

TECHNICAL EVALUATION REPORT
FOR THE RENEWAL OF
SOURCE MATERIALS LICENSE SUB-526
FOR
HONEYWELL METROPOLIS WORKS
UF6 CONVERSION PLANT
METROPOLIS, ILLINOIS
DOCKET 40-3392
May 11, 2007

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1.0 INTRODUCTION

1.1 General

1.1.1 Background

Honeywell International, Inc. (Honeywell or the Licensee) is the holder of Source Materials License No. SUB-526, a 10 CFR Part 40 license last renewed by the U.S. Nuclear Regulatory Commission (NRC) in 1995. Under this license, the licensee operates its Honeywell Metropolis Works, Inc. (MTW) formerly "Allied Signal" (Allied) plant at Metropolis, Illinois, where it converts uranium ore concentrates to uranium hexafluoride (UF₆) by the "fluoride volatility process." The UF₆ product is used as the feed material for uranium enrichment plants.

1.1.2 Review Scope

Consistent with the requirements of 10 CFR 40.43 and 40.45, the MTW possession and use license can be renewed by the NRC, if:

- 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 in accordance with 10 CFR 40.31 and meets the applicable criteria of 10 CFR 40.32.

In particular, Honeywell is subject to 10 CFR 40.31(j) because, at the MTW, it possesses UF₆ either in excess of 50 kilograms in a single container or 1000 kilograms total. Section 40.32 concerns the general requirements for issuance of specific licenses.

To determine whether the stipulations above will be met as conditions for approval of the renewal, the NRC staff has performed an evaluation of the safety and environmental aspects of the license renewal, including an evaluation to determine if Honeywell is in compliance with the specific requirements and objectives set forth in 10 CFR Part 40 (Domestic Licensing of Source Material), and 10 CFR Part 20 (Standards for Protection Against Radiation). The Technical Evaluation Report (TER) provided herein constitutes

the safety portion of the staff's evaluation. A separate Environmental Assessment (NRC 2005) addresses the environmental impacts of the proposed action. The staff's safety evaluation, as described in the sections below, was conducted in accordance with the general guidance provided in the "Standard Review Plan for a Review of a License Application for a Fuel Cycle Facility (SRP)," NUREG-1520, January 2002, and the specific guidance set forth in Regulatory Guide 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," and Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities."

1.2 Site Description

The MTW site is located on an 1,000-acre tract of land in Massac County at the southern tip of Illinois, along the north bank of the Ohio River. The 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. Figure 1 is a general area map showing a five-mile radius relative to southern Illinois and western Kentucky. Operations are conducted within a restricted area covering approximately 54 acres in the north-central portion of the site.

1.3 License History

Initial operations at the site were authorized by Source Material License No. C-4493 on December 17, 1958, which authorized the possession of, and title to, source material for the production of uranium hexafluoride. The following table contains the chronological history of the license.

Table 1. History of the License

License Number	Issue Date	Renewal Date	Comments
C-4493	December 1958		Original License
C-4493		December 1959	
C-4493		December 1960	
C-4493		January 1962	Changed to SUB-526
SUB-526	January 1962	February 1965	
SUB-526		February 1968	
SUB-526		August 1977	
SUB-526		May 1985	
SUB-526		June 1995	

2.0 LICENSE APPLICATION

2.1 Review History

By application dated May 27, 2005, the licensee requested that its license be renewed for a period of ten (10) years from June 30, 2005, until June 30, 2015. Because the request for renewal was received before the license expired on June 30, 2005, operations have continued under the NRC's timely renewal provision of 10 CFR 40.42 (a)(1). By letter dated June 27, 2005, NRC's initial comments on the May 27, 2005, renewal application were transmitted to MTW. This first request was followed up by a request for additional information dated September 21, 2005. During a site visit December 12-15, 2005, NRC and MTW's representatives discussed NRC's comments on the license renewal application. As part of the May 27, 2005 application, the licensee submitted a Decommissioning Funding Plan (DFP), a consolidated Emergency Response Plan (ERP), and a Radiological Contingency Plan (RCP). The DFP and the ERP/RCP are incorporated by reference into Chapters 6 and 7 of the application, respectively.

The Metropolis Plant was built at its present location to supply UF₆ to the U.S. Atomic Energy Commission under a five-year contract (1959-1964). The plant currently provides conversion services for the commercial nuclear power industry as part of the nuclear fuel cycle.

2.2 Compliance History

The compliance histories for 1995 through 2006 were reviewed using inspection reports issued by the NRC Region's II & III office(s). During this period, there were several health and safety inspections conducted. On December 22, 2003, a release of approximately 70 pounds of UF₆ occurred from one of the plant's chemical process lines. The release resulted in the declaration of a Site Area Emergency by Honeywell. The NRC conducted an Augmented Inspection Team (AIT) assessment of the December 2003 event and two Severity Level III violations were issued as a result.

In response, Honeywell implemented a Performance Improvement Plan which focused on plant material condition, worker performance (procedures and training), emergency procedures and response, and the corrective action/auditing processes. As a result of Honeywell's reviews, over one hundred action items necessary for restart were implemented and included substantial upgrades to its processes, procedures, and programs.

The NRC implemented a Honeywell Upgrade and Restart Oversight Plan taking elements from Inspection Manual Chapter 0350 to monitor Honeywell improvements. On April 17, 2004, the NRC staff authorized full restart of the conversion process.

The NRC staff increased the frequency of inspections and is continuing to follow the licensee's longer term corrective actions. These inspections continue to identify issues

related to procedural adequacy and adherence, control room conduct of operations, radiation protection controls and practices, and the corrective action program.

In addition, in November 2004, the NRC became aware of operator attentiveness issues at the site. As a result of these issues, even though there was not a regulatory requirement, the licensee implemented immediate actions to establish performance expectations and increase management oversight. The NRC is performing random off-hour inspections to monitor operator attentiveness and the effectiveness of the licensee's corrective actions.

Since February of 2005, the licensee has appointed a new plant manager, production manager, human resources/training manager, nuclear regulatory affairs manager, maintenance manager (since replaced), engineering manager, and health physics supervisor. The corporate office also exercised increased involvement in site activities, and the services of two outside consultant groups have been employed to audit ongoing operations and to do a comprehensive evaluation of plant operational and management processes.

On April 4, 2006, as distillation operators were removing a defective pressure gauge from a utility air line, the air pressure in the line expelled UF_6 that had inadvertently leaked into the line. The area near the utility air line rapidly filled with uranyl fluoride (UO_2F_2) and hydrofluoric acid (HF) vapor dense enough to totally obscure the vision of the distillation operators. The distillation supervisor ordered all personnel present to evacuate the area. However, one operator, apparently not hearing the evacuation order, remained in the area to attempt to mitigate the leak. The other operator, upon discovering that her partner had not left the building, reentered, found the replacement gauge on the floor and installed the replacement gauge without further difficulty.

A Special Investigation Team (SIT) was dispatched to the site following the above release. The SIT determined that the first of the two employees performing the line break on April 4, 2006, was wearing the upper half of a chemical suit along with chemical gloves, hood and a full face respirator. The second licensee employee participating in the line break was not wearing any part of a chemical suit and was wearing hard hat, leather gloves and fabric coveralls. The SIT further determined that licensee personnel did not have a consistent understanding of what conditions defined a UF_6 line break and as a result, inadequate precautions, including the selection of proper Personal Protective Equipment (PPE), were taken prior to the gauge removal. This was identified as a violation (VIO 2006-008-03) for the failure to wear adequate protective clothing while performing a UF_6 line break.

The compliance history discussed above shows that there is a continuing challenge to bring the safety culture up to the standards expected of a nuclear facility regulated by the NRC, and the NRC will continue to take appropriate steps to ensure the continued safe operation of the MTW.

2.3 Current Application

Honeywell has requested extension of its license for a period of ten (10) years from June 30, 2005, until June 30, 2015. Honeywell's renewal request is in accordance with the Commission's January 24, 1997, staff requirements memorandum ("Extension of License Term For Material Licenses," for SECY 96-252) approving an increase in 10 CFR Part 40 license terms from five to ten years.

The staff reviewed Honeywell's commitments, which are presented in its updated "Application for Renewal of U.S. NRC Source Materials License SUB-526" (Chapters 1 through 7) dated May 12, 2006, which replaces, in their entirety, Chapters 1-7 of the original application dated May 27, 2005. The commitments address: (1) the organization and administration of the nuclear safety program; (2) the technical requirements for the radiation safety, chemical safety, fire protection, and environmental monitoring programs; (3) emergency planning; and (4) the decommissioning plan. Part I of the application contains specific performance requirements for the MTW's operations, and these requirements are inspected by the NRC. The staff also reviewed the safety demonstration portion, which provides a technical basis for the performance requirements for Honeywell operations.

Since the licensing review began, Honeywell has asked for two exemptions and a change to the possession limits. The first exemption application requests relief from the reporting requirements for the Nuclear Materials Management and Safeguards System (NMMSS) and it is discussed in Section 6. The second exemption application requests relief from specific sections of decommissioning funding requirements in 10 CFR 40.36. This is discussed in Section 11. Honeywell has also requested to acquire two radioactive gauges. These gauges require a change to the Possession Limits, as discussed in Section 3.



Figure 1. Location of MTW

3.0 POSSESSION LIMITS (PROPOSED)

In the renewal application, Honeywell requested authorization to possess and use source material for the purpose of UF₆ conversion. Honeywell requested revision of certain possession limits set forth in the June 1995 license. Specifically, Honeywell requested to raise the Cesium (Cs)-137 possession limit to 300 milliCuries, the "Any licensed material" limit to 2 milliCuries, and a request to acquire two fixed gauges. The change in the Cs-137 possession limit has been necessitated by Honeywell's efforts to upgrade the facility's radiological monitoring instrument calibration program and the request to acquire several fixed gauges that contain licensable quantities of Cs-137 as part of the plant infrastructure upgrade program.

3.1 Calibration Sources

A review of NUREG-1556, Volume 11, indicates that the recommended source strength for Cs-137 instrument calibration sources is 85 milliCuries; the current activity of Honeywell's source is approximately 60 milliCuries. The requested change will allow Honeywell to retain possession of its existing Cs-137 source while acquiring and testing a new calibration source of sufficient source activity, then transfer ownership of the existing source.

The change in the "Any licensed material limit" has been requested to facilitate future improvements in Honeywell's instrument calibration and performance testing program.

3.2 Fixed Gauges

On December 27, 2006, NRC received a request from Honeywell to amend its license to include two fixed radioactive gauges manufactured by the Ronan Engineering Company. Each gauge will contain two Cs-137 sources. The total Cs-137 in the four sources will total 200 milliCuries.

3.2.1 Findings

NRC has reviewed the application for the fixed gauges and found it meets the requirements of 10 CFR Part 30. Therefore, the Honeywell license was amended to allow the possession and use of the requested gauges by the licensee. In addition to the commitments made in its December 27, 2006, letter, license conditions are required for all licensees who possess radioactive gauges. Those conditions will be incorporated as License Conditions 9-15 within the renewed license, and are set forth at the end of Section 3.

3.3 Depleted Uranium

The renewed license contains a new authorization to possess depleted uranium, but such depleted uranium will not be used during the renewed license term. In the 1990's, the Department of Energy entered into a contract with the licensee to develop a process

to convert DUF_6 into uranium oxide (U_3O_8 or UO_2). A pilot plant was designed and constructed in 1997, and test runs were started in February 1998 and continued through July 1998. The project was terminated following the test phase, however the depleted uranium remains on site.

The change in "Chemical and/or Physical Form" clarifies that as the ore (U_3O_8) moves through the chemical process, the "chemical intermediates," which are the impurities in the UO_2 before hydro-fluorination, impurities in the Uranium Tetrafluoride (UF_4) before fluorination, and the impurities in the UF_6 before distillation, are all authorized forms of source material under the renewed license.

