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LOCKHEED MARTIN
Lockheed Martin Commercial Space Systems

MMSØL

June 1, 2004

Certified Mail No. 7003 1010 0002 7110 9426

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

03012894

Re: Decommissioning Plan for the Newtown, PA facility for License No. 37-02006-09

Dear Mrs. Ullrich:

Please find enclosed the LMCSS decommissioning plan for the Newtown, PA facility. This plan has been written in accordance with the MARSSIM requirements using a survey conducted by Porter Consultants, Inc. as the scoping survey.

Should you have any questions or comments regarding this matter, please do not hesitate to contact Ms. Charlene McIntyre at (215) 497-1331 or me.

Sincerely,

Clare LumKong

Clare V. LumKong
ESH Manager
LMCSS

Cc: C. McIntyre
C. Krisch
S. Peck
S. Bean
S. Porter
File

135096

NMSS/RGN1 MATERIALS-002

PCI TR-479

PROPOSED MARSSIM CLOSEOUT SURVEY
FOR ROOMS 179G and 158A AT THE
LOCKHEED MARTIN COMMERCIAL SPACE SYSTEMS
NEWTOWN, PA FACILITY

MAGNESIUM THORIUM ALLOY OPERATIONS

Report Date 4/4/04

PREPARED BY Original Signed By: Bill Belanager, PE
William E. Belanger, PE
Health Physicist and Registered Professional Engineer

REVIEWED BY Original Signed by: Sydney Porter, CHP
S. W. Porter, CHP, President
Porter Consultants

WRITTEN FOR Clare Lumkong, EHS Manager
LMCSS Newtown, PA

1 HISTORICAL ASSESSMENT

A. Background

In September 1998, Lockheed Martin Commercial Space Systems (LMCSS) located in Newtown, PA began to work with a magnesium-thorium alloy (mag-thor) containing 2% thorium by weight. This radioactive material was used at LMCSS Newtown, PA in Rooms 158A and 179G under license # SUB-831 from September, 1997 to September, 1999 and license #37-02006-09 from September 1999 through September 2001. In September 2001, the satellite project containing the mag-thor was completed. The last satellite in this series was subsequently launched and is now in orbit. All of the remaining mag-thor components were shipped to the LMCSS Sunnyvale, CA location. The Sunnyvale, CA LMCSS operates under State of California License #0169-43.

In December 2001, a final close out survey was performed by Porter Consultants, Inc. for Rooms 158A and 179G with the objective of releasing these areas for unrestricted use in accordance with U. S Nuclear Regulatory Commission Regulatory Guide 1.86.

In April 2003, LMCSS Management made the decision that there was no longer a current or future design need to work with the mag-thor alloy at LMCSS-Newtown. Therefore, when the license came up for renewal, a request was submitted to the NRC to remove thorium from the license.

This document provides the data collected to date and proposes methodology to provide additional data to NRC in accordance with MARSSIM methodology. This proposal incorporates the results from the December, 2001 closeout survey performed by Porter Consultants, Inc. as outlined below and applies such results to further survey activities necessary to meet the MARSSIM methodology requirements established under 10 CFR 20.

B. Magnesium-Thorium Use at LMCSS

The notable properties of magnesium-thorium alloys include high strength, creep resistance at high temperatures, and weight. LMCSS used mag-thor in the manufacturing of satellites. There is an exemption for possession of thorium alloys with a thorium content of less than 4%. However, this exemption does not cover drilling of mag-thor, which was performed under the LMCSS license.

The main gamma emitting decay product of Th-232 is Ac-228. The decay chain goes from Th-232 to Ra-228 and then to Ac-228. The 5.75 year half-life of Ra-228 determines the rate of in-growth of the principal gamma emitting decay products. For the purposes of this analysis, the thorium-232 will be assumed to be in equilibrium with its decay products because it was smelted in the 1970s. This bears on the ability of gamma survey meters to detect the thorium and the efficiency of the gross alpha detector.

