

# **US Navy Final (Type) Qualification Process – Overview and Future Initiatives**

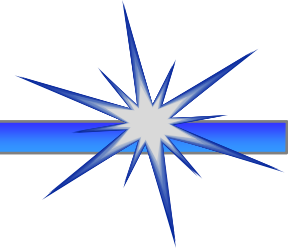
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# Definitions



- **Qualified Explosive:** An explosive that possesses properties judged to make it safe and suitable, primarily from a safety point of view, for consideration for use in a particular role.
- **Final (Type) Qualified Explosive:** A material in a specific application or weapon system that has been formally approved for service use and deemed safe and suitable in the proposed design mode.



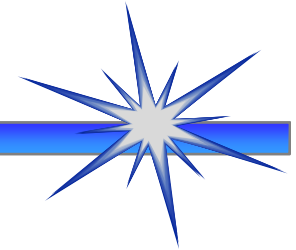
# Explosive Qualification Policy



- NAVSEA/NOSSA is assigned Navy-wide responsibility for explosive materials and Insensitive Munitions (OPNAVINST 8010.13C)
- Use the least sensitive explosive which will meet performance and operational requirements
- Only Qualified explosives shall be used in munition development or product improvement programs
- NAVSEA Instruction 8020.5C is the implementing document for STANAG 4170
- Qualified and Final (Type) Qualified (FTQ) explosives are documented in SWO10-ARG-ORD-010 technical manual “List of Explosives for Navy Munitions”



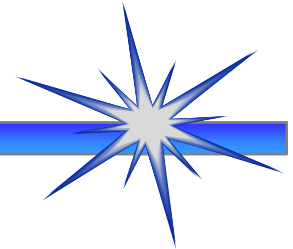
# FTQ Requirements per NAVSEAINST 8020.5C



- Mandatory test data (see following table)
- Plus:
  - Statement of Completion of System Safety Program
  - Navy Munitions Data (NMD), finalized materials documentation for main charge and booster explosives
  - Advisory Processing/Handling Statements
  - Final Hazard Classification
  - Threat Hazard Assessment (THA)
  - Technical Report
  - IM Compliance Statement
  - Recommendation for Final (Type) Qualification signed by the Commanding Officer of the submitting activity



