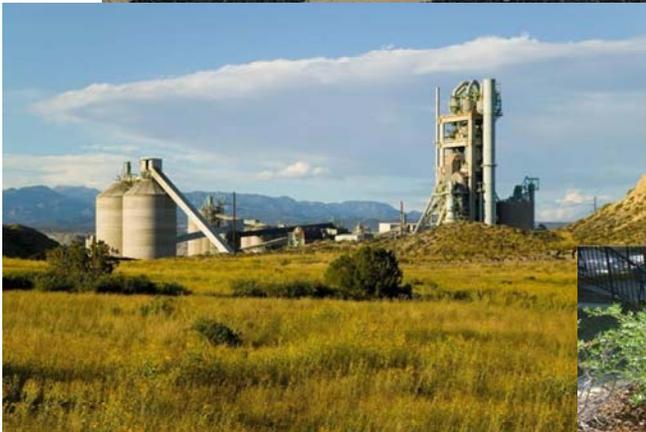




Colorado Department
of Public Health
and Environment

Annual Report

Colorado Waste Tire Market Development Plan Implementation



Prepared for:

Colorado Department of Public Health & Environment
Hazardous Materials & Waste Management Division

Prepared by:

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June 2014



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Appendix A: Technical Trainings, Regulators Meeting (Pre-Conference), and Conference Agendas

ACRONYMS AND ABBREVIATIONS

Acronyms/Abbreviations	Definition
ADC	Alternative Daily Cover
ADEQ	Arkansas Department of Environmental Quality
ASTM	ASTM International
CDPHE	Colorado Department of Public Health and Environment
CDOT	Colorado Department of Transportation
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
IEPA	Illinois Environmental Protection Agency
NDEQ	Nebraska Department of Environmental Quality
ND Department of Health	North Dakota Department of Health
Oklahoma DEQ	Oklahoma Department of Environmental Quality
RMA	Rubber Manufacturers Association
RTD	Regional Transportation District
SWANA	Solid Waste Association of North America
TDA	Tire Derived Aggregate
TDF	Tire Derived Fuel
Tetra Tech	Tetra Tech Inc.
Utah DEQ	Utah Department of Environmental Quality
Wyoming DEQ	Wyoming Department of Environmental Quality

1.0 INTRODUCTION

On behalf of Colorado Department of Public Health and Environment (CDPHE) and the Waste Tire Advisory Committee, Tetra Tech, Inc. (Tetra Tech) completed a Waste Tire Market Development Plan in May 2013. The Waste Tire Market Development Plan presented an approach for achieving 100 percent reuse or recycling of the state's stockpiled, monofilled, and annually generated waste tires by 2024.

Tetra Tech, located in Denver, was awarded a contract by CDPHE in January 2014 to implement the approach described in the Waste Tire Market Development Plan with the goal of advancing CDPHE's waste tire market development. The initial contract period of performance was January 27, 2014 to June 30, 2014, which is the timeframe specified CDPHE's initial contract with Tetra Tech for this project. This Annual Report summarizes the work completed on the project to date. The Tetra Tech team in place for this work includes Terry Gray (TAG Resource Recovery), Mary Sikora (Recycling Research Institute), Dr. Dana Humphrey (University of Maine), Karmen Griffith (Tetra Tech), and Scott Tracy (Tetra Tech).

Priority was placed on tasks that would best advance the waste tire market development goal. Tasks discussed in this Annual Report are expected to carry on into the next fiscal year.

The implementation steps taken thus far under the contract are pursuant to the CDPHE and Tetra Tech contract, and are organized around four main tasks:

- Task 1: Technical Trainings
- Task 2: Technical Assistance and Identification
- Task 3: Annual Statewide Conference on the Use of Tire-Derived Materials
- Task 4: Assistance in the Development of the Waste Tire Fund Programs

The scope, timeframe, details, and results associated with the project tasks are presented in this Annual Report.

2.0 SCHEDULE

The Waste Tire Market Development Plan lays out steps leading to the beneficial use of all waste tires produced and stored in the State of Colorado. As the program advances through the steps, it is important to continue to regularly monitor the results that are being gained as well as existing and new influences, and then adjust activities accordingly to garner the most valuable increases in beneficial use for the state and its citizens. Some efforts can lead to new technologies while others lead to expanded end uses with existing entities. Many of the steps need to be advanced iteratively while monitoring the resulting change in beneficial use capacity. Some steps may lead to more beneficial use than predicted, other steps may consume less than intended. Waste tire market development is a marathon, not a sprint, and requires a thoughtful plan, experience, and perseverance.

