



## **CASE STUDY: HEAT LOAD REDUCTION**

**Marine Corps Base Camp Pendleton, California**

**Vado Del Rio Area 25**

**Animal Control Facility**

**2008-2009**

# Camp Pendleton Utility Energy Service Contract (UESC) Program

- EnviroCoatings was awarded a contract to install Ceramic InsulCoat Exterior Wall on a metal structure.
  - Animal Control Facility was selected.

# Why EnviroCoatings?

- **Year-Round Thermal Barrier**
  - Ceramic particulate plus high titanium dioxide levels
  - Reflect heat rays
  - Improve thermal emittance
  - Slows the movement of heat through the substrate
- **Saves Energy and Reduces Utility Bills**
  - Cooling and Heating
- **Lowers Operating Costs**
- **Provides Significant Life-Cycle Cost Savings**

# Year-Round Thermal Benefits

- **CERAMICS:** Enhances heat management and extends life-cycle performance actors.
- **3-WAY ACTION:** Reflects, Emits (gives off the energy it absorbs), and Resists conductivity of heat.
- **KEEPS** you **WARMER** in winter and **COOLER** in summer.



**REALIZED ENERGY SAVINGS = REDUCED UTILITY BILLS**

# Project Parameters

1. Decades old galvanized metal Quonset Hut.
2. Revitalize structure and improve energy efficiency.
3. Establish a baseline heat load on building using thermal (infrared) imaging photography.
4. Re-paint building with EnviroCoatings Ceramic InsulCoat Exterior Wall.
5. Measure and compare heat load against the established building baseline after application of EnviroCoatings using thermal (infrared) imaging photography.

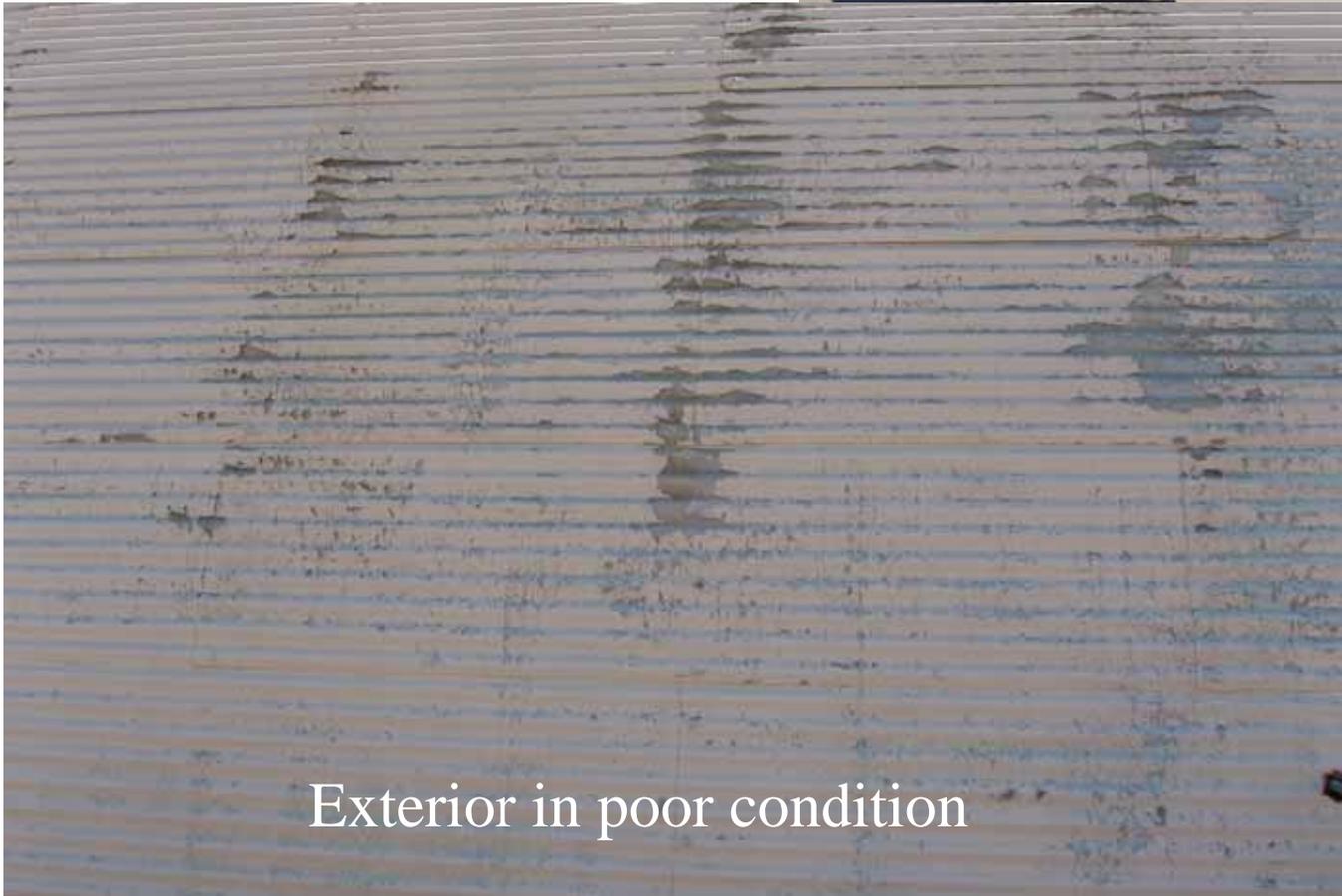
Summer 2008



## Summer 2008

The Quonset Hut had been painted on numerous occasions over the years.

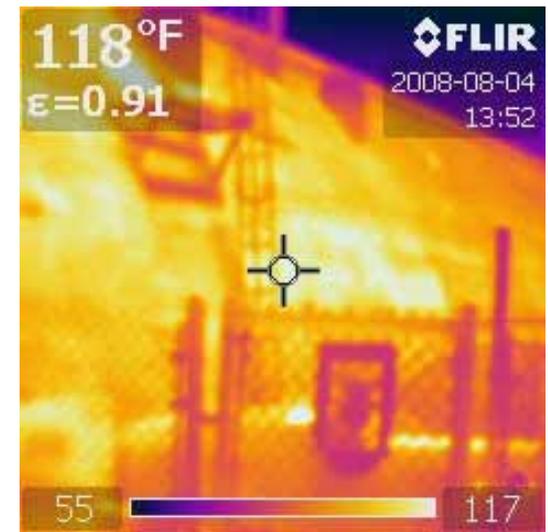
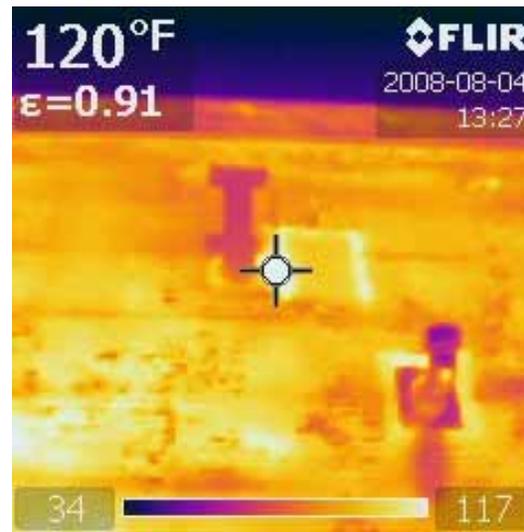
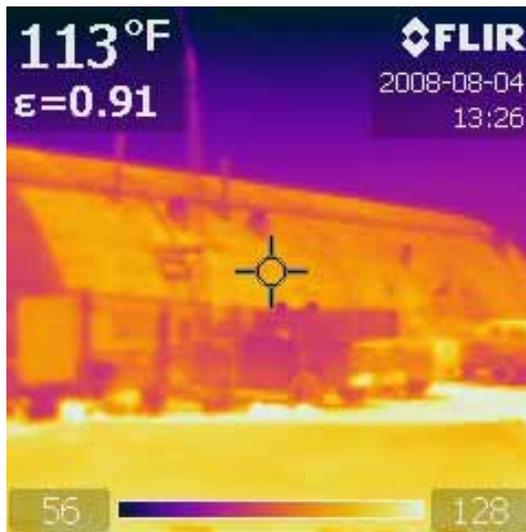
The exterior membrane had degraded and chipped/peeled off the structure exposing the various layers of paint buildup and bare metal.