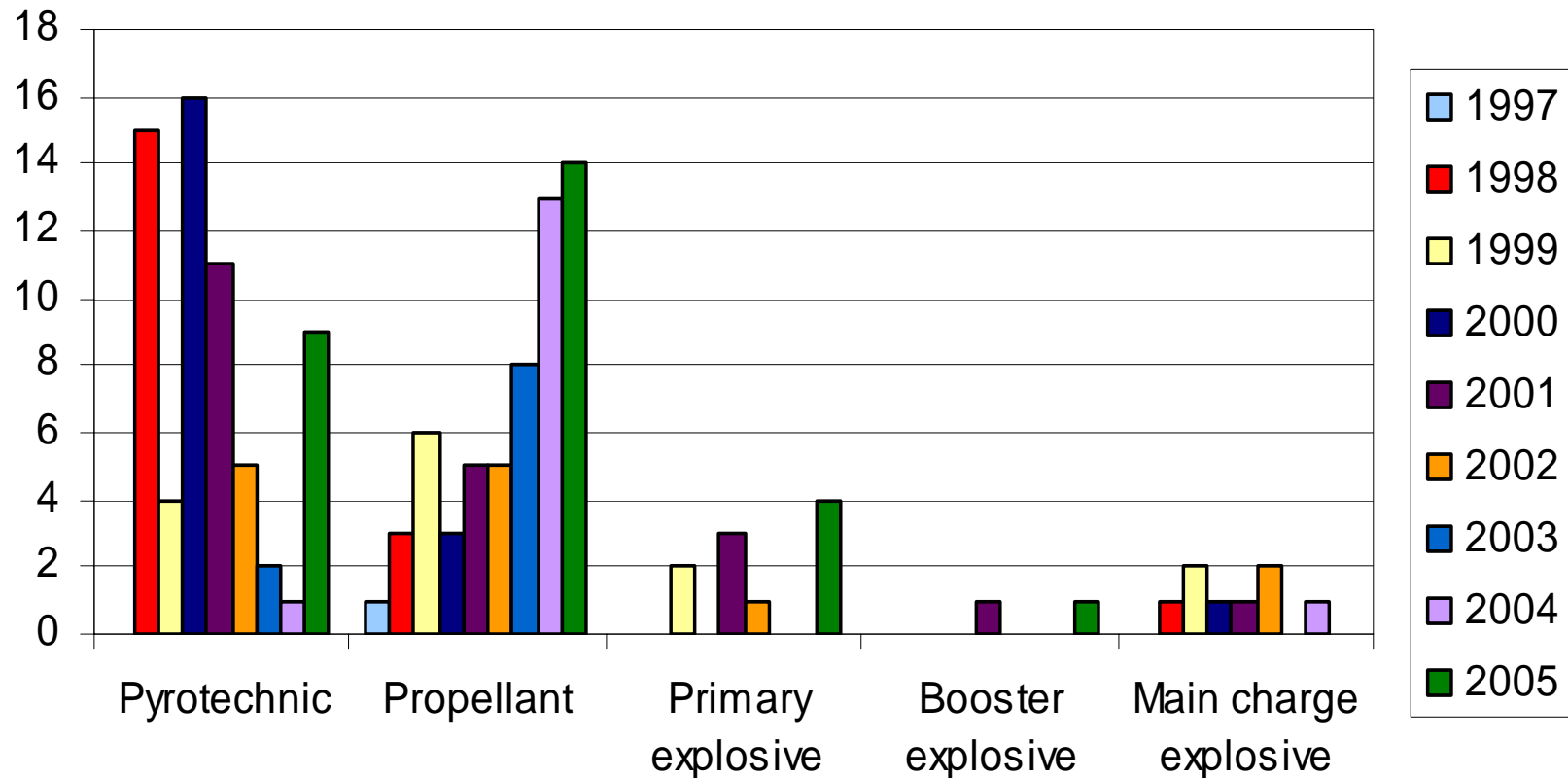
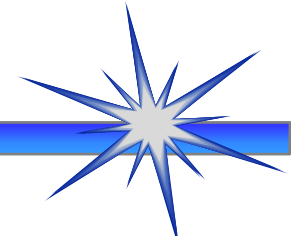
# Mandatory FTQ Tests per NAVSEAINST 8020.5C



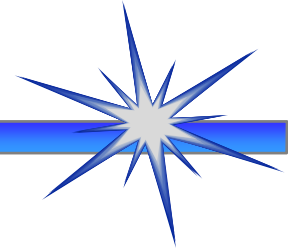
	Primary		Booster	Main Charge	Prop	Pyro	Cartridge	CAD/PAD
	System	Component						
	Level	Level						
Temperature and Humidity	X	X	X	X	X	X	X	X
Vibration	X		X	X	X	X	X	X
40 Foot Drop	X	X	X	X	X	X	X	X
5 Foot Drop		X						X
Fast Cook-Off	X		X	X	X	X	X	X
Slow Cook-Off		X	X	X	X	X	X	X
Bullet Impact			X	X	X	X		
Jolt	X	X	X			X	X	X
Jumble	X		X			X	X	X
Fragment Impact			X	X	X		X	X
Sympathetic Detonation	X		X	X	X		X	X
Spall Impact			X	X	X		X	X
Shaped Charge Jet Impact			X	X	X		X	X
Chemical and Physical Compatibility	X	X	X	X	X	X	X	X
Low Temp/Humidity Aging		X	X	X	X	X	X	X

These tests may be harmonized with Hazard Classification requirements.

