Specialty Materials
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February 25, 2011

Attention: Document Control Desk
Director, Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

References:
1) Docket No. 40-3392; License SUB-526
2) Public Meeting with Honeywell International, Inc. to Discuss Upcoming Licensing Action Related to Honeywell Metropolis Works' Pond Closure Plan and Associated Decommissioning Activities dated October 5, 2010 (ML102640573)
3) Letter from Larry Smith, Plant Manager Honeywell to NRC, Surface Impoundment Decommissioning Plan, dated December 2, 2010.
4) E-mail from the NRC to Michael Greeno, Regulatory Affairs Manager Honeywell, Non-Acceptance of Review – Honeywell Metropolis Works Surface Impoundment Decommissioning Plan, dated February 11, 2011.
5) Conference call conducted Wednesday, February 23, 2011 between the NRC and Honeywell.

Subject: Supplemental Information for the Surface Impoundment Decommissioning Plan Application

Honeywell Metropolis Works hereby submits information to supplement the Surface Impoundment Decommissioning Plan dated December 2, 2010 (Reference 3). Information addressing the requested information from Reference 4 above is included in Attachment 1 to this letter.

The following additional supplemental information will be provided by March 7, 2011:

The NRC-specific aspects of the construction quality assurance plan for the project; and
The quarterly groundwater monitoring reports for the ponds area

If you or your staff have any questions, require additional information, or wish to discuss this further please contact Mr. Michael Greeno, Regulatory Affairs Manager, at (618) 309-5005.

Sincerely,

Larry A. Smith
Plant Manager

Attachment

RMS501

cc:

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Ms. Lidia Litinski

Attachment 1

Supplemental Information Required for the NRC Detailed Technical Review

15 pages to follow

Enclosed CD contains the following files:

File Name	File Size (Bytes)	File Date
Response_1A_Lafarge.PDF	4969541	2/22/2011
Response_3B.pdf	236902	2/25/2011
Response_4C_Pond B Resident Farmer-No Cover.pdf	71236	2/22/2011
Response_4C_Pond C Resident Farmer-No Cover.pdf	71366	2/22/2011
Response_4C_Pond D Resident Farmer-No Cover.pdf	73640	2/22/2011
Response_4C_Pond E Resident Farmer-No Cover.pdf	73703	2/22/2011
Response_5C.pdf	5092566	2/21/2011
Response_5D.pdf	19765866	2/24/2011
Response_5D_Table 1.pdf	52688	2/24/2011
Response_6D.pdf	1916842	2/23/2011

Comment No. 1: Pozzolanic Material

a) Material characteristics and properties (10 CFR 20.1402)

Preliminary bench-scale solidification testing of a composited MTW Pond B & C sample showed the addition of six percent Portland cement (total weight basis) yielded a seven-day unconfined compressive strength (UCS) of 18.6 psi and a 28-day UCS of 36.4 psi, which satisfies the UCS criteria of 25 psi specified to support the final cover. The pozzolan, Portland Cement Type I/II, was secured from a local supplier (Lafarge in Joppa, IL). Optimization of the Portland cement mix ratio will be conducted during planned supplemental treatability testing (see response to item 1d). The MSDS for the Lafarge Portland cement is attached.

b) Description of process by which the sludge will be incorporated into the pozzolanic material and the mixing methodology employed to support the lack of elevated measurement exposure in the dose analysis (10 CFR 20.1402)

Stabilization of the CaF_2 material will be implemented for the purpose of improving structural stability. Appropriate pozzolanic materials and mixing methodologies will be selected for that purpose. Stabilization is not prescribed nor is necessary for dose reduction in the ponds. However, proper mixing and stabilization of the material is expected to evenly distribute radionuclides reducing or even eliminating the potential for small areas of elevated dose consequence.

Various solidification methods are considered feasible to satisfy the specifications. The response provided in Section 3.5 of the Engineering Report (Appendix V of the NRC submittal) was intended to maintain flexibility during implementation. As an example, construction work items could include the following: (i) pumping of ponded storm water from the surface of ponds for treatment, (ii) use of a power mix head with a long-reach excavator or a tracked telescoping boom excavator tool-carrier for in-situ solidification starting at the perimeter of each pond to control the introduction/blending of selected pozzolan, (iii) use of a data acquisition control system to monitor and control quantity of pozzolan addition, (iv) use of a grade control system to provide pre-programmed control of the power mixer head using liner configuration of each pond as verified by grid probe locations, (v) use of a protective cage apparatus to prevent direct contact with the existing EPDM liners, (vi) use of plow-type configuration of mixer head blades and approximately 50-75 rpm vortex action to pull the material into the cage to mix with pozzolan and push the material out to the ends of the mixer head, (vii) application of the power mixer to vertically blend pozzolan within the triangular prism section of the pond slope areas and to the toe of the impoundments once the lens of solidified material is complete along the pond slopes, and (viii) use of a Delmag (or equivalent) vertical deep soil mixing unit to step out on to the bench of solidified material and complete circumferential blending swaths to thoroughly blend pozzolan with calcium fluoride material.

c) Degradation analysis of solidified sludge, in the case that the cover remains intact and the case that cover failure results in cement exposure to the elements; include cement degradation as a failure scenario in dose assessment (10 CFR 20.1402)