Exterior in poor condition

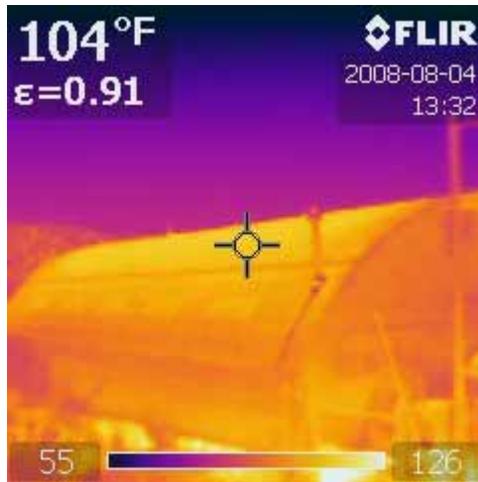
# Infrared Photos of the West Side Exterior

Needed to establish a baseline for heat load on structure  
Photos taken August 4, 2008

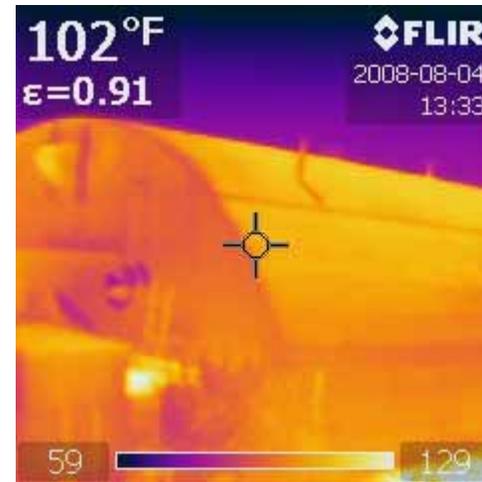


Bright, Sunny Sky with 84° F ambient air temperature

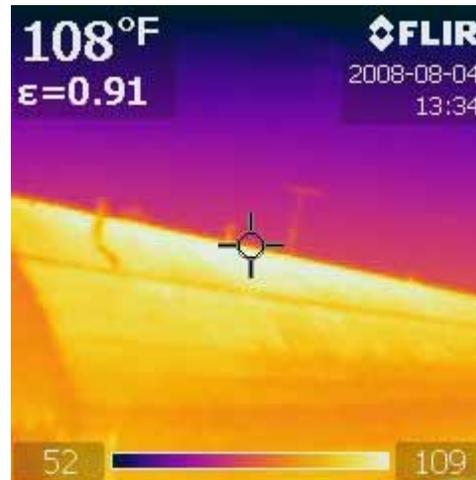
# Infrared Photos of the East Side Exterior



Northeast Corner (Front Entrance)

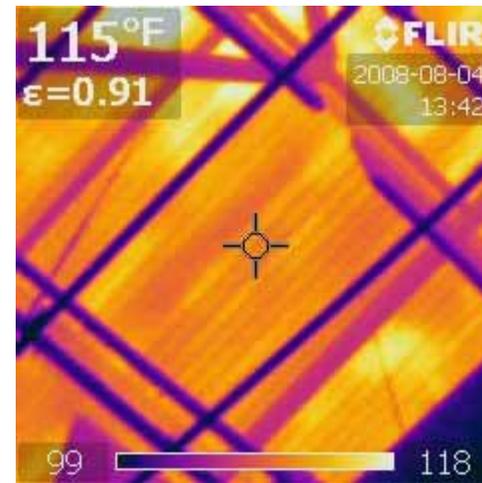
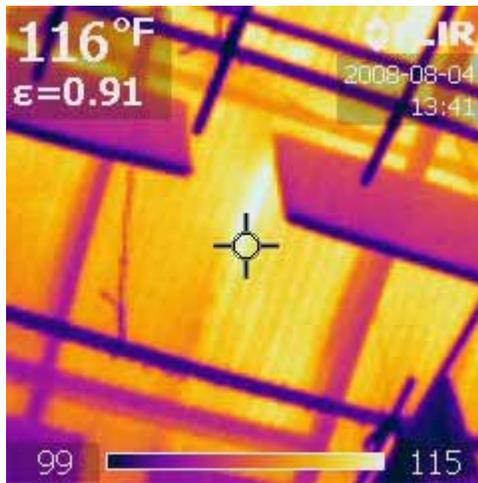


Southeast Corner (Rear Entrance)



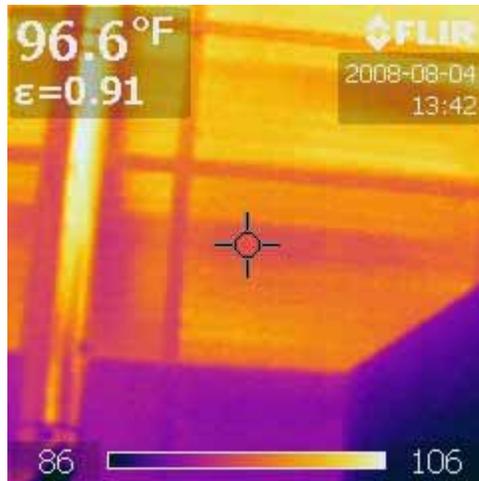
Crown from East Side

# Infrared Photos of the West Side Interior

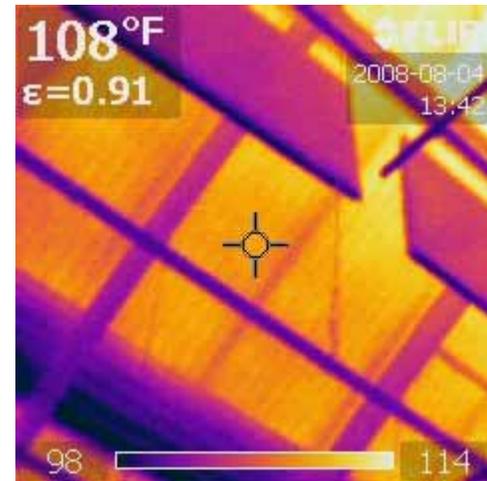


Different angles of the side walls

# Infrared Photos of the East Side Interior

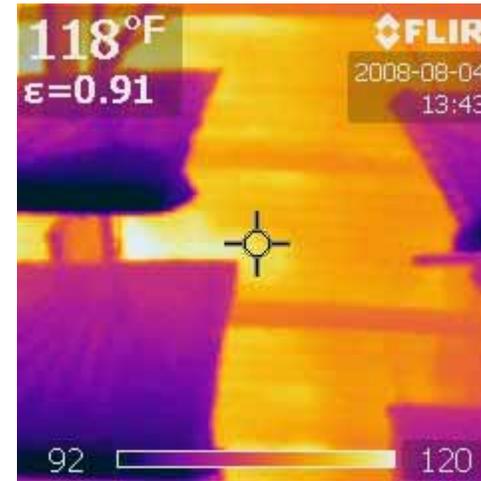
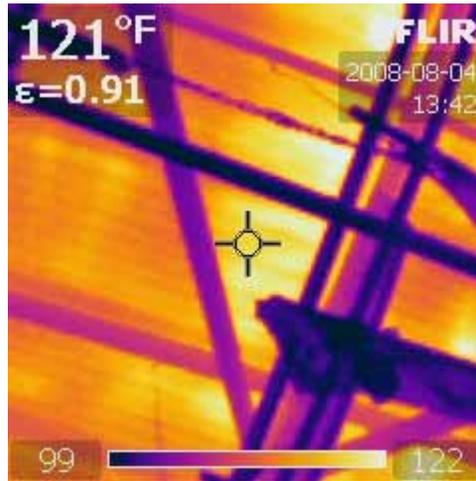


