# True STORY

## Wireless Gas Detection Delivers Key Advantages During Complex Australian Remediation Project

**HUNTER RIVER REMEDIATION PROJECT (HRRP)**

**Remediation contractor:**
Thiess Environmental Services

**Size of cleanup site:**
370+ acres (150+ hectares)

**Main toxic materials:**
PAHs* such as Benzo(b)Fluoranthene, Benzo(a)pyrene and Toluene; VOCs** such as Benzene, Ethylbenzene and Naphthalene; mercury, lead, Chromium, Arsenic and traces of cyanide.

**No. of AreaRAE wireless monitors:** 18

* Poly-aromatic hydrocarbons
** Volatile organic compounds

Australian contractor Thiess deployed wirelessly-connected systems for remote gas-detection monitoring at two large toxic-cleanup sites.

The Hunter River in Newcastle, Australia, may be one of the best examples of river remediation anywhere in the world.

For 84 years – from 1915 until 1999 – Newcastle Steelworks operated at the large, 370-acre riverfront location without today's stringent environmental standards, turning the Hunter River into one of the most heavily polluted waterways in Australia. Over many years, by-products including poly-aromatic hydrocarbons (PAHs) and a host of other toxic substances such as mercury, lead and traces of cyanide – all from steelmaking processes – leeched deep into river sediment.

The Hunter River Remediation Project (HRRP) was initiated in 2007 and included extensive sediment dredging and removal that included the use of wireless, around-the-clock gas-detection monitors to protect work crews, equipment and the river environment during the massive cleanup effort. The project was completed in early 2012. In all, more than 42 million cubic feet of contaminated soil (the equivalent of 300 Olympic-sized swimming pools) was dredged for removal from the river.

The project, the largest ever in Australia, was heavily regulated by the New South Wales Environment Protection Authority (EPA). It also represented the first time wireless gas-detection monitoring was deployed by Thiess, Australia's leading construction, mining and services contractor, known for its innovation in environmental remediation services.

The company received industry acclaim for its HRRP environmental management, including the United Nations Association of Australia World Environment Day 2011 Award for Environmental Best Practice. Working closely with state regulators, Thiess also developed a lasting relationship with the EPA and Department of Health agencies.

# ON The JOB

The project concluded with an impressive environmental record and an enduring monitoring system legacy. It boasted a 99 percent-plus compliance record against nearly 3,500 approval conditions and actions, had no adverse impact to the environment, and achieved 100 percent validation success in verifying target river sediment had been removed (in addition to other landmark achievements), according to Thiess officials. The provision of 24-hour gas-detection monitoring contributed to the success of the project by helping reduce safety and health risks, and protecting the environment.

> "Wireless monitoring has reached the point where it's difficult to imagine doing a remediation project without it."

"Since our original deployment of wireless detection monitors in 2007, the system has continually improved," said Kate Cole, a Thiess manager for industrial health and hygiene, and an environmental engineer. "Now wireless monitoring has reached the point where it's difficult to imagine doing a remediation project without it."

Wireless gas-detection systems, along with other "connected" gas-detection instruments, have become indispensable tools for collecting multiple sensor readings in real time to keep workers, nearby communities, assets and the environment safe during remediation projects. One of the most common ways to increase safety with a networked systems approach is to conduct continuous fenceline or perimeter measurements to monitor any impact corrective activities have outside of the work area.

When dangerous gas or vapors are detected, the real-time systems immediately sound simultaneous alarms at the detection site (including integrated man-down alarms) as well as at the operations center  The wireless gas detection systems also log sensor data. The data can be used to help industrial hygiene professionals generate safety reports, respond to inquiries and mediation, and evaluate and improve safety methods.

The wireless gas detection provides additional benefits that include:

- Immediate, safety-related decision making and deployment of emergency personnel if needed.
- Gas detection data archiving and monitoring for compliance and retrieval. This also frees up personnel to concentrate on their jobs.
- Real-time, secure 24/7/365 data and site map access by remediation teams or stakeholders
- Increased worker confidence in the workspace, safety procedures, and the management team—due to plant-wide safety processes, as well as accurate information on exposure risks and how to protect fellow workers.