Two separate scenarios (cover intact with material degradation and cover removed with material degradation) are requested as failure scenarios. Dose modeling presented in the LAR Report submittal effectively addresses both scenarios. The first scenario is addressed in the industrial worker compliance scenario dose assessment

(Section 6.4.1), and the second scenario is addressed in the industrial worker cover system failure mode dose assessment (Section 6.4.3). These scenarios address the request for degradation analyses because both analyses are based on the assumption that the CaF_2 material behaves as a soil-like mass as opposed to a relatively impermeable "rock-like" material. Treatment of the stabilized CaF_2 material as a soil-like mass within the RESRAD model is an approach which effectively models degraded post-stabilization CaF_2 material.

In the first scenario, with the cover in place over the solidified material, exposure to the elements is minimized and significant degradation should not occur. However, Section 6.4.1 of the LAR Report presents the results of an industrial worker compliance dose assessment that considers degradation by conservatively treating the solidified CaF_2 in the contaminated zone as a soil-like mass with the cover in place. The following examination of relevant dose modeling parameters from the industrial worker compliance scenario shows that the CaF_2 material was treated as a soil-like mass:

- Density of contaminated zone – In situ pond material density data obtained from the Andrews Engineering "Calcium Fluoride Sludge Sampling Report" was used to estimate the average density of the contaminated zone in the RESRAD dose model. This density value was not adjusted considering the effects of material stabilization. The density values for Ponds B, C, D, and E were 1.575, 1.6, 1.6, 1.438 g/cc, respectively. These values are within the range of mean values for soils listed in NUREG/CR-6697, Attachment C, Section 3.1 Table 3.1-1.

- Contaminated zone erosion rate – A uniform probabilistic distribution derived from NUREG/CR-6697, Attachment C, Section 3.8 was used in the probabilistic sensitivity analysis to evaluate the sensitivity of this parameter with respect to dose. The distribution selected for this parameter was derived assuming soil with a permanent pasture east of the Mississippi River with an assumed slope of up to 5% after cover erosion. This parameter was determined to be non-sensitive for all ponds, and a median value of 3.49E-05 m/yr was used in the final dose analyses. This value is a conservative assumption because the stabilized pond material will be less erodible than soil.

- Contaminated zone total porosity – A probabilistic distribution derived from NUREG/CR-6697, Attachment C, Table 3.2-1 was used in the probabilistic sensitivity analysis to evaluate the sensitivity of this parameter with respect to dose. The distribution used was characteristic of loamy sand. This parameter was determined to be non-sensitive for all ponds, and a porosity value of 0.41 was used in the final dose analyses. Loamy sand was selected because this type of soil was expected to have physical characteristics similar to solidified pond material if it degraded.

- Contaminated zone hydraulic conductivity – RESRAD dose modeling used data from the in situ testing of Pond E material. This as-is site-specific parameter was not lowered despite the planned pond material stabilization. Hydraulic conductivity is expected to decrease after stabilization of the pond material. Thus, the RESRAD dose modeling is conservative and does not consider the effects of material stabilization

- Contaminated zone b parameter – RESRAD dose modeling used a probabilistic distribution derived from NUREG/CR-6697, Attachment C, Table 3.5-1 to evaluate the sensitivity of this parameter with respect to dose. The distribution used was

characteristic of loamy sand. This parameter was determined to be non-sensitive for all ponds, and a median value of 1.35 was used in the final dose analyses. Loamy sand was selected because this type of soil was expected to have physical characteristics similar to degraded solidified pond material.

- Contaminated zone distribution coefficients – RESRAD dose modeling used probabilistic distributions derived from NUREG/CR-6697, Attachment C, Table 3.9-1 to evaluate the sensitivity of this parameter with respect to dose. The distributions presented in NUREG/CR-6697 Table 3.9-1 were developed for soil. The following Kd values were determined to be sensitive:
  - Pond B, Kd of U-235 in contaminated zone
  - Pond E, Kd of U-235 in contaminated zone

  In these two cases, conservative Kd values (25^{th} percentile) were used in the RESRAD dose modeling. In the remaining non-sensitive cases, a median value for Kd was used.

This review of relevant parameters from the industrial worker compliance scenario demonstrates that the CaF_2 material was treated as a soil-like mass and therefore degradation potential was considered. The maximum total dose calculated for the industrial worker compliance scenario was 5.32E-07 mrem/yr for Pond C.

The second scenario was addressed by performing an assessment of the industrial worker scenario in the unlikely event that the cover is removed and the stabilized material becomes exposed. This model assumes the same input parameters as the industrial worker compliance scenario, except that the cover is removed. Therefore, soil-like properties and possible degradation of the CaF_2 material were considered in this model as well. The maximum dose calculated for the industrial scenario with the cover material removed is 13.7 mrem/yr for Pond D.

In summary, the stabilized pond material was treated as a soil-like contaminated zone and not as the solidified structure that it will become after mixing with pozzolan. This negates the need for a degradation analysis as discussed in NUREG-1757 Volume 2, Section 3.5. This approach was taken to ensure a conservative assessment of the solidified pond material that meets the requirements of 10 CFR 40.1402.

d) Bench studies regarding treatability and technical viability of cement stabilization (10 CFR 20.1402)

Results of preliminary treatability tests on composite pond material samples mixed with six percent Portland cement were summarized in the response to item 1a.

