



UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

PUBLIC DOCUMENTS
NATIONAL ARCHIVES

DEC 17

GUIDELINE TRANSMITTAL SHEET

GUIDELINE NUMBER NPS-65	TITLE "Explosives-Use"	CLEMSON RELEASE NO. LIBRARY 2
OFFICE OF ORIGIN Branch of Loss Control Management		AMENDMENT NO.
DATE Sept. 10, 1991		

Explanation of material transmitted:

This guideline is an operational aide which provides information on national policy and programs that apply to and guide all explosives handling and operations within the jurisdictional boundaries of the National Park Service. These operating procedures have been formulated to ensure the safety of personnel and property and the efficiency of blasting operations conducted under the auspices of the National Park Service.

This guideline supersedes the first release of NPS-65.

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Acting Chief, Administrative Services Division

EXPLOSIVES USE

GUIDELINE

NPS-65



THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

PH 441



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INTRODUCTION


The guidance contained in this document is the result of extensive field experience and research, and the actions of those who operate under its provisions are expected to reflect at all times sound judgment, a primary concern for blasting safety and knowledge of the current state-of-the-art in blasting and safety techniques.

The NPS use of explosives must be in conformance with Occupational Safety and Health Administration (OSHA) standards, Bureau of Alcohol, Tobacco and Firearms (BATF) and Department of Transportation (DOT) regulations and Institute of Makers of Explosives (IME) recommendations and guidelines as applied to the field operations of the Service (see Appendix B). The peculiarities of Service operations and locations may call for the development of specific variations or standards internal to the NPS.

This program is implemented under the authority of the Director, NPS, and through the delegation of licensing authority by BATF. For purposes of interpretation of this guideline, the word "should" is to be interpreted as "advisory."

OBJECTIVE

The objective of this guideline is to establish a set of operating procedures and regulations formulated to ensure the safety of personnel and property and the efficiency of blasting operations conducted under the auspices of the NPS. Blasting safety means the identification and minimization of risk to all persons involved with or in the vicinity of all aspects of explosives handling and use, the minimization of risk to property and cultural resources and minimization of the environmental impacts of blasting. Environmental impacts include visible and audible impacts and structural alterations.



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USE OF EXPLOSIVES

The safety of personnel should be the controlling concern in the making of decisions regarding blasting operations. All transportation, storage, handling and use of explosives should be done by authorized and qualified personnel who are in possession of a current NPS certification (license) appropriate to the activity undertaken or who are working under the direct supervision of an NPS Explosives Instructor during sanctioned Service training. The only exceptions should be Blasters employed on NPS contracts, concessionaire contracts or special-use permits on NPS lands, who should possess a valid State Blaster's License (or in those states which do not issue a license, a combination of documented experience and training at least equal to the requirements for NPS Blasters) and comply with all requirements of the NPS standard Explosives Specification (see Appendix C) which should be included in all such contracts, agreements and permits.

All transportation, storage, handling and use of explosives should at all times comply with applicable Federal, State and local laws and conform to the recommendations of the IME and the established NPS's Blasting Program. In all cases, specific manufacturer's recommendations should be followed. In cases of conflict, the most stringent regulations or recommendations applicable in each case should be followed.

The qualification of all NPS employees involved in the transportation, storage, handling and use of explosives should be established by NPS certification (licensing) that has been obtained through approved training and qualifying experience.

EXPLOSIVES USE STANDARDS

Pending the issuance of an NPS Blasters Handbook, all explosives transportation, storage, handling and use should follow the current practices, techniques and recommendations of IME, the Forest Service (FS), DuPont's Blasters Handbooks and the current rules and regulations of OSHA, BATF, DOT and applicable State and local codes (see Appendix B). Any variation from the rules and regulations, or requirements, should be based solely on reasons of safety or product technology and must be approved by Denver Service Center (DSC) or the Regional Blasting Officer, as appropriate, prior to implementation. Variations should be approved by the appropriate Blasting Officer only for a specified duration and/or situation. If a variation is necessary for life threatening safety considerations and it is not possible to obtain prior approval, a written notification of the variation and reasons for it should be submitted to the appropriate Blasting Officer within 48 hours after occurrence.

MATERIALS

Only non-nitroglycerin products commercially manufactured for use as explosives should be used. Safety fuse and fuse caps should not be used. Electric initiation of detonating cord systems or fully non-electric systems should be the preferred methodology when deciding on materials (products and systems) to be used. All electric systems wired in series are permissible when problems of static and stray current are non-existent or easily controlled. Parallel series circuits may only be used when approved by the appropriate Regional or DSC Blasting Officer. Parallel circuits should not be used.

PURCHASING

Explosives purchasing by the NPS should follow accepted Federal procurement procedures and applicable requirements of the State and local jurisdiction in which it occurs. Requisitions for explosives and detonators should be reviewed and approved by the Chief Park Blaster prior to issuance of a purchase order. Proper planning should be exercised to preclude in-park storage of any materials for more than 2 years from date of manufacture. In cases where manufacturer's recommended storage life is less than 2 years, those recommendations should be followed.

EQUIPMENT

Only equipment (blasting machines, circuit testers, crimpers, etc.) that is specifically designed and manufactured for use in blasting should be used and should not be used for any other purpose. No substitutes should be allowed. All blasting equipment used by NPS personnel should be inspected and tested on a regular schedule (at least annually) by the Chief Park Blaster.

Personal protective equipment should meet current OSHA construction industry standards and NPS's Loss Control Management Program Guideline requirements and should be kept available in sufficient quantity to provide for all blasting crew personnel, including guards.

TRANSPORTATION

All transportation of explosives should follow DOT, Federal Aviation Administration (FAA), Office of Aircraft Services (OAS), U.S. Coast Guard (USCG), State and local regulations and NPS standards, whichever are applicable and most stringent. Vehicle transport of explosives should be made by no more than two persons, at least one of whom is a licensed Blaster or Explosives Handler. Both should have a current State drivers license, and if Government employees, a U.S. Government Operator's Motor Vehicle Identification Card.

The person receiving delivered explosives from vendors or other sources should be a licensed Explosives Handler or Blaster. Pending issuance of an NPS's Blasters Handbook, transport by backpack and pack stock should follow the directions of the FS's Blasters Handbook and the basic requirements which apply to vehicle transport.

STORAGE

Storage of explosives should be in magazines of the proper BATF class for the particular explosive, detonator or blasting agent. Magazines should be constructed in accordance with BATF and OSHA standards, following most stringent requirements applicable to each magazine feature and should be placed in accordance with the American Table of Distances (ATD). Each magazine should have two shrouded, five-tumbler locks meeting BATF requirements, and all magazine keys should be on a separate lock series from all other locks and should be kept under locked security. A key should be assigned to the Chief Park Blaster and/or the licensed Explosives Handler or Blaster designated as the Magazine Operator; no keys should be assigned to any other employees. Magazines should be visually inspected for any evidence of tampering at least once every 7 days. There should be no overnight storage of explosives other than in appropriate BATF class storage facilities.

