Current Status and Research Trends of NIOSH

The National Institute for Occupational Safety and Health (NIOSH) strives everyday to do its work with the determination, commitment to sound science, spirit of partnership, knack for innovation, and unique understanding of the workplaces that has served NIOSH and its stakeholders well for the past four decades. To ensure continued scientific relevance and impact, IONSH is committed to engaging partners and stakeholders throughout the entire research process and continuing its comprehensive efforts in r2p. Also, it is essential that both internal and external scientists, decision makers and policymakers, and other key stakeholders understand and contribute to the mission of NIOSH to generate new knowledge in the field of occupational health and to transfer that knowledge into workplace practice to prevent work-related injury illness and death.

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Christine M. Branch
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Background Information about NIOSH

The National Institute for Occupational Safety and Health (NIOSH) is the only federal agency in the United States (U.S.) mandated to conduct research and make recommendations to prevent work-related injury, illness, and death. Specifically, under the Occupational Safety and Health Act of 1970, NIOSH was charged with developing recommendations for occupational safety and health standards; performing all functions of the Secretary of Health and Human Services under Sections 20 and 21 of the Act; developing information on safe levels of exposure to toxic materials, harmful physical agents, and harmful physical substances; conducting research on new safety and health problems; conducting onsite investigations to determine the toxicity of materials used in the workplace; and funding research by other agencies or private organizations through grants, contracts, and other arrangements.

NIOSH was created under the Occupational Safety and Health Act of 1970 and has worked diligently and strategically to protect the U.S.working population ever since. The mission of NIOSH is to generate new knowledge in the field of

occupational safety and health and to transfer that knowledge into workplace practice. NIOSH is a public health science organization that provides and funds research, information, education, and training in the field of occupational safety and health; is committed to the development and integration of knowledge and intervention; and is dedicated to building and maintaining productive partnerships, nationally and internationally.

To accomplish its mission, NIOSH provides global leadership by conducting scientific research, identifying causes of work-related disease and injury, identifying the potential hazards of new work technologies and practices, creating ways to prevent workplace hazards, developing guidance and authoritative recommendations, and delivering products and services to its various stakeholders including industry, labor representatives, professional associations, academia, and government and nongovernment organizations.

NIOSH has an annual budget of approximately $300 million and a staff of about 1,200 who represent various scientific disciplines including chemistry, communications, economics, engineering, epidemiology, industrial hygiene, medicine, nursing, physics, psychology, safety, and statistics. NIOSH is headquartered in Washington, District of Columbia and Atlanta, Georgia and has laboratories strategically located throughout the U.S. NIOSH is a center within the Centers for Disease Control and Prevention and is housed under the U.S. Department of Health and Human Services.

Historically, NIOSH research and recommendations have been reflected in the pioneering national initiatives that have made worksites safer and have reduced occupational exposure to hazards such as asbestos, lead, vinyl chloride, and other industrial agents. As the U.S. economy moved from its predominantly manufacturing base towards a more service-providing economy in the 1980s and 1990s, NIOSH kept pace with its research to address emerging issues such as indoor air quality, latex allergy, musculoskeletal disorders, needlestick injuries, workplace violence, and work-related stress. Around this same time, NIOSH also became keenly aware of the need to expand its partnerships, leverage its resources, and more effectively demonstrate the value of its research. As a result, NIOSH created the National Occupational Research Agenda (NORA) and launched its Research-to-Practice (r2p) initiative.

National Occupational Research Agenda

NIOSH created NORA in 1996 as a stakeholder-driven process designed to stimulate innovative research and improved work practices. It is the framework that guides prevention efforts of the occupational safety and health community in selected priority research areas. NIOSH and its partners have been actively collaborating in this process to define research priorities for the U.S. and achieve impact in the prevention of work-related injury, illness, and death. NORA is a national partnership effort that has sparked unprecedented public-private accord and has created a culture of priority-driven research in occupational safety and health. In the first decade of NORA, NIOSH and its partners developed a research agenda focused around 21 public health science priority areas that reflected considerable consensus among more than 500 groups and individuals who participated in the NORA priority-setting process. Priority areas included allergic and irritant dermatitis, control technologies and personal protective equipment, fertility and pregnancy abnormalities, indoor environment, low back disorders, organization of work, and special populations at risk.

