



National Institute of
Environmental Health Sciences
Worker Training Program

History of Evaluation and Future Directions for the NIEHS Worker Training Program



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Contents

.....

3 Introduction and Purpose

.....

4 History of Evaluation Guidance and Capacity Across WTP

- Early Support and Documentation of Grantee Evaluation Activities 4
 - Building Capacity and Documenting Evaluation Best Practices 5
-

6 Evaluating WTP Training Program Areas or Components

- Hazardous Waste Worker Training Program (HWWTP) 6
 - Environmental Career Worker Training Program (ECWTP) 7
 - HazMat Disaster Preparedness Worker Training Program (HDPTP) 7
 - Small Business Innovation Research (SBIR) E-Learning for HAZMAT Program 8
 - Ebola Biosafety and Infectious Disease Response Training Program 8
 - NIEHS/Department of Energy (DOE) Nuclear Worker Training Program 9
-

10 Efforts Across Grantees on a Specific Topic

- Evaluations of Trainee Outcomes..... 10
 - Evaluation of Employer Outcomes 10
 - Evaluation of Worker Trainer Outcomes..... 11
-

11 Evaluation Activities for a Specific Disaster Response or Topic of Focus

- 2010 BP Oil Spill and Resiliency 11
 - Opioids and the Workplace 12
 - COVID-19 12
 - Partnerships 14
-

14 Logic Model Review

- Table 1: Recommendations for Revising the WTP 2012 Logic Model 15
-

16 Future Evaluation Efforts

.....

17 Conclusion

.....

18 References

Introduction and Purpose

The National Institute of Environmental Health Sciences (NIEHS) Worker Training Program (WTP) was initiated to fund and provide occupational health and safety training to workers in the U.S. who may be at risk to hazardous material exposure during work duties and emergency response.¹ WTP has always placed an emphasis on evaluating the training programs conducted by the non-profit organizations receiving NIEHS WTP grants, or grantees.



Photo courtesy of Alabama Fire College Workplace Safety Training Program.

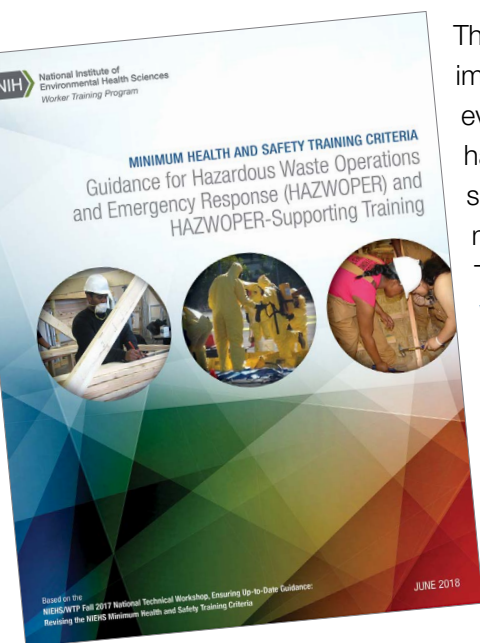
This report reviews the history of how NIEHS WTP has been evaluated over time, focusing on:

- History of evaluation guidance and capacity across NIEHS WTP.
- Evaluations of NIEHS WTP [training program areas](#) or components.
- Evaluation efforts across multiple grantees on a specific topic.
- Evaluation activities for a specific disaster response or topic of focus.

The report concludes with a discussion on how these evaluation activities have or have not been addressed. Suggestions and considerations for future evaluation efforts for NIEHS WTP and revisions to the logic model are also provided, particularly where there may be gaps in evaluation.

This report does not include a review of grantee evaluation reports. While the authors know these reports are plentiful and informative, a collection and analysis of them was outside the scope of this report. This report covers a range of methods, data collection items, and outcomes.

History of Evaluation Guidance and Capacity Across WTP



The need for and implementation of evaluation in NIEHS WTP has been guided by several documents and meeting proceedings. The [Minimum Criteria for Worker Health and Safety Training for Hazardous Waste Operations and Emergency Response](#) (Minimum Criteria) is a guidance document that sets standards for the grantees, including evaluation

of training.² The most recent version of the Minimum Criteria (published June 2018) discusses the use of the Kirkpatrick Model to help build a plan for evaluating outcomes and impacts.³ The NIEHS 2018-2023 [Strategic Plan Advancing Environmental Health Sciences Improving Health](#) specifically calls for evaluation, and to use data to create knowledge that can be used to take actions.⁴

NIEHS WTP developed a [strategic plan](#)⁴ for 2008-2013, and transitioned into an annual [operational matrix](#)⁵ to support strategic planning, which is tied to the [logic model](#) developed in 2012.⁶ The NIEHS WTP logic model lays out how program activities related to occupational health and safety training and education can lead to the intended long-term impacts of improved safety culture in the workplace, reduced morbidity and mortality, reduced occupational health disparities, and increased protection and remediation of communities.