The steps presented on the Gantt chart, presented as Figure 1, were considered necessary to connect the organizations, people, information, and funding needed to capitalize the opportunities presented in the Waste Tire Market Development Plan during the initial period of performance for this contract from January 27, 2014 through

June 30, 2014. All tasks were coordinated with CDPHE and based on the project timeline, priority was placed on those tasks which would have the most impact on advancing market development. Figure 1 depicts the project tasks, timing, interdependencies, and general responsible party for each task. Joint efforts that involve predominantly CDPHE labor with support from Tetra Tech are shown in green on Figure 1; tasks involving primarily Tetra Tech labor are shown in blue. Each task is discussed in detail in Sections 3.0, 4.0, 5.0, and 6.0.

3.0 TECHNICAL TRAININGS

The Tetra Tech team identified and implemented the initial stages of specific training plans to enhance understanding of tire derived aggregate (TDA) usage in civil engineering applications, including highway, landfill, and light rail construction. The objective is to apply TDA where it offers technical and economic advantages versus traditional materials, an approach that is sustainable, controllable, and environmentally compatible on a long-term basis.

The Tetra Tech team completed two technical training sessions in May 2014. The following tasks occurred to support the completion of both technical training seminars.

- Tetra Tech worked with CDPHE, Colorado Department of Transportation (CDOT), and the Solid Waste Association of North America (SWANA) to develop a vision for the training seminars—when and where they would take place, invitees, and the general content of the material that was presented. A significant amount of time was placed on developing content that would appeal to each audience. Tetra Tech developed program agendas based on multiple discussions with CDOT, SWANA, and team members which are included in Appendix A.
- CDPHE provided contact information for CDOT and landfill operators to Tetra Tech. Tetra Tech communicated with the contacts to promote the training sessions and learn what content would be most valuable to the attendees. Tetra Tech maintained communication throughout the planning phase to ensure the project was moving forward. The transportation related technical training session with CDOT required significant coordination efforts by Tetra Tech to the move the session forward.
- Tetra Tech developed training materials (including visual presentations and written materials) for both technical training sessions. These materials included a TDA technical reference book that covers major applications and basic design data required for TDA usage including lightweight embankment fill, retaining wall backfill, drainage applications, and layers to limit frost penetration. The SWANA training included information on alternative daily cover (ADC), leachate ponds/cells, and methane gasification. The CDOT training included information on vibration dampening techniques and projects utilizing TDA.

The following sections discuss each training session including attendees, content, and feedback.

3.1 LANDFILL APPLICATIONS OF TDA

The landfill applications of TDA technical training session, including members of SWANA, was held on May 28th at Geotech Environmental Equipment Inc. located at 2650 E. 40th Avenue in Denver, Colorado. This technical training session had 18 attendees. The Tetra Tech team in attendance included Dr. Dana Humphrey, Terry Gray, Mary Sikora, and Karmen Griffith. Affiliations of attendees, not including CDPHE and Tetra Tech, are presented in Table 1:

Table 1: Landfill Applications of TDA Technical Training Session Attendee Affiliations

Golder Associates	Montezuma County	Waste Management
Logan County Landfill	Swift River Environmental	Weaver Boos
Mesa County Solid Waste		

Dr. Humphrey presented a short course that focused on civil engineering applications of TDA which was specific to landfill applications. The short course covered several topics related to landfill applications of TDA including, but not limited to, the following:

- Introduction of TDA; how it is made and why its use can be beneficial depending on the application
- Overview of TDA use in construction
- ASTM International (ASTM) specifications of TDA
- Engineering properties of TDA
- Use of TDA in landfills
- TDA for septic tank leach fields
- Environmental considerations for use of TDA
- Exothermic reactions in TDA fills

Training evaluation forms were used to evaluate the opinion of attendees. Of the 12 evaluation forms received, the landfill technical training session received nine ratings at 5 and three ratings at 4 (on a scale of 1 to 5 with 5 being the best). Attendees were most interested in the landfill application discussions, case studies, learning about the different types of aggregate, TDA engineering properties, and testing parameters to ensure quality assurance. Suggestions for improvement included:

- Provide real samples of TDA of various sizes
- Reinforce the proper design for use of TDA in the landfill that will not result in future problems (i.e. fires)
- Combine the training session with the waste tire conference

Overall the training session was viewed as a success and the idea of having future sessions was well received by attendees.

