DEPARTMENT OF THE ARMY
UNITED STATES ARMY COMBAT READINESS/SAFETY CENTER
FORT RUCKER ALABAMA 36362-5363

CSSC-CG 8 September 2008

MEMORANDUM THRU Deputy Chief of Staff, CJ 1/4/8, Multi-National Force-Iraq, Baghdad, Iraq APO AE 09342-1400

FOR Commander, Multi-National Force-IRAQ, Baghdad, Iraq APO AE 09342-1400

SUBJECT: Assessment of Electrical Hazards in Operation Iraqi Freedom (OIF)

References (a) AR 385-10, US Army Safety Program, 23 May 2008
(b) FM 5-19, Composite Risk Management, 21 August 2006
(c) Risk Management Information System (RMIS)

1. Purpose. Identify and assess electrical hazards in the Iraq Theater of Operations (ITO) and recommend corrective actions to reduce associated risks to the lowest possible level.

2. Background.

a. At the request of the Commander, Multi-National Force-IRAQ, the Commander of the U.S. Army Combat Readiness/Safety Center (USACRC) deployed a safety team to conduct an independent assessment of the electrical hazards in the ITO. The team also assisted MNF-I in the development of interim and long range courses of action designed to mitigate electrical risk to the lowest possible level.

b. The USACRC assessment team consisted of six personnel with expertise in the areas of command climate, safety programs, and electrical infrastructure. The USACRC developed observations and recommendations through a series of sensing sessions and interviews with key Leaders, Soldiers, and Civilians as well as the assessment of a random sampling of more than 30 billeting, recreational, office, and dining facilities.

c. The USACRC team arrived in theater on 5 August 2008, and proceeded to Forward Operating Base (FOB) Loyalty on 7 August and then to Joint Security Site (JSS) Babel on 8 August. The master electrician and the power generation subject matter experts (SME) evaluated electrical and power generation services. While at these locations, the team also conducted sensing sessions, interviews and facility assessments. On 9 August, the team traveled to Victory Base Complex and then proceeded to Contingency Operating Base (COB) Liberty where they conducted similar assessments.

ENCLOSURE 4

d. The team also interviewed representatives from the Defense Contract Management Agency (DCMA), local safety and electrical experts, Task Force SAFE (Safety Actions for Fire and Electricity) personnel, and conducted a review of contract instruments, and other applicable publications and records.

e. As a result of the assessments, the team concluded that electrical hazards are similar and widespread throughout the ITO.

3. Analysis and Observations. The USACRC team concluded widespread use of uncertified electrical devices, inconsistent enforcement of any standard, inconsistent and inadequate standards for using electrical devices, incomplete application of electrical codes, and lack of thorough contractor oversight result in unmitigated electrical-related hazards throughout the OIF theater. The assessment focused on three major areas: electrical systems (facilities), human factors and materiel, and tactical. The resulting Composite Risk Management worksheet (CRM) is at Annex A, which is a graphic summary of the team's overall assessment. Annex B is a Risk Assessment Matrix that provides definitions for risk levels, probability of occurrence, and severity of injury or damage used for this assessment. Annex C contains photographs supporting the team's assessment, and Annex D contains the survey questions used to guide the sensing sessions and interviews. Annex E contains the briefing for the overall assessment commanders and leaders can use in the development of a theater-wide awareness and corrective action campaign.

a. Electrical Systems Safety (Facilities). (Annex C, Figures 1-12) Varying electrical codes and standards have resulted in many instances of improper grounding and bonding. The team determined the lack of proper bonding is the most pervasive fault. The team also determined use of Ground Fault Circuit Interrupters (GFCI), required when electrical circuits are in proximity to water sources like shower and latrine facilities, is patchy at best. Improper grounding, improper bonding, and inconsistent use of GFCI circuit breakers can lead to electrocution when a ground fault occurs in the system and a human being comes into contact with that circuit. Based upon past accident statistics, the team assessed the probability of this event occurring as SELDOM, but when the event does occur, it is often with CATASTROPHIC results. Therefore, the team assessed the present risk level as HIGH. To mitigate the risk, one clear, common set of electrical codes must be developed, implemented, and enforced. This will require the modification of contracts as well as training of the appropriate personnel on the application of the code. Invigorating contractor quality control and employing a Government Quality Assurance team to ensure the contractors meet the theater codes and standards for safe electrical work would be a positive first step. With these controls in place, the probability of occurrence becomes UNLIKELY resulting in a risk of MODERATE. In the rare or remote event that an electrocution would occur, the effect would still be CATASTROPHIC; therefore, a principal objective should be to apply procedures to reduce the probability of occurrence.

b. Human Factor and Materiel Safety (Annex C, Figures 13-25).

(1) The team noted that overloaded circuits and makeshift electrical repairs are prevalent in the assessed locations and these conditions have resulted in numerous fires and nonlethal shocks; therefore, the team assessed the probability of this occurring as LIKELY with a severity of CRITICAL. This assessment is based on the fact electrically induced fires have severely damaged or destroyed major facilities. The team determined the reason for this condition is that there is no clearly enforceable standard available across the command. Routine electrical use and fire safety inspections based on the new standard should become the norm. Leaders must check to verify compliance. The team concluded implementing and enforcing these controls reduces the probability of occurrence to SELDOM, resulting in residual MODERATE risk.

(2) The team found uncertified electrical devices are the main source of electrical shock and electrically induced fires. Local vendors are providing many of these uncertified devices. With the plethora of uncertified electrical devices in use throughout the ITO, the team assessed the probability of fire and shock occurring as FREQUENT resulting in a risk level of EXTREMELY HIGH. An aggressive and closely supervised program of replacing uncertified electrical devices with approved devices such as power strips and adapters would be a positive step in reducing overall risk. Full implementation of this control would reduce the probability of occurrence to SELDOM, thus making the residual risk MODERATE.

(3) The team noticed that cluttered and unkempt housekeeping is prevalent across the locations they visited. These conditions exacerbate fire hazards in living quarters. The team found ammunition, dirty laundry, and other combustibles touching or in close proximity to potential electrical fire sources creating unnecessary risk. These factors, coupled with the attachment of uncertified power strips to beds and extension cords routed under mattresses can result in all manner of fire hazards. Therefore, the team assessed the resultant risk as HIGH based upon the probability of occurrence and potential severity of personnel injury or facility damage. Developing, implementing, and supervising basic housekeeping through routine health and welfare would go a long way to reduce the affect of this hazard. If leaders aggressively execute these controls, the probability of occurrence could become UNLIKELY, with the residual risk assessed as LOW.

c. Tactical Safety (Annex C, Figure 26 – 29).

(1) The team noted low hanging and exposed wires have caused eight electrocutions in the ITO. While the team did not monitor an actual combat operation, they have no reason to expect units have mitigated the risk associated with this hazard. Because of these data, the team assessed the risk of electrocution while conducting combat operations HIGH. Developing, training, and implementing effective tactics, techniques, and procedures (TTPs) would reduce the overall risk.

(2) The team noted locally produced wire strike prevention measures on many MRAP vehicles (PVC pipe wire deflectors). With these controls as well as the above TTP's, the resultant risk of electrocution could be reduced to a MODERATE level.

4. Recommendations.

a. Electrical Systems Safety (Facilities).

(1) Develop one common set of electrical codes, National Electric Code (NEC) or equivalent.

(2) Modify contracts to require contractors to perform electrical work to the established codes.

(3) Ensure appropriate oversight is provided in the way of quality control to ensure work is performed to code.

(4) Establish a Government Quality Assurance team to provide government oversight for contractors performing electrical work.

b. Human Factor and Materiel Safety.

(1) Develop, implement and enforce clear and achievable standards for electrical use.

(2) Conduct routine electrical use and fire safety inspections.

(3) Eliminate all uncertified electrical equipment and procure certified electrical devices for operational use. Ensure sufficient quantities of properly certified electrical equipment is available for Soldier purchase and use.

(4) Develop, implement, and enforce fire safety standards through routine health and welfare inspections.

(5) Ensure leaders strictly enforce compliance with established electrical use and fire safety standards.

c. Tactical Safety.

(1) Develop, implement, enforce, train and rehearse TTPs to deal with the possibility of contact with energized power lines.

(2) Coordinate, through LARs, with the appropriate equipment PMs to develop effective wire strike prevention devices for military vehicles operating in the ITO.

d. General recommendations:

(1) Develop and implement a theater wide multi-media electrical use and fire safety campaign.

(2) Establish a theater wide policy for proper storage of basic load ammunition in Soldier living areas.

5. Point of Contact. COL (b)(3), (b)(6) at (b)(3), (b)(6) @conus.army.mil DSN (b)(6) (b)(6) COM (b)(6)

6. Information contained in this report is to be used for accident prevention purposes only.

FOR THE COMMANDER:

//s//
(b)(3),(b)(6)
COL, FA
Deputy Commander

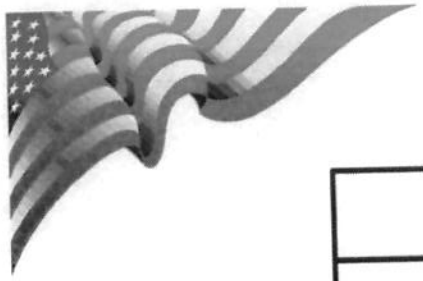
Annexes:
A – CRM Worksheet
B – Risk Management Matrix
C – Figures Supporting CRM Assessment
D – Survey Questions
E – Assessment Briefing

DISTRIBUTION:
ADDRESSEE

CRM Assessment– Electrical/Fire Hazards

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Identify Hazards	Assess Hazards	Initial Risk	Develop Controls	Implement Controls	Supervise and Evaluate	Residual Risk
1. Var_in_ Standards 2. Grounding & Bonding 3. Lack of GFCI	Electrocution	R: High P: Seldom S: Catastrophic	One common Standard – NEC or equivalent	1. Modify Contracts 2. Contractor Training	1. Contractor Quality Control 2. Government Quality Assurance	R: Mod… P: Unlikely S: Cat…
4. Overloaded Circuits 5. Makeshift Repairs	Fire & Shock	R: High P: Likely S: Critical	D/I/E Electrical Use Standards	Electrical & Fire Safety Inspections	Leader Checks	R: Mod… P: Seldom S: Critical
6. Uncertified Electrical Devices	Fire & Shock	R: Ext High P: Frequent S: Critical	Procure Certified Equipment	Purge Uncertified Equipment	Leader Checks	R: Mod… P: Seldom S: Critical
7. Housekeeping	Fire	R: High P: Occasional S: Critical	D/I/E Fire Safety Standards	Health & Welfare Inspections	Leader Checks	R: Low P: Unlikely S: Critical
8. Low Hanging Wires 9. Exposed Wires	Electrocution	R: High P: Occasional S: Catastrophic	1. D/I/E TTPs 2. Engineered Wire Strike Prevention	1. Train & Reh.. TTPs 2. Conduct PCCs	Leader Checks	R: Mod… P: Unlikely S: Cat…

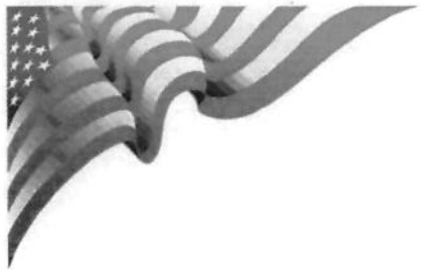


U.S. ARMY COMBAT READINESS/SAFETY CENTER

RISK ASSESSMENT MATRIX

Severity		Probability				
		Frequent A	Likely B	Occasional C	Seldom D	Unlikely E
Catastrophic	I	E	E	H	H	M
Critical	II	E	H	H	M	L
Marginal	III	H	M	M	L	L
Negligible	IV	M	L	L	L	L

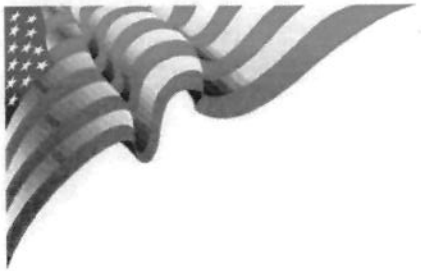
E – Extremely High H – High M – Moderate L – Low



U.S. ARMY COMBAT READINESS/SAFETY CENTER

Probability

- **Frequent** – Occurs very often, known to happen regularly
- **Likely** – Occurs several times, a common occurrence
- **Occasional** – Occurs sporadically, but is not uncommon
- **Seldom** – Remotely possible, could occur at some time. Usually several things must go wrong for it to happen
- **Unlikely** – Can assume will not occur, but not impossible.



U.S. ARMY COMBAT READINESS/SAFETY CENTER

Severity

- **Catastrophic**
  - Complete mission failure or the loss of ability to accomplish the mission
  - Death or permanent total disability
  - Loss of major or mission-critical systems or equipment
  - Major property or facility damage
  - Severe environmental damage
  - Mission-critical security failure
  - Unacceptable collateral damage
- **Critical**
  - Severely degraded mission capability or unit readiness
  - Permanent partial disability or temporary total disability exceeding three months time
  - Extensive major damage to equipment or systems
  - Significant damage to property or the environment
  - Security failure
  - Significant collateral damage
- **Marginal**
  - Degraded mission capability or unit readiness
  - Minor damage to equipment or systems, property, or the environment
  - Lost days due to injury or illness not exceeding three months
  - Minor damage to property or the environment
- **Negligible**
  - Little or no adverse impact on mission capability
  - First aid or minor medical treatment
  - Slight equipment or system damage, but fully functional or serviceable
  - Little or no property or environmental damage

SYSTEMS

Electrical Assessment:

FOB Loyalty

Mayors Cell Building 25 (Loyalty)

Panel 1-1 250a breaker. Wire sizing good. No ground electrode conductor. No GFI for water heater. The A/C equipment grounding conductor, which ran around the building daisy-chaining all units together, was 2.5mm. Inside building receptacle covers were missing and cracked. Outside circuits were not weather proof. There were splices outside not in an enclosure. Outdoor wiring was not secure.

Overall assessment is unsafe due to lack of effective ground fault path, unsafe wiring practices and damaged electrical equipment.