Early Support and Documentation of Grantee Evaluation Activities

One of the reasons for developing the Minimum Criteria was to implement evaluation. In 1989, NIEHS WTP provided funds to the Midwest and New Jersey/New York consortia for projects to evaluate their training.⁷ This was an initial evaluation of grantee training, and the criteria developed was used for much of the evaluation activities that proceeded. Using a mailed survey, telephone interviews, and pre- and post-tests, the group of evaluators searched for information on whether trained workers made changes in work practices or talked to coworkers about making health and safety improvements at their workplace based on what they learned in the training courses offered by NIEHS WTP grantees. The evaluators also assessed how successful the workers were at those efforts. There was an emphasis on demonstrating statistically valid questions.

In 1990, the Occupational Safety and Health Administration (OSHA) considered proposing a set of questions to standardize accreditation of Hazardous Waste Operations and Emergency Response (HAZWOPER) training. Six of the seven NIEHS WTP grantees who offered such training attended a May 1990 meeting hosted by the New Jersey/New York Consortium on evaluating program effectiveness. They stated that, rather than a set of standardized questions, there should instead be a focus on validating currently in-use methods. There were concerns over study design, data collection, and perceived fear of university-based grantees being favored over union programs. Ultimately, the OSHA proposals were never adopted.

In 1996, NIEHS WTP hosted a technical workshop, Measuring and Evaluating the Outcomes of Hazardous Waste Worker Training, to discuss the documentation and effectiveness of training.⁸ The findings of the conference found that NIEHS WTP grantees have engaged in program evaluation of their occupational health and safety training. Lessons learned about how to document these successes formed the basis of an [NIEHS Resource Guide for Evaluating Worker Training](#).

Building Capacity and Documenting Evaluation Best Practices

The NIEHS WTP-funded Self-Sufficiency Research and Evaluation Project (SREP) started in 2000 and focused on teaching worker-trainers evaluation skills and techniques.^{9, 10} SREP was based on a 1997 pilot program implemented through a supplemental grant with the Oil, Chemical, and Atomic Workers. In 2000, the partners involved in SREP were the American Federation of State, County and Municipal Employees under the University of Massachusetts Lowell; Labor Institute and New Perspectives Consulting Group under the Paper, Allied Industrial, Chemical and Energy Workers International Union; International Chemical Workers Union Council; and University of Michigan under the United Auto Workers. Worker-evaluators from the project presented the SREP idea in a session of the 2000 NIEHS-sponsored Trainers' Exchange, a workshop where trainers can share best practices and new techniques to create more effective and empowering training.

SREP partners developed and refined many aspects of a training evaluation project, such as evaluation questions and designs, data collection plans, implementation of data collection, data analysis, report generation, and preparation of a lessons learned report. SREP ended at the 2003 Trainers' Exchange. At this meeting, SREP worker-evaluators used a

questionnaire and conducted in-person interviews to evaluate the workshop and demonstrate evaluation techniques and processes to attendees.¹¹ The project was found to be successful and effective as the first grantee collaboration on an evaluation; it was also found to be beneficial to have the worker evaluators carry out the evaluation activities through training. Worker-evaluators had an opportunity to learn from each other. Having diverse backgrounds helped contribute to the quality of the evaluation.

In 2012, NIEHS WTP hosted a technical workshop, [Prove it Makes a Difference: Evaluation Best Practices for Safety and Health Training](#).¹² The workshop focused on bringing together NIEHS WTP grantees to share resources and promote evaluation of training. The workshop included development of the currently used NIEHS WTP [logic model](#),⁶ mentioned above. The logic model mapped the program's theory of change for intended outputs and impacts.

Also in 2012, metrics for evaluation of training were created and prepared into a manual by NIEHS by the Partnerships for Environmental Public Health.¹³ In 2017, NIEHS WTP formed an [Evaluation Community of Practice](#) to create a forum that allows grantees to share evaluation methods and lessons learned, and provide feedback to program officials on moving evaluation forward for the program.





Evaluating WTP Training Program Areas or Components

NIEHS WTP funds several [training program areas](#), and most have had some level of program evaluation completed over the years.

Internally, NIEHS WTP relies on regular monitoring as required by the National Institutes of Health (NIH) through the Research Performance Progress Reports.¹⁴ Additionally, NIEHS WTP requires grantees to submit data on training implementation and additional details on progress through the Data Management System. Grantees must comply with the Minimum Criteria, which requires process and outcome evaluations, with impact evaluations being encouraged.¹⁵ Grantee evaluation of their programs may include multiple methods, such as pre- and post-tests, quizzes, instructor observations, on-site observations, and focus groups. The data, reports, and evaluation findings submitted by grantees have helped inform national-level evaluation of NIEHS WTP over the years.

NIEHS WTP program officials attend annual advisory board meetings, engage in conference calls, and sometimes conduct more thorough grantee site visits or attend a specific training course.

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Hazardous Waste Worker Training Program (HWWTP)

[HWWTP](#), the flagship and initial program of NIEHS WTP, was created out of the Superfund-related activities. Through its grantees, HWWTP provides model occupational safety and health training for workers who are or may be engaged in activities related to hazardous waste removal, containment, or chemical emergency response.