3.2 TRANSPORTATION APPLICATIONS OF TDA

The transportation applications of TDA technical training session, including many CDOT employees, was held on May 29th at the Holiday Inn Denver – Cherry Creek located at 455 South Colorado Boulevard in Denver, Colorado. This training session had 30 attendees. The Tetra Tech team in attendance included Dr. Dana Humphrey, Terry Gray, Mary Sikora, and Karmen Griffith. Affiliations of attendees, not including CDPHE and Tetra Tech, are presented in Table 2:

Table 2: Transportation Applications of TDA Technical Training Session Attendee Affiliations

CDOT	El Paso County	RTD Fast Tracks	Yeh and Associates, Inc.
City and County of Denver Public Works	FHWA	Town of Castle Rock	
Colorado Asphalt Pavement Association	Grace Construction Products	Waste Management	

Dr. Humphrey presented a short course that focused on civil engineering applications of TDA and was specific to highway related applications. Information was also provided on molded products using tire rubber. The short course covered several topics related to transportation applications of TDA including the following:

- Introduction of TDA; how it is made and why its use can be beneficial depending on the application
- Overview of TDA use in construction
- ASTM specifications of TDA
- Engineering properties of TDA
- Lightweight and conventional fill beneath roads
- Retaining wall and bridge abutment backfill
- TDA as insulation to limit frost penetration
- TDA for lateral edge drains
- Environmental considerations for use of TDA
- Exothermic reactions in TDA fills

The session was interactive with questions and comments from participants. In addition to the topics above and at CDOT's request, Terry Gray provided a brief overview on waste tire markets, and Mary Sikora presented information on molded products.

Training evaluation forms were used to evaluate the opinion of attendees. Of the 15 evaluation forms received, the transportation technical training session received five ratings at 5 and nine ratings at 4 (on a scale of 1 to 5 with 5 being the best); one form did not have a rating listed. Attendees were most interested in the fill engineering technical evaluations, structures and landslide installations, engineering properties, conventional fill applications, retaining wall backfill applications, and the case studies. Suggestions for improvement included:

- Provide a list with more common uses and applications
- Provide additional civil applications (i.e. drainage)
- Include a participant from every discipline (i.e. engineering, constructions, bridge, environmental, etc.)

Overall the training session was viewed as a success by the attendees and the idea of having future sessions was well received by attendees.

Tetra Tech, working with CDPHE, will offer subsequent technical assistance to attendees to advance TDA evaluation and field usage in specific applications. Specific projects have not been identified and additional follow-up is planned. Next steps for this task will include reaching out to technical session attendees to identify potential projects for TDA applications.

During implementation of these trainings, additional training opportunities were identified including a possible subsequent training session for SWANA in October, 2014. Trainings with bridge design groups and county/city highway engineers will also be explored further and implemented as appropriate based on findings.

Civil engineering applications represent a potentially high volume market for Colorado's waste tires. Development of civil engineering applications for TDA is an evolutionary process starting with the initial training sessions previously discussed. The Tetra Tech team initiated follow up discussions to identify specific projects for consideration and analysis. These projects may have implementation schedules one to three years in the future and will provide the foundation for additional projects on a continuing basis.

Economics ultimately dictate the viability of this market. The Tetra Tech team will focus on identifying projects that use TDA to displace higher cost alternatives. Major challenges include an understanding of the logistics and economics associated with processing, storing, and transporting potentially large quantities of TDA for use in a short period of time for major projects. The inherent lag time associated with these projects requires planning and coordination of resources, materials, and public and private sector project participants locally, regionally, and often statewide. Smaller initial applications can help develop the infrastructure and experience required for larger projects and serve as a baseline for development of this market.

4.0 TECHNICAL ASSISTANCE AND IDENTIFICATION

In the Waste Tire Market Development Plan, the Tetra Tech team presented a plan which identified basic characteristics of major waste tire product markets and proposed a plan to define existing and potential waste tire product markets in Colorado and provide technical assistance and tools to accelerate development of multiple segments within each market. The technical training sessions previously discussed represent one component of the coordinated approach.

Another part of the plan involved identifying entities for technical assistance in each market segment. The following sections discuss the major areas of focus with regard to technical assistance and identification.

4.1 TIRE DERIVED AGGREGATE

The Tetra Tech team initiated discussions with Colorado Counties, Inc. and Colorado Municipal League regarding the opportunity for outreach to their members which include Colorado counties and municipalities. Counties and cities have jurisdiction over many local roads and offer the potential to shorten the lead time for implementing projects and increasing the number of TDA projects. Building upon the foundations established in 2014, Tetra Tech plans to conduct additional TDA training sessions for county and city engineers and continue discussions which may lead to presentations and further outreach in fiscal year 2015.

Tetra Tech spoke with representatives of the Regional Transportation District (RTD) prior to the statewide conference and then again during the CDOT TDA technical training session. As a result of the discussions, a supplemental presentation was conducted for approximately 18 RTD personnel regarding historical and planned

usage of TDA in vibration dampening light rail applications. Additional discussions of TDA applications will continue to be explored in the next fiscal year.

