

USING PALM COOLING TO MANAGE OCCUPATIONAL HEAT STRESS

What's the Risk?

WSP is a global professional services provider, providing advisory, design and engineering services across a range of infrastructure and environmental projects. Many of WSP's field personnel work outdoors where exposure to high ambient temperatures, humidity and direct sunlight increases the risk for heat-related illnesses, such as heat exhaustion or heat stroke. Additionally, activities like bridge inspections, construction oversight and field remediation often involve moderate to high physical exertion, while personal protective equipment such as vests, hard hats and coveralls can further trap heat and elevate these risks.

WSP utilizes a comprehensive heat illness prevention program that includes hydration, shade, work/rest cycles, acclimatization, training and heat exposure monitoring. Despite these controls, heat stress continues to present a significant risk to employees performing work in hot environments. During 2024 and 2025, WSP recorded an average of 30 heat exposure events annually, with roughly 10 resulting in heat-related illness symptoms. In 2024, two heat-related incidents involving an employee and a subcontractor required hospitalization, and one heat-related illness required hospital treatment in 2025.

In response to these risks, WSP conducted a pilot to evaluate the effectiveness, feasibility and acceptance of the Narwhals palm-cooling technology as a supplemental heat stress control for field personnel. The pilot assessed the technology across a diverse range of field activities and environmental conditions to better understand how the portable cooling device could be integrated into their existing heat stress management programs while supporting worker recovery in real-world conditions.



Figure 1. WSP trialed the Narwhals palm cooling technology as a supplemental heat stress mitigation control.

Technology Overview

The Narwhals are patented palm-cooling device developed by Apex Cool Labs®. Palm cooling is a targeted cooling approach that lowers core body temperature through the hands, which contain specialized blood vessels known as arteriovenous anastomoses (AVAs). These vessels allow large volumes of blood to circulate close to the skin's surface, making the palms an efficient location for transferring heat from the body to the surrounding environment¹. One randomized controlled trial with heat-stressed subjects in heavy insulating gear found cooling at the palms, soles and cheeks to be significantly more effective at lowering core body temperature than cooling at the neck, armpits or groin².



Figure 2. The Apex Cool Labs Narwhals palm cooling technology.

The devices use a reusable Cool-Not-Cold™ phase-change pack that promotes heat transfer while maintaining comfortable blood flow through the palms. Workers simply hold or grip the handles during breaks or while performing simple tasks. As blood flows through the palms, heat is transferred into the cooling pack, helping remove excess body heat and accelerate recovery. According to Apex Cool Labs, this approach is designed to promote faster cooling and recovery, helping reduce thermal strain, improve comfort, support sustained work capacity and complement existing heat stress prevention measures.

The Apex Cool Labs® Narwhals were named the winner of the 2025 Safety Innovation Challenge, an annual competition hosted by the National Safety Council that recognizes innovative technologies designed to address critical workplace safety challenges.

Pilot Overview

With support from a pilot grant awarded by the [Work to Zero](#) initiative at the National Safety Council, WSP began an exploratory pilot of the Narwhals palm cooling technology. The objectives were as follows:

- 1. Evaluate the effectiveness of the Narwhals palm-cooling technology in helping WSP field workers manage heat stress during outdoor work;**

¹ Walloe, L. (2015). Arterio-venous anastomoses in the human skin and their role in temperature control. *Temperature*, 12(1), 92-103. <https://doi.org/10.1080/23328940.2015.1088502>

² Lissoway et al. (2015). Novel application of chemical cold packs for treatment of exercise-induced hyperthermia: a randomized controlled trial. *Wilderness & environmental medicine*, 26(2), 173–179. <https://doi.org/10.1016/j.wem.2014.11.006>

2. **Assess the impact of palm cooling on worker-reported outcomes, including perceived heat exposure, energy levels, fatigue and physical comfort; and**
3. **Evaluate user acceptance of the Narwhals, as well as their feasibility in real-world field environments, to inform future heat stress prevention strategies and scale implementation across WSP.**

The pilot was conducted over approximately 13 weeks, from mid-June through mid-September 2025. It included approximately 25 project sites across the United States and an estimated 50 to 75 field personnel, with 30 participants completing the post-pilot evaluation survey. WSP field teams evaluated the Narwhals in a range of field conditions, including activities related to construction and infrastructure work, environmental sampling, drilling and remediation projects.

