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FIRE ENDURANCE TEST OF THERMO-LAG® 330-1 FIRE PROTECTIVE ENVELOPES (Common Enclosure With Three 18 in. Cable Trays and Covered 18" Tray with 1 in. and 5 in. Air Drops)

Project No. 11960-97187
(Volume 1 of 2)

FIRE ENDURANCE TEST TO QUALIFY A PROTECTIVE ENVELOPE FOR CLASS 1E ELECTRICAL CIRCUITS

November 18, 1994

Prepared For:

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in cooperation with

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ABSTRACT

A stack of three 18 in. wide x 4 in. deep steel ladderback cable trays , clad with a nominal thickness of 5/8 in. Thermo-Lag® 330-1 (with one-half in a common enclosure) and a single 18 in. wide x 4 in. deep steel ladderback cable tray with a solid cover and a 1 in. and 5 in. air drop, clad with a nominal thickness of 5/8 in. Thermo-Lag® 330-1 and various upgrades as described herein, were evaluated in accordance with the Tennessee Valley Authority TEST PLAN "One Hour Fire Endurance Tests of Cable Trays Protected With The TSI Thermo-Lag Fire Barrier System," Revision 1, and Supplement 1 to the U.S. Nuclear Regulatory Commission Generic Letter 86-10 (with exceptions as noted herein).

The details, procedures and observations reported herein are correct and true within the limits of sound engineering practice. All specimens and test sample assemblies were produced, installed and tested under the surveillance of either Tennessee Valley Authority's or the testing laboratory's in-house Quality Assurance Program. This report describes the analysis of a distinct assembly and includes descriptions of the test procedure followed, the assembly tested, and all results obtained. All test data are on file and remain available for review by authorized persons.

Herbert W. Stansberry II
Project Manager

12/1/94
Date

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INTRODUCTION

The protection of vital electrical circuits from the effects of an external fire exposure is of primary concern in the design and construction of an electrical power generating plant. Typical "fire protective envelopes" are designed to protect the contents of an electrical raceway for fire exposure periods of one to three hours, during which time the electrical circuitry must remain functional.

The external fire exposure selected to evaluate protective envelope systems is that described in the ASTM E119-88 Fire Tests of Building Construction and Materials (E119 Time-Temperature Curve, described later in this document).

Typical fire test programs involve the selection and construction of a specific electrical raceway system, instrumentation for thermal and circuit integrity measurements, followed by the application of the protective envelope system by qualified personnel.

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment that takes into account all the factors that are pertinent to an assessment of the fire hazard of a particular end use.

OBJECTIVE

The objective of this project was to evaluate a specific assembly for use as a 1-hour fire-protective envelope for redundant electrical systems. The entire program was carried out in accordance with the Tennessee Valley Authority (TVA), TEST PLAN, *One Hour Fire Endurance Tests of Cable Trays Protected with the TSI Thermo-Lag Fire Barrier System*, Revision 1 and Supplement 1 to the U.S. Nuclear Regulatory Commission Generic Letter 86-10 (with exceptions as noted herein), both of which may be found in Appendix B of this document. For reasons of clarity and to reduce redundancy, many items discussed in the Test Plan have not been duplicated elsewhere in this document.

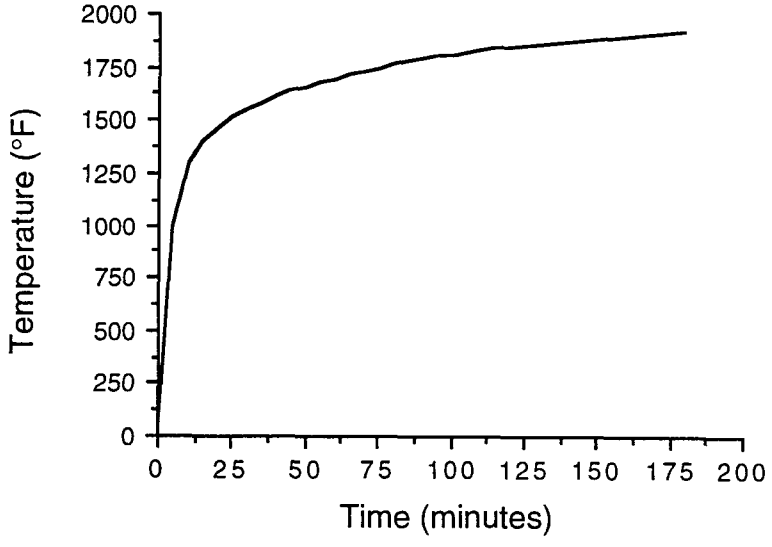
TEST PROCEDURE

FIRE TEST FURNACE

The test furnace is designed to allow the specimen to be uniformly exposed to the specified time-temperature conditions. It is fitted with symmetrically located propane gas burners designed to allow an even heat flux distribution across the surface of a test specimen.

The temperature within the furnace is determined to be the mathematical average of thermocouples located symmetrically within the furnace and positioned 12 in. away from representative parts and locations of the test specimen. The exact positioning of the thermocouples is such that the average fire exposure across the entire test specimen can be determined. The materials used in the construction of these thermocouples are those suggested in the E119 test standard. During the performance of a fire exposure test, the furnace temperatures are monitored at least every 15 seconds and displayed for the furnace operator to allow control along the specified temperature curve. All data is printed to paper every 30 seconds and saved to magnetic disk every minute.

The fire exposure is controlled to conform with the standard time-temperature curve shown in Figure 1, as determined by the table below:



Temperature (°F)	Time (min)
1000	5
1300	10
1462	20
1550	30
1700	60
1792	90
1850	120
1888	150
1925	180

Figure 1

The test furnace used consists of a large horizontal exposure chamber, with internal dimensions of 12 ft (length) by 7 ft (width). The furnace is equipped with

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diffuse-flame propane gas burners symmetrically located across the floor of the furnace and controlled by individual gas flow valves, with the overall gas flow to the furnace being controlled by a single gas control valve. Capable of a maximum heat output of 5 million Btu/hour, these burners are arranged well below the exposed face of the specimen to ensure an even temperature at the surface of the specimen. Windows are located on two sides of the furnace to allow observation of the specimen during fire exposure. The depth of the furnace is variable, being increased to the desired amount by the addition of concrete blocks around the perimeter ledge. These blocks are lined with ceramic fiber blanket to minimize the heat loss from the furnace and to decrease the time required for the furnace walls to heat up. For these tests, the walls are built up from their normal height of 40 in. to a total height of slightly over 79 in. from the furnace floor to the top of the ledge.

The fire test is controlled according to the standard time-temperature curve, as indicated by the average temperature obtained from the readings of the furnace interior thermocouples symmetrically located across the specimen, 12 in. away. The thermocouples are enclosed in protection tubes of such material and dimensions that the time constant of the thermocouple assembly lies between 5.0 and 7.2 minutes, as required by the E 119 standard. The furnace temperature during a test is controlled such that the area under the time-temperature curve is within 10% of the corresponding area under the standard time-temperature curve for the one hour test period.

The furnace pressure is controlled to be as nearly neutral with respect to the surrounding laboratory atmosphere as possible, measured at the vertical mid-height of the test specimen. Adjusting the neutral plane at that position results in a nominal +0.015 in. WC pressure at the top of the specimen (under the surface of the deck) and –0.015 in. WC pressure at the bottom of the specimen.

THERMOCOUPLES

Temperatures on the interior of the fire protected systems were measured with Type K, 24 gauge, Chromel-Alumel electrically welded thermocouples formed from Chromel and Alumel wires of "special limits of error (±1.1°C)," and covered with Teflon® PFA insulation. The Teflon® insulation material begins to break down at temperatures above 500°F. Temperature readings above 500°F can not be guaranteed as accurate since the thermocouple conductors may no longer be adequately separated. Thermocouples installed on the steel support members under the 3M material were covered with standard fiberglass braided insulation.

DATA ACQUISITION SYSTEM

The outputs of the test article thermocouples and furnace probes are monitored by a total of three data acquisition systems consisting of: 1) a John Fluke Mfg. Co., Model HELIOS 2289A Computer Front End, a John Fluke Mfg. Co., Model HELIOS 2281A Extender Chassis, and an Apple Computer Co., Macintosh Classic microcomputer, yielding a channel capacity of 200 channels, 2) a John Fluke Mfg. Co., Model HELIOS 2289A Computer Front End and an Apple Computer Co., Macintosh Classic microcomputer, yielding a channel capacity of 100 channels, and 3) an IOTech TempScan 1000, six IOTech TempScan 1000 EXP10 expansion chassises, an IOTech SCSI to IEEE488 Buss Converter, and an Apple Computer Co., Macintosh Centris 650 microcomputer, yielding a channel capacity of 416 channels. The HELIOS Computer Front Ends are connected to the RS422 Serial Interface Port of the Macintosh Classic Computers and the Extender Chassis is serially connected to one HELIOS Computer Front End. The TempScan units are daisy-chained together and connected via an IEEE488 buss to the SCSI to IEEE488 converter. The converter is then connected to the Macintosh Centris 650 via the SCSI port. The computers are programmed in Microsoft BASIC to command the data acquisition units to sample the data input lines, receive and convert the data into a digital format, and to manipulate the raw data into usable units for display on screen and paper and for storage on hard disk.

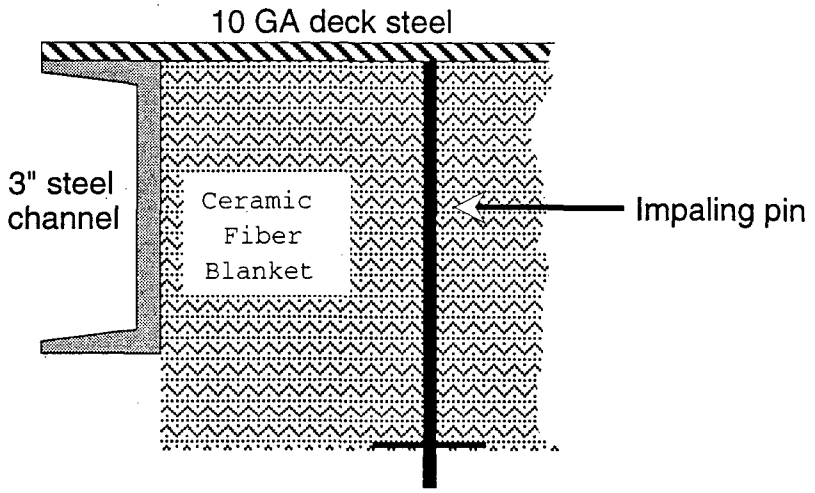
HOSE STREAM TEST

According to the Test Plan, following the fire exposure test, the test specimen is removed from the test furnace, lifted approximately 6 ft. from the ground (as measured from the lowermost part of the specimen), slowly turned (nominally 6 to 8 revolutions per minute) and exposed to the impact, erosion, and cooling effects of a hose stream directed perpendicular to the exposed surface of the test specimen as outlined in the standard. The stream is delivered, for a minimum period of 5 minutes, through a 1-1/2 in. fog nozzle with an adjustable stream, with a nozzle pressure of 75 psi, a spray angle of 30° and with the tip of the nozzle a distance of 5 ft. from the exposed face. The nozzle is to flow a minimum of 75 gpm during the hose stream test. It is recognized that, with a three-dimensional object, not all surfaces can be attacked by the hose stream test. For this reason, the specimen is lifted high enough to allow the stream to play against the sides, inside and outside vertical surfaces and the underside of the item, resulting in little, if any, direct force being applied to the inside top surface of the specimen.

TEST ASSEMBLY

TEST DECK

The test deck consisted of a perimeter of 3 in. structural steel channel, welded together into an 8 ft by 13 ft rectangle, with the flanges outward. Over the top of this framework, a layer of 10 GA steel sheet was welded to form a continuous, smooth top. Pipe sockets (4 in. ø, sch. 40 steel pipe) were then welded onto each corner, so that 3 in. ø steel pipe legs could be attached to hold the assembly at a comfortable working level. Following the installation of the test item, the deck was reinforced with steel channel positioned so as to minimize any warping, bending or sagging during the fire test (the size of the channel being selected on the basis of the amount of stiffness required for that particular assembly), and then insulated on the fire-side with two 2 in. thick layers of 6 pcf ceramic fiber blanket, held in place with impaling pins, spaced a maximum of 12 in. o.c. The figure below illustrates a cross-sectional view of one edge of a typical deck assembly, showing the structural steel, the decking and the insulation.



TEST ITEMS (GENERAL)

As with cable tray and conduit materials installed at TVA's Nuclear Power Plants (NPP), the materials used in the test were subjected to on-site commercial grade dedication programs prior to acceptance and subsequent installation. The cable tray used in the test were provided by various vendors, and were similar in design and representative of those installed in TVA's NPPs.

Electrical cables used in this test were also provided by TVA. Cables used were as follows:

DESCRIPTION	DIAMETER (in.)	CROSS-SECTIONAL AREA (in^2)	WEIGHT (lbs/lin. ft.)
4/C #16 AWG 600v.	0.443	0.154	0.240

The diameter and cross-sectional area listed herein represent the Laboratory's average of ten measurements of the cable type.

WEIGHT OF RACEWAY AND CONTENTS

RACEWAY	CABLING (lbs/lin. ft.)	CABLE TRAY/CONDUIT (lbs/lin. ft.)	TOTAL (lbs/lin. ft.)
Top 18" Tray	0.00	4.00	4.00
Middle 18"Tray	0.00	4.00	4.00
Bottom 18" Tray	0.00	4.00	4.00
Rear 18" Tray	77.04	6.30 (with cover)	83.34
5" Air Drop	10.56	10.56	10.56
1" Air Drop	0.00	0.00	0.00

* Bare #8 copper conductor is considered negligible and is therefore not included

Thermo-Lag® 330-1 Materials

Thermo-Lag® 330-1 materials were supplied by Thermal Science, Inc. (TSI), St. Louis, MO. Each Thermo-Lag® 330-1 V-ribbed panel is 5/8 in. thick (nominal) x 47 in. wide x 77 in. long, with the stress skin monolithically adhered to the panel on one face. The stress skin is installed adjacent to the surface of the protected device. All Thermo-Lag® 330-1 panels were measured, saw cut and installed onto the respective test assembly by Tennessee Valley Authority craft personnel (insulators) using approved TVA drawings, procedures and specifications. The phases of installation and inspection were under direct supervision of TVA engineers.

Other Materials

Materials used in conjunction with Thermo-Lag® 330-1 components, but furnished by other vendors to TVA as commercial grade products included: 16 GA type 304 stainless steel annealed tie wire, external stainless steel stress skin

ASTM E-437 (type 304, plain weave and 8x8 square wire cloth, 0.017 in. wire diameter).

TEST ITEM (CABLE TRAY)

The front portion of the test deck was fitted with a nested stack of three 18 in. steel cable trays. The trays all contained a radial bend on one side and a squared bend on the opposite side. All three of the cable trays passed through the steel deck turned horizontally for distance then turned upward and again passed through the steel deck. The outer tray had a horizontal dimension of 116 in. and dropped 58 in. into the furnace. The middle tray had a horizontal dimension of 92 in. and dropped 46 in. into the furnace. The inner tray had a horizontal dimension of 68 in. and dropped 34 in. into the furnace.

The rear portion of the test deck was fitted with a single 18 in. steel cable tray that passed through the upper steel deck, transitioned to a horizontal run through a radial bend, ran horizontally and turned back up through the upper steel deck with a squared bend. The tray had a horizontal dimension of 108 in. and dropped 36 in. into the furnace. The horizontal section, the radial bend and the vertical section above the radial bend were fitted with a steel solid cover, raised approximately 4 in. above the top surface of the tray side rails. A 5 in. diameter conduit stub was mounted through the upper steel deck, 18 in. from the back of the vertical tray section above the squared bend, centered over the rear tray side rail. The air drop entered the cable tray directly below the conduit stub. A 1 in. diameter conduit stub was mounted through the upper steel deck, 12 in. from the back of the vertical tray section above the squared bend, centered over the front tray side rail. This air drop entered the cable tray in the vertical section approximately 12 in. above the squared bend.

Drawings of the test item and supports are located in Appendix A: Construction Drawings.

RACEWAY SUPPORTS

The three stacked cable trays were supported and held in position by a single "trapeze" type hanger using 3 in. steel channels bolted and welded together with horizontal members at three different levels. The free ends of the vertical channels were attached to 6 in. long sections of 4 in. x 4 in. x 1/2 in. steel angle, by fillet welding the angle to the sides of the channel. The angle sections were then attached to the 10 GA steel deck skin using 1/2 in. threaded steel rod and nuts. The angle sections were separated from the deck skin with two layers of 2 in. thick calcium silicate board (Promat Fire Protection, Inc., Promat-L Board). The

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hanger was centered on the tray assembly. A second "trapeze" type hanger was similarly constructed (using only one horizontal member) to secured the single rear cable tray.

ELECTRICAL CABLES

Electrical cables were installed in the rear cable tray in this test assembly to determine the affects on the performance of the barrier systems where cables have been random filled in the cable tray such that the cables extend above the cable tray side rail height in the center of the cable tray . The cable tray was loaded with cables stacked in a pyramid fashion. The cable tray had a maximum usable cross-sectional areas of 72 in^2 (the 4 in. maximum usable depth multiplied by the 18 in. maximum usable width).

Electrical cables were also placed in the 5 in. air drop at the request of a USNRC representative as a "dummy load". The installation procedure used by TVA installers requires that pre-shaped conduit section used for cladding air drops by completely filled with trowel grade material prior to installation. The excess material squeezes out of the seams and is removed leaving an air drop whose cables are completely encased in Thermo-Lag® 330-1 material with having air gaps. This installation technique would result in a single bare #8 copper with (instrumented with thermocouples) surrounded by a 5 in. diameter casing of Thermo-Lag® 330-1 material. The "dummy load" of 44 4C/#16 AWG electrical cables was not instrumented with thermocouples as directed in USNRC 86-10, Supplement One (exception No.1 to 86-10 - no thermocouples in air drop containing cables).

The table below outlines the number of cables installed and the percent of total area taken up in each raceway.

RACEWAY	NUMBER PRESENT	CROSS-SECTIONAL AREA	% OF TOTAL AREA (in^2)	TOTAL WEIGHT (lbs/lin. ft.)
Rear Tray	321	49.386	68.59	77.04
5" Conduit	44	6.769	34.48	10.56

THERMOCOUPLE PLACEMENT

In order to monitor temperatures in the interior of the raceways, bare #8 AWG stranded copper wire was instrumented with 24 gauge, Type K, Chromel-Alumel electrically-welded thermocouples (Special Limits of Error: ±1.1°C, purchased

with lot traceability and calibration certifications) placed nominally every 6 in. along the length of wire. The thermocouples were attached to the bare #8 AWG stranded copper wire by placing the thermojunction in direct contact with the top surface of the wire and crimping the junction to the copper wire with a copper Buchanan 2011S open-end splice cap fastened in place with a Buchanan C-24 "pres-SURE" tool. Wires instrumented as such were installed on the tray rungs, centered between the tray rails, in each of the three stacked cable trays. Similar wires were also installed under the tray rungs, centered between the tray side rails, on the rear cable tray, and in each of the two air drops.

In order to get a realistic measurement of the temperatures on the cable tray side rail surfaces, similar thermocouples were positioned nominally every 6 in. along the cable tray side rails, being held in position by clamping under the head of a #8 x 32 x 1/4 in. long stainless steel round-head machine screw in a drilled and threaded hole at each location. Thermocouples were also positioned every 6 in. along the centerline of the steel tray cover on the rear tray in lieu of an instrumented bare #8 wire place on top of the cable bundle. The original design of the rear tray indicated that a cover be installed over the vertical tray section above the squared bend. The requirement for the cover in this area was later changed, leaving the top of the cable bundle uncovered. The thermocouples installed on this portion of the cover were deleted (exception No.2 to 86-10 - no thermocouples on top of bundle of cables in one portion of cable tray).

A hole in the steel deck was provided around each penetrating raceway and the perimeter of each hole was edged with 3 in. steel channel (flanges out). These blockouts were sealed with Dow Corning 3-6548 RTV silicone foam material (after installation of the fire barrier material onto the raceway). An internal seals was similarly constructed where the raceways exited the test furnace enclosure.

THERMO-LAG® 330-1 INSTALLATION HIGHLIGHTS

Thermo-Lag® 330-1 materials were installed in accordance with Tennessee Valley Authority design drawings and procedures. Short abstracts of the installation are included herein to clarify specific details. Drawings of the installed Thermo-Lag® 330-1 on the test assembly are shown in Appendix G.

Thermo-Lag® 330-1 V-Ribbed Panel (5/8 in. nominal thickness)

These panels were used to construct the cable tray enclosure, and to cover a portion of the structural support members.

Thermo-Lag® 330-1 Subliming Trowel Grade Material

This material was used to pre-butter all joints, seams and interior surfaces of the V-ribbed panels and pre-shaped sections, to fill in edges and to form the skim coat.

Thermo-Lag® 330-1 Pre-Shaped Conduit Sections (5/8 in. & 3/8 in. nominal thickness)

This material was used to construct the protective envelopes for the air drops.

3M M20A Mat

This material was used to cover a portion of the structural support members.

3/4 in. x 2 in. 10-Gauge Steel Angles

These angle were used to span along the stack of cable trays to provide support and a method of attachment for the Thermo-Lag® 330-1 panels. Threaded steel rod (3/8 in. diameter) was used to fasten the angles to the tray and secure the Thermo-Lag® 330-1 materials to the angles.

Application Methods

The 10 GA steel angles were cut to fit between the stacked trays. Threaded steel rod was used to connect the angle sections together and to clamp them onto the tray side rails. The enclosures for the cable trays were constructed from nominal 5/8 in. thick V-ribbed panels. The score and fold method was used for the bottom of the multiple tray enclosure and for each of the individual tray enclosures. The V-ribs were hammered flat at the tray edges and the 10 GA steel angle locations to obtain a tight fit. The panels were pre-buttered with trowel grade material where they mated to any metal or to another panel. They were secured to the raceway with fender washers and nuts and with stainless steel tie wires. All joints and seams were filled in with trowel grade material.

A skim coat of trowel grade material was applied to the enclosure and external stress skin installed in it while still wet. The external stress skin was secured to the enclosure with 1/2 in. long staples, fender washers and nuts. Another skim coat of trowel grade materials was applied over the external stress skin and allowed to dry. After the completed assembly had dried (approximately 24 fours), the final tie wires were installed on 6 in. spacing where possible.

The air drops (5 in. and 1 in.) were enclosed with one layer of nominal 5/8 in. pre-shaped conduit sections. An outer layer of 3/8 in. nominal pre-shaped conduit

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sections was then installed over the first layer. Each piece was pre-buttered and secured in place with stainless steel tie wire. The first layer was allowed to dry prior to the installation of the second layer. A skim coat of trowel grade material was applied over the second layer and external stress skin was wrapped around the enclosures. The external stress skin was secured with stainless steel tie wires on a maximum 6 in. spacing. A skim coat of trowel grade material was applied over the external stress skin and allowed to dry overnight. The final tie wires were installed on 6 in. maximum spacing.

The "Eighteen Inch Rule" for Thermo-Lag® 330-1 was applied to the supports. Three layers of 3M Corp. M20A mat were installed on the remaining portions of the vertical supports and were secured in place with 3M tape and stainless steel tie wire on 6 in. spacing. A collar (~6 in. wide) of M20A was installed over the M20A to Thermo-Lag® 330-1 interface joint.

TEST RESULTS

After allowing the completed test specimen to cure for minimum of thirty days, the completed test specimen was placed on the Laboratory's horizontal fire test furnace. The thermocouples were then connected to the data acquisition system and their outputs verified.

The test was conducted on September 20, 1994, by Herbert W. Stansberry II, Project Manager, with the following persons present:

Edward Connell	-	USNRC
J.J. Pierce	-	T.V.A.
Mark Salley	-	T.V.A.
Ben Loveless	-	T.V.A.
Bernard McQueen	-	T.V.A.
Rubin Feldman	-	TSI
Deggary N. Priest	-	Omega Point Laboratories, Inc.
Kerry Hitchcock	-	Omega Point Laboratories, Inc.
Connie Humphrey	-	Omega Point Laboratories, Inc.
Cleda Patton	-	Omega Point Laboratories, Inc.
Richard Beasley	-	Omega Point Laboratories, Inc.
Laudencio Castanon	-	Omega Point Laboratories, Inc.

The furnace was fired at 9:56 a.m. and the ASTM E119 standard time-temperature curve followed for a period of 60 minutes. The pressure differential between the laboratory surrounding the furnace and a point within the furnace level with the vertical midpoint of the exposed portion of the specimen was maintained at approximately 0.00 in. water column throughout the test. By 0:55

(min:sec) the outside surface of the test item was beginning to turn brown, and by 1:09 (min:sec) had ignited fairly uniformly across the exposed surfaces. By 3:13 (min:sec) the furnace was filled with intense smoke and heavy flaming. During the fire exposure, no visual openings into the raceway were observed.

At the end of the fire exposure period, the thermocouples were disconnected, the furnace extinguished and the specimen removed from the furnace. When the test item was removed from the furnace it was still flaming, which slowly decreased as it was positioned for the hose stream test. Prior to the hose stream test, the exposed surfaces of the test items were observed to be mostly covered with a layer of black ash and the external stress skin was observed to be exposed in spots where the skim coat of trowel grade material had peeled away.

The test specimen was elevated to a distance of approximately 6 ft. between the floor and the bottom of the test item and spun on a swivel at a rate of 6 – 8 revolutions per minute (to ensure exposure of as much of the exterior surface as possible) while being exposed to a 30° angle spray nozzle hose stream test with a minimum pressure at the nozzle of 75 psi at a distance of 5 feet, for a 5 minute duration. The minimum flow from the nozzle was 75 gpm.

Following the hose stream test, the Thermo-Lag® 330-1 pieces remained firmly affixed and the stainless steel tie wire was still tightly wrapped around the assembly. The layer of external stress skin was exposed in spots. Much of the outer layers of 3M material on the supports had become dislodged by the water hose stream. An in-depth description of the condition of the protective envelope is presented later in this document.

The significant temperatures within the raceway system at the end of the fire exposure test are presented in the table below. An explanation of the allowable limits is given following the table.

LOCATION	MAX. TEMP. (°F)	AVG. TEMP. (°F)
FRONT TOP 18" TRAY		
Front Tray Side Rail	301	264
Rear Tray Side Rail	318	277
Bare #8 Wire on Rungs	344	272
FRONT MIDDLE 18" TRAY		
Front Tray Side Rail	321	265
Rear Tray Side Rail	343	263
Bare #8 Wire on Rungs	345	267
FRONT BOTTOM 18" TRAY		
Front Tray Side Rail	331	258
Rear Tray Side Rail	330	255
Bare #8 Wire on Rungs	343	271
REAR 18" TRAY		
Front Tray Side Rail	268	225
Rear Tray Side Rail	241	218
Bare #8 Wire under Rungs	285	229
Tray Cover	278	223
5 " AIR DROP BARE #8	199	182
1 " AIR DROP BARE #8	214	206

The average initial temperature for all thermocouples at the start of the test was 78°F, yielding an allowable temperature increase of 250°F, or 328°F actual for the average temperatures. (A 325°F increase above the 90°F initial temperature yields a maximum allowable individual temperature of 403°F) All of the thermocouples on within both of the cable tray systems and both air drops met the stated criteria.

Post-Test Examination

Immediately following the hose stream test, the test item was systematically disassembled and examined for damage and general condition. A listing of those findings follows. In all cases, when describing a particular Thermo-Lag® 330-1 V-Ribbed Panel or Pre-Shaped Conduit Section, the term "panel" or "pre-shaped section" will be used, respectively.

FRONT 18 in. CABLE TRAY COMMON ENCLOSURE

LOCATION	OBSERVATION
Outside vertical section.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 1/4 in. to 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Inside vertical section and top horizontal section.	Up to 3/4 in. char depth across panel. Stress skin exposed along edges of panel. Approximately 1/4 in. to 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Bottom horizontal section.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 3/8 in. char depth under outer stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Sides of common enclosure.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 3/8 in. char depth under outer stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.

LOCATION (cont.)	OBSERVATION
End of common enclosure, between stacked cable trays.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining in outer panel. Inner panels completely intact.

TOP FRONT 18 in. CABLE TRAY (individually wrapped portion)

LOCATION	OBSERVATION
Outside vertical section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Inside vertical section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Top horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Bottom horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Tray side rails.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 1/4 in. to 3/8 in. char depth under stress skin. Between 1/4 in. and 3/8 in. uncharred materials remaining against rails.

MIDDLE FRONT 18 in. CABLE TRAY (individually wrapped portion)

LOCATION	OBSERVATION
Outside vertical section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Inside vertical section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Top horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Bottom horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Tray side rails.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 1/4 in. to 3/8 in. char depth under stress skin. Between 1/4 in. and 3/8 in. uncharred materials remaining against rails.

BOTTOM FRONT 18 in. CABLE TRAY (individually wrapped portion)

LOCATION	OBSERVATION
Outside vertical section.	Most of char dislodged by water hose stream, exposing the layer of external stress skin below. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Inside vertical section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Top horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Bottom horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Tray side rails.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 1/4 in. to 3/8 in. char depth under stress skin. Between 1/4 in. and 3/8 in. uncharred materials remaining against rails.

REAR 18 in. CABLE TRAY (with cover)

LOCATION	OBSERVATION
Outside vertical sections.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Inside vertical sections.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining. No visible degradation of the cable jackets.
Top horizontal section.	Up to 3/4 in. char depth across panel, still covering layer of external stress skin. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining. No visible degradation of the cable jackets.
Bottom horizontal section.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 3/8 in. char depth under external stress skin. Between 3/8 in. and 1/2 in. of uncharred material remaining.
Tray side rails.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 1/4 in. to 3/8 in. char depth under stress skin. Between 1/4 in. and 3/8 in. uncharred materials remaining against rails.

AIR DROPS

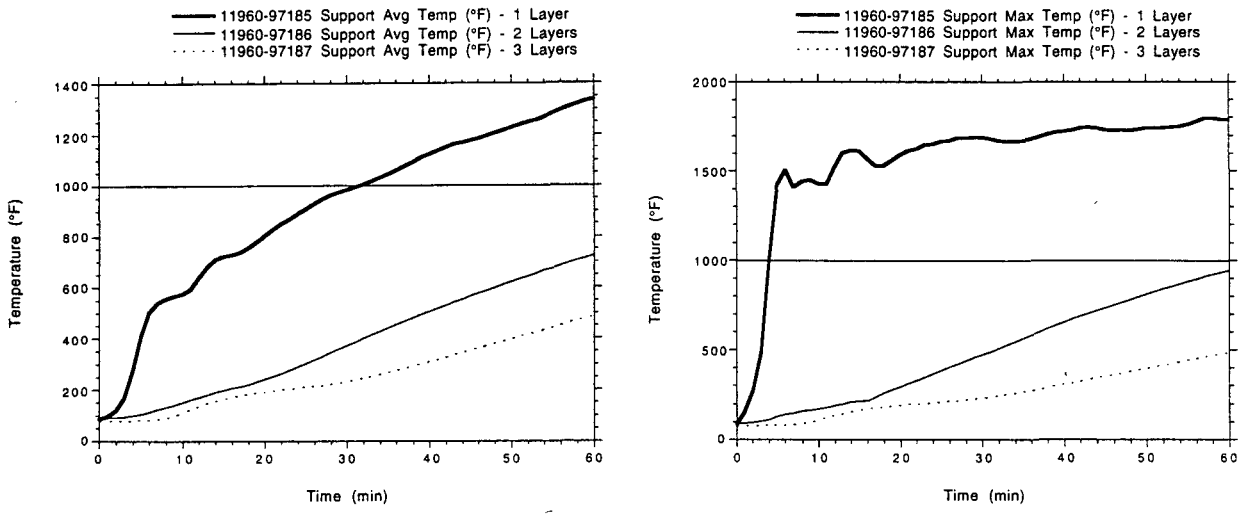
LOCATION	OBSERVATION
5" Air Drop	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 3/8 in. char depth under outer stress skin. Approximately 3/8 in. of uncharred material remaining. No visible degradation of cable jackets.
1" Air Drop.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 3/8 in. char depth under outer stress skin. Approximately 1/8 in. of uncharred material remaining in the outermost layer. Inner layer completely intact.

CONCLUSIONS

The three stacked cable trays, both in the individually wrapped and common enclosure configurations, and the covered rear tray and both air drops evaluated in this test procedure, clad with Thermo-Lag® 330-1 material and upgrades as presented herein, met the requirements of the TEST PLAN for a fire resistance rating of one hour.

This test also investigated the feasibility and performance of non-Thermo-Lag fire barrier material interfacing with Thermo-Lag® 330-1. The steel supports were protected a minimum of 18 in. from the electrical raceway with a single layer of nominal 5/8 in. Thermo-Lag® 330-1 board material. 3M Corp. M20A Fire Barrier Material was installed from this 18 in. point up to the support mounting points under the steel test deck. The 3M Corp. M20A overlapped the Thermo-Lag® 330-1 by approximately 6 in. Prior to cladding, the support members were instrumented with fiberglass insulated Type K thermocouples meeting the same requirements as those used throughout the test sample. Fiberglass insulated wires were used due to their higher heat resistance of over 900°F. Three layers of the M20A were applied to the support members in the deck presented herein. One layer of material was installed on the test deck for Project No. 11960-97185 and two layers were applied to Project No. 11960-97186. These three tests are intended to compare the efficacy of the M20A material at different total wrap thicknesses to determine the minimum requirement to maintain a steel temperature of less than 1000°F* at the end of the one hour standard fire exposure. The graphs below present the averages of all the support steel temperatures in each deck and the

maximum temperature for each deck and allows a direct comparison among the three. The horizontal line represents the 1000°F allowable temperature limit.



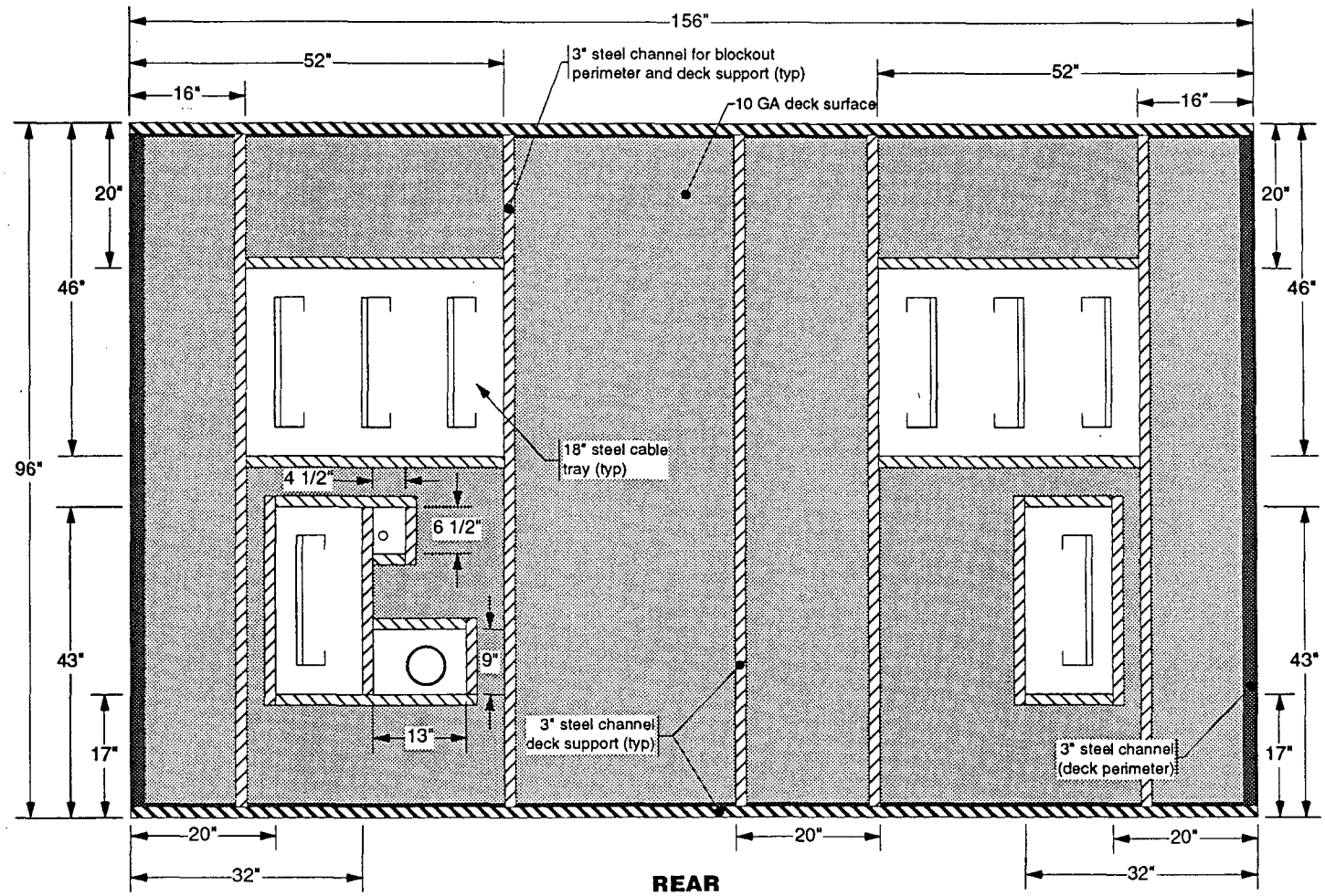
As the above graphs illustrate, a two layer thick application of the 3M Corp. M20A mat material is sufficient to maintain both average and maximum support steel temperature at a level below 1000°F.

* Note: ASTM E119 does not recognize a unique criteria for testing structural steel electrical raceway supports. The 1000°F (temperature acceptance criteria) is derived from ASTM E119-88 sections 25 (columns) and 39 (beams).

Appendix A

CONSTRUCTION DRAWINGS

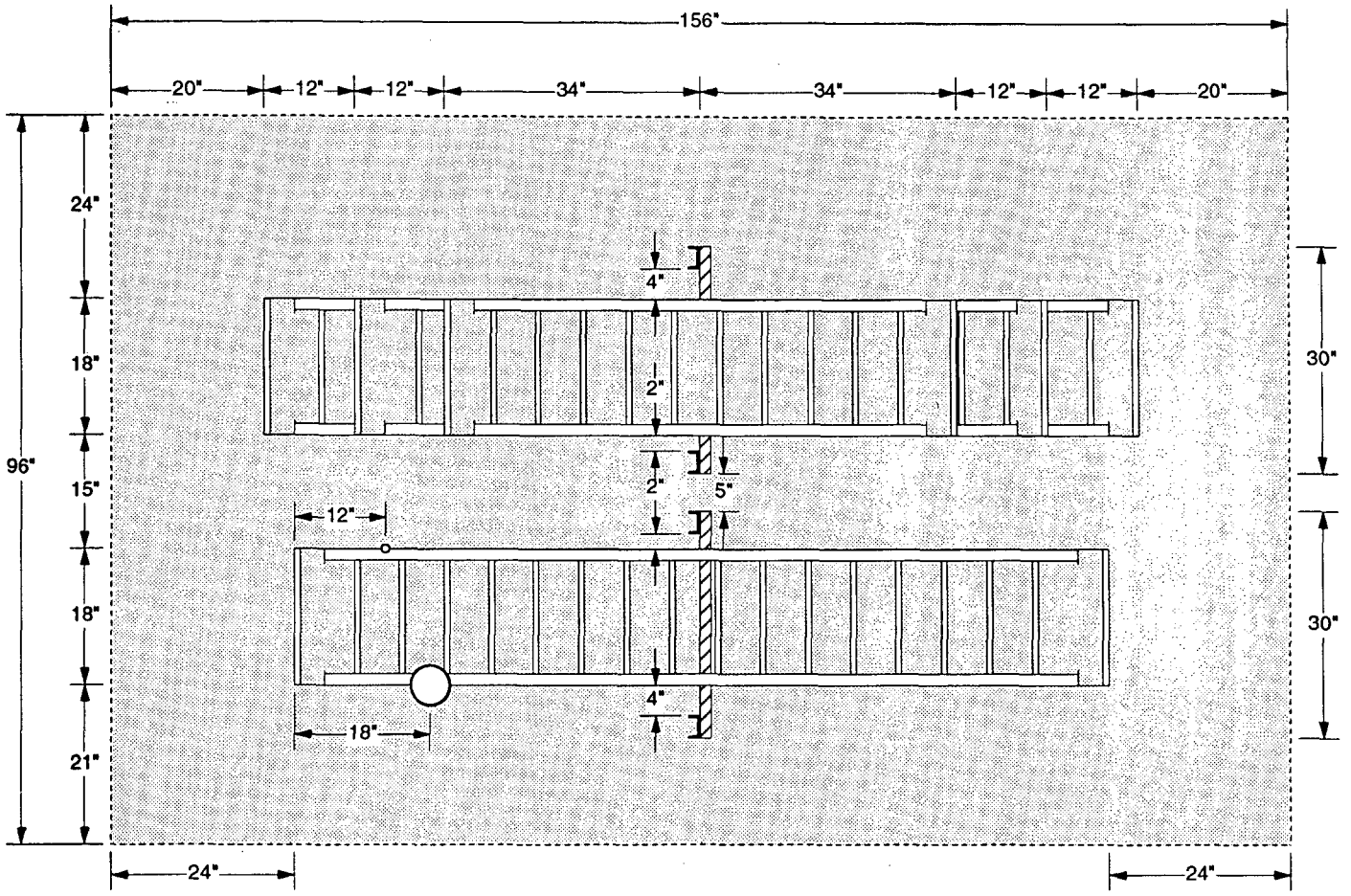
OMEGA POINT LABORATORIES



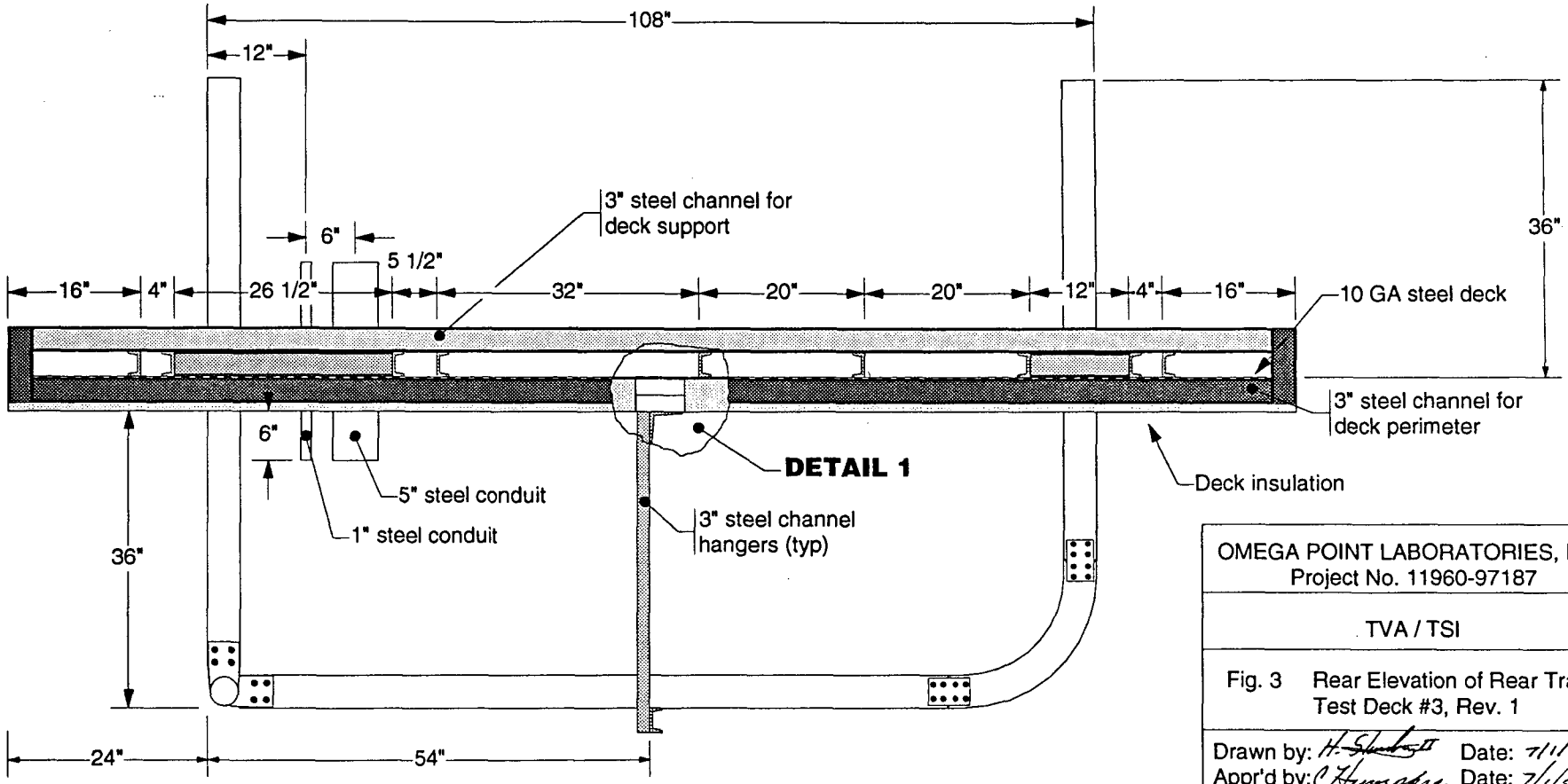
NOTE:
A silicon foam firestop was installed into each penetration blockout prior to testing.

LEFT

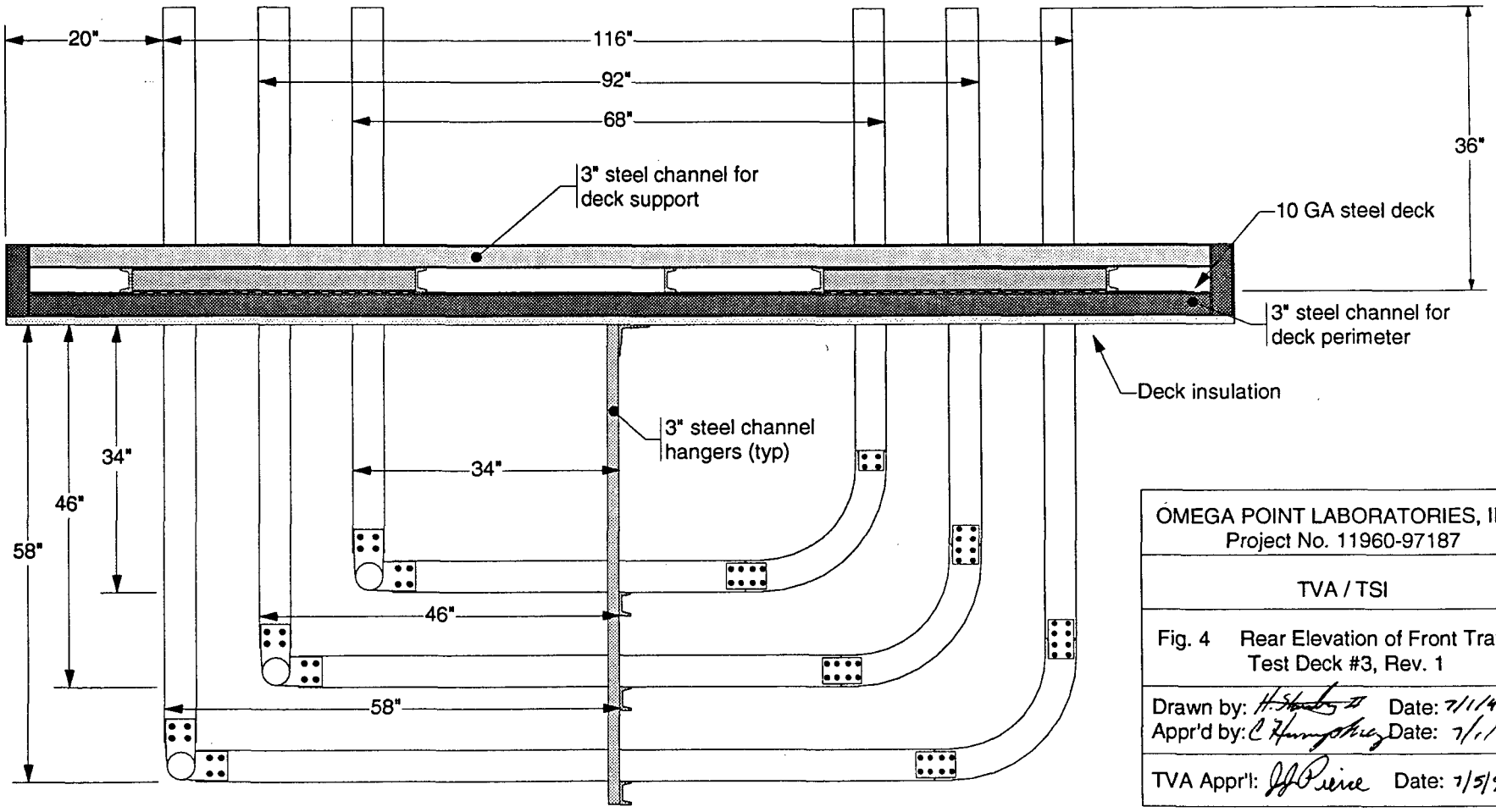
OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 1 Plan View (Above Deck) - Test Deck #3, Rev. 1
Drawn by: [illegible] Date: 7/1/94 Appr'd by: C Humphreys Date: 7/1/94
TVA Appr'l: J J Price Date: 7/5/94



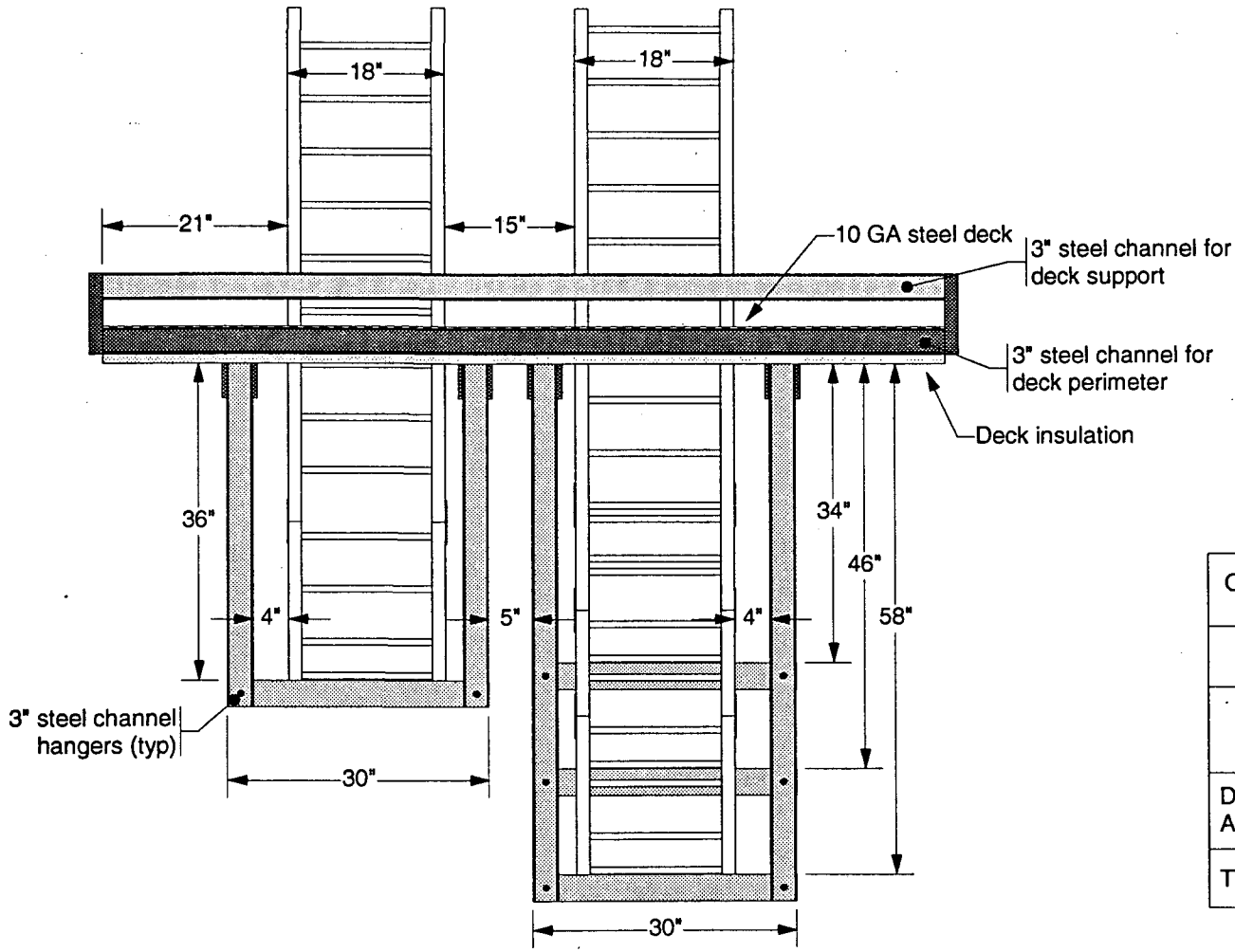
OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 2 Plan View (Below Deck) - Test Deck #3, Rev. 1
Drawn by: H. Stanley II Date: 7/11/94 Appr'd by: C. Humphrey Date: 7/1/94
TVA Appr'l: J. J. Riera Date: 7/5/94



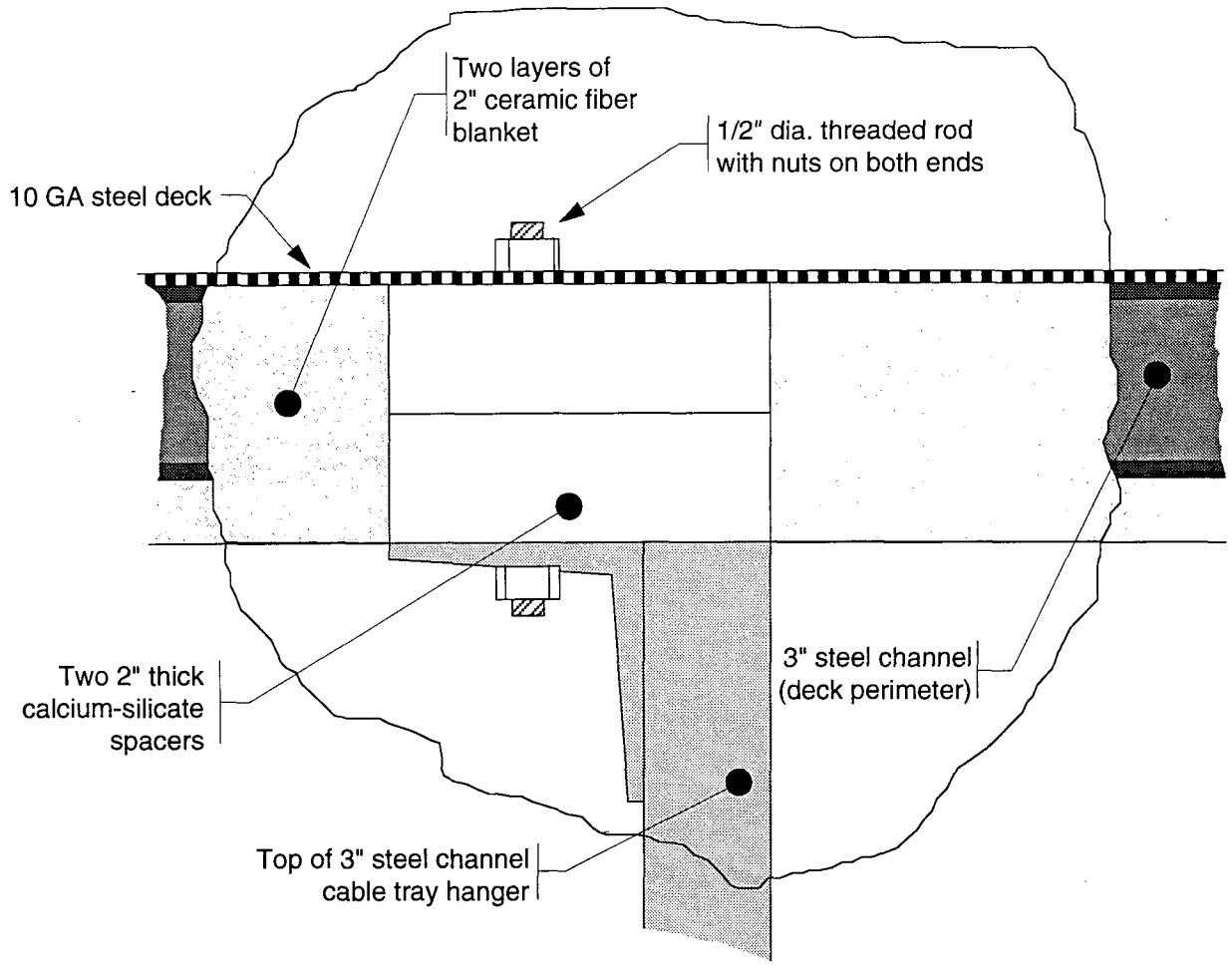
OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 3 Rear Elevation of Rear Tray - Test Deck #3, Rev. 1
Drawn by: H. Stuart III Date: 7/1/94 Appr'd by: C Humphrey Date: 7/1/94
TVA Appr'l: JJ Pierce Date: 7/5/94



OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 4 Rear Elevation of Front Trays - Test Deck #3, Rev. 1
Drawn by: H. Stokes II Date: 7/1/94 Appr'd by: C Humphries Date: 7/1/94
TVA Appr'l: JJ Peirce Date: 7/5/94



OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 5 Left End View - Test Deck #3, Rev. 1
Drawn by: H. Stanley II Date: 7/1/94 Appr'd by: C. Humphrey Date: 7/1/94
TVA Appr'l: J.J. Rivera Date: 7/5/94



DETAIL 1

OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 5a DETAIL 1 - Hanger Mount and Insulation

OMEGA POINT LABORATORIES

Appendix B

TEST PLAN

ONE HOUR FIRE ENDURANCE TESTS OF CABLE TRAYS PROTECTED WITH THE TSI THERMO-LAG FIRE BARRIER SYSTEM

REVISION 1

PREPARED BY J.J. PIERCE

SIGNATURE J.J. Pierce

DATE 7/11/94

CHECKED BY MARK H. SALLEY

SIGNATURE Mark H. Salley

DATE 7/11/94

ONE HOUR FIRE ENDURANCE TESTS OF ARTICLES PROTECTED WITH THE TSI THERMO-LAG FIRE BARRIER SYSTEM

1.0 SCOPE

This test plan describes the methods and guidelines for three fire endurance tests. This test plan includes the preparation of the test decks and specimens, installation of the Thermo-Lag, performance of fire endurance and hose stream tests, temperature monitoring, and applicable documentation of these tasks and test results.

2.0 OBJECTIVE

The objective of these tests is to qualify a protective generic fire barrier system for redundant essential cables at Tennessee Valley Authority's (TVA) nuclear power plants (NPP). Successful results of this test program will provide documented evidence that the electrical raceway fire barrier systems (ERFBS) will satisfactorily withstand an ASTM E-119-88 fire exposure for a period of one hour, followed by a hose stream test. These tests shall satisfy the requirements for fire testing the ERFBS as detailed in Underwriter's Laboratories, Inc. (UL) Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems", Issue Number 2, August 1991, and NRC Generic Letter 86-10, Supplement 1, except where clarified and, in the absence of other standards for these specific types of tests, standard pratice shall be invoked.

3.0 ACCEPTANCE CRITERIA

3.1 The exterior surface temperature of each electrical raceway will be recorded (cold side of the barrier). If the average temperature recorded by the exterior raceway thermocouples does not exceed 250° F (139° C) above their initial temperature and no individual thermocouple is in excess of 325° F (181° C) above its initial temperature, the ERFBS shall be acceptable for use with any type cable.

3.2 The thermocouples located on the bare copper cable (#8 AWG) installed inside the electrical raceway will be recorded. The highest thermocouple temperature rise above its initial temperature and the average temperature rise above their initial temperature will be recorded for each ERFBS. These results will be analyzed, if required, at a later date to determine the unique electrical applications.

3.3 A hose stream test as described in Section 8.2 will be performed at the end of the fire endurance test. If the hose stream test does not cause any openings through which the electrical raceway is visible, the ERFBS shall be acceptable.

4.0 REFERENCES

4.1 10CFR50, Appendix R - Fire Protection Program for Operating Nuclear Power Plants.

4.2 American Society for Testing and Materials (ASTM) E119-88 - Standard Test Methods for Fire Tests of Building Construction and Materials.

4.3 Underwriters Laboratories, Inc. (UL) Subject 1724-91 - Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems.

4.4 TVA Position on Fire Testing Criteria for Fire Barrier Systems used to Protect Electrical Cables Required for 10CFR50, Appendix R Compliance.

5.0 RESPONSIBILITIES

5.1 TENNESSEE VALLEY AUTHORITY (TVA)

5.1.1 Establish the criteria, guidelines, drawings (draft quality), recommendations, etc. to govern the configuration of the test items.

5.1.2 Establish the criteria, guidelines, drawings (draft quality), recommendations, etc. to govern the installation of the fire penetration seal systems, if any (other than deck through-penetration seals).

5.1.3 Establish the criteria, guidelines, drawings (final), recommendations, hold points, etc., to govern the installation of the Thermo-Lag ERFBS to the test articles.

5.1.4 Provide specific Thermo-Lag installation procedures and work package documentation for each test.

5.1.5 Provide the electrical raceway materials (e.g., cable trays, fittings, conduits, junction boxes, cables).

5.1.6 Personnel to install the fire barrier systems.

5.1.7 Supply personnel to witness assembly and test article raceway configurations and Thermo-Lag installation at TVA's discretion.

5.2 THERMAL SCIENCE, INC. (TSI)

5.2.1 Provide the Thermo-Lag materials (5/8" and 3/8" thick ribbed and flat board, preformed conduit sections, trowel grade material), stress skin, stainless steel tie wire and bands.

5.2.2 Make the necessary arrangements with, and provide adequate funding for Omega Point Laboratories to perform the tests.

5.3 OMEGA POINT LABORATORIES, INC. (OPL)

5.3.1 Prepare the test furnace, deck and slab assemblies and provide all required test instrumentation in accordance with its Appendix B Quality Assurance and Quality Control Program and other applicable procedures.

5.3.2 Provide thermocouple calibration and instrumentation, storage temperature records, and relative humidity instrumentation.

5.3.3 Assemble, install and document the installation of the electrical raceways (i.e., trays, conduits, cables, junction boxes, etc.). Provide computer generated drawings of the electrical raceways which clearly indicate critical dimensions, thermocouple locations, etc.

5.3.4 Coordinate all phases of the fire test preparation.

5.3.5 Supply QC personnel to witness and document assembly and test article raceway configurations.

5.3.6 Provide all applicable quality control documentation for the ERFBS materials to the test articles and attendant instrumentation on each test article.

5.3.7 Observe and document the installation of the Thermo-Lag ERFBS materials to the test articles and attendant instrumentation on each test article.

5.3.8 Conduct the fire endurance and water hose stream tests.

5.3.9 Document the test parameters and provide a formal, detailed written report of the test program and test results.

5.3.10 Notify TVA and TSI within three (3) working days of completion of each test specimen.

5.4 OPL QUALITY ASSURANCE/QUALITY CONTROL

5.4.1 Maintain the quality control documentation of the ERFBS materials used in the test program.

5.4.2 Witness and document monitoring activities of the ERFBS installation process performed by TVA.

5.4.3 Inspect and document the construction and instrumentation of the test articles.

5.4.4 Provide written calibration documentation of all thermocouples, measurement devices and data acquisition systems used in this test program.

6.0 SPECIAL PRECAUTION

6.1 PRECAUTIONS FOR INSTALLATION OF THE ERFBS

6.1.1 Observe specific precautions recommended by TSI and other's material safety data sheets.

6.2 PRECAUTIONS FOR CONDUCTING THE FIRE ENDURANCE TEST

6.2.1 Proper safety precautions shall be excerised to preclude personnel from direct exposure to the flame environment, hot object, hazardous gases, and other related hazards.

7.0 PREREQUISITES

7.1 GENERAL TEST CONFIGURATION REQUIREMENTS

The electrical raceway installation configurations for the tests shall be shown on drawings in Appendix A.

7.2 TRACEABILITY REQUIREMENTS

To ensure that the materials used in these tests are representative of those in actual use, or to be used at TVA facilities, all aspects of traceability as required by the OPL QA Program shall be applied.

All thermocouples used in these tests shall be traceable to the respective thermocouple manufacturer, with calibration certification.

7.3 DIMENSIONED DRAWINGS

All test articles shall conform to the draft dimensioned drawings (see Appendix A). Final, dimensioned drawings will be prepared by OPL.

7.4 SHIPPING, RECEIVING, MATERIAL INSPECTIONS

Make a visual inspection of all materials for damage.

Record lot numbers and expiration dates of materials as applicable.

Thermo-Lag bulk grade materials are shipped under "protective service" with an in-transit temperature chart recorder included with each shipment in an identifiable container. That container reads "RECORDER IN HERE". The chart tape produced by this recorder shall be inspected by OPL personnel upon arrival of the shipment to insure that the temperature limitations of 32° F to 100° F were not exceeded.

Thermo-Lag fire barrier materials shall be stored off the ground when not in use. The materials shall be stored in a totally enclosed and weather protected area when not in use (ANSI N45.2.2, level B or better). The bulk grade (trowel grade) material shall be maintained within the temperature limits of 32° F to 100° F.

Prior to application of the bulk grade material, check that the expiration date of the products have not passed. All bulk product expiration dates are good through the end of the expiration date month.

7.5 TEST CONFIGURATIONS

7.5.1 General

The test articles shall be sufficiently secured to the test deck by OPL personnel and sealed in accordance with written instructions and drawings.

7.5.2 Cable Trays and Conduit (Test Deck 1)

One deck will consist of three (3) 18" wide, standard weight steel cable trays with 4" side rails and rungs spaced on 6" centers. Cable tray configurations for this program will consist of "L" shaped assemblies which penetrate the steel deck, extend downwards into the furnace for a minimum of 36", turn horizontally and extend for a minimum of 68" and through the side of the furnace. The deck will also contain a 3" rigid steel conduit that penetrates the steel deck, extends downwards into the furnace for a minimum of 36", turn horizontally and extend for a minimum of 68" and through the side of the furnace (see drawing in Appendix A).

7.5.3 Special Tray Fitting (Test Deck 2)

One deck will consist of a special tray fitting and two sections four feet in length of 18" wide, standard weight steel cable trays with 4" side rails and rungs spaced on 6" centers. The special fitting and two section of cable trays shall be suspended below the steel deck a minimum of 36" into the furnace (see drawing in Appendix A).

7.5.4 Stacked Trays, Raised Cover Tray and Air Drops (Test Deck 3)

One deck will consist of three 18" wide, standard weight steel cable trays with 4" side rails and rungs spaced on 6" centers. The trays will be spaced 12" apart (bottom of tray to bottom of next tray) and extend vertically into the furnace 34" to 56", turn horizontally for approximately 84" to 108", turn back up and extend through the deck. Another 18" wide tray will be located approximately 15" beside the tray stack and extend through the deck approximately 36", turn horizontally for 96", turn back up and extend up through the deck. A solid cover with stand-off extensions will be mounted on this tray. A one inch conduit and a five inch conduit will extend approximately 6-inches through the deck near the vertical portion of the covered tray (see drawing in Appendix A).

7.6 CABLE LOADING REQUIREMENTS

7.6.1

The three cable trays identified in 7.5.2 will be used to bound cable fill attributes of the ERFBS.

One tray will contain a single #8 AWG bare copper conductor within the ERFBS and is to be in accordance with section 4.4 of reference 4.3 (UL Subject 1724). The bare copper conductor shall be instrumented along the entire length of the cable tray being protected.

One tray will contain 26-4/C #16 within the ERFBS. Two bare #8 copper conductors (one routed on top of the center cable and the other under the rungs of the tray) shall be installed and instrumented along the entire length of the tray being protected. | R1

One tray will contain 321-4/C #16 within the ERFBS. Two bare #8 copper cables (one along near the top center of the conductors and one under the tray rungs) will be installed and instrumented along the entire length of the cable tray being protected. | R1

7.6.2 The cable tray identified in 7.5.4 will be used to bound cable tray configurations where cables are above the side rail and have a raised cover. The tray will contain 321-4/C #16 within the ERFBS. A bare #8 copper conductor routed under the tray rungs will be installed and instrumented along the entire length of the tray being protected. In lieu of routing a bare conductor along the top of the insulated cables for thermocouples, the thermocouples will be attached to the raised cover along the center line for the length of the cover. | R1

7.6.3 All other ERFBS will contain a single #8 AWG bare copper conductor within the ERFBS and are to be in accordance with section 4.4 of reference 4.3 (UL Subject 1724). The bare copper conductor shall be instrumented along the entire length of the raceway being protected.

7.7 THERMOCOUPLE INSTALLATION

All thermocouples used in this test program shall be provided and intalled by OPL, with QC surveillance by OPL personnel. The thermocouple wires shall be calibrated (by Lot Number) prior to inatallation and/or use, and applicable quality control documentation records generated. All thermocouples will consist of 24 GA, type K, Chromel-Alumel Teflon PFA insulation (Special Limits of Error $\pm$1.1° C) electrically welded thermojunctions. Calibration will consist of manufacturer supplied (and audited) certifications of calibrations at fire temperatures of thermocouples taken from both ends of each purchased lot number.

The thermocouples shall be placed at 6" intervals and methods of attachment shall be in accordance with the requirements of sections 4.18, 19, 20 and 21 of reference 4.3. The thermocouples shall be attached to the bare copper conductors by wire ties, or equivalent.

7.8 INSTALLATION OF THE ERFBS TO THE TEST ARTICLES

Thermo-Lag ERFBS shall be installed by TVA crafts in accordance with applicable specifications, design drawings and procedures provided by TVA. Details of the ERFBS configurations including fasteners, orientation of structrural ribs, etc., shall be documented in the final test report.

7.9 FIRE SEAL INSTALLATION

Upon completion of the fabrication and installation of the ERFBS to the test articles, all openings in the test articles shall be sealed by OPL. All openings in the test deck assemblies shall be sealed by OPL. All open ends of raceways (conduits, etc.) which extend through the deck shall be sealed with both internal and external fire seals. Internal seals shall consist of silicone foam material (or equal), installed to a depth of nominally 6" and located at the end of the exposed raceway.

7.10 PREBURN INSPECTION

7.10.1 Prior to the commencement of the fire endurance test, a thorough check of the test assembly and associated equipment (including data recording equipment) shall be performed and documented by OPL.

7.10.2 TVA shall inspect the ERFBS for workmanship, surface defects, etc. prior to test.

7.10.3 Written approval of the construction, assembly, installation and instrumentation will be supplied by OPL prior to performance of each fire exposure test (a sign-off sheet for this purpose will be supplied by OPL and included in the final report).

7.10.4 Fire endurance testing of assemblies will not commence until the Thermo-Lag ERFBS attains a moisture meter reading that does not exceed 20 when using a meter with a scale of 0-100 such as a Delmhorst Model DP or equivalent, or 30 days has elasped since completion of the ERFBS installation.

8.0 PROCEDURE

8.1 FIRE ENDURANCE TEST

8.1.1 The protected test article shall be exposed to the standard time/temperature curve found in ASTM E119-88 for one hour. TVA personnel may request stopping of test if premature failure of the specimen occurs.

8.1.2 OPL shall adapt their testing procedures to assure the fire test complies with the requirements established in all referenced standards. Any changes, revisions, or deviations required to comply with this requirement shall be documented and properly justified and included as a part of the final test report.

8.2 WATER HOSE STREAM TEST

8.2.1 Immediately (within 10 minutes) following the fire endurance test, accessible surfaces of the protected test article shall be subjected to the cooling, impact and erosion effects of a hose stream delivered through a 1½-inch fog nozzle set at a discharge angle of 30° with a nozzle pressure of 75 psig and a minimum discharge of 75 gpm. The nozzle orifice is to be a maximum of 5 feet from the edge of the tested assembly. R1

9.0 DATA SYSTEMS

During the fire exposure period, the thermocouples will be scanned at one minute intervals or less. Data storage for reporting purposes will be at one minute intervals (minimum); however, the furnace thermocouples should be scanned at 15 second intervals to allow close control of the furnace. A printer output of all thermocouple data should be done every 60 seconds. | R1

10.0 FIRE TEST REPORT

10.1 OPL shall submit a report on the results of the test and thermocouple data. The test report shall be prepared and submitted in accordance with the requirements of sections 10.2 and 10.3 following.

10.2 OPL will assemble the final test report, containing the collected data and required quality control documentation.

10.3 The test report shall be prepared in sufficient detail to summarize the total testing activity. The report shall include as a minimum:

a. Date of the test
b. Location of the test
c. Description of the test furnace and test article
d. Calibration documentation of all thermocouples
e. Qualification and certification for QA personnel
f. Test procedures used
g. Acceptance criteria
h. Provide quality control records for:
   (1) Test article construction
   (2) Identification and installation of ERFBS
   (3) Thermocouple locations
   (4) Cables, sizes, type and location
   (5) Actual raceway fill densities (mass per linear foot)
i. Computer printout and graphic results of the fire endurance test
j. All raw data
k. 35mm photographic coverage of the test project and video tape documentation of the fire and hose stream test
l. Provide a chronological log (Event Log) of all activities from receipt of materials through final test report
m. A copy of the test plan and fire barrier installation procedures provided by TVA

10.4 OPL shall provide six copies of each test report to TVA and one copy of each test report to TSI.

APPENDIX A

DESIGN DRAWINGS

SUBJECT TEST DECK 1 PROJECT TVA-TSI

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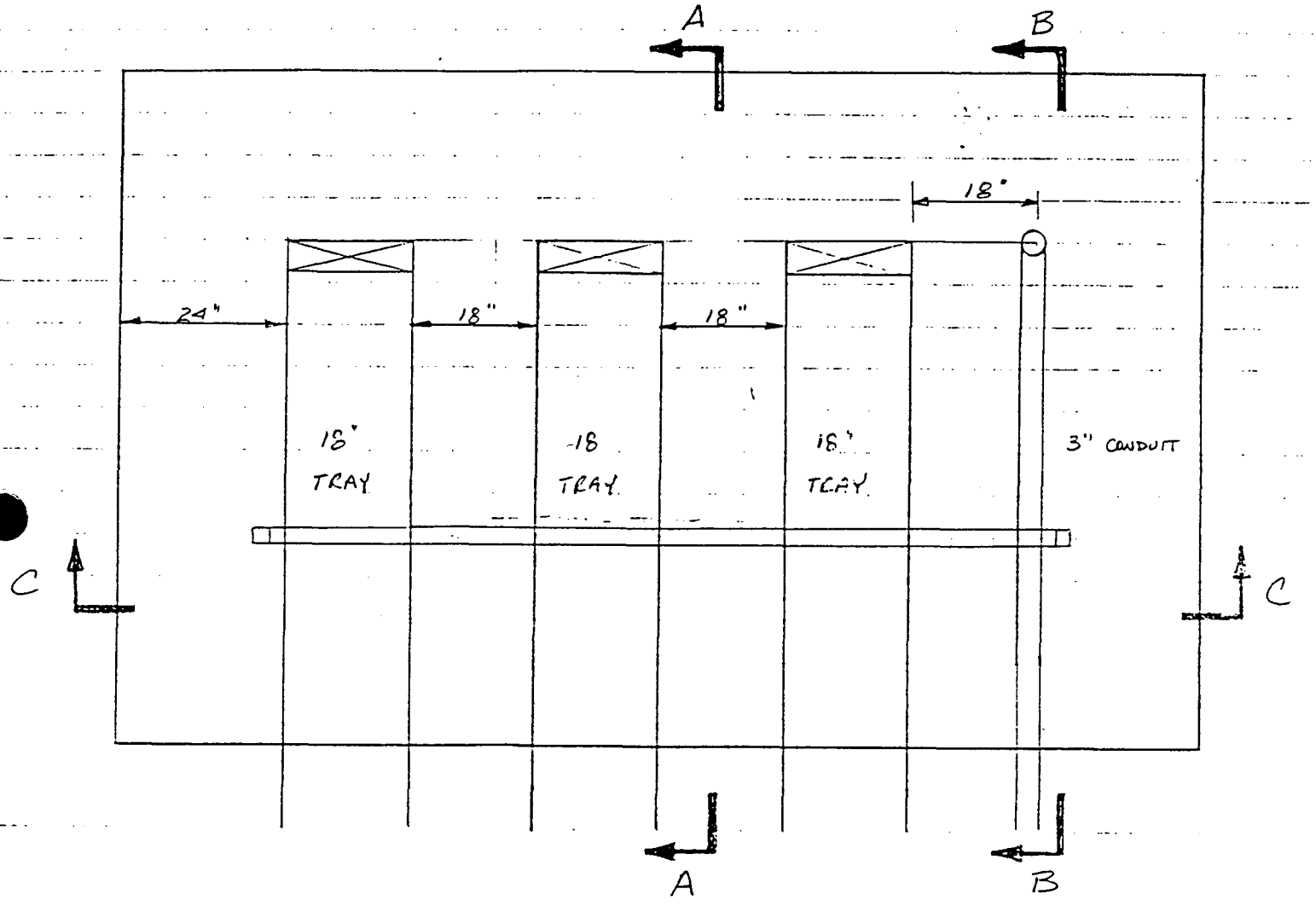
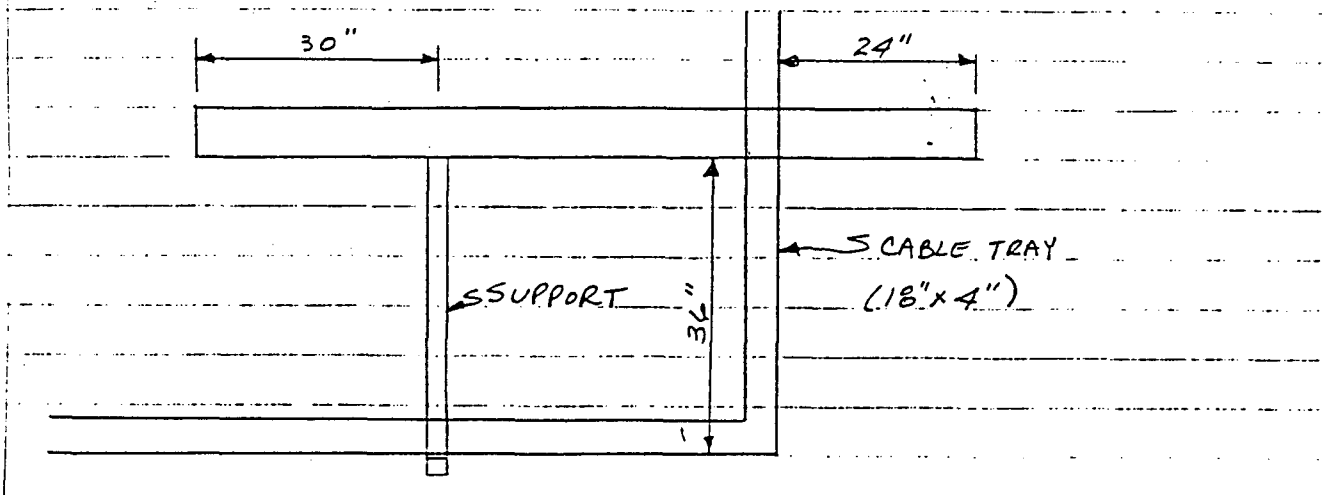


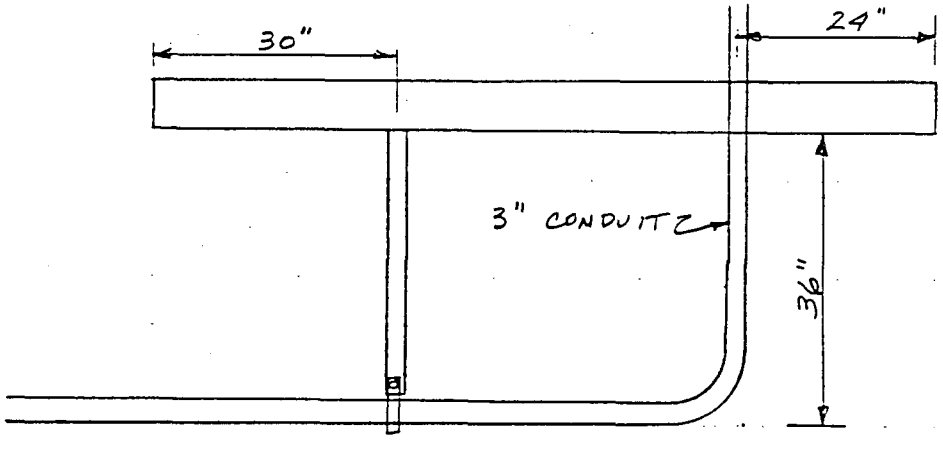
PLAN VIEW
TRAY FILL TEST
AND TSI-3M INTERFACE

SUBJECT TEST DECK 1 PROJECT TVA-TSI 40

COMPUTED BY DATE CHECKED BY DATE



A-A
TYPICAL CABLE TRAY



B-B
TYPICAL CONDUIT

SUBJECT TEST DECK 1 PROJECT TVA-TSI 41

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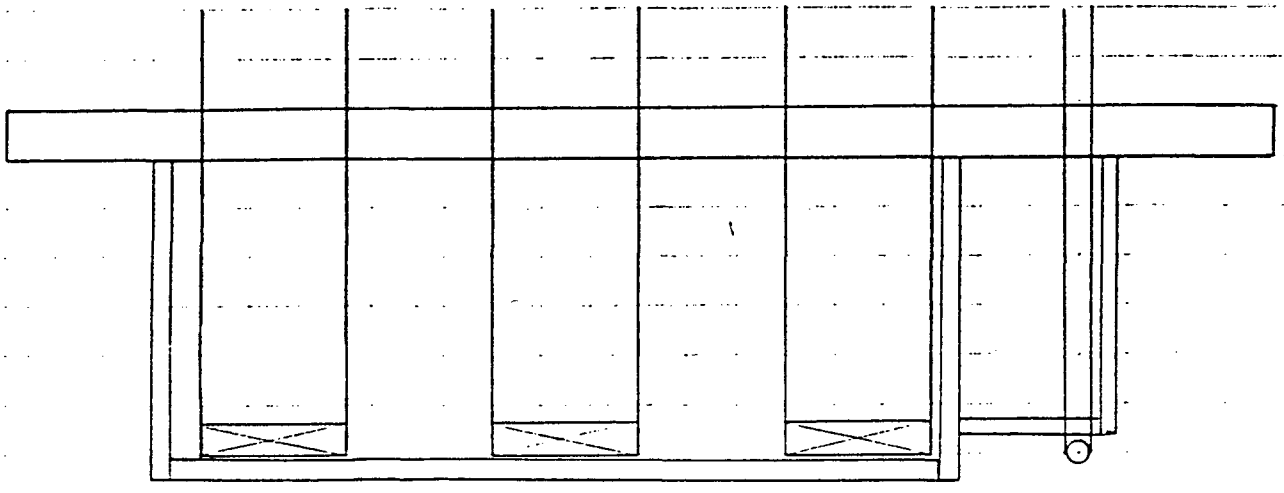

C - C
SUPPORT DETAIL

SUBJECT TEST DECK 2 PROJECT TVA-TSI A2

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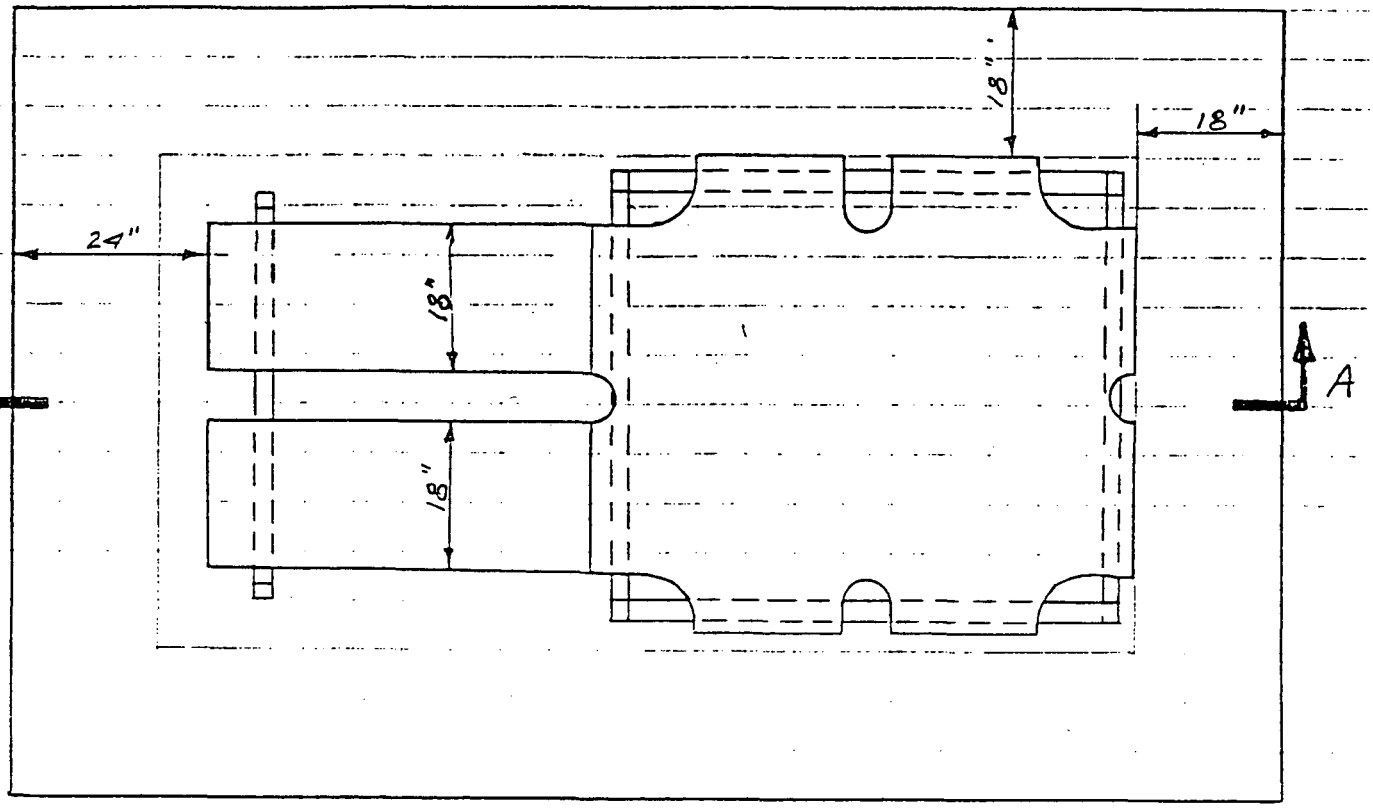

PLAN VIEW
SPECIAL TRAY

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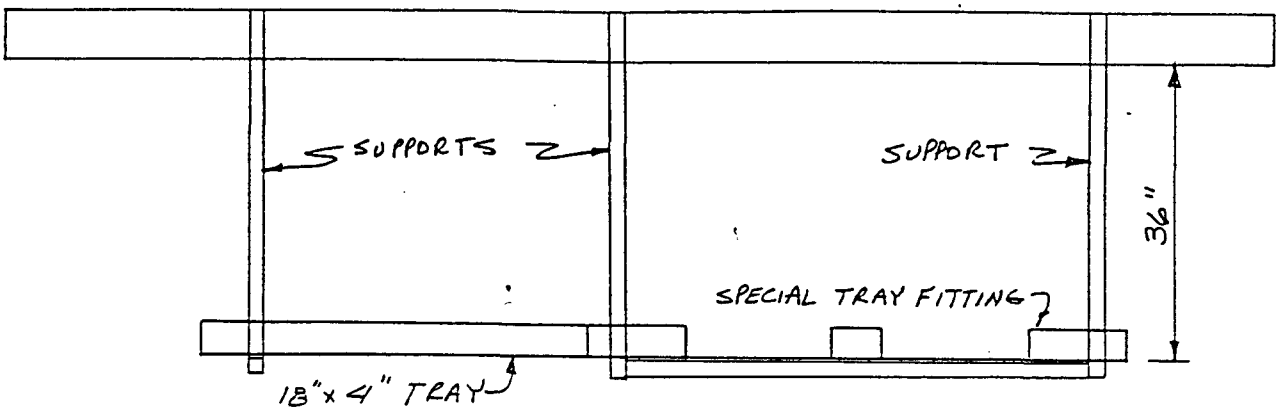

SECTION A-A
SPECIAL TRAY

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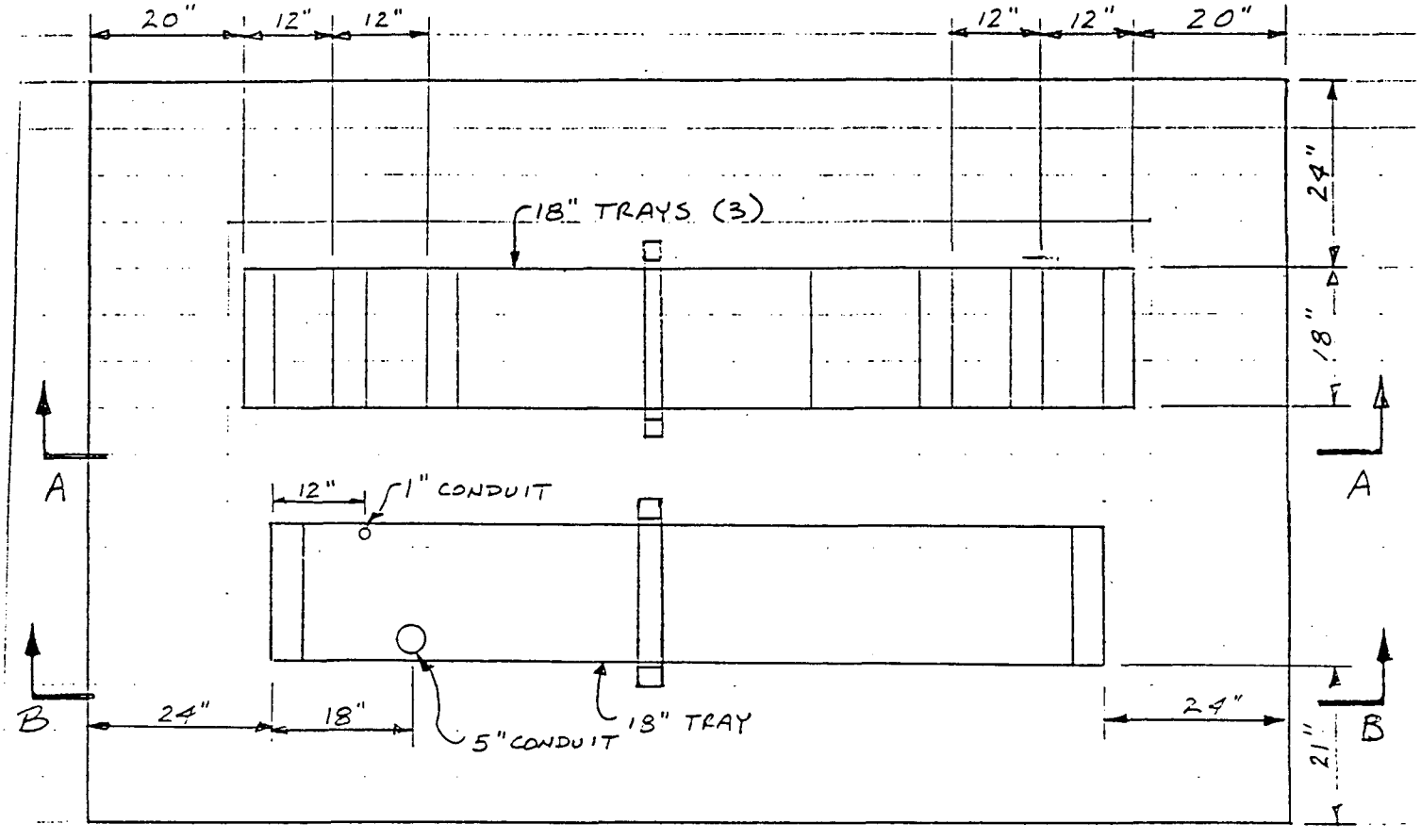

PLAN VIEW

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SUBJECT TEST DECK 3 PROJECT

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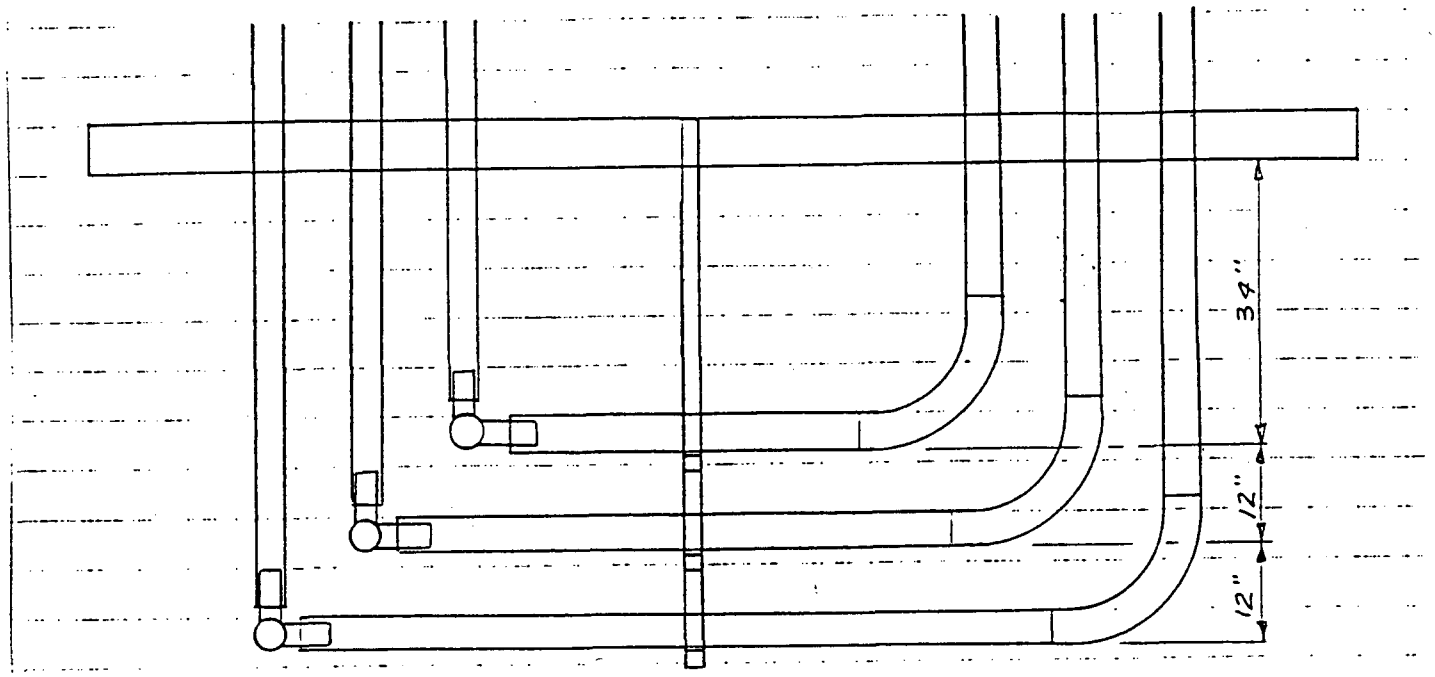
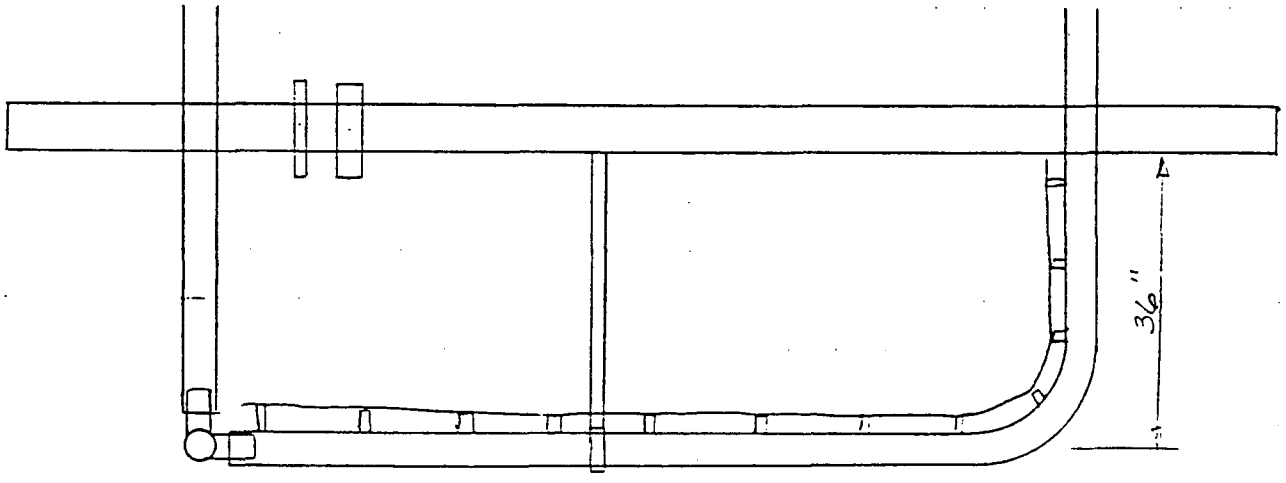


SECTION A-A



SECTION B-B

U.S.NRC Supplement 1 to Letter 86-10

OMEGA POINT LABORATORIES

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

March 25, 1994

TO: ALL HOLDERS OF OPERATING LICENSES OR CONSTRUCTION PERMITS FOR NUCLEAR POWER REACTORS

SUBJECT: FIRE ENDURANCE TEST ACCEPTANCE CRITERIA FOR FIRE BARRIER SYSTEMS USED TO SEPARATE REDUNDANT SAFE SHUTDOWN TRAINS WITHIN THE SAME FIRE AREA (SUPPLEMENT 1 TO GENERIC LETTER 86-10, "IMPLEMENTATION OF FIRE PROTECTION REQUIREMENTS")

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing Supplement 1 to Generic Letter (GL) 86-10, "Implementation of Fire Protection Requirements," April 24, 1986, to disseminate the review guidance contained in Enclosure 1, "Fire Endurance Test Acceptance Criteria for Fire Barriers Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area." This guidance will be used by the staff to review and evaluate the adequacy of fire endurance tests and fire barrier systems proposed by licensees or applicants in the future to satisfy existing NRC fire protection rules and regulations. This guidance refines and clarifies the fire barrier testing acceptance criteria specified by GL 86-10, for application in that specific (future review) context.

BACKGROUND

On April 24, 1986, the NRC issued GL 86-10 in order to give the industry additional guidance on implementing NRC fire protection requirements. The guidance in GL 86-10 did not change the requirement to separate one safe shutdown train from its redundant train with either a 1-hour or a 3-hour fire rated barrier. In Enclosure 2 to GL 86-10, the NRC staff responded to industry questions. Question 3.2.1 of the enclosure provided the staff position on fire endurance test acceptance criteria for fire barrier cable tray wraps. In its response, the staff stated that Chapter 7, "Tests of Nonbearing Walls and Partitions," of National Fire Protection Association (NFPA) Standard 251, "Standard Methods of Fire Tests of Building Construction," was applicable to cable-tray fire wraps.

On July 30, 1991, the NRC established a special review team to identify and evaluate technical issues related to the Thermo-Lag 330-1 fire barrier system. On August 6, 1991, the NRC issued Information Notice (IN) 91-47, "Failure of Thermo-Lag Fire Barrier Material to Pass Fire Endurance Test." This IN gave licensees information on the fire endurance test performed by Gulf States Utilities Company on a Thermo-Lag 330-1 fire barrier installed on a wide aluminum cable tray and the associated fire test failure. On December 6, 1991, the NRC issued IN 91-79, "Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Material," which gave information on deficiencies in procedures that the Thermo-Lag vendor (Thermal Science, Incorporated) provided for constructing Thermo-Lag 330-1 fire barriers. In

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response to concerns about the indeterminate qualifications of Thermo-Lag 330-1 fire barriers, on June 23, 1992, the NRC issued IN 92-46, "Thermo-Lag Fire Barrier Material Special Review Team Findings, Current Fire Endurance Tests, and Ampacity Calculation Errors." The staff found the following problems with Thermo-Lag 330-1 fire barriers: incomplete or indeterminate fire test results, questionable ampacity derating test results and a wide range of documented ampacity derating factors, some barrier installations that were not constructed in accordance with vendor-recommended installation procedures, incomplete installation procedures, and as-built fire barrier configurations that may not have been qualified by valid fire endurance tests or evaluated in accordance with the guidance of GL 86-10.

After reviewing INs 91-47 and 91-79, Texas Utilities (TU) Electric Company initiated a fire endurance test program to qualify the Thermo-Lag raceway fire barrier systems for Comanche Peak Steam Electric Station. Under this program, TU Electric performed an initial fire barrier test series during the weeks of June 15 and 22, and August 19, 1992. Notwithstanding the fire test acceptance criteria guidance specified in GL 86-10, TU Electric followed the guidance of American Nuclear Insurers (ANI) as specified in ANI Information Bulletin 5(79), "ANI/MAERP Standard Fire Endurance Test Method to Qualify a Protective Envelope for Class 1E Electrical Circuits," July 1979.

As a result of NRC interaction with TU Electric regarding its test program, the NRC concluded that there was uncertainty on the part of licensees as to whether or not the ANI test method established a level of fire barrier performance equivalent to that established by the GL 86-10 acceptance criteria. In addition, the NRC staff recognized that the 1-hour and 3-hour raceway fire barrier systems are unique and that additional guidance on the proper implementation of the GL 86-10 acceptance criteria would be useful.

