Department of Transportation
Federal Railroad Administration

1INFORMATION COLLECTION SUPPORTING STATEMENT B
Design and Evaluation of a Robust Manual Locomotive Operating Mode
OMB CONTROL NUMBER 2130-0623

1. Description of sampling method to be used.

Not applicable. The survey method of research is not being used. This research is not a survey but a simulator-research laboratory study therefore no survey sampling method is required. Human subjects will be selected on the basis of locomotive operating experience.

2. Description of procedures for information collection, including statistical methodology for stratification and sample selection.

Each participant will be required for approximately 9.0 hours. The following protocol for the study will include 10 college students and 20 freight locomotive engineers. The operational scenario used in the experiment sessions described below will be representative of typical freight operations. The college students will be used to pilot the data collection methodology only and their performance and data will not be used for analysis.

The first part of the experiment session will be a training session lasting approximately three hours for each participant, so 90 hours in all. Subjects will receive a brief introduction to the CTIL including how to operate the simulator and a description of the train route and nominal train schedule that they will drive during the experiment session.

After the training, subjects will begin an experiment session that is expected to take about six hours each, so 180 hours in all. Subjects will drive the test route a total of four times.

The order of the conditions will be balanced across the subjects, although the project may be constrained by the total number of subjects that are recruited for the study. Drivers will be given an itinerary to follow for each of the four driving sessions which will include many typical events that occur en route such as meets and passes, scheduled stops at specific locations (i.e., to change the consist), or speed restriction changes due to MoW work. The timing and location along the route of these events will differ between the conditions to ensure that subjects do not learn the scenarios and anticipate the critical moments in the test.

During each test session, the subject will also receive instructions from the experimenter (acting as a dispatcher) outlining changes in operating condition. Drivers are expected to remember these changes to act at the appropriate time further down the track. In the test conditions using automation, subjects will have to interact with the automation as needed to ensure the correct control behavior is applied.

At the times when the engineer is waiting for an event to clear or pass, the subject will be asked questions to test their current situation awareness and ability to project to future conditions, such as, What is your current location? and what is the distance to the next stop?

Workload will also be assessed during this pause by the subject rating his/her workload by completing the NASA-TLX subjective rating form to confirm workload measurements derived from the scenario simulated operating task. The rating form will take approximately 1 minute to complete times 30 subjects times 4 scenarios or completions yielding 120 minutes, or about 2 hours in all.

Subjects' driving performance will be measured by the adherence to operational rules, adherence to the schedule, and a measure of situation awareness. After completing the experiment, subjects can ask any further questions about the experimental technology but will be free to leave.

3. Description of methods to maximize response rate and to deal with non-response issues.

Not applicable, laboratory study being conducted. Not a survey

4. Describe any test procedures for procedures or methods to be undertaken.

Not applicable, laboratory study being conducted. Not a survey

5. Provide name and phone number of individuals consulted on statistical aspects of study design and other persons who will collect/analyze information for agency.

No additional consultation beyond original research proposers. However, as required by 45 CFR 46, *Protection of Human Subjects*, the overall study will be presented to an Institutional/Independent Review Board for approval of the study design, collection of experimental data, and procedures for the protection of human subjects.

The total estimated cost to the Government to complete the 2-year study is $990,000 under a cost-share agreement with the researchers to design and develop the prototype system in the first year and to test and evaluate (with human subjects) in the second year.

The point of contact for the study will be:

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