4.2 TIRE DERIVED FUEL

Energy utilization is currently the largest waste tire market in Colorado. Expansion of this market can play an important role in abatement of monofills and stockpiles. The Tetra Tech team visited current and potential waste tire energy users in Colorado. Tetra Tech will continue to assist this market segment with the goal of advancing market development for the beneficial end use of tires.

Tetra Tech conducted discussions with the three cement plants in Colorado as well as the operators of the pyrolysis plant currently in testing phase. Future discussions and site visits are anticipated for fiscal year 2015.

Steel mills are considered to be a material recovery application because they use tires more for their carbon content required in steel composition as well as their energy content. Discussions with biomass facilities and the Colorado steel mill are planned for fiscal year 2015.

4.3 CRUMB RUBBER

Tetra Tech visited a crumb rubber manufacturer and a rubber molding facility in Denver to gain an understanding of the capabilities and needs for further developing and expanding these emerging market opportunities in Colorado. Tetra Tech plans to initiate communications with entities related to these markets, including but not limited to, processors, manufacturers, end-users, compounders, product designers, and testing facilities during fiscal year 2015.

A local molder, installer, and end user were featured speakers at the Colorado Waste Tire Conference to increase awareness of ground rubber markets in Colorado.

The Tetra Tech team identified tools and resources to assist in development of ground rubber markets in the future. These include:

- a. Assisting in the evaluation and documentation of product testing, and appropriate modification of equipment and/or operating procedures.
- b. Defining additional molding or processing equipment needed to initiate commercial production and use.
- c. Exploring tools to enhance acceptance of ground rubber products by public and private purchasers. For instance, some states have evaluated products and applications using ground rubber, developing written summaries, and recognizing the products for procurement under applicable state-wide procurement or subsidy programs.
- d. Identifying and participating in local recycling exhibits or meetings to expose a broad range of commercial products made from scrap tires in Colorado.
- e. Assisting product manufacturers in improving product quality to broaden product acceptability.
- f. Featuring markets and products at the Annual Statewide Conference.

4.4 OUTLOOK FOR 2015

The Tetra Tech team visited waste tire processors in Colorado and will continue discussions moving forward into the next fiscal year. Additionally, CDPHE is regularly contacted by companies and individuals interested in promoting products, establishing facilities, and participating in Colorado's waste tire industry. At CDPHE's request, Tetra Tech has held discussions with seven entities with the goal of offering assistance, comments, and suggestions. The Tetra Tech team will continue to assist CDPHE with follow-up and analysis of potential diversification of the Colorado marketplace.

The Tetra Tech team plans to expand the technical assistance program with alternate approaches including webinars, development of best practices, marketing training sessions, and standards/testing identification training

5.0 STATEWIDE CONFERENCE ON THE USE OF TIRE DERIVED MATERIALS

This task involved organizing and conducting a first annual statewide conference for the promotion and market development of tire derived materials. The conference, titled *Colorado's Waste Tire Program; Building Markets for Tomorrow*, was held on June 18 and 19, 2014 at the Double Tree Hotel located at 7801 East Orchard Road in Greenwood Village, Colorado. The overarching goal of the conference was to provide a forum for all sectors of the waste tire industry to network while congruently promoting the increased beneficial use of waste tires in Colorado.

The Tetra Tech team and CDPHE worked attentively to develop the vision, scope, location, time, invitees, conference themes, speaker possibilities, content, and schedule for the conference. Entities invited to attend the conference included, but were not limited to, waste tire processors, end users, tire derived product manufacturers, government agencies, and other interested parties which were approved by CDPHE.

Approximately 80 attendees were present and allowed for ample networking opportunities with the goal of enhancing the rate of beneficial end use for waste tires in Colorado. As part of the conference, there were 12 presentations involving waste tire market development areas. Members of the Tetra Tech team participated in four of the presentations. A program agenda is provided in Appendix A. Presentations at the conference included the following:

- Colorado's Waste Tire Legislation
- Colorado's Waste Tire Program Overview and Update
- Colorado's Market Development Plan
- Highway Construction with TDA
- Landfill Applications with TDA
- Sports and Playground Surfacing and the Crumb Rubber Market
- Recycled Rubber Molded Products
- Rubber Asphalt Products
- Tire Derived Fuel
- Strategies for Monofill Utilization

- Regional Update on Waste Tire Management Programs from Colorado, Illinois, Oklahoma, and Utah
- A National Perspective on Scrap Tire Markets

Another beneficial aspect of the conference was that it allowed waste tire industry vendors an opportunity to exhibit their abilities, products, services, etc. through eight exhibitor booths located outside the main conference area. Exhibitors included CDPHE, Rubberosion, Front Range Tire, ECO Green Equipment, Tetra Tech, Granutech Saturn, Scrap Tire News, and Columbus McKinnon Corporation. Networking opportunities were strategically provided throughout the conference and attendees were able to learn more about key industry players in the shredding equipment, informational, waste tire processing, rubber molded products, and professional services for the waste tire industry.

