



Plexus Scientific Corporation

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July 10, 2017

George Fenton
Fenton Art Glass Company
700 Elizabeth Street
Williamstown, WV 26187

Re: Request for Information, Docket 040-03149

Dear Mr. Fenton:

Plexus Scientific Corporation, Nuclear Solutions Division (Plexus), coordinated the effort to conduct the final status survey near Furnace 8, performed by Solutient Technologies, LLC. The U.S. Nuclear Regulatory Commission reviewed the report and requested additional information regarding the instrument detection limits for the purposes of scanning.¹ The information that was requested is provided in the Attachment to this letter.

Thank you very much for your interest in Plexus and for the opportunity to complete this work for your firm. Please let me know if you have any questions related to this work.

Sincerely,

A handwritten signature in blue ink that reads 'Bill Thomas'.

Bill Thomas, CHP
Vice President, Nuclear Solutions Division

Attachment

¹ Telephone conversation with Mr. Dennis Lawyer, USNRC, George Fenton, Fenton Glass and Bill Thomas, Plexus, on July 5, 2017.

Request for Information
Final Status Survey for Furnace 8
Fenton Art Glass

Introduction

A final status survey (FSS) was completed by Solutient Technologies, LLC (Solutient), on June 2, 2017, at Fenton Art Glass, near the area around Furnace 8. All licensed uranium was removed and packaged for disposal, prior to the survey. Previously, a radiation survey was completed by Plexus for the entire facility in 2016.² The report by Solutient verified that no impacted concrete was detected during the final status survey and the area satisfied the radiation limits established by the U.S. Nuclear Regulatory Commission (USNRC) for unrestricted use.³

The report was reviewed by the USNRC and additional information was requested regarding the calculated detection limit when scanning surfaces. A description of the survey method and applicable detection limit is provided below.

Survey Method

The procedure used to complete the final status survey for the area near Furnace 8 was consistent with Plexus Radiation Safety Procedure No. RSP-123 Revision 3, dated June 7, 2016, which was included with facility FSS report that was submitted to the USNRC.⁴ Specifically, the FSS measured gross alpha scans of surfaces; stationary gross alpha measurements on surfaces (i.e., total contamination measurements); and the collection and gross alpha analysis of smears from surfaces (i.e., removable contamination measurements). The Solutient technicians did not use a datalogger to collect the radiation measurements, rather the data were recorded by hand.

Scanning Detection Limit

Scanning for alpha emitters differs significantly from scanning for beta and gamma emitters in that the expected background response of most alpha detectors is very close to zero. It is not practical to determine a fixed minimum detectable concentration for scanning.⁵ Instead, it was more useful to determine the probability of detecting an area of contamination at a predetermined derived concentration guideline level (DCGL) for given scan rates based on the approach recommended in MARSSIM. Calibrated scintillation detectors were used for scanning surfaces, Ludlum Model 43-89 or 43-93. The detector scan speed was approximately 2.5 centimeters per second (cm/sec).⁶ In the event that 2 to 3 counts were detected, the surveyor stopped and surveyed in a static mode for a duration equal to the probability of getting another count, a probability of at least 90%.⁷ The time interval, approximately 8 seconds for

² Plexus Scientific Corporation, "Final Status Survey Report for Fenton Art Glass", Report No. 8284-63A-621, August 4, 2016.

³ Solutient Technologies, LLC, "Radiological Release Survey Report, Fenton Art Glass", June, 2017.

⁴ Plexus Scientific Corporation, "Final Status Surveys of the Fenton Glass Facility", RSP-123, Revision 3, June 7, 2016.

⁵ U. S. Nuclear Regulatory Commission, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)", NUREG-1575 (Rev. 1) August, 2000.

⁶ Solutient Technologies, June, 2017.

⁷ Plexus Scientific Corporation, RSP-123, Revision 3, June 7, 2016..

the scintillation detectors, was calculated by using guidance from MARSSIM.⁸ No grids or sub grids exhibited this level of activity, above background, and was verified to satisfy the release criteria established by the USNRC.

Elevated Measurement Comparison

MARSSIM addresses the concern for small areas of elevated activity with an option to use an elevated measurement comparison (EMC) as an alternative to statistical methods.⁹ This method modifies the DCGL_W using an area factor that accounts for the difference in surface area and the resulting change in dose or risk. The area factor is the magnitude by which the concentration within the small area of elevated activity can exceed DCGL_W while maintaining compliance with the release criterion.

Using the DCGL_{EMC} represents a conservative approach and is considered to be a defensible modification because the exposure assumptions (e.g., exposure time and duration) are the same as those used to develop the DCGL_W.¹⁰ While no areas of elevated activity were noted in the survey unit near Furnace 8, the area factor and EMC provided additional support that the area satisfied the release criteria, established by the USNRC. For example, the area factor calculated by the USNRC for Uranium-238 ranged from 36x to 4x for areas ranging from 1 square meter (m²) to 9 m², respectively.¹¹ Furthermore, MARSSIM calculated the probability to be 90% to detect 300 disintegrations per minute per one hundred square centimeters (dpm/100cm²) on a surface, using a scintillation detector with a detection efficiency equal to 15% (cpm/dpm) and scanning at a speed of 3 cm/sec.^{12,13} Using an area factor of 36x and assuming an impacted surface area of less than 1 m², the elevated activity (ie. hot spot) must exceed 3,600 dpm/100cm² in order to exceed the DCGL_W of 100 dpm/100cm². No activity was detected in excess of 3,600 dpm/100cm².

Conclusion

No areas of elevated activity were detected during the scanning procedure. The static measurements, completed in a systematic method, did not detect any elevated activity, and was calculated to be less than 26 dpm/100cm². The desired detection limit was achieved when scanning by using either method, short static measurements or the EMC. The FSS report confirms that there is no impacted concrete near Furnace 8 and the area satisfies the radiation limits established by the U.S. Nuclear Regulatory Commission for unrestricted use.

⁸ U. S. Nuclear Regulatory Commission, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)", Equation 6-13, NUREG-1575 (Rev. 1) August, 2000. NUREG 1575, Equation 6-13, August, 2000.

⁹ NUREG 1575, August, 2000.

¹⁰ NUREG 1575, August, 2000.

¹¹ NUREG 1575, Table 5.7, August, 2000.

¹² NUREG 1575, Table 6.8, August, 2000.

¹³ Soluient used 2 different detectors for the alpha survey, a Model 43-93 with an efficiency of 20.5% and a Model 43-89 with an efficiency of 14.8%. The scan speed was 2.5 cm/sec.