W. M. Keck Observatory | FAQs
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HYDRAULIC FLUID SEEPAGE AT KECK OBSERVATORY

How did Keck Observatory discover the hydraulic fluid seepage?
In mid-April, observatory technicians conducting routine maintenance discovered hydraulic fluid slowly seeping on the pier wall supporting the Keck I telescope, an area normally concealed behind drywall inside the telescope facility.

How long has this been going on?
Because the slow seepage was hidden behind drywall, the duration of the leak is unknown.

How much hydraulic fluid is involved? How much cinder has been contaminated?
The estimated leak rate of hydraulic fluid at the time of discovery was 0.46 gallons/month, some of which was released to the subsurface. Because the duration of the leak is unknown due to drywall concealing the seepage, the total volume of impacted cinder could not be determined. However, a conservative estimate is needed to determine the appropriate regulatory response. Keck Observatory calculated a conservative estimate of 2.5 cubic meters of impacted cinder based on the unlikely scenario the leak began when telescope operations began nearly three decades ago. 2.5 cubic meters is equivalent to the amount of soil you can fit heaped in the long bed of a standard full size pick-up truck.

When and how was this release reported?
On June 4, technicians extracted samples of cinder from a narrow isolation joint, or seam, in the floor of the Keck I telescope. The cinder sample appeared wet; Keck Observatory sent an immediate notification to the Hawaii Department of Health (HDOH).

Timeline of events leading up to HDOH notification:

- April 19, 2018: Technicians discovered hydraulic fluid seeping on the pier wall; action taken to contain the seepage using absorbent material.
- May 24, 2018: Senior management briefed on the Keck I pier seepage.
- May 29, 2018: Internal task force formed to pursue high-priority investigation.
- June 4, 2018: Cinder sampling suggests presence of hydraulic fluid; immediate notification sent to HDOH

Keck Observatory immediately retained environmental, geotechnical and hydrogeological consulting and engineering firm Masa Fujioka and Associates (MFA) to conduct a third-party investigation of the incident, recommend appropriate action, and prepare a full report per HDOH regulations.

After a five-month long investigation, the report – an Environmental Hazard Evaluation (EHE) and Environmental Hazard Management Plan (EHMP) – was filed with HDOH on Friday, November 9, 2018.

What are the findings of the investigation?
According to the report submitted to HDOH, “MFA finds that based on regulatory guidelines, the release is a “low-risk” and low-priority case because the volume of potentially contaminated soil (PCS) is small

and does not pose a significant risk to human health and the environment. The release site is concrete capped, and neither groundwater nor surface water are likely to be impacted. Therefore, management in place is appropriate."

Where is the seepage happening?
The engineering team initially identified six seepage areas on the Keck I pier coming from the hydraulic bearing system, and no seepage on the Keck II telescope pier. Further investigation revealed the total release includes a small leak coming from hydraulic fluid return lines located a few feet away from the Keck I and Keck II piers.

What has Keck Observatory done to prevent any further release of materials to the environment?
Keck Observatory immediately contained all leakage areas using absorbent material to capture and prevent further fluid from releasing to the environment.

On September 28, 2018, Keck Observatory permanently contained the release by re-sealing the one-inch wide gap at the base of the Keck I pier. This gap, or isolation joint, was identified as the pathway for hydraulic fluid to travel from inside the building to the cinder below. The sealant blocks any future accidental releases to the environment.

What is the composition of the hydraulic fluid? Is it dangerous?
Keck Observatory uses Mobil SHC 525 hydraulic fluid, which is formulated from synthetic, wax-free hydrocarbon base fluids.

Substances in the hydraulic fluid are listed in the Safety Data Sheet. None of these substances are in the Reportable Quantities table in the HDOH's Office of Hazard Evaluation and Emergency Response (HEER) Technical Guidance Manual (TGM), Appendix 2-B; however, "oil" (generically) is listed so that a release of the material requires reporting.

Have regulatory officials inspected the site?
Yes. On Wednesday, August 1, 2018, representatives from the Department of Land and Natural Resources (DLNR) and Office of Maunakea Management (OMKM) conducted an in-person site inspection. On Wednesday, September 5, 2018, representatives from HDOH and OMKM also inspected the release site.

What happens next?
With the report submitted, Keck Observatory awaits final determination and direction from HDOH. Now that the release is permanently contained, Keck Observatory is addressing the source of the leaks, making necessary repairs to the hydraulic bearing system, and implementing plans to replace the drywall with a system that protects the operational needs of the telescope while providing easy access for consistent monitoring to ensure nothing like this can go undetected in the future.

For more information, visit www.keckobservatory.org/responsibility