C. LMCSS Newtown Rooms 158A and 179G

The process at LMCSS involved drilling of mag-thor stock. The material was not melted nor was it ground or treated in any way that would result in the generation of any fine dust or powder. The drilling process resulted in the generation of chips that were easily cleaned up. Only small holes were drilled to allow the mounting of printed circuit boards. Less than two pounds of chips were generated in each year of operation of the process.

The cleaning process was performed using a HEPA filtered vacuum several times a day. This included vacuuming at the end of drilling and before any break (such as lunch). The surface on which the chips fell included worktops and a floor covered with a smooth industrial grade floor covering. There were no cracks or other recesses that could potentially trap the chips. There were no small areas of elevated activity observed and foot traffic on the floor areas where the chips fell was not permitted.

D. Surface and Airborne Contamination Measurements

During the mag-thor drilling process, 6 studies were conducted involving the collection of air samples for a one-week duration. The samples were analyzed for gross alpha, which is a reliable way to detect thorium contamination. Results of these air samples were all background, indicating the absence of mag-thor fine dust particles in air. In addition, daily gamma radiation surveys were conducted using a micro-R meter. The micro-R meter can measure gross amounts of mag-thor (in the half-gram range) however cannot measure single chips.

Smears of the work area were conducted periodically and analyzed with all results yielding background. In addition, three smear samples were taken every 6 months in the hallway outside the doors of the process rooms, including one in the center of the doorway, one to the right and one to the left. All smears yielded background. The smears analyzed by LMCSS were counted on a flow-proportional counter and those analyzed by Porter Consultants were counted using a solid-state alpha detector and scaler. The two methods gave equivalent negative results.

2 SCOPING SURVEY

LMCSS proposes to use the survey conducted in December 2001 as the scoping survey. This survey was performed using the methodology of the former NRC Regulatory Guide 1.86 guidance and demonstrated compliance with those surface contamination limits. The data from this survey follows. Note that the net dpm per 100 square cm accounts for three energetic alphas from the Th-232 and its decay products (not including thoron,) so the probe efficiency is three times the 17% efficiency for Th-230. Negative numbers have been preserved. Instrument background has been subtracted, but the gross alpha results from a reference background area have not been subtracted out. This makes this scoping survey conservative.

Room 158A Smears
Alpha Detector Model ASP-2A Serial 973
Scaler Model SAM-2 Serial 569
Calibrated 11/28/01

Rm 158A Smear #	counts/ 10 min	Gross cpm	Bkg	Net cpm	Net dpm / 100 sq cm
1	1	0.1	0.2	-0.1	-0.20
2	1	0.1	0.2	-0.1	-0.20
3	3	0.3	0.2	0.1	0.20
4	2	0.2	0.2	0	0.00
5	1	0.1	0.2	-0.1	-0.20
6	4	0.4	0.2	0.2	0.39
7	2	0.2	0.2	0	0.00
8	1	0.1	0.2	-0.1	-0.20
9	2	0.2	0.2	0	0.00
10	2	0.2	0.2	0	0.00

Rm 158A Smear #	counts/ 10 min	Gross cpm	Bkg	Net cpm	Net dpm / 100 sq cm
11	2	0.2	0.2	0	0.00
12	4	0.4	0.2	0.2	0.39
13	1	0.1	0.2	-0.1	-0.20
14	1	0.1	0.2	-0.1	-0.20
15	1	0.1	0.2	-0.1	-0.20
16	4	0.4	0.2	0.2	0.39
17	2	0.2	0.2	0	0.00
18	2	0.2	0.2	0	0.00
19	1	0.1	0.2	-0.1	-0.20
20	5	0.5	0.2	0.3	0.59
21	6	0.6	0.2	0.4	0.78
22	2	0.2	0.2	0	0.00
23	1	0.1	0.2	-0.1	-0.20
24	2	0.2	0.2	0	0.00
25	2	0.2	0.2	0	0.00
26	1	0.1	0.2	-0.1	-0.20
27	2	0.2	0.2	0	0.00
28	2	0.2	0.2	0	0.00
29	5	0.5	0.2	0.3	0.59
30	6	0.6	0.2	0.4	0.78
31	1	0.1	0.2	-0.1	-0.20
32	1	0.1	0.2	-0.1	-0.20
33	4	0.4	0.2	0.2	0.39
34	2	0.2	0.2	0	0.00
35	1	0.1	0.2	-0.1	-0.20
36	1	0.1	0.2	-0.1	-0.20
37	1	0.1	0.2	-0.1	-0.20