The authorized forms and quantities of licensed materials are specified in License Conditions LC-6, LC-7, and LC-8 of the license and are set forth below:¹

Table 2 Proposed Possession Limits

6. Byproduct Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Quantity
A. Natural Uranium	A. Yellowcake, U_3O_8 , UO_2 , UF_4 , UF_6 , and chemical intermediates of these compounds	A. 68 million kg (150 million lbs)
B. Depleted Uranium	B. U_3O_8 , UO_2 , UF_4 , and UF_6	B. 68 kg (150 lbs)
C. Cs-137	C. Sealed Sources	C. 300 mCi
D. Cs-137	D. Sealed Source Ronan Engineering Company Model SA-1 Source Holder, Source Model CDC.700	D. No single source to exceed the maximum activity specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission or an Agreement State
E. Any licensed material between atomic numbers 1-100	E. Sealed and unsealed radioactive sources	E. 2 mCi total

¹LC-1 through LC-5 indicate the licensee's name and address, license number, license expiration date, and docket number.

- LC-9 Licensed material described in (7-D) above is to be used, for measurement level, in fixed gauging devices that have been registered either with the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State, and have been 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-10 Licensed material as defined in Table 2 C, 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-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-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 U.S. Nuclear Regulatory Commission 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 U.S. Nuclear Regulatory Commission 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 U.S. Nuclear Regulatory Commission 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 U.S. Nuclear Regulatory Commission, 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 U.S. Nuclear Regulatory Commission 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-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 NRC or an Agreement State.

LC-14 The licensee shall conduct a physical inventory every six (6) months, or at other intervals approved by the U.S. Nuclear Regulatory Commission, 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 U.S. Nuclear Regulatory Commission 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 U.S. Nuclear Regulatory Commission or an Agreement State to perform such services

LC-15 The licensee may initially mount a gauge if permitted by the certificate of registration issued by the U.S. Nuclear Regulatory Commission 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-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 U.S. Nuclear Regulatory Commission 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 be performed only by persons authorized to perform such services by the U.S. Nuclear Regulatory Commission 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.

4.0 FACILITIES

The locations of the buildings and facilities are shown in Figure 2. The primary facilities and associated activities are:

Feed Materials Building - Houses essentially all of the equipment necessary for the conversion of ore concentrates to Feed Material for the conversion process.

Sampling and Storage Facility- Receives incoming shipments of ore concentrates and provides for sampling and storage prior to conversion.

Pre-Treatment Facility - Ore concentrates and other materials recycled from the process are treated to remove contaminants (principally sodium).

Ore Calcining Facility - Used to oxidize feed materials to U_3O_8 in preparation for conversion.

Storage Pads - Provided for outdoor storage of ore concentrate drums and product cylinders. Hot product cylinders are also cooled in these areas.

Cylinder Wash Facility - Used for UF_6 cylinder washing to remove contamination and pressure testing to assure cylinder integrity.

Waste Dryer - Used to dewater residues from the uranium recovery process prior to

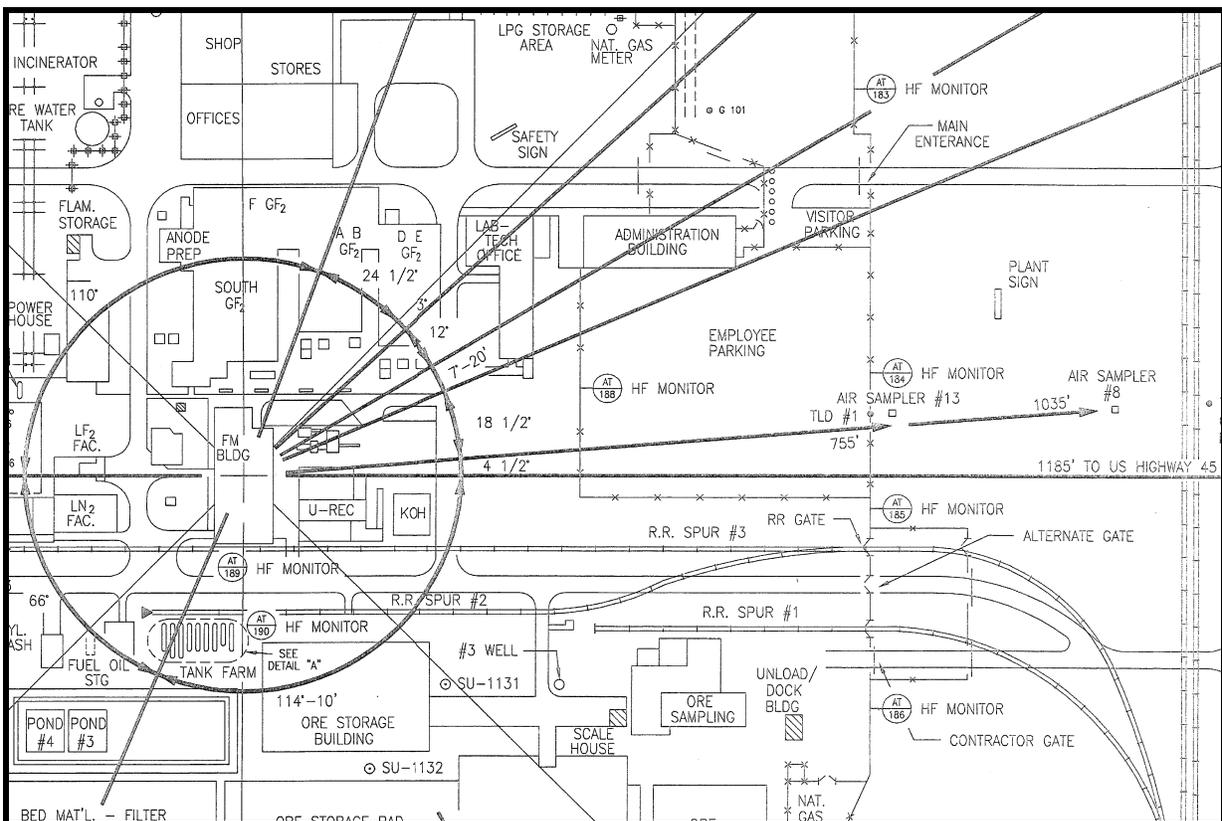


Figure 2. Plant Layout

packaging for off-site recycle or disposal.

4.1 Finding

To authorize continued operation, the license contains the following license condition:

LC-17 Authorized place of use: The licensee's existing facilities at
Honeywell Metropolis Works, Highway 45 North, Metropolis, Illinois.

Additional facilities which are involved in the UF_6 manufacturing process, but do not involve the handling of any significant (licensable) quantities of source material, include a fluorine manufacturing building, a fluoride waste treatment facility with four large settling ponds, a calcium fluoride recovery plant to recycle synthetic CaF_2 , a power plant, incinerator, and two small settling ponds.

5.0 AUTHORIZED ACTIVITIES

5.1 General Summary

In Chapter 1 of the application, Honeywell describes the authorized activities using licensed material. The details of UF₆ conversion and other activities are described in Section 1.5 of the application dated May 12, 2006. The renewed license will authorize Honeywell to perform the following activities at the MTW:

- a. Conversion of natural uranium as ore concentrates to UF₆;
- b. Using Cs-137, as sealed sources for calibrating, testing, and measurement; and
- c. Using Cs-137 in sealed sources within fixed gauges for material flow measurement.

5.1.1 Finding

To authorize the proposed activities, the following license condition will be included:

- LC-18 The licensee shall conduct authorized activities at the Honeywell Metropolis Works Facility in accordance with the statements, representations and conditions (or as revised by change and/or configuration management processes as described therein) in:
- a. License Application dated May 12, 2006, as supplemented by a letter dated March 20, 2007;
 - b. Safety Demonstration Report dated May 12, 2006;
 - c. Emergency Response Plan (ERP), dated May 27, 2005;
 - d. Integrated Safety Analysis Report dated October 26, 2006;
 - e. Site Reclamation Cost Estimate for Metropolis Plant dated January 10, 2007;
 - f. Amendment Request dated December 27, 2006, to possess and use sealed sources; and
 - g. Exemption Request dated February 9, 2007, for relief from some of the NMMSS Reporting Provisions of 10 CFR 40.64.

5.2 Process Description

The process steps used by Honeywell in the production of UF₆ from uranium ore concentrates are illustrated in Figure 3 and include:

- a. Receiving ore concentrates;
- b. Sampling of ore concentrates and storage of concentrates in 55-gallon drums;
- c. Pre-treatment of ore concentrate to minimize undesirable contaminants. The method of pre-treatment used is a two-stage sulfuric acid leach followed by ammonia precipitation;
- d. Calcination, blending, drying, crushing, and sizing of ore concentrates;
- e. Reduction of U_3O_8 to uranium dioxide (UO_2) in fluid-bed reactors utilizing hydrogen and nitrogen as the fluidizing gas;
- f. Hydro-fluorination of UO_2 , converting it to UF_4 using a counter-current flow of anhydrous HF in fluid-bed reactors;
- g. Fluorination of UF_4 , converting it to UF_6 in a fluid-bed reactor using a mix that includes elemental fluorine as the fluidizing gas;
- h. Condensation of UF_6 product material in cold traps and removal to still feed tanks by intermittent heating;

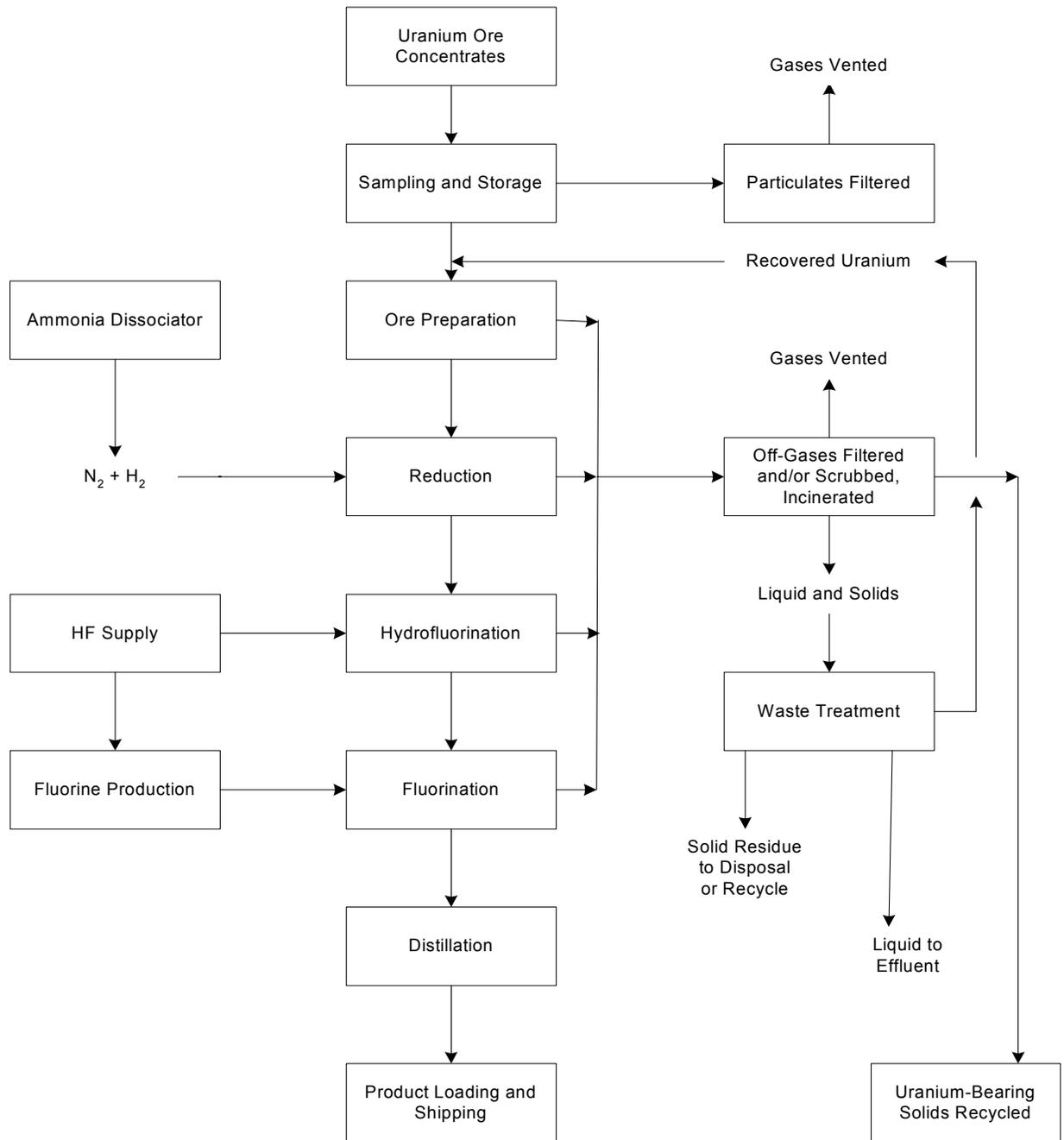


Figure 3 Process Description

- i. Distillation of product using low and high boiler distillation columns to remove impurities;
- j. Packaging and sampling of product; and
- k. Recycling of solid residues that contain economically recoverable quantities of uranium to a licensed uranium mill for recovery of uranium through a toll milling agreement.

