TECHNOLOGY, ENVIRONMENT, AND THE HISTORIC AMERICAN ENGINEERING RECORD

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When studying a park, area or region noted for its natural beauty or environmental qualities it can be easy to overlook the impact that industrial enterprises have had upon the natural landscape. Though almost everyone can recognize the intrusion of modern, active technologies into a relatively natural setting, with older technologies it can become difficult to separate the "natural" environment from historic "intrusions." As a means of assisting natural scientists in their study of parklands and natural preserves, the Historic American Engineering Record (HAER) of the National Park Service provides National Park Service scientists and environmentalists its expertise available for specific projects that relate to the history of technology.

Founded in 1969 under a tripartite agreement among th National Park Service, the Library of Congress and the American Society of Civil Engineers, HAER is responsible for documenting historic engineering and industrial sites throughout the United States. This documentation includes written historical reports, ink-on-mylar measured drawings, and archival quality, large-format photographs that are prepared by HAER and then transmitted to the Prints and Photographs Division of the Library of Congress where they are available without restriction. Largely based on the organizational model of the Historic American Buildings Survey (HABS), an architectural recording program established in the National Park Service in 1933, the HAER program develops most of its documentation as a result of summer recording projects. These projects employ student historians, architects and engineers and require at least partial funding from other governmental programs or from private sources.

The philosophical foundation of HAER recording projects is the premise that by intensively examining the physical remains of historic engineering and industrial sites, in conjunction with in-depth research using more conventional sources of written evidence, it is possible to generate analyses that provide a better understanding of technological history than is usually available. Sites and structures are seen as *documents* that contain historical information unavailable elsewhere. By photographing and measuring a site, HAER creates a permanent record that will exist for use by future scholars regardless of any physical alterations or disasters that may occur.

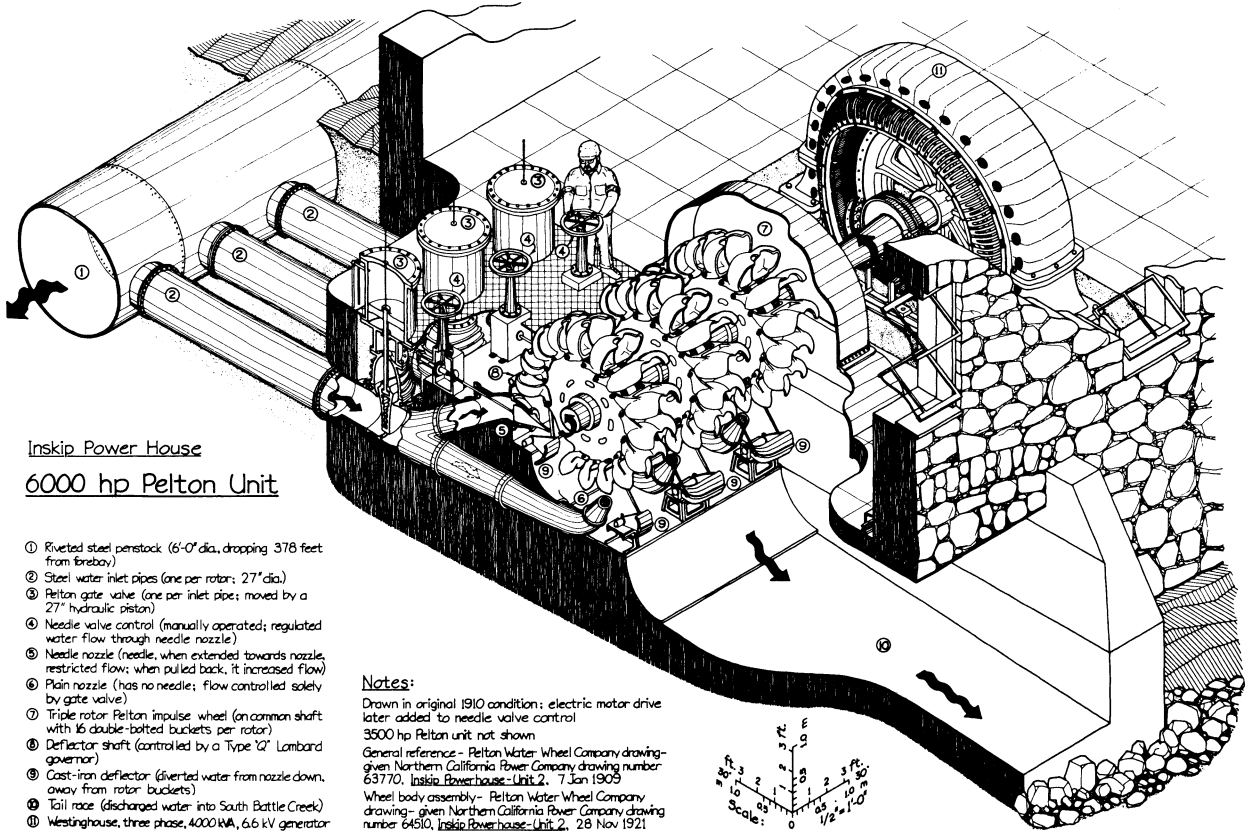
The dynamic nature of technological development is such that engineering and industrial sites are constantly subjected to alterations and innovations. Over time, these constant changes often drastically alter the character and operation of the original facility. Consequently, HAER is especially interested in documenting those rare sites that have largely escaped major alterations since their original operation. These types of sites provide the