Rm 158A Smear #	counts/ 10 min	Gross cpm	Bkg	Net cpm	Net dpm / 100 sq cm
38	3	0.3	0.2	0.1	0.20
39	5	0.5	0.2	0.3	0.59
40	4	0.4	0.2	0.2	0.39
41	4	0.4	0.2	0.2	0.39
42	3	0.3	0.2	0.1	0.20
43	1	0.1	0.2	-0.1	-0.20
44	2	0.2	0.2	0	0.00
	std gross cpm	0.15		standard dev	0.30
	avg gross cpm	0.24		average	0.07

Room 179G Smears
Alpha Detector Model ASP-2A Serial 973
Scaler Model SAM-2 Serial 569
Calibrated 11/28/01

Room 179g Smear #	counts/ 10 min	Gross cpm	Bkg	Net cpm	Net dpm / 100 sq cm
1	3	0.3	0.2	0.1	0.20
2	4	0.4	0.2	0.2	0.39
3	4	0.4	0.2	0.2	0.39
4	5	0.5	0.2	0.3	0.59
5	4	0.4	0.2	0.2	0.39
6	5	0.5	0.2	0.3	0.59
7	1	0.1	0.2	-0.1	-0.20
8	1	0.1	0.2	-0.1	-0.20
9	3	0.3	0.2	0.1	0.20
10	4	0.4	0.2	0.2	0.39
11	4	0.4	0.2	0.2	0.39
12	1	0.1	0.2	-0.1	-0.20
13	2	0.2	0.2	0	0.00
14	2	0.2	0.2	0	0.00

Rm 158A Smear #	counts/ 10 min	Gross cpm	Bkg	Net cpm	Net dpm / 100 sq cm
15	1	0.1	0.2	-0.1	-0.20
	std gross cpm	0.14		standard dev	0.29
	avg gross cpm	0.31		average	0.21

In accordance with NUREG/CR 5512, Volume 3, Paragraph 5.5.1, it may be assumed that the removable contamination is 10% of the fixed plus removable contamination given in the right column of the above table. The total of fixed plus removable contamination may therefore be assumed to be ten times the values in the right column which are given in Net dpm/100 square cm. Based on the measured results, a hypothesis can be made that the mean of these smears indicate the Derived Concentration Guideline Level (DCGL) in Section 3 has been achieved. However, there are several elements of MARSSIM's that are missing from this analysis. First, the samples were not taken from a randomized set of locations. They were taken from "maximum likelihood" locations where the contamination would be expected to occur. This makes the survey more conservative. Second, statistical procedures were not applied to yield a level of assurance that the average concentration in the survey unit meets the DCGL. Therefore, a MARSSIM survey is required.

The standard deviations observed are consistent with instrument counting statistics for the count rates encountered, and therefore, they overestimate the statistical variability of the actual contamination (if any). The average net count rate for room 158A is very close to zero, so the counts may be considered to be variations in the instruments background measurements. The standard deviation of the smaller samples taken in room 179G is almost identical, however the mean is higher.

If this variability is due to the instrument background counting statistics, an excessively large relative shift could result making the Lower Boundary of the Gray Region (LBGR) unattainable. This will be discussed in more detail in Section 4, "Determinimg the LBGR". The observed variance (square of the standard deviation) consists of two parts. Part 1; the variance due to the instrument background counting statistics, and part 2; the true variance of the contaminant being measured. It is important to differentiate between the two, as will be seen in Section 4, "Determining the Lower Bound of the Gray Region."