Only one report was found that looked at an evaluation of the NIEHS HWWTP, an Evaluation of the NIEHS Superfund Worker Training Grant Program (1995).¹⁶ For this evaluation, NIEHS WTP established a special external panel of well-recognized national experts who were charged to review and evaluate the program. The panel found that the HWWTP was fulfilling its mandate to provide management and leadership for hazardous waste worker training. Overall, the program was producing high quality training; developing and implementing innovative training approaches, methods, and evaluations; developing a criterion for hazardous waste worker training; reaching workers with limited literacy and English proficiency; and reporting back improvements in workplace safety and health.

Additionally, an evaluation of the cost-effectiveness of HWWTP was conducted in the above mentioned 1995 report.¹⁶ The evaluation panel found that NIEHS WTP training promotes safer work practices and prevents injury and illness in the workplace. However, the panel was not able to quantify the findings. The evaluators concluded “there is a high probability that occupational injuries and diseases are being prevented as a result of the NIEHS program.”

Regarding the HWWTP, the panel concluded, “not only has the NIEHS grant program provided training to hundreds of thousands of workers, managers and health and safety professionals, it has also made a substantial contribution to a more systematic, analytical and scientific approach to training program development, delivery and evaluation in terms of advancing the state of the art.”



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Environmental Career Worker Training Program (ECWTP)

[ECWTP](#), formerly known as the Minority Worker Training Program, provides training to increase opportunities for individuals from disadvantaged and underserved communities to obtain careers in environmental cleanup, construction, hazardous waste removal, and emergency response.^{15, 17} An [economic impact evaluation](#) was undertaken by NIEHS WTP and the [National Clearinghouse for Worker Safety and Health Training](#) (Clearinghouse) in 2015.¹⁸ ECWTP was found to be effective in reaching underserved populations, estimating increases of employment among trainees by 59%. Overall, ECWTP was found to add total value and reduction of government expenditures; lead to graduates with higher earnings and employment rates than dropouts; decrease the number of injuries from safety and health training; and result in higher employment rates and crime cost savings. Outside of the measurements of the economic costs are the non-monetary benefits of ECWTP, for example the transformative effect on their lives and increase in self-worth.

In addition to the general grantee evaluation and data submission requirements described above, ECWTP grantees are required to report on program recruitment and retention, job placement, and demographics. ECWTP further emphasizes collecting graduate stories or anecdotes for outcome evaluation data. Some ECWTP grantees use the social-ecological model to collect data focusing on intrapersonal, interpersonal, institutional, community, and policy.¹⁹ As of fall 2022, an update to the ECWTP economic impact report is being planned.

NIEHS WTP has a long history of advancing environmental justice. Notably, the ECWTP is now a pilot program under the Biden administration's

[Justice40 initiative](#).^{20, 21} ECWTP has always been a key part of NIEHS WTP's environmental justice efforts and will continue to do so through the Justice40 initiative.²² The trainees' backgrounds are rooted in communities facing environmental justice concerns and the lessons learned from the program can help them contribute and participate in environmental decisions in their communities.

Evaluation of the benefits of ECWTP grantees were discussed during a Justice40 stakeholder engagement

session²² and were presented at the 2022 Annual Public Health Association Conference.²³

ECWTP helps address occupational and environmental health disparities and the broader environmental justice conditions workers face on the job and in their community.

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HazMat Disaster Preparedness Worker Training Program (HDPTP)

[HDPTP](#) supports the development and delivery of disaster-specific training to prepare workers to respond to natural disasters and possible future terrorist incidents involving weapons of mass destruction. The authors did not find any evaluation reports of the HDPTP overall. However, most disaster response efforts have been well-documented and often have NIEHS WTP technical workshops dedicated to summarizing the activities and lessons learned.²⁴⁻²⁸ Additionally, evaluation projects that occurred as part of specific NIEHS WTP disaster responses are described below.

Small Business Innovation Research (SBIR) E-Learning for HAZMAT Program

The [Small Business Innovation Research \(SBIR\) E-Learning for HAZMAT Program](#) focuses on the development of e-learning products that support:

- Health and safety training of hazardous materials workers, emergency responders, and skilled support personnel.
- Community and citizen preparation and resiliency.
- Technology-enhanced training products to support the safety and health training of workers exposed to known, emerging, and new hazards from disasters; disaster preparedness and response resiliency training; job training for underserved and vulnerable workers; and health and safety training for emerging industries and technologies.

The authors did not find any evaluation reports of the SBIR E-Learning for HAZMAT Program overall. NIEHS WTP SBIR grants were included in two reports of all NIH SBIR programs in year 2009 and 2015.²⁹

³⁰ The reports found that overall, the NIH SBIR grants were meeting most congressional goals but limited in success in addressing participation among socioeconomically and minority and women owned businesses. The 2009 and 2015 reports recommend that a greater effort is needed to evaluate the NIH SBIRs for outcomes and impact.

