

# TEST REPORT

The Intertek logo consists of the word "Intertek" in a white, sans-serif font, centered within a dark blue rounded rectangular background.

**REPORT NUMBER: 3179554-SAT-C**  
ORIGINAL ISSUE DATE: May 29,2009  
REVISED DATE: N/A

**EVALUATION CENTER**  
Intertek Testing Services NA Inc.  
16015 Shady Falls Rd.  
Elmendorf, TX 78112

## RENDERED TO

TPR<sup>2</sup> Corporation  
161 Interstate Lane  
Waterbury, CT 06705

PRODUCT EVALUATED: Agribalance™ soy based open cell foam 5 ½" walls  
and 10" ceiling with 19 mil TPR<sup>2</sup> Fireshell® F10E intumescent coating  
EVALUATION PROPERTY: Heat Release, Flame Spread

**Report of testing Agribalance™ soy based open cell foam with  
19 mils TPR<sup>2</sup> Fireshell® F10E for compliance with the applicable  
requirements of the following criteria: NFPA 286 with acceptance  
criteria (AC 377 Appendix A.**

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## 2 Introduction

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Intertek Testing Services NA (Intertek) has conducted testing for TPR<sup>2</sup> Corporation, on *Agribalance*<sup>TM</sup> soy based open cell spray foam covered with TPR<sup>2</sup> Fireshell® F10E on the walls only to evaluate heat release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with NFPA 286 and AC 377 Appendix A comparing PN (3161466-007) tested on October 30, 2008. This was *Agribalance*<sup>TM</sup> and ¼" BC plywood that had fire out the door at 4:29 (min/sec). This evaluation was performed on October 30, 2008.

## 3 Test Samples

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### 3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. The spray foam was applied on September 22, 2008.

### 3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The test specimen consisted of three walls with 2x8 studs, 16 inches o.c. and 2x12 joists, 24 inches o.c. with a 15/32 inch plywood backing. The final interior dimensions were 8 feet high, 8 feet wide and 12 feet deep. Ceiling joists ran parallel to the short dimension of the room. The corner was constructed such that two studs met at their edges, forming a 90° angle.

On top of this substrate, the spray foam was applied to a thickness of 5 1/2 inches on the walls and 10 inches on the ceiling. There was no significant over spray outside of the cavities. The wall foam, studs, ceiling foam, and joists were covered with 19 mils of TPR<sup>2</sup> Fireshell® F10E intumescent coating.

See Photos in Appendix B for a visual depiction of the description.

## 4 Testing and Evaluation Methods

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This standard describes a method for determining the contribution of textile wall and ceiling coverings to room fire growth during specified fire exposure conditions. This method is not intended to evaluate the fire endurance of assemblies, nor is it able to evaluate the effect of fires originating within the wall assembly. The method is not intended for the evaluation of floor finishes.

This method is to be used to evaluate the flammability characteristics of finish wall and ceiling coverings when such materials constitute the exposed interior surfaces of buildings. This test method does not apply to fabric covered less than ceiling height, freestanding, prefabricated

panel furniture systems or demountable, relocatable, full-height partitions used in open building interiors. Freestanding panel furniture systems include all freestanding panels that provide visual and/or acoustical separation and are intended to be used to divide space and may support components to form complete work stations.

This fire test measures certain fire performance characteristics of finish wall and ceiling covering materials in an enclosure under specified fire exposure conditions. It determines the extent to which the finish covering materials may contribute to fire growth in a room and the potential for fire spread beyond the room under the particular conditions simulated. The test indicates the maximum extent of fire growth in a room, the rate of heat release, and if they occur, the time to flashover and the time to flame extension beyond the doorway following flashover. It does not measure the fire growth in, or the contribution of, the room contents. Time to flashover is defined herein as either the time when the radiant flux onto the floor reaches 20 kW/m<sup>2</sup> or the temperature of the upper air reaches 600°C. A pair of crumpled single sheets of newspaper are placed on the floor 2 feet out from the center of the rear wall and front walls to determine flashover. The spontaneous ignition of this newspaper provides the visual indication of flashover.