FIELD STORAGE: Storage at field sites accessible by vehicle should meet all applicable BATF, State and local requirements for temporary storage, with explosives returned to permanent storage magazines at the end of each day. If work periods are longer than 1 day without reasonable access to permanent storage, temporary magazines should be secured in an area and manner precluding public view and entry, immobilized and separated in accordance with the ATD, at the end of each day.

In remote field areas where permanent storage facilities are not feasible, overnight storage should be in an area removed and secured from possible public discovery and entry and separated in accordance with the ATD. Signs should be placed such that they do not constitute an attraction to the storage site. The Blaster-in-Charge and at least one other person should know the exact location of such field storage sites. There should be no explosives abandoned for any reason.

INVENTORY

Inventories should be kept on all explosives, blasting agents, detonators and primers, including unmixed binaries. Permanent storage inventories should be maintained by the designated Magazine Operator, field storage inventories should be maintained by the Blaster-in-Charge. Inventories should be by "cartridge count" and "cap count," not by box or carton count (see Appendix A). Working inventories should be maintained on a daily basis.

Permanent storage inventories should be by withdrawal, return and resupply, with physical magazine inventory checks at least monthly. Permanent storage inventories should be by a "two-mode system," with inventory sheets in each magazine or field storage location and hard-bound permanent inventory book in the possession of the Magazine Operator. Magazine and field storage inventories must balance at the start and end of each day; magazine and hard-bound inventories must be reconciled and balanced at any time a physical inventory check is made. Inventory entries should be made in ink and should include: (a) date, (b) material and quantity removed/returned/ resupplied, (c) name of person being issued or returning materials, or in case of resupply name of manufacturer, (d) lot number and date of manufacture, e) name of person issuing/ receiving materials, and (f) purpose and location of materials used. Inventory inconsistencies should be resolved upon discovery, with full explanation recorded in the hard-bound inventory book.

USE AND HANDLING OF EXPLOSIVES

Only an NPS licensed Blaster or equivalent should use explosives. The Blaster may be assisted only by another trained and licensed Blaster or Blaster-in-Training. All handling and use of explosives should follow the practices given in the NPS Blasters Handbook when issued. Until the issuance of the handbook, the standards and recommendations of OSHA, BATF, DOT, IME, Bureau of Mines (BOM), FS and DuPont's Blasters Handbooks, and the manufacturer of the product being used should define standard practices and should be followed. Violation of these guidelines should be sufficient cause for immediate revocation of Blaster certification by the Regional Blasting Officer or appropriate contractual action by the Contracting Officer, as initiated by the DSC's Blasting Officer or a certified Blasting Inspector.

BLAST AREA SECURITY

Area security should be the responsibility of the Blaster-in-Charge and should be sufficient to preclude injury to any person and all property, including those not directly involved in blasting operations. All persons serving as guards should be thoroughly versed in their role and responsibilities by the Blaster-in-Charge. Signing and "positive-response" signal systems should conform to OSHA and Manual of Uniform Traffic Control Devices (MUTCD) requirements.

BLASTING SPECIALTIES

Blasting operations requiring specialized techniques or products, such as delay blasting, pre-splitting, avalanche control, fire-line blasting, shaft or tunnel work and demolition, should be performed only by a Blaster specifically certified for the particular specialty by reason of training and experience (see Appendix D).

Blasting specialty certifications should be developed based on demonstrated Service need.

BLAST RECORDS

All blasts should be recorded by the Blaster-in-Charge. Repetitive single blasts may be recorded as a group on a cumulative daily basis. Multiple-charge blasts should be recorded singularly, giving the following information: (a) date and time, (b) location, (c) weather, (d) material being blasted and estimated volume or amount, (e) explosive product and quantity used, (f) priming, detonation and initiation system used, (g) blast design, with sketch, if appropriate, (h) blast results, and (i) any problems encountered.

The Chief Park Blaster should maintain a file of park blast records, each record being retained for at least 3 years, and should submit copies of current blast records to the Regional Blasting Officer upon request. The park's blast record file constitutes a body of data by which the suitability and effectiveness of products and techniques may be judged.

DISPOSAL (Excess Materials)

Excess Materials are defined as explosives, detonators and/or initiators which are excess to a particular job and cannot reasonably be returned to a magazine or which have exceeded their reliable shelf-life. Reliable shelf-life should be 2 years from the date of manufacture, unless a shorter shelf-life is recommended by the manufacturer.

In most cases, disposal should be done by the explosives supplier in accordance with IME policy. In remote field operations, should disposal of oversupply be preferable to transport for reasons of safety, it should be directly supervised by the Blaster-in-Charge and done only by persons thoroughly trained in proper disposal methods.

DISPOSAL (Old, Deteriorated and Unstable Materials)

Old, Deteriorated and Unstable Materials are defined as explosives, detonators and/or initiators which exceed the Age-from-Manufacturer limits given in Appendix F or which exhibit any evidence of deterioration and instability (bent, swollen, ruptured, deformed, encrusted, discolored, leaking, stained, etc.). Such materials are unpredictable and should be handled only by persons specifically licensed to deal with them as per the requirement of Appendix D, Specialties.

This is a Hazardous Materials Disposal activity rather than a blasting activity; the possession of a Blaster's License alone in no way qualifies a person to handle unstable products.

Upon discovery of old, deteriorated or unstable materials, the site should be immediately secured and/or guarded to prevent human entry until disposal is accomplished, and the Regional Blasting Officer should be promptly notified. Persons not licensed to perform the actual disposal should never attempt to handle or move deteriorated materials; blasting caps and dynamites in particular can become extremely sensitive to any disturbance. The Regional Blasting Officer should coordinate the disposal operation and assist the park in obtaining qualified disposal personnel, assuring that NEPA and Section 106 compliance requirements are addressed, and developing adequate documentation of the operation. Disposal personnel may be obtained from the following sources, in priority order: (1) The product manufacturer, if known; (2) NPS personnel licensed for this speciality, a roster of whom should be maintained by the Service Blasting Officer; (3) Military Ordnance Disposal Teams; and (4) State, county or municipal bomb disposal teams. Ordnance and bomb disposal personnel are seldom familiar with commercial explosives and detonators and should not be used without obtaining a written plan of disposal with technical review by an NPS employee licensed for disposal. In no instance should disposal be attempted or executed without the approval of the Regional Blasting Officer.

NOTE: Persons licensed to handle deteriorated commercial explosives and detonators are not thereby qualified to handle unexploded ordnance or bombs; the reverse is also true. The handling and disposal of ordnance is a separate specialized activity unrelated to blasting.

