information in the ER and RAI responses to complete an environmental assessment (EA) (Reference 144), as discussed further in Chapter 14. Where appropriate, the NRC staff also used information from the ER and RAI responses for the evaluation in this chapter.

9.2.2 EFFLUENT AND ENVIRONMENTAL CONTROLS AND MONITORING

The NRC staff reviewed Chapter 9, "Environmental Safety – Radiological and Non-Radiological," of the revised LRA, which describes Honeywell's controls for gaseous effluents, liquid effluent treatment and release, waste disposal, environmental monitoring, and off-site dose monitoring. The Health, Safety, and Environmental Manager oversees the environmental protection program. The Health Physics group is responsible for the collection and analysis of samples, and the ALARA [as low as reasonably achievable] Committee reviews selected effluent and environmental monitoring data as needed to establish and ensure consistency with the goals of the ALARA program.

9.2.2.1 Environmental Radiation Protection Program

In accordance with 10 CFR 20.1101(b), Honeywell must implement a radiation protection program based on sound principles to achieve occupational doses as well as doses to the members of the public that are ALARA. This environmental review of the radiation protection program focuses on Honeywell's methods to maintain public doses ALARA, meeting the ALARA goals for effluents, ALARA reviews and reports, and waste minimization practices. As stated in Section 4.1 of the revised LRA, Honeywell follows RG 8.37, "ALARA Levels for Effluents from Materials Facilities," (Reference 78) as appropriate for MTW site hazards and activities. The ALARA Committee uses the guidance provided in RG 8.10, Rev. 2, "Operating Philosophy for Maintaining Occupational and Public Radiation Exposures as Low as is Reasonably Achievable," published on August 11, 2016 (Reference 72). Chapter 4 of this Safety Evaluation Report (SER) discusses the radiation protection program for workers.

The MTW ALARA program is evaluated in detail in Chapter 4 of this SER. As described in the SER at Section 4.2.1.1.b, Honeywell's ALARA Committee provides review and oversight of facility operations to ensure that occupational radiation exposures and effluent releases of radioactive material are controlled. Section 4.2.1.1.b.1 provides the staff's finding that the ALARA policy will continue to meet the requirements in 10 CFR 20.1101(c) for an annual review of the program, and that the Committee and program review are acceptable.

Licensees requesting a license renewal must minimize and control waste generation during operations as part of the radiation protection program. Honeywell MTW's radiation protection program states that plant personnel should use waste volume reduction techniques when practical. Waste minimization is discussed further in Section 9.2.2.2.

The regulation in 10 CFR 19.12 describes the instructions on radiological health protection that must be provided to workers who are likely to receive an annual occupational dose in excess of 100 rem (1000 mSv). Part 20 Subpart L of 10 CFR requires that each licensee maintain records of the radiation protection program, including: (1) the provisions of the program; and (2) audits

and other reviews of program content and implementation. Section 4.2 of the SER addresses Honeywell's record retention program.

9.2.2.2 Effluent Controls and Monitoring

Honeywell MTW produces gaseous and liquid effluent streams. Each of these effluent streams is monitored at or just before the point of release. Results from the gaseous and liquid radiological effluent monitoring program are reviewed weekly. Honeywell MTW established an ALARA Committee, which is described in Section 4.4.2 of the revised LRA. The ALARA Committee reviews and oversees the facility operations to ensure that occupational radiation exposures and releases of radioactive effluents are properly controlled. Trends indicating possible increases in radiological releases are reported to plant management via ALARA meetings, quarterly health physics audits, or immediately, depending on the severity of the condition. Results from the monitoring program are also reported in the semi-annual effluent reports submitted to NRC. The sections below describe the control and monitoring programs for gaseous and liquid effluents and solid wastes.

Gaseous Effluents

Gaseous effluent information is provided in Section 9.2.1 of the revised LRA (Reference 61), Section 2.1.2.3.1 of the ER (Reference 13), and Section 2.3.9.1 of the EA (Reference 144). Gaseous effluents released from the Honeywell MTW facility from numerous stacks and exhaust fans contain both radiological and non-radiological constituents. The primary radiological constituent of concern is uranium. Uranium processing areas that produce dusts, mists, or fumes containing uranium or other toxic materials have dust collectors or scrubbers in place to reduce employee or environmental exposure to ALARA. In addition, the monitoring of 53 stacks and exhaust fans measures the uranium content in gaseous effluents. These release points are sampled continuously at constant flow conditions using particulate filters that capture the uranium. The samples are analyzed for alpha radioactivity either once or twice per 24 hours depending on the process being monitored. Honeywell has established an investigation level, which, if exceeded as indicated on three successive samples, results in an informal investigation and possible corrective actions to decrease radioactive emissions. When corrective action does not reduce emissions below the investigation limit, additional actions are taken, including shutdown of the unit (Reference 144, Section 2.3.9.1). Honeywell MTW's plant procedure, MTW-SOP-HP-0201, "Determination of Airborne Radioactivity" (Reference 8), describes air sampling processes and actions to be taken based on results. In accordance with the requirements of 10 CFR 40.65(a), the results of the effluent monitoring analyses are submitted to the NRC in semi-annual monitoring reports.

Because there are numerous individual emissions sources, Honeywell has established an additional investigation level for gaseous uranium emissions using monitoring results taken at the restricted area fence line. This investigation level, which is discussed further in Section 9.2.2.3 of the SER, is based on the average quarterly uranium concentration that would produce a yearly dose of 10 mrem (TEDE) to an individual continuously present at the fence line (Reference 2, Section 9.2.1).

Honeywell must also comply with dose limits set by the Environmental Protection Agency (EPA) in 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations." The regulation limits the annual dose equivalent to any member of the public to 25 mrem to the whole body. Honeywell MTW uses the EPA's CAP-88 dose modeling software (Reference 150) to demonstrate compliance with this regulation by calculating the dose to the nearest resident

using stack emissions data. This dose (TEDE) was calculated to be 2.17 mrem per year, less than the EPA's limit of 25 mrem (Reference 13, Section 4.6.5.2; Reference 144, Section 4.1.11.1). Honeywell's dose calculations (TEDE) also meets the NRC requirement in 10 CFR 20.1101(d) to ensure the individual member of the public who is likely to receive the highest dose is not expected to receive a TEDE exceeding 10 mrem per year from Honeywell MTW gaseous emissions.

Gaseous effluents that contain non-radiological material are discharged from 14 units in accordance with the MTW's Title V Clean Air Act Permit (Number 96030014), which was issued in December 2016 by the Illinois Environmental Protection Agency's Division of Air Pollution Control (Reference 144, Section 2.3.8.1). Sections 2.3.8.1 and 4.1.6 of the EA (Reference 144) provide more detail on the types of non-radiological air emissions and the associated potential impacts.

Liquid Effluents

Liquid effluent information is provided in Section 9.2 of the revised LRA (Reference 61), Sections 2.1.2.2.6, 2.1.2.3.2, and 4.4 of the ER (Reference 13), and Sections 2.3.8.2 and 4.1.4 of the EA (Reference 144). Liquid waste streams generated at Honeywell MTW are categorized as low-level radioactive and nonradioactive waste streams. Each of the waste streams is recycled or treated separately through the use of the environmental protection facility (EPF), uranium settling ponds, calcium fluoride settling ponds, and a sanitary wastewater treatment facility (which was added in 2015). In 2006, the EPF was expanded through the addition of the surface treatment facility, which added a high-capacity clarifier and sand filters. Honeywell made additional modifications to the EPF in accordance with its National Pollutant Discharge Elimination System (NPDES) permit to enhance treatment for compliance with fluoride discharge limits.

Honeywell MTW facility uses three outfalls (Outfalls 002, 003, and 005) that are permitted by the State of Illinois under NPDES Permit No. IL0004421 (Reference 144, Section 2.3.8.2). Most process-related liquid effluents from the plant, as well as treated sanitary wastewater, are discharged from Outfall 002 to the Ohio River through an unlined drainage channel. Outfalls 003 and 005 are used for nonradioactive storm water discharges to the Ohio River. Some liquid wastes may be containerized and sent to an appropriate disposal facility (Reference 144, Section 2.3.8.2).

Low-level radioactive liquid wastes produced at MTW consist of wash water from the drum dumping building, ammonium sulfate process solutions from the pre-treatment facility, hydrogen fluoride scrubber liquors from the hydro-fluorinators, potassium hydroxide scrubbing solutions from air pollution abatement equipment, sodium hydroxide leach liquors from uranium recovery and uranium hexafluoride cylinder washing, and uranium-contaminated storm water from the FMB area (Reference 144, Section 2.3.8.2).

The potassium hydroxide scrubbing solutions are recycled and solids are removed to recover uranium. Wash waters from the drum dumping building and ammonium sulfate solutions from the preparation process are routed to uranium settling tanks within the wet process or uranium settling ponds. Solids that have settled out in the tanks are routed to uranium recovery, while the liquids are routed to uranium settling ponds 3 and 4. Treated effluent from the ponds, which averages about 95 liters per minute (25 gallons per minute), mixes with other MTW effluents and discharges to Outfall 002 (Reference 144, Section 2.3.8.2).

Honeywell samples the main plant effluent continuously and the composite sample is analyzed daily for uranium. In addition, Outfall 002 effluent is analyzed in accordance with the NPDES permit for various parameters and non-radiological constituents, including total fluorides, pH, suspended solids, and biological oxygen demand. Excursions involving total suspended solids, fluoride, and fecal coliform occurred between 2010 and 2015. Honeywell investigated the causes of these excursions and subsequently added controls, replaced equipment, or increased maintenance to prevent further excursions. Temperature monitoring was discontinued in 2010, because the Illinois Environmental Protection Agency (IEPA) determined the discharge would not affect the Ohio River temperature.

Honeywell's Resource Conservation and Recovery Act (RCRA) permit for hazardous waste storage covers four surface impoundments, calcium fluoride retention Ponds B, C, D, and E. Under the terms of the RCRA permit (Reference 151), the ponds are scheduled to be closed by the end of 2020.

Solid Waste

Information about solid waste management is found in Section 9.2.2.2 of the revised LRA (Reference 61), Sections 2.1.2.2.3, 2.1.2.2.7, and 3.12 of the ER (Reference 13), and Sections 2.3.8.2, 3.12, and 4.1.12 of the EA (Reference 144). Solid wastes generated at Honeywell MTW include low-level radioactive waste, nonradioactive waste, hazardous waste, and mixed waste. Low-level radioactive solid waste consists of items that are contaminated with uranium residuals, including environmental control filters, maintenance and housekeeping wastes, personal protective equipment, and equipment removed from service. These wastes are collected in marked containers, segregated by radioactivity, drummed or bagged, and shipped to a facility permitted to dispose of or otherwise manage such waste. In addition, Honeywell MTW generates waste drums that had contained uranium feedstock (i.e., yellowcake) and materials generated during the intermediate steps in the processing operation. The drums are washed and then crushed at Honeywell MTW and shipped offsite for disposal as low-level radioactive waste (Reference 144, Section 3.12.1).