In addition to the main conference, a pre-conference regulatory meeting was held on June 17, 2014 at the Double Tree Hotel. Agencies present for the pre-conference regulatory meeting included the Arkansas Department of Environmental Quality (ADEQ), Illinois Environmental Protection Agency (IEPA), Nebraska Department of Environmental Quality (NDEQ), North Dakota Department of Health (ND Department of Health), Oklahoma Department of Environmental Quality (Oklahoma DEQ), Utah Department of Environmental Quality (Utah DEQ), and Wyoming Department of Environmental Quality (Wyoming DEQ), and the United States Environmental Protection Agency (EPA). Each state was invited to present information on their waste tire program. The agenda is provided in Appendix A. The forum provided the states' an opportunity to discuss successes and challenges within the regulatory framework and get a sense of the regional demands in the waste tire industry. The meeting provided a framework for future meetings and the opportunity to learn and work together was welcomed by all regulators. Moving forward, Tetra Tech will assist CDPHE on determining the frequency and type of regulatory meetings.

6.0 ASSISTANCE IN THE DEVELOPMENT OF WASTE TIRE FUND PROGRAMS

The Tetra Tech team assisted in the review of previous statutes and regulations, identified alternatives for consideration during development of statutory revisions, and assisted CDPHE during legislative preparation and discussion. The new statutes have passed and were signed by Governor Hickenlooper on June 6, 2014. The Tetra Tech team has been tasked to assist CDPHE in its initial development of regulations required to implement the statutory framework. Under this task, the Tetra Tech team was charged with research, data collection and analysis, and asked to make recommendations regarding modification of existing programs, and for the development of future programs created under CDPHE Waste Tire Program. The new statutes significantly changed the historical fund structure.

6.1 ASSIST IN THE DEVELOPMENT OF THE WASTE TIRE CLEANUP FUND

Under the new statutes CDPHE is charged with developing and implementing a coordinated statewide program. Legislation is in place concerning the cleanup of illegally disposed waste tires. The cleanup program is designed

to provide a mechanism for removal of existing stockpiles as well as amnesty events to encourage proper disposal of miscellaneous tires accumulated by local residents. CDPHE is charged with encouraging recycling and constructive reuse of these waste tires. Waste tire funds can be used to pay for the retrieval, transport, and recycling of waste tires at approved storage, disposal, or recycling facilities. Steps have recently been initiated to develop and implement the new statutes signed on June 6, 2014.

Under this task, the Tetra Tech team conducts research, collects, and analyzes data to assist CDPHE in developing regulations and procedures for implementation of these new statutes. The tasks include:

- Revision of regulations governing this scope of activities has been initiated, including an enforcement policy for cleanups of illegal waste tire sites.
- Developing a statewide abatement list involves identifying, quantifying, characterizing, and prioritizing stockpiles. An abatement list has been initiated and will continue to evolve as additional stockpiles are identified and prioritized for cleanup. Coordination and collaboration with statewide entities will assist in identification of stockpiles.
- Tetra Tech, CDPHE, and Douglas County personnel conducted site visits to two illegal stockpiles in May 2014. The stockpiles, considered small compared to other known stockpiles in Colorado, were added to Colorado's stockpile inventory which seeks to identify all illegal accumulations in the state regardless of size. Identification of the stockpiles is important to forward movement of this task. While characterizing stockpiles, special attention is paid to factors related to their environmental and population impact, as well as practical factors associated with their subsequent stabilization and abatement.
- Developing procedures and supporting materials for selecting prequalified stockpile abatement contractors. Initial procedures and associated materials has been initiated. Examples of similar programs in other states have been evaluated and representative documents have been obtained to assist in developing specific documents and procedures for Colorado. A suitable Request for Qualifications and related contractual documents will be prepared, issued, and evaluated for selection of abatement contractors.
- Development of a statewide communication program is underway. The objective is to establish an interactive communication channel for waste tire related issues.
- Consideration of community cleanup events program has also been initiated. The objective is to provide a mechanism for proper disposal of small quantities of tires in public hands on a one-time basis while preventing potential abuse.

Initial progress has been made on all of these tasks and progress will accelerate in the next fiscal year.

