

# NUCLEAR SURVEYS

## Revealing the Internal Condition of Ballasted Roofing Systems



Troxler® Roof/Reader 3216

Today infrared thermography is an excellent, cost-effective technique for detecting moisture contamination in roofing systems. With our state-of-the-art high resolution cameras, we can perform a highly accurate analysis of most roofs using only IR thermography and routine sample testing.

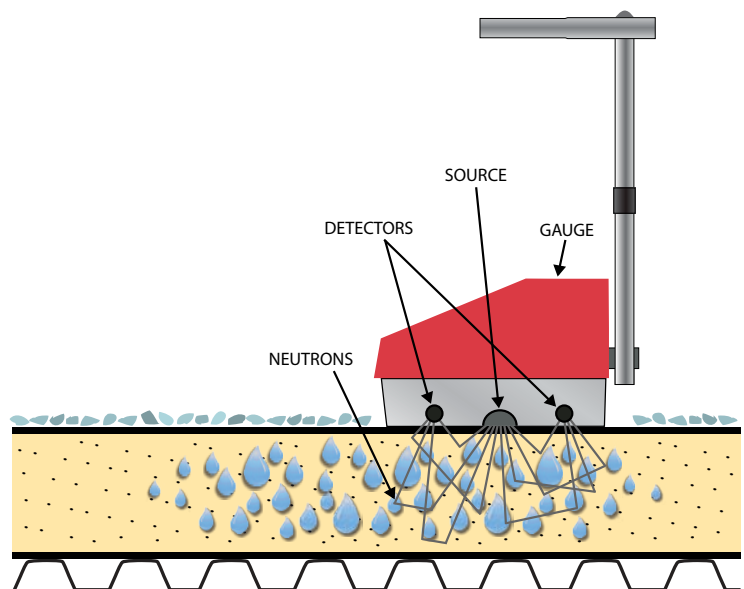
However, some roof systems require an alternative method of moisture detection. For example, ballasted roofs cannot be reliably scanned with infrared thermography because their rock ballast retains too much heat energy from the sun. This creates such a strong thermal signature that it obscures the heat patterns of underlying wet insulation, making accurate thermographic detection of the roof's moisture content impossible.

To address this problem, engineers working to improve testing techniques investigated alternative moisture detection technologies. Using a principle called neutron moderation, they were able to use tiny amounts of radiation to detect hydrogen ions, which typically indicate water. Neutrons emitted from a small isotopic source collide easily with neutrons of hydrogen, and these collisions slow their travel. By detecting changes in the speed of the emitted neutrons, we can safely and accurately identify moisture damage deep within the roof system.

To accurately analyze the data from this extremely sensitive nuclear detection technology, we must account for the original hydrogen content of the roofing materials. By utilizing small amounts of invasive testing, hydrogen readings are established for dry materials. After dry material baselines are established, elevated hydrogen counts indicate moisture damage (H<sub>2</sub>O) in the roof system.

### Nuclear Survey Method

A nuclear roof moisture survey is typically conducted on a 10' x 10' grid pattern across the entire roof surface. On ballasted roofs, the gravel will be temporarily moved aside in order to place the nuclear gauge directly on the roof surface. Readings are taken at each grid intersection to build a hydrogen inventory of the roof system.



**IRANALYZERS**  **Vector Mapping**

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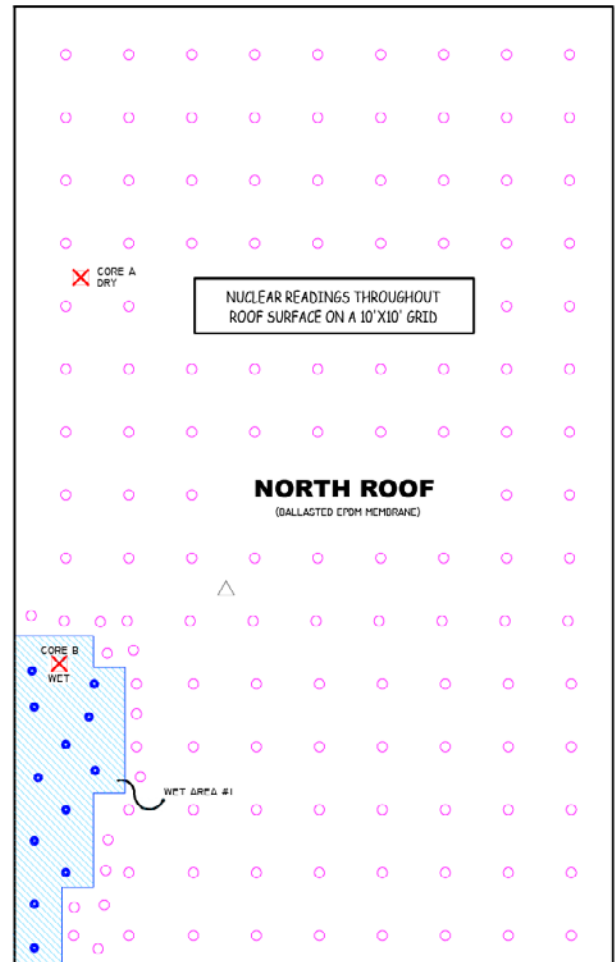
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### Analysis and Visualization of Collected Data

Next, we tabulate and analyze the collected data using statistical and visualization software. Using these diagnostic tools, we convert the raw data produced by the nuclear gauge into a detailed AutoCAD® map of moisture penetration inside the roof system.



Above: Rock ballast is temporarily moved aside in order to place the nuclear gauge directly on the roof surface. Nuclear surveys are typically conducted on a 10' x 10' grid pattern across the entire roof.



Right: Collected data is analyzed and converted to create an AutoCAD® map of moisture inside the roof system.

Although nuclear testing is significantly more labor intensive than infrared analysis, nuclear moisture surveys can be performed during the day and in various kinds of weather. Nuclear moisture analysis remains the only accurate method for testing the extent and location of moisture damage in ballasted roofs. Its unique ability to deeply penetrate roof materials makes it an invaluable tool for evaluating internal roof condition. Do you have questions about nuclear moisture surveys and how they can help save you money? Please call us at 800-879-1964.

We also perform infrared roof moisture surveys, vector mapping leak detection, and other testing services:

- INFRARED
- VECTOR MAPPING
- ELECTRICAL
- MECHANICAL
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## IRANALYZERS Vector Mapping

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