



# ENERGY SAVING ROI: THREE YEARS & BEYOND

SOLUTIONS FOR A STRESSED BUILDING  
STRUCTURAL LOAD & A POTENTIAL ICE-INDUCED  
ROOF COLLAPSE IN MICHIGAN



**15**  
**YEAR GUARANTEE**  
 NO ICE.  
 NO CONDENSATION.  
 NO COST.

**BEFORE**      **AFTER**

## The Problems

After meeting with a Michigan facility in the Spring of 2017, Vapor Armour learned of the following concerns:

**PROBLEM #1**

severe icing and condensation in a distribution freezer and cooler

**PROBLEM #2**

A decreasing ability of the refrigeration system to maintain adequate temperature inside the freezer and cooler in the warmer months

## The Solutions

As a result of the findings, facility leaders contracted Vapor Armour to:

**SOLUTION: STEP #1**

install Vapor Armour™ vapor barrier to the Freezer, Cooler and Loading Dock perimeters

**SOLUTION: STEP #2**

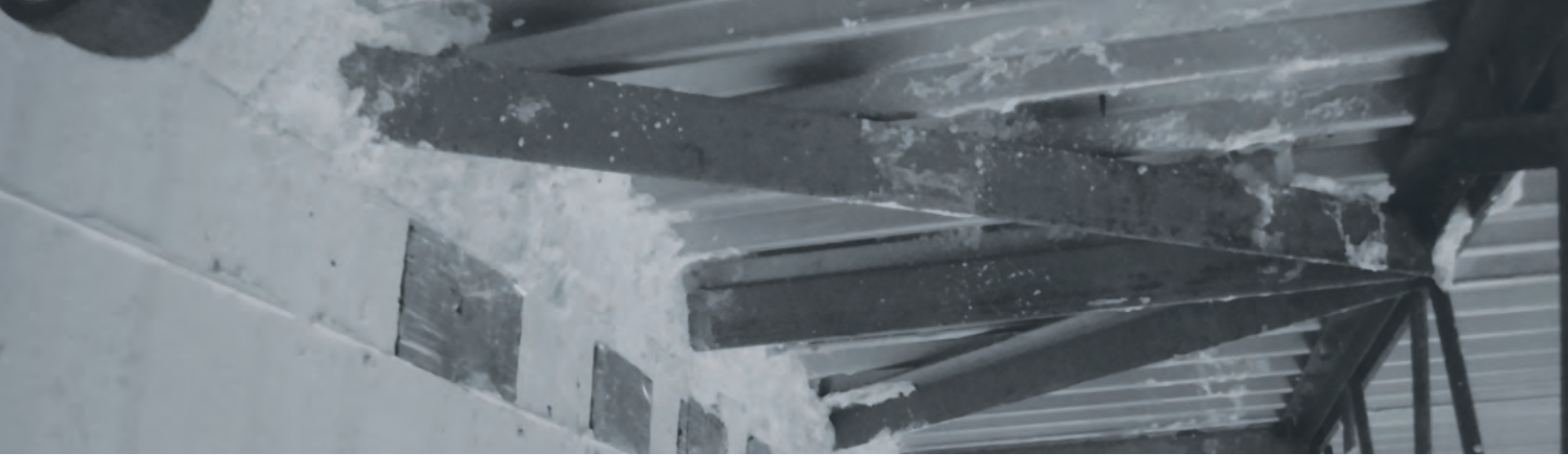
install VA's patented expansion joint in the freezer portion of the building

**PHYSICAL PLANT SPECS**

- A 238,000 sq. ft. multi temperature distribution center:
- 90,425 sq. ft. -10° Freezer with 9" Poly-iso insulation
  - 98,175 sq. ft. 35° Cooler with 7" Poly-iso insulation
  - 18,400 sq. ft. 40° Loading dock with 6" Poly-iso insulation

**INDUSTRY-LEADING APPROACH**

Vapor Armour performed a free, invasive Forensic Evaluation of the facility, and took Thermal Images and Core Samples to determine the extent of the issues.



