APPENDIX A

TECHNICAL DESCRIPTION OF ROBERTSON PROTECTED METAL

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Report# MPE-21876PR-2 RPM Definition

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Subject: Technical Description of Robertson Protected Metal

The Lockheed Martin Airdock is located in Akron, Ohio. The building is approximately 1175 feet long, 325 feet wide and 211 feet tall with the wall/roof line assuming an approximate parabolic shape and enclosed on each end with spherical profile doors.

The Airdock siding is Robertson Protected Metal (RPM) manufactured in 1929 by the H.H. Robertson Company, formerly known as the Asbestos Protected Metal Company.

The siding consists of five components. The following description is taken from various literatures of the 1920s, as listed at the end, and from recent observations.

Component 1 is specially annealed steel sheet protected from corrosion by the other four components. This description of the base metal derives from the H.H. Robertson literature. The sheet was corrugated after the coatings were applied. Currently, the steel appears to be unoxidized where the coatings are intact.

Component 2 is an air-blown (preoxidized) petroleum asphalt layer encasing the steel at a weight of about 16 pounds per hundred square feet. H.H. Robertson Company refined the asphalt with its own process. H.H. Robertson literature describes the material as "an air-blown petroleum asphalt having a low susceptibility factor, being soft and adhesive at low temperatures, yet not flowing at temperatures reached on roofs, even in the tropics… contains practically no mineral matter..." It was applied by drawing the steel sheet through a vat of this asphalt maintained at 350 deg-F. In samples, the asphalt layer is marginally pliable, but very dry and particles disengage from the Component (as opposed to shattering) when prodded by a manual instrument. It is in the range of 24-28 mils thick (1 mil = 0.001").

Component 3 is an asphalt-saturated asbestos felt which was larger than the steel sheet. It was applied to both sides and then wrapped around the edges of the asphalt-coated steel sheet. H.H. Robertson literature suggests that the saturant is a slightly different asphalt than the component 2 asphalt. The J.H. Young article indicates that the asbestos saturant is an asphalt containing hexacloronaphthalene as a fire retardant. However, chemical analysis of the RPM coating shows that the fire retardant is in fact Aroclor 1268, which is a blend of highly chlorinated PCBs, and present at a concentration of about 4.0 percent by weight. From samples, the condition of the asphalt in this layer is about the same as that underneath it: somewhat pliable, but very dry and particles disengage from the Component when prodded by a blunt instrument. This layer is in the range of 24-28 mils thick.

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Component 4 is a weather-proofing compounded bitumen (asphalt-based) of the stearin-pitch type described as being "similar to the best baking Japan bases." It is described as a waterproof coating intended to keep moisture and oxygen away from the underlying asphalt and to lock in the bituminous binders and oils. The coating was applied over the Component 3 impregnated felt by a hot roll method with the rollers maintained at 425 deg-F. Its applied weight was about 14 pounds per hundred square feet. Samples indicate this layer is dry and brittle, exhibiting glass-like fracture when disturbed. Its thickness is in the range of 12-20 mils.

After being applied to the steel sheet, components 2, 3 and 4 were fused together and to the steel sheet in a heated press at the time of manufacture. When cooled, the coated sheet was then formed into corrugations.

Component 5 appears to be an aluminum paint of unknown resin base. The paint is about 4 mils thick. There is an H.H. Robertson marketing sheet which indicates that RPM was available with either aluminum paint or aluminum foil. The base portion of the paint coating is resin-saturated aluminum pigment covered by a clear layer of resin. The aluminum paint on samples is brittle and the top portion of the aluminum pigment layer is oxidized. The oxidized aluminum is part of the gray appearance of this layer, but, in addition, there is a darker gray which appears to be some of the Component 4 bituminous coating dissolved into the clear paint layer by the paint solvents at time of application. The paint resin is immediately soluble in methyl ethyl ketone and can be mechanically dispersed into reagent alcohol to form a gel. There is a reasonable chance that this was a cellulose nitrate lacquer, which, in fact, may have been dispersed in solvent of which alcohol was the chief component, as suggested by the J.H. Young article.

Components 2-5 form a coating over the steel sheet core and are referred to collectively as RPM coating. RPM coating appears to be in the region of 70 mils thick. Visual observation revealed a significant amount of fine-crack crazing in the RPM coating on a day with air temperature around 15 deg-F, which had not previously been observed at warmer temperatures. Crazed areas with various sized cracks were observed earlier (warmer temperatures) in isolated areas adjacent to historic roof leaks.

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Reference literature.

- Robertson Protected Metal, two page ad, undated
- Robertson Protected Metal for Roofing, Walls and Partitions of Buildings, Catalogue No. 105, 5 excerpt pages, undated
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- Robertson Protected Metal, Marketing Brochure, 1925, 4 pages.
- Robertson Protected Metal, Marketing Brochure, undated, 7 pages.
- A Survey of Robertson Protected Metal, H.H. Robertson Company, 1926, 16 pages.
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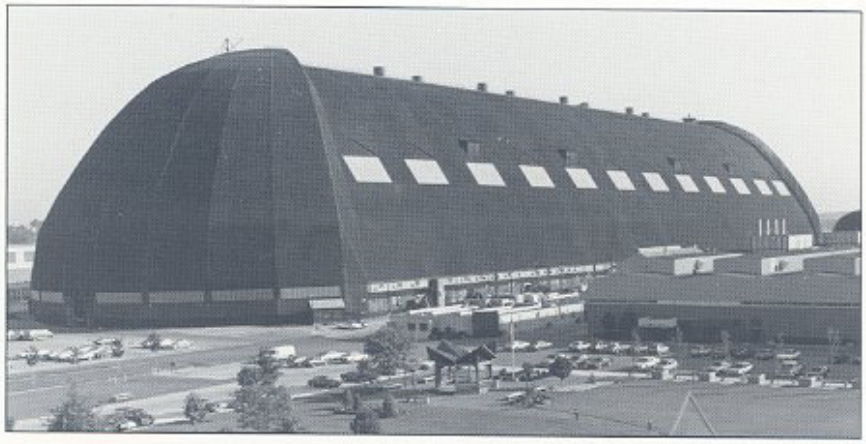

The Airdock as it stands today, provides uninterrupted floor space—the size of seven football fields.