



# HARNESSING TECHNOLOGY for the **WARFIGHTER**

## ***Suppressed Upper Receiver Group Testing Methods***

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# Introduction

- Suppressed Upper Receiver Group (SURG)
- Mr. Caleb McGee speaking on behalf of Mr. Johnathon Parker Lead SURG Engineer for NSWC Crane
- United States Special Operations Command (USSOCOM) Acquisition Program
  - RFP: H92222-17-R-0011
  - 48Mil full and open Indefinite Delivery / Indefinite Quantity (IDIQ) requirement
  - Multiple Award Scenario



# Warfighter Deficiency

- Currently fielded weapon systems are not designed to be suppressed continuously.
- Currently fielded assault rifles use ammunition and suppressors not designed as a system.



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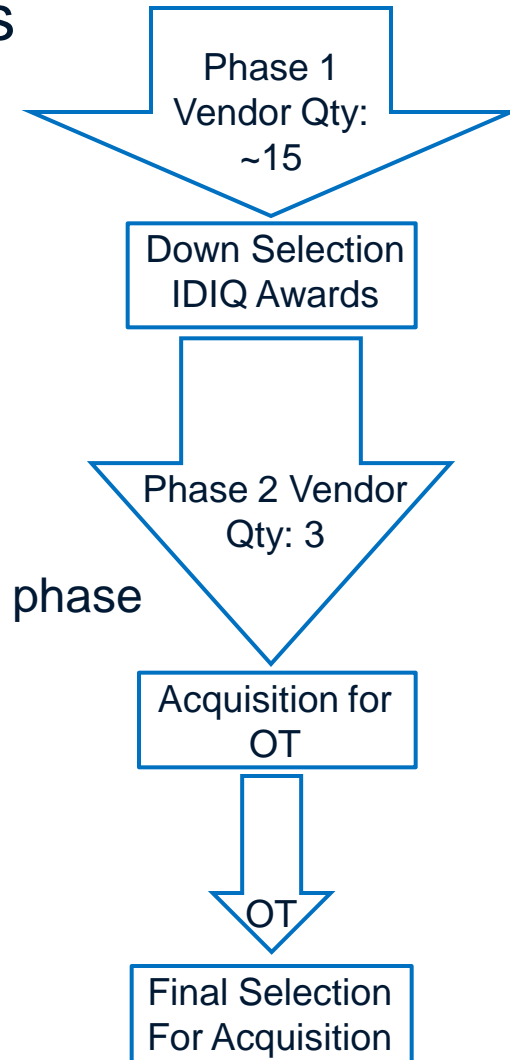
# SURG Improvements

- SURG Performance Specification designed to produce:
  - Improved reliability and endurance over legacy unsuppressed systems
  - Improved thermal characteristics
  - Improved System durability
  - Reduce the toxic fume and blowback exposure to operators