The potential for spread of fire to other objects in the room, remote from the ignition source, is evaluated by measurements of:

1. The total heat flux incident on the center of the floor.
2. A characteristic upper-level gas temperature in the room.
3. Instantaneous net peak rate of heat release.

The potential for the spread of fire to objects outside the room of origin is evaluated by the measurement of the total heat release of the fire.

## **TEST EQUIPMENT AND INSTRUMENTATION**

### **IGNITION SOURCE**

The ignition source for the test is a gas burner with a nominal 12- by 12-inch porous top surface of a refractory material. The burner used at this laboratory is filled with a minimum 4-inch layer of Ottawa sand.

The top surface of the burner through which the gas is applied is positioned 12 inches above the floor, and the burner enclosure is located such that the edge of the diffusion surface is located 1 inch from both walls in the left corner of the room opposite from the door.

The gas supply to the burner is C.P. grade propane (99 percent purity). The burner is capable of producing a gross heat output of 40±1 for five minutes followed by a 160±5 kW for ten minutes. The flow rate is metered throughout the test. The design of the burner controls is such that when one quarter-turn ball valve is opened, the flow of gas to the burner produces 40 kW and when a second quarter-turn valve is opened the combined flow produces 160 kW.

### **COMPARTMENT GEOMETRY AND CONSTRUCTION**

The interior dimensions of the floor of the fire room, when the specimens are in place, measures 8 feet, by 12 feet. The finished ceiling is 8 feet  $\pm$  0.5 inches above the floor. The four walls are at right angles defining the compartment. The compartment contains a 30  $\pm$  0.25 by 80  $\pm$  0.25 inch doorway in the center of one of the 8' by 8' walls. No other openings are present to allow ventilation.

## **PROCEDURE**

### **SUMMARY OF METHOD**

A calibration test is run within 30 days of testing any material as specified in the standard. All instrumentation is zeroed, spanned and calibrated prior to testing. The specimen is installed and the diffusion burner is placed. The collection hood exhaust duct blower is turned on and an initial flow is established. The gas sampling pump is turned on and the flow rate is adjusted. When all instruments are reading steady state conditions, the computer data acquisition system and video equipment is started. Ambient data is taken then the burner is ignited at a fuel flow rate that is known to produce 40 kW of heat output. This level is maintained for five minutes at which time the fuel flow is increased to the 160 kW level for a 10-minute period. During the burn period, all temperature, heat release and heat flux data is being recorded every 6 seconds. At the end of the fifteen minute burn period, the burner is shut off and all instrument readings are stopped. Post test observations are made and this concludes the test.

All damage is documented after the test is over, using descriptions, photographs and drawings, as is appropriate.

#### **4.1. TEST STANDARD**

NFPA 286. as defined in AC 377 Appendix A

## 5 Testing and Evaluation Results

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### 5.1. RESULTS AND OBSERVATIONS

#### FIRE TESTS

The test was started at 10:07 am on October 30, 2008. The ambient temperature was 66°F with a relative humidity of 66%. The data acquisition system was started and the burner was ignited. Events during the test are described below:

<b>TIME (min:sec)</b>	<b>OBSERVATION</b>
0:00	Ignition of burner. Heat output set to 40 kW.
0:27	The walls began to discolor and smoke.
0:50	There was intermittent ignition on walls.
1:05	The back wall ignited.
1:35	The right wall ignited.
2:00	Flames on the back wall began to decrease.
3:00	The room's smoke ceiling was approximately 5 feet from the floor.
5:00	The burner was increased to 160 kW.
5:10	Flames reached the ceiling and emitted a thick black smoke.
6:02	The second stud cavity on the back wall ignited.
6:24	The paper target of the floor ignited indicating flashover conditions. (Fail)
6:30	Flames spread to the 8 foot extremity on the back wall.
6:34	Flames exited the door. Test terminated.

#### Post Test Observations:

The intumescent and foam were heavily charred.