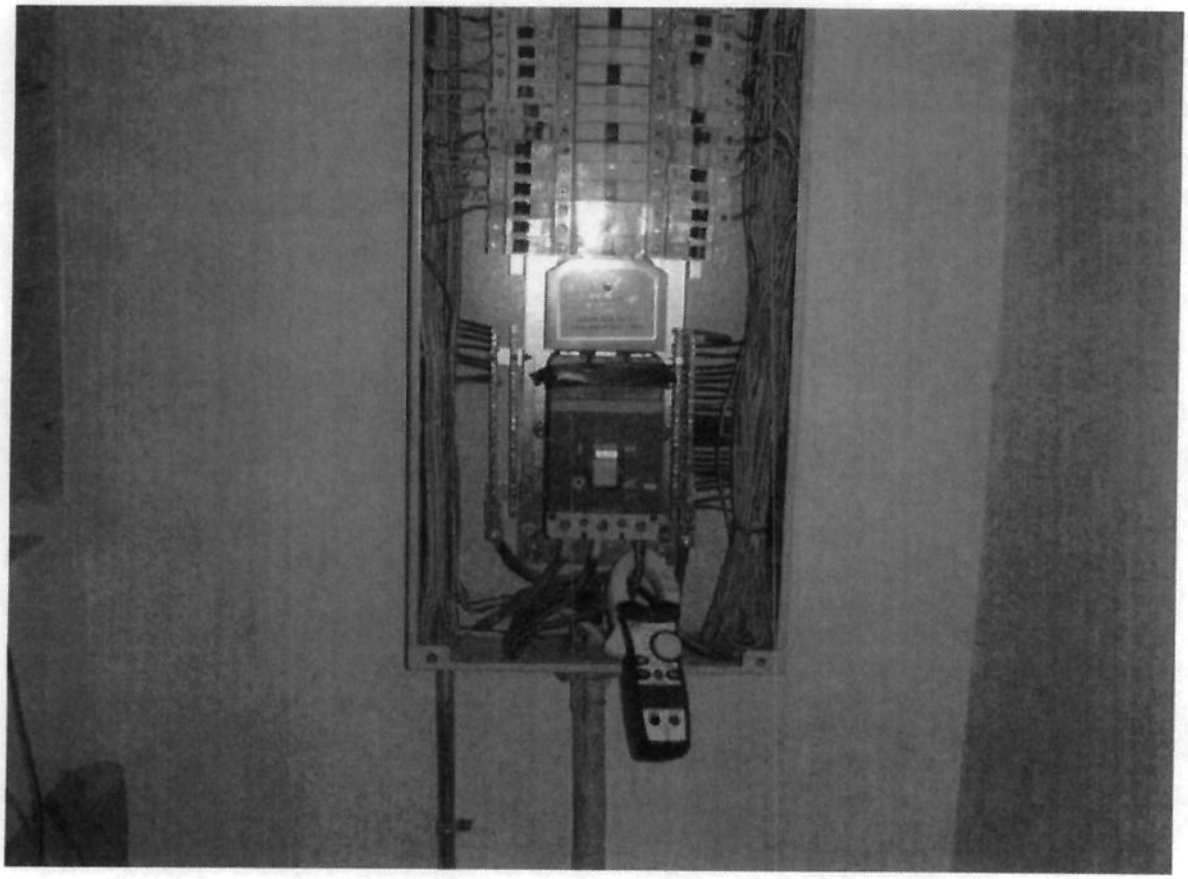


Figure 1 Mayors Cell Panel. Five wires coming in but no ground electrode conductor.

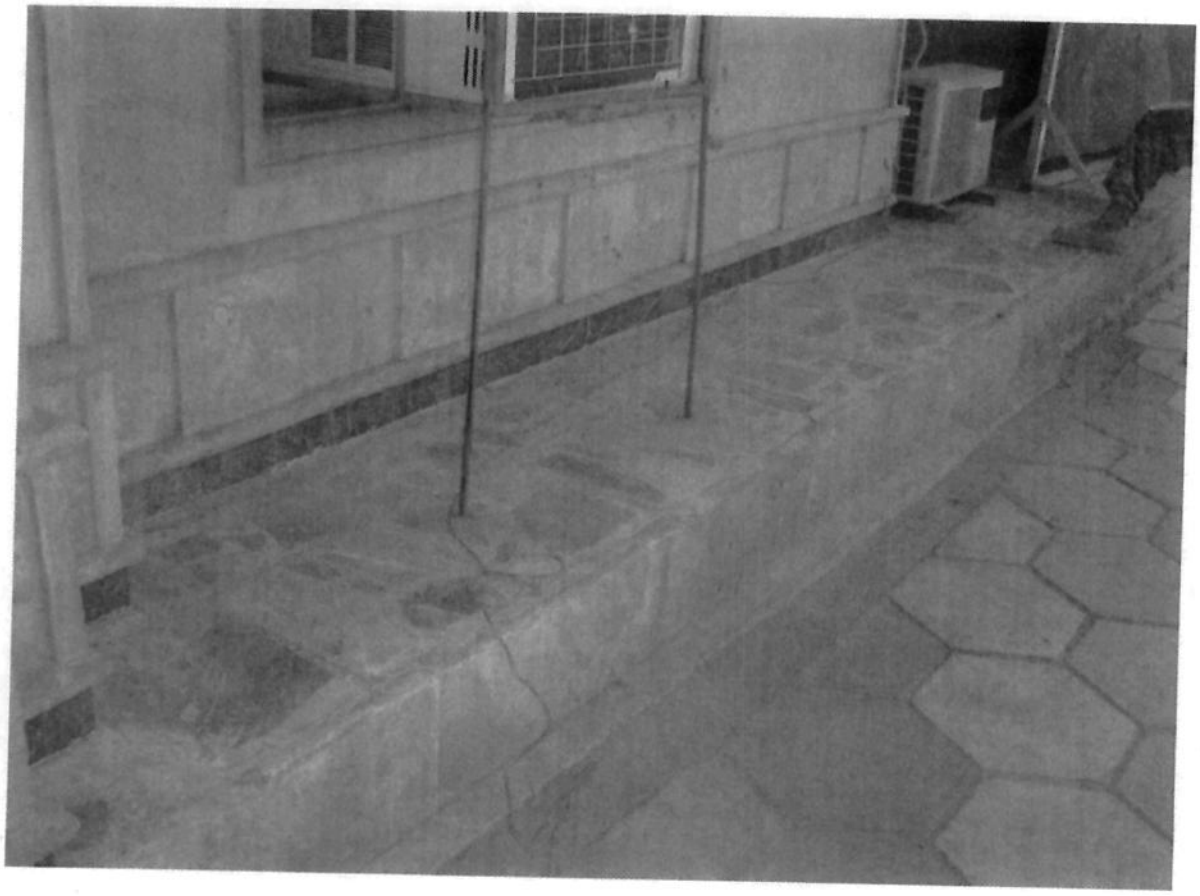


Figure 2 Mayors Cell. Equipment grounding conductor for A/C units daisy-chained and run on open ground.

BLDG 11 Living Quarters (Loyalty)

There was no grounding electrode conductor or equipment grounding conductor brought into the panel. The building piping and structural materials were not bonded to the ground system. There was no effective ground fault path.

Assessment: Not safe.

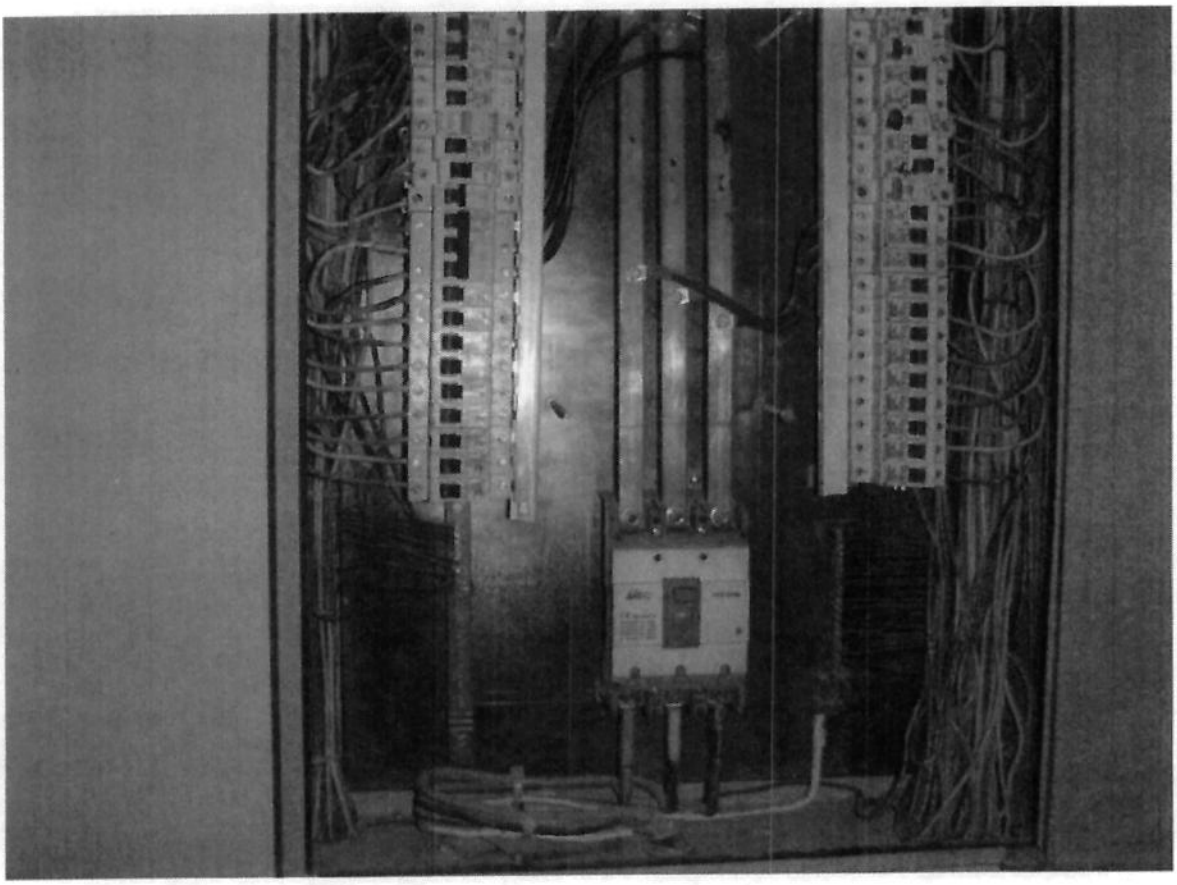


Figure 3 BLDG 11. Four wires coming in, no bonding of neutral to ground and no ground electrode conductor.

BLDG 34A Male Showers, 30A Male Latrine and Male Showers (Loyalty)

There was no equipment grounding conductor brought into the panel. The main breaker was GFCI. There was no effective ground fault path.

Assessment: Building has no effective ground fault current path.

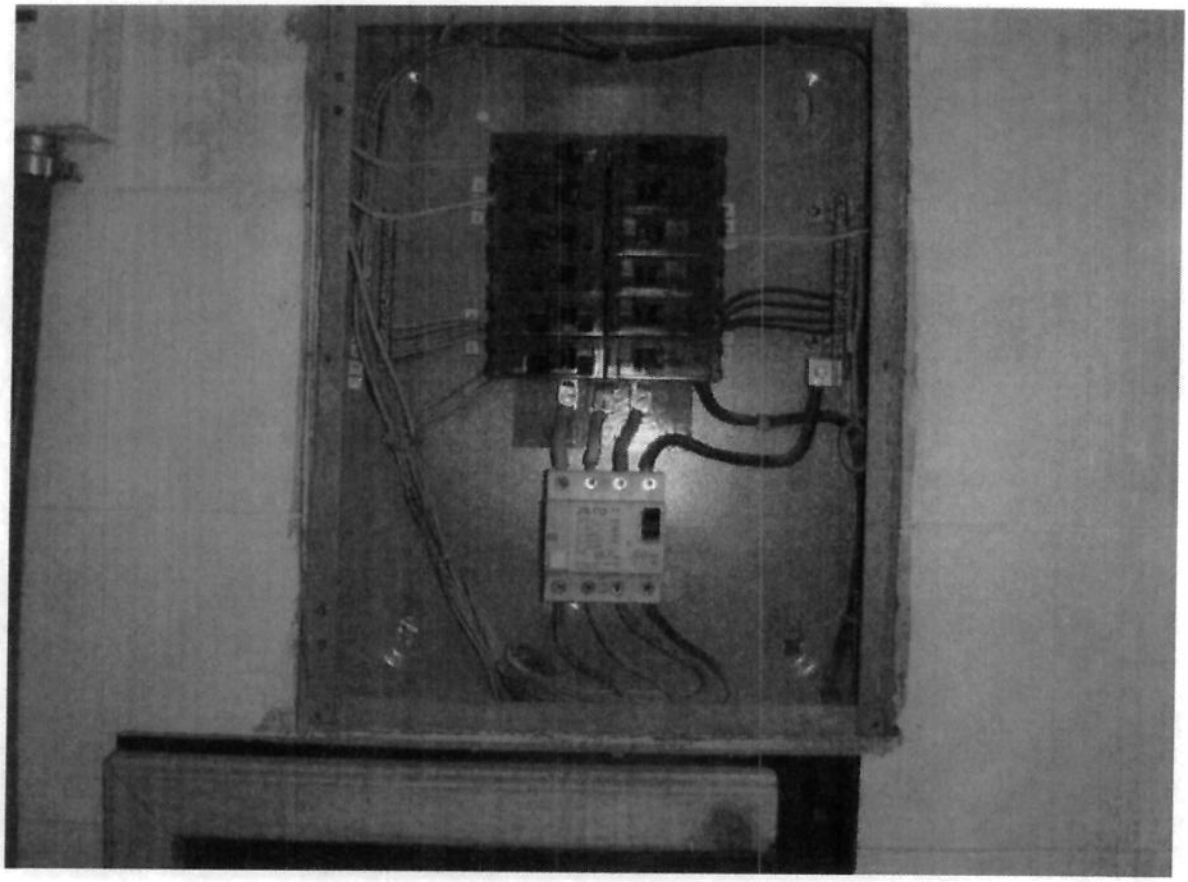


Figure 4 BLDG 34A Male Showers. Four wires brought into an RCCB (residual current circuit breaker) with no equipment grounding conductor or ground electrode conductor.

Building 2 Living Quarters (Loyalty)

Three panels in the building were assessed. There was no equipment grounding conductor or ground electrode conductor brought into the panel. The panels were not grounded and there was no effective ground fault path. There was no bonding of the piping or structural conductive materials.

Assessment: Building panels were not properly grounded; therefore, none of the electrical equipment was grounded. There was no effective ground fault path.

