

Acknowledgments

ITRC and the Tire Anti-degradants (6PPD) Team express our gratitude to Ken Zarker for being the driving force behind this ITRC team. Ken was a pioneer in the field of pollution prevention and was involved in toxics reduction efforts with the automotive industry for many years. Some of his work at Washington Ecology focused on trying to identify toxics coming from cars that were causing coho mortality or URMS. After that chemical was finally identified as 6PPD-q, Ken encouraged Craig Manahan to submit a proposal for an ITRC team because Ken recognized the importance of sharing this information with other states, tribal nations, and municipalities. We are deeply saddened by his passing, though the legacy of his work lives on.

The ITRC Tire Anti-degradants Team would like to express our gratitude to all who contributed and supported the efforts of the team to create the documents and outreach materials that are now available.

First and foremost, we are grateful for and commend the hard work and dedication of all our active team members. In particular, we want to recognize the efforts of our subgroup leaders, without whom none of this would have been possible. Each one of them took time out from their busy schedules and displayed remarkable leadership during the development of the materials produced by this team.

- José Zambrana and Christine Nancarrow led the Problem Formulation subgroup; the materials they produced morphed into the Introduction of this document.
- Mike Garland and Dana McCue led the subgroup that wrote Section 2: Effects Characterization and Toxicity.
- Rachael Lane and Rhea Smith led the Environmental Assessment Strategies subgroup. Their group produced Section 3: Properties of 6PPD and 6PPD-q; Section 4: Occurrence, Fate, Transport, and Exposure Pathways; and Section 5: Measuring, Mapping, and Modeling.
- Madison Rose Bristol and Sigrida Reinis led the Solutions subgroup; the materials they produced became Section 6: Mitigation Measures and Solutions and Section 7: Policies, Regulations, and Laws.
- Rachael Lane took on double responsibilities. She and Ryann Reents led the development and deployment of the training and outreach.

Our team was fortunate and benefited from the active participation of subject matter experts who are leading the research on the many questions surrounding 6PPD and 6PPD-q. They include Rachael Lane, Rhea Smith, Susan Cormier, Ezra Miller, Lizbeth Seebacher, Mark Jankowski, Allen Brookes, Rich Baldauf, and Denis da Silva. Additionally, Jenifer McIntyre, Caitlin Lawrence, Andrew Patterson, Million Woudneh, Sara Nedrich, Katie Holzer, Brent Pautler, and Justin Greer shared their research with the team and kept us up to date on the latest developments on 6PPD and 6PPD-q. Thanks also go to Jamie McNutt and Sarah Amick, who brought our team up to speed on everything related to tires.

The 6PPD team was exceptionally lucky to have thoughtful and active engagement from our USEPA liaisons and partners. In addition to the subject matter experts from USEPA listed above, we give many thanks to José Zambrana, Kathie Dionisio, and Heather Goss. Their participation markedly improved our deliverables and helped us reach consensus even though the science on 6PPD and 6PPD-q is rapidly evolving.

We would also like to thank Seth Book and Marissa Pauling for providing expertise and guidance on tribal fisheries and treaty rights.

Many thanks to all the contributing authors who are too numerous to name. The documents and our training materials are truly the result of a team effort. Thank you all—you have been wonderful to work with (see the full list of contributing authors below).

Thank you to Craig Manahan and Anne Cooper Doherty. They proposed the 6PPD project to ITRC and initiated the formation

of this team.

ITRC staff members Marguerite Bennett, Carolyn Sistare, Evan Madden, and Derick Winn provided critical support throughout the course of the team's work. Nicole Henderson, project support contractor, was also a helpful resource. ITRC Executive Director Charles Reyes has been incredibly supportive of our team as we navigated the unique challenges of working on a rapidly emerging chemical of concern.

The help and support of the ITRC board has been instrumental. In particular, Claudio Sorrentino, ITRC Board Member and Team Leader Liaison, helped the team leaders set the tone for leading the team and provided guidance to get us through the rough patches. Thank you!

These documents were improved significantly from their initial draft by the many comments received during our internal and external review periods. Special thanks go out to all of those who made comments and suggestions on each of the documents. We also acknowledge the tremendous amount of help and support gathered by the ITRC State Points of Contact during the review stages and state surveys.

Additional thanks go to Heather Stettler for her rigorous technical editing of both the focus sheet and the larger document.

Producing this document and training would not have been possible without the unflagging assistance of our Program Advisor, Steve Brauner. Steve seamlessly stepped in as Program Advisor midway through the team's life cycle. He got up to speed quickly and jumped right into the project at our fall meeting. In addition to the logistics of running the team, Steve always asked thought-provoking questions that helped firm up the content of our document and training. His thoughtfulness and team-oriented spirit helped to maintain the character of our team, even through difficult team deadlines that often overlapped with deadlines from our "day jobs". We are tremendously grateful for the work and dedication that Steve has provided the team.