# High-profile Remediation Project

The HRRP is just one of many successful remediation jobs executed by Thiess. Drawing on its experience and expertise, the company has taken on some of Australia's most technically complex environmental remediation projects, utilizing emerging methodologies and technologies to improve its remediation processes and safety protocols.

In 2012, Thiess began remedial work to rehabilitate a disused naval submarine base in world-famous Sydney Harbor. The high-profile project was on schedule to finish before the end of 2013, opening the way for future commercial or parkland development at the site.

The former HMAS Platypus site is unique. It sits on a quiet harbor inlet near Sydney Harbor and directly below apartments perched on bluffs with million-dollar views of the pristine waters surrounding the harbor. The site previously housed a gasworks facility, a workshop for servicing torpedoes and a base for Australian submarines, although the old gasworks operations account for the lion's share of the contamination. The site is about 4.5 acres (1.8 hectares) and includes 11 structures, many of which will be renewed for their cultural significance.

**HMAS PLATYPUS REMEDIATION PROJECT**

**Remediation contractor:**
Thiess Environmental Services

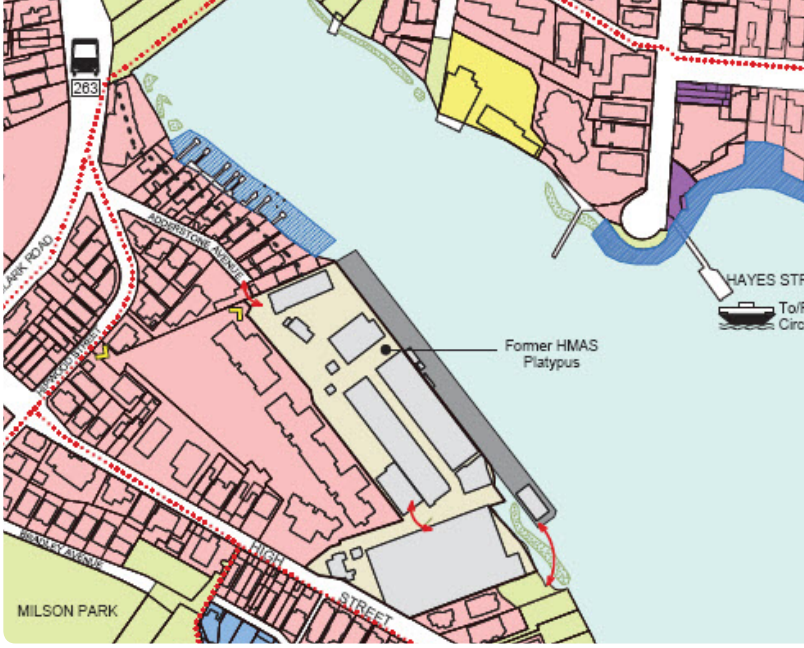
**Size of cleanup site:**
4.5 acres (1.8 hectares)

**Main toxic materials:**
PAHs*, VOCs** such as Benzene, and heavy metals.

**No. of AreaRAE wireless monitors:** 8

**Additional instruments:**
UltraRAE 3000, ToxiRAE Pros, RAELink3 modems/repeaters.

* Poly-aromatic hydrocarbons
** Volatile organic compounds




The Sydney Harbor Federation Trust acquired the site in 2005 to protect the heritage of Sydney Harbor.

Because the remediation site is in a highly populated area, a custom odor-control enclosure (OCE) was constructed to contain toxic and dangerous emissions during remediation work, such as excavating and removing contaminated soil. Perimeter monitors are used to confirm the tent-like structure is effective at keeping emissions contained, while rigorous monitoring is required to maintain worker safety inside the OCE. Thiess designed and built an emissions-control system to ventilate the OCE atmosphere and runs the air through a series of filtration systems before it gets released, said Cole.