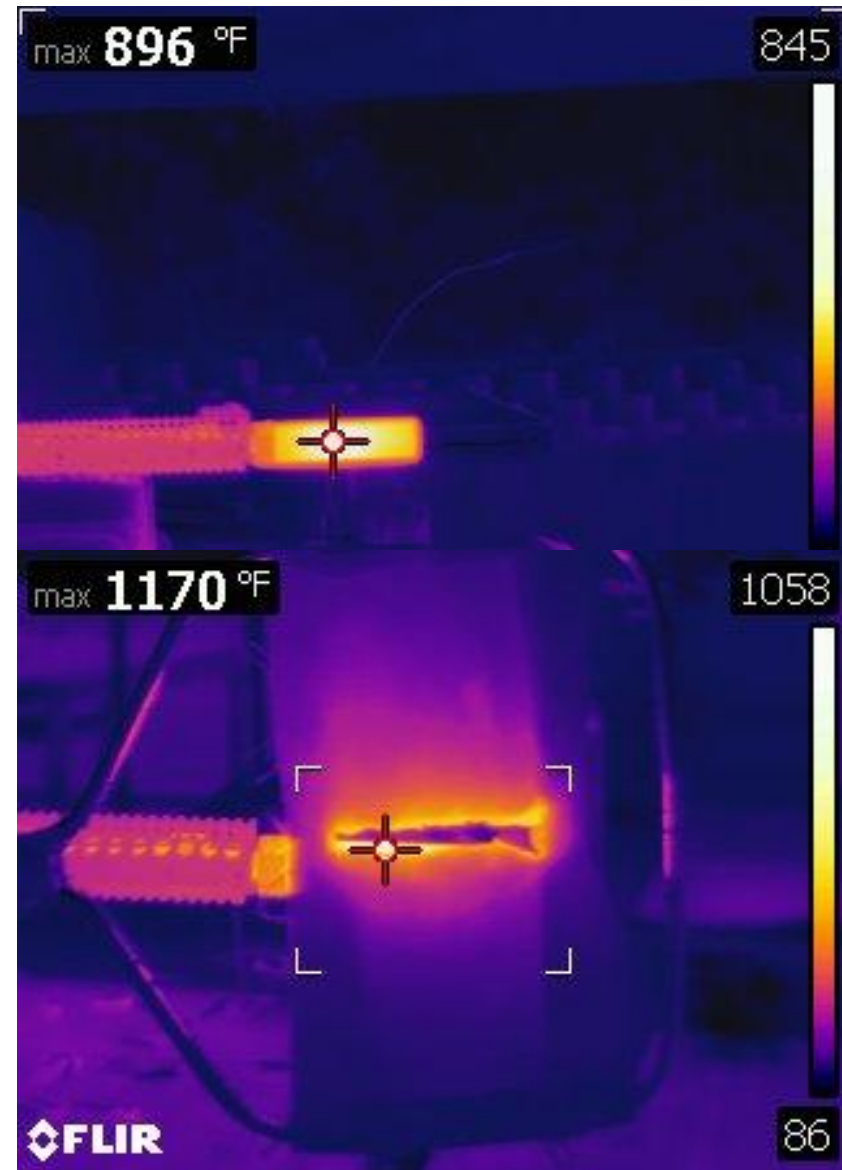
# SURG Acquisition Structure

- Acquisition structure broken in three phases
  - Phase One
    - Full and open competition.
    - Testing with Go / No Go Criteria
    - Fourteen Thresholds tested in Phase one.
  - Phase Two
    - Developmental Testing on three ID/IQ contract awarded vendors.
    - More in depth test and evaluation of samples than phase one.
  - Phase Three
    - Operator testing final selection of primary vendor
- All testing outlined is phase one specific



# Thermal Testing

- Requirement
  - Handguard temperature
  - Signature of the system
  - Momentary contact of suppressor on personnel
  - All tested at 150 rounds in five minutes threshold (T) and 210 rounds in seven minutes objective (O).

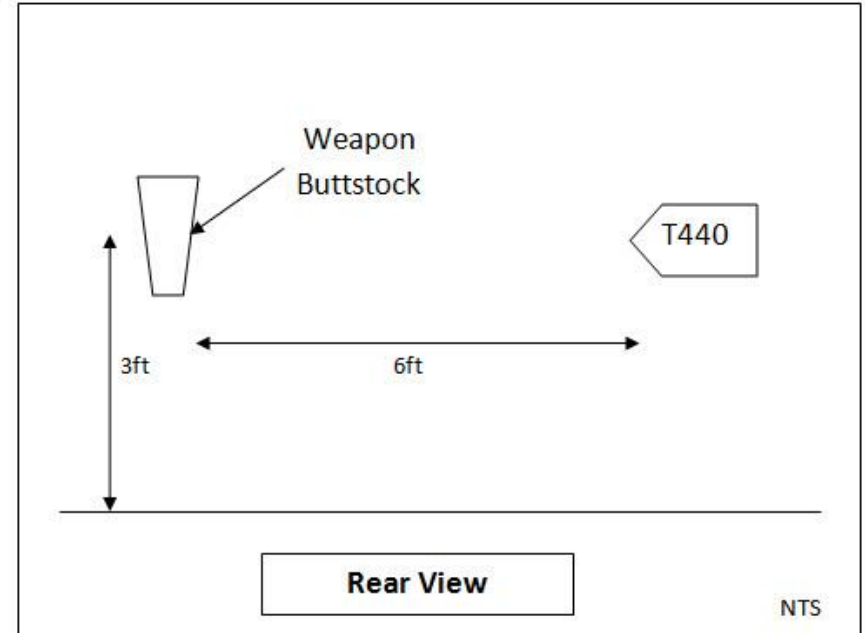
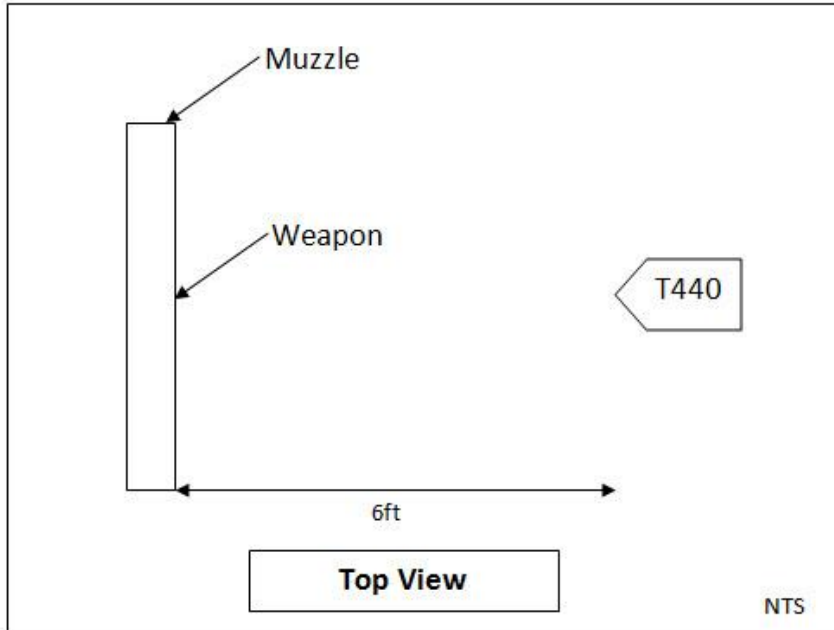