Before entering its second decade, NORA was restructured as a result of stakeholder input. NORA is now pursuing an industry sector-based approach to prioritize research needs at the national level. NIOSH based its

NORA sector organization on the North American Industry Classification System (NAICS), which provides definitions for 20 industry sectors in order to classify businesses for the purposes of collecting, analyzing, and publishing data. NIOSH aggregated the NAICS sectors into eight NORA sectors based on similarities in workplace safety and health issues. The NORA sectors are Agriculture, Forestry, and Fishing; Construction; Healthcare and Social Assistance; Manufacturing; Mining; Services; Transportation, Warehousing, and Utilities; and Wholesale and Retail Trade. NIOSH and its partners use this sector-based approach to assess the state of occupational safety and health, identify focused priority research needs; move research results into workplace practice; and ensure a direct link between businesses, workers, researchers, and other partners to reduce work-related injury, illness, and death and improve the overall safety and health of workers.

The ability to survey and assess the state of occupational safety and health has improved over time; however, the available surveillance data still have substantial gaps and remain fragmented. Data are often collected for different purposes by different organizations using different definitions. Even with these fragmented surveillance systems, data indicate that workplace injury, illness, and death continues to have a profound impact on the safety and health of working America.

NORA Sector Programs

Each NORA sector consists of a council of approximately one-third NIOSH researchers and two-thirds external partners from areas such as academia, industry, labor, and government. Each council identifies and promotes priority research needs, critical knowledge needed to fill gaps in occupational safety and health, and innovative partnerships within their sector. Currently, the councils are developing and implementing sector-based research goals, objectives, and action plans for the U.S.

These national research agendas are based on scientific evidence, available data, public testimonies, peer reviews, stakeholder input, and expert consultation. They provide guidance to prioritize work among the many competing safety and health concerns. Agendas aim to highlight the most important research questions, recognize priority safety and health concerns, understand effective intervention strategies, effectively disseminate information, and achieve sustained improvements in workplace safety and health practice. Agendas are intended to inspire decision makers and program planners to adopt these issues as their top priorities, guide researchers to relevant and cohesive topic areas for research proposals, and encourage dialog and partnering among stakeholders on a subset of key issues.

<Table 1> Fatal and Nonfatal Injury and Illness Data for Private Industry U.S. Workers, 2007

NORA Sector (NAICS Code)	Number of Employed Workers	Number of Worker Fatalities	Fatality Rate Per 100,000 Workers	Number of Nonfatal Injuries & Illnesses	Rate of Nonfatal Injuries & Illnesses
Agriculture, Forestry, & Fishing (11)	2,045,000	585	27.9	50,500	5.4
Construction (23)	11,416,000	1,204	10.5	380,500	5.4
Healthcare & Social Assistance (62)	16,095,000	115	0.7	670,600	5.6
Manufacturing (31-33)	16,204,000	400	2.5	783,100	5.6
Mining (21)	730,000	183	25.1	21,900	3.1
Services (51-56; 61; 71-72; 81; 92)	51,555,000	1231	2.2	984,200	2.8
Transportation, Warehousing, & Utilities (22; 48-49)	6,116,000	924	15.1	289,600	6.1
Wholesale & Retail Trade (42; 44-45)	20,835,000	555	2.6	822,200	4.6

※ Data was obtained from the Bureau of Labor Statistics, U.S. Department of Labor, 2009

Working in the context of the NORA framework recognizes that each industry sector has unique occupational safety and health risks as a result of their workplace settings (i.e., size, design, location, work processes, organizational culture, and workforce characteristics), and the need for tailored interventions. Below is a brief synopsis of each of the eight NORA sectors and includes the priority areas that the sector councils have identified where focused research and translation efforts are needed.

