SUBJECT: Engineering Technical Letter (ETL) 10-6 (Change 2): External Foam Insulation of Temporary Structures

1. Purpose. This ETL provides guidance for the application, use, and disposal of external spray-on closed-cell foam insulation on temporary structures, particularly those in the Iraq and Afghanistan areas of responsibility (AOR). This ETL also describes required modifications to and operational requirements of those structures. Foam insulation is intended to achieve reductions in electrical demand, bulk fuel requirements, and convoy sorties, while improving quality-of-life conditions for military personnel.

Note: The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this ETL does not imply endorsement by the Air Force.

Summary of Revisions. This ETL supersedes ETL 09-18, External Foam Insulation of Temporary Structures, dated 18 November 2009. This revision updates the coordination statement (paragraph 2.2); adds new instructions for preparing structures for foam application (paragraph 7.3); renumbers paragraphs 7.3 through 7.10 as paragraphs 7.4 through 7.11; updates cure time (paragraphs 7.11 and 9.1); updates the organizations responsible for evaluating ventilation systems (paragraph 9.10) and solid wastes (paragraph 10); and updates procedures to dispose of solid wastes.

2. Application. Requirements in this ETL are mandatory for all Air Force organizations. Any deviations require written approval from the Air Force Civil Engineer Support Agency, Expeditionary Engineering Branch (HQ AFCESA/CEXX) and Engineer Support Branch (HQ AFCESA/CEOA).

2.1. Authority: Air Force policy directive (AFPD) 32-10, Installations and Facilities

2.2. Coordination:
   • The Civil Engineer, Expeditionary Engineering Branch (AF/A7CXX)
   • Surgeon General, Healthcare Operations (AF/SG3)

2.3. Effective Date: Immediately

2.4. Intended Users:
   • Major command (MAJCOM) engineers
   • Base civil engineers (BCE)
   • Air Force Prime BEEF and RED HORSE units
   • Contractors performing external insulation of temporary structures (EITS)

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED
• Other organizations responsible for EITS

3. References.

3.1. Air Force:

3.2. Army:

• US Army Briefing, Tent Foam Insulation Cost Benefit Analysis, 14 July 2009
• US Army Center for Health Promotion and Preventive Medicine (USACHPPM) Letter, Toxicity Clearance for the Gaco Western Polyfoam System 193, 8 March 2007
• USACHPPM Letter, Toxicity Clearance for BASF Spraytite System 158 and United Coatings’ Diathon, 15 February 2008
• USACHPPM Letter, Toxicity Clearance for the BASF Spraytite System 158 and Neogard Acrylic Coating, 15 February 2008
• USACHPPM Letter, Toxicity Clearance for the BaySystems Bayseal 2.0 Foam System, Baysystems Evercoat 500 Acrylic Coating, and United Coatings Diathon Acrylic Coating System, 10 March 2008

3.3. DOD:

• US Government Accountability Office (GAO) Report to the Subcommittee on Readiness, Committee on Armed Services, House of Representatives,
Defense Management, *DOD Needs to Increase Attention on Fuel Demand Management at Forward-Deployed Locations*, February 2009 (GAO-09-300)


3.4. Industry:

4. Acronyms and Terms.

°C – degree Celsius  
°F – degree Fahrenheit  
AF/A7CXX – The Civil Engineer, Expeditionary Engineering Branch  
AFOSHSTD – Air Force Office for Safety and Health standard  
AFPAM – Air Force pamphlet  
AOR – area of responsibility  
BCE – base civil engineer  
BEAR – Basic Expeditionary Airfield Resources  
BEE – bioenvironmental engineer  
BEP – break-even period  
CFM – cubic feet per minute  
CO – carbon monoxide  
CoP – community of practice  
COTS – commercial off-the-shelf  
DOD – Department of Defense  
ECU – environmental control unit  
EITS – external insulation of temporary structures  
ERV – energy recovery ventilator  
ETL – engineering technical letter  
HQ AFCESA/CEOA – Air Force Civil Engineer Support Agency, Engineer Support Branch  
HQ AFCESA/CEXX – Air Force Civil Engineer Support Agency, Expeditionary Engineering Branch  
HVAC – heating, ventilation and air conditioning  
IAQ – indoor air quality  
IED – improvised explosive device  
JCC-I – Joint Contracting Command - Iraq  
JCTD – Joint Capability Technology Demonstration  
MAJCOM – major command  
Prime BEEF – Prime Base Engineer Emergency Force  
PSTF – Power Surety Task Force  
RED HORSE – Rapid Engineer Deployable - Heavy Operations Repair Squadron
5. Background.