Pilot Findings

Throughout the pilot, workers were asked to review the Narwhals and rate their experience with the technology, including its effectiveness, convenience and feasibility for workplace safety applications. This pilot yielded several key findings:

1. Participants experienced moderate heat stress conditions during the pilot.

First, WSP surveyed pilot participants about their current working conditions and the factors that influence their susceptibility to heat stress. Results showed that while most considered themselves acclimatized to the heat, more than one-third reported they were only somewhat or not at all acclimatized. Additionally, 37% identified one or more personal risk factors that could increase their risk of heat illness, such as underlying medical conditions, certain medications and other lifestyle factors. Participants also reported performing primarily moderate-intensity work in conditions that often felt warmer than a typical workday. Together, these findings reinforced the importance of pairing the palm cooling technology with ongoing training, education and outreach to promote heat stress awareness and safe work practices throughout the pilot.

Figure 3. **Do you consider yourself acclimatized to higher-heat conditions?**

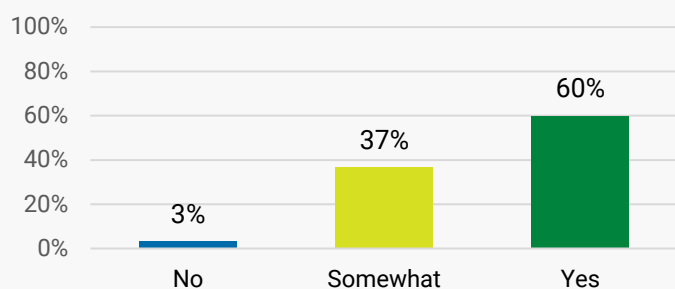


Figure 4. **Based on personal risk factors, are you at an elevated risk of heat illness?**

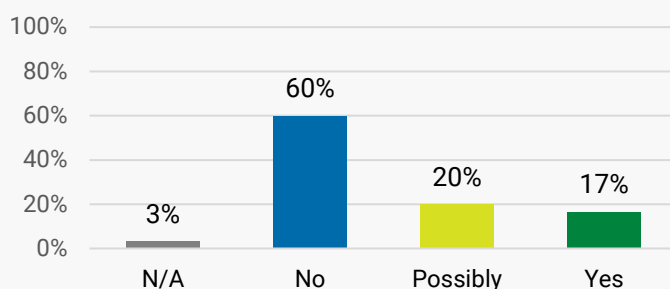


Figure 5. Compared to a typical workday, how hot did it feel today?

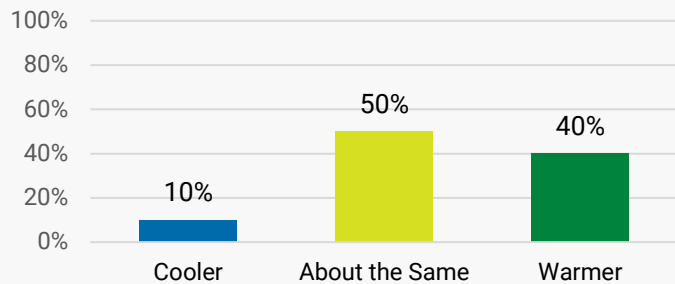
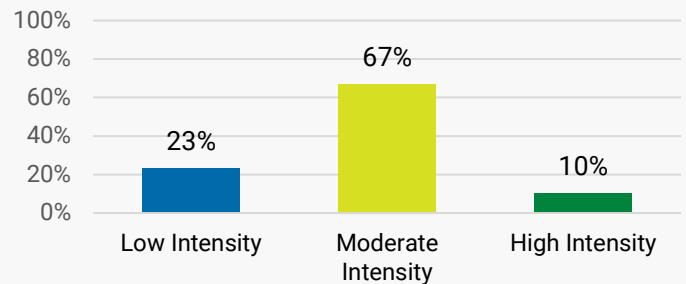


Figure 6. How would you rate the physical effort of your tasks today?