AREAS OF CONCERN

The experiences with Thermo-Lag fire barrier systems at TU Electric recounted above raised the following general concerns:

(1) The fire endurance test acceptance criteria used by other fire barrier vendors, applicants, and licensees may not meet the acceptance criteria of GL 86-10, and may not fully demonstrate the fire barrier performance intended.

(2) Certain past cable functionality testing (i.e., circuit integrity monitoring) may not fully demonstrate the capability of protected circuits to function during and after a postulated fire.

FIRE ENDURANCE CAPABILITY

NRC Qualification Requirements and Guidance for Fire Barriers

Section 50.48 of 10 CFR requires that each operating nuclear power plant have a fire protection plan that satisfies General Design Criterion (GDC) 3. GDC 3 requires that structures, systems, and components important to safety be

designed and located to minimize, in a manner consistent with other safety requirements, the probability and effects of fires. Fire protection features required to satisfy GDC 3 include features to ensure that one train of those systems necessary to achieve and maintain shutdown conditions be maintained free of fire damage. One means of complying with this requirement is to separate one safe shutdown train from its redundant train with a fire-rated barrier. The level of fire resistance required of the barrier, 1-hour or 3-hours, depends on the other fire protection features in the fire area.

The NRC issued guidance on acceptable methods of satisfying the regulatory requirements of GDC 3 in Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants;" Appendix A to BTP APCSB 9.5-1; BTP Chemical Engineering Branch (CMEB) 9.5-1, "Fire Protection for Nuclear Power Plants;" and GL 86-10. In the BTPs and in GL 86-10, the staff stated that the fire resistance ratings of fire barriers should be established in accordance with NFPA Standard 251, "Standard Methods of Fire Tests of Building Construction and Materials," by subjecting a test specimen that represents the materials, workmanship, method of assembly, dimensions, and configuration for which a fire rating is desired to a "standard fire exposure.[1]"

Some licensees have used the acceptance criteria of ANI Bulletin No. 5(79), to evaluate the performance of their fire barrier systems. The ANI test methodology, which ANI issued for insurance purposes only, requires that cables within the fire barrier test specimen be monitored for circuit integrity while the test specimen is subjected to a test fire that follows the standard time-temperature curve specified in American Society of Testing and Materials (ASTM) Standard E-119, "Standard Methods of Fire Tests of Building Construction and Materials," and to a hose stream test. Under this criterion, the fire barrier system is evaluated by monitoring the capability of the cables inside the fire barrier to pass a low voltage circuit integrity test. During the fire and hose stream tests, if cable circuit integrity is maintained, the tests are considered successful. The ANI test methodology does not specify the following GL 86-10 acceptance criteria:

(1) The fire barrier design has withstood the fire endurance test without the passage of flame or the ignition of cotton waste on the unexposed side for a period of time equivalent to the fire-resistance rating required of the barrier.

(2) Analysis of temperature levels recorded on the unexposed side of the fire barrier demonstrates that the maximum temperature rise does not exceed 139 °C [250 °F] above ambient temperature.[2]

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[1] American Society for Testing and Materials Standard E-119 was adopted by NFPA as NFPA Standard 251.

[2] The 163 °C [325 °F] temperature condition was established by allowing the temperature of the unexposed side of the fire barrier to rise 139 °C [250 °F] above the assumed 24°C [75°F] ambient air temperature, as measured by the

3) The fire barrier remains intact and does not allow water to be projected beyond the unexposed surface during the hose stream test.

Enclosure 1, "Interpretations of Appendix R," to GL 86-10, provided additional guidance with respect to the term "free of fire damage" as used in Appendix R. Interpretation 3, "Fire Damage," stated: "In promulgating Appendix R, the Commission has provided methods acceptable for assuring that necessary structures, systems, and components are free from fire damage (see Section III.G.2a, b, and c), that is, the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed."

The review guidance provided in Enclosure 1 (1) clarifies the applicability of the test acceptance criteria stated in GL 86-10 to raceway fire barrier systems, (2) specifies a set of fire endurance test acceptance criteria which are acceptable for demonstrating that fire barrier systems can perform the required fire-resistive function and maintain the protected safe shutdown train free of fire damage, (3) specifies acceptable options for hose stream testing, and (4) specifies acceptable criteria for functionality testing of cables when a deviation is necessary, such as when the fire barrier temperature rise criteria are exceeded or the test specimen cables sustain visible damage.

The test methods and acceptance criteria specified in Enclosure 1 are acceptable for determining the adequacy of fire barrier systems proposed by licensees or applicants in the future to satisfy NRC fire protection rules and regulations. Applicants or licensees may propose alternative test methods and acceptance criteria to demonstrate an equivalent level of protection; the staff will review such proposals on a case-by-case basis. Enclosure 2 is a summary comparison of this review guidance against the GL 86-10 acceptance criteria.

Evaluation and Application of Fire Endurance and Functionality Test Results

The fire endurance qualification test is successful for a raceway fire barrier if the following conditions are satisfied (see Enclosure 3, "Fire Barrier Testing Acceptance Criteria/Logic Diagram"):

(1) The average internal temperature of the fire barrier system, as measured on the exterior surface of the raceway or component, did not rise more than 139 °C [250 °F] above its initial temperature; and

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thermocouples within the test specimen at the onset of the fire exposure, during the fire test.

(2) When cables or components are included in the test specimen, a visual inspection of the protected cables or components revealed no signs of degraded conditions[3] from the thermal effects[4] of the fire exposure; and

(3) The fire barrier system remained intact during the fire exposure and hose stream tests without developing any openings through which the protected component, raceway, or cables are visible.

For raceway fire barrier systems, the staff adopted the hose stream testing methodology specified in NUREG-0800, "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 9.5.1, "Guidelines for Fire Protection for Nuclear Power Plants," Revision 2, July 1981, Position 5.a. This SRP position established the acceptability of using the fog nozzle method for hose stream testing of fire barrier penetration seals. The fog nozzle hose stream test method is an acceptable option for tests of the entire raceway fire barrier system under the new staff position.

Licensees that propose to use fire endurance test results that deviate from the acceptance criteria as the bases for qualifying and installing fire barrier configurations, should request a deviation from the acceptance criteria based on a engineering evaluation acceptable to the staff, such as demonstrating cable functionality. For those licensees required to comply with Section III.G to Appendix R, the engineering evaluation justifying the deviating conditions should be submitted with the exemption request. The review guidance provided in Enclosure 1 provides specific guidance for demonstrating cable functionality, including subjecting the cables to Megger and high-potential tests. The results of these tests can be used to determine the insulation-resistance characteristics of the thermally damaged cable and to determine if the cable insulation would have been sufficient to maintain circuit functionality during and after the fire exposure.

IMPLEMENTATION

This section describes how the NRC plans to use the review guidance contained in Enclosure 1. After this supplement to GL 86-10 is issued, except in those cases in which an applicant or licensee has proposed an acceptable alternative fire endurance test method and acceptance criteria that demonstrates an equivalent level of fire protection, the NRC will use the methods and the

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[3] Examples of thermal degradation of cable jacket and insulation materials are: swollen, split, cracked, blistered, melted, or discolored jacket; exposed shield; exposed, degraded, or discolored conductor insulation; and exposed copper conductor.

[4] When the temperature criterion is exceeded or damage occurs, operability at the temperature conditions experienced during the fire test must be assessed. That is, fire endurance tests that are judged acceptable on the basis of a visual inspection of certain components or cables may not be applied to other components or cables without a specific evaluation.

criteria specified in the enclosed review guidance to (1) evaluate fire endurance testing programs proposed by licensees or applicants in the future for demonstrating compliance with pertinent NRC fire protection rules and regulations and (2) review the adequacy of the fire barrier systems proposed in the future by applicants or licensees.

ACTIONS REQUESTED

None.

REPORTING REQUIREMENTS

None.

BACKFIT DISCUSSION

The guidance transmitted by this generic letter supplement will be used by the staff for review and evaluation of the adequacy of fire barrier systems and fire endurance tests that may be proposed in the future to satisfy NRC fire protection rules and regulations. This guidance refines and clarifies the guidance specified in Generic Letter 86-10 for application in that future review context; specifically it (1) clarifies the applicability of the test acceptance criteria stated in GL 86-10 to raceway fire barrier systems, (2) specifies a set of fire endurance test acceptance criteria which are acceptable for demonstrating that fire barrier systems can serve the required fire-resistive function and maintain the protected safe shutdown train free of fire damage, (3) contains acceptable options for hose stream testing, and (4) specifies acceptable criteria for functionality testing of cables when a deviation would be necessary, such as if the fire barrier temperature rise criteria are exceeded or the cable sustains visible damage.

No generic or plant-specific backfitting is intended or approved at this time in connection with issuance of this review guidance. The staff may consider the need for further generic action in that regard, if the industry guidance currently under development for addressing the pertinent fire protection issues is substantively inconsistent with this staff review guidance; but such action would be separately justified in accordance with the criteria of 10 CFR 50.109 and existing NRC backfit procedures. Similarly, if plant-specific backfits are proposed by the NRC staff consistent with this review guidance, the proposed backfits would be justified on a case-by-case basis in accordance with the criteria of 10 CFR 50.109 and existing NRC backfit procedures.

If you have any questions about this matter, please contact one of the contacts listed below or the appropriate Office of Nuclear Reactor Regulation project manager.

Sincerely,

Luis A. Reyes
Acting Associate Director for Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. NRC Staff Review Guidance and Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe Shutdown Trains Within the Same Fire Area.
2. Comparison of Staff Position on Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe Shutdown Trains Within the Same Fire Area to the Acceptance Criteria of GL 86-10.
3. NRC Fire Testing Acceptance Criteria Logic Diagram.
4. List of Recently Issued Generic Letters

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FIRE ENDURANCE TEST ACCEPTANCE CRITERIA FOR FIRE BARRIER SYSTEMS USED TO SEPARATE REDUNDANT SAFE SHUTDOWN TRAINS WITHIN THE SAME FIRE AREA

I. BACKGROUND

In 1975, the Browns Ferry Nuclear power plant experienced a serious electrical cable tray fire. This fire had a significant impact on operator response to tne event from a safety perspective. The fire caused spurious instrumentation indications and affected the control of several safety systems. As a result of this fire, the NRC issued the following fire protection guidelines and regulations concerning fire protection programs at nuclear power plants:

May 1, 1976	Branch Technical Position (APCSB) 9.5-1, "Fire Protection Program."
February 24, 1977	Appendix A to Branch Technical Position APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976."
February 19, 1981	10 CFR 50.48, "Fire Protection."
February 19, 1981	Appendix R to 10 CFR Part 50, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1979."
July 1981	NUREG-0800, Standard Review Plan (SRP), 9.5.1, "Fire Protection for Nuclear Power Plants."

In addition to the above fire protection guidance and regulations, the NRC, in an effort to clarify its fire protection requirements to the industry, issued Generic Letter (GL) 81-12, "Fire Protection Rule (45 FR 76602, November 19, 1980)," February 20, 1981; GL 83-33, "NRC Position on Certain Requirements of Appendix R to 10 CFR 50," October 19, 1983; and GL 86-10. "Implementation of Fire Protection Requirements," April 24, 1986. GL 86-10, which took precedence over previous staff guidance, provided staff interpretations to Appendix R and answers to industry questions regarding the implementation of Appendix R. The NRC, in an effort to give the licensees flexibility to make changes to its plant specific fire protection program, issued GL 88-12, "Removal of Fire Protection Requirements From Technical Specifications," August 2, 1988. Through the implementation and the adoption of a standard license condition, a licensee can make changes which do not adversely affect the ability to achieve and maintain post-fire safe shutdown to its fire protection program in accordance with 10 CFR 50.59.

The aforementioned NRC documents provided NRC staff guidance concerning fire barriers separating plant fire areas, including the fire resistance (endurance) ratings for the barriers and the qualification tests that establish their fire resistance ratings. In addition, the documents provided

guidance on combustibility of structural materials and tests for demonstrating low flame spread properties.

The following sections of this document provide the objective for providing safe shutdown related fire barriers in nuclear power plants, definition of fire protection terms related to fire barriers, and the NRC fire endurance test acceptance criteria for fire barriers used to separate safe shutdown functions within the same fire area.

II. OBJECTIVE OF FIRE BARRIERS USED TO SEPARATE SAFE SHUTDOWN FUNCTIONS WITHIN THE SAME FIRE AREA

Fire rated barriers are used in nuclear power plants to provide fire area separation between redundant safety-related components and safe shutdown functions. They provide fire resistance protection, as required by Appendix R[5], to one safe shutdown train in those fire areas which contain both trains. The objective of the safe shutdown related Appendix R fire barrier is to ensure that a safe shutdown train is conservatively protected from fire-related thermal damage. The necessity for these fire barriers has been verified by multiple probabilistic risk assessments (PRAs). These PRAs indicated that, even with fire barriers installed, fires are a major contributor to core melt probabilities.

It is the position of the NRC that fire endurance ratings of building construction and materials are demonstrated by testing fire barrier assemblies in accordance with the provisions of the applicable sections of NFPA 251, "Standard Methods of Fire Tests of Building Construction and Materials," and ASTM E-119, "Fire Test of Building Construction and Materials." Assemblies that pass specified acceptance criteria (e.g., standard time-temperature fire endurance exposure, unexposed side temperature rise, and hose stream impingement) are considered to have a specific fire resistance rating.

Enclosure 1 to GL 86-10, "Interpretations of Appendix R," provided additional guidance with respect to the term "free from fire damage." Interpretation 3, "Fire Damage," states, "In promulgating Appendix R, the Commission has provided methods acceptable for assuring that necessary structures, systems, and components are free from fire damage (see Section III.G.2a, b, and c), that is, the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed."

GL 86-10, Response 3.2.1, also stated that, "The resulting 325 °F cold side temperature criterion is used for cable tray wraps because they perform a fire barrier function to preserve the cables free from fire damage. It is clear that cable that begins to degrade at 450 °F is free from fire damage at 325 °F." (Emphasis added.) In addition, the staff response stated that, "for newly identified conduit and cable trays requiring such wrapping new materials

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[5] For advanced reactor designs, redundant safe shutdown functions are required to be located in separate 3-hour fire areas.

which meet the 325 °F criterion should be used, or justification should be provided for the use of material which does not meet the 325 °F criterion. This may be based on an analysis demonstrating that the maximum recorded temperature is sufficiently below the cable insulation ignition temperature." (Emphasis added.)

The basic premise of the NRC fire resistance criteria is that fire barriers which do not exceed 163 °C [325 °F] cold side temperature[6] and pass the hose stream test provide adequate assurance that the shutdown capability is protected without further analyses. If the temperature criteria is exceeded, sufficient additional information is needed to perform an engineering evaluation to demonstrate that the shutdown capability is protected.

III. DEFINITIONS

In order to support the understanding of the technical terms used throughout this document, the following definitions are provided.

Combustible Material - Material that does not meet the definition of non-combustible.

Fire Barrier - Those components of construction (walls, floors and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hour of resistance to fire and are used to prevent the spread of fire.

Fire Resistance Rating - The time that materials of a test assembly have withstood a standard ASTM E-119 fire exposure and have successfully met the established test acceptance criteria (fire barrier test acceptance criteria refer to Sections IV, V, and VI).

Noncombustible Material - (a) Material which, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat; (b) Material having a structural base of noncombustible material, with a surfacing not over 1/8-inch thick that has a flame spread rating of not higher than 50 when measured in accordance with ASTM E-84, "Surface Burning Characteristics of Building Materials." (There is an exception to this definition as defined by BTP Appendix A, Position D.1.d. This position allows the use of combustible interior finishes when listed by a nationally recognized test laboratory, such as Factory Mutual or Underwriters Laboratories, Incorporated, for a flame spread, smoke and fuel contribution of 25 or less in its use configuration.)

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[6] The 163 °C [325 °F] temperature condition was established by allowing the temperature of the unexposed side of the fire barrier to rise 139 °C [250 °F] above the assumed 24 °C [75 °F] ambient air temperature, as measured by t thermocouples within the test specimen at the onset of the fire exposure dur the fire test.

Raceway - Cable trays, conduits, junction boxes, and other components used to support and route cables from circuit termination to circuit termination.

Raceway Fire Barrier - Nonload bearing partition type envelope system installed around electrical components and cabling that are rated by test laboratories in hours of fire resistance and are used to maintain safe shutdown functions free of fire damage.

IV. FIRE ENDURANCE TEST ACCEPTANCE CRITERIA FOR FIRE BARRIER WALLS, FLOORS, CEILINGS, AND FREE STANDING EQUIPMENT ENCLOSURES USED TO SEPARATE SAFE SHUTDOWN FUNCTIONS WITHIN THE SAME FIRE AREA

To demonstrate the adequacy of fire barrier walls, floors, ceilings, and enclosures, barrier designs should be verified by fire endurance testing. NRC fire protection guidance refers to the guidance of NFPA 251 and ASTM E-119 as acceptable test methods for demonstrating fire endurance performance.

The fire endurance test acceptance criteria for the subject fire barriers are:

The fire barrier design has withstood the fire endurance test without the passage of flame or the ignition of cotton waste on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier;

The temperature levels recorded on the unexposed side of the fire barrier are analyzed and demonstrable that the maximum temperature does not exceed 139 °C [250 °F] above ambient; and

The fire barrier remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test. (For acceptable hose stream test methods and time of application - See Section VII.)

If the above criteria are met for fire barrier walls, floors, ceilings, and free standing equipment enclosures separating safe shutdown functions within the same fire area, the barrier is acceptable.

NRC fire protection guidance also ensures that door and ventilation openings and penetrations are properly protected. The guidance requires that these openings be protected with fire doors and fire dampers which have been fire tested and listed by a nationally recognized test laboratory (e.g., Factory Mutual or Underwriters Laboratories, Incorporated). In addition, the construction and installation techniques for door and ventilation openings and other penetrations through these fire barriers should be qualified by fire endurance tests.

The guidance of NFPA 251 and ASTM E-119 should be consulted with regard to construction, materials, workmanship, and details such as dimensions of parts, and the size of the specimen(s) to be tested. In addition, NFPA 251 and ASTM E-119 should be consulted with regard to the placement of thermocouples on the specimen.

V. FIRE ENDURANCE TEST ACCEPTANCE CRITERIA FOR ELECTRICAL RACEWAY AND COMPONENT FIRE BARRIER SYSTEMS FOR SEPARATING SAFE SHUTDOWN FUNCTIONS WITHIN THE SAME FIRE AREA

The NRC provided guidance in Appendix A to Branch Technical Position 9.5-1, Position D.3.(d), for cable tray fire barriers. This fire protection guidance states that the design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Test of Building Construction and Materials," including hose stream test. On November 19, 1980, the NRC issued Appendix R to 10 CFR Part 50. The technical basis for Section III.M, "Fire Barrier Penetration Seal Qualification," states that "Fire barriers are 'rated' for fire resistance by being exposed to a 'standard test fire.' This standard test fire is defined by the American Society of Testing and Materials in ASTM E-119." In addition, this technical basis stated that "[i]f specific plant conditions preclude the installation of a 3-hour fire barrier to separate the redundant trains, a 1-hour fire barrier and automatic fire suppression and detection system for each redundant train will be considered the equivalent of a 3-hour barrier." Appendix R to 10 CFR Part 50, Section III.G, "Fire protection of safe shutdown capability," provides what the NRC views as equivalent means for ensuring that one safe shutdown train remains free of fire damage.

In 1984 Appendix R workshops held with industry, and later in GL 86-10, the staff provided guidance related to fire barrier designs for raceways. In Enclosure 2, "Question and Answers," to this GL, Question 3.2.1., "Acceptance Criteria," the staff provided guidance on the cold side temperature for fire barrier cable tray wraps. In response to this question the staff stated that the acceptance criteria contained in Chapter 7 of NFPA 251, "Standard Methods of Fire Tests of Building Construction and Materials," pertaining to non-bearing fire barriers was applicable to cable tray fire barrier wraps. Chapter 5 of NFPA 251 explains the conduct of the fire test.

The following is the NFPA 251 acceptance criteria:

- The wall or partition withstood the fire endurance test without the passage of flame or gases hot enough to ignite cotton waste, for a period equal to that for which classification is desired;

- The wall or partition withstood the fire and hose stream tests specified in Chapter 5, without the passage of flame, gases hot enough to ignite cotton waste, or the hose stream. The assembly failed the hose stream test if an opening develops that permits the projection of water from the stream beyond the unexposed surface during the hose stream test; and

- Transmission of heat through the wall or partition during the fire endurance test did not raise the temperature on the unexposed surfaces more than 139 °C [250 °F] above their initial temperatures.

The staff considers the fire endurance qualification test for fire barrier materials applied directly to a raceway or component to be successful if the following conditions are met:

- The average unexposed side temperature of the fire barrier system, as measured on the exterior surface of the raceway or component, did not exceed 139 °C [250 °F] above its initial temperature; and

  (Staff Guidance: NFPA 251 and ASTM E-119 allow this temperature to be determined by averaging thermocouple temperature readings. For the purposes of this criterion, thermocouple averaging can be used provided similar series of thermocouples (e.g., cable tray side rail) are averaged together to determine temperature performance of the raceway fire barrier system. In addition, conditions of acceptance are placed on the temperatures measured by a single thermocouple. If any single thermocouple exceeds 30 percent of the maximum allowable temperature rise (i.e., 139 °C + 42 °C = 181 °F [250 °F + 75 °F = 325 °F]), the test exceeded the temperature criteria limit.)

- Irrespective of the unexposed side temperature rise during the fire test, if cables or components are included in the fire barrier test specimen, a visual inspection should be performed.[7] Cables should not show signs of degraded conditions[8] resulting from the thermal affects of the fire exposure; and

  (Staff Guidance: For those cases where signs of thermal degradation are present, the fire barrier did not perform its intended fire-resistive function. For those barriers which are not capable of performing their intended function, a deviation based on demonstrating that the functionality of thermally degraded cables or component was maintained and that the cables or component would have adequately performed their intended function during and after a postulated fire exposure may be granted. The attachment to this position provides a methodology for demonstrating the functionality of cables during and after a fire test exposure. The purpose of the functionality tests is to justify observed deviations in fire barrier performance. For those fire barrier test specimens that are tested without cables,

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[7] When the temperature criteria are exceeded or damage occurs, component operability at the temperatures experienced during the fire test should be assessed. Fire endurance tests that are judged acceptable on the basis of a visual inspection of specific components or cables included in the test specimen may not be applied to other components or cables without a specific evaluation.

[8] Examples of thermal cable degradation are: jacket swelling, splitting, cracking, blistered, melted, or discoloration; shield exposed; conductor insulation exposed, degraded, or discolored; bare copper conductor exposed.

an engineering analysis justifying internal fire barrier temperature conditions greater than allowed can be based on a comparison of the fire barrier internal temperature profile measured during the fire endurance test to existing cable specific performance data, such as environmental qualification (EQ) tests.)

The cable tray, raceway, or component fire barrier system remained intact during the fire exposure and water hose stream test without developing any openings through which the cable tray, raceway, or component (e.g., cables) is visible. Section VII identifies acceptable hose stream test methods.

The test specimen should be representative of the construction for which the fire rating is desired as to materials, workmanship, and details such as dimensions of parts, and should be built under representative conditions. Raceway fire barrier systems being subjected to qualification fire endurance tests should be representative of the end use. For example, if it is intended to install a cable tray fire barrier system in the plant without protecting the cable tray supports, then the test program should duplicate these field conditions. In addition, the fire test program should encompass or bound raceway sizes and the various configurations for those fire barrier systems installed in the plant. It should be noted that several test specimens will be required in order to qualify various sizes of horizontal and vertical runs of cable trays and conduits, junction boxes and pull boxes, etc. The cable tray or raceway design used for the tests should be constructed with materials and configurations representative of in plant conditions (e.g., the mass associated with typical steel conduits and cable trays, representative internal and external penetration seals). If cables are included in the raceway fire barrier test specimen, these cables should be representative of the installed plant-specific cables.

Measuring cable temperatures is not a reliable means for determining excessive temperature conditions which may occur at any point along the length of the cable during the fire test. In lieu of measuring the unexposed surface temperature of the fire barrier test specimen, methods which will measure the surface temperature of the raceway (e.g., exterior of the conduit, side rails of cable trays, bottom and top of cable tray surfaces, junction box external surfaces) can be considered as equivalent if the raceway components used to construct the fire test specimen represent plant specific components and configurations. The metal surfaces of the raceway, under fire test conditions, exhibit good thermal conductivity properties. Temperatures measured on these surfaces provide a indication of the actual temperature rise within the fire barrier system.

In 1979, American Nuclear Insurers (ANI) issued a fire endurance test method for raceway fire barrier systems for insurance purposes. This method, "Fire Endurance Protective Envelope Systems for Class 1E Electrical Circuits," specified that cable temperatures be monitored by thermocouples. Industry considers this the proper location for determining the temperature rise within the raceway fire barrier system. Since cable jackets have a low thermal

conductivity, the actual local temperatures of the cable jackets indications of barrier failure and internal fire barrier temperature rise conditions during the fire exposure are masked. Monitoring cable temperatures can give indications of low internal fire barrier temperature conditions during the fire endurance test. Using this temperature monitoring approach, cable damage can occur without indication of excessive temperatures on the cables. This, linked with no loss of circuit integrity, would give indications of a successful test. The staff considers monitoring the cable temperature as the primary means of determining cable tray or raceway fire barrier performance to be nonconservative. Therefore, the staff has incorporated the provision for a post-fire visual inspection of cables that are installed in fire barrier test specimens. As discussed above, temperatures monitored on the exterior surface of the raceway provide a more representative indication of fire barrier performance.

Fire endurance tests of raceway fire barrier systems should be without cables. This method is preferred because by excluding cables from the test specimen it eliminates bias in the test results created by the thermal mass of the cables. Without this thermal mass, the internal temperature conditions measured by the test specimen thermocouples during the fire exposure will provide a more accurate determination of fire barrier thermal performance.

Thermocouple Placement - Test Specimens Containing Cables

The following are acceptable placements of thermocouples for determining the thermal performance of raceway or cable tray fire barrier systems that contain cables during the fire exposure:

Conduits - The temperature rise on the unexposed surface of a fire barrier system installed on a conduit should be measured by placing the thermocouples every 152 mm [6 inches][9] on the exterior conduit surface underneath the fire barrier material. The thermocouples should be attached to the exterior conduit surface located opposite the test deck and closest to the furnace fire source. Thermocouples should also be placed immediately adjacent to all structural members, supports, and barrier penetrations.

Cable Trays - The temperature rise on the unexposed surface of a fire barrier system installed on a cable tray should be measured by placing the thermocouples on the exterior surface of the tray side rails between the cable tray side rail and the fire barrier material. In addition to placing thermocouples on the side rails, thermocouples should be attached to two AWG 8 stranded bare copper conductors. The first copper conductor should be installed on the bottom of the cable tray rungs along the entire length and down the longitudinal center of the cable tray run. The second conductor should be installed along the outer top

[9] For the thermocouples installed on conduits, cable tray side rails, and bare copper conductors, a ±13 mm [±½ inch] installation tolerance is acceptable.

surface of the cables closest to the top and towards the center of the fire barrier. The bare copper wire is more responsive than cable jackets to temperature rise within the fire barrier enclosure. The temperature changes measured along the bare copper conductors provide indication of joint failure or material burn through conditions. Thermocouples should be placed every 152 mm [6 inches] down the longitudinal center along the outside surface of the cable tray side rails and along the bare copper conductors. Thermocouples should also be placed immediately adjacent to all structural members, supports, and barrier penetrations.

Junction Boxes (JB) - The temperature rise on the unexposed surface of a fire barrier system installed on junction boxes should be measured by placing thermocouples on either the inside or the outside of each JB surface. Each JB surface or face should have a minimum of one thermocouple, located at its geometric center. In addition, one thermocouple should be installed for every one square foot of JB surface area. These thermocouples should be located at the geometric centers of the one square foot areas. At least one thermocouple should also be placed within 25 mm [1 inch] of each penetration connector/interface.

Airdrops - The internal airdrop temperatures should be measured by thermocouples placed every 305 mm [12 inches] on the cables routed within the air drop and by a stranded AWG 8 bare copper conductor routed inside and along the entire length of the airdrop system with thermocouples installed every 152 mm [6 inches] along the length of the copper conductor. The copper conductor should be in close proximity with the unexposed surface of the fire barrier material. Thermocouples should also be placed immediately adjacent to all supports and barrier penetrations.

With the exception of airdrops, the installation of thermocouples on cables is optional and is left to the discretion of the licensee, test sponsor, or test laboratory. Cable thermocouples are to be used for engineering purposes only. Cable thermocouples alone are not acceptable for the demonstration of fire barrier performance. However, cable thermocouples may support fire barrier deviation conditions.

Temperature conditions on the unexposed surface of the fire barrier material during the fire test will be determined by averaging the temperatures measured by the thermocouples. In determining these cable tray or raceway temperature conditions, the thermocouples measuring similar fire barrier areas of performance should be averaged together and the basis of acceptance will be based on the individual averages. The following method of averaging should be followed:

Conduits - The thermocouples applied to the outside metal surface of the conduit should be averaged together.

Cable Trays - The thermocouples on each cable tray side rail should be averaged separately. For example, thermocouples placed on one side rail

will be averaged separately from the other side rail. In addition, the temperature conditions measured by thermocouples on the two bare copper conductors should be averaged separately.

Junction Boxes - For small JBs which have only one thermocouple placed on each JB surface, the individual JB surface thermocouples should be averaged together. For larger JBs which have more that one thermocouple placed on each JB surface, the thermocouples on the individual JB surfaces should be averaged together.

Airdrops - The thermocouples placed on the outer cable(s) routed in the airdrop fire barrier should be averaged together.

The averages of any thermocouple group during the fire test should not exceed 139 °C [250 °F] above the unexposed side temperature within the fire barrier test specimen at the onset of the fire endurance test. In addition, the temperature of each individual thermocouple will be evaluated. Individual thermocouple conditions should not exceed the 139 °C [250 °F] temperature rise by more than 30 percent.

Thermocouple Placement - Test Specimens Without Cables

The following are acceptable thermocouple placements for determining the thermal performance of raceway or cable tray fire barrier systems that do not contain cables:

Conduits - The temperature rise of the unexposed surface of a fire barrier system installed on a conduit should be measured by placing thermocouples every 152 mm [6 inches] on the exterior conduit surface between the conduit and the unexposed surface of the fire barrier material. These thermocouples should be attached to the exterior conduit surface opposite of the test deck and closest to the furnace fire source. The internal raceway temperatures should be measured by a stranded AWG 8 bare copper conductor routed through the entire length of the conduit system with thermocouples installed every 152 mm [6 inches] along the length of the copper conductor. Thermocouples should also be placed immediately adjacent to all structural members, supports, and barrier penetrations.

Cable Trays - The temperature rise on the unexposed surface of a fire barrier system installed on a cable tray should be measured by placing thermocouples every 152 mm [6 inches] on the exterior surface of each tray side rails between the side rail and the fire barrier material. Internal raceway temperatures should be measured by a stranded AWG 8 bare copper conductor routed on the top of the cable tray rungs along the entire length and down the longitudinal center of the cable tray run with thermocouples installed every 152 mm [6 inches] along the length of the copper conductor. Thermocouples should be placed immediately adjacent to all structural members, supports, and barrier penetrations.

Junction Boxes - The temperature rise on the unexposed surface of a fire barrier system installed on junction boxes should be measured by placing thermocouples on either the inside or the outside of each JB surface. Each JB surface or face should have a minimum of one thermocouple, located at its geometric center. In addition, one thermocouple should be installed for every one square foot of JB surface area. These thermocouples should be located at the geometric centers of the one square foot areas. At least one thermocouple should also be placed within 25 mm [1 inch] of each penetration connector/interface.

Airdrops - The internal airdrop temperatures should be measured by a stranded AWG 8 bare copper conductor routed inside and along the entire length of the airdrop system with thermocouples installed every 152 mm [6 inches] along the length of the copper conductor. The copper conductor should be in close proximity with the unexposed surface of the fire barrier material. Thermocouples should also be placed immediately adjacent to all supports and penetrations.

Temperature conditions on the unexposed surfaces of the fire barrier material during the fire test will be determined by averaging the temperatures measured by the thermocouples installed in or on the raceway. In determining these temperature conditions, the thermocouples measuring similar areas of the fire barrier should be averaged together. Acceptance will be based on the individual averages. The following method of averaging should be followed:

Conduits - The thermocouples applied to the outside metal surface of the conduit should averaged together.

Cable Trays - The thermocouples on each cable tray side rail should be averaged separately. For example, thermocouple placed on one side rail will be averaged separately from the other side rail. In addition, the temperature conditions measured by thermocouples on the bare copper conductor should be averaged separately from the side rails.

Junction Boxes - For JBs that have only one thermocouple on each JB surface, the individual JB surface thermocouples should be averaged together. For JBs that have more that one thermocouple on each JB surface, the thermocouples on the individual JB surfaces should be averaged together.

Airdrops - The thermocouples placed on the copper conductor within the airdrop fire barrier should be averaged together.

The average of any thermocouple group should not exceed 139 °C [250 °F] above the unexposed side temperature within the fire barrier test specimen at the onset of the fire endurance test. In addition, the temperature of each individual thermocouple will be evaluated. Individual thermocouple conditions should not exceed the 139 °C [250 °F] temperature rise by more than 30 percent.

a fire barrier test specimen without cables does not meet the average or maximum single point temperature criteria, then the internal raceway temperature profile as measured by the instrumented bare copper conductors during the fire exposure can be used to assess cable functionality through air oven tests of plant specific cable types and construction.

VI. HOSE STREAM TESTS

NFPA 251 and ASTM E-119 allow flexibility in hose stream testing. The standards allow the hose stream test to be performed on a duplicate test specimen subjected to a fire endurance test for a period equal to one-half of that indicated as the fire resistance rating, but not for more than 1 hour (e.g., 30 minute fire exposure to qualify a 1-hour fire rated barrier).

For safe shutdown related fire barrier systems referenced in Section IV and duplicate electrical cable tray or raceway and component fire barrier test specimens that have been exposed to the ½-duration test fire exposure, the staff finds the hose stream application specified by the NFPA 251 acceptable. NFPA 251 requires the stream of water to be delivered through a 6.4 cm [2½-inch] hose discharging through a standard 2.9 cm [1⅛-inch] playpipe nozzle onto the test specimen after the fire exposure test. The stream is applied with the nozzle orifice positioned 6.1 meters [20 feet] away from the center of the test specimen at a pressure of 207 kPa [30 psi]. The application of the stream is to all exposed parts of the specimen for a minimum duration of 1 minute for a 1-hour barrier and 2½ minutes for a 3-hour barrier.

As an alternate for electrical raceway fire barrier test specimens, the application of the hose stream test can be performed immediately after the completion of the full fire endurance test period. If this method is used to satisfy the hose stream test criteria, the following hose stream applications are acceptable:

- The stream applied at random to all exposed surfaces of the test specimen through a 6.4 cm [2½-inch] national standard playpipe with a 2.9 cm [1⅛-inch] orifice at a pressure of 207 kPa [30 psi] at a distance of 6.1 meters [20 feet] from the specimen. (Duration of the hose stream application - 1 minute for a 1-hour barrier and 2½ minutes for a 3-hour barrier); or

- The stream applied at random to all exposed surfaces of the test specimen through a 3.8 cm [1½-inch] fog nozzle set at a discharge angle of 30 degrees with a nozzle pressure of 517 kPa [75 psi] and a minimum discharge of 284 lpm [75 gpm] with the tip of the nozzle at a maximum of 1.5 meters [5 feet] from the test specimen. (Duration of the hose stream application - 5 minutes for both 1-hour and 3-hour barriers); or

- The stream applied at random to all exposed surfaces of the test specimen through 3.8 cm [1½-inch] fog nozzle set at a discharge angle of 15 degrees with a nozzle pressure of 517 kPa [75 psi] and

a minimum discharge of 284 lpm [75 gpm] with the tip of the nozzle at a maximum of 3 meters [10 feet] from the test specimen. (Duration of the hose stream application - 5 minutes for both 1-hour and 3-hour barriers.)

VII. FIRE BARRIER COMBUSTIBILITY

The NRC's fire protection guidelines and requirements establish the need for each nuclear power plant to perform a plant-specific fire hazard analysis. The fire hazard analysis should consider the potential for in-situ and transient fire hazards and combustibles. With respect to building materials (e.g., cable insulation and jackets, plastics, thermal insulation, fire barrier materials), the combustibility, ease of ignition, and flame spread over the surface of a material should be considered by the fire hazards analysis. One method of determining combustibility is by subjecting a sample of the fire barrier material to a small scale vertical tube furnace as described by ASTM E-136. The flashover ignition temperature of the material (as determined by ASTM D-1929) and the flame spread characteristics of the material (as determined by ASTM E-84) should also be evaluated. The potential heat release of the material (as determined by ASTM D-3286 or NFPA 259), should also be factored into the fire hazards analysis.

Fire barrier materials used as radiant energy heat shields inside containment and used to achieve a combustible free zone are required to be noncombustible as defined in Section III.

VIII. REFERENCES

U.S. Nuclear Regulatory Commission

May 1, 1976 Branch Technical Position (APCSB) 9.5-1, "Fire Protection Program."

February 24, 1977 Appendix A to the Branch Technical Position APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976."

February 19, 1981 10 CFR 50.48, "Fire protection."

February 19, 1981 Appendix R to 10 CFR Part 50, "Fire Protection for Nuclear Power Plants."

February 20, 1981 Generic Letter 81-12, "Staff Position - Safe Shutdown Capability."

July 1981 NUREG - 0800, Standard Review Plan, 9.5.1, "Fire Protection for Nuclear Power Plants."

October 19, 1983 Generic Letter 83-33, "NRC Positions on Certain Requirements of Appendix R to 10 CFR 50."

American Society for Testing and Materials

ASTM E-84, "Surface Burning Characteristics of Building Materials."

ASTM E-119, "Fire Test of Building Construction and Materials."

ASTM E-136, "Behavior of Materials in a Vertical Tube Furnace at 750°C."

ASTM D-1929, "Test Method for Ignition Properties of Plastics."

ASTM D-3286, "Test Method for Gross Calorific Value of Solid Fuel by the Isothermal-Jacket Bomb Calorimeter."

American Nuclear Insurers (ANI)

July 1979, ANI Information Bulletin No. 5 (79) test criteria for "Fire Endurance Protective Envelope Systems for Class 1E Electrical Circuits."

National Fire Protection Association (NFPA)

NFPA 251, "Standard Methods of Fire Tests of Building Construction and Materials."

NFPA 259, "Standard Test Method for Potential Heat of Building Materials."

ACCEPTABLE METHODS FOR DEMONSTRATING FUNCTIONALITY OF CABLES PROTECTED BY RACEWAY FIRE BARRIER SYSTEMS DURING AND AFTER FIRE ENDURANCE TEST EXPOSURE

I. INTRODUCTION

The NRC considers fire barrier systems that meet the acceptance criteria adequate under NRC fire protection regulations. The licensee, where the criteria are not met, should submit an engineering analysis to the staff that clearly demonstrates the functionality of the protected cables. This engineering analysis should consider the cable insulation type, actual voltage and current conditions, cable function, and thermal affects on the cable and its ability to function. This evaluation should also consider cable operating temperatures within the fire barrier at the onset of the fire exposure.

II. CABLE CIRCUIT INTEGRITY TESTS

In 1979, American Nuclear Insurers (ANI) issued a fire endurance test method for raceway fire barrier systems for insurance purposes. This method, "Fire Endurance Protective Envelope Systems for Class 1E Electrical Circuits," specified a circuit integrity test. The intent of this test was to identify the onset of fire damage to the cables within the raceway fire barrier test specimen during the fire endurance test period. The circuit integrity test voltage is 8 to 10 volts DC; therefore the loss of circuit integrity under these voltage conditions may occur only as a result of a dead short or open circuit.

During fire tests of raceway fire barrier systems, thermal damage to the cables has been observed. This thermal damage has led to cable jacket and insulation degradation without the loss of circuit integrity as monitored using ANI criteria. Since cable voltages used for ANI circuit integrity tests do not replicate cable operating voltages, loss of cable insulation conditions can exist during the fire test without a dead short occurring. It is expected that if the cables were at rated power and current, a fault would propagate. The use of circuit integrity monitoring during the fire endurance test is not a valid method for demonstrating that the protected shutdown circuits are capable of performing their required function during and after the test fire exposure. Therefore, circuit integrity monitoring is not required to satisfy NRC acceptance criteria for fire barrier qualification.

III. EQUIPMENT QUALIFICATION

Comparison of the fire barrier internal time-temperature profile measured during the fire endurance test to existing cable performance data, such as data from environmental qualification (EQ) tests, could be proposed to the staff as a method for demonstrating cable functionality. EQ testing is typically performed to rigorous conditions, including rated voltage and current. By correlating the EQ test time-temperature profile to the fire test time-temperature profile, the EQ test data would provide a viable mechanism to ensure cable functionality. A large body of EQ test data for many cable types

.ists today. The use of EQ data represents a cost-effective approach for addressing cable functionality for fire tests for those cases where the 163 °C [325 °F] limit is exceeded.

The staff agrees that a comparison of fire test temperature profiles to existing EQ and Loss of Cooling Accident (LOCA) test results or air oven test results is an acceptable approach to demonstrate cable functionality provided the subject analysis incorporates the anticipated temperature rise due to self heating effects of installed power cables with the fire test results.

IV. CABLE INSULATION TESTS

The two principal materials used as cable insulation and cable jackets by the nuclear industry are thermoplastics and thermosetting polymeric materials. A thermoplastic material can be softened and resoftened by heating and reheating. Conversely, thermosetting cable insulation materials cure by chemical reaction and do not soften when heated. Under excessive heating thermosetting insulation becomes stiff and brittle. Electrical faults may be caused by softening and flowing of thermoplastic insulating materials at temperatures as low as 149 °C [300 °F]. Thermosetting electrical conductor insulation materials usually retain their electrical properties under short-term exposures to temperatures as high as 260 °C [500 °F]. Insulation resistance (Megger) tests provide indications of the condition of the cable insulation resistance, whereas the high potential (Hi-Pot) test provides assurance that the cable has sufficient dielectric strength to withstand the applied rated voltage. A cable insulation failure usually results from two breakdown modes: one failure mode is excessive dielectric loss which is due to low insulation resistance, and the other failure mode is overpotential stress which is due to loss of dielectric strength of the insulation material.

If Megger tests are not performed at frequent intervals during the fire exposure, indications of insulation damage in insulation may go undetected. When removed from elevated temperatures, insulation will reset. Megger tests of insulated cables after the fire endurance test and after the cable has sufficiently cooled may not detect degradation in the insulation resistance. Therefore, wet or dry Megger of cables after a fire exposure does not provide reasonable assurance that the cables would have functioned as intended during the fire exposure.

To provide reasonable assurance that the cables would have functioned during and after the fire exposure, Megger tests need to be performed before the fire test, at multiple time intervals during the fire exposure (i.e, every 20 minutes during the 1-hour fire test and every hour during the 3-hour fire test) for instrumentation cables only, and immediately after the fire endurance test to assess the cable insulation resistance levels. This testing will assure that the cables will maintain the insulation resistance levels necessary for proper operation of instruments.

The Megger tests (pre-fire, during the fire [if performed], and immediately after the fire test conditions) should be done conductor-to-conductor for multi-conductor and conductor-to-ground for all cables. The minimum

acceptable insulation resistance (IR) value, using the test voltage values as shown in the table below, is determined by using the following expression:

$$IR\ (\text{Mega-ohms}) \geq \frac{[[K+1]\ \text{Mega-ohm}\ ] * 1000\ (\text{ft})\ ]}{\text{Length (ft)}}$$

Where K = 1 Mega-ohm/KV * Operating Voltage (expressed in KV)

In addition, to determine the insulation resistance levels required for nuclear instrumentation cables, an assessment of the minimum insulation resistance value (e.g., one mega-ohm) and its potential impact on the functionality of these cables should be evaluated. An ac or dc high potential (Hi-Pot) test for power cables greater than 1000 volts (V) should also be performed after the post-fire Megger tests to assess the dielectric strength. This test provides assurance that the cable will withstand the applied voltage during and after a fire. The high potential test should be performed for a 5 minute duration at 60 percent of either 80 V/mil ac or 240 V/mil dc (e.g., 125 mil conductor insulation thickness x 240 V/mil dc x 0.6 = 18,000 V dc).

The table below summarizes the Megger and Hi-Pot test voltages[10] which, when applied to power, control and instrumentation cables, would constitute an acceptable cable functionality test.

TYPE	OPERATING VOLTAGE	MEGGER TEST VOLTAGE	HIGH POTENTIAL TEST VOLTAGE
Power	≥ 1000 V ac	2500 V dc	60% x 80 V/mil (ac) 60% x 240 V/mil (dc)
Power	< 1000 V ac	1500 V dc*	None
Instrument and Control	≤ 250 V dc ≤ 120 V ac	500 V dc	None

* A Megger test voltage of 1000 V dc is acceptable provided a Hi-Pot test is performed after the Megger test for power cables rated at less than 1000 V ac.

The electrical cable functionality tests recommended above are one acceptable method. Alternate methods to assess degradation of cable functionality will be evaluated by the staff for acceptability on a case-by-case basis. The above table summarizing the Megger and Hi-Pot test voltages are "typical" and the applicant can follow the applicable industry standards and manufacturer's recommendations for the specific cable application in the performance of the insulation resistance and Hi-Pot tests.

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[10] The review guidance for Megger and Hi-Pot test voltages was derived from IEEE 383-1974, IEEE 422-1986 and IEEE 690-1984.

V. AIR OVEN TESTS

Air oven tests can be used to evaluate the functionality of cables for those cable tray or raceway fire barrier test specimens tested without cables. This testing method consists of exposing insulated wires and cables at rated voltage to elevated temperatures in a circulating air oven. The temperature profile for regulating the temperature in the air oven during this test is the temperature measured by the AWG 8 bare copper conductor during the fire exposure of those cable tray or raceway test specimen which were tested without cables.

The staff finds the test method described by UL Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems", Issue Number 2, August 1991, Appendix B, "Qualification Test for Circuit Integrity of Insulated Electrical Wires and Cables in Electrical Circuit Protection Systems", with the following modifications, acceptable:

1. During the air oven test the cables are to be energized at rated voltage. The cables are to be monitored for conductor-to-conductor faults in multi-conductor cables and conductor-to-ground faults in all conductors.

2. The cables being evaluated should be subjected to the Megger and high potential tests, recommended above in Section IV, "Cable Insulation Tests."

3. The impact force test, which simulates the force of impact imposed on the raceway by the solid stream test, described in UL 1724, Appendix B, paragraph B3.16, is not required to be performed.

VI. CABLE THERMAL EXPOSURE THRESHOLD

The following analysis, which is based on determining whether a specific insulation material will maintain electrical integrity and operability within a raceway fire barrier system during and after an external fire exposure, is an acceptable method for evaluating cable functionality. In order to determine cable functionality, it is necessary to consider the operating cable temperatures within the fire barrier system at the onset of the fire exposure and the thermal exposure threshold (TET) temperature of the cable. For example, if the TET of a specific thermoplastic cable insulation (Brand X) is 149 °C [300 °F] and the normal operating temperature within the fire barrier system is 66 °C [150 °F], then the maximum temperature rise within the fire barrier system should not exceed 83 °C [150 °F] during exposure to an external fire of a duration equal to the required fire resistance rating of the barrier. For this example the TET limit for Brand X cable is 83 °C [150 °F] above the cable operating temperatures within the fire barrier system at the onset of the external fire exposure. The cable TET limits in conjunction with a post test visual cable inspection and the Hi-Pot test described above should readily demonstrate the functionality of the cable circuit during and after a fire.

The normal cable operating temperature can be determined by loading cable specimens installed within a thermal barrier system in the test configuration with rated voltage and current. The TET temperature limits for most cable insulation may be obtained from the manufacturer's published data which is given as the short-circuit rating limit. With the known TET and normal operating temperature for each thermal barrier system configuration, the maximum temperature rise limit within a fire barrier system may then be determined.

COMPARISON OF FIRE ENDURANCE TEST CRITERIA
FOR FIRE BARRIER SYSTEMS USED TO SEPARATE
SAFE SHUTDOWN FUNCTIONS WITHIN THE SAME FIRE AREA

GL 86-10, SUPP. 1	GL 86-10	RATIONALE FOR CLARIFICATION
Temperature, as measured on the external surface of the Raceway, should not exceed 163 °C [325 °F] (Note 1). This temperature is determined by averaging temperature readings of similar series of thermocouple (e.g., cable tray side rail) (Note 2).	Temperature, as measured on the unexposed side of the fire barrier material, should not exceed 163 °C [325 °F].	Temperature - Difficult to measure a uniform temperature on the fire barrier material surface. Raceway temps provide good indication of internal temp-rise and potential barrier failure locations during the test.
Barrier Condition - Fire barrier should remain intact. No visible signs of component, raceway or cables after fire and hose stream test.	Barrier Condition - The barrier should have withstood the fire and hose stream test without the passage of flame or hot gasses hot enough to ignite cotton waste.	Barrier Condition - Cotton waste has not been used in raceway fire barrier testing as an indicator of barrier failure. Visual inspection process provides a better indication of barrier condition after the fire and hose stream test.
Hose Stream Test - solid stream test as specified in NFPA 251 on second test specimen after being subjected to a fire exposure of 1/2 duration (Note 4) or a fog stream after the full fire exposure.	Hose Stream Test - solid stream test as specified in NFPA 251.	Hose Stream Test - To reflect alternative methods found acceptable (Note 3). The use of a fog nozzle for the hose stream at the end of a full duration of the fire test provides a good method for testing erosion and cooling effects.

GL 86-10, SUPP. 1	GL 86-10	RATIONALE FOR CLARIFICATION
Cable condition - When cables are included in the test specimen, post-fire condition must be visually inspected. Cables should show no signs of degraded conditions resulting from the thermal affects of the fire exposure.	Cable condition - No consideration given to determining the material condition of the cable.	Cable condition - The objective of these fire barriers is to assure that thermal damage to protected safe shutdown cables or components does not occur.

GUIDANCE FOR ENGINEERING EVALUATIONS JUSTIFYING DEVIATIONS FROM THE FIRE BARRIER ACCEPTANCE CRITERIA

Functionality should be demonstrated if any of the preceding criteria are exceeded (Note 5). .ethods when cables are excluded from test specimen: Comparison of internal temp. profiles to EQ and LOCA test data. Air oven test of cables at rated voltage with Megger and Hi-Pot tests (Note 6) Method when cables are in test specimen include megger and Hi-Pot testing (Note 7) Demonstration of functionality should also consider operating temperature of the cables inside the fire arrier at the onset of he fire exposure.	Functionality - No guidance provided. Up to licensees to demonstrate by engineering analysis. Analysis kept on file for NRC review. Engineering analysis generally based on internal temperature below the ignition temperature. No consideration given cable operating temperatures within the barrier at the onset of the fire exposure.	Functionality is considered to be a deviation from the acceptance criteria and must be justified on a case-by-case basis which includes an assessment of cable jacket material.

Note 1: The 163 °C [325 °F] temperature condition was established by allowing the internal temperature on the raceway surface to rise a maximum of 139 °C [250 °F] above the initial temperature of the test specimen (assumed to be 24 °C [75 °F]).

Note 2: NFPA 251/ASTM-E119 allows the temperature condition to be determined by averaging the thermocouple readings. The conditions of acceptance are also placed on the temperature conditions measured by a single thermocouple. Under these conditions of acceptance, if any single thermocouple exceeds 30 percent above the maximum allowable temperature rise (i.e., max. allowable 139 °C + 42 °C = 181 °C [250 °F + 75 °F = 325 °F]) the test is considered to have exceeded the criteria temperature limit.

Note 3: SRP 9.5.1 recognizes the use of a fog stream as an alternative hose stream testing method for qualifying fire barrier penetration seals.

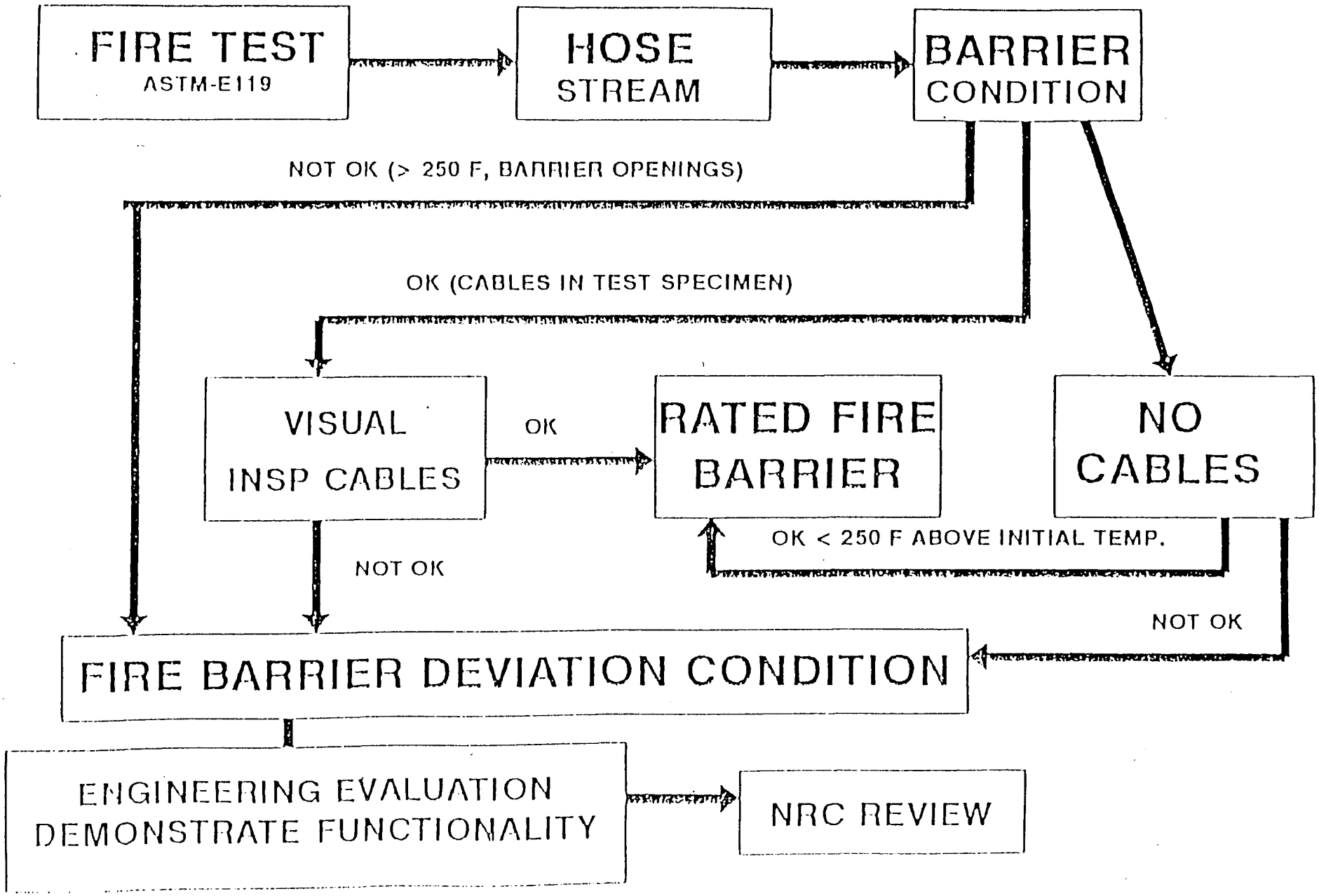
Note 4: This hose stream test method provides assurance that the cable tray or raceway fire barrier system has sufficient structural integrity to resist minor fire related barrier breaches caused by falling objects.

Note 5: A fire barrier system that does not meet the acceptance criteria is not considered a rated fire barrier. For those conditions (e.g., high raceway temperature, barrier openings, water projection, cable damage) which deviate from the acceptance criteria, an engineering analysis which clearly demonstrates the functionality of the protected components or cables should be submitted to the staff for review. The purpose of the recommended functionality tests is to justify observed deviations in fire barrier performance. Engineering analyses justifying these deviations should not rely substantially upon the equipment (e.g., cable) qualification as the basis for acceptance. Deviations will be evaluated by the staff on a case-by-case basis.

Note 6: For fire barrier systems tested without cables, plant-specific cable types should be subjected to air oven tests when the fire barrier temperature rise criteria are exceeded. These cables will be exposed to a temperature profile as determined by the internal raceway thermocouples during the fire test. Cables will be tested at rated voltage. Megger and Hi-Pot testing should be performed in a consistent manner to those tests performed for cables included in a fire barrier test specimen and subjected to the fire endurance test.

Note 7: Megger tests of cables included in the fire test specimen should be performed before, during (instrumentation cables only) and immediately after the fire exposure and subjecting power cables which have voltage ratings $\geq$ 1000 volts ac to a Hi-Pot test (60 percent) immediately after the fire exposure.

LOGIC DIAGRAM



Report No. 11960-97187
TVA / Thermal Science, Inc.

November 18, 1994
APPENDICES

TVA Position on Fire Testing Criteria

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT

POSITION ON FIRE TESTING CRITERIA FOR FIRE BARRIER SYSTEMS USED TO PROTECT ELECTRICAL CABLING REQUIRED FOR 10 CFR 50 APPENDIX R COMPLIANCE

Background

There is considerable discussion between the NRC, nuclear utilities and manufacturers of fire barrier systems on the appropriate test method and acceptance criteria for electrical fire barrier systems. The NRC has based its methodology and criteria on National Fire Protection Association (NFPA) 251, "Standard Method of Fire Tests of Building Construction and Materials," Chapter 7, "Tests of Nonbearing Walls and Partitions."[1] Thermal Science, Inc. (TSI), the manufacturer of Thermo-Lag, and most nuclear utilities, have based their methodology and criteria on American Nuclear Insurers (ANI) "Standard Fire Endurance Test Method to Qualify a Protective Envelope for Class 1E Electrical Circuits."[2] Other manufacturers of fire barrier systems, such as 3M and Thermal Ceramics, Inc., have typically used Underwriters Laboratory (UL) test methods and acceptance criteria such as "UL Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems."[3] The American Society for Testing and Materials (ASTM) has recognized the need to develop a unique test method and acceptance criteria for electrical fire barrier systems. They have been working for approximately the last five years on this issue but have not issued a standard.

Discussion

The Code of Federal Regulations (CFR), Title 10 Part 50 Domestic Licensing of Production and Utilization Facilities, Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, paragraph III.G.2 provides the requirements for fire protection and safe shutdown capability. If redundant trains are located in the same fire area and a licensee does not provide alternative or dedicated shutdown systems for the redundant equipment in that fire area, the three acceptable methods of ensuring that one of the trains is free from fire damage are:

a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.[1]

A fire wall design that has passed on appropriate test method (e.g., NFPA 251) is considered a "rated" barrier. Components which penetrate fire walls, such as mechanical and electrical penetrations, fire doors, and HVAC fire dampers, are "rated" under their own unique test method and acceptance criteria. There is presently no generally accepted test method and acceptance criteria specifically applicable to fire barrier enclosures applied to electrical cable systems. Existing methods intended for other purposes have been utilized to test such barrier systems, but none of these standards are fully appropriate to this unique application of fire barrier materials. In an attempt to define a test method for electrical circuit protection, American Nuclear Insurers (ANI) prepared "Guidelines for Fire Stop and Wrap Systems at Nuclear Facilities". However, this test method was intended to be used "for insurance purposes only".[2] The method and acceptance criteria in the ANI document are not definitive.

Position

The fire testing methodology and acceptance criteria for electrical cable systems should be unique to these systems. Underwriters Laboratory currently has an appropriate test method (Subject 1724), which addresses the uniqueness of electrical cable fire barrier systems. This test method was developed by UL specifically to address issues such as Appendix R electrical fire barrier rating requirements. The scope of the test method is:

- Measurement of temperature changes within the electrical circuit protective system caused by the heat transfer through the electrical circuit protective system to the electrical conductor or raceway, or both, during the external fire exposure test.

- Determination of the integrity of the electrical circuit protective system during the external fire exposure and water hose stream test.

- Determination of the ability of insulated electrical conductors to maintain electrical circuit integrity at the temperature conditions present within the electrical circuit protective system during the external fire exposure test and during the water hose stream test.[3]

Details such as thermocouple types and placements are discussed in this test method. The test follows the standard time-temperature curve specified in ASTM E-119, as used in other fire endurance tests (e.g., NFPA 251). The test allows the use of the actual installed cables or a No. 8 AWG (3.38mm^2) bare copper conductor to simulate the electrical circuits. With the bare conductor method the thermocouple measurements can be correlated to actual cable qualification tests as described in Appendix B of UL Subject 1724.

TVA considers that UL Subject 1724 is the most appropriate test method currently

available for determining the fire resistance rating of electrical fire barrier systems. TVA will use UL Subject 1724 with the following clarifications to perform tests of Thermo-lag 330 electrical circuit protective systems intended for use at Watts Bar:

(1) The exterior surface temperature of the electrical raceway will be recorded (cold side of the barrier). If the average temperature recorded by the exterior thermocouples is less than 250°F (121°C) above their initial temperature and no individual thermocouple is in excess of 325°F (163°C) above its initial temperature, the fire barrier will be considered acceptable for use with any type cable.[5]

(2) Section 6, Internal Fire Exposure Test, will not be used. TVA considers that this portion of the testing is not necessary, since an internally generated cable tray fire would be extremely unlikely. Circuits are protected with a fuse or breaker that will actuate prior to the jacket of a faulted cable reaching its auto-ignition temperature (for existing designs) or reaching its insulation damage temperature (for new designs) for all credible low impedance and bolted faults.[6] No other ignition sources exist within the protective barrier.

(3) Section 5, Hose Stream Test. TVA will follow the criteria for hose stream testing described in NUREG-0800 using one and one-half inch fog nozzle set at a discharge angle of 15° with a nozzle pressure of 75 psig and a minimum discharge of 75 gpm.[7] TVA considers that this would accurately represent the mechanical impact, erosion and cooling effects that would exist in TVA's nuclear power plant environment. The hose stream test shall be performed within ten minutes of the completion of the fire test. The duration and application will follow the requirements of UL 1724 Table 5.1. The nozzle will be located a maximum of ten feet measured horizontally from the outside edge of the testing assembly. Acceptance shall be based on the fire barrier system remaining intact with minimal material flaking. (The alternative test called for by the UL document, involving a one and one-eighth inch solid bore National Standard Playpipe operating at 30 psig, is not a realistic simulation of the challenge to barrier systems as installed in a nuclear power plant).

REFERENCES

(1) National Fire Protection Association (NFPA) 251, "Standard Method of Fire Tests of Building Construction and Materials", 1990 Edition.

Note: For the purposes of this paper NFPA 251 (90) is considered equivalent to ASTM E119-88 "Standard Test Method for Fire Tests of Building Construction and Materials".

(2) American Nuclear Insurers/Mutual Atomic Energy Reinsurance Pool (ANI/MAERP) RA "Guidelines for Fire Stop and Wrap Systems at Nuclear Facilities" Revision 0, November 1987.

(3) Underwriters Laboratories, Inc. (UL) Subject 1724, "Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems", Issue Number: 2, August 1991.

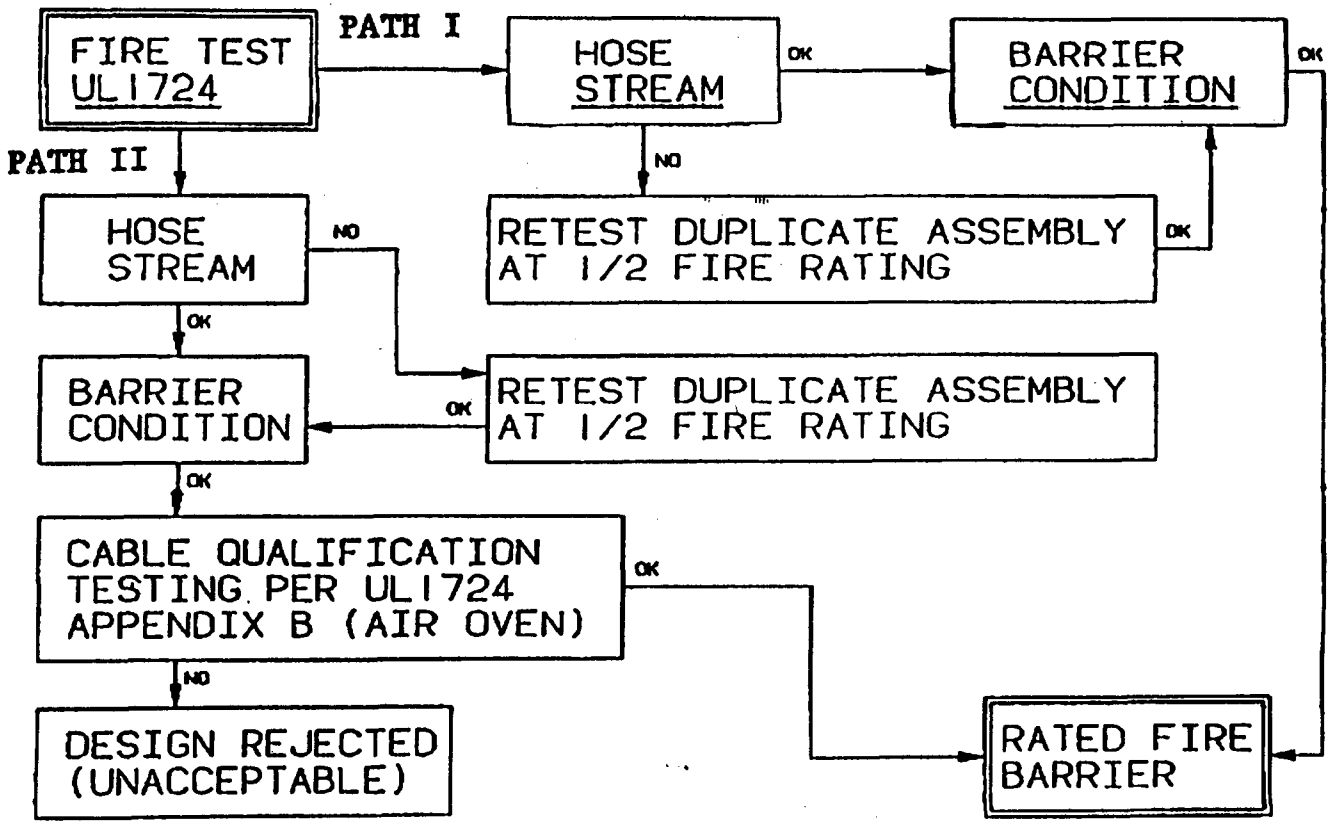
(4) Code of Federal Regulations, Title 10, Part 50, Energy, January 1, 1992.

(5) Based on a NFPA 251 (90) acceptance criteria for Nonbearing Walls and Partitions.

(6) Tennessee Valley Authority (TVA), "Watts Bar Design Criteria - WB-DC-30-13, 10 CFR 50 Appendix R Type I, II, and III Circuits". Revision 2, February 13, 1990.

(7) U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Standard Review Plan, NUREG 0800, Rev. 2, July 1981, Section 9.5.1 Fire Protection Program, page 9.5.1-29.

TVA-WBN FIRE BARRIER TESTING
ACCEPTANCE CRITERIA



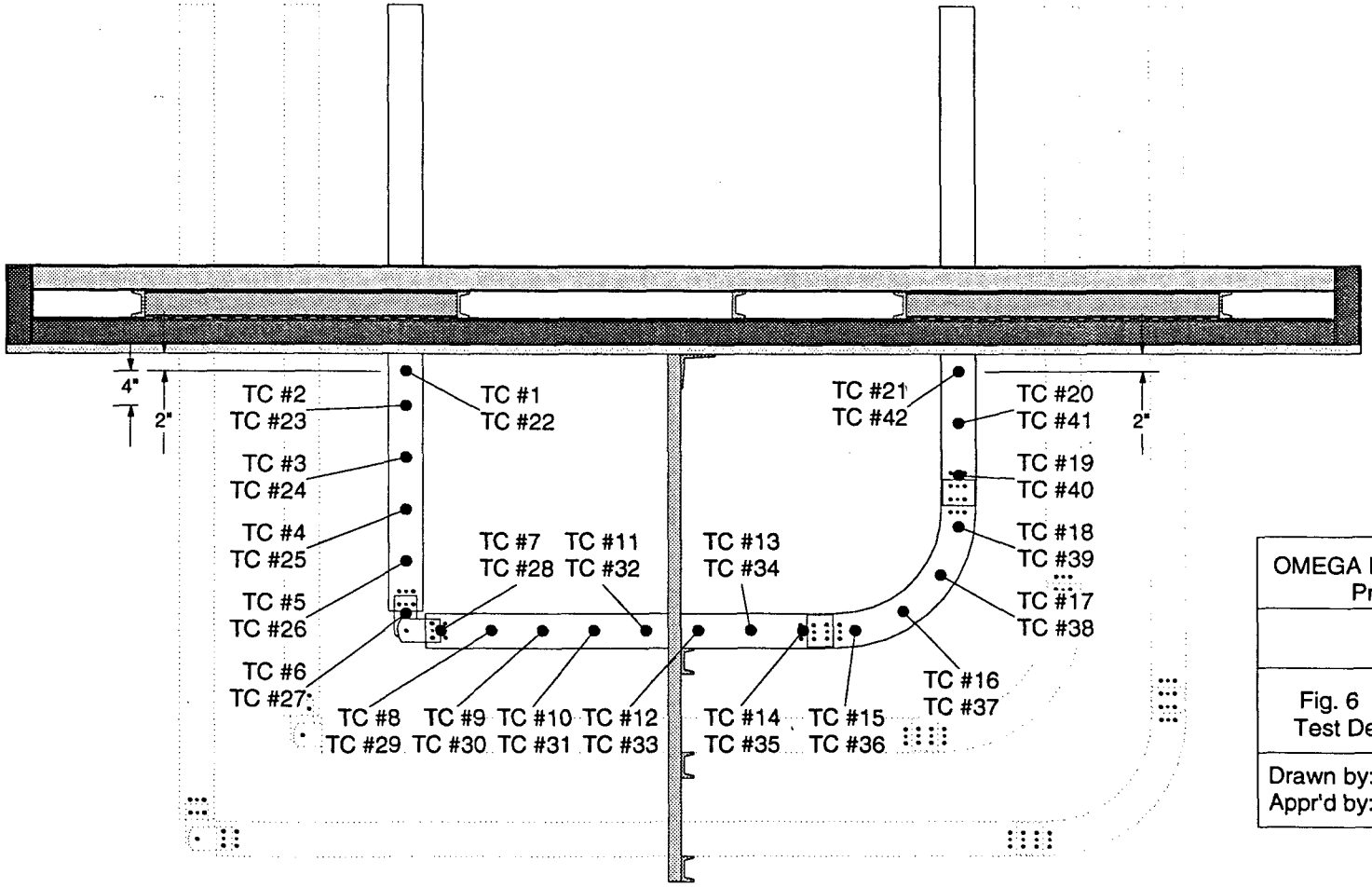
PATH I - RACEWAY $\Delta T_{avg.} \leq$ 250°F AND $\Delta T_{max.} \leq$ 325°F

PATH II - RACEWAY $\Delta T_{avg.} \geq$ 250°F OR $\Delta T_{max.} \geq$ 325°F

Appendix C

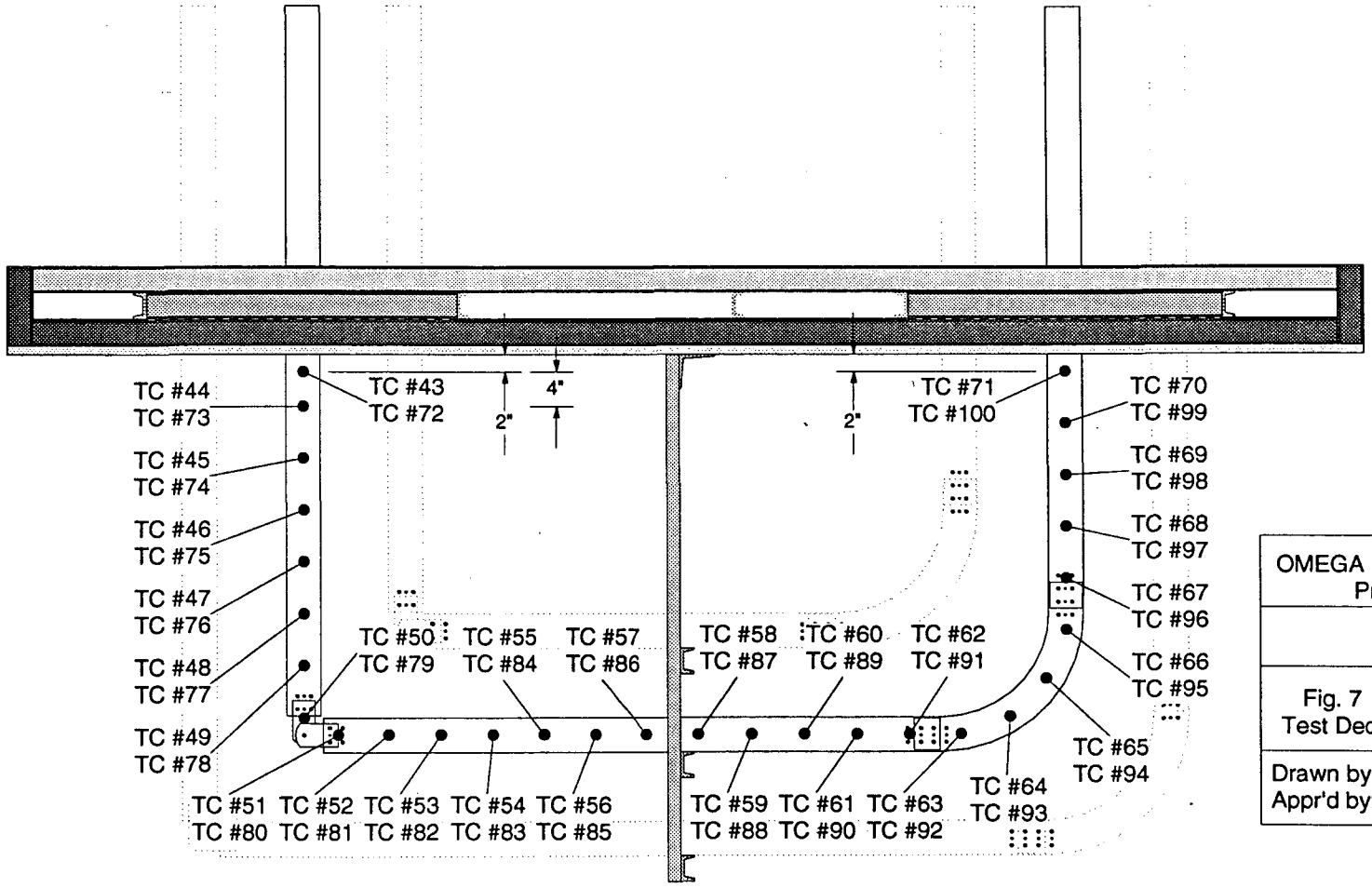
THERMOCOUPLE LOCATIONS

OMEGA POINT LABORATORIES



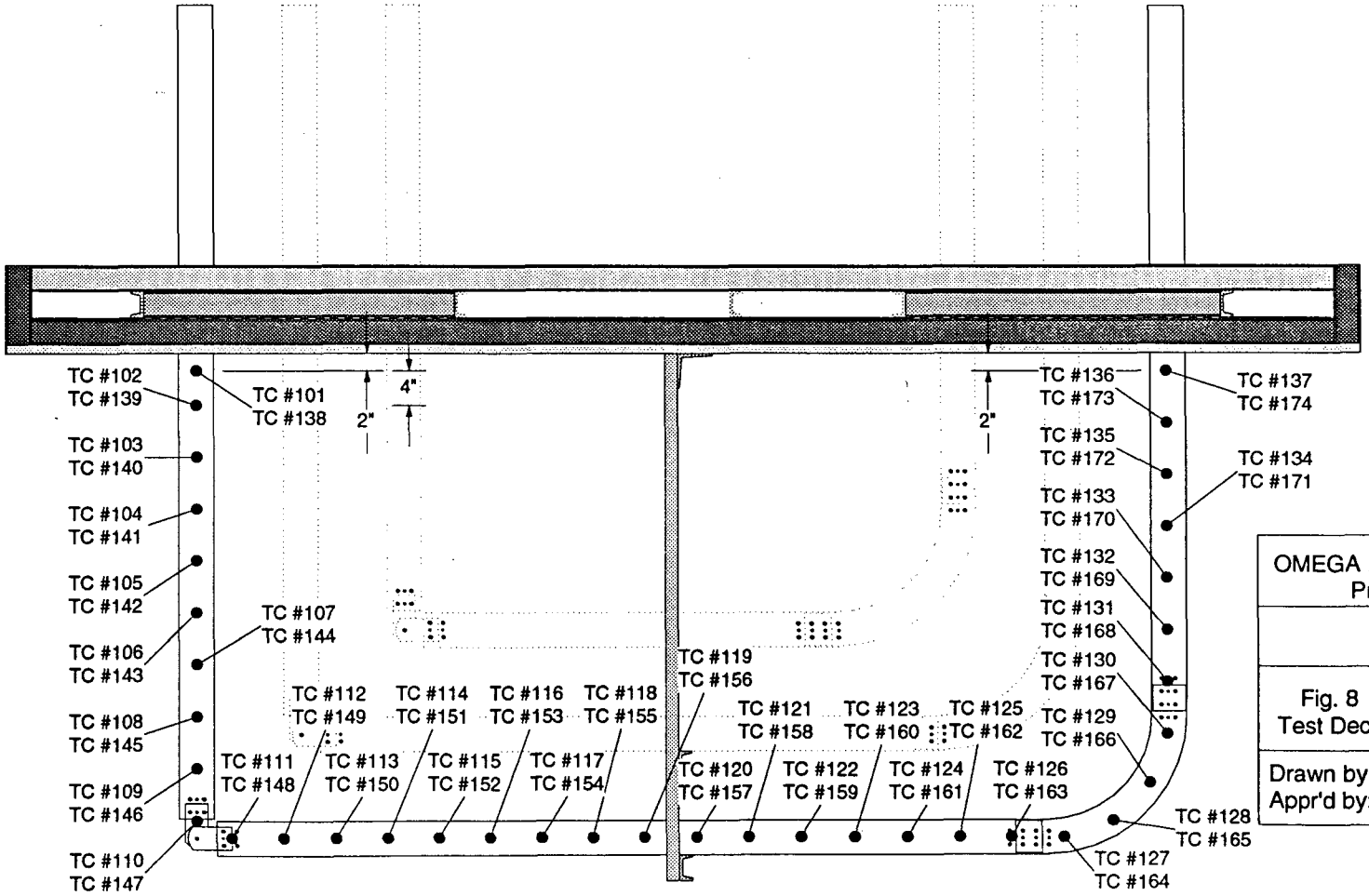
NOTE:
Top set of numbers indicates thermocouple channel numbers for the front cable tray side rail. The bottom set of numbers indicates thermocouple channel numbers from the rear cable tray side rail. All thermocouples were spaced 6" o.c. and were held in place by clamping the thermojunction under the head of a small screw tapped into the tray side rails.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 6 Thermocouple Locations - Test Deck #3,Top Front Tray, Rev. 0
Drawn by: [signature] Date: 7/7/94 Appr'd by: C Humphrey Date: 7/7/94



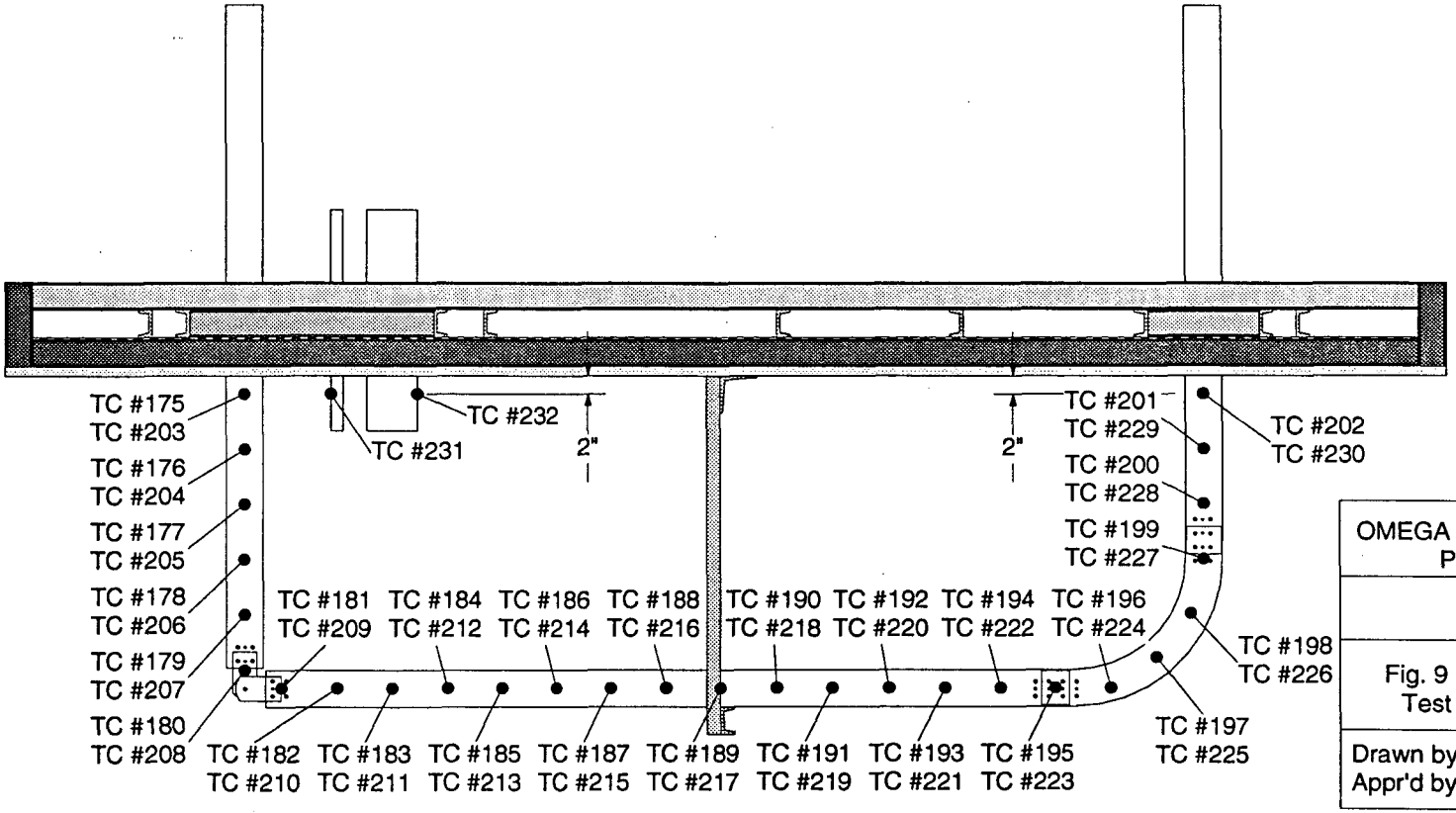
NOTE:
Top set of numbers indicates thermocouple channel numbers for the front cable tray side rail. The bottom set of numbers indicates thermocouple channel numbers from the rear cable tray side rail. All thermocouples were spaced 6" o.c. and were held in place by clamping the thermojunction under the head of a small screw tapped into the tray side rails.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 7 Thermocouple Locations - Test Deck #3,Center Front Tray, Rev. 0
Drawn by: [illegible] Date: 7/7/94 Appr'd by: C Humphrey Date: 7/7/94



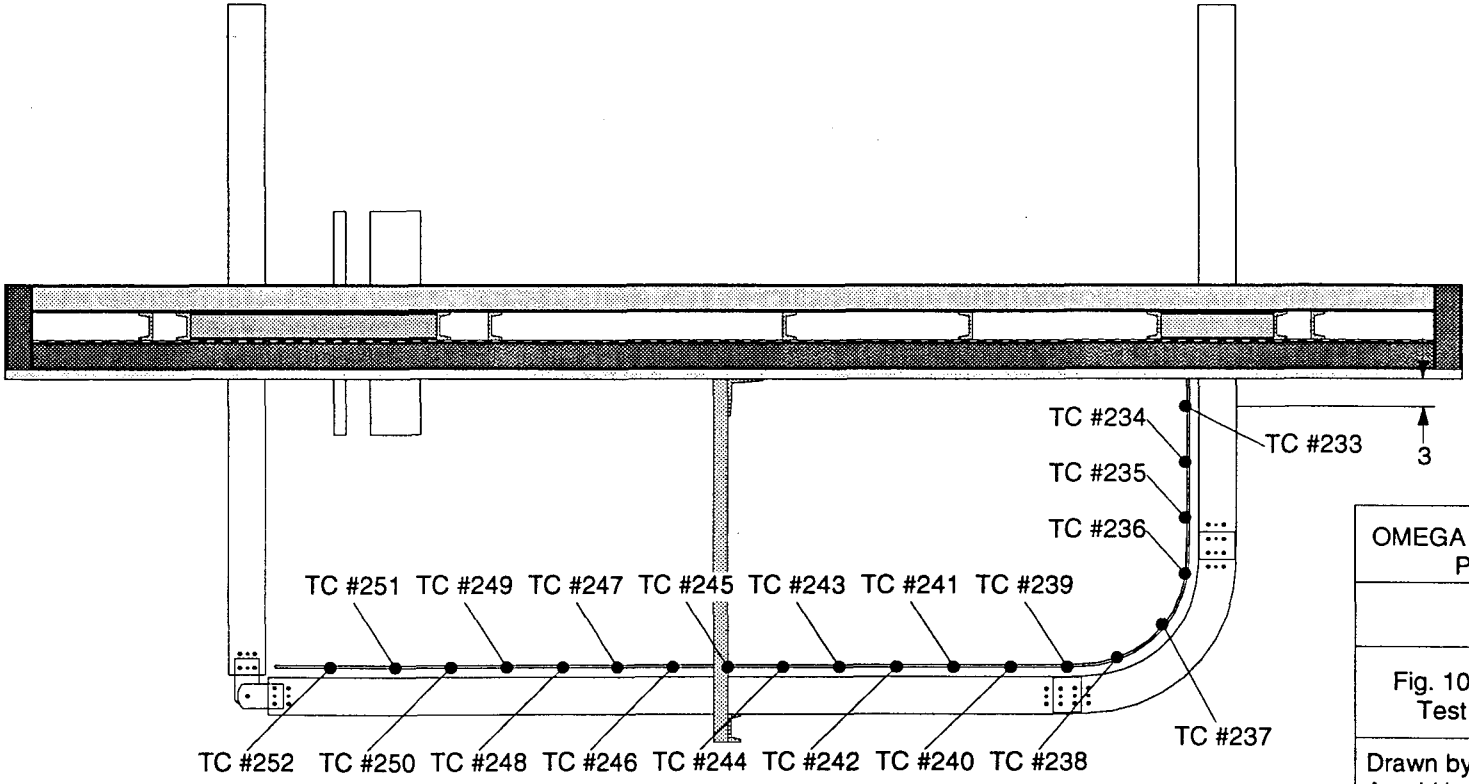
NOTE:
Top set of numbers indicates thermocouple channel numbers for the front cable tray side rail. The bottom set of numbers indicates thermocouple channel numbers from the rear cable tray side rail. All thermocouples were spaced 6" o.c. and were held in place by clamping the thermojunction under the head of a small screw tapped into the tray side rails.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 8 Thermocouple Locations - Test Deck #3,Bottom Front Tray, Rev. 0
Drawn by: [signature] Date: 7/7/94 Appr'd by: C Humphrey Date: 7/7/94



NOTE:
Top set of numbers indicates thermocouple channel numbers for the front cable tray side rail. The bottom set of numbers indicates thermocouple channel numbers from the rear cable tray side rail. All thermocouples were spaced 6" o.c. and were held in place by clamping the thermojunction under the head of a small screw tapped into the tray side rails.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 9 Thermocouple Locations - Test Deck #3, Rear Tray, Rev. 0
Drawn by: H. Stanford Date: 7/7/94 Appr'd by: C Humphrey Date: 7/7/94



NOTE:

All thermocouples were spaced 6" o.c. and were held in place by clamping the thermojunction under the head of a small screw tapped into the tray cover plates.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97187
TVA / TSI
Fig. 10 Thermocouple Locations - Test Deck #3, Rear Tray, Rev. 1
Drawn by: H Stanley Date: 7/26/94 Appr'd by: C Humphrey Date: 9/26/94

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

NOTE:
This Log is to be used to document the precise location of the thermocouples located on each test item. The back of this sheet may be used for any necessary drawings or schematics.

Project #: 97187

Test Deck #: 3

Item: Cable Tray Front Side Rail on Top Front 18" Cable Tray Assembly

TC Number	Description of exact physical location
E1	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E2	On horizontal centerline of the side rail, 4" below previous thermocouple.
E3	On horizontal centerline of the side rail, 6" below previous thermocouple.
E4	On horizontal centerline of the side rail, 6" below previous thermocouple.
E5	On horizontal centerline of the side rail, 6" below previous thermocouple.
E6	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E7	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E8	On vertical centerline of the side rail, 6" left of previous thermocouple.
E9	On vertical centerline of the side rail, 6" left of previous thermocouple.
E10	On vertical centerline of the side rail, 6" left of previous thermocouple.
E11	On vertical centerline of the side rail, 6" left of previous thermocouple.
E12	On vertical centerline of the side rail, 6" left of previous thermocouple.
E13	On vertical centerline of the side rail, 6" left of previous thermocouple.
E14	On vertical centerline of the side rail, 6" left of previous thermocouple.
E15	On vertical centerline of the side rail, 6" left of previous thermocouple.
E16	On vertical centerline of the side rail, 6" left of previous thermocouple.
E17	On horizontal centerline of the side rail, 6" above previous thermocouple.
E18	On horizontal centerline of the side rail, 6" above previous thermocouple.
E19	On horizontal centerline of the side rail, 6" above previous thermocouple.
E20	On horizontal centerline of the side rail, 6" above previous thermocouple.
E21	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

PLEASE USE THE BACK OF THIS SHEET FOR DRAWINGS, IF NECESSARY

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

NOTE:
This Log is to be used to document the precise location of the thermocouples located on each test item. The back of this sheet may be used for any necessary drawings or schematics.

Project #: 97187

Test Deck #: 3

Item: Cable Tray Rear Side Rail on Top Front 18" Cable Tray Assembly

TC Number	Description of exact physical location
E22	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E23	On horizontal centerline of the side rail, 4" below previous thermocouple.
E24	On horizontal centerline of the side rail, 6" below previous thermocouple.
E25	On horizontal centerline of the side rail, 6" below previous thermocouple.
E26	On horizontal centerline of the side rail, 6" below previous thermocouple.
E27	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E28	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E29	On vertical centerline of the side rail, 6" left of previous thermocouple.
E30	On vertical centerline of the side rail, 6" left of previous thermocouple.
E31	On vertical centerline of the side rail, 6" left of previous thermocouple.
E32	On vertical centerline of the side rail, 6" left of previous thermocouple.
E33	On vertical centerline of the side rail, 6" left of previous thermocouple.
E34	On vertical centerline of the side rail, 6" left of previous thermocouple.
E35	On vertical centerline of the side rail, 6" left of previous thermocouple.
E36	On vertical centerline of the side rail, 6" left of previous thermocouple.
E37	On vertical centerline of the side rail, 6" left of previous thermocouple.
E38	On horizontal centerline of the side rail, 6" above previous thermocouple.
E39	On horizontal centerline of the side rail, 6" above previous thermocouple.
E40	On horizontal centerline of the side rail, 6" above previous thermocouple.
E41	On horizontal centerline of the side rail, 6" above previous thermocouple.
E42	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Front Side Rail on Center Front 18" Cable Tray Assembly

TC Number	Description of exact physical location
E43	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E44	On horizontal centerline of the side rail, 4" below previous thermocouple.
E45	On horizontal centerline of the side rail, 6" below previous thermocouple.
E46	On horizontal centerline of the side rail, 6" below previous thermocouple.
E47	On horizontal centerline of the side rail, 6" below previous thermocouple.
E48	On horizontal centerline of the side rail, 6" below previous thermocouple.
E49	On horizontal centerline of the side rail, 6" below previous thermocouple.
E50	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E51	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E52	On vertical centerline of the side rail, 6" left of previous thermocouple.
E53	On vertical centerline of the side rail, 6" left of previous thermocouple.
E54	On vertical centerline of the side rail, 6" left of previous thermocouple.
E55	On vertical centerline of the side rail, 6" left of previous thermocouple.
E56	On vertical centerline of the side rail, 6" left of previous thermocouple.
E57	On vertical centerline of the side rail, 6" left of previous thermocouple.
E58	On vertical centerline of the side rail, 6" left of previous thermocouple.
E59	On vertical centerline of the side rail, 6" left of previous thermocouple.
E60	On vertical centerline of the side rail, 6" left of previous thermocouple.
E61	On vertical centerline of the side rail, 6" left of previous thermocouple.
E62	On vertical centerline of the side rail, 6" left of previous thermocouple.
E63	On vertical centerline of the side rail, 6" left of previous thermocouple.
E64	On vertical centerline of the side rail, 6" left of previous thermocouple.
E65	On horizontal centerline of the side rail, 6" above previous thermocouple.
E66	On horizontal centerline of the side rail, 6" above previous thermocouple.
E67	On horizontal centerline of the side rail, 6" above previous thermocouple.
E68	On horizontal centerline of the side rail, 6" above previous thermocouple.
E69	On horizontal centerline of the side rail, 6" above previous thermocouple.
E70	On horizontal centerline of the side rail, 6" above previous thermocouple.
E71	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

NOTE:
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Project #: 97187

Test Deck #: 3

Item: Cable Tray Rear Side Rail on Center Front 18" Cable Tray Assembly

TC Number	Description of exact physical location
E72	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E73	On horizontal centerline of the side rail, 4" below previous thermocouple.
E74	On horizontal centerline of the side rail, 6" below previous thermocouple.
E75	On horizontal centerline of the side rail, 6" below previous thermocouple.
E76	On horizontal centerline of the side rail, 6" below previous thermocouple.
E77	On horizontal centerline of the side rail, 6" below previous thermocouple.
E78	On horizontal centerline of the side rail, 6" below previous thermocouple.
E79	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E80	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E81	On vertical centerline of the side rail, 6" left of previous thermocouple.
E82	On vertical centerline of the side rail, 6" left of previous thermocouple.
E83	On vertical centerline of the side rail, 6" left of previous thermocouple.
E84	On vertical centerline of the side rail, 6" left of previous thermocouple.
E85	On vertical centerline of the side rail, 6" left of previous thermocouple.
E86	On vertical centerline of the side rail, 6" left of previous thermocouple.
E87	On vertical centerline of the side rail, 6" left of previous thermocouple.
E88	On vertical centerline of the side rail, 6" left of previous thermocouple.
E89	On vertical centerline of the side rail, 6" left of previous thermocouple.
E90	On vertical centerline of the side rail, 6" left of previous thermocouple.
E91	On vertical centerline of the side rail, 6" left of previous thermocouple.
E92	On vertical centerline of the side rail, 6" left of previous thermocouple.
E93	On vertical centerline of the side rail, 6" left of previous thermocouple.
E94	On horizontal centerline of the side rail, 6" above previous thermocouple.
E95	On horizontal centerline of the side rail, 6" above previous thermocouple.
E96	On horizontal centerline of the side rail, 6" above previous thermocouple.
E97	On horizontal centerline of the side rail, 6" above previous thermocouple.
E98	On horizontal centerline of the side rail, 6" above previous thermocouple.
E99	On horizontal centerline of the side rail, 6" above previous thermocouple.
E100	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Front Side Rail on Bottom

Front 18" Cable Tray Assembly

TC Number	Description of exact physical location
E101	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E102	On horizontal centerline of the side rail, 4" below previous thermocouple.
E103	On horizontal centerline of the side rail, 6" below previous thermocouple.
E104	On horizontal centerline of the side rail, 6" below previous thermocouple.
E105	On horizontal centerline of the side rail, 6" below previous thermocouple.
E106	On horizontal centerline of the side rail, 6" below previous thermocouple.
E107	On horizontal centerline of the side rail, 6" below previous thermocouple.
E108	On horizontal centerline of the side rail, 6" below previous thermocouple.
E109	On horizontal centerline of the side rail, 6" below previous thermocouple.
E110	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E111	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E112	On vertical centerline of the side rail, 6" left of previous thermocouple.
E113	On vertical centerline of the side rail, 6" left of previous thermocouple.
E114	On vertical centerline of the side rail, 6" left of previous thermocouple.
E115	On vertical centerline of the side rail, 6" left of previous thermocouple.
E116	On vertical centerline of the side rail, 6" left of previous thermocouple.
E117	On vertical centerline of the side rail, 6" left of previous thermocouple.
E118	On vertical centerline of the side rail, 6" left of previous thermocouple.
E119	On vertical centerline of the side rail, 6" left of previous thermocouple.
E120	On vertical centerline of the side rail, 6" left of previous thermocouple.
E121	On vertical centerline of the side rail, 6" left of previous thermocouple.
E122	On vertical centerline of the side rail, 6" left of previous thermocouple.
E123	On vertical centerline of the side rail, 6" left of previous thermocouple.
E124	On vertical centerline of the side rail, 6" left of previous thermocouple.
E125	On vertical centerline of the side rail, 6" left of previous thermocouple.
E126	On vertical centerline of the side rail, 6" left of previous thermocouple.
E127	On vertical centerline of the side rail, 6" left of previous thermocouple.
E128	On vertical centerline of the side rail, 6" left of previous thermocouple.
E129	On horizontal centerline of the side rail, 6" above previous thermocouple.
E130	On horizontal centerline of the side rail, 6" above previous thermocouple.
	CONTINUED ON NEXT SHEET

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

PLEASE USE THE BACK OF THIS SHEET FOR DRAWINGS, IF NECESSARY

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Front Side Rail on Bottom Front 18" Cable Tray Assembly

CONTINUED

TC Number	Description of exact physical location
E131	On horizontal centerline of the side rail, 6" above previous thermocouple.
E132	On horizontal centerline of the side rail, 6" above previous thermocouple.
E133	On horizontal centerline of the side rail, 6" above previous thermocouple.
E134	On horizontal centerline of the side rail, 6" above previous thermocouple.
E135	On horizontal centerline of the side rail, 6" above previous thermocouple.
E136	On horizontal centerline of the side rail, 6" above previous thermocouple.
E137	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

PLEASE USE THE BACK OF THIS SHEET FOR DRAWINGS, IF NECESSARY

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

NOTE:
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Project #: 97187

Test Deck #: 3

Item: Cable Tray Rear Side Rail on Bottom

Front 18" Cable Tray Assembly

TC Number	Description of exact physical location
E138	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E139	On horizontal centerline of the side rail, 4" below previous thermocouple.
E140	On horizontal centerline of the side rail, 6" below previous thermocouple.
E141	On horizontal centerline of the side rail, 6" below previous thermocouple.
E142	On horizontal centerline of the side rail, 6" below previous thermocouple.
E143	On horizontal centerline of the side rail, 6" below previous thermocouple.
E144	On horizontal centerline of the side rail, 6" below previous thermocouple.
E145	On horizontal centerline of the side rail, 6" below previous thermocouple.
E146	On horizontal centerline of the side rail, 6" below previous thermocouple.
E147	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E148	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E149	On vertical centerline of the side rail, 6" left of previous thermocouple.
E150	On vertical centerline of the side rail, 6" left of previous thermocouple.
E151	On vertical centerline of the side rail, 6" left of previous thermocouple.
E152	On vertical centerline of the side rail, 6" left of previous thermocouple.
E153	On vertical centerline of the side rail, 6" left of previous thermocouple.
E154	On vertical centerline of the side rail, 6" left of previous thermocouple.
E155	On vertical centerline of the side rail, 6" left of previous thermocouple.
E156	On vertical centerline of the side rail, 6" left of previous thermocouple.
E157	On vertical centerline of the side rail, 6" left of previous thermocouple.
E158	On vertical centerline of the side rail, 6" left of previous thermocouple.
E159	On vertical centerline of the side rail, 6" left of previous thermocouple.
E160	On vertical centerline of the side rail, 6" left of previous thermocouple.
E161	On vertical centerline of the side rail, 6" left of previous thermocouple.
E162	On vertical centerline of the side rail, 6" left of previous thermocouple.
E163	On vertical centerline of the side rail, 6" left of previous thermocouple.
E164	On vertical centerline of the side rail, 6" left of previous thermocouple.
E165	On vertical centerline of the side rail, 6" left of previous thermocouple.
E166	On horizontal centerline of the side rail, 6" above previous thermocouple.
E167	On horizontal centerline of the side rail, 6" above previous thermocouple.
	CONTINUED ON NEXT SHEET

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Rear Side Rail on Bottom Front 18" Cable Tray Assembly

CONTINUED

TC Number	Description of exact physical location
E168	On horizontal centerline of the side rail, 6" above previous thermocouple.
E169	On horizontal centerline of the side rail, 6" above previous thermocouple.
E170	On horizontal centerline of the side rail, 6" above previous thermocouple.
E171	On horizontal centerline of the side rail, 6" above previous thermocouple.
E172	On horizontal centerline of the side rail, 6" above previous thermocouple.
E173	On horizontal centerline of the side rail, 6" above previous thermocouple.
E174	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Front Side Rail on Rear 18" Cable Tray Assembly

TC Number	Description of exact physical location
E175	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E176	On horizontal centerline of the side rail, 4" below previous thermocouple.
E177	On horizontal centerline of the side rail, 6" below previous thermocouple.
E178	On horizontal centerline of the side rail, 6" below previous thermocouple.
E179	On horizontal centerline of the side rail, 6" below previous thermocouple.
E180	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E181	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E182	On vertical centerline of the side rail, 6" left of previous thermocouple.
E183	On vertical centerline of the side rail, 6" left of previous thermocouple.
E184	On vertical centerline of the side rail, 6" left of previous thermocouple.
E185	On vertical centerline of the side rail, 6" left of previous thermocouple.
E186	On vertical centerline of the side rail, 6" left of previous thermocouple.
E187	On vertical centerline of the side rail, 6" left of previous thermocouple.
E188	On vertical centerline of the side rail, 6" left of previous thermocouple.
E189	On vertical centerline of the side rail, 6" left of previous thermocouple.
E190	On vertical centerline of the side rail, 6" left of previous thermocouple.
E191	On vertical centerline of the side rail, 6" left of previous thermocouple.
E192	On vertical centerline of the side rail, 6" left of previous thermocouple.
E193	On vertical centerline of the side rail, 6" left of previous thermocouple.
E194	On vertical centerline of the side rail, 6" left of previous thermocouple.
E195	On vertical centerline of the side rail, 6" left of previous thermocouple.
E196	On vertical centerline of the side rail, 6" left of previous thermocouple.
E197	On horizontal centerline of the side rail, 6" above previous thermocouple.
E198	On horizontal centerline of the side rail, 6" above previous thermocouple.
E199	On horizontal centerline of the side rail, 6" above previous thermocouple.
E200	On horizontal centerline of the side rail, 6" above previous thermocouple.
E201	On horizontal centerline of the side rail, 6" above previous thermocouple.
E202	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Rear Side Rail on Rear 18" Cable Tray Assembly

TC Number	Description of exact physical location
E203	On horizontal centerline of the side rail, 2" below deck insulation on right side.
E204	On horizontal centerline of the side rail, 4" below previous thermocouple.
E205	On horizontal centerline of the side rail, 6" below previous thermocouple.
E206	On horizontal centerline of the side rail, 6" below previous thermocouple.
E207	On horizontal centerline of the side rail, 6" below previous thermocouple.
E208	On horizontal centerline of the side rail 90° plate, 6" below previous thermocouple, 2" above pivot bolt.
E209	On vertical centerline of the side rail, 4" left of the pivot bolt of the side rail 90° plate.
E210	On vertical centerline of the side rail, 6" left of previous thermocouple.
E211	On vertical centerline of the side rail, 6" left of previous thermocouple.
E212	On vertical centerline of the side rail, 6" left of previous thermocouple.
E213	On vertical centerline of the side rail, 6" left of previous thermocouple.
E214	On vertical centerline of the side rail, 6" left of previous thermocouple.
E215	On vertical centerline of the side rail, 6" left of previous thermocouple.
E216	On vertical centerline of the side rail, 6" left of previous thermocouple.
E217	On vertical centerline of the side rail, 6" left of previous thermocouple.
E218	On vertical centerline of the side rail, 6" left of previous thermocouple.
E219	On vertical centerline of the side rail, 6" left of previous thermocouple.
E220	On vertical centerline of the side rail, 6" left of previous thermocouple.
E221	On vertical centerline of the side rail, 6" left of previous thermocouple.
E222	On vertical centerline of the side rail, 6" left of previous thermocouple.
E223	On vertical centerline of the side rail, 6" left of previous thermocouple.
E224	On vertical centerline of the side rail, 6" left of previous thermocouple.
E225	On horizontal centerline of the side rail, 6" above previous thermocouple.
E226	On horizontal centerline of the side rail, 6" above previous thermocouple.
E227	On horizontal centerline of the side rail, 6" above previous thermocouple.
E228	On horizontal centerline of the side rail, 6" above previous thermocouple.
E229	On horizontal centerline of the side rail, 6" above previous thermocouple.
E230	On horizontal centerline of the side rail, 6" above previous thermocouple, 2" from insulated deck, on left side of tray assembly.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Cable Tray Cover Plate on Rear 18" Cable Tray Assembly

TC Number	Description of exact physical location
E231	On the outside surface of 1" conduit stub, 2" below deck insulation.
E232	On the outside surface of 5" conduit stub, 2" below deck insulation.
E233	On centerline of vertical tray cover plate, 2" below deck insulation on left side.
E234	On centerline of vertical tray cover plate, 6" below previous thermocouple.
E235	On centerline of vertical tray cover plate, 6" below previous thermocouple.
E236	On centerline of radial tray cover plate, 6" below previous thermocouple.
E237	On centerline of radial tray cover plate, 6" below previous thermocouple.
E238	On centerline of radial tray cover plate, 6" below previous thermocouple.
E239	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E240	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E241	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E242	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E243	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E244	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E245	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E246	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E247	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E248	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E249	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E250	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E251	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E252	On centerline of horizontal tray cover plate, 6" right of previous thermocouple.
E253	Deleted
E254	Deleted
E255	Deleted
E256	Deleted
E257	Deleted
E258	Deleted

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

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Project #: 97187

Test Deck #: 3

Item: Bare #8 AWG Copper Wire on Rungs in Top Front 18" Cable Tray

TC Number	Description of exact physical location
C259	On bare #8 wire on tray rungs, 2" below deck insulation in right side of tray.
C260	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C261	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C262	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C263	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C264	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C265	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C266	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C267	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C268	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C269	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C270	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C271	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C272	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C273	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C274	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C275	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C276	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C277	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C278	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C279	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C280	On bare #8 wire on tray rungs, 6" from previous thermocouple.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97187

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Project #: 97187

Test Deck #: 3

Item: Bare #8 AWG Copper Wire on Rungs in Center Front 18" Cable Tray

TC Number	Description of exact physical location
C281	On bare #8 wire on tray rungs, 2" below deck insulation in right side of tray.
C282	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C283	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C284	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C285	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C286	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C287	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C288	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C289	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C290	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C291	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C292	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C293	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C294	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C295	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C296	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C297	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C298	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C299	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C300	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C301	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C302	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C303	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C304	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C305	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C306	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C307	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C308	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C309	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C310	On bare #8 wire on tray rungs, 6" from previous thermocouple.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Bare #8 AWG Copper Wire on Rungs in Bottom Front 18" Cable Tray

TC Number	Description of exact physical location
C311	On bare #8 wire on tray rungs, 2" below deck insulation in right side of tray.
C312	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C313	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C314	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C315	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C316	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C317	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C318	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C319	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C320	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C321	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C322	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C323	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C324	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C325	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C326	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C327	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C328	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C329	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C330	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C331	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C332	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C333	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C334	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C335	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C336	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C337	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C338	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C339	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C340	On bare #8 wire on tray rungs, 6" from previous thermocouple.
	CONTINUED ON NEXT SHEET

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Bare #8 AWG Copper Wire on Rungs in Bottom Front 18" Cable Tray

TC Number	Description of exact physical location
C341	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C342	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C343	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C344	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C345	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C346	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C347	On bare #8 wire on tray rungs, 6" from previous thermocouple.
C348	On bare #8 wire on tray rungs, 6" from previous thermocouple.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Bare #8 AWG Copper Wire Under Rungs in Rear 18" Cable Tray

TC Number	Description of exact physical location
C349	On bare #8 wire under tray rungs, 2" below deck insulation in right side of tray.
C350	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C351	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C352	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C353	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C354	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C355	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C356	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C357	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C358	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C359	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C360	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C361	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C362	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C363	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C364	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C365	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C366	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C367	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C368	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C369	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C370	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C371	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C373	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C374	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C375	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C376	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C377	On bare #8 wire under tray rungs, 6" from previous thermocouple.
C378	On bare #8 wire under tray rungs, 6" from previous thermocouple.

NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

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Project #: 97187

Test Deck #: 3

Item: Bare #8 AWG Copper Wire in Air- Drops into Rear 18" Tray

TC Number	Description of exact physical location
C379	On bare #8 wire in 5" conduit, 2" below deck insulation.
C380	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C381	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C382	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C383	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C384	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C385	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C386	On bare #8 wire in 5" conduit, 6" below previous thermocouple.
C387	On bare #8 wire in 2" conduit, 2" below deck insulation.
C388	On bare #8 wire in 2" conduit, 6" below previous thermocouple.
C389	On bare #8 wire in 2" conduit, 6" below previous thermocouple.
C390	On bare #8 wire in 2" conduit, 6" below previous thermocouple.
C391	On bare #8 wire in 2" conduit, 6" below previous thermocouple.
C392	On bare #8 wire in 2" conduit, 6" below previous thermocouple.
C393	On bare #8 wire in 2" conduit, 6" below previous thermocouple.
C394	On bare #8 wire in 2" conduit, 6" below previous thermocouple.

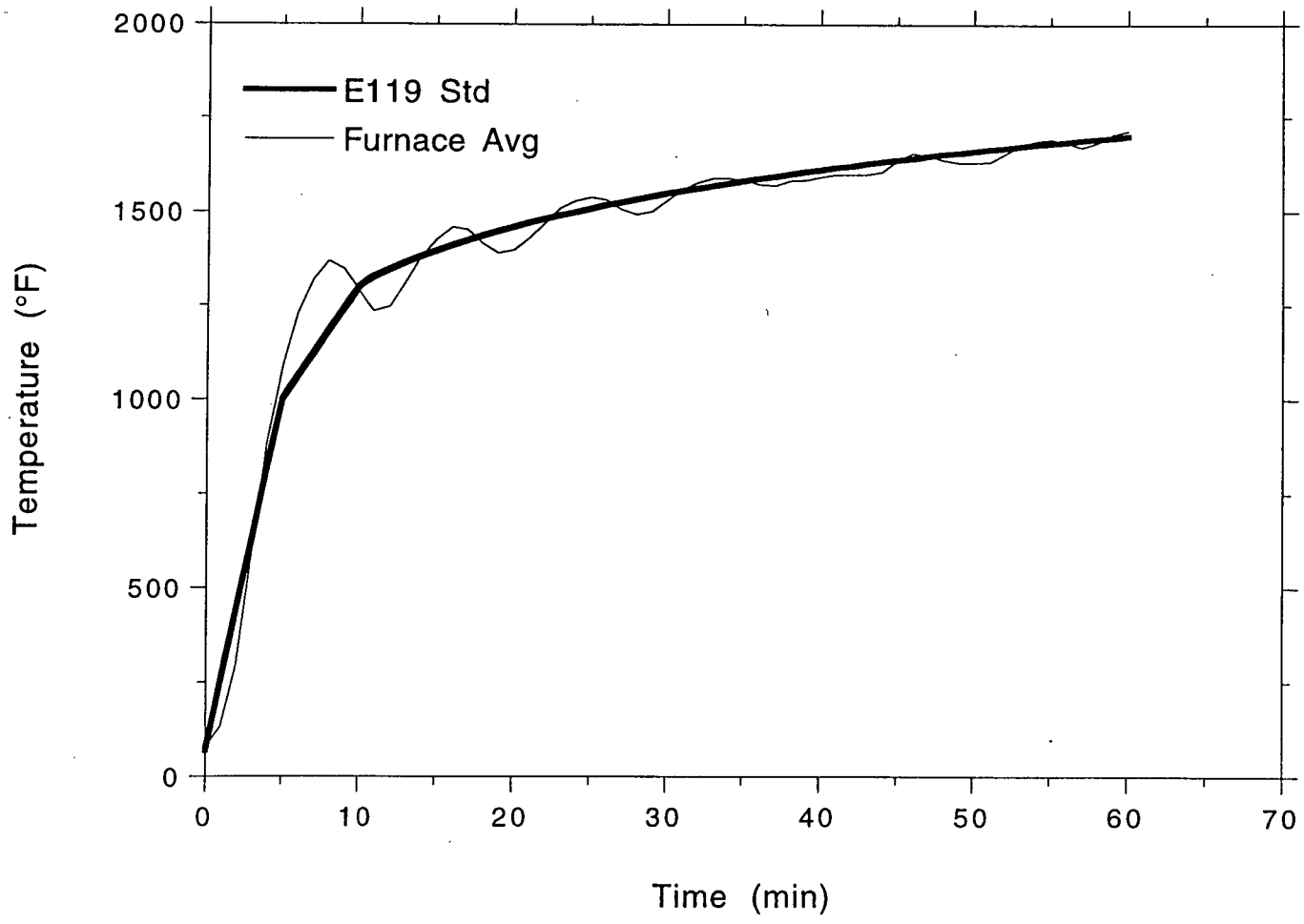
NOTE: TCs shall be numbered sequentially from 1 upwards for each deck assembly. Prefixes shall be added as follows: C (copper wire), and E (engineering TC), for instance c1, E35, etc.

PLEASE USE THE BACK OF THIS SHEET FOR DRAWINGS, IF NECESSARY

Appendix D

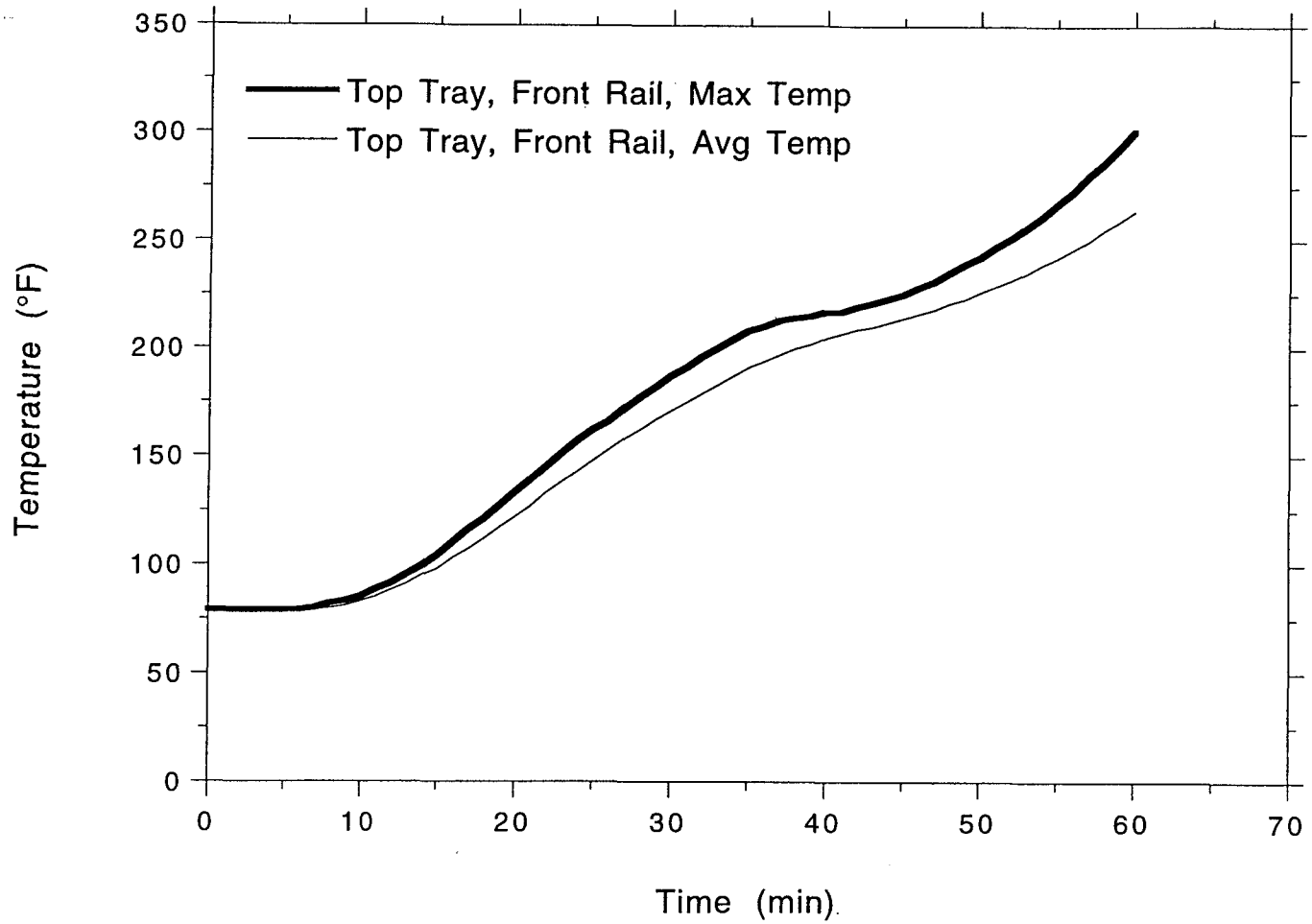
TEST DATA

TSI/TVA
Project No. 11960-97187
Furnace Temperature



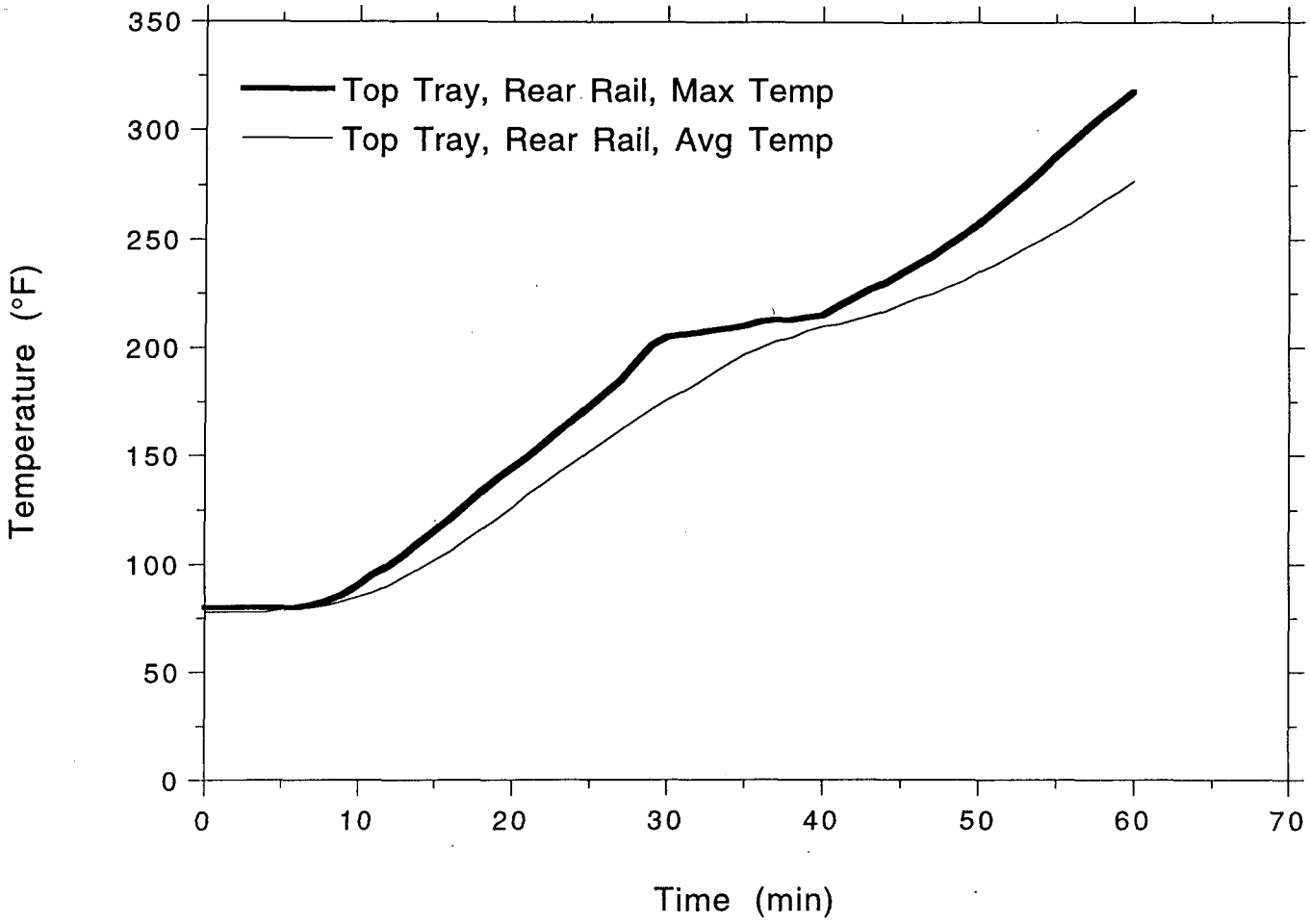
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



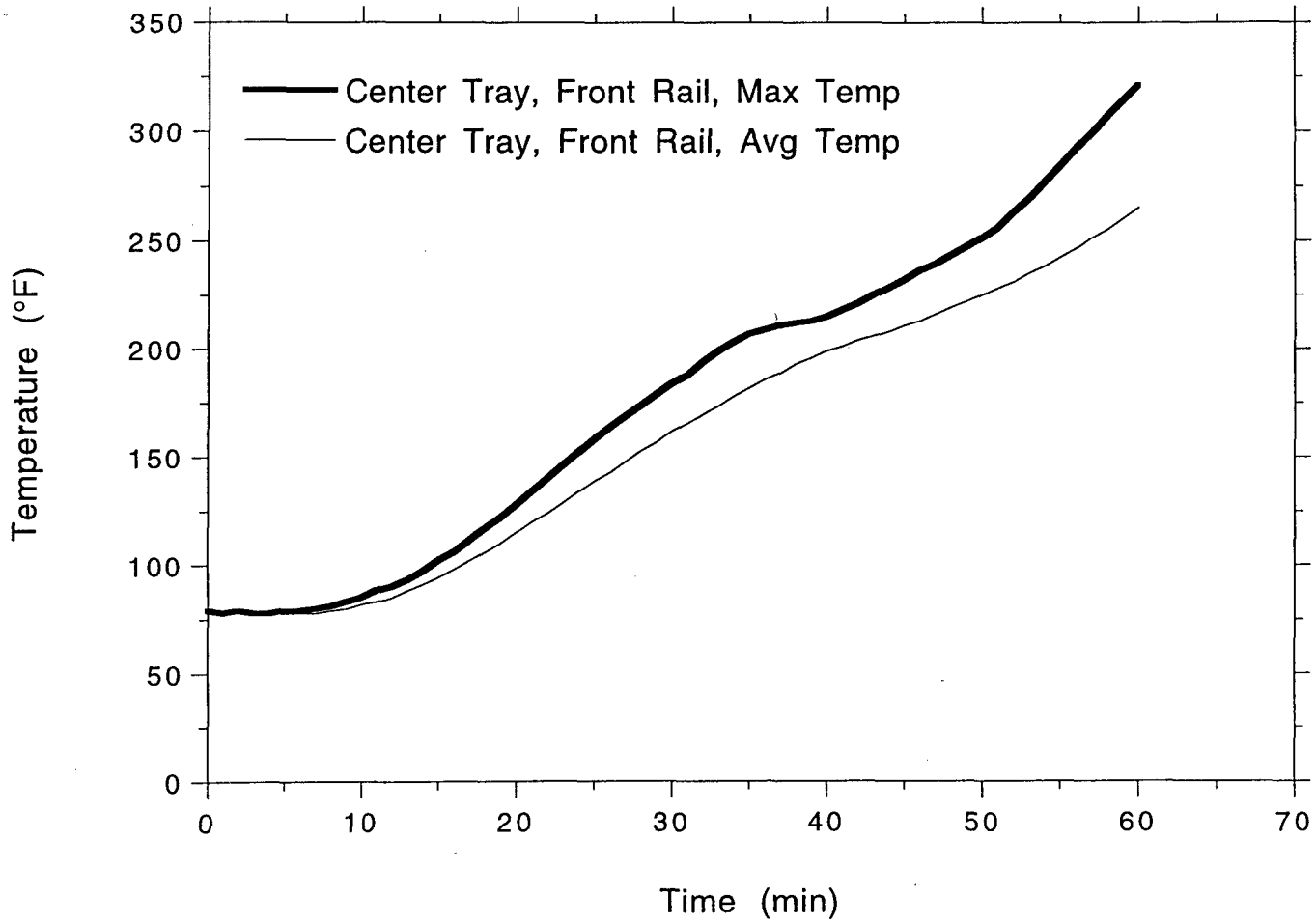
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



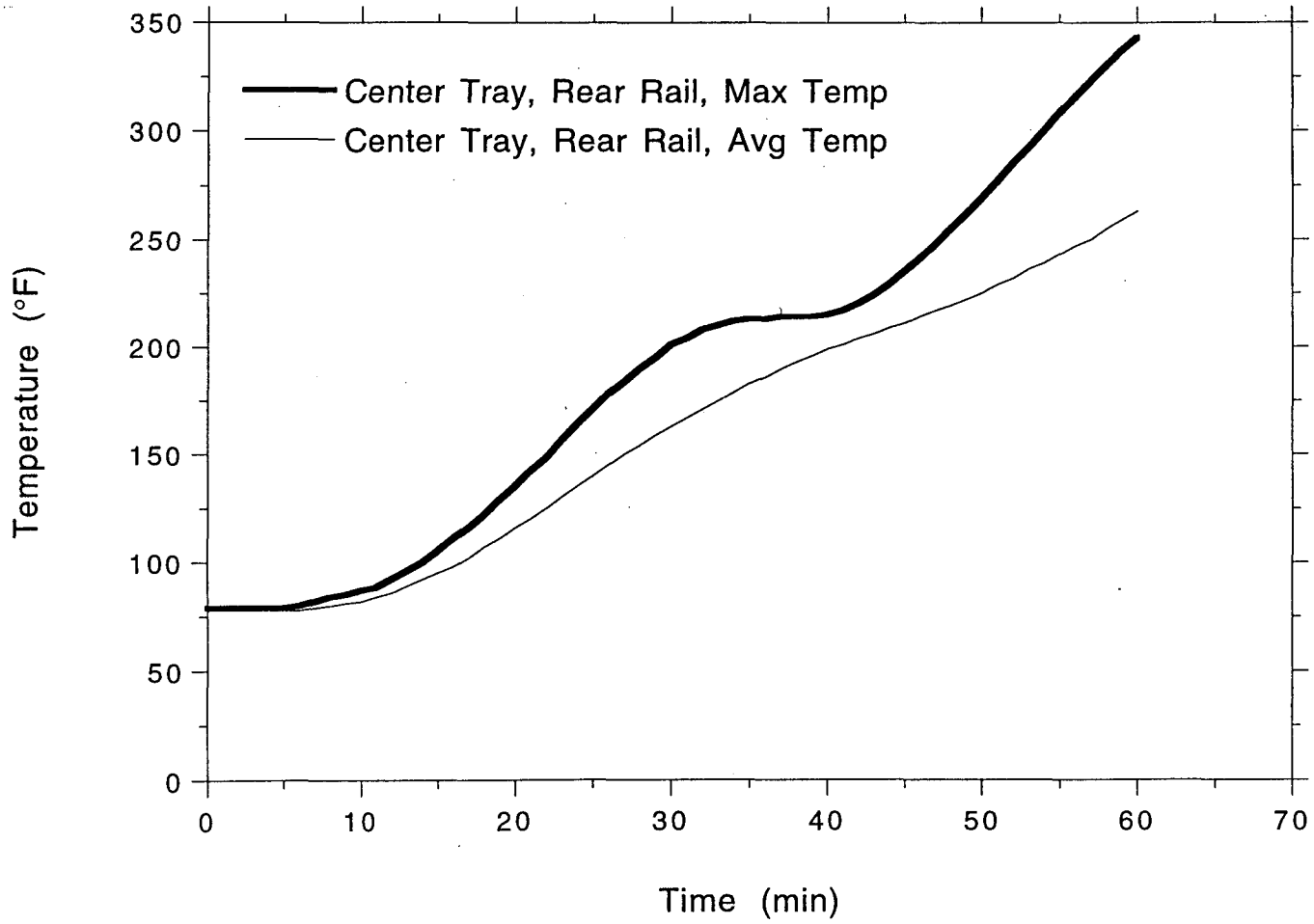
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



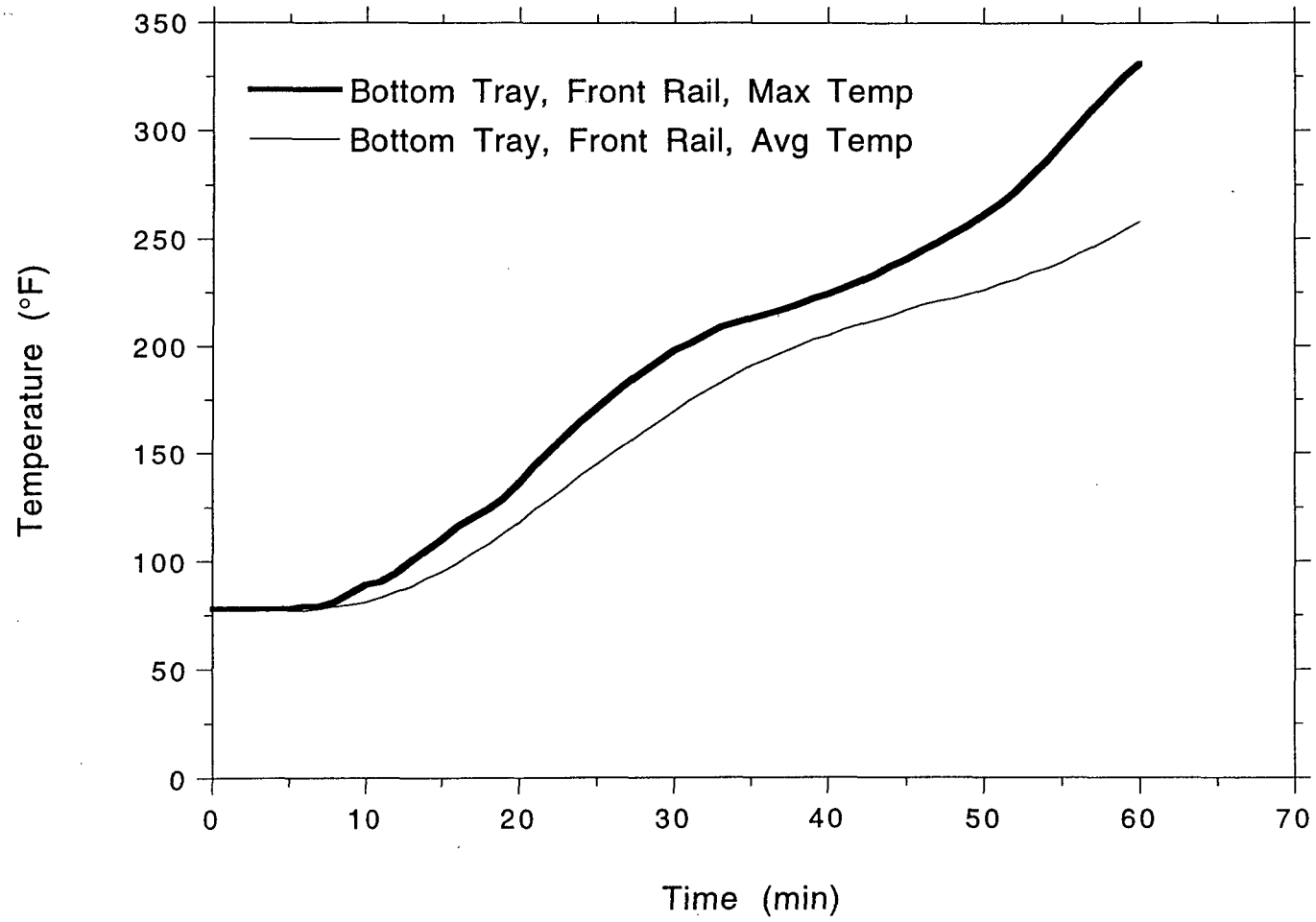
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



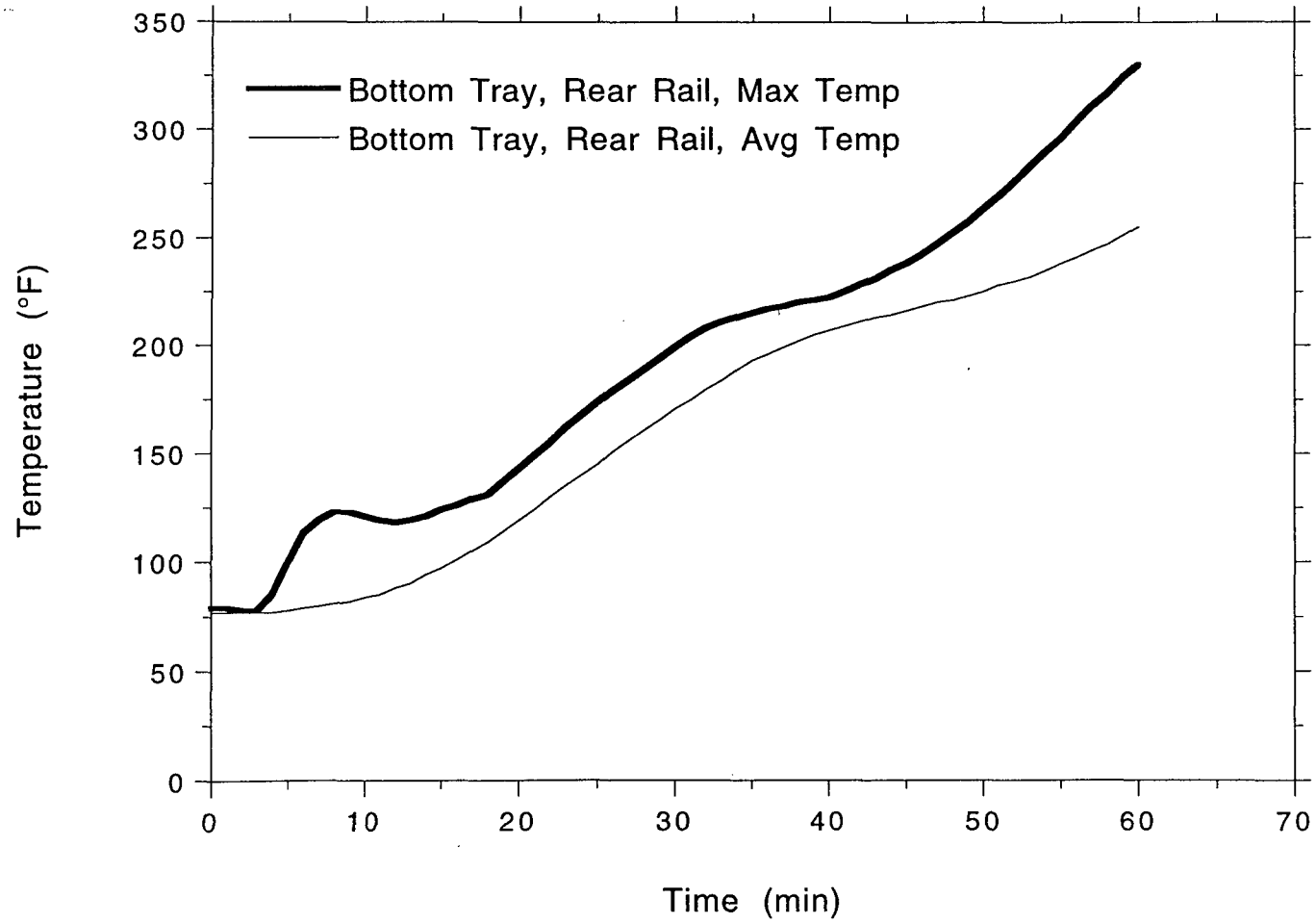
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



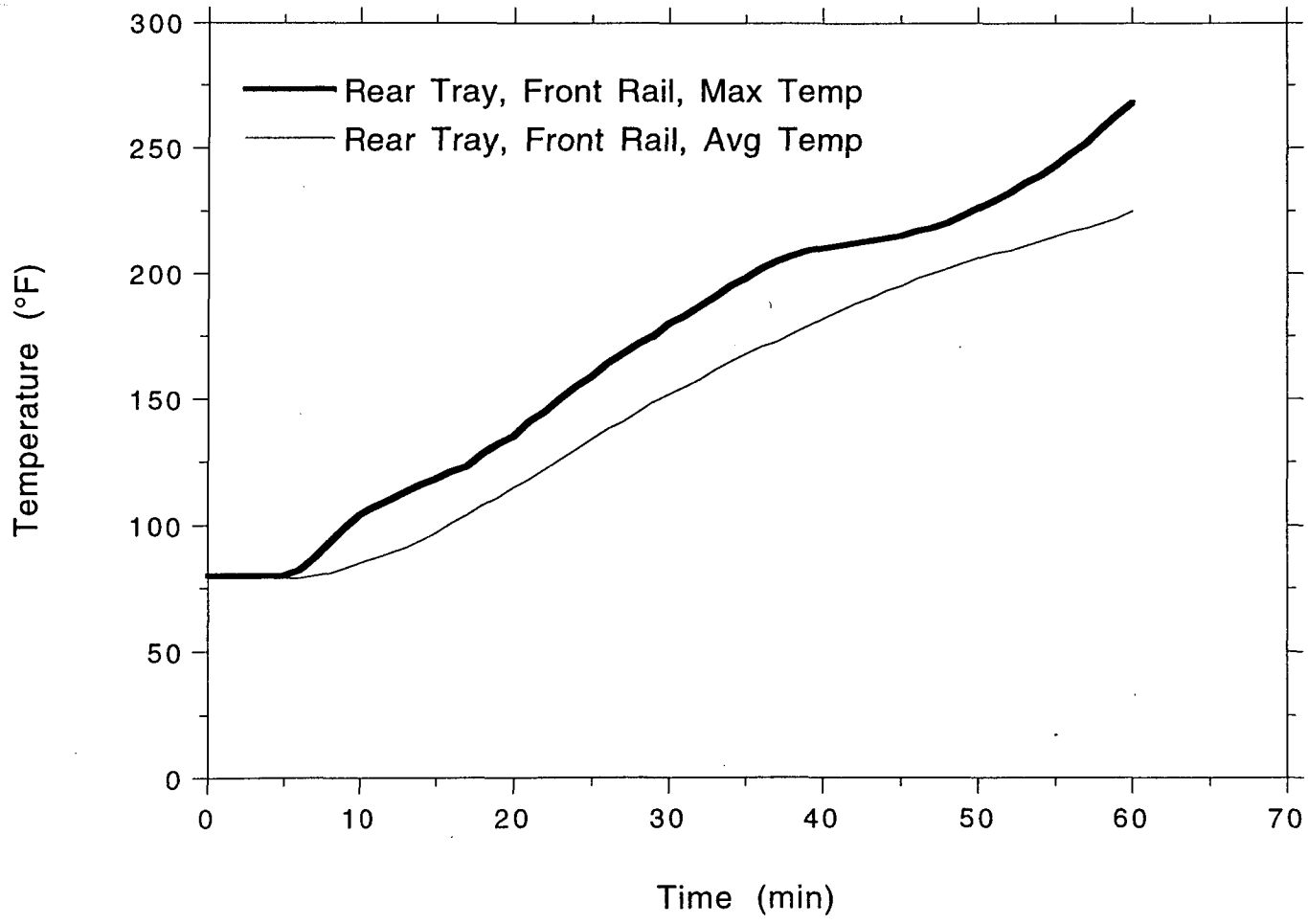
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



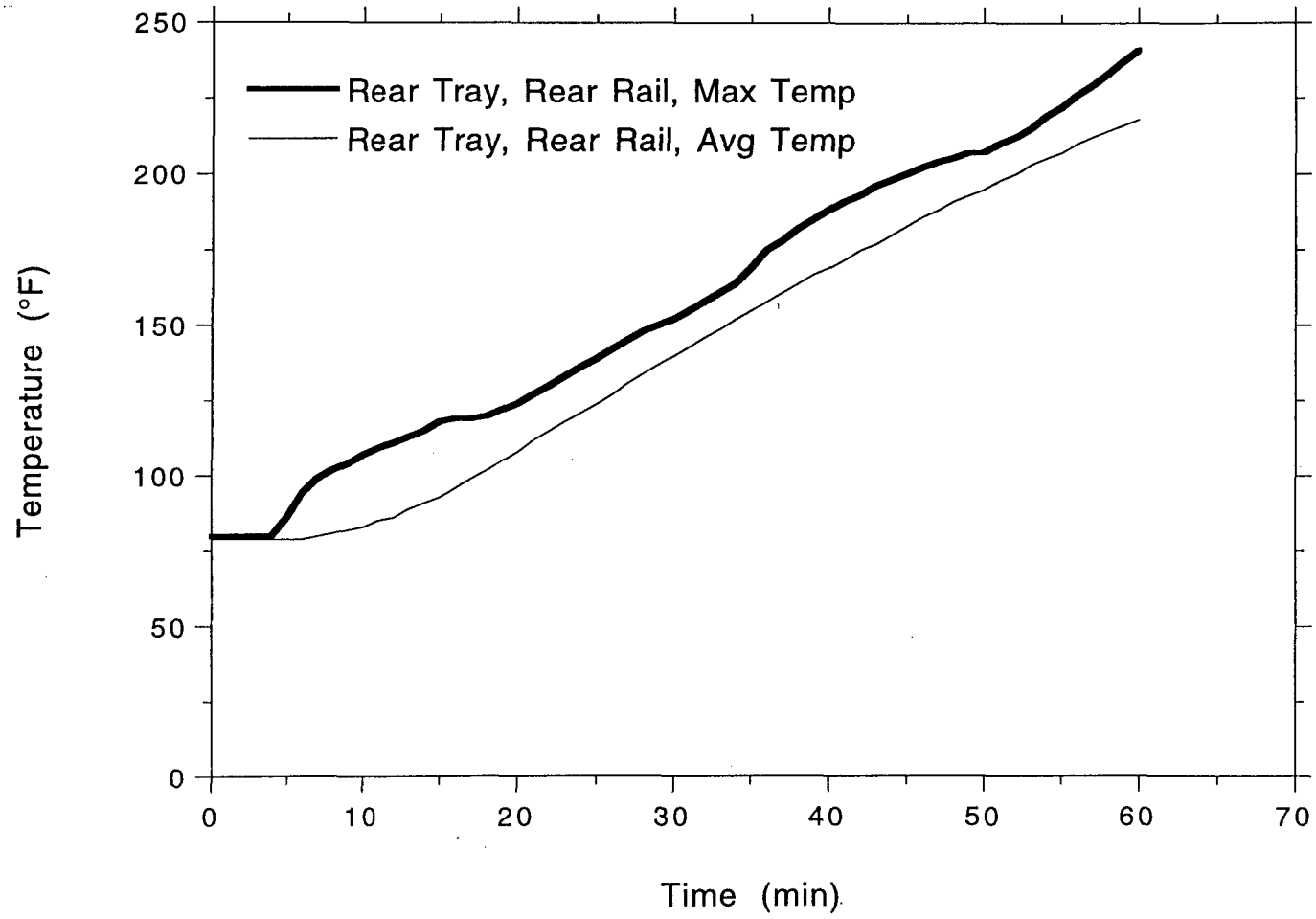
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



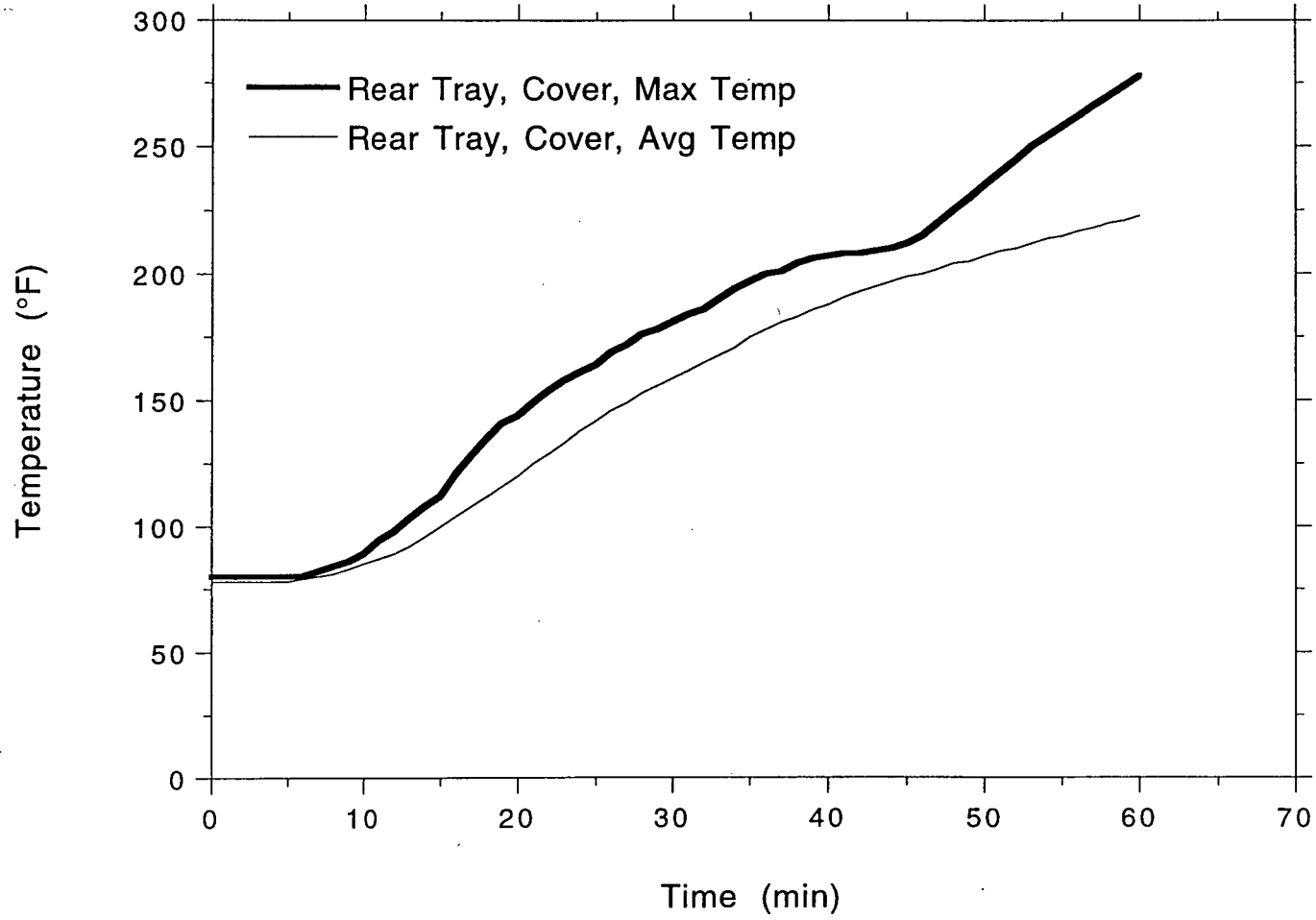
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



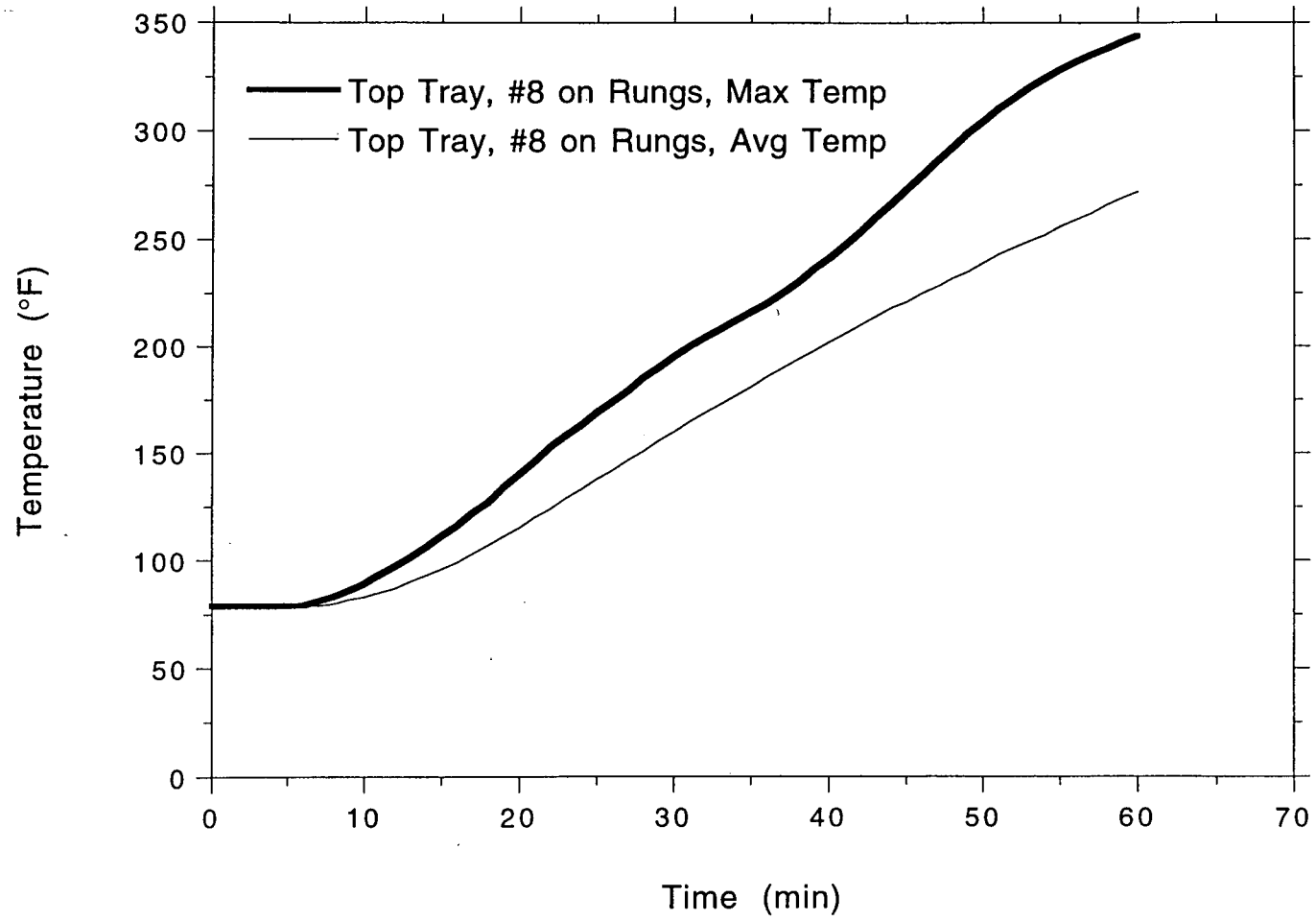
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



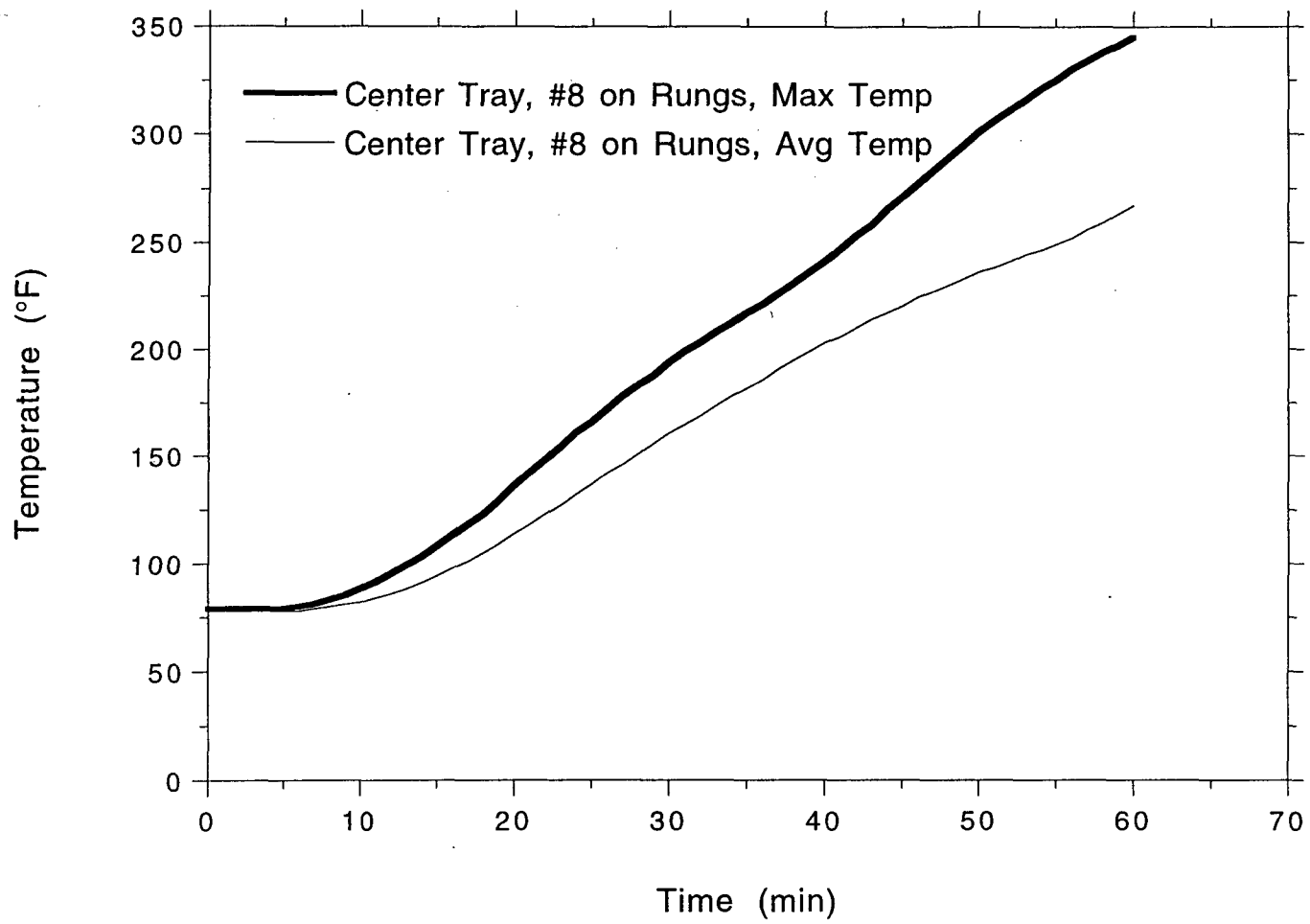
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



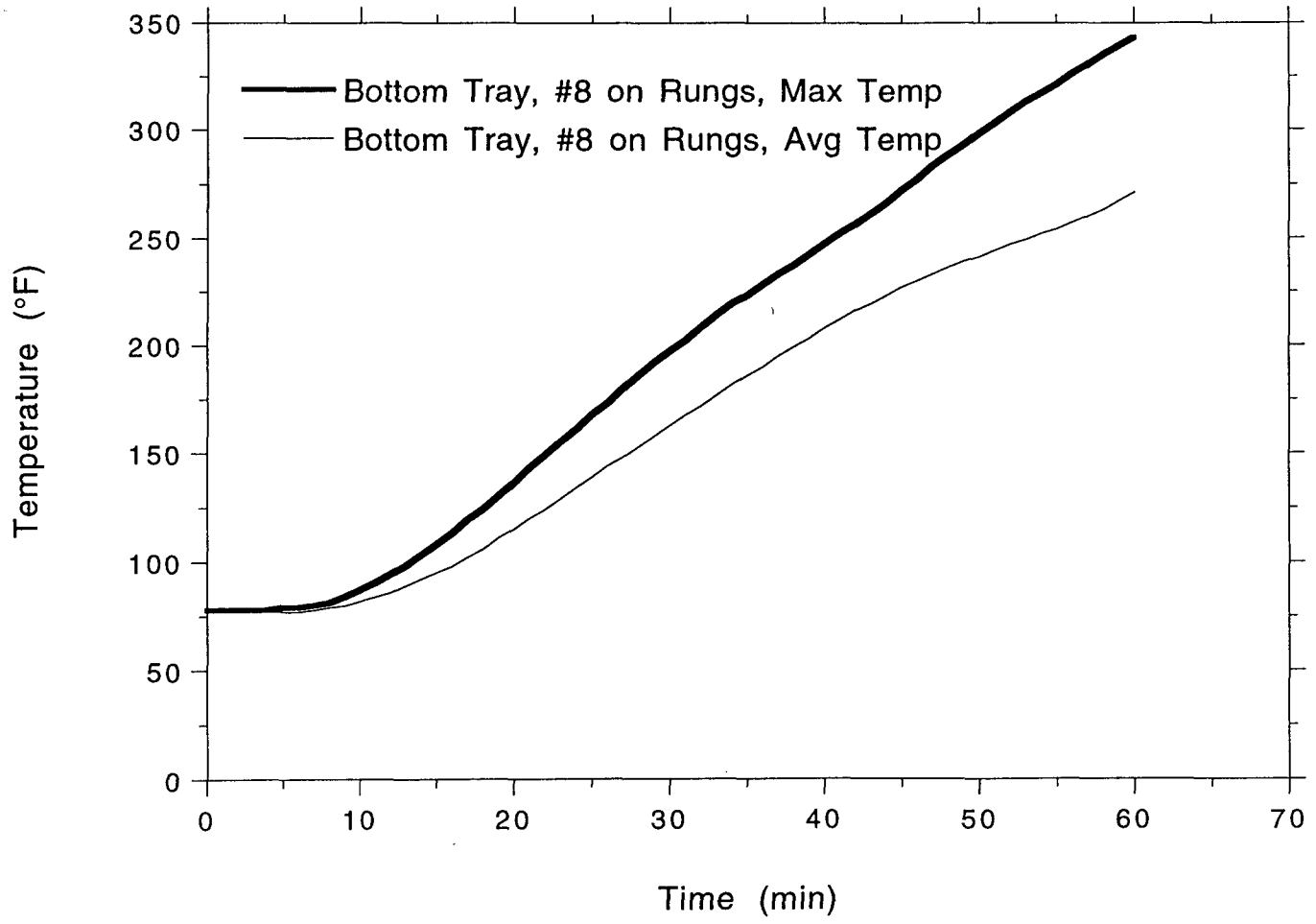
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



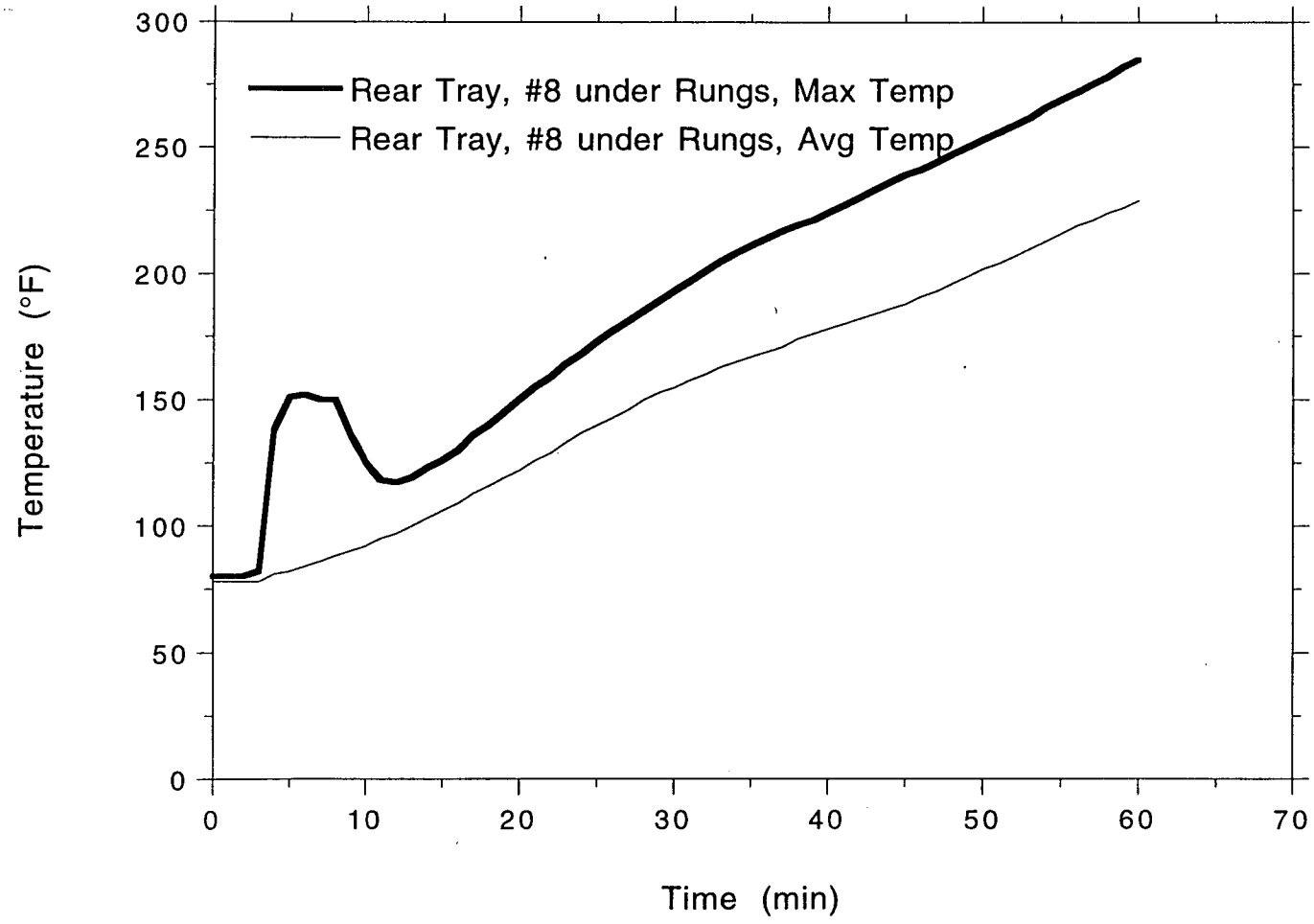
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



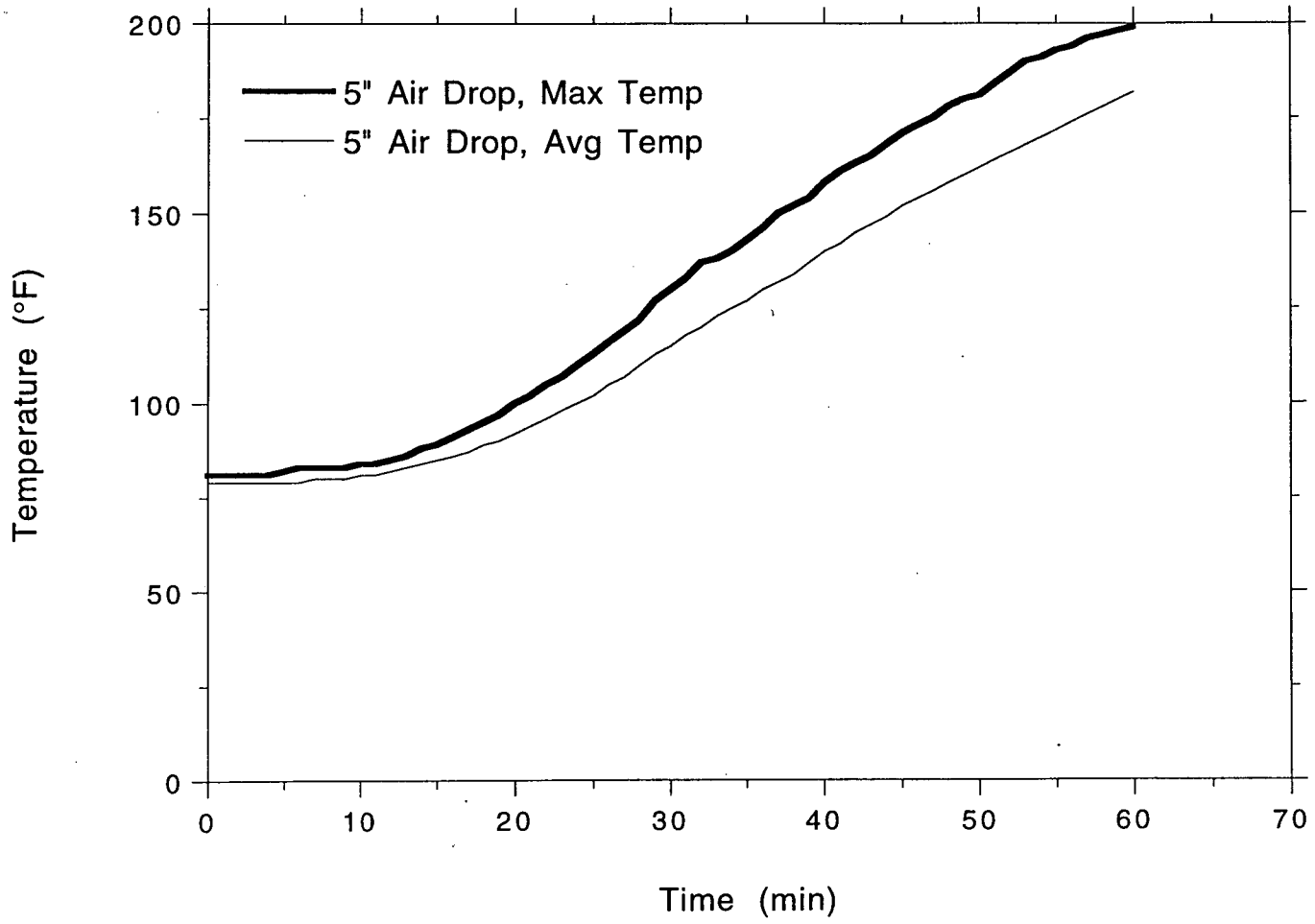
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



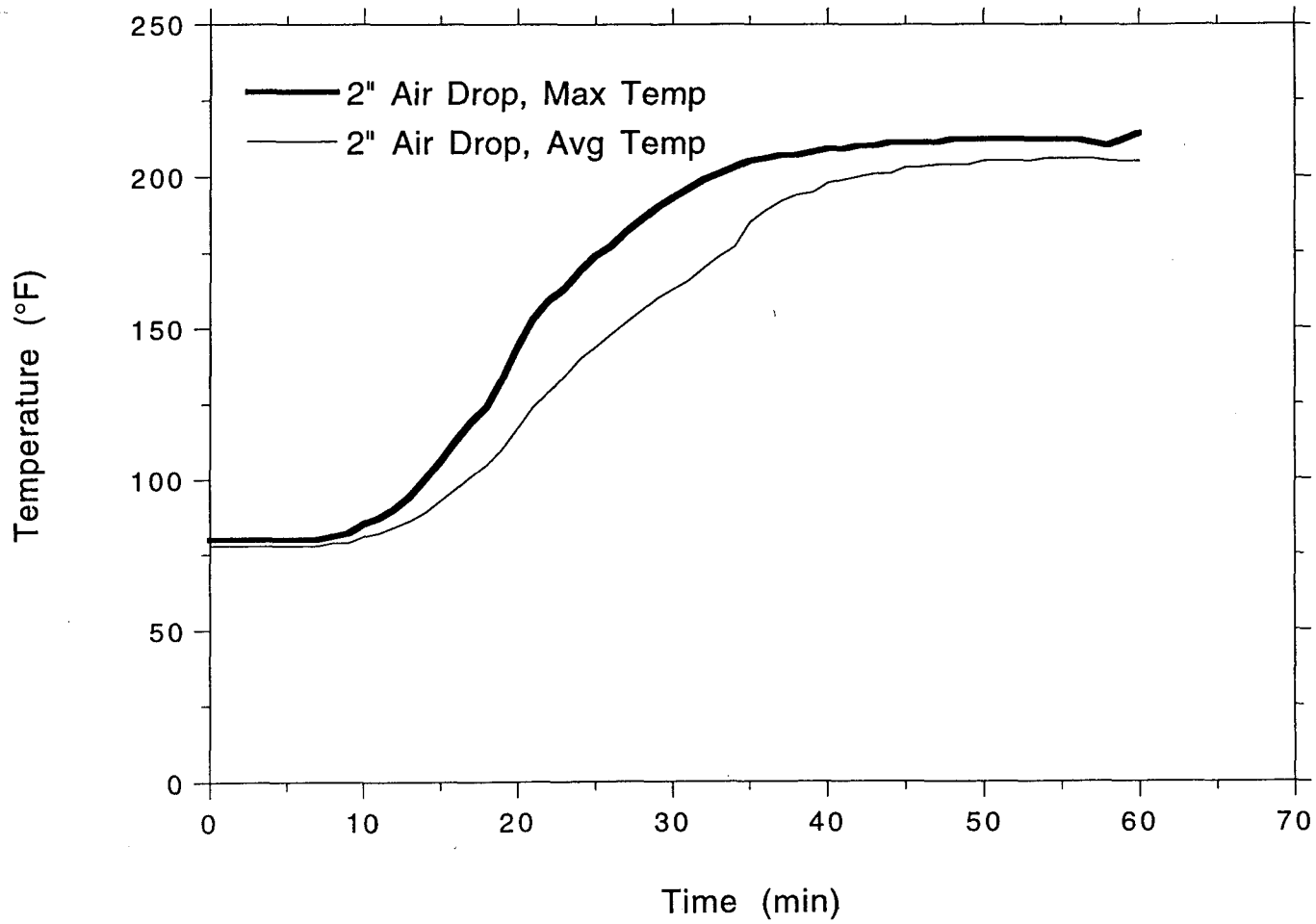
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



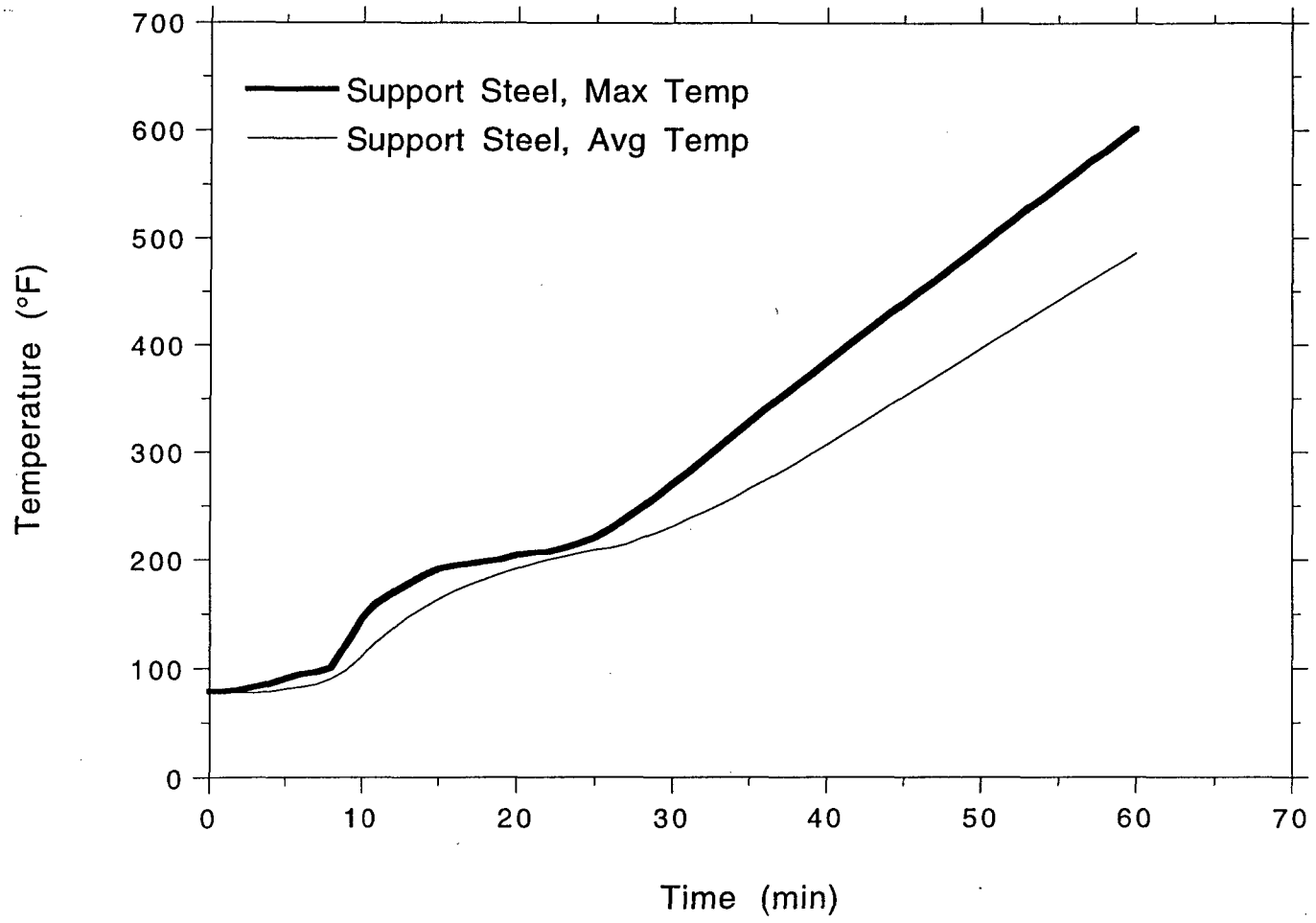
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



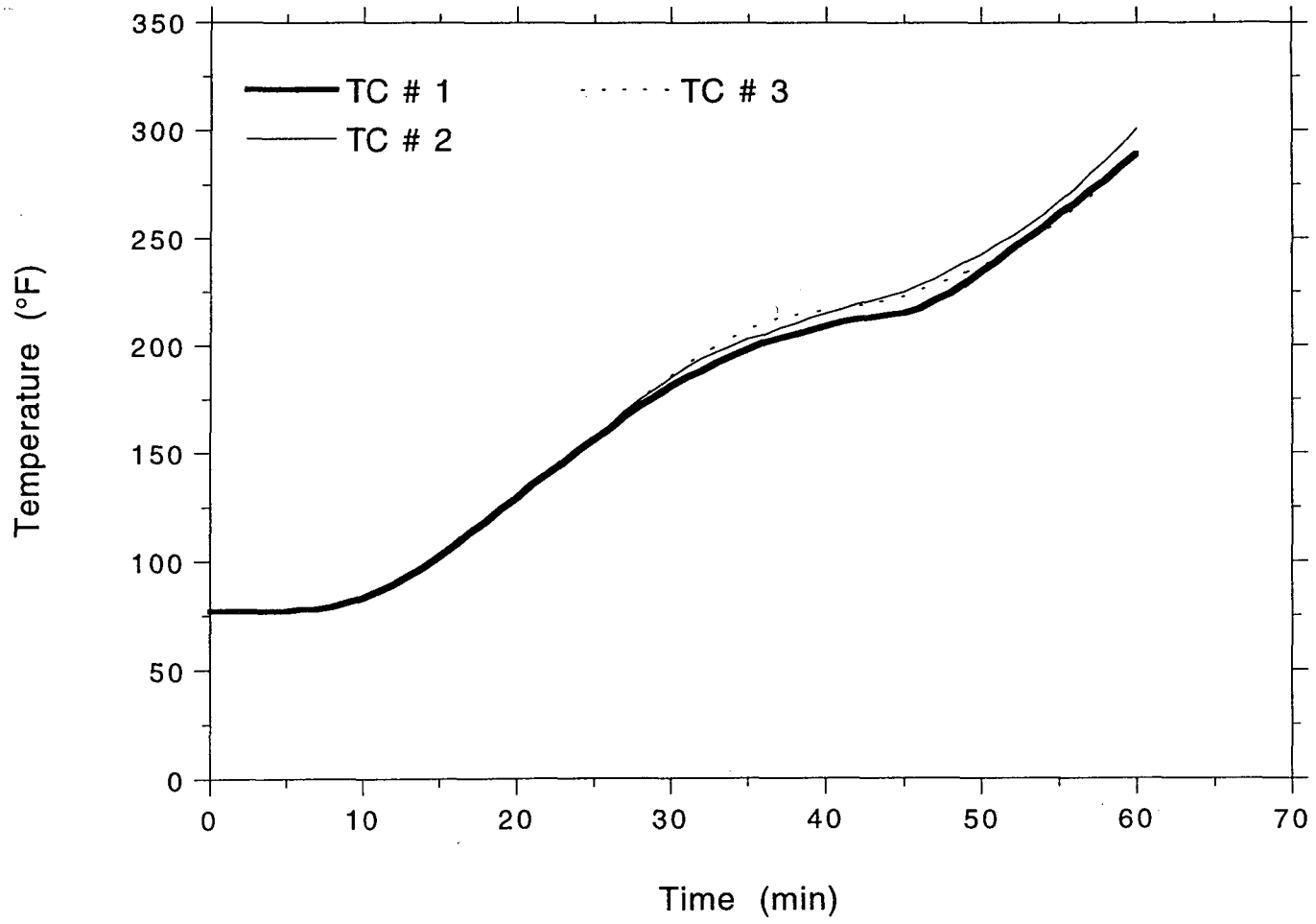
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Average/ Maximum Temperatures



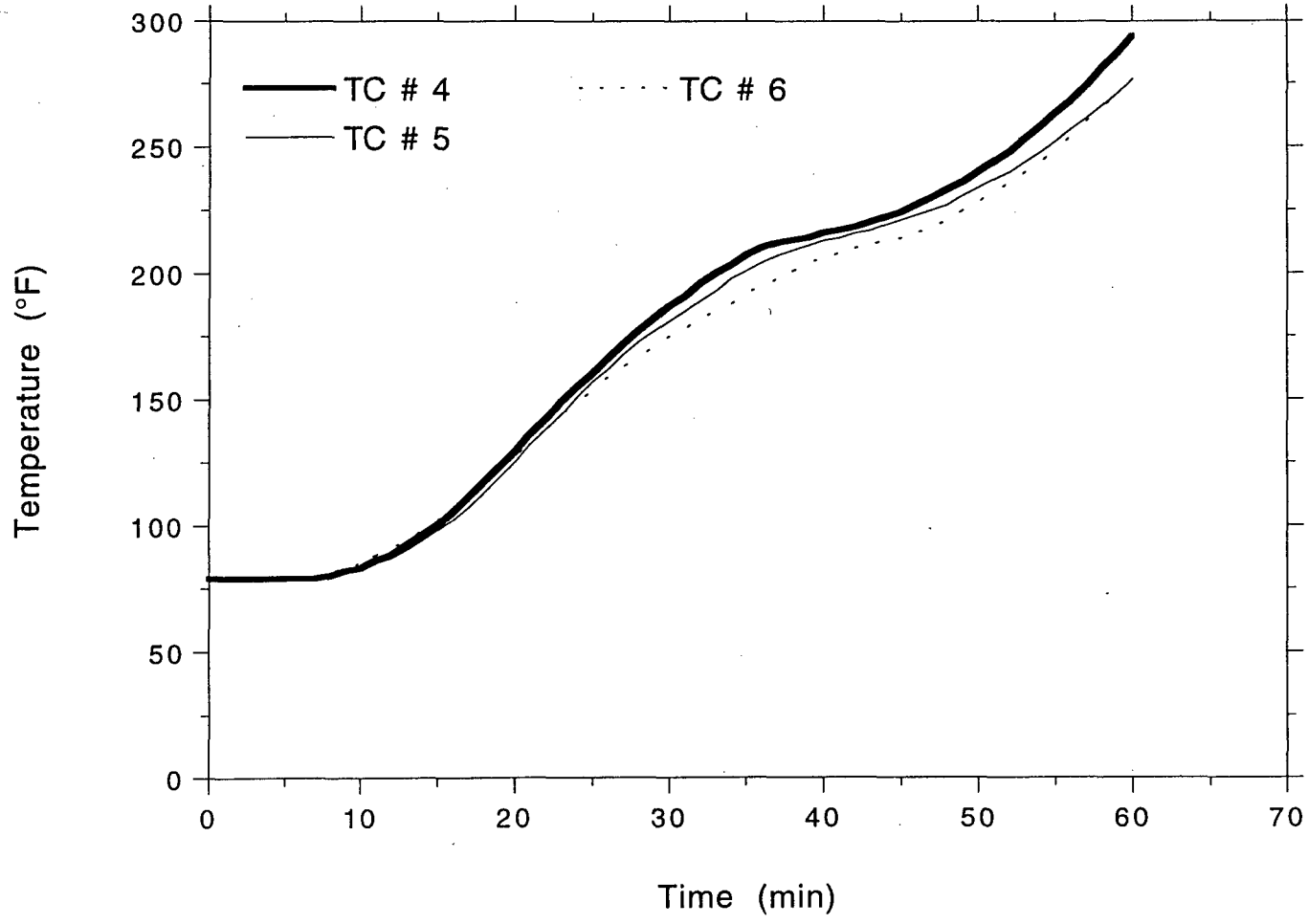
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



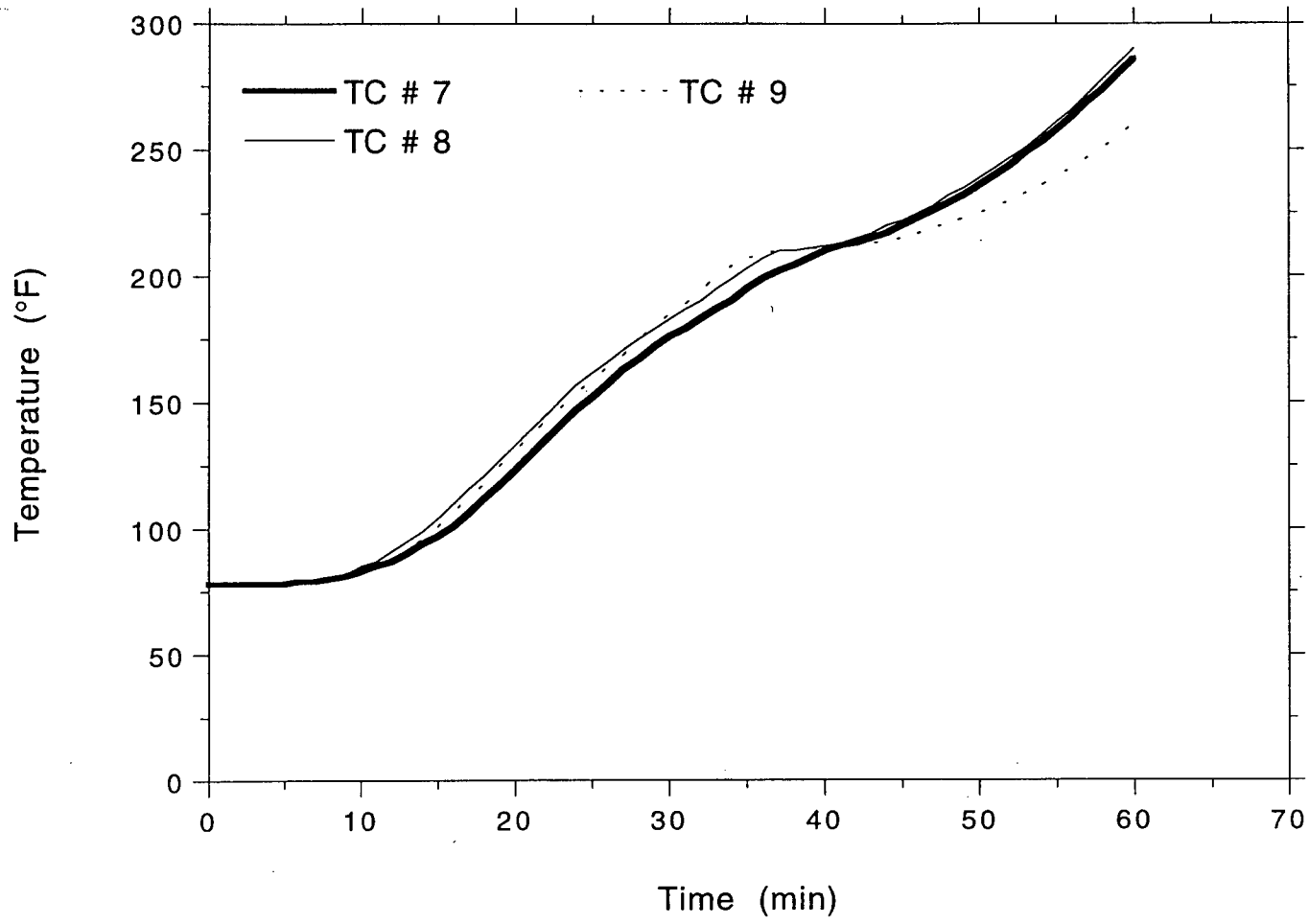
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



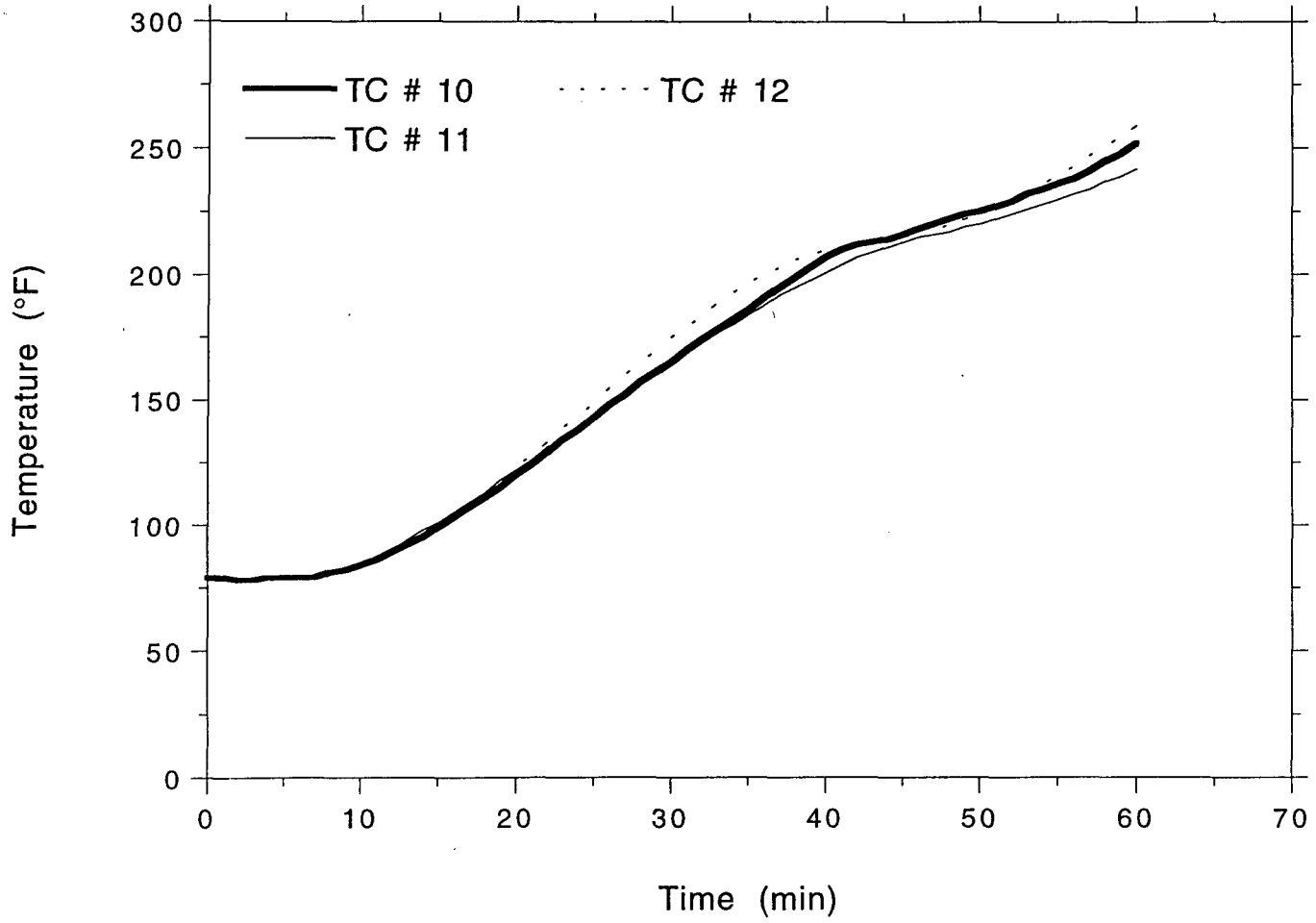
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



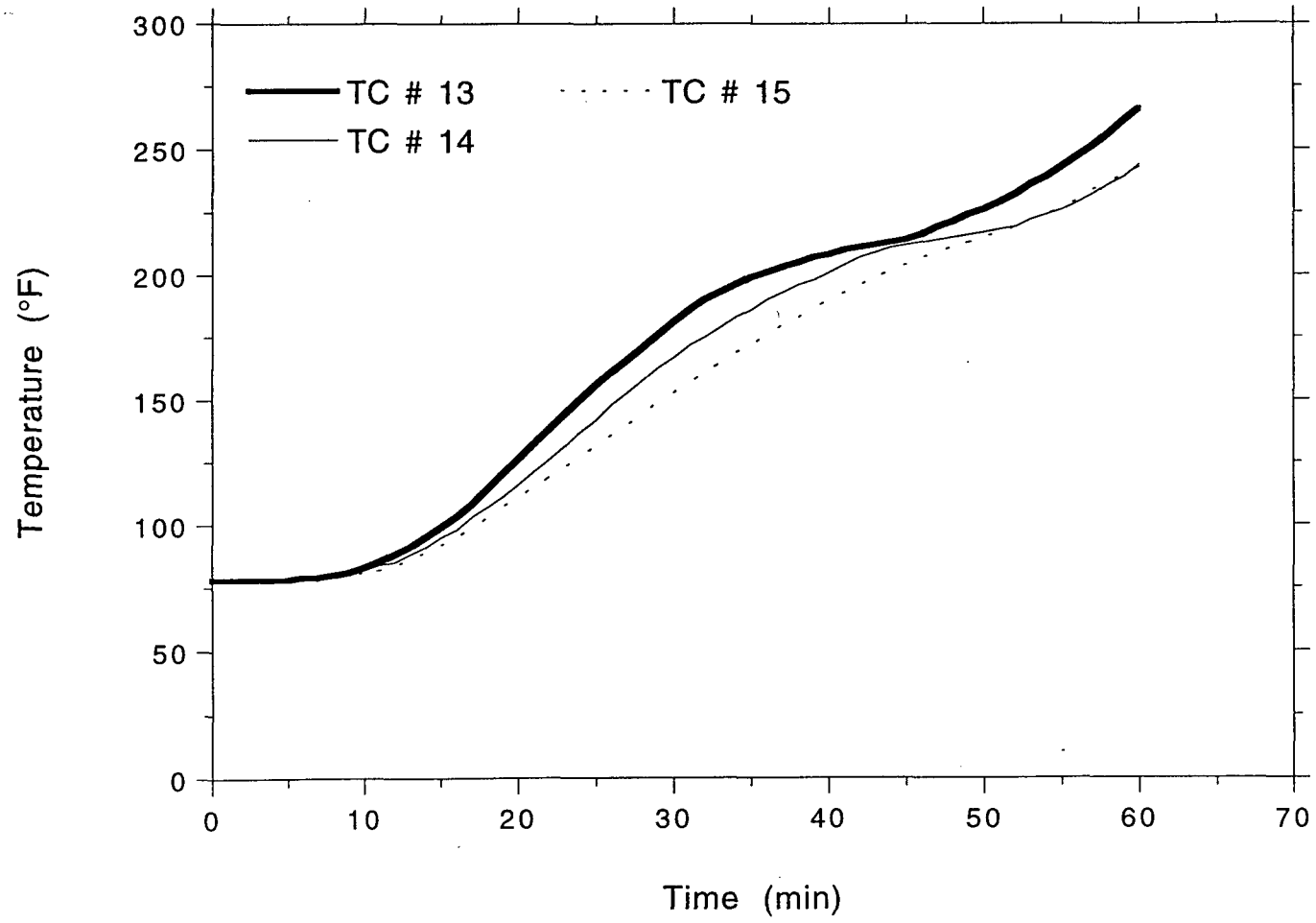
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



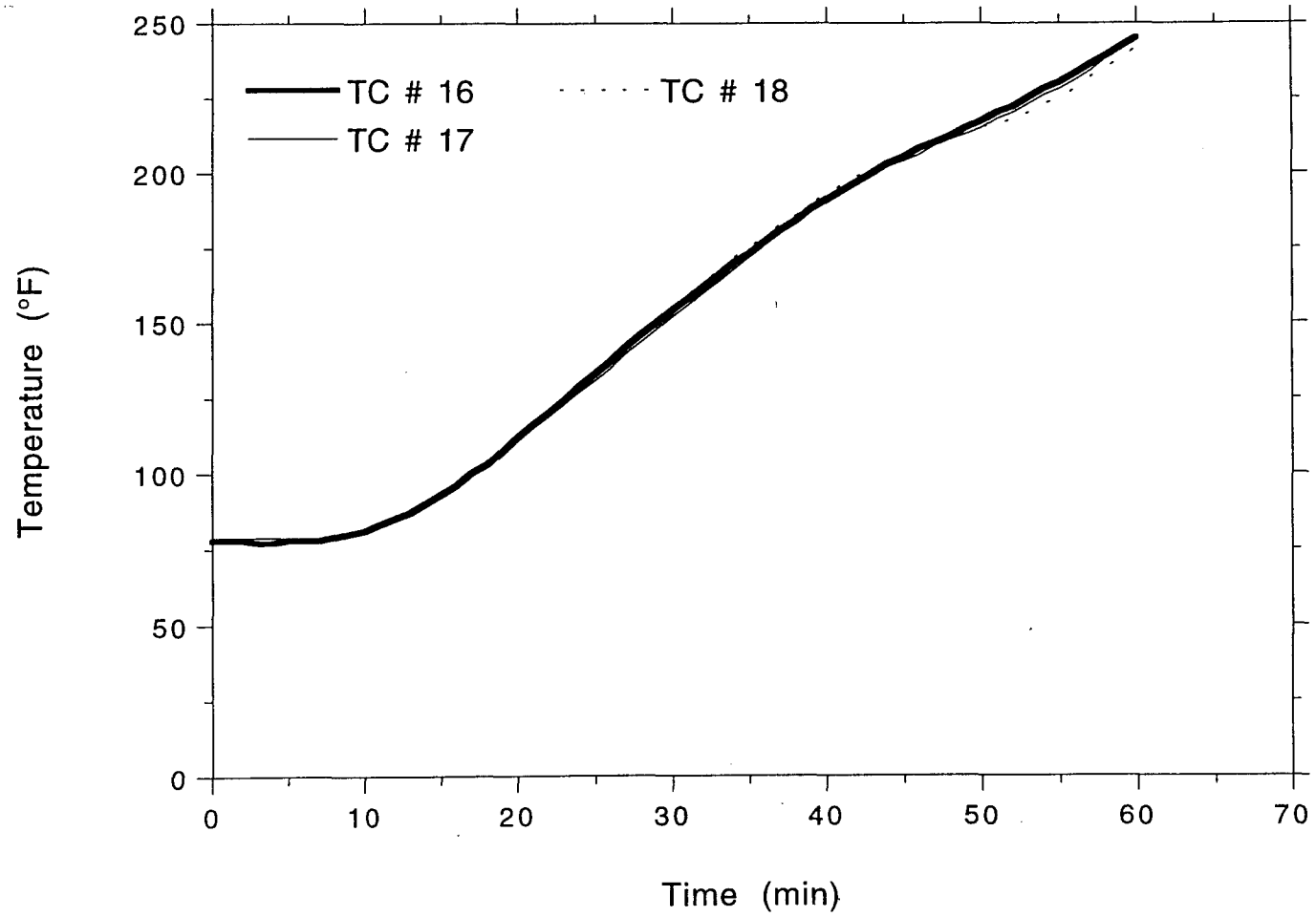
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



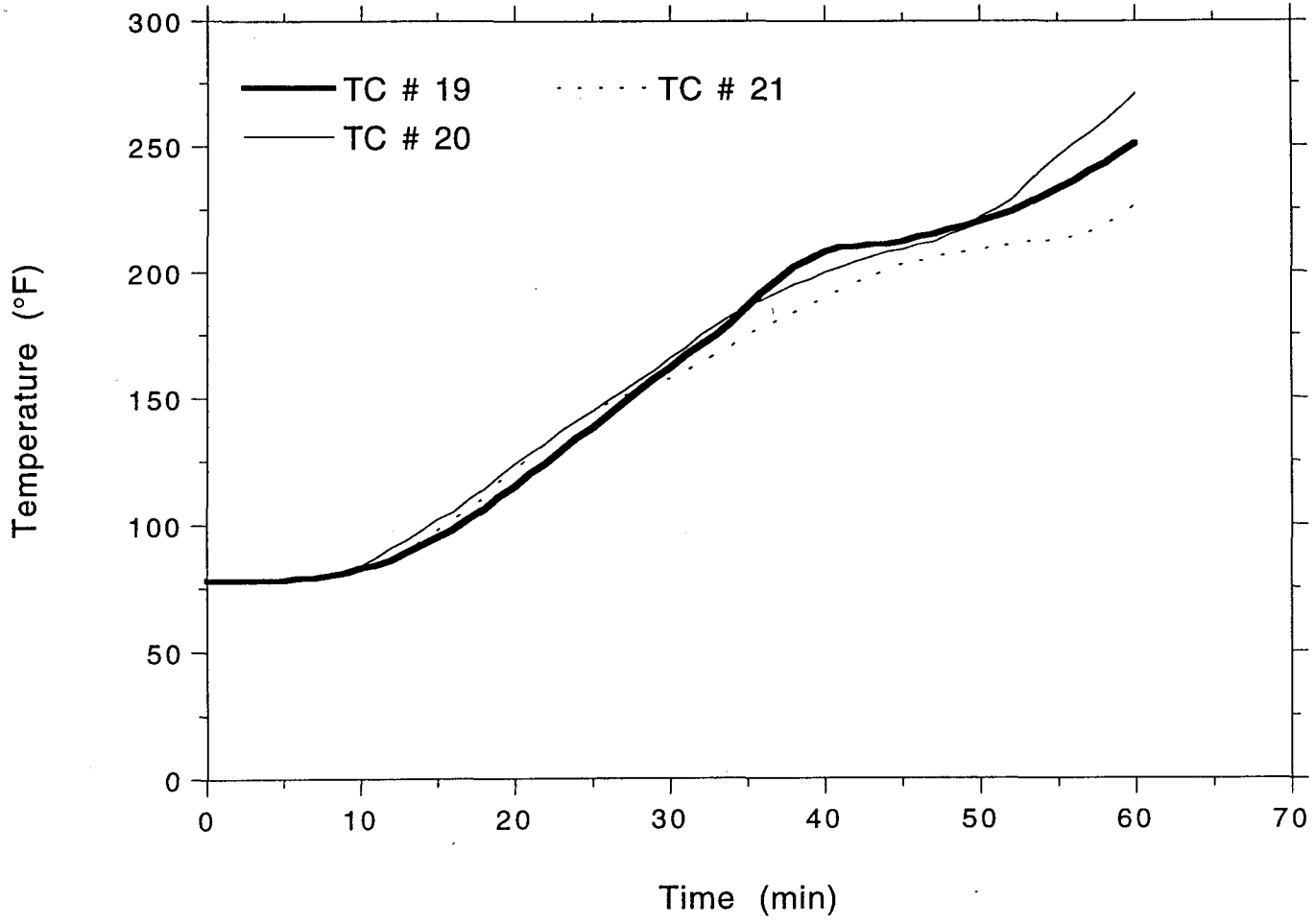
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



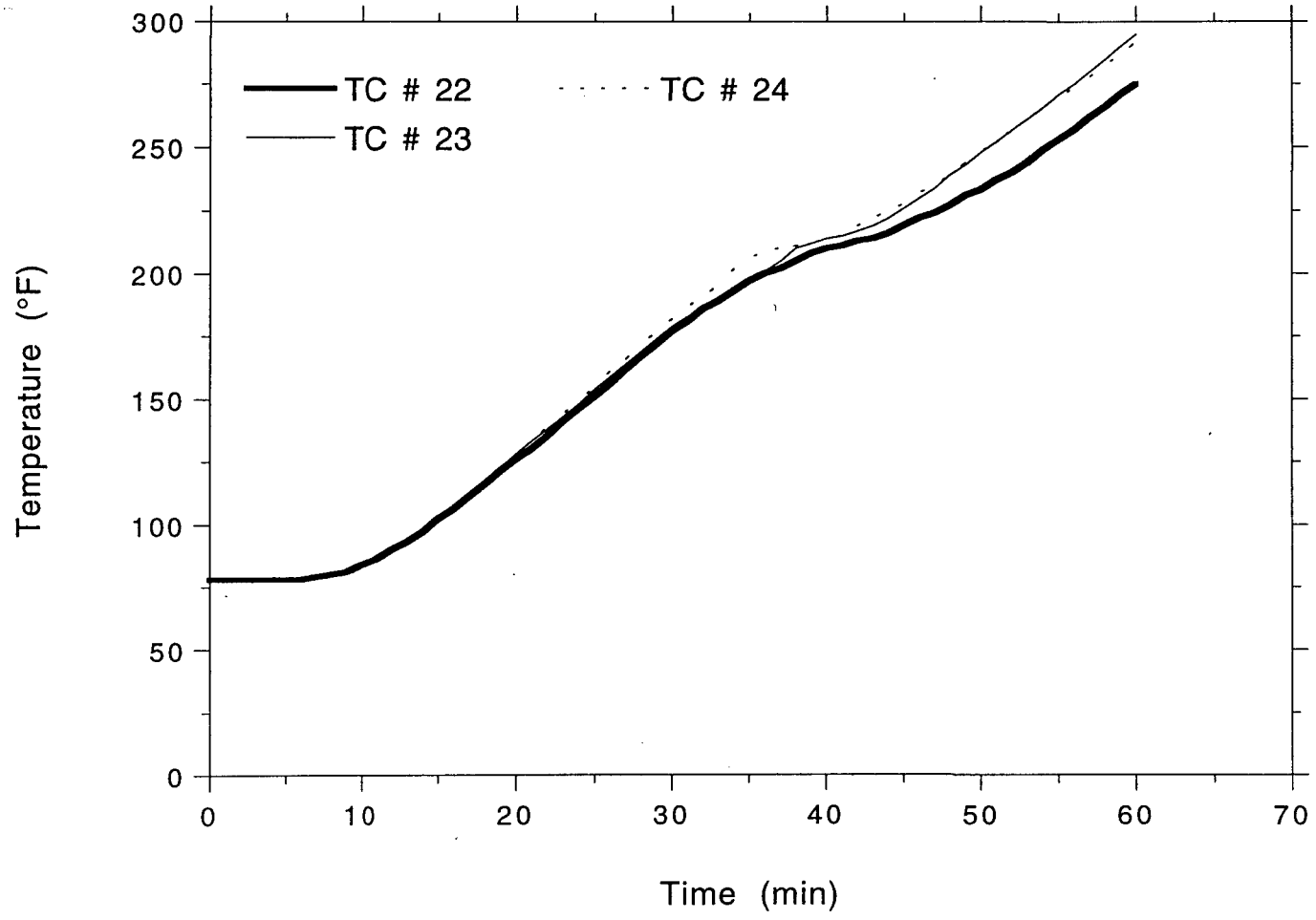
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Front Rail



