US Department of Transportation
Office of Hazardous Materials Safety

RESEARCH & DEVELOPMENT
ROUNDTABLE

October 24th, 2019

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

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Office of Hazardous Materials Safety

RESEARCH & DEVELOPMENT

Program Overview

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

ABOUT OHMS R&D

- OHMS Mission: Protect people and the environment from the risks of hazmat transportation
- $7.5M/year R&D budget
- 2 dedicated staff members, 20+ technical experts
- Current research portfolio contains a vast number of topics (explosives, aerosols, medical waste, lithium batteries, cylinders, cargo tanks, risk assessments, among others)

PROGRAM STAFF

Rick Boyle, Chief

Eva Rodezno, Chemist

GENEROUS VOLUNTEERS

Alex Cheng, Engineer

Britain Bruner, Chemist

Michael Klem, Chemist

Andrea Smith, Engineer

HOW THE MONEY IS SPENT

- Our authorization does not direct us to focus on specific issues (broad)
- Some input given from Congress and other agencies (IAAs)
- Remaining funds:
  - Broad Agency Announcements (BAAs) → a lot
  - Requests for Proposals (RFPs) → rare

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RESEARCH & DEVELOPMENT

2017 BAA AWARDS

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

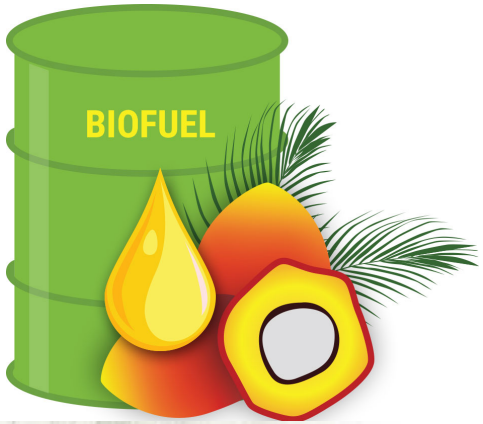
2017 BAA CONTRACT STATUS

- BAA published January 2017 on FedBizOps
- Received 80+ white papers totaling $39M
- Requested full proposals from 30+ white papers
- Awarded 16 research contracts totaling $7M
- Contracts awarded March 2018 to July 2019
- Limits: 2-year project schedule; $1M cost

BIOFUELS

APT Research: Jerry Rufe; jrufe@apt-research.com

- Biofuels can degrade traditional packaging materials, resulting in corrosion and fouling.
- Research will identify packaging material types and handling procedures that keep fuels and packaging from degrading.



BULK EXPLOSIVES TRUCK PACKAGING DESIGN

APT Research: Jerry Rufe; jrufe@apt-research.com

- A containment-at-all-costs approach for explosives truck transport can create explosive overpressure shock waves when a fire is present and the package ruptures.
- Research will develop container designs to reduce the amount of confinement and possibility of detonation from fire.

DAMAGED & DEFECTIVE BATTERIES

APT Research: Jerry Rufe; jrufe@apt-research.com

- Testing the viability of recommended packaging methods for damaged and defective batteries.
- Research will develop standard guidelines and best practices for damaged & defective batteries

COMPOSITE CYLINDER STRESS ANALYSIS

Newhouse Technology: Norman Newhouse; newhousetech@windstream.net

- No easy way to determine if a composite cylinder complies with stress requirements.
- Research will develop a regulatory-agreed upon computer method of evaluating the stress performance of composite cylinder designs.

FIRST RESPONDERS APPLICATION

APT Research: George Mayer; gmayer@apt-research.com

- Need a vehicle/cargo-specific, real-time hazmat app for first responders that can function in a smart city architecture.
- Research will develop a mobile app that will provide real-time information about potential hazmat hazards, including explosive quantity-distances, the potential for a toxic cloud, spill data and other surface danger zone considerations.

LITHIUM BATTERY PACKAGING

Q DOT, LLC: Jim Quintiere; jimq@umd.edu

- Currently no single packaging for lithium ion batteries.
- Research will develop a commercial packaging system for safe shipment of lithium ion batteries and provide input for a new battery packaging standard.