Agriculture, Forestry, & Fishing

The Agriculture, Forestry, and Fishing sector is the cornerstone of industries that produce and market food, fiber, and fuel. Each year it generates more than $1 trillion in economic activity and creates exports exceeding $68 billion. Workers in this sector perform intense seasonal work, which lead to work-related fatality rates more than seven times higher than all industry sectors and higher incidence of many adverse occupational health outcomes, including hearing loss, respiratory conditions, and skin disorders.

The national research agenda for the Agriculture, Forestry, and Fishing sector outlines five strategic goals: improve surveillance to describe occupational hazards, worker populations at risk for adverse health outcomes, and the nature, extent, and economic burden of occupational illness, injury, and death; reduce excessive adverse outcomes in workers who have real limits to safeguarding their own safety and health; move proven safety and health strategies into workplaces by disseminating information about relevant interventions and promoting the adoption of best work practices through partnerships and collaborations; reduce the number, rate, and severity of traumatic injuries and deaths involving hazards of forestry, commercial fishing, and production agriculture and its support activities; and improve the health and well-being of Agriculture, Forestry, and Fishing sector workers by reducing work-related causes or factors that contribute to acute and chronic illness and disease such as musculoskeletal strains and sprains, respiratory hazards, toxic chemicals, psychological stresses, animal-borne diseases, new production methods and technologies, environmental issues, and changing workforce demographics.

Construction

Construction workers represent only about 8% of the U.S. workforce but experience 21% of the fatal injuries. They experience the second highest rate of nonfatal injuries resulting in days away from work and the fourth highest fatality rate. Leading causes of death among construction workers are falls to a lower level; electrocutions; and struck-by, caught-in, or crushed-by incidents.

The Construction sector council identified priority areas that aim to: reduce injury and illness from traumatic injuries, hearing loss, silica exposure, welding fume exposure, and musculoskeletal disorders; improve understanding of factors related to work organization, organizational culture, safety and health management systems, and occupational health disparities; develop, strengthen, and expand training and education; increase the use of prevention through design strategies; and improve surveillance at the federal, state, and private levels.

Healthcare & Social Assistance

Long hours, changing shifts, physically demanding tasks, violence, and exposures to infectious diseases and harmful chemicals are examples of hazards that put Healthcare and Social Assistance workers at risk for illness and injury as they work to serve the sick and those in need.

The Healthcare and Social Assistance sector council identified six strategic goals as part of its research agenda: conduct surveillance to better understand exposure to hazards, injuries, illnesses, and near-misses; promote the use of existing approaches, techniques, and safe work practices, such as lifting equipment to aid with patient transfers, safer medical devices, and reasonable work schedules and

workloads, to protect these workers from injury and illness; promote safety and health management programs to reduce injury and illness rates; conduct research and develop safe approaches to protect healthcare and social assistance workers; address all types of healthcare settings to ensure workers employed in nonhospital settings are also protected from injury and illness; and build strong partnerships among industry, labor, academia, government, and those who have a stake in protecting the safety, health, and well-being of patients and workers in this sector.

Manufacturing

Of the eight NORA sectors, manufacturing faces the most diversity in workplace safety and health challenges. Hearing loss, nanotechnology, chemical process safety, management systems, and special populations are some of the priority research areas needed to protect the millions of workers in this sector.

In 2007 the leading causes of death among manufacturing workers were contact with objects and equipment, transportation incidents, and falls. More than 50% of the nonfatal injuries that occurred in this sector resulted in days away from work, job transfer, or job restriction. Of all U.S. industries, 14 reported more than 100,000 nonfatal injuries and illnesses; 3 of these were among the largest of the manufacturing industries.

Priority areas identified by the Manufacturing sector council include: contact with equipment and objects; slips, trips, and falls; ergonomic issues that can lead to musculoskeletal disorders; hearing loss; chemical exposure; work organizational systems and stress; special populations such as contract workers, younger and older workers, immigrants, and women of child-bearing age; nanotechnology; and small business.