## Forensic Evaluation

It is more important than ever for us to maintain a food-safe facility and maintain our budgets to comply with the USDA, FDA, and Insurance Audits — and all of that is possible with Vapor Armour's Free Virtual Forensic Evaluation. For this Michigan facility, here's what we did:

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### STEP 1: VISUAL INSPECTION

- A. Customer was correct: our VISUAL inspection indicated major icing inside the freezers and some build-up on the loading docks and condensation in the coolers. Visual inspection of the freezer and cooler area indicated massive air infiltration from outside the facilities through a failed perimeter seal between the roof to IMP connection.
- B. Icing inside the freezer area was so severe that the sprinkler system was encapsulated inside an ice ball approximately 4 feet tall and 8 feet long.
- C. Condensation was dripping inside the cooler and was putting product at risk of contamination.

### STEP 2: THERMAL IMAGING

- A. Warm air was pouring into the facility from the perimeter and the encased sprinkler was in direct line with that warm air current.
- B. The dripping inside the cooler portion was also being caused by a stream of warm air hitting the cooler surfaces and dripping on product - risking product contamination.
- C. The thermal imaging showed temperatures as warm as 28° entering the freezer and 57° entering the cooler.
- D. The entire perimeter of both the freezer and cooler showed an extremely hot signature and approximately 40' to 60' from the exterior edge of the building were veins of ice in 20' foot swaths. This indicated a substantial portion of the roofing insulation had been compromised from air infiltration.

### STEP 3: CORE SAMPLING

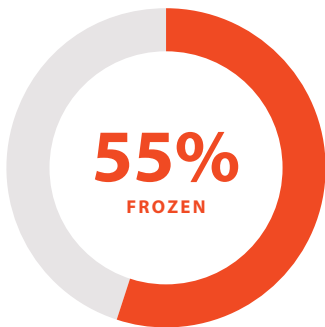
From the thermal imaging, we needed to confirm the roof deck status below the surface by drilling cores through the roof membrane to the roof deck and viewing the samples – we needed to cut core samples. We drilled 30 such core samples:

- 40 feet' into the field from the freezer perimeter, dense frozen insulation had resulted and the condition in the cooler was much worse with completely saturated insulation 80' around the perimeter. The entire loading dock area had no viable insulation remaining.
- Vapor Armour's forensic evaluation determined the loss of R-value of the insulation was the cause of the temperature issues the facility was experiencing.
- The loading dock perimeter was water saturated.



## Key Findings & Extent of the Concern

From the Forensic Evaluation, it was determined:



### CONCERN #1

Of the 90,425 sq. ft. -10° freezer, 49,600 sq. ft had frozen insulation



### CONCERN #2

76,800 of the 98,175 sq. ft insulation inside the 35° Cooler was contaminated.



### CONCERN #3

Of the 18,400 sq. ft. loading dock, 100% of the insulation was contaminated.

### CONCERN #4

Vapor Armour's forensic evaluation determined the **FAILED PERIMETER VAPOR BARRIER** caused a **HIGH LOSS OF INSULATION R-VALUE** which in turn **CAUSED THE TEMPERATURE ISSUES** the facility was experiencing.



## Project Results

We can discuss the results from this project in at least 5 variants: Specific Concerns recalculated to actual, Future Results, Energy Savings, ROI, and FSMA regulatory compliance.



### ENERGY SAVINGS

The reduction in energy usage attributable to Vapor Armour vapor barrier installation was over 25%. This represents a yearly savings of at least \$90,600 per annum.



### FUTURE RESULTS

We provided a Building Envelope 20-year Systems Warranty, ensuring the building envelope will be free from leaks, contaminated insulation, ice and condensation for 20 years.

## 25% ROI

PAYBACK IN JUST 48 MONTHS

### RETURN ON INVESTMENT

Based on a simple pay back analysis (ROC), the cost of the project divided by the energy savings alone gives a payback of less than 48 months.



### FSMA & OTHER REGULATORY COMPLIANCE

With this VA building envelope replacement and 20-year warranty, Ice or Condensation caused by vapor leaks or vapor barrier discontinuity is eradicated and the building is FSMA Compliant.



## In Summary (Energy Saving ROI: Three Years and Beyond)

As documented, this contamination, the ice and condensation were easily visible to the naked eye. The contaminated — wet and frozen — insulation was obvious. The roof membrane was beyond its usefulness. The project of replacing the building envelope while the operation continued immediately affected a return. Eradicating the condensation and ice insures there will be no FSMA violations from Vapor Drive.

Because of the ROI, this project will pay for itself in a little more than 3 years just from the energy savings alone and those savings will continue beyond the first 3 years. Finally, there should be peace of mind knowing this building envelope will continue its efficiency for at least 20 years.