



Off-Normal Assets: The Answer to the Question “How Hard Can that be?”

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Off-Normal Assets

- **In conventional demil we receive and dispose of assets which:**
 - **Have reached the end of their life cycle**
 - **Are non-serviceable**
 - **Are obsolete**
- **Some assets received are outside the normal range of physical condition one would anticipate from TDP information and typical storage and transportation cycles**
- **These off-normal assets can:**
 - **Interrupt production and cause major schedule delays**
 - **Cause financial stress on demil operations**
 - **Impose major safety risks and challenges**
 - **Could cause environmental concerns if disposed of by the established procedures**



Off-Normal Assets: Causes

- **Aging**
- **Improper packaging or storage**
- **Abnormal environmental exposure**
- **Damage in transport, handling, deployment**
- **Prototype or field modification**
- **Manufacturing defect**



Off-Normal Assets

- Detailed maintenance and surveillance at Army Depots and visual inspection of outer packs prior to shipment greatly limits extreme off-normal assets from being shipped to commercial demil operations
- Although continually improving, the cumulative maintenance, surveillance, inspection and screening cannot be expected to be 100% effective in eliminating extreme off-normal assets from out bound shipments
- Varying lesser degrees of off-normal asset conditions are routinely encountered and addressed in demil operations
- As a commercial demil service provider, GD-OTS is prepared to deal with the disposition of off-normal assets of all degrees



Extreme Example: HC Smoke Pot MK 3

- Examination of outer pack (box) would not necessarily point to abnormal condition (right)
- Random inspections inside the outer pack might not catch severe examples
- In this case the condition was discovered before further transport
- Dispositioned to Emergency Demil





Extreme Example: CBU

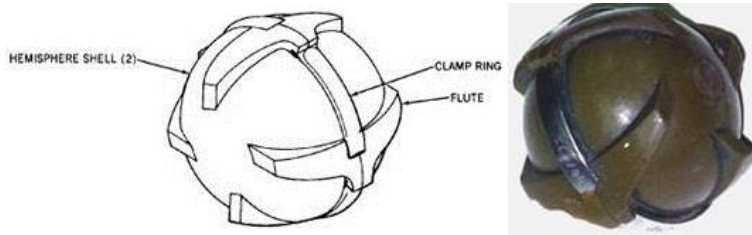
- Examination of outer pack (box) did not necessarily point to condition
- This off-normal asset was encountered at the Joplin facility (at that time a GD-OTS subcontractor) during routine operations in 2007
- The condition was such that it had to be processed on site by EOD





Extreme Example: CBU

- In this case disposition was worked out in tandem with the USG
- This off-normal asset was demilitarized after carefully working out procedures and handling protocols
- This was one of the more extreme off-normal asset encountered by GD-OTS to date in our demilitarization work
- A similar situation with an MLRS warhead was encountered a few years ago





Off-Normal Assets

- The appearance of such extreme off-normal assets triggers a stop everything and evacuate the area type response while the required expertise is drawn upon to resolve the situation
- Examples of less extreme off-normal assets can be illustrated from GD-OTS experience with 105mm Depleted Uranium (DU) Cartridge Demilitarization
- The blend of explosives and radioactive material create several unique off-normal categories that if present in a conventional non DU cartridge would not necessarily interrupt normal processing
- GD-OTS takes a structured approach to dealing with off-normal assets starting with recognition of such condition by all levels of personnel



