RECEIVED
REGION 1

'05 MAR -2 P 7

LOCKHEED MARTIN

March 1, 2005

37-02006-09
03012894

U.S. Nuclear Regulatory Commission
Nuclear Materials Safety Branch, Region 1
Attention: Elizabeth Ullrich
476 Allendale Road
King of Prussia, PA 19406-1415

Dear Ms. Ullrich:

Lockheed Martin Commercial Space Systems (LMCSS) has received your letter dated August 18, 2004 titled "Lockheed Martin Commercial Space Systems, Voidance of Application for License Amendment, Control No. 135096". The following data is respectfully provided in response to your request for additional information. It is important to note that LMCSS has every intention of complying with the decommissioning requirements set forth by the Nuclear Regulatory Commission. In 2001, LMCSS performed a survey of the affected areas using Regulatory Guide 1.86 methodology in order to do a closeout survey of residual thorium for LMCSS internal purposes, not for license termination. It was the intention of LMCSS to maintain License Number 37-02006-09 with the NRC, however it is now our understanding the since we no longer possess radioactive materials, the facility must be decommissioned according the Multi-Agency Radiation Survey & Site Investigation Manual (MARSSIM) and subsequently the license must be terminated. Therefore, LMCSS proposes to use the 2001 survey to serve as the scooping survey required by MARSSIM in order to release the potentially affected areas for unrestricted use.

The assumptions that led to the proposed analysis for the decommissioning plan submitted on June 1, 2004 are as follows: First, the decommissioning plan addresses the unique processes that LMCSS performed on the Magnesium-Thorium (Mg-Th) panels. For example, the material was drilled, and the drilling process produced shavings, not a powder or liquid. These shavings were readily visible to the naked eye and could be easily vacuumed from the floor. This vacuuming was done frequently. The Mg-Th itself is not readily oxidized into a powder, and it is physically robust enough to resist being ground to a powder by contact with its surroundings.

Although we do not expect contamination to exist, if it were to exist, it would be in the form of shavings or chips that were not captured by vacuuming. Since these chips are visible by the naked eye, they can be checked using a pancake probe that would exhibit an apparent reading. LMCSS would not expect to find "areas of elevated contamination" as envisioned by MARSSIM. Therefore, the decommissioning plan developed herein represents 100% area survey criteria designed to find shavings that may have been missed by the vacuuming process. We would expect these to be in locations not easily

(Ref. 135096)

136617

reached by the vacuum. Particle visibility adds an additional level of detection and although subjective, does improve the sensitivity of the surveys.

Below is our response to your requests as they were presented in the letter dated August 18, 2004:

NRC Request #1: *Confirm that the Closeout Survey will meet the data quality objectives by demonstrating that the survey units are acceptable for release for unrestricted use, using the Wilcoxon Rank Sum (WRS) test."*

LMCSS Reply #1: The WRS test will be used to determine compliance with release criteria.

NRC Request #2: *"Please note that a Class 3 area is defined as an "impacted area" that may be potentially contaminated from site activities, but is not expected to contain radioactivity. The WRS test, used when the contaminant is also present in the normal background, compares a survey unit to a background reference area, which is an area that is non-impacted (not potentially contaminated by site activities) and has similar physical, chemical, radiological, etcetera characteristics to the survey unit. Confirm that you will revise the Closeout Survey to use a background reference area for comparison in the WRS test, not a Class 3 area."*

LMCSS Reply #2: There are no Class 3 survey units. The Background Reference Area will be the onsite Medical Department. The Medical Department is in the same building as the survey units in question, and has the same flooring material and other physical characteristics. It is an Unaffected Area. The designation of Class 3/Background Reference in the June 1, 2004 decommissioning plan was not intended to indicate any potential for contamination. No radiological treatments are performed in the Medical Department.

NRC Request #3: *"...Confirm that the minimum number of samples to be collected will be at least 13. Please note that the number of samples to be collected is determined both by the LBGR and sigma, and if the number of data points is too few to obtain the desired power level for the WRS test, a resurvey is required."*

LMCSS Reply #3: Our proposed number of sampling points was calculated based on a statistical separation of instrument variance from concentration variance of residual thorium. This was done because the variations observed in the scooping survey are consistent with normal variations in instrument background, and do not necessarily indicate the presence of residual thorium. The proposed methodology of a 1000 square cm sample would have a different ratio of instrument variance to concentration variance than the scooping survey, so LMCSS proposed to separate the two. However LMCSS recognizes that this technique is not a part of the MARSSIM methodology. LMCSS concurs with increasing the number of sampling points per survey unit to 13 and therefore LMCSS has revised the survey plan to include at least 13 survey locations in each survey unit. This will be done using a triangular grid to minimize the area factor. If

the WRS test does not provide adequate assurance that the survey unit meets the release criteria, additional survey locations will be added. LMCSS understands that adding additional random survey points to the original survey design is acceptable under NRC guidance to achieve the required survey sensitivity.