5.2.1 Conclusion

As part of the license renewal review, members of the NRC review team visited the MTW site. The site visit was to ensure that the written descriptions of the MTW matched the actual plant layout. Additionally, the process descriptions provided by the licensee were compared to the operating MTW.

The NRC staff found that the description of the proposed process operations presented in the renewal application was sufficiently detailed to enable a knowledgeable reader to comprehend the intended processes. The associated conditions of operations and the specific location of each process within the MTW were verified to be substantially correct. The process description is therefore acceptable.

6.0 ORGANIZATION AND ADMINISTRATIVE PROCEDURES

6.1 Purpose

Key positions with safety-related responsibilities should be identified and their functions described. The licensee should provide separate lines of authority for production and safety functions. The lines of responsibility leading to top management should be indicated.

6.2 Regulatory Requirements

The regulatory bases for the review are the general and additional contents of an application that protect health and minimize danger to life and property, as required by 10 CFR 40.31(j) and 10 CFR 40.32(c). The specifics for this chapter are discussed in Regulatory Guide 3.55.

6.3 Regulatory Acceptance Criteria

Regulatory Guide 3.55 states that the application should contain a description of the minimum qualifications and requirements (i.e., education, training, and experience) for all safety-related positions and for safety committee members.

6.4 Staff Review and Analysis

6.4.1 Organization, Personnel Responsibilities, and Minimum Qualifications

The MTW is owned and operated by Honeywell International, Inc., whose corporate headquarters is located in Morristown, 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 lines of authority for production, maintenance, and engineering functions are independent of those for safety, auditing, and regulatory affairs functions. Primary responsibility for development of plant safety programs, including programs for industrial, chemical, and environmental safety, is assigned to the Health, Safety and Environmental (HSE) Manager. Primary responsibility for auditing, inspection, and regulatory affairs functions is assigned to the Regulatory Affairs Manager. Primary responsibility for plant engineering, UF₆ production, and maintenance functions is assigned to the Engineering, Nuclear Services, and Maintenance Managers, respectively.

The Manager of Regulatory Affairs is responsible for compliance with regulatory requirements related to both occupational and environmental radiation protection. This manager supervises the Health Physics Supervisor and associated Health Physics staff. An indirect reporting relation is provided to the corporate Health, Safety, and Environmental staff, which is located in Morristown, New Jersey. The Manager will have at a minimum, as of July 18, 2006, a four year degree, or equivalent experience in engineering, science or a related discipline, with 10 years of diversified experience, in the chemical or nuclear industry, including supervisory, management, or oversight

experience.

The Health Physics Supervisor's primary responsibility is supervision of health physics technical personnel maintaining compliance with NRC requirements. The minimum qualifications for the Supervisor are a four year degree or equivalent experience in physical or biological science and three years health physics or related experience.

6.4.2 Committees

Honeywell has established a primary management safety committee (the HSE Council) that provides oversight for the occupational and environmental safety programs. The HSE Council provides direction to four subordinate committees that are charged with carrying out the policies established by the HSE Council, investigating incidents, preparing reports, and evaluating plant performance. Each committee prepares records and reports related to its meetings, actions, investigations, and results and provides specified records and reports to the HSE Council for review and management action.

6.4.2.1 HSE Council

The HSE Council consists of the plant management team and provides overall leadership for HSE issue identification and correction. The HSE Council also provides management direction to its reporting committees. The HSE Council meets at least once each quarter.

6.4.2.2 "A" Council Safety Committee

The "A" Council Safety Committee establishes plant health and safety policy and reviews reports of significant accidents and injuries. Membership includes: the Plant Manager; HSE Manager; one to three additional selected managers; Safety Supervisor; and selected hourly employees. The "A" Council meets at least once each quarter.

6.4.2.3 ALARA Committee

The ALARA Committee (As Low As is Reasonably Achievable (ALARA)) supports planning and review of MTW operations to ensure that occupational radiation exposures and effluent releases of radioactive material are effectively controlled. Membership includes: the Plant Manager; Regulatory Affairs Manager; one to three additional selected managers; Health Physics Supervisor; and selected hourly employees. The ALARA Committee meets at least once each quarter.

6.4.2.4 Environmental Committee

The Environmental Committee supports planning and review of MTW operations to control the MTW's non-radiological impact on the surrounding environment. Membership of the Environmental Committee includes: the Plant Manager; HSE Manager; one to three additional selected managers; Environmental Supervisor; and selected hourly employees. The Environmental Committee meets at least once each quarter.

6.4.2.5 "B" Council

The "B" Council consists of first-line supervisors and foreperson's and all hourly personnel. "B" Council meetings are conducted monthly for employee training and review of industrial, chemical, radiological, and environmental safety procedures.

6.4.2.6 Conclusion

The description provided in the application of the management organization and minimum technical qualifications are sufficiently detailed to enable the NRC staff to make a determination of their adequacy. NRC staff has concluded that the applicant has adequately described and assessed the committees that are charged with carrying out the policies established by the HSE Council, investigating incidents, preparing reports, and evaluating plant performance in a manner that satisfies regulatory requirements, and is consistent with the guidance in this TER. Therefore, it is acceptable.

6.5 Administrative Practices

6.5.1 Operations

To meet the requirements of 10 CFR 40.32(c), Honeywell commits to conducting operations, with licensed material, in accordance with approved written procedures. Written procedures will also govern the preparation, review, revision, approval, and implementation of operating procedures. Honeywell has committed that written procedures will provide detailed instructions for operating each production unit, and include information on employee health and safety, environmental protection, and hazardous chemicals. All procedures will be in place within 180 days of the issuance of the renewed license.

Within Section 2.6 of the license application, Honeywell committed that plant procedures will be reviewed, revised, approved, and implemented in accordance with a written procedure development and revision program. Honeywell identified one such program for technical procedures as MTW-ADM-PRO-0103, "Development and Implementation of Plant Technical Procedures." The implementation of this program will be reviewed during the normal inspection process of the facility.

Honeywell has committed, within Section 2.7 of the application for renewal, as well as their response to the last Licensee Performance Review (LPR), to ensure adverse conditions identified during audits and inspections, that cannot be immediately corrected, are entered into a corrective action tracking system and then tracked to completion. The implementation of these commitments will take the form of a formalized Configuration Management Program, and Facility Change Process.

6.5.2 Integrated Safety Analysis Report

To meet the requirements of 10 CFR Part 40.31(j)(3), pertaining to accident analysis/mitigation issues to be addressed for emergency planning purposes, Regulatory

Guide 3.55 specifies that:

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

To address 10 CFR Part 40.31(j), Honeywell submitted, in May 2006, a document entitled "Integrated safety analysis" (ISA). The ISA was dated October 21, 2005, supplemented May 12, 2006, and replaced in total by a submission dated October 26, 2006. This report was modeled after the requirements for a 10 CFR Part 70 ISA, however, it was not intended to be a full Part 70 ISA. In that report, Honeywell identifies accident sequences and, from those sequences, designated Plant Features And Procedures (PFAP) to either prevent such accidents or to mitigate their consequences.

Within MTW, materials are handled that could pose a risk to public health and safety if released during an accident. An accident scenario may result in releasing a higher concentration of material over a shorter time period relative to releases associated with normal operations.

The ISA describes management measures to provide reasonable assurance of the availability and reliability of PFAPs. The ISA uses a hazard analysis method to identify the relevant hazards. The hazard identification process resulted in identification of physical, radiological, and/or chemical characteristics that have the potential for causing harm to site workers, the public, or the environment. The hazard identification also identified potentially hazardous conditions that have a potential impact on the discrete components of the process systems.

The results of the ISA are intended to give assurance that the potential failures, hazards, accident sequences, as well as PFAPs have been analyzed in an integrated fashion. Also considered were common mode and common cause situations. Honeywell evaluated selected high consequence chemical accident sequences which were found to bound all consequences from credible accidents at MTW. The accidents analyzed included a hydrogen fluoride (HF) unloading accident, the rupture of an HF storage tank, an ammonia unloading accident, the failure of an ammonia storage tank, the release of UF₆ vapor or liquid from the still feed tank, and a UF₆ product cylinder drop or pigtail failure. Initiators for these accidents included personnel activities, seismic events, tornado, tornado missile, high winds, snow and ice, flooding, heavy rain, river transportation, aircraft, pipelines, highway traffic, railroads, on-site natural gas, and the effects of operations of other nearby facilities. Radiological and chemical consequences of these events were tabulated and those considered more likely by Honeywell were further evaluated. For those events that resulted in potential for a high consequence, Honeywell provided a detailed evaluation of MTW PFAPs that would tend to prevent or mitigate those consequences.

6.5.2.1 Findings

Honeywell has considered a wide range of accidents utilizing a structured approach of Hazard Identification. The principal consequences of concern are the chemotoxic exposure to HF, UF₆, and UO₂F₂. The release of ammonia was also evaluated. Only those accidents considered "Highly Unlikely," and then only when un-mitigated by PFAPs, result in significant off-site effects. To determine what plant equipment and procedures were critical to the safe operation of the facility, Honeywell utilized a process hazard analysis (PHA) method that was found to be consistent with the guidance provided in NUREG-1513, "Integrated Safety Analysis Guidance Document," USNRC, May 2001.

At the time of this writing, Honeywell has not yet fully implemented its ISA, therefore the NRC staff has determined that it will require Honeywell, within 180 days of the issue of the renewed license, to fully implement its ISA. To ensure this, the following License Condition will be required.

LC-19 Within 180 days of the issuance of the renewed license, all Plant Features and Procedures, to be designated PFAP, shall be developed and implemented within the ISA. The implementation shall include the Configuration Management Program, and Facility Change Process.

6.5.2.2 Conclusion

NRC staff concludes that credible accident scenarios at the MTW have been adequately evaluated. The staff also reviewed Honeywell commitments for written procedures and their updates. The NRC staff has concluded that the applicant has adequately described and assessed the Administrative Practices to ensure that adverse conditions are identified and that their resolution are tracked in a manner that both satisfies regulatory requirements and is consistent with the guidance in the Standard Review Plan (SRP). Therefore, the Administrative Practices for MTW are acceptable.

6.5.3 Configuration Management

Honeywell has committed to a system of Configuration Management detailed within Section 4.5.1.2 of the ISA. Within the Configuration Management Program, is a Facility Change Process (FCP). The FCP allows it to implement, without prior approval of the NRC, a change to the site, structures, processes, systems, components, computer programs, and activities of personnel if the proposed change does not:

- Create new types of accident sequences that, unless mitigated or prevented, would exceed regulatory requirements, and have not previously been described in the ISA;
- Use new processes, technologies, or control systems for which Honeywell has no prior experience;
- Remove a PFAP that is relied on for safety as identified in the MTW ISA, without a replacement PFAP that is at least equivalent;
- Alter any PFAP, as listed in the MTW ISA, that is the sole item preventing or mitigating an accident sequence that exceeds regulatory requirements; or
- Create any condition or configuration that is otherwise prohibited by this section, license condition, or order.

For changes that require prior NRC approval, Honeywell will submit, to the NRC, a request for amendment of the license.