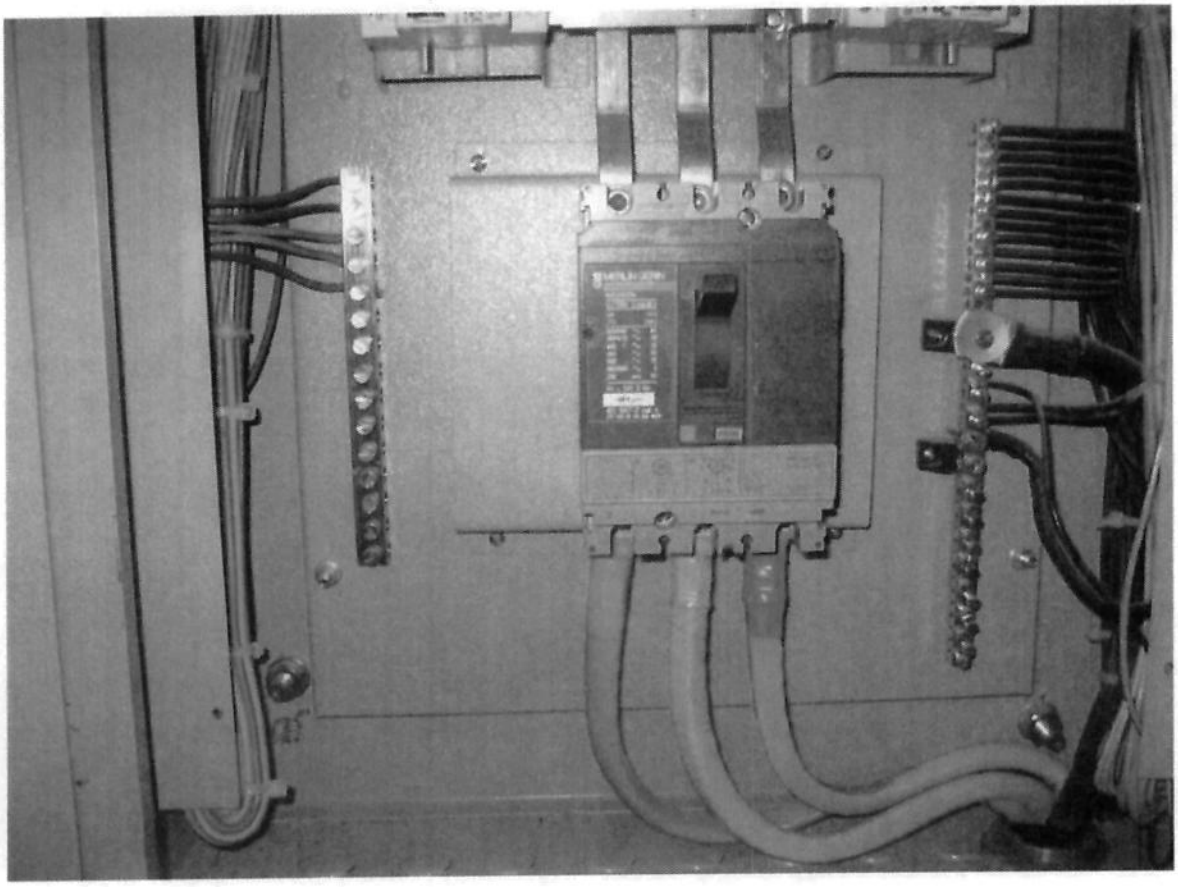


Figure 5 Bldg 2. There is no equipment grounding conductor or grounding electrode conductor, typical of panels in this building

DFAC (Loyalty)

Main disconnect panel outside used undersized wire on 60a breaker. System was bonded and grounded at the main disconnect and at the panels inside the building. Multiple bonding points (at main disconnect and sub panels) will result in parallel paths, neutral and equipment grounding conductor, returning to the main disconnects. Current on the equipment grounding conductor is unacceptable and can result in electrical shocks to personnel.

Loyalty Gym

Panel 1-1 There was no grounding electrode conductor or equipment ground conductor brought into the panel. There is no effective ground fault path for this circuit.

Assessment: the building is electrically unsafe.

Bldg 31 Generator Set (Loyalty)

Generator chassis was grounded with ground electrode. Generator distribution panel had no bond (ground to neutral).

BLDG 40 Living Quarters and Office Space (Loyalty)

We assessed the main distribution panels in the building. There were four wires coming in to the panels (three hots and a neutral) and no bond between the neutral and ground. There was no grounding electrode conductor or equipment grounding conductor brought into the panels from the source, the building had no effective ground fault path for a short to ground event.

Pool (Loyalty)

Assessed the main power panel and the pump control panel. There were four wires coming in to the power panel (three hots and a neutral) and no bond between the neutral and ground. There was no grounding electrode conductor or equipment grounding conductor brought into the panels from the source, the building had no effective ground fault path for a short to ground event. The control panel had numerous wires not terminated hanging loose in the cabinet.

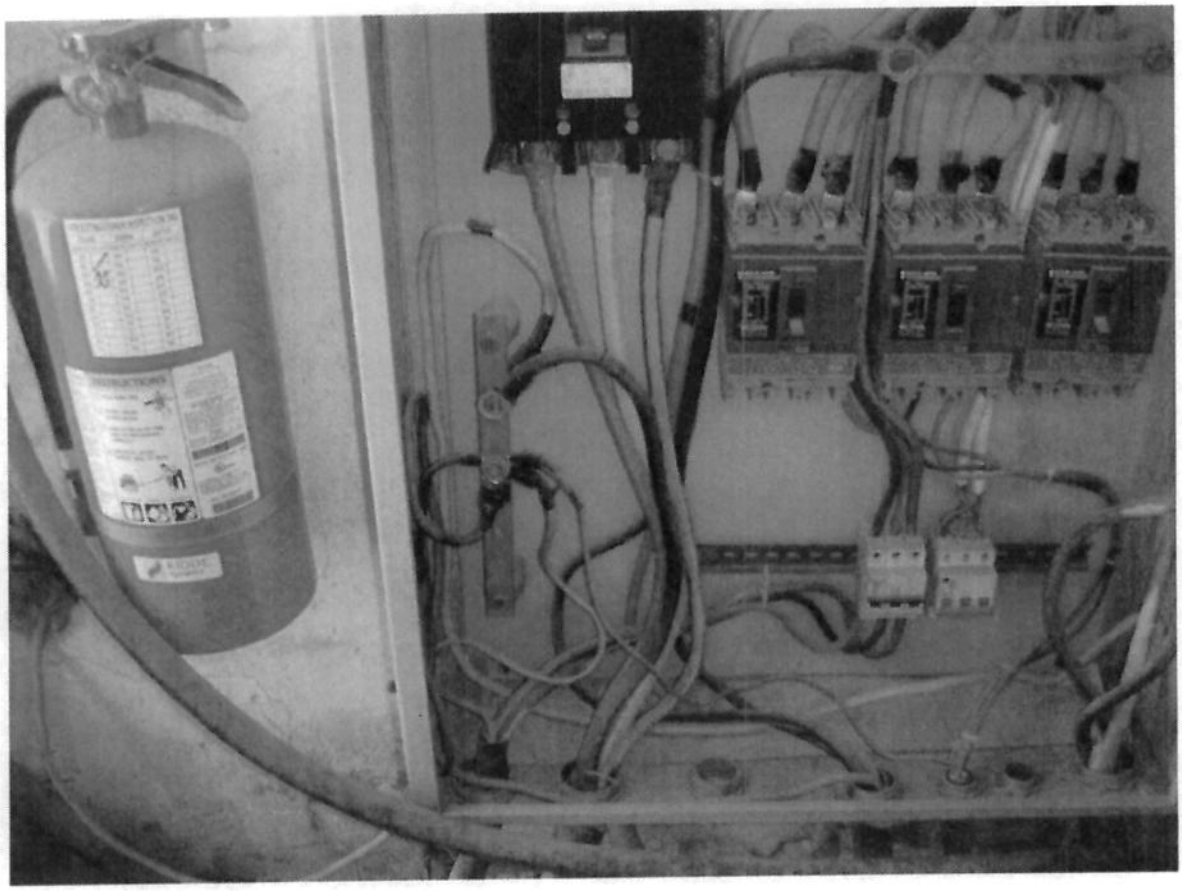


Figure 6 Pool Distribution panel (note four incoming wires on left and no ground bus).

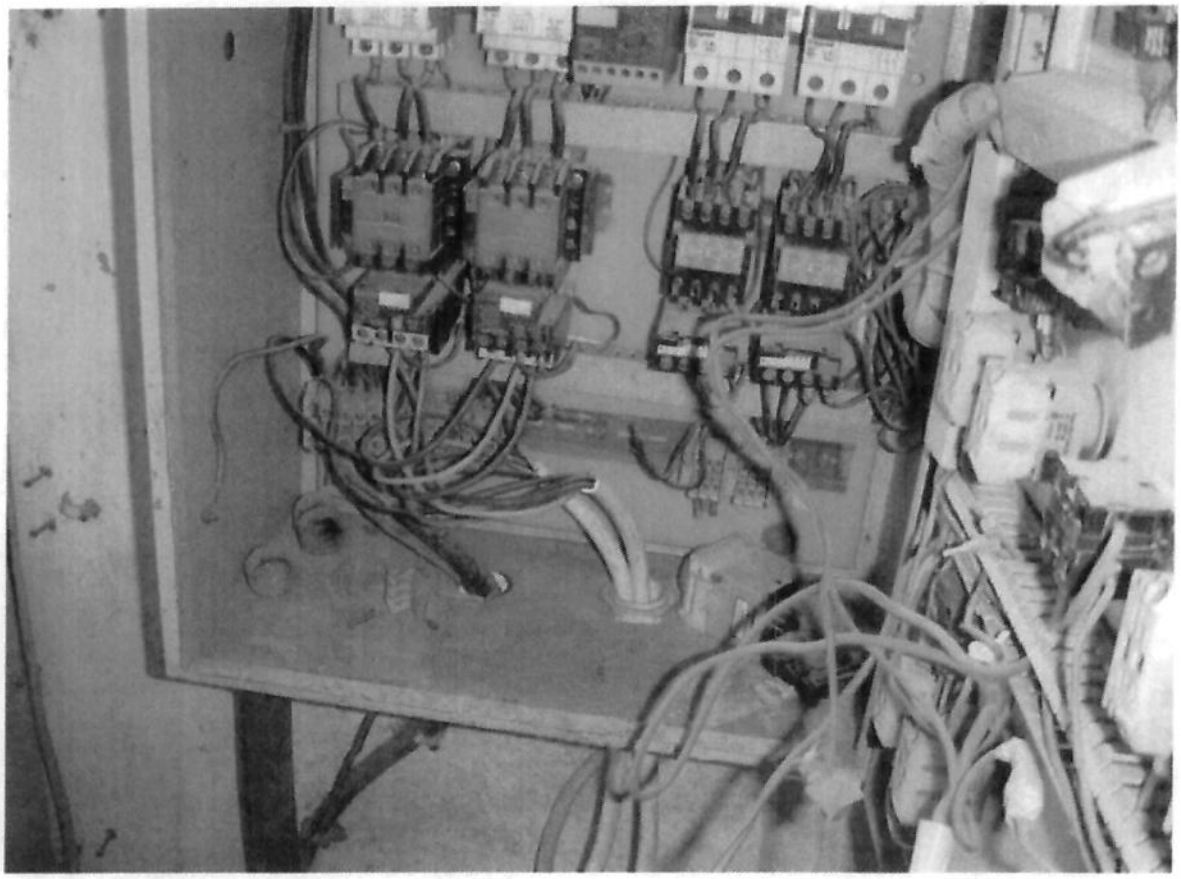


Figure 7 Pool pump control panel.

Laundry SDP (Loyalty)

There were four wires coming in from source with no equipment ground or ground electrode conductor. The shields on the outgoing cables were twisted and taped together and attached to the ground bus in this cabinet and the panel they went to, but there was no bond between ground and neutral anywhere in the system.

JSS Babel

Found three subpanels in the building. No equipment grounding conductor was run from the main disconnect to the subpanels. A grounding electrode conductor was run to one panel then series connected to the other two panels. One panel had an undersized bonding jumper from the equipment grounding bus to the neutral bus (see photo). There was current on the grounding electrode conductors going to the second and third subpanels, but no current on the conductor to the ground electrode. Live wires were hanging loose in the panel (disconnected source to wires and secured them). The connection between the grounding electrode and grounding electrode conductor was poor. The

conductor was wrapped around the electrode and the connection was then covered with tape. Outside connections were not weather proof. Connections were scabbed into the feeders and taped over.

Assessment: Electrical installation was unsafe.

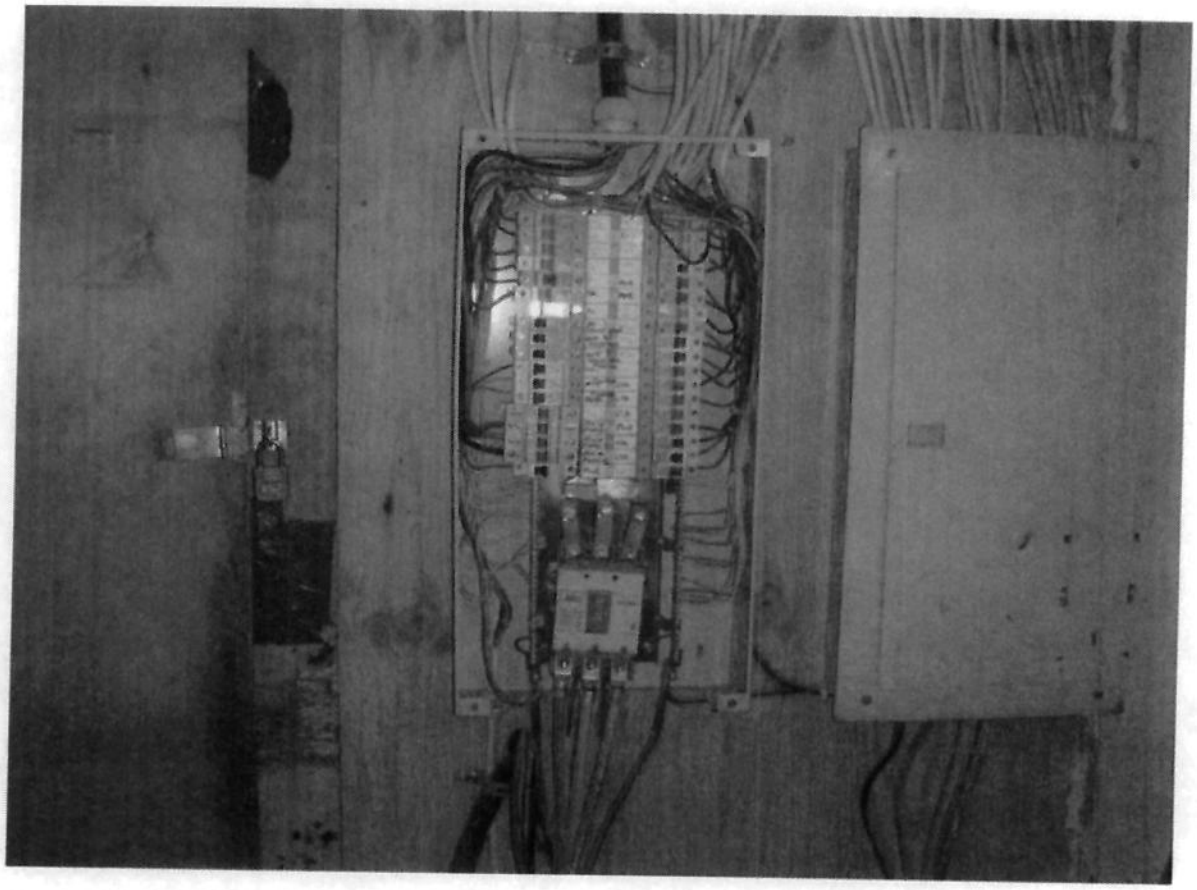


Figure 8 JSS Babel. No equipment grounding conductor and routing of ground electrode conductors carrying current.

