TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Date: ____May 14, 2012_____

Lead Agency (FHWA or State DOT): _____Indiana DOT_____

INSTRUCTIONS:
Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.

Transportation Pooled Fund Program Project # *(i.e, SPR-2(XXX), SPR-3(XXX) or TPF-5(XXX)* ***TPF 5(238)***	**Transportation Pooled Fund Program - Report Period:** ☐Quarter 1 (January 1 – March 31) ☐Quarter 2 (April 1 – June 30) ☐Quarter 3 (July 1 – September 30) ☐Quarter 4 (October 1 – December 31)

Project Title:
Design and Fabrication Standards to Eliminate Fracture Critical Concerns in Steel Members Traditionally Classifi Fracture Critical

Name of Project Manager(s): **Tommy E. Nantung**	**Phone Number:** **765-463-1521 ext. 248**	**E-Mail** tnantung@indot.in.gov
Lead Agency Project ID: **TPF-5(238)**	**Other Project ID (i.e., contract #):**	**Project Start Date:** 8/1/2011
Name of Project Manager(s): **Tommy E. Nantung**	**Phone Number:** **765-463-1521 ext. 248**	**E-Mail** tnantung@indot.in.gov

Project schedule status:

X On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
$790,000	**$29,942**	**15%**

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$11,087 (1.4%)	**$11,087**	**19.1%**

Project Description:
The objective of this research project is to take advantage of the major advances that have occurred in the past 30 years in following areas related to fracture control in steel bridges:

1. The very high toughness of high performance steel (HPS), which was not available 30 years ago, can be used to take br fracture off the table so to speak. Crack arrest and very large defect tolerance can be ensured in these steels. Similar stra have been employed by other industries for several years.
2. Modern fatigue design and detailing can ensure fatigue cracking does not occur.
3. Modern fabrication, shop inspection and the AWS FCP, greatly reduces the likelihood that defects are not introduced du Advancements in NDT techniques along with technologies not regularly used, such as phased array UT have the potential further reduce the chance of a defect being missed.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):

- The literature review continues.
- The large-scale experimental program is being refined. The cooling chamber has been designed and has undergone multiple tests. At this time, a full-scale plate girder that is larger than what will be tested, has been successfully cooled to temperature below -60F (Zone III LAST). All minor refinements have been made and the cooling chamber is ready for use.
- The test setup has been refined, specimen dimensions including load frame and actuator placement were investigated.
- Small-scale material testing (CVN, CTOD) continues.
- The research team is working with various steel fabricators and DOT's to obtain "drops" of HPS from bridge projects around the US. The small pieces of HPS will be used for samples to be used in the small scale testing
- Fixtures for loading have been obtained and are in fabrication.
- The syncronization of two hydraulic actuators has begun. The actuators are being connected to the control system to test the ability of running two actuators simultaneously. Such a setup will be used during the fracture test and possibly during cyclic loading.
- Preliminary FE work has begun. Basic fracture mechanics models (i.e., a plate with a center crack or plate with a hole crack) are being created and compared to textbook solutions.

Anticipated work next quarter:

- Continue to refine the testing plan.
- Finalize design of large scale specimens
- Finalize the actuator control program for the fracture tests.
- Take delivery of the large-scale testing fixtures.
- Continue with small-scale material testing.
- Continue to work with DOT's to obtain more "drops".
- Once reliable results are obtained from the preliminary FE studies, more complex models attempting to estimate fracture toughness demands on girders and plates with cracks will be created.

Significant Results:

During the past quarter, the major steps forward included:

1. Finalization of large cooling chamber to ensure large girders can be tested at temperatures of -60F or less has been completed.
2. Initial FE work has commenced.
3. Programming of the hydraulic actuator control program for the fracture test has initiated.

Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the agreement, along with recommended solutions to those problems).

None this quarter

Potential Implementation:

None at this time. Too early in the research.