For additional details, see the post-test photographs later in this report.

## 6 Conclusion

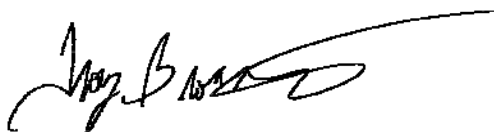
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The sample submitted, installed, and tested as described in this report displayed high levels of heat release, high upper level temperatures, and had flames exiting the test chamber. The heat flux on the floor did reach flashover levels. The sample did not spread flames to the ceiling during the 40 kW exposure.

NFPA 286 does not publish pass/fail criteria. One must consult the codes to determine pass fail.

This specimen **Met** the criteria for ICC-ES AC 377 Appendix A in comparison to PN (3161466-007) Agribalance foam covered with ¼" BC plywood on October 30, 2008.

### INTERTEK TESTING SERVICES NA

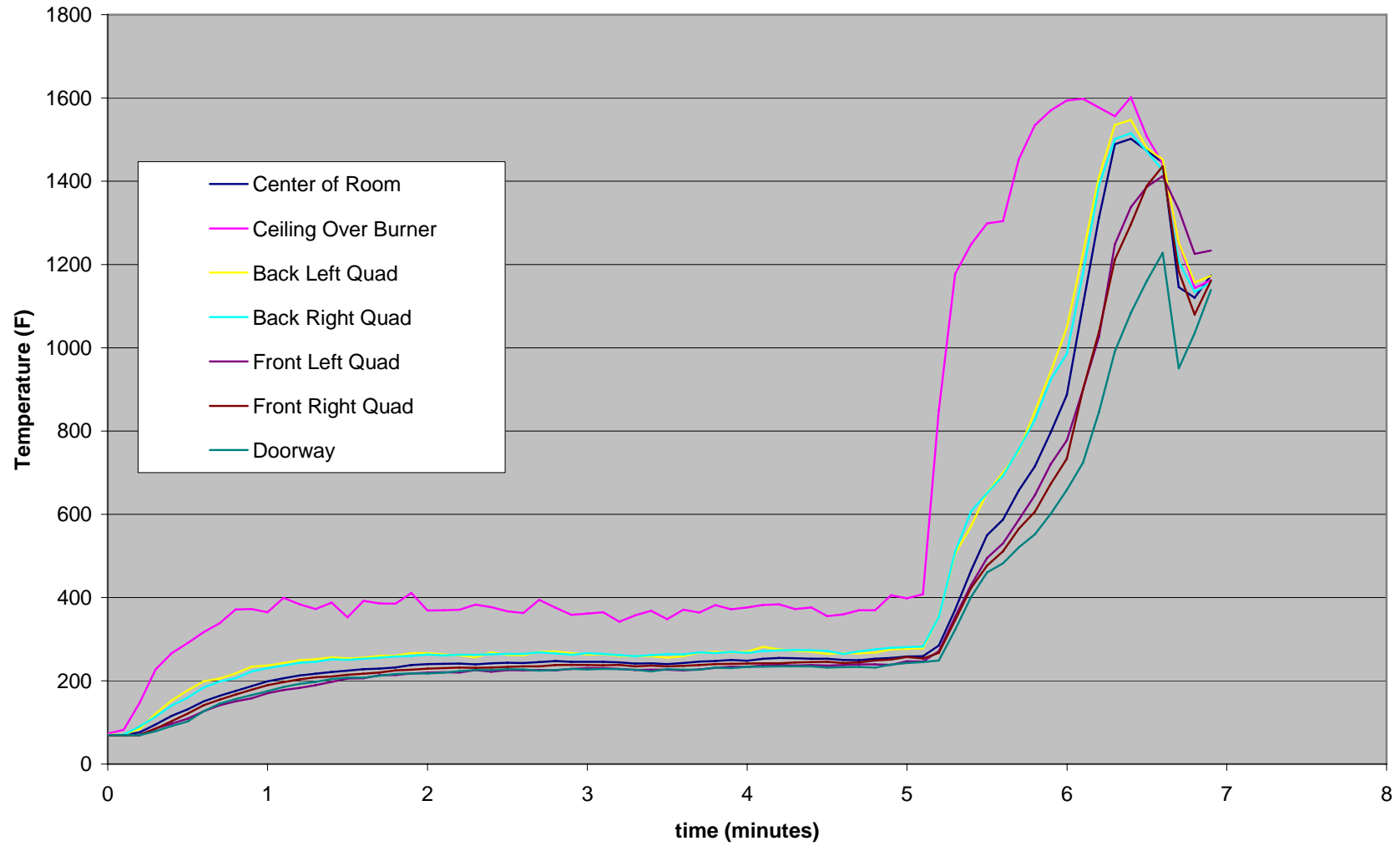
Reported by:   
Troy G. Bronstad  
Team Leader, Building Products