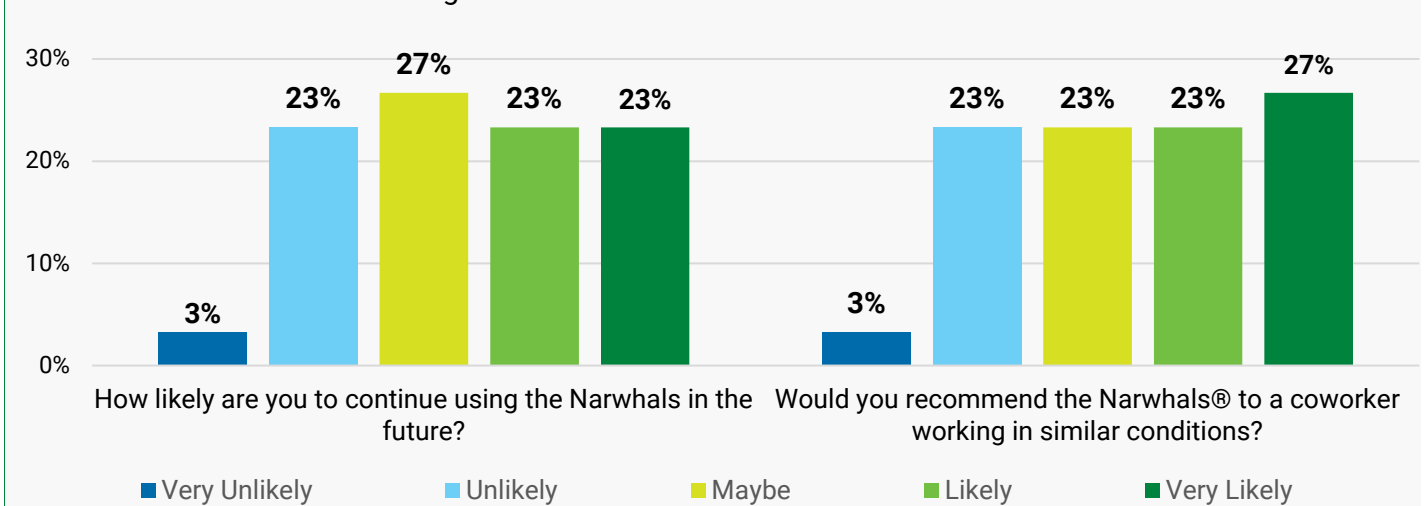


2. Participants reported modest but favorable improvements following use of the Narwhals.

Pilot participants were asked after the field evaluations to rate the extent to which the Narwhals improved their heat management, energy, overall fatigue, and muscle fatigue using a 10-point scale (0 = no improvement, 10 = significant improvement). Average ratings ranged from 5.3 to 5.7, with the highest rating observed for heat management (5.7), followed by sustained energy (5.4), muscle fatigue reduction (5.4) and overall fatigue reduction (5.3). Overall, these findings suggest that participants perceived consistent, moderate benefits across multiple dimensions while working in hot environments.

Overall acceptance was also favorable, with 46% of respondents indicating that they would “likely” or “very likely” continue to use the technology onsite. An additional 27% indicated they were open to continuing use (“maybe”), bringing overall receptivity to approximately 73% (see Figure 7). Throughout the pilot, participants identified key logistical and operational challenges that limited use in certain situations, feedback that enabled WSP to refine deployment strategies and improve implementation throughout the pilot.

