the US, meanwhile, brings urgency to Europe's decision on whether to build a 30-meter–class telescope or go straight to a 50- to 100-meter one. "The fact that [AURA and CELT] have joined makes their project more likely to succeed. It also makes a European one more likely to succeed," says Roberto Gilmozzi, director of the European Southern Observatory's Very Large Telescope and principal investigator for ESO's 100-meter Overwhelmingly Large Telescope (OWL). "The natural timescale of OWL is 15 years. If CELT moves ahead in 10 years, the [European astronomy] community would ask us to do something faster. The biggest pressure is that Europe not lag behind." The new partnership, adds Tim de Zeeuw of Leiden University in the Netherlands and a member of both the AURA board and the ESO council, "has stimulated the ESO to look carefully at its own future planning. Do we compete? Or do we at some point join forces?"

Toni Feder

South Dakota Governor Pushes for Underground Lab as Homestake Water Rises

NSF officials say approval of a science laboratory in the Homestake mine can come only after a multistep review process that takes "many months to many years." But a determined Republican governor and South Dakota's congressional delegation may bring politics to the science.

Deep in South Dakota's Homestake mine, in shafts and chambers that had been dry for decades, there is the sound of moving water. Flowing in at a rate of nearly 500 gallons per minute, the water has been filling Homestake since 10 June, when Barrick Gold Corp of Canada, the company that owns the mine, kept its promise to shut off the pumps that protected against flooding.

Wick Haxton, the principal investigator for a group that wants to create a National Underground Science and Engineering Laboratory (NUSEL) at Homestake, sits in his University of Washington office frustrated by the rising water, NSF, and just about everything else that has turned the proposed conversion of the mine into a high-stakes drama. In mid-July, Haxton's group sent NSF a Homestake underground lab "reference design project book" detailing where and how NUSEL would build research facilities within the mine. The book, a year in the making, "was produced with a lot of science and engineering hours of work," he said. Beyond sending the project book, Haxton said, his group simply has to wait. "We can't do anything more without access to the site."

He can, however, calculate how fast the water is rising in Homestake and how long it will be before the water threatens the NUSEL proposal. "The 7400-foot level is the area we want to develop," he said of the 8000-foot-deep mine. "We've been told in 18 months the water would be at that level. It appears the water is rising a little more slowly than expected, but if it reaches that level [7400 feet], then you really have to reassess your plans."

Indemnification intrigue

The idea of converting Homestake into a national science lab primarily for neutrino physics seemed obvious and relatively simple when it was first proposed in 2000 (see PHYSICS TODAY, January 2001, page 23). University of Pennsylvania astrophysicist Ken Lande raised the possibility after he heard that the mine was going to be closed. The neutrino physics community, familiar with Homestake because physicist Raymond Davis conducted a Nobel Prize–winning neutrino experiment there in the mid-1960s, enthusiastically endorsed Lande's idea. In 2001, an ad hoc study group led by physicist John Bahcall and supported by NSF and the Department of Energy, recommended Homestake as the site for an underground lab. But mine owners, concerned about possible lawsuits over environmental issues and potential health claims from former workers, wanted to simply close the mine and let it flood.

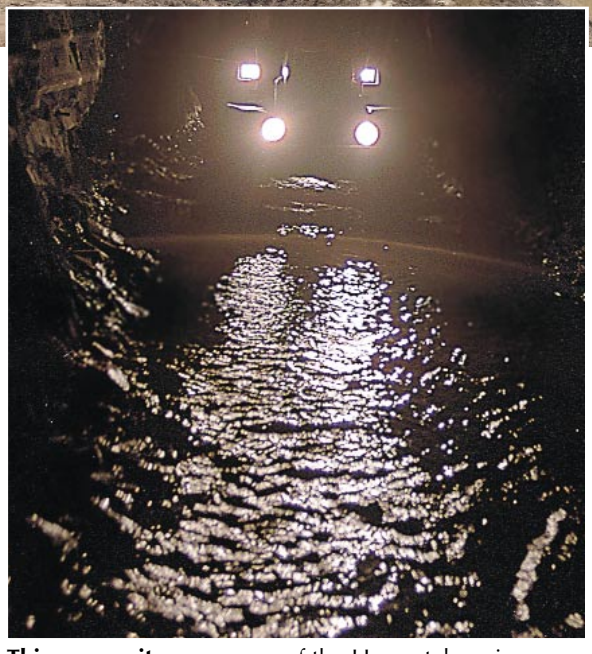
Barrick officials are not yet satisfied with liability protection schemes proposed by South Dakota, and weren't happy with an indemnification bill called the Homestake Mine Conveyance Act that passed Congress last year. The company refused an offer from South Dakota to take some of the $10 million in federal money that had been given to the state as development funding, and announced in May that it was on the verge of turning off the pumps. As the pumps were about to stop, NSF officials said an external advisory panel was completing an engineering study to determine which of several competing sites was most feasible for an underground lab. The panel picked Homestake as the most suitable from an engineering standpoint, but that didn't mean the mine had actually been selected as the official NSF site.