To ensure that all changes are reviewed by NRC staff, the following License Condition will be required:

LC-20 For changes to the site, structures, processes, systems, components, computer programs, and activities of personnel 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 MTW 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, or revised ISA pages, as appropriate.

6.5.3.1 Conclusion

Honeywell has committed to ensure adverse conditions identified during audits and inspections that cannot be immediately corrected are entered into a corrective action tracking system and then tracked to completion. Honeywell has established a tracking system that ensures appropriate management review, assignment of responsibility, action dates, and proper documentation review of actions taken. Honeywell has

committed to a configuration management system that ensures that systems and procedures critical to the safe operation of the MTW are carefully considered prior to any changes to configuration or operations. NRC staff has concluded that the applicant has adequately described and assessed the Configuration Management program in a manner that both satisfies regulatory requirements, is consistent with the guidance in the SRP, and, therefore, it is acceptable.

6.6 Inspections and Audits

6.6.1 Purpose

Audits and inspections should be conducted to determine that plant operations are conducted in compliance with regulatory requirements, and the license. Audits are formal examinations made to verify that operations are being conducted according to established criteria. Inspections are routine reviews to check that operations are being conducted according to approved procedures. Audits are more formal and less frequent than inspections.

6.6.2 Staff Review and Analysis

Section 2.7 of the application details Honeywell's inspection and audit program. To ensure that operations are being conducted in accordance with standard procedures, operations are continuously inspected through observation by the supervisory personnel.

Honeywell has assigned primary responsibility for the audit and inspection program to the Regulatory Affairs Manager, who will maintain written plans for implementing the program. The Regulatory Affairs Manager will be delegated authority to shut down operations or require additional safety precautions as needed. Qualified auditors conduct regular audits of operations involving source material to assure compliance with regulations, license conditions, and licensee procedures. The audit findings, including deficiencies and corrective actions taken, are documented in a formal report to the Plant Manager. Audit results are reported directly to plant management.

In addition to the audit and inspection program, Corporate Health, Safety, and Environmental personnel conduct audits to assure compliance with Company, Federal, and State standards for occupational health, safety, and pollution control.

6.6.3 Conclusion

NRC staff has concluded that the applicant has adequately described and assessed the Inspections and Audits program in a manner that satisfies regulatory requirements, is consistent with the guidance in the SRP, and is therefore acceptable.

6.7 Training

6.7.1 Regulatory Requirements

10 CFR 19.12 states requirements for worker instructions that are applicable to personnel training and qualifications. The application should contain a description of the program (e.g., plan, content) for training operators and other personnel in safety. Also, describe the system for maintaining records on training of new employees and refresher or upgrading training of personnel.

6.7.2 Staff Review and Analysis

Initial indoctrination of employees to industrial and chemical safety includes the issuance and demonstration of proper use of safety equipment, operating and emergency procedures, and safety and radiation protection procedures.

Employees are provided with refresher training in safety hazards and proper radiation protection procedures at monthly "B" Council Safety meetings.

Radiation protection topics consist of a wide range of subjects that include, as appropriate, radiological emergency planning, ALARA, air activity measurements, surface contamination procedures, waste disposal, external dose control, dose units and limits, uranium deposition and toxicity, biological effects of radiation, respiratory protection, and employee rights and responsibilities.

Honeywell provides training and refresher training to the Emergency Response Team members in accordance with the MTW Emergency Response Plan.

Plant operators will be trained and refresher training provided in accordance with a written qualification description document and written procedures. Records of training are retained by the Plant Training Department.

6.7.3 Conclusion

NRC staff has concluded that the applicant has adequately described and assessed the training program in a manner that satisfies regulatory requirements, is consistent with the guidance in the SRP, and therefore is acceptable.

6.8 Record Retention

6.8.1 Regulatory Requirements

10 CFR 19.12 states requirements for worker instructions that are applicable to personnel training and qualifications and 10 CFR Part 20 Subpart L 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.

6.8.2 Staff Review and Analysis

The application should include a description of the system for maintaining records relating to health and safety. Retention time for these records should be specified. If a retention period is not otherwise specified by regulation or license condition, each record must be maintained until the U.S. Regulatory Commission terminates the license that authorizes the activity that is subject to the record-keeping requirement. Such records should include changes related to safety made under internal review and approval, unusual operational incidents and events associated with radioactivity releases, audits and inspections, instrument calibration ALARA findings, employee training and retraining, personnel exposures, routine radiation surveys, and environmental surveys.

Records which relate directly to radiation exposure of employees or members of the public (e.g., TLD's, bioassay results, environmental air concentrations) will be retained until NRC authorizes disposition. Other records which relate indirectly to exposure (e.g., contamination smears, daily air activity measurement, daily stack sampling) will be retained a minimum of five years; however, before disposition, a summary report will be prepared. The summary reports will be retained until NRC authorizes disposition. Documentation generated as a result of the Quality Assurance Program (audit, investigation, or surveillance reports), is maintained for a minimum of five years.

6.8.3 Conclusion

The staff reviewed Honeywell's records retention requirements and concluded that the applicant has adequately described and assessed the Record Retention program in a manner that satisfies regulatory requirements, is consistent with the guidance in the SRP, and is therefore acceptable.

6.9 Request for an Exemption to the Reporting Requirements for The Nuclear Materials Management and Safeguards System

On February 9, 2007, Honeywell submitted an amendment request seeking relief from the ten day reporting requirements for the receipt of source material contained in 10 CFR 40.64(a). 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. Thus, Honeywell is rarely able to report a final weight and assay within the number of days as outlined in NUREG/BR-0006.

6.9.1 Regulatory Requirements

10 CFR 40.64(a) requires, in part, that a licensee who imports or exports greater than 1 kilogram of uranium or thorium source material must complete a Nuclear Material Transaction report. Each licensee who receives the material shall submit a Nuclear Material Transaction Report, in computer-readable format, in accordance with instructions, within ten days after the material is received. Guidance on compliance with 10 CFR 40.64 is provided in NUREG/BR-0006 which states that a final weight and assay are to be reported to the NMMSS database within 60 days.

6.9.2 Staff Review and Analysis

Honeywell is subject to these requirements. Because of the way source material is received, inventoried, and utilized at the MTW, Honeywell is unable to report measurement of weight within 10 days, or a final weight and assay within 60 calendar days of the receipt. The staff has reviewed the Honeywell receipt process and concluded that there is no reasonable way for the licensee to comply with either the regulatory requirements of 10 CFR 40.64(a) or the guidance provided in NUREG/BR-0006. Honeywell has proposed an alternative reporting criteria wherein it will report the shippers values within the 10 day requirement, and in lieu of the 60 day guidance, the licensee proposed that after the source material weight and assay have been measured and the quantity determination has been agreed upon with the supplier, the NMMSS database will be updated. To ensure that the values reported are correctly posted, Honeywell shall compare, on a monthly basis, its weights of natural uranium it has received with weight values contained in the NMMSS database, and will provided corrections as necessary.

6.9.3 Finding

10 CFR 40.14 states that: "The Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulation in this part as it 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."

When taking into consideration the constraints that the Honeywell receipt process imposes, the exemption will allow the NMMSS database to be kept as current as possible. The staff finds that the exemption Honeywell has requested will neither endanger life or property, nor the common defense and security. Further, granting the request will not have a negative effect on the public interest. Therefore, the staff finds that an exemption to the reporting requirements of 10 CFR 40.64(a) is warranted. The following License Condition will be imposed.

LC-21 Honeywell shall, within 10 days of receipt of source material, report to the 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. To ensure that the values

reported are correctly posted, Honeywell shall compare, on a monthly basis, its weights of natural uranium it has received with weight values contained in the NMMSS database, and provide corrections as necessary. 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.

7.0 RADIATION PROTECTION

7.1 Purpose

To verify that the licensee has stated its policy for keeping occupational exposures and radioactive contamination in effluents as low as is reasonably achievable (ALARA) and also describe how this policy will be implemented.

7.2 Regulatory Requirements

The regulations in 10 CFR Part 20 establish standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the Nuclear Regulatory Commission. These regulations are issued under the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, as amended.

It is the purpose of the regulations 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.

7.3 Regulatory Acceptance Criteria

The regulatory bases for the review are the general and additional contents of an application that protect health and minimize danger to life and property, as required by 10 CFR 40.32. The specifics for the minimum contents of this chapter are discussed in Regulatory Guide 3.55.

7.4 Staff Review and Analysis

7.4.1 Administrative Practices

The Plant Manager's (PM) primary responsibility is the safe, efficient, and reliable operation of the MTW. The PM coordinates and delegates this responsibility through his staff managers. It is the responsibility of the Manager of Regulatory Affairs (MRA) to ensure compliance with regulatory requirements related to environmental and occupational radiation protection. The Health Physics Supervisor reports to the MRA. The Health Physics Supervisor's primary responsibility is supervision of Health Physics technical personnel maintaining compliance with NRC requirements.

The licensee will prepare, on a semiannual basis, a report summarizing and evaluating the radiological measurements, including airborne radioactivity, surface contamination, internal and external exposures, effluents, and environmental monitoring. The report will be provided to the ALARA Committee, the Plant Manager, and other levels of supervision, as necessary, for appropriate action.

Two specific features of the radiation safety program, the ALARA commitment, and Radiation Work Permit (RWP) are described below.

7.4.1.1 ALARA Commitment

Honeywell has committed to implement an operating philosophy consistent with Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low as is Reasonably Achievable." To accomplish it, Honeywell has established an ALARA Committee consisting of: the Plant Manager; Regulatory Affairs Manager; one to three additional selected managers; Health Physics Supervisor; and selected hourly employees. The ALARA Committee meets at least once each quarter. Honeywell has stated that, to the extent practicable, worker and public exposures will be controlled through the use of design features and engineering controls. Administrative controls will be implemented only as needed to supplement the design features and engineering controls.

7.4.1.2 Radiation Work Permit

At MTW an Radiation Work Permit (RWP) is only required when an employee is planning to enter a uranium bearing vessel. Health Physics (HP) personnel are required, by procedure, to perform a survey prior to initial vessel entry. If required by the results of the initial vessel entry, HP personnel will be present prior to entry.

In the absence of a specific written procedure that establishes the required precautions, Honeywell has committed to establish and maintain an RWP system to ensure safe job performance in these areas.

The permit system will, at a minimum, include the following features:

- a. Preparation of the permit by the responsible foreperson/supervisor with assistance, as needed, 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 acknowledgment signatures.

In addition, Health Physics personnel will be present whenever entry is made into

containment structures, including ventilation baghouses, where the likelihood exists for exposure to airborne radioactivity. Following elimination of the radiological hazard (by closure of the vessel, decontamination, or other process), the permit will be terminated and routed for retention in accordance with plant procedures. Records associated with the RWP system will include completed permits and records of area entry.

7.4.2 Exemptions

Honeywell has requested continuation of its current exemption from the requirements of 10 CFR 20.1904(a) only as they may apply to labeling of containers of natural uranium and the resulting intermediates and byproducts of uranium processing operations. Honeywell has requested that, in lieu of labeling each individual radioactive material container, as specified in 10 CFR 20.1904(a), it will establish one or more Radioactive Material Areas within or congruent with the restricted area and post all entrance or access points to the Radioactive Material Areas with postings authorized by 10 CFR Part 20.

Staff reviewed the request and finds that the quantity of low level radioactive materials, handled on a daily basis, makes compliance with the posting requirements unduly burdensome. During site visits staff found that the current system meets the intent of the regulatory requirements of 10 CFR Part 20. The existing license authorizes the above activities. The licensee has applied these practices during the past years. The staff finds the request acceptable and recommends continuing the authorizations. Therefore, in consultation with Regional personnel, we finds the justification for continuance of the exemption acceptable.

7.4.3 Findings

Staff has reviewed the exemption request and finds that it is appropriate and should be authorized by the following License Condition:

LC-22 The licensee is hereby granted a continuation of the exemption from the labeling requirements of 10 CFR 20.1904 (a), as described in Section 1.7.1 of its license renewal application.

