

CHAPTER 1. INTRODUCTION

1-1. Purpose. This manual describes reliable or preferred procedures or concepts of drilling and blasting conducted during rock excavation, in order to aid design and construction personnel in related matters (para 1-4). Drilling and blasting methods described herein are not to be regarded as official Corps of Engineers (CE) policy, but they should be of assistance to CE personnel in establishing policy. The manual is designed principally for the use of geologists and engineers who are given responsibilities in drilling and blasting projects. Such responsibilities may come either in the design or in the construction phase.

1-2. Applicability. The provisions of this manual are applicable to CE Divisions and Districts concerned with Civil Works design and construction.

1-3. References.

a. Department of the Army publications on related subjects are listed below:

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| (1) ER 1110-2-1200 | Plans and Specifications |
| (2) EM 385-1-1 | General Safety Requirements |
| (3) EM 1110-1-1801 | Geological Investigations |
| (4) EM 1110-1-1806 | Presenting Subsurface Information
in Contract Plans and
Specifications |
| (5) EP 415-1-261 | Construction Inspectors Guide |
| (6) TM 5-332 | Pits and Quarries |

b. Strict adherence to safety precautions in blasting is of utmost importance. Publications specifically on safety in blasting include:

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| Handbook of Electric Blasting | Atlas Chemical Industries,
Inc., Explosives Division |
| Manufacture, Storage, Transportation and Use of Explosives and Blasting Agents,
1968 Rev Ed. | National Fire Protection
Assoc. |

The following are obtainable from Institute of Makers of Explosives,
420 Lexington Ave., New York, N. Y. 10017

Standard Storage Magazines, 1957, Pamphlet 1

Safety in the Handling and Use of Explosives, 1960, Pamphlet 17

How to Destroy Explosives, Pamphlet 21

Rules for Storing, Transporting, and Shipping Explosives,
Publication 5

American Table of Distances for Storage of Explosives, 1964,
Pamphlet 2

Do's and Don'ts, 1964

Radio Frequency Energy, 1968, Rev Ed., Pamphlet 20

c. A series of CE engineer manuals on rock excavation is anticipated for the future. The drilling and blasting manual for surface excavations is the first of this series. Selected references that describe drilling and blasting procedures and results as well as specific application in construction are cited herein by superscript numbers; these numbers correspond to those in Appendix A, References.

1-4. Duties of Government Construction Personnel. The Resident Engineer usually bears ultimate responsibility for major decisions but relies on his inspectors and resident geologist for advice.

a. Construction Inspector. The construction inspector will determine that blasting methods used by the contractor are in compliance with the requirements of the plans and specifications and also that the work complies with the blasting program and methods submitted by the contractor to the Contracting Officer. Significant deviations will be reported to the Resident Engineer for a decision. The inspector will report on a Government form information concerning the program and blasting method, as discussed in Chapter 8 of this manual. The inspector also should report daily observations and progress of the job to the resident geologist.

b. Resident Geologist. The resident geologist should be intimately familiar with the rocks and their properties so that he, in turn, can assist the Resident Engineer regarding blasting progress and any problems that arise.

1-5. Specifications.

a. The principal intent of the specifications is to inform the

contractor what the work is to be and the conditions he will encounter. At present, no "Guide Specifications for Civil Works Construction" on drilling and blasting exist. Certain provisions are included in specifications of CE Districts to ensure desired results. Chapter 5 of this manual includes information on basic blasting techniques that may be helpful in preparation of these specifications, and a few sample specifications are presented in Appendix B.

b. The contractor can be closely restricted by specifications that require procedures assuring no damage to the excavation or adjacent structures. An advantage of this type of specification is that it gives a legal basis for the Contracting Officer to supervise the contractor's compliance. Other specifications may allow the contractor relative freedom to choose his procedure as long as the final excavation is satisfactory. Incentive can be included in such specifications; e.g., the contractor may find it to his advantage or disadvantage in concrete payment according to whether his final rock surface (after scaling) falls within the rock excavation tolerances.

1-6. Working Relationships. A cooperative spirit should be maintained among CE personnel, drillers, and blasting crew if the best results are to be obtained. Although the inspector monitors the drilling and blasting operations, he does not take over the role of foreman for the contractor, i.e., should refrain from giving orders directly to workmen. A thorough knowledge of drilling and blasting techniques is the best assurance of a satisfactory job. Chapters 2 through 5 of this manual are intended to help in this regard.

1-7. Geological Information. The geology of the project can be a major factor in a successful blasting job. The bidding documents should reflect the geological conditions and establish procedures compatible with the results desired. Design memoranda and technical letters covering the geology of the project site should be made available to and be carefully reviewed by the field forces. For details of the effects of geological conditions on blasting, see Chapter 6.