Ebola Biosafety and Infectious Disease Response Training Program

In 2016, to address the gaps identified following the 2014 Ebola outbreak, the [Ebola Biosafety and Infectious Disease Response Training Program](#) was developed with the support of emergency Congressional appropriations.³¹ The program ended in May 2020, and during its existence provided workers

with skills and knowledge, increased awareness and operational capacity, coordinated infection prevention across various levels and facilities, and promoted and established partnerships to provide training and support. In response to the Ebola outbreak, an evaluation plan was developed to organize a rapid response to training if needed.³² The overall plan contained a framework and logic model which would be used and adapted by NIEHS WTP for evaluations in future disasters or health emergencies, such as the COVID-19 pandemic. Reports summarizing activities and accomplishments for years two³³ and year three³¹ of the program were completed. Some key findings included that a wide variety of occupational sectors were trained and that training was delivered in 36 states and one territory. Common challenges included less motivation from organizations when highly infectious diseases are not being discussed in media and difficulty for organizations and workers to commit time to longer operations-level training and in some cases even shorter awareness-level training. The findings support sustainability of the program by permanent integration of curriculum into program requirements, certification of training courses, and integration and availability of materials under other hazardous worker response training programs. An overall program report is in development, which includes the last few months of the program that overlapped with the COVID-19 pandemic.



Photo courtesy of Emory University.

NIEHS/Department of Energy (DOE) Nuclear Worker Training Program

The [NIEHS/DOE Nuclear Worker Training Program](#) funds grants to develop and administer model health and safety training programs for hazardous materials or waste workers within the DOE nuclear weapons complex. A National Clearinghouse report, FY1999 Accomplishments, Highlights, and Future Directions: NIEHS/DOE Hazmat Worker Training Program, highlighted over the years 1994-1999 that nearly 90,000 DOE workers across 34 sites were trained with 1.4 million training contact hours and kept pace with emerging DOE needs. The report also highlighted anticipated challenges for the NIEHS/DOE training program, such as “challenges in the coming years associated with recent DOE reorganizations; shifting from Management and Operating (where DOE was a principal actor in the site operations) to Management and Integration (where DOE steps away from day to day involvement in site management) contractors; increased utilization of lower tier contractors; and significant changes in contracting methods associated with increased contractor responsibilities, emphasis on performance parameters, and resource constraints.”³⁴ A 2009 needs assessment of the NIEHS/DOE Nuclear Worker Training Program found that between the fiscal years of 2000-2007, over 205,000 workers at 30 DOE sites were trained, resulting in more than 2.5 million contact hours.³⁵

The Clearinghouse conducted an evaluation of the NIEHS/DOE Program in 2019, focusing on a review of progress reports, training course data, and other supporting documents by the grantees from 2015 to 2018.³⁶ The evaluation examined evaluation methods, challenges, and grantee successes. The [report](#) provides a synopsis of evaluation methods used across the NIEHS/DOE Program, a summary of key findings from grantee evaluations, and lessons learned and recommendations for improving evaluation efforts

across the program. The evaluation methods used by grantees varied, such as specialized tools to collect data and measure competency, competency tests, trainee feedback, and follow-up of trainees. All grantees conduct an audit, internal evaluation, and monitoring of instructor performance and course quality. Most grantees acknowledge third-party evaluations and all grantees have an advisory board to serve as a helpful and trusted resource in evaluating training and providing recommendations for improvement.

Trainees of the NIEHS/DOE program reported some of the successes and outputs experienced, including gained employment, gained knowledge on proper personal protective equipment, increased appreciation for hazard awareness and responsibilities, increased awareness for emergency response actions, drills, and capacity to recognize hazards. Additional successes included increased reporting of health and safety issues among those managing organizational decisions and the improvement of workplace conditions.

The grantees further reported successes and outputs of the NIEHS/DOE training program. There was evidence to support quality instruction, peer training, and learning outcomes. There was an increased awareness of target populations’ training needs and challenges, as well as enhancement of trainees’ understanding of courses, improvements in evaluation methods, and efforts to overcome cultural and educational barriers.



Photo courtesy of International Brotherhood of Teamsters.



Efforts Across Grantees on a Specific Topic

Grantees conduct evaluations of their training programs, and some have published findings on the outcomes of trainees, employers, and worker trainers.

