

Generic Clearance for CDC/ATSDR
Formative Research and Tool Development
Title: Characterization of Haul Truck Health and Safety Issues

Supporting Statement A

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Supporting Statement A

Goal of the study: The goal of this study is to inform future phases of health and safety research for the U.S mining sector by identifying and characterizing health and safety issues related to mine haul truck operators using formative research methods.

Specifically, with this information collection, researchers are hoping to gain a better understanding of



A. JUSTIFICATION

1. Circumstances Making the Collection of Information Necessary

The Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) requests OMB approval of a new generic information collection (GenIC) under the generic information collection entitled *Generic Clearance for CDC/ATSDR Formative Research and Tool Development* for a period of 12-months.

The new GenIC is a task under the NIOSH Pittsburgh Mining Research Division (PMRD), project *Characterizing of Haul Truck Health and Safety Issues*. The project will be conducted by NIOSH under the Federal Mine Safety and Health Act of 1977, Public Law 91-173 as amended by Public Law 95-164 (see Attachment A). Title V, Section 501 (a) states NIOSH has the responsibility to conduct research “to improve working conditions and practices in coal or other mines, and to prevent accidents and occupational diseases originating in the coal or other mining industry (Federal Mine and Safety and Health Act, 1977, Title V, Sec. 501).”

Background

Haul-truck-related accidents continue to be one of the leading health and safety concerns in mining. Haul trucks are the most prevalent piece of equipment, accounting for over 45% of all equipment in the mining industry [3]. In fact, there are estimated to be over 44,500 haul trucks in use worldwide [4]. Additionally, haul trucks accounted for 7 out of 28 and 6 out of 27 mining fatal accidents that occurred in the United States in 2017 and 2018, respectively [5]. However, it is still unclear why these accidents continue to occur and what should be done to prevent and mitigate them.

Previous research has identified many contributing factors to the number of haul-truck-related accident and injuries, including visibility, road conditions, operational conditions, weather, and failures in human performance [6] [7] [8] [9], and most of the haul-truck-related injuries and fatalities have been linked to vehicle control and hazard identification [10] [11]. Further complicating the issue, large blind spots and a fully enclosed and elevated cab force operators to be highly reliant on policies and procedures (e.g., parking, right of way) as well as the information transmitted (e.g., dispatch radio) and presented by technology (e.g., collision avoidance systems) to understand their environment. In this dynamic and ever-changing environment [12] haul truck operators must be constantly vigilant. However, research also suggests that even highly trained safety professionals fail to identify a significant portion of workplace hazards [13]. More work needs to be done to better understand what haul truck operators need to safely operate their vehicles and identify hazards and how it can be achieved through effective interventions.

NIOSH is not alone in identifying haul trucks as a critical issue. The Mine Safety and Health Administration (MSHA) has repeatedly called attention to haul truck safety and roadway hazard identification in their “Rules to Live By” [14] and most recently in their powered haulage initiative [15].

NIOSH is well positioned to perform further investigation into haul truck health and safety issues, as it has completed decades of haul truck-related work. Preliminary NIOSH work was done to create a classification system for haul truck accidents [16], develop ergonomic recommendations (e.g. ErgoMine) [17], and assess safety technologies to improve haul truck safety [18] [19] [20]. As a federal research agency, NIOSH will also be able to examine the problem more holistically. NIOSH is an unbiased entity with cross-sector expertise that can also investigate issues at large and small mines alike.

2. Purpose and Use of Information Collection

The purpose of this information collection is to support NIOSH's strategic goal of reducing mineworker's risk of traumatic injuries and fatalities specifically addressing the intermediate goal of the adoption of workplace solutions to eliminate fatalities and injuries related to operating and maintaining mobile and stationary mining equipment. This work supports current and future research of health and safety issues related to haul trucks by identifying research, technology and implementation gaps and could lead to product improvement and development. The key objectives of this work are (1) to gain a better understanding of the goals, skills, challenges, and task requirements for haul truck operators and (2) to learn how haul truck operators respond to challenging or non-routine scenarios and gain a greater depth of knowledge about these scenarios.

Up to 120 semi-structured interviews across 6 surface mine sites will be conducted with individuals about their experiences related to haul truck operations, maintenance, and safety. To capture a variety of perspectives, various members of the mine organization will be invited to participate in the interviews. Participants from each mine site may include haul truck operators, maintenance crew members, operations and maintenance supervisors, and manager/safety professionals. To gain an understanding of both the baseline task requirements for haul truck operators and how operators respond to challenging or non-routine scenarios, two interview instruments will be used. The first interview instrument (see Attachment B) will use cognitive task analysis (CTA) methods to gain understanding of the goals, skills, challenges, and task requirements for haul truck operators. The second interview instrument (see Attachment C) will use critical decision methods (CDM) to gain an understanding of how haul truck operators respond to challenging or non-routine scenarios and gain a greater depth of knowledge about these scenarios. Researchers will ask operators to talk through a particularly challenging scenario, or event, from their own experience. An example of a challenging event may be a near miss, a collision involving property damage, or loss of control due to environmental conditions.

