cists will have much to say in biology and physics too.

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BNL Official Explains Sources and Handling of Tritium Leaks

As interim director of Brookhaven National Laboratory, I appreciate Irwin Goodwin's continuing coverage of BNL. His comprehensive and balanced articles have enabled the greater physics community to stay up-to-date on the issues involving the lab.

However, I must point out and correct three misperceptions contained in his October story, "Peña Vows to Speed Up Lab Reforms In Wake of Political Sharpshooting" (page 86).

First, the story includes a statement that "lab officials still don't know the source of elevated levels of tritium that were detected in groundwater." That is not true. After months of exhaustive analysis, we can say with near-100% certainty that the tritiated water is slowly leaking from the 68 000-gallon pool of spent fuel in the basement of the High Flux Beam Reactor (HFBR) building.

Second, I am perplexed by Goodwin's characterization of the sequence of events—specifically his claim that when the tritium leak was found in December 1996, "it was weeks before the leak was revealed to local authorities." Although the erroneous belief that we withheld information has plagued us since last January, I believe we acted in a manner that allowed us to verify the unexpected, and apparently contradictory, results before releasing them to other parties. There was no intent on BNL's part to keep information from the authorities then, and there is none now.

Here is what actually happened. On 17 October 1996, our environmental staff took samples for the first time from the two new groundwater monitoring wells that had recently been installed just south of the HFBR. The samples were sent to the BNL testing lab for routine analysis, and the results—received on 5 December—showed a tritium level that was unexpected but not extraordinary, given our knowledge of groundwater contamination at our site: 2520 picocuries per liter in one sample from one well. That result led our environmental staff to take a new set of samples on 11 December to validate the result obtained the previous week. When the results from the new samples became available on 8 January, they showed a surprisingly high level of 44 700 pCi/L in the same well. That discovery led to an immediate resampling the next day, 9 January, and expedited overnight testing verified the high concentration of tritium. The next business day, 13 January, we notified the Department of Energy, BNL's most immediate regulatory agency. Subsequently, we notified other regulators and public officials on 16 January, BNL employees on 17 January and the news media on 18 January.

To sum up, we believe that our actions reflected a careful verification of scientifically determined results, not a deliberate delay on BNL's part, before the appropriate regulators were notified. Throughout the groundwater testing and other environmental initiatives of the past year, we have shared monitoring data with regulators and the public as soon after verification as has been feasible.

Third, I would like to correct the incorrect impression left by Goodwin's statement that our recent facilities review—initiated voluntarily by BNL—"turned up another tritium leak under a second, smaller reactor that is used for medical research." Although the proximity of this much lower level of tritium contamination to the Brookhaven Medical Research Reactor may seem to suggest that the tritium comes directly from the reactor, we have determined that neither the BMRR nor any of its systems is directly responsible. The source of the contamination appears to have been historical practices involving a portable tank and/or sump, both of which received low-level radioactive waste from medical research years ago. Currently we are monitoring this contamination further.

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Lev Shubnikov: Physics Pioneer, Landau Ally, Secret-Police Victim

PHYSICS TODAY has introduced a number of little-known or forgotten Russian physicists to Western readers in recent years (see, for example, the letters about Sergei Vavilov in your December 1995 and September 1996 issues), and I would like to add yet one more: Lev Shubnikov, a pioneer in the field of low-temperature physics who was arrested by the NKVD (secret police) during Stalin's "Great Terror" and whose fate has only recently been revealed.

This gifted experimentalist started in the mid-1920s with crystal physics, and that is why Abram Ioffe (the founder and long-time director of the Leningrad Physico-Technical Institute) recommended him to Leiden University's Wander Johannes de Haas, who was looking for an expert in growing crystals.[1] In the fall of 1926, Shubnikov started working in de Haas's department at the Kamerlingh Onnes Laboratory. There, on the basis of the advances he made in growing extremely perfect monocrystals of bismuth, he discovered a subtle phenomenon that later came to be known as the Shubnikov–de Haas effect. The result was published in 1930.[2]

Right afterward, circumstances forced Shubnikov to leave The Netherlands and return to the Soviet Union. He joined the new Ukrainian Physico-Technical Institute (UPhTI) in Kharkov, and after a frustrating period of waiting to get started, he succeeded in developing the Soviet Union's first cryogenic laboratory. His lab at UPhTI quickly gained a reputation as a world-class facility for conducting low-temperature experiments. His pioneering work on superconducting alloys was later acknowledged in the term given to the mixed state of type II superconductors: the Shubnikov phase.

Together with Olga Trapeznikova, his wife and colleague, Shubnikov was the first to detect the transition into a new, antiferromagnetic phase, and, with Boris Lazarev, to directly measure the nuclear paramagnetism of solid hydrogen. When Lev Landau, who had headed the theoretical division of UPhTI since 1932, developed the theory of the layer structure of the intermediate state of a superconductor, Shubnikov was the first to experimentally test it. In return, it was Shubnikov's pioneering experiments in low-temperature physics, as well as his many discussions with Landau, that aroused Landau's interest in this field, especially in second-order phase transitions.

Theirs was a close friendship that endured in difficult situations. When Landau vigorously defended pure science against the threats of ignorant administrators and proposed splitting the institute into divisions for pure and applied research, his ally from the experimentalists' side was Shubnikov. In December 1936, Landau