Mining

Mining provides the foundation for the U.S. economy and standard of living. The mining industry spans all 50 states and the U.S. depends heavily upon it for raw materials and energy. Hundreds of mined commodities play integral roles in everyday products, from medicines to computers. Despite the significant progress made to protect the safety and health of miners, the industry's fatality rate remains more than six times higher than the national average for all industry sectors. High rates of lost work time and permanently disabling injuries plague the industry as do diseases from long-term exposure, such as respiratory illness and hearing impairment.

Priority areas in the Mining sector as identified by NIOSH and its partners include: reducing health hazards in the workplace to reduce respiratory disease; noise-induced hearing loss; repetitive and cumulative musculoskeletal injuries; traumatic injuries; the risk of mine disasters such as fires, explosions, and inundations; and ground failure injury and death. Minimizing the risk and enhancing the safety and effectiveness of emergency responders is also of high importance. It is essential to determine the impact of changing mining conditions, new and emerging technologies, and the shifting patterns of work on worker safety and health to prevent potentially adverse outcomes.

Services

The NORA Services sector is the most diverse in its job categories and includes industries such as public safety and other government services, automotive repair, hotels and restaurants, education, recreation, and waste collection. U.S. workers in this sector are exposed to a variety of substances such as asbestos, cleaning solvents, carbon monoxide, diesel exhaust, and tobacco smoke; physical stressors such as temperature extremes, overexertion, assaults, and other forms of violence; and safety hazards such as electrocution, motor vehicle crashes, and slips, trips, and falls. Work environments are varied and often uncontrolled, putting these workers at increased risk of sustaining a work-related injury or illness.

To address the diverse safety and health issues in the Services sector, NIOSH developed 2 sector councils, one that focuses specifically on public safety workers and another that focuses on all other Service sector industries. Priority goals address safety and health issues such as: roadway hazards and vehicle crashes for outdoor workers; workplace violence and stress for law enforcement, corrections, and restaurant workers; overexertion and falls from heights for solid waste and landscape workers; effective training programs for youth and immigrant workers and workers with disabilities; fire ground exposures and chronic disease among fire fighters; and patient transfer equipment for emergency medical service workers.

Transportation, Warehousing, & Utilities

The Transportation, Warehousing, and Utilities sector is very diverse in its workforce, job responsibilities, and hazards. The sector covers all modes of transporting passengers and cargo-air, rail, water, road, and pipeline-as well as support activities related to all modes; establishments engaged primarily in warehousing and storage of goods; and electric power, natural gas, water, sewage, and other systems. In 2007 this sector accounted for 16% of all workplace deaths; transportation incidents alone accounted for 71% of its fatalities.

The sector council identified four priority areas where focused efforts are needed: traumatic injury rates that result in lost workdays; incidence and severity of work-related musculoskeletal disorders; workplace programs and practices that allow workers to engage in healthy behaviors to reduce work-related physiological and psychological stressors, improve the use of healthcare services, and reduce premature death; and chemical, biological, physical, and psychosocial work-related hazards and exposures. Within each priority area, the sector council identified goals and projects to address safety and health issues more specifically within the sector's many subsectors.

Wholesale & Retail Trade

The Wholesale and Retail Trade sector is comprised of approximately 1.6 million businesses that range from one-person, one-location worksites to a 1.7 million-employee chain store with more than 3,000 worksites. Workers in this sector are increasingly contract, temporary, or part-time, and more than 70% are employed with small businesses. The Wholesale and Retail Trade sector typically employs the youngest and oldest workers-many of whom are culturally and linguistically diverse-which can put them at increased risk of workplace injury and illness.

The Wholesale and Retail Trade sector, as defined by NORA, is expected to grow by 12% throughout the next decade. Workers are potentially exposed to an assortment of occupational hazards including psychosocial factors (i.e., stress from lack of job security and frequent interaction with the public), long workdays, shift work, violence, materials handling, static posture, prolonged standing, repetitive motion, and heavy lifting. Although the potential hazards are varied and the incidence rates are high, the Bureau of Labor Statistics suggests that the overall number of injuries and deaths within this sector may be attributed to a specific subset of high-risk workplaces.