Each interview instrument has questions tailored for the respondent's level within the organization (i.e. operator/crew member, supervisor, management/safety professional). Note that each respondent will be asked for one interview using one interview instrument method (i.e. CTA or CDM, not both). Each respondent will be asked for approximately 1 hour of their time to complete the interview.

The following outlines the data collection processes.

- (1) NIOSH researchers will first contact mining company representatives using a recruitment script (see Attachment D) to determine interest in participating in the research study.
- (2) If a mining company representative expresses interest, NIOSH researchers will work with the mine site management or safety professional to identify potential respondents using a recruitment script (see Attachment E).
- (3) All respondents must give verbal consent to participate in this project. All respondents wishing to participate will be given an informed consent form (see Attachment F).
- (4) NIOSH researchers will conduct an interview with respondents using the CTM interview instrument (see Attachment B) or the CDM interview instrument (see Attachment C).

By using formative research methods, NIOSH and its research partners will have clearer direction and be able to funnel their time and money into haul truck-related health and safety issues more efficiently. The continued presence of haul-truck-related issues highlights the need for a broader approach to this critical problem. Furthermore, improved understanding of the underlying problems related to haul trucks could help direct future intervention development, as the industry is incorporating higher levels of automation, from collision avoidance systems to remote operation and even fully autonomous haulage systems.

If this data collection were not to happen, there would remain a lack of knowledge and understanding of haul truck operator decision making and the adequacy of policies and procedures related to haul truck health and safety. As is evidenced by the continued occurrence of these accidents and injuries, mineworkers would still face high risk situations that have the potential to be mitigated through the development of interventions and controls.

3. Use of Information Technology and Burden Reduction

Data will be collected using two semi-structured interview instruments (i.e., CTA and CDM) for 100% of participants (see Attachment B and C). During the interview researchers will take written notes as well as audio recordings of participants as a requirement for participation. The audio recording will reduce the burden on participants by limiting the need to write every detail and thus, reducing the length of the interview. The participants will not be required to complete any forms or surveys.

The use of technology is minimal for this data collection effort because of the nature of the instrument. Semi-structured interview instruments typically require direct (face-to-face) interaction between respondents and the project staff. However, to reduce respondent burden, project staff will travel to a neutral and convenient location at or near the respondent's place of work. Additionally, in some cases, interviews may be conducted over the phone to reduce the overall time spent with the respondent.

The interviews will also be recorded to aid in the review and interpretation of information collected. Continual analysis of the information collected will allow project staff to determine if the data has reached saturation (e.g. reoccurring themes and patterns within the data) and will allow the project staff to reduce any unnecessary additional information collections beyond the saturation point. Burden to the participants is also being reduced because the data collection will be conducted during normal work hours.

4. Efforts to Identify Duplication and Use of Similar Information

A literature review found no instances of similar information to be available. As briefly described above, NIOSH, MSHA, and other researchers have looked at haul truck health and safety issues. Previous NIOSH work was done to create a classification system for haul truck accidents [16], develop ergonomic recommendations (e.g. ErgoMine) [17], and assess safety technologies [18] [19] [20] to improve haul truck safety. However, no work could be found that looked at the cognitive and situational awareness requirements of haul truck operators nor the adequacy of related policies and procedures. This is supported by the fact that MSHA also issued a related request for information (RFI) on powered haulage [15] and no comments address these issues either. Members of the project team also attended the public meetings associated with the MSHA RFI as well as several annual conferences including the Society of Mining, Metallurgy, and Exploration to discuss issues with researchers, associations, and mine operators their knowledge of the area. Though the literature identified does not contain similar

information, it will be used in conjunction with the results of this study for intervention improvement and development. Ultimately, having a better understanding of the underlying goals, decisions, and requirements of haul truck operators is critical to understanding *why* haul truck injuries and fatalities continue to occur.

5. Impact on Small Businesses or Other Small Entities

This data collection will not involve small businesses.

6. Consequences of Collecting the Information Less Frequently

This request is for a one-time data collection. Each respondent will be asked for one interview utilizing one interview instrument method (i.e. CTA or CDM, not both). Each respondent will be asked for approximately 1 hour of their time to complete the interview. To our knowledge, there are no legal obstacles to the collection as planned.

7. Special Circumstances Relating to the Guidelines of 5 CFR 1320.5

This request fully complies with the regulation 5 CFR 1320.5

8. Comments in Response to the Federal Register Notice and Efforts to Consult Outside the Agency

8a. A 60-day Federal Register Notice (FRN) is not required for a Generic Clearance submission

8b. MSHA was consulted on their work related to the powered haulage. Their input was used to identify potential near-miss and serious events that will be explored with the CDM. MSHA has been kept updated on the progress through formal and informal meetings such as the NIOSH automation and emerging technologies partnership meeting to be held in the summer of 2020.

9. Explanation of Any Payment or Gift to Respondents

Respondents will not receive any payments or gifts. The data collection will be conducted during normal work hours and therefore does not create any additional burden for the participants.