ACCIDENTS AND THEFT

Accidents involving explosives should be reported immediately to the park Superintendent, park Safety Officer, Chief Park Ranger and Chief Park Blaster, who should promptly notify the Regional or DSC Blasting Officer (as appropriate) and Regional Safety Manager. In any case of theft or loss of explosives, the park Superintendent, Chief Park Ranger and Chief Park Blaster should be promptly notified; such theft or loss should also be reported within 24 hours to the local office of BATF, the park Safety Officer, the Regional or DSC Blasting Officer (as appropriate), the Regional Safety Manager and Law Enforcement Specialist. A Blasting Review Board should be held within 3 working days of any theft or accident with explosives. A Report of Survey must also be initiated within 30 days after discovering any loss or theft of explosives (Reference, 41 CFR 114-60).

NON-NPS USERS OF EXPLOSIVES

All persons or entities utilizing explosives within the jurisdictional limits of the Service should conform to the requirements of this guideline and applicable Federal, State and local regulations. All NPS promulgated special use permits, purchase orders, concessions contracts and construction and maintenance contracts in which the use of explosives may be anticipated, should contain the NPS standard Explosives Specification implementing the intent of this guideline and program (see Appendix C). This standard specification or clause should specifically address: (a) Blaster designation and qualification, (b) blasting crew qualification, (c) transportation, storage, handling and use of explosives, (d) blasting plans and records, (e) safety plans, (f) disposal of explosives and (g) any other subjects related to the specific need. Such blasting operations should be accomplished only under the inspection of NPS licensed Blasting Inspectors. The Chief Park Blaster should be available as a technical consultant to the Contracting Officer's Representative on any contract involving explosives.

EXPLOSIVES-USE PROGRAM

NPS PERSONNEL

All persons handling, transporting or using explosives should be certified (licensed). All certified Blasters should possess a current Standard Red Cross First Aid certification, or equivalent, and a current cardiopulmonary resuscitation (CPR) certification. All personnel should be in good physical and mental condition and not be addicted to or under the influence of alcohol, drugs, strong medications or intoxicants of any kind, when using, handling or transporting explosives. There should be no language barrier within any blasting crew. All persons handling, transporting or using explosives should be subject to the drug testing program.

NPS Blasting Officer: may be a collateral-duty position, not necessarily located in the Washington Office; should have at least 40 hours of Explosives and Blasting Safety training and must be familiar with all aspects of NPS blasting operations. The Service Blasting Officer should be nominated by the NPS Safety Manager, approved by the Associate Director, Operations and appointed by the NPS's Director.

Duties:

- Serves as overall coordinator of the NPS Blasting Program and in a technical advisory capacity for blasting operations and training in the Service;
- Supervises all Explosives Instructor training that takes place in the Service and has the responsibility and authority for issuance, suspension or revocation of Instructor certifications.
- Stays abreast of and disseminates information on advancements and developments in blasting products and methodology.
- Maintains a library of training materials, aids and sources for use by NPS Explosives Instructors.
- Communicates with NPS Safety Manager, Associate Director, Operations and Regional and DSC Blasting Officers regarding the Blasting Program, procedures and regulations.
- Develops an annual synopsis of NPS blasting activities and results of Blasting Review Boards and distributes them to all Regional Blasting Officers and the DSC Blasting Officer.
- Serves as the officer of final appeal on cases of suspension or revocation of certification and in cases of requests for policy variance that have been denied by a Regional Blasting Officer.

Regional Blasting Officer: May be a collateral-duty position, not necessarily located in the Regional Office. Should have at least 40 hours of NPS Explosives and Blasting Safety training, and must be familiar with all aspects of NPS blasting operations within the Region. The Regional Blasting Officer should be nominated by the Regional Safety Manager, approved by the Associate Regional Director, Operations, and appointed by the Regional Director.

Duties:

- Serves as overall coordinator of the Blasting Program and in a technical advisory capacity for blasting operations, within the Region; reviews contractor Blasting Plans on Regional or park level contracts.
- Stays abreast of and disseminates information on advancements and developments in blasting products and methodology; disseminates information provided by the Service Blasting Officer.
- Supervises all explosives training that takes place in the Region and has the responsibility and authority for issuance, suspension or revocation of Blaster certifications. Reviews and approves or disapproves any requests for variance from the Policy and Blasting Program arising from NPS areas within the Region.
- With the Regional Safety Manager, establishes a Blasting Review Board to investigate cases of accident or theft involving explosives.
- Maintains a file of Regional blasting records and sends a copy of the finding of any Blasting Review Board to the Service Blasting Officer.
- Maintains a current roster of Blasting Program participants, certifications and experience, including specialties.
- Communicates with Regional Safety Manager, Associate Regional Director, Operations; DSC and other Regional Blasting Officers, Superintendents, park Safety Officers and park personnel involved in the Blasting Program regarding blasting policy, procedures and regulations.

DSC BLASTING OFFICER: May be a collateral-duty position. Should have at least the 40 hours of NPS "Explosives and Blasting Safety" training and the 40 hours of "Blasting Inspection" training, or equivalent, and extensive field experience on projects which included significant blasting operations. The DSC Blasting Officer should be recommended by the DSC Safety Engineer and approved and appointed by the Manager, DSC.

Duties:

- Serves in a technical advisory capacity for all DSC administered contracts and Federal Highway Administration (FHWA) contracts within NPS boundaries; reviews contractor Blasting Plans.
- Stays abreast of and disseminates information on advancements and developments in blasting products, technology and safety; disseminates information provided by the Service Blasting Officer.
- Assists Chiefs, Branches of Construction, in establishing and enforcing blasting safety programs; advises project supervisors on blasting safety matters.
- Ensures that DSC contractual requirements for explosives safety are enforced; provides data for and is a member of DSC Blasting Review Boards.
- Assists DSC Safety Engineer in establishing Blasting Review Boards to investigate blasting accidents and incidents.
- Supervises all DSC explosives safety training and has responsibility and authority for the issuance, suspension or revocation of certificates for Blasting Inspectors.
- Maintains a roster of Blasting Inspectors and a record of their training and experience.
- Communicates with Regional Blasting Officers, Chief Park Blasters and other individuals involved in the Blasting Program, as necessary.

Chief Park Blaster: Certified NPS Blaster who is best qualified by experience, training and position within the park organization to guide and oversee all park activities involving explosives. The Chief Park Blaster should be appointed by the Superintendent; the Regional Blasting Officer may recommend candidates for appointment.

Duties:

- Serves in a technical advisory capacity for blasting operations in that park.
- Has the responsibility and authority for supervising the blasting program and activities in that park.
- Stays abreast of and disseminates information on advancements and developments in blasting products and methodology.
- Administers tests and disseminates information provided by the Regional and Service Blasting Officers.
- Maintains blast records and technical library; submits copies of blast records to the Regional Blasting Officer upon request.
- When requested, advises DSC project supervisors and park Contract Inspectors on contractor blasting safety and procedures.