7.4.4 Conclusion

The staff reviewed the administrative practices of the radiation protection program, which includes radiation protection responsibilities, ALARA commitments, and the RWP system. NRC staff has concluded that the applicant has adequately described and assessed the Radiation Protection Program in a manner that satisfies regulatory requirements, is consistent with the guidance in the SRP, and is therefore acceptable.

7.5 Systems for Exposure Controls

7.5.1 Regulatory Requirements

The applicant is required by 10 CFR 40.32 to describe the proposed equipment, facilities and procedures to ensure that they are adequate to protect health and minimize danger to life or property.

7.5.2 Staff Review and Analysis

Honeywell states that its Occupational Radiation Exposure Control Program is based upon: confinement of natural uranium, in process vessels, to the maximum extent possible; observation of spills or leaks, smear results, and air monitoring of the resultant contamination; required use of respiratory protection; bioassay to determine uranium intake; external-whole body radiation monitoring; and a computerized records management system to document individual total effective dose equivalent (TEDE) annually. A description of its exposure control program follows.

7.5.2.1 Exposure Controls

Radiation exposure, in a uranium processing facility such as Honeywell, is almost exclusively from internal exposure. Therefore, control of internal exposure to radioactive material is paramount. Radioactive material may enter the body by breathing contaminated air or by ingesting particulate matter as a consequence of poor hygiene or inadequate self-monitoring. Protection of personnel from excessive internal and external exposure is provided by:

- a. Employee training in accordance with 10 CFR 19.12 and Section 2.5.1 of the application;
- b. Area posting in accordance with 10 CFR 20.1901 - 20.1904 and Section 1.7 of the application;
- c. Specific facility and equipment design and engineering features;
- d. Implementation of the RWP system;
- e. Implementation of the ALARA Program;
- f. Maintenance and operation of the facility ventilation system; and
- g. Control of facility contamination.

Honeywell has committed to perform routine gamma radiation surveys consistent with the guidance provided in Section 2.4 of Regulatory Guide 8.30. Beta-gamma instrument surveys will be conducted when a process or procedural change is made that could result in a significant increase in employee exposure. Exposure rate and occupancy

factors are used, as appropriate, to determine if additional precautions are needed. Additionally, Health Physics staff will conduct a radiation survey upon initial entry into a radioactive material vessel.

7.5.2.2 External Exposure and Monitoring

Honeywell will implement an external dosimetry program that includes the following features:

- a. Use of a Honeywell-issued personnel dosimeter by each individual who enters an area where external exposures are likely to exceed 10% 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) accreditation;
- c. Processing will be completed on a quarterly basis for salaried employees and a monthly basis for hourly employees; and
- d. Notification of Health Physics staff by the processor of any whole body exposure exceeding 125 millirem per month.

The external exposure data for 1995 through 2004 shows that annual exposures are typically less than 10% of the permissible total effective dose equivalent of 5 rem per year and no employee exceeded 1 rem per year.

7.5.2.3 Monitoring of Air Concentration of Radioactivity

Within Section 3.2.3 of the license application Honeywell states that the work area air sampling program relies primarily on routine continuous air sampling of primary work areas on each floor in the Feed Material Building (FMB). The goal at Honeywell is to not have any airborne areas, however, should one develop, procedures require the Production Foreperson, with Health Physics support, correct whatever is causing the airborne condition.

The Honeywell standard for controlling air concentrations of radioactivity is 10 CFR 20 "Standards for Protection Against Radiation" App B. Using the solubility for greensalt, which is 32% D class material and 68% Y class material, their Annual Limit on Intake (ALI) value is $4.1 \times 10^{-1} \mu\text{Ci}$. Their Derived Air Concentration (DAC) value is $1.7 \times 10^{-10} \mu\text{Ci/ml}$. Therefore, their air monitoring practice is to post an area as an airborne radioactivity area any time the air monitoring results are greater than 30% of a DAC or $5 \times 10^{-11} \mu\text{Ci/ml}$.

Honeywell will perform periodic breathing zone sampling to ensure the installed continuous air sampling system provides a reliable indication of work-place airborne radioactivity levels. If the average airborne radioactivity concentration on any floor in the

FMB is greater than 30% of the applicable DAC, or any four (4) of eight individual air samples exceed 30% of DAC, the entire floor will be posted as an airborne radioactivity area. If any single air sample is greater than one (1) DAC, an investigation will be initiated and will be documented by the Production Foreperson, with support from Health Physics. Consistent with Section 2.2 of Regulatory Guide 8.30, lapel samples will be used in specific exposure evaluations, as specified by Health Physics, to ensure accurate measurements of uptake.

7.5.2.4 Internal Exposure Monitoring

Internal exposures are determined primarily through implementation of the bioassay program, including both routine and special urinary sampling and analysis. Honeywell will enroll in the program all individuals who are likely to receive an intake exceeding 10% of the applicable ALI(s) in Table 1, Columns 1 and 2 of Appendix B to 10 CFR Part 20. For purposes of practicality, the routine bioassay program typically includes all individuals who routinely access areas where unsealed quantities of uranium are used or processed. The bioassay program will include the following features:

- a. Routine urinalysis of all affected personnel.
- b. Special urinalysis will be conducted following specified events and evolutions. Employees whose urinary uranium excretion rate exceeds 15 µg/L will be resampled for confirmation. The investigation level is 60 µg/L urinary uranium (200 µg/L for UF₆ exposure).

Any exposure resulting in an excretion rate exceeding the applicable investigation level will be investigated. Typically, daily urinary uranium samples are collected until the results are less than the evaluation level. Work restrictions will be considered if the bioassay data indicate the intake exceeds 30% of the ALI for mixed solubility material (class "Y", "W", and "D"). Honeywell will impose work restrictions if results exceed the weekly intake limit (10 mg) for class "D" uranium. The program utilizes guidance provided in Regulatory Guide 8.9.

Total Effective Dose Equivalent (Internal and external exposure) for the years 2003-2006 shows that the maximum individual exposure is less than 2 rem.

7.5.2.5 Control of Surface Contamination

To control contamination, the MTW is divided into three areas: uncontrolled areas, intermediate areas, and controlled areas. All specified areas are monitored for removable alpha contamination in accordance with the frequency and action levels specified in Table 3. Honeywell has committed to decontaminate any area found to exceed the specified action level and to resurvey the area.

Table 3. Surface Contamination Control

Uncontrolled Areas	Intermediate Areas	Controlled Areas
Removable Contamination Action Level: 200dpm/100 cm ² (alpha)	Removable Contamination Action Level: 200dpm/100 cm ² (alpha)	Removable Contamination Action Level: 5000 dpm/100 cm ² (alpha)
Survey Frequency: Weekly	Survey Frequency: Quarterly	Survey Frequency: Monthly

In Chapter 3 of the application, Honeywell also states that, in controlled areas, protective clothing must be worn and, upon exiting the area, the individuals must monitor themselves for possible contamination. If during monitoring, contamination is found above release limits, decontamination is required or health physics approval is required for release. In a letter dated March 20, 2007, Honeywell transmitted a revised commitment, contained within Section 3.2.1.5 of the license application, to use the Branch Technical Position entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated April, 1993.

7.5.2.6 Use of Respiratory Protection Equipment

Honeywell will utilize respiratory protection equipment in accordance with 10 CFR Part 20, Subpart H. Honeywell will implement a Respiratory Protection Program consistent with the guidance provided in Reg Guide 8.15. Individuals who work in specified areas shall carry a half-face respirator for potential emergency use. Honeywell has committed within Chapter 3 of its license application to establish written procedures that clearly define the conditions that require respirator usage for radiological protection, such as appropriate consideration of airborne radioactivity concentrations and planned exposure times and work activities, consistent with the facility ALARA program. When conditions indicate that the protection provided by a half-face respirator may be inadequate, respiratory protection equipment that provides greater protection shall be used. The NRC staff's review of Honeywell's program indicates that it meets the requirements of Part 20.

7.5.2.7 Conclusion

The staff reviewed the systems for exposure controls, which include external and internal radiation exposures, air sampling program, bioassay program, control of surface contamination, and respiratory protection. The staff finds that the systems for exposure controls for workers' external and internal radiation exposures, and surface contamination are equivalent to the controls used at other nuclear facilities with similar types of material and operation. The licensee has agreed to follow the guidance in the 1993 Branch Technical Position for the release of equipment from the contaminated area to ensure that equipment will be properly evaluated prior to abandonment or

release for unrestricted use. The staff finds that the systems for exposure controls are consistent with the NRC established regulations and guidance and are therefore, acceptable.

7.6 Effluent Controls

7.6.1 Regulatory Requirements

Radioactivity levels in gaseous and liquid effluents that require a commitment to action should be specified. The action levels should be selected to meet regulatory limits, including ALARA commitments. These limits must ensure compliance with the Environmental Protection Agency's regulations in 40 CFR Part 190, as required by paragraph 20.1101(d) of 10 CFR Part 20. The application should contain a description of anticipated corrective actions to be taken if these limits are exceeded. Limits at which an operation will be shut down should be specified.

7.6.2 Regulatory Acceptance Criteria

Honeywell's proposed effluent controls were evaluated and reported in the "Environmental Report - Renewal of Source Material License SUB-526" (ER) dated May 25, 2005. The ER and the resultant conditions are discussed in Chapter VIII of this report. The following is a brief description of Honeywell's proposed effluent controls for the MTW.

7.6.3 Staff Review and Analysis

7.6.3.1 Air Effluents

There are numerous individual stacks and exhaust fans associated with the operation of the UF₆ conversion process which could contain significant concentrations of uranium. These exits are sampled continuously² at isokinetic flow conditions using particulate filters to measure the uranium emission rate. If moisture or chemical attack precludes the use of particulate filters, a combination water scrubber mist impinger is normally used.

An investigation limit is established for each dust collector stack (usually 5000 dpm). Stack samples with a higher risk of uranium loss (in excess of investigation guidelines) are collected twice per 24 hours and counted for alpha radioactivity. If the risk of an action potential is small, the samples are collected once every 24 hours. Every 24 hours, the individual filters for each sample point are composited and analyzed for total uranium emissions. If the stack limit for alpha radioactivity is exceeded on three successive samples, an investigation is conducted to correct the problem.

²Specific release data is discussed within the Environmental Report published in support of this licensing action.

Due to the large number of individual emission sources, an additional investigation level for gaseous uranium emissions is utilized based on the average of four continuous air samples collected at the restricted area fence line. Filters are changed weekly. The investigation level is based on the average quarterly uranium concentration which would produce an annualized dose of 10 mrem (CEDE), if an individual were continuously present at the fence line.

7.6.3.2 Liquid Effluents

All liquid effluents from the MTW are discharged through the main effluent via natural drainage into the Ohio River. The main effluent is continuously sampled and the composite sample is analyzed daily for uranium. The investigation level for uranium in the liquid effluent is established at 1.0 PPM uranium as a monthly average. This concentration would produce an individual ingestion dose of <1 mrem/yr (EDE) (.01mSv) at the nearest downstream municipality which could, but does not, use Ohio River water as a drinking water source. This is a very small fraction of the 1 mSv annual effective dose limit to members of the public given in ICRP-60, and would be considered a Negligible Individual Dose (NID).

7.6.3.3 Solid Waste

Radioactive solid wastes are generated from routine operation of the MTW. The routine wastes generated consist primarily of contaminated filters, paper, floor sweeping compounds, cleaning rags, and contaminated scrap metal. These materials are normally compacted or supercompacted for volume reduction before being shipped to a licensed waste disposal site.

The solid radioactive wastes generated in the uranium recovery process consist primarily of inorganic insoluble material (calcium fluoride) which contains small quantities of natural uranium. The average concentration of uranium is approximately 5,000 - 20,000 ppm. This material also contains other long-lived isotopes which have not been removed in the uranium milling process. The average concentration of significant isotopes is about 0.03 $\mu\text{Ci/gm}$. These residues are dried, appropriately packaged, stored in specially designated areas, and then either shipped to a licensed off-site facility for recovery of contained uranium or disposed of at a low level waste disposal site.