Team Members

State and Local Government

Renee Goentzel

Alaska Department of Transportation

Caitlin Burwell

Arizona Department of Environmental Quality

Anne-Cooper Doherty

California Department of Toxic Substances Control

Claudio Sorrentino

California Department of Toxic Substances Control

Farrukh Ahmad

California Department of Toxic Substances Control

Kelly Grant

California Department of Toxic Substances Control

Vivek Mathrani

California Department of Toxic Substances Control

Michael Garland

California Environmental Protection Agency

Brian Gaboriau

Colorado Department of Public Health and Environment

Shannon Pociu

Connecticut Department of Energy and Environmental Protection

Kalyanasundar Balasubramanian

California Department of Toxic Substances Control

Ryann Reents

Illinois Environmental Protection Agency

Crystal Pirozek

New Jersey Department of Environmental Protection

Frannie Nilsen

North Carolina Department of Environmental Quality

Jennie Morgan

Oregon Department of Transportation

Pablo Martos

Oregon Department of Environmental Quality

Tim Barrick

Pennsylvania Department of Environmental Protection

Sandra Snyder

South Carolina Department of Environmental Services

Keisha Long

South Carolina Department of Environmental Services

Ian McMullen

State of Delaware, DNREC, Division of Water

Justin Meredith

Tennessee Department of Environment and Conservation

Stanley Aniagu

Texas Commission on Environmental Quality

Nadine Demers

Vermont Department of Environmental Conservation

William R. Chapman

Virginia Department of Environmental Quality

Cody Nichols

Kansas Department of Health and Environment

Gregory Wilson

Kentucky Department for Environmental Protection

Jared Champagne

Louisiana Department of Environmental Quality

Louise Roy

Maine Department of Environmental Protection

Iver McLeod

Maine Department of Environmental Protection

Miguel Mendez

Massachusetts Department of Public Health

Aubrey Munsell

Michigan Department of Agriculture and Rural Development

Mark Reimann

Michigan Department of Environment, Great Lakes, and Energy

Michael Behrens

Nebraska Department of Environment & Energy

Daniel Millemann

New Jersey Department of Environmental Protection

Kristina Merola

New Jersey Department of Environmental Protection

Adam Hayes

Washington State Department of Ecology

Madison Bristol

Washington State Department of Ecology

Morgan Baker

Washington State Department of Ecology

Douglas Howie

Washington State Department of Ecology

Rhea Smith

Washington State Department of Ecology

Stephanie Gill

Washington State Department of Ecology

Tanya Williams

Washington State Department of Ecology

Samuel Iwenofu

Washington State Department of Ecology

Cassie Horton

Washington State Department of Ecology

Craig Manahan

Washington State Department of Ecology

Elinor Fanning

Washington State Department of Health

Mallory Little

Washington State Department of Health

Tatiana Dreisbach

Washington State Department of Transportation

Tony Bush

Washington State Department of Transportation

City/Local Government

Steve Nelson

City of Austin, Texas

Lanita Walker

City of Tallahassee

Shelly Walther

Los Angeles County Sanitation Districts

Samreen Siddiqui

King County

Lan Wiborg

Orange County Sanitation District

Kim Nimmer

Orange Water and Sewer Authority (OWASA)