Blaster: NPS employee having successfully completed 40 hours of NPS "Explosives and Blasting Safety" training and having at least 3 years prior experience as a licensed Blaster-in-Training or Blaster; recommended by the Explosives Instructor, approved and licensed by the Regional Blasting Officer. Capable of effectively designing and safely executing blasting operations necessary to meet most NPS blasting needs. Blasting specialties in which the Blaster is qualified will be listed on the back of the NPS Blaster's License.

Technical Blasting should be considered a "specialty" (see Appendix D) applying to those Blasters who have received advanced training in rock mechanics, explosives product technology and blast design and demonstrated the capability to design and successfully execute complex multiple-hole delay blast systems. Emphasis at this level is on controlled results of more complex blasting problems.

Each Blaster should obtain a valid State Blaster's License within 1 year after receiving NPS certification or upon transfer to a unit in another State which issues a State license

Upon recommendation of the Chief Park Blaster and approval of the Regional Safety Manager and Service Blasting Officer, the Regional Blasting Officer may issue a Blaster's License for a specific length of time, not to exceed the duration of original certification, to a person whose exceptional or specific experience and training qualifies them to conduct blasting operations. A written examination should be required and familiarity with NPS Explosives-Use Guideline proven.

Blaster-in-Charge: The Blaster having the authority and ultimate responsibility for all aspects of the blast and its results. There should be a designated Blaster-in-Charge for each blast. The Blaster-in-Charge should maintain a written record of blasts and submit it to the Chief Park Blaster.

Blaster-in-Training: Entry-level program participant. A person who has met the requirements of the 40 hours of NPS "Explosives and Blasting Safety" training but lacks the experience to qualify for Blaster certification. The Blaster-in-Training must work directly under the supervision of a licensed NPS Blaster and be provided qualifying experience within 3 years. If qualifying experience is not obtained, certification will lapse. The Chief Park Blaster must recommend the Blaster-in-Training for Blaster status and may recommend that additional experience be obtained prior to the issuance of Blaster certification.

Explosives Handler: A person who has successfully met the requirements of the Explosives Handler portion of NPS "Explosives and Blasting Safety" training. An Explosives Handler can transport and/or store explosives and may participate in blasting operations under the direct supervision of a licensed NPS Blaster, but in no case should prime, load, connect or initiate any blast.

Magazine Operator: A person designated by the Chief Park Blaster to manage and be responsible for a park's permanent explosives storage magazines. Must be at least a certified Explosives Handler.

Blasting Inspector: Either park, Regional or DSC personnel assigned as Inspector or Contracting Officer's Representative (COR) on an NPS contract in which blasting is involved. Blasting Inspectors should have completed a minimum of 40 hours of NPS Explosives Safety or DSC Blasting Inspection training and must be certified as a Blasting Inspector by the DSC or Regional Blasting Officer, as appropriate.

Explosives Instructor: A knowledgeable and experienced NPS Blaster with the proven ability to effectively instruct technical courses and to examine persons for technical competency, recommended by the Regional Blasting Officer and certified by the Service Blasting Officer. Only an Instructor certified for specialty courses may instruct and recommend licensing for those specialties. Instructor ratings are: Explosives Handler, Blaster and specific specialties.

To become Instructor-rated, the person desiring the rating should inform their Chief Park Blaster and Regional Blasting Officer; the Blasting Officer can designate that person as an Assistant Instructor. Each Instructor must serve as an Assistant Instructor for at least one class of the same level that they wish to instruct. The Instructor supervising an Assistant Instructor should give a thorough oral and written evaluation of performance, including recommendations for further improvement, and send a copy of the written evaluation to the Regional Blasting Officer.

Blasting Inspection Instructor (DSC): Nominated by the DSC Blasting Officer, appointed by the DSC Safety Engineer with approval of the DSC Manager, and certified by the Service Blasting Officer; should have not less than 80 hours of training in blasting safety, materials, methods and techniques (including 40 hours of NPS "Explosives and Blasting Safety") and extensive field experience on projects which included significant blasting operations.

Assistant Instructor: May be recommended by a Chief Park Blaster or Explosives Instructor, is appointed by the Regional Blasting Officer, and is currently licensed as an NPS Blaster. The Assistant Instructor should, prior to assisting in class instruction, author and submit for Review to the supervising instructor and Regional

Blasting Officer a complete set of class lecture notes appropriate for the level of class for which Instructor rating is sought.

The same procedures should apply to assistant instructors for Blasting Inspection classes, with recommendation by a Chief, Branch of Construction or Instructor, appointment by the DSC Blasting Officer and current certification as an NPS Blasting Inspector.

TRAINING

General: Classes should be no larger than stipulated by the supervising instructor for courses that include field operations, with a minimum of two instructors or one instructor and one assistant instructor. In no case should an Instructor or Assistant Instructor supervise more than five participants at one time in field operations. Each Region in which blasting occurs annually should have at least two instructors. The Regional Blasting Officer should approve any explosives training conducted in that Region. Standardized NPS explosives training courses should include:

Explosives and Blasting Safety: at a minimum, a 40-hour course, including 8 hours of field exercises, thoroughly covering the subjects shown in Appendix E. For participants lacking prior experience, only ratings of Explosives Handler or Blaster-in-Training may result from course attendance.

Advanced Blasting Techniques: required for certification in Technical Blasting and selected other specialties. At a minimum, a 24-hour course, thoroughly covering the subjects shown in Appendix E. This course will be arranged by request to the Service Blasting Officer through the appropriate Regional or DSC Blasting Officer, and will be limited to licensed Blasters and Blasting Inspectors.

Blasting Inspection (DSC): at a minimum, a 40-hour course, thoroughly covering the subjects shown in Appendix E, and designed to give a comprehensive view of materials, systems and methods to be checked in determining compliance with safe blasting practices in contractors' operations.

Other Training: As appropriate, courses or seminars of at least 8 hours covering specific blasting topics (specialized blasting, problem areas, hazard analysis, new product or other technology) may be held. The Regional Blasting Officer should distribute Technical Bulletins to all park Blasters as necessary to stay abreast of new technology or information. The Service Blasting Officer should review and evaluate the content of any proposed non-NPS training courses for relevance to NPS needs.