Supplemental treatability testing will be conducted to optimize the pozzolan mix to meet the UCS criteria of at least 25 psi at 28 days. The supplemental treatability testing results will be provided to NRC in the third quarter of 2011.

From a technical viability standpoint, USEPA and USDOE have approved use of solidification/stabilization for industrial and radioactive wastes. The American Society for Testing and Materials (ASTM) provides unified standards for stabilization/solidification of hazardous, radioactive, and mixed wastes in Special Technical Publications (STPs) such as STP 1123, 1240, and 1033. Honeywell has retained the services of RECON

Construction who has successfully performed solidification/stabilization on several sites (Kaiser Thorium, Textin Superfund, and Noranda Alumina).

e) Leachate study to demonstrate nuclide composition and concentration, and assessment on exposure pathways (10 CFR 20.1402)

RESRAD utilizes distribution coefficient (Kd), solubility, and/or leach rate in determining nuclide composition and concentration of the leachate from the contaminated zone. The form of Uranium in the ponds is expected to be calcium diuranate, which has a reported solubility for uranium of 0.7 part per million (2.94E-06 mol/L) for conditions that exist in the ponds. Kd values used in the dose models in the submittal result in a calculated solubility, and thus leaching, of the pond materials approximately 17 to 142 times greater than this reported value. Thus, the dose model in the submittal is very conservative in evaluating nuclide composition and concentration, and their impact on exposure pathways.

Using the reported solubility of the pond materials and the existing uranium concentrations within the ponds, a uranium Kd of approximately 2,100 is calculated using equations J.9 through J.12 in Appendix J of the RESRAD Users Manual. The RESRAD dose model in the submittal used probabilistic distributions for Kd values derived from NUREG/CR-6697, Attachment C, Table 3.9-1 to evaluate the sensitivity of this parameter with respect to dose. Of the 12 potential uranium Kd values (3 nuclides in 4 ponds), only the following two Kd values were determined to be sensitive:

- Pond B, Kd of U-235 in contaminated zone
- Pond E, Kd of U-235 in contaminated zone

In these two cases, conservative Kd values (25^{th} percentile) of approximately 15 were used in the RESRAD dose modeling. In the 10 remaining cases where Kd is non-sensitive, the median Kd value was used for dose modeling. The non-sensitive Kd values probabilistically derived by RESRAD and used in the submittal are approximately 125.

Based on the non-sensitive Kd values (i.e. 125), the solubility of the uranium is 5.03E-05 mol/l. This solubility is approximately 17 times greater than the computed value based on the reported solubility of the pond materials. Using the sensitive Kd values (i.e. 15), the solubility of the uranium is 4.16E-04 mol/L. This solubility is nearly 142 times greater than the computed value based on the reported solubility of the pond materials.

Thus, even the least conservative Kd values (i.e. 125) used in the RESRAD model are conservative relative to the reported solubility value. The dose model as presented represents solubility greater than that of the actual pond materials. Based on this analysis, the approach used in the dose model is conservative. Therefore, results of leachate testing would not have a significant effect on dose calculations.

Comment No. 2: Cover Design

a) Decouple the cover design description related to the Illinois Environmental Protection Agency and NRC requirements to clearly define the selected compliance scenario (10 CFR 20.1402)

The cover design description has been decoupled from the selected NRC compliance scenario in the response to Comment 2b below.

b) Additional discussion regarding current cell design and the cover design for NRC that clearly delineates the components of the cover and stabilization engineered barriers included in the compliance scenario and those components excluded (10 CFR 20.1402)

Submittal Section 5.1 describes the hydrogeologic setting for dose modeling. The hydrogeologic setting describes site conditions from the surface down to the first saturated potable groundwater zone. The following supplemental information provides additional detail to more clearly delineate:

- The hydrogeologic setting including components of the current cell design;
  - Components of the current cell design that are excluded from the hydrogeologic setting used in the dose model; and
  - The final hydrogeologic setting used in the dose model.

RESRAD requires that the hydrogeologic conditions of the site be described from the surface down to the first saturated potable groundwater zone. Upon completion of pond material stabilization and final cover placement, the hydrogeologic setting for the ponds will consist of the following layers listed from the ground surface down to the groundwater table:

- A 6-inch thick topsoil layer
- An 18-inch thick vegetation support layer
- A 12-inch thick granular filter/drainage layer
- A composite drainage net
- A 60-mil textured geomembrane
- A needle-punched geosynthetic clay liner (GCL)
- A common fill layer of variable thickness for each pond
- A contaminated zone of varying thickness for each pond
- An ethylene propylene diene monomer EPDM pond liner
- A 6.86 m thick clayey silt/silty clay layer (Unsaturated Zone 1)
- A 1.71 m thick sandy silt/silty sand layer (Unsaturated Zone 2)
- A 1.71 m thick sand layer (Unsaturated Zone 3)
- A 4.00 m thick sandy silt/silty sand layer (Unsaturated Zone 4)
- A 1.14 m thick sand layer (Unsaturated Zone 5)
- A saturated sand layer (Saturated Zone)

