



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

July 14, 2014

Docket No. 040-00791
Control No. 583820

License No. SMB-151

L. Renee Welsh
Director - Facilities
United Technologies Corporation
Pratt & Whitney
400 Main Street
East Hartford, CT 06118

SUBJECT: UNITED TECHNOLOGIES CORPORATION, PRATT & WHITNEY, REQUEST
FOR ADDITIONAL INFORMATION CONCERNING APPLICATION FOR
AMENDMENT TO LICENSE, CONTROL NO. 583820

Dear Ms. Welsh:

This is in reference to your letter received April 29, 2014 with the enclosure, "Site-Specific Pratt & Whitney Surface DCGL Using RESRAD-BUILD," and the letter dated June 6, 2014, with the enclosure, "Final Status Survey Plan, Revision 0, Termination of License SMB-151 at the Middletown, CT Facility" (FSSP-Middletown) requesting to amend Nuclear Regulatory Commission License No. SMB-151. In order to continue our review, we need the following additional information:

1. At this time, the site-specific Derived Concentration Guideline Level (DCGL) is under review. We will contact you separately for additional information if needed, and to notify you if it is approved. No response to this item is necessary.
2. Section 2.0, "Summary of the Final Status Survey Process," states that residual contamination limits are represented by surface contamination levels or volumetric contamination levels. Please note that the NRC does not specify generic volumetric contamination levels. The NRC has established screening values for surface contamination that are expressed in disintegrations per minute (dpm) per 100 square centimeters (cm^2) area, and for concentrations of residual radioactivity in soils that are expressed in picocuries per gram. For other materials that may be volumetrically contaminated, such as concrete or wood, site-specific criteria must be established on a case-by-case basis. We understand from the FSSP-Middletown that there is not contamination of soils, and there is not other volumetric contamination. If our understanding is not correct, provide us corrected information.
3. Section 3.0 of the FSSP-Middletown states that SMB-151 was issued in the early 1960s. Based on NRC records, License No. SMB-151 (Docket No. 040-00791) was issued March 31, 1961, by the Atomic Energy Commission (AEC). Prior to that, activities with source material were authorized by the AEC under Docket No. 40-791 with License Nos.

C-3724 and C-4559 as early as April 17, 1957. The documents from that time do not indicate in which buildings material was used. However, the early documents do indicate that source material also was used in the Connecticut Aircraft Nuclear Engine Laboratory (CANEL) under an AEC contract. It is our understanding that the surveys performed of the former CANEL facilities were performed to meet the "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material" (Guidelines) and focused on the byproduct materials used there, not source material, which was still in use at the Middleton site. However, the Guidelines limits for source materials exceed those of your proposed DCGLs.

- a. Confirm that you will review your records to determine that all facilities where source materials were used previously are included in your final survey activities for source materials for termination of this license.
 - b. Section 1.0, "Introduction" and 3.0, "Middletown Facility Historical Site Assessment" do not consider activities with source material that occurred at the Middletown location under License No. 06-00550-03 which was remediated and released in 1995 under the Site Decommissioning Management Program (SDMP). Pursuant to 10 CFR 20, Subpart E, if these locations were contiguous with the facilities authorized under License No. SMB-151, the entire site must meet the criteria for release for unrestricted use. Confirm that you will assess the total dose from all activities at the Middleton site in determining the dose from release of the site for unrestricted use.
 - c. Before release of the site, the licensee needs to demonstrate how the facilities impacted by licensed material meets the criteria in 10 CFR Part 20, Subpart E. The review of Building 140 provides insufficient survey and characterization to conclude that it meets the criteria in 10 CFR 20, Subpart E.
4. Section 3.0 of the FSSP-Middletown states that activities in Building 10 ceased in 2000 and the building was demolished in 2004. Although it states that the building was since "terminated" from the license, the NRC did not review the surveys of the building until many years after its demolition. As stated in the letter from the NRC dated August 26, 2013, only the remaining concrete pad from Building 10 was released for unrestricted use by the NRC. We note that Building 10 was not released for unrestricted use by the NRC prior to its demolition; instead, in 2013, the NRC evaluated the available data from surveys performed in 2000, as described in the NRC Inspection Report No. 040-00791-12-002 dated July 22, 2013, to determine that the building most likely met the Subpart E release criteria. The FSSP-Middletown section "Building 10 Decommissioning and Final Status Survey Report" addressed only the surveys of the remaining Building 10 concrete pad. Please correct Section 3.0 to state that only the remaining concrete pad from Building 10 was released for unrestricted use by the NRC.
 5. The following items refer to Section 3.0, page 7, list of conclusions
 - a. Conclusion 1 refers to the NMRD laboratory.