METAL FIRE HAZARD REDUCTION

Fire and Materials Research Laboratory: Elizabeth Buc; ecbuc@fmrl-llc.com

- Research will assess the test method for particulate metals (UN N.1 Test Method for Readily Combustible Solids) to ensure proper hazard characterization and assess technologies aimed to prevent or reduce ignition.
- Research will confirm appropriateness of test method or identify issues and recommend test modifications to addresses shortcomings.

NATURAL GAS HYDRATE TRANSPORTATION

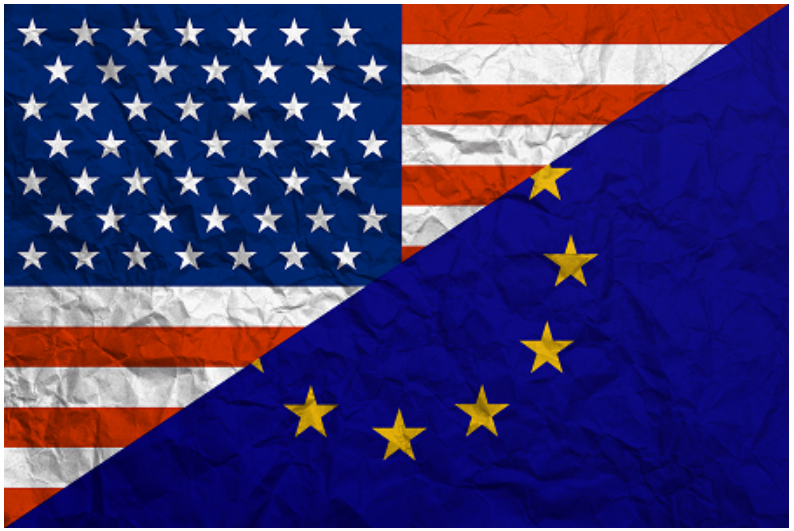
Colorado School of Mines: Carolyn Koh; ckoh@mines.edu

- Novel method of transporting natural gas (naturally and man made natural gas pellets).
- Research will identify pellet characteristics (stability during transport) and identify and address risks associated with transporting NGH pellets.

POLYMERIZING MATERIALS HARMONIZATION

APT Research: Jerry Rufe; jrufe@apt-research.com

- Research is aimed at reducing the uncertainty surrounding polymerizing materials' self-accelerating polymerizing temperature with the goal of aligning US regulations with UN regulations.



CATEGORY A INFECTIOUS SUBSTANCE ANALYSIS

Booz Allen Hamilton: April McDowell; McDowell_April@bah.com

- The type of packaging described for HMR 6.2 Category A infectious waste did not account for the size and magnitude of waste produced in the 2014 Ebola outbreak.
- Research will develop procedural response for handling sudden outbreaks.

HAZMAT COMMUNICATIONS

FACTOR: Ravi Palakodeti;
rpalakodeti@essentialfactor.com

- Need to facilitate timely communications and information exchange of hazmat, especially after an incident.
- Research will develop an integrated platform for sharing transport data (shipping papers) within the transportation system.

HIGH HAZARD SMART RAIL TECHNOLOGY

Vanderbilt University: Mark Abkowitz; mark.abkowitz@Vanderbilt.Edu

- Olin Chemical's high-hazard rail technology detects potential safety issues of railcars in transit and communicates alerts to rail operators, personnel at Olin and other transportation stakeholders.
- Research will assess system transferability to truck and barge modes.

TANK CAR THERMAL PROTECTION

Rutgers University: Xiang Liu; xiang.liu@rutgers.edu

- Research is aimed at developing a new material that exhibits superior thermal protection performance than existing tank car coatings.
- Material can be applied to the outside of a tank car or used between tanks as a thermal insulation layer.

EXPLOSIVES TRANSPORTATION RISK MODEL

APT Research: Katie Byers; kbyers@apt-research.com

- Research is aimed at developing a transportation risk model for the transportation of explosives by truck.
- Assesses the risk to surrounding populations from hazmat transportation.
- If successful, the risk model will be expanded to assess risk of any other “high risk” hazmat.