The hydrogeologic setting described above is based upon the final cover system design described in Appendix V of the Report, the source terms described in Report Section 5.1 and a geologic cross section prepared by Andrews Environmental Engineering, Inc. provided in Appendix A of the Report. To model the hydrogeologic conditions for the ponds using RESRAD, conservative assumptions were made for the hydrogeologic model. These assumptions were made to develop RESRAD model input parameters, and at the same time provide conservatism by eliminating reliance on engineered barriers. First, a simplifying assumption was made to reduce the multi-layer final cover system for the ponds into a single soil cover layer since RESRAD is only capable of modeling one cover layer. The appropriate material for the single cover layer was assumed to be clayey silt/silty clay. This type of material is the most prevalent on-site soil type and its location in the upper geologic strata of the site makes it the most likely

source of borrow material for the vegetation support layer and common fill layer in the final cover system for each pond.

In addition, all engineered barriers were removed from RESRAD model, and the ponds were conservatively modeled as simple source terms covered with soil that does not rely on the performance or durability of the engineered, manmade materials. This approach eliminated engineered barriers from the compliance strategy for the pond closures. The following components were removed from the hydrogeologic setting:

- The 12-inch thick granular filter/drainage layer
- The composite drainage net
- The 60-mil textured geomembrane
- The needle-punched geosynthetic clay liner (GCL)
- The ethylene propylene diene monomer EPDM pond liner

After adjusting the hydrogeologic setting based on simplifying assumptions, the hydrogeologic setting for the dose model included the following layers listed from the ground surface down to the groundwater table,

- A clayey silt/silty clay cover of varying thickness for each pond
- A contaminated zone of varying thickness for each pond
- A 6.86 m thick clayey silt/silty clay layer (Unsaturated Zone 1)
- A 1.71 m thick sandy silt/silty sand layer (Unsaturated Zone 2)
- A 1.71 m thick sand layer (Unsaturated Zone 3)
- A 4.00 m thick sandy silt/silty sand layer (Unsaturated Zone 4)
- A 1.14 m thick sand layer (Unsaturated Zone 5)
- A saturated sand layer (Saturated Zone)

Based on data obtained from previous investigations and currently permitted Part B groundwater monitoring network, the groundwater flow characteristics beneath the facility have been adequately identified. Site groundwater is well below the bottom of the ponds. The depth to the closest groundwater is approximately 45-60 feet. Water at this depth is not used as either drinking or process water. Locally and regionally, an aquifer approximately 400 feet below the existing ground surface is used for drinking water. This aquifer was selected as the groundwater drinking water source.

c) Clear basis for reliance on engineered barrier components in the compliance scenario including justification for why some cover components can be considered passive and remain effective without reliance on monitoring and maintenance (10 CFR 20.1402)

As indicated in the response to Comment 2b, engineered barrier components are not considered in the compliance dose model. All engineered barrier components have been removed from the hydrogeologic setting for the model. As described in the response to Comment 1c, the compliance dose model provided in the submittal conservatively uses a single layer of soil covering a buried source term with no reliance on the additional beneficial effects provided by engineered barrier components. This cover is not intended as an engineered barrier as discussed in NUREG-1757 Volume 2 Section 3.5, but is only utilized by the RESRAD model as a cover layer that exists above the pond materials. Therefore, the dose model allows water infiltration through a soil cover and a soil-like pond material without reliance on engineered barrier components, monitoring, or maintenance. This conservative approach effectively removes

engineered barriers from the compliance strategy for the ponds. Thus, the compliance scenario for the ponds does not depend on monitoring and maintenance.

d) Construction inspection and monitoring discussion (10 CFR 40.42)

Construction inspection and monitoring activities performed during closure of the ponds are described in the Construction Quality Assurance Plan included as Appendix U in the submittal. This plan describes how stabilization work will be inspected and monitored to ensure proper mixture of the pozzolanic with the pond materials and the subsequent cover system placement. Honeywell is required by IEPA to describe and comply with construction monitoring requirements to ensure closure of the ponds that meets IEPA requirements. Details specifying compliance with construction inspection and monitoring and the scheduling, performance, and frequency of these activities were provided to NRC. This information was provided to meet the requirement of 10 CFR 40.42 (i)(5) that directs the licensee to describe "Other site-specific factors which the Commission may consider appropriate on a case-by-case basis, such as the regulatory requirements of other government agencies."

e) Rock durability analysis for the rip rap proposed in the cover's erosion control design (10 CFR 20.1402)

Riprap will be installed on the pond berm side slopes and in drainage ditches. This riprap is necessary to prevent long-term erosion of the berms or ditches which could encroach on the top final cover systems or the solidified pond materials. The riprap will provide long-term passive erosion protection without the need for maintenance.