- i. Describe the renovation(s) that have occurred to this laboratory in more detail, including a discussion of surveys that were done prior to the renovation(s).
 - ii. The direct measurement criteria cited from the "Guidelines" is applicable to beta-gamma emitters and uranium isotopes. However, these criteria are not applicable to thorium. Provide results of the direct measurements compared to the Guidelines limits of 100 dpm per 100 square centimeters ($dpm/100cm^2$) average and 300 dpm/ $100cm^2$ maximum for Th-228 and 1000 dpm/ $100cm^2$ average and 3000 dpm/ $100 cm^2$ maximum for Th-232 and natural thorium, as listed in the "Guidelines".
 - iii. Conclusion 1 refers to a single smear result for removable contamination, without indicating why a single smear is sufficient. Also, this paragraph does not specify when that sample was collected. Provide the basis for performing such a limited survey.
 - iv. Conclusion 1 states that a sample of contaminated concrete was analyzed, but did not provide results of the analysis. Provide the results of the analysis of the concrete and the basis for believing that the concrete does not require remediation.
 - b. Conclusion 3 states that additional surveys will not be required of locations where spray powders containing less than 0.05% source material by weight, as described in 10 CFR 40.13(a). In order to determine if we do, or do not, agree with this conclusion, please provide the following information:
 - i. State if you will continue to use the spray powders containing 10 CFR 40.13(a) source materials.
 - ii. List the buildings (and if applicable, the locations within the buildings) where the spray powders were used in the past, and where they are currently used.
 - c. Revise Conclusion 4 to indicate that the final status survey results are applicable to the remaining concrete pad of Building 10. The building no longer exists, and you are considering only the remaining pad to be a class 3 area. In addition, explain why additional surveys are to be performed of the pad, if the pad was released for unrestricted use in a previous license amendment.
 - d. Conclusion 6 is not applicable to the FSSP-Middletown. Confirm that this will be discussed when the FSSP for the East Hartford site is submitted.
6. Table 4-1, "Survey Unit Surface Area Limits" appears to reverse the area limits for Class 1 structures and Class 1 land areas. We understand that you did not consider any areas at Middletown to be Class 1 areas, but if you subsequently re-classify any area to be Class 1, confirm that you will limit Class 1 structural survey units to less than or equal to 100 square meters.