Low wall above animal pens

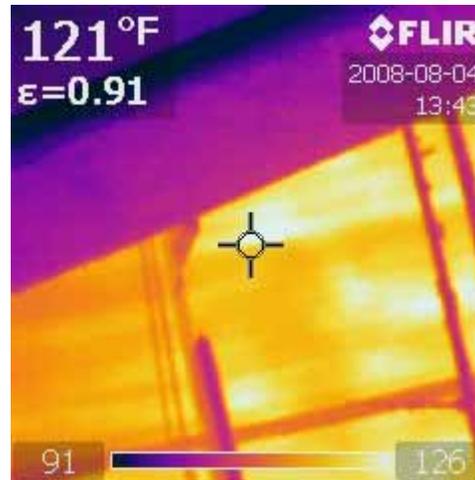


High wall near crown of building

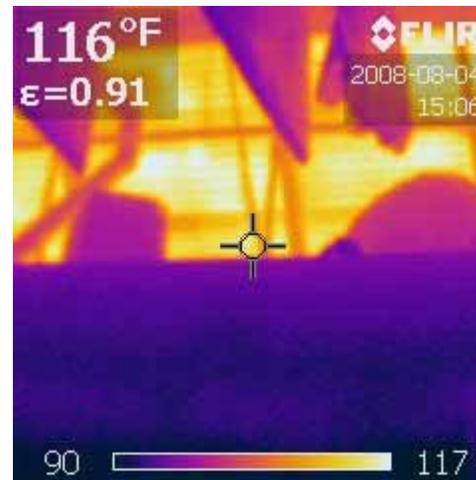
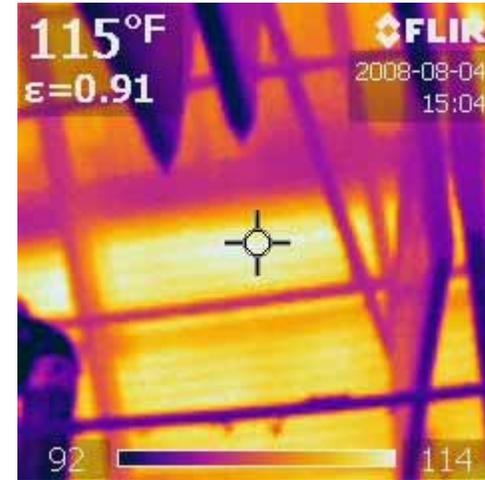
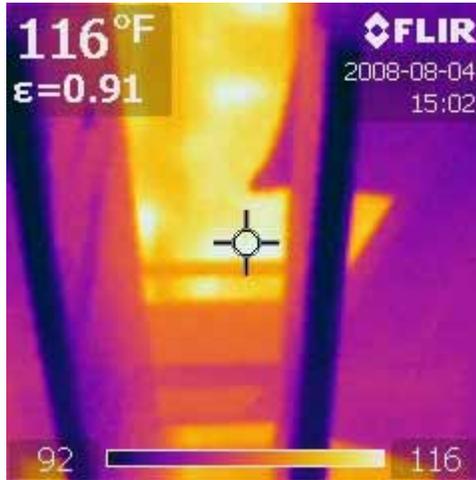
# Infrared Photos of the Interior Crown



Greatest heat load on the building recorded here. 126° F maximum recorded temperature (Note temperature range on each photograph).



# Infrared Photos of the West Side Interior at 3PM



No significant increase of interior temperatures when compared to earlier photos taken at 1:40 PM.

# Lead Abatement

- There was suspicion that some of the existing layers of paint may be lead-based.
- Samples of the paint were tested and confirmed to contain lead.
- It therefore became necessary to remove the lead paint following approved environmental regulations and procedures.

Vacuum system used to collect lead chips and dust as they were removed from the structure and then shipped to disposal.



# Paint Preparation

- EnviroCoatings Ceramic InsulCoat Exterior Wall is applied according to Master Painters Institute (MPI) guidelines.
  - Clean
  - Dry and
  - Sound Substrate

# Paint Preparation

- Loose paint was removed from the building.
- As the lead abatement exposed bare metal in some areas and lead paint remaining on the surface needed to be encapsulated, the building was completely primed with an appropriate metal primer.

# American Painting

Contracted to perform preparation and painting of the Quonset Hut.



Building preparation - Metal Primer



Paint preparation included caulking building penetrations and uneven seams



Entire building  
was primed



# EnviroCoatings Application

- Clean, Dry and Sound Substrate.
- Building completely primed.
- EnviroCoatings Ceramic InsulCoat Exterior Wall is a two-coat system applied at 8 -10 wet mils per coat.

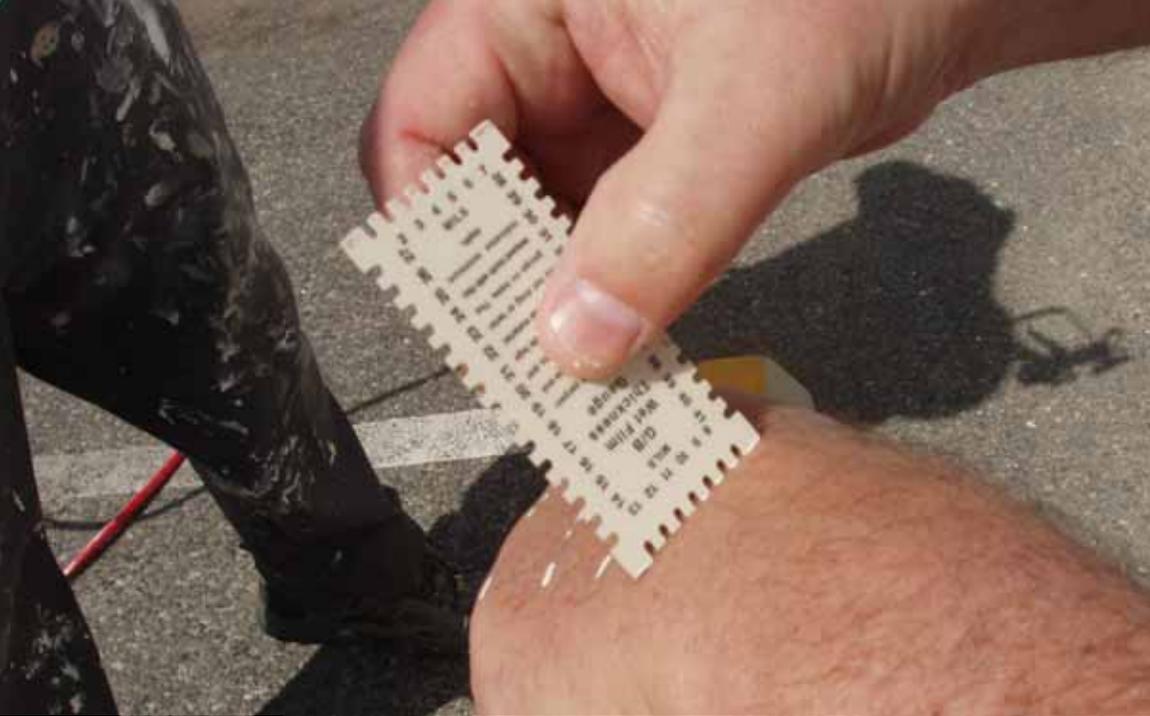


Application of the first coat of EnviroCoatings



Wet Mil Gauge used to measure the applied coating thickness

EnviroCoatings Ceramic InsulCoat Exterior Wall specifications call for 8 - 10 wet mils per coat



Wet Mil Gauge reads 10 mils



Application of 2nd coat of EnviroCoatings on East Side  
Note safety gear and procedures



Various views of the completed project





**Camp Pendleton  
Animal Control**  
**HOURS OF OPERATION**  
Thurs - Sun  
1000 to 1700  
Closed  
Mon - Wed  
For other local agencies call 760 263-6888

# Warranty Inspection

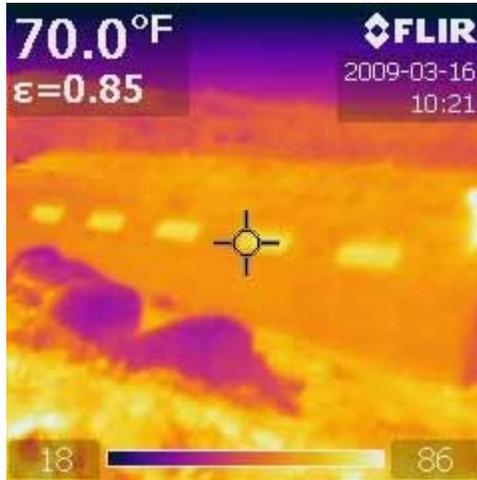
- EnviroCoatings conducts a physical inspection of warranty projects.
- An Ultra-Sonic Gauge is used to measure the dry film thickness of the membrane.
- A minimum of 11-12 dry mils are required to meet our specifications.