The riprap will be selected and constructed for long-term passive performance in accordance with NUREG-1623 (Appendixes D and F) and NUREG-1757 (Appendix P). Specifically:

- Riprap source material will be selected and evaluated based on rock durability testing/scoring, absence of adverse minerals and heterogeneities, and evidence of resistance to weathering (per NUREG-1623, Appendix D and NUREG-1757, Appendix P).
- Construction quality assurance criteria will be implemented to ensure proper riprap construction for long-term passive performance (per NUREG-1623, Appendix F and NUREG-1757, Appendix P)

A riprap borrow source has not yet been selected. Honeywell will include in the Construction Quality Assurance Plan the requirement to evaluate the riprap quality from candidate borrow sources per the guidance cited above.

Comment No 3: Description and Characterization of Partial Site Release

a) Detailed physical description and diagram, including three dimensional boundaries, of land to be released for unrestricted use (10 CFR 40.42)

Drawing G-3 in Appendix V of the submittal shows the area described as the "Project Area". This area represents the boundaries of the land to be released for unrestricted use.

b) Characterization of all potential radioactive material contaminations that may be present in soil and water (10 CFR 40.42)

Site characterization activities were completed in 2009. Characterization data from the soils in the vicinity of the ponds are shown in the attached map. The Environmental Report submitted to the NRC in 2006 with the license renewal application provided a summary of the site's groundwater data. The facility performs a large number of sampling events to comply with its NRC, Illinois EPA and other regulatory requirements. Groundwater at the site is routinely monitored through a series of wells located around the property. The groundwater well locations are shown in the figure submitted in response to Comment No. 5c. In accordance with the facility's RCRA Part B permit, issued by the Illinois EPA, groundwater wells G101, G102, G103, R104, G105, G106, G107, G108, and R110 are used to monitor groundwater quality up gradient, side gradient and down gradient of the ponds, and groundwater well G109 is used to measure water levels only. These wells are sampled on a quarterly basis. It is our intent to submit copies of groundwater monitoring reports from 2006 to present, submitted to the Illinois EPA for the wells associated with the ponds in the facility's RCRA Part B permit by March 7, 2011.

Comment No 4: Dose Calculation

a) Additional justification and discussion on the derived concentration guideline level values for radionuclides, i.e., values presented seem unrealistic (10 CFR 20.1402)

The Final Status Survey section of the report references 'assumed DCGLs' for the purpose of calculating unity values only. This is in relation to the discussion regarding the quantity of data collected and demonstrating that the data collected thus far meets 95% certainty requirements. The 'assumed DCGLs' referenced in the submittal were calculated using the RESRAD model for a 25 mrem annual dose for each pond. The 'assumed DCGLs' stated in the report are based on the maximum dose calculated using RESRAD for pond D.

The compliance scenario presented in the submittal does not rely on comparison of contaminated zone concentrations to DCGL, but rather demonstrates compliance by comparing the Total Effective Dose Equivalent (TEDE) to the 25 mrem annual dose criteria. As such, the 'assumed DCGLs' are not a release criteria but only are used in a calculation of unity.

b) Additional justification supporting the foreseeable land use assumptions with dose modeling regarding the inclusion or exclusion of the various scenarios presented, i.e., the industrial scenario being the reasonably foreseeable land use description of the assumed industrial worker activities (10 CFR 20.1402)

Honeywell has supplied information regarding future plans for the facility, both long and short term. This information will be used to supplement the justification for application of the Industrial Worker scenario as being the most reasonable.

Honeywell has no plans to either move operations or sell the facility. There are no current or planned conditions which would permit a member of the general public unrestricted access to the industrial area, including the ponds. Given the fact that the facility is the only domestic provider of the UF6 product, making it a sole supplier to the nuclear industry, it is unlikely the facility would cease operations. There are no known industry or government plans to construct a production facility that could replace the

operations of the Metropolis facility. Each of these factors indicates that operations at the Metropolis facility will continue for the foreseeable future.

Industrial use of the Honeywell property is also a reasonable and likely land use scenario, given the site characteristics. The site is currently and will remain for the foreseeable future an industrial facility. The characteristics of the site also make industrial use the reasonable and likely land use scenario. U.S. Highway 45 and a Burlington Northern railroad right-of-way border the site to the northeast. An American Electric Power Company coal blending plant is located immediately northwest of the site. An electrical transmission line crosses the property about half-way between the Ohio River and the southwestern border of the exclusion zone. A buried natural gas pipeline, crossing the property about 150 meters (500 feet) north of the administration building, provides gas to the MTW plant and continues east to serve the City of Metropolis. Conversion to agricultural use is also unlikely given the widespread availability of agricultural land in the surrounding area.

