

Chapter 1

Introduction

You have to start somewhere.

1.1 WHO, WHAT, WHY, AND HOW OF THIS BOOK

This work is an outgrowth of the author's many years in industry as a member of or supervising a group of engineers charged with securing, maintaining, and/or negotiating environmental quality permits issued by government agencies. (On the author's watch, no capital project was ever delayed on account of not having been issued an environmental permit on time.) Demonstrating compliance and, when necessary, troubleshooting processes and equipment to ensure such compliance go with the territory. To "fill out the form" as per the printed instructions, one would often have to fall back on fundamental principles or develop one's own methods to estimate emissions to the environment, in addition to or in spite of using a prescribed methodology that came with no explanation or perhaps made no sense at all. This book attempts to capture many of those calculations and procedures in one place to serve as a reference for interested parties.

If one is looking for a book on environmental regulations, perhaps translated from legalese into plain English, this is *not* the right book. Although some discussion of regulations is necessary to clarify the motivation for certain calculations, the presentation strives to avoid being too specific lest it become dated as regulations, subject to change, indeed do change. In contrast, the underlying scientific principles, and the calculations derived from them, are timeless.

The presentation presumes at least a general background in science. One can accept on faith the equations and calculation procedures presented and proceed from there. However, to understand the origin of some of the mathematical relationships to the fullest, knowledge of algebra, calculus, and differential equations is required. The author's suggestions for a course curriculum useful in preparing practitioners in the environmental control function are explored in Appendix A.

There may be some overlap between sections as common elements are perhaps repeated to make the example problems as independent as possible, so that the reader does not have to refer to the entire book while solving a particular problem. The book, however, contains a minimal amount of “handbook information.” Sufficient chemical and physical property data, basic constants, and conversion factors are included to enable an understanding of the subject matter and solve the example problems. This document may be used along with other references as necessary when modifying the problems for one’s own use and/or for other materials. It cites such sources, rather than incorporating vast amounts of supplemental material in the text. (Besides, where better to find handbook data than in a handbook?)

1.2 POTENTIAL USERS

One title that came to mind was *Dr. Bob’s Handy Household Guide to Environmental Permitting Calculations*, but the grown-ups at Wiley prevailed; hence, the present title. The book is designed to help someone in industry to complete environmental permit applications. It is also intended for an Environmental Regulatory Permit Engineer in a government agency to evaluate the technical content of such an application and write a meaningful permit for a new project, or ascertain compliance/noncompliance with an existing permit. This compendium of calculation procedures could also be used as a primary or supplemental text in a college course in environmental stoichiometry or as a reference source to prepare for professional engineering or other professional licensing examinations. It may serve as a useful guide for government officials and mass media personnel when called upon to educate the public in the midst of an environmental disaster, such as a chemical fire, explosion, or release of hazardous/toxic materials. A recent local example comes to mind [1]. Since the book is oriented more toward technical issues than to specific environmental regulations, the basic principles discussed could have international appeal beyond the United States, especially in developing countries where environmental control efforts may be just getting started.

1.3 ARRANGEMENT

The book is arranged by environmental media, with several chapters on air, water and wastewater, solid waste, noise, and radioactive decay, following an overview of basic concepts. (The chapter on solid waste includes a discussion of potentially hazardous materials stored on site, which may result in the aforementioned environmental disaster.) The format is an explanation of a given topic (and possibly a related anecdote) followed by a worked example problem to illustrate the concept. Where appropriate, a general discussion of environmental laws and regulations driving the need for a permit is included. Each succeeding topic builds upon others that have preceded it. When a more extensive discussion is warranted, original, real-world case study material is presented in an appendix. Finally, one of Kunz’s Maxims, truisms/snippets of philosophy accumulated over the years, appears after each chapter heading. For example, “If you are at all capable of something no one else wants to do, you’ve got the job.” Enjoy!

1.4 TRUTHS AND MYTHS ABOUT ENVIRONMENTAL CONTROL

Environmental control is based upon what the author calls the *First Three Laws of the Environmental Material Balance*, to wit

- What enters either stays there or leaves.
- It's all got to go somewhere.
- That somewhere is usually the most inconvenient place.

The last statement is a corollary to Murphy's law. Since the universe does not come with an owner's manual and new discoveries are still being made, there may well be other laws of which the author is not yet aware.