Honeywell MTW is a large quantity generator of RCRA hazardous waste and has two onsite storage areas that are permitted by the IEPA as a RCRA hazardous waste storage facility (Permit #B-65R2-M-17). One of these areas consists of two buildings for storing containerized hazardous waste. The other area consists of the four surface impoundments for calcium fluoride-contaminated liquid waste. As discussed earlier, these ponds are scheduled to be closed by the end of 2020 in accordance with the RCRA permit (Reference 144, Section 3.12.3).

Mixed waste (waste that contains both RCRA hazardous waste and radioactive constituents) is not generated by the manufacturing process, but some incidental mixed waste streams are produced as part of laboratory and maintenance activities. Mixed waste is stored in the two RCRA-permitted storage facilities and includes radiologically contaminated xylene paint thinner, used lubricating oils and waste naphtha from maintenance or cleaning activities, waste acetone, tributylphosphate, and Freon (Reference 144, Section 3.12.2).

Nonradioactive, nonhazardous solid wastes include cleaning compounds, antifreeze, floor sweep, compressed gases, debris and trash from operations, and office waste. The waste is screened for radioactivity and segregated if needed by detected radioactivity levels. Cleaning compounds, antifreeze, floor sweep, and compressed gases are sent offsite for disposal or recycling. Scrap metals that cannot be recycled are shipped to licensed disposal facilities, as

appropriate depending on whether or not the materials are contaminated with uranium. Debris, trash, and office waste are collected in roll-off containers with the waste being shipped to a local municipal landfill (Reference 144, Section 3.12.4).

Two byproduct streams include synthetic calcium fluoride and filter fines. These two waste streams are transported offsite for reclamation. Synthetic calcium fluoride is shipped to industrial sites who use it as a substitute for natural calcium fluoride (fluorspar). Filter fines are shipped offsite for the recovery of uranium that is returned to MTW for re-introduction into the manufacturing process (Reference 144, Section 3.12.4).

Item 3 of Section 4.2.1.3.a (Removal of Existing License Conditions Related to Radiation Protection) of this SER discusses in detail calcium fluoride recycling and License Condition (LC) 23. LC-23 established a limit on the radioactivity content of byproduct calcium fluoride that Honeywell recycles. The removal of LC-23 was requested by MTW on October 8, 2018 (Reference 50). These radioactivity limits are fully described in Chapter 9.2.2, Radioactive Waste Handling, of the revised LRA. In addition, in Chapter 9.2.2.1 of the revised LRA, MTW commits to conduct authorized activities within the radioactivity content limits. As stated in Item 3 of Section 4.1.2.3.a of the SER, the staff found the commitments to be acceptable.

Waste Minimization

Information about waste minimization practices is found in Section 9.2.2.2 of the revised LRA (Reference 61), the Section 4.13 of the ER (Reference 13), Sections 2.4 and 4.1.2 of the EA (Reference 144), and RAI responses (References 24 and 29). Pursuant to 10 CFR 20.1406(c), Honeywell operates the facility using ALARA practices to minimize subsurface contamination and reduce employee and environmental exposure to radioactive materials. Honeywell MTW has a procedure on decommissioning planning that requires that any work on the facility, the surface, or subsurface of the MTW be evaluated to determine the potential impacts to the decommissioning of the MTW. In addition, Honeywell submits an annual hazardous waste report to the IEPA and maintains a RCRA waste minimization plan. Waste minimization efforts are undertaken to reduce the use and generation of halogenated oils and oil-based paints and to reduce the potential for mixing radioactive and nonradioactive materials. Contaminated pieces of process equipment and other scrap metal are decontaminated where feasible to recover uranium and, when possible, shipped to a licensed processor. Non-contaminated scrap metal is sold to various scrap metal dealers when possible. In addition, the MTW recycles potassium hydroxide muds to reclaim both uranium and potassium hydroxide for reuse in the production of uranium hexafluoride. As discussed in the section above, the MTW also recycles byproduct calcium fluoride, shipping it offsite for use by industrial facilities.

9.2.2.3 Environmental Monitoring

Honeywell MTW conducts an environmental monitoring program that samples sediment, soil, vegetation, surface water, air, and groundwater, and measures direct gamma radiation at locations on or near the facility. Information about this program is found in Section 9.2.3 through 9.2.8 of the revised LRA (Reference 61), Section 2.1.2.3.3 through 2.1.2.3.8 of the ER (Reference 13), and Section 2.3.9.2 of the EA (Reference 144). Results from the radiological environmental monitoring program (for air and water) are reviewed weekly by Honeywell MTW Health Physics group. Plant management is made aware of undesirable trends and results that may indicate non-compliance with applicable standards. The plant ALARA committee meets quarterly to evaluate data, identify any undesirable trends in environmental exposures, and develop investigation and action plans, as necessary. Table 9-1 in Honeywell's revised LRA

(Reference 2) summarizes the types and frequency of sampling and monitoring. Honeywell MTW uses its plant procedure, MTW-SOP-HP-0209, "Collecting Environmental Samples," (Reference 19) for the collection of air, soil, vegetation, sediment, and surface water samples and procedure MTW-SOP-HP-0213, "Kinetic Phosphometric Determination of Uranium," (Reference 20) for the onsite analysis of samples to determine uranium content.

The MTW's environmental air monitoring program consists of continuous air sampling from four points along the restricted area fence line, two points near the site boundary in the prevailing wind direction, and at two offsite points (at the nearest downwind residence and approximately one mile downwind of the FMB). Sample filters are changed weekly and analyzed for uranium and fluoride. Additionally, a quarterly composite of the weekly samples is sent to a vendor analytical laboratory for radium (Ra)-226 and thorium (Th)-230 analysis. Weekly samples obtained at the nearest residence sample station are analyzed for uranium, and quarterly composites of the weekly samples are analyzed by a vendor laboratory for Ra-226 and Th-230. The MTW's environmental sample collection procedure, MTW-SOP-HP-0209, "Collecting Environmental Samples," (Reference 19) sets the investigation limit for uranium results of the fence line sampling points at 2.0×10^{-14} micro curies per milliliter ($\mu\text{Ci}/\text{ml}$) for the average of four continuous samples. Additionally, if the average concentration of total alpha radioactivity (the sum of natural uranium, radon-226, and thorium-230) measured in samples collected from the nearest residence exceeds 3.0×10^{-14} $\mu\text{Ci}/\text{ml}$ over any calendar quarter, MTW must submit a written report to the NRC within 30 days. The report must identify the cause for exceeding the limit and the corrective actions being taken to reduce the radioactivity release rates.

The MTW monitors direct gamma radiation continuously using environmental dosimeters at nine points: four on the restricted area fence line on each side of the plant, one at the nearest site boundary, one at the Metropolis Municipal Airport (1.6 kilometers northeast of the plant), and two at the nearest residence. The ninth dosimeter is a control measurement. These dosimeters are analyzed and replaced every quarter.

The MTW collects environmental surface water and sediment samples semi-annually from seven offsite locations, of which four are on the Ohio River and three are at lakes and ponds. The MTW collects environmental soil and vegetation samples semi-annually from six onsite stations, which are co-located with the air samplers. In addition, seven offsite sampling points are located in nearby areas of Illinois and Kentucky, all within approximately eight miles of the plant. All water, sediment, soil, and vegetation samples are analyzed for uranium.

The MTW has three groundwater monitoring programs that are required by the state and are associated with past or present NRC-regulated activities: one for monitoring the sanitary well and process well #3 for compliance with drinking water standards; a second required by the RCRA permit for routine compliance monitoring of the calcium fluoride ponds; and a third also required under the RCRA permit for monitoring an inactive landfill located beyond the restricted area in the eastern portion of the MTW site. The sanitary well and process well #3 are monitored for inorganic constituents, volatile organic compounds, radionuclides, and general parameters, including pH, turbidity, chlorine, total coliform, and fecal coliform. Monitoring of the calcium fluoride ponds consists of two upgradient and seven downgradient wells, which are sampled and analyzed quarterly for pH, specific conductance, fluoride, gross alpha and gross beta. The inactive landfill monitoring network consists of eight wells that are monitored for pH, specific conductance, other environmental constituents, gross alpha, gross beta, Rn-226, and Ra-228. Data available for the water supply wells indicates the wells continue to be in compliance with Illinois Department of Public Health drinking water requirements. Data available for the two RCRA groundwater monitoring programs indicate that the rare

exceedances of maximum contaminant levels (MCLs) for radiological parameters have been isolated. The staff has determined that these programs are adequate for detecting radiological contaminants that might reach groundwater in these areas.

Corrective Actions

As described in Honeywell's ER (Reference 13) at Section 3.4.8.3 and the EA (Reference 144) at Section 2.3.9.2 (Groundwater Monitoring subsection), Honeywell MTW is addressing two areas of identified non-radiological contamination, in accordance with its IEPA-issued RCRA permit. The first is the chlorinated solvent/arsenic area, and the second is related to underground process sewers. These are discussed briefly below.

In April 2001, IEPA issued a violation notice to Honeywell after identifying elevated contaminant levels in groundwater from the on-site monitoring wells (Reference 144, Section 2.3.9.2). The violation prompted Honeywell to investigate the source of the groundwater contaminants, which included dissolved arsenic, total arsenic, chloroform, trichloroethene, tetrachloroethene, and trichlorofluoromethane (Reference 144, Section 2.3.9.2). In August 2014, the IEPA approved an evaluation by Honeywell indicating the risks associated with the residual groundwater impacts were below regulatory thresholds and that no additional investigation or remediation was necessary (Reference 144, Section 2.3.9.2). In March 2016, the IEPA restated its determination that no further action was needed and established the terms of an environmental land use control (ELUC) for portions of MTW (Reference 144, Section 2.3.9.2). The ELUC will be attached to the property deed and places certain use limitations on the property. No further groundwater monitoring is being performed in this area. Honeywell is working with the IEPA to obtain regulatory closure for the area (Reference 144, Section 2.3.9.2).

Honeywell is investigating the condition of its underground process sewers and structures under its RCRA permit (Reference 144, Section 2.3.9.2). In 2016, two areas of concern were identified where contaminants were suspected to have migrated out of the underground process sewers into surrounding soils. Honeywell coordinated with IEPA on delimiting the extent and significance of the releases associated with these two areas of concern. The IEPA reviewed Honeywell's remedial actions, the results of the now concluded groundwater monitoring well investigation, and the results of a soil investigation, the IEPA approved the closure of Honeywell's investigations of the two areas of concern. Under the terms of its RCRA permit and its sewer investigation and maintenance plan, Honeywell continues to inspect the remaining process sewers and reports annually to the IEPA on the progress of its investigations (Reference 144, Section 2.3.9.2)

9.2.3 INTEGRATED SAFETY ANALYSIS SUMMARY AND MANAGEMENT MEASURES

The NRC staff's review of credible accident sequences that have potential consequences outside the controlled area are presented in Chapter 3 of this SER and include an assessment of plant features and procedures (PFAP) that are relied on for safety and needed for effluent control, environmental protection, and the prevention or mitigation of accidents. In Section 11.3 of this SER, the staff evaluated management measures for PFAPs that are relied on for safety to ensure they are available and reliable to prevent or mitigate accident consequences to a member of the public and the environment.

