

# ***IFO AUDIT GUIDE***

## ***Explosives Safety***

TABLE OF REFERENCES

<b>Document Number</b>	<b>Title</b>
NSS 1740.12*	NASA Safety Standard for Explosives, Propellants, And Pyrotechnics

\* Note: This is an OSHA supplemental standard (29 CFR 1960.18).

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<b>ATTRIBUTE</b>	<b>SOURCE</b>	<b>SAT/ UNSAT</b>	<b>REMARK/COMMENT</b>
<p><b>A. Explosives and Personnel Limits</b></p> <p>1. Is the quantity of explosives minimized at operating locations while ensuring that the operation can be carried out in a safe and efficient manner?</p> <ul style="list-style-type: none"> <li>a. What is the process used to determine these limits?</li> <li>b. Are supplies exceeding this minimum quantity removed from the operating area?</li> </ul>	NSS 1740.12, Sects. 200.a		
<p>2. How does the Center ensure that the quantity of explosives permitted in an operating building does not exceed the maximum permitted by the Quantity-Distance (QD) criteria?</p> <ul style="list-style-type: none"> <li>a. How is the QD criteria communicated to personnel?</li> <li>b. Are limits established for each operation rather than one building or total workplace capacity?</li> </ul>	NSS 1740.12, Sects. 200.b, 200.c		
<p>3. Are the number of personnel at an operating location kept to a minimum while still ensuring safe and efficient operation?</p> <ul style="list-style-type: none"> <li>a. How is it determined that there are sufficient personnel available to perform a hazardous operation safely?</li> <li>b. Are jobs that are not necessary to the performance of a hazardous explosives operation prohibited from being performed in the same location as the hazardous operation?</li> <li>c. Are personnel not needed for the hazardous operations restricted from hazardous locations?</li> <li>d. Do personnel limits allow for necessary supervision and transients?</li> </ul>	NSS 1740.12, Sect. 201, 201.a, 201.b, 201.c		

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<p>4. Have personnel and operational explosive materials limits been approved by the Authority Having Jurisdiction (AHJ) and responsible safety office?</p> <p>a. How is this documented?</p>	NSS 1740.12, Sects. 200.f, 202.b(1)		
<p>5. Has a system been established to control the presence of personnel within explosives operating areas?</p> <p>a. How does it work?</p>	NSS 1740.12, Sect. 202.c		
<p>6. Are placards stating the maximum number of workers and transients permitted at any one time and the maximum amount of explosives materials and their classes/divisions posted in a conspicuous place in all buildings, cubicles, cells, rooms, and service magazines containing explosives and similar material?</p> <p>a. Are personnel and material limits and the placard must be kept current and maintained for legibility?</p> <p>b. Are placards of sufficient size and color that they are readily visible by personnel entering the work area?</p>	NSS 1740.12, Sects. 201.d, 201.g, 202.a(1)		
<p>7. Are maximum explosives and personnel limits for all buildings and bays for each explosives area recorded and maintained on file?</p>	NSS 1740.12, Sect. 202.a(2)		
<p>8. Is there evidence that when an operation changes, personnel and explosives weight limits are reviewed prior to resumption of operations and limits are reestablished?</p>	NSS 1740.12, Sect. 202.b(1)		

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<b>B. Training</b> 1. Is there an explosives training and qualification program? a. Is it documented?	NSS 1740.12, Sect. 302		
2. How is it ensured that personnel are properly trained before being assigned to any explosives operation or operating any explosives-carrying vehicle? a. Is there evidence that the AHJ, with guidance from the safety office, has determined the level of training commensurate with operation being performed? b. Is there a training requirements matrix (or similar) defining which personnel require what training? c. Is there a training/qualification tracking system easily accessible by supervisors to enable them to see who is qualified to perform specific operations?	NSS 1740.12, Sects. 300, 301.a, 301.f		
3. Is worker training continually updated as necessary?	NSS 1740.12, Sect. 301.e		
4. How is it ensured that personnel read and understand appropriate operating procedures? a. Are examinations administered?	NSS 1740.12, Sect. 300.e		
5. If an operating procedure is modified substantially, are all personnel using that procedure retrained in the use of the new procedure? a. Is there evidence that this takes place? Recent examples?	NSS 1740.12, Sect. 302.a(3)		

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<p>6. How are qualifications maintained?</p> <p>a. Who decides the length of qualification periods? Are qualification periods documented?</p> <p>b. What triggers requalification actions when a worker’s initial qualification period has expired?</p> <p>c. What prevents workers with expired or suspended qualifications from performing work?</p>	NSS 1740.12, Sects, 302.a, 302.a(4)		
<p>7. Are training and qualification records maintained for each worker?</p>	NSS 1740.12, Sect. 302.a(5)		
<p>8. Does there appear to be a safe attitude toward work with explosives?</p> <p>a. Are potential hazards defined and understood by personnel?</p>	NSS 1740.12, Sects. 300.a, 300.b		
<p><b>C. Operating Procedures</b> Review Center operational procedures.</p> <p>1. Have operational procedures been generated for all explosives operations?</p> <p>a. Have they been prepared by responsible personnel with knowledge of the operations involved? How is this ensured?</p> <p>b. What approval process do they go through?</p> <p>c. Are operational procedures at least approved by line and safety organizations?</p>	NSS 1740.12, Sect. 400, 402.a		