# Warranty Inspection

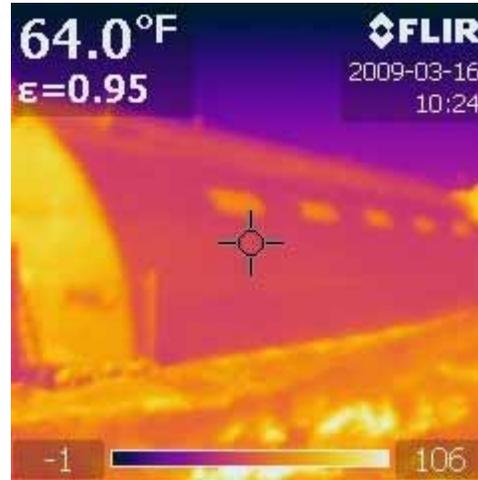


A series of Ultra-Sonic readings were taken around the Quonset Hut to measure dry film thickness. They confirmed EnviroCoatings Ceramic InsulCoat Exterior Wall was applied to specifications.

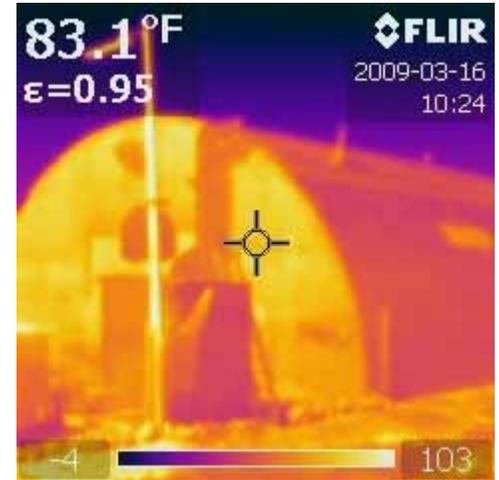
# Photos of the East Side Exterior



Facing Southwest



Facing Northwest



Rear Entrance

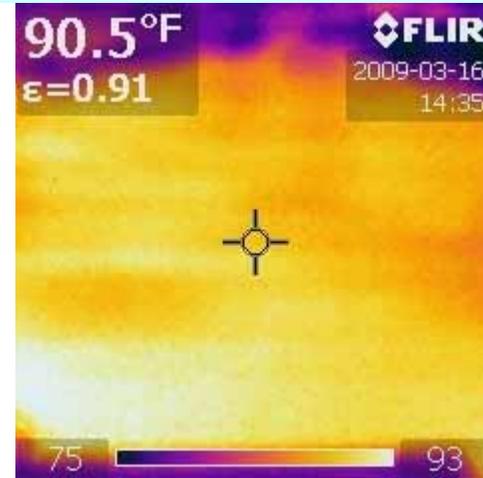
Following the application of EnviroCoatings in February 2009 to compare against the established baseline for exterior and interior heat load photographs that were taken on August 4, 2008

Bright, Sunny Sky with 68° F ambient air temperature

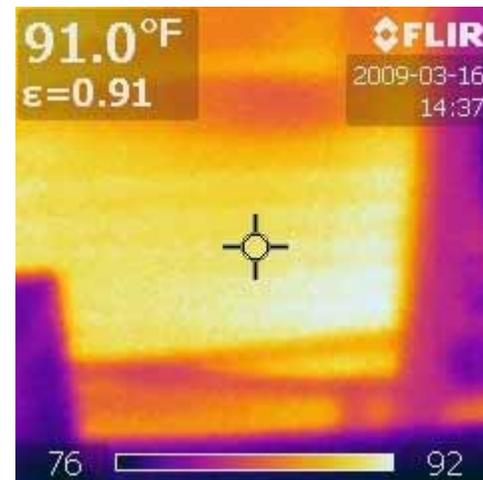


Photos taken March 16, 2009

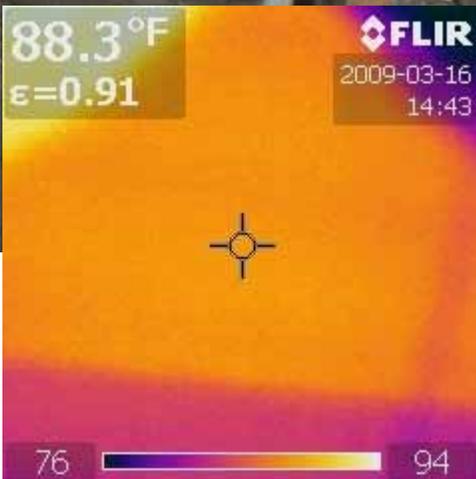
# Infrared Photos of the West Side Interior



Comparing Interior Temperature of area that has a panel that was primed only with Metal Primer against the rest of the exterior wall coated with EnviroCoatings



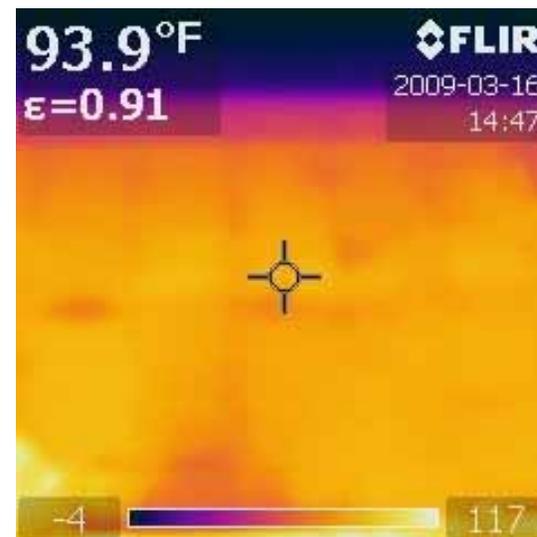
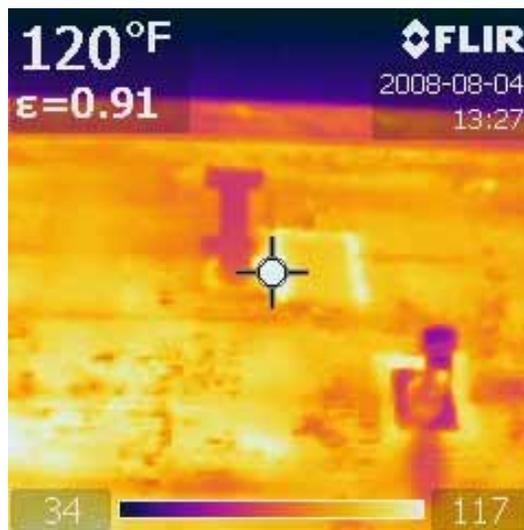
# Infrared Photos of the Interior Crown



Above the door  
to the Animal  
Quarantine Area

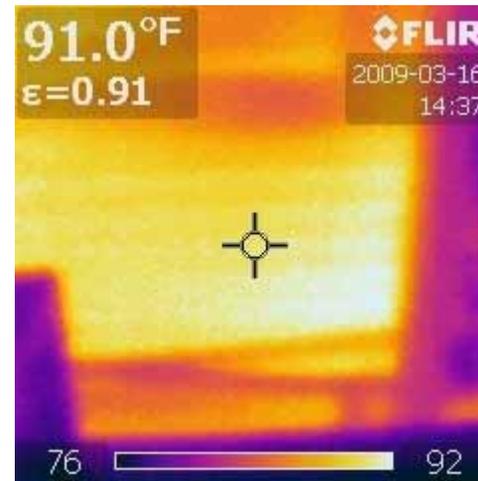
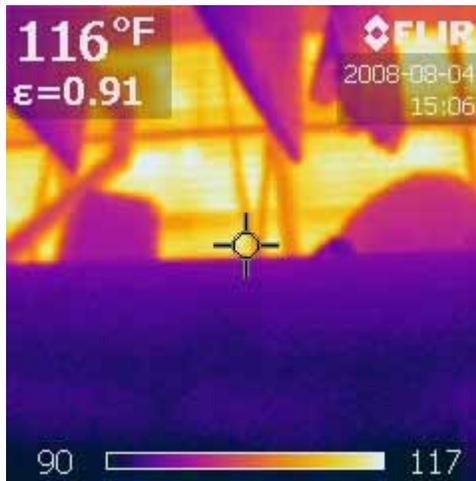
# Comparisons - West Side Exterior