5.1. The Department of Defense (DOD) relies heavily on petroleum-based fuel to sustain forward-deployed locations. DOD reports that the greatest consumers of fuel during wartime are generators, which provide power for cooling, heating, and lighting at locations that are not connected to local power grids. Transporting fuel to forward locations presents an enormous logistics burden and risk—every day, hundreds of trucks transporting fuel convoy for hundreds of miles, exposing drivers and soldiers protecting the convoys to improvised explosive devices (IED). DOD has acknowledged the vulnerabilities associated with dependence on fuel for power generation. Additionally, the need to sustain forward-deployed locations for longer periods than initially anticipated and the fact that global fuel supply routes flow through unstable regions have further highlighted significant vulnerabilities. In a series of reports between 2006 and 2009, the General Accountability Office (GAO) has recommended that DOD establish an effective approach to managing fuel demand at forward-deployed locations.

5.2. An Air Force study estimated that up to 65 percent of convoy shipments at some primary forward-deployed locations were fuel for electrical generators. Additionally,
80 percent of the electricity generated was used to power environmental control units (ECU). Most ECUs are connected to uninsulated structures.

5.3. DOD established a Power Surety Task Force (PSTF) to identify and demonstrate emerging or commercial off-the-shelf (COTS) technology that can reduce fuel demand. DOD has also decided to pursue a large-scale effort to apply foam insulation to temporary structures to reduce the number of generators needed to power those structures.

5.4. After conducting a study at Fort Benning, Georgia, in 2007, the PSTF concluded that external insulation of temporary structures (EITS) (e.g., military tents) with foam could reduce the number of ECUs by 50 percent. It further concluded that insulated tents require 75 to 90 percent less power than non-insulated tents. In another study in Kuwait (Figure 1), foam-insulated facilities provided 20 percent to 40 percent energy savings while reducing wear and tear on base generators. A PSTF study on US Navy facilities in Djibouti concluded that foam insulation resulted in an estimated fuel savings of 40 percent. Overall, the PSTF has concluded that applying foam insulation reduces dust, heat, cold, noise, and air-conditioning requirements. The PSTF initiated a three-year demonstration project called the Net-Zero+ Joint Capability Technology Demonstration (JCTD) at the National Training Center in Fort Irwin, California. The project will continue testing foam insulation and similar technologies while soliciting feedback from DOD personnel.

5.5. The US Army currently uses closed-cell foam to insulate tents and other structures in multiple locations, including Iraq and Afghanistan. The Army’s Director of Operations (G-4) conducted an independent cost-benefit analysis of potential heating, ventilation, and air conditioning (HVAC) energy savings resulting from use of closed-cell foam insulation (see Army briefing Tent Foam Insulation Cost Benefit Analysis). The goals of the analysis were to:

5.5.1. Determine the insulating properties of foam;
5.5.2. Determine projected cost savings due to the application of foam;
5.5.3. Determine the break-even period (BEP) for foam investment.

5.6. The cost-benefit analysis considered the energy load and fuel consumption of foamed and un-foamed structures in Iraq. The analysis was only performed on structures that were foamed under current contracts. The insulating properties and the fuel-saving rate of the foam (by reduction in electricity usage) were significant.