Reviewed by:   
C. Anthony Peñaloza  
Flammability Testing Team Leader, Building Products

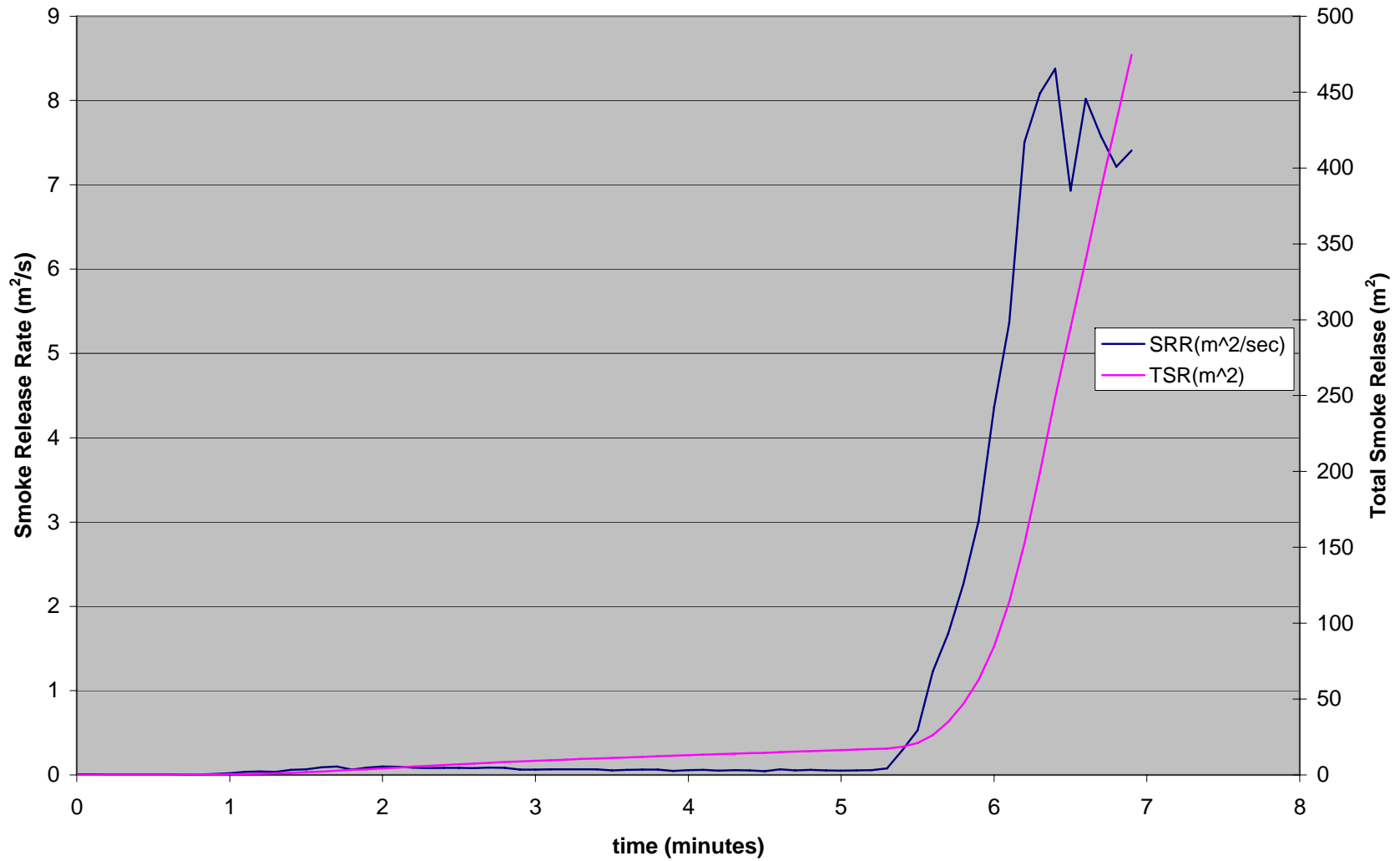
## APPENDIX A

Test Data