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Evaluations of Trainee Outcomes

Several grantees have conducted evaluations and had them published in peer-reviewed literature. Some examples include:

- The International Chemical Workers Union Council (ICWUC) performed an evaluation of their January and May 1999 Hazardous Waste Worker Training Program.³⁷ Using a cross sectional survey before the training and 14-18 months later, ICWUC found that the training helped increase worker use of resources and the workers made attempts to improve working conditions.
- The United Autoworkers used phone interviews to assess outcomes of their December 1996 and October 1997 Industrial Emergency Response (IER) training on average 16.8 months later.³⁸ The survey aims included, but were not limited to, how trainees were using the course materials, sharing resources, being involved in improving health and safety programs. Of the trainees, 88.5% of those that reported incidents also responded that the IER training changed how they handled the incident.
- In a one-year follow-up of ICWUC hazardous waste worker trainees using phone interviews, over 80% respondents agreed that the training better prepared them to handle hazardous waste operations and 57.6% agreed they handled spills differently post-training.³⁹
- The Kirkpatrick Model of Four Levels of Evaluation is a key method among NIEHS WTP grantees for program outcome evaluation.³ A one-year follow-

up of 978 Midwest Consortium HAZWOPER refresher trainees was conducted by Ruttenberg and Rice (2019).⁴⁰ The evaluation focused on Levels 3 and 4 in the Kirkpatrick model by asking participants “in the past year, how have you applied this training at your work or in your community?” The evaluation found an increase in awareness led to actions being taken among trainees. The trainees were able to better recognize and address health and safety concerns, for example electrical and trenching hazards. Trainees reported improvements in addressing emergency response, for example fire hazards and new and improved incident command. Additional themes identified included equipment made safer; planning, general procedures, and improvements in standard operating procedures; enhanced training; and increased use of written resources.

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Evaluation of Employer Outcomes

A study by Riley et al. (2015) evaluated mid-level managers of employees who participated in university-based grantee HAZWOPER training courses.⁴¹ The four training providers were the Midwest Consortium Waste Workers Training, the New England Consortium – Civil Service Employees Association, the New Jersey/New York Hazardous Materials Worker Training Center, and the Western Region Universities Consortium. The study used a survey and targeted managers of employees who took any 40- or 24-hour Hazardous Waste Operations or 8-hour refresher course; 24-hour treatment, storage, or disposal facility worker or 8-hour refresher, or emergency response courses. Among the 124 respondents (34% response



rate), the most important reason for providing training was protecting workers from hazards and preparing them for emergencies. Some important factors reported were interactive training methods and the use of group activities. Respondents reported the most important outcome of the training was maintaining knowledge and skills, and approximately 75% reported trained employers were more likely to engage in safer work practices and follow workplace safety rules. Over 75% of respondents agreed that HAZWOPER training “made our company or agency more prepared for emergencies” or “helped improve health and safety policies and procedures.”

Evaluation of Worker Trainer Outcomes

- NIEHS WTP’s model of disseminating training broadly and nationally has included the training and empowerment of worker trainers. By preparing peers in the workplace and community, NIEHS WTP can reach a wider audience with their resources to address occupational health and safety. By training a classroom, that classroom can then share the training with others and so forth. Morawetz et al. (2021) studied worker trainers for their contributions towards safer and healthier working conditions among those trained through the International Chemical Workers Union Council Consortium.⁴² A study by Ruttenberg et. al (2020) further supported those results by finding worker trainers sharing their knowledge and experiences helps empower others and themselves.⁴³ This method has had on-site points of contact for workers to reach out to, which is often less challenging to a co-worker as compared to a supervisor.

Evaluation Activities for a Specific Disaster Response or Topic of Focus

2010 BP Oil Spill and Resiliency

Following the events of the 2010 Deepwater Horizon British Petroleum (BP) oil spill, training was provided to more than 147,000 workers and volunteers.⁴⁴

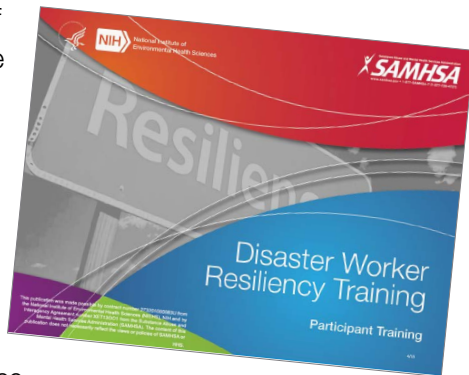
The [training evaluation plan](#) used the Kirkpatrick model’s four levels of evaluation. The evaluation used qualitative data collection for the process evaluation and quantitative data for outcome evaluation. Sources of the evaluation included trainees, trainers, supervisors, and employers. The evaluation method included questionnaires and focus groups. Some of the lessons learned included giving all program stakeholders a participatory role, encouragement of communication, and multiple methods for various stakeholders.

Sarpy et al. (2017) found that trainee knowledge and behavior improved. The evaluation further reported on trainees’ behaviors learned following the training (Level 3). Lastly, trainees provided examples of accidents, injuries, and illnesses experienced to support if the training contributed to long-term outcomes such as reduced worker harm from oil spill cleanup (Level 4). The evaluation found the training to be effective in improving knowledge and behavior; that supportive safety climates and cultures positively influenced learning; and reported applied learning and contributions to reduce worker harm. However, the results of the evaluation found significant differences among racial-ethnic groups in regard to reactions to training, with specifically Asian and Isleño groups reporting lower reactions to training, learning, and

safety performance. The evaluation underscores the importance of language justice in training and NIEHS WTP's efforts to address such barriers.

The integration of disaster resilience has been part of NIEHS WTP's evaluation and program planning.