- August 4, 2008
- Bright, Sunny sky
- 84°F ambient air temperature
- March 16, 2009
- Bright, Sunny sky
- 68°F ambient air temperature



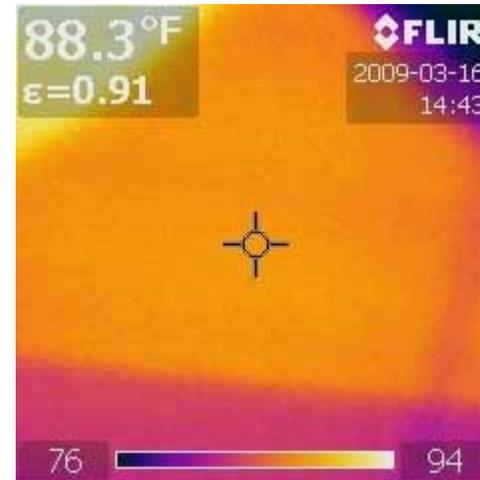
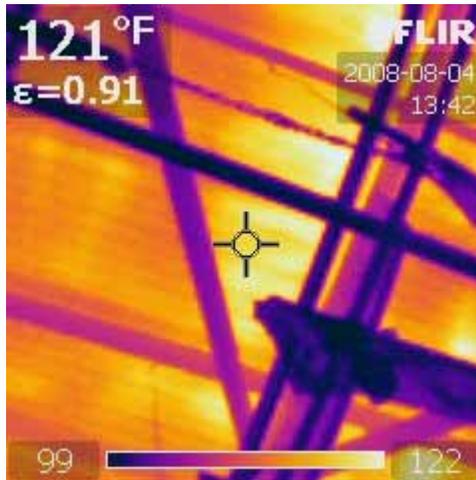
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# Comparisons - Interior Crown

- August 4, 2008
- Bright, Sunny sky
- 84°F ambient air temperature
- March 16, 2009
- Bright, Sunny sky
- 68°F ambient air temperature



# Initial Conclusions

After application of EnviroCoatings  
Ceramic InsulCoat Exterior Wall:

1. Exterior surface temperatures have decreased 17% - 22% ↓
2. Interior surface temperatures have decreased 22% - 27% ↓

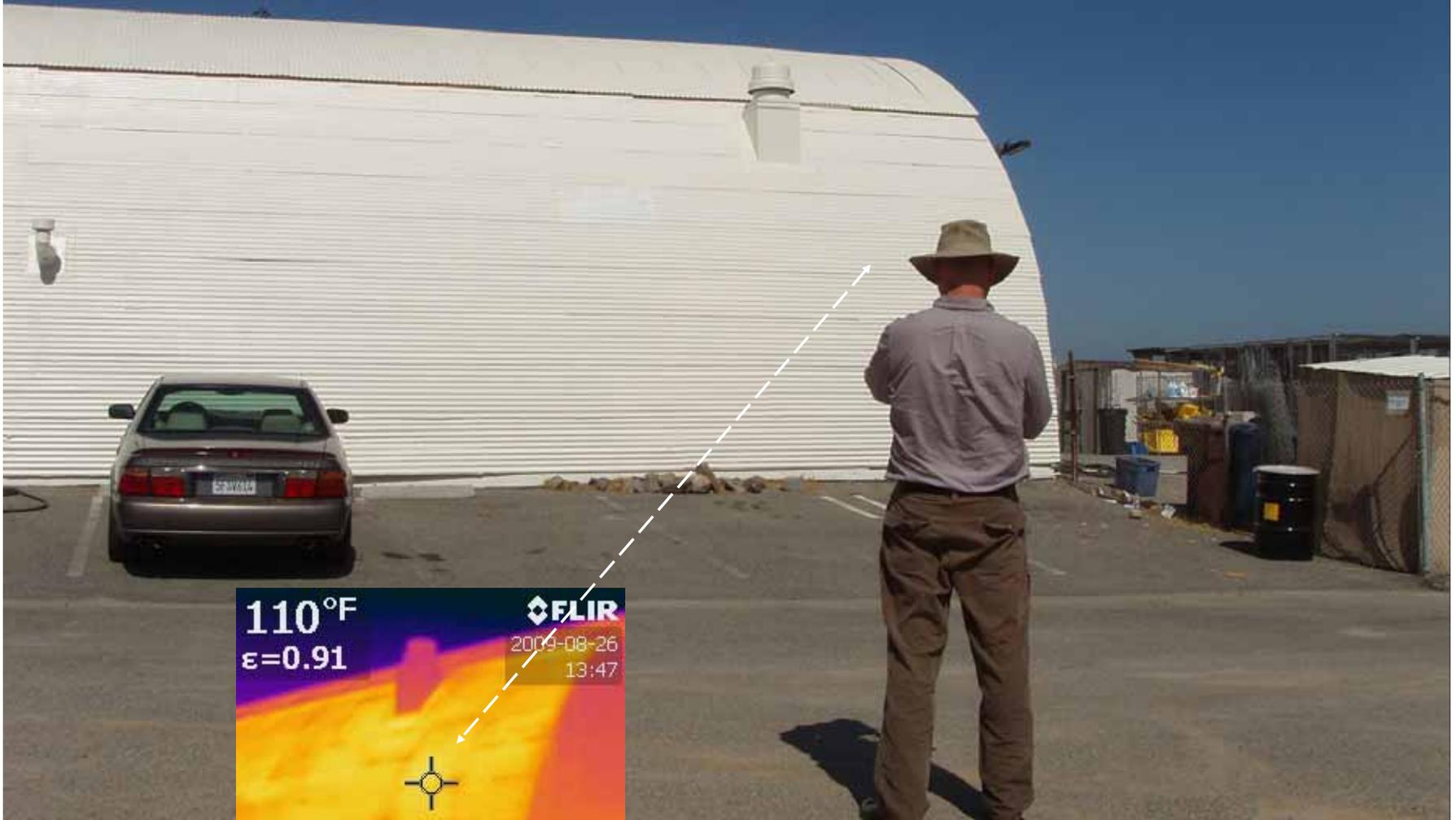
# Fair Comparisons

- Need data taken on a day with similar weather conditions of August 4, 2008:

*Bright, Sunny Sky with 84° F ambient air temperature*

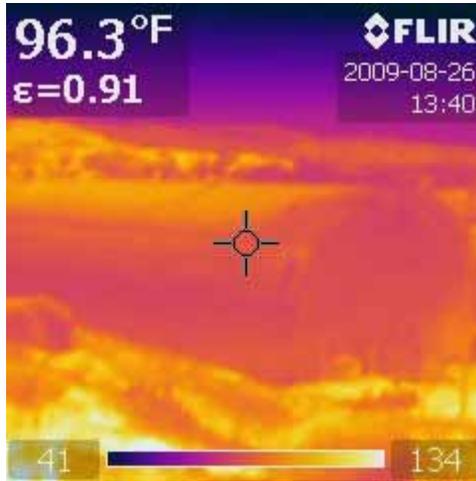
- Take additional thermal (infrared) photographs during Summer 2009 and compare results