9.3 Evaluation Findings

The applicable regulatory requirements in 10 CFR Part 20 and 40 are listed in Section 9.1 of this chapter. The staff undertook this review to determine whether Honeywell's environmental protection measures are adequate to protect public health and safety and the environment. The staff considered the environmental safety of radiological and non-radiological activities at MTW as presented in the following documents: (1) the applicant's ER (Reference 13), (2) the Integrated Safety Analysis (ISA) program of the LRA (Section 3 of Reference 61), the ISA Summary (Reference 14), and the license conditions proposed in the revised LRA and discussed in Chapter 3 of the SER, and (3) Honeywell's MTW Radiation Protection Program presented in Section 4 of the revised LRA and discussed in Chapter 4 of the SER. The NRC staff finds that the applicant demonstrated that it has an acceptable program for minimizing, measuring and controlling air and water effluents and monitoring environmental conditions in air, surface water, sediments, soils, and vegetation. In the case of groundwater, the staff finds that the radiological monitoring required under the applicant's RCRA permit is acceptable for those areas where monitoring is conducted.

The NRC staff finds that with the continued operations of the MTW facility for an additional 40-year license term, airborne and liquid effluents will continue to be treated before discharge, will be monitored in accordance with the applicable license and permits, and are expected to remain within regulatory limits for non-radiological and radiological components. Public doses from continued Honeywell MTW operations are expected to remain below 10 CFR Part 20 regulatory limits and in compliance with EPA regulations in 40 CFR Part 190 for doses to members of the public. Honeywell MTW's estimated TEDE to the maximally exposed individual of 2.17 mrem/yr is less than the limit of 100 mrem/yr in 10 CFR 20.1301(a), less than the limit of 25 mrem/yr to the whole body established in 40 CFR Part 190, and less than the limit of 10 mrem/yr established in 10 CFR 20.1101(d) for a member of the public likely to receive the highest dose (Reference 144).

Honeywell has developed a program to implement adequate environmental protection measures during operation, which include: (1) effluent controls to maintain public doses ALARA as part of the radiological protection program, and (2) effluent and environmental monitoring. The NRC staff concludes that the program is adequate to protect the environment and the health and safety of the public during the license renewal term and complies with the applicable regulatory requirements in 10 CFR 20.1101, 10 CFR 20.1301, 20.1406(c), and 10 CFR 20.2003.

As discussed in Section 9.2.1, Honeywell MTW submitted an environmental report as part of its license application, as required in the NRC's NEPA-implementing regulations in 10 CFR Part 51 and in 10 CFR 40.43 and 40.31(f). The staff found the environmental report acceptable and requested additional information that was needed for the staff to prepare an environmental assessment. Chapter 14 of this SER describes the environmental assessment in more detail.

CHAPTER 10 DECOMMISSIONING

10.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review to determine with reasonable assurance that the applicant will be able to decommission the facility safely and in accordance with NRC regulations. Nuclear facilities licensed under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40 are required to comply with financial assurance in 10 CFR 40.36, “Financial assurance and recordkeeping for decommissioning.” In addition, the licensees must submit decommissioning plans for NRC approval in accordance with 10 CFR 40.42, “Expiration and termination of licenses and decommissioning of sites and separation buildings or outdoor areas.”

Pursuant to 10 CFR 40.36(d), Honeywell is required to submit a Decommissioning Funding Plan (DFP). The purpose of NRC’s review of the DFP is to determine whether the applicant has considered decommissioning activities that may be needed in the future, has performed a credible site-specific cost estimate for those activities, and has presented the NRC with financial assurance to cover the cost of those activities in the future. The DFP, therefore, should contain an overview of the applicant’s proposed decommissioning activities, the methods used to determine the cost estimate, and the financial assurance mechanism. This overview should contain sufficient detail to enable the reviewer to determine whether the Decommissioning Cost Estimate (DCE) is reasonably accurate.

10.2 Staff Review and Analysis

The NRC staff performs reviews of decommissioning funding using the guidance provided in NUREG-1757, Volume 3, Rev.1, “Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness” (Reference 102). The information to support this review was obtained from Honeywell’s License Renewal Application dated February 8, 2017 (Reference 2), which states that Honeywell develops and implements changes to the DFP in accordance with 10 CFR 40.36(d)(2).

10.2.1 DECOMMISSIONING COST ESTIMATE

Pursuant to 10 CFR 40.36(d)(2), Honeywell is required to submit an updated DFP, at intervals not to exceed 3 years, for NRC review and approval. Honeywell submitted its triennial DFP update and its 2015 DCE of \$254,238,000 on January 6, 2016 (Reference 11). The NRC reviewed the triennial update and approved Honeywell’s 2015 DCE on June 27, 2016 (Reference 101). In accordance with 10 CFR 40.36(d)(2), Honeywell submitted its next triennial DFP update on January 4, 2019 (Reference 81). This revision is currently under review by the NRC staff.

The NRC staff found the 2015 DCE, as provided by Honeywell, acceptable because it (1) reflected the cost of an independent contractor to perform decommissioning activities; (2) was based on unrestricted use; (3) included an adequate contingency factor; and (4) identified and provided justification for key assumptions. Accordingly, the NRC staff finds the 2015 DCE satisfies the requirements of 10 CFR 40.36(d) and is consistent with the guidance contained in NUREG-1757.

10.2.2 DECOMMISSIONING FINANCIAL ASSURANCE

After the NRC's approval of the cost estimate, Honeywell submitted revised financial instruments as decommissioning financial assurance which were approved by the NRC on August 11, 2016 (Reference 102). Honeywell relies on letters of credit and a standby trust as financial assurance, and the staff found these financial instruments acceptable on the basis that they meet the NRC's requirements in 10 CFR 40.36(e). The financial instruments are consistent with NUREG-1757, and the aggregate amount of financial assurance provided by these instruments is equal to the cost estimate approved by NRC. In accordance with 10 CFR 40.36(e), Honeywell submitted its updated certification of financial assurance for decommissioning on January 4, 2019 (Reference 81). This certification is currently under review by the NRC staff.

Pursuant to 10 CFR 40.36(d)(1)(iv), Honeywell provided a Certification of Financial Assurance. The NRC staff finds that it certifies that financial assurance is provided in the amount of the cost estimate approved by the NRC. The NRC staff finds that the certification meets the requirements in 10 CFR 40.36(d)(1)(iv), and the language of the certification is consistent with guidance; therefore, the certification is acceptable.

10.3 Evaluation Findings

The NRC staff evaluated Honeywell's 2015 DCE and financial assurance for decommissioning using NUREG-1757. As discussed above, the NRC staff finds Honeywell's decommissioning funding is in accordance with 10 CFR 40.36(d), and as the decommissioning funding will be updated, reviewed and approved at least every three years, reasonable assurance of protection for the public and the environment will be provided during the renewed license term.

CHAPTER 11 MANAGEMENT MEASURES

11.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review to assess whether Honeywell Metropolis Works' (MTW's) Management Measures Program complies with the requirements and policies necessary to grant a license renewal under 10 CFR Part 40. In addition, the NRC staff verified that the contents of the previous Safety Demonstration Report (Reference 52), related to management measures, are incorporated into the applicable sections of the management measures chapter of the revised LRA (Reference 61). The Safety Demonstration Report, which was previously used by Honeywell to demonstrate compliance with 10 CFR Part 40 requirements, is no longer a separate document required by License Condition 18B to be submitted with the LRA. However, the NRC staff concluded the information in the Safety Demonstration Report needed to be incorporated into the LRA (Reference 61). The NRC staff in its review of the revised LRA, evaluated how Honeywell's management measures activities are applied to its plant features and procedures (PFAPs). The staff's evaluation also assessed whether the licensee's equipment, facilities and procedures are adequate and will continue to be adequate to protect health and minimize danger to life or property, as required by 10 CFR 40.32(c).

The NRC staff recognizes that Honeywell is a Part 40 licensee and therefore is not subject to the requirements of Part 70. However, Honeywell committed to conducting an ISA to provide structured analyses of the MTW site hazards and the safety controls applied to prevention and/or mitigation of identified accident sequences. Honeywell applies management measures to ensure that PFAPs identified in the ISA are available and reliable to perform their functions as needed. For management measures, the content and format of Honeywell's revised LRA follows Chapter 11 of NUREG-1520 "Standard Review Plan for Fuel Cycle Facilities License Applications," published in June 2015 (Reference 98). For this reason, the staff assessed the management measures program against the NRC's guidance in NUREG-1520 to determine the adequacy of the management measures program and whether PFAPs will be available and reliable to prevent or mitigate the consequences of an event.

11.2 Staff Review and Analysis

The NRC staff reviewed Honeywell's revised LRA (Reference 61) and its April 25, 2018 (Reference 25) response to the NRC's RAI, dated February 12, 2018 (Reference 107) and June 13, 2019 (Reference 62) in evaluating the adequacy of the management measures program. In addition, the staff reviewed the portions of Honeywell's Safety Demonstration Report (Reference 52), which was most recently approved in December 2016. Certain management measures program elements (i.e., training, records) are now included in the management measures program, because the SDR is no longer part of the application.

The NRC staff conducted an on-site review of the applicant's management measures program on December 14, 2018 (Reference 145, non-publicly available). The on-site review included interviewing the site personnel responsible for implementing the management measures program and for reviewing several plant procedures. Honeywell prepared the management measures section of the revised LRA following the format contained in Chapter 11 of NUREG-1520.

The management measures sections from NUREG-1520 are discussed in the following sections:

11.2.1 CONFIGURATION MANAGEMENT

Honeywell has established a configuration management program to evaluate, implement, and track proposed changes to the site, structures, processes, systems, components, computer programs, and activities of personnel. The configuration management program provides assurance that PFAPs can perform their functions when needed. The configuration management program is documented in Section 11.1 of the revised LRA.

The NRC staff acknowledges that Honeywell is not subject to the 10 CFR 70.72 facility change mechanism, which is required of 10 CFR Part 70 facilities. However, Honeywell committed to establishing a change management process in the revised LRA Sections 11.1.3.1 and 11.1.3.2. Section 11.1.3.1, Changes Affecting the MTW ISA summary provides criteria for evaluating whether MTW's proposed facility changes require NRC pre-approval. Section 11.1.3.2, Changes affecting the revised LRA provides criteria for determining changes that MTW can make to the LRA and the conditions that are to be met if it is determined that a license amendment is not needed. Section 11.1.3.3, Reports of Changes to NRC provides the criteria to determine when and how Honeywell must report and document MTW facility changes.

The change process for Honeywell is presented in Section 11.1.3 of the revised LRA (Reference 61). The process for both changes to the ISA summary and the LRA was derived by the licensee RG 3.74 "Guidance for Fuel Cycle Facility Change Processes" (Reference 108). This regulatory guide discusses the types of changes for which licensees are to seek prior approval from the NRC before their implementation. As stated in the RG, the guidance also applies to certain applicants under 10 CFR Part 40, "Domestic Licensing of Source Material," that must comply with the requirements in Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material," of 10 CFR Part 70 or with similar requirements in 10 CFR Part 40. The guide describes how licensees can evaluate potential changes to determine whether NRC approval is required before implementing them. The regulatory guide also identifies an acceptable level of information to be provided by licensees when documenting and reporting changes made without prior NRC approval.