The sector council identified six strategic goals that aim to: reduce chronic musculoskeletal disorders, traumatic

injuries caused by slips, trips, and falls, acute injuries from contact with hard objects, workplace violence, and motor vehicle-related injury and death; improve outreach to small businesses; increase understanding of how vulnerable working populations experience disproportionate risks; and expand the availability and use of effective interventions to reduce injury and illness among this population.

The strategic goals outlined in the national research agendas are intended to be accomplished through new and existing partnerships between NIOSH and its stakeholders over the course of the next decade. To accomplish these strategic goals and achieve sustained reduction in work-related injury, illness, and death, a comprehensive and focused effort involving surveillance, needs assessment, data management, economic analyses, research, interventions, information dissemination, and evaluation is critical.

NIOSH is responsible for managing the day-to-day operations of NORA and facilitating the work of the sector councils; however, partners are essential to conducting new research, assessing the state of the field, and communicating findings to those in positions who can make positive changes in the workplace. Through the cooperative efforts of workers, management, labor, practitioners, and scientists, NIOSH will continue to reduce the economic and personal impact of occupational disease, disability, and death through high-quality research and effective prevention strategies, as well as help ensure research-to-practice success, reduce work-related hazards and exposure, improve workplace safety, and protect workers.

NIOSH Cross-Sector Programs

The NIOSH program portfolio is comprised of the eight NORA sector research programs (as described above) and 24 traversing programs. These cross-sector programs are managed solely by NIOSH researchers through interdisciplinary steering committees; however, NIOSH may at times utilize the knowledge, expertise, and experience of the NORA council members to assist in guiding its internal portfolio of research programs. The cross-sector programs are intended to enhance the NORA sector programs, coordinate priorities that affect multiple sectors, support the sectors in accomplishing their goals for the nation, and create an organizational culture that nurtures interdisciplinary research and prevention efforts. The cross-sector programs are organized around surveillance, hazard exposure, interventions, adverse health outcomes, information dissemination, and statutory programs.

NIOSH cross-sector programs are: Authoritative Recommendations; Cancer, Reproductive, and Cardiovascular Disease; Communication and Information Dissemination; Economics; Emergency Preparedness and Response; Engineering Controls; Exposure Assessment; Global Collaborations; Health Hazard Evaluations; Hearing Loss; Immune and Dermal Diseases; Musculoskeletal Disorders; Nanotechnology; Occupational Health Disparities; Personal Protective Technologies; Prevention through Design; Radiation Dose Evaluation; Respiratory Diseases; Small Business Assistance and Outreach; Surveillance; Training Grants; Traumatic Injury; WorkLife; and Work Organization and Stress-related Disorders.

Similar to the sector programs, these cross-sector programs have each identified unique and complementary missions, striving to achieve their mission through a focused program involving high-quality research, effective prevention strategies, and internal and external collaboration. Cross-sectors have identified chief occupational safety and health concerns within their program areas; have identified priority research needs where gaps in critical knowledge must be filled; have developed goals to track injury and illness data and service the Institute, including the NORA sectors; and have established strategic partners to assist in effectively disseminating research finding.

The synergy and cooperation between the eight NORA

sector programs and the 24 NIOSH cross-sector programs fosters an environment where multidisciplinary groups of internal and external stakeholders can collaborate to drive progress in occupational safety and health, reduce potential exposure to workplace hazards, and protect workers from injury, illness, and death. A well-designed and facilitated approach to address critical occupational safety and health issues can increase the likelihood of reducing risks faced daily by the U.S.working population.

Transferring Research to Practice

Building a solid connection between scientific results and their use is an essential component of high-quality research organizations. NIOSH has built an organizational culture that integrates this value throughout its research portfolio. Along with scientific credibility, quality, and integrity, both relevance and impact are of utmost importance to the Institute.