NIEHS WTP, in collaboration with the Substance Abuse and Mental Health Services Administration (SAMHSA), conducted the Gulf Responder Resilience Training Project. The project included the development of the [Disaster Worker Resiliency Training](#) to address unmet mental health and resilience needs following the BP oil spill and other disasters.⁴⁵ The awareness level training focused on education and empowerment of disaster-impacted communities on recognizing work-related stress, building resilience, and obtaining organizational support. The Disaster Worker Resiliency Training Program, jointly offered by NIEHS WTP and SAMHSA, was found in a randomized clinical trial among Hurricane Sandy responders to have reduced mental health symptoms three months later.⁴⁶



Opioids and the Workplace

NIEHS WTP recognized the need for occupational safety and health training related to opioids and the workplace for workers, their representatives, and employers. In 2018, WTP held a [workshop](#) on developing a training framework to address exposure, use, and prevention of opioid-related hazards in the workplace.⁴⁷ A needs assessment and literature review were conducted by NIEHS WTP and the Clearinghouse.⁴⁸ Following the findings, a pilot awareness-level training program, Opioids and the

Workplace Prevention and Response, was conducted and [evaluated](#) in the U.S. among four locations.

The awareness level training was found to be effective in raising awareness among trainees for course objectives. In [a 6-month follow-up](#) mixed-methods evaluation, some evidence was found that the opioids awareness training program and materials were helping workers introduce opioid-related policies and programs back at their organizations.⁴⁹

There was a need among trainees and stakeholders for an instructor and leadership program. Therefore, a Train-the-Trainer (TTT) program was developed to increase confidence among instructors in delivering the opioids awareness training.⁵⁰ The leadership training was developed to increase the awareness of trainees in implementing policies and programs related to substance use and injury prevention back at their organizations. The training was found to be effectively delivered on-line, due to social distance guidelines during the COVID-19 pandemic.⁵¹ Both the TTT and leadership training were found to be effective in raising knowledge among trainees. In a 6-month follow-up, the programs were also found to be helpful for trainees conducting education and training and implementing policies and programs related to opioids.⁵²

COVID-19

In March 2020, following [congressional funding](#) to respond to the COVID-19 pandemic with occupational safety and health training, NIEHS WTP and the [Clearinghouse](#) developed COVID-19 training tools and materials.⁵³ WTP hosted [calls, webinars, meetings, and forums](#) for discussion across grantees and stakeholders nationally to address unmet needs and increase capacity to deliver occupational safety and health training.⁵⁴ The Clearinghouse conducted a needs assessment to understand how grantees safely transitioned health and safety training under social



distancing and infection control guidance, and their overall concerns and needs. The needs assessment further assessed how grantees adapted training for return to work.⁵⁵ The NIEHS WTP Evaluation Community of Practice was used to communicate among a network of evaluators. The Ebola overall plan and logic model were modified with input from the Evaluation Community of Practice for the COVID-19 response.⁵⁶

To evaluate the COVID-19 response, a mixed-methods approach was used by reviewing data and progress reports in the Data Management System, and conducting focus groups and surveys.⁵⁷ Quantitative and qualitative findings supported that the NIEHS WTP COVID-19 training program grant funding, materials, and technical assistance were effective and helpful to grantees in responding to the COVID-19 pandemic.

NIEHS WTP was able to support grantees with resources besides funding through webinars, national calls, and forums for discussion across grantees. The support of NIEHS WTP contributed to grantees changing organizational policies and programs related to occupational infection control, and preparing a national cadre of instructors to raise COVID-19 awareness. WTP funding and supportive resources have helped grantees respond to COVID-19 by raising worker training capacity and increasing confidence in responding to future disasters.

Small Business Innovation Research and COVID-19

During COVID-19, several WTP SBIR E-Learning for HAZMAT Program grantees received supplemental funding to develop unique and innovative ways to provide training and education to workers responding to COVID-19 through e-learning. These grantee activities were included in the COVID-19 [2020 Supplements Outcomes Report](#).⁵⁸ Populations reached included essential workers, disaster recovery

workers, emergency medical service workers and first responders, business owners, and volunteers.

One innovative training method was the development and deployment of a learning management system for mobile refresher training, which was used by 13 organizations to train workers on COVID-19 safety and health and vaccination information. The system, accessible to the public via the NIEHS WTP website, converted COVID-19 safety guidelines in the Clearinghouse into a mobile format and delivered them to approximately 1,000 users in over 280 sites around the world.