3 DERIVED CONCENTRATION GUIDELINE LEVEL (DCGL)

The contamination levels from NUREG/CR-5512, Table 5.19 give 90% confidence of achieving the 25 mrem per year dose limit for the occupancy scenario for Th-232. The DCGL is given as dpm per 100 square cm. Table 5.19 defines the DCGL as 7.31E00 for Th-232 and Th232+C as 6.03E00. (+C refers to initial daughters in equilibrium with the parent nuclide.)

The age of the thorium is in excess of 20 years and is substantially in equilibrium with its radioactive daughters, and therefore the Th232+C derived limit will be used. The 90% confidence limit is the more commonly used of the three confidence levels given in NUREG/CR-5512 (75%, 90%, 95%.) This limit is based on a large area of relatively uniform contamination. The preliminary survey gave no indication of a significant non-uniform distribution. Based on the above factors, the proposed DCGL is 6 dpm per 100 square cm for fixed contamination. It is proposed not to assign a site-specific inhalation factor to this facility.

4 DETERMINING THE LOWER BOUND OF THE GRAY REGION (LBGR)

From the NRC Publication titled NUREG/CR-5512, Table 5.19, the appropriate DCGL is 6 dpm per 100 square cm in order to yield a 90% confidence that 25 mrem per year dose will not be exceeded. The lower bound of the gray region is set below the DCGL to ensure with a known degree of statistical confidence that the average concentration measured is actually below the DCGL.

The standard deviation for removable contamination from the scoping survey is 0.29 (for Room 179G) and 0.30 (for Room 158A) dpm per 100 square cm. The observed variance (square of the standard deviation) consists of two parts, the variance due to the instrument background counting statistics, and the true variance of the contaminant being measured. This is important to note because of the proposed sampling method that will used which is described in Part 7 "Survey Technique".

This analysis will assume the removable contamination is 10 % of the total. In order to derive the total concentration, the results must be multiplied by a factor of 10. In addition, the standard deviation must be multiplied by a factor of 10 since it is the same units as the contamination. The scoping survey used 100 square cm wipes, however the remedial action support survey will use 1000 square cm wipes in order to achieve the required sensitivity. The instrumentation and count times will remain the same. The benefit is the variance due to the instrument background will be carried through, while the variance due to the distribution of thorium will be multiplied by a factor of 10. If the instrument component were also multiplied by a factor of 10, the result would be an excessive relative shift and an unnecessarily low LBGR. It therefore becomes important to separate the two components of variance.

One important observation would be that, for most regular distributions, the standard deviation cannot exceed the average value being measured. In fact, it is highly unlikely to exceed half that value because a large fraction on the measurements occur within one standard deviation on either side of the mean. The average in room 158A is 0.07 dpm per 100 sq cm removable or 0.7 dpm per 100 sq cm total. This suggests that the standard deviation of the contaminants in that room cannot exceed 0.35 dpm per 100 sq cm.

Room 179G has a higher average, but the standard deviation of the measurements is almost identical. This suggests that a large fraction of the variance in this room is also due to instrument background. The average on the wipes is 0.21 dpm per 100 sq cm, which equates to 2.1 dpm per 100 sq cm total contamination. This suggests a maximum standard deviation of about 1 dpm per 100 sq cm due to the thorium that is present, if any.

Because both the instrument variance and the variance due to the thorium will be present in the statistical analysis, both must be considered. Combining the 1 dpm above, with the 0.3 dpm per 100 sq cm due to the instrument background (a vector sum) yields just over 1 dpm per 100 sq cm. LMCSS proposes to use this as the standard deviation (sigma) when calculating the relative shift. The relative shift is calculated from the standard deviation of the previous survey measurements. If 95 percent confidence is desired (Pr = .95) in determining compliance with the DCGL, then delta over sigma equals 2.5 (derived from MARSSIM table 5.1.)