LC-20A and LC-20B provide the criteria Honeywell must follow in order to make changes to the LA and ISA Summary without prior NRC approval. LC-20C states that Honeywell must request and obtain an amendment from the NRC for changes that do not meet the criteria in LC-20A and 20B. LC-20C also requires the licensee to submit an application for an amendment in order to change the change process in Sections 11.1.3.1, 11.1.3.2 and 11.1.3.3 of the LA.

The staff finds that the criteria Honeywell applies to determine whether changes can be made to the LA and ISAs without prior approval are consistent with those outlined in RG 3.74 and are therefore acceptable. The change process is incorporated in LC-20.

The NRC evaluated the description of Honeywell MTW's configuration management program and finds reasonable assurance that PFAPs will perform their functions when needed because the configuration management program sufficiently evaluates, implements, and tracks proposed changes to PFAPs.

The NRC staff finds the applicant commits to a facility change process as part of its configuration management program. The licensee commits to review a proposed facility change in accordance with Section 11.1.3 of the revised LRA, to determine if a proposed change requires the NRC's approval, before a change is implemented.

The NRC staff also finds that the revised LRA describes the types of documentation required under MTW's configuration management program (e.g., facility changes, engineering evaluations).

The staff concludes that the applicant's configuration management program provides reasonable assurance that the licensee's equipment, facilities, and procedures are adequate and will continue to be adequate to protect health and minimize danger to life or property, and therefore meets the regulatory requirements of 10 CFR 40.32.

11.2.2 MAINTENANCE

The revised LRA, Section 11.2 provides Honeywell's commitment to implement maintenance management functions to ensure that MTW's structures, systems and components are maintained as necessary to ensure PFAPs are available and reliable to perform their safety function(s) when needed.

Section 11.2 of the revised LRA states that the maintenance of PFAPs, and any items that may affect the function of PFAPs, encompasses planned testing and preventative maintenance, corrective maintenance, surveillance, monitoring, and functional testing. Honeywell implements a specific written procedure governing PFAPs maintenance. In addition, maintenance activities affecting PFAPs are controlled by special work packages.

In its response to RAI 3-16, (Reference 25), the applicant clarified the maintenance roles and responsibilities of personnel at the MTW facility, the organizational structure applicable to maintenance program, and the implementation of the maintenance program. Honeywell identified language from MTW's administrative procedure that describes the different roles of individuals responsible for planning and implementing maintenance throughout the facility, depending on the type of maintenance.

The staff concludes that the applicant's maintenance program provides reasonable assurance that the licensee's equipment, facilities, and procedures are adequate and will continue to be adequate to protect health and minimize danger to life or property, and therefore meets the regulatory requirements of 10 CFR 40.32.

11.2.3 TRAINING AND QUALIFICATION

Section 11.3 of the revised LRA describes the applicant's training and qualification program for its employees and contractors.

Honeywell commits to implementing an employee training and qualification program to provide assurance that personnel working in the facility recognize the importance of and are qualified to perform assigned activities in a manner that protects workers, the public, and the environment. Honeywell's training and qualification program includes safety training and technical and skills training commensurate with the assigned tasks. The training program also provides assurance that PFAPs are available and capable of performing their intended safety functions. Honeywell's training and qualification program includes safety training and technical and skills training

commensurate with the assigned tasks. The training program also provides assurance that PFAPs are available and capable of performing their intended safety functions.

Honeywell describes the specific training and qualifications required for ISA team members in the revised LRA at Section 11.3. Honeywell commits to following training and experience requirements for ISA Team leaders: (1) knowledge in ISA methodologies as defined in NUREG-1513, (2) experience in chemical process engineering or radiological safety, (3) an understanding of PSM requirements, and (4) familiarity with process operations and site hazards.

The NRC staff finds that Sections 11.3 of the revised LRA adequately describes the implementation of and criteria for the training and qualification program. The staff also finds the program provides reasonable assurance that the personnel working in the facility recognize the importance of and are qualified to perform assigned activities. The training and qualification program includes: the criteria for the selection of instructors; methods of implementation and assessment; record keeping and training refresh policies, including specific training requirements for multiple disciplines.

For the reasons described above, the NRC staff finds the applicant's discussion of the training and qualification of personnel involved in ISA activities and the personnel responsible for overseeing those activities to be acceptable. The staff finds reasonable assurance that MTW's personnel are qualified by reason of training and experience to use the source material for the purposes permitted by its license and are adequate to protect health and minimize danger to life or property, and therefore the applicant's Training and Qualification Program, as described in Section 11.3, meets the regulatory requirements of 10 CFR 40.32(b).

11.2.4 PROCEDURES

The NRC staff found that the revised LRA, Section 11.4, describes its established process for the preparation, use, and management control of Honeywell written procedures, which govern the procedure control process. These procedures address the areas of operating procedure preparation, management measures, specific processes, and other facility activities. Honeywell's procedure implementation process includes key elements of identification, preparation, verification, review and comment resolution, approval, validation, issuance, change control, and cancelation. In addition, it encompasses the generation, use, and maintenance of all procedures in the facility. Honeywell has established a process to identify those operations that required procedural guidance and to ensure the proper execution of actions in accordance with approved procedures.

The applicant's response to RAs dated February 12, 2018, (Reference 25) clarified the requirements and mechanism for procedure generation, procedure review, and revision. The revised LRA describes the variety of procedures for plant activities including: administrative and management processes, plant operations, and maintenance, health physics, environmental, laboratory and safety activities. In addition, Honeywell provided a description of the organizational authority for the review and approval of such procedures.

The staff concludes that the applicant's procedure implementation process provides reasonable assurance that its procedures are adequate to protect health and minimize danger to life or property, and therefore meets the regulatory requirements of 10 CFR 40.32(c).

11.2.5 INCIDENT INVESTIGATION

The NRC staff found that the revised LRA, Section 11.6 describes an Incident Reporting and Investigation Program for the MTW facility. The applicant's program describes general procedures and the management structure for reporting, investigating incidents and determining appropriate corrective actions. The site maintains specific procedures that requires the investigation, recording, reporting, and following up on reportable incidents as required by 10 CFR 40.60, 10 CFR Part 20, Subpart M, and 10 CFR Part 21. In addition, the applicant provided additional information on how procedures identify the level of significance of the incident, determine timely completion of corrective actions, and assign the responsible personnel to complete the task.

The staff concludes that the applicant's Incident Reporting and Investigation Program provides reasonable assurance that its procedures are adequate to protect health and minimize danger to life or property, and therefore meets the regulatory requirements of 10 CFR 40.32(c).

11.2.6 RECORDS MANAGEMENT

The NRC staff found that the revised LRA, Section 11.7 Records Management and applicant's responses to the staff's RAIs dated, February 12, 2018 (Reference 25), provide reasonable assurance that Honeywell keep and maintains records in a manner which is consistent with its corporate record keeping practices and regulatory requirements. The NRC staff also found that the applicant's records program describes a list of types of records, record keeping process and specific processes for records maintenance. In addition, in the applicant's responses to the NRC's RAI, the applicant provided specific examples of the types of documents maintained by Honeywell under each record category (i.e., design, incident investigations, reported events) and their respective retention periods.

The staff concludes that the applicant's records management functions provides reasonable assurance that its procedures are adequate to protect health and minimize danger to life or property, and therefore meets the regulatory requirements of 10 CFR 40.32(c).

11.2.7 AUDIT AND ASSESSMENT

The NRC staff found that Honeywell implements a program of audits and inspections to verify that plant operations, maintenance activities, radiation protection program, chemical safety, fire protection program, emergency response program, environmental protection program are conducted in accordance with regulatory requirements, license conditions and written procedures. Section 11.5 of the revised LRA describes a process for preparation, use, and management control of the audit and assessment program. This process includes elements such as, procedures, audit schedules, audit scope, and personnel with implementation and execution authority. The staff found that the applicant performs audits in accordance with approved procedures to verify operations at MTW are in compliance with its company policies and regulatory requirements.

The staff concludes that the applicant's audit and assessment program provide reasonable assurance that its procedures are adequate to protect health and minimize danger to life or property, and therefore meets the regulatory requirements of 10 CFR 40.32(c).

11.3 Evaluation Findings

The NRC staff reviewed the Management Measures Program, as described in Section 11.2 of this SER, and finds that it provides reasonable assurance that Honeywell's operations and PFAPs comply with 10 CFR 40.32(c) and that MTW equipment, facilities and procedures are and will continue to be adequate to protect health and minimize danger to life or property for the duration of the renewed license.

The staff finds the procedural elements of the Management Measures program; Maintenance, Training and Qualification, Procedures, Incident Investigation, Audit and Assessment, and Records Management are fully described in the revised LRA at Chapter 11. Honeywell's commitment to fully implement and maintain these procedures during the term of MTW license provides reasonable assurance that the equipment, facilities and procedures are adequate to protect health and minimize danger to life or property. In addition, NRC staff finds that Honeywell has committed to the organizational structure procedure and responsibilities to implement a configuration management program.

The NRC staff finds that Honeywell's management measures program, as described in its revised LRA, provides reasonable assurance that the authorized activities will be carried out in compliance with the license requirements, and deviations from requirements will be promptly identified and corrected. The NRC staff concludes that the applicant demonstrates compliance with 10 CFR 40.32(c) because its proposed equipment, facilities and procedures are and will continue to be adequate to protect health and minimize danger to life or property.

CHAPTER 12 MATERIAL CONTROL AND ACCOUNTING

12.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review to ensure that the Honeywell license renewal application complies with the requirements for material control and accounting (MC&A). Part 40 source material licensees subject to the MC&A requirements in 10 CFR Part 40 must also comply with the recordkeeping and reporting requirements in 10 CFR 40.61, "Records," and 10 CFR 40.64, "Reports."

Honeywell develops and submits Nuclear Material Transaction Reports addressing foreign-obligated source material in accordance with 10 CFR 40.64(a). The records related to those reports are maintained in accordance with 10 CFR 40.61.

12.2 Staff Review and Analysis

The information to support this review was obtained from the original application (Reference 2), Honeywell responses to requests for additional information (Reference 3), and additional information supplementing the application (References 34, 35, 61, and 4).

12.2.1 RECORDS – 10 CFR 40.61

Section 40.61 of 10 CFR requires licensees to retain specific records, including those related to MC&A documentation. Paragraph (a) of this section requires each licensee who receives source material to keep records showing the receipt, transfer, and disposal of licensed source material in accordance with the specified retention periods.

In Section 12.2, "Record Keeping," of the revised LRA (Reference 61), the licensee affirms that records of receipts, transfer, and disposal of source material are maintained in accordance with 10 CFR 40.61.

The NRC staff reviewed the license's description regarding records in Section 12.2 of the license application and finds that it meets the requirements of 10 CFR 40.61.