# Types of Energetics Qualified by Year

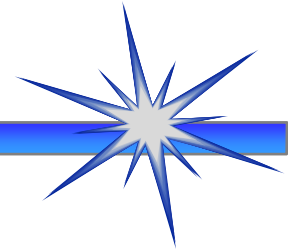


# Trends in Qualification



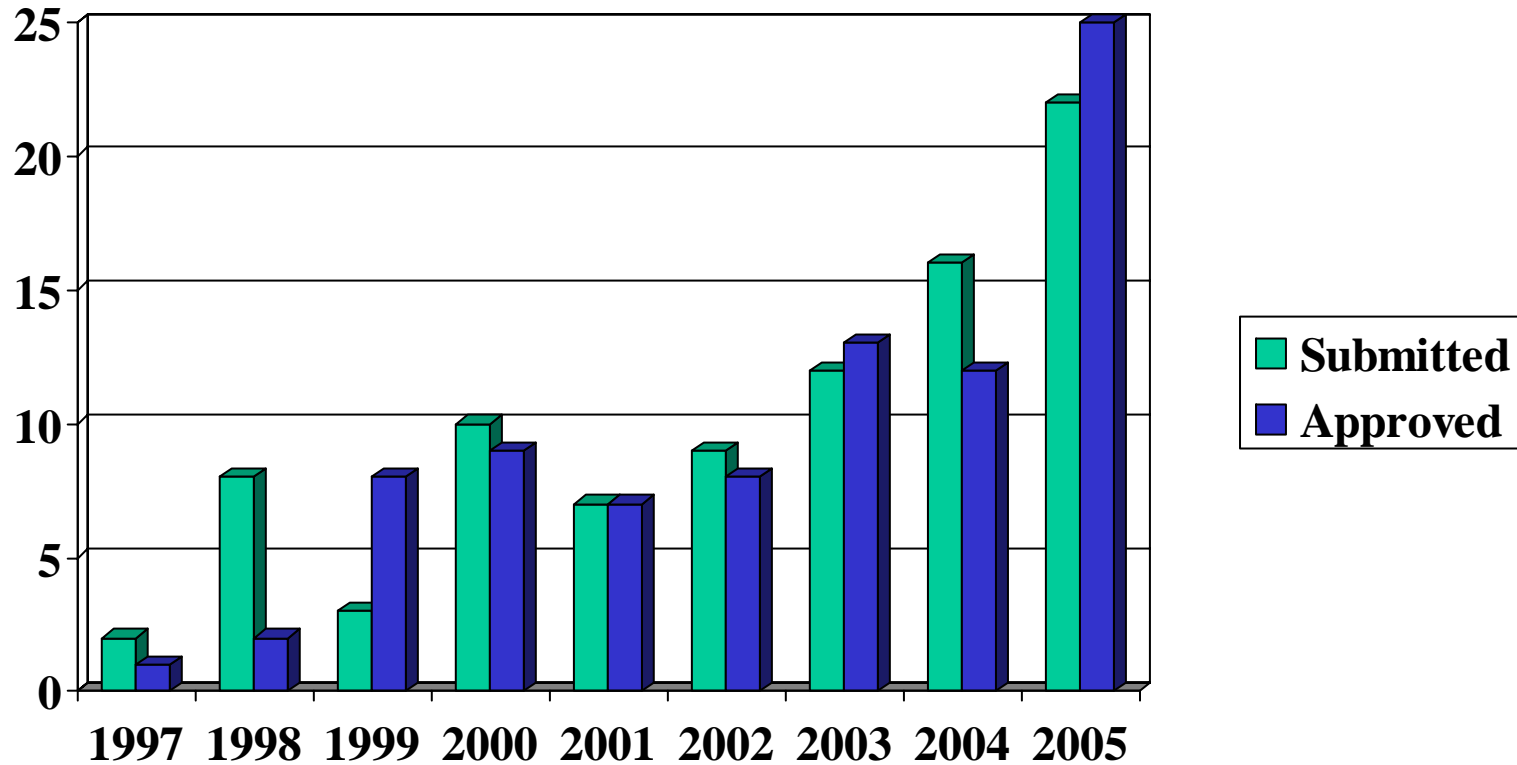
- In the past, Qualification was mainly required for the predominant explosives in a system, but now Qualification and Final (Type) Qualification are required for *all energetics*
- One large system may have ten to twenty or more energetics that all must be accounted for via the Qualification and FTQ processes
- Growth in propellants, pyrotechnics and primaries is largely due to legacy systems, especially small arms

# Future Initiatives



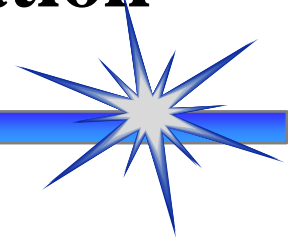
- Families of gun propellants
  - Expand the Qualification of families of gun propellants (first approved in 2001)
- Families of small arms primer compositions
  - Qualify families of similar primer compositions
- Compositions in CAD devices
  - Qualify formulations (largely pyrotechnics and primer compositions) that have been tested in devices that meet the Cartridge Actuated Device (CAD) specification requirements.