CERTIFICATION

Certification (licensing) can be granted to NPS personnel at least 21 years old, and should be based on Final Exam scores and field performance evaluation in required training courses (including an oral examination, if deemed necessary, by the Instructor or Certifier), and a written "Experience Statement for Blaster Certification" detailing previous experience (type, quantity, complexity). Proof of certification should be an NPS Blaster's Card, upon which is shown the level of certification (Explosives Handler, Blaster-in-Training, Blaster, Blasting Inspector), with specialties shown on the reverse side. Certification should be valid for 3 years. Recertification should be by retaking and successfully completing the "Explosives and Blasting Safety" course, except in the case of explosive handlers who may recertify by successfully completing a written examination administered by the Regional Blasting Officer. At the discretion of the Regional Blasting Officer, and affected instructor, currently active and experienced blasters may be recertified by a modified version of the basic safety course, at least 24 hours in length, which will review course content, but provide more technical update material and field work. Specialty certifications are continuous, as long as Blaster certification is maintained. Instructor certification should be valid for 5 years and should be renewed automatically if at least one class has been taught during that period. Instructors should have that designation shown on their NPS Blaster's Card. Certification may be extended by the appropriate Regional or DSC Blasting Officer in exceptional circumstances, for a period not to exceed 1 year, if the applicant has been actively involved in blasting operations within the previous 24 months.

Any documented violation of safe practices, regulations or NPS policy should be sufficient cause for immediate revocation of certification. Recertification should then be possible only by successful completion of the full certification process, including 3 years as a Blaster-in-Training. Any accident with or theft of explosives should cause certification of the Blaster-in-Charge to be suspended pending the outcome of the Blasting Review Board. Appeals of revocations or suspensions of certification should be directed to the Service Blasting Officer, whose decision should be final.

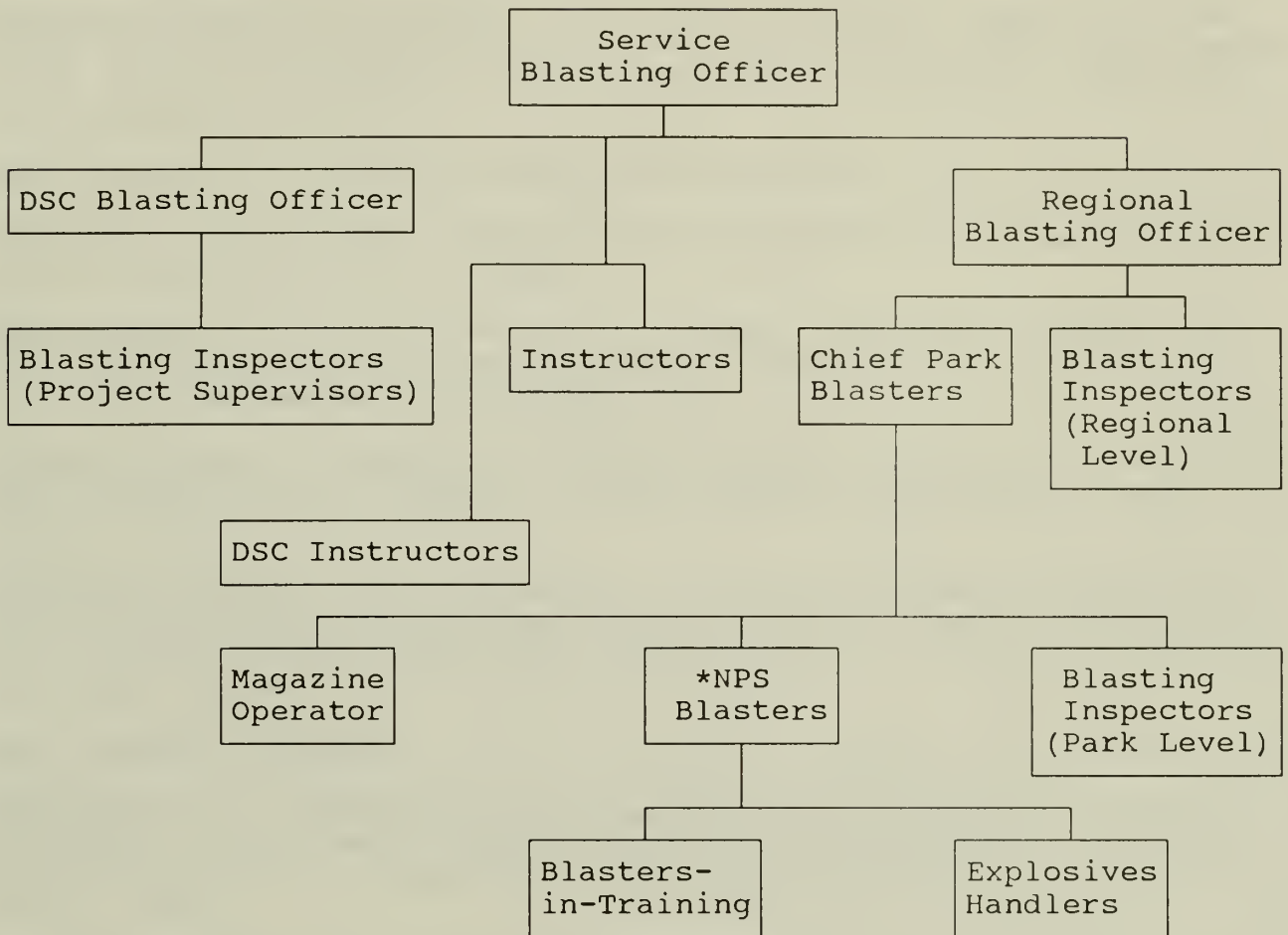
The Regional or DSC Blasting Officer, as appropriate, is the sole source of NPS certification, except that the Service Blasting Officer is the sole source of instructor certification. In a case where the Regional or DSC Blasting Officer does not participate in the instruction of required training, certification should be granted only upon the recommendation of both Instructors. Employees must be certified by the Regional or DSC Blasting Officer even though they may have obtained training and/or certification from another government or private source.

BLASTING REVIEW BOARD

A Blasting Review Board should be formed of selected personnel, including the Chief Park Blaster by the Regional or DSC Blasting Officer and Regional or DSC Safety Engineer, to investigate the circumstances (including technical blast analysis) of any explosives accident leading to injury, fatality or property damage over \$100, or any case of theft or loss of explosives. A written record, including recommendations, should be maintained and sent to the Service Blasting Officer and others, as appropriate. In the case of an accident, a general case incident record should be developed and circulated to inform other Blasters so that a recurrence can be prevented. If the Board's findings indicate that the Blaster-in-Charge or responsible Explosives Handler was not in conformance with this Policy and its provisions, revocation of certification is mandatory.

The findings of a Blasting Review Board should be made available to any Board of Inquiry formed by the Superintendent to investigate the same incident. The formation of a Board of Inquiry that results from blasting operations not otherwise covered under this section should result in the formation of a Blasting Review Board. All findings of the Blasting Review Board concerning loss or theft should be provided to the Park Board of Survey in order for the board members to make recommendations for relieving the accountable officer of accountability. Findings will also be used to establish the possibility of personal history for the loss or theft of explosives.