12.2.2 REPORTS – 10 CFR 40.64(A)

Paragraph 40.64(a) of 10 CFR requires licensees who transfer, receive, or adjust the inventory in any manner, of uranium or thorium source material with foreign obligations by one kilogram or more, or who imports or exports one kilogram or more of uranium or thorium source material to complete a Nuclear Material Transaction Report in accordance with the instructions stated in NUREG/BR-006, "Instructions for Completing Nuclear Material Transaction Reports" within 10 days after the material is received, or no later than the close of business the next working day for shipments (Reference 99). NUREG/BR-0006 also states that a final weight and assay are to be reported to the NMMSS database within 60 days of receipt.

In Section 12.1, "Material Control and Accounting," of the revised license renewal application (Reference 61), the licensee affirms that Nuclear Material Transaction Reports addressing foreign-obligated source material are developed and submitted in accordance with the requirements of 10 CFR 40.64(a).

During the 2007 license renewal (Reference 88), the NRC granted Honeywell an exemption from the requirement in 10 CFR 40.64(a) to provide a report for materials received. The NRC staff documented the exemption by imposing License Condition (LC) 21. In the response to the NRC's staff's RAI 12-2, the licensee requested the LC-21 be retained in the renewed license (Reference 3).

Honeywell is subject to the regulatory requirements in 10 CFR 40.64(a). However, Honeywell is unable to report the measurement of weight within 10 days, or a final weight and assay within 60 calendar days of the receipt because of the way source material is received, inventoried, and utilized at the MTW. Honeywell noted that the time required to complete the analytical process for material received at Honeywell Metropolis Works, from receipt to finalization of weight and assay, takes approximately six to twelve weeks and, depending on the amount of material received in a given period, the time required to complete the analytical process may extend to as much as 180 days (Reference 88). Thus, Honeywell is rarely able to report a final weight and assay within the number of days as outlined in NUREG/BR- 0006. Accordingly, in the revised LRA, Honeywell requested continuation of the exemption from the requirements 10 CFR 40.64(a) for the duration of a 40-year license renewal.

Section 40.14 of 10 CFR allows exemptions from the requirements of regulations in Part 40 which the Commission determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The alternative reporting method that Honeywell currently implements by exemption provides that final weight and assay values are correctly posted and are compared with, on a monthly basis, the weights of natural uranium recorded in the NMMSS database. Honeywell must provide corrections as necessary. The exemption is memorialized in LC-21.

The NRC staff reviewed Honeywell's request for continuation of the exemption. The staff determined that there have been no changes in the licensee's receipt process since its review of the initial exemption request in 2007. The staff determined that the requirements of Honeywell's alternative receipt process continue to maintain the NMMSS database as current as possible. In addition, the exemption continues to provide adequate controls over the receipt, reporting, and control of source material without endangering life or property, or the common defense and security. The staff also finds that continuation of the exemption is not contrary to law. Further, continuation of this exemption allows MTW, the only US-based Part 40 uranium conversion facility to maintain its license, which serves the public interest. Therefore, the staff finds that the continuation of Honeywell's exemption from the reporting requirements of 10 CFR 40.64(a) is acceptable.

The LC-21, Amendment 14 of License SUB-526, which includes a correction to the name of the NMMSS acronym to Nuclear Materials Management and Safeguards System, is revised as follows:

LC-21 is retained and modified in Amendment 14 to state that Honeywell is granted an exemption from compliance with the "receipts" requirement in 10 CFR 40.64(a) because an alternative reporting requirement has been implemented. The LC-21 is also modified to correct a typographical error in the spelling out of the NMMSS acronym. Discussion of the technical analysis that serves as the basis for the renewal of the exemption documented in LC-21 is in SER Section 12.2.2.

12.2.3 REPORTS – 10 CFR 40.64(B)(1)

Paragraph 40.64(b)(1) of 10 CFR requires that licensees who possess, or had possessed in the previous reporting period, at any one time and location, one kilogram or more of uranium or thorium source material with foreign obligations document holdings as of September 30 of each year and to submit to the Commission a report to the NRC within 30 days a statement of its source material inventory with foreign obligations.

In Section 11.4.1, “Procedure Development,” of the revised LRA (Reference 61) the licensee states that written procedures are established to govern a variety of plant activities, including administrative and management processes, plant operations, maintenance, health physics, environmental, laboratory, and safety activities. In addition, the licensee states that Metropolis Works (MTW) procedures that govern activities related to PFAP include both Nuclear Service procedures, plant operation procedures, as well as administrative, maintenance, and training procedures.

The NRC staff reviewed Honeywell’s administrative procedure, MTW-ADM-ISO-0180, “Tracking Receipt and Sampling of Uranium Ore” (Reference 35). Section 4.7, “742 Annual Report,” of the procedure states that the written report regarding source material with foreign obligations is submitted to the NRC in accordance with 10 CFR 40.64(b)(1). Therefore, the NRC staff finds that the licensee procedures meet the requirements of 10 CFR 40.64(b)(1).

12.2.4 REPORTS – 10 CFR 40.64(C)

Paragraph 40.64(c)(1) of 10 CFR nuclear material transaction reports requires licensees who are authorized to possess uranium or thorium pursuant to a specific license, shall notify the NRC Headquarters Operations Center of any incident in which an attempt has been made or is believed to have been made to commit a theft or unlawful diversion of more than 6.8 kilograms of such material at any one time or more than 68 kilograms of such material in any one calendar year. The licensee is required to notify the NRC as soon as possible, but within 4 hours, of discovery of such theft or unlawful diversion under 10 CFR 40.64(c)(2). Paragraph 40.64(c)(3) of 10 CFR requires that the licensee’s initial notification shall be followed within a period of 60 days by a written follow-up notification in accordance with 10 CFR 40.5. Paragraph 40.64(c)(4) of 10 CFR requires that the licensee update the written notification with any substantive additional information concerning an attempted or apparent theft of unlawful diversion of source material, when it becomes available.

In Section 11.4.1, “Procedure Development,” the licensee states that written procedures are established to govern a variety of plant activities, including administrative and management processes, plant operations, maintenance, health physics, environmental, laboratory, and safety activities. In addition, the licensee states that MTW procedures govern plant operation procedures, as well as other types of procedures, including administrative, maintenance, and training procedures.

The NRC staff reviewed administrative procedure, MTW-ADM-HP-0105, “Completing Reports to the USNRC” (Reference 34). Under Section 2.3.2 of the procedure, the licensee states how the reporting requirements contained in 10 CFR 40.64(c) are to be met. Therefore, the NRC staff finds that the licensee procedure meet the requirements of 10 CFR 40.64(c).

12.3 Evaluation Findings

Based on the review of Honeywell's license renewal application and subsequent submittals, the NRC staff finds that the licensee's MC&A program adequately addresses the applicable requirements in 10 CFR 40.61 and 40.64. Therefore, the NRC staff concludes that Honeywell's MC&A program is acceptable.

CHAPTER 13 PHYSICAL PROTECTION

13.1 Purpose of Review

The purpose of this review is to determine if the applicant has committed to establish and maintain a physical protection program, consistent with 10 CFR 40.31(m), which requires compliance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements," and 10 CFR 73.22, "Protection of Safeguards Information: Specific Requirements."

In addition, this review also serves to evaluate whether the physical security program at Honeywell Metropolis Works (MTW) meets all the requirements in U.S. Nuclear Regulatory Commission (NRC) Orders, EA-02-025, Interim Compensatory Safeguards Measures, dated March 25, 2002, and EA-03-096, Additional Security Measures Associated with Access Authorization, dated August 18, 2004 (Reference 87), and provides reasonable assurance that the public health and safety, and common defense and security, will continuously be protected. The specific requirements contained in the aforementioned orders are safeguards information (SGI) and are withheld in accordance with 10 CFR 2.390.

Finally, the NRC staff reviewed the proposed License Condition (LC) 33, "Honeywell shall maintain a security program in accordance with Compensatory Measures Order (EA 02-025) dated March 25, 2002, as approved and amended." Honeywell submitted the request in "Honeywell Metropolis Works Requested Revisions to Current License Conditions," dated October 8, 2018 (Reference 4).

13.2 Staff Review and Analysis

Chapter 13 of the revised LRA (Reference 61), describes the physical protection activities Honeywell commits to conduct at the MTW facility during the renewal period. Honeywell also committed to implement processes to protect SGI and to comply with the Interim Compensatory Measures issued by the NRC. By letter dated August 3, 2017 (Reference 104), the NRC provided requests for additional information (RAIs) to Honeywell, related to Section 13 of the LRA. Honeywell provided responses to the NRC staff's RAIs by letter dated September 20, 2017 (Reference 17). During a site visit conducted by NRC staff to the Honeywell MTW site on February 6, 2018, the NRC staff requested that Honeywell provide supplemental information to support its initial RAI responses. By letter dated March 15, 2018 (Reference 28), Honeywell provided supplemental RAI responses to the NRC. The NRC staff's RAIs and Honeywell's RAI responses are SGI, as a result, they are withheld from public disclosure in accordance with 10 CFR 2.390.

The NRC staff reviewed the physical protection activities, described in the revised LRA and the RAI responses, which Honeywell commits to conduct at the MTW facility during the license renewal period, as described. Based on the review, the NRC staff has determined that Honeywell's proposed physical protection activities will continue to meet the requirements as described in NRC Orders EA-02-025 and EA-03-096. The NRC staff has also prepared a detailed safeguards evaluation report which contains SGI, which is withheld from public disclosure in accordance with 10 CFR 2.390.

The NRC staff reviewed the proposed LC-33 to address the Compensatory Measures Order EA 02-025. As part of the evaluation, NRC staff determined that the condition will not create a conflict between the requirements in 10 CFR 73.21, "Protection of Safeguard Information: Performance requirements," and 10 CFR 73.22, "Protection of Safeguard Information: Specific requirements" and the requirements in Order EA 02-025. Additionally, LC-33 does not decrease the effectiveness of Honeywell's physical protection plan for the MTW facility.

LC-33 of License SUB-526, Amendment 14 states:

Honeywell shall maintain a security program in accordance with Compensatory Measures Order (EA 02-025) dated March 25, 2002, as approved and amended.

13.3 Evaluation Findings

Based on the review, the NRC staff finds that Honeywell provided an acceptable physical protection plan for its MTW facility which will continue to meet the applicable requirements as specified in 10 CFR 40.31(m), and NRC Orders EA-02-025 and EA-03-096. In addition, the NRC staff concludes that the applicant's physical protection program is acceptable and provides reasonable assurance that the public health and safety and common defense and security are adequately protected during the term of the renewed license. The NRC staff also finds that the addition of LC-33 provides reasonable assurance that the acceptable physical protection plan will remain in place at MTW.

CHAPTER 14 ENVIRONMENTAL REVIEW

14.1 Purpose of Review

The U.S. Nuclear Regulatory Commission (NRC) staff conducted this review under the National Environmental Policy Act to examine the potential environmental impacts of renewing Honeywell's materials license. The NRC regulations for environmental reviews are provided in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51. The NRC staff conducted the review using the guidance in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," published in August 2003 (Reference 44).

