Unfortunately, although I claim to be the former, I am not the latter (two) and that deficiency inhibits my ability to critically evaluate this innovative text.

The book is divided into five parts and each part has a number of sections. The first part is entitled Pollution Prevention and Waste Minimization. It begins with descriptions of process flowsheets and block-flow diagrams. It then describes pollution prevention, cost, and energy. It describes control of exhausts from processes or, in other words, reduction of emissions. There is then a very brief description of the design or simulation of a plant so the reader can get the flavor of it before pollution prevention is discussed more thoroughly. Reaction systems and separation systems appropriate for waste minimization are then introduced.

Following this very interesting (for the most part non-mathematical) chapter are the chapters entitled (a) Mathematical Methods, (b) Computer Programs for Pollution Prevention and/or Waste Minimization, (c) Computer Programs for the Best Raw Materials and Products of Clean Processes and (d) Pathways to Prevention.

This book charts the way to a new era in design, and should immensely assist those engineers dedicated to the P2 concept.

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GARY F. BENNETT

Remediation of Firing Range Impact Berms

Donald F. Lowe, Karen L. Duston, Carroll L. Oubre, C. Herb Wards (Eds.), Lewis Publishers, Boca Raton, FL, 2000, pp. 379, US$ 99.95, ISBN 1-56670-462-6

This book is one of a series of ten books reporting the results of projects designed to attack the Department of Defence's most serious site pollution projects. Reviews of several of the books have appeared in the journal (and hopefully reports on all projects will, in time, be printed).

In introducing the book, the author wrote:

"The soil within firing ranges across the US has been heavily contaminated with lead bullets that hit the ground and impact berm. The lead bullets can be found as whole bullets or fragments. Lead smears on soil particles and lead oxide also exist. Consequently, there is a growing need to treat these firing range soils to prevent public exposure to the lead-laden soil and the leaching of the lead into the ground water. The US Army alone has over 3000 small arms firing ranges. In addition to military facilities, there are numerous firing ranges that are used by law enforcement agencies and by private groups and organizations.

The primary objective of the soil washing demonstration was to provide reliable, detailed performance data that would help evaluate the feasibility and cost of implementing full-scale treatment systems. An important secondary objective was to demonstrate the effectiveness of the technology in producing a "clean" soil based on analytical results.

The project included the following steps:

- Bench scale treatability studies of prospective firing range soils.
- Selection of the demonstration site.
- Pilot plant flowsheet development and equipment selection and installation.
- Execution of the demonstration at the selected DOD (Department of Defense) site,
- Data evaluation and report preparation.

- Design and economic evaluation for a full-scale treatment system at a hypothetical DOD firing range site."

"The pilot plant consisted of gravity and leach systems. The gravity system contained a soil feed system, an attrition scrubber, a trommel, a mineral jig concentrator, two spiral classifiers, two Reichert spiral concentrators, a hydrocyclone, a Knelson bowl concentrator, and two fine soil settling basins. The plant also had a small batch leach system that treated coarse and sand soil fractions containing residual lead contamination."

Separate chapters are discussed in detail.

- Soil Washing Treatability Studies — "In the treatability studies and pilot plant demonstration, the ability of gravity separation and leaching processes in combination to remediate a lead contaminated firing range were evaluated. Lead particles were physically separated from the soil matrix by breaking up the agglomerated material. The de-agglomerated contaminated soil was settled or screened to create fractions of particle sizes that were uniform and, therefore, more easily handled and treated. Gravity separation techniques were used to concentrate lead particles and soil particles with associated lead for disposal or further treatment. The coarse and sand soil fractions with lead concentrations greater than 500 mg/kg soil were treated using a vat leaching process. Agitation leaching was also evaluated to treat the contaminated fines fraction of soil". The section includes detailed outlines of the chemistry involved.
- Technology Demonstration — discussed in this section are site selection, pilot plant description and design and project execution.
- Design and Operation of Hypothetical System.
- Economic Analysis — "In this section, the capital costs of equipment, fabrication costs of the skid-mounted system components, and operating costs for a full-scale commercial soil washing system were estimated. The estimates were based on the pilot demonstration conducted at NAS Miramar, other full-scale soil washing pilot demonstration projects, and best engineering judgment. Costs were defined as applicable to typical remediation activities at Superfund and RCRA sites, and were determined using outside sources, purchasing experience, and good engineering practices. . . ".
- Performance and Potential Application — "The major goal of this evaluation was to determine general applicability of soil washing technology to remove heavy metals from all sizes and types of small arms ranges within Department of Defense (DOD) control. For the remediation of small arms ranges, three principles govern the remedial work. First, the amount of clean reusable soil must be maximized. Second, particles of coarse lead must be produced through gravity separations. Third, the process must be cost effective."

Soil washing is an ex situ water-based process that separates contaminants from the clean soil matrix. To achieve separation and physical sizing, gravity separation and attrition scrubbing are used. All process water is recycled through a closed-loop treatment system, minimizing water consumption and disposal requirements. Treated soil can be reused on-site, undergo further treatment, or be stabilized, if required, for use as foundation material for subsequent berm reconstruction. The concentrated lead streams recovered during the process are recycled, with the salvage value offsetting a portion of the cleanup cost. Since soil washing is a highly efficient mineral separation process, little, if any, soil ends up in the concentrated lead streams, resulting in premium quality salvageable metals.

The text takes up the first 116 pages. The rest of the book is devoted to test details as follows:

- CMRI (Colorado Minerals Research Institute) Treatability Study Results
- Demonstration Process Flowsheet
- Operating Rates and Mass Balance for NOS Miramar Pilot Plant
- Supporting Calculations for Equipment Capacities
- Pilot Plant Photographs
- Daily Log and Results of Feed Rate Tests
- Analytical Discussion
- Process Control and Monitoring Data
- Process Flowsheet and Mass Balance for Full-scale Plant
- Equipment Calculations for Full-scale Plant
- Design Figures for Full-scale Plant
- Cost Analysis Backup Data

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GARY F. BENNETT

Serious Incident Prevention: How to Achieve and Sustain Accident-Free Operations in Your Plant or Company

Thomas Burns, Gulf Publishing Company, Houston, TX, 1999, $55.00, 173 pp. ISBN: 0-88415-808-X

Hardly a month goes by without my reading of a serious chemical accident that resulted in death and/or destruction of major proportion. But most of these accidents are preventable according to the guru of chemical accidents (and author of several excellent texts on this topic) Trevor Kletz. He is quoted by Burns as follows:

> It might seem to an outsider that industrial accidents occur because we do not know how to prevent them. In fact, they occur because we do not use the knowledge that is available.

Burns, with an impressive safety background, described a "... serious incident preventive management process ..." to "... help organizations achieve and sustain breakthrough results through the merging of proven quality management principles with sound risk management practices." He suggests an eight-element model be used for maintaining the workplace conditions necessary to sustain serious incident-free operation.

Each of these eight elements, described in a separate chapter, is as follows:

1. Establish serious incident prevention as an organizational priority.
2. Involve employees.
3. Understand the risks.
4. Identify critical work for controlling the risks.
5. Establish performance standards.
6. Maintain measurement and feedback systems.
7. Reinforcement and corrective actions.
8. Improve and update the process.

Burns' advice is put to use in a case study (Chapter 13) of a hypothetical company that utilizes large volumes of flammable materials in its manufacturing process. Shown is a chart entitled "Serious Incident Prevention Performance Measurement Matrix" that