Moreover, the resident farmer is not an appropriate land use scenario. Deed restrictions will be applied (even if those are not considered sufficient by the NRC, in and of themselves, to warrant inclusion in the modeling used to demonstrate compliance with the dose criteria in 10 CFR Part 20). The presence of deed restrictions exists independently of the critical group selected by Honeywell, but its existence was considered in selecting the industrial worker as the critical group. Also, the stabilized CaF2 will not support plant growth, so pathways such as plant growth and use, food pathways, and animal plant consumption are not appropriate. The impoundments, once closed, would not be amenable for use as a suburban garden plot or by a residential farmer – for example, the closed impoundments cannot be ploughed without significant efforts (and there is plenty of other easily usable land nearby) and, given the elevation profile of the closed impoundments, the area would not be a likely candidate site for farming activities. Nevertheless, as a means of demonstrating conservatism in the proposed closure approach, Honeywell has modeled the residential farmer scenario and the resulting doses are still within NRC limits.

c) Dose assessments and evaluations for all reasonably foreseeable scenarios for compliance and for unlikely scenarios to inform the process, e.g., a residential scenario with failure modes such as no cover and no stabilization (10 CFR 20.1402)

Performing a dose evaluation on unstabilized material is not realistic as the only way the material will remain at the site is in a stabilized form. Alternate scenarios for an industrial worker without the cover material and for a resident farmer are included in the current submittal. An additional resident farmer scenario without the cover has been performed to inform the process. This scenario is not seen as realistic because: 1) the only valid use of the site is in an industrial capacity, and; 2) regardless of the form of the pond contents (stabilized or unstabilized), we are not aware of any plants capable of growing in unsupplemented pond materials.

Even though a resident farmer scenario is unrealistic and the ponds will be covered, probabilistically determined RESRAD input values were used to evaluate this scenario for the ponds without a cover. The RESRAD calculated dose results, and the portion of that dose attributed to plant ingestion are provided in the table below. As shown in this table, approximately 60% of the dose consequence is due to plant ingestion.

Table 1- Dose Consequence to a Resident Farmer with Cover Removed

Pond	Maximum Annual TEDE Dose (mrem)	Dose from Plant Ingestion	Occurs at Year
B	44	67%	1000
C	63	63%	1000
D	179	57%	50
E	49	60%	87

Thus, the unlikely scenario of a residential farmer results in the largest RESRAD dose consequence from the plant ingestion pathway that cannot contribute dose. The RESRAD dose summary reports for the four ponds using this unrealistic scenario are attached.

d) Discussion on the nature of a partial release in meeting the dose criteria for the total site with consideration of the dose from the previous release of Pond A and the dose from the proposed pond solidification, as these in combination with the dose from the eventual operating facility decommissioning should not lead to a restricted release (10 CFR 20.1402)

Honeywell recognizes that any dose allocated to an unrestricted release of the ponds footprint area will credit against the overall regulatory limit of 25 mrem/year. Based on the dose models evaluated and submitted to NRC, release of the ponds will result in a total combined dose allocated to closure of all four ponds of 1.83E-07 mrem per year. This dose is inconsequential and would not impact the unrestricted release of the remainder of site if it occurred in the future. Decommissioning of the plant operational areas in the future after planned unrestricted release of the ponds to the criteria of 25 mrem per year as specified in 10 CFR 40.1402 will result in the reminder of the site having an unrestricted release criteria of about 24.99 mrem per year. Honeywell will retain records of the partial site release, which will be used to prepare the remainder of the site for eventual decommissioning.

When Pond A was closed per IEPA requirements, the area occupied by pond A was not released from the license. The location of the former pond A was used to construct the Surface Treatment Facility (STF) and it supports current plant operations. This area, along with all other plant operational areas, will be required to meet unrestricted release criteria if the plant is decommissioned and the license is terminated at some point in the future.

Comment No 5: Environmental Monitoring

a) Historical monitoring results (10 CFR 51.21)

As described in comment 3b, site characterization activities were completed in 2009. Characterization data from the soils in the vicinity of the ponds are shown in the attached map. The Environmental Report submitted to the NRC in 2006 with the license renewal application provided a summary of the site's groundwater data. The facility performs a large number of sampling events to comply with its NRC, Illinois EPA and other regulatory requirements. Groundwater at the site is routinely monitored through a series of wells located around the property. The groundwater well locations are shown in the figure submitted in response to Comment No. 5c. In accordance with the facility's RCRA Part B permit, issued by the Illinois EPA, groundwater wells G101, G102, G103, R104, G105, G106, G107, G108, and R110 are used to monitor groundwater quality up

gradient, side gradient and down gradient of the ponds, and groundwater well G109 is used to measure water levels only. These wells are sampled on a quarterly basis. It is our intent to submit copies of groundwater monitoring reports from 2006 to present, submitted to the Illinois EPA for the wells associated with the ponds in the facility's RCRA Part B permit by March 7, 2011.

b) Effects of stabilization on effluents previously and currently entering ponds (10 CFR 51.21)

The effluent that currently goes to Pond D in compliance with the NPDES permit will be sent directly to the outfall after upgrades are completed to the STF waste water treatment plant. Thus, after pond closures storm water will be sent directly to the permitted outfall and will continue to comply with the site NPDES permit. After pond closure, no water will enter the ponds.

c) The number, location, and characteristics of wells onsite (10 CFR 51.21)

A list of the groundwater monitoring wells, the current status of each well, and a map providing the location of each well is attached.

d) Additional justification regarding the lack of perched water, at the site, suitable for monitoring and/or sampling (10 CFR 51.21)

The potential presence of a perched water-bearing zone beneath the ponds has been previously assessed and documented in the following:

- November 7, 1986, *Surface Impoundment Retrofitting Exemption Application*, Roy F. Weston, Inc. (see Appendix A)
- July 28, 1987, *Memorandum to File: Draft Determination*, Allied Corporation Retrofitting Waiver Request, Region 5, USEPA (see Appendix B)
- February 2000, *RCRA Part B Permit Application*, Section E, page E-18, Radian Corporation (see Appendix C)
- Boring Logs (various individual logs of subsurface soil samples)

Based on these information sources, it was concluded that while some localized perched (saturated) groundwater may be present above the uppermost aquifer, these zones represent localized conditions, are less than two feet in thickness and laterally discontinuous, and would, therefore, not be suitable for monitoring or sampling. Highlights from each of the listed sources which are attached are presented in the following narratives.

