Below is a response to the questions posed in the Federal Registry Notice 0909100442-0563-02 as they pertain to NIST activities related to building joint sealants and the NIST led public-private consortium on standards development for this industry.

Standards setting process, reasons for participation and benefits of standardization.

The modern sealant industry traces its roots back to the mid 1960's with the development of structural sealants. These materials are used to separate the inside conditioned space from the outside. The use of these sealants enabled the modern highrise towers of glass and steel to be comfortable, dry and warm or cool. The insulating glass panels, typically 1.2m x 4m weighing 200kg are attached only by the structural glazing sealants sometimes hundreds or thousands of feet up. Mechanical fasteners shear with the wind driven oscillations of the upper floors of these buildings. One of the first buildings to employ these new design elements was the John Hancock tower in Boston. Shortly after it opened, these huge glass panels started popping off the building and sailing around Boston (Jefferies orbits) before crashing to the streets below. It was determined that the structural sealant used to hold the glass panels to the building was not sufficient to accommodate the stresses between the building and the insulating glass panels. There was recognition that without standards for these materials, the entire industry would be lost.

This stress, the 200 kg falling glass panels in Boston, forced the members of the sealant industry to recognize the value of standards. Without standards and specifications, the entire industry would be discredited as reliable method of sealing buildings. Since this focusing incident, the sealant industry has successful been using ASTM C24 as the vehicle for setting standards for the industry. To address the structural sealant issues presented by the John Hancock tower, this committee developed a series of standards and specifications based on threshold testing. These tests could be developed with little or no experimental foundation and could ensure that the materials met basic initial qualifications. There has been little progress on moving beyond threshold testing due to a lack of credible scientific data on which performance tests could be based.

The membership of this committee is a mix of manufacturers, raw material suppliers, installers, designers, architects, and engineering firms. Each of these members lacks the resources to devote to the substantial investment in research to develop new testing methods. Even with such a cohesive motivated group at the standards meetings, they cannot engage in more than simple experiments. The standards that emerge are variations of threshold testing. The reliance on threshold testing forces the industry to use a small number of legacy chemistries that dominate the $51B in annual sales.

The current problem is that while the structural sealants initially met the qualifications, many are reaching the end of their effective service. Incidents of glass panels falling off of buildings have been occurring with increasing frequency. Additionally, damage from bulk water intrusion based on failed building sealant is a major cause of the $65B/yr spent by American homeowners to repair their homes.

In 2000, ASTM held the third International Symposium on Durability of Sealants. This meeting, concluded that the lack of ability to predict in-service performance was a significant barrier to

innovation. Currently the industry uses threshold testing to evaluate durability. The test, ASTM C719 subjects sealants to a series of serial exposures: under water for a week, hot oven for a week, cycle for a week, freezer under compression for a week followed by visual inspection. There is broad agreement that in order for innovation to grow this market there must be move from threshold testing towards performance based evaluation with the ability to predict the service life of the sealant. This has been the goal for the last fifty years of this committee.

Perspective on Government's Approach to Standards Activities.

Shortly after the 2000 report, the sealant industry contacted the federal government (NIST) to ask about help in developing service-life prediction standards for sealant. The industry came to the understanding that federal involvement was critical. This was based on the following understanding: no single company could afford to develop test methods that benefit the entire industry, no collection of companies could work together without encountering anti-trust concerns. The SDOs or trade associations did not have the money or expertise to develop new test methods. The solution was to have the federal government use it's convening role to nucleate a industry wide consortium. This way the burden (financial, logistical, and political) would be reduced by the use of a neutral, well respected, federal role. Because of the federal role, all members of the industry could meet, jointly finance and work together on developing new test methods without encountering anti-trust concerns. This convening role is a critical component of the successful development of new standards.

NIST was able to work with the members of ASTM to develop a public-private consortium through the use of CRADA agreements. This consortium was able to leverage the knowledge about sealant from the private sector with the focus on test method development from NIST. The consortium, now in its 10^{th} year has been able to develop test methods, new instrumentation, and innovative approaches to existing problems. The members of the consortium are also members of the ASTM committee. The knowledge and data developed in the consortium is then used to educate, and support standard development within ASTM C24. By providing unbiased, high precision data long standing biases have been experimentally evaluated. Some of them have been upheld and some have been reassessed. The ASTM committee is now developing a series of new standards based on consortium shared data published in peer reviewed journals that enable performance based evaluation of the sealant materials. For example, previous to the public-private partnership there was a strong belief that movement was not important environmental stress for the sealant. High precision data developed at NIST, shared with the consortium has over time changed the view of the members of ASTM C24 that movement is not considered one of the most important environmental stressors.

This NIST led consortium has been able to work with the members of ASTM to develop a long range standards plan that will result in a performance based evaluation of materials. It is the belief of the industry participants that this is creating significant innovation within this industry. For example, the new thinking about movement as an environmental stress has enabled broader customer acceptance of acrylic foam tapes in high rise insulating glass units. A consortium member has used the consortium developed techniques to develop new "cool roof" membrane products. A different member has used the consortium developed outdoor "natural movement" instrumentation to evaluate candidate sealant

materials. Because of the success of ASTM C24 in developing new standards, the international standards groups are adopting many of the new ideas into their practices. It helps that most of these international standards groups are populated with members of the NIST led consortium.