6.2 ASSIST IN THE DEVELOPMENT OF WASTE TIRE MARKET DEVELOPMENT FUND

The Waste Tire Market Development Fund was impacted by the new statutes. The Tetra Tech team has conducted activities in support of recommendations, legislation discussion, and possible future fund development. Strengths and weaknesses of programs, as well as their applicability to Colorado's unique conditions and needs, were identified and evaluated in other states including Kentucky, Illinois, Minnesota, California, and Missouri.

Benefits and drawbacks of a "Loan to Grants" Program were identified and discussed. Additional effort may focus on identifying advantages and practical limitations of these programs in the limited number of states with this experience.

Depending on the future viability and resources of this fund, the Tetra Tech team may continue to assist CDPHE in the development of grant programs for this fund. The objective is to maximize the long term market development value of the grants. Examples that have been identified include demonstration of innovative products and applications that offer significant potential expansion of waste tire usage in Colorado. Another alternative involves repeated grants for similar installations within a defined period of time to achieve geographic diversity or create a critical market mass to encourage processor investment to serve the emerging market.

6.3 ASSIST IN THE DEVELOPMENT OF THE LAW ENFORCEMENT GRANT FUND AND WASTE TIRE FIRE PREVENTION FUND

Specific tasks, including the evaluation of the benefits of developing and implementing a training curriculum on law enforcement and fire prevention as it relates to waste tires, were initially envisioned for these two funds; however, the new statutes merged and significantly changed these funds. Tetra Tech will assist CDPHE in reviewing the optimum restructuring of objectives, priorities, and plans. For fiscal year 2015, these funds will be combined with the Waste Tire Cleanup Fund.

6.4 ASSIST IN THE DEVELOPMENT OF THE PROCESSORS AND END USERS FUND

Under this task, the Tetra Tech team is assisting CDPHE in developing regulations and a reimbursement structure for this Fund. States with reimbursement programs have been identified and their historical performance was assessed. Discussions are continuing to develop a regulatory framework and reimbursement mechanism for Colorado that avoids the shortcomings experienced by other state programs. A Processor and End User Reimbursement model will be developed to assess and demonstrate the viability of program alternatives. This model guidance document is designed to reflect historical experience, allow for significant future market changes and provide a predictable reimbursement without exceeding Fund resources.

The Tetra Tech team will continue to assist CDPHE with this task.

6.5 STATUTORY AND REGULATORY REVIEW OF THE WASTE TIRE PROGRAM

Under this task, the Tetra Tech team has assisted CDPHE in review of statutory and regulatory changes to the Waste Tire Program to provide input and make recommendations on the administration and implementation of the program. The Tetra Tech team is continuing to assist CDPHE in its initial development of regulatory modification required for implementation of the new statutes and will continue the process through stakeholder and legislative review. The Tetra Tech team has provided input based on knowledge of strengths and weaknesses of numerous other state programs and recognition of Colorado's unique needs. This effort will continue to move forward during the next fiscal year.

7.0 CONCLUSION

The Waste Tire Program operates within the Hazardous Materials & Waste Management Division of CDPHE to allow the program to streamline and increase efficiency. Through technical trainings, technical assistance and identification, annual educational and networking forums, and further development of the Waste Tire Program funds, substantial progress will continue in the promotion and advancement in the waste tire industry for the beneficial end use of waste tires.

FIGURE 1
CDPHE WASTE TIRE MARKET DEVELOPMENT PLAN IMPLEMENTATION
(One Sheet)

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APPENDIX A
TECHNICAL TRAININGS, REGULATORS MEETING (PRE-CONFERENCE), AND CONFERENCE AGENDAS
(Six Sheets)

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CIVIL ENGINEERING APPLICATIONS OF TIRE DERIVED AGGREGATE

Landfill Focus **Short Course**

Primary Presenter:

Dana N. Humphrey, Ph.D., P.E.
Professor of Civil Engineering
University of Maine

Geotech Environmental Equipment, Inc.
2650 E 40th Ave,
Denver, CO 80205

Wednesday, May 28, 2014

8:30 am to 8:40 am	Welcome - SWANA
8:40 am to 9:00 am	Waste Tire Market Overview and Objectives – Terry Gray
9:00 am to 10:30 am	Introduction to TDA Overview of TDA use in civil engineering Engineering Properties of TDA
10:30 am to 10:45 am	Break
10:45 am to 11:45 am	Drainage layers in leachate collection systems Leachate recirculation trenches Drainage layers in landfill covers
11:45 am to 12:30 pm	Lunch
12:30 pm to 1:45 pm	Gas Collection in landfills Environmental considerations for use of TDA Self-heating reactions in TDA fills Summary
1:45 pm to 2:00 pm	Break
2:00 pm to 3:00 pm	Application Experience in Colorado Regulatory/Permitting Discussion
3:00 pm	Adjourn



Colorado Department
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CIVIL ENGINEERING APPLICATIONS OF TIRE-DERIVED AGGREGATE (TDA)

Road and Highway Focus

Short Course

Presented by:

Dana N. Humphrey, Ph.D., P.E.