Multiplying sigma (1 dpm per 100 sq cm) by this value yields a relative shift of 2.5 dpm per 100 sq cm. Subtracting this relative shift from the DCGL yields a LBGR of 3.5 dpm per 100 sq cm.

5 POTENTIALLY CONTAMINATED AREAS

This proposal defines three potentially contaminated areas for this investigation plus a background reference area. Two of these areas are class 1 (affected), one is class 2 (possibly affected), and the background reference area is class 3 (unaffected).

Class 1 Area

There are two class 1 areas including rooms 179G and 158A where the magnesium-thorium alloy was drilled. Since these rooms are each less than 1000 square feet, each room is defined as a survey unit.

Class 2

There is one class 2 survey area which include the hallways outside rooms 179G and 158A. Because the ongoing surveys during the operation detected no contamination in the hallways even before cleanup, these areas of the hallway can be safely lumped into a single survey unit. For the purposes of this designation of the survey units, this hallway survey unit is defined as the area extending 10 feet on either side of the doorway and the full width of the hallway.

Class 3 / Background Reference

The class 3 survey area was chosen based on physical similarity to the potentially affected areas. Mag-thor was not handled in this area, nor was there the potential for spread of contamination into this area based on the foot traffic patterns in the building. Physical similarity is defined as having the same type of floor and wall material with the same potential for naturally occurring alpha emitters, both in the thorium and uranium series. The room chosen is the Medical Suite, which is unaffected, is similar in size to the affected areas, and has similar floor and wall materials. For the purposes of this survey, this area will also serve as the background reference area.

Contamination Outside Buildings

There is no potential for contamination of soil outside the buildings, and therefore this survey will be limited to the rooms inside the LMCSS Newtown facility.

6 DATA QUALITY OBJECTIVES

The objective of this survey is to determine whether the area to be released meets the 25 mrem per year limit for release for unrestricted use. The DCGL from NUREG/CR-5512 will be used for this purpose. Based on the preliminary survey, non-uniform contamination is not expected to exist because the contaminant to be measured is present in background, and a gross alpha measurement is to be used.

The criteria for meeting the objective is stated as follows: Determine whether the average Th-232 concentration in each of the class 1 and class 2 areas does not exceed the average in the class 3 (non-affected) areas by more than the DCGL. This is to be determined at the 95% confidence level.

Since a non-specific gross alpha measurement is to be used, alpha emitters from both the naturally occurring thorium-232 and uranium-238 decay chains will be present. In addition, radon and thoron decay products will be present. The radon and thoron decay products can be substantially excluded from the analysis by delaying the counting of the samples for sufficient time for these decay products to decay away. In the case of radon, only 3 hours is required, but thoron has a Bi-212 daughter with a 10.6-hour half-life which requires a 106-hour (about 5 day) holding period.

7 SURVEY TECHNIQUE

Two survey techniques will be used for this MARSSIM survey:

A. Use of a Micro-R meter.

Since thorium has a significant gamma-emitting decay product, severe hot spots will be detected using a micro-R meter gamma survey meter. Ac-228 has a gamma factor of 0.844 R/hr per Curie at 1 meter, so a micro-R meter will measure twice background (about 10 uR/hr) at 0.1 meter when exposed to about 0.1 microcurie. On contact, twice background would be measured with about 1 nanocurie of thorium-232 in equilibrium with Ac-228, or about 6 milligrams of thorium. This translates to roughly a third of a gram of mag-thor. Based in this, the micro-R meter survey technique can detect large pieces of mag thor or areas with gross contamination. It is not sensitive enough to be used to determine thorium contamination near the DCGL, but makes it suitable as a tool to do a 100% coverage survey for gross hot spots.