NPS BLASTING PROGRAM ORGANIZATION



- NOTES: (1) All positions within the organization are, or may be, collateral-duty in nature.
- (2) Many of the positions shown can, or should be, combined to one person; For instance, within a small park the Chief Park Blaster, NPS Blaster, Blasting Inspector and Magazine Operator could easily be the same individual.
- * When on a blasting job, the Blaster becomes the Blaster-in-Charge and assumes full responsibility and authority for all aspects of the blast and related activities; no one can override that authority without themselves assuming Blaster-in-Charge responsibility and relieving the original Blaster of all liability.

TERMS AND DEFINITIONS

American Table of Distances - The Table of minimum separation distances from susceptible structures and travelways, and between magazines, for the placement of permanent explosives storage magazines; IME Publication No. 2.

BATF - Bureau of Alcohol, Tobacco and Firearms.

Binaries - commercially manufactured two-component explosives which are not explosives until mixed.

Blast Record - a written record of a blast, including design, results and factors affecting performance; may be a "Blaster's Log" available from explosives distributors.

Blasting Agent - a commercially manufactured bulk explosive which is "non-cap sensitive;" examples include "ANFO," "slurries," "emulsions," "water gels."

Blasting Program - the combination of Explosives-Use Standards (as set forth in handbooks and regulations), Explosives-Use Policy, and Policy-implementing organization and activities, constitute the NPS Blasting Program.

BOM - Bureau of Mines.

Cap-count* - an inventory system based on the count of individual detonators (caps, delay caps, MS connectors, Primadets, etc.), such as "5 delay caps, 100 each" (NOT "1/2 box EB caps", "1/4 box MS delays", etc.).

Cartridge-count* - an inventory system based on the count of individual units of explosives, such as "Tovex 800, 54 sticks", "4-lb Kinepouch, 24 pouches", "E-cord, 700 feet" (NOT "1/4 case Tovex", "1/2 box Detaprimes", etc.).

***NOTE:** Detonators, primers and detonating cords are packaged by unit count (each, feet, meters) resulting in a specific number of units per box or spool for a given product; once that number is known, there is no need to open factory-sealed boxes to obtain an accurate "cap-count." Cartridge explosives do not share that reliability, and each case must be counted when opened; however, until opened, the factory seals should be left on cases, and the inventory should read something like "5 cases + 38 sticks," meaning there are 5 sealed cases and one opened case containing 38 sticks presently in the magazine. Blasting agents are normally inventoried by weight (pounds), although sack or bag counts may be used.

COR - Contracting Officer's Representative or his designee (Contract Inspector).

DOT - Department of Transportation.

DSC - Denver Service Center, National Park Service.

Explosives Transport Vehicle - a vehicle designated and equipped for the legal transportation of explosives; such transport is not an exclusive use, and the vehicle may be used for other purposes so long as when it is used for explosives transport it meets all legal requirements.

FAA - Federal Aviation Administration.

FHWA - Federal Highway Administration.

FS - U.S. Forest Service.

Magazine Class - Type I, II, III, IV, or V magazine, as defined by the regulations of BATF.

MUTCD - Department of Transportation "Manual of Uniform Traffic Control Devices."

Non-electric Initiation - A system of blast initiation relying on detonating initiation cords, ignition cords, flash-through cords and caps, shotgun primer initiators or on no more than one electric cap to initiate a detonating cord trunk line.

NPS - National Park Service.

OAS - Office of Aircraft Services, Department of the Interior.

OSHA - Occupational Safety and Health Administration, Department of Labor.

Positive-response - a signal system requiring positive response from signal system guards to Blaster's signals.

Two-mode Inventory System - a permanent magazine inventory system consisting of a daily working inventory kept in the magazine and a permanent hard-bound inventory kept by the Magazine Operator.

USCG - U.S. Coast Guard.

INDEX OF REGULATIONS

Explosives use regulations which affect all NPS explosives activities.

NOTE: Where State or local regulations are more stringent than the Federal regulations, they take precedence and must be followed.

Definitions:

BATF - Bureau of Alcohol, Tobacco & Firearms
CFR - Code of Federal Regulations
DM - Departmental Manual
DOI - Department of the Interior
DOT - Department of Transportation
OAS - Office of Aircraft Services
OSHA - Occupational Safety & Health Administration

USE

29 CFR 1910.109 (OSHA)
29 CFR 1926.900-914 (OSHA)

PURCHASE

27 CFR 55.103-109 (BATF)
27 CFR 55.26-27 (BATF)

TRANSPORTATION

Motor Vehicle

49 CFR 390-397 (DOT)
29 CFR 1910-109 (OSHA)
29 CFR 1926.902-903 (OSHA)

Watercraft

46 CFR 146-149 (DOT)

Aircraft

14 CFR 103 (DOT)
351 DM 1-3,8 (OAS)

STORAGE

27 CFR 55.29, 55.63, 55.127, 55.163-164, 55.201-220 (BATF)
29 CFR 1910.109 (OSHA)
29 CFR 1926.900, 904 (OSHA)

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AREA SECURITY, SIGNALS

29 CFR 1926.900, 909, 910 (OSHA)

ACCIDENTS

29 CFR 1926.900, 911 (OSHA)

27 CFR 55.31 (BATF)

49 CFR 394 (DOT)

THEFT

27 CFR 55.28, 30, 165 (BATF)

29 CFR 1926.900 (OSHA)

LICENSES AND PERMITS

29 CFR 1926.900, 901 (OSHA)

27 CFR 55.41-83 (BATF)

49 CFR 391 (DOT)

351 DM 8.2G (OAS)

VARIANCES

485 DM 3.1A (DOI)

REPORTS AND RECORDS

27 CFR 55.121-142 (BATF)

29 CFR 1926.900, 905 (OSHA)

49 CFR 397.19 (DOT)

STANDARD EXPLOSIVES-USE SPECIFICATION FOR CONTRACTS

Deletions or alterations to this specification cannot be made without the prior written approval of the NPS Blasting Officer. This approval is mandatory under the NPS Explosives-Use Policy. No alterations should, in any way, reduce the degree of control over safety to be exercised by the Contracting Officer and the Blaster-in-Charge, unless that control is assured by the general provisions and other requirements of the contract in which this specification is included.

SECTION 02114

EXPLOSIVES-USE STANDARD

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of all activities that relate to explosives, including receiving, handling, transporting, storing, distributing, priming, loading, firing and disposal.

