

12

From: "Sprung, Jeremy L" <jlsprun@sandia.gov>
To: "Guttman, Jack" <JXG@nrc.gov>
Date: Thu, Jan 31, 2002 6:09 PM
Subject: Preliminary Milestone chart (schedule and costs) for the sabotage program is attached

<<PlaneCrashGuttman.xls>>

Jack: What we send you late next week or early the following week should look a lot like this but not be identical to this. Jeremy Sprung

Portions Ex 2

E/12

Task
Task 1.1: Large Plane Crash (if possible, otherwise a
 Initial NRC Briefing (model description, scenario specifications)
Mechanical Analysis
 (Deformable plane into field of casks represented by force transducers
 Detailed PRONTO Models
 HI-Storm Cask
 Engine
 Landing Gear
 PRONTO Cask Collision Calculations
 Engine + Cask
 Landing Gear + Cask
 Detailed CTH Models
 Center fuel tank + fuel
 CTH/PRONTO Cask Collision Calculations
 Center Fuel Tank + fuel + force transducer for Cask
 PRONTO Calculation with CTH forcing function
 Analysis of Canister Failure
Thermal Analysis
 Estimation of Amount of Fuel in Fireball and Pool Fire
 Estimation of Canister Failure Temperature
 Time to Rod Burst Rupture
 Undamaged Cask (w and wo storage overpack)
 Construct Model
 Run Models
 Damaged Cask: time dependence of rod failure
 Engine Collision
 Construct Model
 Run Model
 Landing Gear Collision
 Construct Model
 Run Model
 Center Fuel Tank Collision
 Construct Model
 Run Model
 Rod-to-cask source term: NUREG/CR-6672 methodology
 (Engine) Scenario
 Other Scenarios
Fission Product Transport through cask (MELCOR)
 100% rod failure, undamaged cask
 Damaged casks
 Engine Scenario
 Landing Gear Scenario
 Center Fuel Tank Scenario
Consequence Calculations (MACCS)
 (Engine) Scenario
 Other Scenarios
 Interim Report (engine scenario)
 Final Report (all scenarios)
 Analytical Tool Demonstrations (Pronto, PThermal, CTH, MELCOR, MACCS)

| MWs | F | M | A | M | J | J | A | S | O | N | D |
|------|---------------------|---|---|---|---|---|---|---|---|---|---|
| 8 | -> (7/28) | | | | | | | | | | |
| 8 | -----> | | | | | | | | | | |
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| 1 | -> | | | | | | | | | | |
| 6 | -----> | | | | | | | | | | |
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| 3 | --> | | | | | | | | | | |
| 2 | -> | | | | | | | | | | |
| 4 | -----> | | | | | | | | | | |
| 6 | -----> (6/14) | | | | | | | | | | |
| 6 | -----> (10/15) | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 96 F | M A M J J A S O N D | | | | | | | | | | |
| 528 | | | | | | | | | | | |

Portions
 1-7

Task
Task 1.2: Crash of a Small Plane
Planes, Explosives, Scenarios
 Survey of Small Planes (number, carrying capacity for construction) that could be used
 Crash Scenarios (speed, angle, fires)
 Plausible Combinations (plane + scenario); modeling needs for each combination
 Justification for neglected features (e.g., plane impact, fuel fires)
 Proposed Modeling Methods
 NRC Review Meeting

Ex 2

| MWs | F | M | A | M | J | J | A | S | O | N | E |
|-------|---|--------|---|---|---|---|---|---|---|---|----------------|
| 6 | | -----> | | | | | | | | | |
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| 1 | | -> | | | | | | | | | |
| 2 | | -> | | | | | | | | | |
| 2 | | | | | | | | | | | -> (5/10) |
| 8 | | | | | | | | | | | -----> |
| 6 | | | | | | | | | | | -----> |
| 4 | | | | | | | | | | | -----> |
| 2 | | | | | | | | | | | -----> |
| 3 | | | | | | | | | | | -----> (10/21) |
| 39 P | M | A | M | J | J | A | S | O | N | E | |
| 214.5 | | | | | | | | | | | |

Modeling
 damage to casks
 Fission Product release to cask interiors
 Fission Product transport through cask to environment (MELCOR)
 Radiological consequences (MACCS)
 Small Plane Crash Report

Total MWs
 \$K @ \$5.5 K/MW

Task
Task 1.3: Simplified Large Plane Model
Model Development
 Definition of Model Capabilities
 Identification of Modeling Methods
 NRC Review Meeting

| MWs | F | M | A | M | J | J | A | S | O | N | E |
|------|---|---|---|---|---|---|---|---|---|---|----------------|
| 3 | | | | | | | | | | | -> |
| 4 | | | | | | | | | | | -----> |
| 3 | | | | | | | | | | | -> (5/10) |
| 8 | | | | | | | | | | | -----> |
| 2 | | | | | | | | | | | -----> |
| 8 | | | | | | | | | | | -----> (10/14) |
| 2 | | | | | | | | | | | -----> (11/18) |
| 30 P | M | A | M | J | J | A | S | O | N | E | |
| 165 | | | | | | | | | | | |

Model Coding and Validation
 Develop Simplified Finite Element Model
 Model Testing
 Model Validation
 Report
 Total MWs
 \$K @ \$5.5 K/MW

Task
Task 2: Weapons, Radioactive Materials, Consequences
Summary Table of Previous Studies
Source Term Methodology
 Form Expert Panel (5 experts)
 Develop Source Term Methodology (3 MWs/expert)
 NRC Review of Proposed Methodology
 Modify Methodology as Required

| MWs | F | M | A | M | J | J | A | S | O | N | D | J | F |
|------|---|---|---|---|---|---|---|---|---|---|---|---|-----------|
| 3 | | | | | | | | | | | | | -> |
| 2 | | | | | | | | | | | | | -> |
| 15 | | | | | | | | | | | | | -----> |
| 7 | | | | | | | | | | | | | -> (4/30) |
| 3 | | | | | | | | | | | | | -> |
| 4 | | | | | | | | | | | | | -----> |
| 6 | | | | | | | | | | | | | -----> |
| 4 | | | | | | | | | | | | | -----> |
| 3 | | | | | | | | | | | | | -> (8/1) |
| 2 | | | | | | | | | | | | | -----> |
| 49 P | M | A | M | J | J | A | S | O | N | D | J | F | |
| 294 | | | | | | | | | | | | | |

Sabotage Table (weapons, materials, source terms, consequences)
 Identify possible weapons and target materials; select weapon/target pairs to analyze
 Use ST methodology to develop STs for each selected weapon/target pair
 Use STs to estimate radiological consequences for each selected weapon/target pair
 NRC Review
 Report
 Total MWs
 \$K @ \$6 K/MW

Options
 Ex 2