Off-Normal Assets

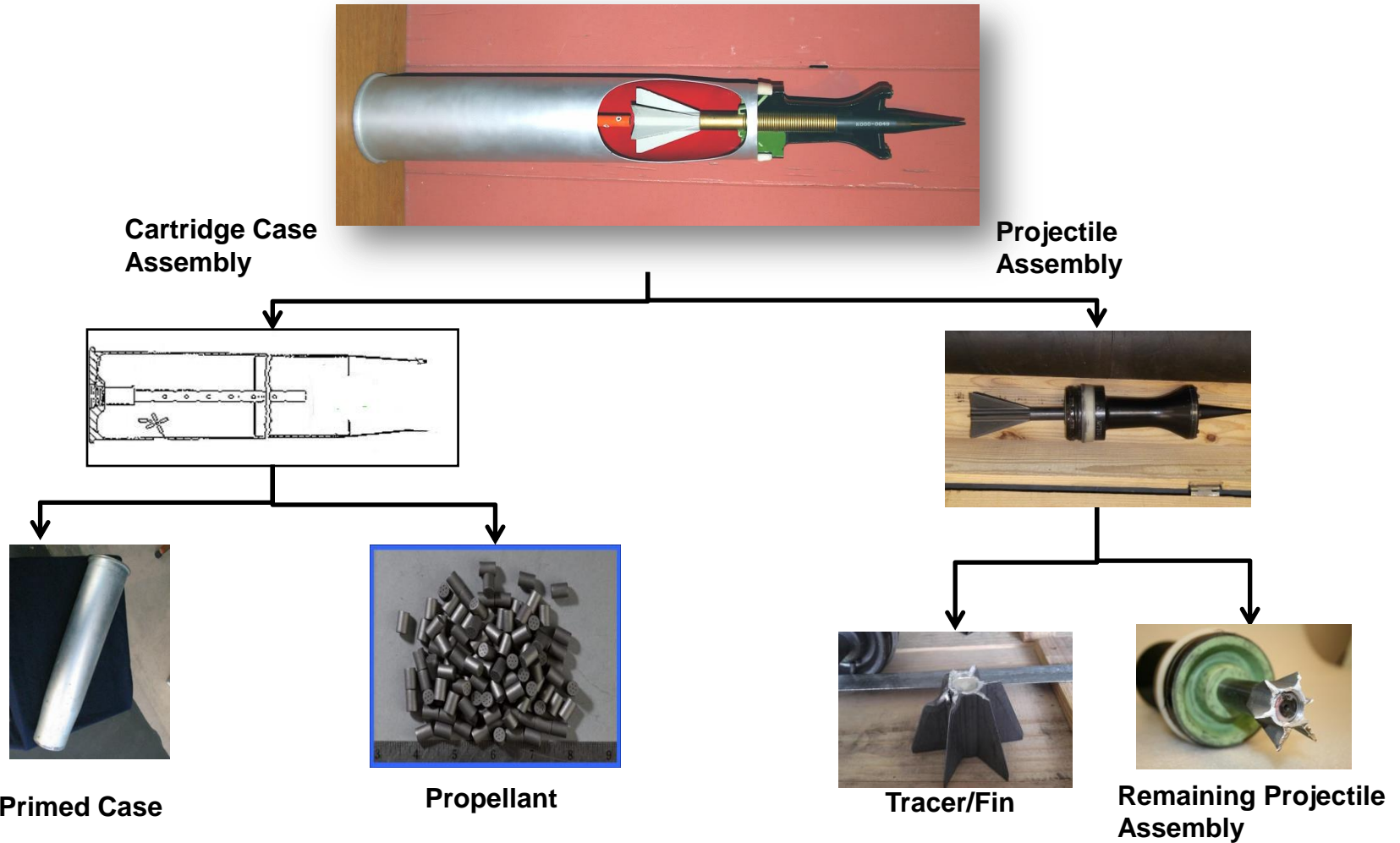
- Operators and supervisors working on the DU demil line are trained to observe and call a halt to normal operations when anything unusual or abnormal is observed with the assets being demilitarized or with their components
- Depending on severity and occurrence, the asset/component in question is set aside for further engineering review and disposition
- Further review and disposition will determine the action plan
- Routine anomalies have been experienced in ongoing production with actions scaled accordingly
- Recurring anomalies have prescribed associated procedures



Off-Normal Assets

- Constant two way communication with the USG demil team works to help mitigate the effect of these anomalies
 - When issues are noted with assets from one depot the USG demil team can determine any applicable lessons learned and apply them to the same or similar assets from other depots
 - An example is: first deliveries from depot “A” were palletized in a manner that would not fit through the earth covered magazine doors and corrected for subsequent deliveries
 - Understanding anomalies and correlating available information about related lot numbers can give the demil operation a heads up about upcoming assets
 - Lot designators indicating “prototype” might be held to process together in a campaign rather than piecemeal

105mm Depleted Uranium (DU) Cartridge Demilitarization: Basic Process





Off-Normal Assets: M774 cartridges have been heavily contaminated with sand (Environmental)

- Lot MA-82F001Y013
- Fiber board tubes appeared grit blasted & covered with sand
- Sand in and on the cartridges and filling the outer pack boxes
- Sand carried through the process
- Operators developed dermatitis
- PPE was expanded
- Vacuum pick-up introduced
- More frequent PM





Off-Normal Assets: Irregular tight packaging has been encountered on M774 cartridges requiring cutting off the tube

- Lot MA-82D001-012
- 60 consecutive cartridges encountered “stuck” in the fiber board tubes
- Encountered occasionally in other lots
- Required off-line extraction operation



Round too far into the tube



Round clamped in a pipe vise



Cutting the cardboard tube after removing the metal end cap



Off-Normal Assets: Irregular tight packaging has been encountered on M774 cartridges requiring cutting off the tube (Packaging)

- Increased cycle time about 700%
- Created ergonomic concerns
- Frequency peaked and declined before investment in additional equipment required



Peeling the cardboard tube away



Exposed white plastic component, tap to remove



Remove the round from the remainder of tube



Off-Normal Assets: New wind screen protector technology encountered on several cartridges (Field Modification)