Surface Impoundment Retrofitting Exemption Application

The *Surface Impoundment Retrofitting Exemption Application* contains the numerical simulation for evaluating the potential of hazardous constituents migrating to the groundwater or surface water based on the design, operation and location characteristics of the surface impoundments.

Attachment 1 of this submittal includes the following portions of the application:

- Table of Contents
- Section 4.0, Site Geology and Hydrogeology
- Section 7.0, Conclusions
- Appendix E-1, Soils Data

The water table is described as occurring within the sandy deposits of the Mackinaw Member (top elevation occurs at approximately 344 feet MSL or 45 feet deep below the bottom of the ponds) and is approximately 35- to 65-feet thick. The Mackinaw Member extends to the top of bedrock, the McNairy Sandstone, at an elevation of approximately 290 feet MSL. This observation is consistent with water level readings recorded in onsite borings performed in 1979, 1981, and 1982; and is consistent with groundwater elevation measurement events completed at wells G101, G102, G103, and G104 for the period June 1982 through November 1984 are provided as Table 4-1 of the referenced report.

Memorandum to File: Draft Determination, Allied Corporation Retrofitting Waiver Request

The document identified as Memorandum to File: Draft Determination, Allied Corporation Retrofitting Waiver Request provided by U.S. EPA Region 5, USEPA's geologist David A. Wilson, addressed the potential for perched groundwater. Page 2 of the memorandum reiterates the findings of the investigation submitted as part of the *Surface Impoundment Retrofitting Exemption Application* described previously.

Specifically, Mr. Wilson concluded that, "the moisture content of the soils was tested to determine that the soils above the water table were not saturated."

RCRA Part B Permit Renewal Application

The perched groundwater issue is addressed in Section E of the September 1996 RCRA Part B Permit Renewal Application. This issue is addressed in Section E-3 General Hydrogeologic Information.

On page E-18 of Section E-3 it is described that the water table elevations at the Honeywell facility generally range from 305.5 to 323.15 feet MSL. The narrative also states much higher water levels of 330, 340, and 365 feet MSL have been measured in onsite boreholes. It was noted that these elevated water levels were found to occur within the silty deposits of the Carmi Member of the Equality formation in several of the boreholes. However, the water level data at these wells were considered to be anomalous based on the moisture content data indicating the soils were not saturated. The narrative rationalizes the elevated water level measurements as being due to temporary saturated conditions that result from infiltration and percolation of rainfall, and that the elevated water level readings may or may not represent perched water table conditions.

The conclusion that the water levels were anomalous is supported on page E-18, which states most moisture contents for the silty deposits of the Carmi Formation were less than 20 percent. Based on average porosities of 35 to 50 percent for the silty soils and assuming an average particle density of 2.65 g/cm^3 for the silt, saturated moisture contents for such soils would range from 20 to 38 percent. In a January 4, 1985 letter from Illinois EPA to the facility, it concluded that there is no perched water at the site suitable for monitoring and/or sampling, based on field observation of soil samples (cores) obtained during installation of monitoring wells G105 and G106.

Boring Log Observations

Available documentation for boring log data collected in close proximity (within approximately 500 feet) to the ponds reflect the general lack of perched saturated water-bearing zones occurring above the uppermost aquifer. These logs include, but were not limited to:

- Logs for five borings (SB-1 through SB-5) completed to characterize the stratigraphy of the soils underlying the ponds that show the soils beneath the ponds exhibiting moisture contents between 6.3 and 25 percent under field conditions
- Logs for RCRA wells G102, G105, G106, G107 G108, G109, and G110
- Logs for GB-03 through GB-10, GB-17 and SB-01 through SB-12 completed as part of a RCRA Corrective Action investigation

The moisture observations and the presence of perched water-bearing zones, where encountered is provided as Table 1. Based on the review of the boring log observation the presence of a perched water-bearing zone was observed at one location, at GB-09, located south-southeast of the ponds at a depth of 34.3 to 35.5 feet BGS.