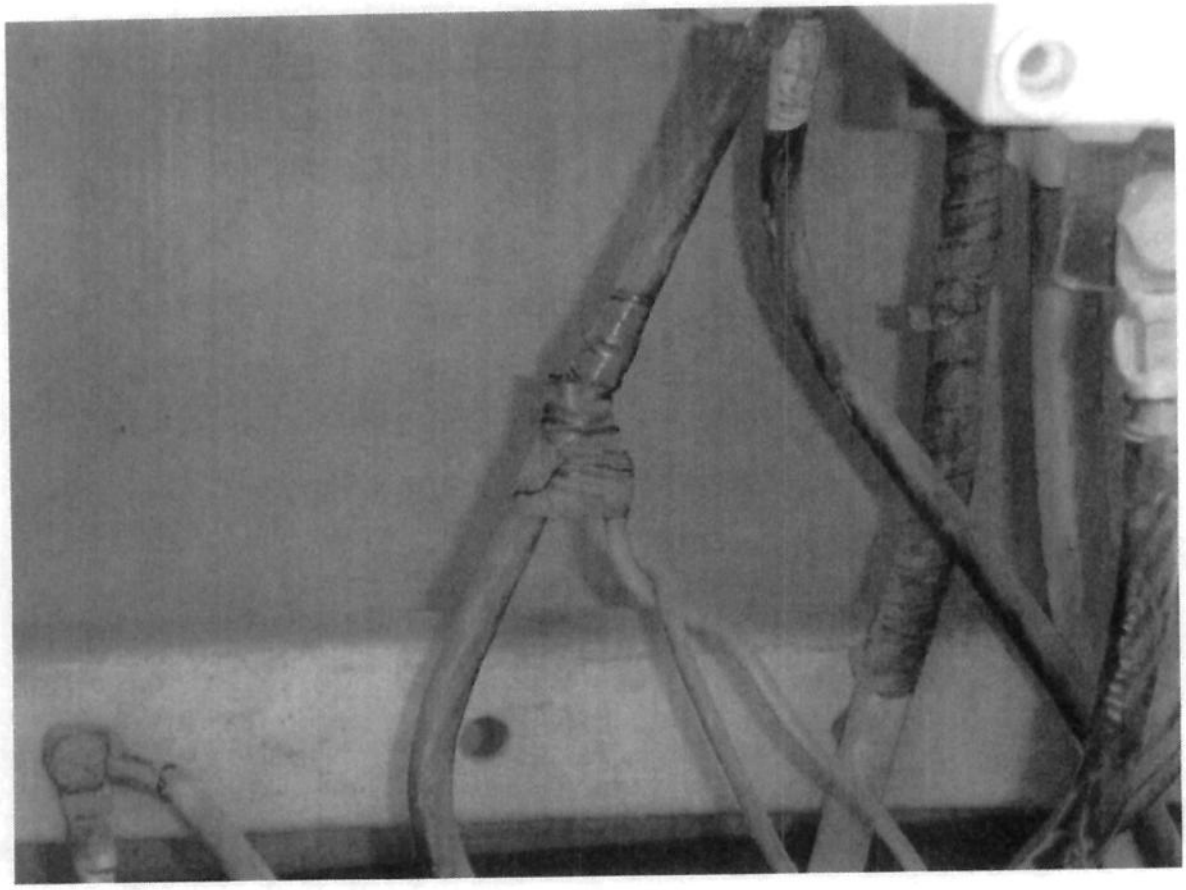


Figure 9 JSS Babel. Less than acceptable way to run power. Smaller conductors spliced (not even mechanically attached) to a feeder. There is no overload protection for this circuit.

Victory Base

Audie Murphie Main Disconnect Panel, Subpanel, LSA, Latrine and Shower

Main Disconnect Panel

The main disconnect panel had five conductors coming in from the generator. Three hots, a neutral and the ground (cable shield twisted, taped and bolted to the ground bus). The system used to feed from the generators to the LSA trailers uses the bond at the generator as the effective ground fault current path. I am not confident in the way the shield was used as the equipment grounding conductor because of the bond to the cabinets and the size of the shield after it was trimmed and twisted together to be attached to the ground bus in the cabinets.

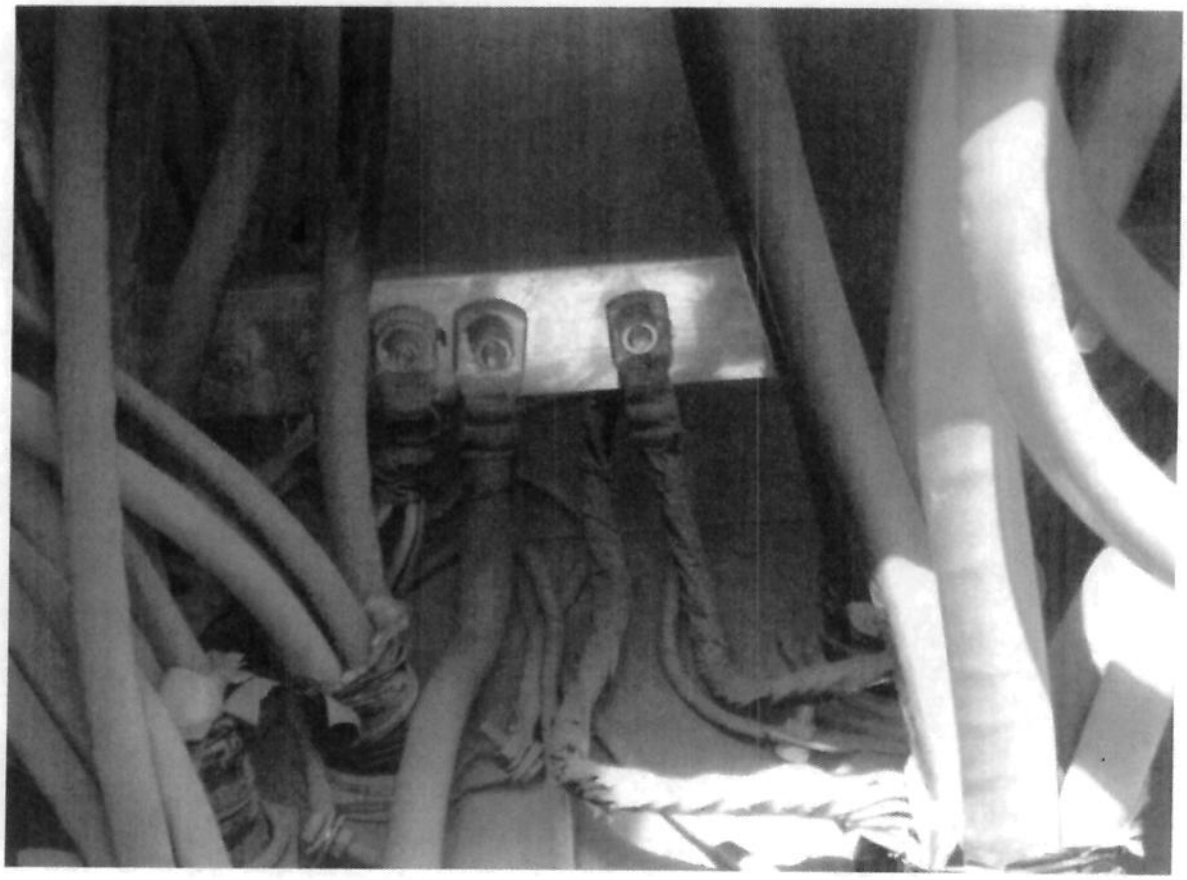


Figure 10 Main disconnect panel cable shields connected to the ground bus and used for equipment grounding conductor.

Subpanels

The subpanel feeder cable had five conductors in it including the shield which was used as the equipment grounding conductor. Cables leaving the subpanel also had five conductors (including the shield) run to the LSA, shower or latrine. There was no bond from neutral to ground in the main disconnect or subpanel. Wires running from the subpanel to the trailers exceeded the maximum distance allowed in NEC550.

LSA Showers/Latrines

There were five wires running from the subpanel to the latrine/shower facilities. The equipment ground wire running into the building was pulled out of the cable jacket and spiced to the ground electrode conductor outside of the building in a junction box. The main panel was fed by a GFCI breaker, there was a ground bus and neutral bus in the panels. Overall appearance of the panels was satisfactory.

The Omaha Beach LSA was setup the same way.

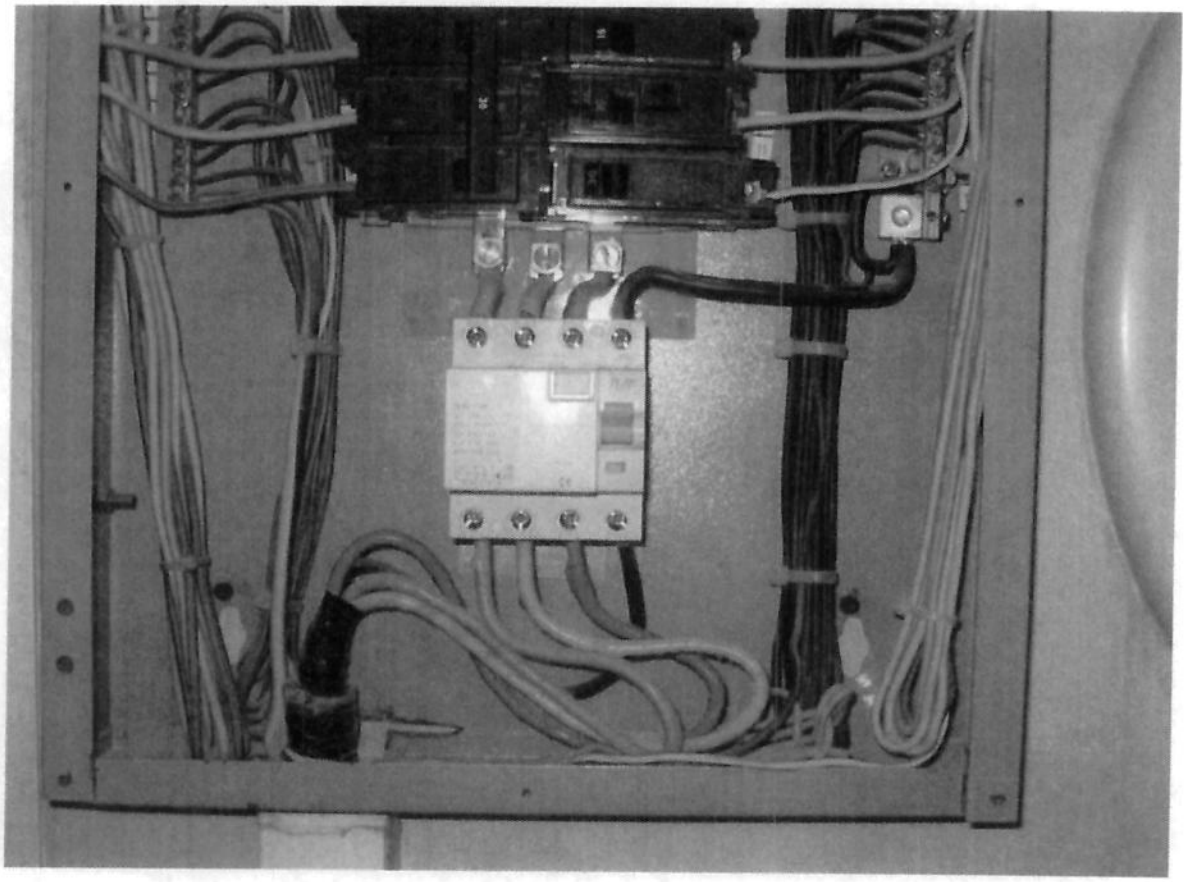


Figure 11 Typical shower trailer in the Audie Murphie LSA. Note only one ground conductor coming in (equipment ground conductor splice in small box on the outside of the trailer).

Band Bldg (VBC)

The band building was a pool converted into an office space and practice area. Found one breaker panel in the whole bldg. There must be another distribution panel feeding the multiple a/c units around the bldg. None of the breakers were marked (don't know which breaker feeds what). The hole in the wall the breakers were in was much too small for the breakers and wiring. There was card board and tape stuffed between the wires for insulation (assumption). The power feeding the breaker box was scabbed of the pool system main breaker (the system was not marked at all and this is my best guess). The pool power distribution system used only four incoming wires and did not appear to be bonded in the cabinet.

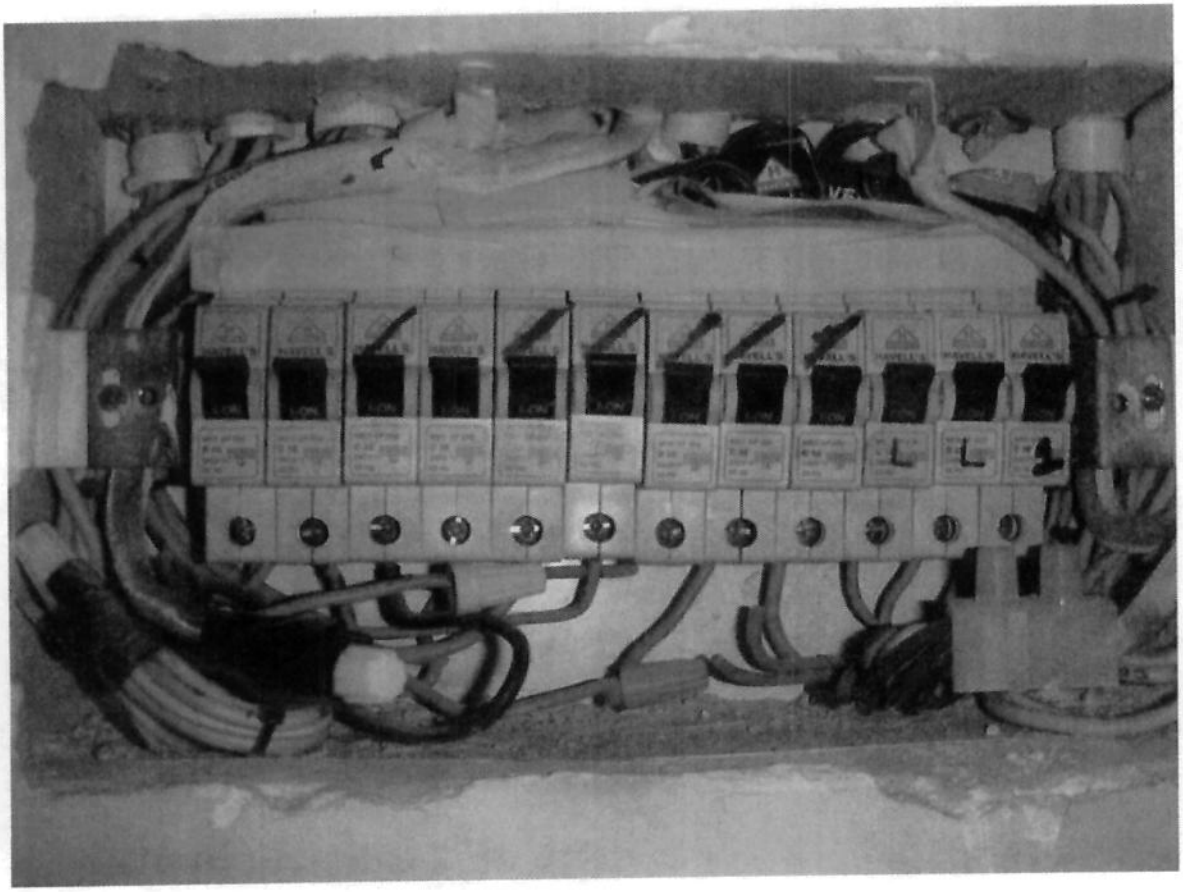


Figure 12 Band BLDG breaker box (with cardboard between wires).