As the engineering study was concluding and the pumps were about to stop, Lande and his colleague, physicist Alfred Mann, flew to the town of Lead, near the mine, and pleaded for Barrick to keep the pumps on (see PHYSICS TODAY, June 2003, page 26). City and state officials joined in, as did the entire South Dakota congressional delegation. Fifteen Nobel laureates even wrote Barrick a letter asking that the mine be kept dry.

South Dakota Governor Mike Rounds has a background in insurance, not science, and although scientific pleas have failed to stop the flooding, he has moved forward "with an aggressive time frame" to make sure the Homestake lab is built. He talks enthusiastically about "the opportunity to bring pure and applied research into our region," and about the cultural change a world-class science facility would bring to South Dakota's Black Hills, where Homestake is located. "There is an opportunity to have our people learning from scientists who come in from all over the world," he said. "This could be a mecca of pure research. We want that."

Rounds plans to create a nonprofit, state-run authority to obtain the mine from Barrick. To make that happen, he said, he will call a special session of the state legislature before the end of the year. Rounds said the authority would assume the liability for Homestake, which would allow Barrick to insulate itself against future claims. The authority would purchase an insurance policy to cover any claims that might arise from Homestake, and that would insulate the state government. "We're talking a pretty good-sized insurance policy, but it's available," Rounds said.

First, he has to get an agreement from Barrick, and Rounds said that, by the end of August, he expected to have a signed option to obtain the mine. "We understand we're dealing with a business organization that has nothing to gain by doing this," he said. If the authority is then created, and if NSF commits to constructing an un-



STEVE MCENROE/RAPID CITY JOURNAL

This composite panorama of the Homestake mine near Lead, South Dakota (top), shows the "open cut" on the right and the mine buildings on the left. Headlights from a tractor transporting miners deep in the mine in 1998 reflect off water that sometimes accumulated during normal operations. Pumps that kept the water under control have been shut off.

derground lab at Homestake, then Rounds said Barrick may turn over control of the mine to the state. Once the state has the mine, dewatering and reconditioning will begin, he said. Barrick is insisting on the reconditioning, he said, because then the state becomes liable for any accidents. Scientists won't be allowed in the mine until the reconditioning is complete.

Political intrigue

While Rounds is trying to fast-forward the process, NSF officials are warning that it could be "many months to many years" before a final decision is made on whether or not to develop an underground lab, how to do so, and whether it should be located at Homestake. Although NSF has received Haxton's site proposal and detailed project book, that is just the beginning of the process, said Curt Suplee, NSF's director of legislative and public affairs. A more detailed engineering and planning study would likely be necessary, he said. Once that is done, the plan has to be judged "feasible, accurate, and affordable," he added, noting that the mine conversion is estimated at $500 million or more. Even if the laboratory is a good idea scientifically, cost is a real factor for NSF.

If a proposal cleared those hurdles, it would go to an NSF panel that reviews proposed major research equipment and facilities construction (MREFC). Homestake would be stacked up against other big-ticket project proposals. If it passed that review, it would go to another review board for further scrutiny. Then the NSF director would decide if the project should be submitted to the National Science Board for approval. The NSB has to approve such proposals on their merits, then approve each for funding. After that, NSF officials would have to convince the administration to include the funding in its budget request, and then Congress would have to approve that funding amount and then actually allocate the money.

"The shortest time in which that could happen would be many, many months," Suplee said. NSF officials are aware of the push for the lab from South Dakota's governor and from the neutrino science community, "but none of this will change anything about the way we do business."

What may change the normal NSF process is the politics of South Dakota. Governor Rounds is a Republican and has the strong support of the congressional Republicans from the state. He also has the backing of Senator Tom Daschle (D-S.Dak.), the senate minority leader. In last year's congressional elections, both parties tried to use support of the Homestake conversion as leverage in the election, and that approach will likely continue as Rounds pushes to get a commitment from NSF. Some congressional staff members who deal with science issues fear that political pressure could force funding of Homestake at the expense of other physics projects. As the political intrigue develops on Capitol Hill, Rounds will continue pushing his timetable. "We would like to see the lab being created in 2006 and scientists in doing science in 2007. It's going to require a lot of people doing their part," he said.

Jim Dawson

Italy's Underground Lab Recuperates From Toxic Spill, Gets New Director

"I think the worst moment is in the past," says Eugenio Coccia, his feet barely wet as new director of Gran Sasso National Laboratory in the Apennines, northeast of Rome. Coccia joined the world's largest underground lab on 16 June, the same day that a court lifted a restriction that had brought the lab to a near standstill in the aftermath of a small chemical leak.

The leak occurred a year ago, when scientists who were testing the purity of the scintillator pseudocumene (1,2,4-trimethylbenzene) for Borexino, a solar neutrino detector, turned a reverse-oriented valve the wrong way. About 50 liters escaped. Picnickers smelled pseudocumene's gasolinelike odor in a stream, says Frank Calaprice, the principal investigator for US participation in the experiment. "They found one dead fish. The incident was minor in terms of environmental damage, but major in terms of political implications for the lab."

Indeed, the matter might have ended with an investigation into the mishap and improvements to Borexino, but environmentalists, with whom the lab has long had strained relations, took the lab to court. Safety