Note: The analysis does not fully take into account the cost of the shelter (rendered unrecoverable); costs to modify the HVAC/ECUs, for health/safety modifications, or for quality control inspections; and costs to ensure proper harvesting of recyclable material and disposal of waste materials.
5.7. The Army’s cost-benefit analysis concluded that:

5.7.1. Using closed-cell foam to insulate non-expeditionary tent structures in Iraq results in greater than 50 percent fuel savings annually;

5.7.2. Based on a constant cost of fuel and the foam cost, the BEP for most structures is only about 75 days;

5.7.3. The BEP is inversely related to the price of fuel and directly related to foaming cost per square foot.

5.7.4. The analysis was applied to potentially foaming structures (sleeping quarters and offices only) at 10 deployed locations in Iraq and the projected annual cost savings was projected to be $43 million the first year and $65 million each additional year. That is roughly the equivalent of 940 loads (5,000 gallons each load) of fuel avoided each year.

Note: Foam insulation renders the insulated structure unrecoverable; commanders should consider this when calculating local cost-benefit decisions.

5.8. While external spray-on closed-cell foam insulation provides significant energy savings, it has also been shown to reduce indoor air quality (IAQ) below minimum standards unless modifications are made to provide fresh-air ventilation within the temporary facility.

5.9. Based on this information, the Air Force has authorized the use of external spray-on closed-cell foam insulation with an associated protective surface coating on temporary facilities in the Iraq and Afghanistan AOR. Such facilities must also be modified and operated as required by this ETL. However, this authorization excludes all Basic Expeditionary Airfield Resources (BEAR) shelters and assets unless prior approval has been received from the BEAR program office. It is accepted that these temporary facilities will be rendered non-relocatable to other expeditionary locations and will incur additional costs for disposal upon completion of the expeditionary mission.

5.10. When authorized, external foam insulation, associated protective surface coatings, and facility modifications shall only be installed by factory-authorized and trained contractor personnel.

6. Types and Sources of Foam. Prior to allowing application of foam, commanders must ensure the product has been granted a toxicity clearance and is approved for use on military structures. The following are currently the only approved types and sources of foam authorized by the Air Force.

6.1. Gaco Western Polyfoam System 193 (GWPS-193). GWPS-193 is a COTS item developed to provide improved insulation of military tent systems. The system
consists of a hydrofluorocarbon-blown, zero-ozone-depleting, liquid spray that cures to a low-density, rigid, polyurethane insulation material. Polyfoam is a two-part polyurethane spray foam that contains diphenylmethane diisocyanate (monomeric MDI) (50 percent) and 1,1,1,3,3-pentafluoropropane (6 percent to 12 percent). It may be applied in temperatures as low as 35 °F (1.66 °C). GWPS-193 can be applied to the exterior surface of military tents and shelters. The polyfoam is then sprayed with a silicone-enhanced elastomeric coating for improved weatherability. The Army toxicity clearance and safety confirmation for this product, including health and exposure considerations, are listed in paragraph 3.2.

6.2. BASF Spraytite System 158 and Diathon Acrylic Elastomeric Waterproof Coating. Spraytite 158 is a closed-cell, liquid, two-component, non-fibrous polyurethane foam that includes an isocyanate and a resin. The isocyanate is a mixture of diphenylmethan-4,4′–diisocyanate (MDI), MDI mixed isomers, and polymethylene polyphenyl isocyanate (P-MDI). The Part B resin of Spraytite 158 is a mixture of 2-dimethylmethanol, 1,1,1,3,3-pentafluoropropane, dipropylene glycol, and an unidentified polyol, flame retardant, surfactant, and catalyst. Diathon waterproofing is also a two-component coating composed of a basecoat and a white topcoat. The majority of the ingredients in both the basecoat and topcoat are dry powders. The acrylic polymer in the topcoat contains aqua ammonia. The Spraytite insulation system can be sprayed with the Diathon elastomeric acrylic coating. The Army toxicity clearance for these products, including health and exposure considerations, is listed in paragraph 3.2. Joint Contracting Command - Iraq (JCC-I) has posted an advisory that both products are offered by the Abkarr Corporation, Baghdad, Iraq.

6.3. BASF Spraytite System 158 and Neogard Terrastrong Acrylic Coating 7261. Information on the Spraytite System 158 is in paragraph 6.2. Neogard 7261 is a high-solids, fire retardant, quick-set elastomeric acrylic latex coating that can be sprayed over the cured Spraytite 158 foam to improve weatherability. The Army toxicity clearance letter for these products, including health and exposure considerations, is listed in paragraph 3.2. JCC-I has posted an advisory that these products are available through Honeywell International.