Gym (VBC)

The gym main distribution panel had four wires coming in (three hots and a neutral) and no bond between the neutral and ground bus. The gym latrine was fed from this main panel through a sub panel; there were five wires coming into the latrine breaker panel, but still no bond anywhere.

BLDG 51 10th Mountain HQ (VBC)

The building was being fed from the grid and had two backup generators. Talked with the contractor (FLUOR) responsible for the building electrical system. The contractor explained there was no neutral to ground bond in the system; it was a TT (Earthen arrangement) wiring system. He went on to say that to the best of his knowledge bonding of the neutral to ground was not occurring in any of the systems he was responsible for and he firmly believed this was a problem. He stated FLUOR was working on a fix to make the system safer in the event of a ground fault.

DCMA LSA on VBC

Found an 80a service outside the building. The service was fed by four wires (three hots and one neutral). There was a ground bus connected to the ground electrode and equipment grounding conductors. The ground bus was not connected to the neutral bus (no effective ground fault path). Inside building the breaker panels were not wired per the drawing on the cover. The bathrooms were fed by a GFCI breaker. The hot water heater in one room was leaking into the electrical box on the heater; turn off the breaker for the hot water heater.

Overall assessment is the building is a potential electrical hazard because there is no effective ground fault path.

Australian Pool on VBC

Assessed the pool power and main breaker panel feeding the pool facilities and found no equipment grounding path back to the neutral bus. Pool panels located underground had no grounding electrode system connected to the panels. The piping and structural metal part of the underground system were not bonded to the grounding grid.

LSF 1 RPC Complex

The military group using the complex stated that the building's electrical system had been completely overhauled and it was one of the safest buildings on the complex. The building had a service fed from the power pole with a main disconnect. There were two breaker panels side by side both external to the building. Both panels had a neutral to ground bond. There were GFCI breakers feeding the bathroom appliances and the laundry area. The water pump was external to the building and had an equipment ground wire attached to it. The potential from the shower faucet to the drain was in the ohms range. The piping of the system was not bonded to the ground system.

OVERLOADED CIRCUITS

MAKESHIFT REPAIRS

FOB Loyalty

Found many instances of power strips grossly overloaded.

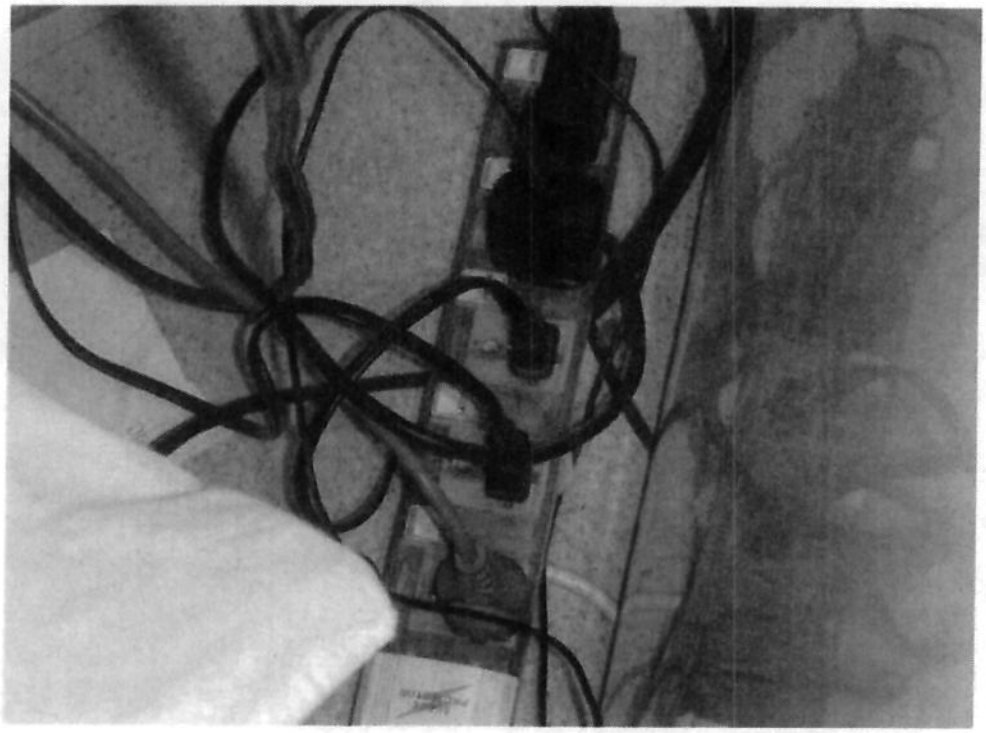


Figure 13 Power strip in Soldier's living area, overloaded and in close proximity to combustible material.

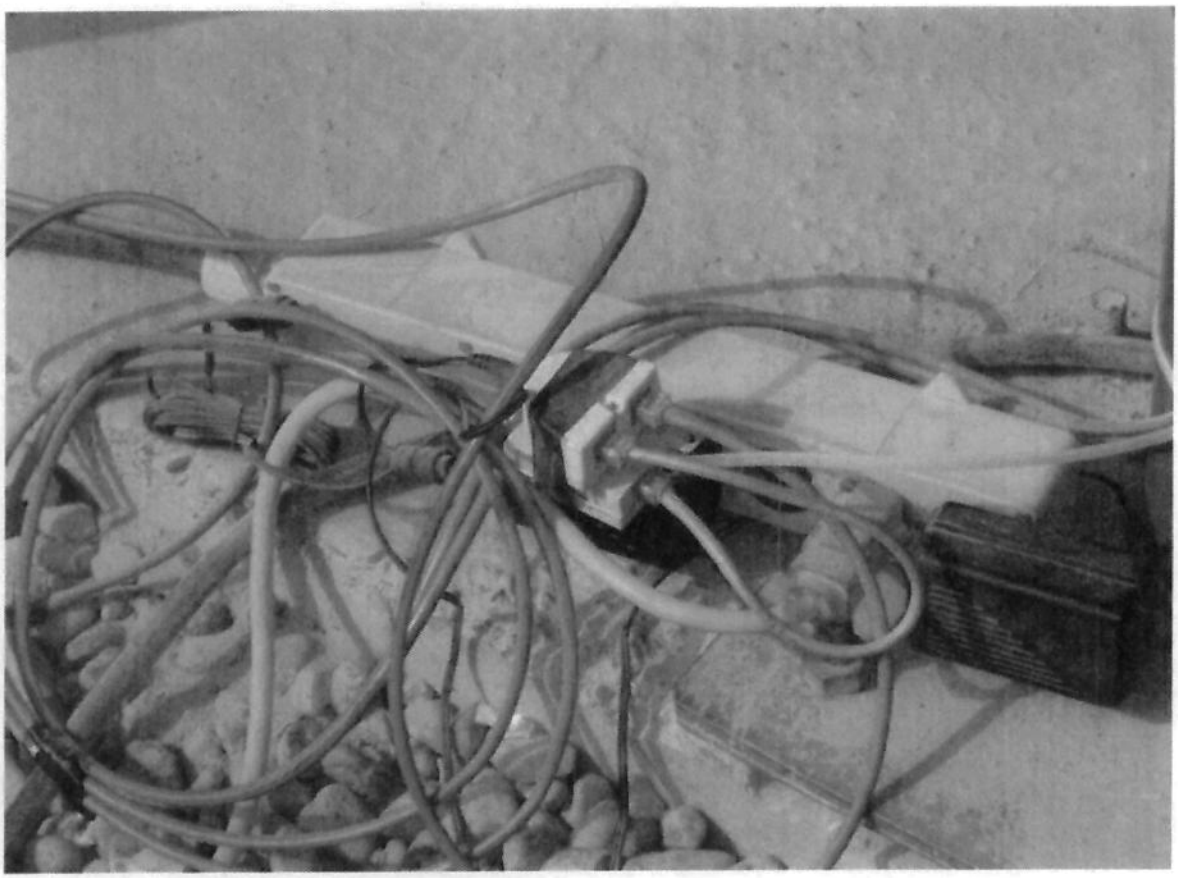


Figure 14 Overloaded power strip located outside, subject to extreme weather conditions.

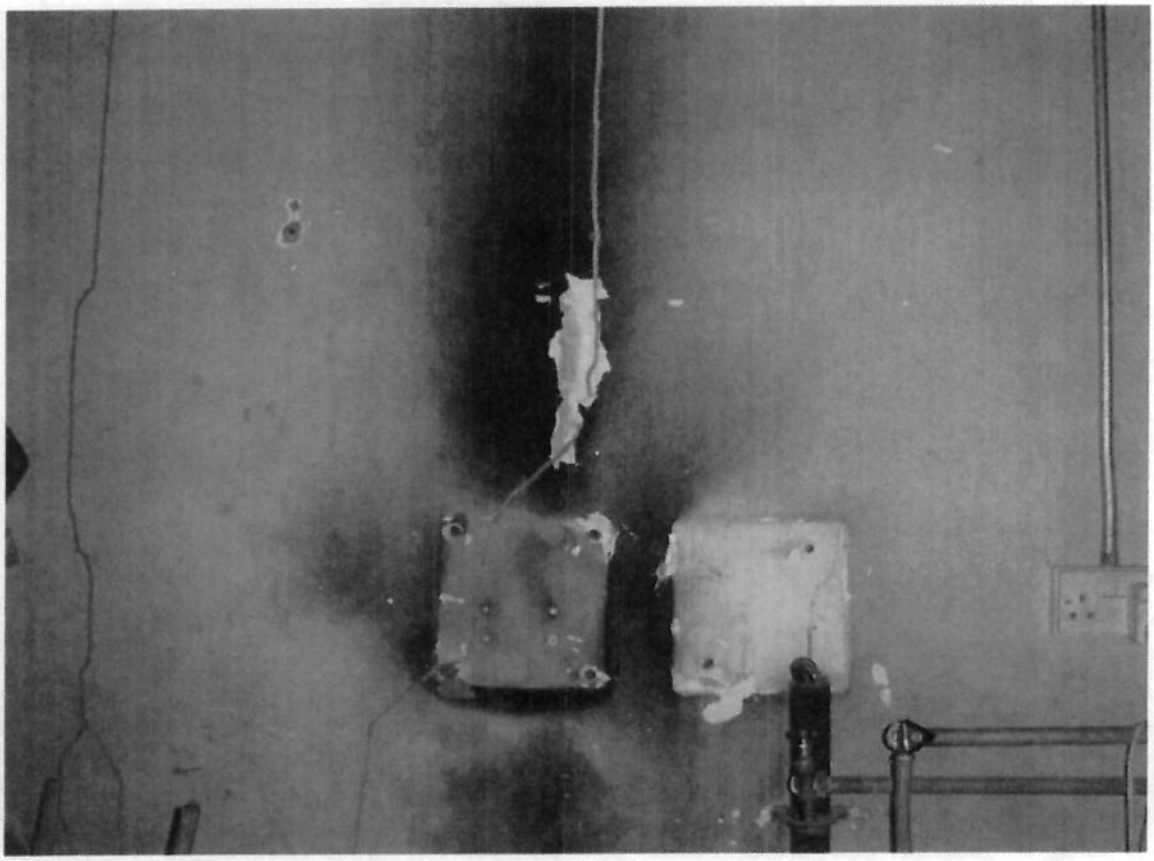


Figure 15 Recent fire caused by makeshift repair

This evidence of burned electrical device was found in the laundry room in the senior officer and NCO billets, FOB Loyalty

UNCERTIFIED ELECTRICAL DEVICES

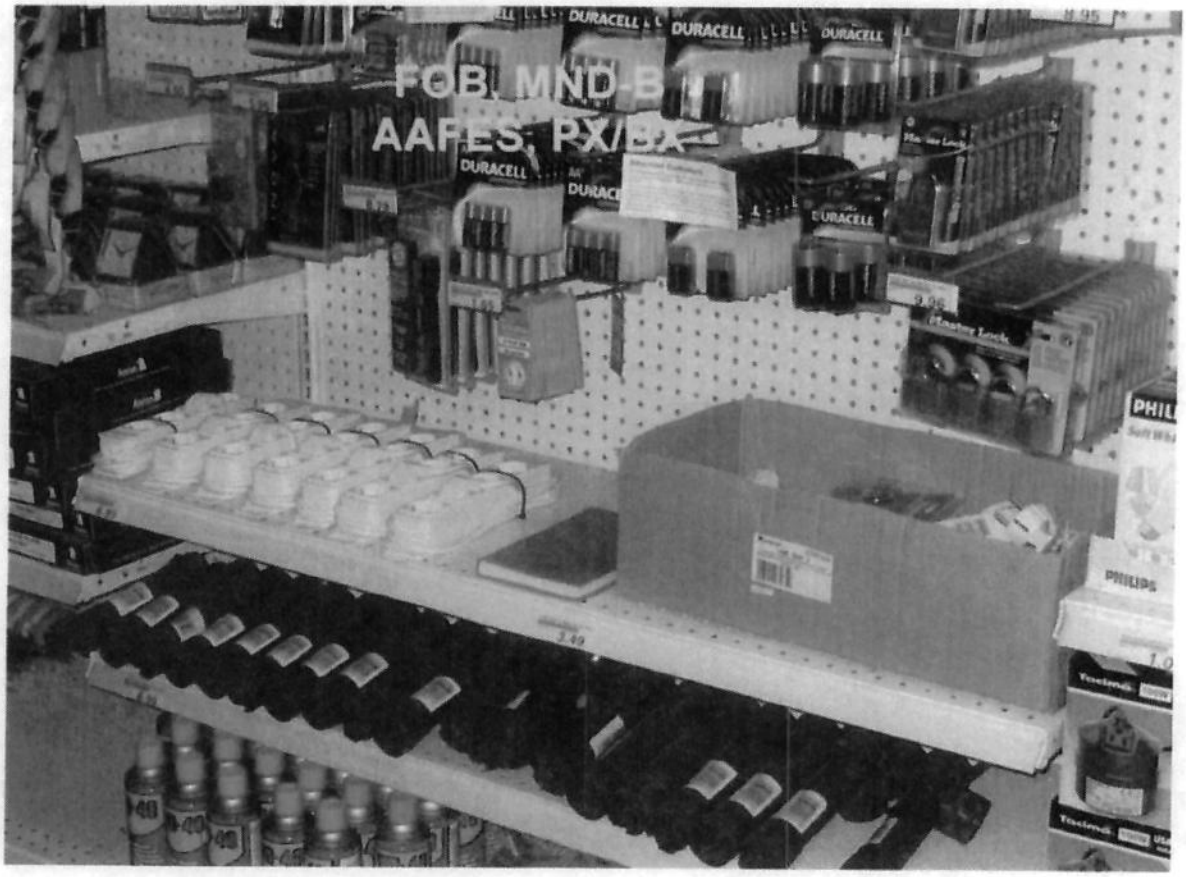


Figure 16 Power strips and adapters sold in the PX

The power strips and adapters found in the PX at FOB Loyalty were European standard. They would be useless for many of the applications used by the Soldiers. Soldiers would purchase their adapters and power strips in the bazaar. Most of which are uncertified or counterfeit.

Figure 17 Uncertified power strips found in the bazaar.

Figure 18 Uncertified, and possibly counterfeit adapters found in the bazaar.