The Environmental Protection Facility (EPF) removes chemical pollutants (primarily fluoride) from the MTW's effluent stream. The EPF process uses calcium hydroxide to precipitate fluorides as insoluble calcium fluoride. The precipitated "synthetic" calcium fluoride (CaF_2) solids are separated, recovered, and recycled to any commercial organization that can use synthetic CaF_2 , however, the CaF_2 solids could contain trace amounts of natural uranium, thorium-230, radium-226, and arsenic.

The release of the CaF_2 , for use in the steel-making industry, was reviewed and documented in an Environmental Assessment (EA) dated January 14, 1992 (ML060320548). The EA concluded that to ensure the dose limits are not exceeded, the uranium concentration of the synthetic CaF_2 should not exceed 212 pCi/gram.

7.6.4 Findings

The staff's dose assessment performed in support of the 1992 EA demonstrates that the doses received by members of the critical group, and the exposed general population, are well below the dose limits of 100 mrem/year and 25 mrem/year, as specified in 10 CFR Part 20 and 40 CFR Part 190, respectively. The environmental impact from the industrial use of synthetic CaF₂ is insignificant. However, to ensure the dose limits are not exceeded, the staff recommended that the uranium concentration of the synthetic CaF₂ should not exceed 212 pCi/gram, when averaged over any consecutive 12-month period.

To ensure that the release of slightly contaminated CaF₂ is within the limits analyzed, the following license condition to limit the concentration of uranium will be imposed.

LC-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.

Contaminated pieces of process equipment, piping and other metals may be decontaminated or shipped to a licensed disposal site for further processing and disposal. In this regard, in a letter dated March 20, 2007, Honeywell transmitted a revised commitment, contained within Section 3.2.1.5 of the license application, to use the Branch Technical Position entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated April, 1993.

7.6.5 Conclusion

Upon completion of the radiation safety review, the staff concludes that Honeywell's radiological controls and radiation protection program are adequate and that it has the necessary technical staff to administer an effective radiological protection program for the MTW facility.

8.0 ENVIRONMENTAL MONITORING

8.1 Purpose

The Metropolis facility 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. Undesirable trends are reported to plant management via ALARA meetings, quarterly health physics audits, or immediately depending on the severity of the condition.

8.2 Regulatory Requirements

The radiological environmental monitoring program is described within the Environmental Assessment prepared in support of this licensing action. The description should explain methods of sampling and analyses of air, soil, vegetation, surface water, and ground water to be used for evaluating radioactivity released from the plant. It should show the location of the sampling stations, including any background stations, and the procedures for evaluating and reporting the results of this monitoring program. The application should also contain a description of the non-radiological monitoring program used to meet State and Federal requirements, including sampling of stack gases, soil, vegetation, surface water, and ground water for chemical pollutants. The applicant must list and give the status of all licenses, permits, and other approvals of plant operations required by Federal, State, local, or regional authorities.

8.3 Staff Review and Analysis

Honeywell has an environmental program which monitors the MTW's liquid and airborne effluents. The program also includes ambient air, surface water, groundwater, soil, vegetation, and sediment sampling. The adequacy of this program was evaluated and reported in the "Environmental Assessment for SUB-526 License Renewal," (EA) dated June 30, 2006 (ML061780260).

8.4 Conclusion

On the basis of the Environmental Assessment, a Finding of No Significant Impact (FONSI) was published in the *Federal Register* on August 10, 2006. The conclusion of the FONSI was that the Environmental Monitoring program was found to be acceptable.

9.0 EMERGENCY PLAN

9.1 Purpose

The provisions of the ERP and its supporting procedures were developed to provide an appropriate means of detection and response for multiple industrial incidents and natural disasters, including those described in the Metropolis Works Risk Management Plan and the Honeywell Safety Demonstration Report for Renewal of Source Materials License SUB-526. This plan is intended to be fully consistent with the multiple regulatory requirements, that apply to activities at the plant, including 10 CFR 40.31(j) and 20 CFR 191.120(q). The Metropolis Works maintains a separate Resource Conservation and Recovery Act (RCRA) Contingency Plan that has been developed to implement the requirements of 40 CFR 264 and related regulations. The provisions of the RCRA Contingency Plan augment and complement the provisions of the ERP.

9.2 Regulatory Requirements

The applicant is required by 10 CFR 40.31(j)(1)(ii) to have an emergency plan for responding to the radiological hazards of an accidental release of source material and to any associated chemical hazards directly incident thereto.

9.3 Regulatory Acceptance Criteria

Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle Facilities," contains the guidance to be used to judge the level of detail required to comply with the applicable requirements for an emergency plan in 10 CFR 40.31(j)(3).

9.4 Staff Review and Analysis

In accordance with the regulatory requirement of 10 CFR 40.31(j)(1)(ii), Honeywell submitted an emergency plan as part of its license renewal application. The emergency plan was a new document that consolidated the existing Emergency Response Plan & Radiological Contingency Plan (ERP/RCP) into a single ERP. The consolidated ERP was reviewed to ensure that all critical aspects of the ERP/RCP were transferred.

In Section 2.6.3 of the license application (as up-dated May 12, 2006), Honeywell committed to make no changes to the emergency plan that would decrease its effectiveness without prior approval of the NRC. The NRC will be notified of changes that do not decrease the plan's effectiveness within six months of such changes taking effect.

Honeywell has both an ERP and a program to support local responders, as required by 10 CFR 40.31(j)(3), including an emergency response team to mitigate the potential impact of a process chemical release or incipient fire. The team is trained and equipped to provide the initial response to such events. The response would be initially supplemented by the Massac County Emergency Services, with support from three area hospitals: Massac Memorial, Lourdes, and Western Baptist. If the situation warrants it,

further support is available from the Illinois Emergency Management Agency which provides a point of contact and coordinating efforts for State support.

Section 1 of the ERP contains descriptions of the licensed activities, the facility, and the site, including buildings, processes, chemicals of concern, the area near the site, demographics, and maps of the site and surrounding areas. The information fulfills the requirements of 10 CFR 40.31(j)(3)(i).

Descriptions of the types of accidents, including the maximum credible UF₆ release, are discussed in Section 2 of the ERP. The assumptions and modeling parameters are listed. The information fulfills the requirements of 10 CFR 40.31(j)(3)(ii).

Section 3 of the ERP explains the system used to classify accidents as a Plant Emergency, Alert, or Site Area Emergency, and defines the threshold for escalating an event from the initial classification to a higher one. The information fulfills the requirements of 10 CFR 40.31(j)(3)(iii).

Section 2.3 of the ERP explains the methods and systems available for detection of accidents at the facility, including alarms and visual warning capabilities. The information fulfills the requirements of 10 CFR 40.31(j)(3)(iv).

Section 5.4 of the ERP includes a summary of the systems and controls used to mitigate the harmful effects of a release of material. The major hazard would be the chemical hazard caused by release of UF₆. In addition, Section 7.5 of the ERP describes the maintenance and testing program for emergency equipment, instrumentation, and supplies. The information fulfills the requirements of 10 CFR 40.31(j)(3)(v).

Sections 2.3, 3.2, and 5.3 of the ERP provide a description of the methods and equipment to assess releases of radioactive materials. Additional detailed instructions are provided in Emergency Plan Implementing Procedure 001. The information fulfills the requirements of 10 CFR 40.31(j)(3)(vi).

The responsibilities of facility personnel during normal and emergency situations are described in Section 4 of the ERP. Responsibilities of the key positions such as the Lead Foreperson, Crisis Manager, Plant Manager, and Incident Commander are included. Section 7.1 of the ERP identifies the officer responsible for developing, maintaining, and updating the ERP. The information fulfills the requirements of 10 CFR 40.31(j)(3)(vii).

Sections 3.3.1, 4, and 6 of the ERP provides a clear commitment to promptly notify offsite emergency response organizations in the event of an emergency, including the NRC Operations Center. Because of the nature of the chemical hazards at the facility, recommendations of preliminary protective actions are included. The information fulfills the requirements of 10 CFR 40.31(j)(3)(viii).

Section 3.3 of the ERP adequately describes the types of pertinent information to be given to offsite response organizations during an emergency. Tables 3-1 and 3-2 supply

additional information regarding events, emergency action levels, and chemical information. The information fulfills the requirements of 10 CFR 40.31(j)(3)(ix).

Sections 7.2 and 7.3 of the ERP describe the training Honeywell will provide for both emergency response personnel and non-emergency response personnel, including offsite support groups such as hospital, police, and fire departments. Initial and refresher training is described. The information fulfills the requirements of 10 CFR 40.31(j)(3)(x).

Safe shutdown, recovery, and facility restoration operations are described in Sections 5.5.3 and 9 of the ERP. Actions of key positions within the emergency response organization and commitments for interface with offsite organizations are listed. The information fulfills the requirements of 10 CFR 40.31(j)(3)(xi).

Section 7 of the ERP includes adequate provisions for drills and exercises, including a commitment for an annual site area emergency drill. Section 7 also includes provisions for equipment and communications checks. Notification of the NRC prior to conducting the annual Site Area Emergency drill exercise is included. The information provided by the licensee fulfills the requirements of 10 CFR 40.31(j)(3)(xii).

A certification that the licensee has met its responsibilities under the Emergency Planning and Community Right to Know Act (EPCRA) is included in both Section 3.2 of the ERP, and in the licensee's notarized letter dated October 10, 2006. The information fulfills the requirements of 10 CFR 40.31(j)(3)(xiii).

9.5 Findings

The staff reviewed the ERP using the guidance in Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle Facilities," which contains the guidance to be used to judge the level of detail required to comply with the applicable requirements of 10 CFR 40.31(j)(3)(I) through (xiii). Upon completion of the emergency plan review, the staff concludes that the emergency plan is acceptable. However, to ensure that an up-to-date emergency plan is maintained, the staff is imposing the following license condition:

LC-24 The licensee shall maintain and execute the response measures in the Emergency Response Plan dated May 27, 2005. Any changes to the Emergency Response Plan are subject to the 10 CFR 40.35(f) requirements.

10.0 FIRE SAFETY

10.1 Purpose

Because the standards by which the fire protection system at Metropolis Works was designed and constructed were those codes and standards in effect at the time of construction in 1956, the staff had to verify that the plant fire protection system is still appropriate for the plant areas protected, and that the licensee utilizes the guidance provided in the appropriate National Fire Protection Association (NFPA) standards, e.g., NEPA 10, 14, and 24.

10.2 Regulatory Requirements

The fire protection review was performed relative to the guidance provided in Section 9.7 of Regulatory Guide 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production" (NRC, 1985). Information to support this review was obtained from the "Honeywell Metropolis Works Safety Demonstration Report; the response to a Request for Additional Information dated July 27, 2005, from David B. Edwards of Honeywell Chemicals to Michael Raddatz of NRC; the "Integrated Safety Analysis; and an onsite review at the Honeywell Metropolis Works.

10.3 Staff Review and Analysis

The MTW's original fire protection systems were designed and constructed to industrial standards in effect in the 1950's. Much of the original fire protection system design information is no longer available. However, according to the licensee, the system has been significantly upgraded and modified during the intervening years. Section 2.7 of the Safety Demonstration Report makes specific reference to NFPA Standards 10, "Portable Fire Extinguishers", and NFPA 24, "Standard for the Installation of Private Service Mains and their Appurtenances." Other components of their fire protection systems include a 250,000 gallon above ground reservoir for fire water; a 1000 gpm pump; a pre-action wet sprinkler system for the maintenance shop and stores area; a deluge system for the main rectifiers for the gaseous fluorine plants; stationary monitors for the three 30,000 gallon liquified petroleum tanks; stand pipes; and hose houses. The fire pump, pre-action sprinklers, deluge system, hydrants, and monitors are operationally tested in accordance with testing frequencies as specified by NFPA 25 "Inspection, Testing, and Maintenance of Water-based Fire Protection Systems." The hoses are hydrostatically tested and re-racked annually.