most interesting historical information, but HAER recognizes that no historic engineering and industrial site stands as a pristine, unmodified relic of an earlier era. Often times only certain components of a historic technology survive while other features of the site have been destroyed, removed or radically altered. For example, a dilapidated early 19th Century mill may be missing its overshot waterwheel and most of its original machinery but retain intact its original wood and cast iron power shafting system. It should be stressed that every site presents a unique situation and that the focus and form of HAER documentation must be individually tailored to meet its specific features. The quality and detail of HAER documentation is also dependent upon the magnitude of funding available for any given project.

Just as natural scientists recognize that industrial activities affect the internal balance of various ecosystems, historians of technology realize the important role played by the natural environment in shaping technological development. This is not to say that historians see the environment as completely determining the form of regional technologies. Instead, environmental factors are seen as significantly influencing how technologies develop.

For example, the origins of coal-fueled iron smelting are inextricably linked with the exhaustion of England's forests during the 17th Century. As timber reserves dwindled, interest grew in developing a means of using coal to replace charcoal in the smelting process. Following Abraham Darby's successful coal-fueled blast in 1709, interest in coal mining grew throughout the 18th Century and coal mines descended deeper into the Earth. As the mines expanded problems with water seepage and flooding also increased and the first atmospheric steam engines were built to drain coal mines. Thus, it is possible to relate environmental factors to the development of coal fueled iron smelting and steam engines, two of the most important technologies associated with the industrial revolution.

Though the influence of the environment on technologies is not always as dramatic as the example given above, HAER projects have documented this relationship at a wide variety of sites. In studying the history of water power sites in New England, Michigan and California, HAER has discerned how topography and the availability of fossil fuels influenced technological development. At the ca. 1850 MacIntyre Iron Furnace in New York's Adirondack Mountains, the environment was found to have a different type of effect on technological growth. In this instance the trace elements of titanium found in the region's voluminous iron ore deposits prevented successful smelting and ultimately forced the company into bankruptcy. Thus, at times, environmental factors can be seen to stymie or stop technological development. The relation of technology to environment is not necessarily clear-cut and it is not always of paramount importance in understanding technological history. But HAER perceives this relationship as being an important component of technological development that warrants increased attention.



Isometric drawing showing design of Pelton water wheels inside Pacific Gas and Electric's (formerly the Northern California Power Company's) ca.1910 Inskip Power House near Redding, California.

1910 view of the Michigan Lake Superior Power Company's powerhouse in Sault Ste. Marie, Michigan, as it undergoes foundation repair.

The symbiotic relationship between technology and environment also insures that technological endeavors can have a major influence on ecological systems. In the future, HAER is interested in working with natural scientists to study more closely the relationship of environment to technology in particular geographical areas. These projects would not be selected exclusively on the merits of the region's technological significance or environmental qualities, but rather on how these two factors interrelate with one another both historically and in the contemporary world.

An example of this type of project might be one that studies the history of copper mining on Isle Royale National Park in Lake Superior. As part of two recent projects to document the Quincy Mining Company's and the Calumet and Hecla Company's copper mining operations on the Keweenaw Peninsula, HAER historians uncovered material documenting copper mining activities throughout the Lake Superior region. In so doing they became aware that some of the earliest mining in the area occurred on Isle Royale. Though today Isle Royale is usually thought of as being a natural preserve of great beauty, it is clear that the island has in some ways changed dramatically since the 18th Century. Just how early copper mining affected the island's environment should be a topic of interest to natural scientists.

Based on our earlier projects at Quincy and at Calumet and Hecla, HAER is familiar with the development and history of Lake Superior copper mining. It is this understanding of the development and history of copper mining in the Lake Superior region that could be used to explain and interpret the physical remains of copper mining on Isle Royale and to suggest to the natural scientists relatively recent environmental changes that this mining inflicted on Isle Royale's ecology.

The history of copper mining on Isle Royale is only one example of how HAER work might be integrated into environmental studies and we are interested in exploring other possibilities for interaction between historians of technology and natural scientists. We actively encourage members of The George Wright Society (and all other interested parties as well) to contact us about potential projects or about issues of concern to them that relate to the history of technology. Please do not hesitate to consult us at the address below.

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