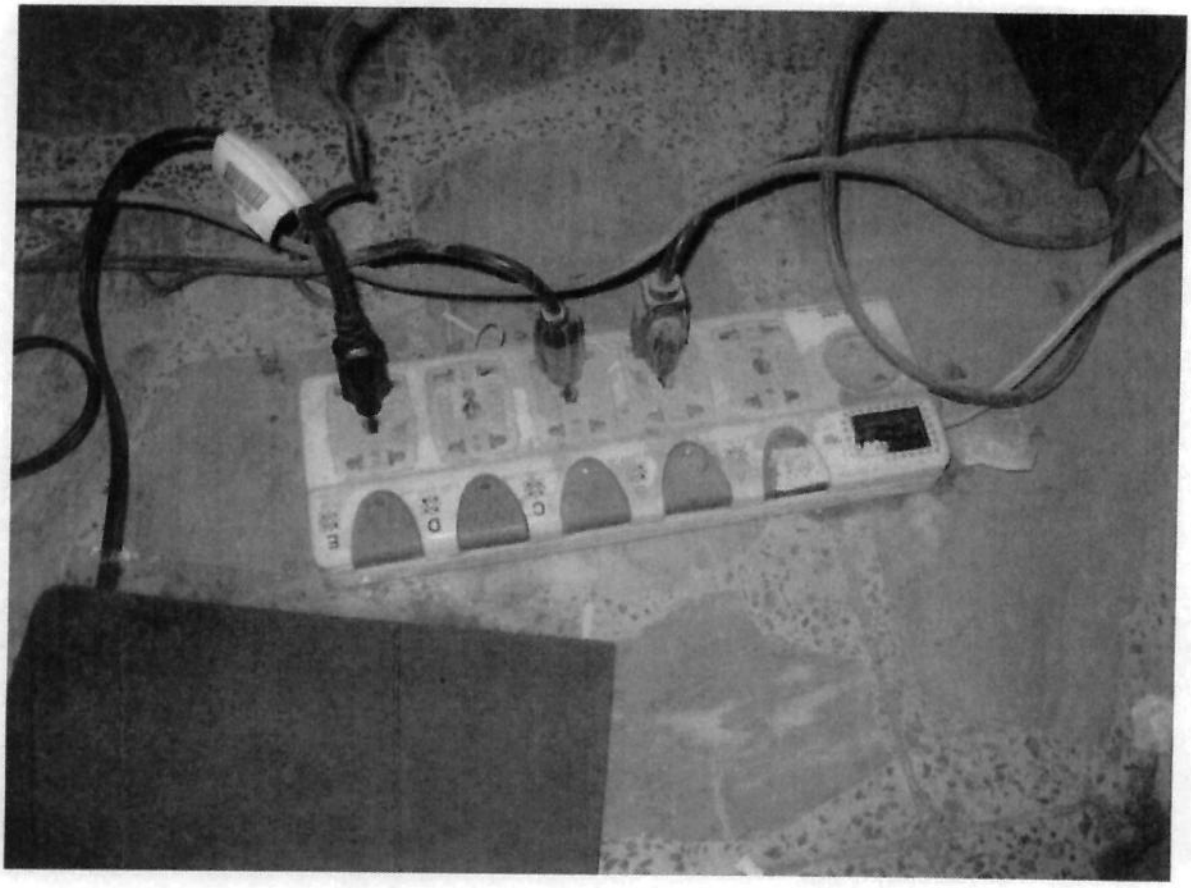


Figure 19 Uncertified electrical power strip found in an office area at FOB Loyalty

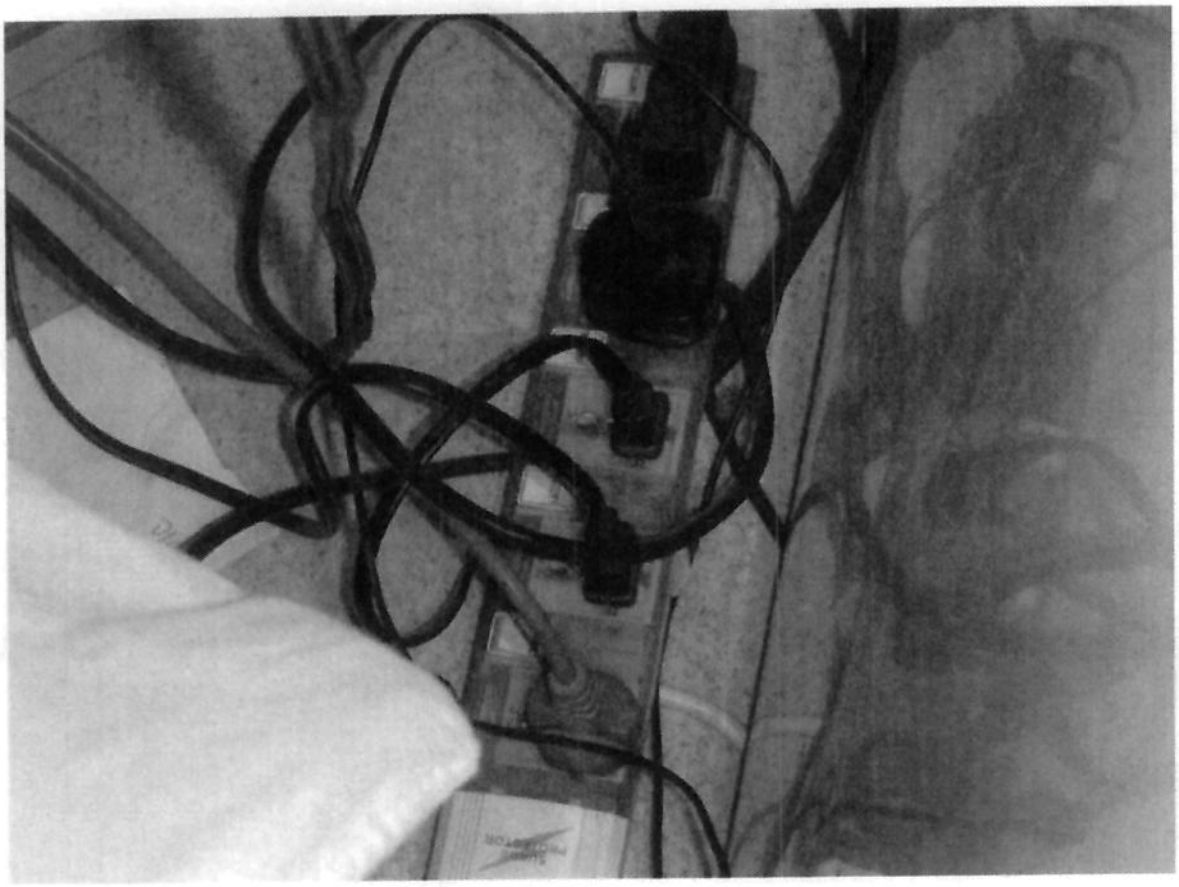


Figure 20 Uncertified power strip found in Soldier's living area.

HOUSEKEEPING

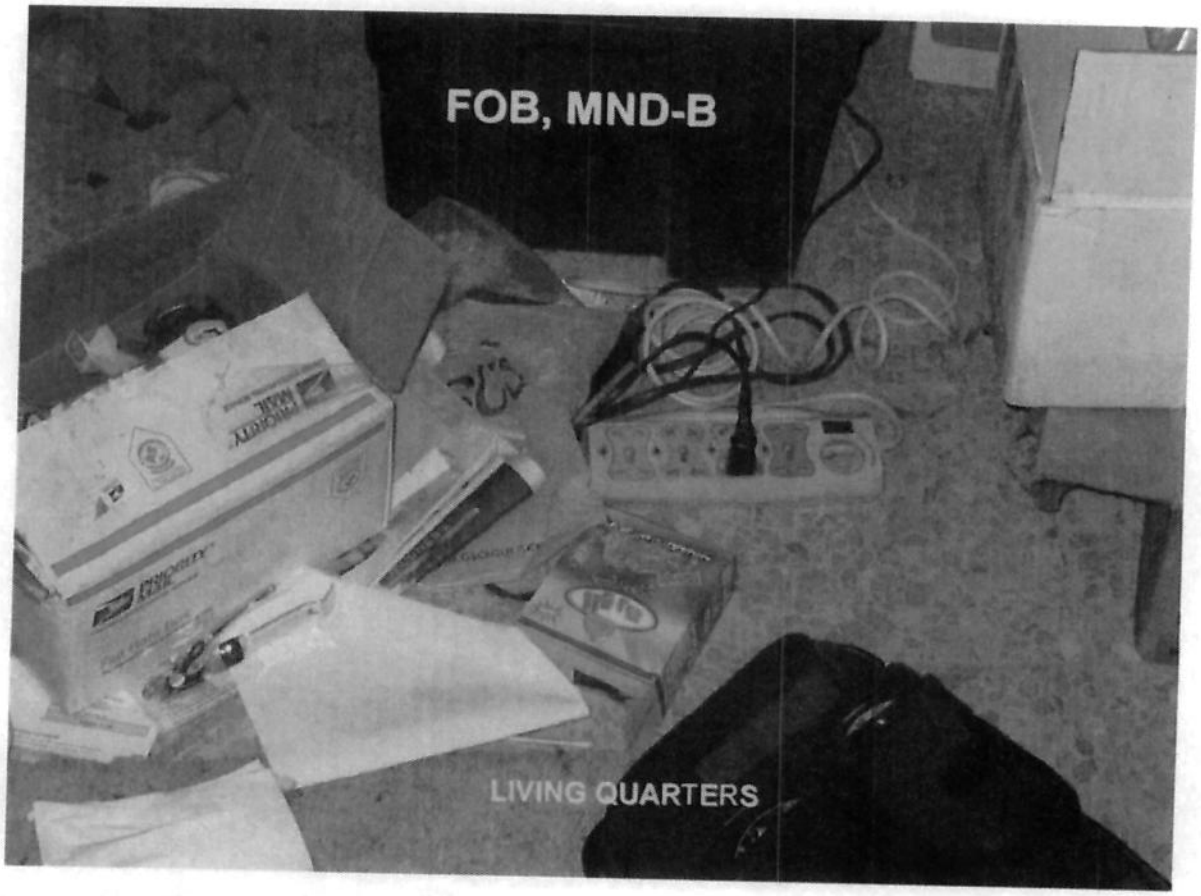


Figure 21 Soldier living quarters at FOB Loyalty.

An example of clutter and combustible material in close proximity to an uncertified power strip.

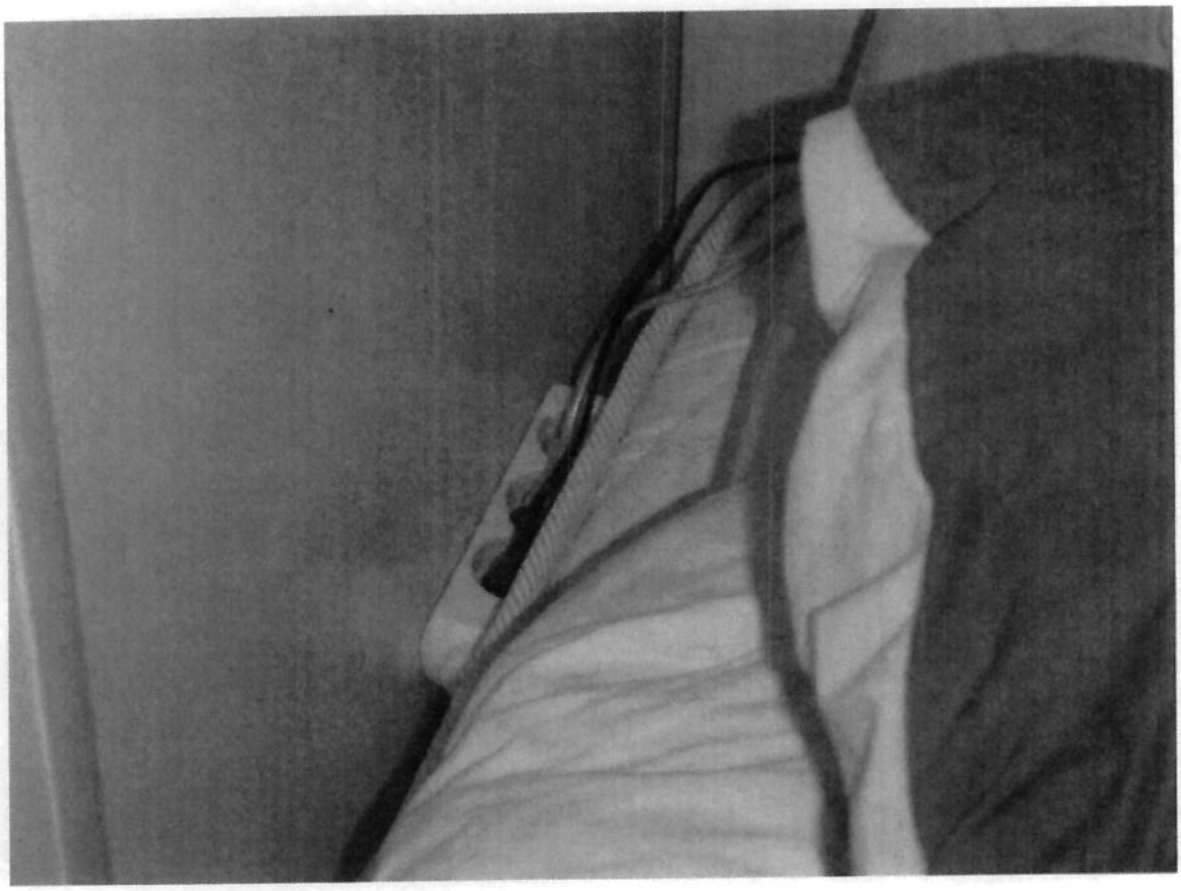


Figure 22 Power strip wedged against the wall and bedding.

An overloaded circuit would heat up and cause a fire of the Soldier's bedding and death within minutes.

Figure 23 Ammunition and loaded weapons stored in living areas

Figure 24 40mm rounds stored in Soldier living areas

Figure 25 Ammunition laying in close proximity to a likely fire source.

