Proving the Principle

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Dedication

To the pioneers of the NRTS who were part of the nuclear science adventure, and to the employees of the INEEL who continue the adventure of science.

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Introduction

"What did they actually do there?" This question has come my way frequently while researching and writing this history. Idahoans seem to have a sense of continuity with their mining and timber roots, their agricultural heritage, and the great themes of the West—Lewis and Clark, the Oregon Trail, Reclamation. But when it comes to their nuclear heritage, connections seem vague. The Idaho National Engineering and Environmental Laboratory (INEEL) was set up deliberately in a remote area. Fifty years later, it still is remote, in more ways than one.

I became curious about the INEEL after hearing a lecture about Hanford, the government's other nuclear facility in the Pacific Northwest. The speaker described Hanford's secret war-time mission to manufacture plutonium for weapons and criticized its later environmental record. The talk made me wonder about the role of INEEL in the nuclear world, for I knew little of its history. Therefore, when I was asked in June 1998 to prepare a history of the INEEL on the occasion of its 50th anniversary in 1999, I was ready with questions to ask of the past.

The story of the INEEL, originally named the National Reactor Testing Station (NRTS), is really a thousand stories. Sadly, not all could be in this book. Among those not here are certain defense research topics—the Centaurus laser-pumping experiments, for example—and medical topics like the campaign to recycle the Power Burst Facility for Boron Neutron Capture Therapy, a potential treatment for a deadly type of brain tumor. The accomplishments of the Radiological and Environmental Sciences Laboratory and a kaleidoscopic array of recent non-nuclear research are likewise missing. Recent decades in general receive less attention than the early days. But then, recent decades are full of programs and issues that continue to evolve, so perhaps it is better to let them mellow before a historian tries to characterize them.

This book is neither a technical report nor a scientific assessment. It is intended for the general reader with no background in physics, chemistry, or any other science. It aims to trace the changing relationship between a federal nuclear laboratory and its home state. Nuclear science is a character in the story, however, but not dressed in all its technical finery. A glossary and acronym list are available at the back of the book for those who wish an occasional reminder.

It is the question "What did they do?" that produces the thousand stories. The INEEL was the scene of thousands of scientific experiments. I learned to correct my notion of an "experiment." The word brought up vague memories of high school chemistry class—pouring a liquid of one color into a glass filled with a liquid of another color. The result was a third color, and that was it. In nuclear matters, however, an experiment may require acres of land, huge buildings, hundreds of people, and millions of dollars. It may take years to conceive, design, and build. After all that, the action phase of an experiment might take about the same time it took to pour liquid A into liquid B.

Large-scale laboratory work requires the well-orchestrated efforts of teams. Nevertheless, a historian, particularly when commissioned for a golden anniversary, looks for insight by talking to individuals. Who can interview a team that existed and dissolved forty-five years ago? Yet accomplishments are so often the product of teams, working groups, task forces, and committees, that it is hard to identify the individual who might have flashed the first break-through light on a problem. Team work is a fact of life in Big Science, perhaps most science. People demonstrate creativity and imagination in ways not often recognized. This book does not mention all the times that someone said of another, "He was the most brilliant physicist I've ever known," "We had superb back-up from our radiochemists," "The weather service sent their best meteorologists to the NRTS," "Our welders were the best in the business." I heard that sort of thing frequently.

Therefore, I regret the many stories not recorded here, the many exceptional individuals not acknowledged, the many discoveries and engineered systems not mentioned, the many ingenious experiments not described. I hope that the all-too-few names and episodes that do appear in the book will be understood partly as stand-ins for the many others that could just as well have been included—and stand-ins, as well, for the teams that made it possible for individuals to have stories to tell.

All historians of the Atomic Energy Commission or the Department of Energy (DOE) and its laboratories have had to cope with the multiple-arena aspect of their subjects: activity moves on several fronts at the same time. At the INEEL this is notably the case. Major programs were under different contractors and progressed simultaneously, sometimes having little more in common than the desert scenery and the landlord. Rather than chart INEEL history using internal bench marks such as the change in DOE secretaries or the five-year increments of operating contracts, I tried to keep in mind the general reader and the non-scientist, for most of whom this book will be an introduction to the INEEL.

As this manuscript neared completion, a criticality accident occurred in Tokaimura, Japan, in a plant fabricating highly enriched nuclear fuel. Having learned some basic nuclear language, I saw how carelessly many journalists reported this news. They used the word "contaminated," for example, when they meant "irradiated." The Idaho Chemical Processing Plant (renamed Idaho Nuclear

Technology and Engineering Center, INTEC, in 1998) at the INEEL has been the scene of three accidental criticalities. These episodes, although as grave as any unintentional criticality, were not germane to the general flow of the history and were piled on the stack of untold stories. Lest anyone believe that these were deliberately omitted, information about them is supplied in the appendix.

Associates have asked if my research exposed any "secrets" at the INEEL. DOE supplied me with no security clearance. Considering the broad scope of the history—and the time given in which to complete it—this was not a concern. I consulted many documents that were at one time classified and subsequently declassified. Nevertheless, the manuscript managed (inadvertently) to arouse classification concerns in connection with certain activities at the Chem Plant in the 1950s. For the rest, the selection of material, its interpretation, and any errors it may contain are entirely my own responsibility.

It was a special privilege to become acquainted with dozens of retired and current employees at the INEEL. Selected excerpts from some of these conversations appear in the book. If these in any way encourage INEEL people to record their own memories and their own explanation of why things were done the way they were, I say, "Get busy." The tons of scientific reports on the shelves omit all too well the flavors of human experience, be they disappointment, tedium, or exhilaration.

Now at the end of the project, I reflect once more on the lecture about Hanford and consider what I learned about the INEEL. In trying to understand environmental and other events within the context of their time and place, it seems to me that the managers and scientists of the INEEL were neither careless nor casual about the disposition of hazardous materials, radioactive waste, or radioactive releases. Some people account for this by remarking, "This was not a weapons production site." This explanation, expressed as a negative, gives insufficient credit to more positive themes in INEEL history. A research mentality, the daily use of the scientific method, the safety traditions established by the founders, and the integration of Site employees into surrounding communities—all of these must count for something.

Environmental concerns are surely important, but it is possible that when future generations consider the impact of the INEEL on the environment, they will find that impact to be far outweighed and outlived by the laboratory's remarkable legacy of scientific discovery and engineering achievement.

Susan M. Stacy

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The one-year horizon for preparing this book required some serious help from a lot of people. Greg Hula, the DOE/ID project manager, asked DOE/ID's contractor Jason Associates to supply a lot of it. Nelson Soucek managed the project for Jason, sensitive always to the tension between the deadlines that crowd and the space required to do work. I appreciate the many quiet ways he kept these contending forces in a productive balance. Greg Hula was on the other side of that coin, and I thank him for the many ways his kind patience, guidance, and astuteness helped to improve the manuscript.

Jason placed Lori McNamara on the project as research assistant and photo researcher. Lori and Kris Burnham compiled the information on historic NRTS reactors found in Appendix B. Assisted by Terese Nield, she located most of the photos appearing in the book. This task took her into many private homes, and we thank all of those generous people, including Bertie Lee Marvel, Pat Gibson, the Thomas Sutton family, the Ada Marcia Porter family, Orville and Margaret Larsen, and William Holden, Jr., who permitted the use of their photos.

Kris Burnham also designed the book and cover. She, along with others at Jason, also undertook the task of preparing the index. In addition to her talent, Kris brought her own considerable knowledge of NRTS/INEEL resources to bear on many details of the book, for all of which I thank her.

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