AUTONOMOUS VEHICLE RISK ASSESSMENT

APT Research: Jerry Rufe; jrufe@apt-research.com

- There is a commercial push to use autonomous vehicles (UAVs) to transport goods, which will likely eventually include hazardous materials.
- Research will define unmanned systems and hazardous materials most likely to be transported; define the risks to be addressed when transporting hazmat by unmanned system.

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RESEARCH & DEVELOPMENT
2019 BAA

U.S. Department of Transportation
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BAA BASICS

BAA 4 STAGE PROCESS

1. Expressions of Interest
2. Development of Concept Papers
3. Review Board
4. Determination and Award

WHY A BAA?

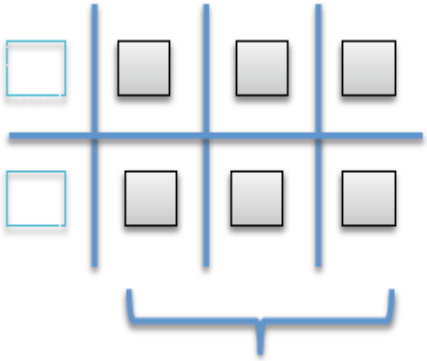
- Our Broad Agency Announcement (BAA) is based off of two of PHMSA's goals:
  - Promote continuous improvement in **safety** performance
  - Invest in safety **innovation** to become more proactive and forward-looking
  - Build stakeholder and public trust
  - Cultivate organizational excellence and safety culture
  - Pursue operational excellence
- We solicit a broad range of ideas

2019 BROAD AGENCY ANNOUNCEMENT PROCESS

Internal Process → **Proposals Collected** → **Research Prioritized** → **Final Selection**

Collaboration with Stakeholders:
Modal Partners
TRB, NTSB
International Partners
Congress
Conferences

Outreach Methods:
FedBizOpps
Website
Email
Events



White papers evaluated on:
1. Relevance to OHMS mission
2. Technical merit to solution proposed
3. Urgency of need

1. Proposals reviewed
2. Internal Determination
3. Research Prioritized

1. PHMSA Management Concurrence
2. Contract Award

OHMS 2019 BAA BASICS

- Topic areas must relate to the transportation of hazmat in commerce
- BAA will open by October 31st and will close by the end of Jan 2020 (white papers) on FedBizOpps
- Individual proposals limited to $3M and 3-year timeline
- Industry and academia welcomed to apply
- Research must improve hazmat transportation safety or must propose innovative (new) materials, methods or processes

2019 BAA TOPIC AREAS

Safety

1) New Standards for Bulk and Non-Bulk Packaging
2) New Default Classification Methods
3) ERG Updates
4) Charge Storage Devices

Innovation

1) Packaging Materials & Designs
2) New Communication Technologies

OHMS BAA LIMITS

- PHMSA/OHMS can only regulate hazmat packages, not the transport vehicle
- This OHMS BAA does not cover the pipeline transportation mode. (Pipeline office within PHMSA has its own separate R&D program).
- OHMS can only regulate hazmat commerce within the transport scheme, no onsite use or storage
- Work proposed must be R&D

DIFFERENCES FROM LAST BAA

- Higher funding amount
- Longer project timelines allowed
- Different topic areas
- Priorities given
- Longer page limits for full proposals
- Evaluation and contracting should go faster this time
- More explanation provided

SUMMARY

- Look for the BAA on FedBizOpps
- BAA open until January 20th, 2020
- Proposals limited to $3M and 3-year schedule
- First step is a 3-page white paper
- Two areas: safety and innovation
- Multiple submissions per vendor allowed
- Limited to industry and academia, small businesses encouraged to apply

CONTACT

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https://www.phmsa.dot.gov/research-and-development/hazmat/research-and-development-branch

If interested in proposing a topic for future research, please contact Rick or Eva

What We are Trying to Prevent