Design Group

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December 8, 2021

**Devens Fire Department**
182 Jackson Road
Devens, MA 01434

Attn: **Chief Timothy Kelly, Director of Public Safety / Fire Chief / EMD**

RE: **Johnson Matthey-Devens, Massachusetts**
Building 1 Fire Sprinkler System Protection Capability Review
Project No. 2103073

Dear Chief Kelly:

This letter is in regard to the Building 1 Fire Sprinkler System Protection Capability Review at the Johnson Matthey facility in Devens, MA.

In support of a variance request to establish a total number of hazardous materials control areas inside Building 1 that exceeds the maximum allowed by the International Building Code (IBC), Johnson Matthey requested Design Group review the existing fire sprinkler protection for determining whether additional protection capability could be provided from this system. Details regarding this review are as follows:

1. The existing building fire sprinkler water supply is provided by a fire pump connected directly to the public water system that, in turn, supplies fire sprinkler risers serving Buildings 1, 2 and 3.

    a. This fire pump produces a discharge churn pressure of 90 psi with a residual discharge pressure of 62 psi at a flow rate of 1,912 gpm.

2. The existing sprinklers in the Building 1 laboratories are 1/2-inch NPT, K-5.6, ordinary temperature sprinklers (response unknown) that are nominally spaced at the 130 square feet maximum protection area. This existing system criteria indicates an Ordinary Hazard fire sprinkler system design per NFPA 13 and NFPA 45.

3. Many of the laboratories are constructed with 1-hour fire barriers and rated doors. The 1-hour fire-rated laboratory furthest from the existing fire sprinkler riser is Automation Lab 209, which totals 862 sq ft in area with 8 sprinklers.

4. To assess additional protection capability, this laboratory was re-calculated using the “Room Design Method” per NFPA 13 Section 11.2.3.3 for the 1-hour fire rated space.

5. With the existing fire pump test data as the water supply basis for our review, along with 6-inch supply from the fire pump to Building 1, 4-inch floor control valve and mains, and scheduled branch line pipe sizes shown on the drawings (1", 1 ¼", 1 ¼", 1 ½", 2"), our hydraulic calculations indicate an Extra Hazard, Group 1 fire sprinkler density (0.30 gpm/sf) over the entire room can be achieved in Lab 209 with approximately 10 psi of safety margin. Note this design basis provides a 50-100% density increase beyond the NFPA 13 Ordinary Hazard, Group 1 and Ordinary Hazard, Group 2 densities (0.15 gpm/sq ft and 0.20 gpm/sq ft, respectively).

6. Achieving this additional protection capability will require replacing the existing K-5.6 standard orifice sprinklers with ½-inch NPT, K-8.0 large orifice sprinklers to accommodate flow for the increased fire sprinkler density.

7. Our calculation included 500 gpm of outside hose stream allowance as required for an Extra Hazard Group 1 occupancy per NFPA 13.

8. Beyond replacing the existing standard orifice fire sprinklers with large orifice fire sprinklers, no other modifications of the existing fire sprinkler system are required, or proposed, to achieve Extra Hazard, Group 1 system protection criteria for Lab 209.

We trust this information is helpful, but please contact us if we can provide further detail. Thank you for your consideration.

Respectfully,

**DESIGN GROUP FACILITY SOLUTIONS, INC.**

Thomas E. Dalferes

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cc: John Coelho, P.E., Design Group Facility Solutions, Inc.