14.2 Evaluation Findings

The staff has prepared an Environmental Assessment to evaluate the impacts on the environment with respect to license renewal (Reference 144). In accordance with 10 CFR 51.33(a), the staff issued a draft finding of no significant impact (FONSI) in the *Federal Register* (83 FR 54787, dated October 31, 2018) and provided a 30-day public review and comment period on the draft EA and draft FONSI. The comments received and the staff's responses to the comments are provided in Appendix B of the Environmental Assessment (EA). In the EA, the NRC staff concluded that the potential environmental impacts from the proposed license renewal would not be significant. Based on its review of the proposed action relative to the requirements set forth in 10 CFR Part 51 and its consideration of all comments received on the draft EA, the staff has determined that renewal of SUB-526, which authorizes continued operations at the Metropolis Works (MTW) for an additional 40 years, will not significantly affect the quality of the human environment. Therefore, an environmental impact statement is not warranted, and, pursuant to 10 CFR 51.31, "Determinations Based on Environmental Assessment," a FONSI is appropriate.

As required by Section 106 of the National Historic Preservation Act (NHPA), the NRC considered the impact of the proposed license renewal on historic, archaeological, and traditional cultural resources. In accordance with 36 CFR 800.8 (the implementing regulations for NHPA), "Coordination with the National Environmental Policy Act," the NRC used the National Environmental Policy Act process to coordinate its obligations under NHPA Section 106, including consultations with the Illinois State Historic Preservation Office and American Indian Tribes. Sections 3.8 and 4.8 of the EA respectively describe efforts to identify cultural resources on the MTW site and assess the potential impacts of the proposed license renewal on known or unknown resources.

As a result of its environmental evaluation, the NRC staff determined that a license condition was needed to protect cultural resources that are or may be present on the site in the event of future ground disturbance. The staff made this determination because no sitewide survey had been completed at the site before it was developed for MTW operations and because much of the site remains undeveloped. LC-34 requires that Honeywell notify the NRC before undertaking ground-disturbing activities on its property that are related to a pending or potential NRC licensing action. The condition also requires that Honeywell will take appropriate measures to protect and evaluate any cultural resources, including human remains, that may be encountered during ground disturbance activities. The staff shared the text of the license condition with consulting American Indian tribes, and the tribes had no comments.

CHAPTER 15 CONCLUSION

Based on the reviews documented in this SER regarding Honeywell's revised LRA, the NRC staff finds that there is reasonable assurance that the activities to be authorized at the MTW facility by the issuance of a renewed license will not constitute an undue risk to the public health and safety and will not significantly affect the quality of the human environment. The NRC staff finds that the revised LRA meets the requirements of 10 CFR 40.31, "Applications for Specific Licenses," and 10 CFR 40.32, "General Requirements for Issuance of Specific Licenses."

Accordingly, the NRC staff finds that the materials license for Honeywell MTW facility should be renewed for a 40-year term. The renewed license will be issued as Amendment 14 to SUB-526, which includes license conditions with which Honeywell must comply.

CHAPTER 16 REFERENCE LIST

- 1 Honeywell International Inc., Application to Amend NRC License and Continuation of Exemption dated September 18, 2007, ADAMS Accession No. ML072630158.
- 2 Honeywell International, Inc., Honeywell Metropolis Works "Application for Renewal of USNRC Source Materials, SUB-526," February 8, 2017, ADAMS Accession No. ML17048A263.
- 3 Honeywell International, Inc., Honeywell Metropolis Works, "Honeywell Metropolis Works Response to RAIs for Radiation Protection and Material Control and Accounting," September 20, 2017, ADAMS Accession No. ML17268A154.
- 4 Honeywell International, Inc. Honeywell Metropolis Works, "Honeywell License Renewal Application Revision 9/14/2018," October 8, 2018, ADAMS Accession No. ML18284A332.
- 5 Honeywell International, Inc., "Renewal of USNRC Source Materials License," May 27, 2005, ADAMS Accession No. ML052310382.
- 6 Honeywell International, Inc., "Honeywell Metropolis Works Emergency Response Plan," May 27, 2005, ADAMS Accession No. ML052310405 (Non-Public).
- 7 Honeywell International, Inc., "Integrated Safety Analysis Summary Submittal and License Amendment Request," September 30, 2008, ADAMS Accession No. ML082770112 (non-public).
- 8 Honeywell International, Inc., MTW-SOP-HP-0201, "Determination of Airborne Radioactivity," 2016, ADAMS Accession No. ML18143B264 (Non-Public).
- 9 Honeywell International, Inc., "Honeywell Metropolis Works Emergency Response Plan Update," June 5, 2013, ADAMS Accession No. ML13158A308.
- 10 Honeywell International, Inc., 2013 Plant Configuration Changes Summaries, SRI, ADAMS Accession No. ML14028A154 (Non-Public).
- 11 Honeywell International, Inc., "Honeywell Metropolis Works Triennial Update to Decommissioning Funding Plan," January 6, 2016, ADAMS Accession No. ML16008A088.
- 12 Honeywell International, Inc., "[Supplement to] Submittal of License Renewal Application for Metropolis Works," September 20, 2017, ADAMS Accession No. ML17268A153.
- 13 Honeywell International, Inc., "Environmental Report," February 8, 2017, ADAMS Accession No. ML17048A244.
- 14 Honeywell International, Inc. Integrated Safety Analysis Summary, Source Materials License SUB-526 Docket Number 40-3392, Honeywell Performance Materials and Technology, Rev. 16, 01/16/18 ADAMS Accession No. ML18200A284 (Non-Public) and ML18200A232 (cover letter),.
- 15 Honeywell International, Inc., "Honeywell Metropolis Works Request NRC to Withdraw License Condition 30," July 19, 2019, ADAMS Accession No. ML19199A039
- 16 Not Used.
- 17 Honeywell International, Inc., "Honeywell Metropolis Works Response to RAIs for Physical Protection," September 20, 2017, ADAMS Accession No. ML17291A092.
- 18 Honeywell International, Inc., "Honeywell Metropolis Works Emergency Response Plan Update [Revision 9]," September 7, 2017, ADAMS Accession No. ML17255A481.

- 19 Honeywell International, Inc., MTW-SOP-HP-0209, "Collecting Environmental Samples," March 20, 2017, ADAMS Accession No. ML18150A685 (Non-Public).
- 20 Honeywell International, Inc., MTW-SOP-HP-0213, "Kinetic Phosphometric Determination of Uranium," March 15, 2017; ADAMS Accession No. ML18143B290 (Non-Public).
- 21 Not Used.
- 22 Not Used
- 23 Honeywell International, Inc., "Responses to RAIs for Chemical Safety and Fire Safety", February 2, 2018, ADAMS Accession No. ML18043A121.
- 24 Honeywell International, Inc., "Honeywell Metropolis Works Response to RAIs for the Environmental Report," January 22, 2018; ADAMS Accession No. ML18029A119.
- 25 Honeywell International, Inc., "Response to Request for Additional Information (RAI) Concerning License Renewal Application in the Areas of Integrated Safety Analysis and Management Measure," April 25, 2018, ADAM Accession No. ML18128A280.
- 26 Honeywell International, Inc. "Supplemental Response to Requests for Additional Information for Chemical Safety", April 25, 2018, ADAMS Accession No. ML18121A151.
- 27 Honeywell International Inc., "Honeywell MTW Materials License, Amendment 13," April 6, 2018, ADAMS Accession No. ML18080A047.
- 28 Honeywell International, Inc., "Honeywell Metropolis Works Supplemental Responses to RAIs for Physical Protection," March 15, 2018; ADAMS Accession No. ML18113A365.
- 29 Honeywell International, Inc., "Honeywell Metropolis Works Supplemental Response to RAIs for the Environmental Report," April 2, 2018, ADAMS Accession No. ML18095A055.
- 30 Not Used.
- 31 Honeywell International, Inc., "Honeywell Metropolis Works Emergency Response Plan Update," June 25, 2018, ADAMS Accession No. ML18187A214.
- 32 Not Used.
- 33 Not Used.
- 34 Honeywell International, Inc. Honeywell Metropolis Works, "Administrative Procedure MTW-ADM-HP-0105, Completing Reports to the USNRC," Revision 7, November 15, 2017, ADAMS Accession No. ML18151A456. (Non-Public)
- 35 Honeywell International, Inc., Honeywell Metropolis Works, "Administrative Procedure MTW-ADM-ISO-0180, Tracking Receipt and Sampling of Uranium Ore," Revision 6, dated November 15, 2017, ADAMS Accession No. ML18151A355. (Non-Public)
- 36 U.S Nuclear Regulatory Commission, Notice of Receipt of Application for License Notice of Availability of Applicant's Environmental Report; Notice of Consideration of Issuance of License; and Notice of Hearing and Commission Order; Louisiana Energy Services, L.P.; Claiborne Enrichment Center, 56 FR 23310, 23312, dated May 21, 1991.
- 37 Honeywell International, Inc. Honeywell Amendment Application to Update the Current and New NRC License SUB-526, Docket #40-3392, dated December 27, 2006, ADAMS Accession No. ML070360588.
- 38 Honeywell International, Inc., "QSA Global letter dated November 5, 2009 Regarding Receipt of Ronan Gauges", ADAMS Accession No. ML18257A013.

- 39 Honeywell International, Inc., Amendment Request to Modify Honeywell License Application Concerning Contamination Levels, dated March 27, 2009, ADAMS Accession No. ML090910146.
- 40 Honeywell International, Inc., Honeywell Metropolis Works Supplemental Documentation for Request to use ICRP 68 for Determination of DAC, ALI, and Soluble Uranium Limit dated October 5, 2011, ADAMS Accession No. ML11286A228.
- 41 Honeywell International, Inc., Honeywell Metropolis Works Procedure MTW-SOP-HP-0201, "Determination of Airborne Radioactivity," July 2016, ADAMS Accession No. ML18143B264. (Non-Public)
- 42 Honeywell International, Inc., Honeywell Metropolis Works Procedure MTW-ADM-HP-0113, "Respiratory Protection Program," Revision 20, November 2016, ADAMS Accession No. ML18143B261. (Non-Public)
- 43 U.S. Nuclear Regulatory Commission, NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," August 2003.
- 44 Honeywell International, Inc. Honeywell Metropolis Works Procedure MTW-ADM-HP-0100, "Radiological Protection Program," Revision 20, March 2017, ADAMS Accession No. ML18143B256. (Non-Public)
- 45 Honeywell International, Inc., Honeywell Metropolis Works Procedure MTW-SOP-HP-0230, "Calibration and Test of Portable Detection Instruments, Revision 11, March 2017, ADAMS Accession No. ML18143B264. (Non-Public)
- 46 Honeywell International, Inc. Honeywell Metropolis Works License Amendment Request to Grant Exemption from the 24-hour Reporting Requirements of 10 CFR 40.60(b)(3) for Medical Treatment of Contaminated Individuals at the MTW On-site Medical Facility, dated September 7, 2017, ADAMS Accession No. ML17255A243.
- 47 Honeywell International, Inc. Honeywell Metropolis Works Procedure MTW-SOP-HP-0213, "Phosphorometric Kinetic Determination of Uranium," Revision 14, March 2017, ADAMS Accession No. ML18143B290. (Non-Public)
- 48 Honeywell International, Inc. Honeywell Metropolis Works License Amendment Supplemental Request to Grant Exemption from the 24-hour Reporting Requirements of 10 CFR 40.60(b)(3) for Medical Treatment of Contaminated Individuals at the MTW On-site Medical Facility dated November 9, 2017, ADAMS Accession No. ML17318A097.
- 49 U.S. Nuclear Regulatory Commission, "Notice Extending License Terms of Operating Uranium Hexafluoride Facilities Under 10 CFR Part 40 and Fuel Fabrication Facilities Under 10 CFR Part 70", 55 FR 24948, dated June 19, 1990.
- 50 Honeywell International, Inc., Honeywell Metropolis Works "Requested Revisions to Current License Conditions," October 8, 2018, ADAMS Accession No. ML18284A333.
- 51 Honeywell International, Inc., Honeywell Email dated September 28, 2018 re: Ronan Gauge Failures, ADAMS Accession No. ML18274A045.
- 52 Honeywell International Inc., "Honeywell Metropolis Works Safety Demonstration Report for USNRC Source Materials License SUB-526," August 3, 2015, ADAMS Accession No. ML15236A375.
- 53 Honeywell International Inc., Letter from J. Albritton, Honeywell Performance Materials and Technologies, "Honeywell Metropolis Works Configuration Changes for 2016", January 25, 2017, ADAMS Accession No. ML17026A328.