Honeywell's industrial risk insurance carriers provide expertise and recommendations during their periodic assessments of the fire protection program. The most recent assessment was conducted during August 2005 by Global Risk Consultants. The employee of Global Risk Consultants who conducted the assessment holds a Bachelors of Science degree in Chemical Engineering and is a member of both the NFPA and the Society of Fire Protection Engineers. The periodic risk assessments audit the systems and program to current NFPA standards; the consultant identifies any deficiencies in the

current installation and maintenance practices that present a danger to safety and provides recommendations for resolving these deficiencies. Annual tests of fire protection systems are carried out by the insurance carrier and/or fire equipment service contractor.

The services performed by Global Risk Consultants include witnessing the capacity flow tests for the fire pump and plotting a pump discharge curve, witnessing tests of the deluge systems, and witnessing sprinkler system drain tests. Monthly portable fire extinguisher surveillances, surveillances of sectional valves, and other relatively routine fire protection activities are carried out by the "Safety Operator."

The fire-fighting capabilities of the onsite Emergency Response Team are limited to fighting incipient fires only. The facility maintains a letter of assistance with the Massac County Fire Department, which is located approximately 3.5 miles (driving distance) from the MTW.

Combustible, uncontaminated refuse is deposited in metal drums and disposed of in accordance with local industrial waste disposal practices.

The hot work permits system is an approval by the designated fire safety reviewer which states the precautions that must be followed during welding, cutting, grinding, or burning in order to reduce the risk of fire in nearby areas. It is an integral part of an effective fire prevention program. Honeywell has a hot work permit program in place, and functioning in accordance with site safety procedures.

10.4 Conclusion

The staff finds the fire protection aspects of the license renewal application to conform with the guidance in Regulatory Guide 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production."

11.0 PLANT DECOMMISSIONING

11.1 Purpose

The goal of the decommissioning process is to remove a facility or site safely from service, and to reduce residual radioactivity to a level that permits either release of the property for unrestricted use or for release under restricted conditions, with eventual termination of the NRC license.

11.2 Regulatory Requirements

When Honeywell decides to permanently cease NRC-licensed activities at the MTW, it will be required to submit a decommissioning plan in accordance with 10 CFR 40.42. However, under 10 CFR 40.36, Honeywell has already been required to submit a decommissioning funding plan containing a cost estimate for decommissioning and a description of the method of assuring that sufficient funds for decommissioning will be available. Cost estimates must be adjusted at intervals not to exceed three years. The decommissioning funding plan must also contain a certification, by the licensee, that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning, and a signed original of the financial instrument obtained to satisfy the requirements of this section. To meet these requirements, the licensee provided both a reclamation cost estimate and a financial assurance mechanism.

11.3 Reclamation Cost Estimate

10 CFR 40.36(d) requires the cost estimate to be adjusted at intervals not to exceed three years. NRC received the most recent cost estimate on January 10, 2007. The reclamation cost estimate is under review, and it will be dispositioned outside of the license renewal process.

Therefore, for the purposes of license renewal, the staff will continue to rely upon the previously submitted "Site Reclamation Cost Estimate" dated June, 2000. This estimate was updated in December 2000, to reflect a 3% cost increase to \$103,000,000.00, and again in December 2001 to reflect a further 3% increase to \$106,000,000.00. The January 10, 2007, cost estimate contains an estimated decommissioning cost estimate, as measured in 2006 dollars of \$156,440,898.00.

As required by 10 CFR 30, Appendix C.II.B, Honeywell has, in the past, submitted supporting documentation that verified that it met the financial test allowing it to utilize the self-guarantee. However, in order to meet the same financial test this year Honeywell found that it needed an exemption to 10 CFR Part 30, Appendix C, Section II.A.1 (as made applicable by 10 CFR Part 40.36(e)(2)). If granted the exemption would allow it to utilize goodwill assets, in addition to tangible assets, to meet the 10 to 1 ratio of tangible net worth to meet the decommissioning obligation. As detailed in the findings associated with Section 11.5 which follows, this exemption has been granted.

11.4 Finding

Until such time that the staff completes its review of the Site Reclamation Cost Estimate dated January 10, 2007, the staff believes that adequate funding continues to be available for the decommissioning of the Honeywell facility.

11.5 Financial Assurance

In the past, Honeywell has provided the required financial assurance mechanism for decommissioning funding through a corporate self-guarantee. The self-guarantee, as a financial assurance mechanism, was first approved by NRC on May 26, 1994, by License Amendment 17 (1985 license). MTW has incorporated this amendment, by reference, into Chapter 6 of the renewal application.

However, in a letter dated November 3, 2006, Honeywell notified NRC that it was unable to meet the tangible net worth leg of the financial test as set forth in 10 CFR Part 30, Appendix C, Section II (as made applicable by 10 CFR Part 40.36(e)(2)). The regulation requires, among other things, that the licensee have tangible net worth of at least 10 times the decommissioning obligation. Honeywell's tangible net worth no longer meets the 10 to 1 criterion. This means that it is no longer eligible to use the self-guarantee. The regulations require that Honeywell provide alternate financial assurance within 120 days after notifying the NRC that it is no longer qualified to use the self-guarantee.

In a letter dated December 1, 2006, Honeywell submitted a request under the provisions of 10 CFR 40.14 for an exemption from 10 CFR Part 30, Appendix C. Honeywell requested that it be allowed to include the asset of goodwill in the tangible net worth test. Using its requested alternate definition of tangible net worth, Honeywell presented data showing the ratio of net worth to its estimated MTW decommissioning liabilities exceeded 35 to 1. If Honeywell is not allowed to use the alternate definition of tangible net worth to pass the test, it will incur significant costs to provide another method of financial assurance. Honeywell estimated it would cost about \$550,000 to \$700,000 per year to provide alternate financial assurance. Honeywell's exemption request stated that it continued to meet the other criteria of 10 CFR Part 30, Appendix C. In particular, its bonds are rated "A" by Moody's and Standard and Poor's. The NRC determined that the 120 day clock to provide alternate financial assurance would not be tolled during consideration of the exemption request.

10 CFR 40.14 states that: "The Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulation in this part as it 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 basis for decommissioning financial assurance is to assure that funds for decommissioning are available when needed. A self guarantee relies on the licensee's financial ability to fund decommissioning costs in a timely manner. The ability to pay may be considered in two parts: (1) ability under normal circumstances and (2) ability in cases of financial distress.

The licensee's financial ability to pay under normal circumstances is regularly rated by the bond rating agencies, such as Moody's and Standard and Poor's. A rating of "A" or higher indicates a very low probability of default on a company's bonds. The bond rating agency considers environmental obligations, such as decommissioning, in its rating of the licensee's ability to pay. The bond rating agency also considers the value of goodwill reflected in the licensee's balance sheet. An objective method to determine the value of goodwill is provided by Financial Accounting Standards Board (FASB) Standard No. 141, "Business Combinations." Honeywell uses the FASB standard to determine the value of its goodwill assets. Consequently, the "A" rating held by Honeywell is a reliable indicator that it has the ability to pay its decommissioning obligations under normal circumstances. The bond rating is supported by Honeywell's annual revenues of approximately \$27 billion, which generates about \$2.4 billion net annual cash flow. Total decommissioning liabilities are \$243 million, of which \$156 million represents radiological decommissioning governed by NRC regulations. In view of the bond rating and Honeywell's financial strength, its ability to pay for decommissioning under normal circumstances is adequate.

The likelihood that Honeywell will face financial distress during a particular time span can be assessed with the bond rating. For "A" rated and higher bonds, a transition from the "A" rating to a default has not occurred within a one year time span during the period 1983 to 2005 for bonds rated by either Moody's or Standard and Poor's. For the time period from 1920 to 2005, fewer than 0.08% of bonds rated "A" or better by Moody's defaulted within one year. (Standard & Poor's did not publish historical data as far back as Moody's.) The default rate rises as the time span for default extends greater than one year. Consequently, the financial test to qualify for using the self guarantee must be repeated annually, to assure that the risk of default remains low for the next year.

An NRC licensee's ability to pay under conditions of financial distress relates to the ratio of assets to decommissioning liability. Where tangible assets, as defined in the rule, are considered alone, a 10 to 1 ratio is adequate to assure that funds will be available if needed in case of financial distress. In the Honeywell case, the ratio of tangible assets to decommissioning cost is approximately 7 to 1. However, if goodwill assets are included in net worth, Honeywell's ratio exceeds 35 to 1. In view of the "A" bond rating and the high ratio of net worth (including goodwill) to decommissioning obligation, the likelihood that assets will be available for decommissioning in the event of financial distress in the next year is adequate.

In view of the above, an exemption to permit using goodwill assets to meet the 10 to 1 ratio of tangible net worth to decommissioning obligation will not endanger life or property or the common defense and security because there is no significant increase in the risk that funds for decommissioning will not be available when needed. The exemption is in the public interest because resources will not be expended on alternate financial assurance methods that would not increase the likelihood that funds for decommissioning will be available when needed.

However, Appendix C to Part 30 is currently under evaluation for proposed rulemaking. The NRC staff is in the process of developing proposed amendments which, if approved

by the U.S. Nuclear Regulatory Commission, will be published for public notice and comment. After public comments are received, additional information may arise that could cause the staff to reconsider the adequacy of using goodwill assets to meet the ratio of tangible net worth to decommissioning obligation. Public comments may be received within a year after Honeywell's license renewal application is approved. In view of this factor, an exemption to permit use of goodwill assets to meet the ratio of tangible net worth to decommissioning obligation in Appendix C to Part 30 must be time limited to allow reconsideration of the basis for the exemption in the future.

Therefore, a time limited exemption to Appendix C to Part 30 will be granted to Honeywell. Honeywell is exempted from the requirement to exclude goodwill assets to meet the ratio requirement of Appendix C.II.A. Honeywell may include goodwill assets to meet the 10 to 1 ratio of tangible net worth to decommissioning obligation. Honeywell must meet all other requirements of Appendix C to Part 30 to use the self guarantee to provide financial assurance for decommissioning. This exemption is granted for a period of one year from the date of approval of this license renewal. This exemption will expire at the end of that time and Honeywell must either re-apply for the exemption 30 days prior to the expiration, meet the actual requirements of Appendix C to Part 30, or have an alternative surety in place when the exemption expires.

Honeywell is required by 10 CFR 40.36(d) to adjust the cost estimate for decommissioning at intervals not to exceed three years. Although it must perform the adjustment, the regulations are unclear as to whether it must submit the results for NRC review and approval. In order to ensure that NRC staff reviews the update to the cost estimate for decommissioning a License Condition requiring that the update be submitted for review and comment will be required.

Honeywell is also utilizing a self-guarantee financial assurance mechanism to ensure that funds are available for decommissioning. Therefore, 10 CFR 30 Appendix C.II.B requires Honeywell to verify that it meets the financial test allowing it to utilize the self-guarantee within 90 days of the close of each fiscal year. Although it must perform the test, the regulations are unclear as to whether it must submit the results for NRC review and approval. Therefore, NRC will impose License Condition 26:

11.6 Finding

Honeywell is required by 10 CFR 40.36(d) to adjust the cost estimate for decommissioning at intervals not to exceed three years. In order to verify that this requirement is met, the following License Condition is imposed:

LC-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.

Honeywell is also utilizing a self-guarantee financial assurance mechanism to ensure

that funds are available for decommissioning. Therefore, 10 CFR 30 Appendix C.II.B requires Honeywell verify that it meets the financial test allowing them to utilize the self-guarantee within 90 days of the close of each fiscal year. In order to verify that this requirement is met, the following License Condition is imposed:

LC-26 Honeywell shall submit to NRC, for review and approval, the results of the financial test and supporting documentation required by 10 CFR 30 Appendix C II.B(3) within 120 days of the close of each fiscal year.

Honeywell is granted an exemption to include goodwill assets to meet the 10 to 1 ratio of tangible net worth to decommissioning obligation to pass the financial test for a self-guarantee of financial assurance for decommissioning. The exemption is limited to a period of one year. Honeywell must continue to comply with the other requirements of 10 CFR Part 30 Appendix C. Therefore, NRC will impose the following License Condition:

LC-27 Honeywell is granted an exemption to 10 CFR Part 30, Appendix C, Section II.A.1 (as made applicable by 10 CFR Part 40.36(e)(2)). Specifically, as described in a letter dated December 1, 2006, Honeywell may include goodwill assets in its calculation of tangible net worth to meet the 10 to 1 ratio of tangible net worth to decommissioning obligation to pass the financial test. All other applicable conditions within 10 CFR Part 30, Appendix C remain. This license condition will expire one year from the date of approval of this license renewal.