7. Explain the purpose of the ‘general area background’ that is discussed in Section 4.2, “Reference Areas and Materials,” and how you will collect and use the general area background measurements.
8. The last paragraph in Section 4.4 states that the removable contamination limit will be set at 10% of the proposed site-specific DCGL, and compares it to “free release surveys...that have long been the standard in industry...” Please note that the previous release limits, however long used in industry, were not dose-based limits and were superseded when Subpart E of 10 CFR 20 went into effect in 1997. Most of the previous limits for source materials and other alpha-emitters do not meet the current dose-based Subpart E release criteria. Therefore, this information does not support the current site-specific DCGL and should not be cited. No change is required in the FSSP-Middletown, but the changes should be made when the FSSP for East Hartford is submitted, and in any final status survey reports. Please note that a similar statement was also made in the last paragraph of Section 5.2.1. and should be revised in future submissions.
9. Section 5.1.2., “Determining the Relative Shift,” states that the value of 0.3 for the coefficient of variation (sigma) was used in the calculation of the relative shift. Given the surveys that were described in Section 3.0, explain why the assumed value of 0.3 was used, instead of using the survey data.
10. In section 5.1.4, “Determining Measurements Locations,” you state you will determine fixed measurement locations at random. Please describe the method you will use to determine the random locations.
11. The instruments listed in Table 5-3, “Available Instruments and Associated MDCs,” in Section 5.4.1, “Instrument Selection,” do not appear to have a suitable minimum detectable concentration (MDC) for either direct measurements or scan surveys for the proposed site-specific DCGL. The MARSSIM guidance states that scanning and direct measurement techniques should have an MDC of 10% to 50% of the DCGL. If the proposed site-specific DCGL is 354 dpm/100cm², then the MDC should be a minimum of 177 dpm/100cm² for static measurements of total residual radioactivity. Only the ZnS scintillator appears to be sufficiently sensitive, as described in Table 5-3.
 - a. Confirm that the MDC of each instrument will be at least 50% of the site-specific DCGL for direct measurements and for scanning measurements.
 - b. For each instrument you will use to perform surveys (direct, scanning and removable measurements), show a sample calculation of the actual MDC including the actual values for efficiency(ies), background, sample count time, background count time, detector area, proportionality constant(s) etcetera. Also, state any assumptions that are made to demonstrate that the measurements meet 50% of the site-specific DCGL. For example, if an instrument is used in alpha-only mode, identify the number of alphas that could be detected from the decay of Th-232 by that instrument, and show how the instrument measurement is corrected to compare the result to the DCGL for Th-232.

- c. Table 5-3 shows the alpha nominal background as 15 counts per minute (cpm) for the gas proportional counter. Based on the scan conditions stated in section 5.4.4.3, it would appear that a single count is likely to occur during a scan over each detector area. Please review this consideration. Please state how you plan to perform alpha scans and determine scan MDC for this instrument.
12. In section 5.4.4.3, "MDCs for Alpha Scan Surveys for Structure Surfaces," you describe the method for determining MDCs for Alpha Scan and the associated probability of detecting an area of contamination at a predetermined DCGL for a given scan rates. It is not clear what criteria you have established for probability of detection at the DCGLw value to determine your scan rates. Provide the criteria that you intend to use.
13. In section 5.4.4.3, you state that the typical alpha survey instrument background is one to three counts per minute (cpm). In Table 5-3, you presented the nominal background as 15 cpm, 6 cpm, and 2 cpm for gas proportional, dual phosphor scintillator, and a ZnS scintillator respectfully. Table 5-3 shows the instrument nominal scan MDC as 400 dpm per 100 square centimeters for each of the different type detectors, but section 5.4.4.3 used a value of 300 dpm per 100 square centimeters. Please clarify the basis for the probability of detection for each of these type detectors.
14. Section 5.4.4.4, "MDCs for Wipe Samples," states that the MDC for wipe samples will be maintained to ensure that the MDC does not exceed 50% of the DCGL. The proposed site-specific DCGL is 354 dpm/100cm², of which not more than 10% (35.4 dpm/100cm²) may be removable. Confirm that the MDC for wipe samples will not exceed 50% of the removable contamination limit of 35 dpm/100cm².

Current NRC regulations and guidance are included on the NRC's website at www.nrc.gov; select **Nuclear Materials; Med, Ind, & Academic Uses**; then **Licensee Toolkits, see our toolkit index page**. You may also obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-866-512-1800. The GPO is open from 8:00 a.m. to 5:30 p.m. EST, Monday through Friday (except Federal holidays).

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 583820. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5040.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we will assume that you do not wish to pursue your application.

Sincerely,

Original signed by Elizabeth Ullrich

Betsy Ullrich
Senior Health Physicist
Commercial, Industrial, R&D
and Academic Branch
Division of Nuclear Materials Safety

cc:

David Alberghini, Radiation Safety Officer

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