"The net result is you don't smell it at all from anywhere onsite," she said. "It does, however, concentrate contaminants within the OCE that requires us to effectively monitor conditions closely to make sure worker safety is not compromised." The biggest threats at the HMAS Platypus site are volatile organic compounds (VOCs) such as benzene, a known carcinogen, PAHs and heavy metals.

## AGGRESSIVE MONITORING STRATEGY

The concentration of contaminants within the OCE required an aggressive gas-detection monitoring strategy. Thiess deployed RAE Systems' wireless AreaRAE multi-threat detection monitors to "screen" the boundaries of the Platypus site. It was the same system the company used previously at the HRRP site.

Inside the OCE, additional wireless AreaRAE monitors were used as part of the OCE health network. Thiess safety experts set the alarm thresholds low for early detection, to allow safety teams time to reach the OCE in response to alarms. If one of the area monitors alarm, the safety team immediately conducts "attended" measurements to confirm readings using other instruments, such as RAE Systems' hand-held UltraRAE 3000, a photoionization detector that can measure VOCs at a high resolution.

"We use the wide-area monitors in the OCE as our eyes and ears to initially screen for emissions," said Cole. "If a problem arises, we then go in and use our portable instruments to focus on certain areas that may need additional attention." Those hand-held instruments also connect to the monitoring network to log measurements using a RAELink3 modem from RAE Systems.

Signal routers and repeaters, such as the RAELink3 are used to extend the system's range, add access points and send signals around or over line-of-sight obstacles. During the Hunter River project, RAELink3 units were placed on anchored barges in the middle of the river to extend the wireless signals across the river. The RAELink3 also allows integration of many RAE Systems gas and radiation monitors, and select third-party devices, into a single real-time wireless safety network. The system can send data and GPS coordinates to a host computer from up to 2 miles (3 km) away.


## REAL-TIME MONITORING SOFTWARE

For Cole, the use of wireless detection monitors brings substantial advantages to the work site. Instead of placing engineering personnel with handheld detectors at perimeter locations to capture readings and then return to the operations center to download the data, the company gains efficiencies by redeploying people to other tasks and letting automated perimeter monitors collect and transmit data.

> "We use the wide-area monitors in the OCE as our eyes and ears to initially screen for emissions..."

Readings and alarm information can then be viewed in real time using monitoring software, which includes a site map that displays the location and alarm status of every sensor on the network. Industrial hygienists use the real-time readings to assess safety equipment requirements, such as determining how often self-contained breathing apparatus (SCBA) filters should be changed.

At the Platypus site, RAE Systems' monitoring software – ProRAE Guardian Wireless Safety System – aggregates, logs and displays sensor information from a range of wireless gas-detection instruments into a comprehensive real-time display of threat data. The system also can integrate biometric data and GPS information, and can be viewed on smartphones and Apple iPads®.

> "Wireless gas-detection systems give us is a real-time data set that provides confidence to both management and the people working in these hazardous environments..."

To further reduce the impact on the neighboring community, contaminated soil and materials at Platypus are removed from the site by barge, eliminating the need to move dump trucks through the neighborhoods. Local gas-detection instruments and an environmental engineer monitor loading and unloading activities, to protect workers and the environment. And by reducing diesel-vehicle traffic, nitrogen oxide (NO) and nitrogen dioxide ($NO_2$) pollutants – which are being monitored – also are reduced.

## BUILDING STAKEHOLDER CONFIDENCE

Wireless gas systems and the data they collect are integral tools to verify the effectiveness of occupational health and environmental controls to protect the health of workers, the community and the surrounding environment.

"One of the things wireless gas-detection systems give us is a robust real-time data set that provides confidence to both management and the people working in these hazardous environments," Cole said. "It builds trust that the controls implemented are effective at providing a safe working environment and that monitoring is being performed responsibly."