- 54 Honeywell International Inc., Letter from J. Albritton, Honeywell Performance Materials and Technologies, "License Renewal Application," February 8, 2017, ADAMS Accession No. ML17048A263.
- 55 Honeywell International Inc., Letter from J. Albritton, Honeywell Performance Materials and Technologies, "Submittal of License Renewal Application for Metropolis Works", September 20, 2017, ADAMS Accession No. ML17268A153.
- 56 Honeywell International Inc., Letter from D. Edwards, Honeywell Specialty Materials, "Integrated Safety Analysis," October 21, 2005, ADAMS Accession No. ML061530235 (Non-Public).
- 57 Honeywell International Inc., Letter from D. Edwards, Honeywell Specialty Materials, License Renewal Application, May 12, 2006, ADAMS Accession No. ML061660355. (Non-Public)
- 58 Honeywell International Inc., Letter to J. Fulks, Honeywell Metropolis Works, "Honeywell International, Inc., 2018 LR - Request for Additional Information Concerning License Renewal Application in the Areas of Integrated Safety Analysis Summary and Management Measures," June 23, 2016, ADAMS Accession No. ML16141A734.
- 59 Honeywell International Inc., Letter from J. Fulks, Honeywell Performance Materials and Technologies, "Honeywell Metropolis Works Responses to Request for Additional Information Concerning License Renewal Application in the Areas of Integrated Safety Analysis and Management Measures," April 25, 2018, ADAMS Accession No. ML18128A280.
- 60 Honeywell International Inc., Letter from M. Tillman, Honeywell Specialty Materials, "Integrated Safety Analysis Summary Submittal and License Amendment Request," September 30, 2008. ADAMS Accession No. ML082770112 (Non-Public)
- 61 Honeywell International Inc, Letter from J. Fulks, "Honeywell Metropolis Works Revised License Application," December 19, 2019, ADAMS Accession No. ML19357A061.
- 62 Honeywell International Inc. "Honeywell Responses to Request for Additional Information for License Renewal for Honeywell Metropolis Works Facility in Metropolis, IL," June 13, 2019, ADAMS Accession No. ML19168A031.
- 63 International Commission on Radiation Protection (ICRP) Publication 60, Annals of the ICRP, Volume 21, Number 1-3, 1991.
- 64 International Commission on Radiation Protection (ICRP) Publication 68, Annals of the ICRP, Volume 24, Number 4, 1994.
- 65 Illinois Environmental Protection Agency, "Honeywell International, Inc. – Metropolis Works Facility NPDES Permit No. IL0004421 Final Permit," June 26, 2015.
- 66 National Fire Protection Association, NFPA 51B, "Standard for Fire Prevention During Welding, Cutting, and Other Hot Work," 1999.
- 67 National Fire Protection Association, NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," 2002.
- 68 National Fire Protection Association, NFPA 10, "Standard for Portable Fire Extinguishers," 2010.
- 69 National Fire Protection Association, NFPA 14, "Standard for the Installation of Standpipe and Hose Systems," 2010.
- 70 U.S. Nuclear Regulatory Commission, NUREG-4884, "Interpretation of Bioassay Measurements," November 1987, ADAMS Accession No. ML11285A018.
- 71 U.S. Nuclear Regulatory Commission, "Honeywell Materials License SUB-526, License Amendment 17," ADAMS Accession No. ML070570354.

- 72 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.10, Rev. 2, "Operating Philosophy for Maintaining Occupational and Public Radiation Exposures as Low as is Reasonably Achievable," published August 11, 2016.
- 73 U.S. Nuclear Regulatory Commission, "Integrated Safety Analysis Guidance Document," NUREG-1513, May 2001, ADAMS Accession No. ML011440260.
- 74 U.S. Nuclear Regulatory Commission, Regulatory Guide 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," April 1985, ADAMS Accession No. ML040750447.
- 75 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.25, "Air Sampling in the Workplace," Revision 1, June 1992, ADAMS Accession No. ML003739616.
- 76 U.S. Nuclear Regulatory Commission, NRC Correspondence issued January 23, 1992, ADAMS Accession No. ML060320608.
- 77 Not Used
- 78 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.37, "ALARA Levels for Effluents from Materials Facilities," July 1993, ADAMS Accession No. ML003739553.
- 79 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program," Revision 1, July 1993, ADAMS Accession No. ML003739554.
- 80 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure," Revision 1, February 1996, ADAMS Accession No. ML003739438.
- 81 Honeywell International Inc, Letter from J. Fuls, "Honeywell Metropolis Works Triennial Update to Decommissioning Plan," January 4, 2019, ADAMS Accession No. ML19008A046.
- 82 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure," June 1999, ADAMS Accession No. ML00379505.
- 83 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," Revision 1, October 1999, ADAMS Accession Number ML003739528.
- 84 U.S. Nuclear Regulatory Commission, "Staff Requirements - SECY-99-077 - To Request Commission Approval for Exemptions from Parts of 10 CFR Part 20," dated April 21, 1999.
- 85 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.30, "Health Physics Surveys for Uranium Recovery Facilities," Revision 1, May 2002, ADAMS Accession No. ML021260524.
- 86 U.S. Nuclear Regulatory Commission, NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," August 2003, ADAMS Accession No. ML032450279.
- 87 U.S. Nuclear Regulatory Commission, "Additional Security ICMs for Access Authorization," August 18, 2004, ADAMS Accession No. ML042240002.
- 88 U.S. Nuclear Regulatory Commission, "Renewal of Honeywell Metropolis Works Source Materials License No. SUB-526," May 11, 2007, ADAMS Accession Package No. ML062140687.
- 89 U.S. Nuclear Regulatory Commission, "D. Edwards Enclosure re: License SUB-526, Amendment 0 for the Honeywell Metropolis Works Renewal of Honeywell Metropolis Works Material License SUB-526," dated May 11, 2007, ADAMS Accession No. ML071280120.

- 90 U.S. Nuclear Regulatory Commission, "Amendment Request for an Exemption to 10 CFR 20.1902(a) and 10 CFR 20.1904(a)," dated November 2, 2007, ADAMS Accession No. ML072700459.
- 91 U.S. Nuclear Regulatory Commission, "Approval of Amendment Request Dated September 30, 2008, to Substitute an Integrated Safety Analysis Summary for the Full Integrated Safety Analysis Originally Submitted on October 25, 2006," March 26, 2009, ADAMS Accession No. ML090650525.
- 92 U.S. Nuclear Regulatory Commission, "Approval of Amendment Request to Modify License Application Concerning Contamination Levels," dated August 6, 2009, ADAMS Accession No. ML092160494.
- 93 U.S. Nuclear Regulatory Commission, Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," April 2011, ADAMS Accession No. ML103360487.
- 94 U.S. Nuclear Regulatory Commission, "Honeywell Metropolis Works Exemption from the Requirements of Appendix B of 10 CFR Part 20 and 10 CFR 20.1003 to Modify DAC, ALI, and Organ Dose Weighting Factors," dated June 13, 2012, ADAMS Accession No. ML113260350.
- 95 U.S. Nuclear Regulatory Commission, "Confirmatory Order," October 15, 2012, ADAMS Accession No. ML12289A863.
- 96 U.S. Nuclear Regulatory Commission, NUREG-1757, "Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness," Volume 3, Revision 1, February 2012, ADAMS Accession No. ML12048A683.
- 97 U.S. Nuclear Regulatory Commission, "Technical Evaluation Report for Safety Basis and Corrective Action Plan Leading to Restart," June 25, 2013, ADAMS Accession No. ML13190A165.
- 98 U.S. Nuclear Regulatory Commission, NUREG-1520, "Standard Review Plan (SRP) for Fuel Cycle Facilities License Applications," Revision 2, June 2015, ADAMS Accession No. ML15176A258.
- 99 U.S. Nuclear Regulatory Commission, NUREG/BR-0006, Revision 8, "Instructions for Completing Nuclear Material Transaction Reports," May 4, 2018, ADAMS Accession No. ML18123A473.
- 100 U.S. Nuclear Regulatory Commission, Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational and Public Radiation Exposures as Low as is Reasonably Achievable," Revision 2, August 2016, ADAMS Accession No. ML16105A136.
- 101 U.S. Nuclear Regulatory Commission, "Approval of 2015 Decommissioning Cost Estimate, Honeywell Metropolis Works, Cost Activity Code Number L34349," June 27, 2016, ADAMS Package Accession No. ML16166A252.
- 102 U.S. Nuclear Regulatory Commission, "Receipt of Additional Financial Assurance Documents Reflecting Updated Decommissioning Cost Estimate, Honeywell Metropolis Works, Cost Activity Code Number L34349," August 11, 2016, ADAMS Accession No. ML16215A057.
- 103 U.S. Nuclear Regulatory Commission, Request for Additional Information, Chemical Safety, November 7, 2017, Adams Accession No. ML17298B742.
- 104 U.S. Nuclear Regulatory Commission, "Request for Additional Information Concerning License Renewal Application in the Areas of Radiation Protection, Material Control and Accounting, and Physical Protection, Honeywell Metropolis