# Thermal Testing – Handguard Temp

- Verification
  - FLIR T440 setup 6ft from the weapon, perpendicular to the major weapon axis, at the same 3ft height from the ground.
  - Weapon, ammunition and magazines are at 72°F prior to testing.
  - Handguard temperature is measured at five minutes and seven minutes.
  - Five and seven minute test are done independently.



# Thermal Testing





# Durability Testing

- Requirement
  - Fire 240 rounds per Table II

**Table II: Stress Test Firing Schedule**

30 round Magazine #	Rate of Fire
1	1 shot /sec.
2	2 shots / sec.
3	1 shot /sec.
4	3 to 5 shot bursts
5	1 shot /sec.
6	2 shots / sec.
7	1 shot /sec.
8	30 shot burst
Allow to Cool	1 Cycle = 240 shots

- Threshold six cycles
- Objective twenty cycles



# Durability Testing

- Verification
  - Operator has 5 seconds to reload weapon
  - Weapon is to fire the 240 rounds in continuum else the testing will be restarted per the test plan criteria.
  - Weapon is allowed to cool between 240 round “runs” to 120°F at the hottest point externally visible. Weapon inspected post 240 round completion.
  - Weapon will be shot until failure point is reached in accordance with (IAW) test plan.
  - Test conducted with operator in the loop.
  - Weapon was shot through protective barrier to ensure operator safety.
  - Destructive test designed to take equipment to failure.



# Toxic Fume and Blowback Testing

- Requirement
  - Phase one: Blowback comparative testing.
    - Not a quantitative measurement but a comparative test to the baseline M4A1 performance.
    - Done on one weapon per vendor.
  - Phase two: Toxic fume measurement IAW ARDEC developed new procedure.
    - An in depth quantitative measurement.
    - Done on only three vendors samples.



# Toxic Fume and Blowback Testing

- Phase One Verification
  - Weapon will be setup in remote firing fixture.
  - Weapon supported by the length of the MIL-STD 1913 rail on the top of the weapon.



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# Toxic Fume and Blowback Testing

- Weapon operating group submerged in colored CLP mixture for sixty seconds.
- Time operating group leaves CLP bath to firing weapon will be timed and conducted the same between each vendor.
- Witness paper will be placed around the weapon from the left of the muzzle to the right of the muzzle at constant distance of six inches.







# Toxic Fume and Blowback Testing

- Weapon will be remotely fired inside the fixture with paper in place.
- The blowback produced from the weapon will be imprinted onto the paper.
- Weapon and paper will be reset for three concurrent tests.
- Upon completion of each round fired the paper will be placed flat and allowed to dry.
- Dry papers from the test weapon and the corresponding M4A1 will be compared for requirements verification.
- Photo analysis software will be used if test samples necessitate a more in depth comparison.



# Toxic Fume and Blowback Testing



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# Toxic Fume and Blowback Testing

- Phase Two Verification
  - Phase two testing has not been conducted to date.
  - Current test plan is to test the weapons making it into phase two per newly developed ARDEC Toxic Fumes Test.
  - This format of testing will utilize a sealed container with hole for projectile passage.
  - Measurement of the component gas makeups will be done with gas analyzers throughout the test chamber.
  - Per the TOPs the primary compounds for analysis should be Ammonia, carbon dioxide, carbon monoxide, sulfur dioxide and nitrogen oxides.



# Questions





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