Incorporation of Additional Plant Inputs in the Chemical Effects Spreadsheet

Project Overview

- **Objective**: Incorporate plant-specific inputs to address conservatisms without changing the base chemical model
- **Benefit**: Reduction of predicted precipitate generation to aid evaluation of sump screen head loss and chemical effects on fuel
- **Approach**: Use existing WCAP-16530 methodology with the addition of plant-specific inputs where conservative assumptions had been made
- **Participation**: Not all plants participating in this work scope
- **Project Duration**: 12/15/2006 through 5/15/2007

Project Scope

- Several areas of testing identified:
  - Silicate and phosphate inhibition of corrosion for both submerged and sprayed on Al metal
  - Differences in corrosion for Al alloys in containment vs. commercially pure Al used in testing
  - Consideration of solubility limits in order to reduce amount of precipitation from material releases
    - Large quantities of dissolved material were observed in the ICET program which did not form precipitate
- Results of testing to be used as an enhancement to the existing plant-specific chemical model evaluations

Program Benefits

(Estimates based on comparison of spreadsheet results to ICET data)

Refinements	**Estimated Plant-Specific Precipitate Reduction**	**Considerations**
Silicate inhibition of aluminum corrosion	50-90% reduction	Applicable for “high silica” plants
Corrosion for plant-specific aluminum alloys	60-80% reduction	Need to identify alloy types in containment
Phosphate inhibition of aluminum corrosion	70-90% reduction	Applicable for plants with TSP buffer
Evaluation of solubility limits for key precipitates	Potentially >50%	Dependent upon specific chemistry conditions, applicable for plants with low-to-moderate precipitate burdens

Project Schedule

- Project Start 12/15/06
- Issue Final Test Plan/Begin Testing 01/19/07
- Completion of Bench Scale Tests 03/30/07
- Issue Final Topical Report 05/15/07

Program Implementation

Potential plant actions required in order to implement results of the testing may include:

1. Identification of alloy types for significant sources of aluminum metal in containment
2. Evaluation of time-dependent silicate concentrations post-LOCA using the chemical model spreadsheet
3. Consideration of recirculation spray operation to confirm exposure of aluminum to spray containing either silicate or phosphate