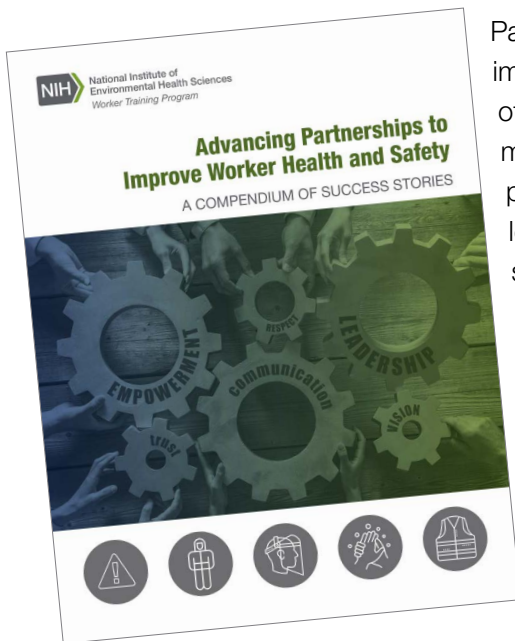
Other examples included the development of training in virtual reality platforms. One platform provided training on decontamination procedures, while another aided business owners to safely return back to work. The latter platform emphasized identifying risks, reducing those risks, and placing a focus on the hierarchy of controls for higher levels of worker protection. The outcomes from the platform included written policy and an employee training tool.

WTP COVID-19 Recovery Centers

NIEHS WTP has further supported grants with supplemental funding for [COVID-19 Recovery Centers](#).⁵⁹ The Recovery Centers are located around the U.S. and Puerto Rico, and focus on providing training to essential workers. Additionally, the centers are assessing COVID-19 health risks and enhancing coordination of resources to promote recovery in communities that are socioeconomically disadvantaged and at high-risk for COVID-19. Grantees aim to accomplish these objectives through various activities, including the delivery of high quality and culturally appropriate training to mitigate COVID-19 in the workplace and community; promoting recovery and resilience by connecting communities to social services and employment assistance; and making referrals for basic needs, such as food distribution, housing, and vaccination

access. Evaluation of the Recovery Centers activities is expected in 2022.

Partnerships



Partnerships are an important component of the NIEHS WTP model to ensure the program's reach, longevity, and success. To the authors' knowledge, the earliest recorded note of the need for partnerships can be seen in a 1997 workshop on Successful Training Partnerships:

Lessons Learned.⁸ The workshop report emphasized the need to continue forming partnerships and evaluating the program, including economic evaluations.

One example of a successful partnership is between WTP and the NIH/NIEHS Disaster Research Response (DR2) Program. In 2016, WTP and DR2 held a [joint workshop](#) that brought together local, state, and federal government, community members, and other stakeholders, to better understand disaster research. Overall, workshop participants shared that the sessions were useful.

The fall 2021 NIEHS WTP technical workshop, [Advancing Partnerships to Improve Worker Health and Safety](#), specifically focused on partnerships among WTP stakeholders, including grantees, government, and community organizations. Such partnerships have helped NIEHS WTP and grantees better communicate, evaluate, and support worker training efforts and disaster prevention and response on a

local and national scale. The workshop addressed the importance of sustaining partnerships for the long-term and sharing lessons learned, including aspects of program evaluation. A [compendium document](#) (2022) outlines success stories from several NIEHS WTP grantees given their partnerships with tribal and fenceline communities, community-based organizations, federal and local government, professional societies, and others.

The ability to have partnerships among others was one of the most widely discussed outcomes of the COVID-19 training program evaluation among grantees. The partnerships helped organizations provide training in a timely and effective manner, but also went further in sharing examples of how to evaluate and reach vulnerable populations.

Logic Model Review

NIEHS WTP has a long history of evaluation and has taken steps to continuously understand and learn from their occupational safety and health training and disaster response activities. The 2012 logic model has been a valuable tool in understanding and evaluating NIEHS WTP overall and disaster response activities. It should be noted that the further out the outcomes are measured, the more that additional factors contribute to achieving outcomes. NIEHS WTP should not expect that mid-term and long-term impacts can be solely and directly attributed to the training programs, although there may be examples where training has contributed to these outcomes. Table 1 lists issues in the logic model identified through the review of NIEHS WTP history and provides suggested recommendations on how to revise the logic model for each issue. The table may help NIEHS WTP prepare for evaluation of ongoing and future occupational safety and health training needs.

Table 1: Recommendations for Revising the WTP 2012 Logic Model

Issue	Category	Recommendation
WTP partners with a diverse group of institutions across various levels which is not described.	Inputs	Add broader occupational health and safety community
Needs assessments and economic evaluations are more frequently being reported by WTP.	Activities	Add needs assessments and economic evaluations
WTP focuses on creating partnerships among grantees and stakeholders which is not evident in the logic model.	Outputs	Add partnerships formed
The development of instructors is not described and plays a pivotal role in WTP responses.	Short-term	Add trainers trained. Consider adding “leadership trained” as WTP has been increasingly adding focus to safety and health managers, supervisors, and technical experts
Discussion of knowledge gain is mentioned, but skills and actions which are in later logic models (COVID-19) are not included.	Short-term	Add increases to skills and actions
Company policies and programs are mentioned. However, WTP does not only focus on companies but organizational change, such as unions.	Short-term	Change “safer company policies/programs” to “organizational changes in policies, programs, and practices”
Technological fluency, capacity, comfort, and skill were crucial in WTP COVID-19 training. Such reliance on technology should be mentioned in the program.	Short-term	Add increased technological fluency, comfort, skill, and capacity
Worker empowerment is mentioned. The concept of confidence, used in other logic models, should be considered.	Mid-term	Add confidence increased
WTP emphasizes the hierarchy of controls, and this should be reflected in the program theory.	Mid-term	Using the hierarchy of controls for a higher level of protection
The definitions used for impact does not align with other evaluation definitions. Impact is for long-term outcomes as opposed to all outcomes (short to long).	Long-term	Consider removing “impact” above “short-term” and possibly “mid-term”
Evaluations are an ongoing part of WTP and may merit including other factors or components.	Overall	Include program evaluation, throughout the entire model



