**Public Page**
**A New Approach to Control Running Fracture in Pipelines #141**
**Contract Number: DTRS56005-T-0003**
**Battelle**

During the seventh quarter the fracture model was reexamined relative to “first-principles” of mechanics to identify areas for potential improvement. Relative to the materials and their fracture response, two significant observations were considered, namely the relationship identified previously between the fracture toughness as determined by the area under the stress strain curve and the toughness determined by the Charpy impact energy, and the observations and measurements of energy dissipation that due to initiation and propagation during fracture. These observations are of particular interest in regard to the shift from “fracture-controlled” running fracture to “flow-controlled” running fracture. This shift has been driven by the advancement of steel production techniques that have lead to an increase in toughness the newer high strength pipe materials. The limiting toughness for a range of gas pressures and pipe strengths were evaluated. The results established the toughness level at which the fracture shifts from toughness-controlled to flow-controlled. As pressure increases and the pipe material is subjected to increasing stress, the limiting toughness decreases. In addition, as the strength of the pipe material increases the limiting toughness also increases as would be expected. These observations will be further investigated in the next quarter relative to the formulation of an energy dissipation-based arrest model.