Buffering Agents and GSI-191 Chemical Effects

Buffer Agent Activities

- PWROG program completed to consider alternative buffering agents to reduce the potential for post-LOCA chemical precipitation
- WCAP-16596, “Evaluation of Alternative Emergency Core Cooling System Buffering Agents,” issued July 2006
- One utility submitted License Amendment Request (LAR) to change buffering agent based on WCAP-16596 results

Buffer Agent and GSI-191 Chemistry

- Post-LOCA chemical precipitation potential concern for sump screen head loss and downstream effects
  - Trisodium phosphate (TSP) buffer + calcium-containing insulation = calcium phosphate
  - High pH of sodium hydroxide (NaOH) solution + aluminum metal and/or fibrous insulation = aluminum oxyhydroxide and/or metal aluminosilicates
- Recommended solutions from WCAP-16596
  - Replace TSP with sodium tetraborate (NaTB) which does not contain phosphate
  - Replace NaOH solution with sodium metaborate (NaMB) solution to mitigate high pH sump solution

Favorable Buffer Scenarios

- TSP without significant sources of calcium (such as Cal-Sil insulation)
  - TSP was shown in WCAP-16596 to cause the least Al corrosion
- Sodium tetraborate is recommended for most plant debris mixes
  - WCAP-16596 demonstrated to be a good alternative to TSP for plants with large calcium dissolution
  - NUREG/CR-6913 observed limited impact on head loss from combination of NaTB and either Al or NUKON/Cal-Sil debris mixes
- NaOH for plants with limited fiberglass and aluminum metal inventories
- Sodium metaborate recommended by WCAP-16596 as replacement because can be used as a solution at a lower pH than NaOH