Comment No 6: Other NUREG-1757 Review Information

a) Details of the health and safety program during decommissioning (10 CFR 40.42)

Honeywell requires all contractors working at the site to adhere to the plant health and safety programs including radiation safety controls and monitoring for workers as referenced in NUREG-1757 Volume 1, Appendix D, Section D.2, Part X. Any contractor selected to perform work related to the pond closures will be required to prepare a site specific health and safety plan (HASP) and comply with MTW-SAF-LS-0015, Contractor Work Permit Procedure. Thus, health and safety (H&S) requirements for the site that are routinely evaluated by NRC inspectors will be followed for pond closure work.

b) Additional commitments and detail regarding the decommissioning quality assurance program (10 CFR 40.42)

Construction inspection and monitoring activities performed during closure of the ponds are described in the Construction Quality Assurance Plan included as Appendix U in the submittal. This plan describes how stabilization work will be inspected and monitored to ensure proper mixture of the pozzolanic with the pond materials and the subsequent cover system placement. Honeywell is required by IEPA to describe and comply with construction monitoring requirements to ensure closure of the ponds that meets EPA requirements. Details specifying compliance with construction inspection and monitoring and the scheduling, performance, and frequency of these activities are provided to NRC. This information is provided to meet the requirement of 10 CFR 40.42 (i)(5) that directs the licensee to describe "Other site-specific factors which the Commission may consider appropriate on a case-by-case basis, such as the regulatory requirements of other government agencies."

At the time of construction, contractors will be required to provide a quality assurance program that meets the requirements of NUREG-1757 Volume 1, Section D.2, Part XIII.

c) Radioactive waste management program description (10 CFR 40.42)

Honeywell has evaluated all of the waste streams that occur as a result of site operations. The Waste Management program addresses all forms of waste and discharges from the site. Closure of the ponds will not result in any new waste streams or discharges. The stabilization process will eliminate the unlikely possibility that pond materials could be accidentally released from the site, thus providing greater protection for the surrounding environmental media. Waste incidental to the project (dry activated wastes such as tyvek coveralls, gloves, and similar materials) will be managed and disposed off-site with other materials discarded from normal site operations. The radioactive waste generated during the construction process is therefore managed under a program consistent with the requirements of NUREG-1757.

d) An originally signed duplicate of a financial assurance mechanism sufficient to cover the estimated cost of the partial site decommissioning provided in the submittal (10 CFR 40.42)

Ponds B through E are RCRA-regulated surface impoundments and are being remediated as RCRA-regulated units. These surface impoundments are included in the RCRA decontamination and decommissioning estimate associated with the required RCRA financial security. RCRA financial security for the impoundment closure is accounted for separately from NRC decommissioning. As a result, closure costs for these impoundments are not part of the NRC decommissioning cost estimates for MTW and were not included in the 2009 Site Reclamation Cost Estimate approved by the NRC. *See* Letter from Marissa G. Bailey, NRC, to Larry Smith, Plant Manager, dated September 16, 2010 (ADAMS Accession No. ML102170174); 2009 Site Reclamation Cost Estimate (ADAMS Accession Nos. ML100150095 and ML102230042). Honeywell is not proposing NRC license termination under restricted conditions. Accordingly, there are no costs (and no financial assurance obligations) associated with radiological controls or restrictions following completion of NRC decommissioning activities.

Honeywell is providing an originally signed duplicate of the letter of credit used to provide RCRA decommissioning financial assurance for the surface impoundments at MTW. Honeywell is also providing a copy of the letter to the Illinois EPA used to demonstrate compliance with applicable RCRA financial security requirements. Honeywell provides decommissioning financial assurance, in compliance with Title 35, Part 724 of the Illinois Administrative Code, in the form of this letter of credit. Specifically, Honeywell demonstrates financial assurance through Irrevocable Standby Letter of Credit No. 083292-793 issued by Intesa Sanpaolo SpA. The letter of credit provides decommissioning financial assurance for three Honeywell facilities located in Illinois. According to Schedule A (dated April 7, 2010), the amount of the letter of credit allocated to Metropolis is $92,610,846. This includes both the closure estimate ($92,294,340) and the post-closure estimate ($316,506). The amount available through the letter of credit ($92,610,846) significantly exceeds the estimated cost of the proposed closure plan ($32,000,000).

e) An updated decommissioning funding document, with associated additional financial assurance mechanisms as appropriate, describing the impacts of this action on the total site decommissioning cost (10 CFR 40.36)

Honeywell recognizes that any dose allocated to an unrestricted release of the pond footprint area will credit against the regulatory limit of 25 mrem/year for overall site decommissioning. Based on the dose models evaluated and submitted to NRC, release

of the ponds will result in a total combined dose allocated to closure of all four ponds of 1.83E-07 mrem per year. This dose is inconsequential and would not impact the unrestricted release of the remainder of the plant site. As a result, the unrestricted release of the pond areas is not expected to require a change to the 2009 Site Reclamation Cost Estimate approved by the NRC and the impoundment closure will have no impact on the NRC decommissioning cost estimate.

Ponds B through E are RCRA-regulated surface impoundments and are being remediated as RCRA-regulated units. RCRA financial security for pond closures is accounted for separately from NRC decommissioning activities. As a result, closure costs for these impoundments are not included in the 2009 Site Reclamation Cost Estimate for Metropolis that has been approved by the NRC. Instead, the cost of all activities associated with closure of the impoundments is secured with Irrevocable Standby Letter of Credit No. 083292-793 issued by Intesa Sanpaolo SpA in the amount of $92,610,846. Because the closure costs were not included in the 2009 Site Reclamation Cost Estimate approved by the NRC, the impoundment closure will have no impact on the NRC decommissioning funding instruments.

Based on the above, no changes to existing NRC decommissioning funding documents will be necessary to support partial site release of the ponds area.