In 2003, NIOSH launched its Research-to-Practice (r2p) initiative as a way to strategically conduct and support relevant and impactful research. r2p focuses on translating and transferring NIOSH research findings, technologies, and information into effective injury and illness prevention practices used in the workplace; emphasizes that research conducted or funded by NIOSH should be relevant for recognized evidence-based policy and practice; effectively diffuses research outputs to individuals or groups most likely to adopt them; and ensures that outputs are usable by organizations with the power to improve workplace safety and health. Opinion leaders and innovators must be familiar with NIOSH research and understand its utility if the Institute is to have confidence that its research findings and best practices will have impact and prevent work-related injury and illness.

As part of its r2p initiative, NIOSH is both demonstrating and increasing its contribution to science and occupational safety and health practice to maximize return on the nation's investment. The Institute works closely and extensively with its multiple partners and stakeholders to develop effective prevention products; translate research findings into practical and understandable information; guide tailored dissemination efforts to workers and others; move research findings and technologies out of the Institute and into the workplace; promote the diffusion of products and information; protect workers and reduce cost to employers, workers, their families, and society; and evaluate its effectiveness. Transparency and accountability is crucial for research organizations such as NIOSH, especially in a period of diminishing federal resources.

Global Collaborations

NIOSH is actively engaged in multiple international collaborations; participates in the global dialogue concerning occupational safety and health issues including silicosis, bloodborne pathogens, hearing loss, nanotechnology, radiation, and mining hazards; and is a national and international leader in occupational safety and health.

Examples of recent international involvement include chairing the WHO Global Network of 65 Collaborating Centers on all continents to assist countries in implementing the WHO Global Plan of Action for Workers' Health; providing training in classifying chest radiographs according to the ILO Classification System; contributing to the International Program on Chemical Safety; participating in ISO to improve the quality and dissemination of occupational safety and health guidance, research, and applications; collecting, analyzing, and sharing employer practices that reduce injuries to workers with high exposure to road traffic; and supporting and participating in partnerships between universities in the U.S. and other countries to provide opportunities for training, research, and policy development to researchers in their home countries and abroad. NIOSH is actively collaborating with many

countries, including Australia, Brazil, Canada, Chile, China, Columbia, Finland, Germany, India, Italy, Japan, Korea, Mexico, Netherlands, Peru,Singapore, South Africa, Sweden, Vietnam, United Kingdom, Venezuela, and Zambia.

NIOSH is committed to strengthening its current national and international partners and seeking new partnerships; to remaining a leader in the global efforts to protect the safety and health of all workers; and working collaboratively with industry and others partners to identify and solve workplace safety and health problems through strategic research and prevention activities.

Distinct Emphasis Areas in Occupational Safety & Health

In addition to the national initiatives that NIOSH has established, such as NORA and r2p, and its extensive international involvement, NIOSH has several other areas of emphasis that address unique working populations. Two examples are summarized below.

Disparities in Worker Safety & Health

The composition of the U.S. workforce continues to change and data suggest the importance of addressing health disparities, which exist across many priority working populations. Workers with specific biologic, social, and economic characteristics, such as female workers, younger and older workers, workers with disabilities, immigrant workers, and migrant and agricultural workers, are more likely to have increased risk or work-related diseases and injuries. NIOSH is working diligently to identify and prevent health disparities by identifying effective research methods and disseminating relevant information to the public health community.

Linking Health Protection & Health Promotion

The healthy workplaces initiative looks at the combined effects of work-related risks (i.e., chemicals, noise, excessive stress, and other hazardous working conditions) and personal health risks (i.e., poor nutrition, physical inactivity, and tobacco use). Strategies and actions are designed to better understand and promote work environments, programs, and policies that result in healthier more productive workers, reduced disease and injury, and lower healthcare needs and costs. NIOSH is committed to ensuring that workplaces are free of recognized hazards and better work-based health policies and practices are implemented to sustain and improve the health and well-being of workers, and to addressing the complexity of work and nonwork factors that affect health.

Program Reviews by the National Academies

From 2005-2008 NIOSH requested the National Academies to review eight of its major research programs: Agriculture, Forestry, and Fishing; Construction; Health Hazard Evaluations; Hearing Loss; Mining; Personal Protective Technologies; Respiratory Diseases; and Traumatic Injury. The National Academies are known as the Advisers to the Nation and their reviews are recognized for their independence and rigor.