6.4. BaySystems Bayseal 2.0 Foam System, BaySystems Evercoat 500 Acrylic Coating, and Diathon Acrylic Coating System. Bayseal 2.0 is identified as a non-ozone-depleting, closed-cell spray, polyurethane foam consisting of an aromatic isocyanate and a polyol system. The aromatic isocyanate is a mix of diphenylmethan-4,4′–diisocyanate (MDI), MDI mixed isomers, and polymeric diphenylmethane diisocyanate (pMDI). Evercoat 500 is a single component, water-based acrylic coating. The majority of the ingredients in the final product are dry powders; however, the acrylic coating contains 2,4,5,6-1,3-benzenedicarbonitrile, which is highly toxic when inhaled. The Army toxicity clearance letter for these products, including health and exposure considerations, is listed in paragraph 3.2. JCC-I has posted an advisory that these products are offered by Honeywell International.
7. Preparations for Spray-Foam Application by Contractors.

7.1. Verify that the structure to be insulated meets the fire separation requirements of ETL 09-4, *Fire Protection Engineering Criteria – Expeditionary and Force Projection Operational Theaters*. Relocate structures as necessary.

7.2. Build weather vestibules for each entrance/exit door. Ensure every structure is provided with the required number of entrance/exit doors (at least two) and that they are properly located in the structure as specified in ETL 09-4.

7.3. Dig a trench approximately 4 inches (100 millimeters) deep around each structure. Ensure that spray-foam is extended below grade level and the dirt/gravel is pushed back against the side of each structure after the coating cures. Applying foam over sandbags that are against the structure does not satisfy this requirement; sandbags should be removed and a trench should be dug, filled in, and the sandbags replaced. SWA huts (or similar plywood structures) benefit greatly from foam. Add a “skirt” to enclose the opening that typically exists 2 feet (0.6 meter) below floor level; this skirt must extend 4 inches (100 millimeters) below ground level to allow foaming below ground level. A vestibule on this structure is also recommended.

7.4. Disconnect all electrical power to the structure. Relocate electrical outlets and lighting as necessary to prevent contact with the interior wall and ceiling surfaces after foam application.

**Note:** The weight of the non-cured foam may move fabric and other flexible surfaces. Verify that the relocated electrical outlets and lighting remain out of contact with interior wall and ceiling surfaces after the foam has cured and before occupancy.

7.5. Remove all heat-generating appliances from the structure.

7.6. Install a zero clearance-rated vent-stack if heat-generating appliances that use combustible fuels will be utilized after applying the foam insulation. Sufficient external supply air is also required when using such appliances; this will ensure occupants are not injured by exposure to carbon monoxide (CO).

**Note:** Applying foam insulation significantly decreases air leakage in the structure but significantly increases the risk of CO poisoning when combustible fuel-fired appliances are in operation.

7.7. Complete necessary modifications to the ECU and install additional equipment needed to provide sufficient fresh-air ventilation as detailed in paragraph 8.

7.8. Repair or replace any torn or damaged surfaces on the structure.
7.9. Cover permanent windows with sheathing material to protect against overspray of foam insulation. If permanent windows are to be provided in tents, they should be installed before applying the spray foam.

7.10. Cover exterior supply and return air flexible ducts with sheathing material to protect against overspray of foam insulation.

**Note:** Spray foam may physically and/or chemically alter the flexible duct performance.

7.11. Establish limited access zones and ensure that during spraying operations personnel are not inadvertently exposed to the mists or vapors associated with the spraying operations. No unauthorized personnel should be permitted within 150 feet (45 meters) of the work area. Expand the limited access zone downwind as far as necessary to ensure personnel without protective equipment are not exposed to the mists and vapors. Erect windbreaks, as required, to confine the spray-mist within the work zone. Maintain these limited access zones until the foam and protective coating applications are fully cured, no less than 24 hours after foam application is complete.