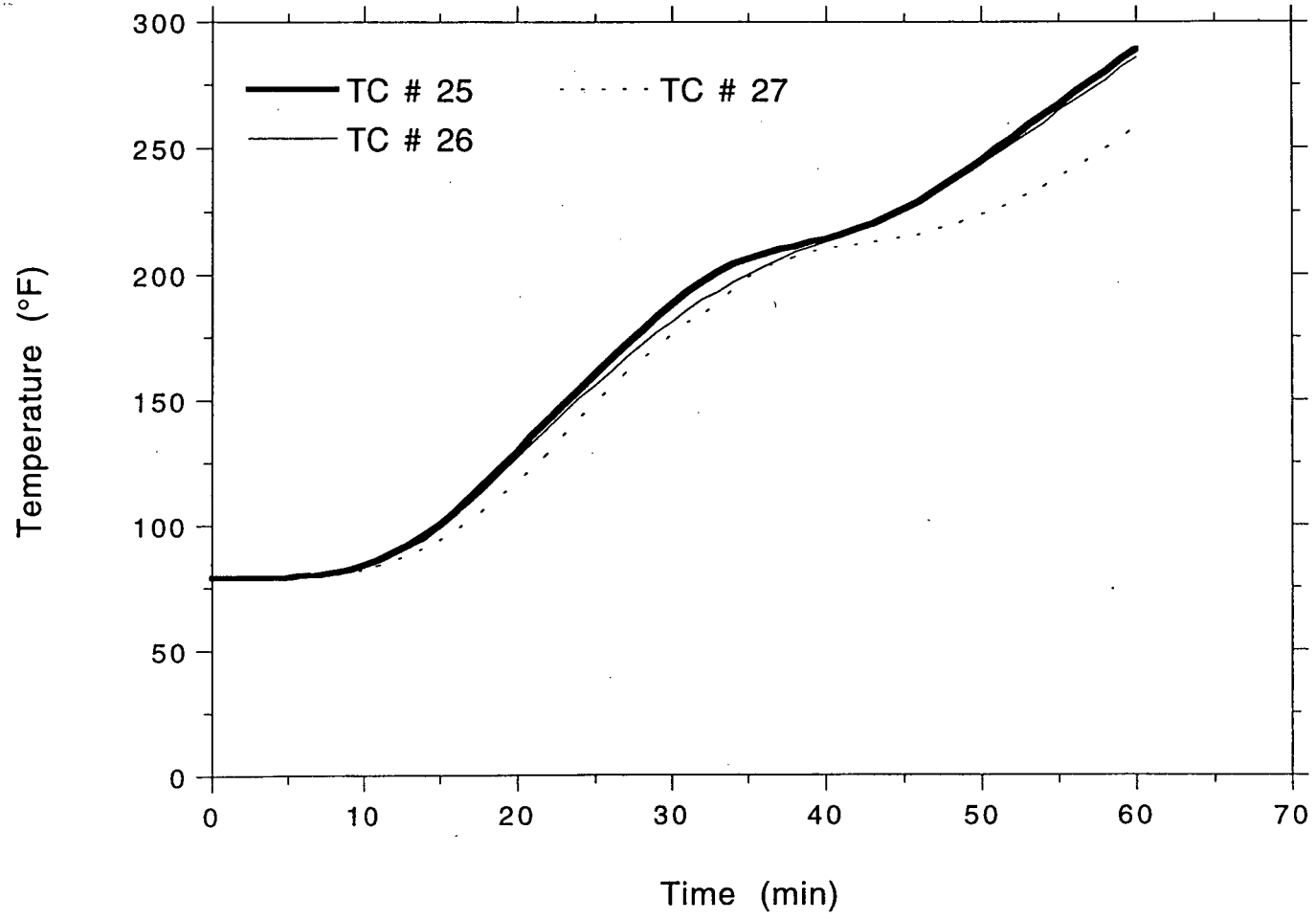
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Rear Rail



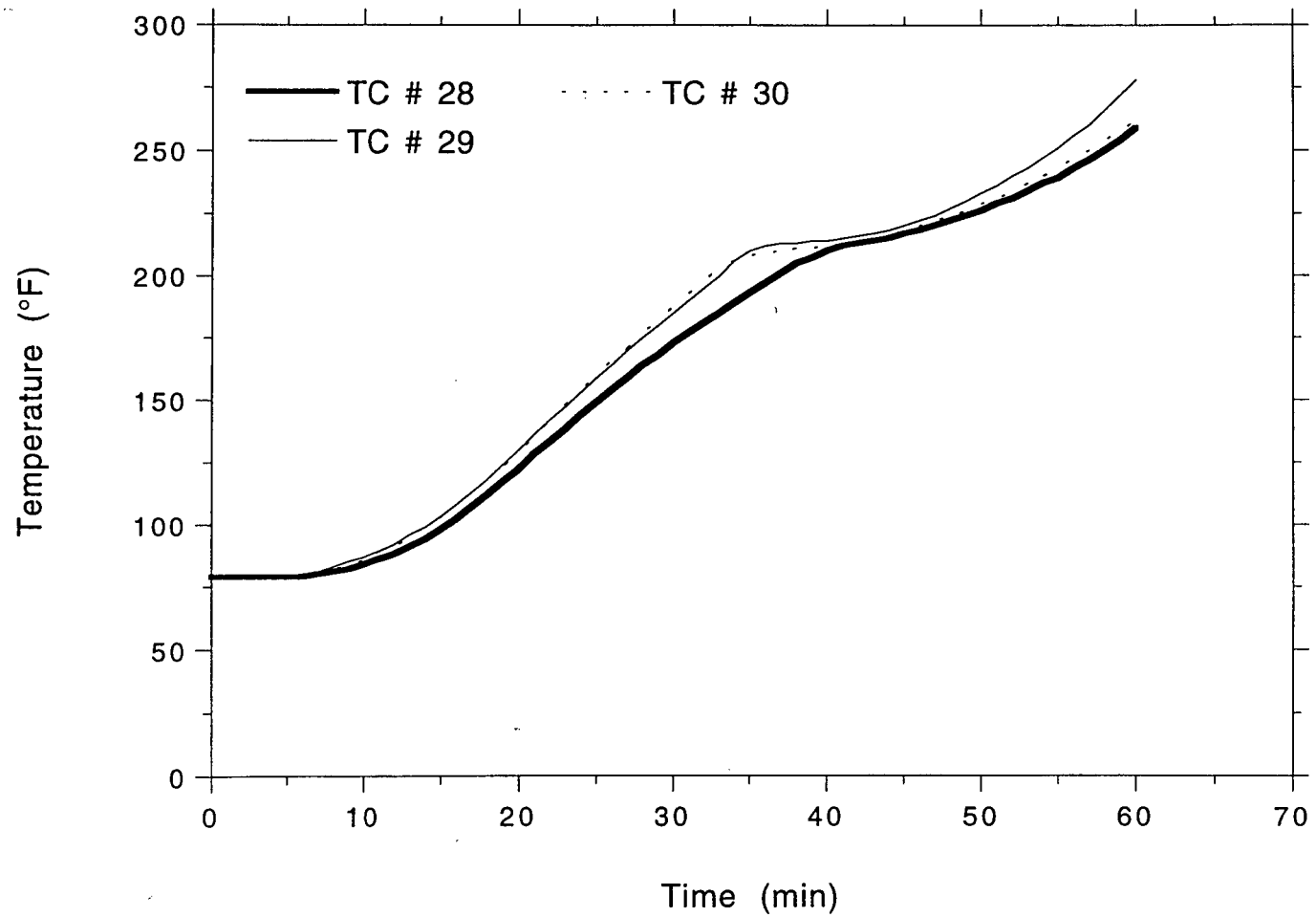
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Rear Rail



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Rear Rail



OMEGA POINT LABORATORIES

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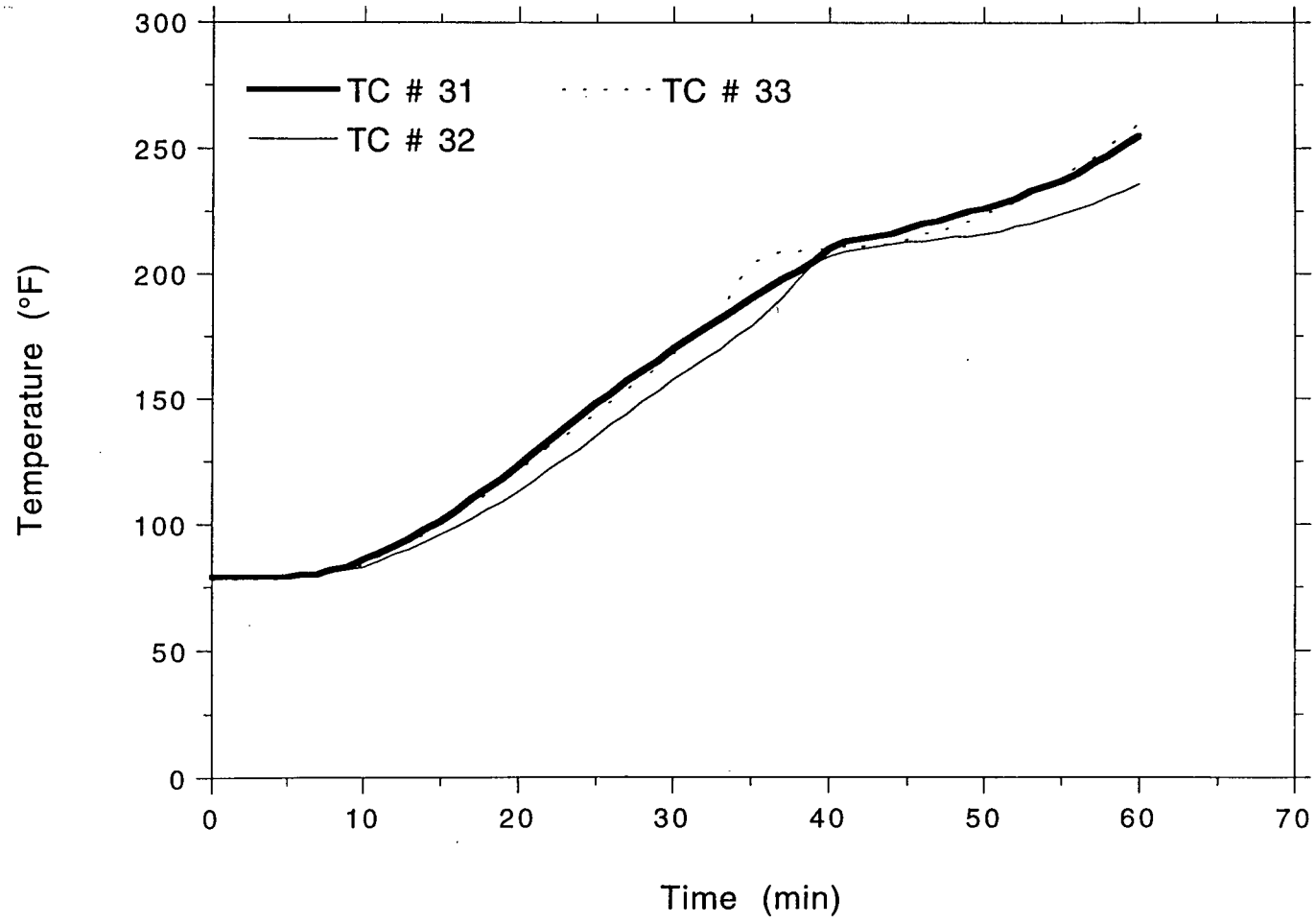
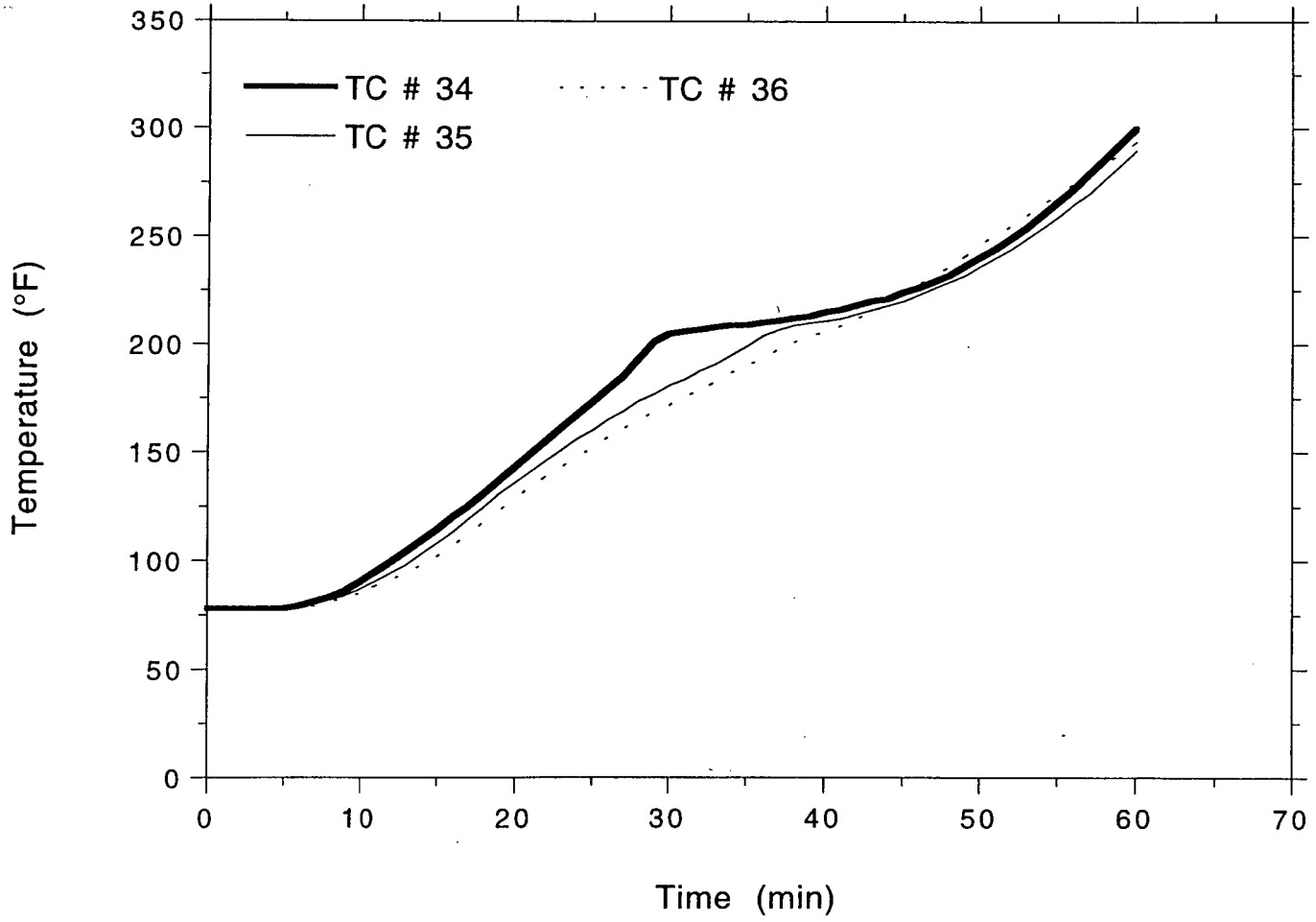
Project No. 11960-97187
Front Tray, Rear Rail



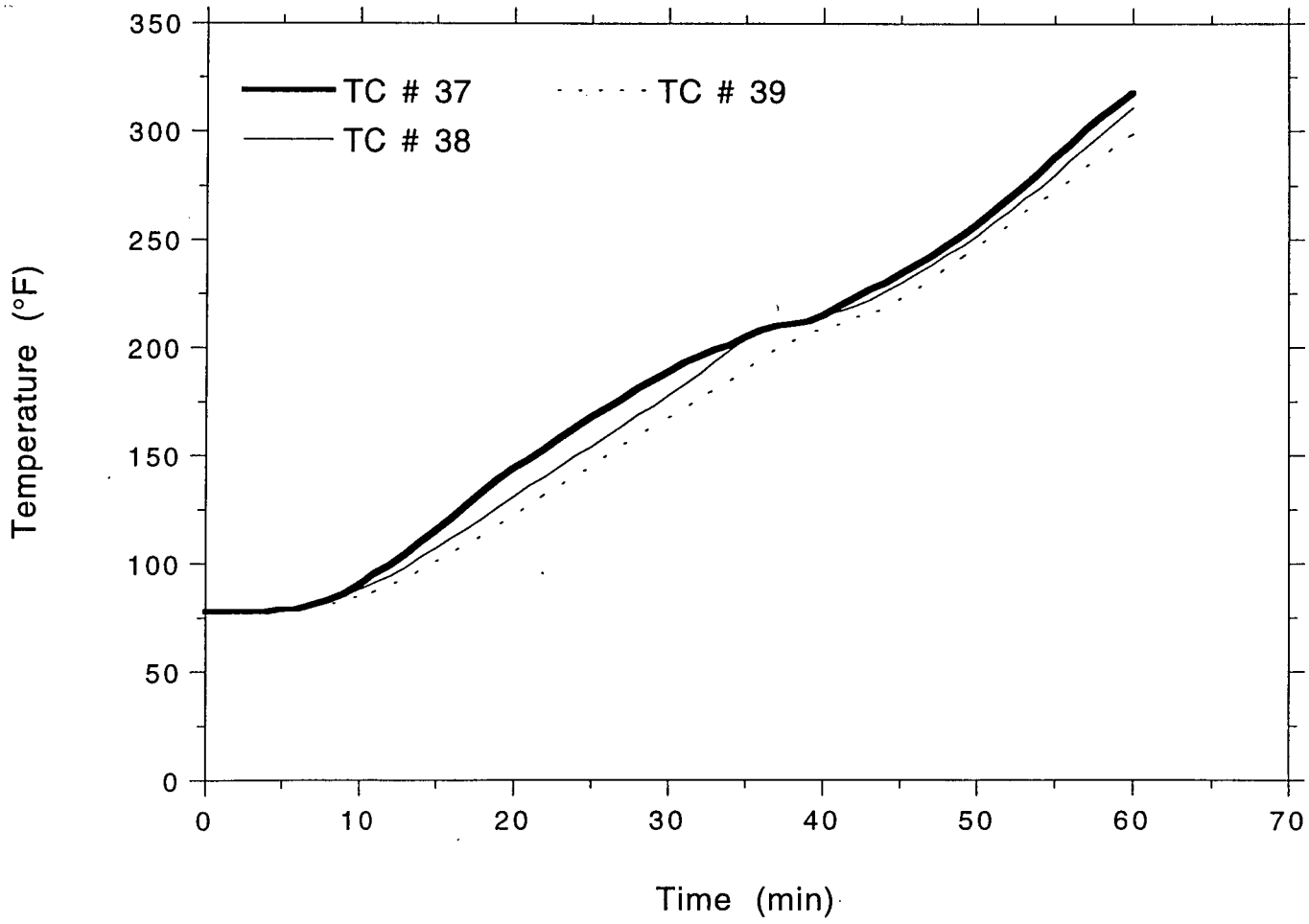
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Rear Rail



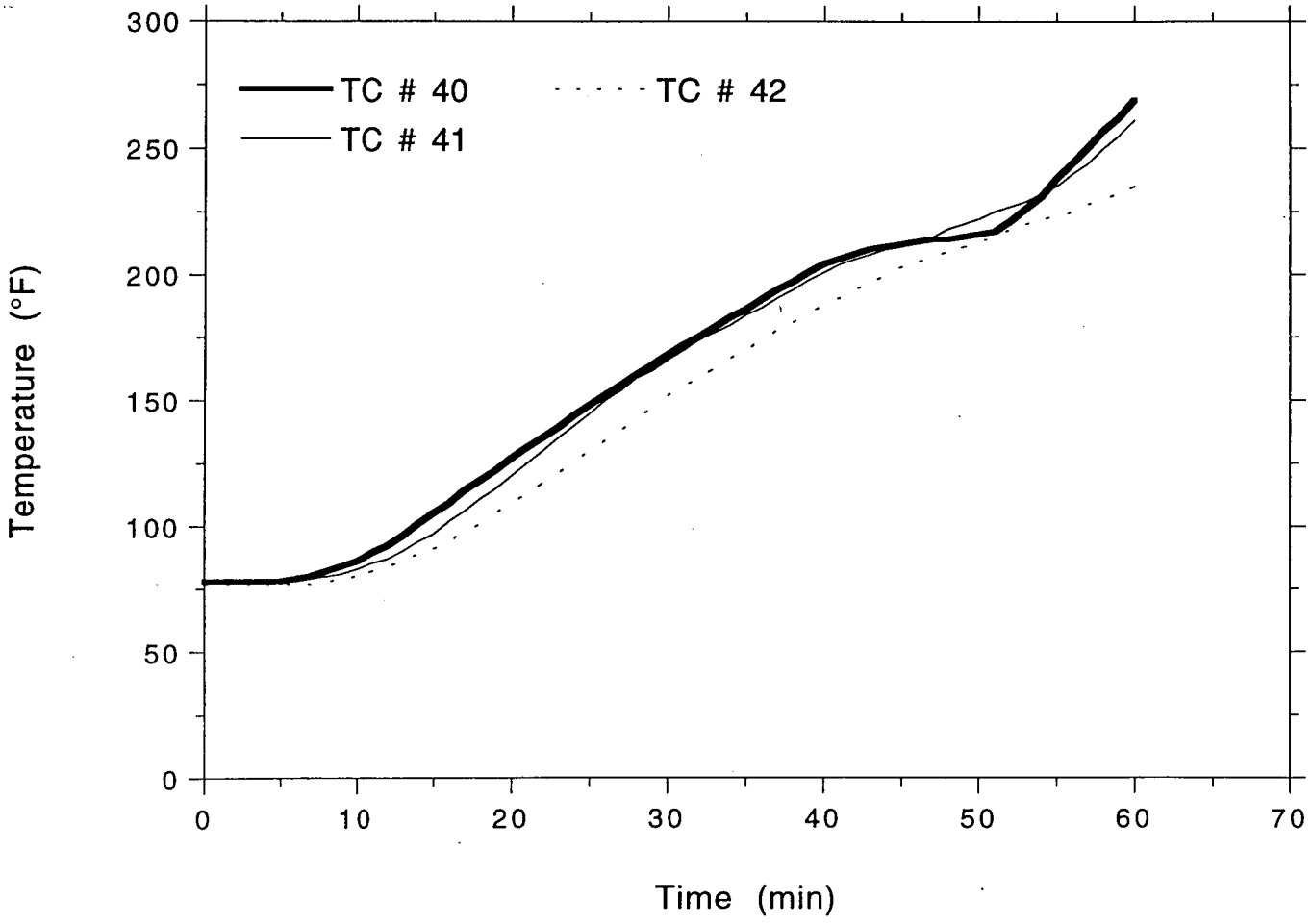
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Rear Rail



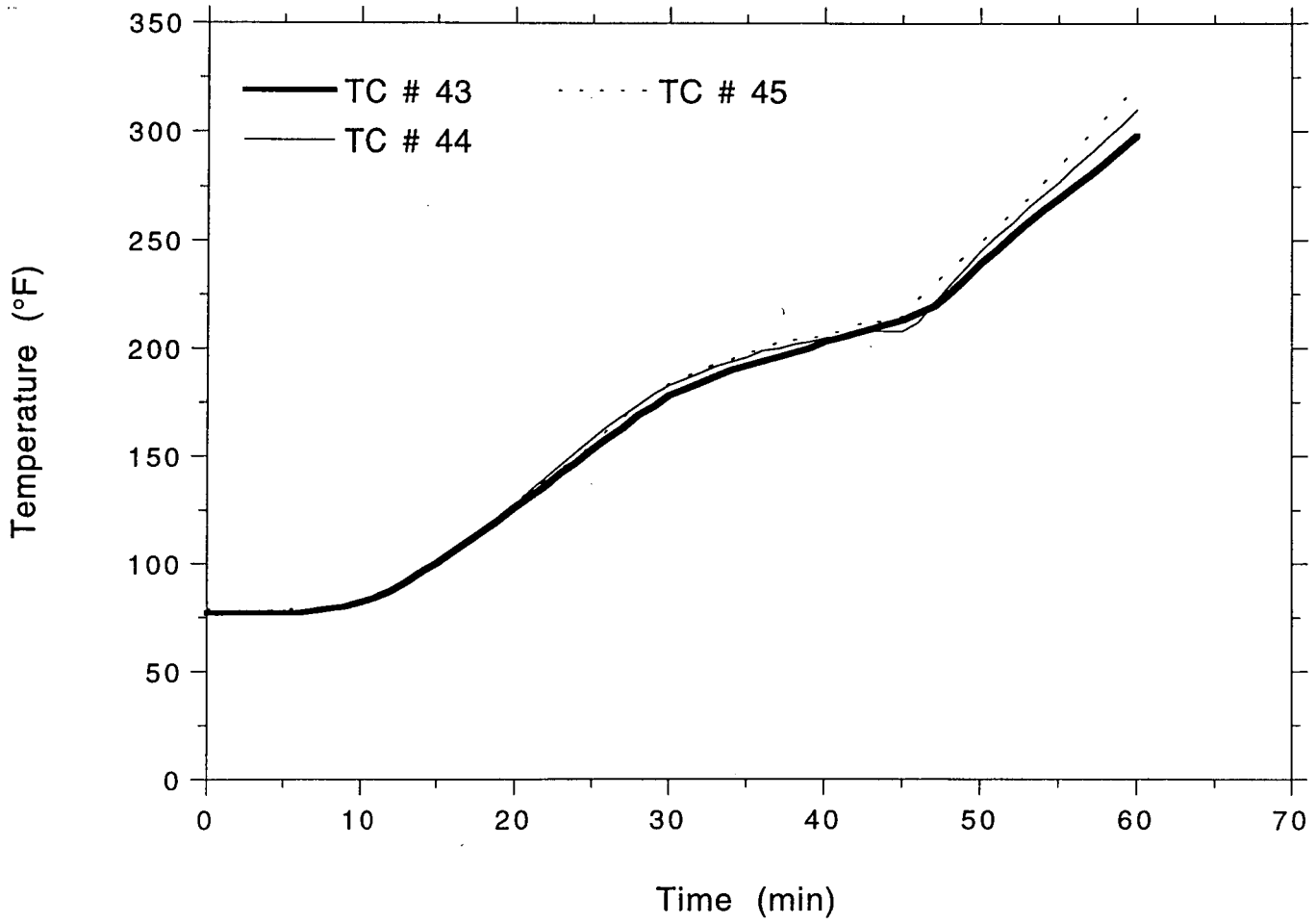
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Front Tray, Rear Rail



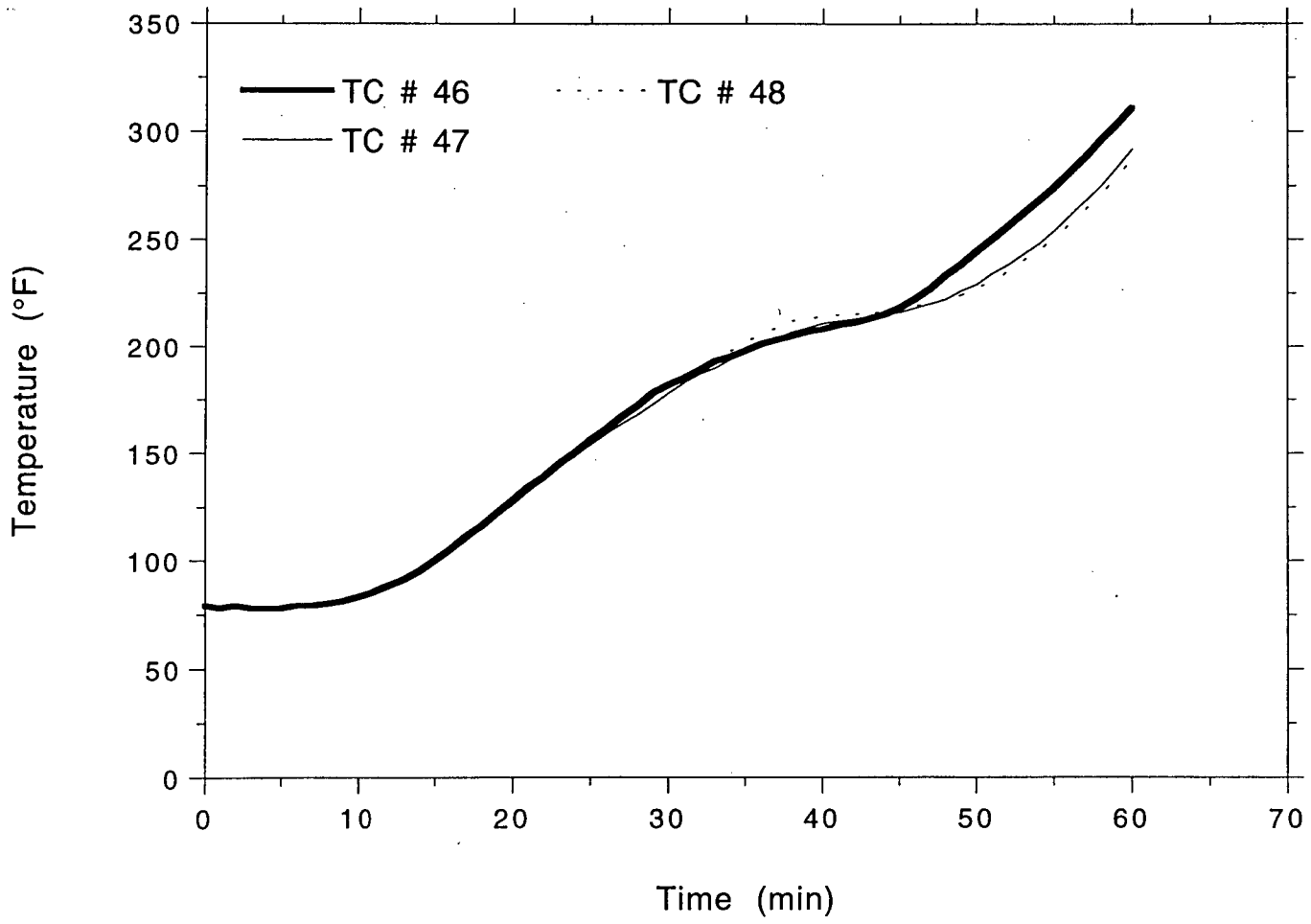
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



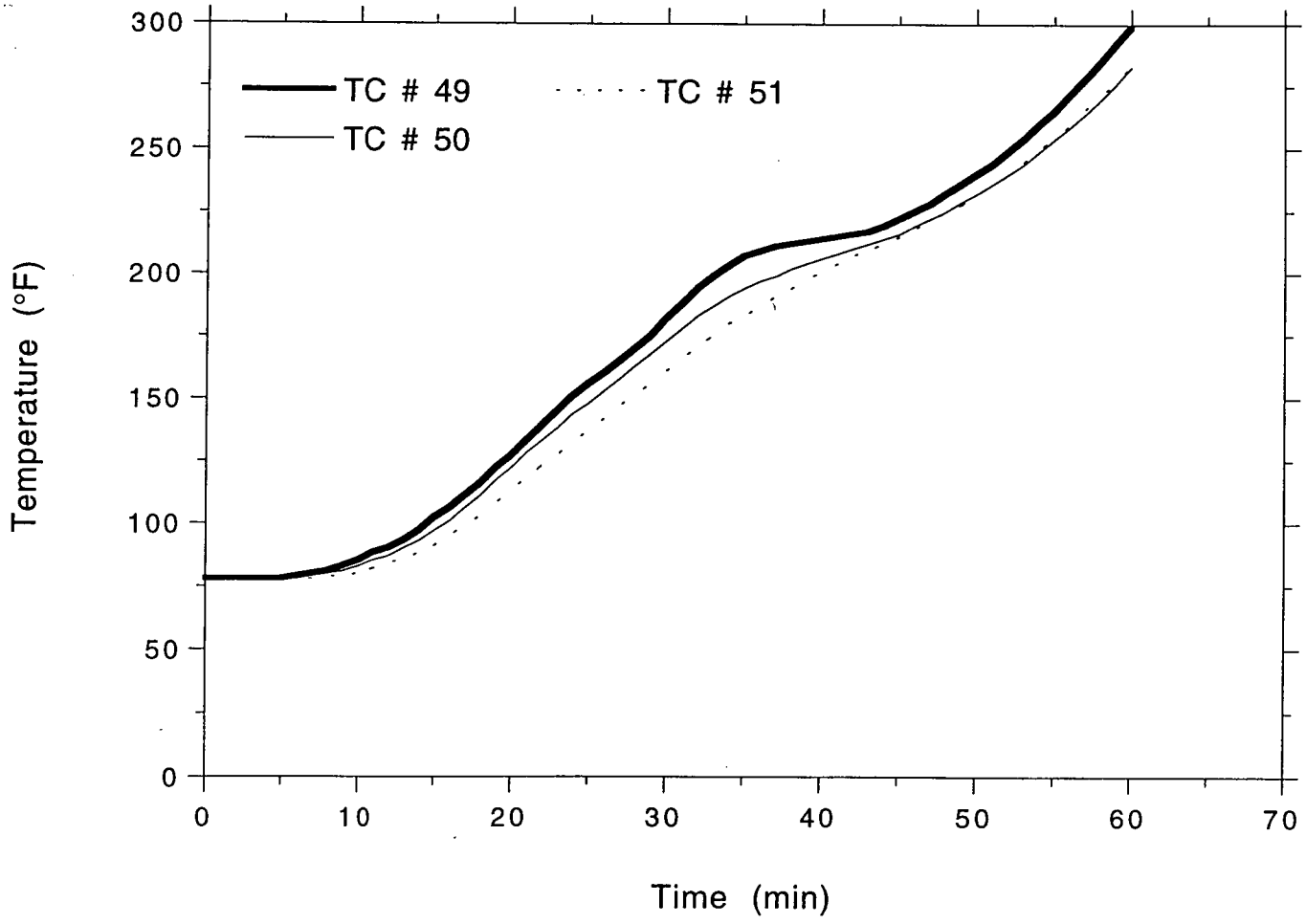
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



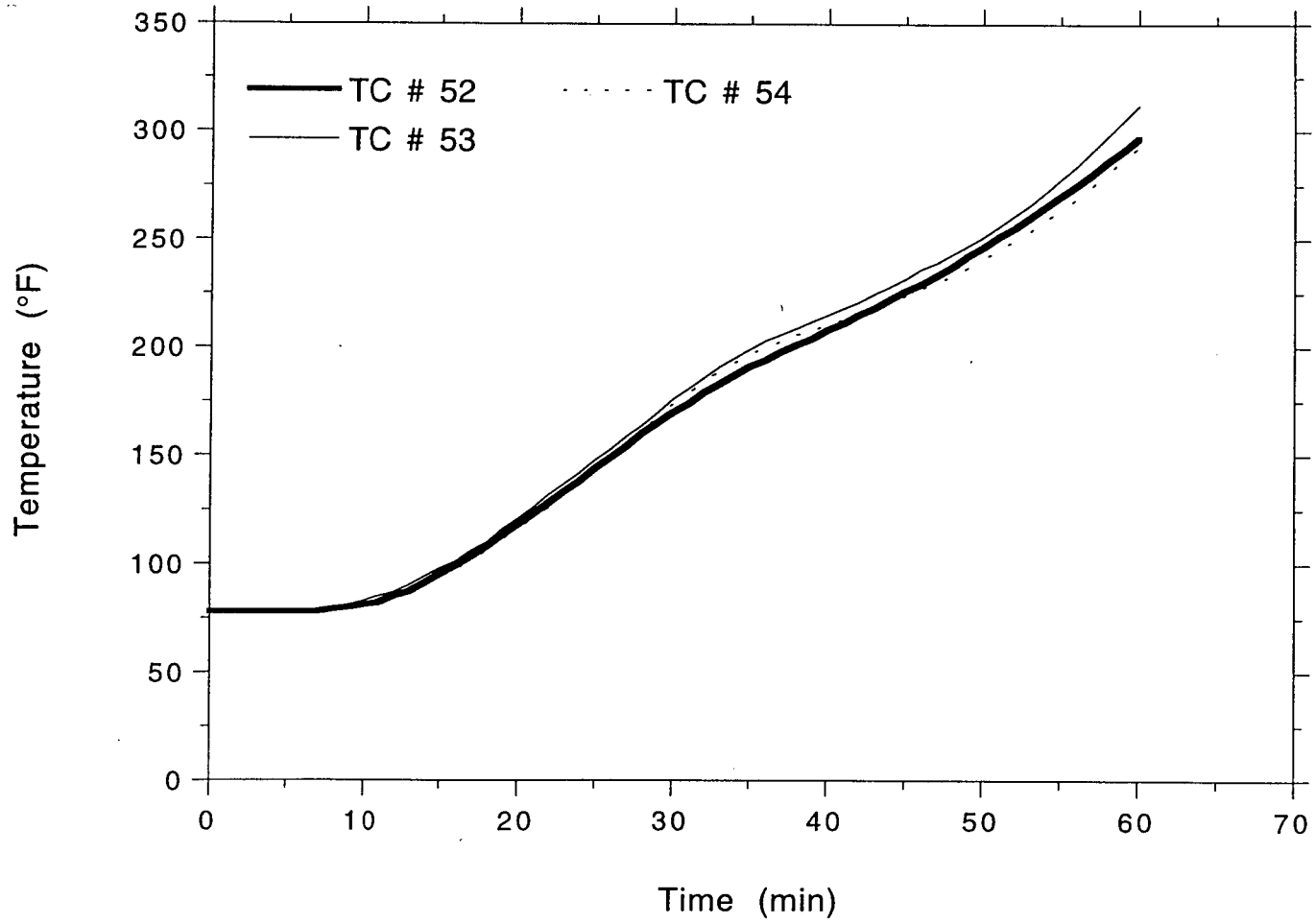
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



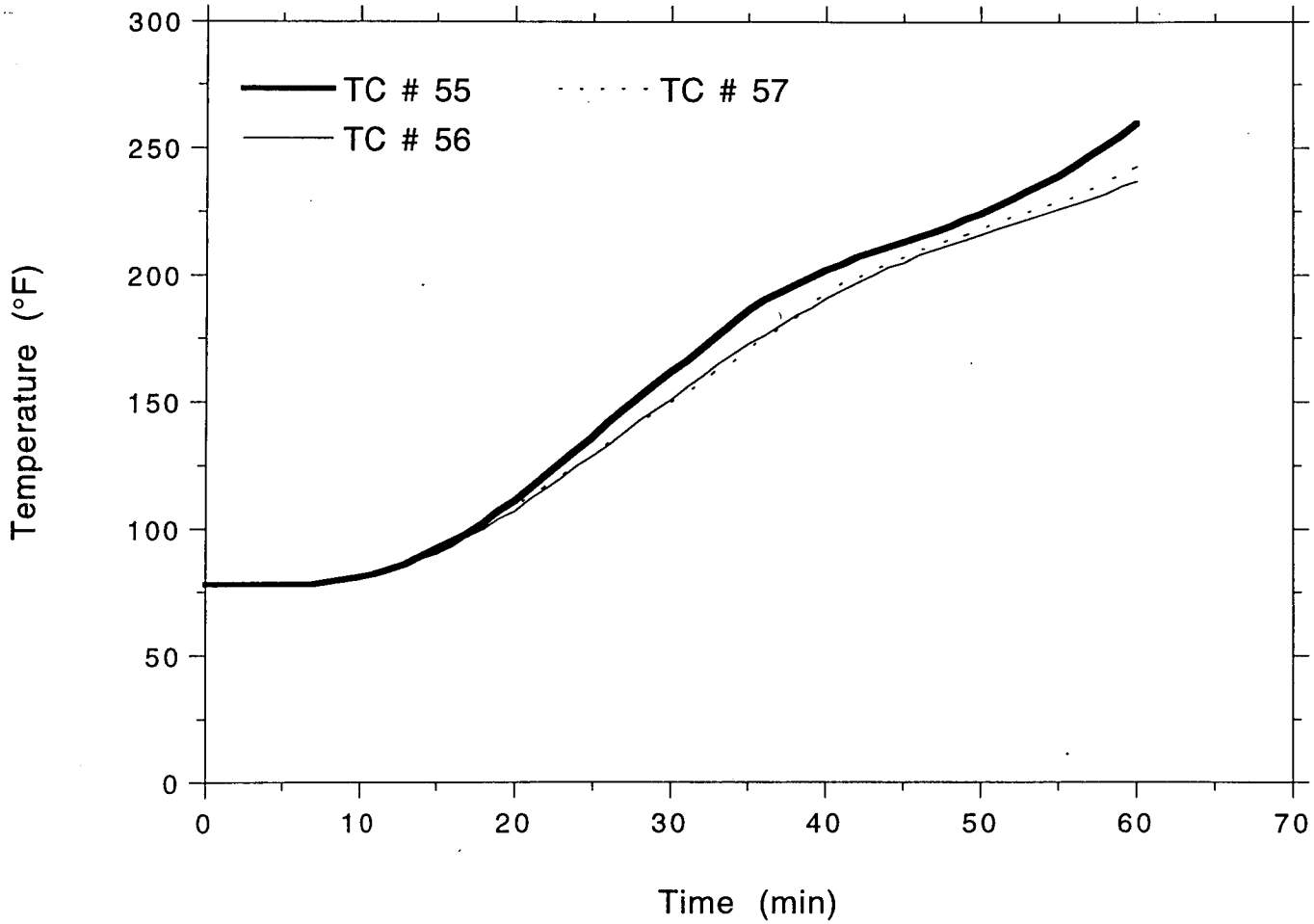
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



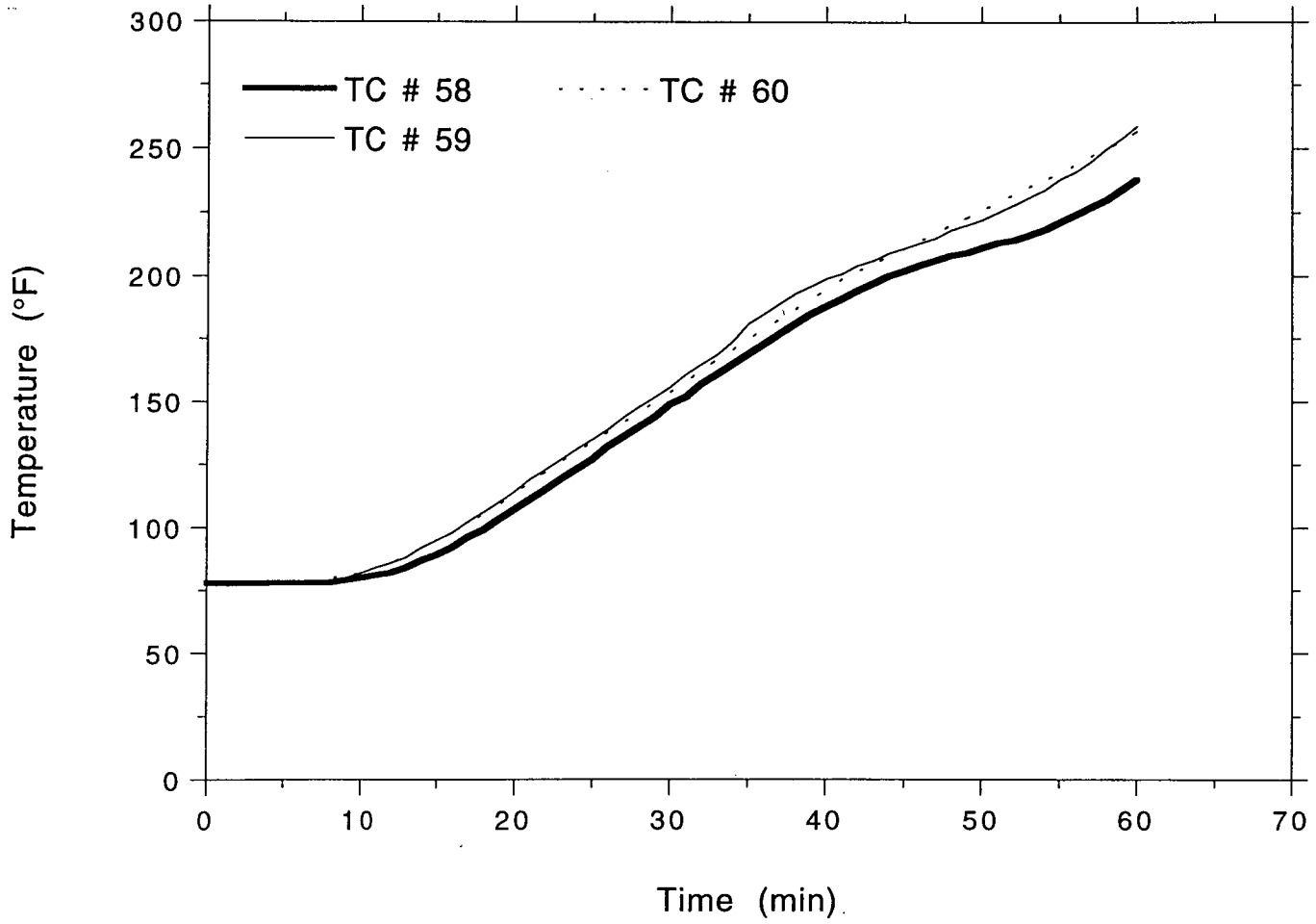
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



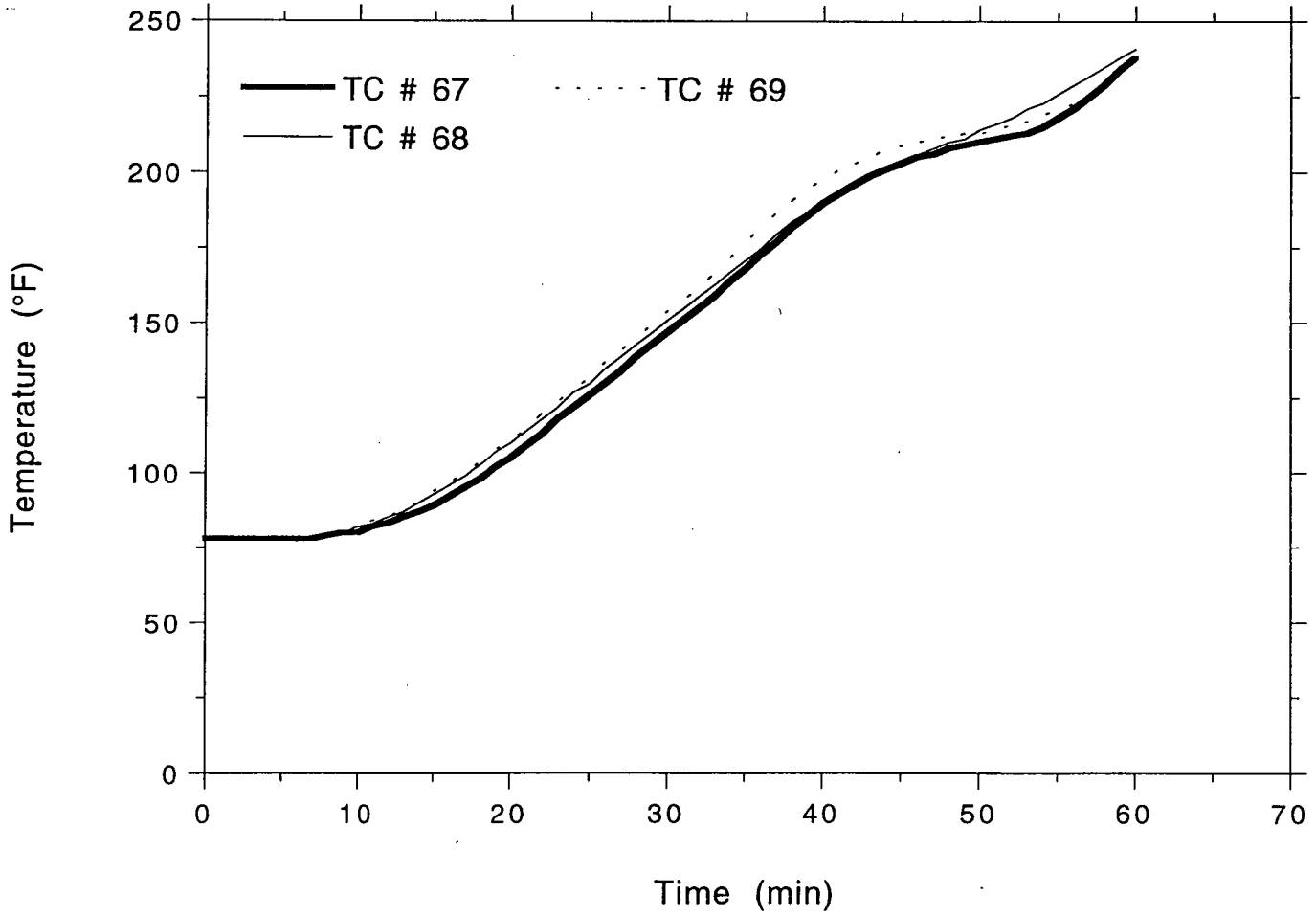
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



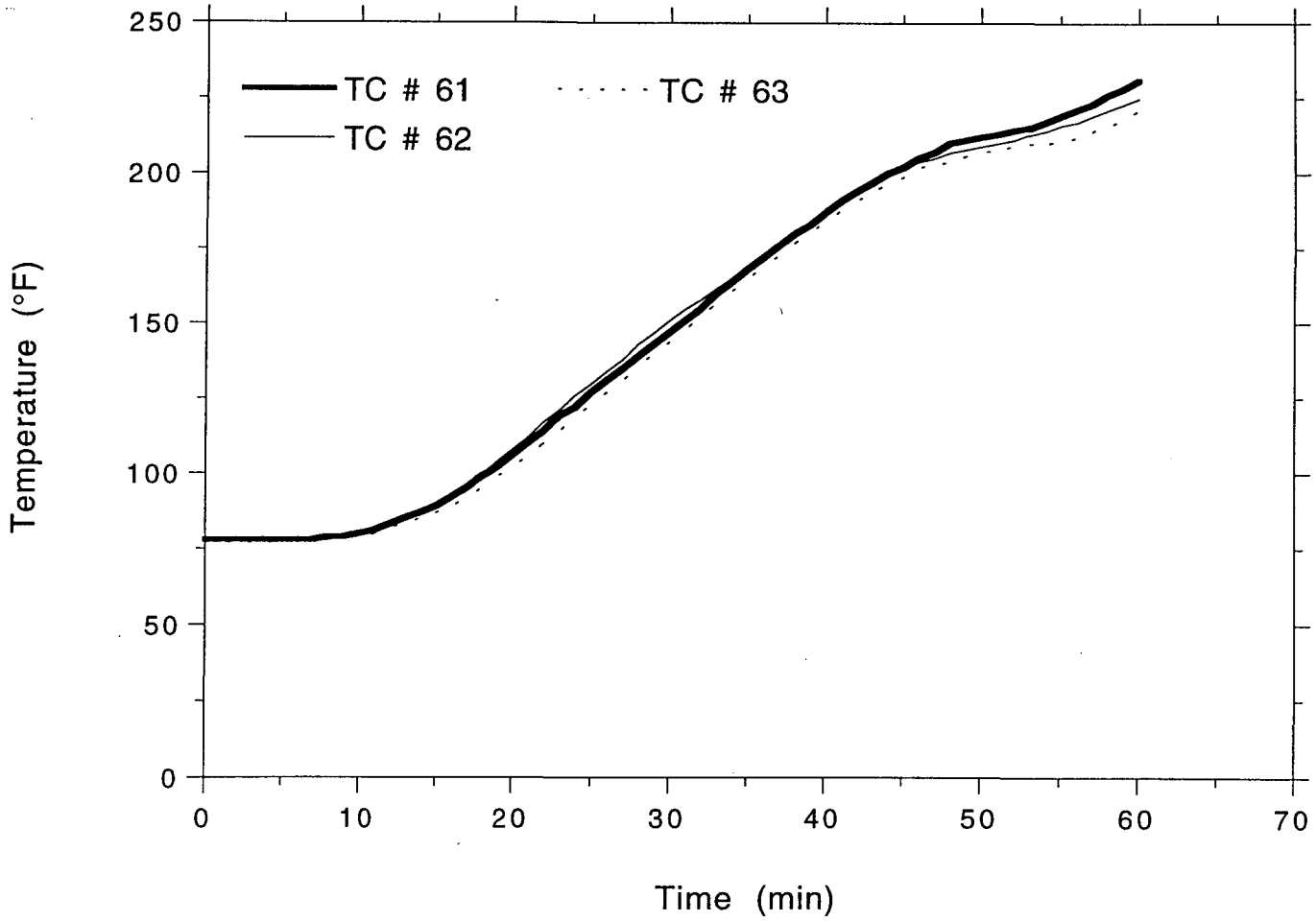
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



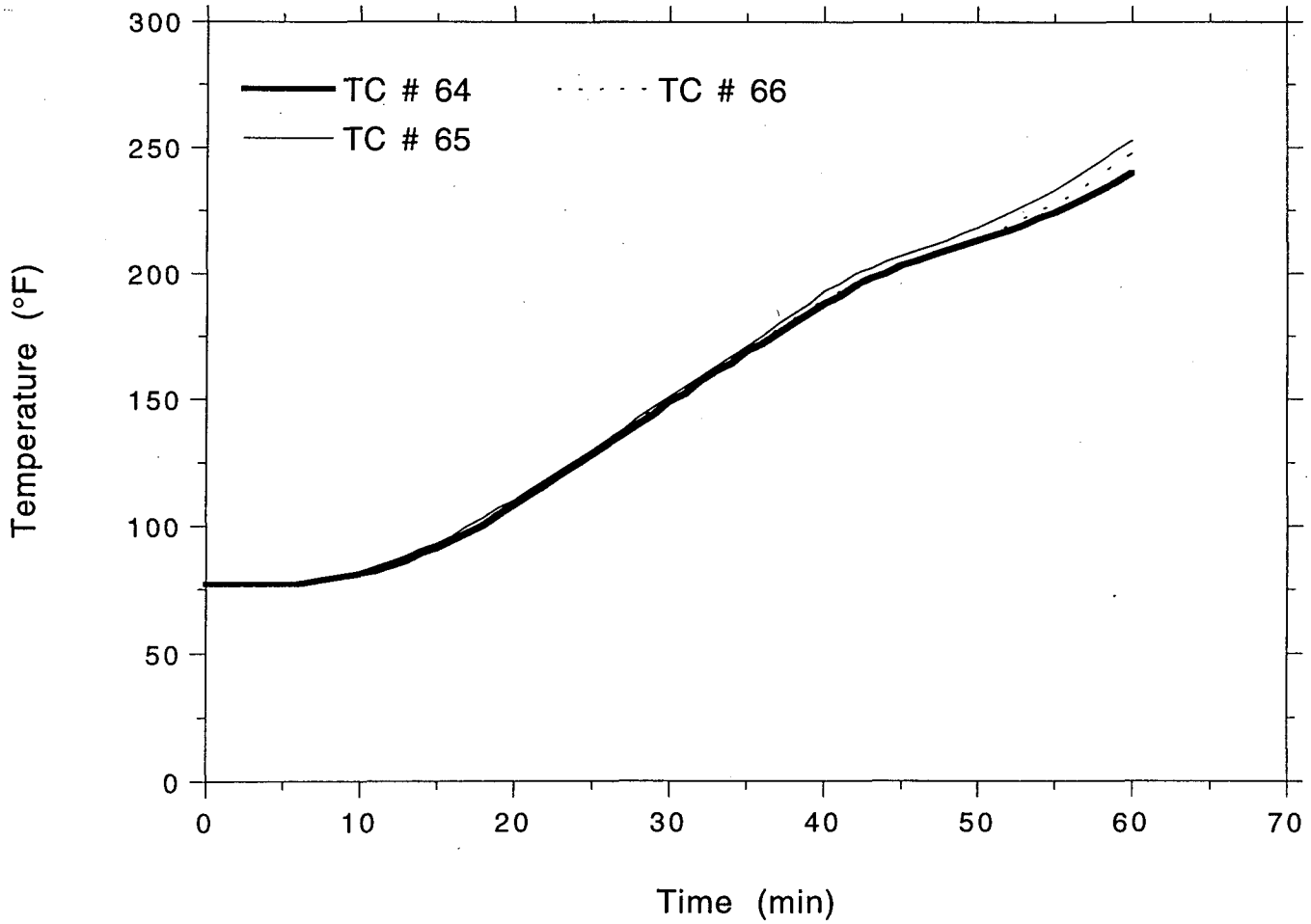
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



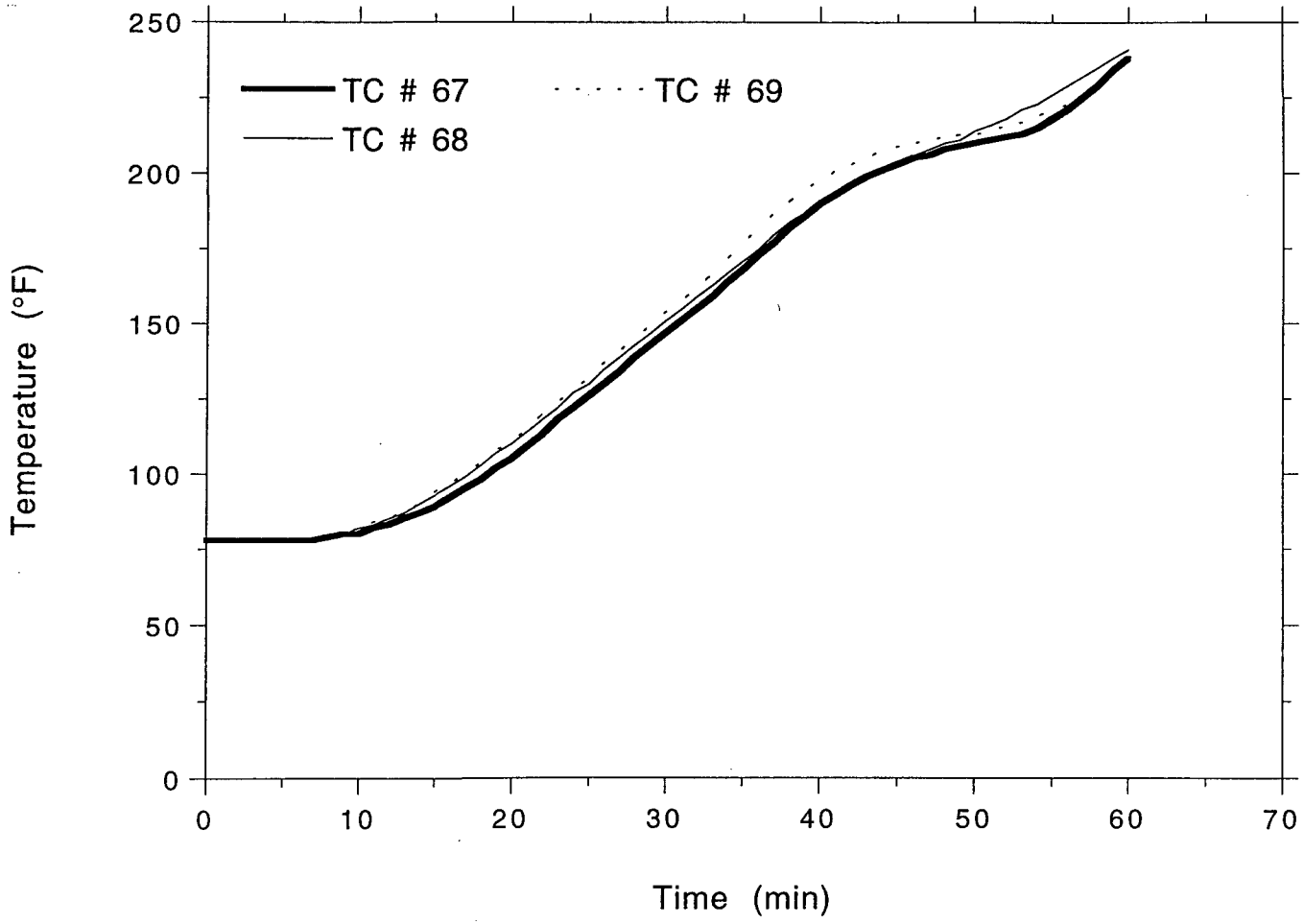
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



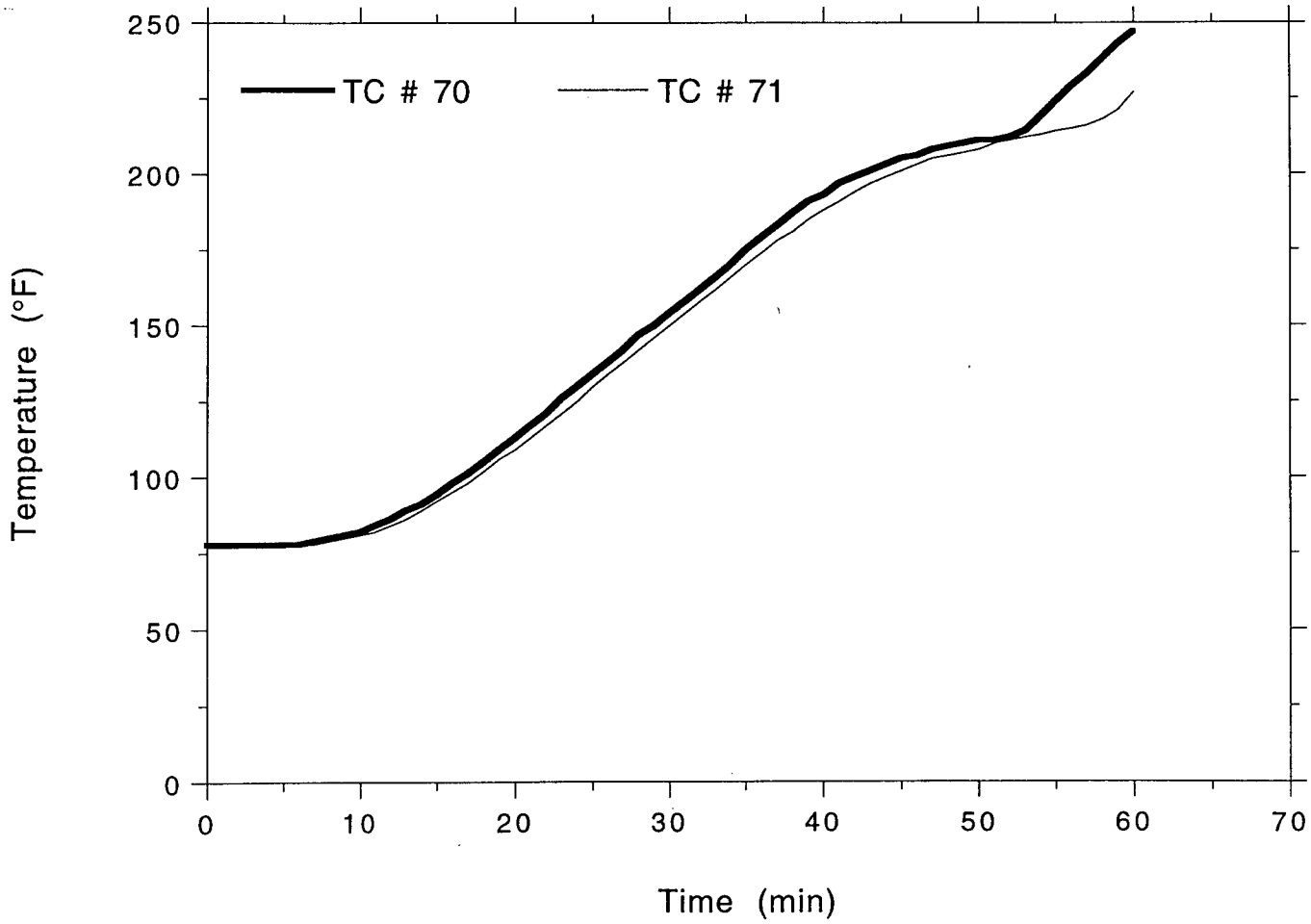
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



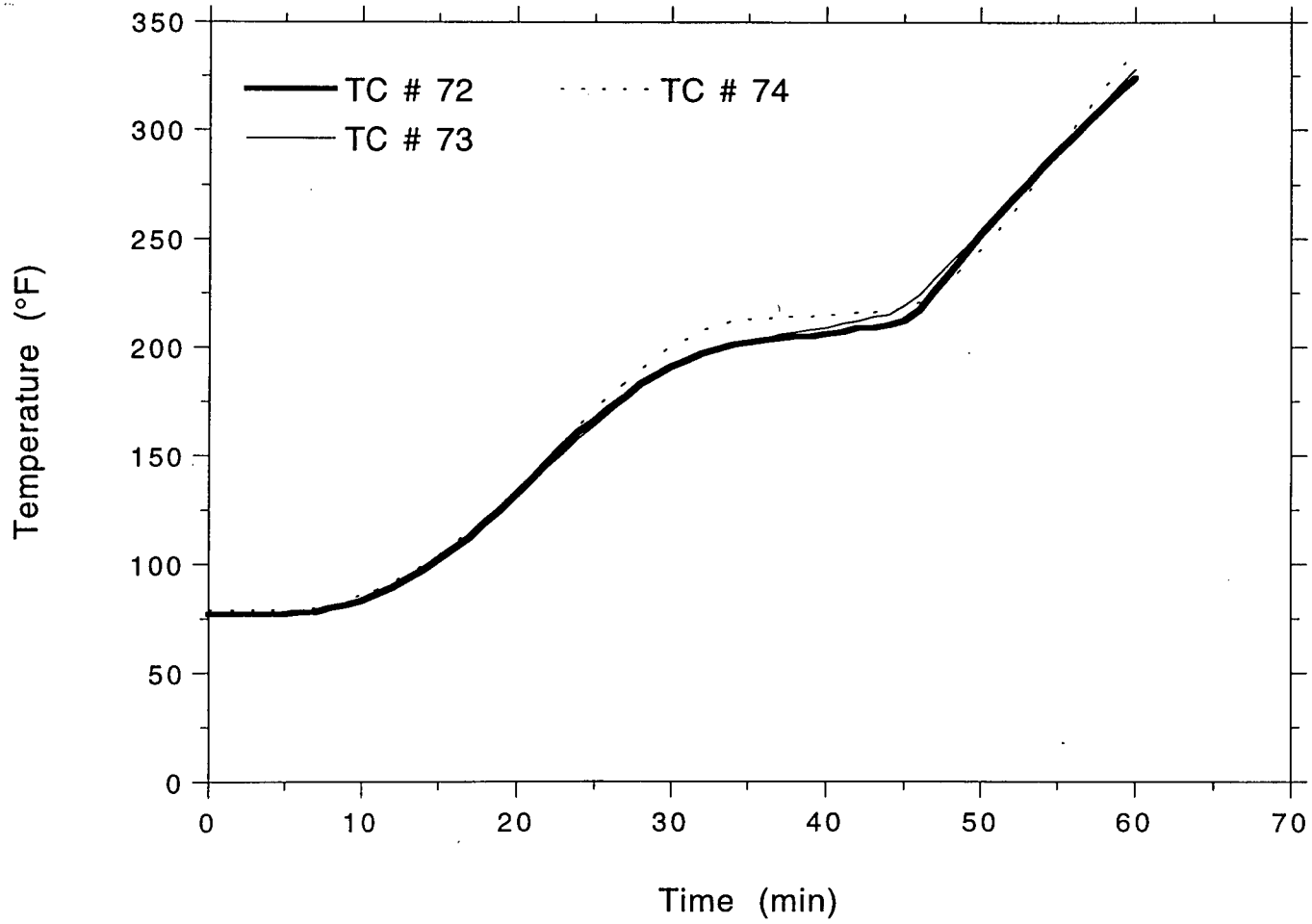
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Front Rail



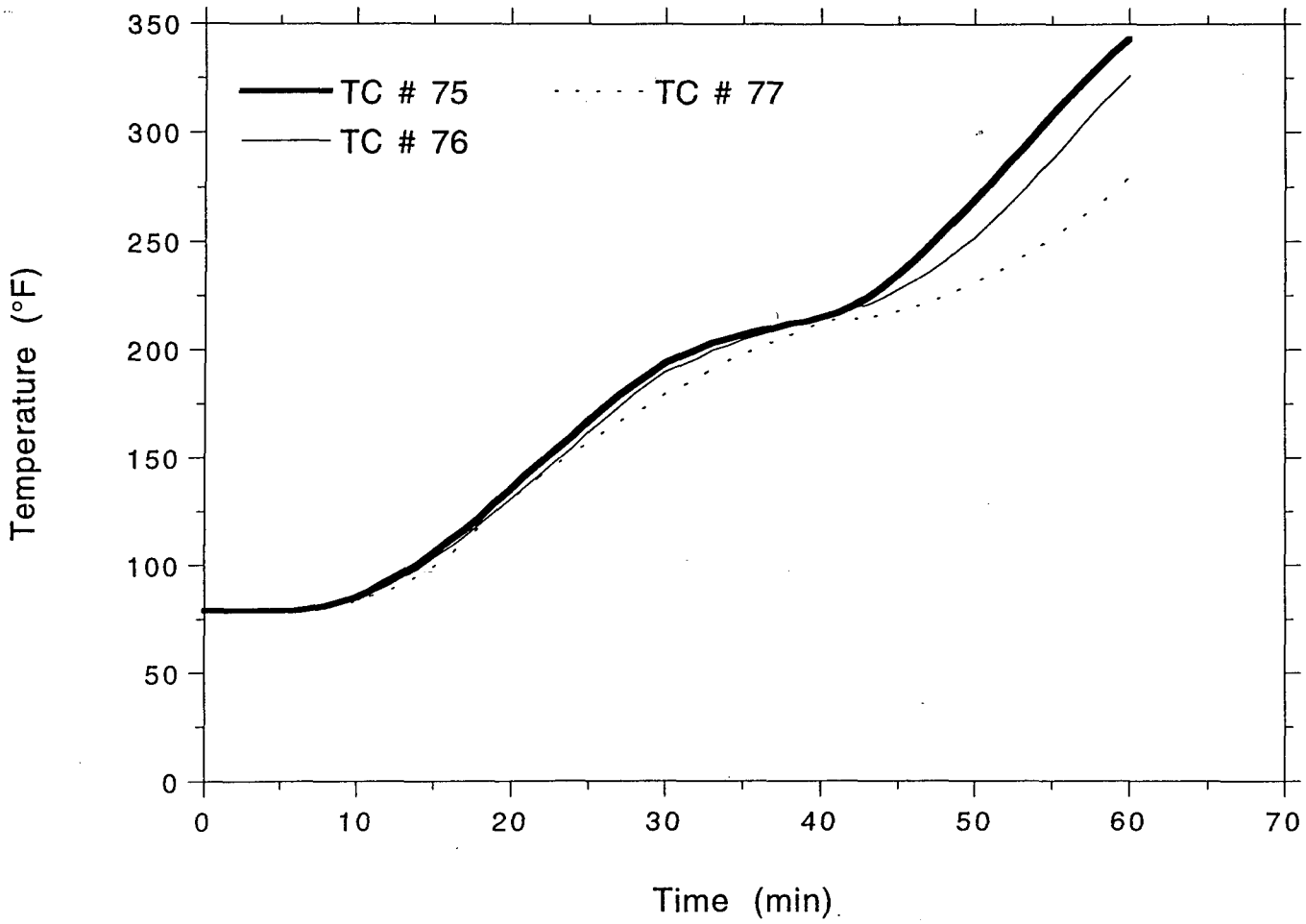
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



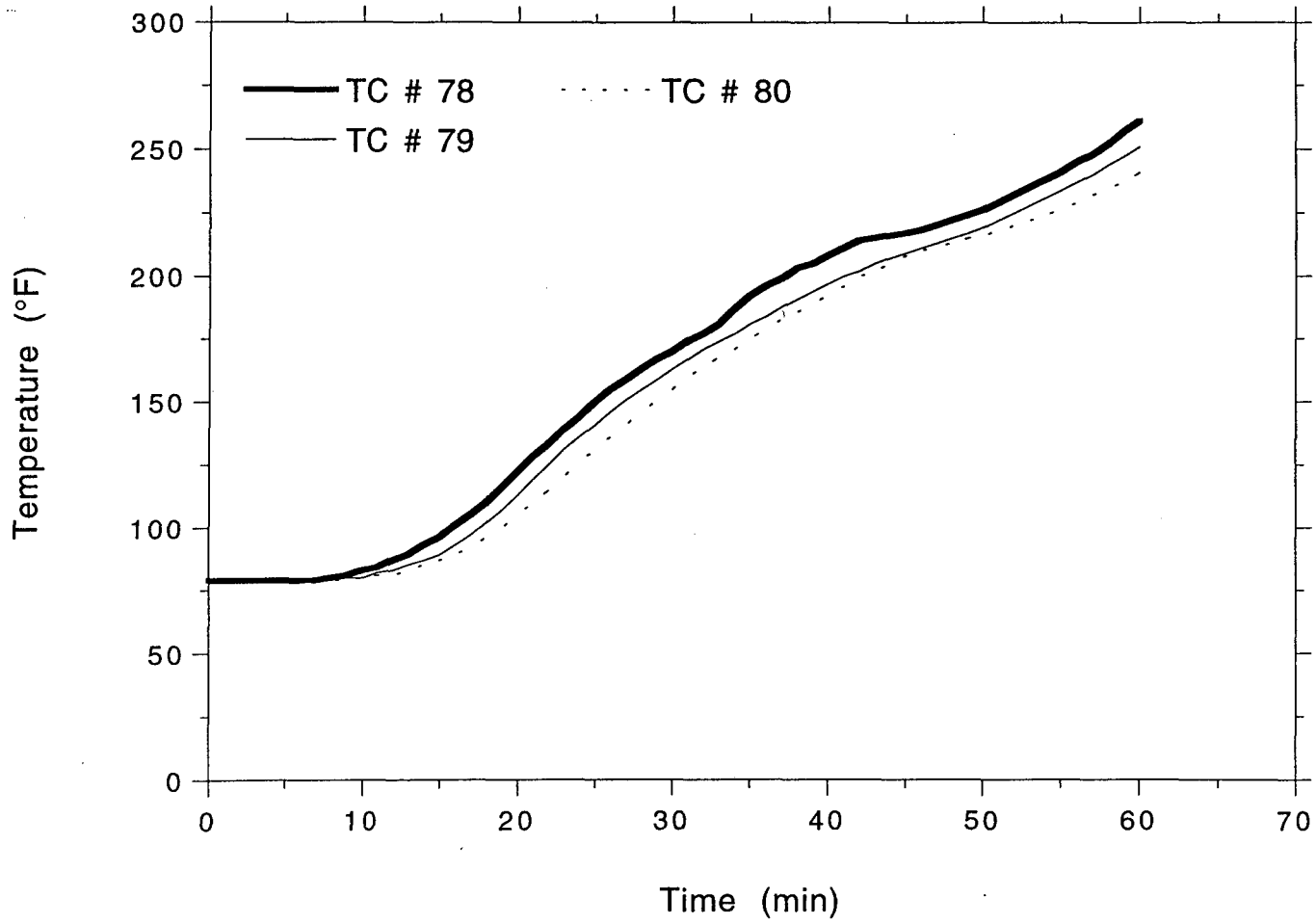
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



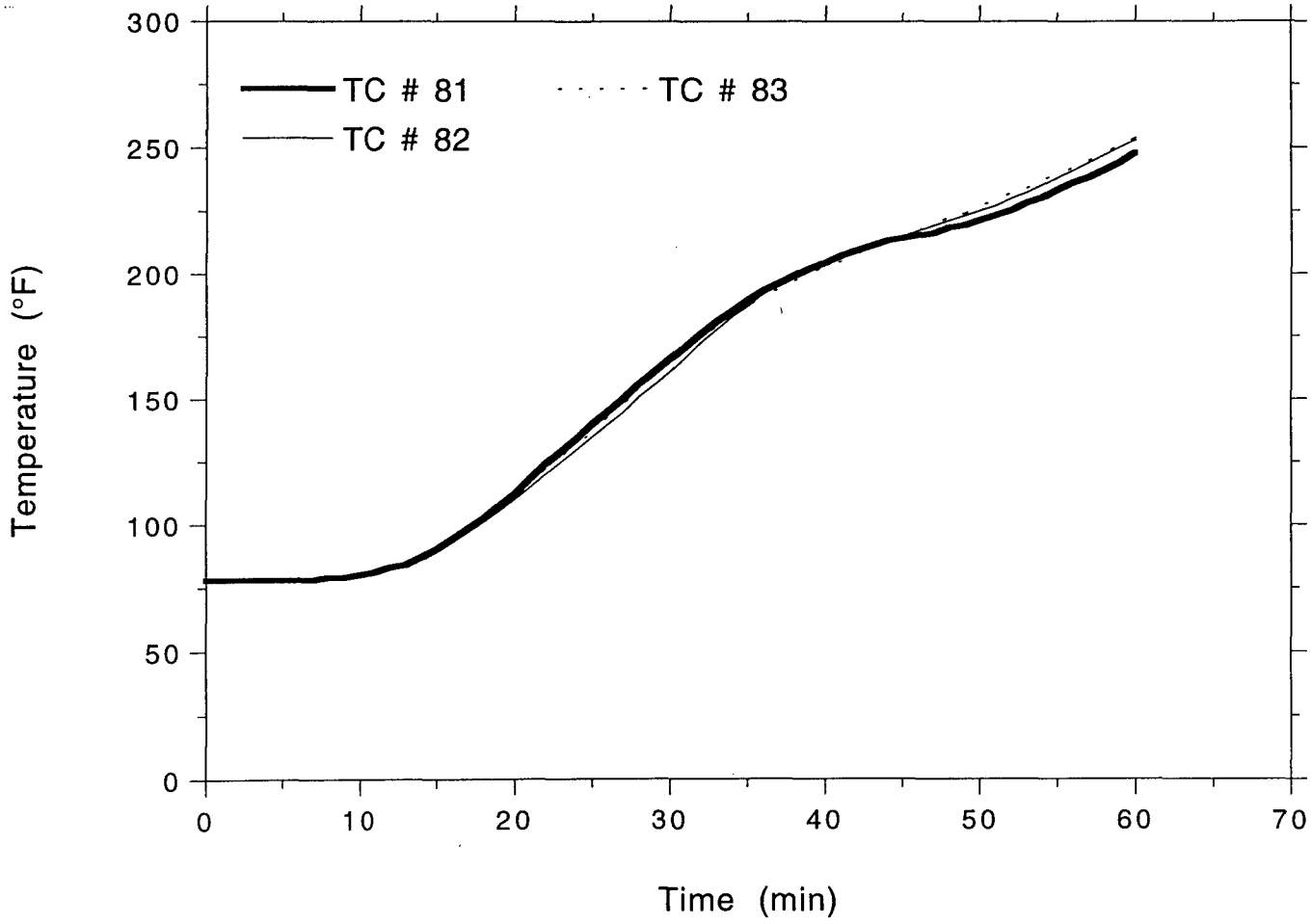
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



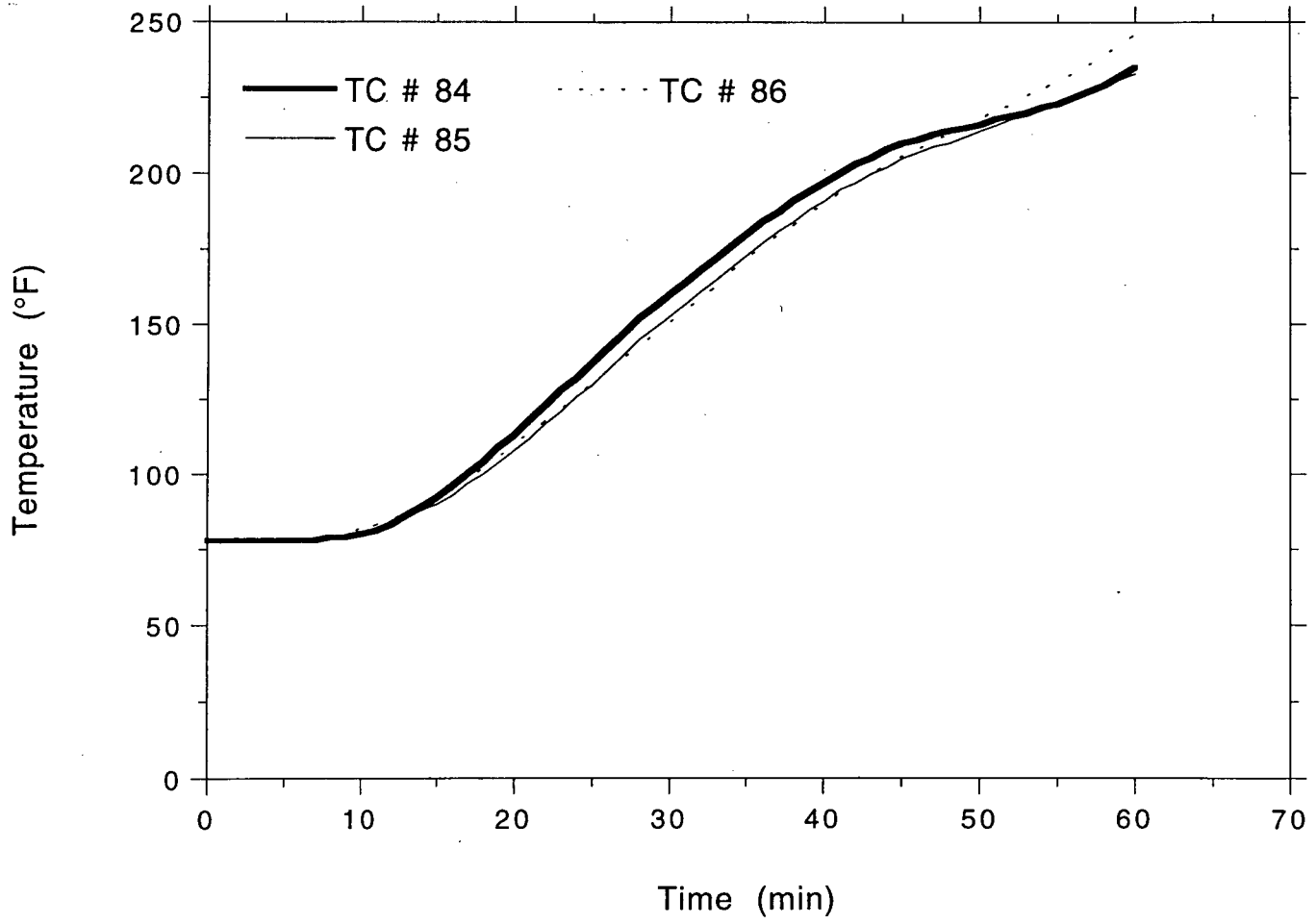
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



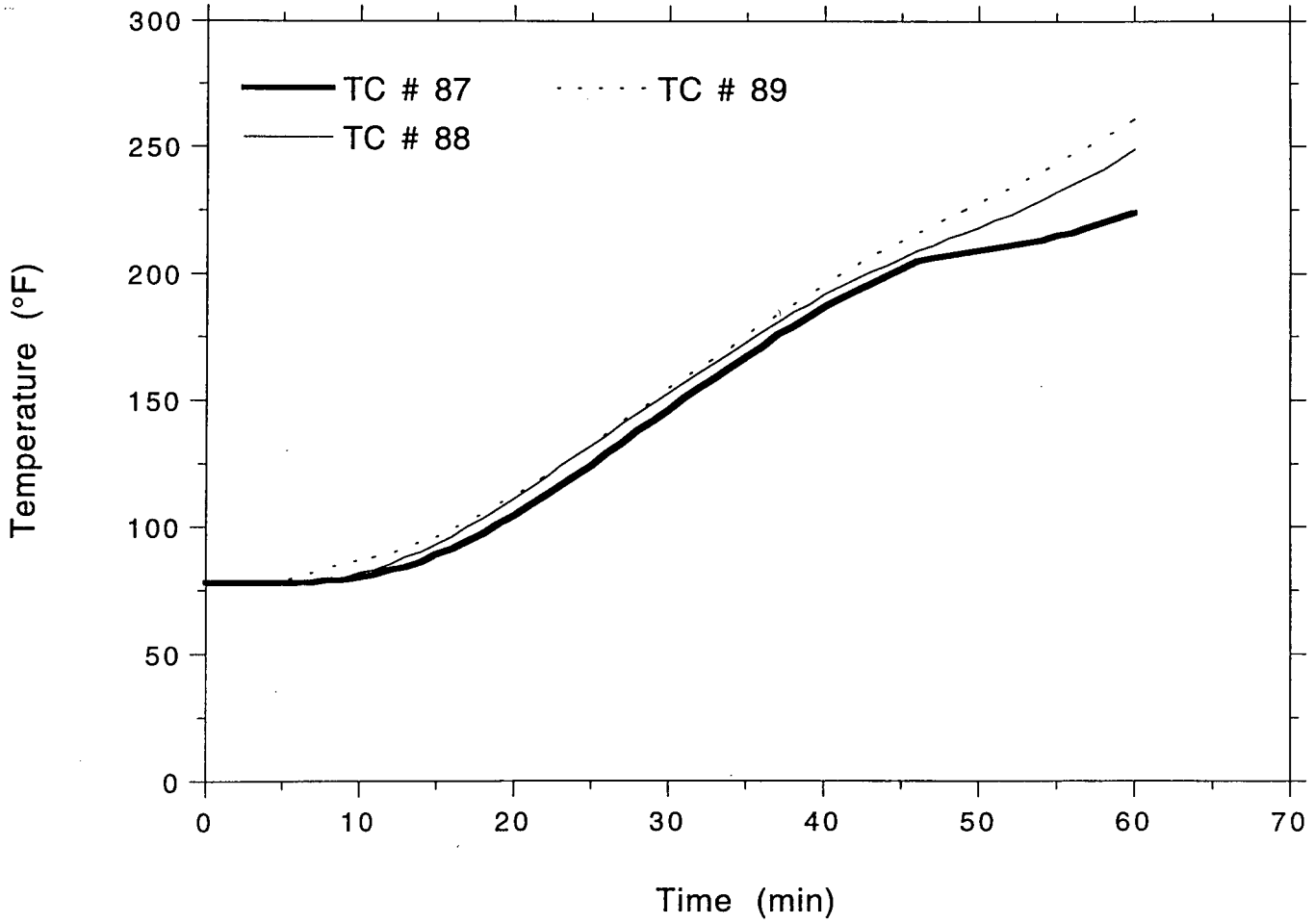
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



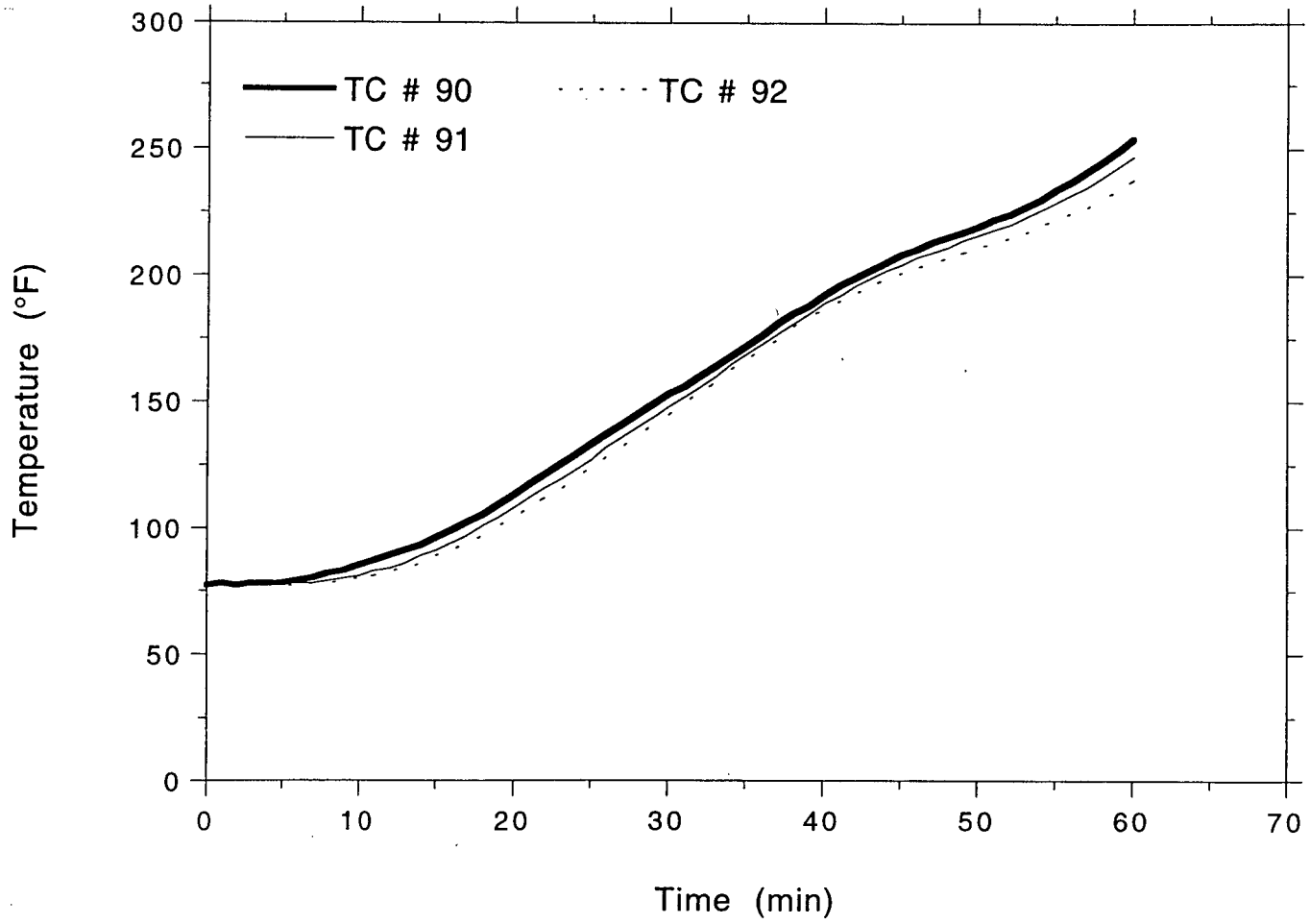
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



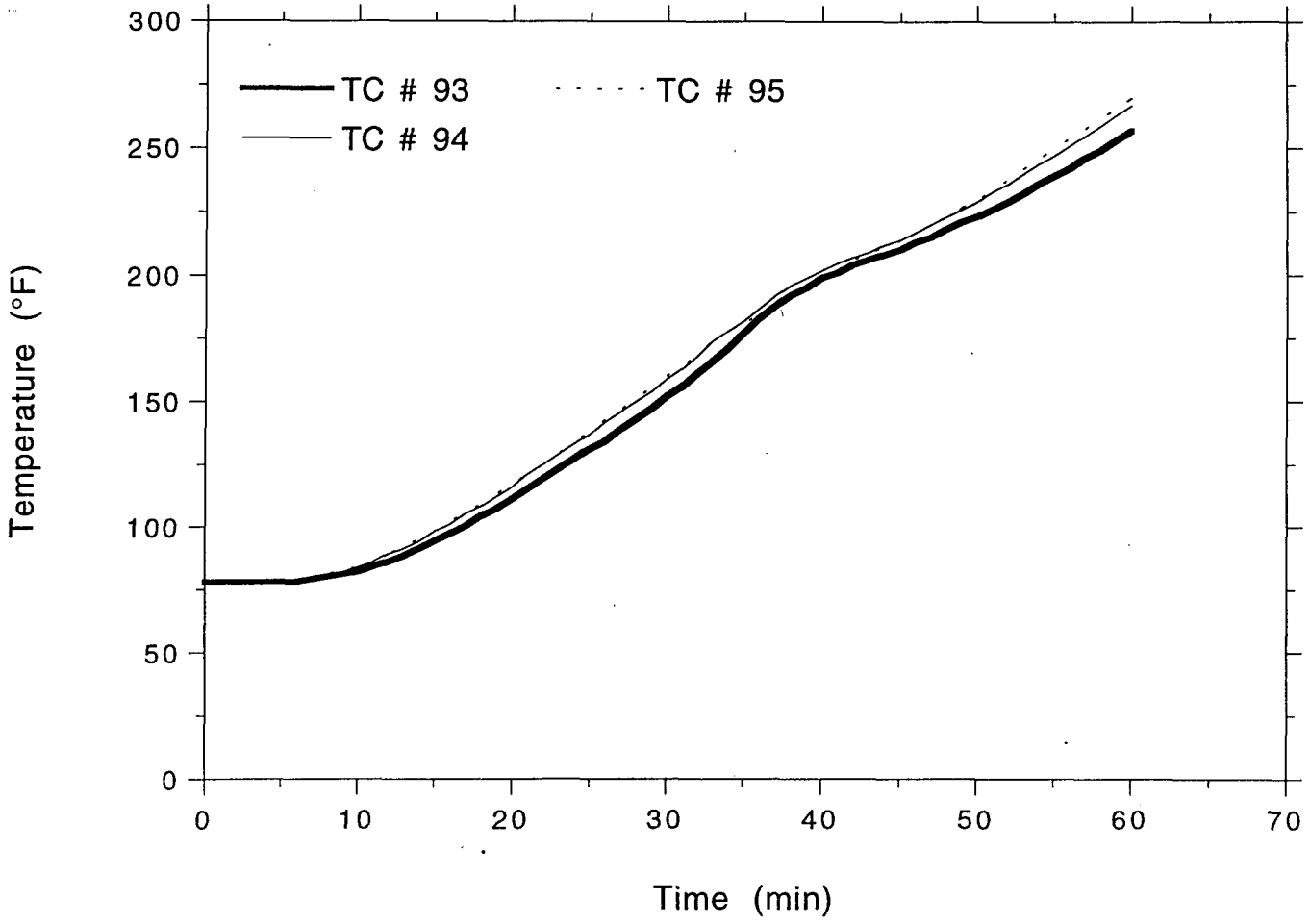
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



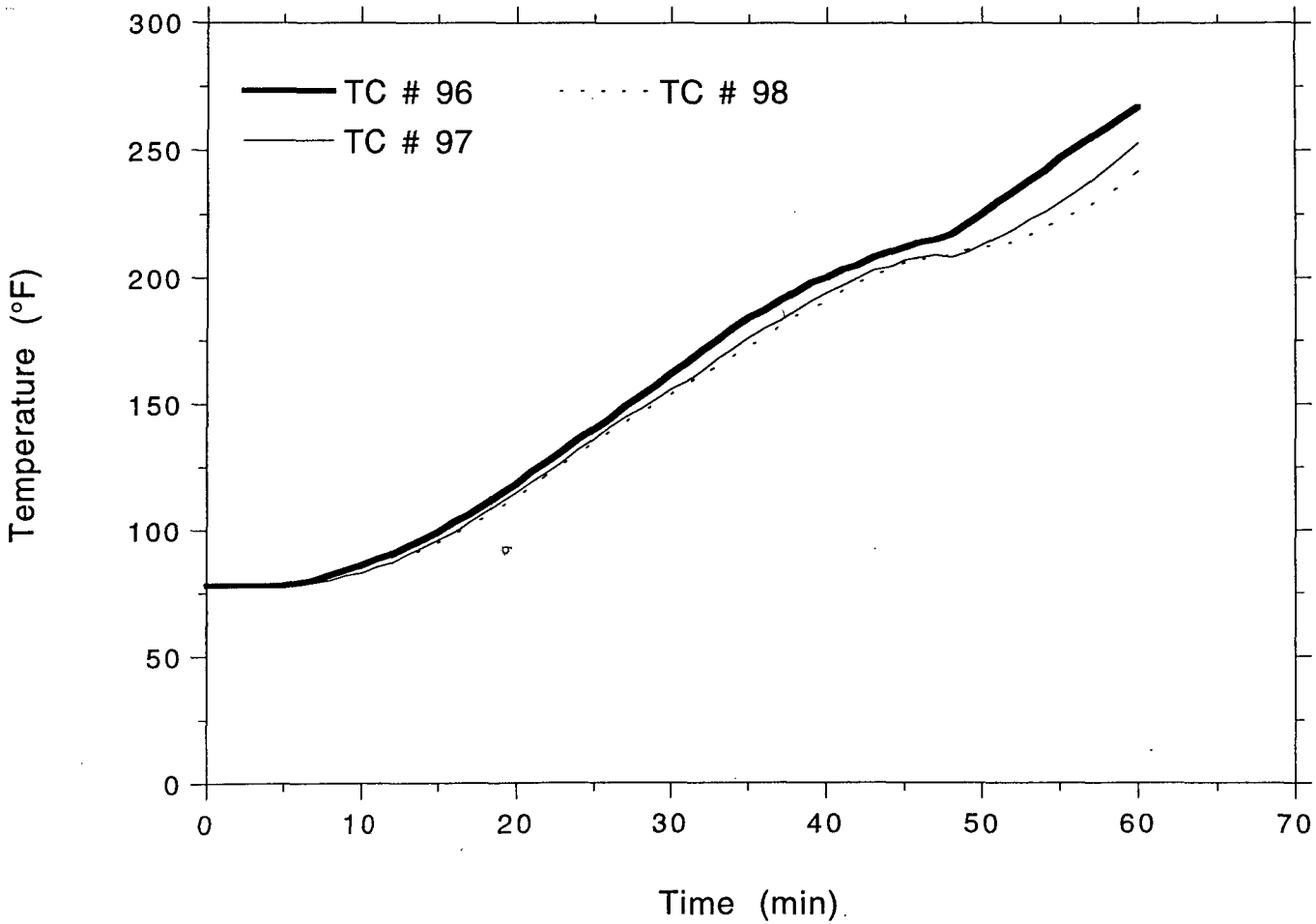
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



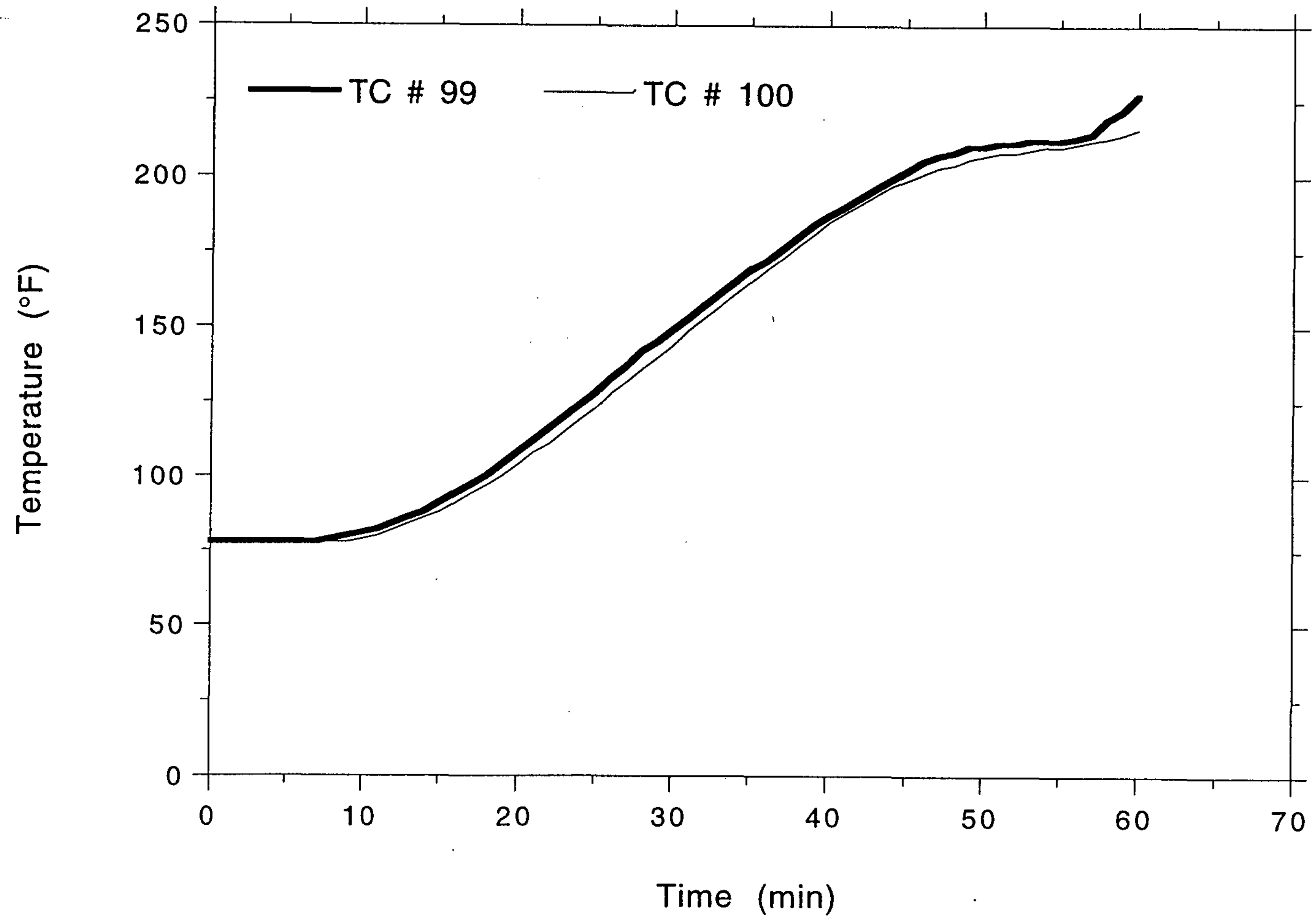
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