1-2 QUALITY ASSURANCE:

- A. Regulatory Agencies: All operations with explosives should be conducted in accordance with the NPS Explosives-Use Policy and the rules and regulations established by the Occupational Safety and Health Administration (OSHA) contained in 29 CFR 1910 and 1926, Construction Safety. In addition, the Contractor should comply with Department of Transportation rules and regulations contained in 14 CFR 103, Air Transportation; 46 CFR 146-149, Water Carriers; 49 CFR 390-397, Motor Carriers; and Internal Revenue Service regulations contained in 27 CFR 55, Commerce in Explosives.
- B. Legal Requirements: Comply with all applicable Federal, State and local laws pertaining to the purchase, transportation, storage, handling and use of explosives. Obtain all required permits and licenses.

1-3 SUBMITTALS:

- A. Blasting Plan: Submit a Blasting Plan covering qualifications of Blaster-in-Charge and blasting crew; transportation; storage and magazines; blast site operations; area security plan, including signal system; handling of misfires; removal and disposal of unused or excess explosives; and blast records.
1. Blaster-in-Charge Qualifications:
 - a. Must possess a valid state Blasters License or other license issued by an equivalent licensing body acceptable to the Contracting Officer.
 - b. Must submit written resume showing not less than 3 years of active involvement as Blaster-in-Charge on projects similar in scope to this contract.
 - c. Must submit a list of five references who can testify to the known qualifications and reliability of the proposed Blaster-in-Charge.
 2. Blasting Crew Qualifications: All crew members must have completed explosives and blasting safety training of at least 24 hours and/or have not less than 1 year of experience acceptable to the Contracting Officer.
 3. Transportation Plan: Include description and license number of vehicle to be used, route(s) to be travelled, proposed hours of travel, and qualifications of driver.
 4. Storage and Magazines: Show location and construction of magazines and day-boxes, inventory system to be used and signing installed.
 5. Blast Site Operations: Include type of explosives to be used, initiation system to be utilized, drilling system, loading plan, firing plan, preblast and post-blast inspection, handling of misfires, and removal and disposal of excess explosives.
 6. Area Security Plan: Include proposed signing, guard system, signal system, methods of communication and pre-blast notification of affected agencies or entities.
- B. Permits and Licenses: Submit copies, or other proof acceptable to the Contracting Officer, of all applicable permits and licenses, including blasting liability insurance.

C. Contracting Officer's Approval: The Contracting Officer will indicate his approval or disapproval of each submittal and reasons for disapproval. When submittals have been approved, the number of copies the Contractor wants for his own use will be returned. No work should be done before approval is received.

1-4 PROJECT CONDITIONS:

- A. Protection: The safety of personnel should be the controlling consideration in decisions involving explosives activities. The Contractor should exercise the utmost care not to endanger life and property. Make proper use of blasting mats and other protective devices, adopting whatever additional precautions are deemed necessary to prevent damage to trees, shrubs, other landscape features, buildings, utilities, monuments and other structures. Make every effort to prevent damage to the natural and the constructed surroundings. Should damage occur, make restoration as required by the Contracting Officer at no additional cost to the Government.
- B. Blaster-in-Charge: One competent experienced person should be specifically designated in charge of explosives and all related activities. The designated person must present certification to the Contracting Officer as required in 1-3, A.1. He should carefully supervise all work related to the use, storage, transportation and handling of explosives. Permit only a minimum number of competent, experienced personnel, consistent with efficient operation, to handle explosives. Exclude anyone demonstrating carelessness, incompetence or inexperience from further handling of explosives.
- C. Blasting Crew: Those persons designated by the Blaster-in-Charge or Contractor to assist with explosives activities, including transportation and area security.
- D. Fire Watch: During periods of fire danger, the Contracting Officer may require a person to be detailed as a fire watch for 1 hour after blasting or for 2 hours during periods of extreme fire danger. Under extreme fire danger, the use of all-electric detonation systems may be required by the Contracting Officer.

1-5 CLOSEOUT SUBMITTALS: On completion of the work, furnish a written statement, countersigned by the Blaster-in-Charge, certifying that:

- A. All blasting is complete and all explosive materials, including detonators, detonating cord, explosives and any unmixed components of a two-component explosive system, have been removed from the park.

- B. All blast holes loaded with explosives and any other set explosive charges have either been detonated or unloaded and explosives have been properly disposed of.

PART 2: MATERIALS

Provide as required. Only explosives, explosive components and detonators commercially manufactured within the previous 2 years should be used.

PART 3: EXECUTION

3-1 GENERAL REQUIREMENTS: The Contractor should abide by all referenced rules and regulations and should give special attention to the following specific rules:

- A. Locate magazines only at sites approved by the Contracting Officer.
- B. Magazines should be of the type required by Bureau of Alcohol, Tobacco and Firearms (BATF) for the material being stored.
- C. Magazines and day-boxes should be kept locked at all times except when withdrawing or returning materials from or to that magazine or box.
- D. Clear blast area of unnecessary personnel and equipment before delivery of any explosives to the site.
- E. Keep no more than a one day supply of explosives and detonators at or near the work site. Keep explosives and detonators in separate approved day-boxes.
- F. Use only wooden or plastic tamping poles for charging explosives into drill holes. Drilling in bootlegs, or within 50 feet of any loaded hole, is prohibited.
- G. Do not use electricity from light or power circuits or from batteries, for firing shots.
- H. Provide a positive signal system to give adequate warning in every direction as required in the Area Security Plan. Guard all access points, including water access, to the blast area to halt personnel and vehicles a safe distance from the blast. Maintain intercommunication between guards and person firing the blast, assuring the blast area is clear prior to firing. Guarding should commence when loading commences and should continue until post-blast inspection has been made and the "All Clear" signal given.

- I. Provide warning signs at all access points, including warnings to turn off radio transmitters, in accordance with OSHA requirements.
- J. Daily explosives inventory records should be kept and a record or log should be made of each blast, such records to be available for inspection by the Contracting Officer upon request. Copies of all blast records should be submitted to the Contracting Officer daily.

PART 4: MEASUREMENT AND PAYMENT

4-1 EXPLOSIVES: Payment will be included under the bid item to which this work relates.

BLASTING SPECIALTIES AND REQUIREMENTS FOR CERTIFICATION

(Not all-inclusive; others may be added as need is demonstrated)

<u>Specialty Title</u>	<u>Minimum Requirements</u>
Technical Blasting	NPS Blaster; successful completion of "Advanced Blasting Techniques," and show previous experience in large-blast design and delay blasting acceptable to Regional Blasting Officer.
Trenching and Rock	NPS Blaster; successful completion Excavation of "Advanced Blasting Techniques" plus 8 hours minimum NPS training in this specialty, and show previous experience in trenching and bedrock excavation acceptable to Regional Blasting Officer.
Logjams	NPS Blaster; 8 hours minimum NPS training in this specialty, recommended by Instructor and approved by Regional Blasting Officer.
Ice jams	Same as for Logjams.
Underwater (non-diving)	Same as for Logjams.
Timber Felling	Includes snags; same as for Logjams, except must have minimum 3 years prior experience in falling similar timber with a saw.
Avalanche Control	NPS Blaster; certified by the National Avalanche Training School and approved by Regional Blasting Officer.
Fireline Blasting	NPS Blaster; recommended from Forest Service Fireline Explosives School and approved by Regional Blasting Officer.