8. **Modifications to ECU, Ventilation Air, and Operational Requirements.**

8.1. Foam insulation reduces the infiltration of fresh (ventilation) air which can lead to reduced IAQ and the buildup of contaminants. Modify the ECU to provide for the introduction of ventilation air and to allow for pressure relief (exhaust) air from the structure. Ventilation air must be continuously supplied and conditioned to reduce its sensible and latent loads. This can be accomplished by passing the ventilation air through an air-to-air energy recovery ventilator (ERV) that captures up to 50 percent of the energy (sensible and latent heat) from the pressure relief (exhaust) air stream. The ERV must be sized and balanced to supply approximately 10 cubic feet per minute (cfm) per person of ventilation air for the expected occupancy. Install a passive ERV (without internal fans) as shown in Figure 2.
8.2. Foam insulation will reduce the thermal load of the structure by more than 50 percent, resulting in the ECU being oversized. This will reduce the ECU’s run time and cause short-cycling and additional wear and tear. Units that are too large can actually over-cool a structure and reduce potential energy savings. Consequently, it is recommended that the number of ECUs serving a structure be reduced by half, or where one ECU serves one structure, the air distribution system be modified so one ECU serves two structures. This can be accomplished by:

8.2.1. Extending or connecting the air distribution ducts when one ECU is removed from a structure served by multiple units.

8.2.2. Installing galvanized metal tees with locking balance dampers in the supply and return flex ducts. This will balance air flow when one ECU serves two structures.

8.3. Operation of ECU.

8.3.1. The ECU must operate with the supply air fan running continuously. Set the thermostat to cycle the compressor as needed to meet the thermal load. This will ensure a positive flow of ventilation air into the structure.

8.3.2. When a combustion-type heater is installed and operated in the structure, reduce the amount of pressure relief air (exhaust) from the ERV to ensure proper draft is maintained by the combustion heater. This is accomplished by partially closing the damper on the ERV relief air (exhaust) duct.
9. Additional Health and Safety Considerations. In addition to the potential physical irritants noted in the Army toxicity clearance letters, commanders are advised of the following additional health and safety considerations.

9.1. The foam insulation and protective coating must be allowed to fully cure before personnel are permitted to occupy the insulated structures. Wait at least 24 hours after foam application is complete before allowing occupancy of the newly foamed shelters.

9.2. Prior to contractor installation, ensure containers of foam components are not exposed to direct sunlight and kept away from caustic solutions, tertiary ammonia compounds, and water.

Note: Uncured foam components contain volatile ingredients and dangerous pressures may develop over time.

9.3. The contractor should not be permitted to install spray foam at a thickness of greater than 2 inches (50 millimeters) in a single application (including allowing the application to cure). Otherwise, the fast exothermic reaction of the curing process can cause excessive heat buildup that may scorch or ignite the spray foam.

9.4. Excess, non-cured foam and protective coating components shall be disposed of as specified by the manufacturer. Generally, this includes incineration within an authorized facility. Liquid components shall not be permitted to migrate into ground water by unauthorized disposal. The installing contractor shall not be permitted to abandon any excess materials for subsequent disposal by military personnel.

9.5. Building codes normally require that a building provided with insulating foam have an interior surface that provides at least 15 minutes of fire resistance (e.g., 0.5-inch [12-millimeter] gypsum board). Many temporary structures at expeditionary bases are not provided with an interior surface meeting this requirement. Consequently, the interior surface requirement is uniformly exempted for all temporary structures when:

9.5.1. The structure is provided with an intact interior surface that prevents direct personal contact with the cured, spray-on foam insulation;

9.5.2. The foam insulation has been installed in accordance with the requirements in this ETL.

9.6. Wireless fire detection systems shall be provided in the structures in accordance with ETL 09-4, paragraph 8.2.3.2. Additionally, when the detection system does not report to a constantly attended location, the wireless fire detection systems in each fire separation configuration/grouping (as defined in ETL 09-4, paragraph 7.1.1) shall be interconnected so that a fire alarm in any one structure causes a fire alarm in all
other structures in that configuration/grouping (in accordance with ETL 09-4, paragraph 10.9.4.3).