12.0 CHEMICAL PROCESS SAFETY

12.1 Purpose

The primary purpose of the review was to determine that the licensee has designed and is operating the MTW in a manner that will adequately protect workers, the public, and the environment during normal and credible abnormal operations against the chemical hazards of licensed materials and their byproducts. The licensee must also protect against conditions or operator actions that can affect the safety of licensed materials.

12.2 Regulatory Requirements

The regulatory bases for the review are the general and additional contents of an application that protect health and minimize danger to life and property, as required by 10 CFR 40.31(j) and 10 CFR 40.32(c).

12.3 Regulatory Acceptance Criteria

The acceptance criteria were provided in Reg Guide 3.55, "Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Hexafluoride Production," (NRC, 1985) and NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility" (NRC, 2002).

12.4 Staff Review and Analysis

The NRC staff reviewed the Safety Demonstration Report (SDR), license application, Integrated Safety Analysis (ISA), and other documentation submitted by Honeywell, and considered the following areas:

1. Chemical Process Description;
2. Chemical Accident Sequences;
3. Chemical Process Plant Features and Procedures; and
4. Management Measures.

In addition, NRC required a certification that Honeywell has met its responsibilities under the Emergency Planning and Community Right-to-Know Act of 1986, title III, Pub. L. 99-499 (42 U.S.C. 11001 et seq.) (EPCRA), in accordance with the NRC's emergency plan requirement set forth in 10 CFR 40.31(j)(3)(xiii). That certification was received in a notarized letter dated 10 October 2006 (ML62920525).

12.4.1 Process Description

The licensed operation begins with receipt, sampling, and storage of ore concentrates. Ore concentrates may be pretreated or fed directly to the calciner. Ore concentrates are

blended, dried, agglomerated, crushed, and sized to a uniform particle called "prepared feed." The prepared feed is processed through fluidized bed reducers where uranium is reduced to dioxide form (UO_2). Uranium dioxide is fed through a pair of hydrofluorinators operated in series, using a countercurrent flow of anhydrous Hydrogen Fluoride (HF) to convert the uranium dioxide to uranium tetrafluoride (UF_4). The uranium tetrafluoride is fed to fluidized bed fluorinators where it is converted to gaseous uranium hexafluoride (UF_6). The uranium hexafluoride gas is filtered and fed to cold traps for collection. Intermittently, uranium hexafluoride is removed for distillation and purification. The liquid uranium hexafluoride is packaged in approved cylinders for cooling and shipping steps.

12.4.2 Chemicals of Concern

Anhydrous Ammonia is stored on site in bulk quantities in two horizontal steel tanks. Relief valves and an atmospheric vent protect the tanks from overpressurization. Steam is used to vaporize the liquid ammonia to be fed to the dissociators. High temperature, in the presence of a catalyst, breaks the ammonia into elemental hydrogen and nitrogen.

Hydrofluoric Acid is stored on site in bulk quantities in three horizontal steel tanks. Relief valves are protected by rupture disks. Inadvertent releases flow to a dump tank of equivalent design. The dump tank in turn relieves into a scrubber. A system of vaporizers and heat exchanges brings the HF to the proper temperature for use in the hydrofluorinators.

Fluorine cells generate elemental fluorine prior to use in the fluorinators.

12.4.3 Interaction Chemicals

Uranium Hexafluoride is present in significant quantities at the MTW. Any uranium hexafluoride that is released to the environment will react exothermically with water vapor present in air, producing uranyl fluoride (UO_2F_2) and HF.

12.4.4 Hydrocarbon controls

The possibility of hydrocarbon contamination exists during equipment and piping maintenance. In normal operations, the licensed process takes place in a closed system. Administrative controls and extensive degreasing procedures are in place, and are augmented by increased supervision during maintenance.

12.4.5 Glycol Contamination Controls

Glycol is used as a heat transfer fluid, and is separated from the licensed product by the internals of the Primary Cold Traps. Weight and temperature indicators and alarms are used to notify the operator of unusual weight or temperature increases, which would indicate a cross-contamination. Administrative controls require that the cold trap is weighed before and after the first heating and cooling cycle following any repair.

12.4.6 Incidental Chemicals

Potassium Hydroxide is stored in bulk quantities in a horizontal mild steel tank. Any overpressurization is directed by an overflow line to the containment area below the tank and is used to scrub uncondensed gases from the licensed process.

Sulfuric Acid is stored in bulk quantities in a horizontal mild steel tank. Any overpressurization is directed by an overflow line protected by a rupture disk to the containment area below the tank which is used in ore preparation steps.

Nitrogen is present on site and is used for purging process equipment and as an inert cover gas. Nitrogen is not reactive with UF_6 in any plant operational condition.

12.5 Chemical Accident Sequences

Within the Integrated Safety Analysis dated October 25, 2006, Honeywell evaluated selected high consequence chemical accident sequences, including an HF unloading accident, rupture of an HF storage tank, ammonia unloading accident, failure of an ammonia storage tank, release of vapor or liquid from the still feed tank, and UF_6 product cylinder pigtail failure. Radiological and chemical consequences were calculated for both workers and the general public. Safety features installed to prevent or mitigate the consequences of the accidents were tabulated. NRC staff reviewed the documents and confirmed that the Honeywell analysis utilized conservative assumptions and the consequences were reasonable. The effects on public health and safety, when mitigated by plant features and procedures, were found to be acceptable.

12.6 Chemical Process Plant Features and Procedures (PFAPs)

Safety controls are provided for cylinder filling and handling. Remotely operated shutoff valves in the liquid UF_6 filling manifold prevent further cylinder filling if a leak occurs in the pigtail piping. At least two independent controls of cylinder fill weight by scale, automatic or manual calculation of fill rate must be available. Load cell weight is continuously indicated and recorded in the FMB control room. A flow totalizer is used to determine the amount of UF_6 which has been fed to the cylinder. After filling, a crane with a scale is used to confirm the weight indicated by the cylinder load cells. Final weight determination is verified by a beam scale prior to cooling and storage.

Safety controls for heating or sampling UF_6 cylinders. A continuous sampling system as well as manual cylinder sampling are available. When a sample must be drawn from a filled cylinder, the cylinder weight must be confirmed prior to sampling. If the cylinder weight exceeds administrative limits, remedial actions must be reviewed and approved prior to cylinder heating.

12.7 Management Measures

Honeywell has identified management measures to ensure the reliability and availability of safety related equipment (Plant Features and Procedures).

12.8 Maintenance

Maintenance activities generally fall into the following categories: surveillance/monitoring, corrective maintenance, preventive maintenance, and functional testing.

12.9 Process Safety Management

The applicant has implemented a Process Safety Management (PSM) program consistent with the requirements of the Occupational Safety and Health Administration (OSHA) regulation, 29 CFR 1910.119, including the following elements: employee participation, process safety information, process hazard analysis, operating procedures, employee training, contractors, pre-startup safety review, mechanical integrity, hot work permits, management of change, incident investigations, emergency planning and response, compliance audits, and trade secrets. NRC determined that implementation of an effective PSM program was an acceptable means of protecting health and minimizing danger to life and property, as required by 10 CFR 40.31(j)(1)(ii) and 10 CFR 40.32(c).

12.10 Process Safety Information

Process safety information is maintained current by the Engineering Department. Miscellaneous process safety information and material safety data sheets (MSDS) are available at multiple locations at the MTW.

12.11 Operating Procedures

Honeywell uses several types of procedures to control activities: operating procedures, procedure preparation, review and approval, as well as maintenance procedures. Administrative procedures are required to be in place to establish expectations for operator attentiveness, shift briefings and shift turnover.

12.12 Employee Training

Honeywell committed to a training program that ensures unescorted personnel possess the requisite knowledge to work safely and take appropriate action in the event of an emergency. New employees participate in plant safety training and radiation safety training. All experienced employees are re-instructed as appropriate. Emergency Response Team members receive initial and refresher training. The training program is developed and implemented with input from safety staff and management, and includes: analysis of jobs and tasks, design and development of learning objectives, design and development of qualification requirements by position, and development of chemical safety awareness throughout the MTW.

12.13 Contractors

Temporary contract workers receive chemical and radiological hazard training, as well as emergency plan training. Contractors who perform long-term or repetitive work in the

restricted area are given refresher training.

12.14 Pre-startup Safety Review

When portions of the MTW are modified, such as pressure vessels, piping systems, process instruments or controls, the licensee's safety manual requires a pre-startup safety review prior to the re-introduction of highly hazardous chemicals, such as HF, ammonia, and liquid UF₆. A management of change form is prepared by the originator of a process change request, who is responsible for completion of the pre-startup review.

12.15 Mechanical Integrity

Honeywell has a mature mechanical integrity program in place and functioning to ensure that the primary passive controls (tanks, piping components, and relief valves) for containment of highly hazardous chemicals remain capable and available. Internal, external, and ultrasonic inspections are performed, as well as functional tests of safety significant instrumentation. Relief valves are serviced and replaced.

12.16 Management of Change

The Management of Change (MOC) Process, as part of the PSM Program, is described in Chapter 1.8.13 of the Safety Demonstration Report. It is being implemented by the licensee to assure proper review and approval of changes to specified procedures, equipment or processes that could be detrimental to employee health and safety, environmental quality, or the equipment integrity.

12.17 Incident Investigations

Honeywell has an incident investigation process that includes evaluation of chemical process-related incidents. Evaluations and investigations are performed by a multi-discipline team, in accordance with approved procedures. The depth of the investigation depends on the severity of the incident. Investigation results are shared with plant personnel at regular safety briefings. Employees are required to report incidents, regardless of severity, to their foreperson or supervisor.

12.18 Compliance Audits

Section 2.7 of the license renewal application details Honeywell's inspection and audit program. To ensure that operations are being conducted in accordance with standard procedures, operations are continuously inspected through observation by the supervisory personnel.

Honeywell has committed to conduct audits to determine that plant operations are performed in compliance with regulatory requirements, license conditions, and written procedures. Honeywell assesses activities related to radiation protection, hazardous chemical safety, fire protection, and environmental protection, and performs audits in

accordance with a written plan, which identifies and schedules audits to be performed. Audit team members have no responsibility for the function and area being audited. Audit team members have the technical expertise or experience in the area being audited and are trained in audit techniques. Audit findings and identified deficiencies are documented in a written report to the Plant Manager.

12.19 Conclusion

The staff evaluated the license renewal application using the criteria previously listed. Based on the review of the license application and site examination, the NRC staff has concluded that Honeywell has described and assessed accident consequences including but not limited to an HF unloading accident, rupture of an HF storage tank, ammonia unloading accident, failure of an ammonia storage tank, release of vapor or liquid from the still feed tank, and UF₆ product cylinder pigtail failure. Radiological and chemical consequences were calculated for both workers and the general public that can result from the handling, storage, and processing of licensed material. Honeywell has evaluated those hazards and potential accidents, and established safety controls and programs capable of providing reasonable assurance of safe facility operation.

The staff concludes that Honeywell's plan for managing chemical process safety meets the regulatory requirements of Part 40 and provides reasonable assurance that the public health, safety, and the environment will be protected.

13.0 OVERALL CONCLUSION

Upon completing the safety review of Honeywell's license renewal application, the staff concludes that there is reasonable assurance that the activities to be authorized by the issuance of a renewed license for the MTW will not constitute an undue risk to the health and safety of the public. Furthermore, the staff determined that the renewal application meets the requirements of 10 CFR 40.31 and 40.32.

The staff discussed the renewal and the proposed license conditions with the Region II Inspector. The Inspector has no objection to the issuance of the renewed license.

The staff recommends that the license for the MTW be renewed for a 10-year term in accordance with the statements, representations, and conditions in the license renewal application, subject to the identified license conditions detailed within this document.

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