- Cans trimmed to cover the wind screen cushion
- Variety of source material
- Recommended as a universal reliability enhancement by contemporary advertising
- No effect on operations





Off-Normal Assets: Damaged/Modified

- Cartridges observed to have deformed cases
- Line shut down to investigate
- Damaged cartridges set aside
- Cartridges processed after hours with manual settings
- No propellant charge





Off-Normal Assets: External corrosion (Environment / Packaging)

- Heavily corroded steel cartridges and primer heads making de-prime problematic if needed
- Brittle liner material (below) which drove the installation of a screen at the propellant dump station



Off-Normal Assets: Wrong Munition, Prototype, Packaging Error



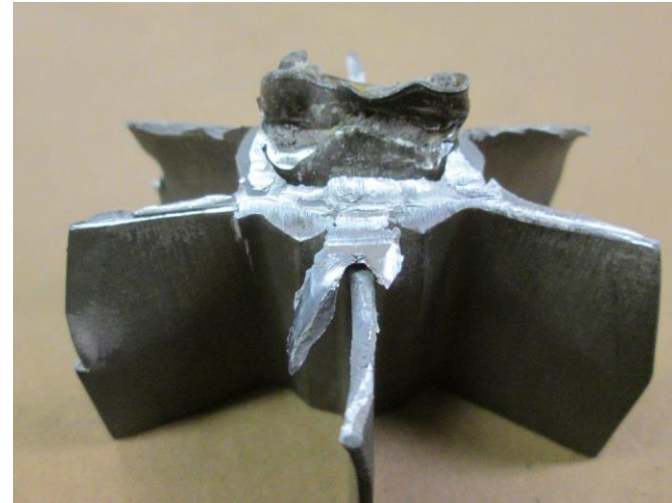
- HEAT cartridges comingled with DU cartridges (returned to USG)
- Prototype experimental XM774 traced fin broke line tooling
- Tooling replaced and upgraded and prototype fins processed off line in a campaign
- Unsafe palletization (re-palletized)





Off-Normal Assets: Manufacturing Defect in M833

- The tracer is cut off with a portion of the fin through an aluminum spacer
- Live tracer pyrotechnic was discovered in the cut surface
- Subsequent analysis revealed a second inverted tracer where the aluminum spacer resides
- Considered self limiting (an expensive tracer replacing an aluminum slug would eventually be noticed by Finance)





Off-Normal Assets: Odd propellant grains and heavily damaged sabots



Broken Projectile Taped Together



Broken Projectile



Open Gap in Sabot with DU Exposed (No Corrosion)



Off-Normal Asset: DU Corrosion

- Example from Lot MA-81C001-001
- Cartridge was encountered at the end of lot processing
- No external corrosion
- Corrosion was noted prior to tracer cut-off when the propellant did not dump due to clumping from excess moisture





Off-Normal Asset: DU Corrosion

- Heavy yellow oxide corrosion on exposed DU core
- Indications of extreme moisture exposure for this cartridge
- Non-projectile components require evaluation / decontamination before further disposition
- Components segregated and line shut down for decontamination





Off-Normal Asset: DU Corrosion

- Example from Lot MA-81J001-005
- Heavy yellow oxide corrosion on exposed DU core
- Indications of extreme moisture exposure for this cartridge
- Tracer was cut off
- In this case propellant was dumped in pack with other propellant from normal cartridges





Off-Normal Asset: DU Corrosion

- The steel cartridge case was heavily corroded on the inside as well
- Propellant was not as clumped as first example nor was oxide as noticeable
- Non-projectile components require evaluation / decontamination before further disposition
- Components segregated and line shut down for decontamination



Off-Normal Asset: DU Corrosion of varying degrees





Off-Normal Asset : DU Corrosion

- Radioactive contamination of cartridge components (especially the propellant) makes this off-normal condition a challenge
 - Explosive low level radioactive waste (LLRW) is not welcome anywhere
 - One or the other (explosive characteristics or DU oxide contamination) must be removed before disposition
- Explosive device components (tracer, primer) must be surveyed and decontaminated if needed prior to thermal treatment
- Inert components must be surveyed and decontaminated if needed for recycle or disposed in a licensed LLRW facility
- Contaminated propellant is surveyed/screened with the remaining amount rendered non-explosive by base hydrolysis



Conclusion

- While rare with constantly evolving maintenance, surveillance, inspection and screening, protocols must be in place to deal with extreme off-normal assets
- A variety of more moderate off-normal asset conditions can be expected in routine demil operations
 - Moderate off-normal should be handled in a structured manner
 - Characteristic recurring off-normal conditions will require specific modifications to procedures to address
 - Safety and environmental concerns are the first priority when dealing with off-normal assets
- Effective communications with the USG demil team and collective application of lessons learned helps reduce and mitigate the negative impacts of off-normal asset conditions