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<p>2. Does the safety section of each procedure present the following information or reference a safety manual that specifies the requirements:</p> <ul style="list-style-type: none"> <li>a. General safety rules and techniques that will ensure safety of operations, prevent injury or illness to personnel, and prevent damage to equipment?</li> <li>b. Personnel control features that protect personnel from exposure to hazardous operations, toxic materials, or tests?</li> <li>c. Personnel number and explosive weight limits?</li> <li>d. Additional or specific emergency controls not addressed by the facility emergency plan?</li> <li>e. A description of the range of work authorized by the procedure?</li> <li>f. Safety rules that are specific to the operation, e.g., color coding of components (if applicable)?</li> <li>g. Protective equipment that must be used?</li> <li>h. Emergency controls applicable to the operation that are not considered in the General Operating Procedures?</li> </ul>	NSS 1740.12, Sect. 402.b(2)		
<p>3. How is distribution of procedures controlled to ensure that each operating area has the most current revision?</p> <ul style="list-style-type: none"> <li>a. Are superseded or inactive procedures removed from operating areas?</li> </ul>	NSS 1740.12, Sect. 402		
<p>4. Is there an audit system that routinely evaluates the adequacy, availability, and currentness of procedures?</p> <ul style="list-style-type: none"> <li>a. Are audits documented and are actions tracked to completion?</li> <li>b. Do audits include an evaluation of operator knowledge and compliance with procedures?</li> </ul>	NSS 1740.12, Sect. 401.d(1)		

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<p><b>D. Site and Storage Requirements</b></p> <p>1. Have explosive safety site plans and general construction plans for facilities or structures containing explosives, pyrotechnics, and propellants been approved by the AHJ and NASA Field Installation Safety Office?</p> <p>    a. Have modifications to these facilities been approved as well?</p>			
<p>2. Have explosives limits, personnel limits, and minimum separation distances been determined and are they in place for all areas where explosives, pyrotechnics, and propellants are stored, handled, and used including:</p> <p>    a. Buildings, magazines, and adjacent explosives facilities?</p> <p>    b. Loading Docks?</p> <p>    c. Railcar and transport vehicles?</p> <p>    d. Petroleum, oil, and lubricant handling and storage facilities?</p> <p>    e. Wharf yards?</p> <p>    f. Utilities Installations?</p> <p>    g. Airfields, aircraft, and helicopters?</p> <p>    h. Laboratories?</p> <p>Are these limits complied with?</p>	NSS 1740.12, Sects. 505.a, 506.a, 507, 508, 509, 510, 511, 516, 800, 801, 802, 803		
<p>3. Are appropriate fire symbols displayed on all facility buildings and storage sites containing explosives, pyrotechnics, and similar hazardous materials?</p>	NSS 1740.12, Sects. 513.d		
<p>4. Are structures containing explosives kept clean and orderly?</p> <p>    a. Is a regular program of cleaning carried out?</p> <p>    b. Are appropriate precautions taken during cleaning?</p>	NSS 1740.12, Sect. 525		



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5. Is a master list of all storage explosive sites and their locations, fire symbols, chemical storage sites, and available empty storage sites maintained current by the local fire and security office?	NSS 1740.12, Sects. 519, 521		
6. How is it ensured that hazardous energetic materials, including explosive and pyrotechnics materials, are not stored within an operating building except for the minimum quantities necessary to maintain individual operations?	NSS 1740.12, Sect. 530.a		
7. Are explosives properly stored in accordance with Storage Compatibility Group requirements? a. How is this ensured?	NSS 1740.12, Sect. 606, 607, 608,		
8. Are liquid propellants stored in accordance with requirements?	NSS 1740.12, Sect. 700, 701, 702, 703		
9. How is it ensured that safety requirements for the transportation of explosives and for the safe operation of vehicles and materials handling equipment in explosives locations are followed?	NSS 1740.12, Sect. 900, 901, 902, 903, 904, 905, 909, 910		
10. What process is used to ensure that Quantity-Distance requirements are not violated? a. Is the process documented?	NSS 1740.12, Sect. 801		
11. What oversight activities are employed to ensure compliance with explosives storage and handling requirements?			

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<b>E. Safety Practices</b>			
1. Are concurrent hazardous operations avoided?	NSS 1740.12, Sect. 523		
2. Are precautions taken to prevent electrostatic discharge of explosives?	NSS 1740.12, Sect. 519, 521, 522		
3. Is proper personal protection clothing and equipment used?	NSS 1740.12, Sect. 527		
4. What measures have been taken to prohibit indiscriminate smoking in NASA explosives and hazardous materials facilities?	NSS 1740.12, Sect. 526		
5. Is all new, newly modified, or repaired equipment to be used in hazardous operations examined and tested by competent designated operating personnel and supervisors prior to use to assure safe working conditions? a. How is this ensured? b. Is this documented?	NSS 1740.12, Sect. 536		