SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2009

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I. PROBLEM NUMBER

GHE-09-02

II. PROBLEM TITLE

Determine Energy and Emission Savings Attributable to the Green Light Weigh Station Preclearance Program

III. RESEARCH PROBLEM STATEMENT

Oregon's Green Light commercial vehicle preclearance program has significant economic and environmental benefits to the State. Expansion of this program is limited by available funding. If emission benefits can be quantified by research, new sources of funding may become available for expansion of the program.
Today we can only estimate the environmental benefits of Green Light. We estimate a 26.6 percent reduction in four health impact pollutants regulated by the Clean Air Act. These pollutants include Volatile Organic Compounds (VOC), Carbon Monoxide (CO), Nitrogen Oxides (NOX), and Particulate Matter (PM10). The Oregon Department of Environmental Quality cautions these are "reasonable estimates". Emissions testing with quantifiable results are necessary for funding proposals. Likewise fuel savings, and by extension carbon dioxide emissions, are currently only estimated while measurement based data is needed.

IV. RESEARCH OBJECTIVES

1. Determine reduction in fuel consumption from trucks not exiting highway, stopping to be weighed and re-entering highway.
2. Determine reduction in health impact pollutants from trucks not exiting highway to weigh and re-entering highway. Pollutants include Volatile Organic Compounds (VOC), Carbon Monoxide (CO), Nitrogen Oxides (NOX), Particulate Matter (PM10), and carbon dioxide emissions.

V. WORK TASKS, COST ESTIMATE AND DURATION

Testing can be accomplished by focusing detailed observations on one green light weigh station as a test site. Other sites can be sampled for comparison to the focal weigh station.

Task 1: Literature Review - $4,000

This data is needed regardless of existing research results. The prior work of others will be used for comparison purposes as well as refinement of methodology.

Task 2: Measurement of Speed Impact of Weigh Station Ingress-Egress - $6,000

Make measurements of the speed of trucks some distance(s) before the weight station, by-passing the weight station when it is open, by-passing the weight station when it is closed, passing through the weigh station, and some distance(s) after the weight station. The average speed of cars with the weight station operating and not operating will also be measured to see if there is possibly a fuel savings effect to be found there as well. These measurements will need to be repeated on different days of the week and at different time of day and with different weather conditions. Part of this data can come from the existing traffic recorders but data on individual vehicles will also need to be collected.

Task 3: Measurement of Fuel Consumption and Emissions - $30,000

Using a small fleet of test trucks, trucks of various configurations will be instrumented to carefully measure fuel consumption and emissions. Several passes through the weight station corridor will be made in both directions with each of these trucks. Some passes will be as Green Light Vehicles and some passing through the weight station. Again, these measurements will need to be repeated on different days of the week and at different times of day and at with different weather conditions. Details of this task's data collection will need to be based on the literature review and consultation with the TAC & DEQ.

Task 4: Measurement of Emissions from Non-instrumented Traffic - $5,000

Measurement of the emissions of the overall traffic flow and the weight station will be made. This will be done

using the remote emissions measurement capabilities that have been developed by numerous researchers and that continue to be perfected. Since individual vehicle emissions are not the objective, no lane constrictions or encroachment of the travel lanes will be required. These measurements will be made both with the weight station operating and with it closed. Once again, these measurements will need to be repeated on different days of the week and at different time of day and with different weather conditions.

Task 4: Sampling at Other Weigh Stations - $10,000

To provide information for extrapolating the data in tasks 2 through 4 to other weight stations, some of the measurements will be duplicated at a variety of other weigh stations around the state. Only a single configuration of truck will be used for this and the observations will only be on a single day. The exact scope of this replication will be determined after task 1 and while tasks 2, 3, and 4 are under way.

Task 5: Data Reduction and Report Writing - $10,000

The data collected in all the tasks will be processes and analyzed and combined into a report. The report will utilized ADT and weight station data to extrapolate the measurements to annual fuel and emission savings for the Green Light Program. Various scenarios of expanding the Green Light Program will also be evaluated for there savings.

Task 6: Research Administration - $7,000

Work Task Cost Estimate Duration	
1. ***Literature Review***	$4,000 2 months
2. ***Speed Impact***	$6,000 8 months
3. ***Instrumented Fuel and Emissions Impact (duration overlaps with task 2)***	$30,000 8 months
4. ***Non-instrumented Emissions Measurements*** (duration overlaps with tasks 2 and3)	$5,000 8 months
5. ***Sampling of Other Weigh Stations*** (duration overlaps with tasks 2 through 4)	$10,000 8 months
6. ***Report***	$10,000 2 months
7. ***Research Administration***	$5,000 16 months
Time & Budget: 12 months & $70,000 (FY09-$58,000; FY10-$12,000)	

VI. IMPLEMENTATION

Research findings will provide scientific data supporting the benefits of the Oregon Green Light Program. Findings will be used to justify adding additional sites. Scientific data is necessary to be eligibility for some funding sources that could help expand the program. For example, funding from "The Climate Trust" requires scientific data involving the reduction of carbon emissions. Research findings will also be shared with other States who utilize weigh-in-motion and weigh station bypass programs to assist in the administration of their programs. Data will be shared with the trucking industry to help them understand the benefits of Oregon's Green Light program.

VII. POTENTIAL BENEFITS

Scientific data related to fuel consumption and diesel emissions related to weighing trucks will help secure funding for expanding ODOT's Green Light Program. By constructing additional sites fewer emissions will be produced and less fuel consumed. The Green Light Program also provides time savings for truckers and possibly for all the traveling public. A side benefit of this research will be the ability to increase participation in the program by more convincingly demonstrating to trucker the benefits of the program in time and fuel savings.

VIII. SUBMITTED BY

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