Bright, Sunny Sky with 97° F ambient air temperature

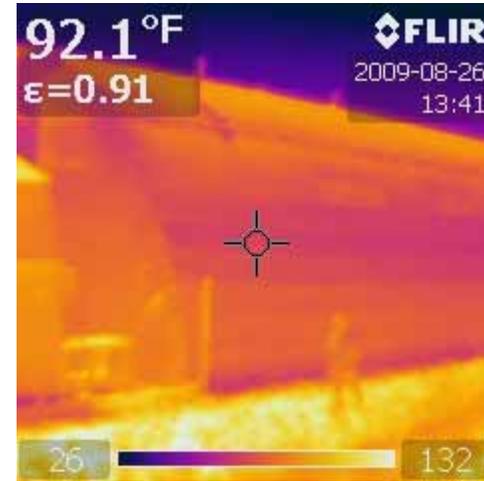


Photos taken August 26, 2009

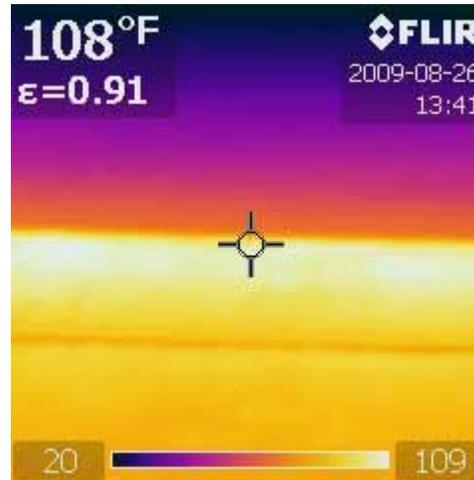
# Infrared Photos of the East Side Exterior



Northeast Corner (Front Entrance)

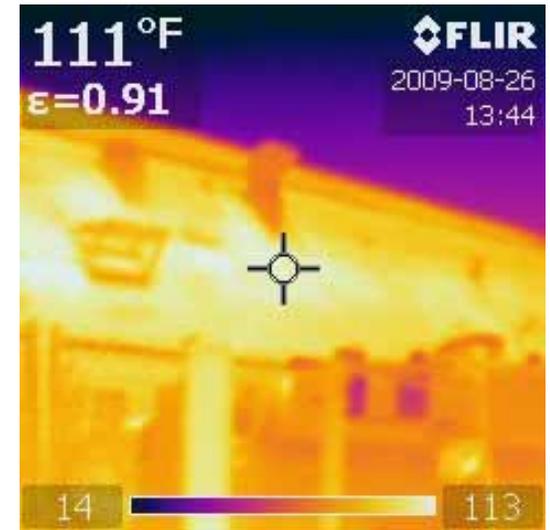
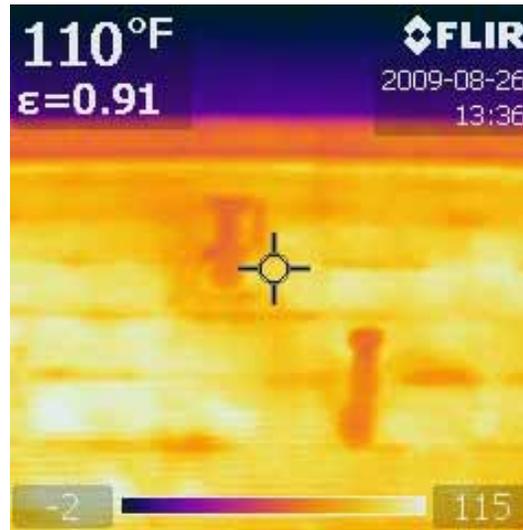
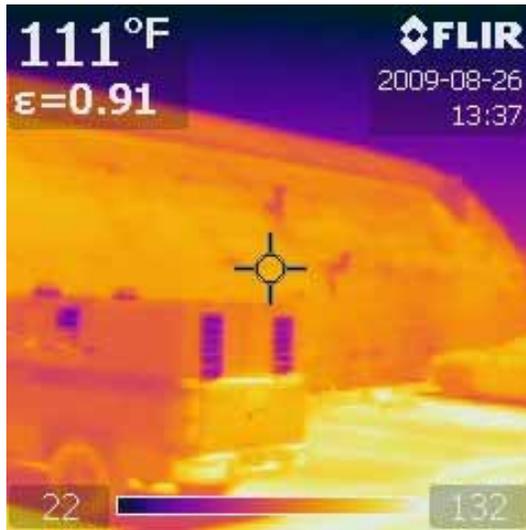


Southeast Corner (Rear Entrance)



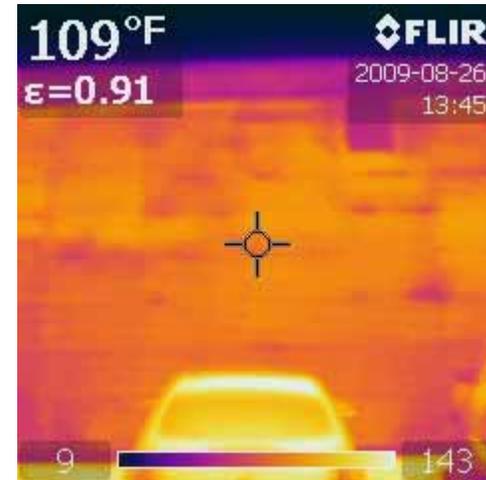
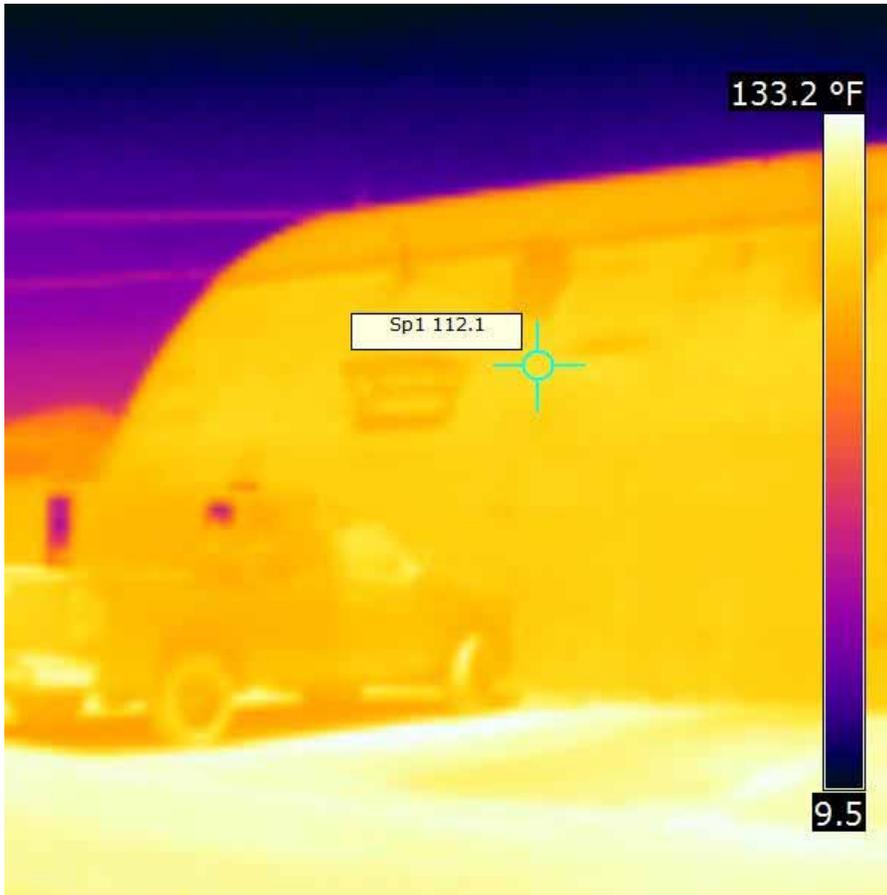
Crown from East Side