10. Protection of the Privacy and Confidentiality of Information Provided by Respondents

NIOSH's Information Systems Security Officer reviewed this submission and determined that the Privacy Act does not apply. The proposed study does not involve the collection of personally identifiable information or sensitive data. Participants will not be required to use their names during the interviews.

11. Institutional Review Board (IRB) and Justification for Sensitive Questions

IRB Approval

This study has been determined by the NIOSH IRB to be an exempt category of research involving human subjects. The IRB approval letter and exempt determination is included as an attachment to this statement (see Attachment G).

Sensitive Questions

This data collection does not require participants to answer questions of a sensitive nature.

12. Estimates of Annualized Burden Hours and Costs

12a. The proposed research study involves conducting one-time, semi-structured interviews with a maximum of 96 mine haul truck operators, and one-time semi-structured interviews with a maximum of 24 mine supervisors/managers/safety professionals or individuals who oversee haul truck operations. Note that each mine haul truck operator respondent will be asked for one interview using one interview instrument method (i.e. CTA or CDM, not both). Mine supervisors/managers/safety professionals wishing to take part in the interviews will be asked for one interview using only the CTA method. Each respondent will be asked for approximately 1 hour of their time to complete the interview. Additional estimated burden for recruitment and informed consent of each respondent is shown in table 1 below.

Table 1. Estimated Annualized Burden Hours

Types of Respondents	Form Name	No. of Respondents	Average Burden per Response (in hours)	Total Burden (in hours)
Mine Haul Truck Operators	Cognitive Task Analysis (CTA) Interview (Attachment B)	48	1	48
Mine Haul Truck Operators	Critical Decision Method (CDM) Interview (Attachment C)	48	1	48
Mine Supervisors, Managers, or Safety Professionals	Cognitive Task Analysis (CTA) Interview (Attachment B)	24	1	24
Total				120

12b. The annualized cost to the respondent is shown in Table 2. The United States Department of Labor, Bureau of Labor Statistics, May, 2018 (https://www.bls.gov/oes/2018/may/naics3_212000.htm) data were used to estimate the median hourly wage rate for occupations within the occupational code NAICS 212000 – Mining (except Oil and Gas).

Table 2. Estimated Annualized Burden Costs

Type of Respondents	Form Name	No. of Respondents	Avg. Burden per Response (in hours)	Total Burden Hours	Hourly Wage Rate	Total Respondent Costs
Mine Haul Truck Operators	Cognitive Task Analysis (CTA) Interview (Attachment B)	48	1	48	\$20.80	\$998.40
Mine Haul Truck Operators	Critical Decision Method (CDM) Interview (Attachment C)	48	1	48	\$20.80	\$998.40
Mine Supervisors, Managers, or Safety Professionals	Cognitive Task Analysis (CTA) Interview (Attachment B)	24	1	24	\$54.93	\$1,318.32
Total	--	--	--	--	--	\$3,315.12

13. Estimates of Other Total Annual Cost Burden to Respondents or Record Keepers

This data collection does not involve other annual cost burdens to respondents or record keepers.

14. Annualized Cost to the Government

Data will be collected over a 12-month period. Table 3 shows the estimated annualized cost to the Federal Government over the 12-month data collection period. Hourly rates for CDC/NIOSH employees were obtained from the 2020 General Schedule Pay Table (https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/salary-tables/pdf/2020/GS_h.pdf).

Table 3. Annualized Costs to the Government

Personnel	Hours	Hourly Rate	Data Collection, Analysis, and Writing Costs	Travel Costs	Total
Mechanical Engineer (GS 12-1)	640	\$31.70	\$20,288	\$10,000	\$30,288
Associate Service Fellow (GS 12-1)	640	\$31.70	\$20,288	\$10,000	\$30,288
Computer Engineer (GS 13-1)	640	\$37.70	\$24,128	\$10,000	\$34,128
Behavioral Research Scientist (Contractor)	320	\$93.75	\$30,000	\$10,000	\$40,000
Branch Chief/Behavioral Research Scientist (GS 15-1)	80	\$52.40	\$4,192	N/A	\$4,192
Total Cost	2,320	--	\$19,695.50	\$40,000	\$138,896

15. Explanation for Program Changes or Adjustments

This is a new data/information collection.

16. Plans for Tabulation and Publication and Project Time Schedule

All activities for the project are expected to be completed within 12 months. One year of clearance is being requested for research activities. Table 3 outlines the project schedule.

Table 3. Project Timeline

Project Time Schedule	
Activity	Time Schedule
Recruitment/ Mines contacted to schedule interviews	1-7 months after OMB approval
Data collection/Conduct interviews	1-9 months after OMB approval
Data analysis/Coding and descriptive statistics	2-10 months after OMB approval (ongoing process)
Reporting and synthesis for the next phase of the study	11 months after OMB approval

17. Reason(s) Display of OMB Expiration is Inappropriate

The display of the OMB expiration date is not inappropriate. No written materials will be given to participants. Expiration date can be added to IRB consent, but written copies are likely to be refused due to data collection location (e.g., miners may not want extra paper while traveling around the mine site).

18. Exceptions to Certification for Paperwork Reduction Act Submissions

There are no exceptions to the certification.

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