Future Evaluation Efforts

Based on the findings outlined in this report, the following are evaluation projects and questions recommended in the future:

- A separate document to organize examples and lists of grantee evaluation reports.
- Evaluation of HWWTP and SBIR E-Learning for HAZMAT Program training areas is little to none and should be considered.
 - A pilot evaluation of the SBIR E-Learning for HAZMAT Program was conducted in fall 2022 and a more thorough evaluation is underway.
 - An evaluation plan for HWWTP is in the discussion phase as of this report. Because HWWTP is a larger program than the SBIR, the planning stage and available resources to conduct such an evaluation will take longer to pilot.
- **HWWTP:**
 - How has HWWTP trained workers for work in hazardous environments and on hazardous waste sites, including Superfund National Priority List sites? How has this helped with site clean-up in the U.S.? How has the NIEHS WTP provided key trainings required under 1910.120 in HWWTP (e.g. HAZWOPER 40 hr., refreshers)?
 - How are NIEHS WTP key principles implemented in trainings under HWWTP (e.g., worker empowerment, adult learning, use of Minimum Criteria)?
 - How has the HWWTP supported businesses, municipalities, and other organizations through training workers, and encouraging safe work environments?
 - What are the economic impacts of the HWWTP?
- **SBIR E-Learning for HAZMAT Program:**
 - How has the SBIR E-Learning Program supported the use of technology in the delivery of training and education to workers performing duties in a hazardous environment?
 - How successful have SBIR E-Learning Program grantees been in advancing the technologies developed under the program? Measures of success can include jobs created, equity funding, patents, and participation in broader NIH commercialization programs such as I-Corps.
- **ECWTP:**
 - How has ECWTP impacted pre-employment and health and safety training for underserved communities?
 - How has the ECWTP supported individuals, workplaces, and their communities?
 - How has ECWTP pre-apprenticeship and community benefit agreement programs impacted communities and opportunities for individuals to obtain environmental careers?
- **Evaluation of ECWTP's intangible benefits, for example:**
 - Building a life and career after incarceration, homelessness, unemployment, or not graduating high school.
 - Helping and giving back to the community.
 - Ability to buy a home or rent sustainably, pay for children's education, buy a car, retire, etc.
 - Providing a path towards a leadership position in trainee's career.
 - Life skills and social services benefits.
 - Feelings of being supported and helped by the program to move forward in life.
 - Adaptability of ECWTP over time and delivery methods.

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- **Empowerment:** There are anecdotal examples of worker empowerment, but an evaluation may be helpful in documenting those impacts from the WTP.
 - **HDPTP:** HDPTP has been evaluated in terms of specific disaster response activities, but there may be more that could be done to evaluate how the program contributes to preparedness overall. For example, how are the specific courses delivered under HDPTP useful for workplaces and communities if there is an emergency or disaster, particularly in disaster-prone and vulnerable communities?
 - **Technology:** While the evaluation of distance learning in the context of the COVID-19 pandemic has been explored by at least one grantee⁶⁰, evaluation of use of technology and innovation is needed in the context of the broader NIEHS WTP. With increased use of online learning methods, related training outcomes should be evaluated for effectiveness in relation to the Minimum Criteria.
 - **Longer-term Outcomes:** There are examples of intermediate protection of workers, but longer-term outcome evaluations may be needed to assess impact in health and safety.
 - **Community Connections:** Evaluation of NIEHS WTP's overall improved connections with communities may be needed, building on work done in other programs. ECWTP highlights connections between workplaces and communities and how this is facilitated by the program. There are also examples of community outreach in disaster responses.
 - **Economic Evaluation:** NIEHS WTP should continue considering when an economic evaluation would be helpful for specific program areas and have strategies in place to conduct these evaluations.

Conclusion

Historically, NIEHS WTP has conducted evaluation projects and made evaluation a key factor in their program theory and grantee guidance and requirements. Prior examples include evaluating NIEHS WTP training program areas or components, efforts across multiple grantees on a specific topic, and evaluation activities for a specific disaster response or topic of focus. In a variety of ways, NIEHS WTP has evaluated their program theory intended outputs and outcomes over time, but more cohesive summaries of these efforts may be needed, and some goals may need further and more specific strategies to document those outcomes. Recommendations are provided to further improve and sustain ongoing NIEHS WTP evaluation, address program accountability, and revise the logic model.



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