# Infrared Photos of the West Side Exterior

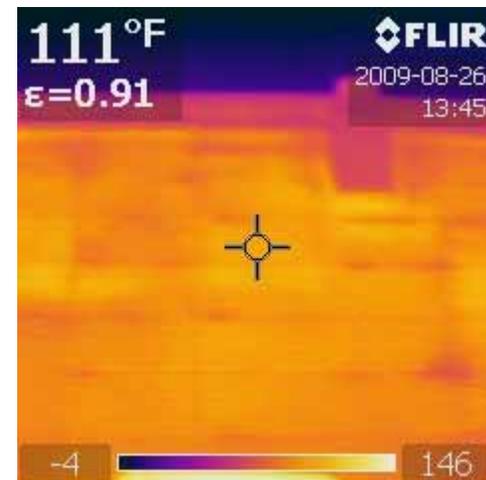


Attempted to have similar photographs as those that were taken on August 4, 2008

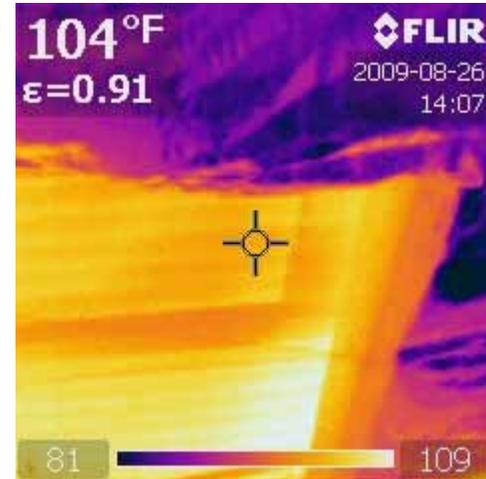
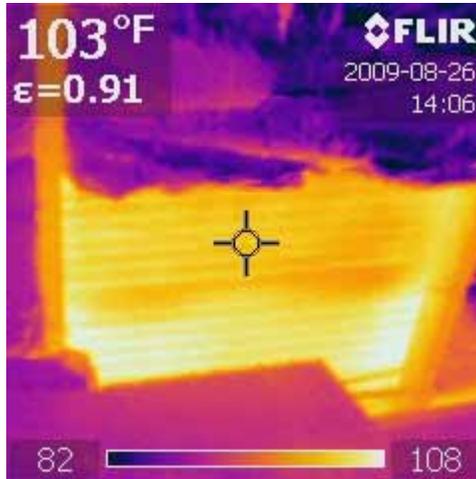
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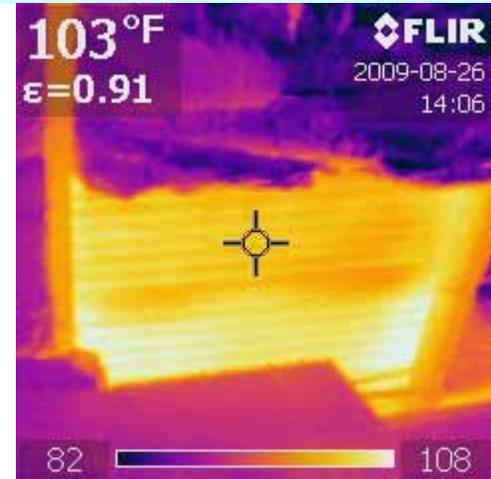
Note the surface temperature of the roof and trunk of the parked car.



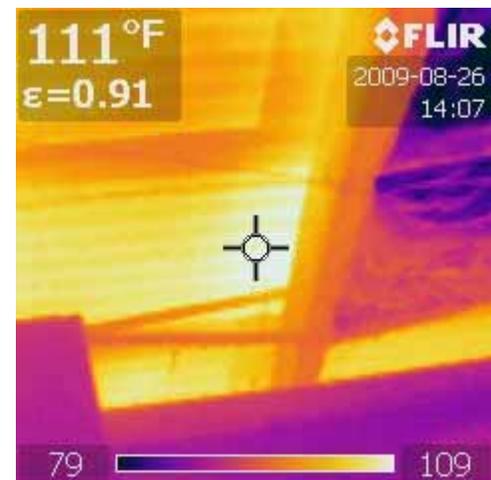
# Infrared Photos of the West Side Interior



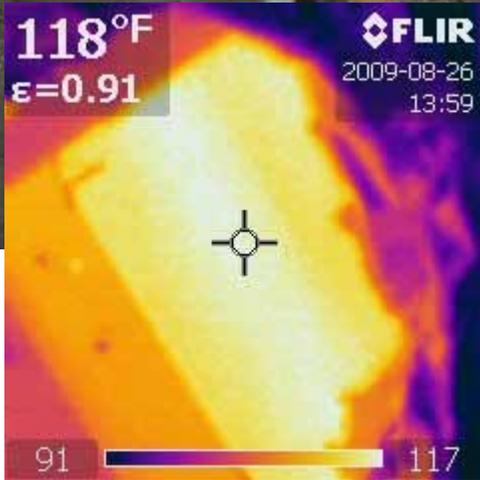
# Infrared Photos of the West Side Interior



Comparing Interior Temperature of area that has a panel that was primed only with Metal Primer against the rest of the exterior wall coated with EnviroCoatings



# Infrared Photos of the Interior Crown



Above the door  
to the Animal  
Quarantine Area

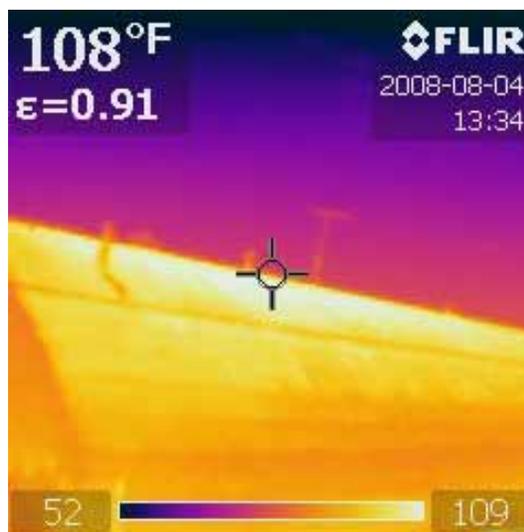
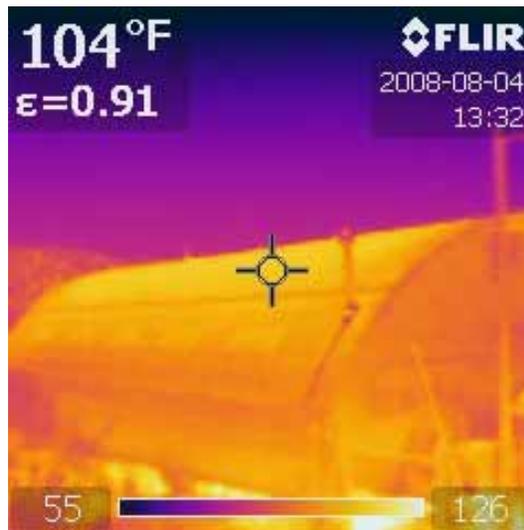
# Comparisons - Weather Conditions

- *August 4, 2008*
- *Bright, Sunny sky*
- *84°F ambient air temperature*
- *August 26, 2009*
- *Bright, Sunny sky*
- *97°F ambient air temperature*

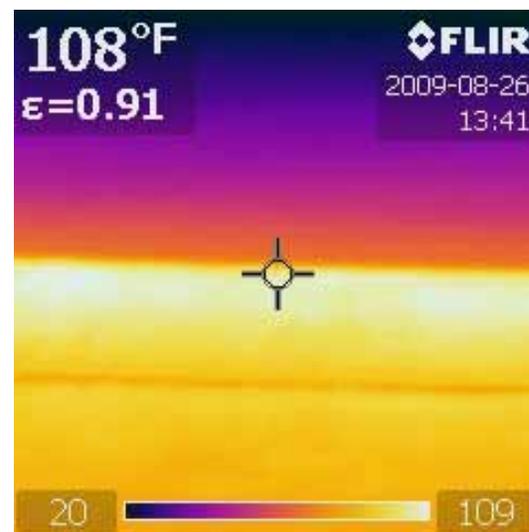
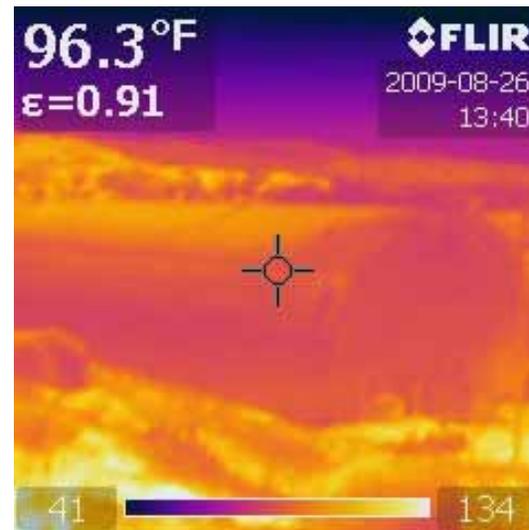
**+13°F increase in ambient air temperature  
or  
+15% increase in ambient air temperature**