9.7. Hot work is not authorized within any structure after installation of foam insulation.

9.8. Smoking is not authorized within foam-insulated structures.

9.9. Heat-generating appliances using combustible fuels are permitted within foam-insulated structures if a zero clearance-rated vent stack is provided, adequate combustion air is supplied, and the appliance complies with the requirements of AFPAM 91-216, *USAF Safety Deployment and Contingency Pamphlet*. Electrically powered heat-generating appliances may be used within the limits specified in AFOSH 91-501, *Air Force Consolidated Occupational Safety Standard*, and AFPAM 91-216.

9.10. Request an on-site survey from the lead preventive medicine organization to evaluate the effectiveness of the ventilation system and to verify the air exchange rate is adequate for long-term occupancy.

9.11. The spray-on foam insulation post-application safety inspection checklist (Attachment 1) shall be completed for each spray foam-coated structure prior to use/occupancy. Inspection shall not be conducted until the foam has cured. Any deficiencies shall be corrected prior to use/occupancy.

**10. Disposal of Foam-Insulated Structures.** Commanders shall ensure that the appropriate base operating support provider evaluates the solid wastes generated by disposal of any structure provided with foam insulation as authorized by this ETL. Solid wastes so generated shall be disposed of in compliance with applicable host nation environmental laws or DOD environmental regulations, or shall be returned to US territory for appropriate disposal.

**11. Point of Contact.** Recommendations for improvements to this ETL are encouraged and should be furnished to the Expeditionary Engineering Branch, HQ AFCESA/CEXX, 139 Barnes Drive, Suite 1, Tyndall AFB, FL 32403-5319, DSN 523-6995, email AFCESAResearchCenter@tyndall.af.mil.

LESLIE C. MARTIN, Colonel, USAF  
Chief, Operations and Programs Support Division  

2 Atchs  
1. Spray-On Foam Insulation  
   Post-Application Safety  
   Inspection Checklist  
2. Distribution List
SPRAY-ON FOAM INSULATION
POST-APPLICATION SAFETY INSPECTION CHECKLIST

1. Does the separation between spray foam-insulated structures meet or exceed the requirements in ETL 09-4, Fire Protection Engineering Criteria – Expeditionary and Force Projection Operational Theaters, paragraph 7.1? Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

2. Are a minimum of two egress points available in sleeping tents? Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

3. Do the egress features meet or exceed the requirements in ETL 09-4, paragraph 7.4.2.1? Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

4. Are egress points unobstructed? Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

5. Do door closure devices hamper opening of door in the event of fire? Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

6. Are all smoke detectors/alarms installed and operational per ETL 09-4? Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________
7. Is a fire evacuation plan posted and visible within the structure?  

Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

8. Confirm the proper use or routing of the following:

a. Are electrical outlets away from walls?  

Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

b. Are electrical cords free of cuts and scrapes, appropriately sized, and protected from metal/sharp edges?  

Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

c. Are electrical cords cool (not warm) to the touch?  

Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

d. Are electrical devices such as printers, copiers, and other heat-producing appliances at least 6 inches from walls?  

Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________

e. Are light bulbs shielded and spaced far enough from foam that foam is cool to the touch?  

Yes ☐ / No ☐

Deficiency: ______________________________________________________________

Corrective Action: _________________________________________________________
f. Is conduit or shielded cable used everywhere wiring penetrates or touches foam?
   Yes ☐ / No ☐

   Deficiency: ________________________________________________________

   Corrective Action: _______________________________________________________

9. Has the HVAC unit been modified to allow for intake of fresh air as required by ETL 09-18, *External Foam Installation of Temporary Structures?*
   Yes ☐ / No ☐

   Deficiency: _____________________________________________________________

   Corrective Action: _________________________________________________________

INSTALLATION: __________________________________________________________________

STRUCTURE IDENTIFICATION: _______________________________________________________

STRUCTURE USE: __________________________________________________________________

STRUCTURE LOCATION: ____________________________________________________________

POST-APPLICATION INSPECTION CONDUCTED BY: _______________________________________

Signature: ________________________________________________ Date: ___________________

CORRECTIVE ACTION COMPLETED AND VERIFIED BY: _________________________________

Signature: ________________________________________________ Date: ___________________

APPROVING REVIEWER: ____________________________________________________________

Signature: ________________________________________________ Date: ___________________
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