Demolition

(Limited to small structures such as single-story buildings, wood or masonry bridges, small diversion dams, foundations and footings, masonry tanks, etc.) NPS Blaster; successful completion of "Advanced Blasting Techniques," plus 16 hours minimum NPS training in this specialty; show prior experience, similar to type of demolition to be done, acceptable to Regional Blasting Officer.

Disposal

(of old, deteriorated or unstable products) NPS Blaster; 24 hours minimum classroom training in this specialty; minimum 3 prior experiences under supervision of someone qualified in disposal of deteriorated commercial explosives and detonators; recommended by Instructor and Chief Park Blaster, approved by Regional Blasting Officer.

- * (Other specialties, such as blasting of structural steel and cable, channel blasting, blast casting, underwater blasting at diving depths, tunnel blasting, etc., may be developed as an NPS need for such work is demonstrated).

STANDARD TRAINING COURSES: MINIMUM CONTENTS

EXPLOSIVES AND BLASTING SAFETY

- (a) Terms and Definitions
- (b) Rules and Regulations, including NPS Blasting Program
- (c) Commercial Explosives - history, properties, uses
- (d) Detonators - history, properties, uses
- (e) Primers and Boosters
- (f) Safety Hazards - impact, heat, propagation, extraneous electricity, radio frequency energy, fumes
- (g) Personal protective equipment
- (h) Explosives Deterioration and Disposal
- (i) Transportation - vehicles, aircraft, boats, pack stock, human
- (j) Storage and Inventory
- (k) Area Security and Signal Systems
- (l) Accident and Theft procedures
- (m) Methods of Initiation - systems, materials, equipment, testing
- (n) Loading, Tamping, Stemming
- (o) Safety Hazards - flyrock, shot timing, misfires and hangfires, airblast, ground vibration
- (p) The Blaster - authority, responsibility, role as a risk factor
- (q) Basics of Blast Design, including NPS applications and environmental impacts
- (r) Reports and Records

This course should include one full day of field exercises structured around transport, field storage and inventory, area security, signal systems, blast design, load determination, priming, loading, hookup (electrical and detonating cord), detonation, post-blast check, flyrock prediction and control, and blast result analysis. It should also include quizzes on each major subject and a written final exam in which a minimum score of 85 (out of 100) is required for successful course completion. The final exam should be in two parts, Part I to cover items (a) through (l) and be required for Explosives Handlers, Part II to cover items (m) through (r) and be required, along with Part I, for Blasters-in-Training and Blasters.

ADVANCED BLASTING TECHNIQUES

- (a) Terms and Definitions
- (b) Blast Design based on desired end product
- (c) Rock Fracture and Movement
- (d) Principle of Relief - control of flyrock and backshatter
- (e) Matching Explosive to Rock - stress magnitude, sonic vs detonation velocity, diameter effect, coupling ratio, burden ratio

- (f) Load Determination - velocity, energy, distribution, priming, stemming, powder factor, records
- (g) Drilling - rock structure, drill patterns, alignment, sub-drilling, records
- (h) Delay Blasting - principles, systems, techniques, patterns
- (i) Shouldow Hole Blasting - problems and techniques
- (j) Controlled Blasting - line drilling, pre-shearing, smooth and cushion blasting, limitations, records
- (k) Unconfined Surface Charges - powder factor, wave replication, flyrock control, airblast problems, shaped charges
- (I) Environmental Factors - weather, ground moisture, ground structure, and composition
- (m) Blast Analysis - systematic changes, records

This course should include quizzes on each major subject, and a written final exam on which a minimum score of 85 (out of 100) is required for successful course completion. When possible, this course may be extended to 32 hours to include 1 full day of field exercises structured around blast design, drill patterns, load distribution, multi-point priming, loading, hookup, detonation, flyrock prediction and control, end-product prediction and control, blast result analysis and projecting next-blast design. This course may also be extended to up to 40 hours to include training in specific specialties.

BLASTING INSPECTION (DSC)

- (a) Terms and Definitions
- (b) NPS Blasting Program
- (c) Commercial Explosives - history, properties, uses, hazards
- (d) Detonators - history, properties, uses, hazards
- (e) Primers and Boosters - properties, uses, hazards
- (f) Detonation and Initiation Systems - theory, layout, testing
- (g) Borehole Blasting - theory, loading, testing, blast control
- (h) Unconfined Surface Blasting - theory, loading, testing, blast control
- (i) Transportation of Explosives - DOT, OSHA, and NPS requirements
- (j) Storage of Explosives - BATF and OSHA Regulations, magazine construction, location, signing
- (k) Required Record Keeping - inventories, blast records
- (l) Safety Requirements - OSHA Standards, acceptable practices, guards, signals, signs, blasting mats, blast control, protection of persons and property
- (m) The Contract Blaster - qualifications, licensing, responsibilities
- (n) DSC Specification 02114 EXPLOSIVES USE STANDARD - contents, enforcement policy, practical application
- (o) Accident and Incident Reporting and Investigation

This course may include quizzes on each major subject and should include a comprehensive final exam on which a minimum score of 85 (out of 100) should be required in order to maintain Project Supervisor (Blasting Inspector) status.

OLD, DETERIORATED AND UNSTABLE PRODUCTS

Lacking any physical evidence which could indicate deterioration, the following Age from Date of Manufacture should be used to establish whether or not a particular product is defined as "Old" and potentially unstable, or unpredictable in certain disposal methods. Where no Date of Manufacture can be determined or accurately approximated, the product must be considered potentially unstable.

	<u>Age from Manufacture (years)</u>	
	<u>Stored In</u>	<u>Not Stored</u>
	<u>Magazine*</u>	<u>In Magazine</u>
<u>EXPLOSIVES</u>		
Dynamite, Straight	3	2
Dynamite, all others	8	4
ANFOs	15	10
Watergels, Emulsions, Slurries	8	5
Binaries (mixed)	20	20
Black Powder	10	3
<u>DETONATORS/INITIATORS</u>		
Fuse Caps	5	2
Electric Caps	10	8
Det-Cord Caps	8	5
Det-Cord Connectors	5	3
Shock-Tube Caps	8	5
Safety Fuse	20	20
Fuse Connectors/Lighters	10	10
Detonating Cords	20	10
Shock Tubes	20	10
<u>OTHER</u>		
Cast Primers	20	15
Detaprimes	10	8

* (Means product has been consistently stored in a cool, dry, properly vented magazine).