# Comparisons - East Side Exterior

- August 4, 2008

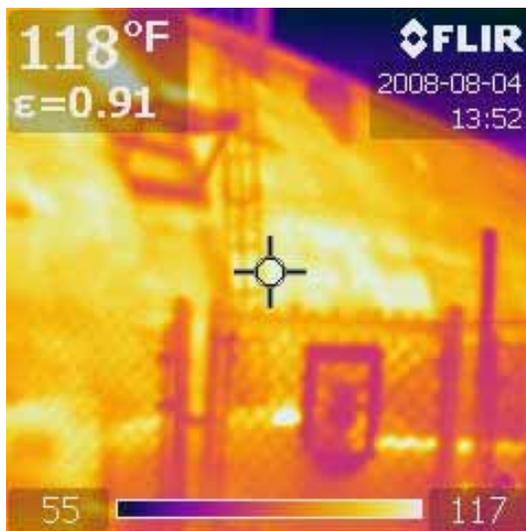


- August 26, 2009

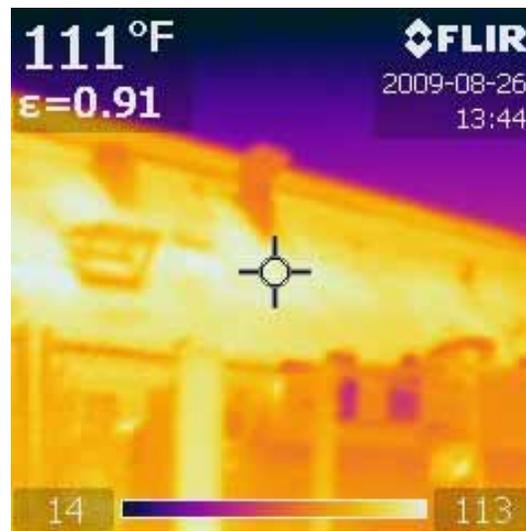
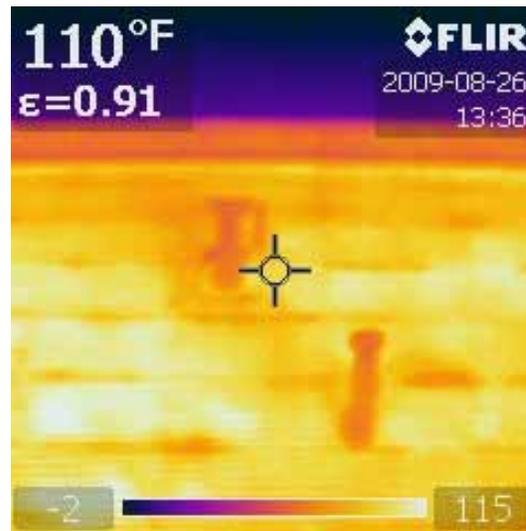


# Comparisons - West Side Exterior

- August 4, 2008

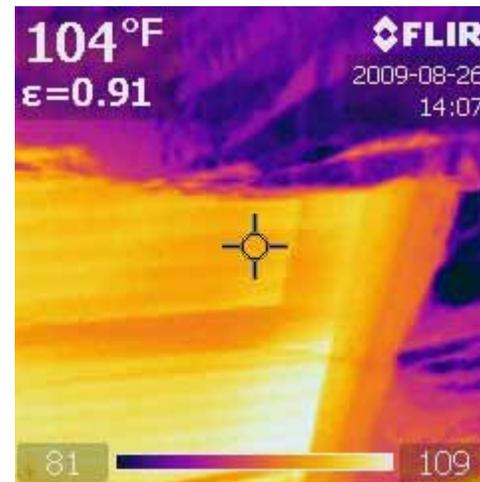
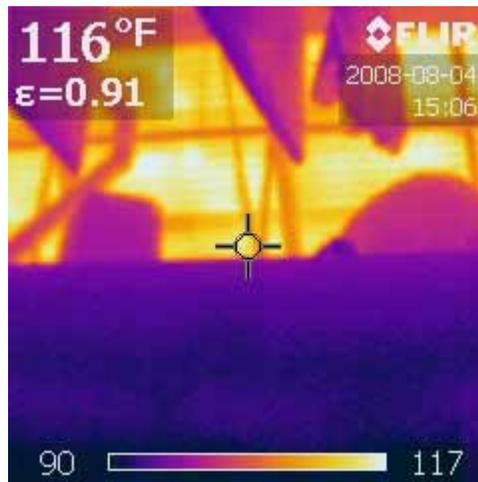


- August 26, 2009



# Comparisons - West Side Interior

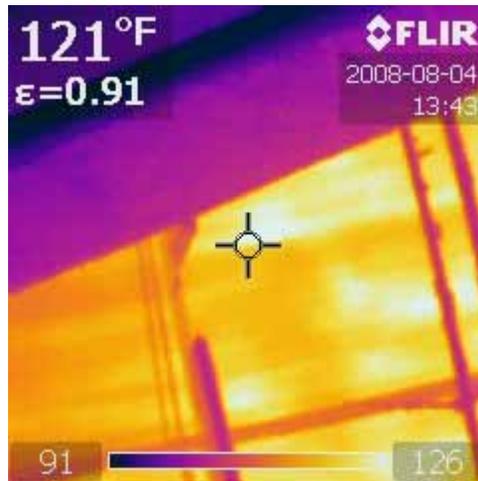
- August 4, 2008
- Bright, Sunny sky
- 84°F ambient air temperature
- August 26, 2009
- Bright, Sunny sky
- 97°F ambient air temperature



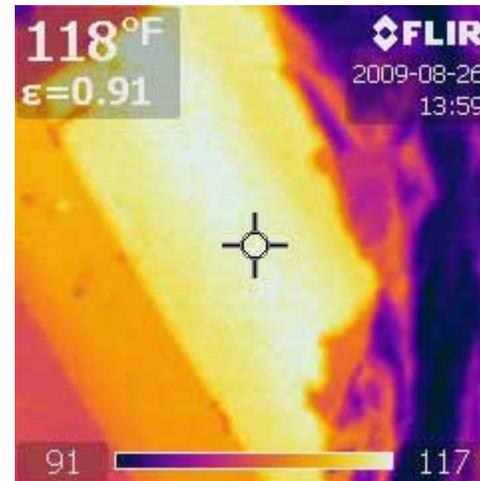
Lower panel in photo was painted only with Metal Primer

# Comparisons - Interior Crown

- August 4, 2008
- Bright, Sunny sky
- 84°F ambient air temperature
- August 26, 2009
- Bright, Sunny sky
- 97°F ambient air temperature



(Maximum temperature is 126°F)



(Maximum temperature is 118°F)

# Results - 2009 versus 2008

1. Ambient air temperature increased  
 $+13^{\circ}\text{F} = +15\% \uparrow$

2. Exterior surface temperatures decreased from  
 $0^{\circ}\text{F}$  to  $\langle 5^{\circ}\text{F} \rangle \approx 0\%$  to  $\langle 4\% \rangle \downarrow$

3. Interior Crown surface temperatures decreased  
 $\langle 8^{\circ}\text{F} \rangle \approx \langle 6\% \rangle \downarrow$

4. Interior West Wall surface temperatures decreased  
 $\langle 12^{\circ}\text{F} \rangle \approx \langle 10\% \rangle \downarrow$

# Conclusions

*After the application of*

*EnviroCoatings Ceramic InsulCoat Exterior Wall:*

1. The Thermal Heat Load on the building exterior and interior surfaces has dropped.
2. The Energy needed to cool (and heat) the building will decrease.
3. This will result in lower Utility costs.
4. It will improve Occupant Comfort.



**EnviroCoatings**

**Ceramic Thermal Barrier  
Performance Coating Systems**

*SINCE 1960*



Questions and Comments?

# EnviroCoatings

would like to acknowledge the following entities  
for their cooperation in the completion of  
and permission to use this

## Case Study:

- Marine Corps Base Camp Pendleton, Energy Office
- Marine Corps Base Camp Pendleton, Animal Control
- Marine Corps Air Station Camp Pendleton, Headquarters and Headquarters Squadron, Operations - Weather
- Marine Corps Base Camp Pendleton, Public Affairs Office