

SECTION A. Project Title: Mechanistic Understanding of Silver Sorbent Aging Processes in Off-Gas Treatment – Syracuse University**SECTION B. Project Description**

Syracuse University proposes to develop an understanding of the different mechanisms of silver-aging processes on adsorbents exposed to off-gas streams to enable prediction of long-term operation of gas treatment systems. Experiments to be conducted on silver-exchanged mordenite (AgOZ) and silver-functionalized silica aerogel (Ag0-aerogel) include aging effects of dry air, humid air, and dry air containing 2v/v% NO₂ or 1v/v% NO over periods of 1, 2, 4, and 6 months. Data obtained will be used to develop models for sorbent deactivation, which will be employed in our models of multicomponent adsorption equilibria and adsorption kinetics that include aging affects to predict column adsorption.

SECTION C. Environmental Aspects / Potential Sources of Impact

Chemical Use/Storage – Iodine solids are used to create iodine gas for adsorption experiments. Approximately 100 grams are available and stored when not in use in a container in a fume hood specially designed for exhausting iodine gases. Iodine gas streams produced for adsorption studies are passed over silver mordenite particles and then the spent gas is diluted through a specially designed ventilation system to bring the iodine concentration to acceptable dilution levels for disposal into the atmosphere. This procedure and system was approved by the Syracuse University Office of Environmental Health and Safety Services (SUOEHS).

Chemical Waste Disposal – Use silver mordenite adsorption particles with adsorbed iodine are stored in a container in the fume hood. The used solver mordenite are sent to the SUOEHS for appropriate disposal.

Hazardous Waste Generation – One hazardous waste is iodine gas generated by vaporizing iodine from solid iodine particles. Approximately 28 grams are generated per continuous experiment taking place per month. A second hazardous waste is silver mordenite particles with produced by passing iodine vapors over the particles. Approximately 10 grams of silver mordenite with adsorbed iodine are generated each month.

Air Emissions – Diluted iodine gases are emitted into the air at acceptable dilution levels and as approved by the SUOEHS using the specially designed and constructed ventilation system.

SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s): Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B; give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of the action, and the action is not “connected” nor “related” (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial development.

Justification: The activity consists of university-scale research aimed at investigating silver-aging processes on adsorbents exposed to off-gas streams.

Approved by Jack Depperschmidt, DOE-ID NEPA Compliance Officer on 08/10/2016