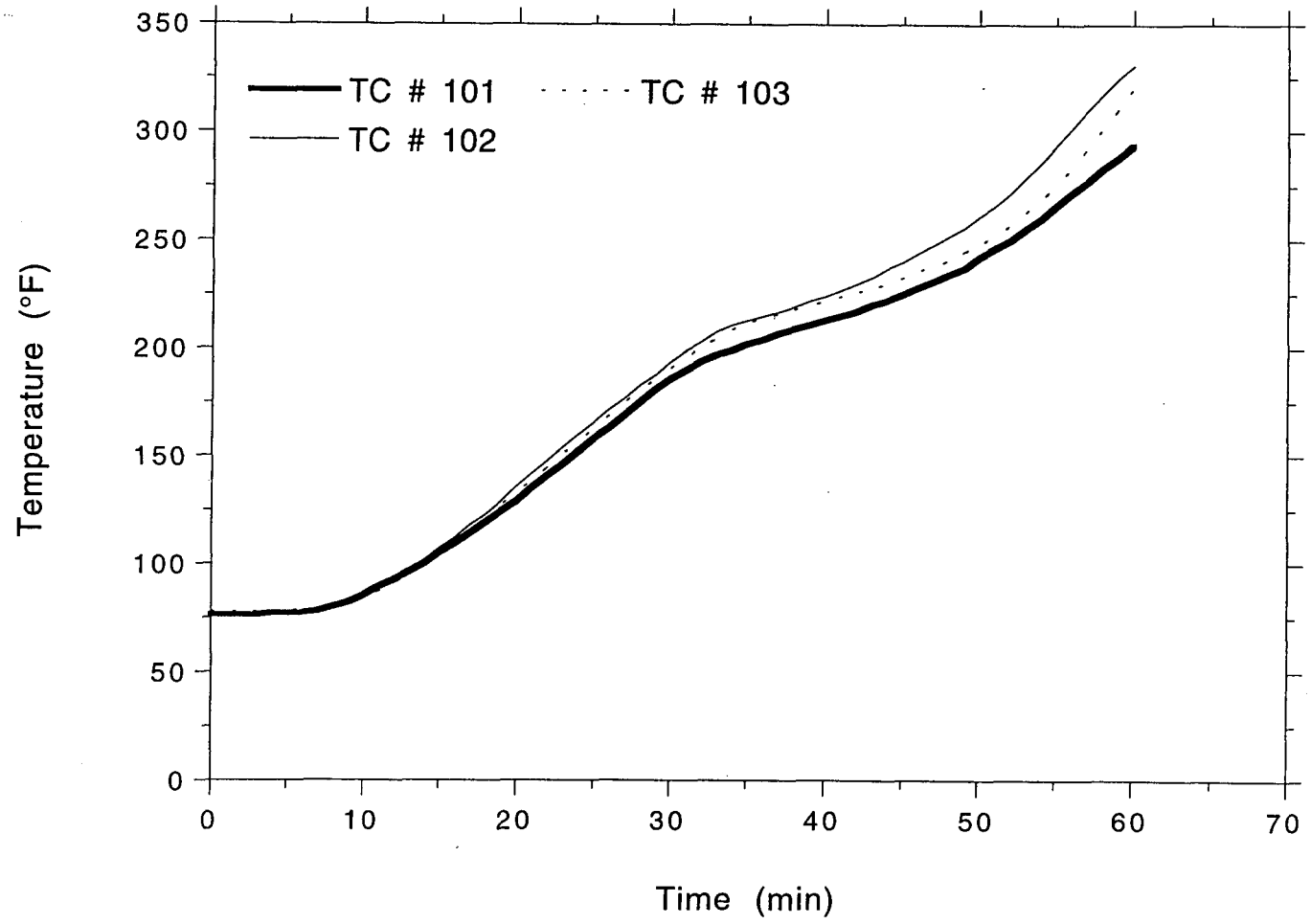
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, Rear Rail



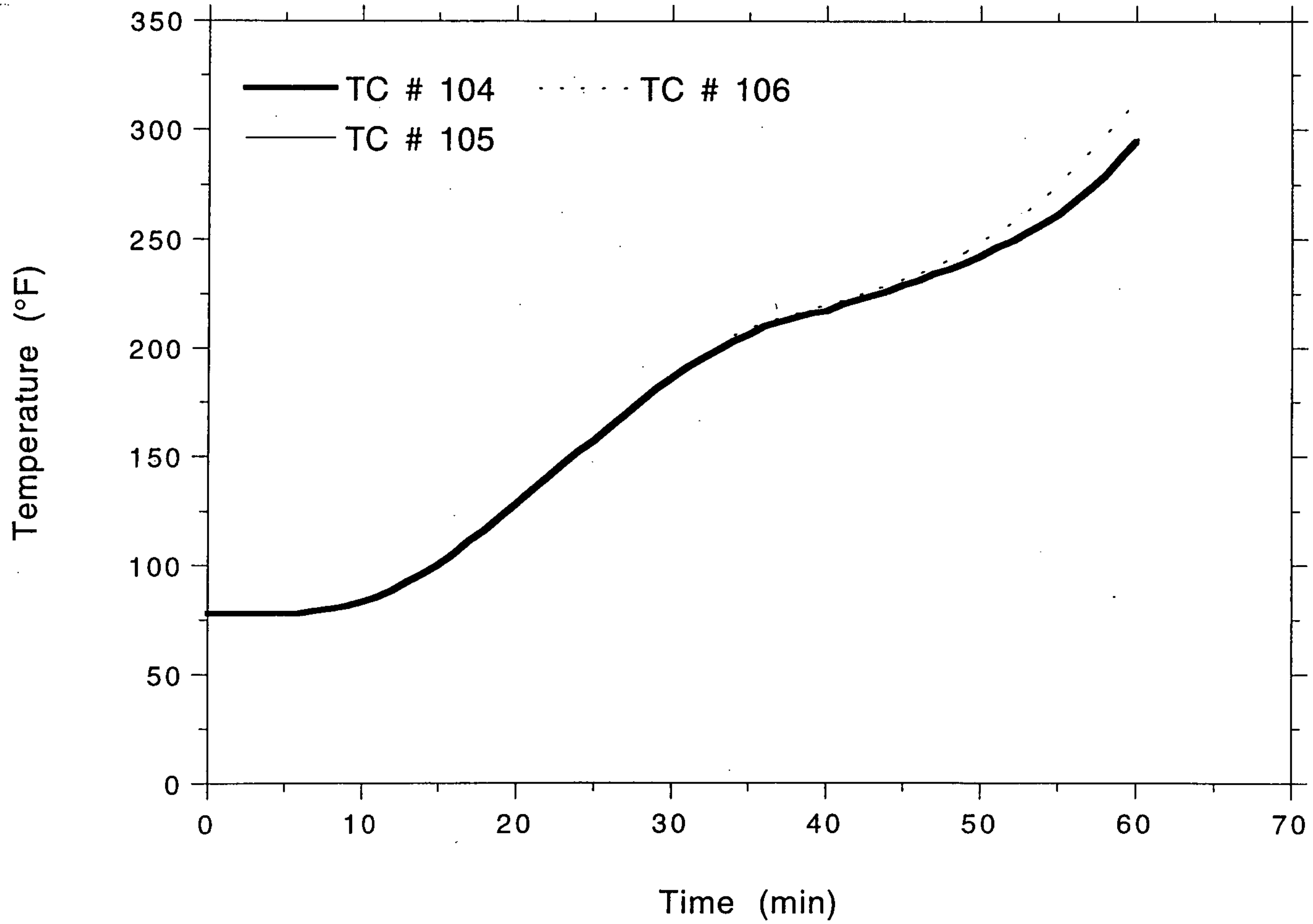
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



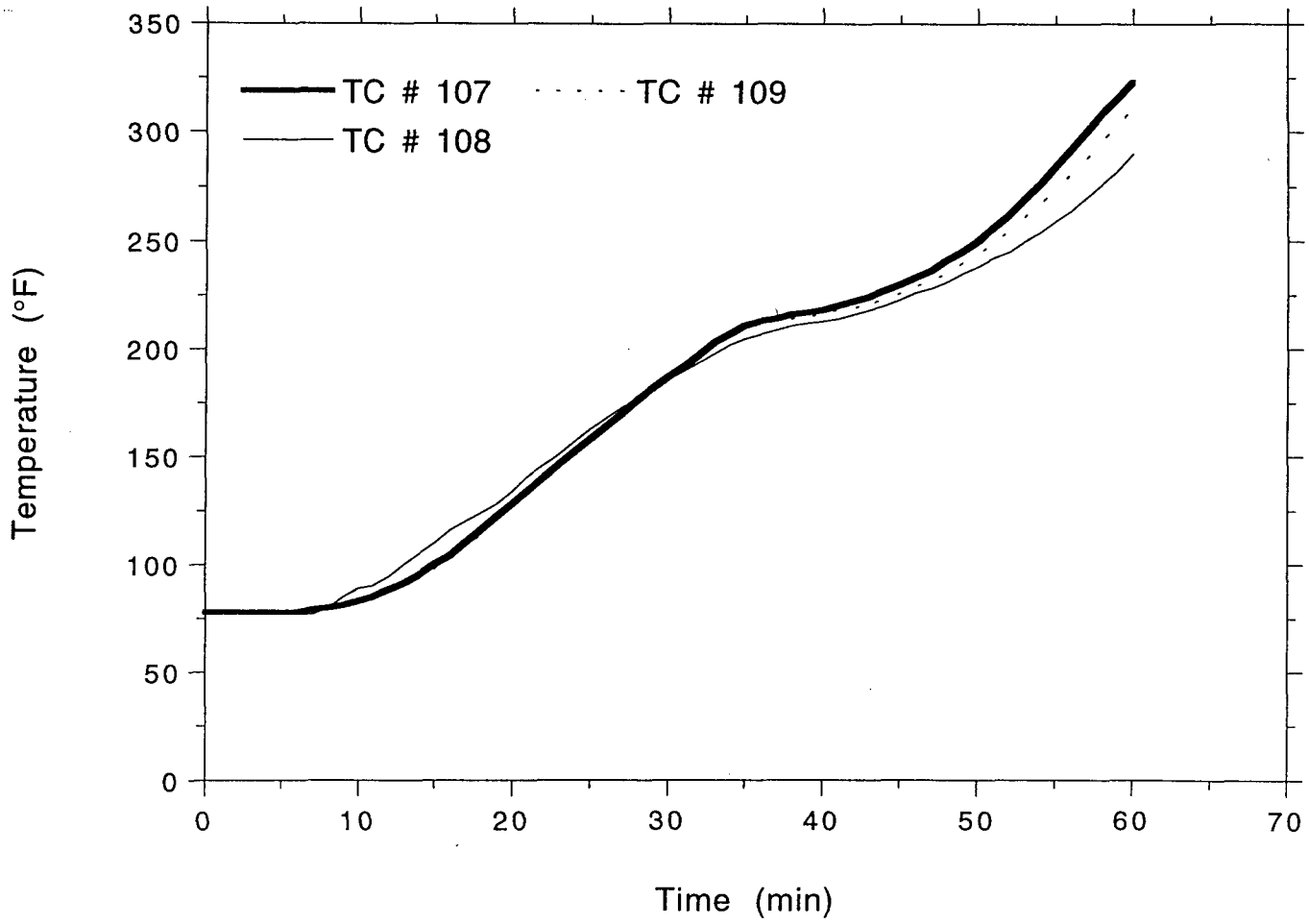
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



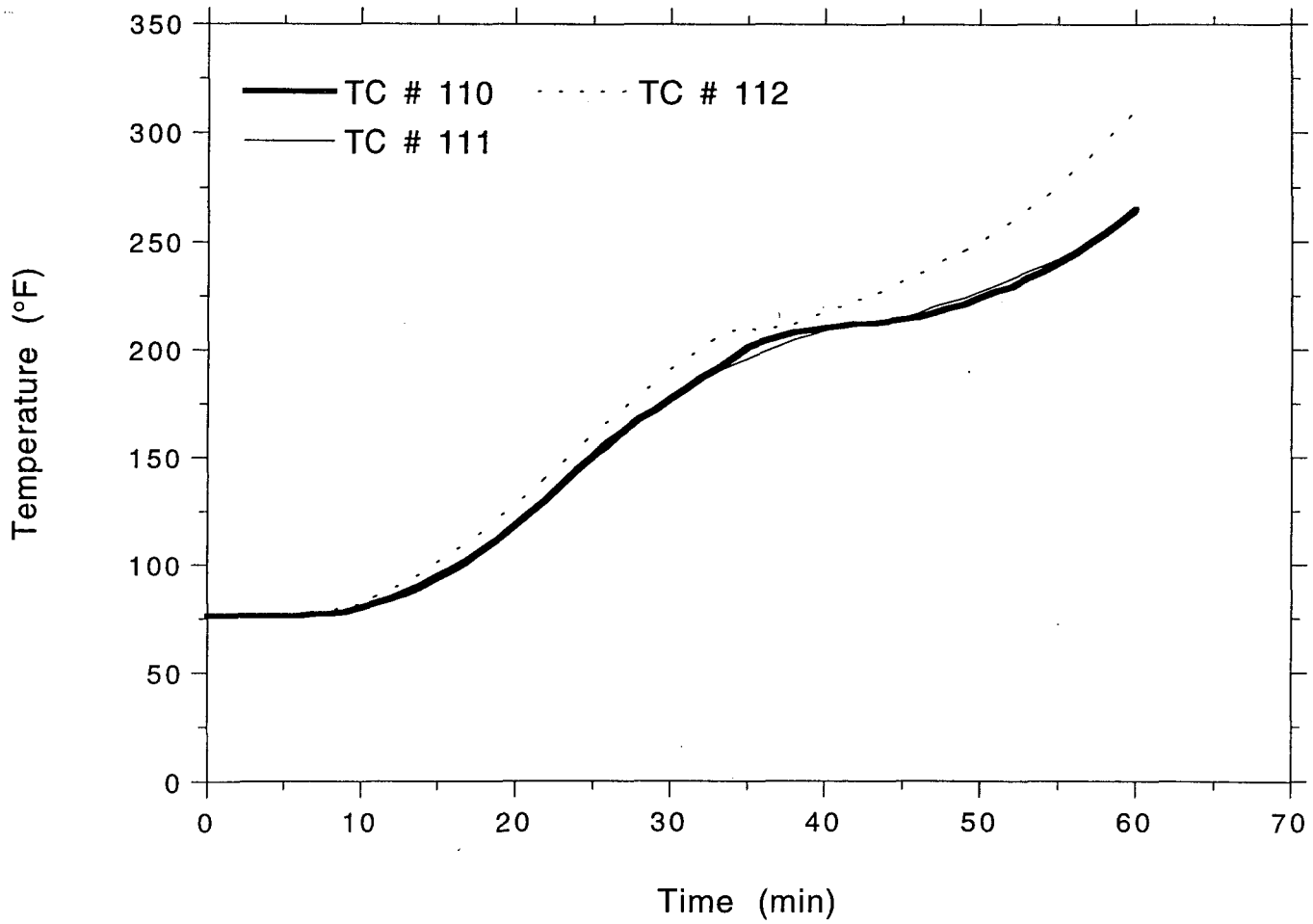
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



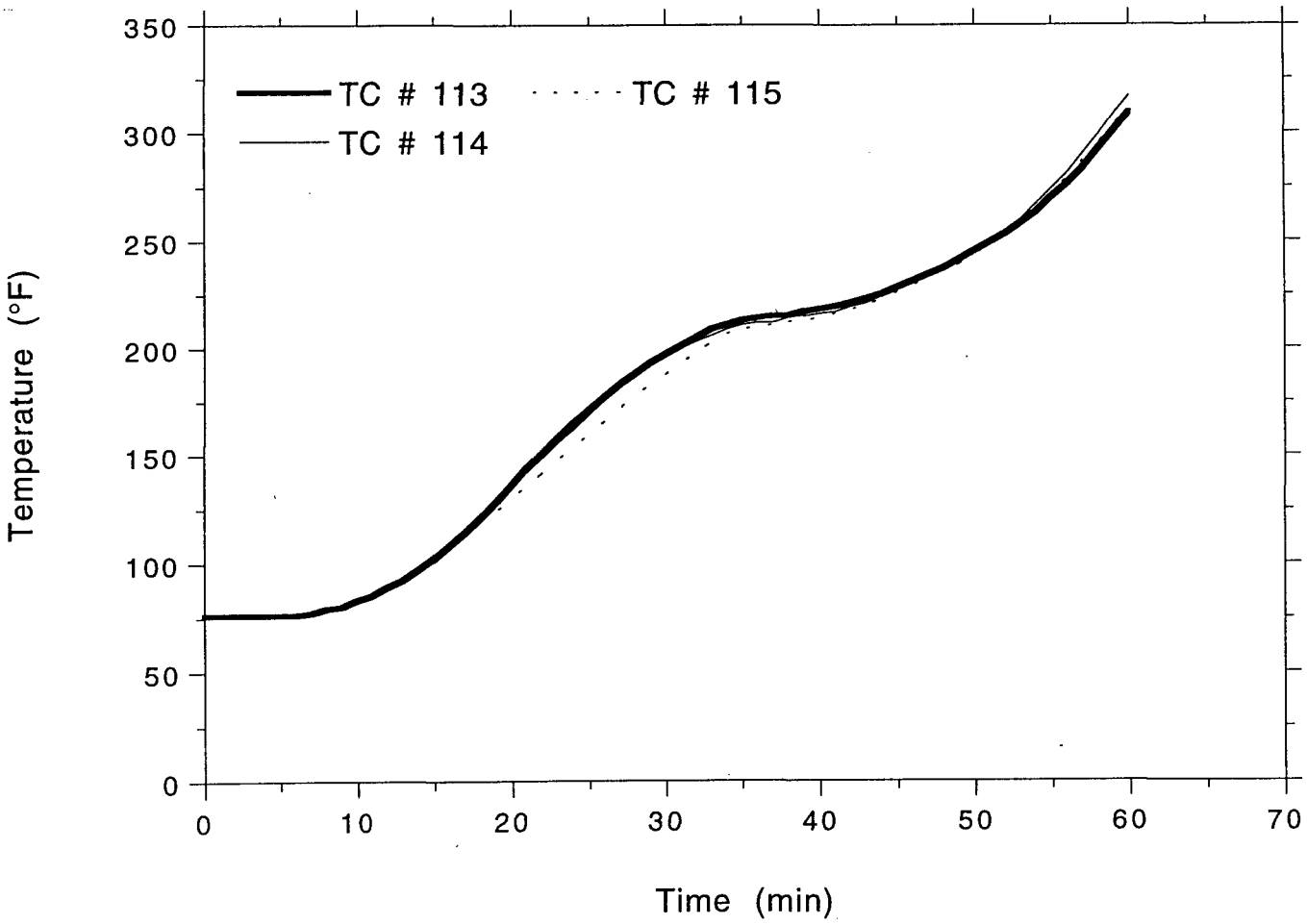
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



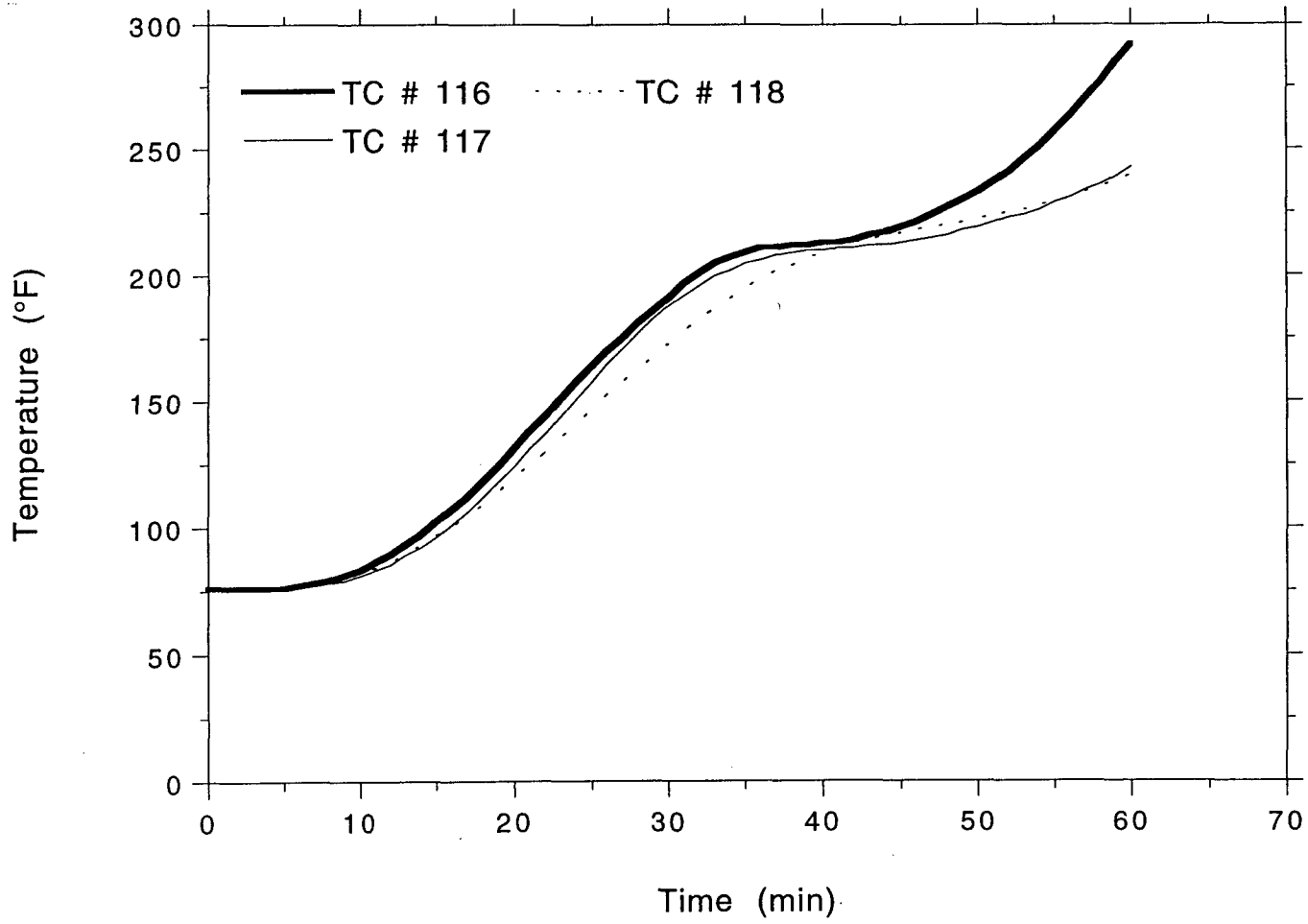
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



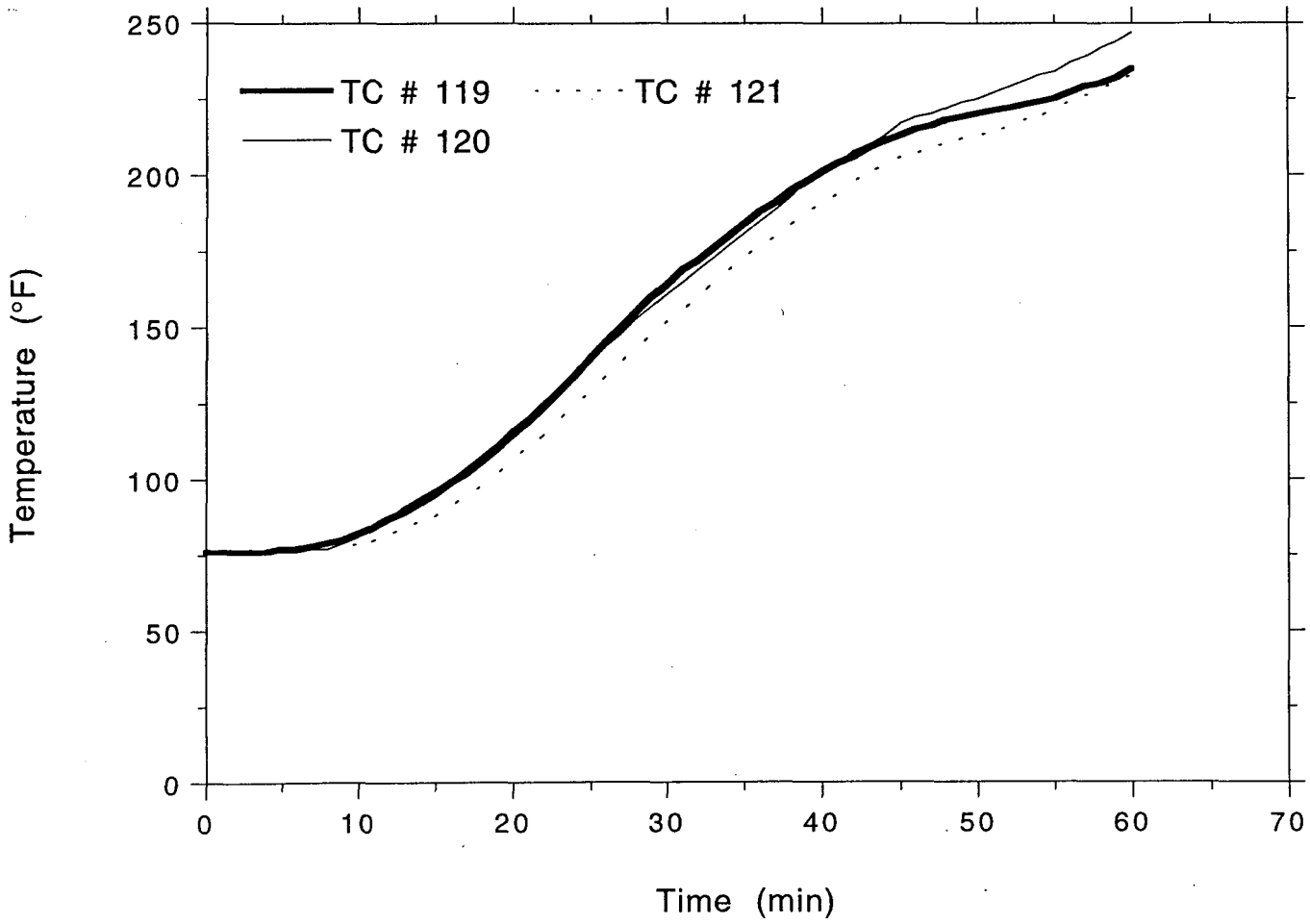
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



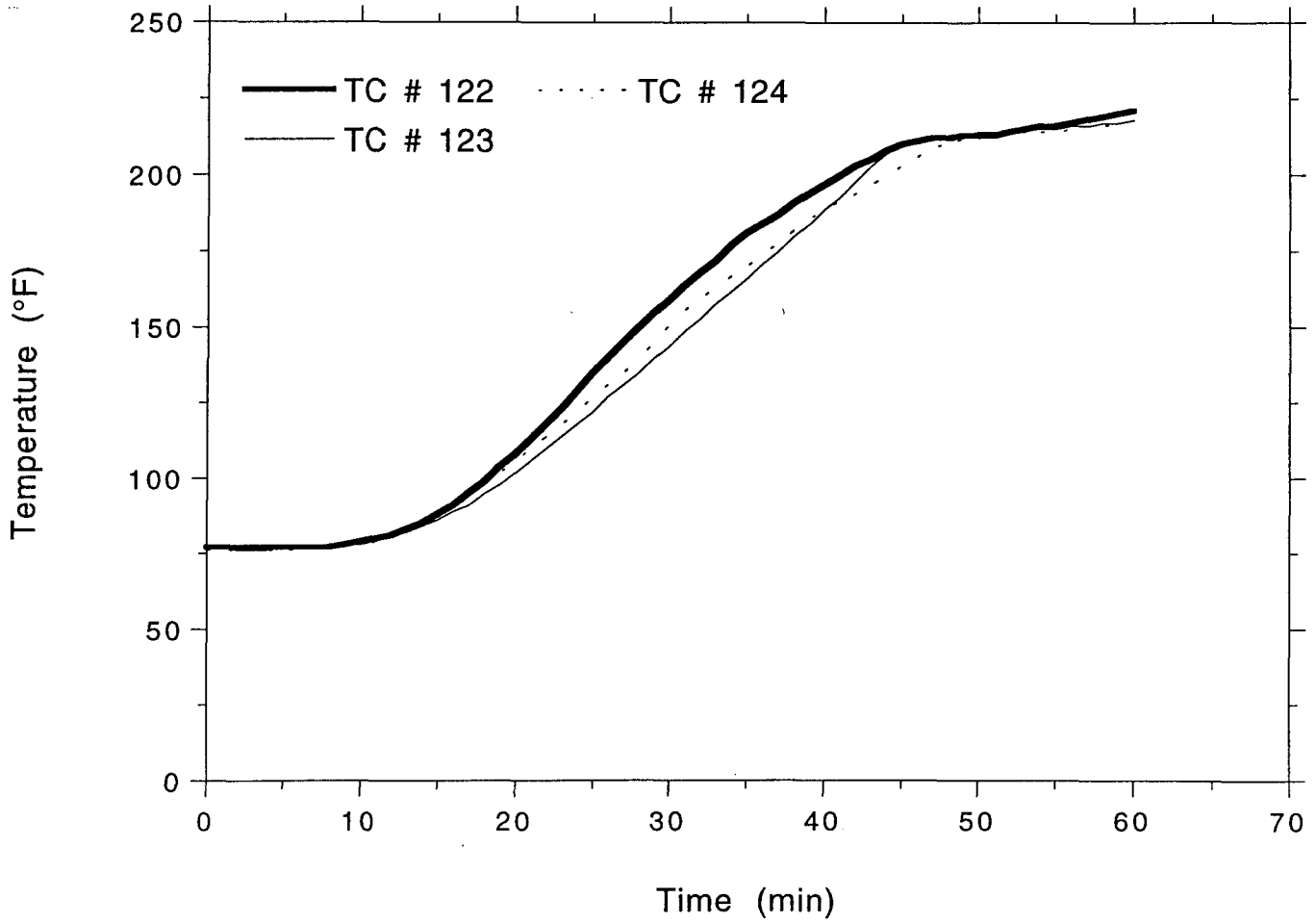
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



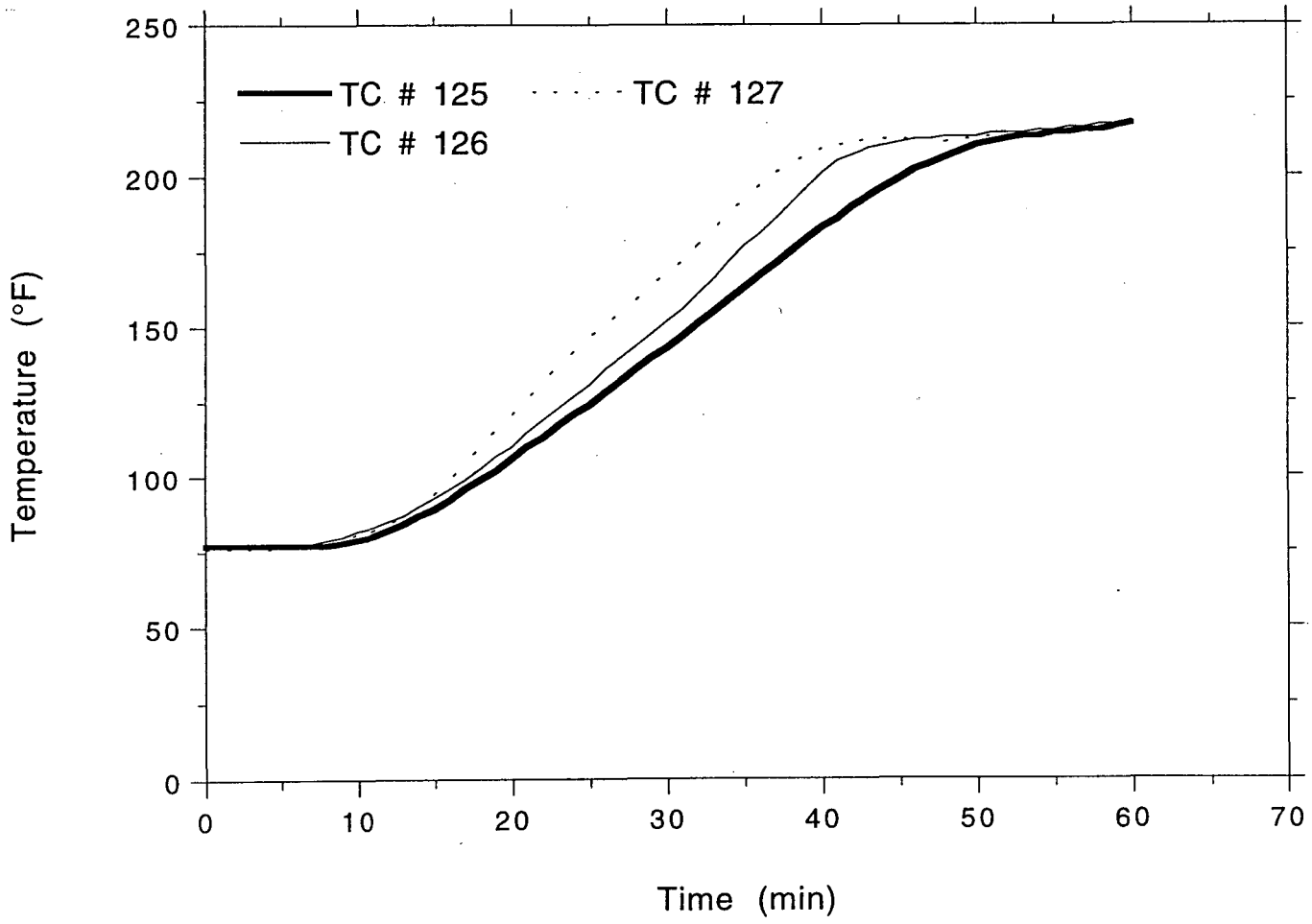
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



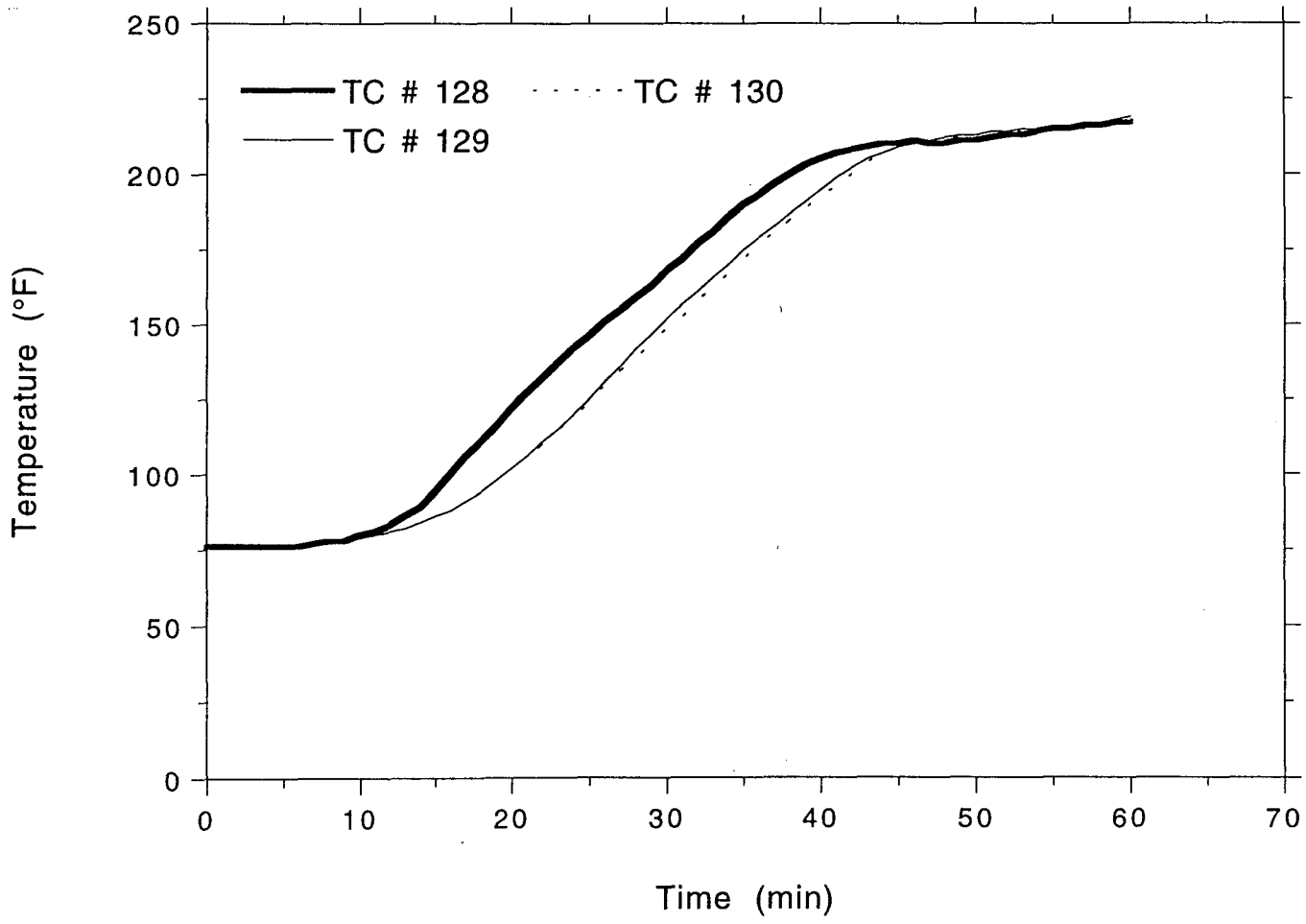
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



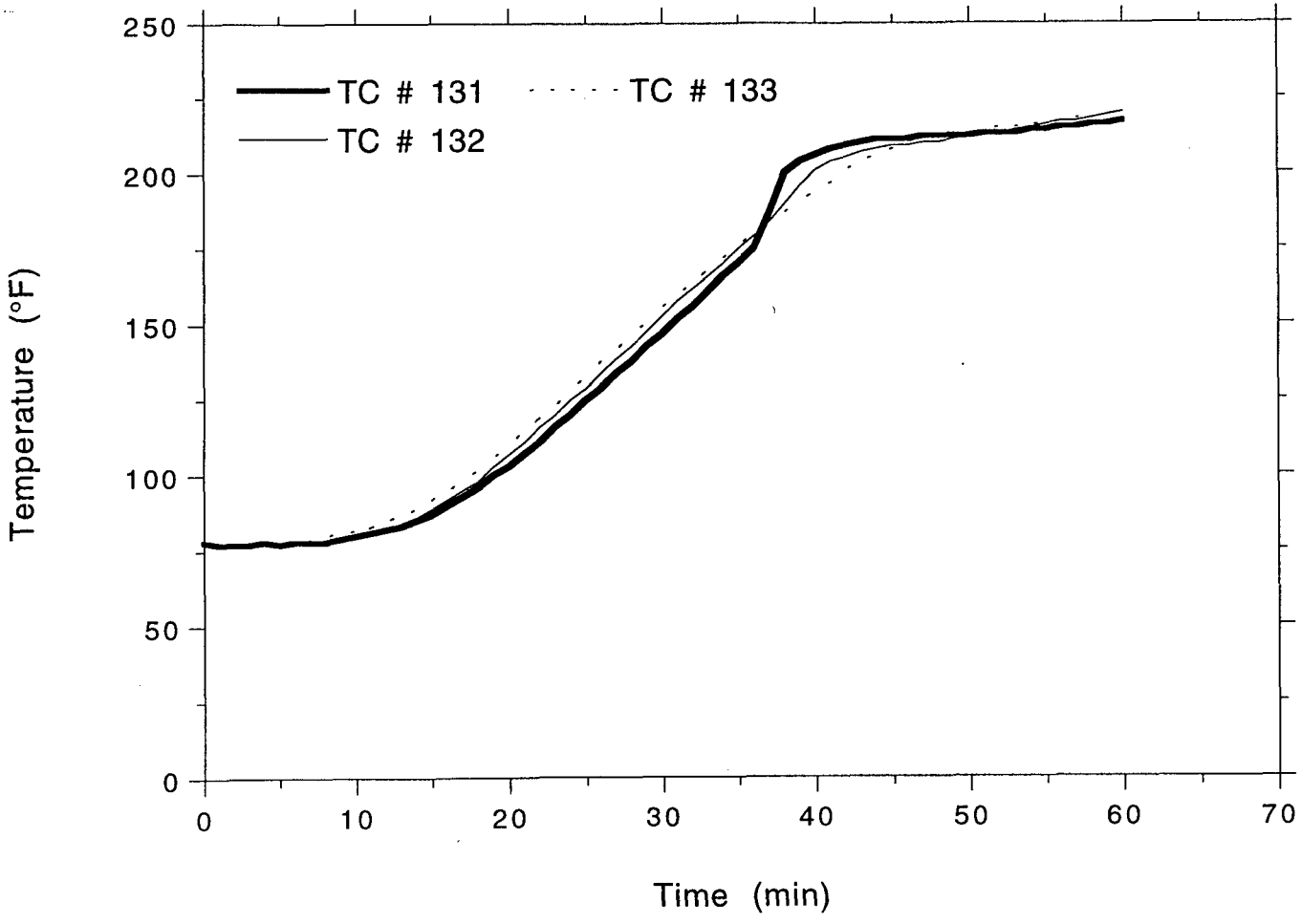
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



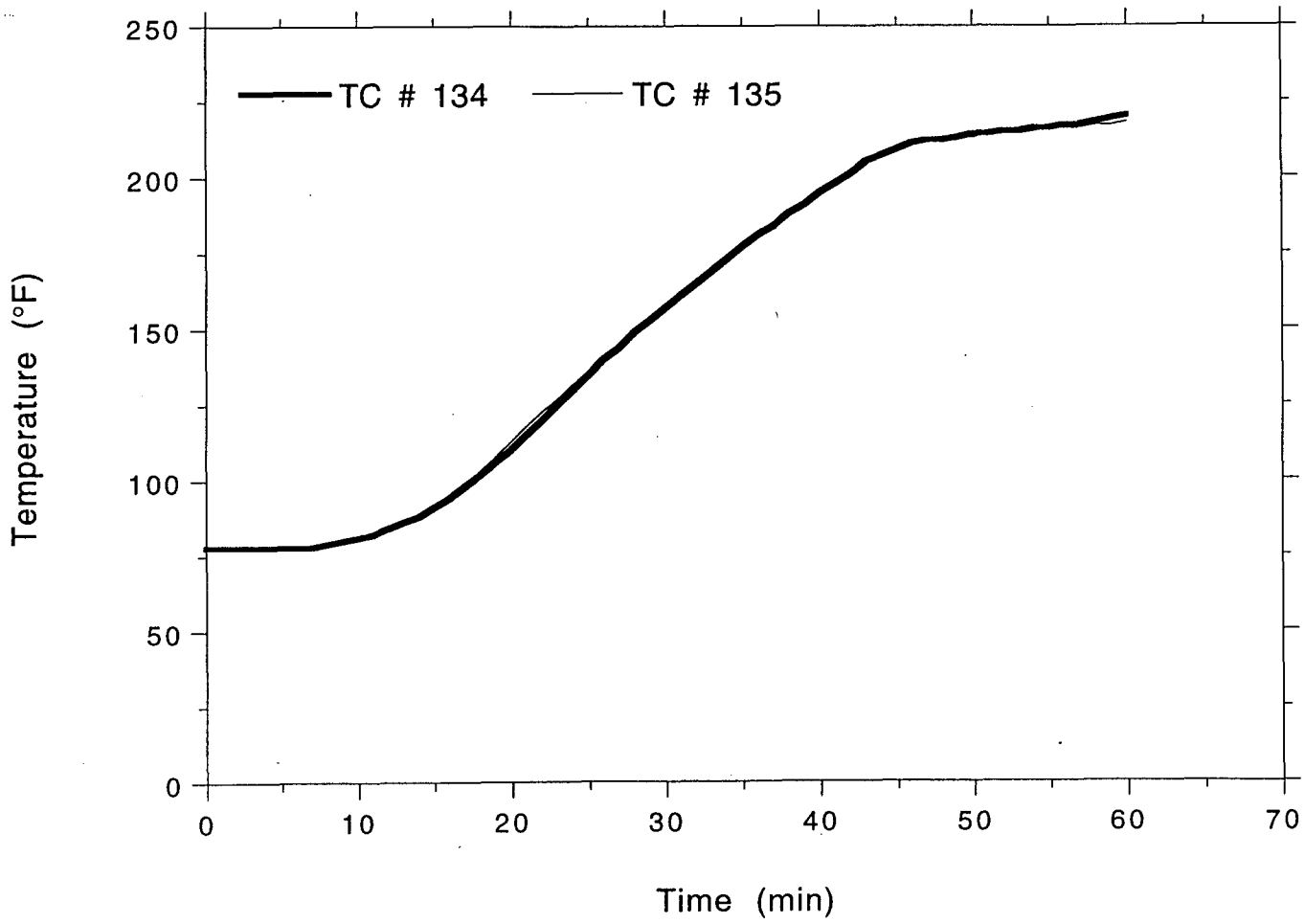
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



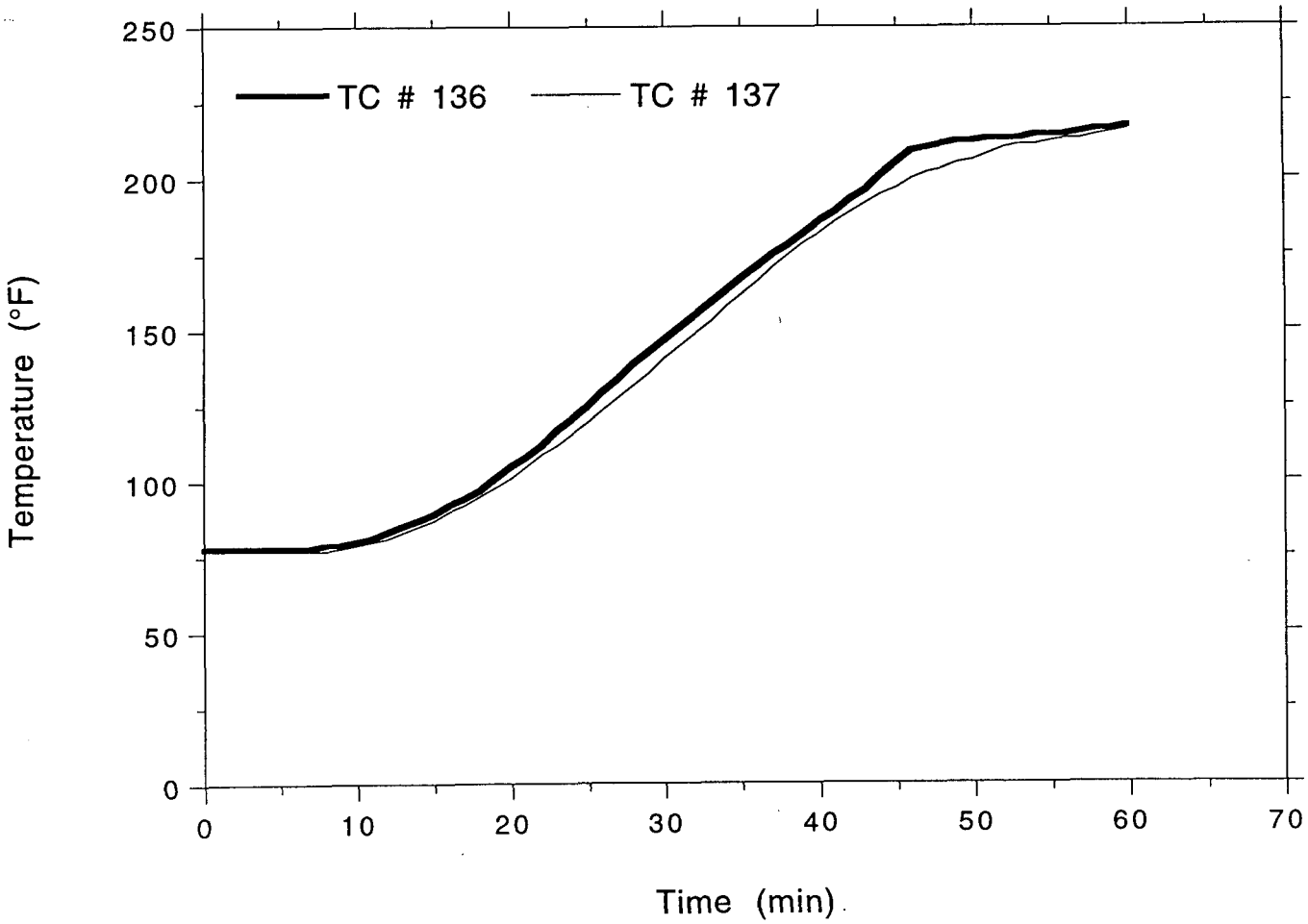
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



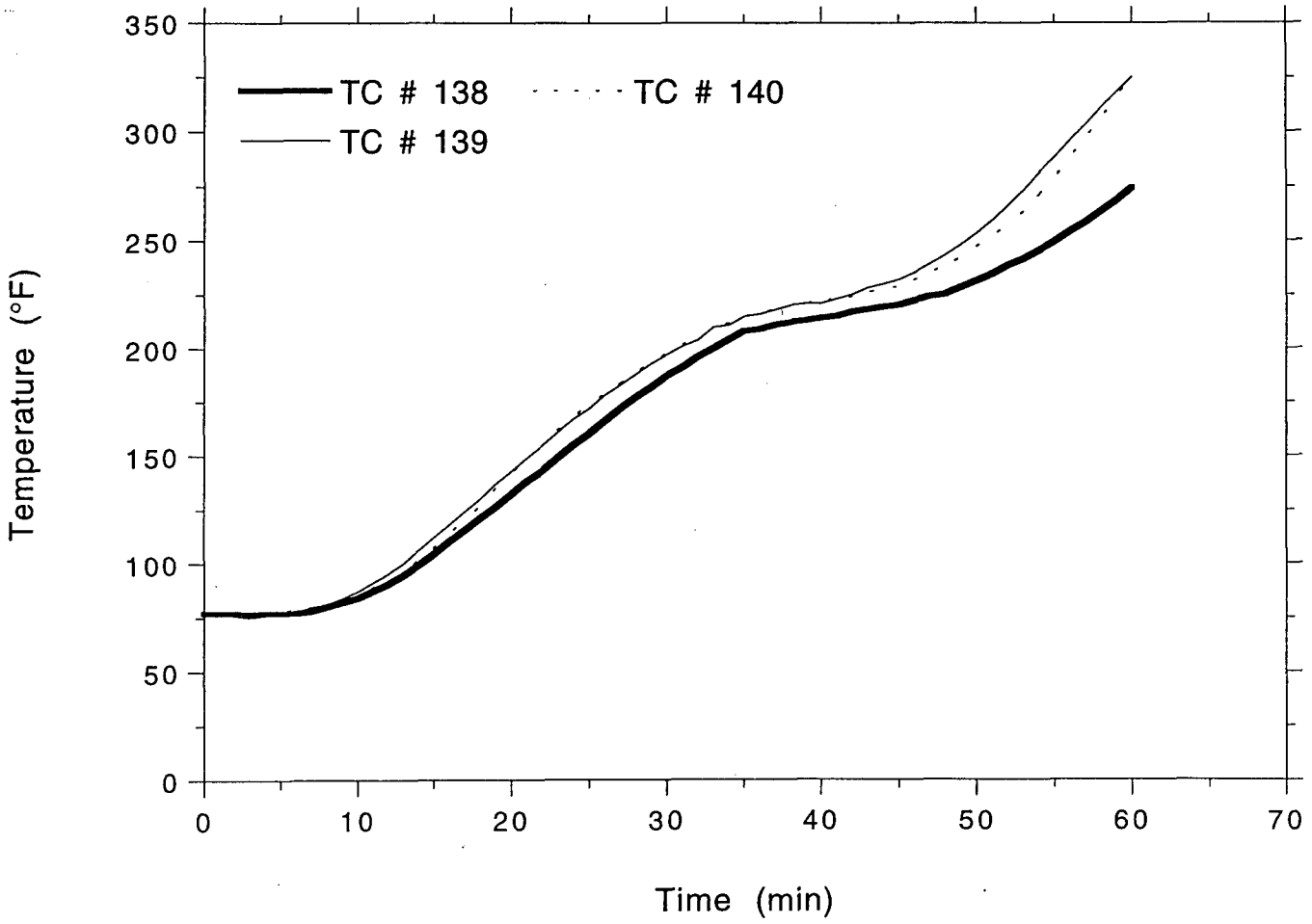
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Front Rail



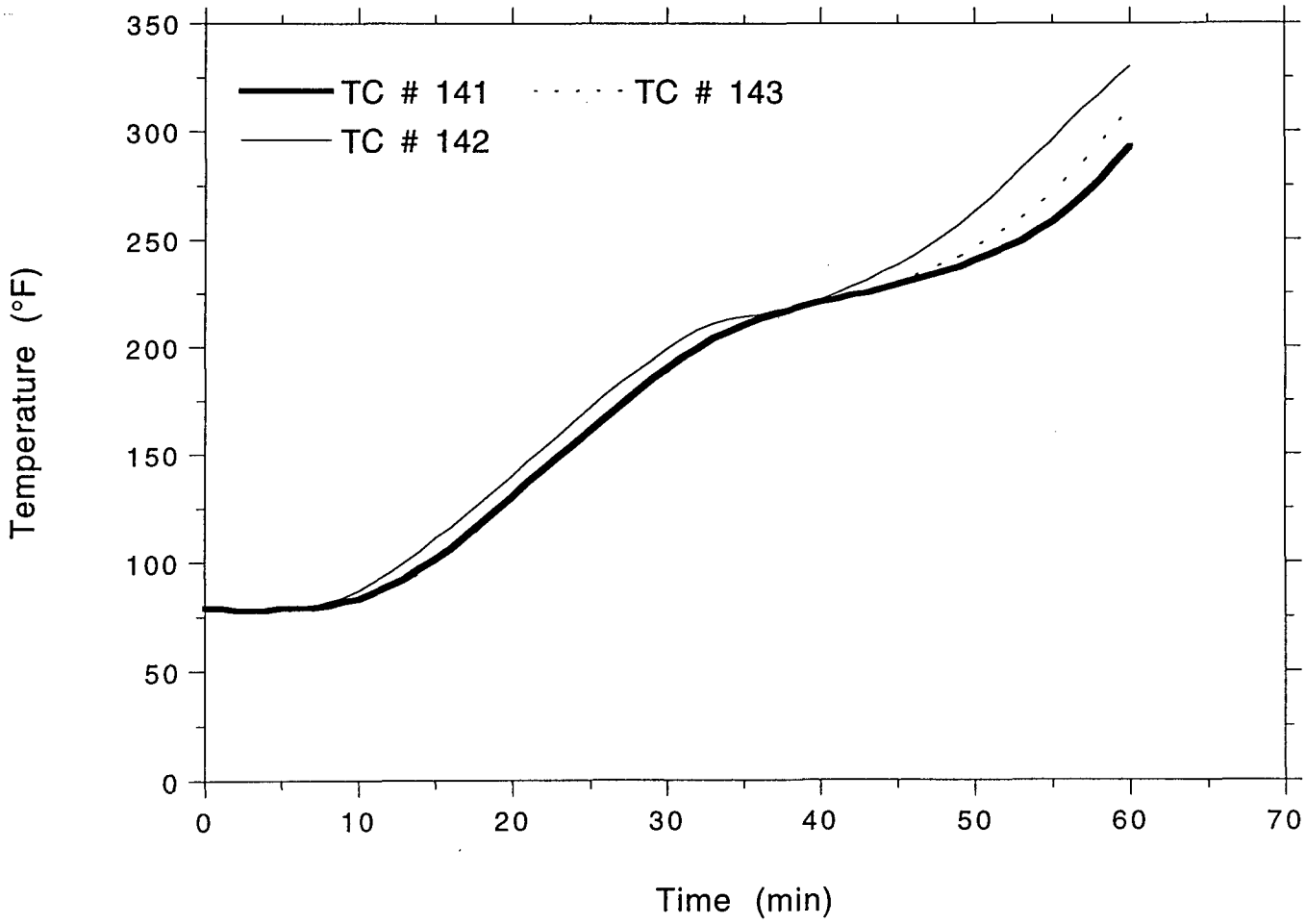
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



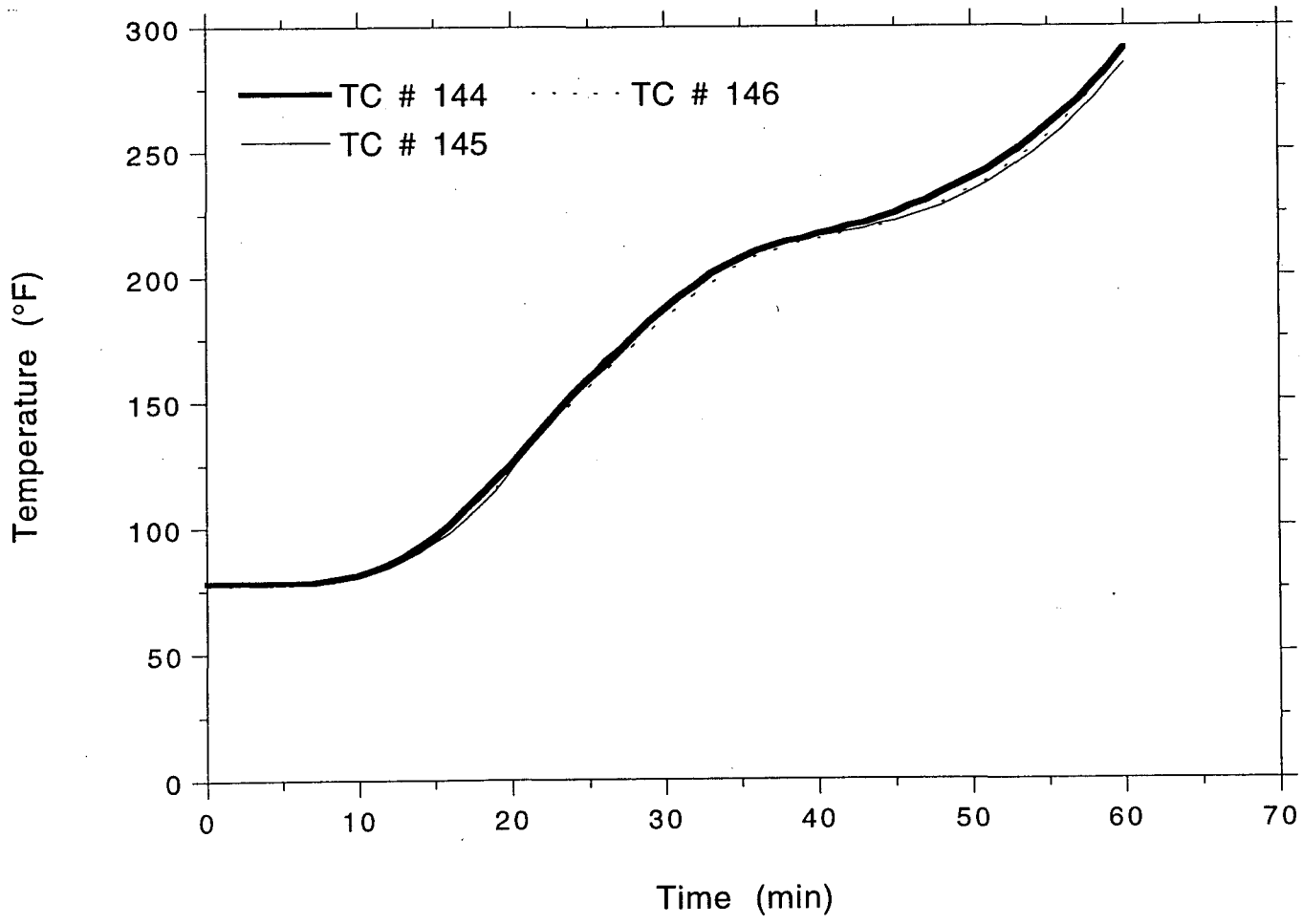
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



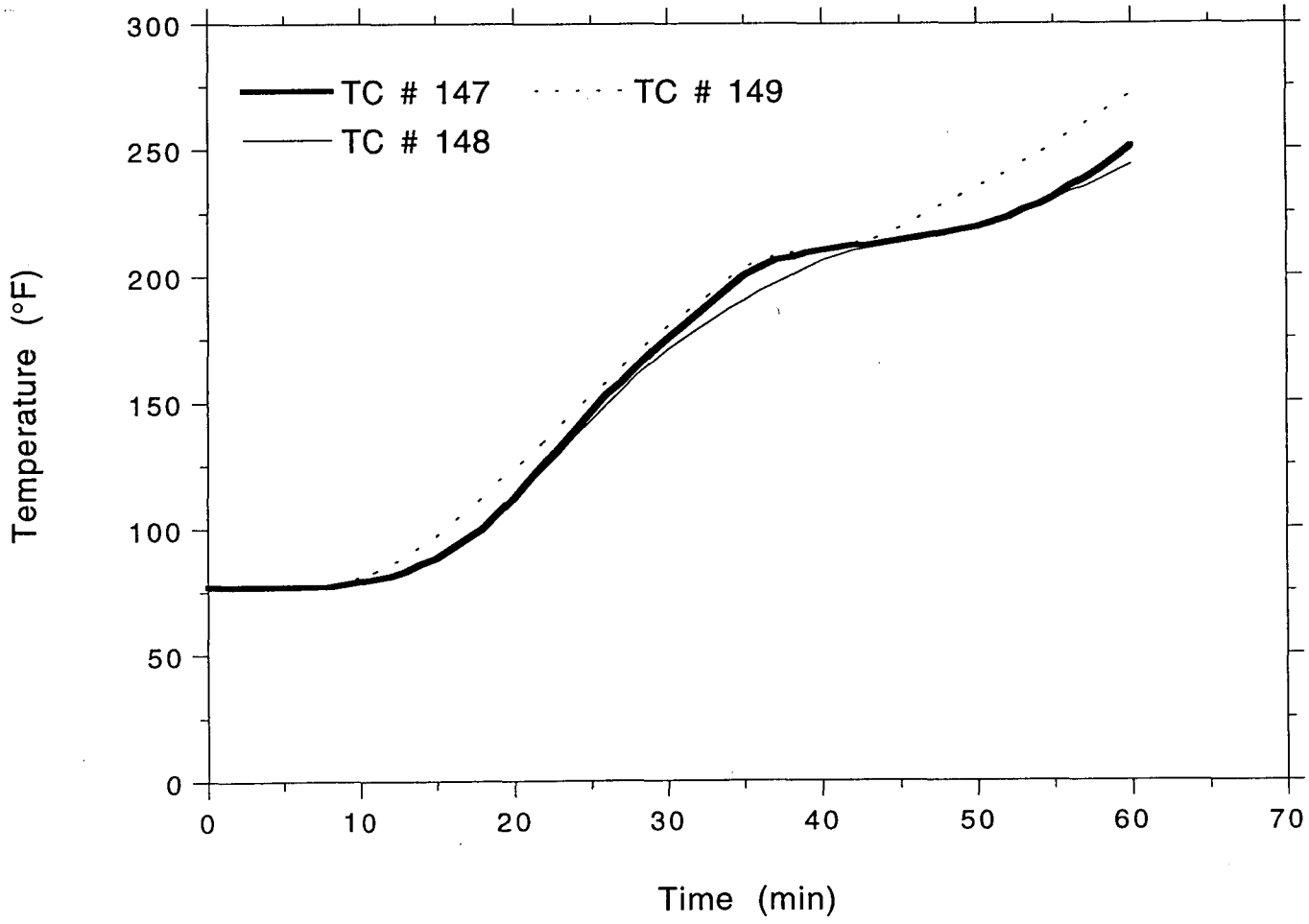
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



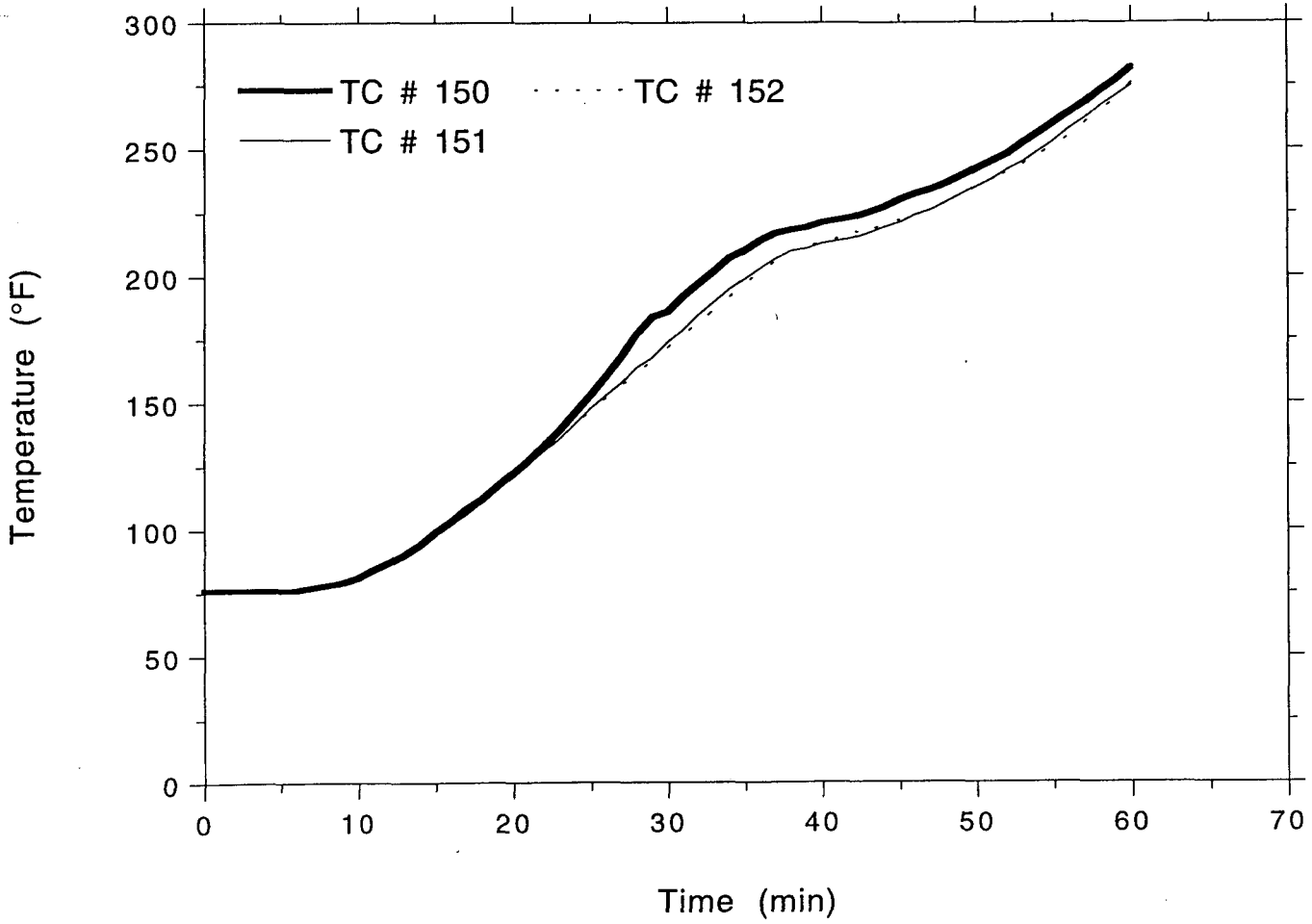
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



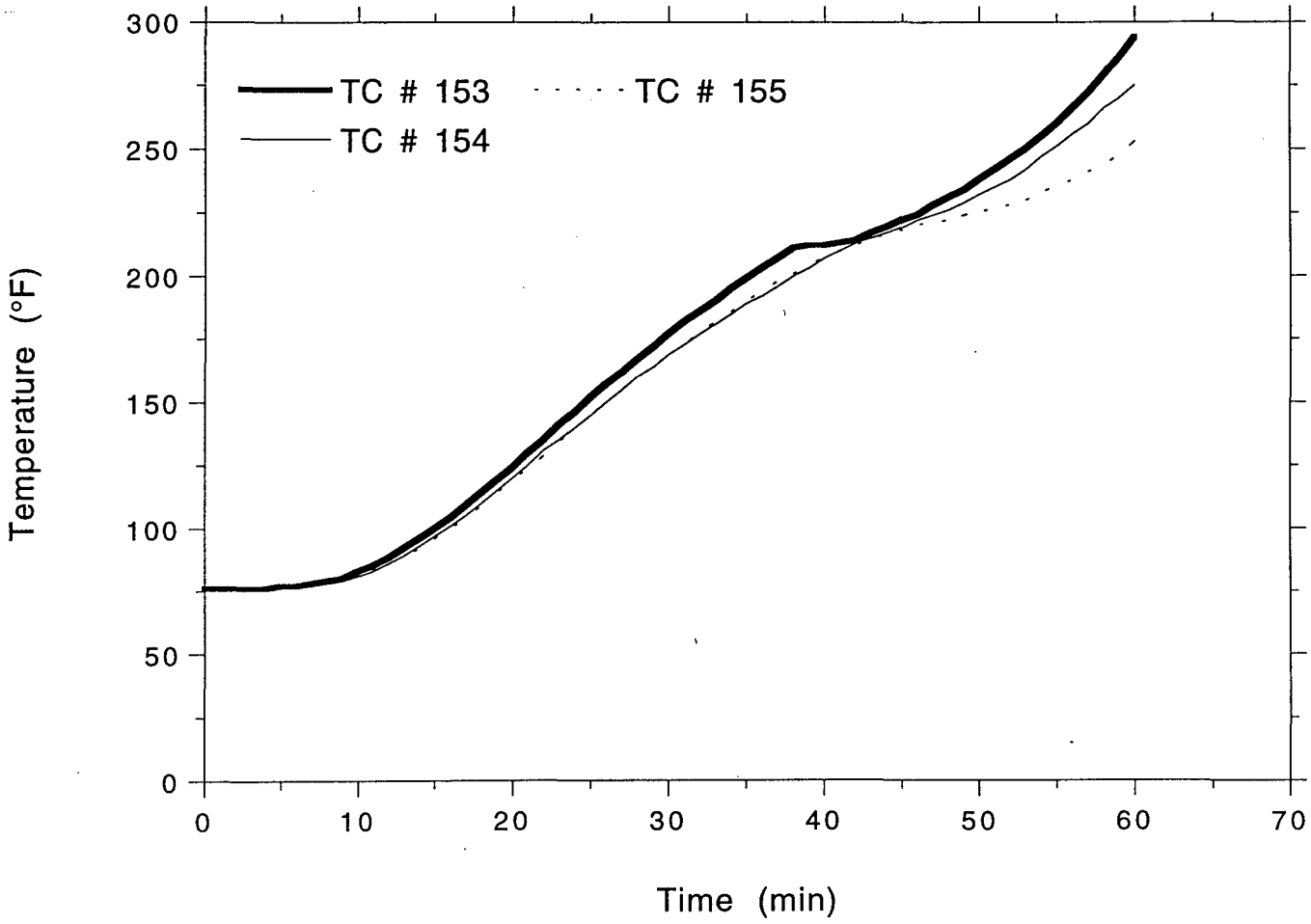
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



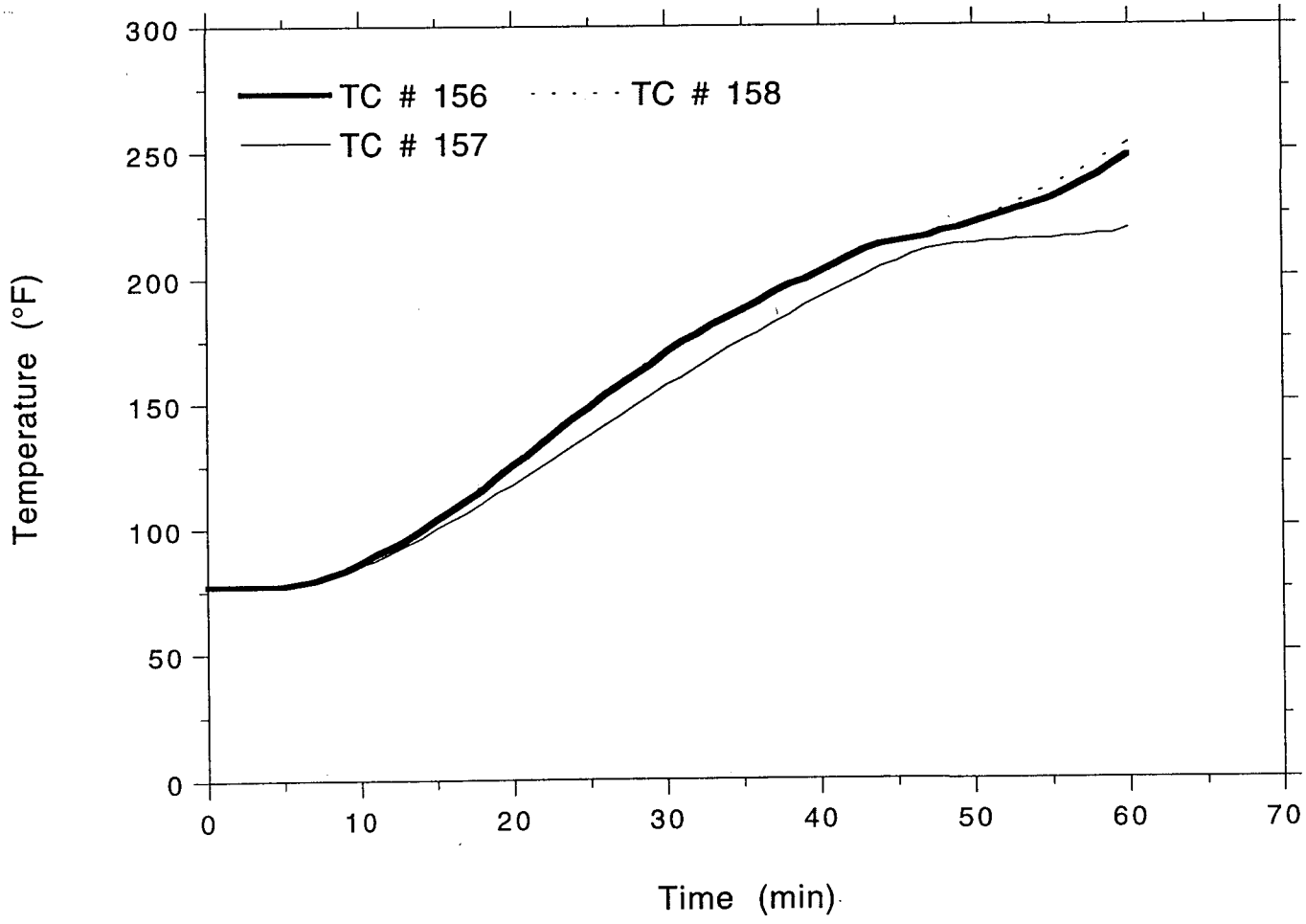
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



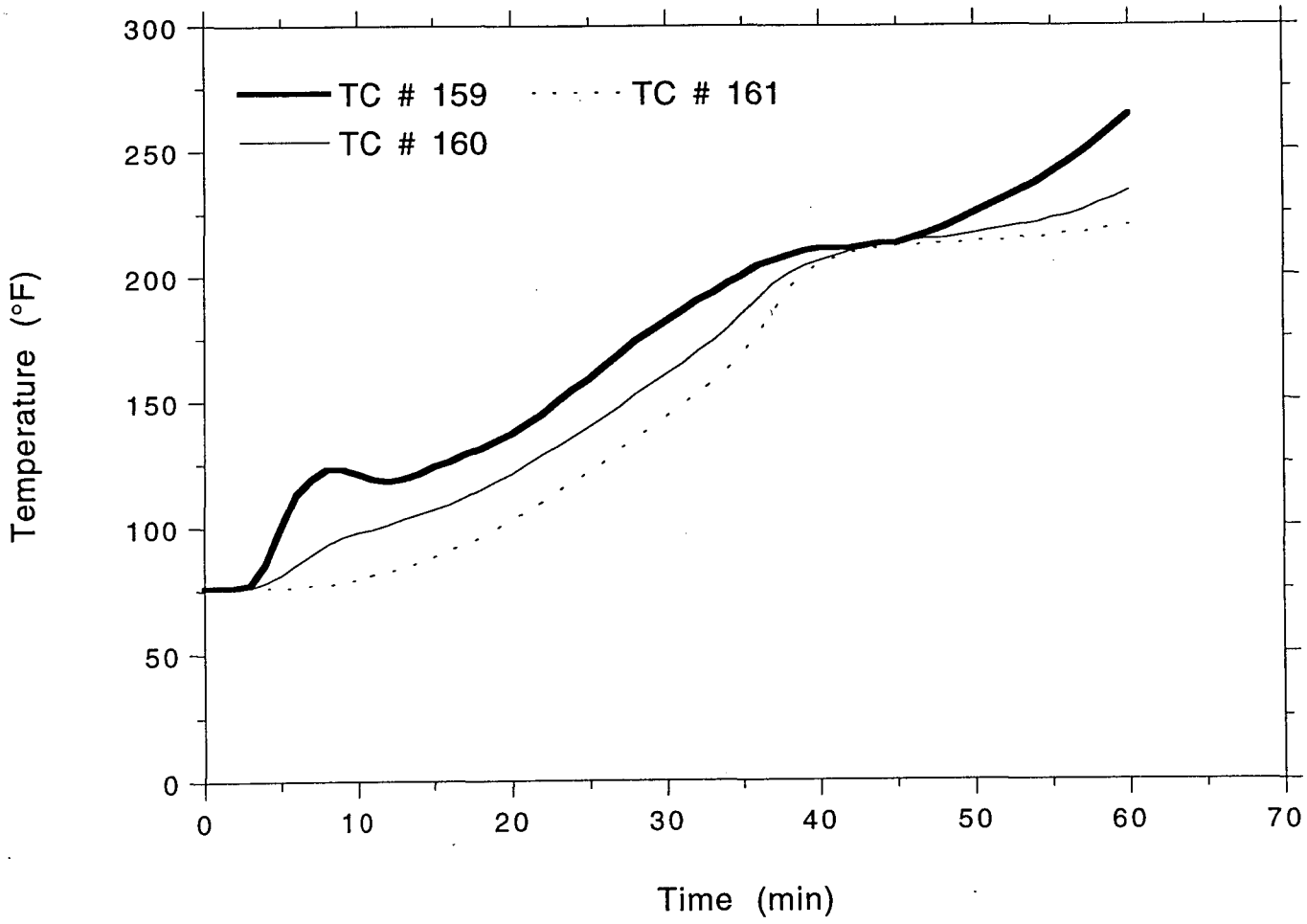
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



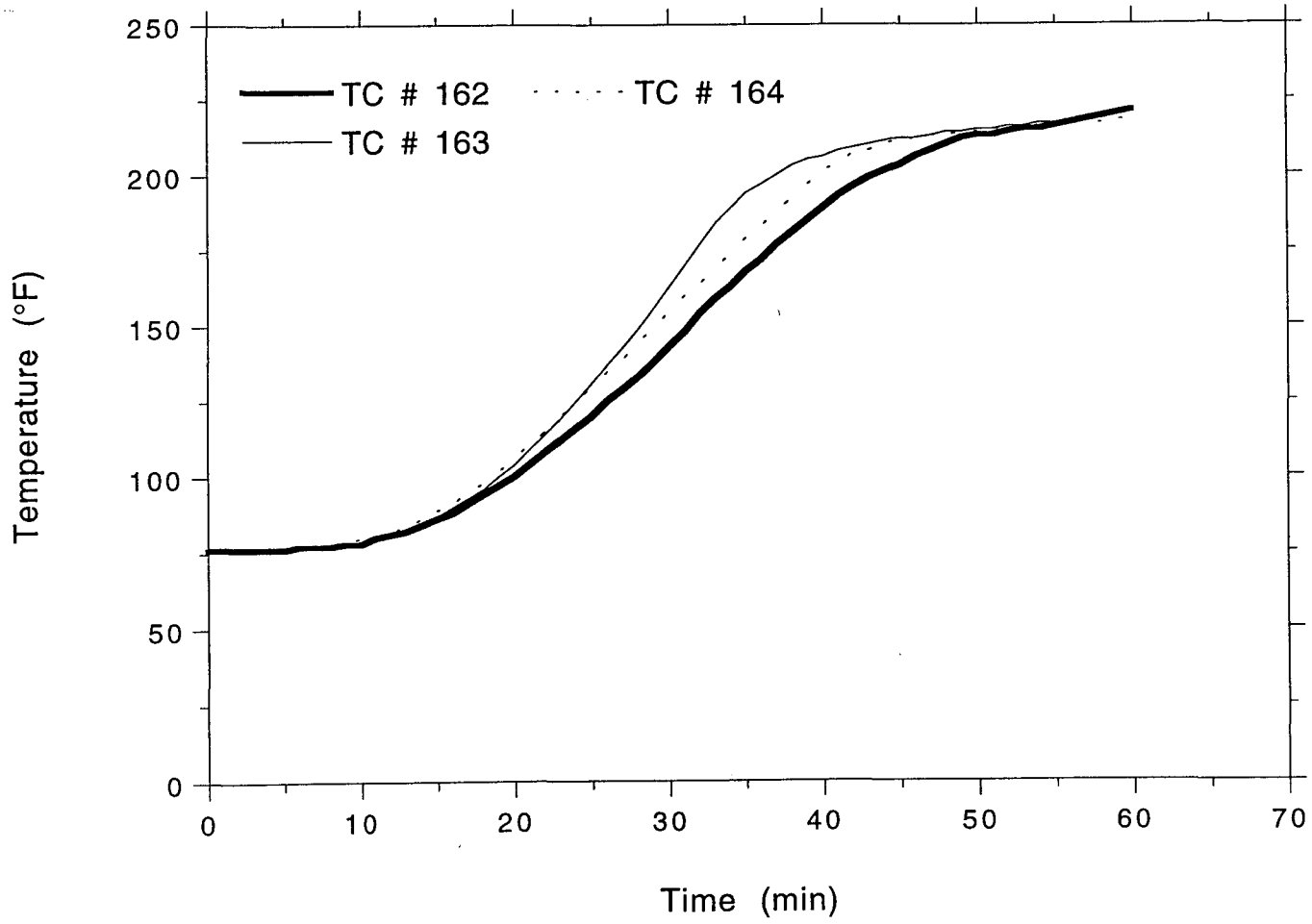
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



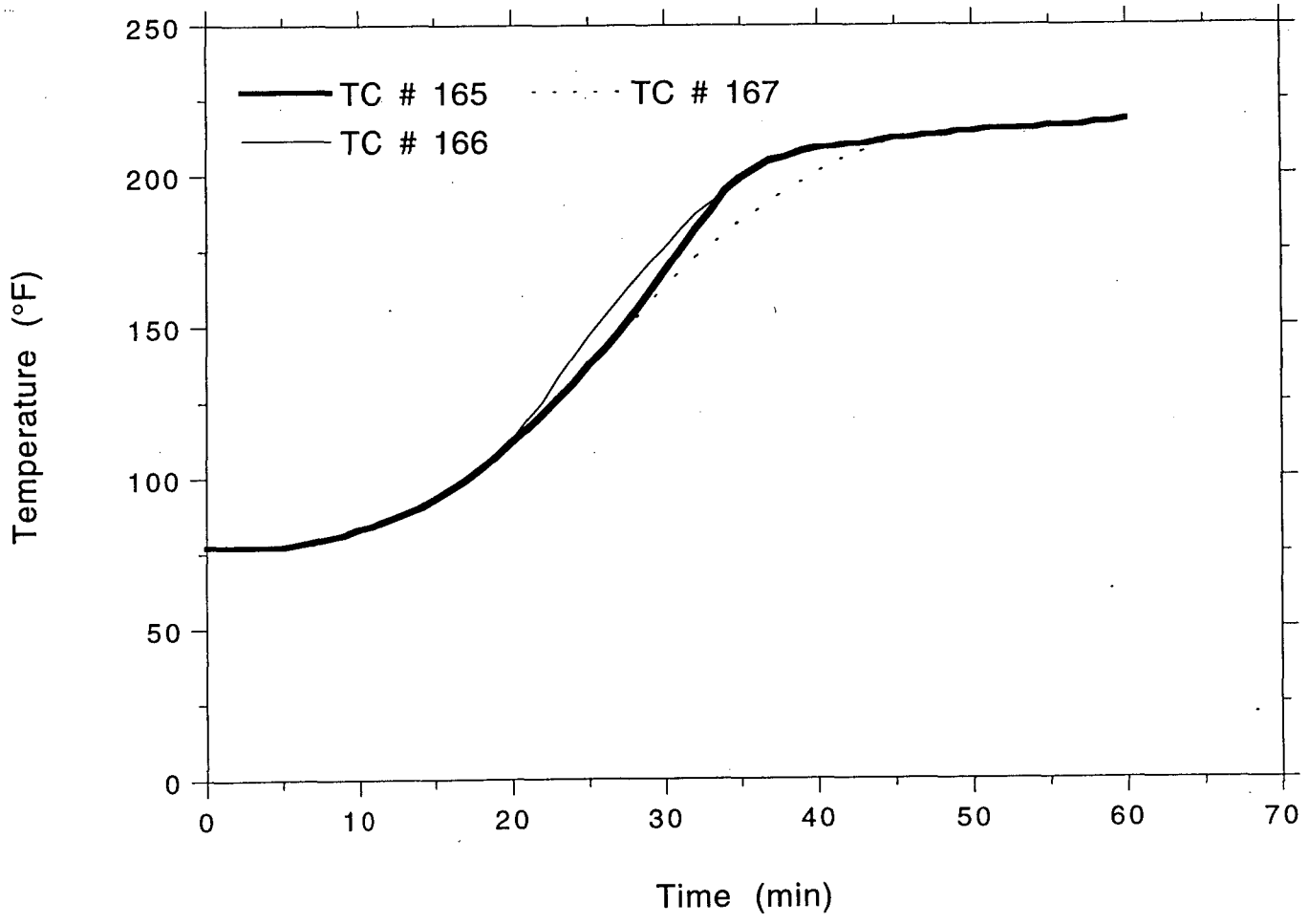
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



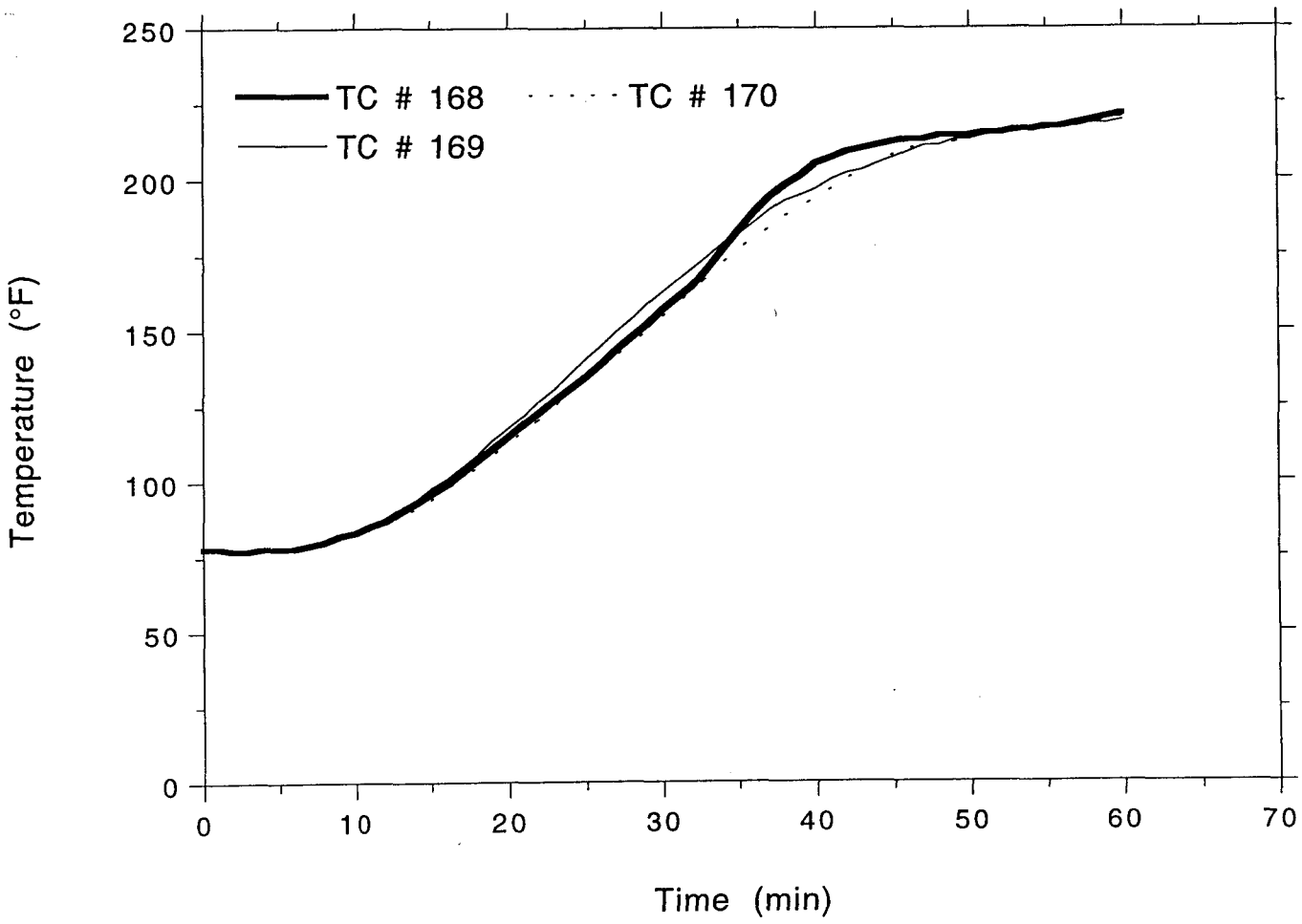
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



OMEGA POINT LABORATORIES

TSI/TVA
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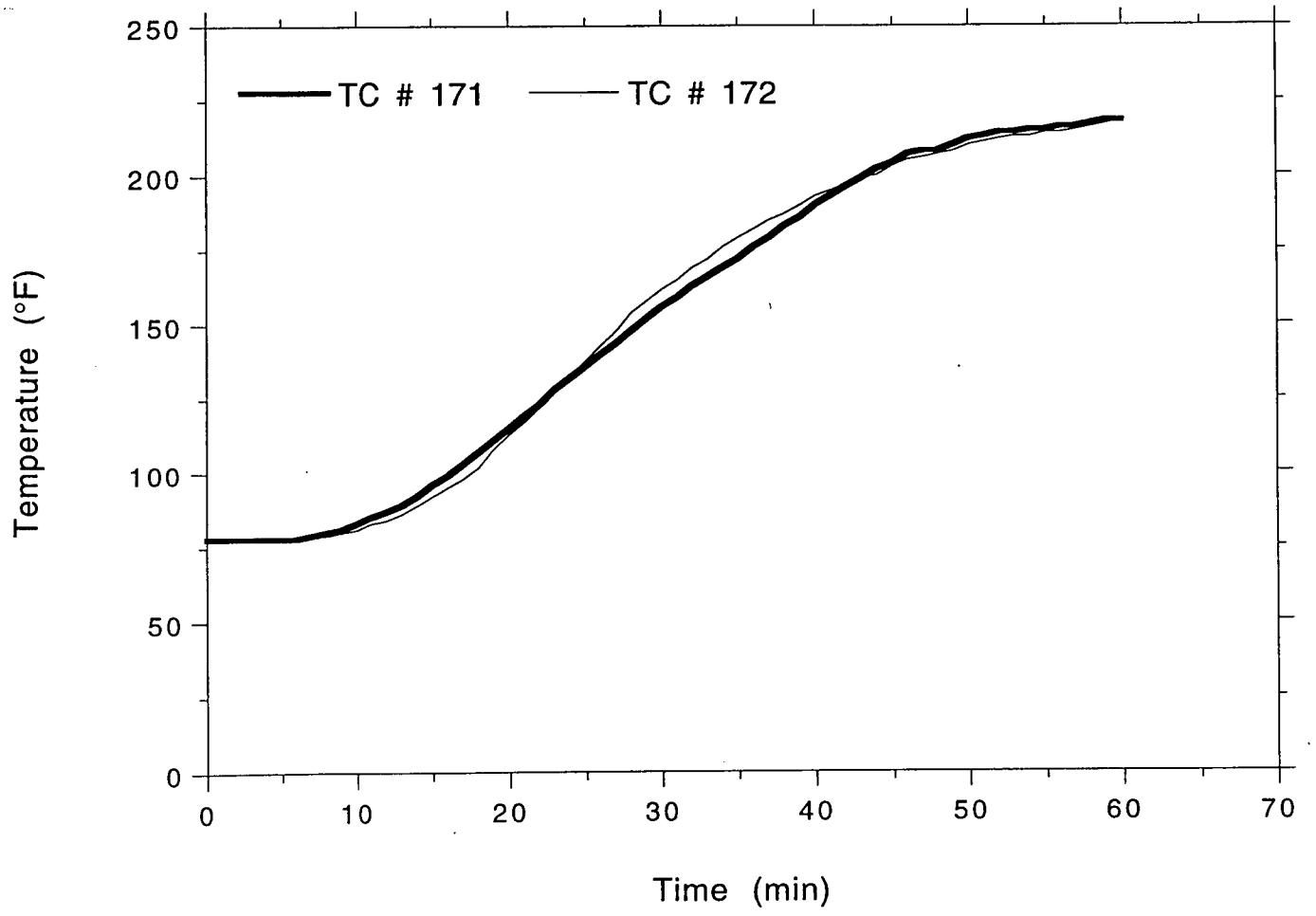
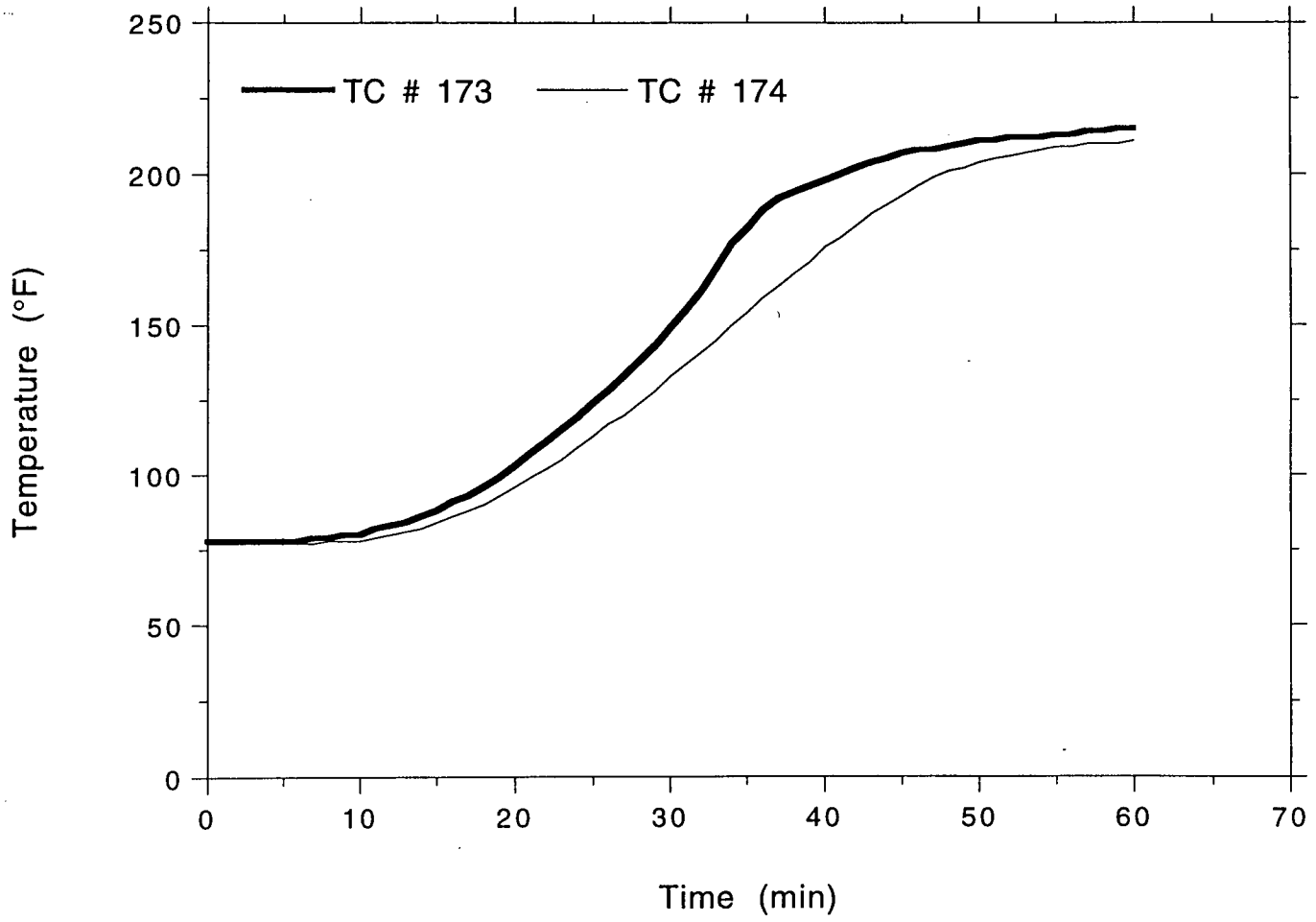
Bottom Tray, Rear Rail



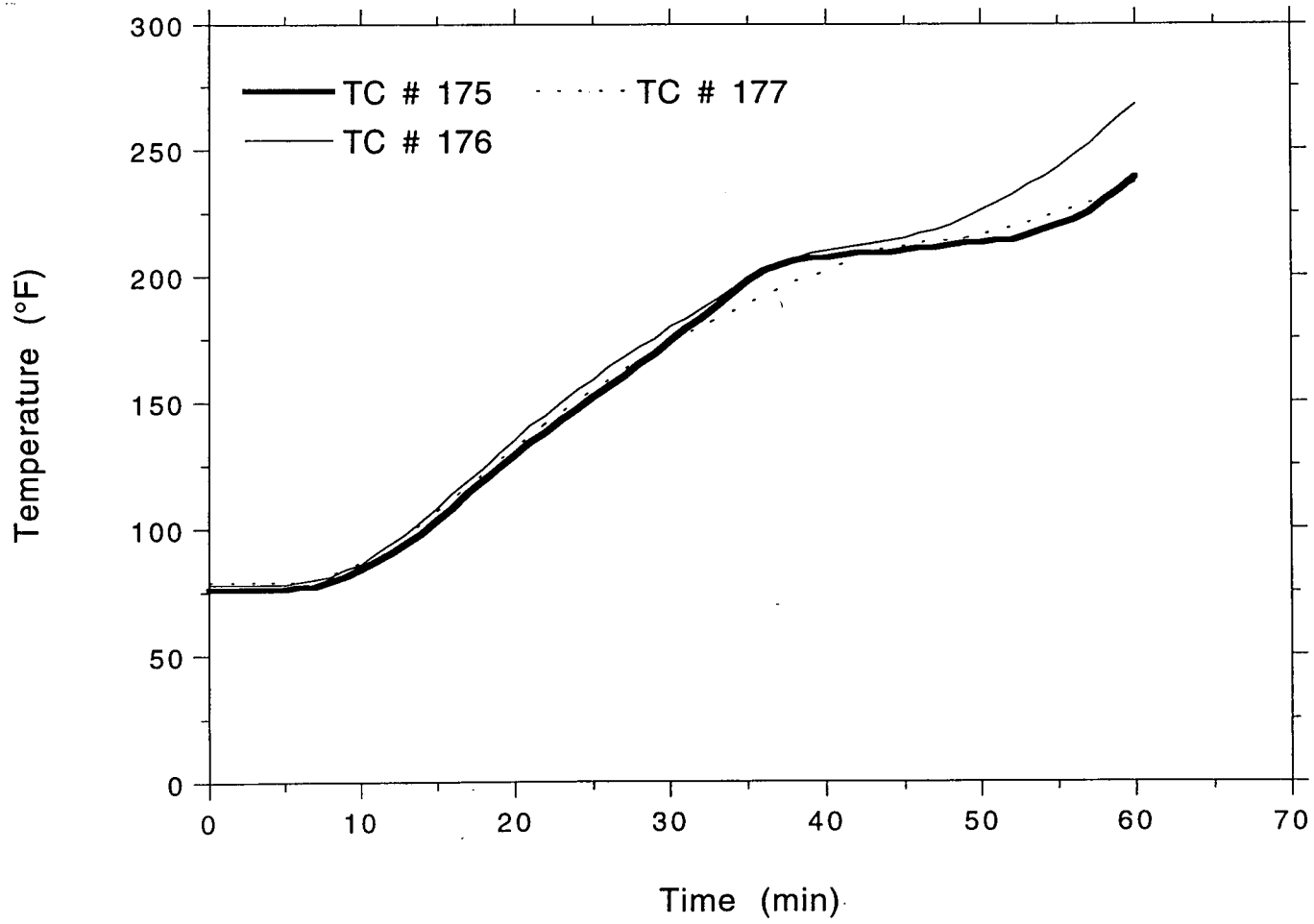
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, Rear Rail