# Final (Type) Qualification by Year





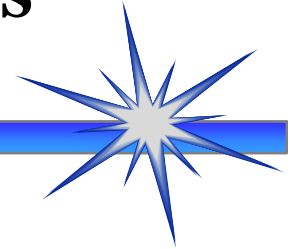
# Trends in Final (Type) Qualification



- Final (Type) Qualification requests have been steadily increasing
- Trend should continue as new systems are developed and older ones are modified and upgraded to include improved energetics
- Legacy systems must go through the FTQ process as their energetics are upgraded
- More systems are requesting to have un-Qualified energetics Final (Type) Qualified in their particular application



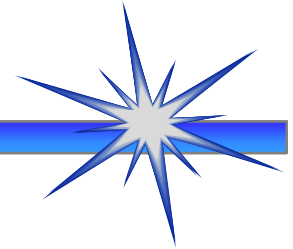
# FTQ of Un-Qualified Explosives



- Although the goal is to Qualify all compositions, some energetics may be allowed to proceed directly to Final (Type) Qualification in order to get the systems released to the Fleet in a timely manner
- Sometimes very little data can be found on the energetic compositions in legacy systems; however the system has a long history of safe use
- This situation is occurring more often as more legacy items come through the FTQ process
- In these cases, the energetic has proven it will perform safely in the designated system, but there is not enough information available to approve it for general use



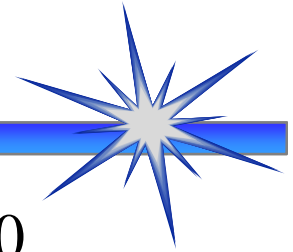
# Future Initiatives



- Develop new category – Approved for use, but not for new developments
- Qualification implies approval and encouragement for use in developmental work (“Navy seal of approval”)
- Legacy energetics may be safe for use, but not state-of-the-art and encouraged for new developments
- New category would cover many of the formulations that are currently Final (Type) Qualified in a particular system, but remain Un-Qualified for general use

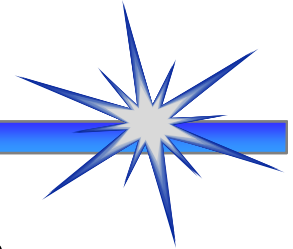


# DoD Joint Qualification



- Joint DoD Explosives Qualification effort begun in 2000
- Navy introduced this initiative at an OSD Insensitive Munitions IPT meeting
- All Services participated with representatives from explosives safety, energetics development, and hazard classification
- Detailed requirements matrices were generated for each type of energetic
- Decision was then made to incorporate these matrices into the US Section of AOP-7

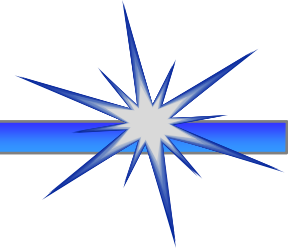
# AOP-7



- Joint Service Explosive Qualification requirements, both mandatory and optional
- MIL-STD-1751 described test methods and data required for qualification. These were incorporated into the US Section of AOP-7
- In accordance with OSD policy, MIL-STD-1751 was cancelled and replaced by the US Section of AOP-7
- AOP-7 gives the framework of minimum Joint Qualification requirements; however, each Service retains the ultimate authority for Qualification



# Future Initiatives



- Incorporate AOP-7 into NAVSEAINST 8020.5C
- Better define requirements for the Navy to approve another Service's Qualification and Final (Type) Qualification
- Continue to work towards true Joint Service Qualification requirements
- Update of AOP-7 was a good start; however, there is much more work to be done before this becomes a truly Joint process
- Joint Service requirements and approval process should be the ultimate goal