Professor of Civil Engineering

University of Maine

May 29, 2014

- 8:30 Welcome (by CDOT/CDPHE)
- 8:40 – 9:00 Broad waste tire market perspective presented by Terry Gray
- 9:00 – 10:15 Short Course by Dr. Humphrey
- Introduction to TDA
- Overview of TDA use in civil engineering
- Engineering properties of TDA
- 10:15 – 10:30 Break
- 10:30 – 12:00 Lightweight and conventional fill for highway embankments and landslide stabilization
- Retaining wall and bridge abutment backfill
- 12:00 – 1:00 Lunch (provided)
- 1:00 – 2:15 Retaining wall and bridge abutment backfill (continued)
- Drainage and insulation layers in roads
- Use of whole tires in highway applications
- Environmental Considerations for use of TDA
- 2:15 – 2:30 Break
- 2:30 – 3:40 Self-heating reactions in TDA fills
- Summary
- Other highway applications of waste tire products presented by Mary Sikora
- 3:40 – 4:00 Discussion of questions and/or projects
- 4:00 Adjourn



Colorado Department
of Public Health
and Environment

WASTE TIRE REGULATORS MEETING

DENVER, COLORADO

June 17, 2014

7:30 a.m. - 9:00 a.m. Registration / Continental Breakfast (in meeting room)

9:00 a.m. State Waste Tire Program Overviews

Each state is invited to give a 10 – 15 minute overview of its waste tire management program. A computer and projector will be available for PowerPoint presentations. Typical topics include:

- Program resources
- Registration, permitting and financial assurance
- Enforcement methods and results
- Product markets and any market development efforts
- Stockpile abatement status, abatement methods and control
- Any other important program information
- Continuing challenges

10:30 a.m. – 10:45 a.m. Break

10:45 a.m. – Noon Completion of Overviews, then Requested Topical Discussions:

- Current markets and trends
- Pyrolysis technology, issues and status
- Used tires- drivers and issues
- Tire and product storage guidelines
- Tire bales - applicability?
- Market development methodology and practice
- Landfill uses of TDA
- Control of tire flow into states and subsidies
- Enforcement on illegal haulers
- Stockpile abatement-legacy & landowner responsibility

Noon – 1:00 p.m. Lunch (provided)

1:00 p.m. – 2:15 p.m. Continuing discussion of topics

2:15 p.m. – 2:30 p.m. Break

2:30 p.m. – 4:00 p.m. Continuing discussion of topics

COLORADO'S WASTE TIRE PROGRAM: BUILDING MARKETS FOR TOMORROW



June 18-19, 2014

Wednesday, June 18th

7:00 am – 8:15 am: Registration / Continental Breakfast

8:15 am – 8:30 am: Welcome and Introduction of Representative Tyler

- Brian Gaboriau – Waste Tire Grants Administrator, Hazardous Materials & Waste Management Division, Colorado Department of Public Health & Environment (CDPHE)

8:30 am – 9:00 am: Keynote Address - Colorado Waste Tire Legislation

One of Colorado's key lawmakers will discuss Colorado's waste tire legislation.

- Speaker: Colorado Representative Max Tyler

9:00 am – 9:45 am: Colorado Waste Tire Program Overview/ Update

The CDPHE's Waste Tire Program continues to evolve. Statutory and regulation changes, grants, enforcement, and marketing of tire derived products are just some of the things we in the Hazardous Materials and Solid Waste Division are working on to improve the overall management and end use of waste tires. In this session, an overview will be provided of where we are as a department in managing the current Waste Tire Program and what we are looking to accomplish in the future.

- Moderator: Brian Gaboriau – CDPHE
- Speaker: Charles Johnson – Program Manager, Solid Waste and Materials Management Program, Hazardous Materials & Waste Management Division, CDPHE

9:45 am – 10:15 am: Colorado's Waste Tire Market Development Plan

60 million waste tires in storage; 5 million newly generated each year. This session will highlight the process used to analyze Colorado's complex, dynamic, multi-element waste tire system; define its influences, risks, interdependencies, and unrealized synergies; and develop a practical sequence for transforming the system into an asset for the citizens of Colorado.

- Moderator: Karmen Griffith – Tetra Tech, Inc.
- Speakers:
 - Scott Tracy – Operations Manager, Tetra Tech, Inc.
 - Terry Gray – Principal, TAG Resource Recovery

10:15 am – 10:45 am: Break

10:45 am – 11:30 am: Highway Construction with Tire Derived Aggregate (TDA)

From lightweight fill to use as drainage and insulating material, TDA has a broad range of applications in highway construction. One of the nation's leading experts on TDA will take you through the engineering properties, benefits of TDA, and will discuss how TDA is performing in road projects across the country.