The data is used to generate regular reports detailing monitoring results and to identify trends to improve health and safety. Updated information about the effectiveness of the controls implemented on these projects is easily communicated to the workforce and to local communities. The monitoring effort records and logs monitored data, which can be accessed and reviewed later

to address inquiries, mitigate risks, and potentially reduce ongoing costs and expenses as part of an ongoing improvement process for future projects. "If we receive a community inquiry, for example, we can go back in time and provide data collected by our calibrated equipment confirming the conditions at a set location and time," Cole explained. "That can go a long way to show we operated safely and in accordance to respective legislative requirements."

## CONNECTIVITY BRINGS EFFICIENCIES

The HMAS Platypus site is a federally funded project that does not require Thiess to coordinate its cleanup effort with state officials, including the New South Wales Environment Protection Authority (EPA) and Department of Health.

But Thiess managers, who worked closely with these agencies during the Hunter River project, involved state officials early on to show them the monitoring approach and share measurement results. Advances in secure Internet access and the ability to get data onto the Internet from almost anywhere makes this kind of real-time information sharing safe and easy to implement using a wireless detection system.

"These agencies are as concerned about the impact of the project on the environment and on the health of neighboring communities as much as we are," said Cole. "Even though the project is outside their jurisdiction, we knew involving them would build confidence in our work, and demonstrate our adherence to following the same principles and processes as if this were a state project."

## INFORMATION ACCESS FROM ANYWHERE

For industrial hygienists, spending time outside the office is part of the job. But with wireless monitoring systems that include integrated data-management capabilities such as the AreaRAE system, managing multiple locations is efficient and convenient.

The system comes with a fully supported cascade mode, allowing aggregation of multiple sites into a map-based display for real-time monitoring from nearly anywhere. By setting one or two parameters on a compatible wireless system, one monitor becomes a peer on the other system, which enables the sharing of detection data and alarms in real time.

Cole uses the data-sharing feature to manage multiple job locations. In addition to her work at the Platypus site, Cole also is one of the industrial hygiene managers responsible for gas-detection

monitoring at the Collinsville Open Cut Mine in North Queensland. Thiess is responsible for all operations over the life of the mine. That site, owned primarily by Xstrata Coal, is about 1,900 miles (3,000 km) from the Platypus site.

While at the Platypus site or the Thiess company office in Rhodes, Cole can view information from the Collinsville facility in real time by cascading the information to one of the other networks. Similarly, when in Collinsville, she can cascade the Platypus information to that location, allowing her to view the information from each site separately in different panes or all the information combined on a single screen.

"It's quite useful in that wherever we are, we can obtain the data for what we need," Cole said. "Even though we have project teams based at these locations, it's very easy to see the data, no matter where we are. So when questions arise, we can offer up solutions or recommendations based on the latest information."

## RAE Systems Inc.

Keeping emergency responders safe gets easier when you have the right gas-detection solutions.

**Real-Time Information is Critical**
When disaster strikes, incident commanders and emergency responders are tasked with making critical, split-second decisions about how and where to deploy limited resources.

RAE Systems instruments – including multi-gas monitors – can be used as stand-alone devices or connected to RAE Systems' wireless ProRAE Guardian Real-time Wireless Safety System or EchoView Host closed-loop team network to leverage its unique five-way alarm system.

RAE Systems' ProRAE Guardian network allows incident commanders to quickly set up and establish a "mobile command center," receive real-time gas and radiation readings from more than 500 remote sensors, alarm status, responder location and biometric information from multiple teams and immediately evaluate the situation and better protect responders and the public.

RAE Systems' proven real-time safety and threat detection systems have been deployed by leading organizations, helping save lives and maintain safety in more than 120 countries. The company's industry-leading gas sensors and radiation detection solutions are widely recognized for their performance and reliability.

RAE Systems can help you prevent an incident from becoming a disaster. Learn more at http://www.raesystems.com/firstresponder/

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Real-time gas detection
For real-time decisions

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