River Wan

Pierce County

Federal Government

Denis da Silva

NOAA

Christopher Zevitas

US Department of Transportation

Jacob Klaybor

US Department of Transportation

Emily Richardt

US Department of Transportation

Rachael Lane

US Geological Survey

Patrick Moran

US Geological Survey

Prarthana Shankar

US Geological Survey

Justin Greer

US Geological Survey

Mark Reider

Defense Logistics Agency

Rachel Methvin

US Navy

Natalia Vinas

OSD

Heather Goss

USEPA

Mark Jankowski

USEPA

Michael Hays

USEPA

José Zambrana

USEPA/Office of Research and Development

Denise Rivers

US Army Corps of Engineers

Sarah Thompson

DOE EM-4 Regulatory and Policy Affairs

Alexandra Melnyk

DOE-EM

Marci Smeltz

ORD/CPHEA

Allen Brookes

USEPA

Joseph Martin

USEPA

Katrina Varner

USEPA

Laura Webb

USEPA

Paul Randall

USEPA

Richard Baldauf

USEPA

Susan Cormier

USEPA

Kathie Dionisio

USEPA/Office of Research and Development

Tao Li

USEPA/Office of Research and Development

Georges-Marie Momplaisir

USEPA/ORD/CEMM/WECD/ECB

Public and Tribal Stakeholders

Allan Chartrand

Puget Soundkeeper Alliance

Catherine Harris

Northwest Indian Fisheries Commission

Dianne Barton

Columbia River Inter-Tribal Fish Commission

Divinia Ries

Elkhart County, Indiana Community

Ezra Miller

San Francisco Estuary Institute

Jeffrey Short

ITRC Public Stakeholder

Kelsey Payne

Snoqualmie Indian Tribe

Kim Bray

Hoh Indian Tribe

Larry Franks

Friends of the Issaquah Salmon Hatchery

Marissa Paulling

Northwest Indian Fisheries Commission

Page Hingst

Santee Sioux Nation

Sean Dixon

Puget Soundkeeper Alliance

Seth Book

Skokomish Indian Tribe

Academia

Adrian Gale

Benedict College

Katherine von Stackelberg

Harvard Center for Risk Analysis

Steven Becker

University of Alaska Fairbanks

Megan Hart

University of Missouri Kansas City

Seebacher Lizbeth

University of Washington

David Wark

University of Washington Tacoma

Damian Shea

North Carolina State University

Michael Hyman

North Carolina State University

Heidi Siegelbaum

Washington State University

Caitlin Lawrence

Washington State University

Jenifer McIntyre

Washington State University

Emeritus

Michael Murphy

Virginia DEQ

Retired

Andrew Kenefick

Retired

Industry Affiliates

John Norman

American Chemistry Council

Jessica Gattenby

Arcadis

Shannon Dunn

Arcadis

Hope Nemickas

Arcadis

Shalene Thomas

Battelle Memorial Institute

Jana Heisler White

Battelle Memorial Institute

Deepti Nair

Battelle Memorial Institute

Jenna Chaffeur

BBJ Group LLC

Jamie Suski

EA Engineering, Science, Technology, Inc., PBC

Hannah Dennis

EA Engineering, Science, Technology, Inc., PBC

Zachary Spotts

EA Engineering, Science, Technology, Inc., PBC

Jason Paul

ECS Southeast, LLP Raleigh

Paul Ecker

EES Environmental Consulting, Inc.

Chrissy Peterson

EHS Support, LLC

Dana McCue
EHS Support, LLC

Ioana Petrisor
Ensafe, Inc.

Jon Lindberg
Ensafe, Inc.

Patricia McIsaac
Eurofins

Andrew Patterson
Eurofins

Bonnie Janowiak
Groundwater & Environmental Services, Inc.

Kenia Whitehead
GSI Environmental Inc.

Graham Ansell
GSI Environmental Inc.

Sara Hutton
GSI Environmental Inc.

Erica Whiting
Terraphase Engineering, Inc.

Kevin Long
Terraphase Engineering, Inc.

Judd Mahan
Tetra Tech, Inc.

Camarie Perry
ToxStrategies, Inc.

Stephanie Kennedy
ToxStrategies, Inc.

David Feifarek
ToxStrategies, Inc.

Jennifer Bare
ToxStrategies, Inc.

Faith Morse
TRC

Jenny Phillips
TRC

Elizabeth Denly
TRC

Sean Moore
US Tire Manufacturers Association

Kirk Eastham
BBJ Group LLC

Carl Peters

BBJ Group LLC

Ivan Williamson

Burns & McDonnell Engineering Company, Inc

Kathrine Muirhead

Burns & McDonnell Engineering Company, Inc

Heather Lanza

CDM Smith

Patricia Reyes

Clean Harbors Environmental Services

Mahsa Modiri

EA Engineering, Science, Technology, Inc., PBC

Casey Remmer

GSI Environmental Inc.

Zhong Xiong

Haley & Aldrich, Inc.

Mike Ehlebracht

Haley & Aldrich, Inc.

Mark Schroeder

Integral Consulting Inc.

Barrie Selcoe

Jacobs

Jenny Zenobio

Jacobs

Cayla Whiteside

Kennedy/Jenks Consultants

Riz Sarmiento

Langan Engineering and Environmental Services Inc.

Sigrida Reinis

Langan Engineering and Environmental Services Inc.

Troy Gill

Matrix Environmental Services, LLC

Erik Bakkom

Maul Foster & Alongi, Inc.

Christine Nancarrow

Pacific Stormwater

Ryan Thomas

Parsons Corporation

Shuo Yu

Ramboll

Linda Logan

Terraphase Engineering, Inc.

Lisa McIntosh

Terraphase Engineering, Inc.

Tracey Norberg

US Tire Manufacturers Association

Alice England

Verdantas, LLC

Nicole Scroggins

Verdantas, LLC

Ziqi He

Verdantas, LLC

Kelsi Evans

WSP

Heather Gosack

WSP

Stefano Marconetto

WSP Canada Inc.

Pamela Rodgers

WSP

Dora Chiang

WSP USA

Jane Parkin Kullmann

WSP USA

Mark Surette

WSP USA Solutions, Inc.