B. Gross alpha determination using a Zinc Sulfide Scintillator.

A second technique that will be used is a gross alpha determination of smear samples using a zinc sulfide scintillator with a photomultiplier detector and a counter. This technique has a typical instrument background of about 2 counts per 10 minutes (about 0.2 cpm) and has a 17% detection efficiency for Th-230 which emits a single alpha. Th-232 in equilibrium with its decay products (which takes about 20 years) would have three energetic alphas (before thoron), from Th-232, Th-228, and Ra-224. In effect the decay products would triple the alpha count leading to an effective Th-232 detector efficiency of about 51% for 20 year old thorium.

NUREG/CR 1505 gives the MDC (Minimum Detectable Concentration) as

$$MDC = \frac{3 \quad 4.65\sqrt{C_B}}{KT}$$

where C_B is the background count in time T (0.2 cpm),
K is the detector efficiency and
T is the count time.

This yields a MDA (Minimum Detectable Activity) of 1.9 dpm for a 10-minute count.

If the sample is a wipe of 100 square cm, then removable contamination of 1.9 dpm per 100 square cm could be detected with 95% reliability. If 10% of the contamination is assumed to be removable, then the MDA of this technique would be about 19 dpm per 100 square cm total contamination. This is above to the DCGL and so is not acceptable.

This detection sensitivity can be readily increased by wiping a larger area or by counting for a longer time. Of these options, a larger sample area is the more widely implemented throughout industry. A 1000 square cm wipe would yield a detection sensitivity of 1.9 dpm per 100 square cm total contamination which is within the sensitivity required. This is preferable to increasing the count time because it requires little additional time or effort and yields greater coverage of the survey unit.

If a 1000 square cm wipe sample is taken and the wipe removes 10% of the total contamination, then 6 dpm would be expected on the sample if a concentration equal to the DCGL were present. This would yield about 3 cpm assuming a 51% gross counting efficiency (based on secular equilibrium) or 30 counts per 10 minutes. This is well below the MDA of the method.

In order to sample a 1000 square cm area, a card with a cutout measuring 32 by 32 cm will be made. The cutout will have a 1000 cm area. The card will be placed on a designated sample location and the entire area wiped down with a single wipe. The wipe will then be counted using a zinc sulfide detector with a photomultiplier and SAM-2 scaler.

8 QUALITY ASSURANCE

The instrument to be used is a Johnson model ASP-2A zinc sulfide / photomultiplier connected to a SAM-2 counter. The instrument will be calibrated using a Th-230 calibration source traceable to NIST. Ten percent blanks will be run as a quality control check on instrument background. These will be counted as every 10th sample to detect any change in instrument performance. With the very low levels of thorium to be detected, it is not practical to include spiked samples.

9 REMEDIAL ACTION SUPPORT SURVEY

A. Gamma Survey.

In the Class 1 survey units (rooms 158A and 179G) a 100% surface scan is required. This will be accomplished using a micro-R meter to detect any gross contamination. The survey meter will be systematically moved over the horizontal surfaces in the room in such a manner that the meter will come within 10 cm of every point on the horizontal surfaces. This will be performed by surveying along lines spaced 20 cm apart.

The Class 2 areas (hallways outside the rooms) will be surveyed in a similar manner, but with a spacing of 50 cm. This will yield approximately 50% coverage for gross contamination, as described in "survey technique" above, but the actual coverage will be a function of the strength of any hot spot as determined by the inverse square law.

Class 3 reference background areas will be monitored to obtain a general reading of the gamma background in the facility.

The results of the gamma surveys will be used only to verify the absence of any residual "hot spots" and the statistical homogeneity of the survey units. Any gamma level that reveals a "hot spot" significantly above background will be cause for additional remediation. Care will be exercised to assure that the elevated gamma reading is from thorium contamination and not from elevated natural radioactivity in the building materials.

B. Surface Smears

The number of surface smear samples required was obtained form MARSSIM Table 5.3. With a delta over sigma of 2.5 and alpha and beta errors set at 0.05 probability, N/2 is given as 11 samples. Thus 11 samples are required in each survey unit plus 11 in the reference background area. This sampling will be done in a similar manner as outlined below in every survey unit regardless of the class of the area.