Figure 7. Overall Narwhals Satisfaction

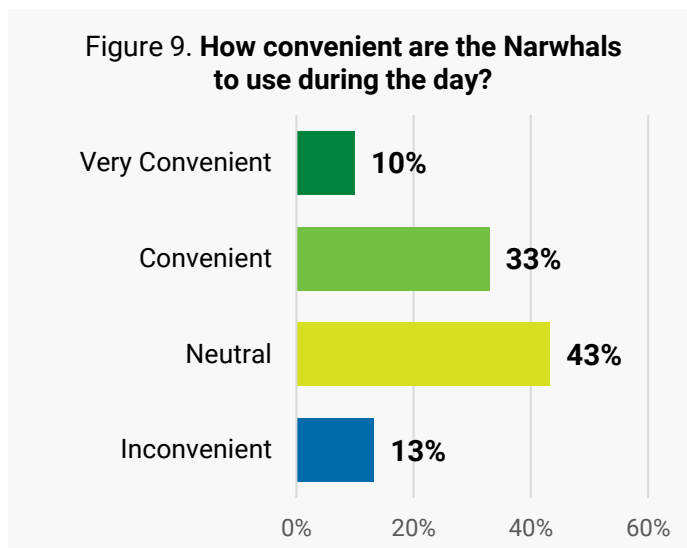
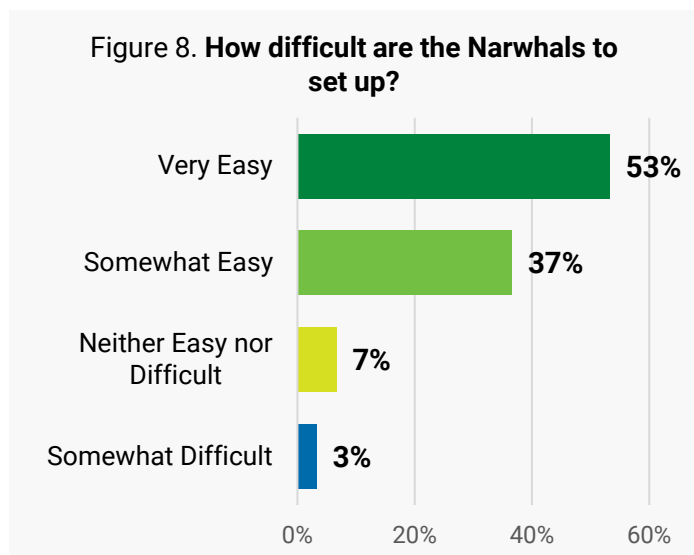


Several participants also described positive experiences with the Narwhals during field evaluations. Comments such as *"worked very well and cooled me down super-fast"* and *"refreshed and ready to go"* reflected the perceived cooling benefits among many users. However, participant experiences varied, with some reporting more limited or localized effects. For example, one participant noted, *"I felt like the Narwhals helped cool me down for the first few minutes but didn't do much after that,"* while another commented, *"Narwhals cooled hands and forearms but did not cool the rest of the body."* These responses highlight that the perceived benefits of the technology differed among workers and underscore the importance of evaluating cooling technologies across a range of users, tasks and environmental conditions.

Notably, in one case, a subcontractor used the device after experiencing symptoms consistent with early heat stress. After stopping work, hydrating and using the Narwhals, they were able to recover without requiring additional medical treatment. While a single case cannot demonstrate broader effectiveness, this example illustrates the value of having an accessible cooling tool available when early signs of heat stress appear.

3. User acceptance of the Narwhals was generally positive, while also providing valuable lessons for future implementation.

A second objective of the pilot was to evaluate the feasibility of implementing the Narwhals across WSP field operations. Overall, participants found the devices easy to deploy, with **90% rating the setup process as "easy" or "very easy."** Responses regarding day-to-day convenience of use were more varied. While 43.3% described the devices as "convenient" or "very convenient" to use, an equal proportion reported a neutral experience, while 13.3% found them inconvenient.



Qualitative feedback helped add critical context to these responses. First, responses revealed an important perception gap between what workers were expecting and the actual performance of the technology. While workers thought the Narwhals would provide instant, intense relief, the devices function through a controlled heat exchange designed to gradually reduce core body temperature rather than cooling the skin's surface. Consequently, many workers found it difficult to gauge the effectiveness of the devices, with one saying it's *"difficult to tell if cooling was from Narwhals or simply stopping work, resting, and hydrating."* Others noted that the devices were effective for cooling the hands but produced less noticeable whole-body cooling.



Figure 10. Pilot kits being transported onsite.

Separate from perceptions of effectiveness, participants also identified several logistical challenges associated with field implementation. Common themes included the size and weight of the cooler, maintaining access to conditioned cooling packs at remote work locations, and incorporating the devices into work activities outside of scheduled rest breaks. WSP used these findings to refine implementation strategies and address these practical barriers, as further discussed in the *Lessons Learned* section below.