- Works (Cost Activity Code L34389)," August 3, 2017, ADAMS Accession No. ML17206A427.
- 105 U.S. Nuclear Regulatory Commission, "Request for Additional Information Concerning License Renewal Application in the Areas of Fire Safety and Chemical Safety, Honeywell Metropolis Works," November 7, 2017, ADAMS Accession No. ML17298B769.
- 106 U.S. Nuclear Regulatory Commission, "Approval of Exemption Request from the 24-hour Reporting Requirement of 10 CFR 40.60(b)(3) for Medical Treatment of Contaminated Individuals at the MTW On-site Medical Facility," dated January 30, 2018, ADAMS Accession Number ML17335A582.
- 107 U.S. Nuclear Regulatory Commission, "Request for Additional Information Concerning License Renewal Application in the Areas of Integrated Safety Analysis Summary and Management Measures," February 12, 2018, ADAMS Accession No. ML18031A726.
- 108 U.S. Nuclear Regulatory Commission, "Guidance for Fuel Cycle Facility Change Processes," Regulatory Guide 3.74, January 2012.
- 109 U.S. Nuclear Regulatory Commission, "Confirmatory Order", EA-12-157, October 15, 2012, ADAMS Accession No. ML12289A800.
- 110 U.S. Nuclear Regulatory Commission, "Integrated Safety Analysis Guidance Document," NUREG-1513, May 2001, ADAMS Accession No. ML011440260.
- 111 U.S. Nuclear Regulatory Commission, "Honeywell Metropolis Works Integrated Inspection Report," May 15, 2014, ADAMS Accession No. ML14135A460.
- 112 U.S. Nuclear Regulatory Commission, "Honeywell Metropolis Works Integrated Inspection Report," January 30, 2017, ADAMS Accession No. ML17030A108.
- 113 U.S. Nuclear Regulatory Commission, "Honeywell Metropolis Works Integrated Inspection Report," January 19, 2016, ADAMS Accession No. ML16019A334.
- 114 U.S. Nuclear Regulatory Commission, "Honeywell Metropolis Works Special Inspection Report," October 8, 2015, ADAMS Accession No. ML15281A286.
- 115 U.S. Nuclear Regulatory Commission, "Materials License, Amendment 14," December 2019, ADAMS Accession No. ML19211B649.
- 116 U.S. Nuclear Regulatory Commission, "Technical Evaluation Report for the Renewal of Source Materials License Sub-526 for Honeywell Metropolis Works UF₆ Conversion Plant," May 11, 2007, ADAMS Accession No. ML062640369.
- 117 U.S. Nuclear Regulatory Commission, "Technical Evaluation Report on the Acceptability of an Integrated Safety Analysis Summary submitted by Honeywell Metropolis Works to replace the Current Integrated Safety Analysis, March 26, 2009, ADAMS Accession No. ML090680096.
- 118 U.S. Nuclear Regulatory Commission, "Multi-Agency Radiation Survey Investigation Manual, (MARSSIM)," NUREG-1575, Revision 1, August 2000, ADAMS Accession No. ML 003761445.
- 119 U.S. Nuclear Regulatory Commission, SECY-96-252, "Extension of License Term for Material Licensees", December 17, 1996, ADAMS Accession No. ML12262A795 (Non-Public).
- 120 U.S. Nuclear Regulatory Commission, SRM-SECY-96-252, "Extension of License Term for Material Licensees", January 24, 1997 ADAMS Accession No. ML003753032 (Non-Public).
- 121 U.S. Nuclear Regulatory Commission, SRM-SECY-06-0186, "Increasing Licensing Terms for Certain Fuel Cycle Facilities," September 26, 2006, ADAMS Accession No. ML062700110.

- 122 U.S. Nuclear Regulatory Commission, SECY-06-0186, "Increasing Licensing Terms for Certain Fuel Cycle Facilities," August 24, 2006, ADAMS Accession No. ML060880241.
- 123 U.S. Nuclear Regulatory Commission, SRM-SECY-07-0146, "Regulatory Options for Licensing New Uranium Conversion and Depleted Uranium Deconversion Facilities," October 10, 2007, ADAMS Accession No. ML072830536.
- 124 U.S. Nuclear Regulatory Commission, COMSECY-15-0002, "Termination of Rulemaking to Revise Title 10 of the Code of Federal Regulations Part 40, "Domestic Licensing of Source Material" and Staff Plans to Address Other Items in Staff Requirements Memorandum for SECY-12-0071 (RIN 3150-A150), January 16, 2015, ADAMS Accession No. ML13331A559.
- 125 U.S. Nuclear Regulatory Commission, SRM-SECY-16-0009, "Recommendations Resulting from the Integrated Prioritization and Re-Baselining of Agency Activities," April 13, 2016, ADAMS Accession No. ML16104A158.
- 126 U.S. Nuclear Regulatory Commission, SRM-SECY-17-0086, "Increasing Licensing Terms for Uranium Recovery Facilities," November 9, 2017, ADAMS Accession No. ML17313B020.
- 127 U.S. Nuclear Regulatory Commission, "Notice of Violation to NRC Inspection Report No. 040-3392/2009003 and Office of Investigations Report No. 2-0008-056," September 2, 2009, ADAMS Accession No. ML092460165.
- 128 U.S. Nuclear Regulatory Commission, "IR 04003392-10-005 on 9/3-17/2010 for Honeywell International, Inc. and Notice of Violation," November 15, 2010, ADAMS Accession No. ML103190401.
- 129 U.S. Nuclear Regulatory Commission, "Honeywell Restart Authorization, Authorization to Resume Full Licensed Operations (EA-12-157)," July 2, 2013, ADAMS Accession No. ML13183A336.
- 130 U.S. Nuclear Regulatory Commission, "IR 04003392/2015006, and Notice of Violation, October 26, 2014, Honeywell Metropolis Works," April 20, 2015, ADAMS Accession No. ML15110A228.
- 131 U.S. Nuclear Regulatory Commission, "Confirmatory Order Modifying License, Honeywell International, Inc., (Effective Immediately) (EA-14-114), March 11, 2015, ADAMS Accession No. ML15055A094.
- 132 U.S. Nuclear Regulatory Commission, "Integrated Inspection Report 04003392/2016002, January 1, 2016 - March 31, 2006, Honeywell Metropolis Works," April 25, 2016, ADAMS Accession No. ML16116A253.
- 133 U.S. Nuclear Regulatory Commission, "Fuel Cycle Operational Safety and Safeguards Inspection Program," Manual Chapter 2600, January 27, 2010, ADAMS Accession No. ML093420698.
- 134 Honeywell International Inc, "Application for Renewal of Honeywell Metropolis Works - Source Materials License SUB-526, Docket No. 40-3392," May 27, 2005, ADAMS Accession No. ML052310382.
- 135 U.S. Nuclear Regulatory Commission, "D. Edwards Letter Re: Acknowledgement of Request for Renewal of Materials License No. SUB-526 (TAC LU0093)," June 27, 2005, ADAMS Accession No. ML051880293.
- 136 Honeywell International Inc. "Integrated Safety Analysis for Renewal of Source Material License SUB-526 - Honeywell Specialty Materials - Docket 40-3392," November 17, 2005, ADAMS Accession No. ML053390288 (Non-Public).
- 137 Honeywell International Inc. "Revision 1 to Integrated Safety Analysis for Renewal of Source Material License SUB-526 - Honeywell Specialty Materials - Docket 40-3392," October 25, 2006, ML070820545 (Non-Public).

138 Honeywell International Inc. "Integrated Safety Analysis Summary Submittal and
License Amendment Request," September 30, 2008, ML082770112 (Non-Public).

139 U.S. Nuclear Regulatory Commission, "Documentation of In-Office Review of
Honeywell Metropolis Works Documents in Support of the License Renewal
Application," March 18, 2019, ADAMS Accession No. ML19136A235.

140 U.S. Nuclear Regulatory Commission, "Memorandum of Understanding Between the
U.S. Nuclear Regulatory Commission and the Occupational Safety and Health
Administration," September 2013, ADAMS Accession No. ML11354A432.

141 Occupational Safety and Health Administration, "Foundation of Workplace Chemical
Safety Programs, <https://www.osha.gov/dsg/hazcom/global.html>.

142 GESTIS Substance Database, <http://www.dguv.de/ifa/gestis-database>.

143 U.S. Nuclear Regulatory Commission, "Chemical Process Safety at Fuel Cycle
Facilities", NUREG-1601, July 1997, ADAMS Accession No. ML093070119
(Non-Public)

144 U.S. Nuclear Regulatory Commission, "Final Environmental Assessment for the
Proposed Renewal of Source Material License SUB-526 Metropolis Works Uranium
Conversion Facility, Honeywell International, Inc.", October 31, 2019, ADAMS
Accession No. ML19273A012.

145 U.S. Nuclear Regulatory Commission, "Trip Report to Honeywell Metropolis Works in
Support of License Renewal Application Review December 13 and 14, 2017,"
January 18, 2018, ADAMS Accession No. ML18003A235, not publicly available.

146 Honeywell International Inc. "Surface Impoundment Decommissioning Plan,"
December 2, 2010, ADAMS Accession No. ML103400456.

147 Honeywell International Inc. "Supplemental Information for the Surface Impoundment
Decommissioning Plan Application, February 25, 2011, ADAMS Accession No.
ML110620251.

148 Honeywell International Inc. "Honeywell Metropolis Works, Additional Supplemental
Information for the Surface Impoundment Decommissioning Plan Application," March
4, 2011, ADAMS Accession No. ML110750234.

149 U.S. Nuclear Regulatory Commission, "NRC Enforcement Policy", May 28, 2019,
ADAMS Accession No. ML19123A129.

150 EPA's CAP-88 dose modeling software, <https://www.epa.gov/radiation/cap-88-pc>.

151 IEPA 2015b, "RCRA Part B Permit: 1278540002–Massac County Honeywell
International, Inc.," Illinois Environmental Protection Agency, issue date: October 28,
2014, effective date: December 3, 2013, modification date: October 13, 2015,
ADAMS Accession No. ML18214A827.

152 Honeywell International Inc, "Small Cylinder Filling Process Approval and License
Amendment Request", July 17, 2008, ADAMS Accession No. ML113340282.

153 Honeywell International Inc, "Small Cylinder Filling Process Approval and License
Amendment Request", October 1, 2008, ADAMS Accession No. ML19351E314.

154 Honeywell International Inc, "Subsequent Reply to Request for Additional
Information Regarding Small Cylinder Filling Process Approval and License
Amendment Request", December 3, 2008, ADAMS Accession No. ML113340313.

155 U.S. Nuclear Regulatory Commission, "Approval of Small Cylinder Filling License
Amendment Request, Honeywell Metropolis Works," January 13, 2009, ADAMS
Accession No. ML090080213 and December 3, 2008, ADAMS Accession No.
ML113340313.

156 Honeywell International Inc, Letter from J. Price, "Honeywell Metropolis Works
Revised License Application," July 9, 2019, ADAMS Accession No. ML19192A168.

- 157 U.S. Nuclear Regulatory Commission, SECY-07-0146, "Regulatory Options for Licensing New Uranium Conversion and Depleted Uranium Deconversion Facilities," August 2007, ADAMS Accession No. ML071700584.
- 158 U.S. Nuclear Regulatory Commission, January 2016 in SRM-COMSECY-15-0002, "Termination of Rulemaking to Revise Title 10 of the Code of Federal Regulations Part 40, 'Domestic Licensing Source Material' and Staff Plans to Address Other Items in Staff Requirements Memorandum for SECY-12-0071" (ADAMS Accession No. ML15107A488).
- 159 U.S. Nuclear Regulatory Commission, License for the International Isotopes Flourine Products, Inc., October 2, 2012, ADAMS Accession No. ML12234A496.

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