In addition to the self-evident truths enumerated above, there is a series of accompanying environmental myths commonly held by people not directly involved in obtaining or issuing environmental permits. These are listed in Table 1.1. The

Table 1.1 List of Environmental Myths

Myth no. 1	Permits? Permits? We don't need no stinking permits!
Myth no. 2	Environmental regulations have to make sense.
Myth no. 3	These rules don't apply to us: Small plants don't require permits. The plant is out in the middle of nowhere. It's only water/steam. The agency will listen to reason. We'll get an exemption. We can always change the law. Political influence works wonders.
Myth no. 4	The contractor, vendor, project engineer, consultant, or someone else gets the permits, certainly not us.
Myth no. 5	Permit expenses are not in the budget.
Myth no. 6	Requirements are getting easier.
Myth no. 7	There is no need: No need to explain: environmental engineers (ours and theirs) are psychic. No need to be straightforward: slip it in (or leave it out); maybe they won't notice. No need to plan ahead: agency personnel work nights, weekends on our permit applications; the really dedicated ones give up their vacation time.
Myth no. 8	Plant managers never go to jail.
Myth no. 9	No problem! The plant's neighbors will gladly wear earplugs, gas masks, and dark glasses.
Myth no. 10	All environmentally concerned persons are "tree huggers."
Myth no. 11	If only our environmental people were more clever . . .
Myth no. 12	The Operations Department will fix it in the field.
Myth no. 13	There is a magic universal permitting handbook.

tabulation is limited here to a baker’s dozen (13) to avoid devoting the entire book to this one topic. It is hoped that this book will help to remove the existence of a universal permitting handbook from the list of myths.

1.5 ADEQUATE PREPARATION IS THE KEY

One last item of interest: It would seem that the role of a “permit getter” in industry is caught in the middle—representing the “big, bad, predatory, price-gouging, mean-spirited, polluting” corporation before a regulatory agency and then having to explain the rules of a seemingly intransigent agency to company management just interested in moving things along.

However, lest agency personnel be overlooked, their job is no picnic either. Many on the front line in the permitting process are overworked and underpaid. They too have deadlines to meet. At least initially, they know less about the applicant’s manufacturing process than the applicant and must learn quickly, one process after another, to perform each new evaluation and write a meaningful permit. Routine permitting often takes several to many months; more complicated permitting can take considerably longer.

1.6 A LIST OF DO’S

Some advice about expediting the permitting process has been discussed previously [2], as summarized in Table 1.2. This involves the so-called *preapplication meeting*. In the author’s experience, some steps may be omitted/modified, and the order of activities may vary on a case-by-case basis. The keys are to make it a

Table 1.2 Suggested Procedures for Obtaining Environmental Permits

Start early and devote adequate resources to develop a complete application.
Define the scope thoroughly (emissions/discharges, emission/discharge points, control equipment and monitoring systems, environmental effects/impacts (both onsite and off-site)) to avoid the application’s being placed on the permit writer’s “back burner.” Perform emission and modeling calculations for routine and nonroutine operations. Follow agency’s checklist, if available.
Determine permits required and develop a permit list for each and every agency having jurisdiction.
Review previously issued permits and background information, as necessary.
If agency rules allow, arrange for and attend a preapplication meeting with the agency, and possibly a site visit. Modify application, as necessary, as a result of agency input.
Obtain buy-in from Operations Department. Allow sufficient operational flexibility to meet requirements at all times without the need for (a) permit amendment(s).
Be proactive and provide required information before being asked, but do not submit an application prematurely.

downright pleasure for the agency permit engineer to work on one's permit application in preference to the many others that may be on his/her desk at the same time and to develop a positive track record of cooperation, which may help to dispel any sense of suspicion and replace that feeling with one of trust.

1.7 AND AT LEAST ONE DON'T

A final caution: Never, never, never obtain the agency's commitment to expedite the permitting process and then fail to provide the necessary information correctly, completely, and in a timely manner. This might not be the worst thing that one can do to shoot oneself in the foot, but it certainly ranks right up there with those that are.

1.8 AUTHOR'S SUPPLEMENTAL DISCLAIMER

No animals were harmed in the writing of this book; trees may be quite another matter. And now on with the show . . .

REFERENCES

1. R. Hall, P.E., Supervisory Investigator, Case study: fire and community evacuation in Apex, North Carolina, Report No. 2007-01-NC, U.S. Chemical Safety and Hazard Investigation Board (USCSB), Washington, DC, April 16, 2008, 14 pp.
2. M. Peters and G. Scappatura, Expediting issuance of cracking furnace permits, Proceedings of the 6th Ethylene Producers' Conference, American Institute of Chemical Engineers (AIChE), New York, NY, 1994, pp. 491–497.