NRC Request #4: *"Provide the investigation level that will be used during scanning surveys to indicate when additional investigations of contamination are necessary."*

LMCSS Reply #4: The investigation level of 40 dpm/100 cm^2 has been chosen in accordance with MARSSIM 5.5.2.6. This level is above the (DCGL). If the 40 dpm per 100 cm^2 investigation level is exceeded, survey locations will be added locally in order to assure that no areas of elevated concentration exist which could cause the survey unit to exceed the DCGL. Any such areas will be treated per MARSSIM methodology.

NRC Request #5: *"Provide a Minimum Detectable Count Rate (MDCR) and the scan Minimum Detectable Concentration (MDC) for the μR meter, or other suitable survey instrument, to be used for performing scanning surveys."*

LMCSS Reply #5: LMCSS proposes to eliminate the survey with the μR meter and replace with the survey discussed in LMCSS Reply #6. This additional survey addresses the potential for 'areas of elevated concentration' using a method of greater sensitivity which will provide more rigorous determination of compliance with the NRC requirements.

NRC Request #6: *If you choose to perform the scanning survey for alpha emitters, you should use the criteria in Section 6.7.2.2 of MARSSIM. In accordance with the MARSSIM, Section 5.5.3, scanning surveys in Class 1 areas should be designed to detect small areas of elevated activity that are not detected by the systematic measurements; the areas between systematic measurement locations may need to be adjusted if the canning sensitivity is not sufficient."*

LMCSS Reply #6: Since Thorium-232 is substantially in equilibrium with its decay products (which includes energetic beta and gamma radiation), LMCSS does not propose to scan areas for elevated concentration using alpha detection techniques in Section 6.7.2.2. Section 6.7.2.1 is the applicable section. We intend to use the beta emitters present in the thorium decay chain to detect areas of elevated concentration rather than the alpha emitters. The reason for this will be substantiated below. We will still use the alpha scintillator for the random survey locations as originally proposed. This is because the lower background of the alpha probe gives a favorable MDC using a 1000 square cm wipe area.

The area factor can be calculated as follows. The revised grid for both Class 1 survey units has a length between sample points (L) of 8 feet or 2.44 meters. This gives an area of each triangle of 55 feet or 5.15 square meters. A circular "area of elevated concentration" of this 5.15 square meter surface area has a very high chance of being detected by virtue of having a grid location fall within the circle. Note that we plan to

employ large area wipes (about one square foot) to improve detection sensitivity, so the distance between sampled locations is less than L by about one foot.

MARSSIM Table 5.7 for Th-232 is based on a RESRAD-BUILD calculation with an assumed area of 36 square meters yielding an area factor of 1.0. Area factors for grid spacing are the ratio of 36 to the area of the circular "area of elevated concentration". Hence, the area factor for this triangular grid with L=8 feet would be 36 divided by 5.15 which gives an area factor of 6.9. This achieves the required sensitivity of the area scan of 6.9 times the $DCGL_w$ (6 dpm/100 cm^2) or 41 dpm per 100 square cm.

LMCSS proposes not to use a gas proportional detector for this survey and for this reason it is important to note the consequences of using this very sensitive method to search for areas of elevated concentration. For a gas proportional detector used in scan mode for Th-232 substantially in equilibrium with its decay products, MARSSIM Table 4.1 suggests a MDC of 340 Bq/m^2. This converts to 3.4 Bq/100 cm^2 or 204 dpm/100 cm^2 for this field instrument in scan mode. This is above the required 41 dpm/100 cm^2. Therefore a denser sampling grid would be required to increase the area factor. Since the area factor is inversely proportional to the grid spacing, the grid spacing would have to be reduced to 1 foot in order to achieve adequate sensitivity. Since the random sample location wipe test sample area is 1 ft^2, this would effectively require wipe samples of the entire floor area. Using wipes and an alpha scintillation detector is an unreasonable requirement.

The authors of MARSSIM were aware that such an unreasonable result is possible, especially for thorium, and therefore they provided a means to provide reasonable assurance of compliance with the DCGL without such unreasonable effort. We have quoted directly from the MARSSIM document, Page D-23 of MARSSIM Appendix D, which states:

> "*In this part of the DQO process, the concern is less with areas of elevated activity that are found than with providing adequate assurance that negative scanning results truly demonstrate the absence of such areas. In selecting acceptable values for A_{min} and R_a, maximum use of information from the HAS and all surveys prior to the final status surveys should be used to determine what sort of areas of elevated activity could possibly exist, their potential size and shape, and how likely they are to exist. When the detection limit of the scanning technique is very large relative to the DCG_{LEMC}, the number of measurements estimated to demonstrate compliance using the statistical tests may become unreasonably large. In this situation an evaluation of the survey objectives and considerations will be performed. These considerations may include the survey design and measurement methodology, exposure pathway modeling assumptions and parameter values used to determine the DCGL's Historical Site Assessment conclusions concerning source terms and radionuclide distributions, and the results of scooping and characterization surveys. In most cases, the results of this evaluation is not expected to justify an unreasonably large number of measurements.*"

We propose to utilize the latitude given by this MARSSIM paragraph in the following way. Since the Historical Site Analysis leads us to suspect that if contamination were to exist, it would be in the form of chips or shavings, not embedded powder or liquid, and therefore LMCSS proposes to capture and measure any potential residual chips and shavings. This will be accomplished by vacuuming the entire floor (100% sampling) using a HEPA vacuum. The dust collected from the vacuum filter will be emptied onto a disposable surface (kraft paper) and surveyed using a pancake probe. The pancake probe is capable of detecting 1 bq of Th-232 + decay products and can easily detect a small chip of Mg-Th with an activity of 1 Bq since there is an abundance of betas in the decay series of Th-232. Since the Thorium has decayed significantly, there is no need to restrict the analysis to an alpha detection system.