4. Use of safety technology helped increase awareness of heat stress across the organization and promote a model of continuous improvement.



Figure 11. WSP tailgate meeting to discuss the Narwhals.

Beyond evaluating the performance of the Narwhals, the pilot also highlighted opportunities to strengthen heat stress prevention strategies across WSP. Early surveys and discussions revealed that some workers were not fully aware of personal risk factors that increase susceptibility to heat stress, nor the importance of acclimatization and early symptom recognition. According to WSP, starting in May 2025, there was a significant increase in the reporting of heat-related observations as field staff proactively identified and logged more heat hazards and near-misses than in previous years.

Management also observed that the pilot increased safety behaviors, expanded understanding of heat-stress risks, and advanced a human-

centered approach to wellbeing within WSP. According to a project lead with WSP, the Narwhals became symbols of WSP's commitment to employee wellbeing, encouraging open dialogue about heat risks and more consistent use of cooldown strategies.

Lessons Learned

WSP and Apex Cool Labs cited several lessons learned throughout the duration of the pilot, including:

- **Begin with leadership buy-in.** WSP noted that leadership support and visibility were both critical to driving adoption and use of the Narwhals onsite. Clearly communicating how the pilot aligned with organizational safety goals, along with establishing key performance indicators (KPIs), helped build support and maintain engagement throughout the evaluation.
- **Make information simple and accessible.** WSP built an online resource hub that provided information on heat stress, the technology, and pilot enrollment. They also leveraged QR codes to collect feedback and enroll new sites, keeping the process low friction and quick to complete for workers. The hub also included a centralized dashboard for pilot feedback and performance metrics. Providing workers with accessible information and a simple enrollment process helped increase awareness and encourage participation.
- **Set expectations and explain the science.** Education and training on occupational heat stress and the Narwhals technology were both essential for successful implementation. Explaining the physiological mechanism behind palm cooling, as well as the purpose of technology, helps set expectations and clarify misconceptions about the technology.
- **Plan for field logistics.** With any cooling device, consider how long the device stays cool, how often it needs to be reconditioned, and whether workers have access to freezers or ice for reconditioning. Store devices near any rest or break areas to minimize barriers to use.
- **Identify site "champions".** WSP designated a worker or supervisor at each site to serve as a "heat champion". The individuals helped manage the equipment, encouraged participation, and served as a critical resource for questions or feedback for coworkers during the pilot.



Figure 12. A worker incorporates a cooling break into his ongoing tasks.



Figure 13. Two WSP workers pose with the Apex Cool Labs™ Narwhals before a cooling break.

In summary, this pilot provided critical feedback on the effectiveness and feasibility of an additional cooling technology designed to help workers reduce heat stress on the job. It also helped support important organizational learning and culture change at WSP. As one internal report concluded, *“pilot leadership delivered Zero Harm results and strengthened WSP’s culture of proactive, people-first safety, setting a new benchmark for innovation in protecting workers in extreme environments.”*

The Narwhals have been expanded to additional WSP regions and high-risk projects in 2026, using the same model established during this pilot. Kits from the original pilot have been redeployed to teams in high-risk areas across the U.S. and additional kits are being implemented to provide greater coverage to WSP employees working in high-heat conditions.



WSP

WSP is one of the world's largest global professional services firms, delivering engineering, environmental and advisory services across infrastructure, energy, mining, buildings, transportation and environmental sectors. Supporting clients across the full lifecycle of built and natural environment projects, WSP operates in over 50 countries and employs approximately 83,000 workers worldwide.



Apex Cool Labs®

Apex Cool Labs develops portable palm cooling technology to help workers stay cool and productive in the toughest and hottest conditions. Their flagship product, the Narwhals, is a science-backed cooling device that helps remove excess body heat through the palms. **Apex Cool Labs was the winner of the 2025 Work to Zero Safety Innovation Challenge, focused on addressing occupational heat stress.**

Contact Us:
worktozero@nsc.org

Learn More:
nsc.org/WorktoZero