LOW HANGING WIRES

EXPOSED WIRES

Figure 26 Low hanging wires located throughout the ITO

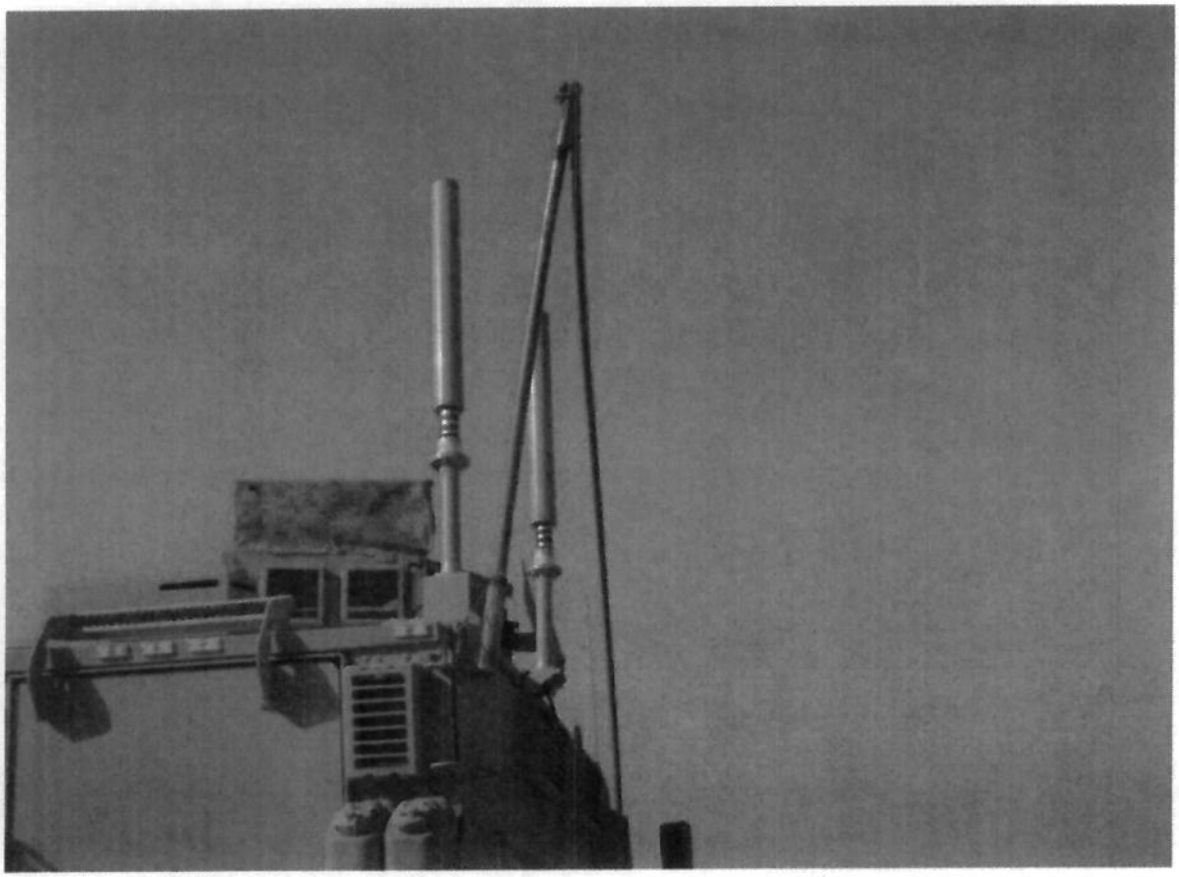


Figure 27 MRAP wire strike protection for IMG Navistar variant.

Figure 28 Wire strike protection.

Soldier installed make-shift protection to deflect wires. The system is made from two pieces of PVC piping, duct taped together at the aft connection.

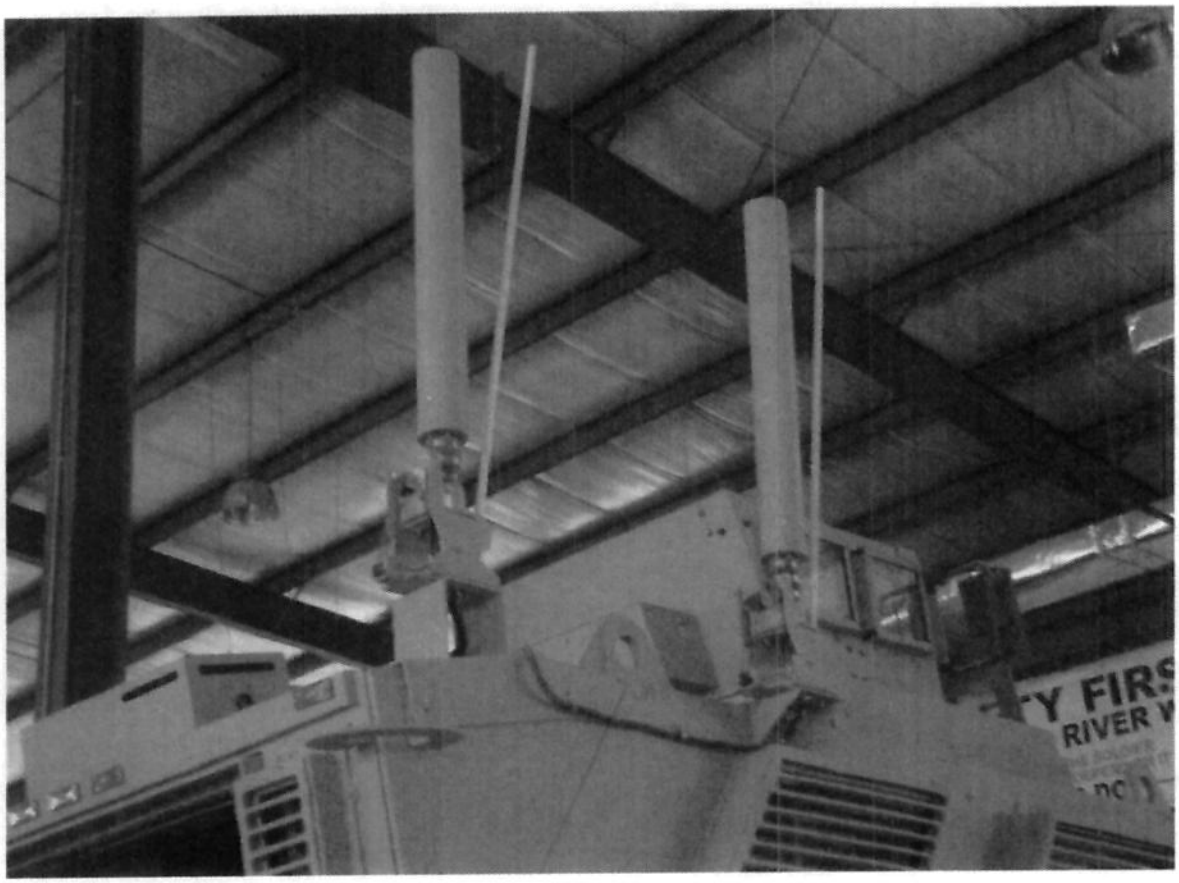


Figure 29 MRAP wire strike protection for the IED jammer antennae.

ANNEX D

SURVEY TOOL
QUESTIONS FOR ASSISTANCE VISIT TEAM

Q: Have there been any incidents in your unit where someone received an electrical shock? If so, how did they receive the shock, and how severely were they injured? Have you heard of incidents in other units?

Q: How common are electrical hazards? (exposed wires, multiple plugs, overheated circuits, tripped breakers)

Q: Have you been briefed on safety risks to include identification of electrical hazards and preventing electrical shock?

Q: Who is responsible for fixing electrical hazards? When hazards are identified within the facilities, what is the process to have them corrected?

Q: Who is allowed to make electrical modifications? What are their qualifications?

Q: Who checks electrical repairs / modifications to make sure it was done right?

Q: Who is trained to inspect / identify electrical hazards? What training did they receive? Access to electrical test equipment? Who is trained to use it?

Q: Are you familiar with stories in the media available to you (Fox News, CNN International, Stars & Stripes, etc.) describing accidents where Soldiers have been electrocuted while in theatre? Do you think this is a common problem here and if so, why?

Q: How often are safety inspections conducted of your facilities? Who conducts them?
Q: Do you get feedback on what hazards were identified and what's being done to fix them?
Q: What is the safety climate of your organization? How do you know? What do you use as a measure of the climate?

Q: What is the safety structure in your organization? Is there a BCT safety professional? Have your ADSOs conducted the distance learning course or something similar? Do you feel they are capable of assisting your leaders to identify and mitigate hazards in their AOs? What do you think the biggest accidental risks are in your AOR?

Q: What does composite risk management mean in Iraq?

Q: Who is your unit safety representative? Have they been effective in helping you identify hazards and control risks?

Q: What do you think the number one accidental hazard is here? If you were to guess how the "next guy" in Iraq would die from an accident, what would be the cause?

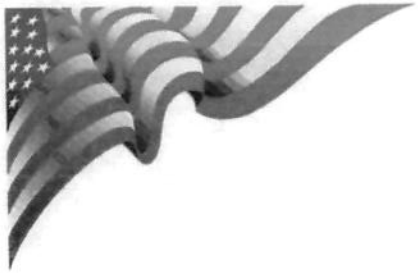
Q: What's the difference in safety while at home and safety once you're in theatre? Do you think there's as much concern or emphasis, or is it something of a luxury you can't afford while in combat?

Q: Is it common for personnel to take part in identifying and eliminating hazards across the AOR?

Q: What's more dangerous, the enemy or an accident? Why do you think so, and what are some examples based on what you have observed.

Q: What are the most significant actions the commander could take to improve safety?

Q: Do leaders above you demonstrate concern for identifying and reducing hazards? Could you give some examples of how you do it in your unit?



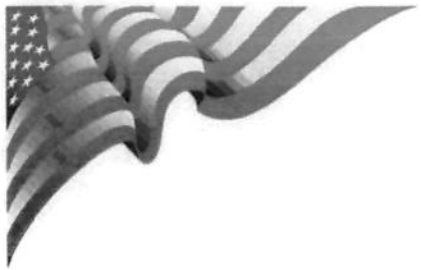
U.S. ARMY COMBAT READINESS/SAFETY CENTER

USACRC ASSISTANCE VISIT
OUT BRIEF

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Own the EDGE

Leading on the Edge



U.S. ARMY COMBAT READINESS/SAFETY CENTER

Team Composition

COL [redacted] – OIC / Team Lead

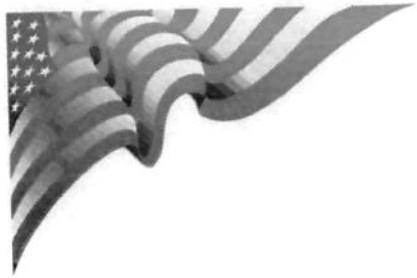
MAJ [redacted] – XO / Investigator

CW4 [redacted] – ARCENT, Safety

Mr. [redacted] – Investigator / Recorder

Mr. [redacted] – Military Generated Power SME

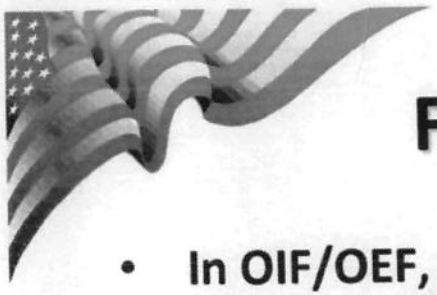
Mr. [redacted] – USACE Master Electrician



U.S. ARMY COMBAT READINESS/SAFETY CENTER

Specified Tasks/Objectives

- Provide CRC institutional knowledge of past Electrical accidents.
- Conduct site visits and interviews in order to evaluate plans, programs, facilities and tools used at MNF-I to gain an understanding of effectiveness and propose "way ahead."
- Provide MNF-I an assessment to assist in the development of short term Electrical safety information and awareness.
- Provide MNF-I an assessment to assist in the development of proposed long-term solution sets to mitigate identified Electrical hazards.

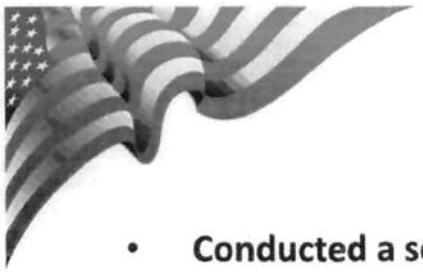


Facts Bearing on the Problem

U.S. ARMY COMBAT READINESS/SAFETY CENTER

- **In OIF/OEF, electrical problems have resulted in 3,538 facility fires (May 07 – June 08)***
- **16 Electrocution Fatalities**
  - 8 involved contact with power lines during tactical military or construction operations
  - 5 were Marines and one was a local national civilian employee
- **23 Class A – C accidents with 10 Soldiers killed in the past five years**
- **Maintenance Class A Accidents, 5 Soldiers Killed**
  - 2 generator maintenance electrocutions due to inattentiveness
  - 1 high voltage maintenance electrocution due to inadequate planning
  - 1 telecom equipment maintenance electrocution due to inadequate planning
  - 1 electrocution while power washing in motor pool
- **Shower/Swimming Pool Class A Accidents, 3 Soldiers Killed**
  - 2 electrocutions while showering
  - 1 electrocution in a swimming pool
- **Vehicle Class A Accidents, 2 Soldiers Killed**
  - 1 ACV clearance electrocution, gunner grabbed power line
  - 1 crane clearance electrocution, emplacing barriers

* CENTCOM Data



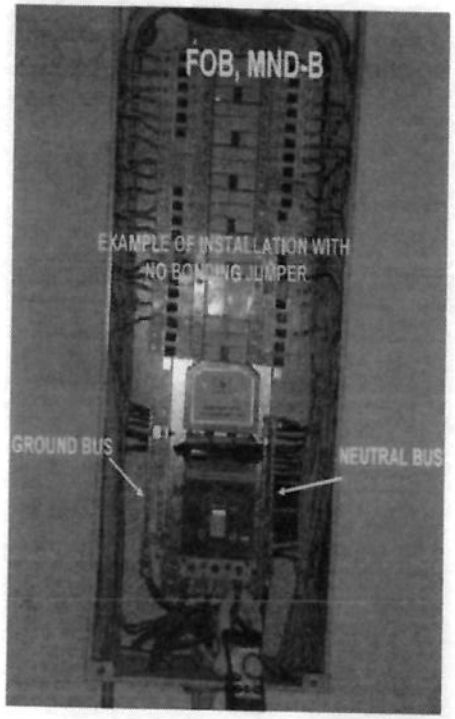
Execution

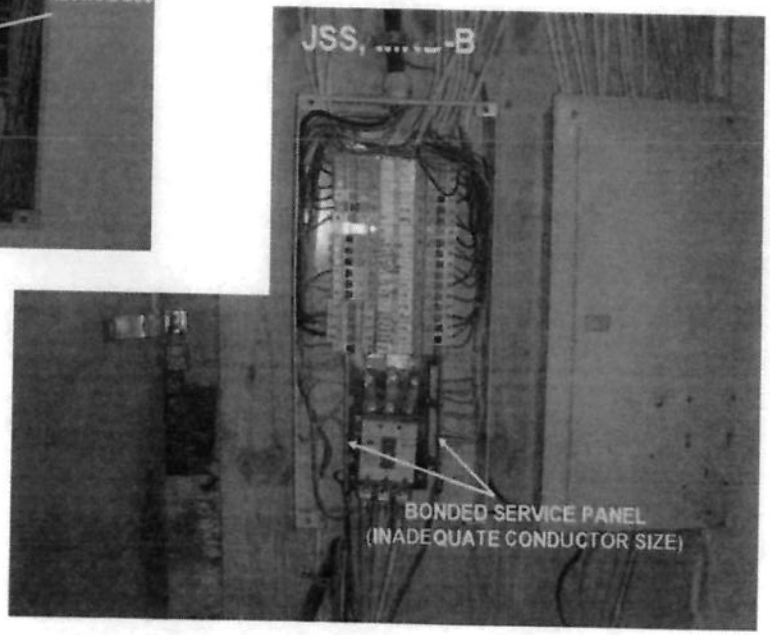
U.S. ARMY COMBAT READINESS/SAFETY CENTER