Because of the weight of the particles generated by the drilling process, it is not reasonable to expect them to adhere to the walls. Sampling will therefore be restricted to horizontal surfaces such as floors and tabletops. Because the probability of contamination was approximately equal on all these horizontal surfaces, the sampling grid will be developed without regard to their position. If a sampling point falls on a table, then the sample will be collected from the tabletop. If it falls on the floor, the floor will be sampled. This yields a truly random sample of the entire survey unit with equal probability of sampling any point.

Randomization of the sample points will be performed by choosing an initial random point and drawing a rectangular grid from that point as allowed by MARSSIM. Since 11 samples are required in each survey unit, a 3 point by 4 point grid will be used to select sample locations. Starting from a random point, the grid will be laid out aligned with the room walls. The spacing between each in the "X" direction (the longer dimension of the room) will be one fifth the room dimension. The spacing in the "Y" direction (the smaller room dimension) will be one fourth the room dimension. This will yield 12 samples in each of these survey units.

10 STATISTICAL METHOD TO BE USED

Since a non-specific gross alpha measurement is to be used, alpha emitters from both the naturally occurring thorium-232 and uranium-238 decay chains will be present. In this situation MARSSIM suggests the Wilcoxon Rank Sum test, therefore that is the test that LMCSS plans use.

In addition, radon and thoron decay products will be present. The radon-222 decay products are natural, as are bulk of the thoron decay products which arise from thorium in the construction materials of the facility and the underlying soil. These can be substantially excluded from the analysis by delaying the counting of the samples for sufficient time for these decay products to decay away. In the case of radon, only 3 hours is required, but thoron has a Bi-212 daughter with a 10.6 hour half-life which requires a 106 hour (about 5 day) holding period. This will not affect the choice of statistical method, but will reduce the statistical variability of the analytical method, resulting in a more robust analysis. The main reason for excluding the radon and thoron decay products is that both radon and thoron are gases, and their decay products are likely to have originated at a location other than the surface where the smear was taken.

The reference / background area will be compared to each class 1 and class 2 survey unit to determine whether the contamination is above the background reference area by less than the DCGL with the required level of confidence.

11 DECISION RULE

The following decision rule will be used:

If the Wilcoxon Rank Sum shows compliance: no further action.

If the Wilcoxon rank Sum does not show compliance but the average of the smears shows contamination below the DCGL: If there are no obvious hot spots, increase the number of samples to improve the statistics. If there are hot spots, conduct further remediation. If compliance is then demonstrated, no further action; if not conduct further remediation.

If the average concentration exceeds the DCGL further decontamination is required.

12 REFERENCES

1. Code of Federal Regulations, Title 10, Part 20

2. NUREG 1505 "A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys", Nuclear Regulatory Commission,

3. NUREG-1575. "Multiagency Radiation Survey and Site Investigation Manual (MARSSIM)." Washington, D.C.: Nuclear Regulatory Commission. December 1997.

4. NUREG /CR 5512, Volumes II, III and IV, "Residual Radioactive Contamination from Decommissioning, Nuclear Regulatory Commission. May, 1999.

5. NUREG /CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination," Nuclear Regulatory Commission. June, 1992.

6. NUREG-1507 -" Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions," Nuclear Regulatory Commission., August, 1995

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

6/11/2004, and to inform you that the initial processing which includes an administrative review has been performed.

☑ AMEND. 37-02006-09
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.

Your action has been assigned **Mail Control Number** 135096.
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

: (FOR LFMS USE)
: INFORMATION FROM LTS
: --------------------

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

: 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: 20040603
   Docket No: 3012894
   Control No.: 135096
   License No.: 37-02006-09
   Action Type: Amendment

2. FEE ATTACHED
   Amount: ~~______~~
   Check No.: ~~______~~

3. COMMENTS

Signed M. A. Parkins
Date 6/4/2004

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 ______________________