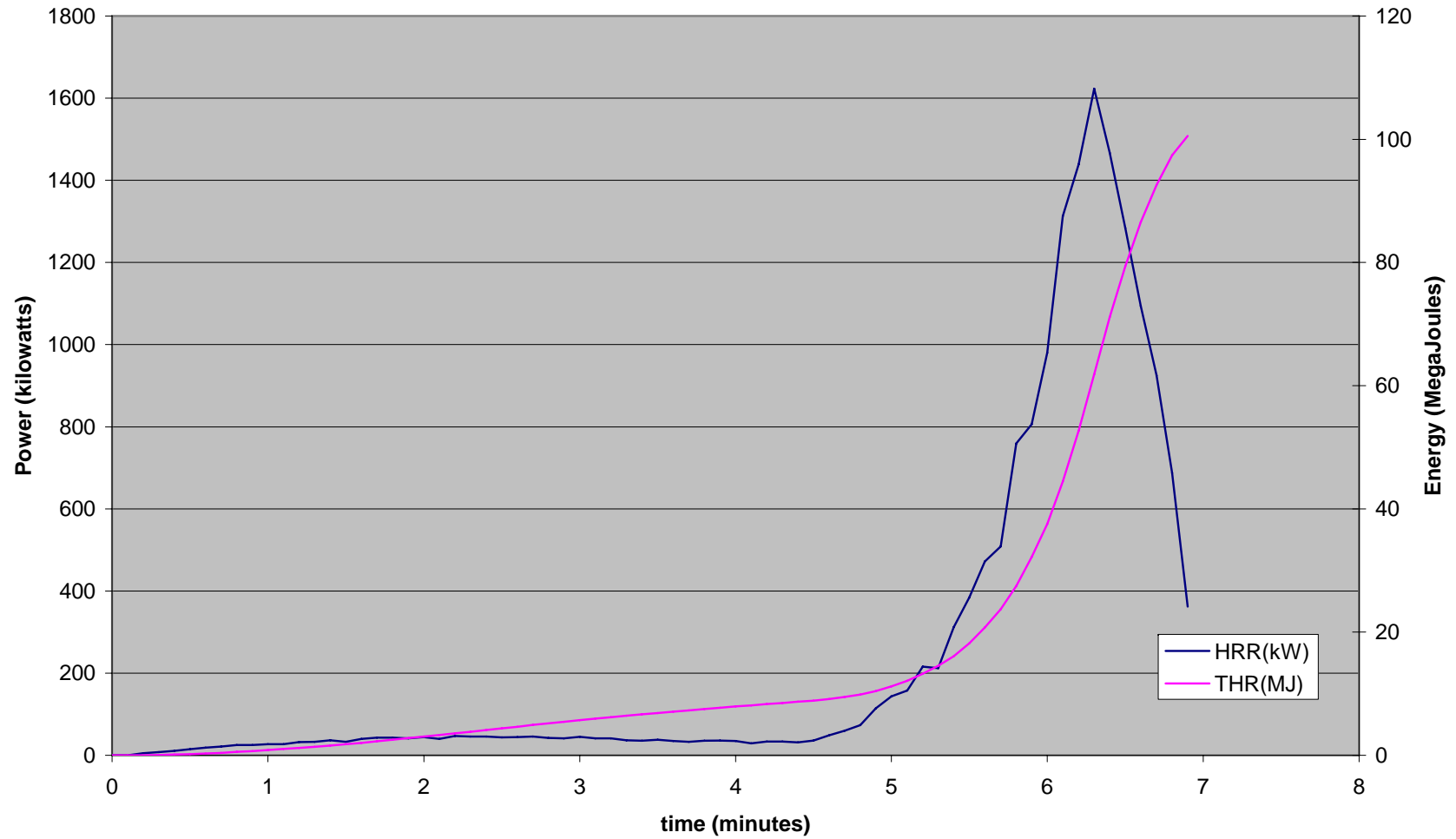
### Thermocouple Data



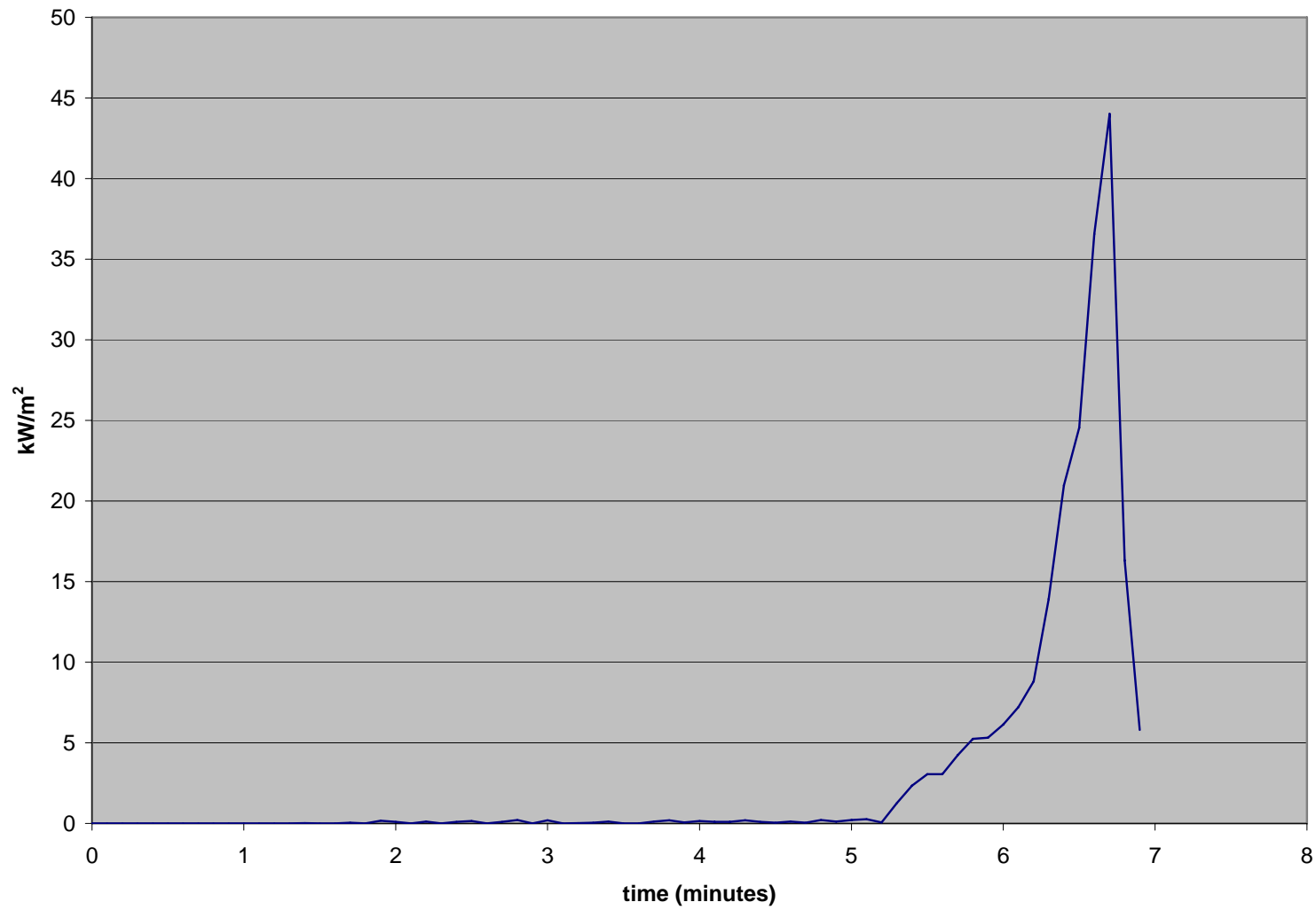
### Smoke Release



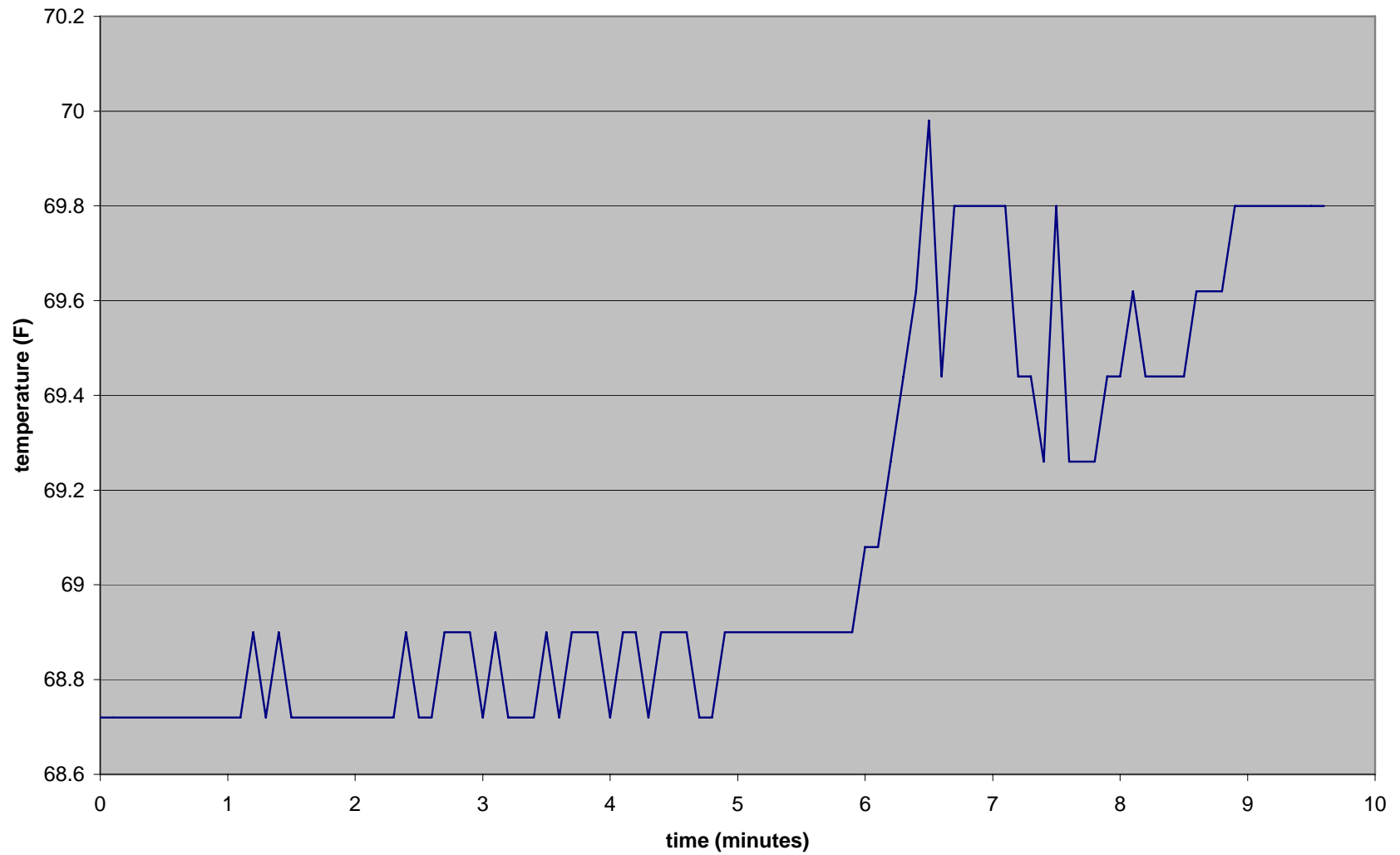