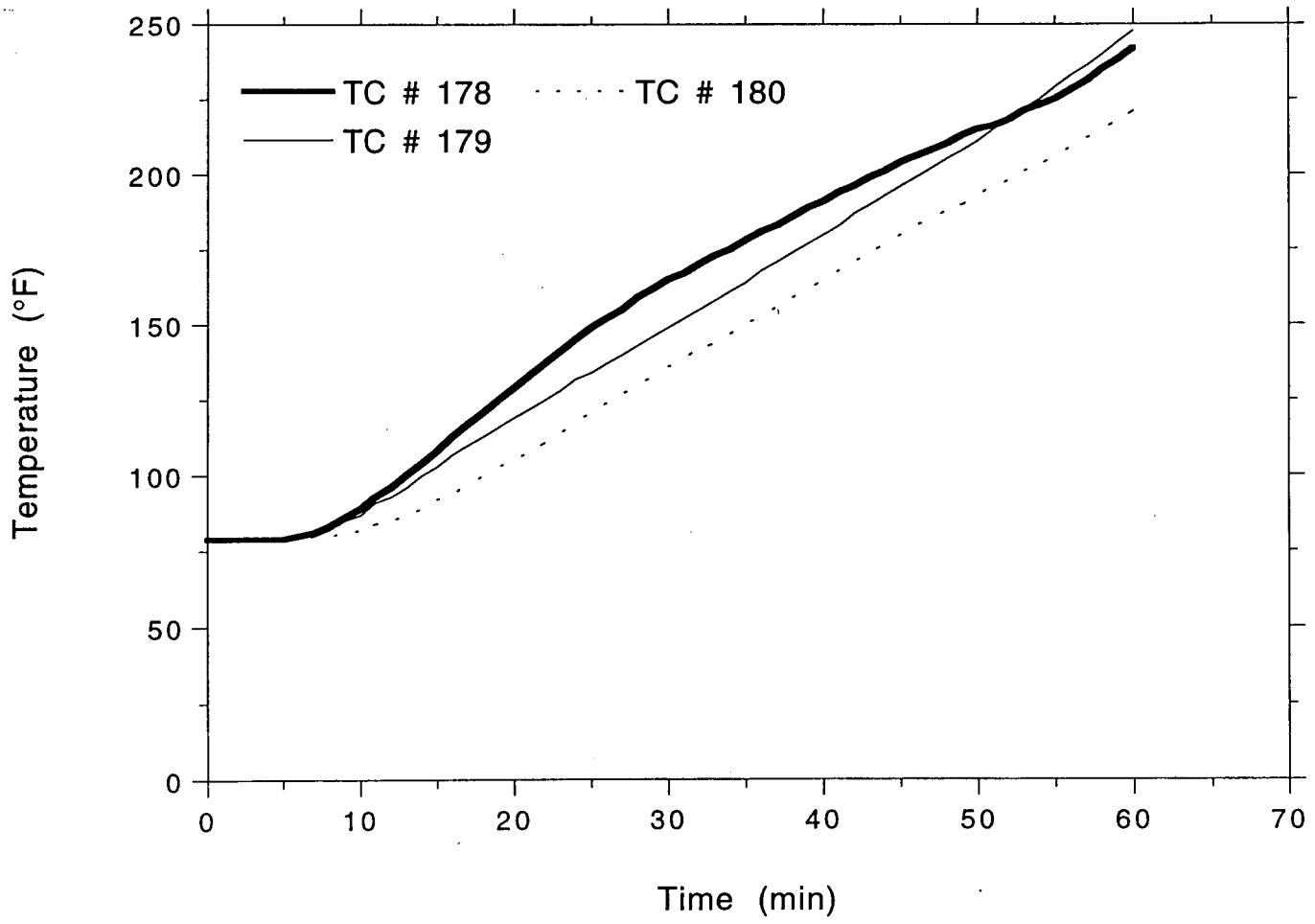
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



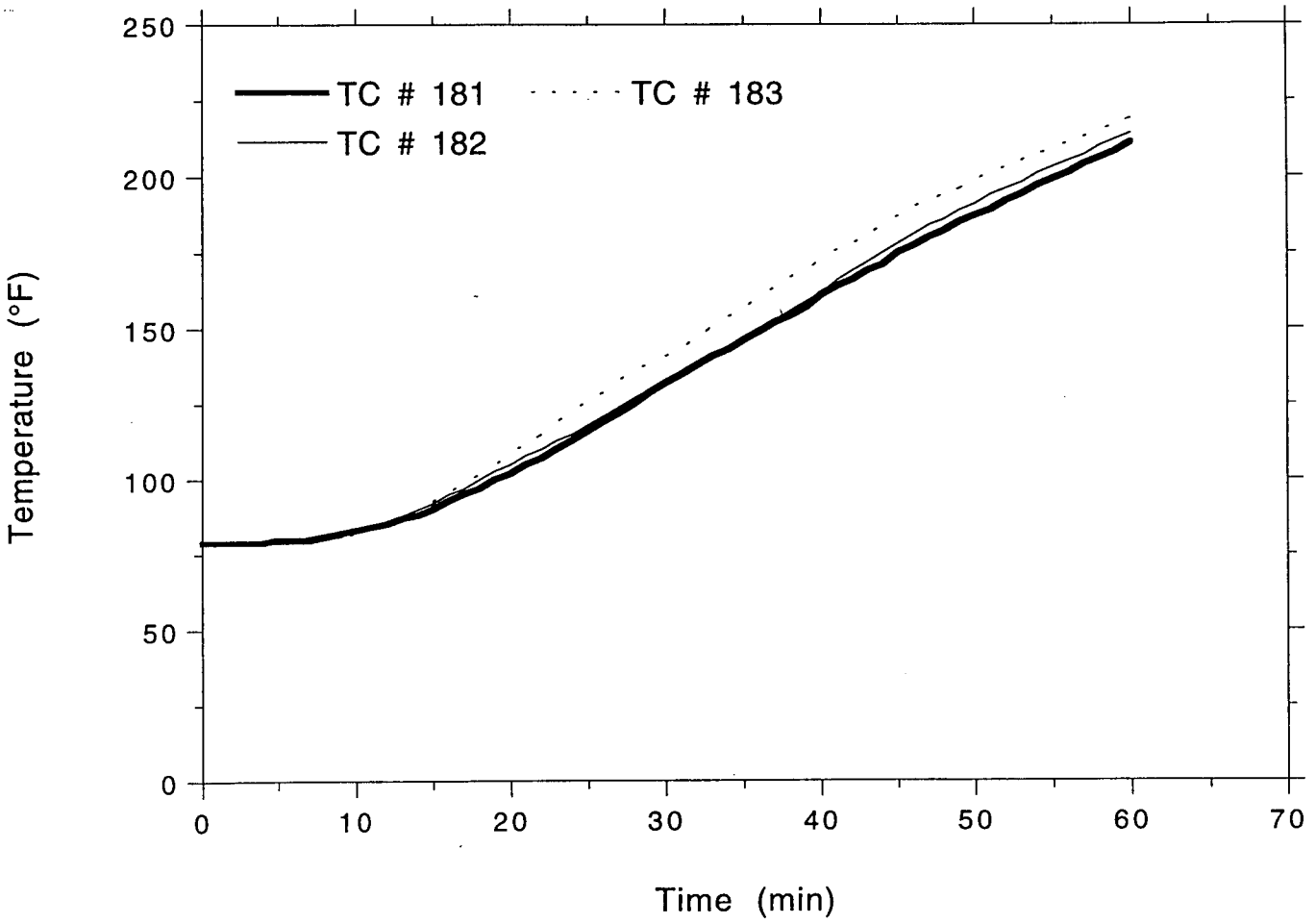
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



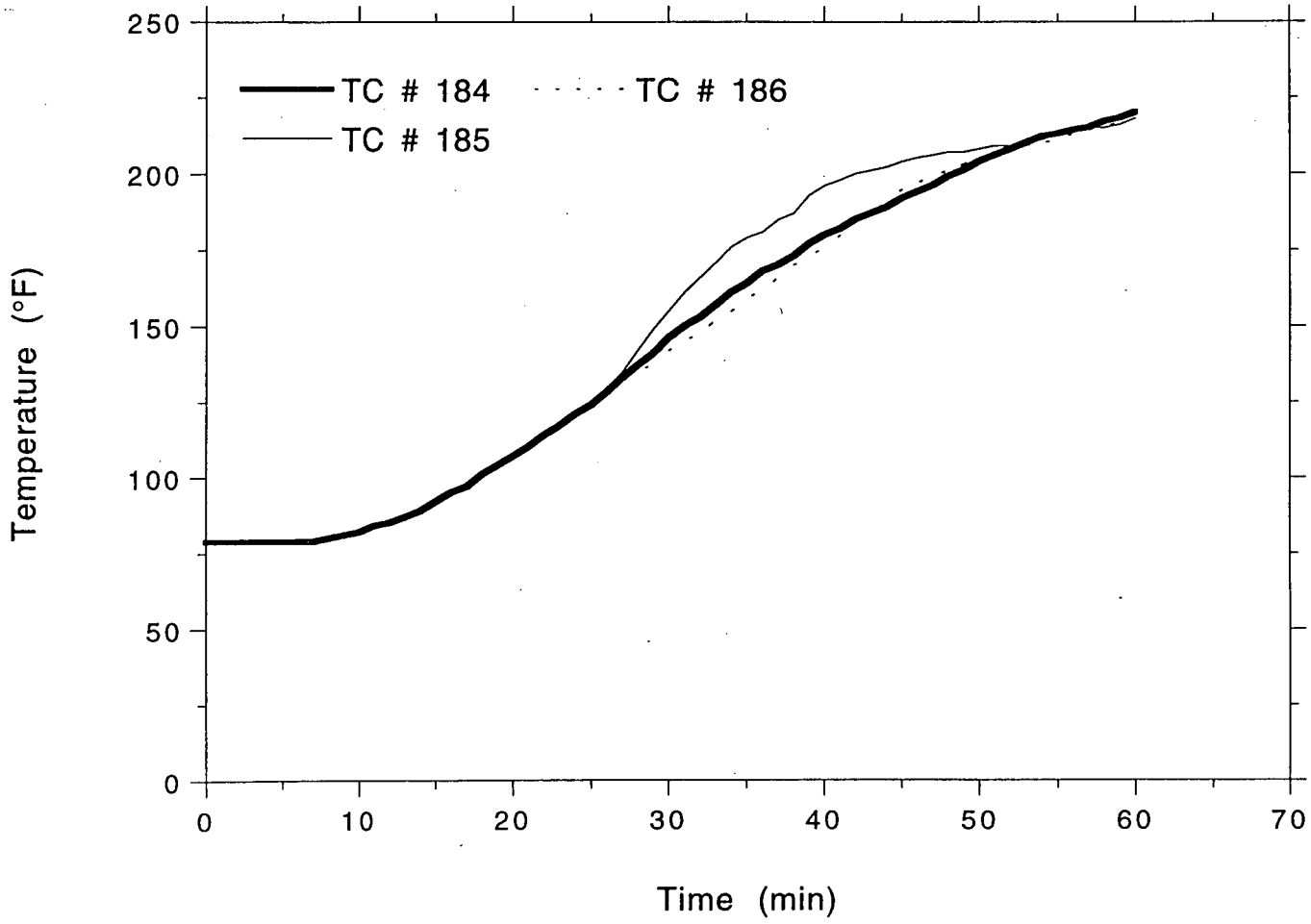
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



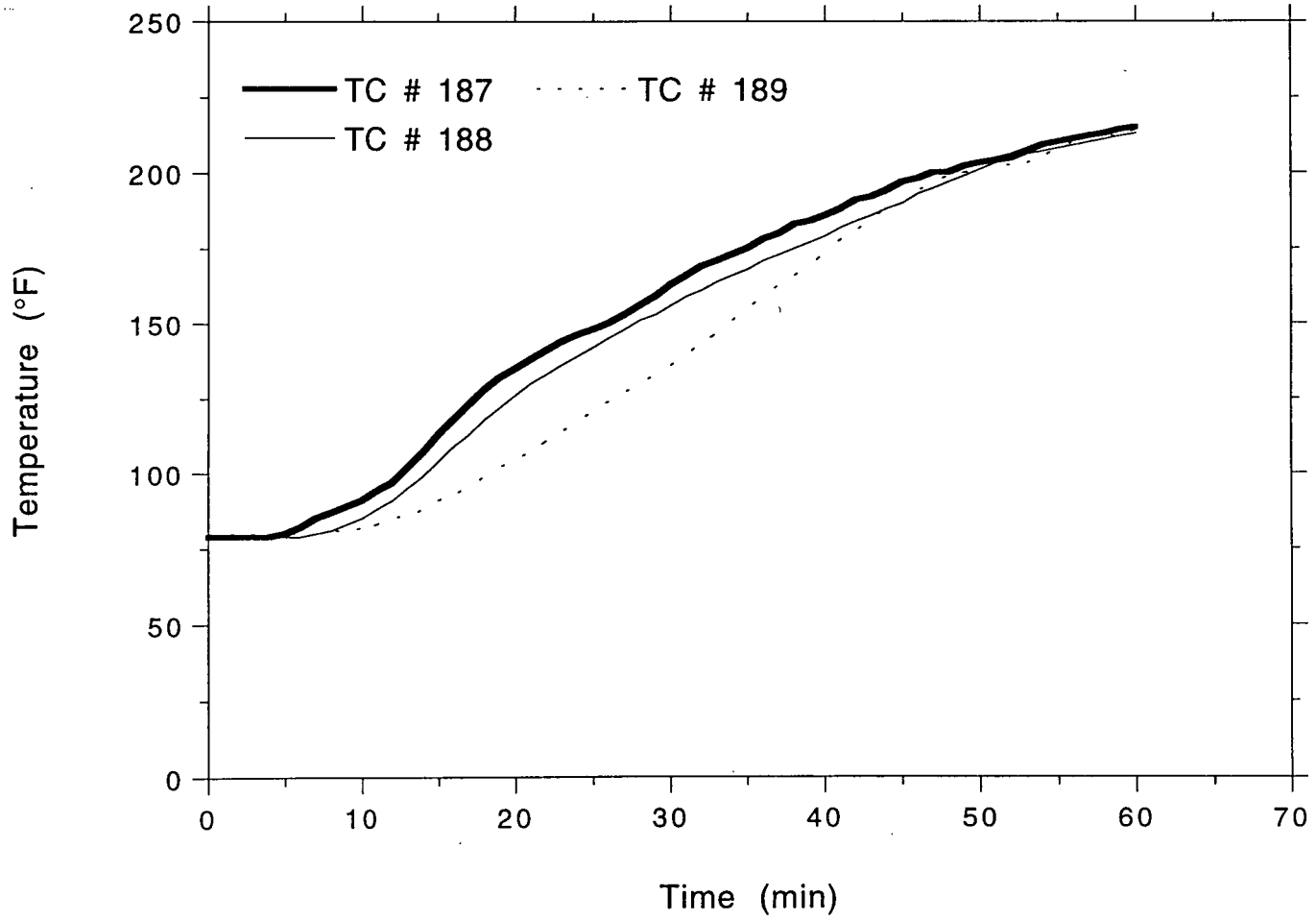
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



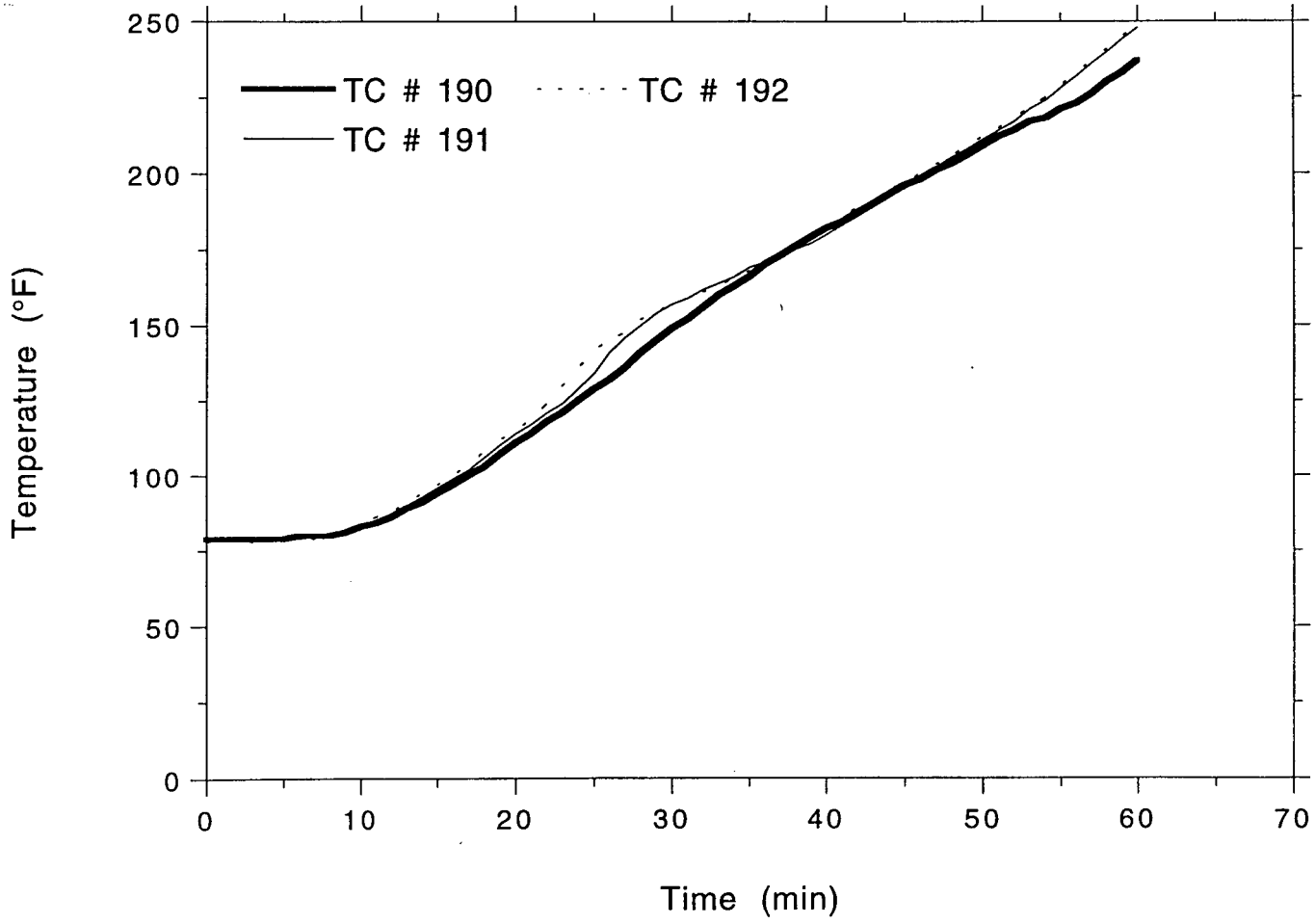
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



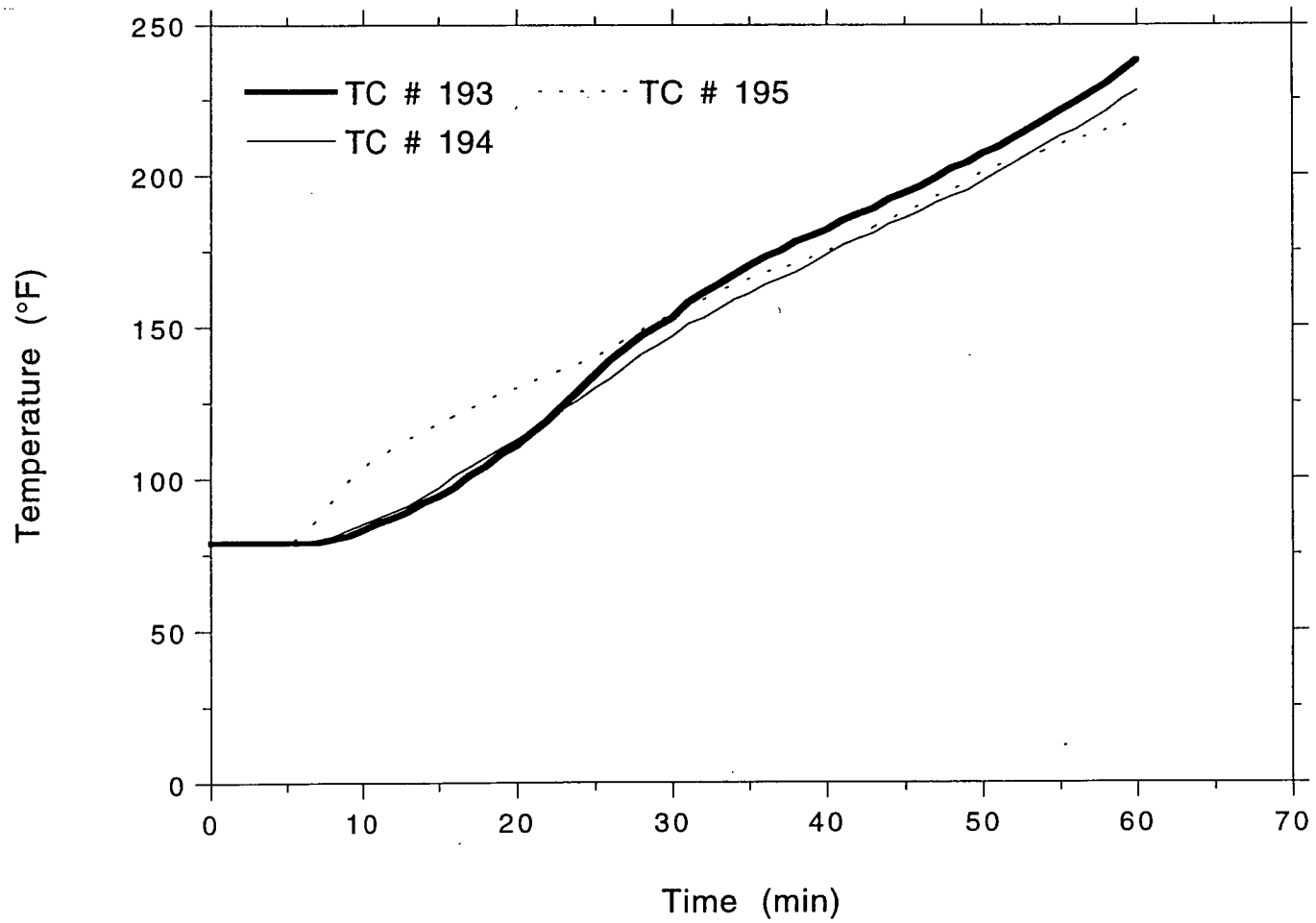
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



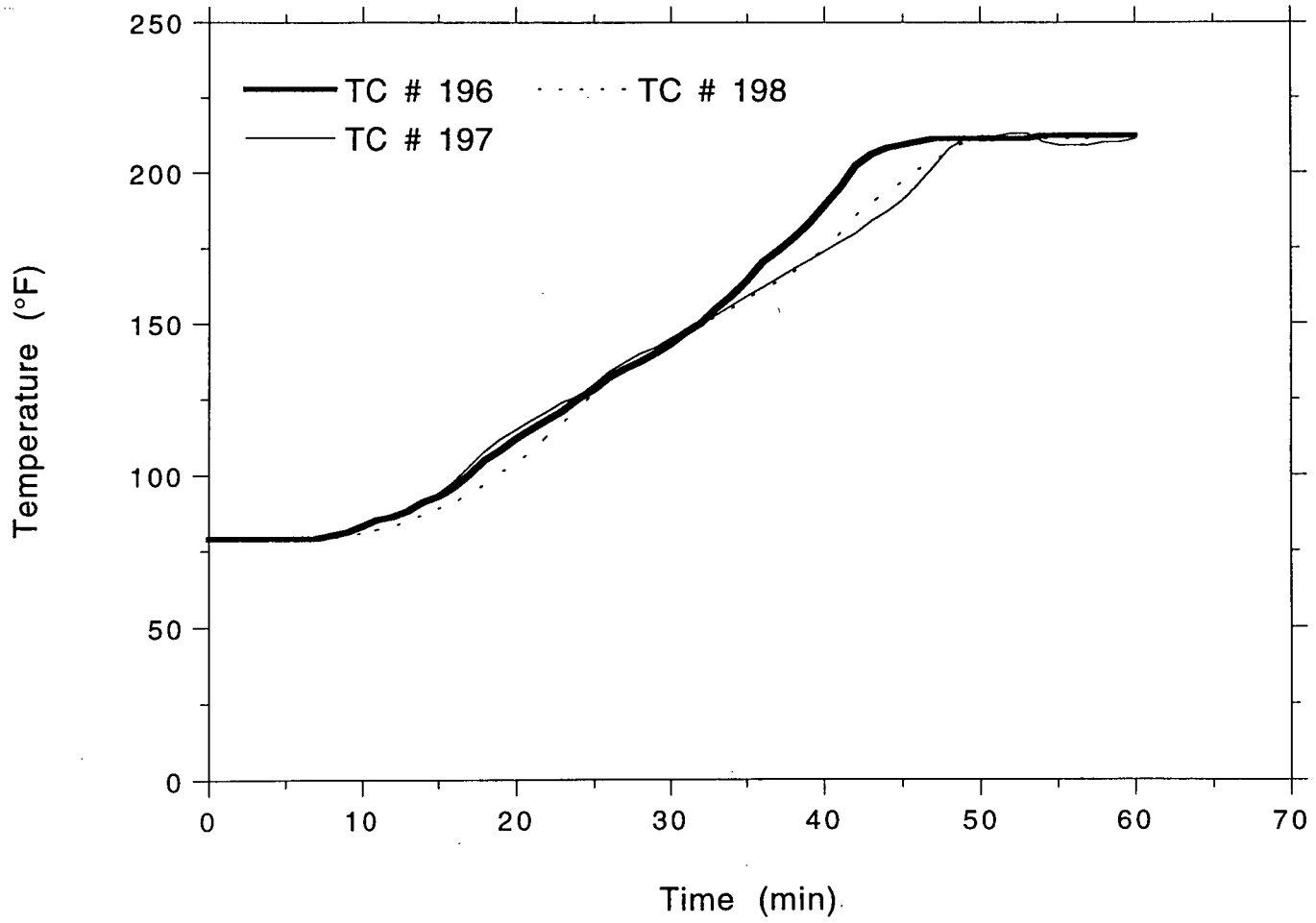
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



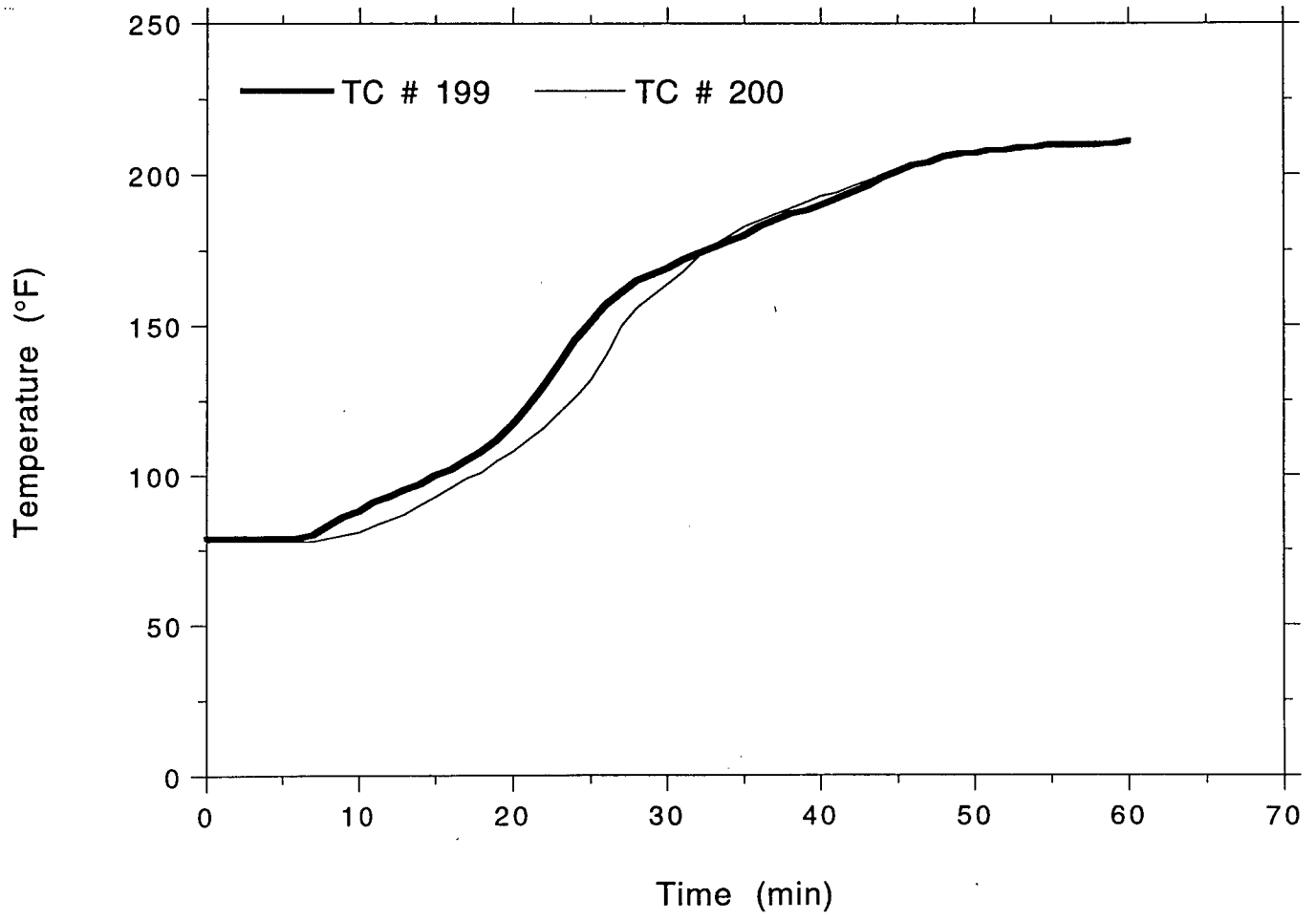
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



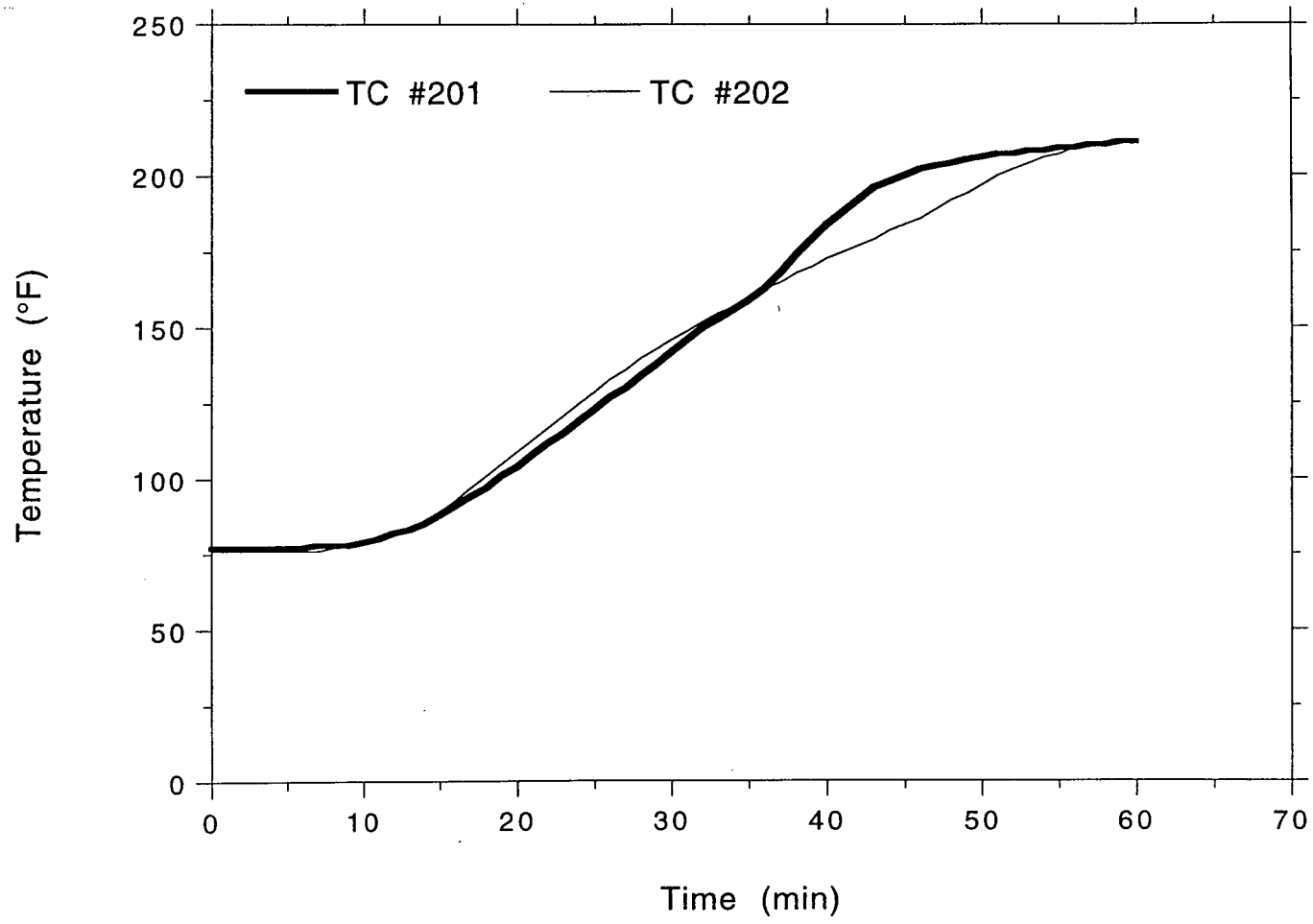
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



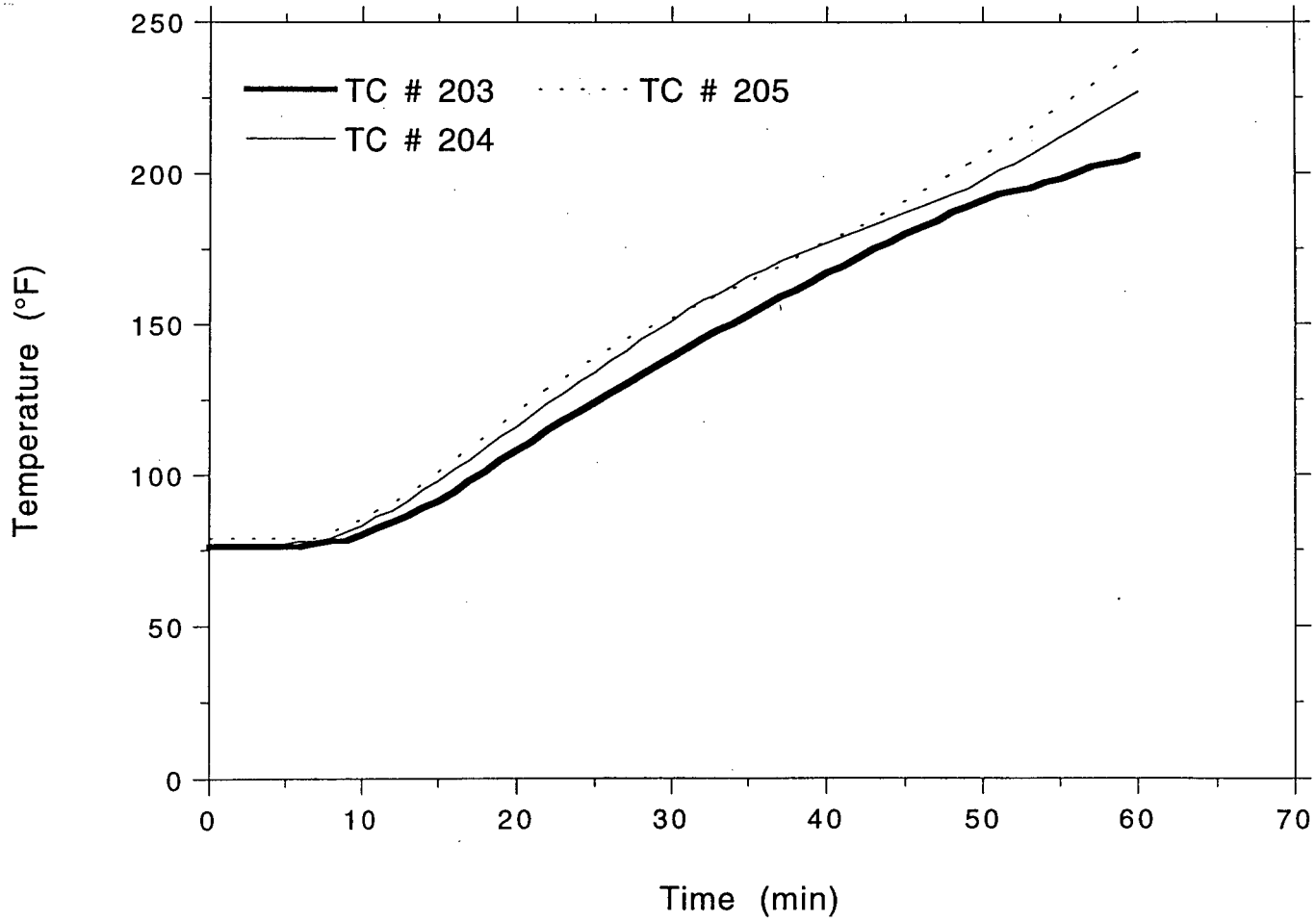
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Front Rail



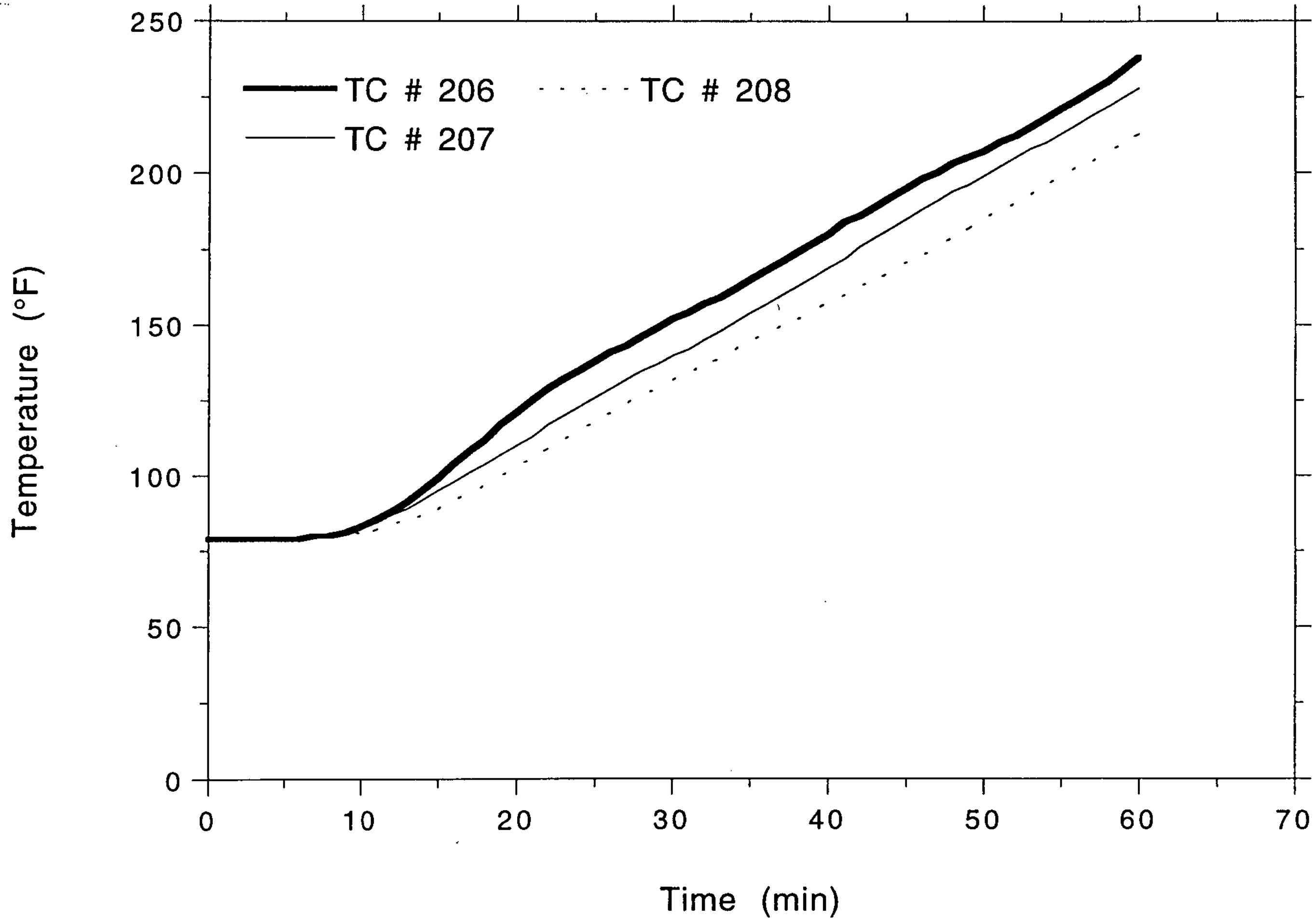
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



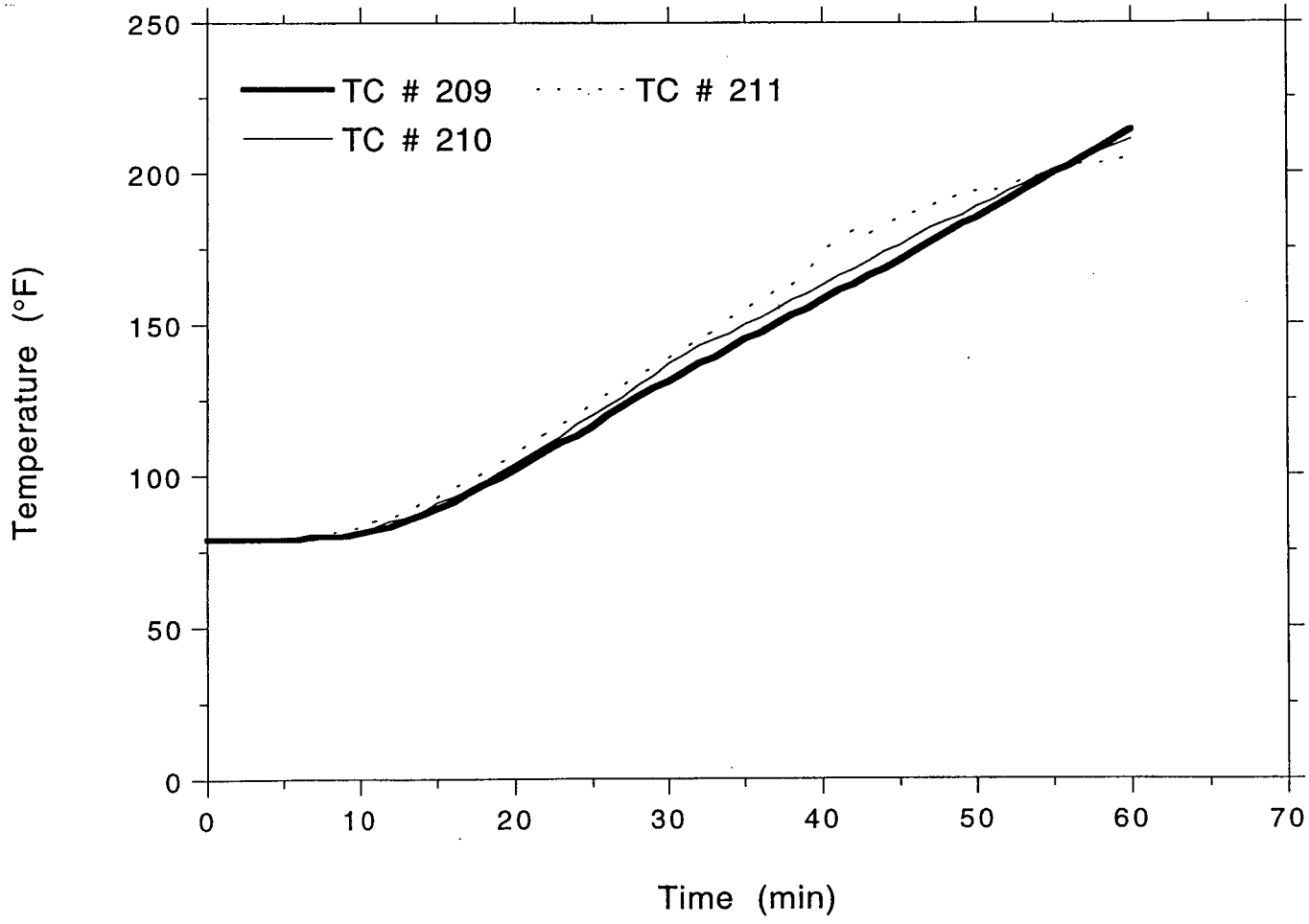
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



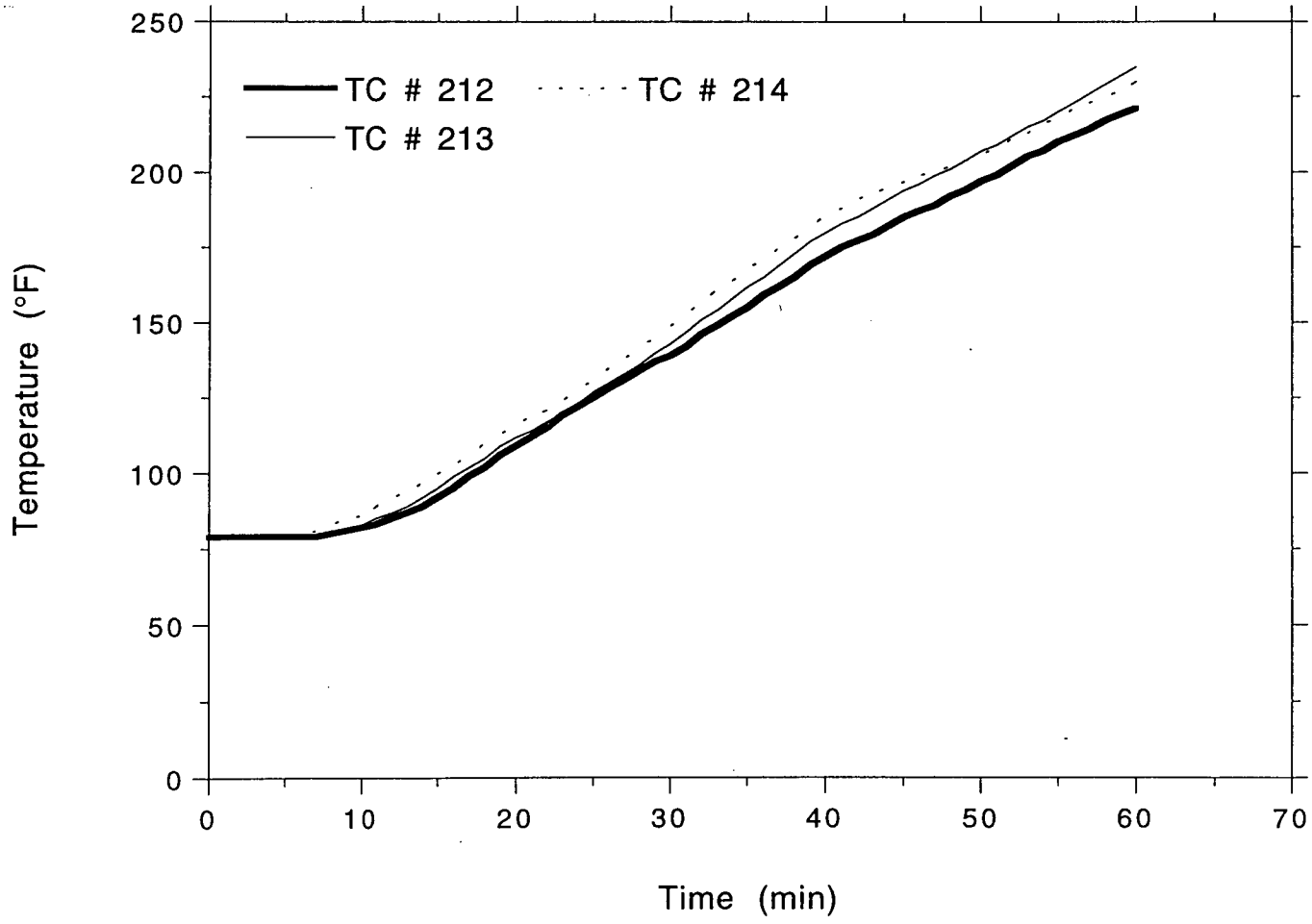
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



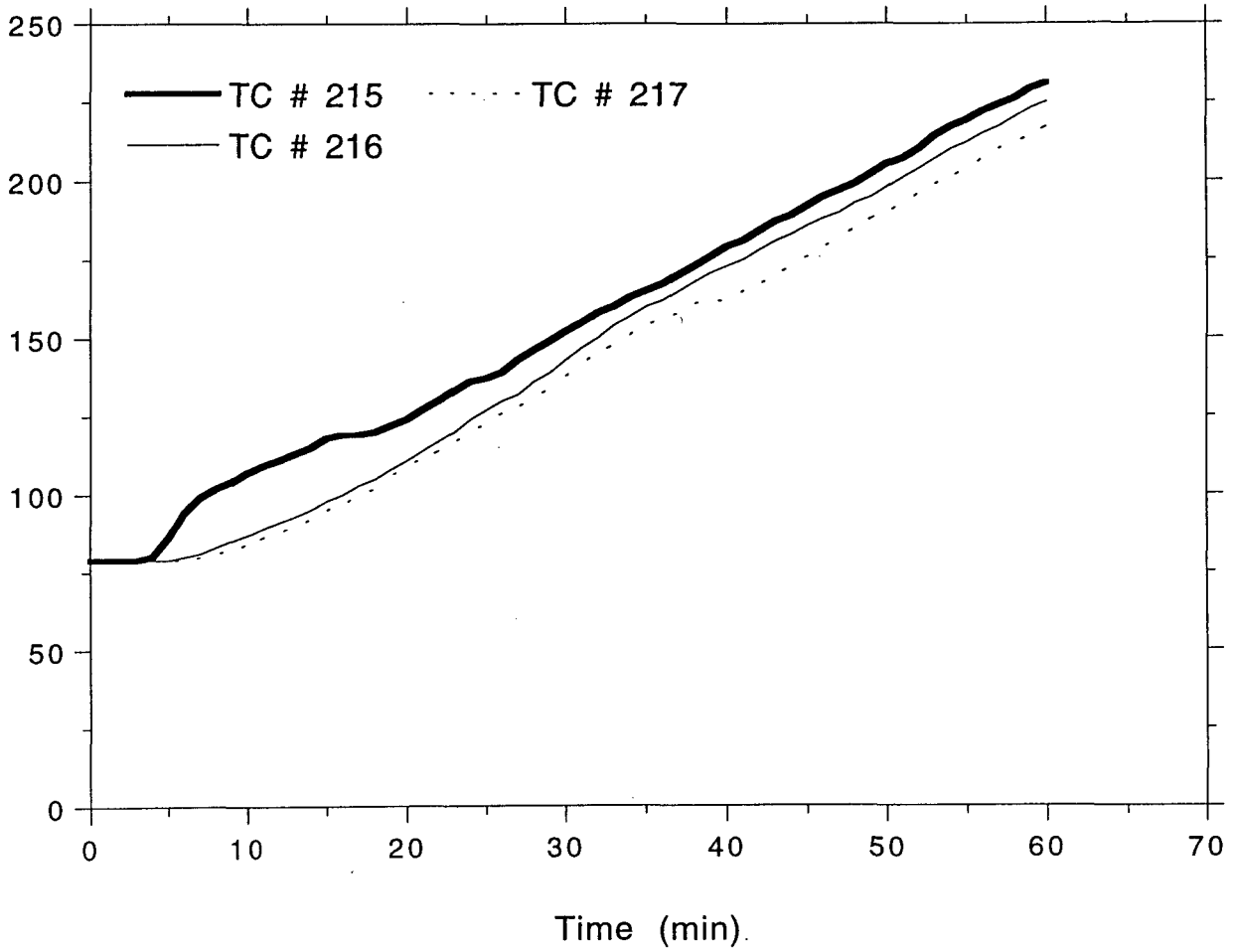
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



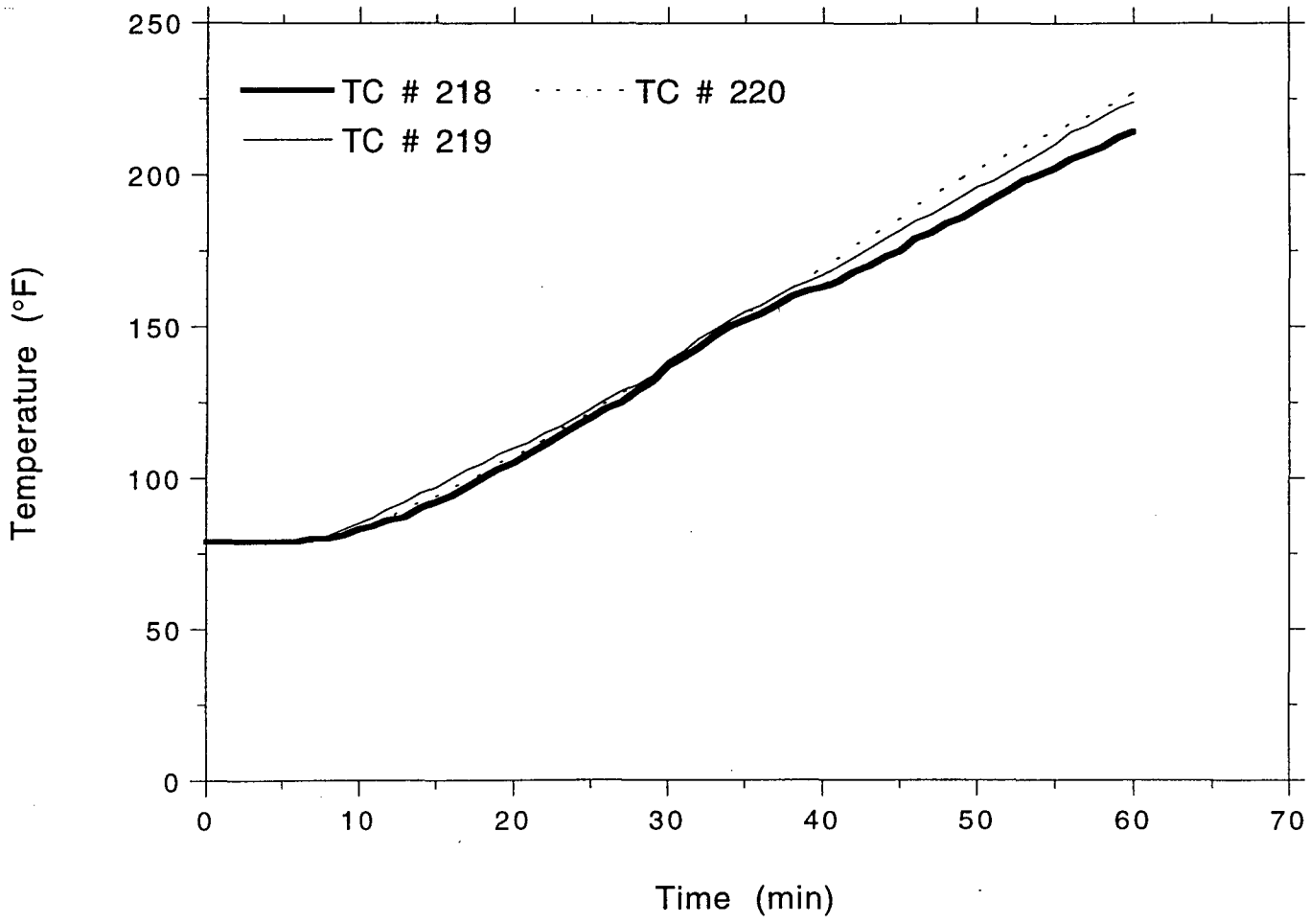
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



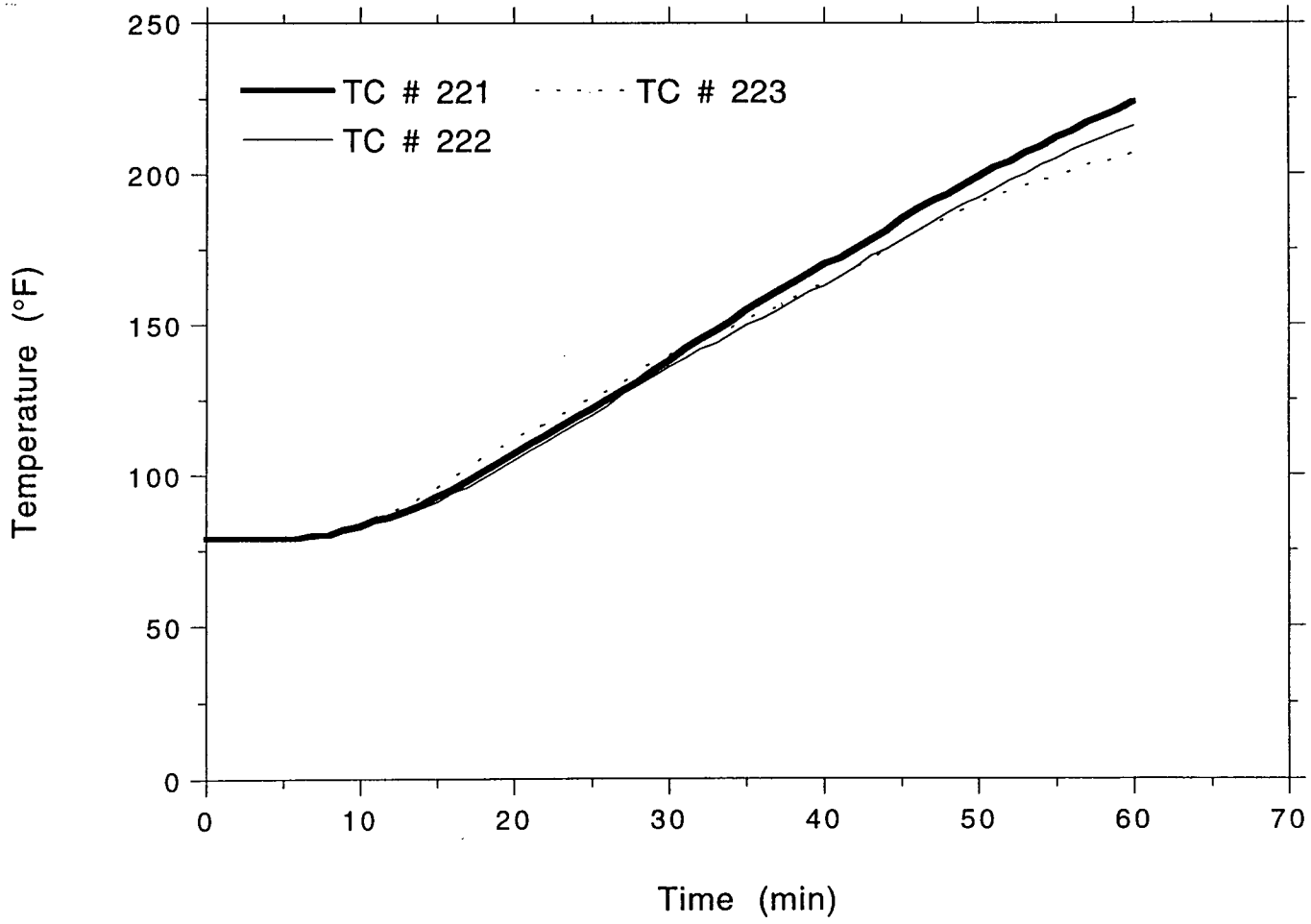
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Rear Rail



OMEGA POINT LABORATORIES

TSI/TVA
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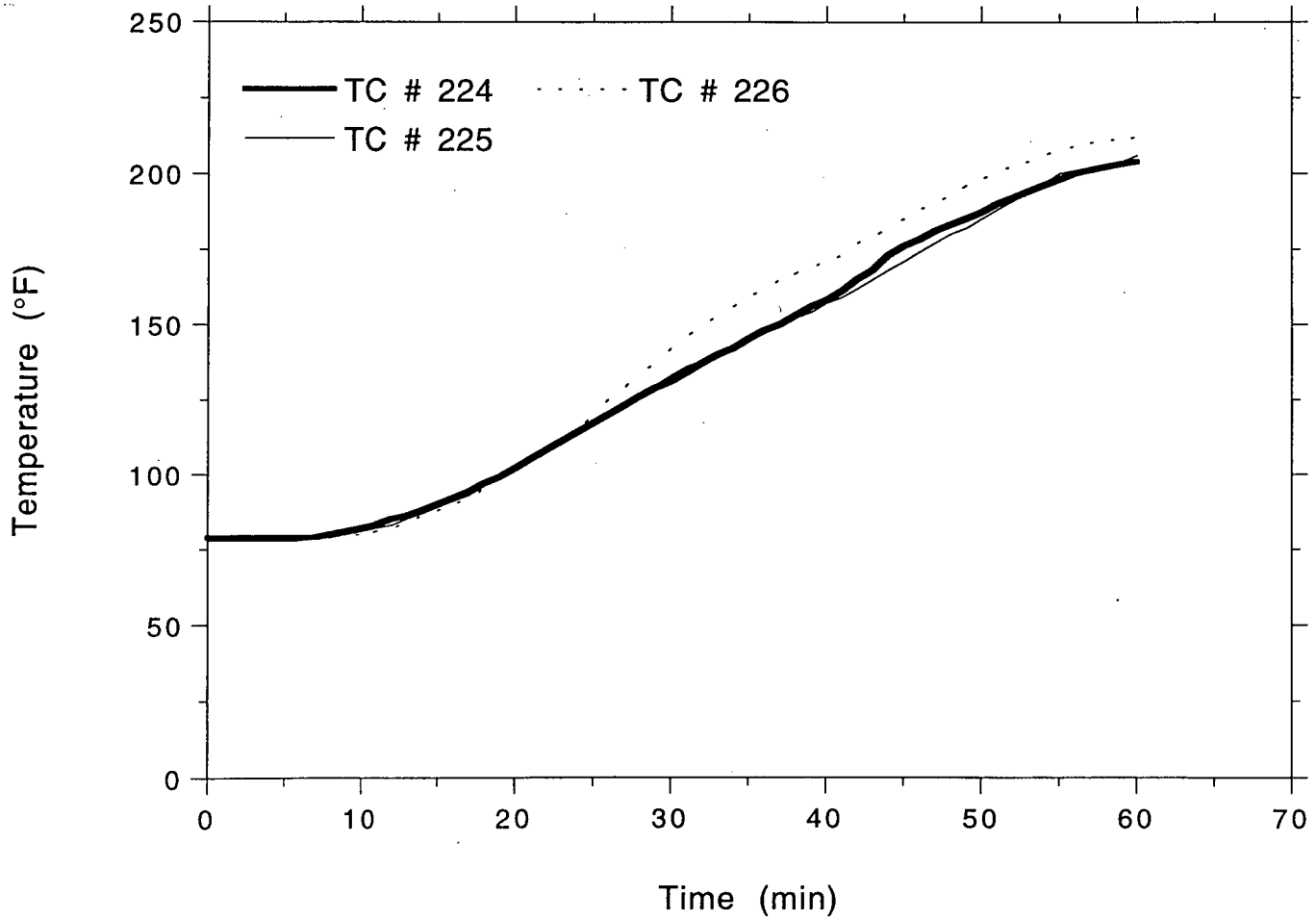
Rear Tray, Rear Rail



OMEGA POINT LABORATORIES

TSI/TVA
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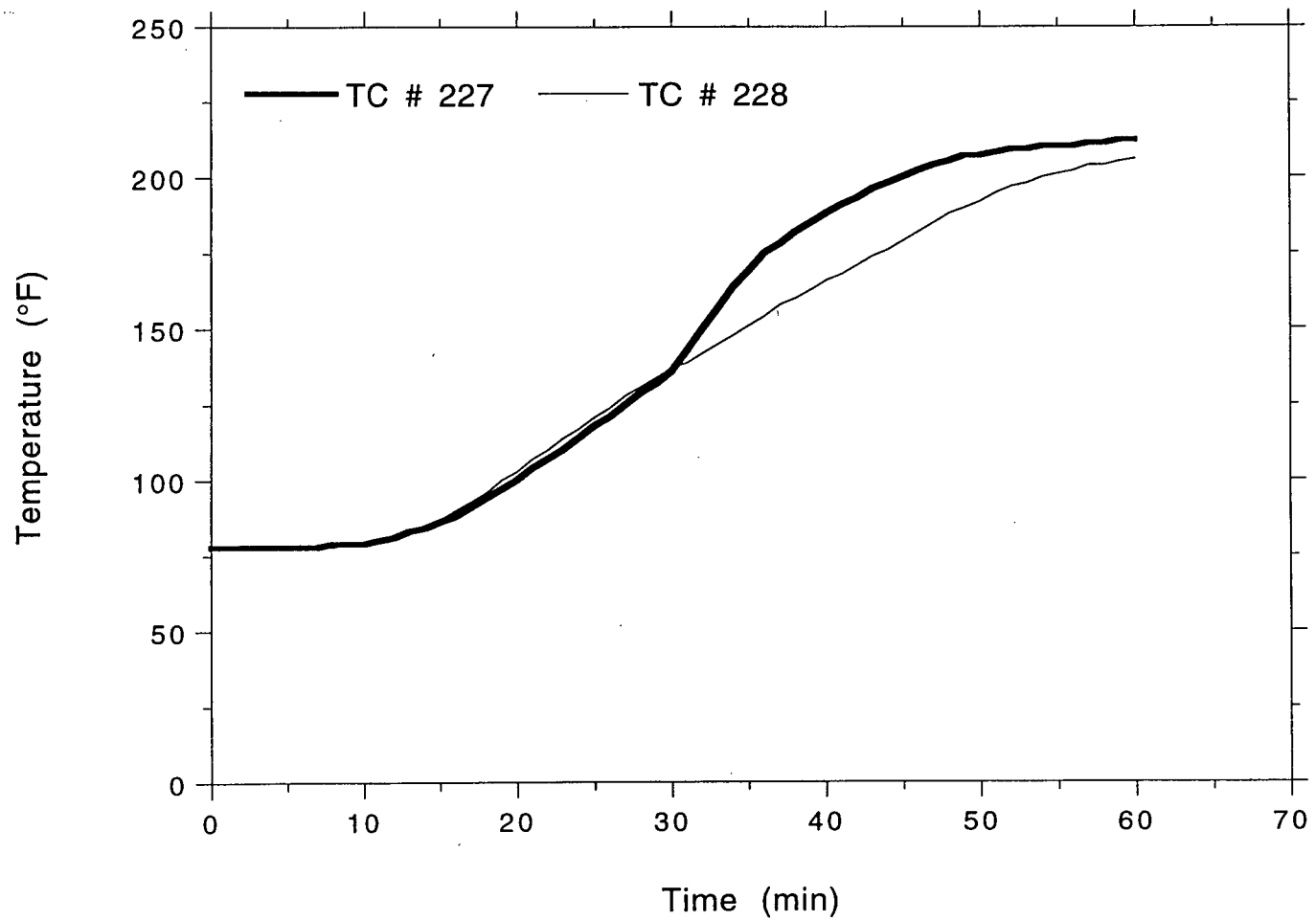
Rear Tray, Rear Rail



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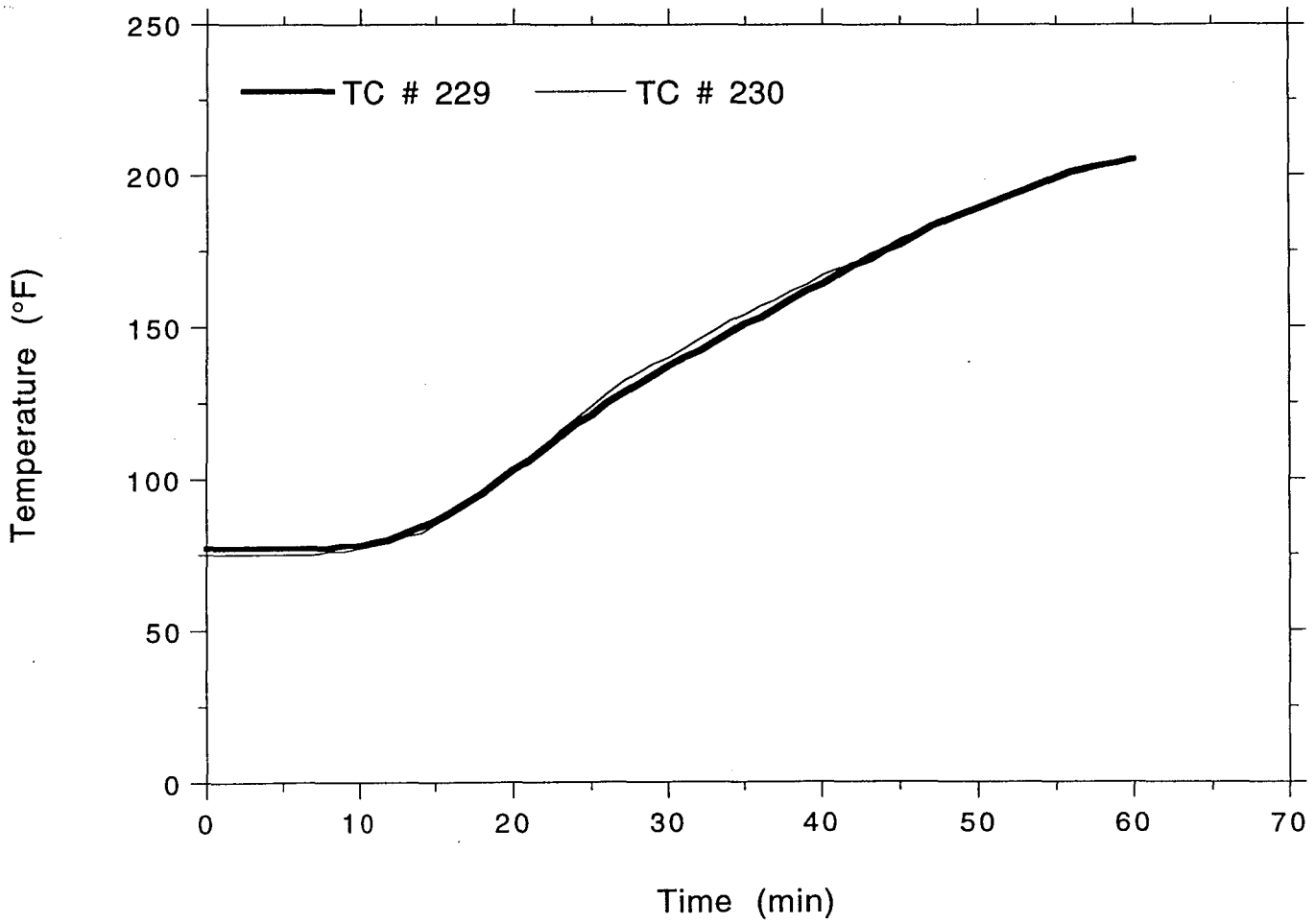
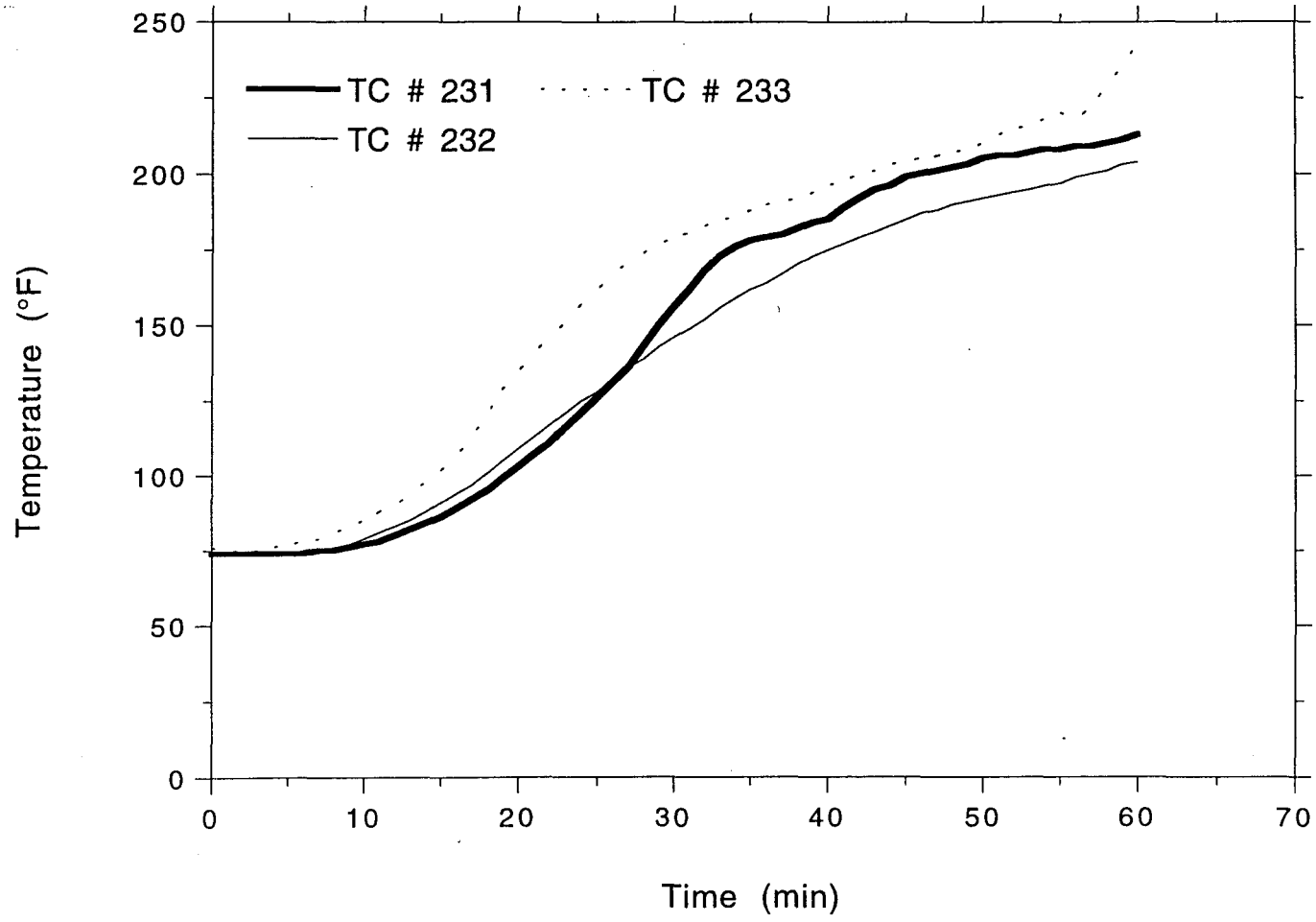
Project No. 11960-97187
Rear Tray, Rear Rail



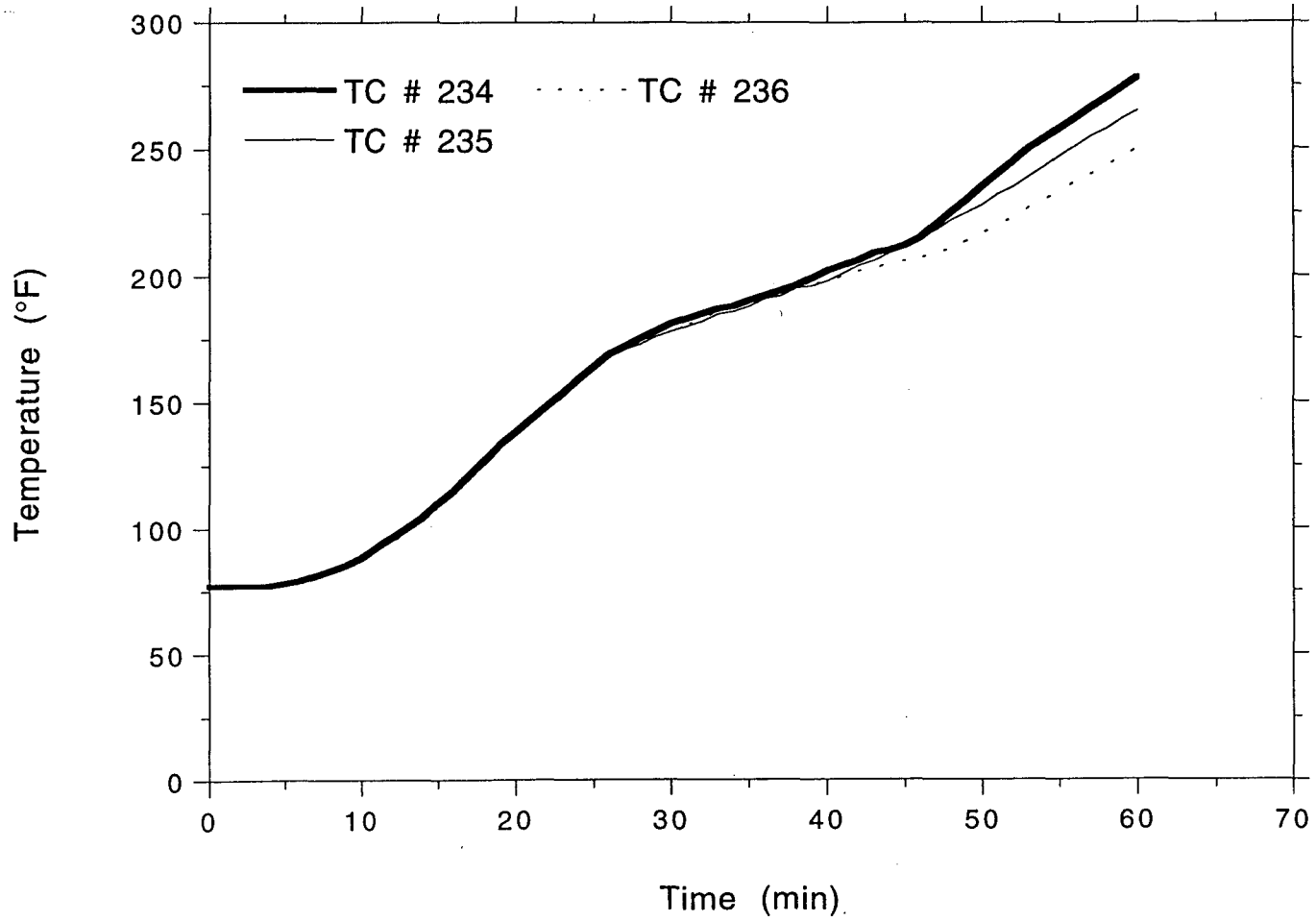
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



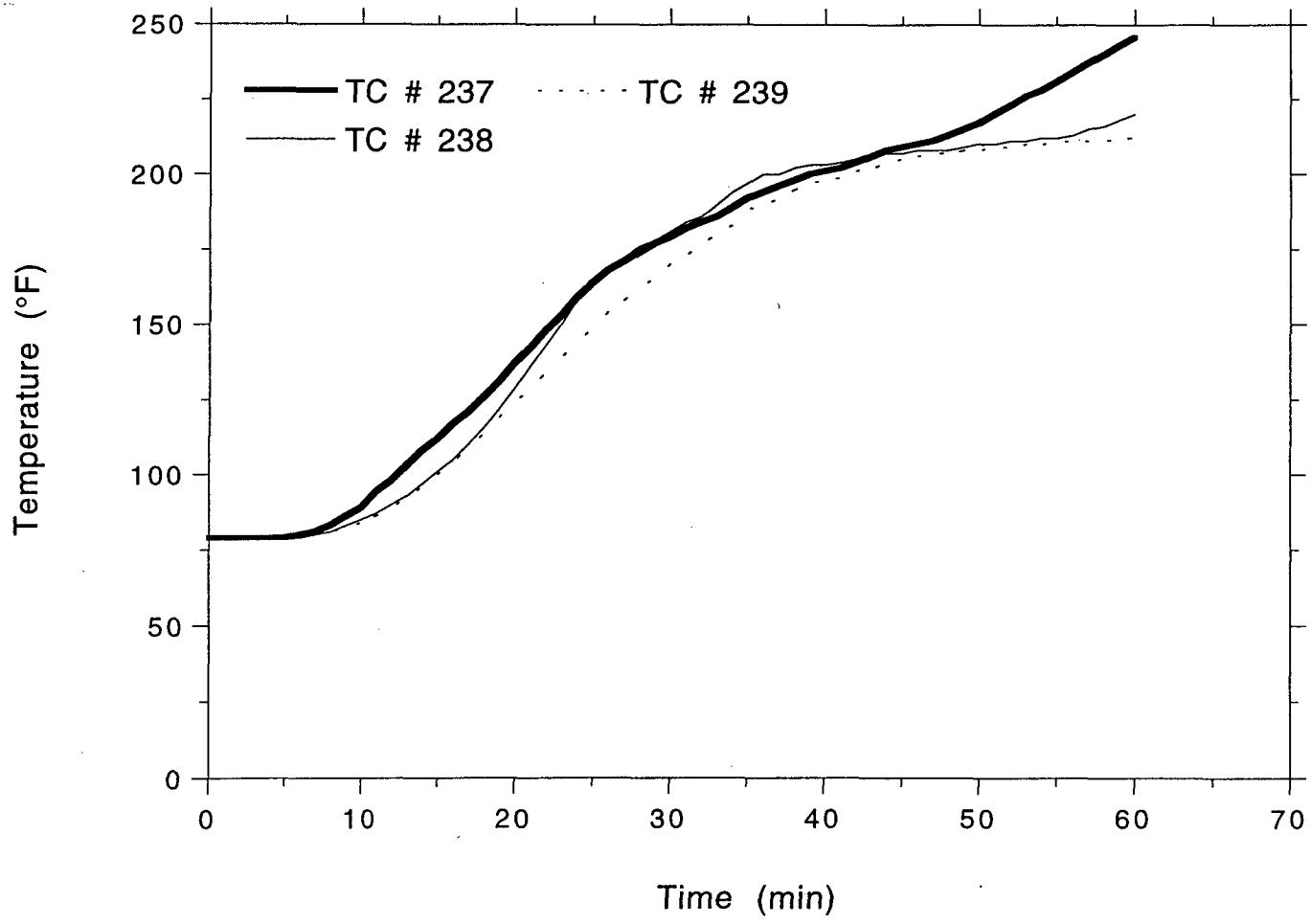
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



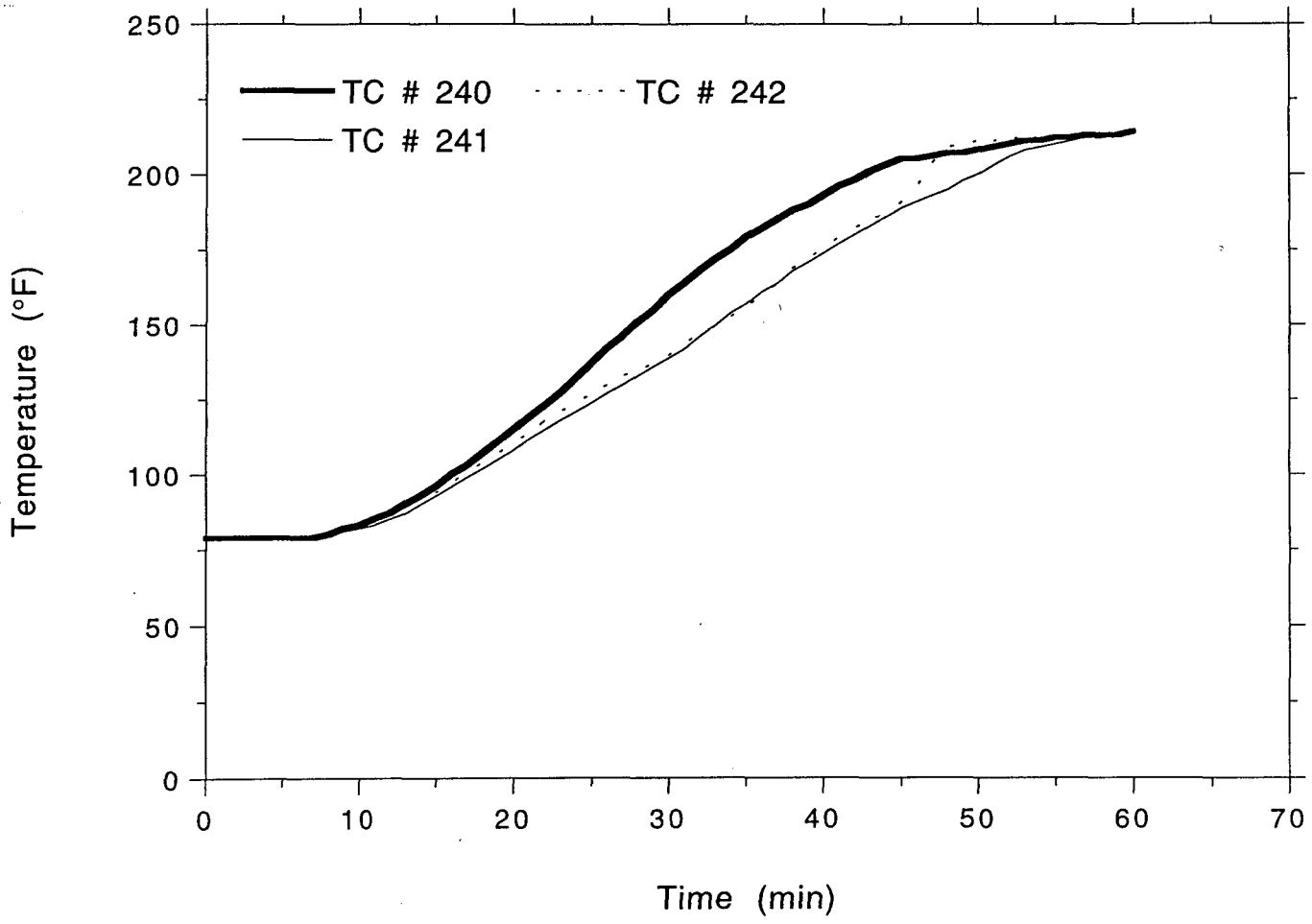
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



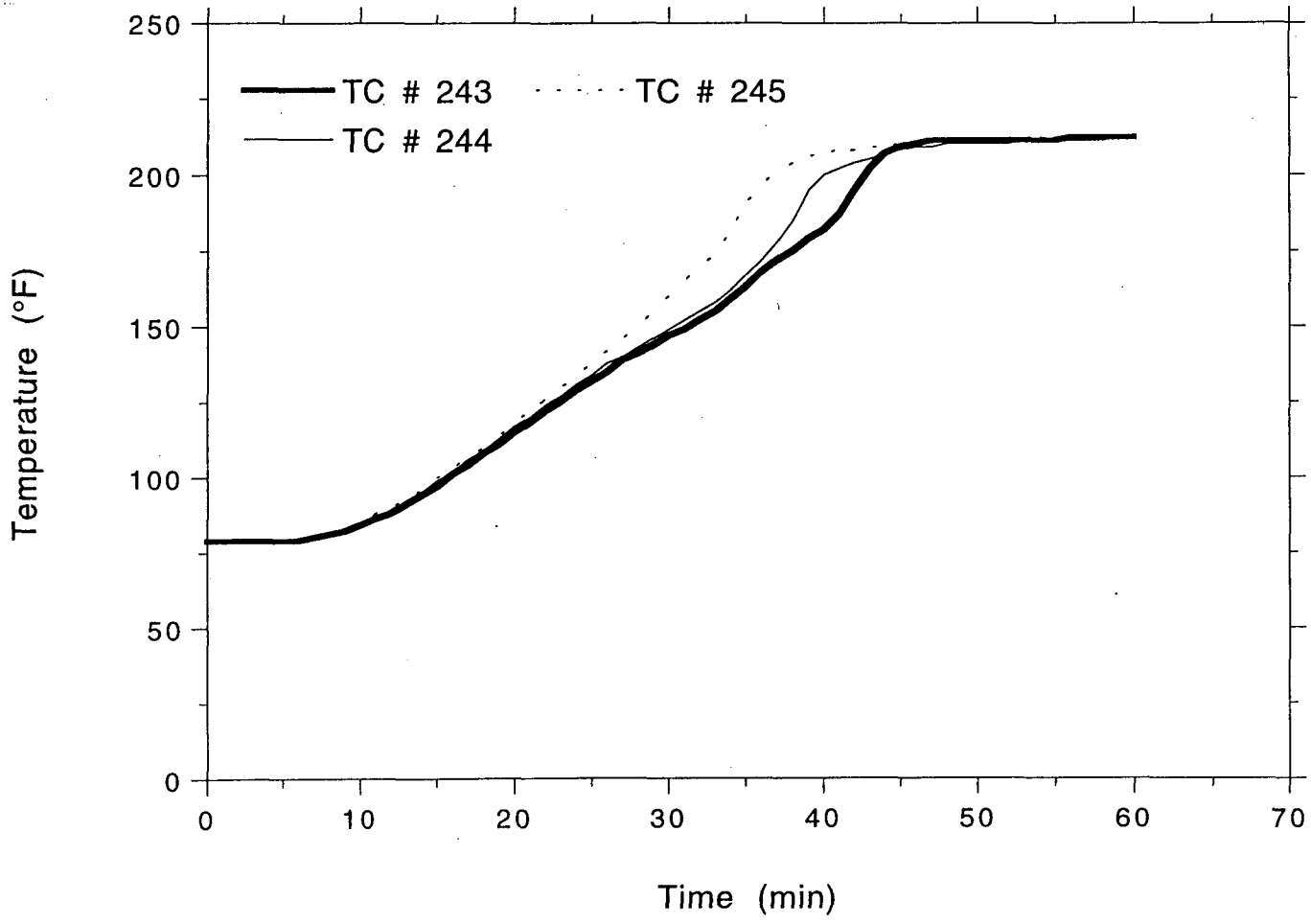
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



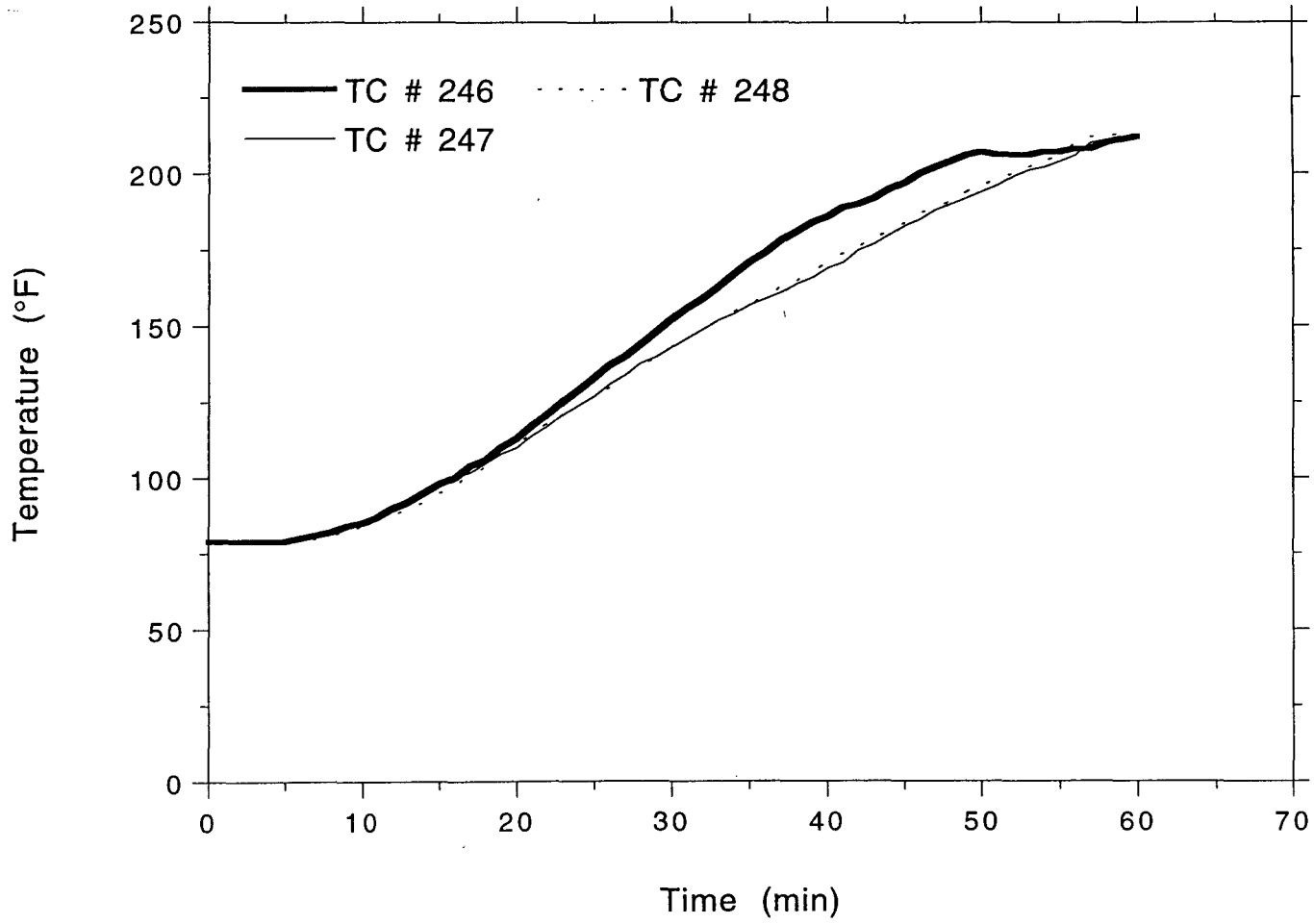
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



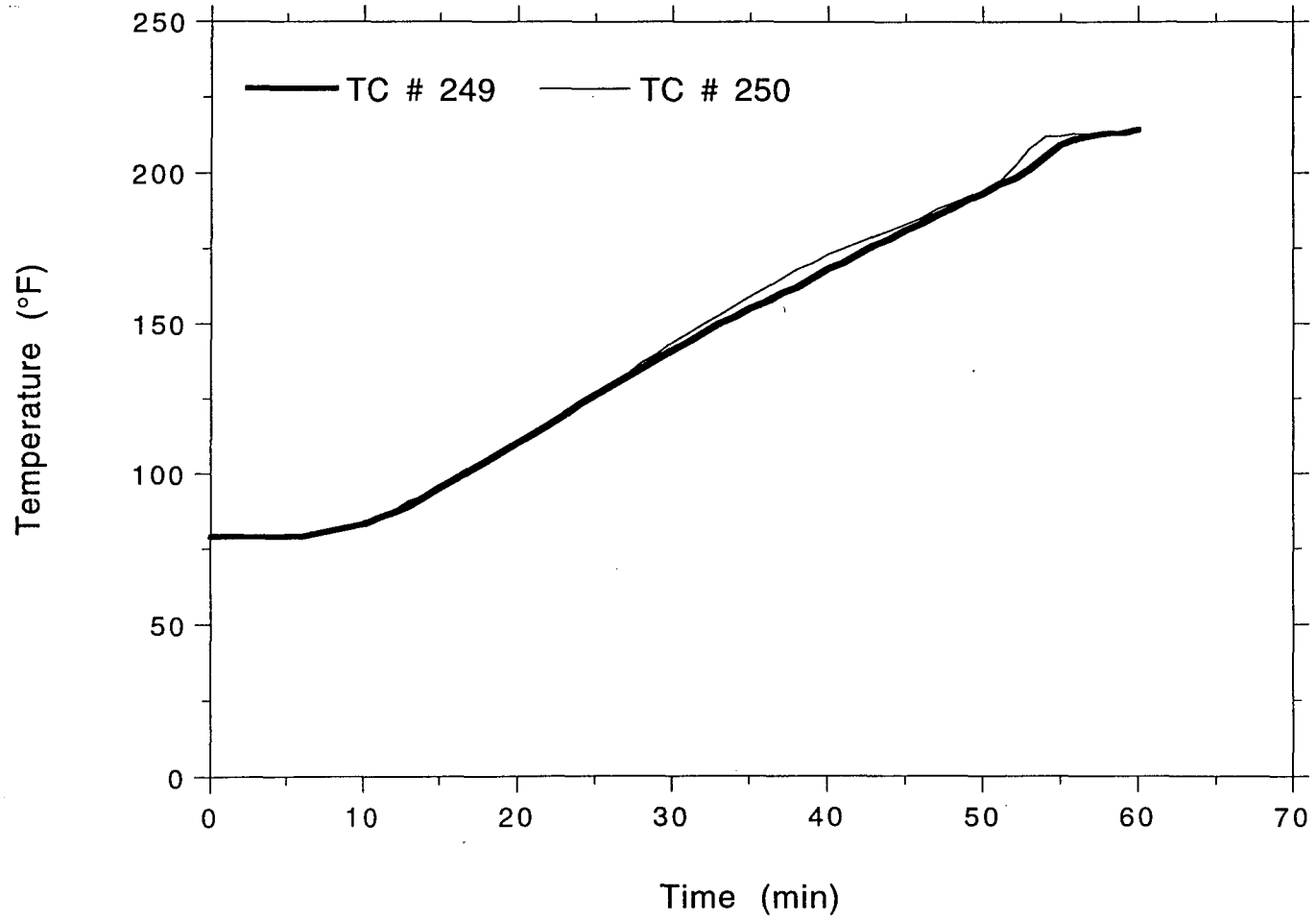
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



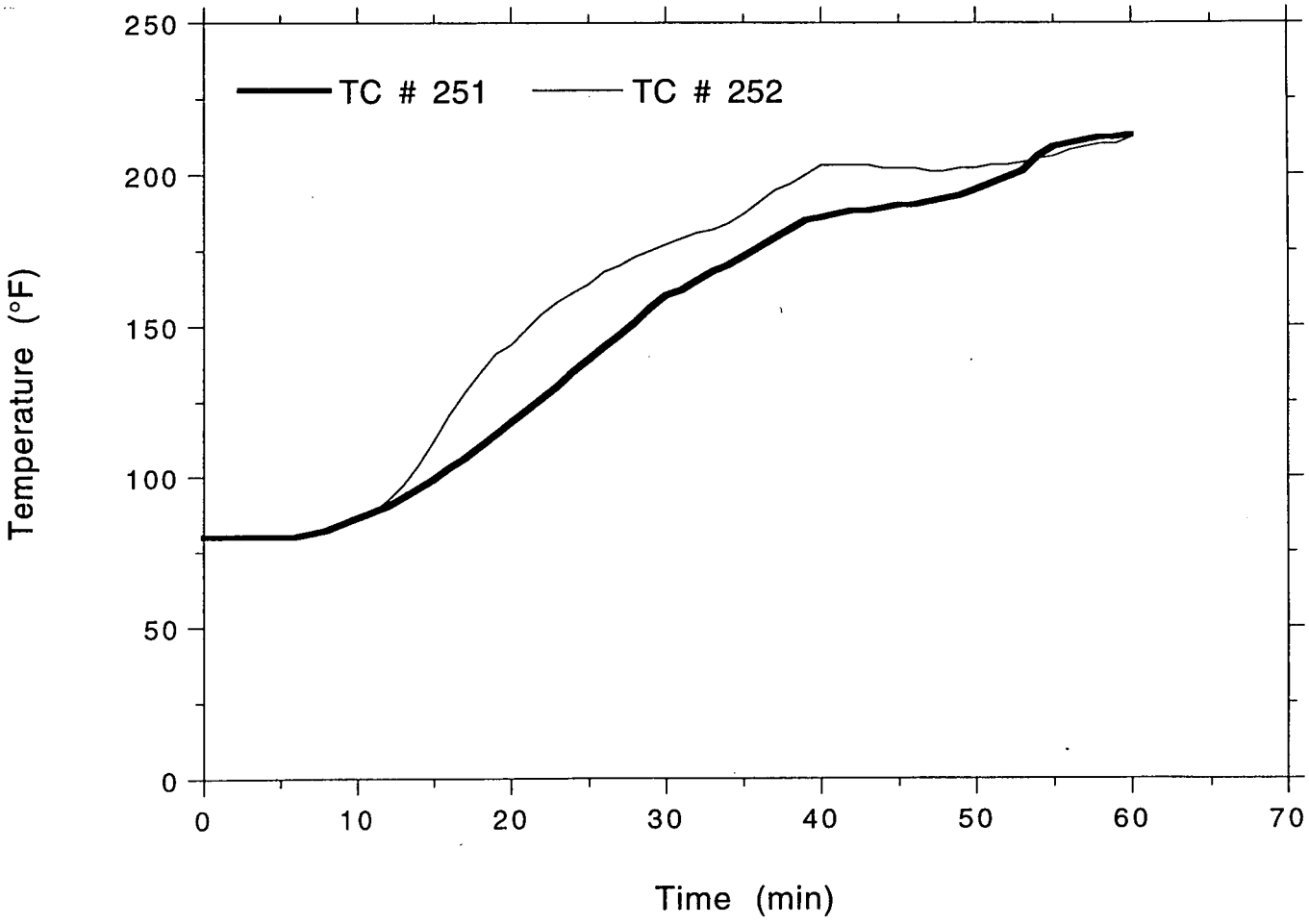
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