Next, the entire floor will be wiped using a commercial floor cleaning device (dust mop with adhesive such as Endust.) The device will be chosen specifically for cleaning floor surfaces capable of retaining any thorium in the powder form. This method will wipe the entire floor into a single sample and will concentrate the sample to the point that it is easily surveyed using a pancake probe. Again, since we are not measuring alpha radiation, there is no need to consider self-shielding or shielding by the Endust in this small amount of material. This 100 percent sampling is reminiscent of the result of the area factor analysis, but will use a simpler detection method, the pancake probe, and therefore is reasonable to do.

There are effectively 3 betas easily detectable by the pancake probe in the Th-232 decay chain, accounting for energy and abundance. Background on the pancake probe is about 40 cpm. As a simple approximation, twice background can be readily detected. Assuming the probe efficiency for each beta of approximately 30%, the effective probe efficiency is somewhat above unity for Th-232 when all the betas in the decay chain are included and when the photons are considered. Thus the pancake probe can readily detect less than 1 Bq of Th-232 activity.

An average of 6 dpm/100 cm^2 (equal to the $DCGL_w$) over the area of each Class 1 Area (100 m^2 each) is 60,000 dpm. Using conservative assumptions, if the entire floor is wiped and the wipe picked up half the removable contamination, and assuming 10% removable contamination, then the entire floor wipe would contain 3,000 dpm or 50 Bq.

The surface area of this complete floor area wipe sample will be greater than the active pancake probe area, so the probe will be scanned over its surface. The pancake probe will detect about one-tenth of the area of wipe at any given position. Thus, at the $DCGL_w$ the wipe should yield close to 300 cpm, or about 7.5 times background for the pancake probe. This method therefore allows the presence of areas of elevated concentration to be either confirmed or ruled out. It would also provide additional assurance that the statistical analysis of the grid locations is robust because the entire survey unit would be sampled. We feel this procedure yields an equivalent level of assurance that the survey unit meets the decommissioning criteria.

If areas of elevated concentration are ruled out, then the systematic survey would be completed with the triangular grid and a minimum of 13 samples as described above and outlined in our decommissioning plan. If the entire floor wipe detects elevated activity above the $DCGL_w$, LMCSS will assume additional remedial action is necessary and continue with remediation. LMCSS will not continue closeout sampling until the required cleanup is completed.

The decision criterion for this entire floor wipe is the $DCGL_w$, not the $DCGL_{EMC}$. This is because the sampling method samples the entire floor. No single elevated point will be missed on the sampling grid. Since Thorium is an ingestion pathway risk, the concern over areas of elevated concentration is because of the increase in the average concentration over the whole survey unit. Therefore, if the entire survey unit is being sampled, the $DCGL_w$ over the whole survey unit is the appropriate criterion. This same sampling procedure will be performed from the background reference area and will be subtracted from the result in the Class 1 and Class 2 areas.

Thank you for your response to our decommissioning plan dated June 1, 2004. LMCSS is confident that this response results in a sampling plan acceptable to the NRC. If you have any questions or require additional information, please contact Charlene McIntyre at 215-497-1331.

Sincerely,

Clare LumKong
ESH Manager

CC: C. Krisch
M. Stewart
C. McIntyre
S. Porter
ESH Files

This is to acknowledge the receipt of your letter/application dated

3/1/2005, and to inform you that the initial processing which includes an administrative review has been performed.

Amendment 37-02006-09

[X] There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

[ ] Please provide to this office within 30 days of your receipt of this card

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved. (Ref 135096)

Your action has been assigned **Mail Control Number** 136617.
When calling to inquire about this action, please refer to this control number.
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)
(6-96)

Sincerely,
Licensing Assistance Team Leader

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 03620
Status Code: 0
Fee Category: 3E 2C 3M EX 2B
Exp. Date: 20131031
Fee Comments: _____
Decom Fin Assur Reqd: Y

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED
   Applicant/Licensee: LOCKHEED MARTIN COMMERCIAL
   Received Date: 20050302
   Docket No: 3012894
   Control No.: 136617
   License No.: 37-02006-09
   Action Type: Amendment

2. FEE ATTACHED
   Amount: _____
   Check No.: _____

3. COMMENTS

Signed Rebecca Jurock
Date 3/21/2005

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered /__/)

1. Fee Category and Amount: _____

2. Correct Fee Paid. Application may be processed for:
   Amendment _____
   Renewal _____
   License _____

3. OTHER _____
   _____

Signed _____
Date _____