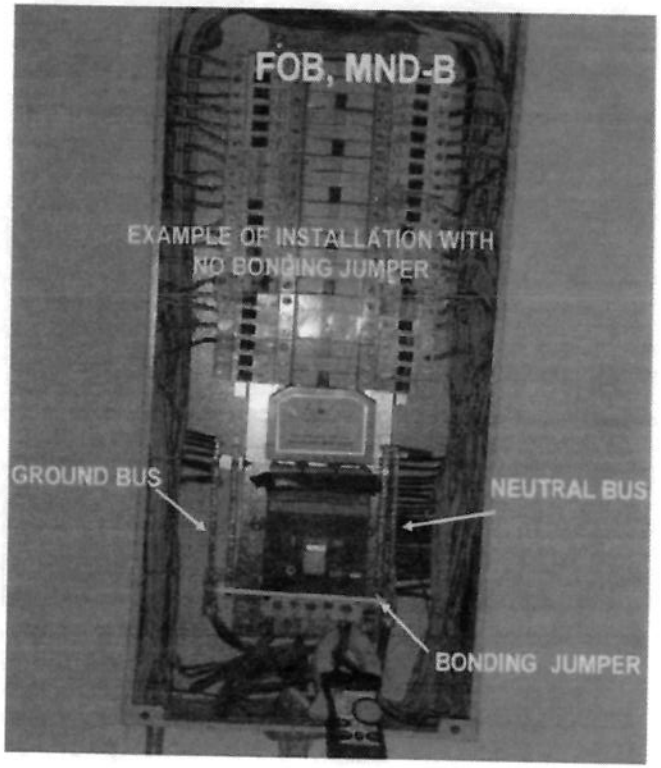
- Conducted a series of sensing sessions with key leaders and Soldiers from MND – Center, and MND – Baghdad
- More than thirty facilities were evaluated in the Contingency Operating Bases/Sites (COB/COS) and Contingency Locations (COL)
- Interviewed personnel from DCMA, Task Force SAFE, the Utilities Operation and Maintenance Technician from MND – North, the FLUOR Electrical Manager, and the electrical contract administrator for the US Army Corps of Engineers
- The Team Master Electrician evaluated facilities for proper wiring, grounding and bonding in accordance with established codes and accepted practices
- The team power generation SME evaluated the organization's use of military generators to supply power and to determine who is allowed to maintain and support the equipment
- The team conducted a walk-through of common areas and individual sleeping areas to determine the level of knowledge of electrical safety and whether they were in compliance with command directed safe practices

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Service Panels and Distribution Boxes not Properly Grounded or Bonded at the Main Distribution Panel







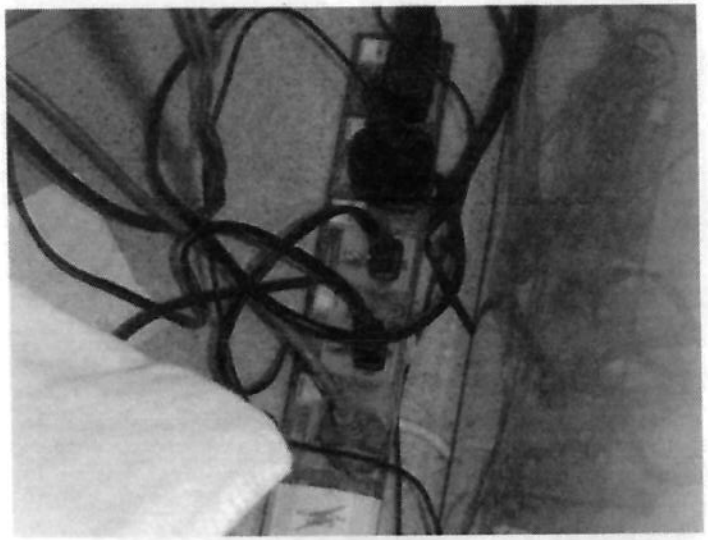
U.S. ARMY COMBAT READINESS/SAFETY CENTER

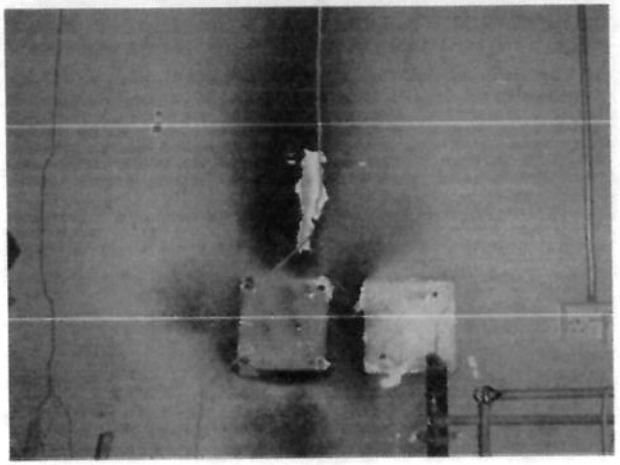
Hazard – Varying Standards, Grounding and Bonding and Lack of GFCI

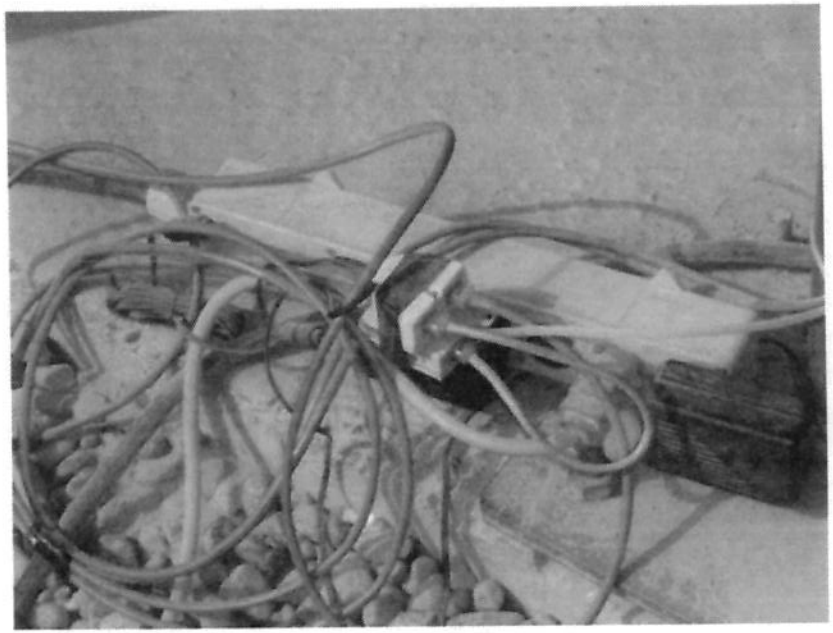
- **Initial RAC – I-D (Catastrophic/Seldom), High Risk**
- **Effect – Personal injury or Death**
- **MNF-I Controls**
  - Establish one clear, common set of electrical codes and standards
  - Develop, implement and enforce those standards
  - Modify contracts as necessary to establish standards for electrical work
  - Invigorate contractor quality control
  - Establish a Government quality assurance team
  - Ensure proper grounding, bonding and GFCI where needed
- **Residual RAC – II-E Catastrophic Unlikely Moderate Risk**

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Overloaded Circuits and Makeshift Repairs







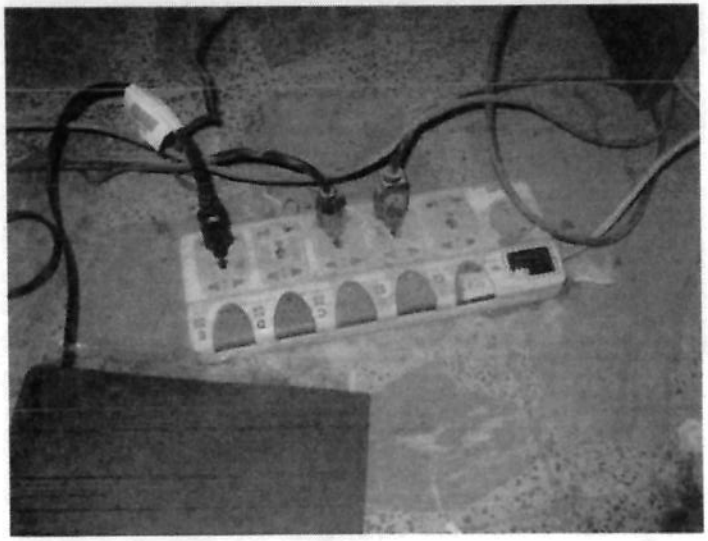
U.S. ARMY COMBAT READINESS/SAFETY CENTER

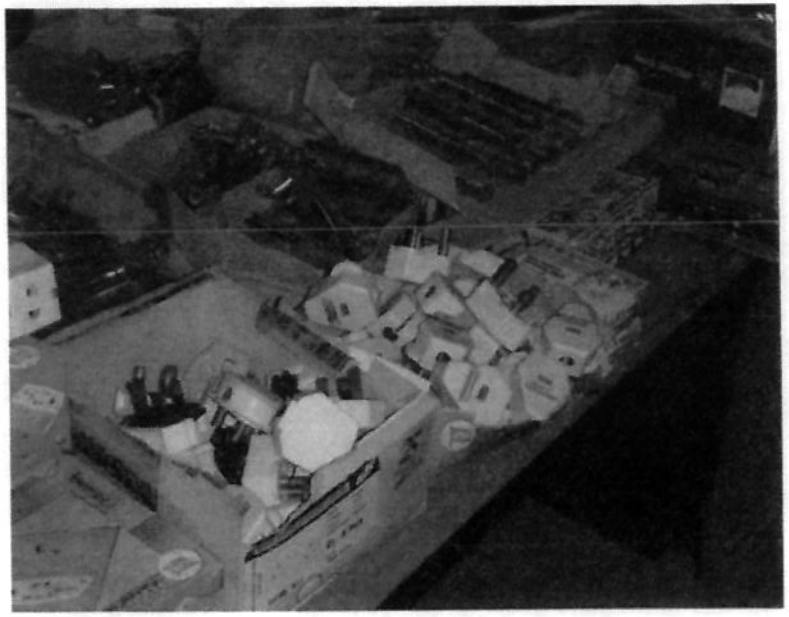
Hazard – Overloaded Circuits and Makeshift Electrical Repairs

- **Initial RAC II-B (Critical/Likely),High Risk**
- **Effect – Personnel Injury and Property Damage**
- **MNF-I Controls**
  - Develop, implement and enforce electrical use standards
  - Conduct routine electrical and fire safety inspections
- **Residual RAC II-D (Critical/Seldom), Moderate Risk**

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Uncertified Electrical Devices





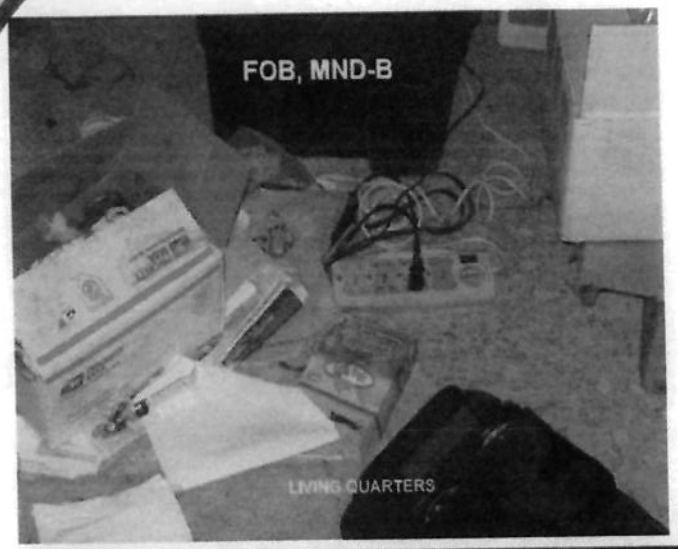
U.S. ARMY COMBAT READINESS/SAFETY CENTER

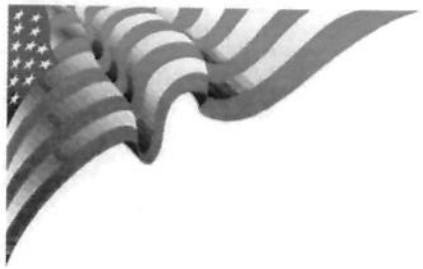
Hazard – Uncertified Electrical Devices

- **Initial RAC II-A (Catastrophic/Frequent) Extremely High Risk**
- **Effect - Personnel Injury or Death**
- **MNF-I Controls**
  - Purge all uncertified electrical devices
  - Provide Soldiers, Sailors, Airmen, Marines and Civilians with the appropriate, certified electrical devices
  - Engage leaders to ensure Soldiers, Airmen, Sailors, Marines and Civilians are using certified electrical devices
- **Residual RAC II-D (Catastrophic/Seldom) Moderate Risk**

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Housekee_ in_





U.S. ARMY COMBAT READINESS/SAFETY CENTER

Hazard – Housekeeping

- **Initial RAC II-C (Critical/Occasional) High Risk**
- **Effect - Personnel Injury or Death**
- **MNF-I Controls**
  - Develop, implement and enforce fire safety standards
  - Conduct routine health and welfare inspections
  - Leaders constantly checking for compliance with electrical and fire safety standards
- **Residual RAC II-D (Critical/Unlikely) Low Risk**

U.S. ARMY COMBAT READINESS/SAFETY CENTER

Low Hanging and Exposed Power Lines

U.S. ARMY COMBAT READINESS/SAFETY CENTER

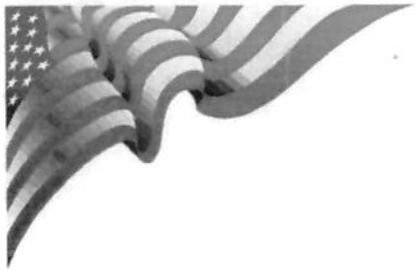
Hazard – Low Hanging or Exposed Wires

- **Initial RAC I-C (Catastrophic/Occasional) High Risk**
-
- **Effect - Personnel Injury or Death**

- **MNF-I Controls**
  - Develop, implement, train and rehearse TTPs to deal with the wire hazard
  - Equip all vehicles with wire deflecting devices

- **DA/DoD Controls**
  - Provide a properly engineered wire strike protection device for all vehicles

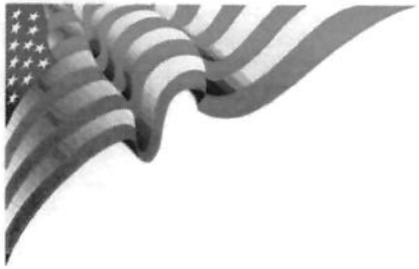
- **Residual RAC II-D (Critical/Seldom) High Risk**



U.S. ARMY COMBAT READINESS/SAFETY CENTER

Conclusion

- Soldiers, Sailors, Airmen, Marines and Civilians are at risk of electrical shock and possible electrocution
- Improper grounding and bonding coupled with overloaded circuits and substandard equipment make the risk of electrical shock, electrocution and electrically caused fires extremely high
- Standards for electrical use/fire safety generally do not exist
- Established/enforced electrical use/fire safety standards, proper grounding and bonding, along with the use of certified electrical equipment reduces the risk of electrical shock, electrocution and fires to a moderate level



U.S. ARMY COMBAT READINESS/SAFETY CENTER

Questions