### Heat Release



Heatflux



Exterior TC



## APPENDIX B

Photographs



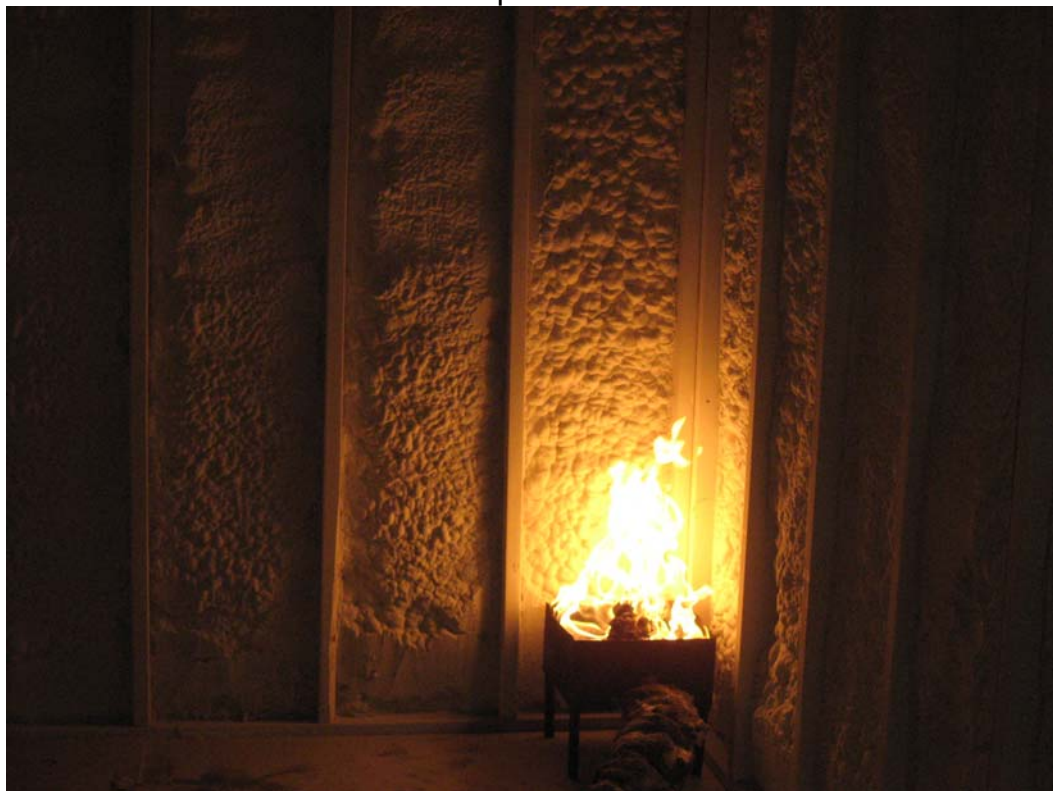
Pre-test photo back wall



Pre-test photo ceiling



Pre-test photo corner.



Start of test. 40kW



Test photo. Ignition.



Test photo



Test photo. Flashover and ignition of paper target.



Post-test photo



Post-test photo



Post test photo

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## REVISION SUMMARY

<b>DATE</b>	<b>SUMMARY</b>
May 29, 2009	First issue. No revisions.