- Moderator: Terry Gray – TAG Resource Recovery
- Speaker: Dr. Dana Humphrey – Professor of Civil Engineering, University of Maine

11:30 am - 12:15 pm: Landfill Applications for TDA

This session will highlight the use of TDA in various civil engineering applications in a landfill environment. An overview of example TDA projects as well as their historical and potential applicability in Colorado will be presented.

- Moderator: Terry Gray – TAG Resource Recovery
- Speakers:
 - Dr. Dana Humphrey – Professor of Civil Engineering, University of Maine
 - Mark McClain – Senior Program Manager, Golder Associates, Inc.

12:15 pm – 1:45 pm: Lunch

1:45 pm – 2:30 pm: Sports and Playground Surfacing Drive Colorado’s Crumb Rubber Market

High quality, safe playing surfaces are more in demand today than ever before. Also, communities across the country are experiencing increased competition for access to fields. This session highlights how the use of crumb rubber in surfaces – from synthetic turf, to playgrounds, to running tracks, and trails - is helping Colorado field installers and project planners meet the market demand for safety, quality, and accessibility.

- Moderator: Shana Baker – CDPHE
- Speakers:
 - Ryan Farney – Owner, Performance Surfacing & Recreation
 - Christine Fischer – Owner, Fischer Project Management & Consulting Services

2:30 pm – 3:15 pm: Expanding the Potential for Recycled Rubber Molded Products in Colorado

Every day manufacturers are finding new ways to recycled tire rubber in their products. This session examines the fledging rubber products manufacturing initiatives in Colorado and what’s needed to grow this market.

- Moderator: Mary Sikora – Recycling Research Institute, Inc.
- Speaker: Rick Welle – President, Rubberosion, LLC

3:15 pm – 3:45 pm: Break

3:45 pm – 4:30 pm: Taking a New Look at Rubber Asphalt Products for Colorado

For many states, rubberized asphalt is providing economic and performance benefits for their road projects, while other states continue to test the material to see if it works for them. This session will present a general overview of rubberized asphalt, why states are using it, a status update on Colorado rubberized asphalt projects, and its potential future use in the state.

- Moderator: Brian Gaboriau – CDPHE
- Speaker: Doug Carlson – Vice President, Asphalt Products for Liberty Tire

4:30 pm: Daily wrap-up

5:00 pm – 7:00 pm: Reception - Hotel Atrium

Thursday, June 19th

7:00 am – 8:30 am: Breakfast

8:30 am – 9:15 am: Tire Derived Fuel (TDF) Use in Colorado

TDF is the largest market for scrap tires nationwide and in Colorado. This session will discuss technical characteristics, environmental performance of TDF in diverse applications and opportunities for growth in Colorado, then focus on use at Holcim's cement facility in Colorado.

- Moderator: Shana Baker – CDPHE
- Speakers:
 - Terry Gray – Principal, TAG Resource Recovery
 - Joel Bolduc – Senior Environmental Specialist, Holcim (US), Inc.

9:15 am – 10:00 am: Developing Strategies for Monofill Utilization

This session offers the opportunity to learn about the options available for developing beneficial uses and reducing the number of tires in monofills in Colorado. Representatives of Colorado monofills and CDPHE will discuss the projects, technologies, and planned beneficial uses for the waste tires.

- Moderator: Terry Gray – TAG Resource Recovery
- Panelists:
 - Charles Johnson, CDPHE
 - Trent Peterson, GCC
 - Twylia Sekovec, Resource Management Company

10:00 am – 10:30 am: Break

10:30 am – 11:15 am: Regional Update on Waste Tire Management Programs

A panel of experienced regulators from nearby states will address issues of common interest, alternatives that have been utilized to address these issues and challenges facing the industry and its regulators.

- Moderator: Terry Gray – TAG Resource Recovery
- Panelists:
 - Todd Marvel – Illinois Environmental Protection Agency
 - Deborah Ng – Utah Department of Environmental Quality
 - Ferrella March – Oklahoma Department of Environmental Quality
 - Shana Baker – CDPHE

11:15 am – 11:45 am: Scrap Tire Markets: A National Perspective, Local Implications

An industry expert will provide an update on the state of scrap tire recycling market in the U.S. and the existing and developing uses of scrap tires.

- Moderator: Mary Sikora – Recycling Research Institute, Inc.
- Speaker: Michael Blumenthal – Vice President, Rubber Manufacturers Association

11:45 am – 12:00 pm: Conference wrap-up