Within the National Academies, program reviews were managed by the Institute of Medicine and the Division of Earth and Life Sciences. The National Academies recruited eight separate evaluation committees; each committee was made up of top experts. In total, more than 200 scientists external to NIOSH participated in the reviews.

Before the reviews began, the National Academies convened a committee of experts to write a framework of criteria. That framework advised the evaluation committees to examine each program's inputs, activities, outputs, and outcomes; assess its relevance to important workplace safety and health needs; and evaluate its impact on improving worker safety and health. Evaluation committees were also

directed to assess emerging issues for the program, provide recommendations, and score the programs on their relevance and impact. NIOSH programs received a numerical value for both relevance and impact; each score was given on a scale from 1-5. See Table 2 below for program scores.

Recommendations and noted accomplishments varied greatly between NIOSH program reviews, however, the evaluation committees did identify some commonalities. Areas for improvement included partnerships and collaborations, strategic planning, surveillance, dissemination and transfer activities, and extramural research activities. Noted accomplishments included conducting research in high-priority areas, positively affecting workforce conditions, providing excellent training programs for occupational safety and health professionals, and engaging in research translation activities.

Following the National Academies' review, each program was charged with developing an implementation plan in response to the committee's review. Implementation plans address how the program intends to implement their recommendations. In addition to a public comment period, plans are shared with the NIOSH Board of Scientific Counselors or the Mine Safety and Health Research Advisory Committee for review and comment and provided to the National Academies.

NIOSH strives every day to do its work with the determination, commitment to sound science, spirit of partnership, knack for innovation, and unique understanding of the workplace that has served the Institute and its stakeholders well for the past four decades. To ensure continued scientific relevance and impact, NIOSH is committed to engaging partners and stakeholders throughout the entire research process and continuing its comprehensive efforts in r2p. Also, it is essential that both internal and external scientists, decision makers and policymakers, and other key stakeholders understand and contribute to the mission of NIOSH to generate new knowledge in the field of occupational safety and health and to transfer that knowledge into workplace practice to prevent work-related injury, illness, and death. For more information about NORA, r2p, the NIOSH program portfolio, or any other occupational safety and health topic, please visit www.cdc.gov/niosh.

<Table 2> Relevance & Impact Scores Awarded to NIOSH Research Programs Reviewed by the National Academies

NIOSH Research Program	Relevance Score	Impact Score
Agriculture, Forestry, & Fishing	4	3
Construction	5	4
Health Hazard Evaluations	4	4
Hearing Loss	3	4
Mining	4	4
Personal Protective Technologies	4	4
Respiratory Diseases	5	4
Traumatic Injury	4	4

Relevance Score Key

5 = Research is in high-priority subject areas and NIOSH is significantly engaged in appropriate transfer activities for completed research projects/reported research results.

4 = Research is in priority subject areas and NIOSH is engaged in appropriate transfer activities for completed research projects/reported research results.

3 = Research is in high-priority or priority subject areas but NIOSH is not engaged in appropriate transfer activities; or research focuses on lesser priorities but NIOSH is engaged in appropriate transfer activities transfer activities; or research focuses on lesser priorities but NIOSH is engaged in appropriate transfer activities.

2 = Research program is focused on lesser priorities and NIOSH is not engaged in or planning some appropriate transfer activities.

1 = Research program is not focused on priorities and NIOSH is not engaged in transfer activities.

Impact Score Key

5 = Research program has made major contributions to worker safety and health on the basis of end outcomes or well-accepted intermediate outcomes.

4 = Research program has made some contributions to end outcomes or well-accepted intermediate outcomes.

3 = Research program activities are ongoing and outputs are produced that are likely to result in improvements in worker safety and health (with explanation of why not rated higher). Well-accepted outcomes have not been recorded.

2 = Research program activities are ongoing and outputs are produced that may result in new knowledge or technology but only limited application is expected. Well-accepted outcomes have not been recorded.

1 = Research activities and outputs do not result in or are not likely to have any application.

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