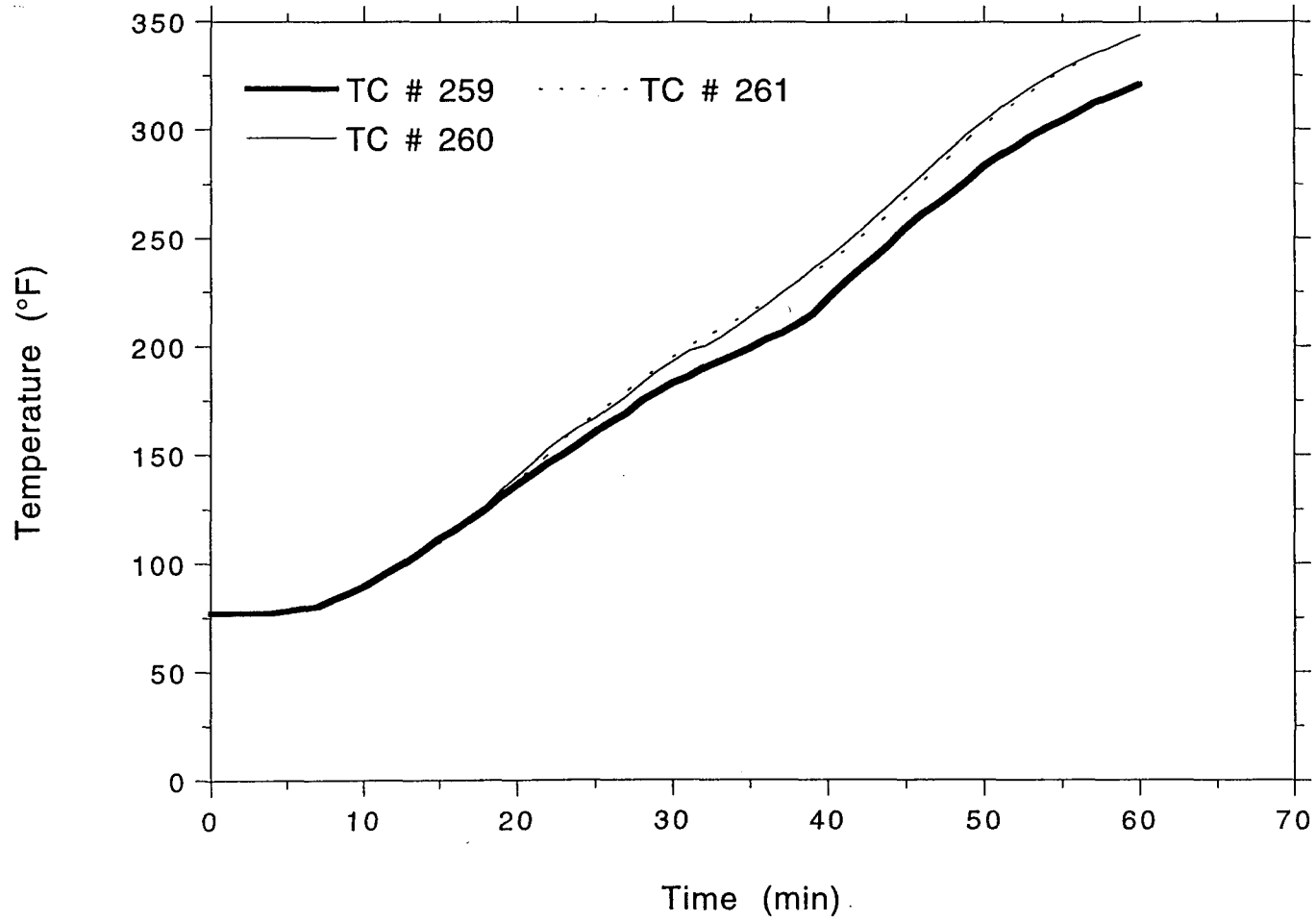
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, Cover Plate



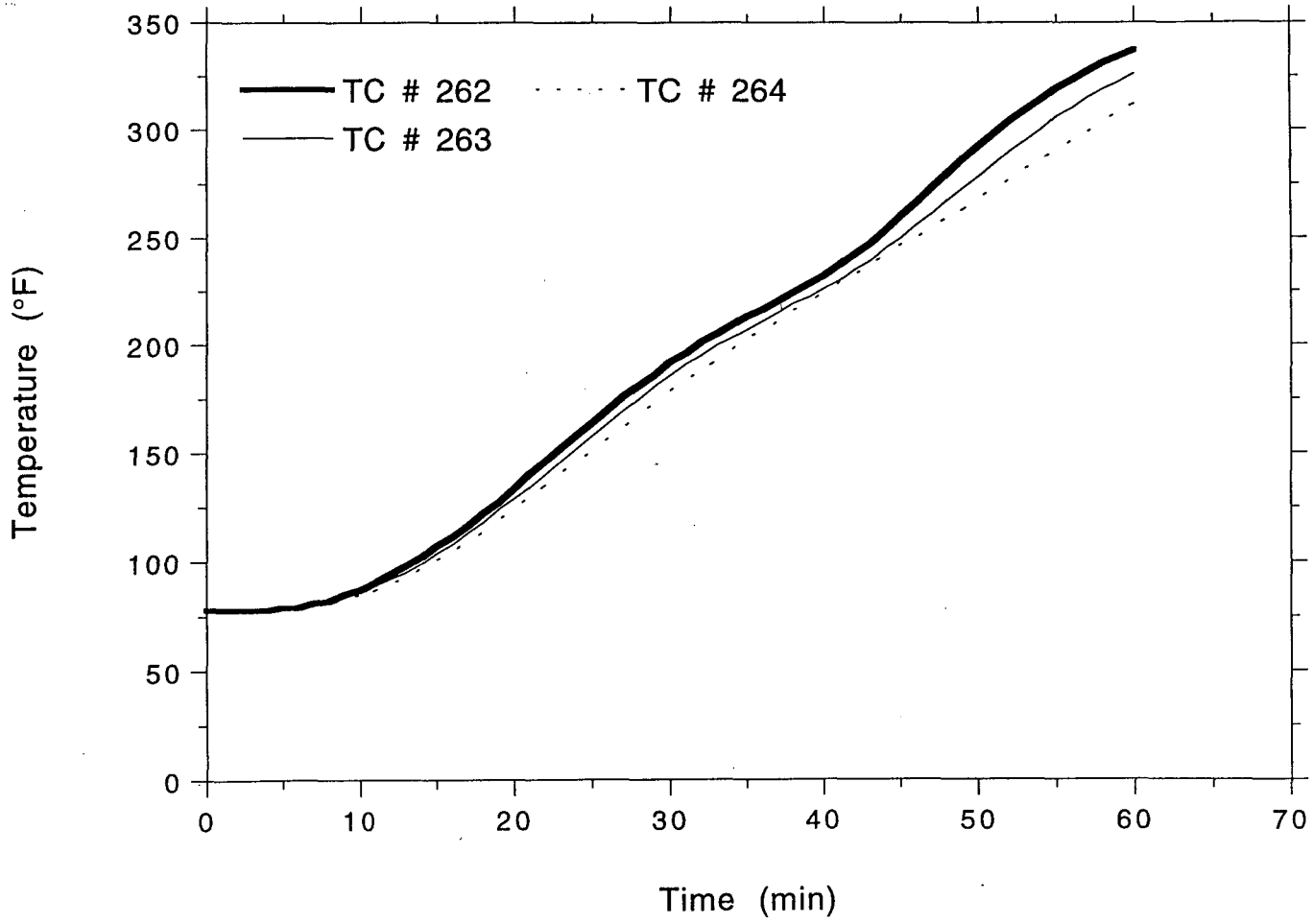
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



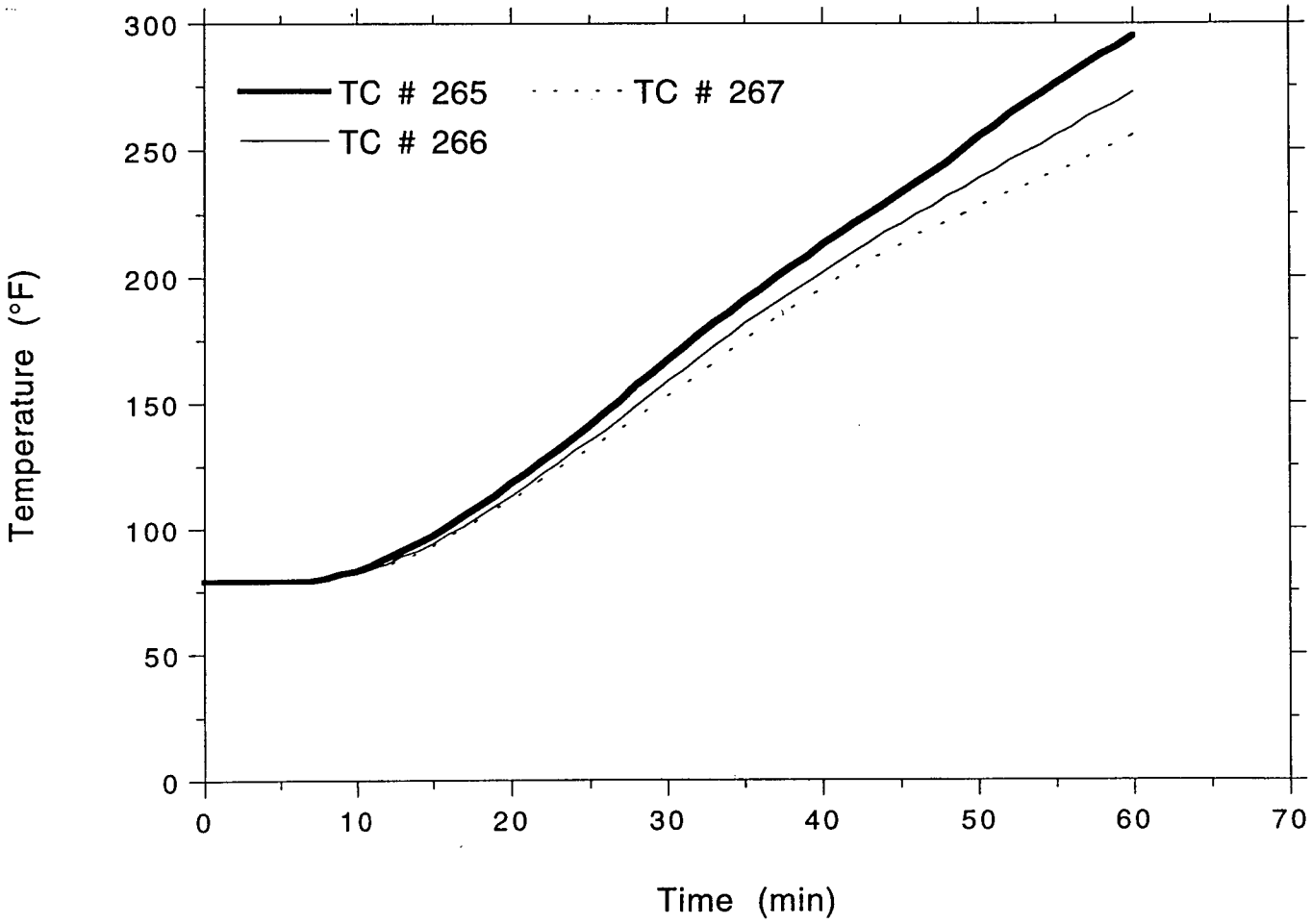
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



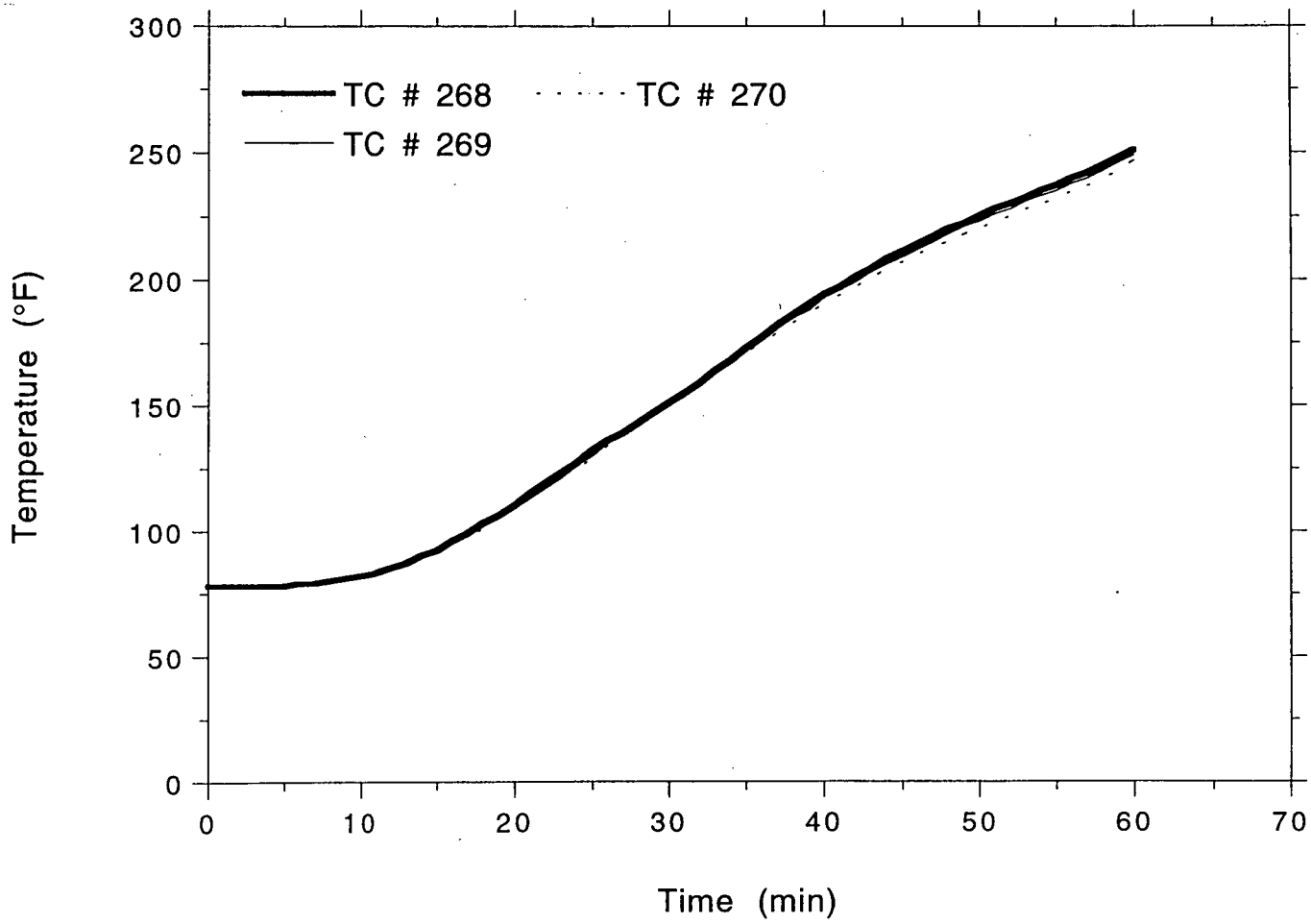
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



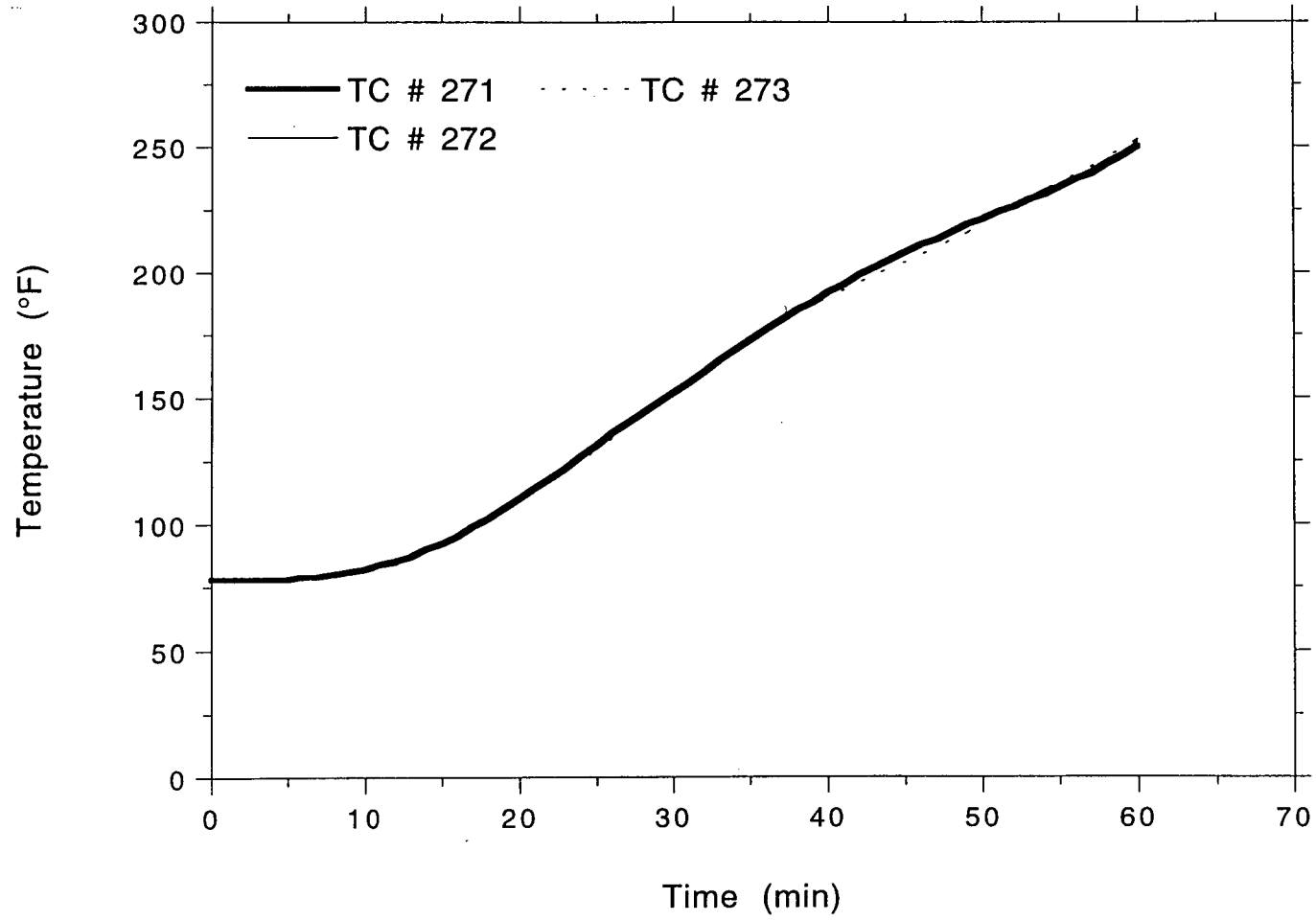
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



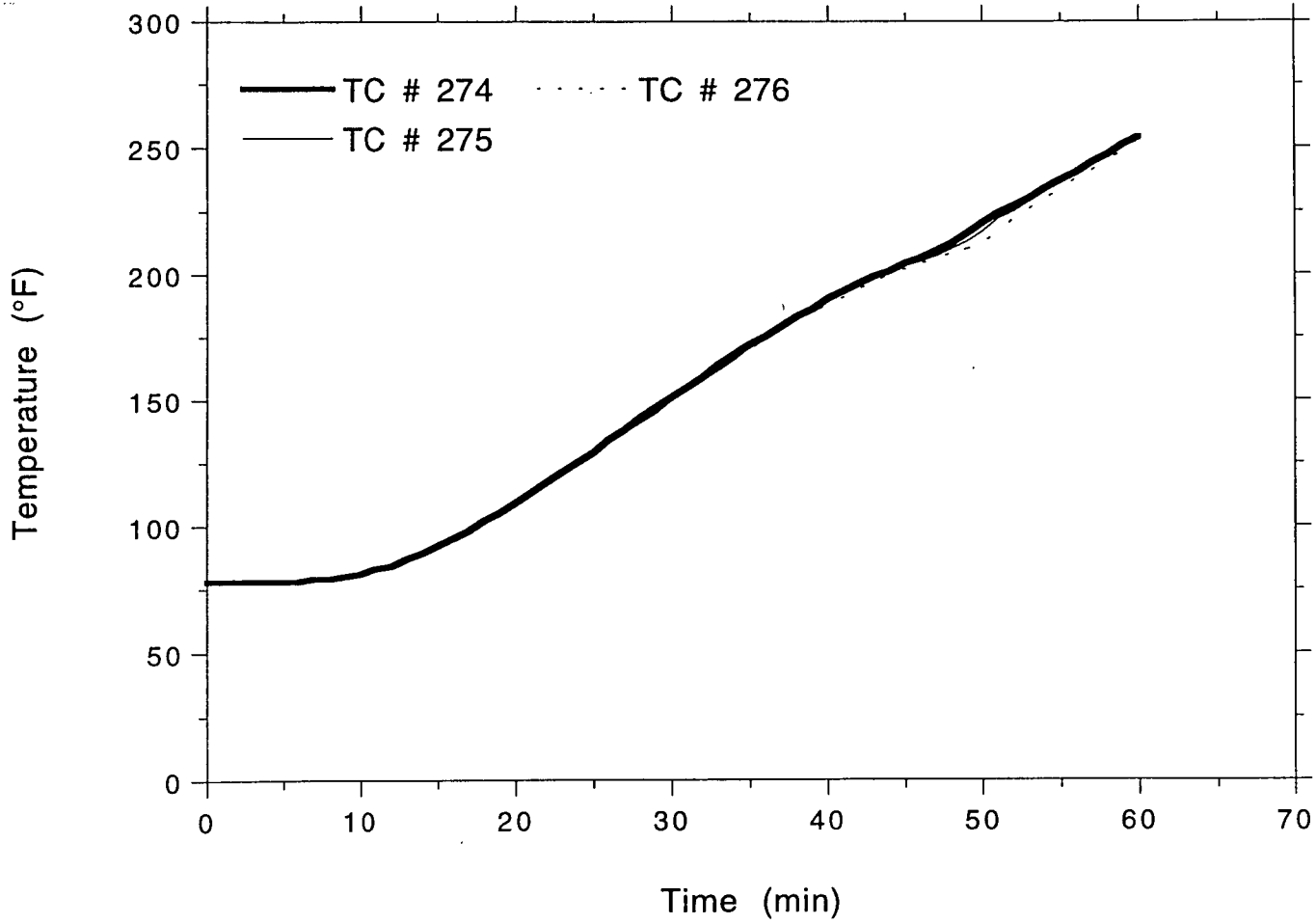
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



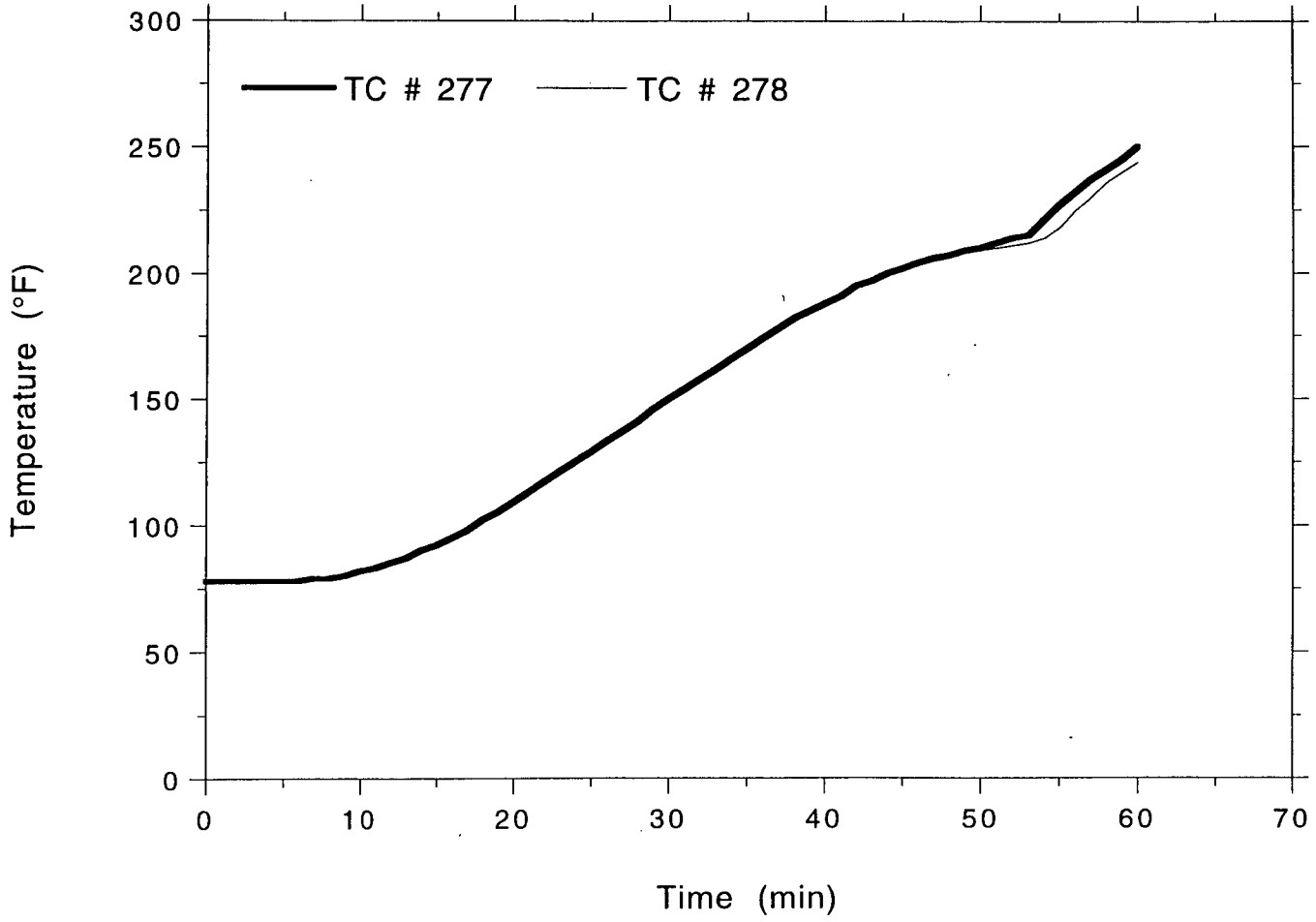
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



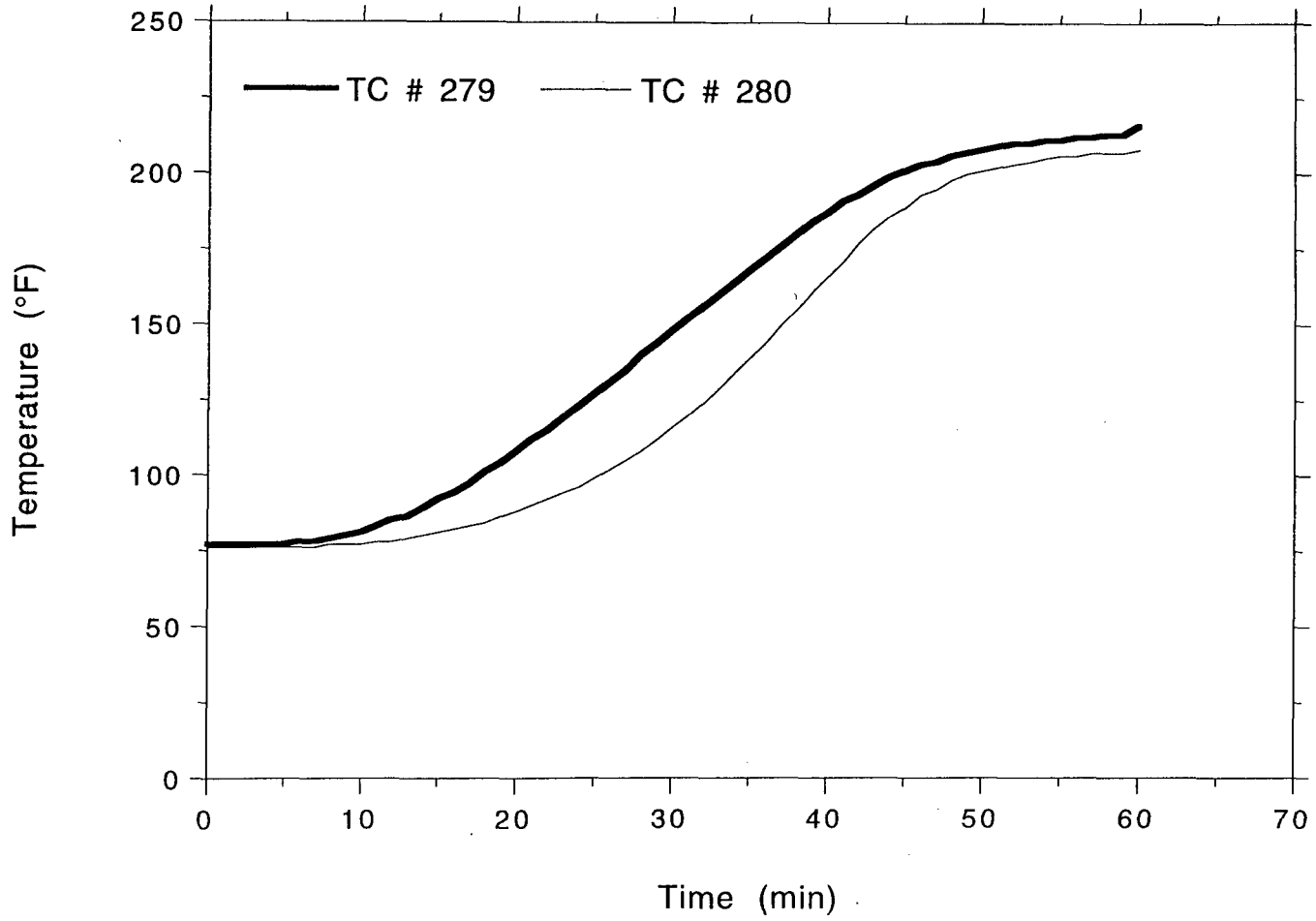
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



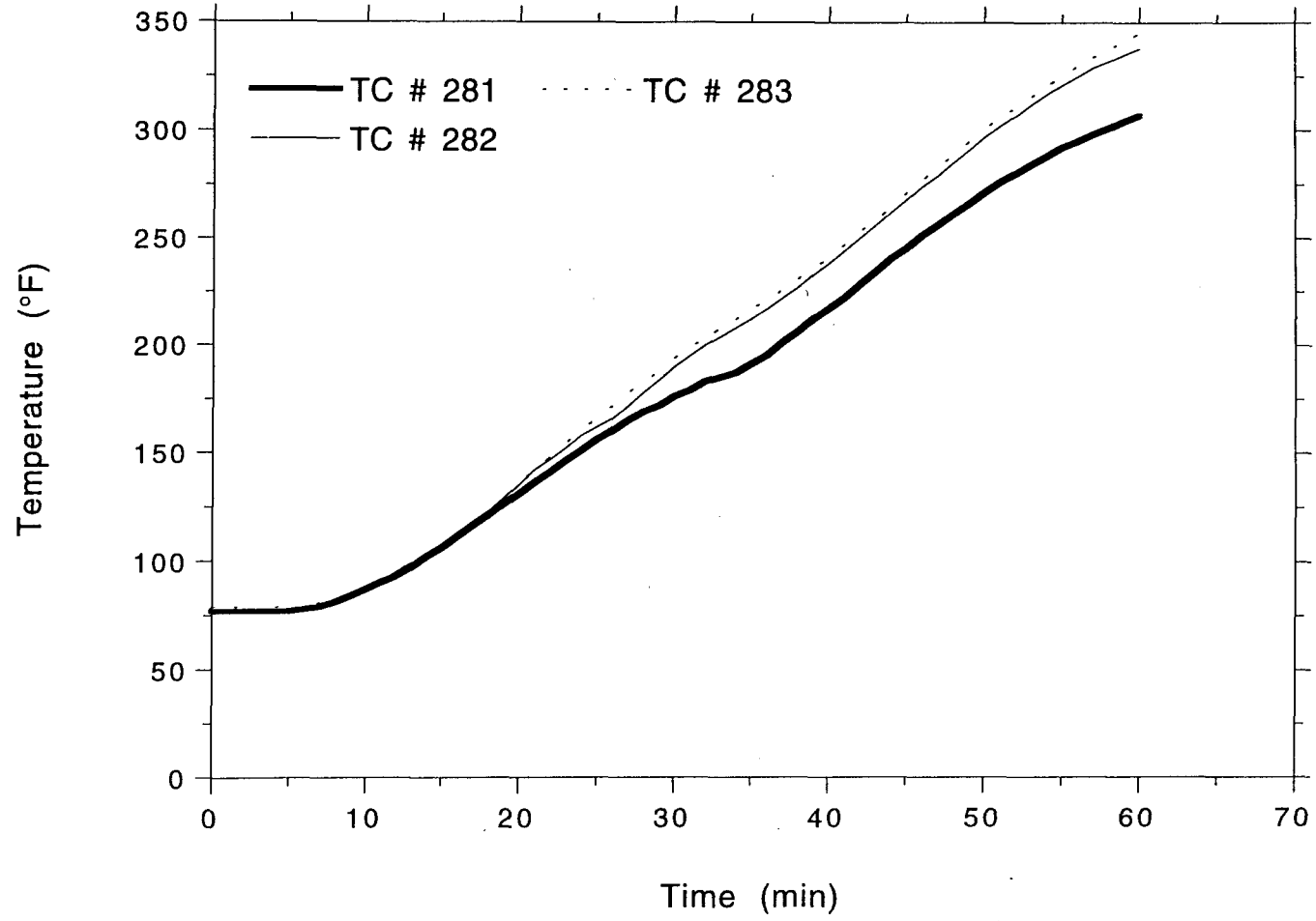
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Top Tray, #8 Wire



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
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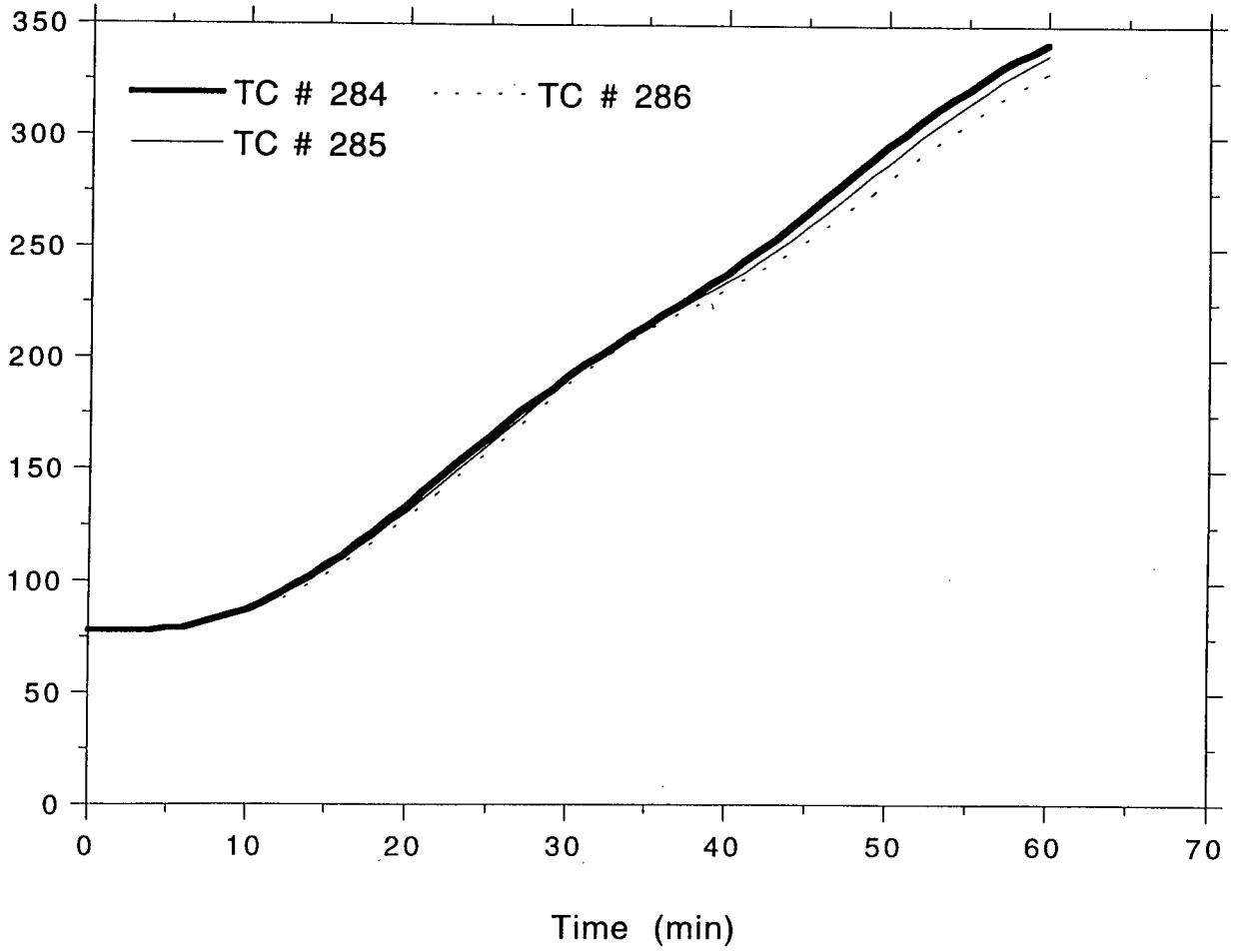
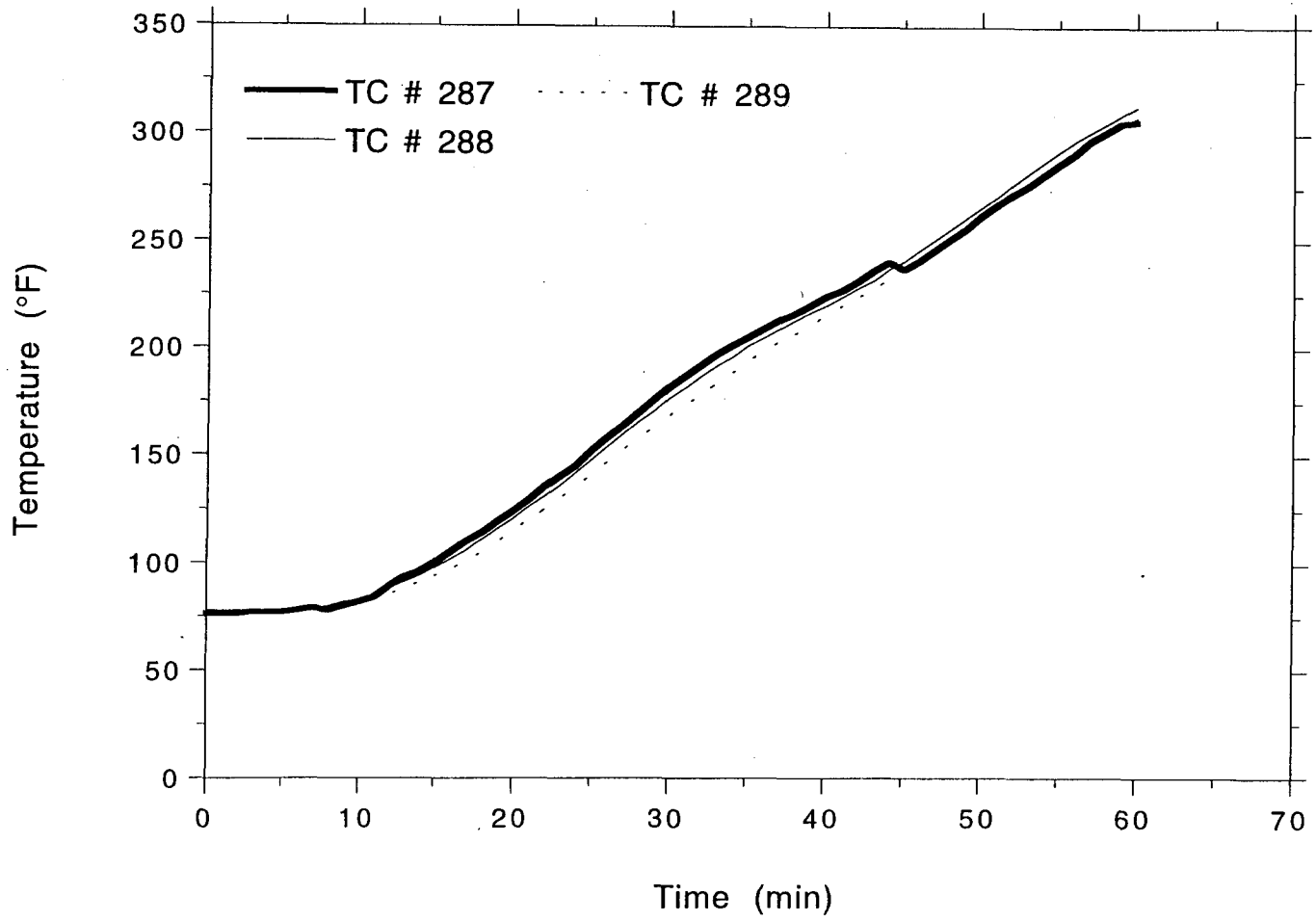


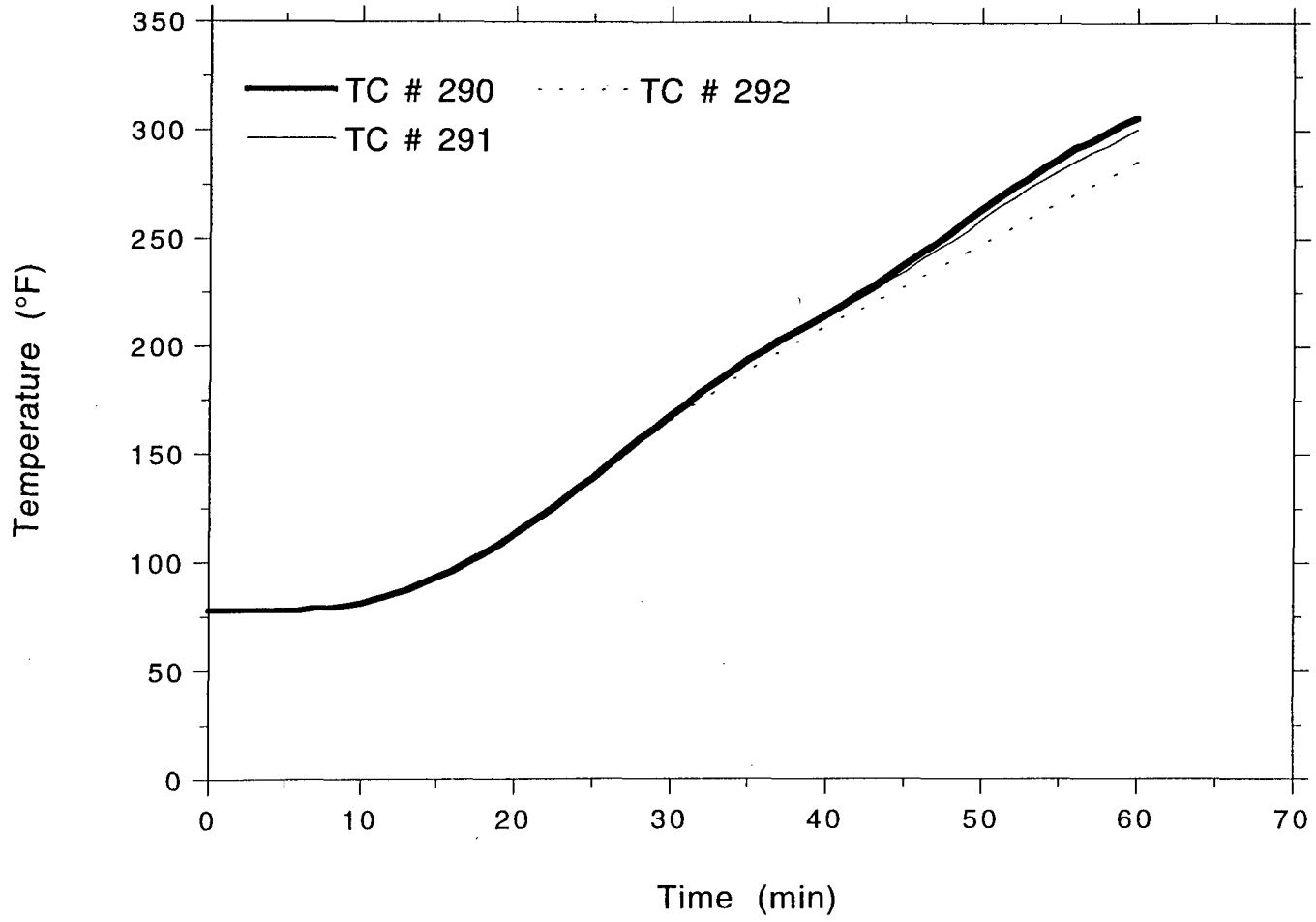
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



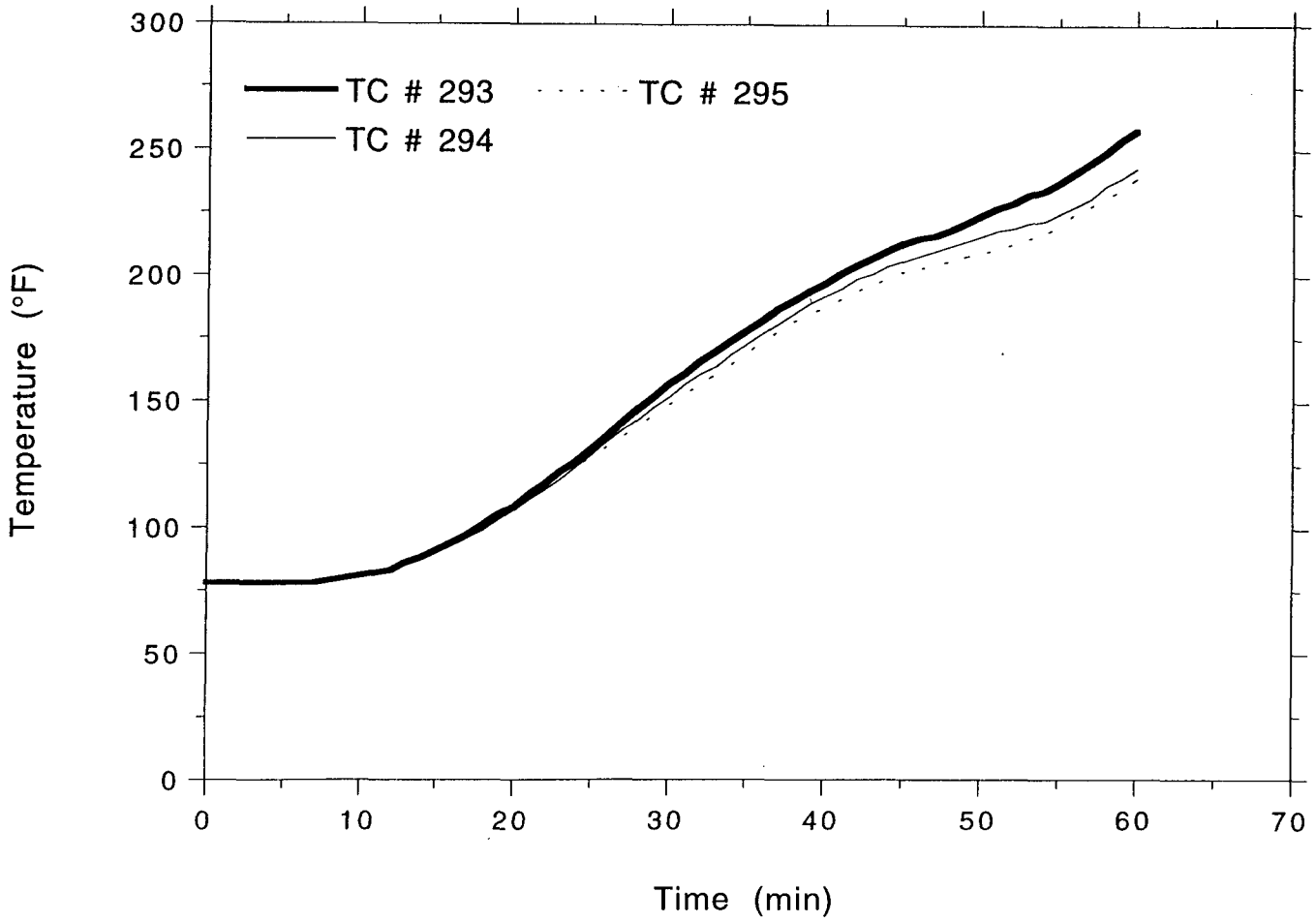
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



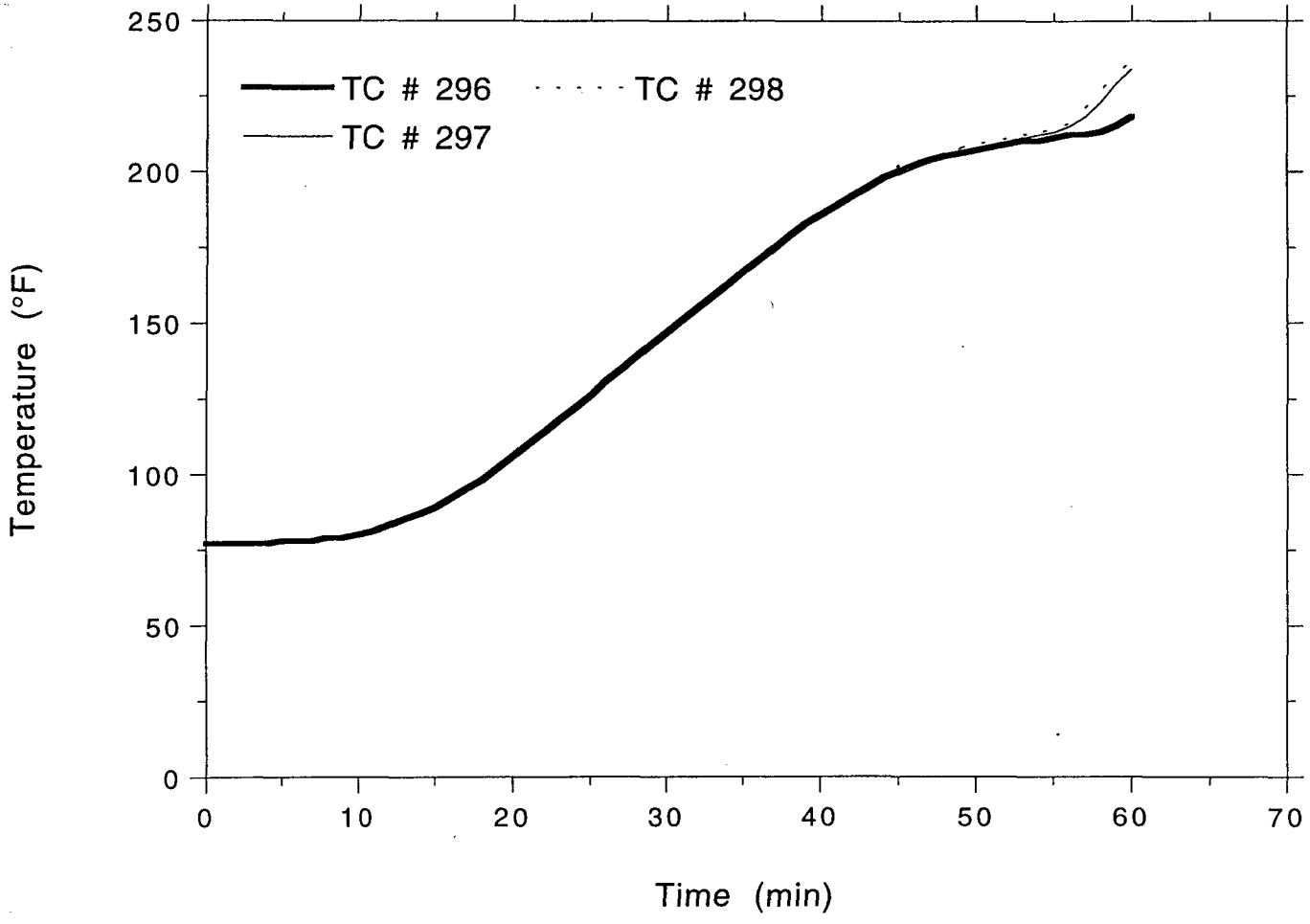
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



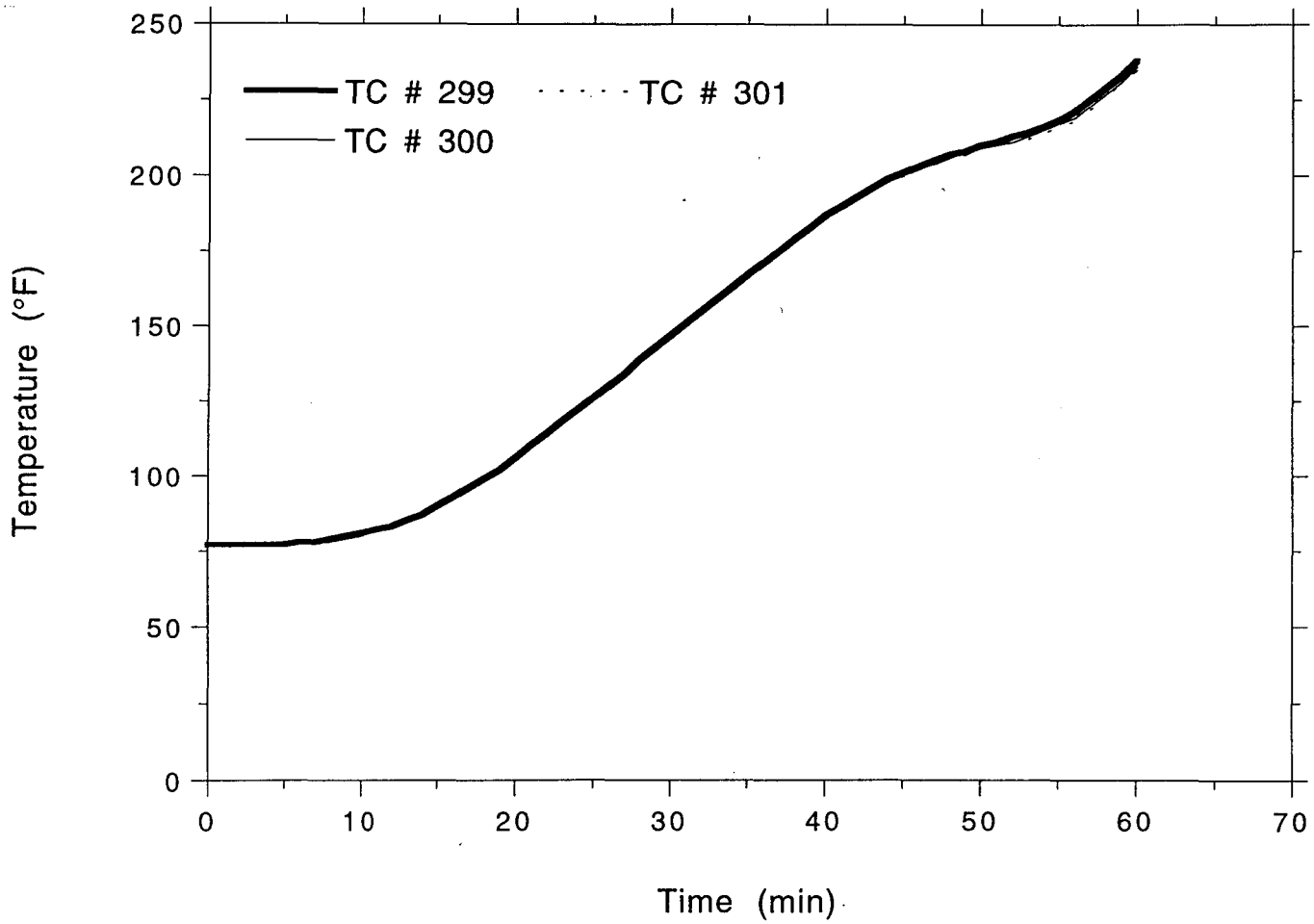
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



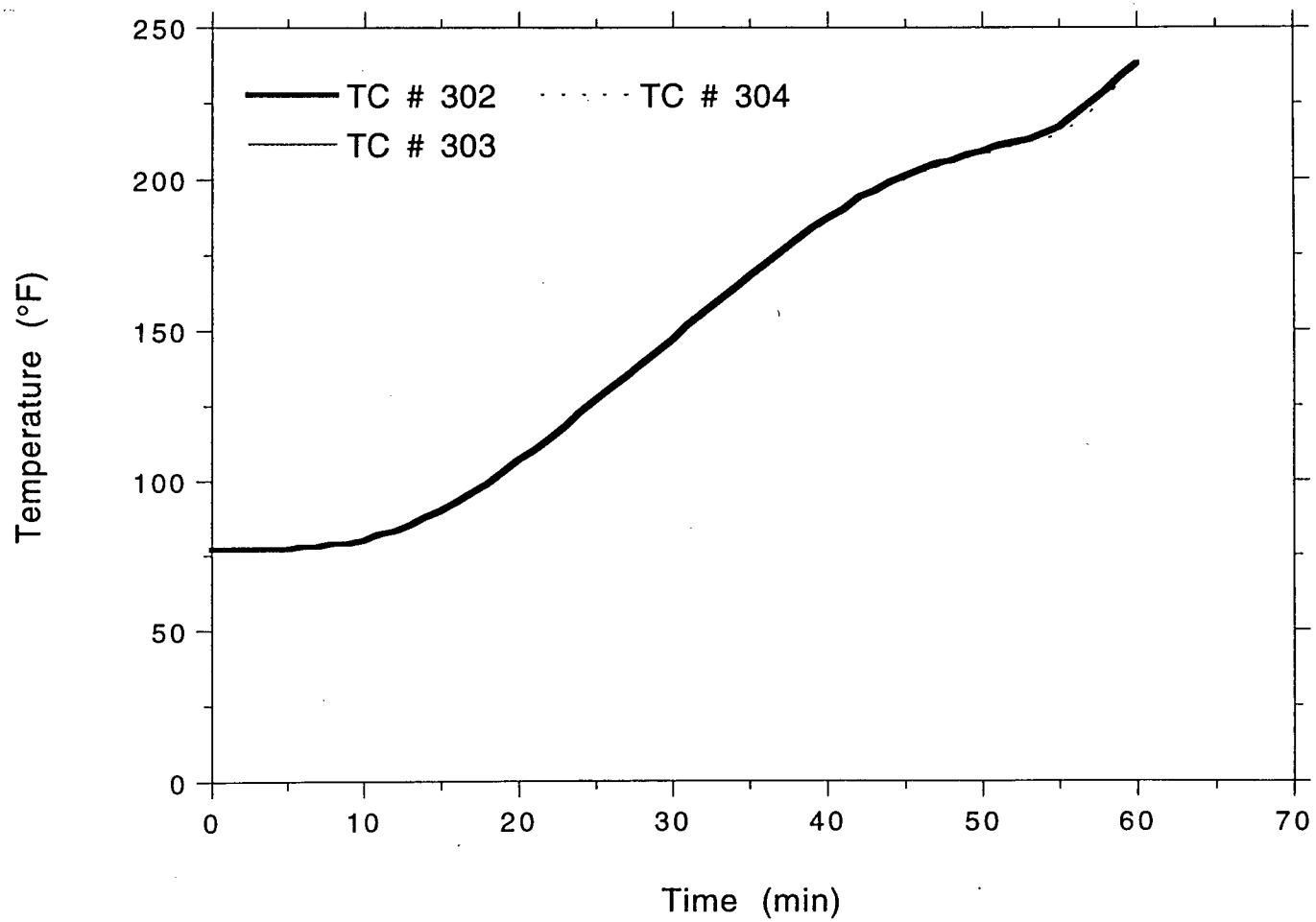
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



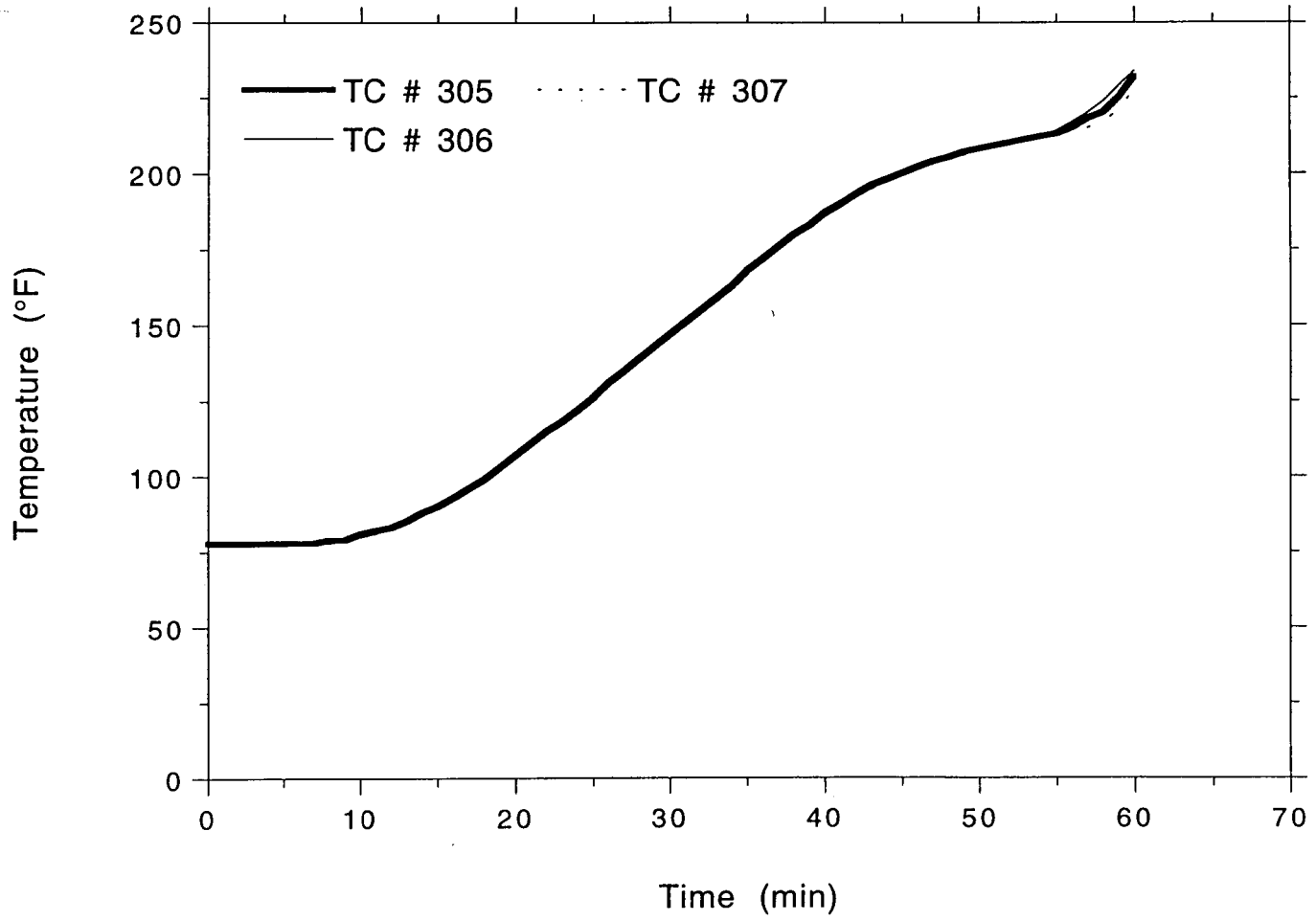
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



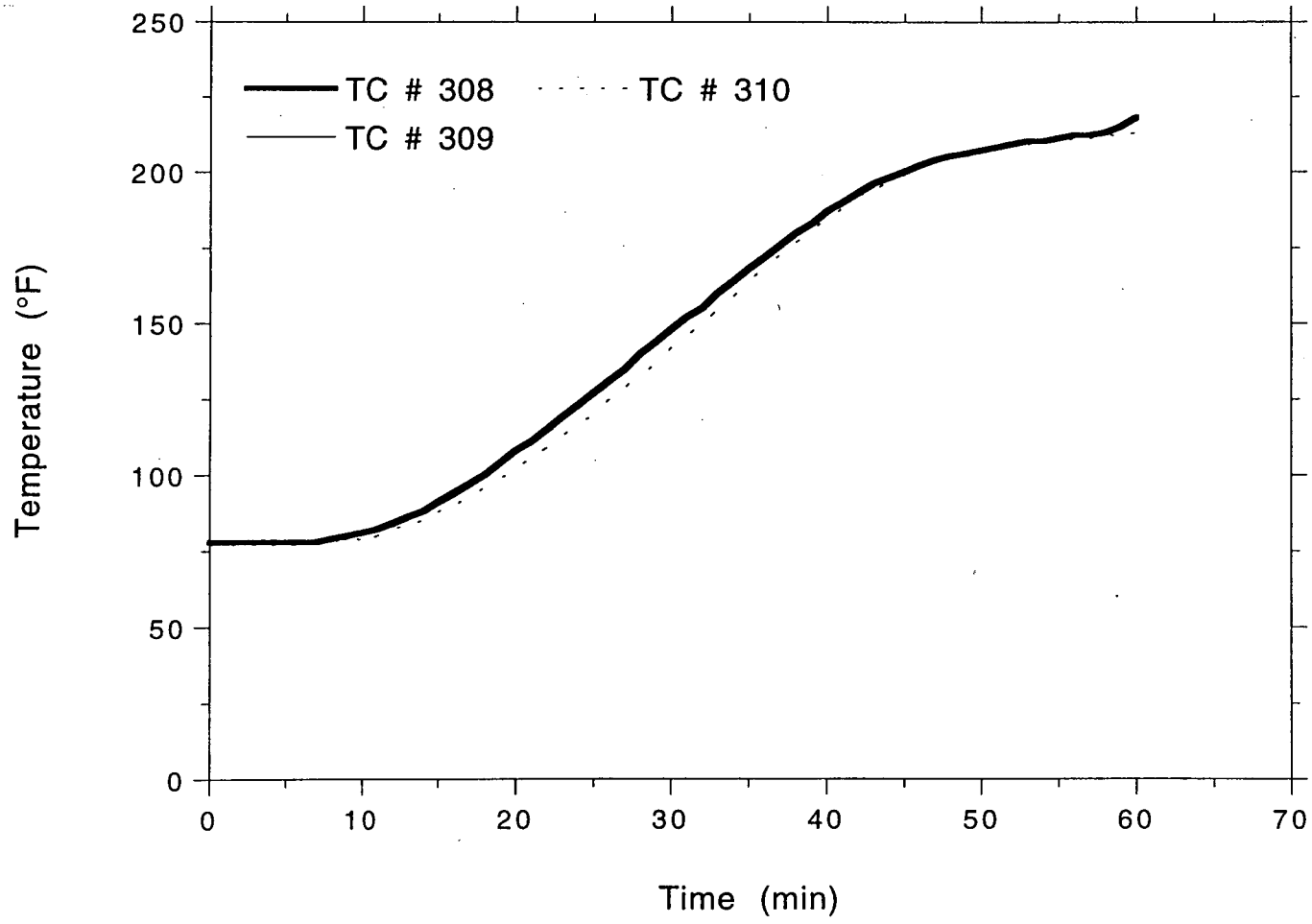
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



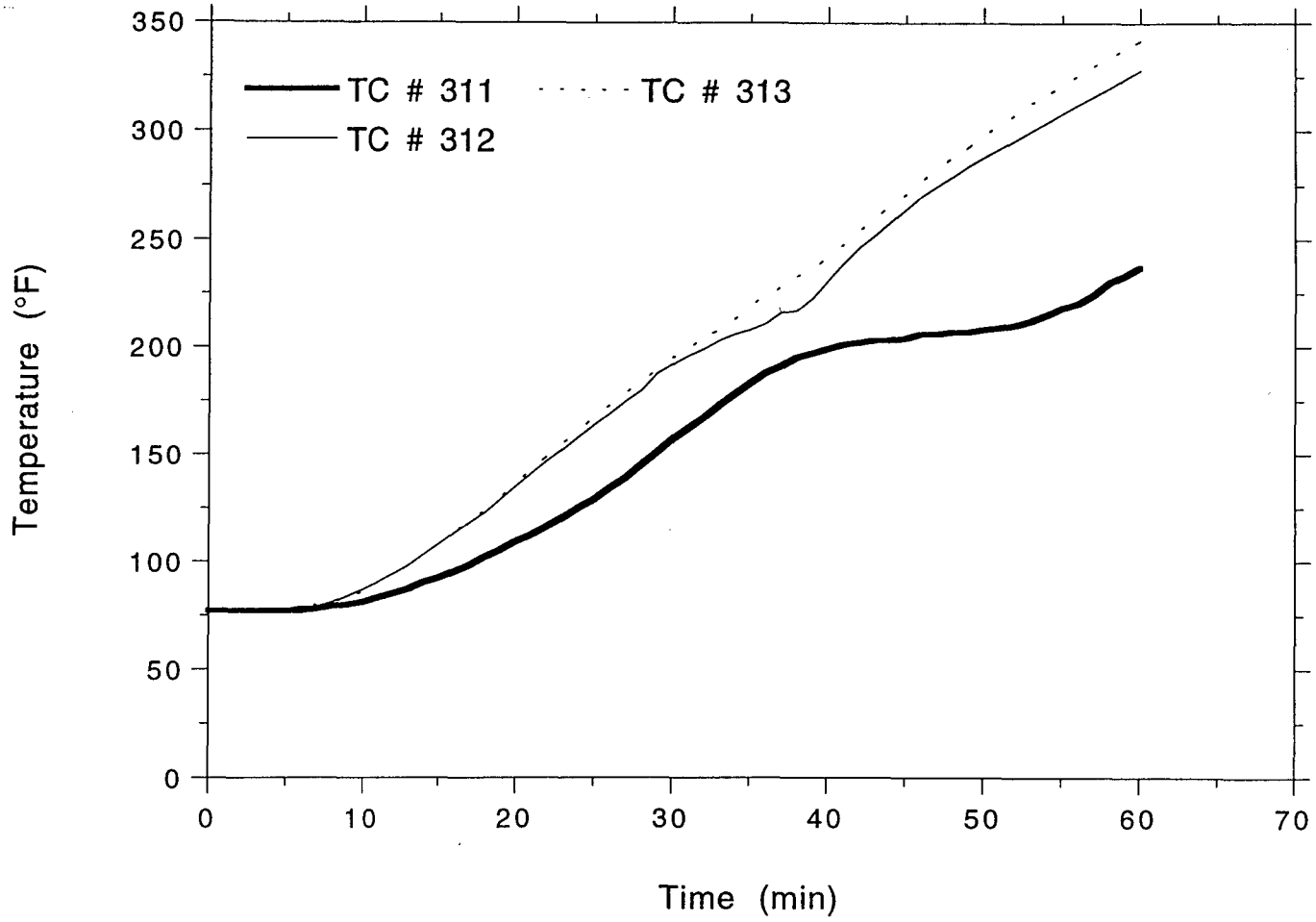
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Center Tray, #8 Wire



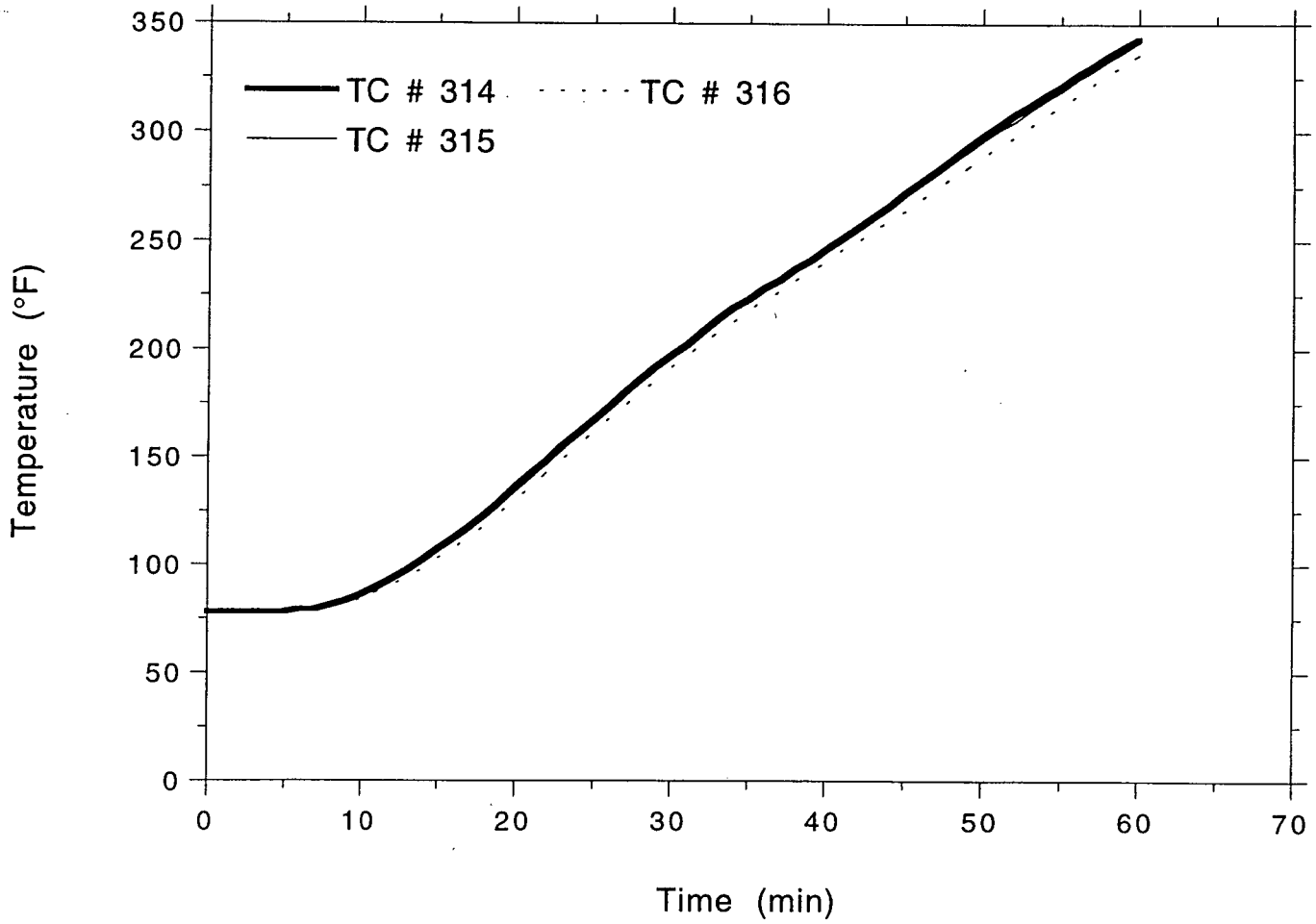
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



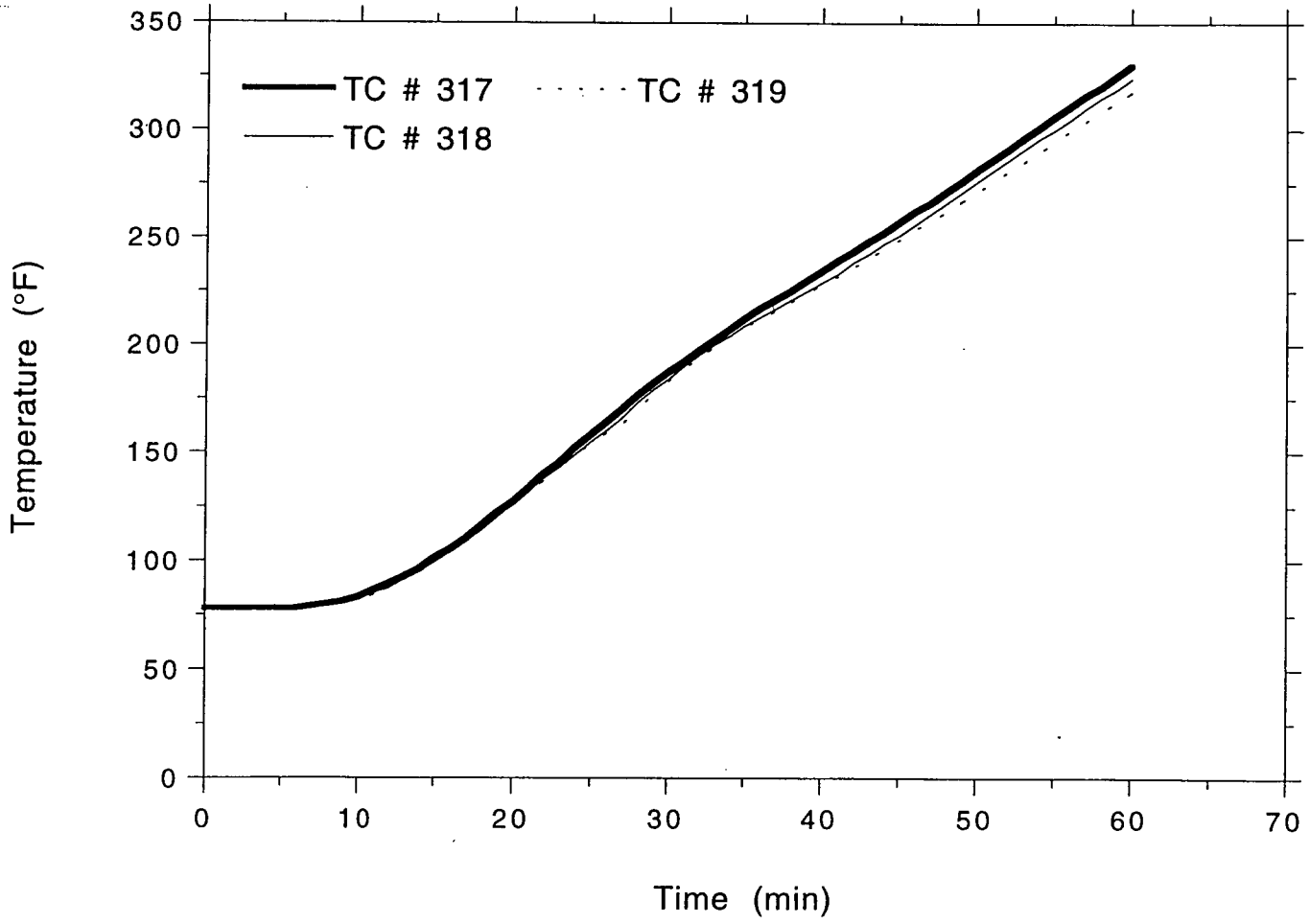
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



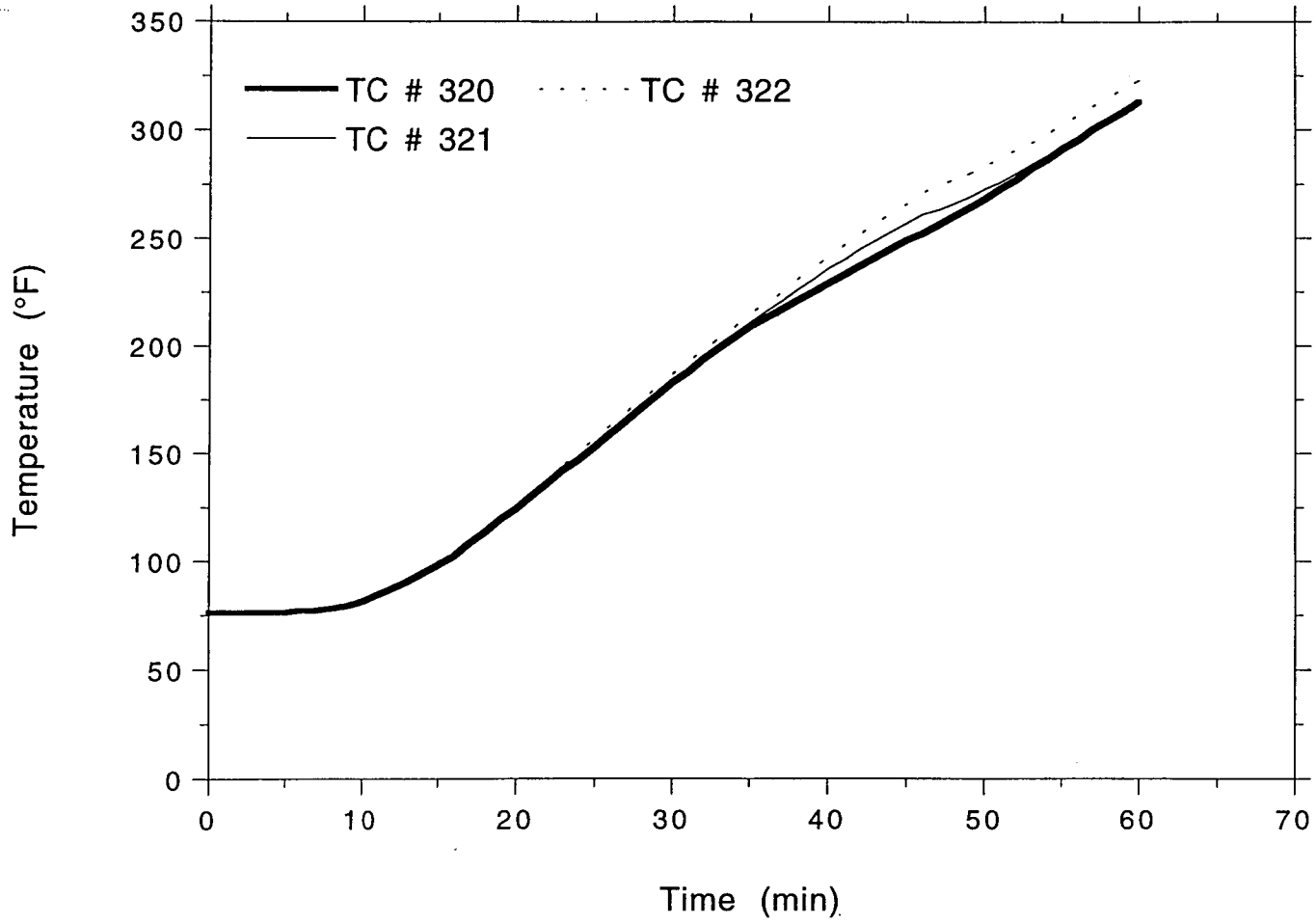
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



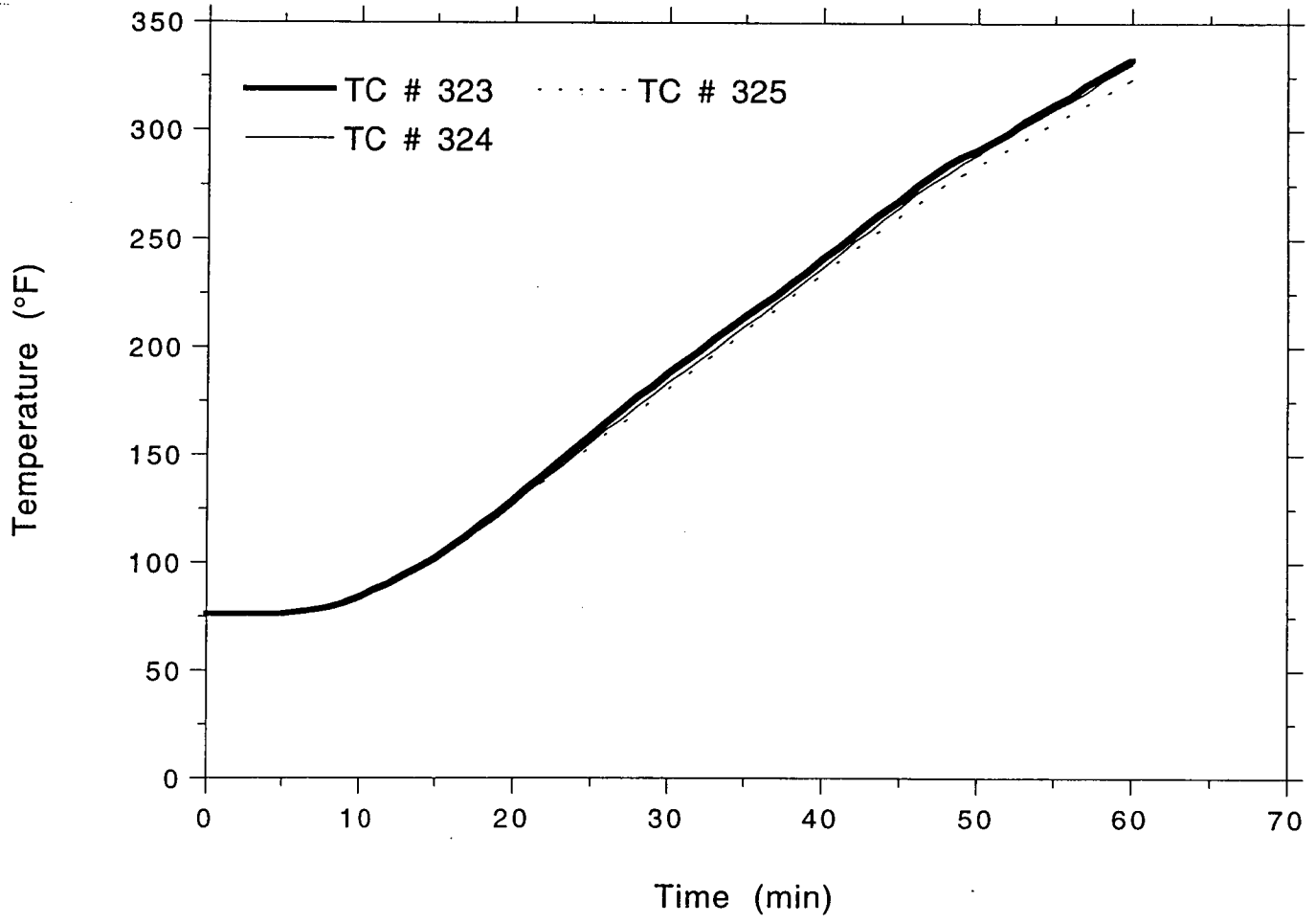
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



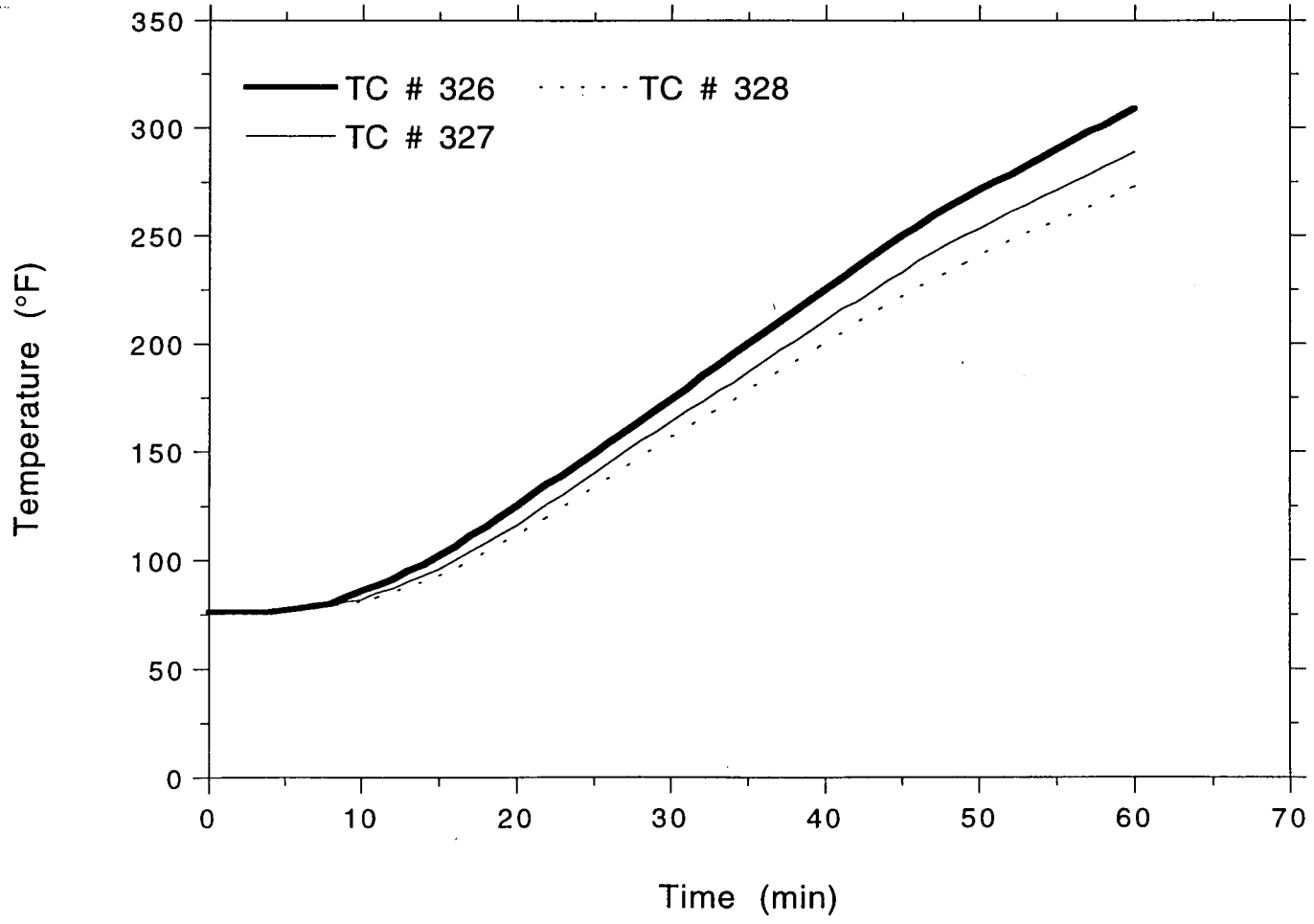
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



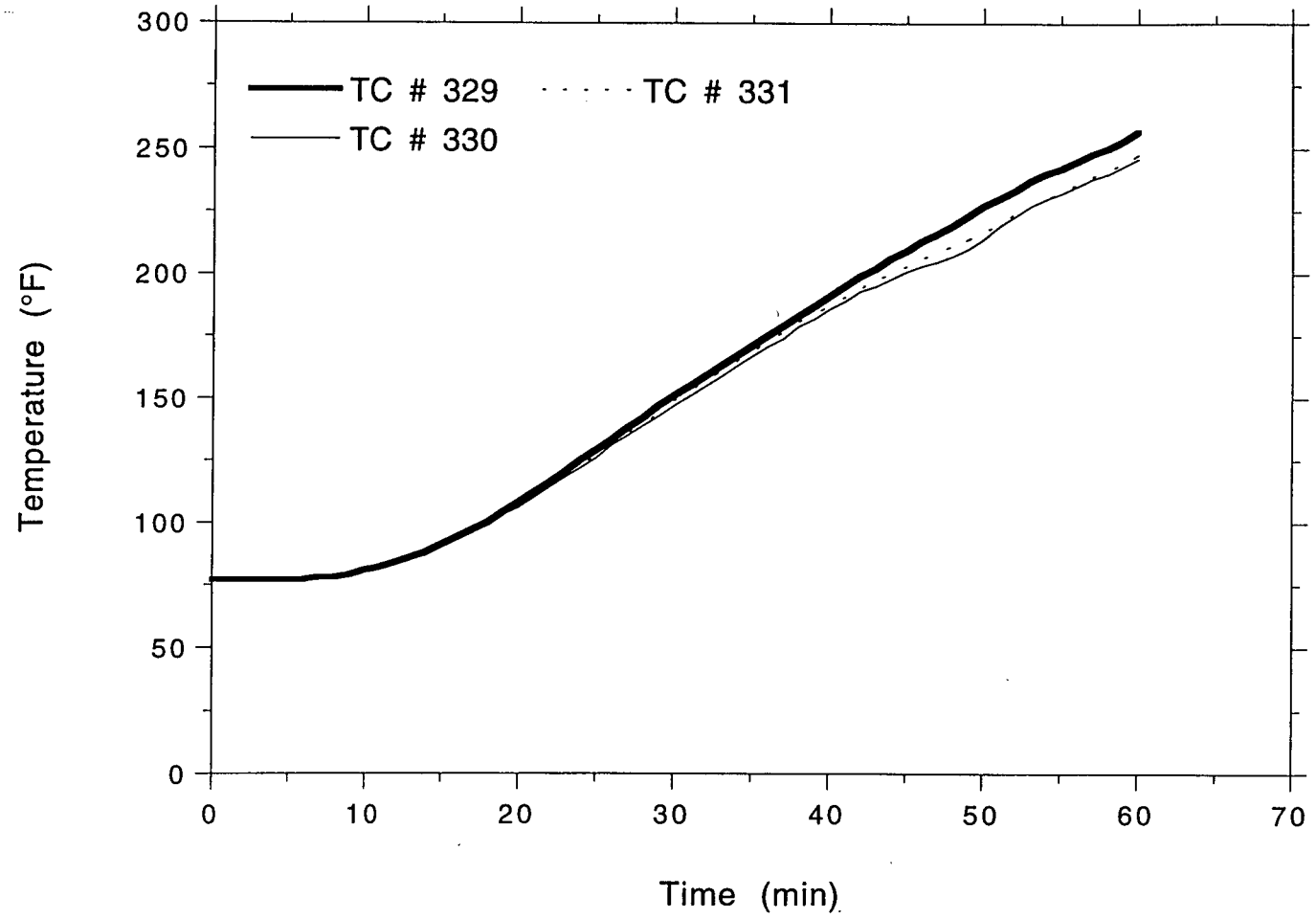
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



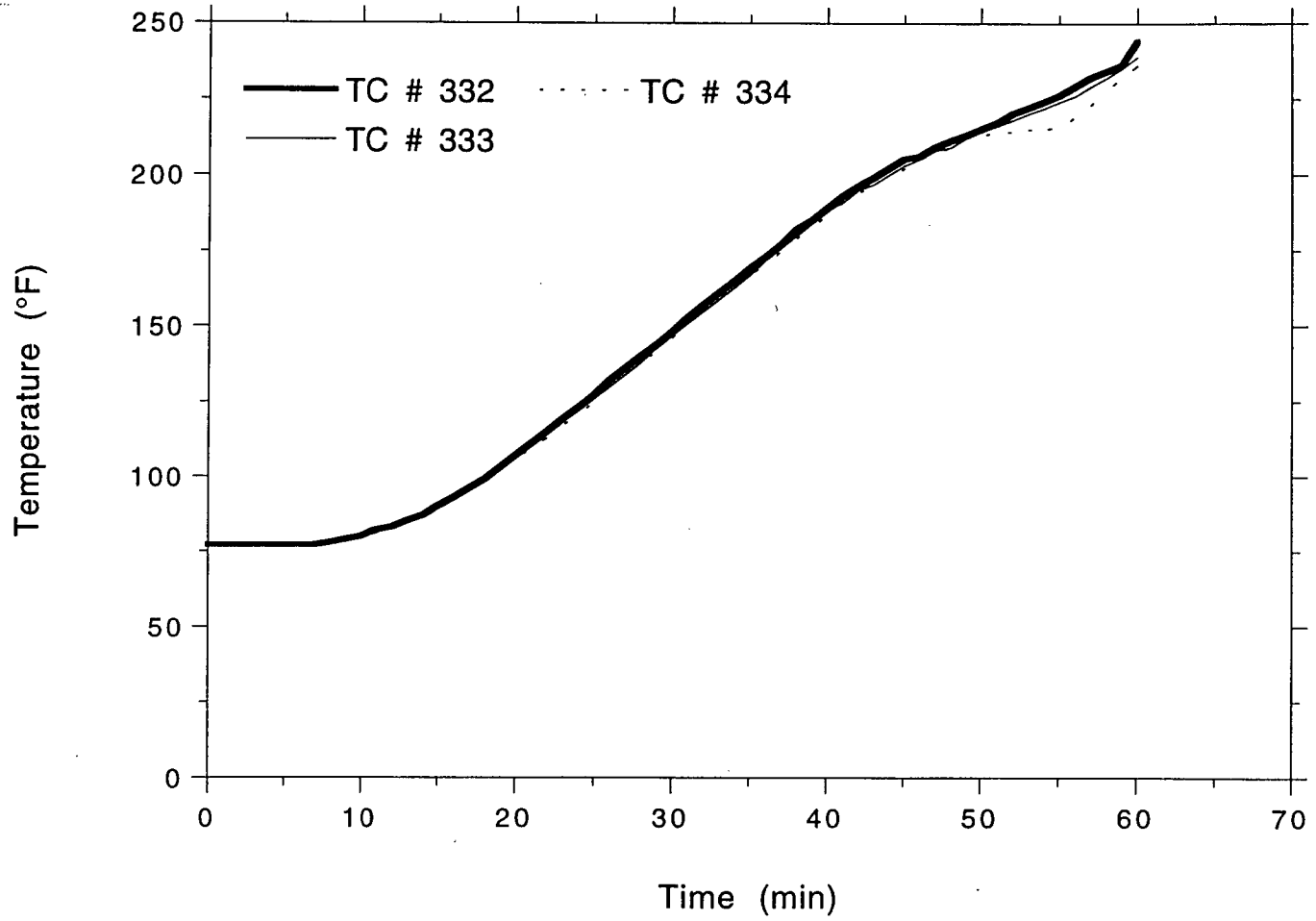
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



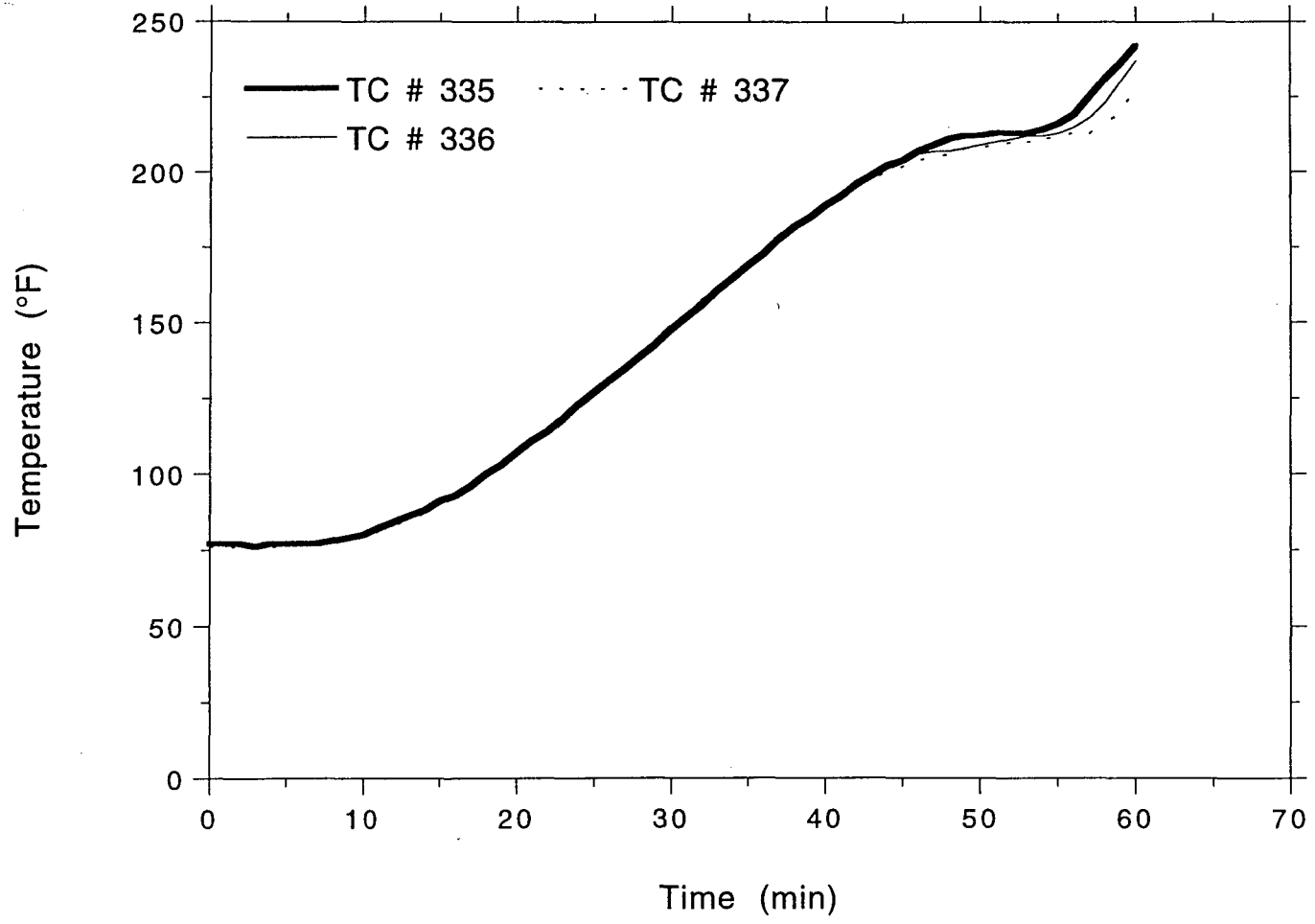
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



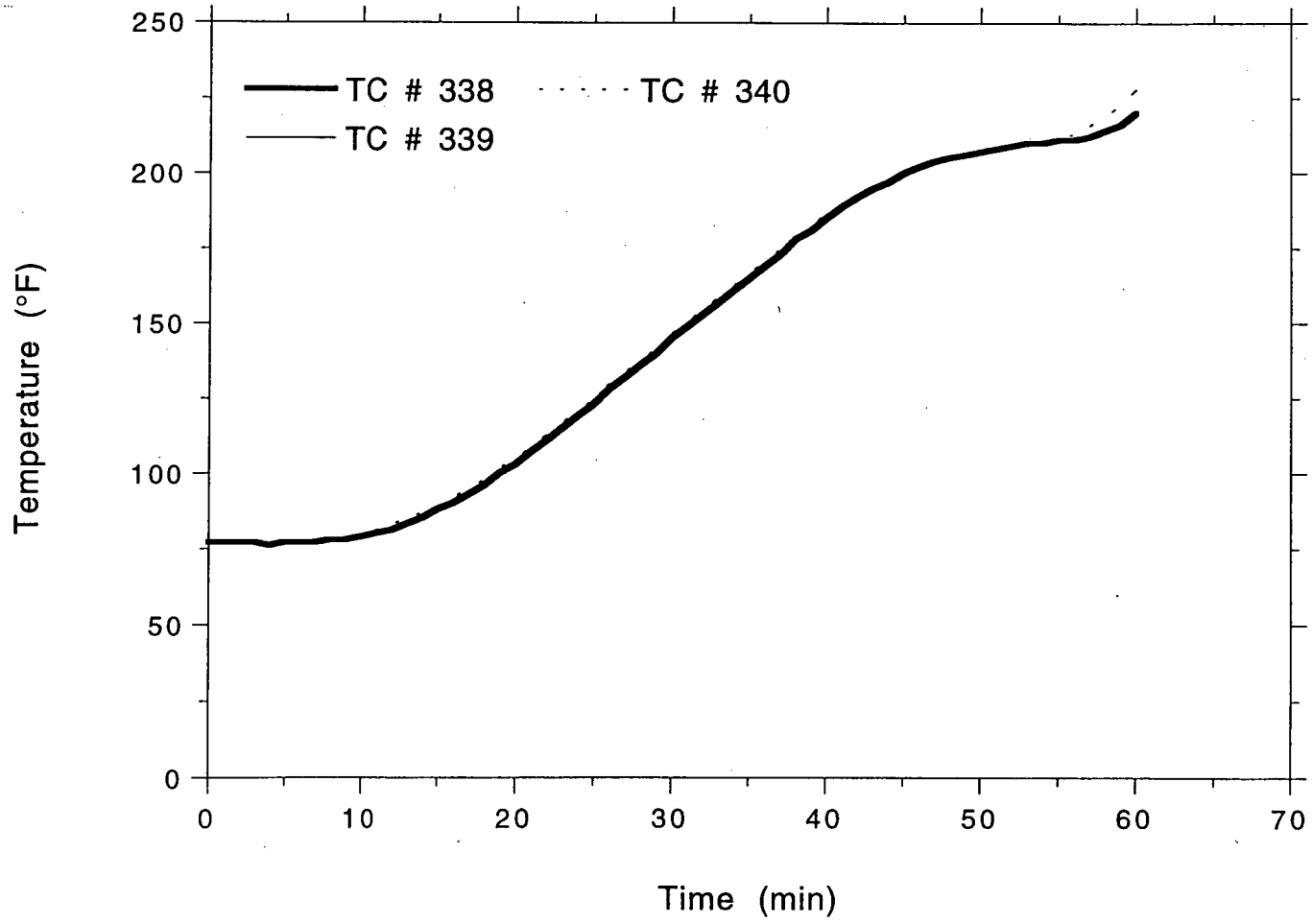
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



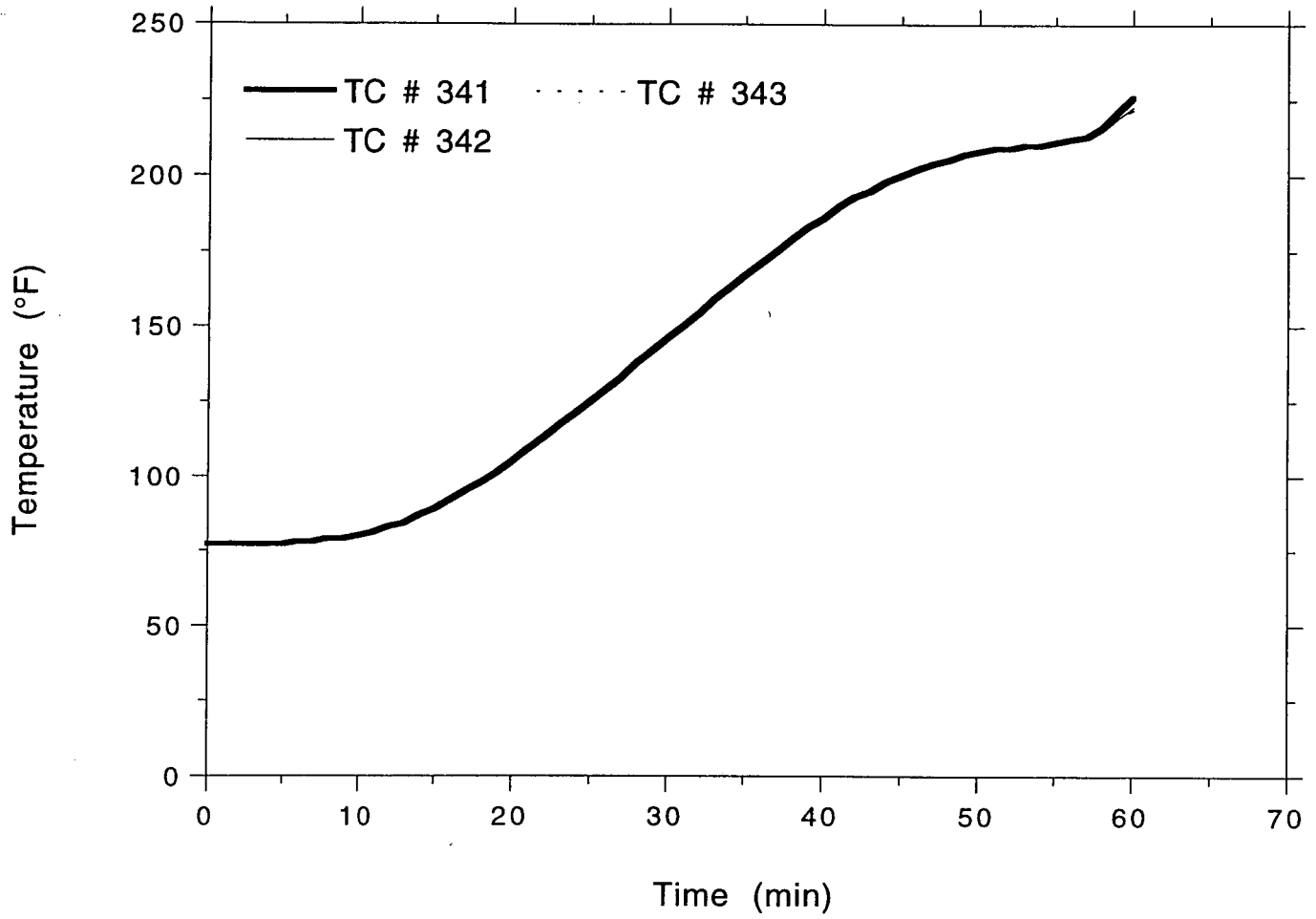
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



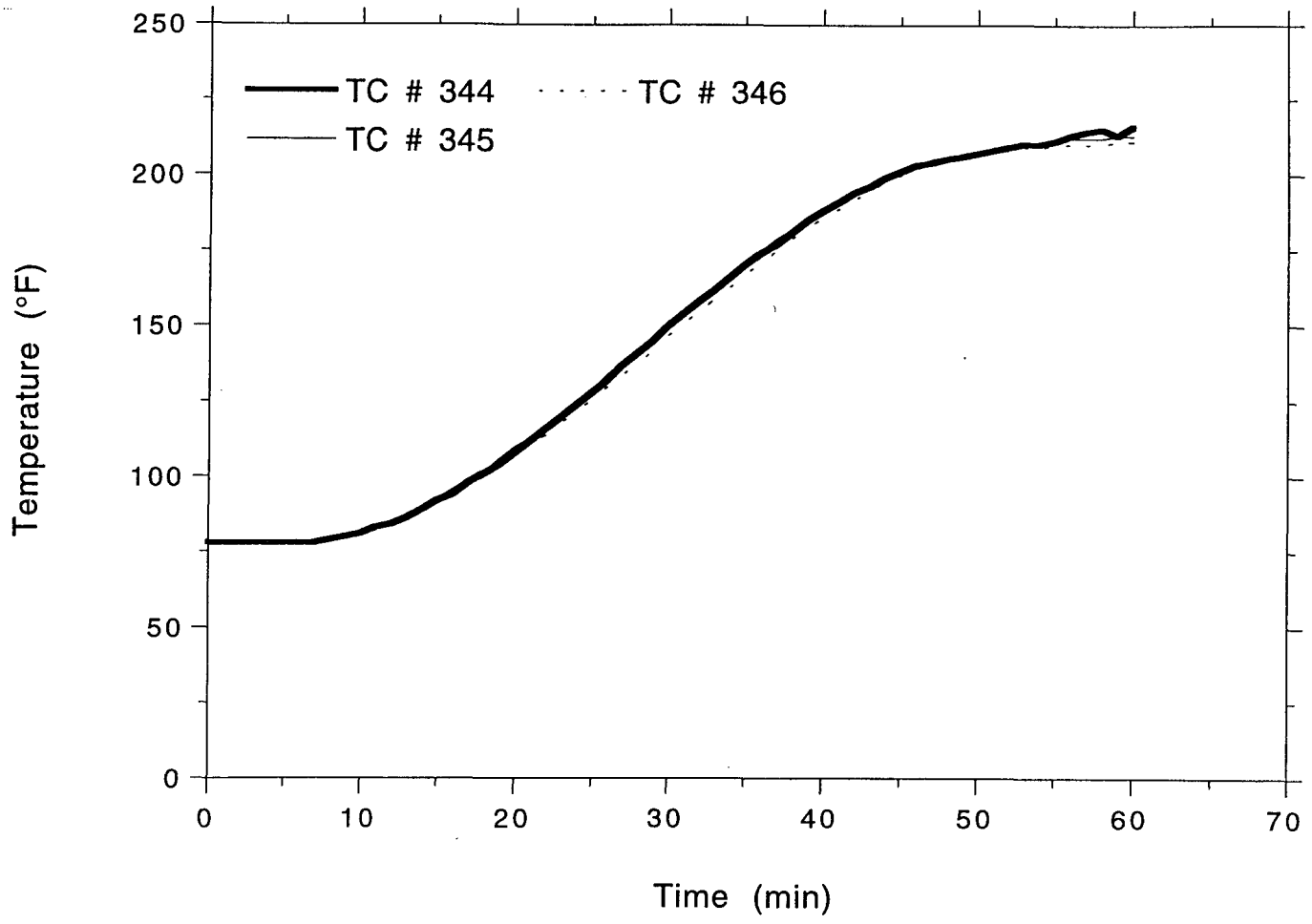
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



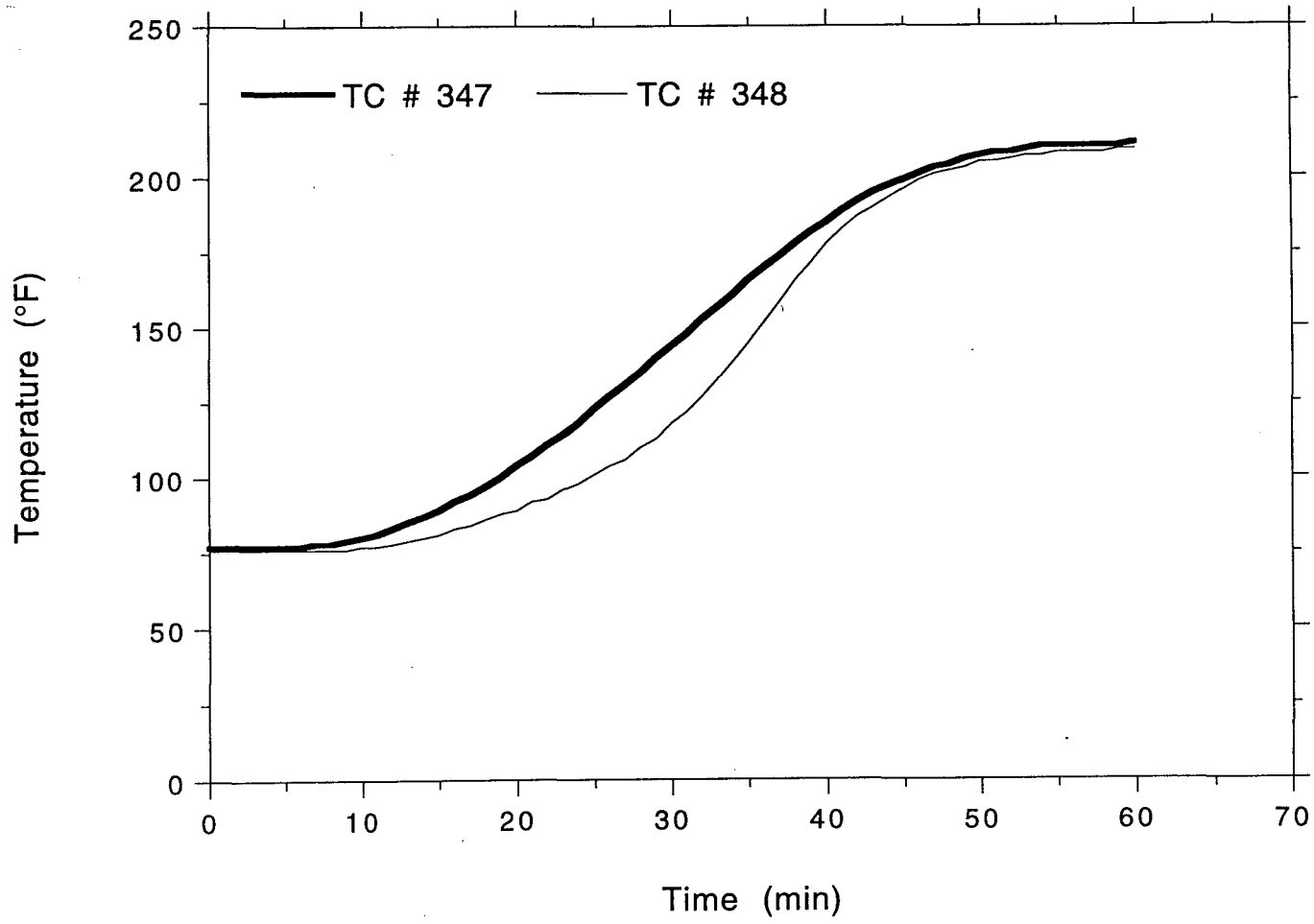
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



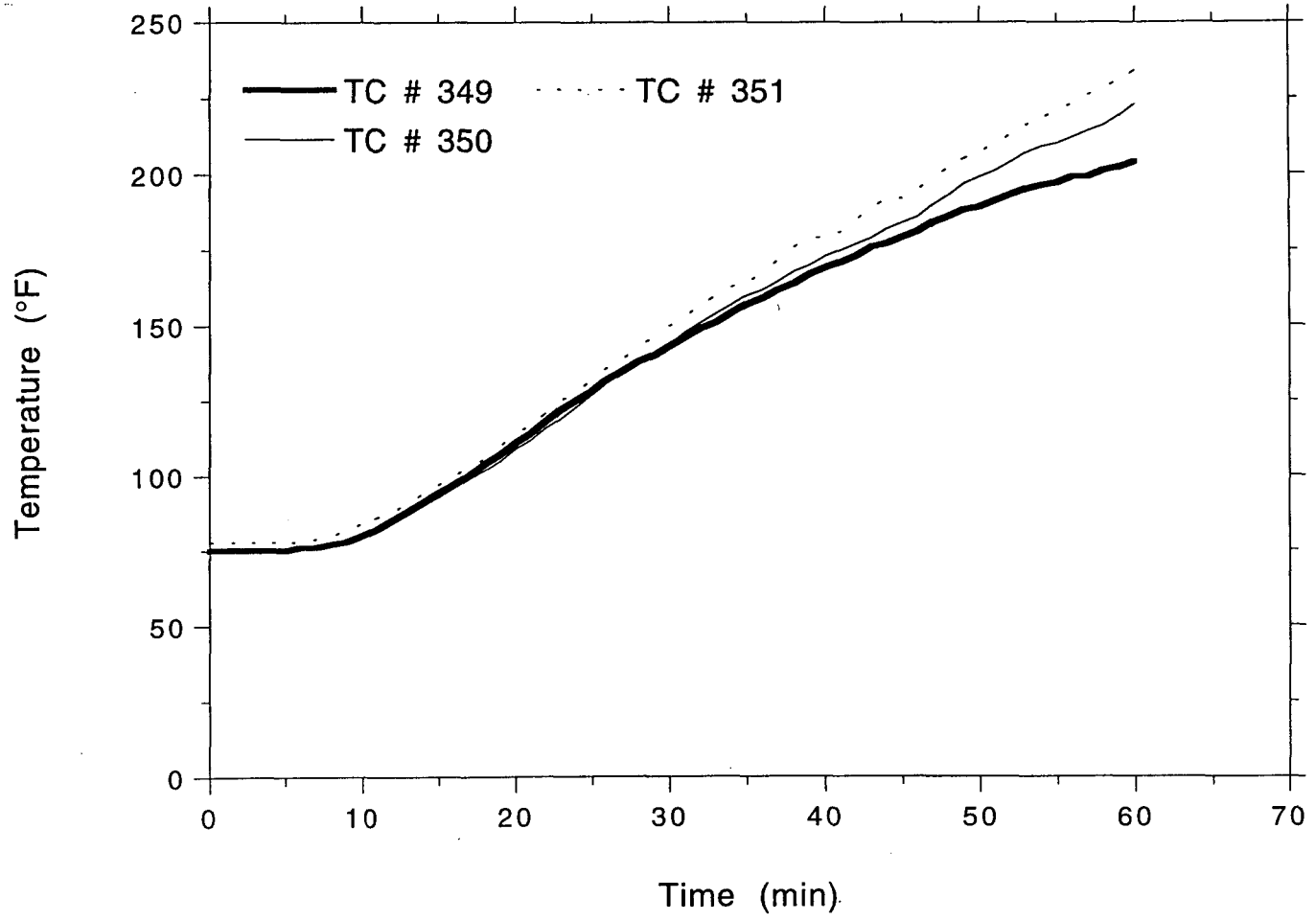
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Bottom Tray, #8 Wire



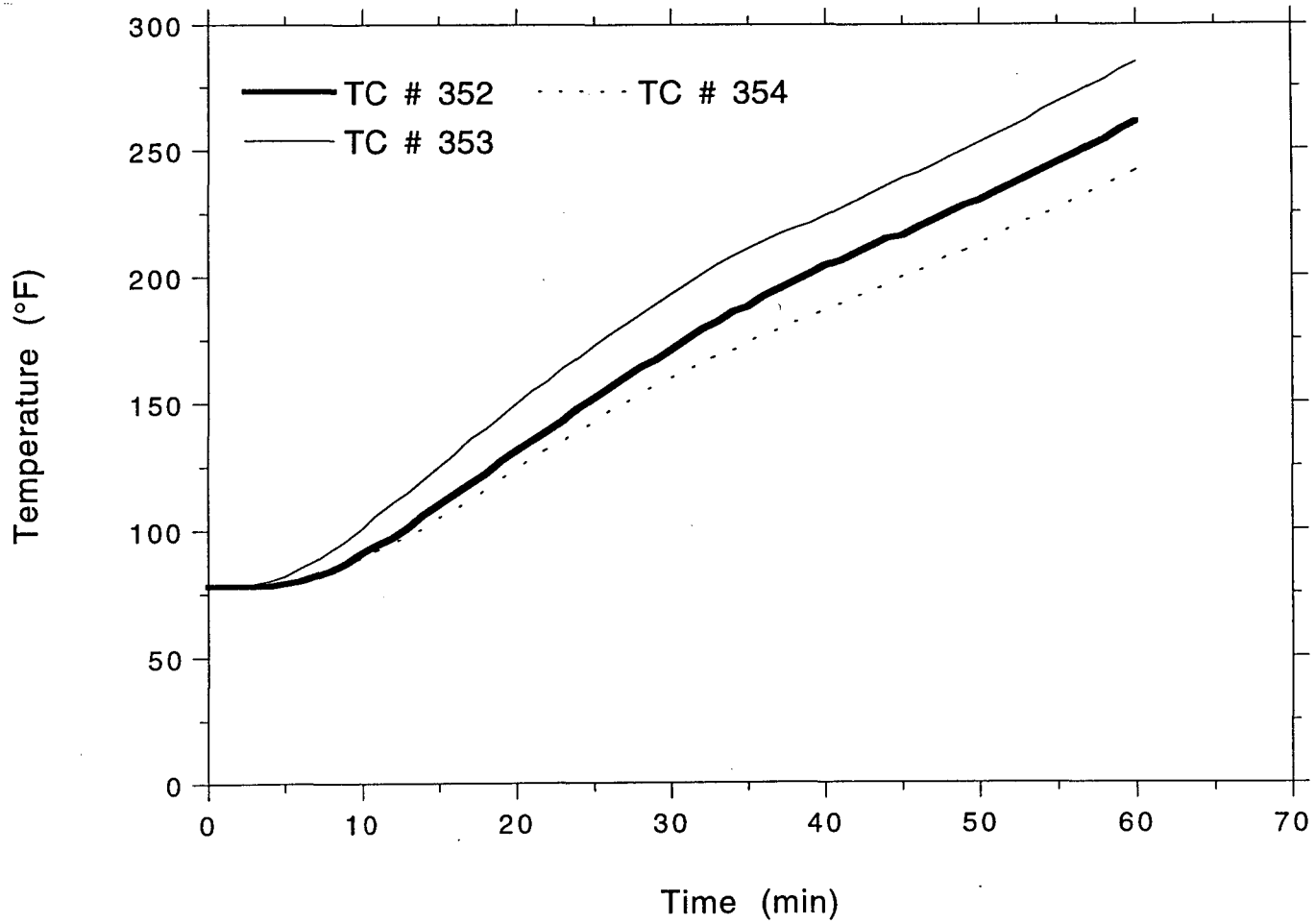
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



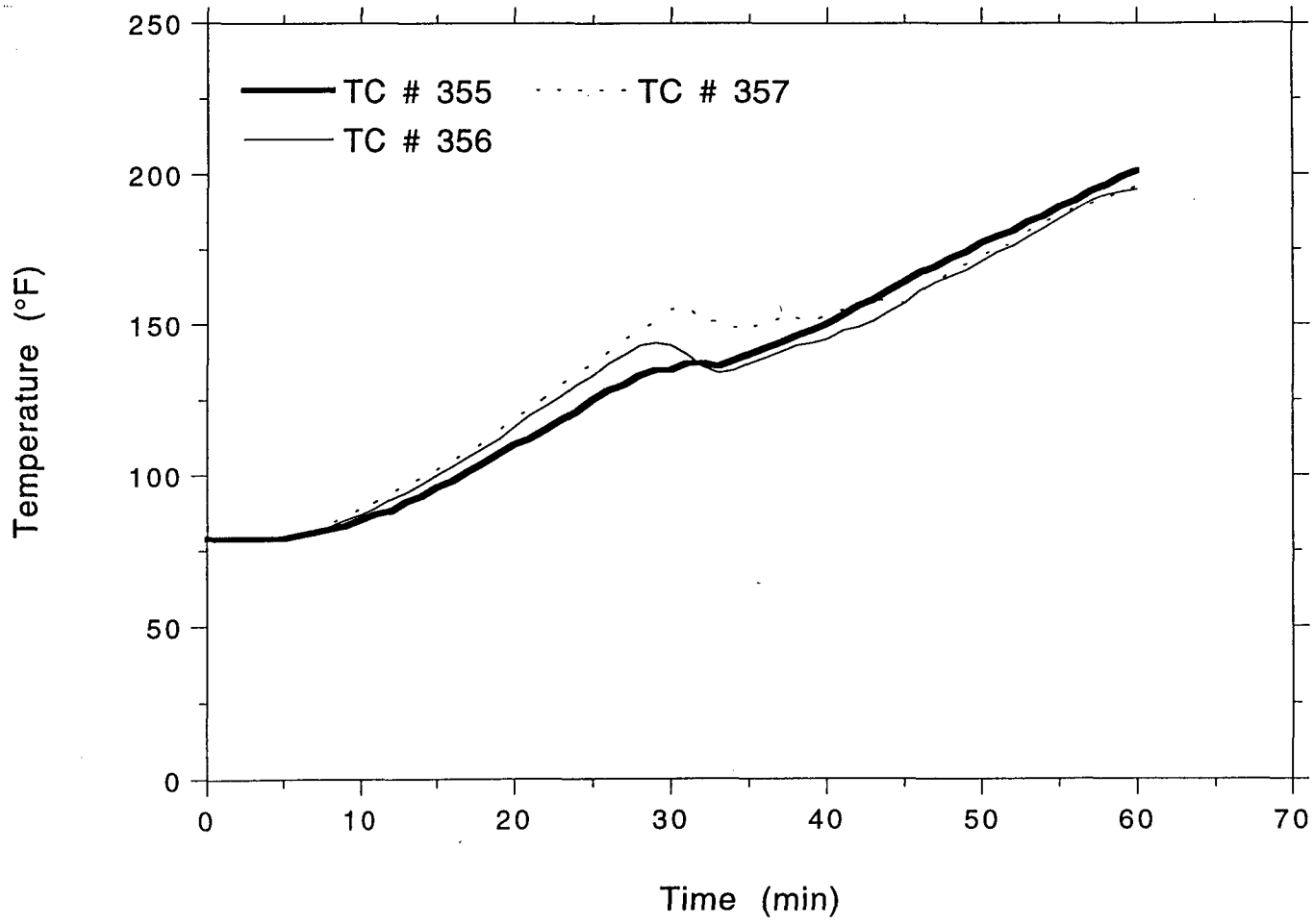
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



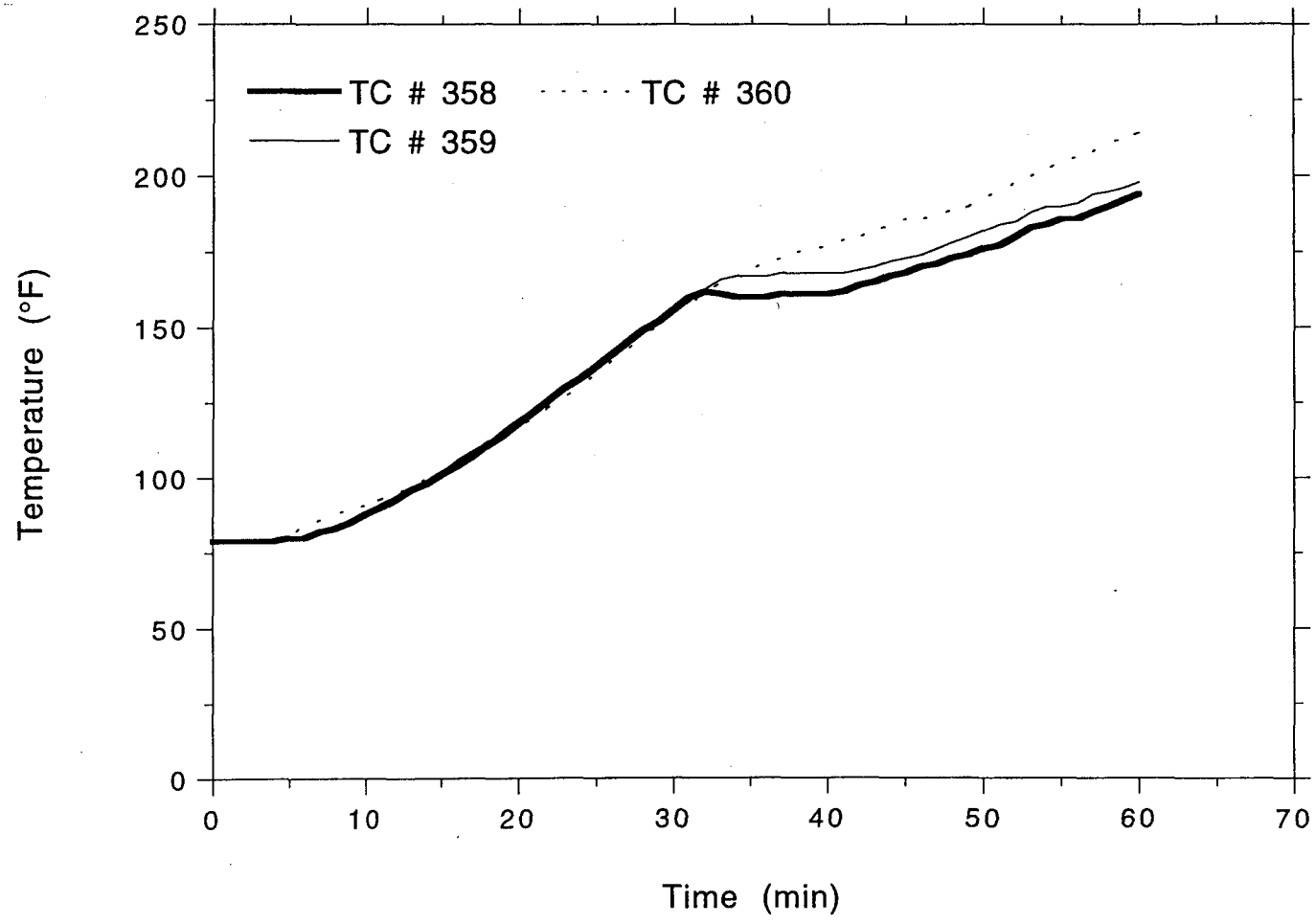
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



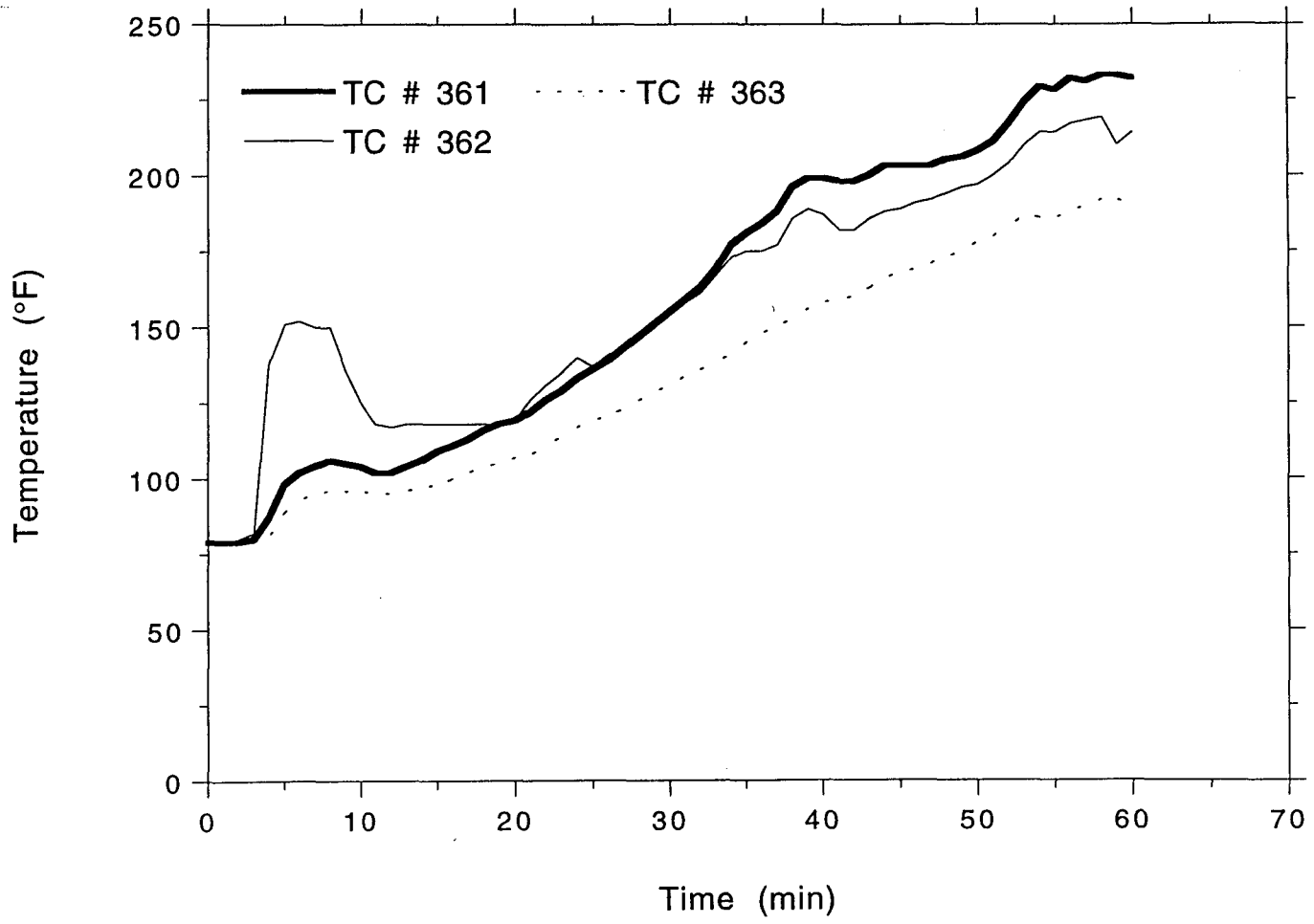
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



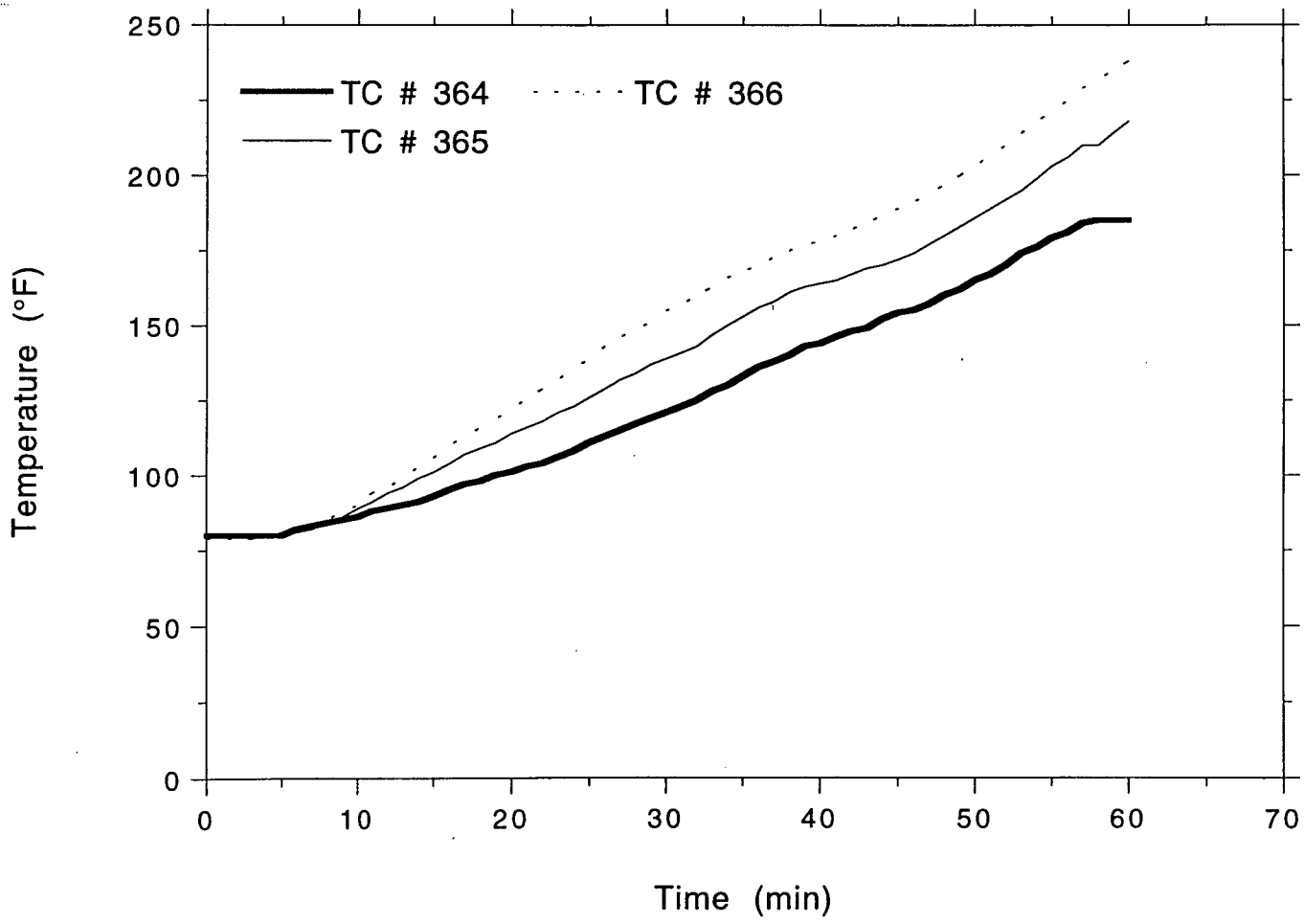
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



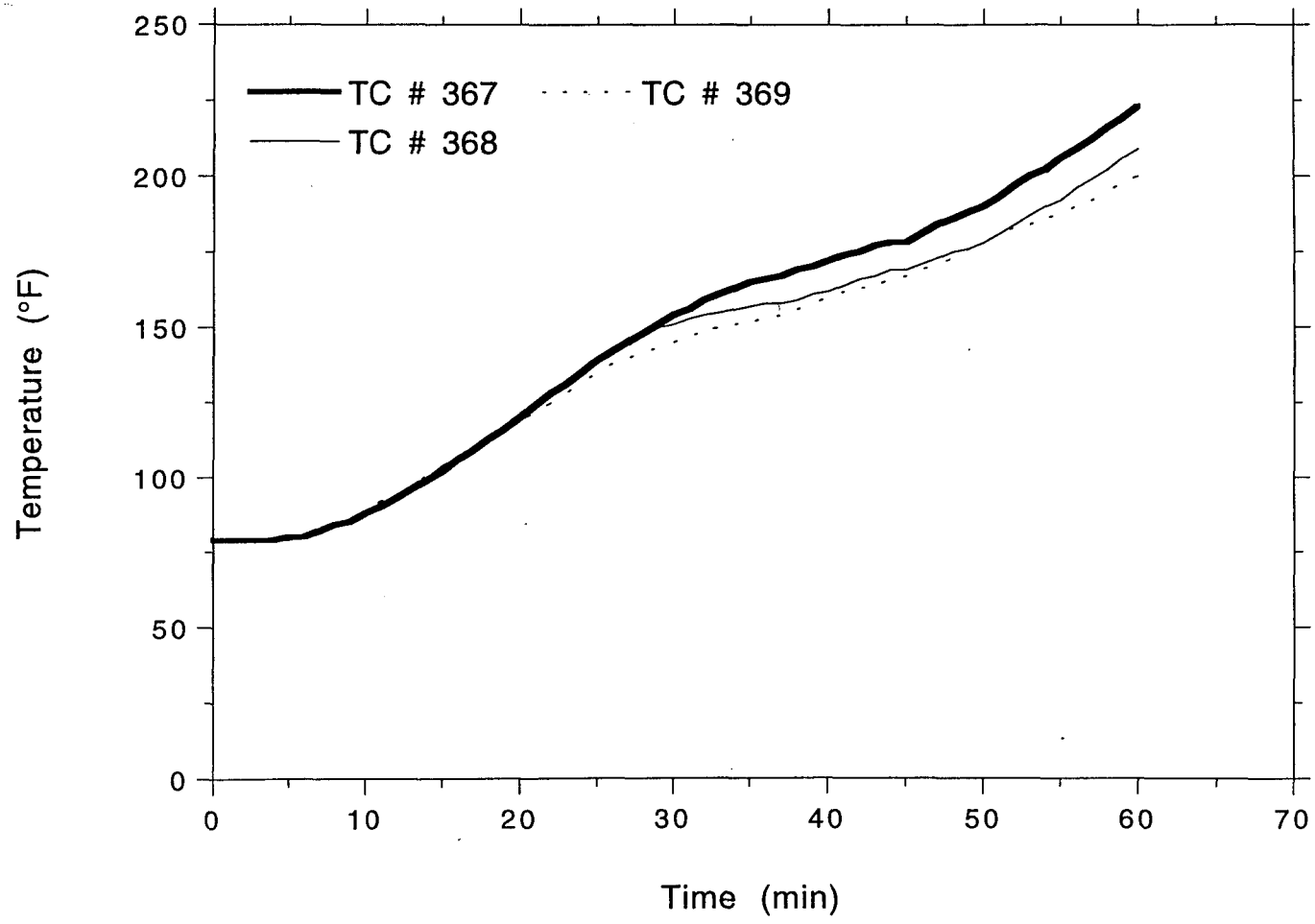
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



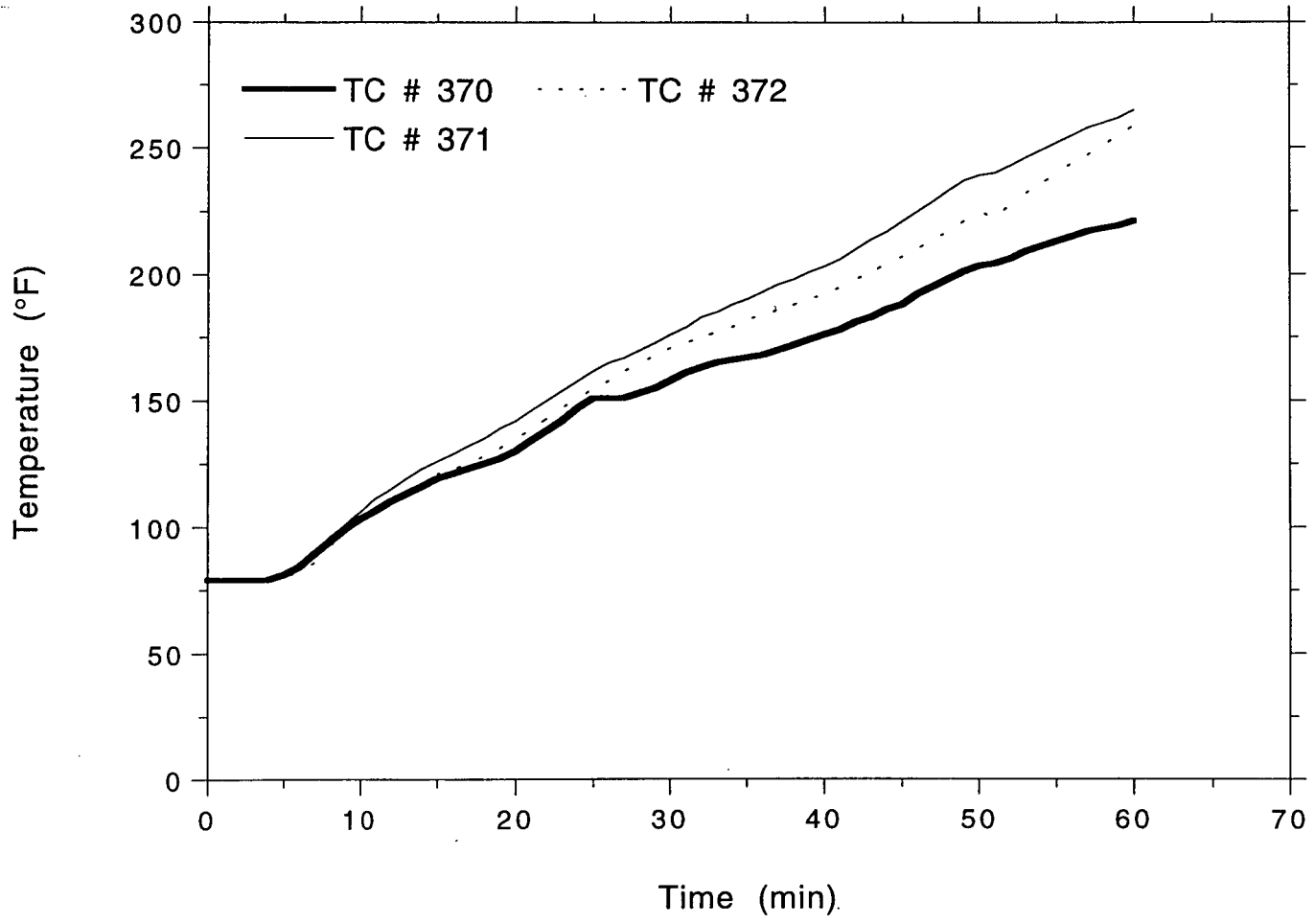
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



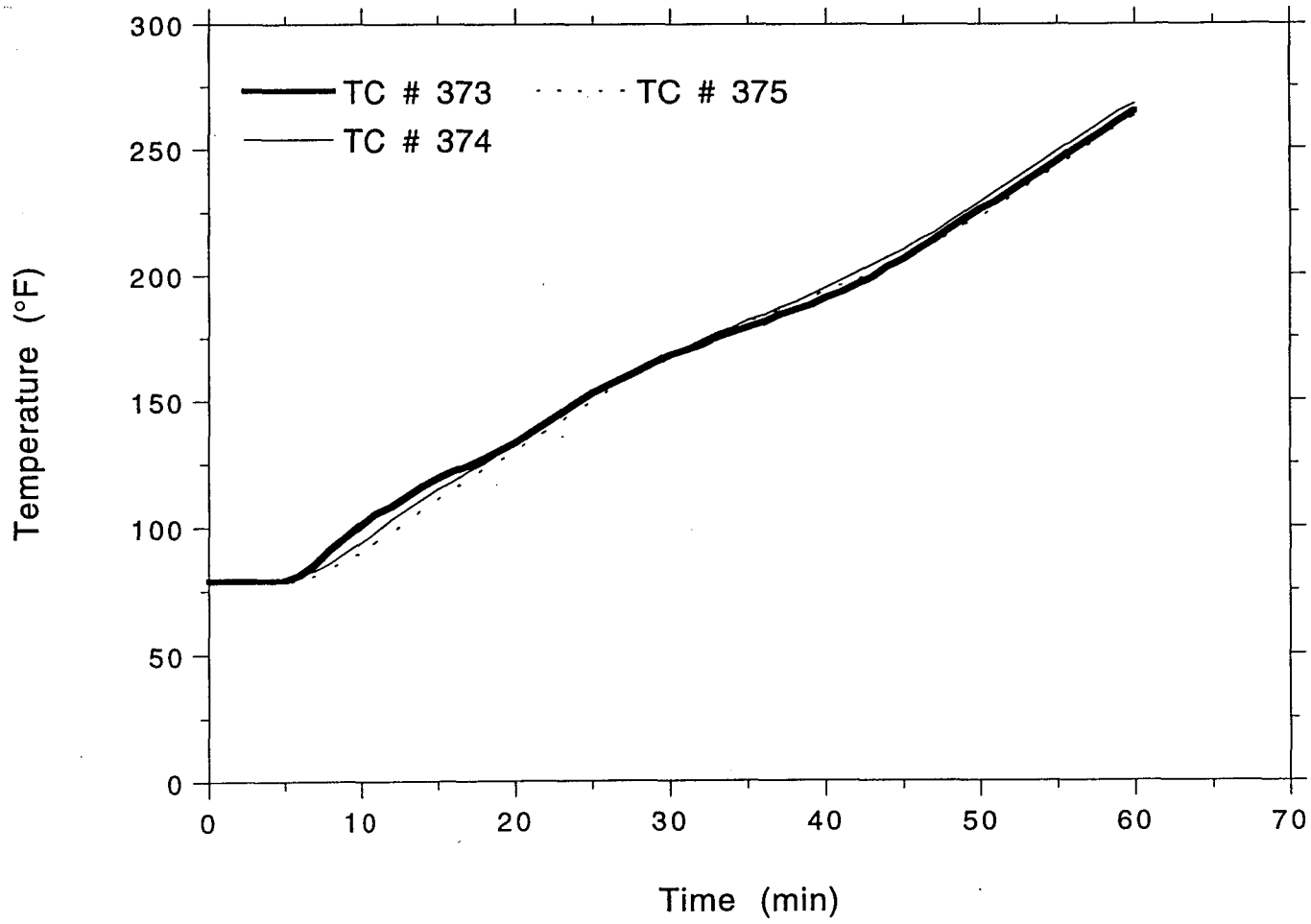
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



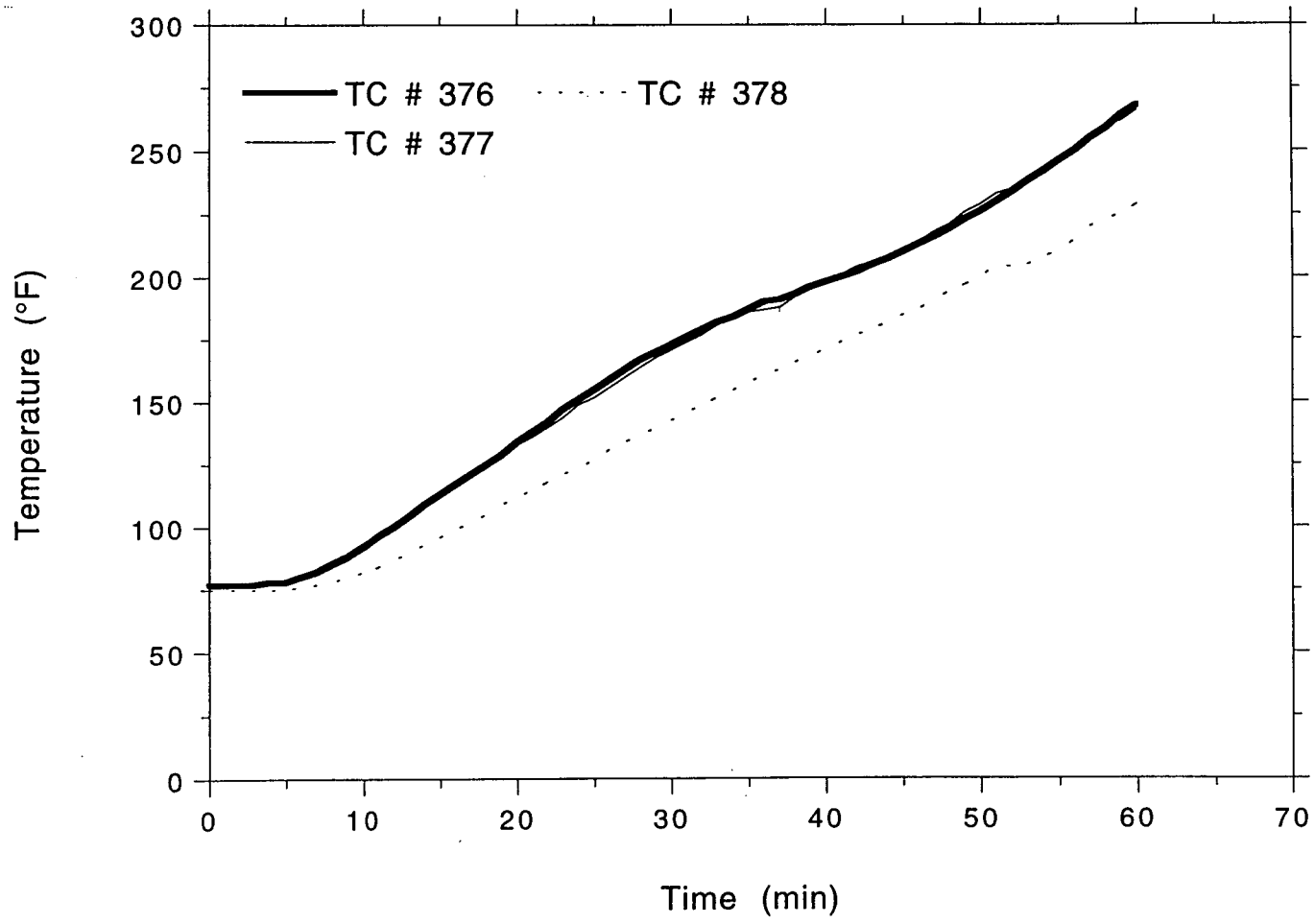
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



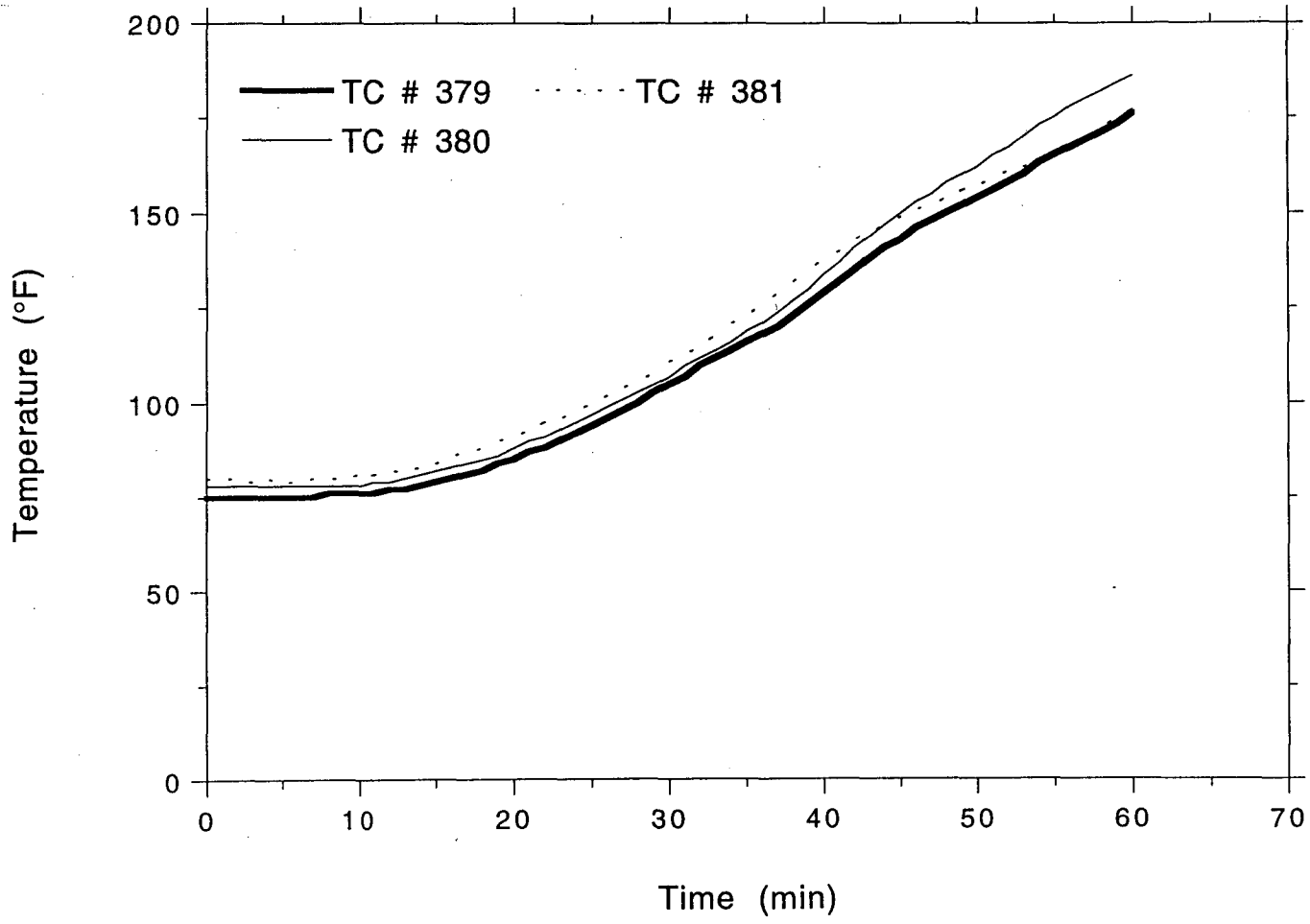
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Rear Tray, #8 Wire



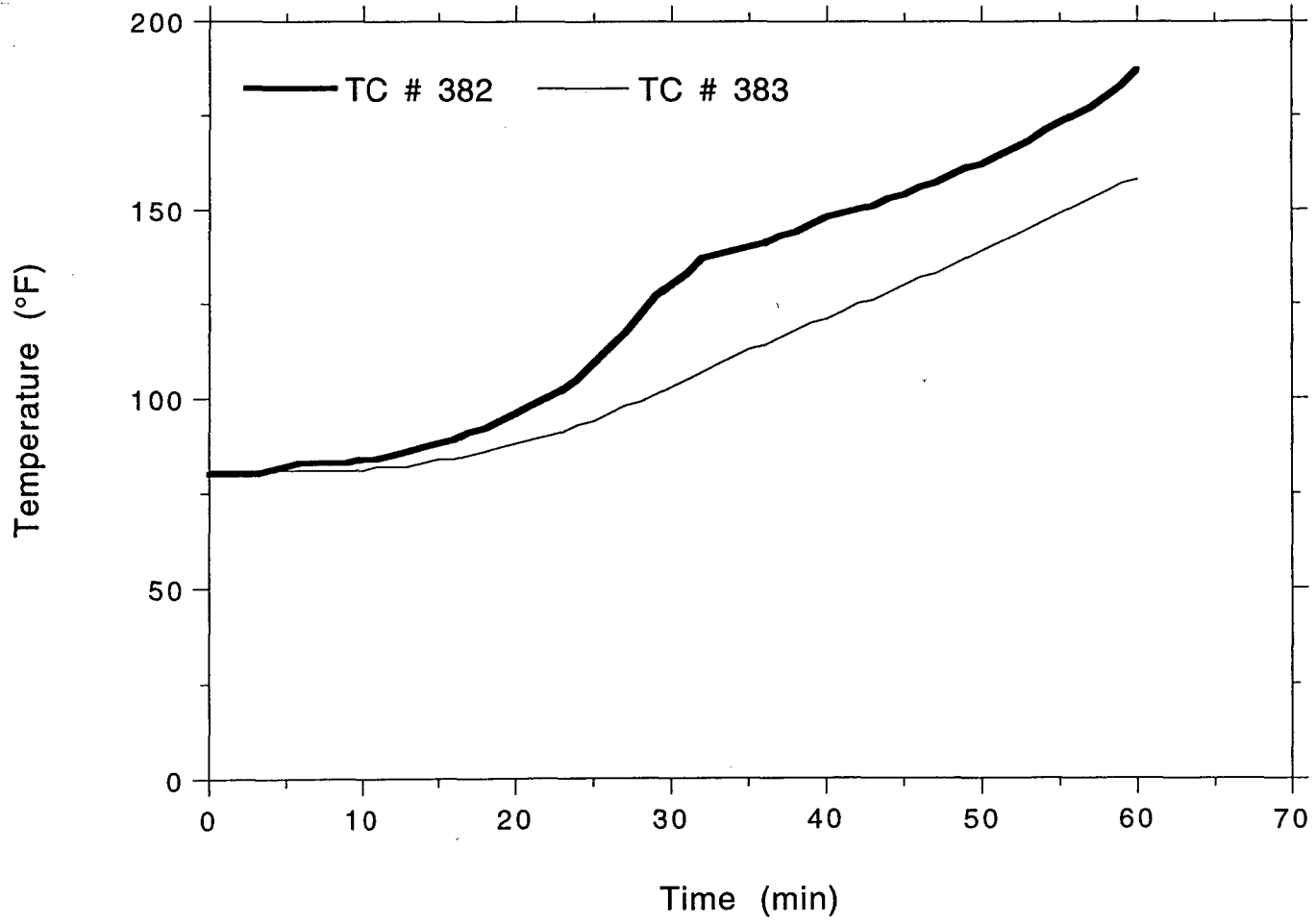
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
5" Air Drop, #8 Wire



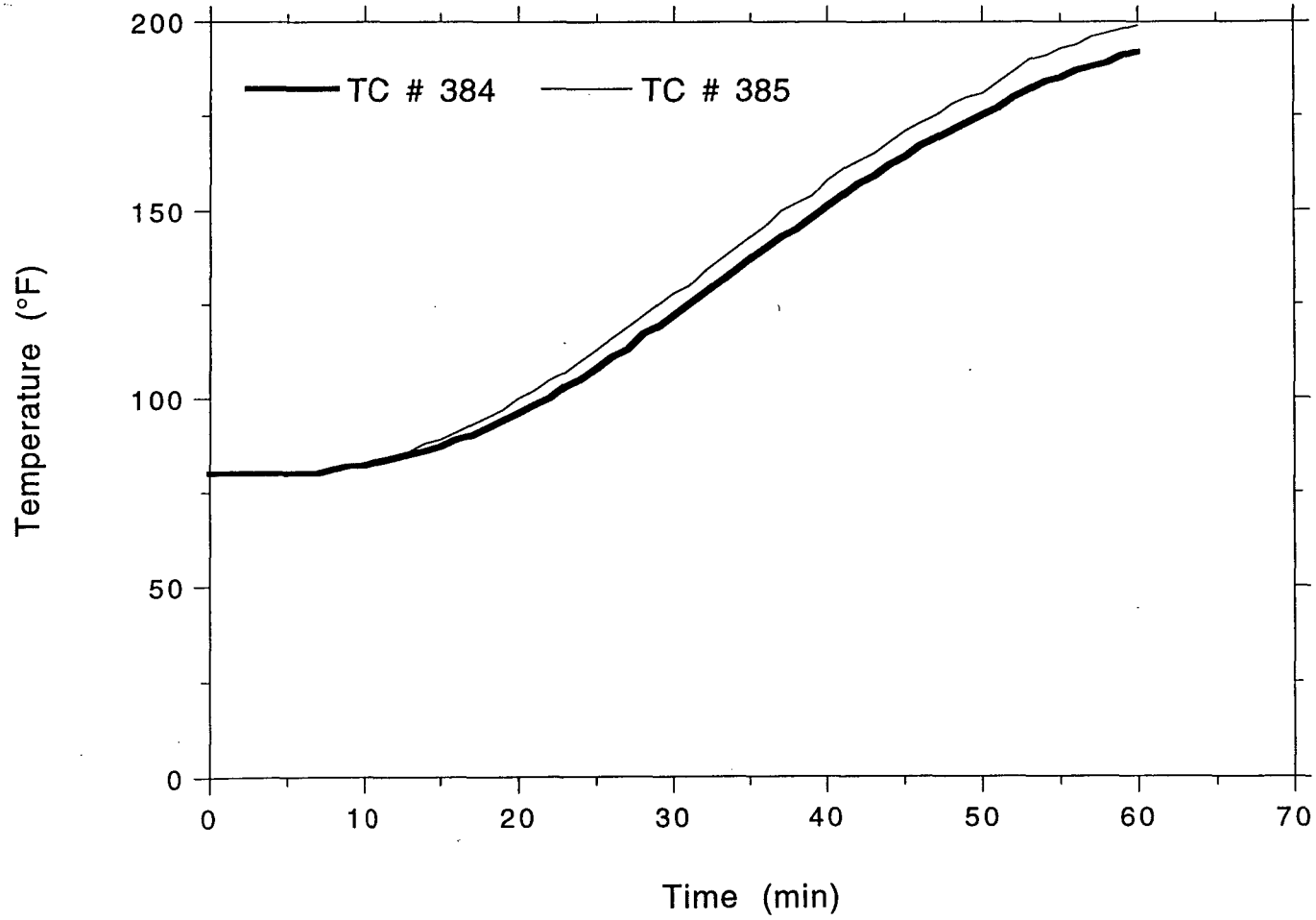
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
5" Air Drop, #8 Wire



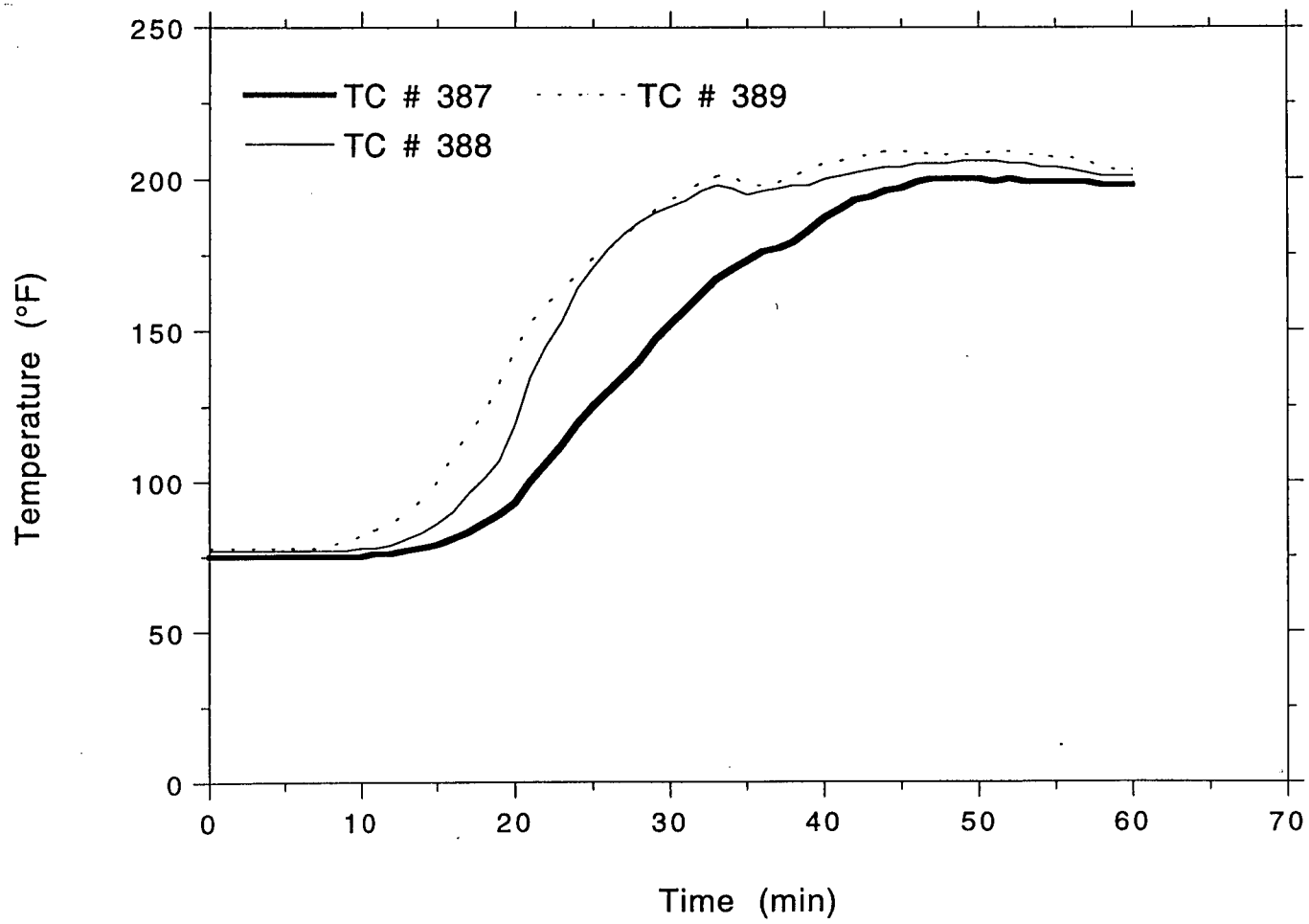
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
5" Air Drop, #8 Wire



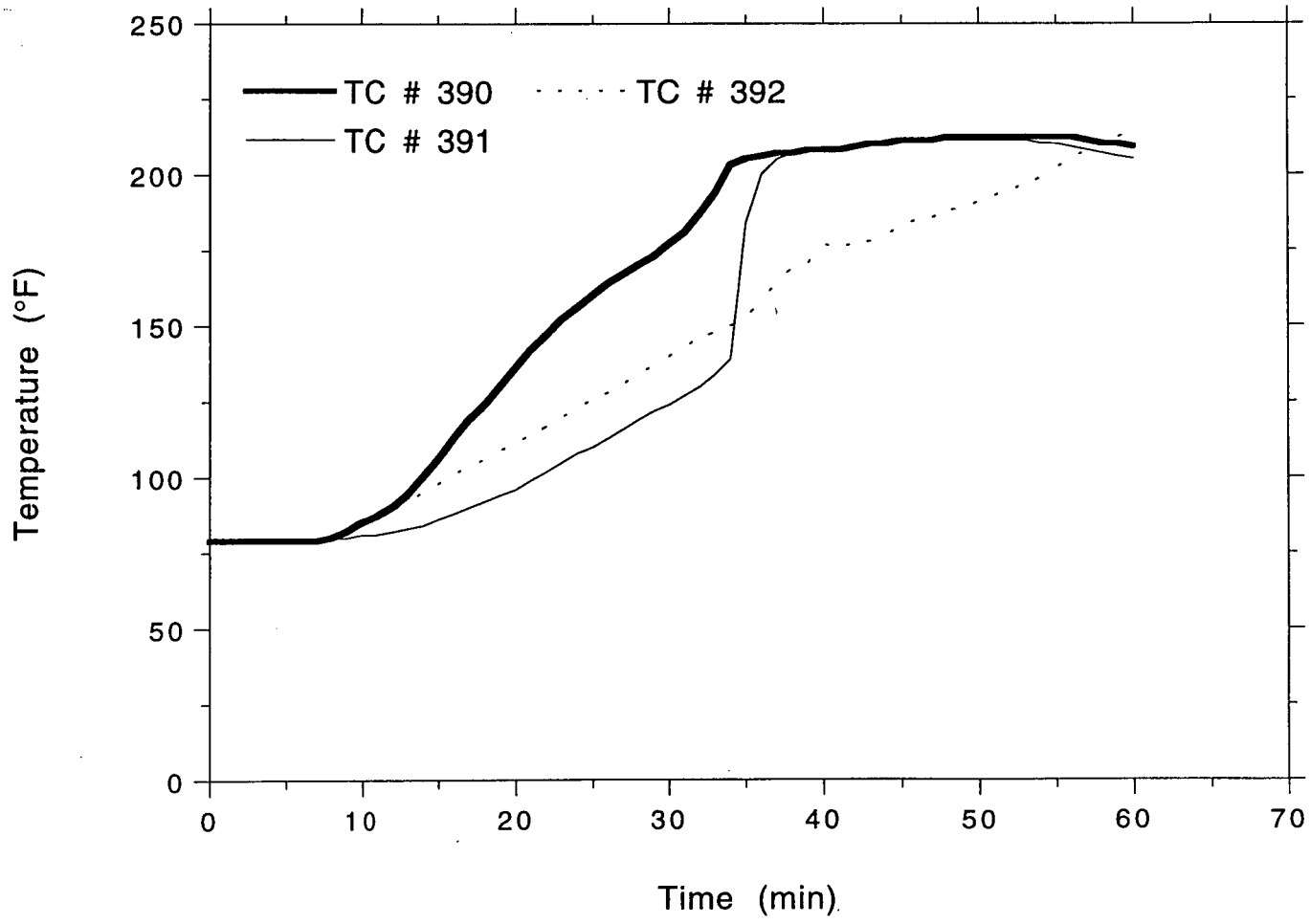
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
2" Air Drop, #8 Wire



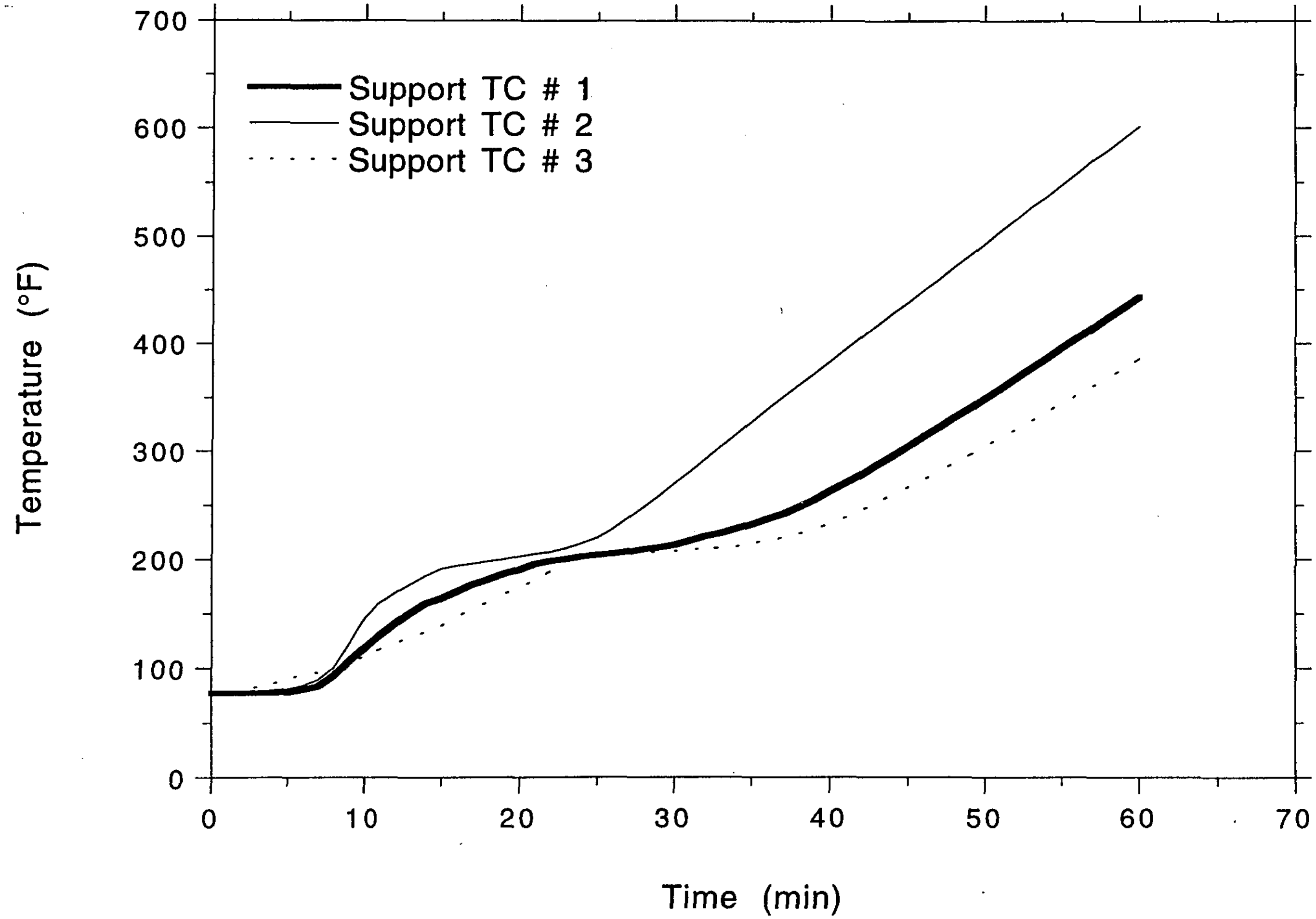
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
2" Air Drop, #8 Wire



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Support Temperatures



OMEGA POINT LABORATORIES

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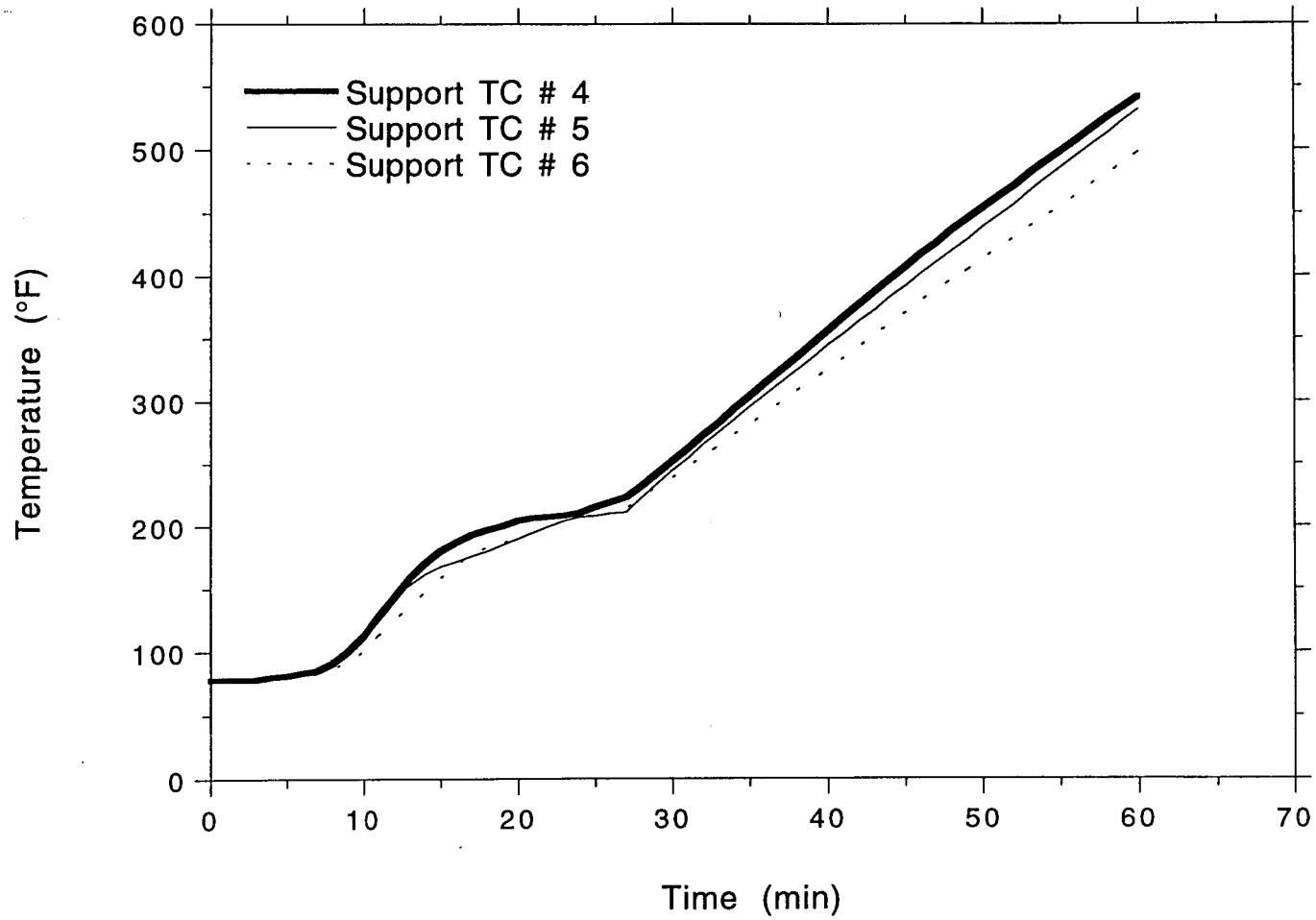
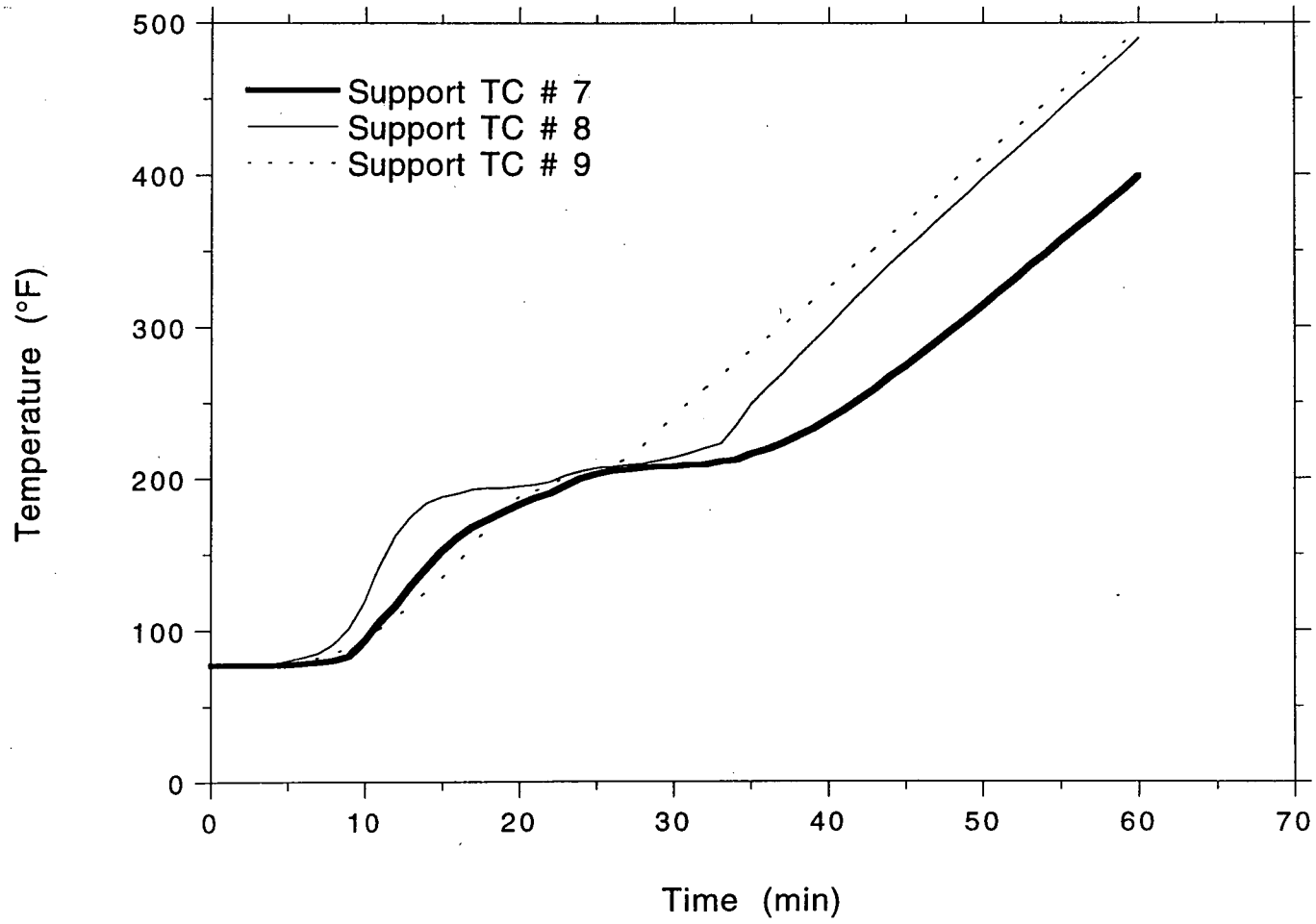
TSI/TVA
Project No. 11960-97187
Support Temperatures



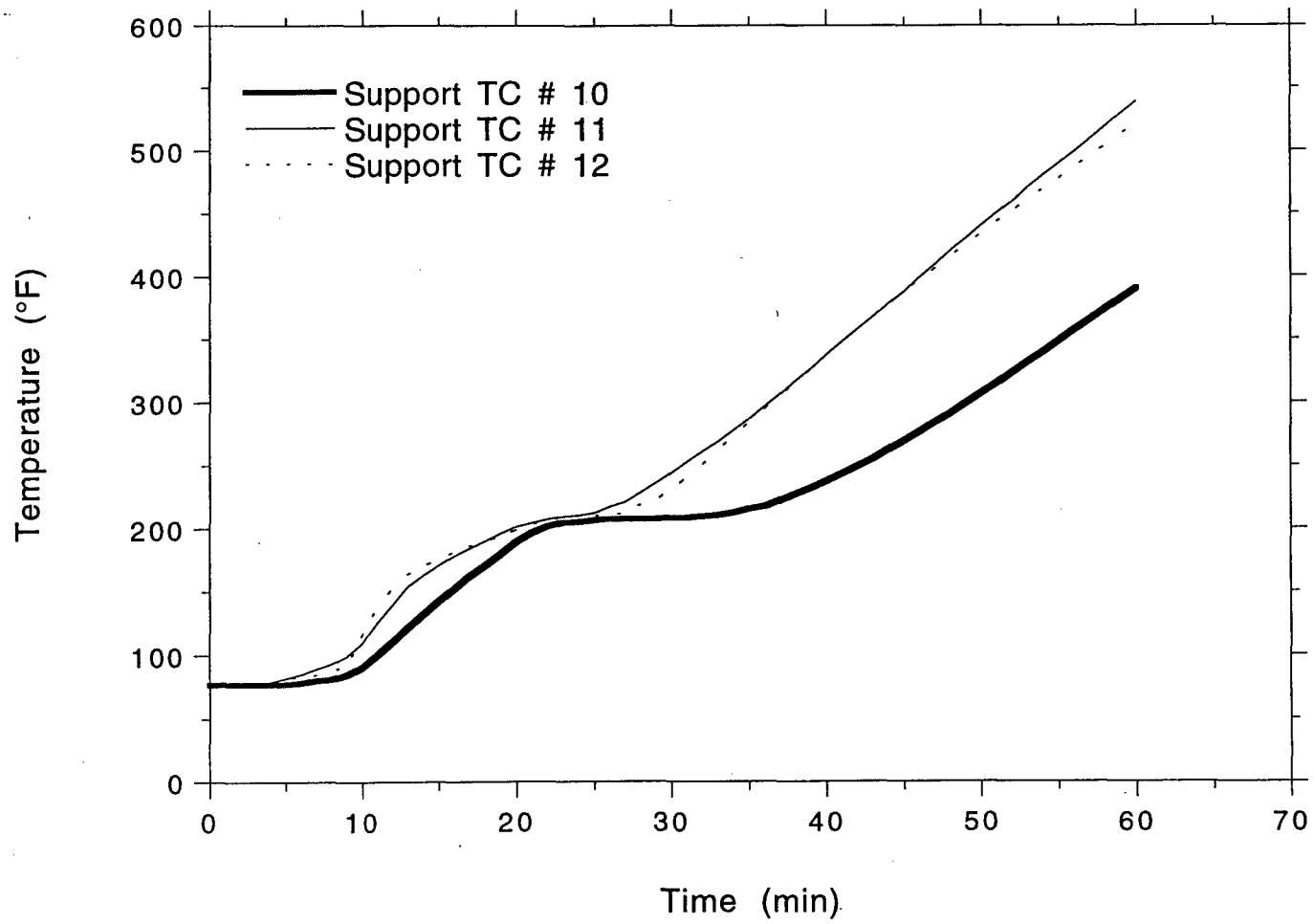
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Support Temperatures



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97187
Support Temperatures



OMEGA POINT LABORATORIES

PROJECT ALL DISCIPLINE MECHANICAL
CONTRACT TV-92362V UNIT 0
DESCRIPTION FIRE ENDURANCE TESTING
DOCUMENT NO. 11960-97187

FIRE ENDURANCE TEST OF THERMO-LAG® 330-1 FIRE PROTECTIVE ENVELOPES (Common Enclosure With Three 18 in. Cable Trays and Covered 18" Tray with 1 in. and 5 in. Air Drops)

Project No. 11960-97187
(Volume 2 of 2)

FIRE ENDURANCE TEST TO QUALIFY A PROTECTIVE ENVELOPE FOR CLASS 1E ELECTRICAL CIRCUITS

November 18, 1994

Prepared For:

Tennessee Valley Authority
P.O. Box 11127
Chattanooga, TN 37401

in cooperation with

Thermal Science, Inc.
2200 Cassens Drive
Fenton, MO 63026

OMEGA POINT LABORATORIES

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OMEGA POINT LABORATORIES

Appendix D

TEST DATA (continued)

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	Front 18" Tray Front, Top Side Rail Max (°F)	Front 18" Tray Front, Top Side Rail Avg (°F)	Front 18" Tray Rear, Top Side Rail Max (°F)	Front 18" Tray Rear, Top Side Rail Avg (°F)
0	79	78	80	78
1	79	78	80	78
2	79	78	80	78
3	79	78	80	78
4	79	78	80	78
5	79	78	80	79
6	79	79	80	79
7	80	79	81	80
8	82	80	83	81
9	83	81	86	83
10	85	83	90	85
11	88	85	95	87
12	91	88	99	90
13	95	91	104	94
14	99	95	110	98
15	104	98	115	102
16	110	103	121	106
17	116	107	127	111
18	121	112	133	116
19	127	117	139	121
20	133	122	144	126
21	139	127	149	132
22	145	133	155	137
23	151	138	161	142
24	157	143	167	147
25	162	148	173	152
26	166	153	179	157
27	172	158	185	162
28	177	162	193	167
29	182	167	201	172
30	187	171	205	176
31	191	175	206	180
32	196	179	207	184
33	200	183	208	189
34	204	187	209	193
35	208	191	210	197
36	210	194	212	200
37	213	197	213	203
38	214	200	213	205
39	215	202	214	208

OMEGA POINT LABORATORIES

Time (min)	Front 18" Tray Front, Top Side Rail Max (°F)	Front 18" Tray Front, Top Side Rail Avg (°F)	Front 18" Tray Rear, Top Side Rail Max (°F)	Front 18" Tray Rear, Top Side Rail Avg (°F)
40	217	205	215	210
41	217	207	219	211
42	219	209	223	213
43	221	210	227	215
44	223	212	230	217
45	225	214	234	220
46	228	216	238	223
47	231	218	242	225
48	235	221	247	228
49	239	223	252	231
50	242	226	257	235
51	247	229	263	238
52	251	232	269	242
53	256	235	275	246
54	261	239	281	250
55	267	242	288	254
56	273	246	294	258
57	280	250	301	263
58	286	255	307	268
59	293	259	312	272
60	301	264	318	277
Max Temp:	301	264	318	277
Max Allowed:	404	328	405	328

Time (min)	Front 18" Tray Front, Center Side Rail Max (°F)	Front 18" Tray Front, Center Side Rail Avg (°F)	Front 18" Tray Rear, Center Side Rail Max (°F)	Front 18" Tray Rear, Center Side Rail Avg (°F)
0	79	78	79	78
1	78	78	79	78
2	79	78	79	78
3	78	78	79	78
4	78	78	79	78
5	79	78	79	78
6	79	78	80	78
7	80	78	82	79
8	81	79	84	80
9	83	80	85	81
10	85	82	87	82
11	88	83	88	84
12	90	85	92	86
13	93	88	96	89
14	97	91	100	92
15	102	94	105	95
16	106	98	111	98
17	111	102	116	102
18	117	106	122	107
19	122	110	129	111
20	128	115	135	116
21	134	120	142	120
22	140	124	148	125
23	146	129	156	130
24	152	134	164	135
25	158	139	171	140
26	164	143	178	145
27	169	148	184	150
28	174	153	190	154
29	179	157	195	159
30	184	162	201	163
31	188	166	204	167
32	194	170	208	171
33	199	174	210	175
34	203	178	212	179
35	207	182	213	183
36	209	186	213	186
37	211	189	214	190
38	212	193	214	193
39	213	196	214	196

OMEGA POINT LABORATORIES

Time (min)	Front 18" Tray Front, Center Side Rail Max (°F)	Front 18" Tray Front, Center Side Rail Avg (°F)	Front 18" Tray Rear, Center Side Rail Max (°F)	Front 18" Tray Rear, Center Side Rail Avg (°F)
40	215	199	215	199
41	218	201	217	201
42	221	204	220	204
43	225	206	224	206
44	228	208	229	209
45	232	211	235	211
46	236	213	241	214
47	239	216	248	217
48	243	219	255	219
49	247	222	262	222
50	251	225	269	225
51	256	228	277	229
52	263	231	285	232
53	269	235	292	236
54	277	238	300	239
55	284	242	308	243
56	292	246	316	247
57	299	251	323	250
58	307	255	330	255
59	314	260	337	259
60	321	265	343	263
Max Temp:	321	265	343	263
Max Allowed:	404	328	404	328

Time (min)	Front 18" Tray Front, Bottom Side Rail Max (°F)	Front 18" Tray Front, Bottom Side Rail Avg (°F)	Front 18" Tray Rear, Bottom Side Rail Max (°F)	Front 18" Tray Rear, Bottom Side Rail Avg (°F)
0	78	77	79	77
1	78	77	79	77
2	78	77	78	77
3	78	77	78	77
4	78	77	85	77
5	78	77	100	78
6	79	77	113	79
7	79	78	119	80
8	81	79	123	81
9	85	80	123	82
10	89	81	121	84
11	90	83	119	85
12	94	86	118	88
13	100	88	119	90
14	105	92	121	94
15	110	95	124	97
16	116	99	126	101
17	120	104	129	105
18	124	108	131	109
19	129	113	137	114
20	136	118	143	119
21	144	124	149	124
22	151	129	155	130
23	158	134	162	135
24	165	140	168	140
25	171	145	174	145
26	177	150	179	151
27	183	155	184	156
28	188	160	189	161
29	193	165	194	166
30	198	170	199	171
31	201	175	204	175
32	205	179	208	180
33	209	183	211	184
34	211	187	213	189
35	213	191	215	193
36	215	194	217	196
37	217	197	218	199
38	219	200	220	202
39	222	203	221	205

OMEGA POINT LABORATORIES

Time (min)	Front 18" Tray Front, Bottom Side Rail Max (°F)	Front 18" Tray Front, Bottom Side Rail Avg (°F)	Front 18" Tray Rear, Bottom Side Rail Max (°F)	Front 18" Tray Rear, Bottom Side Rail Avg (°F)
40	224	205	222	207
41	227	208	225	209
42	230	210	228	211
43	233	212	231	213
44	237	214	235	214
45	240	217	238	216
46	244	219	242	218
47	248	221	247	220
48	252	222	252	221
49	256	224	257	223
50	261	226	263	225
51	266	229	269	228
52	272	231	276	230
53	279	234	283	232
54	286	236	290	235
55	294	239	296	238
56	302	243	304	241
57	310	246	311	244
58	318	250	317	247
59	325	254	324	251
60	331	258	330	255
Max Temp:	331	258	330	255
Max Allowed:	403	327	404	327

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	Rear 18" Tray Front Side Rail Max (°F)	Rear 18" Tray Front Side Rail Avg (°F)	Rear 18" Tray Rear Side Rail Max (°F)	Rear 18" Tray Rear Side Rail Avg (°F)
0	80	79	80	79
1	80	79	80	79
2	80	79	80	79
3	80	79	80	79
4	80	79	80	79
5	80	79	86	79
6	82	79	94	79
7	87	80	99	80
8	93	81	102	81
9	99	83	104	82
10	104	85	107	83
11	107	87	109	85
12	110	89	111	86
13	113	91	113	89
14	116	94	115	91
15	118	97	118	93
16	121	101	119	96
17	123	104	119	99
18	128	108	120	102
19	132	111	122	105
20	135	115	124	108
21	141	118	127	112
22	145	122	130	115
23	150	126	133	118
24	155	130	136	121
25	159	134	139	124
26	164	138	142	127
27	168	141	145	131
28	172	145	148	134
29	175	149	150	137
30	180	152	152	140
31	183	155	155	143
32	187	158	158	146
33	191	162	161	149
34	195	165	164	152
35	198	168	169	155
36	202	171	175	158
37	205	173	178	161
38	207	176	182	164
39	209	179	185	167

Time (min)	Rear 18" Tray Front Side Rail Max (°F)	Rear 18" Tray Front Side Rail Avg (°F)	Rear 18" Tray Rear Side Rail Max (°F)	Rear 18" Tray Rear Side Rail Avg (°F)
40	210	182	188	169
41	211	185	191	172
42	212	188	193	175
43	213	190	196	177
44	214	193	198	180
45	215	195	200	183
46	217	198	202	186
47	218	200	204	188
48	220	202	205	191
49	223	204	207	193
50	226	206	207	195
51	229	208	210	198
52	232	209	212	200
53	236	211	215	203
54	239	213	219	205
55	243	215	222	207
56	248	217	226	210
57	252	218	229	212
58	258	220	233	214
59	263	222	237	216
60	268	225	241	218
Max Temp:	268	225	241	218
Max Allowed:	405	329	405	329

Time (min)	Rear 18" Tray Cover Plate Max (°F)	Rear 18" Tray Cover Plate Avg (°F)	Top Front 18" Tray #8 AWG On Rungs Max (°F)	Top Front 18" Tray #8 AWG On Rungs Avg (°F)
0	80	78	79	78
1	80	78	79	78
2	80	78	79	78
3	80	78	79	78
4	80	78	79	78
5	80	78	79	78
6	80	79	79	79
7	82	80	81	79
8	84	81	83	80
9	86	83	86	82
10	89	85	89	83
11	94	87	93	85
12	98	89	97	87
13	103	92	101	90
14	108	96	106	93
15	112	100	111	96
16	121	104	116	99
17	128	108	122	103
18	135	112	127	107
19	141	116	134	111
20	144	120	140	115
21	149	125	146	120
22	154	129	153	124
23	158	133	158	129
24	161	138	163	133
25	164	142	169	138
26	169	146	174	142
27	172	149	179	147
28	176	153	185	151
29	178	156	190	156
30	181	159	195	160
31	184	162	200	165
32	186	165	204	169
33	190	168	208	173
34	194	171	212	177
35	197	175	216	181
36	200	178	220	186
37	201	181	225	190
38	204	183	230	194
39	206	186	236	198

OMEGA POINT LABORATORIES

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Time (min)	Rear 18" Tray Cover Plate Max (°F)	Rear 18" Tray Cover Plate Avg (°F)	Top Front 18" Tray #8 AWG On Rungs Max (°F)	Top Front 18" Tray #8 AWG On Rungs Avg (°F)
40	207	188	241	202
41	208	191	247	206
42	208	193	253	210
43	209	195	260	214
44	210	197	266	218
45	212	199	273	221
46	215	200	279	225
47	220	202	286	228
48	225	204	292	232
49	230	205	299	235
50	235	207	304	239
51	240	209	310	243
52	245	210	315	246
53	250	212	320	249
54	254	214	324	252
55	258	215	328	256
56	262	217	332	259
57	266	218	335	262
58	270	220	338	266
59	274	221	341	269
60	278	223	344	272
Max Temp:	278	223	344	272
Max Allowed:	405	328	404	328

Time (min)	Center Front 18" Tray #8 AWG On Rungs Max (°F)	Center Front 18" Tray #8 AWG On Rungs Avg (°F)	Bottom Front 18" Tray #8 AWG On Rungs Max (°F)
0	79	78	78
1	79	78	78
2	79	78	78
3	79	78	78
4	79	78	78
5	79	78	79
6	80	78	79
7	81	79	80
8	83	80	81
9	85	81	84
10	88	82	87
11	91	84	90
12	95	86	94
13	99	88	98
14	103	91	103
15	108	94	108
16	113	98	113
17	118	101	119
18	123	105	124
19	129	109	130
20	136	114	136
21	142	118	143
22	148	123	149
23	154	127	155
24	161	132	161
25	166	137	168
26	172	142	173
27	178	146	180
28	183	151	186
29	188	156	192
30	194	161	197
31	199	165	202
32	203	169	208
33	208	174	214
34	212	178	219
35	217	182	223
36	221	186	228
37	226	191	233
38	231	195	237
39	236	199	242

OMEGA POINT LABORATORIES

Time (min)	Center Front 18" Tray #8 AWG On Rungs Max (°F)	Center Front 18" Tray #8 AWG On Rungs Avg (°F)	Bottom Front 18" Tray #8 AWG On Rungs Max (°F)
40	241	203	247
41	247	206	252
42	253	210	256
43	258	214	261
44	265	217	266
45	271	220	272
46	277	224	277
47	283	227	283
48	289	230	288
49	295	233	293
50	301	236	298
51	306	238	303
52	311	241	308
53	316	244	313
54	321	246	317
55	325	249	321
56	330	252	326
57	334	256	330
58	338	259	335
59	341	263	339
60	345	267	343
Max Temp:	345	267	343
Max Allowed:	404	328	403

Time (min)	Bottom Front 18" Tray #8 AWG On Rungs Avg (°F)	Rear 18" Tray #8 AWG Under Rungs Max (°F)	Rear 18" Tray #8 AWG Under Rungs Avg (°F)	Rear 18" Tray 5"ø Air Drop #8 AWG Max (°F)
0	77	80	78	81
1	77	80	78	81
2	77	80	78	81
3	77	82	78	81
4	77	138	81	81
5	77	151	82	82
6	77	152	84	83
7	78	150	86	83
8	79	150	88	83
9	80	136	90	83
10	82	125	92	84
11	84	118	95	84
12	86	117	97	85
13	89	119	100	86
14	92	123	103	88
15	95	126	106	89
16	98	130	109	91
17	102	136	113	93
18	106	140	116	95
19	111	145	119	97
20	115	150	122	100
21	120	155	126	102
22	124	159	129	105
23	129	164	133	107
24	134	168	137	110
25	139	173	140	113
26	144	177	143	116
27	148	181	146	119
28	153	185	150	122
29	158	189	153	127
30	163	193	155	130
31	168	197	158	133
32	172	201	160	137
33	177	205	163	138
34	182	208	165	140
35	186	211	167	143
36	190	214	169	146
37	195	217	171	150
38	199	219	174	152
39	203	221	176	154

Time (min)	Bottom Front 18" Tray #8 AWG On Rungs Avg (°F)	Rear 18" Tray #8 AWG Under Rungs Max (°F)	Rear 18" Tray #8 AWG Under Rungs Avg (°F)	Rear 18" Tray 5"ø Air Drop #8 AWG Max (°F)
40	208	224	178	158
41	212	227	180	161
42	216	230	182	163
43	219	233	184	165
44	223	236	186	168
45	227	239	188	171
46	230	241	191	173
47	233	244	193	175
48	236	247	196	178
49	239	250	199	180
50	241	253	202	181
51	244	256	204	184
52	247	259	207	187
53	249	262	210	190
54	252	266	213	191
55	254	269	216	193
56	257	272	219	194
57	260	275	221	196
58	263	278	224	197
59	267	282	226	198
60	271	285	229	199
Max Temp:	271	285	229	199
Max Allowed:	327	405	328	406

Time (min)	Rear 18" Tray 5"ø Air Drop #8 AWG Avg (°F)	Rear 18" Tray 2"ø Air Drop #8 AWG Max (°F)	Rear 18" Tray 2"ø Air Drop #8 AWG Avg (°F)	Avg Wrapped Supports (°F)
0	79	80	78	78
1	79	80	78	78
2	79	80	78	78
3	79	80	78	78
4	79	80	78	79
5	79	80	78	81
6	79	80	78	83
7	80	80	78	85
8	80	81	79	90
9	80	82	79	98
10	81	85	81	111
11	81	87	82	124
12	82	90	84	136
13	83	94	86	147
14	84	100	89	156
15	85	106	93	164
16	86	113	97	171
17	87	119	101	177
18	89	124	105	182
19	90	133	110	187
20	92	144	117	192
21	94	153	124	196
22	96	159	129	200
23	98	163	134	203
24	100	169	140	206
25	102	174	144	209
26	105	177	148	211
27	107	182	152	214
28	110	186	156	220
29	113	190	160	225
30	115	193	163	231
31	118	196	166	238
32	120	199	170	244
33	123	201	174	251
34	125	203	177	258
35	127	205	185	266
36	130	206	189	274
37	132	207	192	282
38	134	207	194	290
39	137	208	195	299

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 1 (°F)	TC # 2 (°F)	TC # 3 (°F)	TC # 4 (°F)	TC # 5 (°F)	TC # 6 (°F)	TC # 7 (°F)	TC # 8 (°F)	TC # 9 (°F)
0	77	78	78	79	78	78	78	78	79
1	77	78	78	79	78	78	78	78	79
2	77	78	78	79	78	78	78	78	79
3	77	78	78	79	78	78	78	78	79
4	77	78	78	79	78	78	78	78	79
5	77	78	78	79	78	78	78	78	79
6	78	78	79	79	79	79	79	79	79
7	78	79	79	79	80	80	79	79	80
8	79	80	80	80	81	82	80	81	80
9	81	82	82	82	82	83	81	82	82
10	83	84	84	83	83	85	83	85	83
11	86	87	86	86	85	88	85	87	86
12	89	90	89	88	87	91	87	91	88
13	93	94	93	92	90	94	90	95	92
14	97	98	97	96	94	98	94	99	96
15	102	103	101	100	98	102	97	104	101
16	107	108	106	105	102	106	101	110	107
17	113	114	111	111	107	111	106	116	112
18	118	119	117	117	113	116	112	121	118
19	124	124	123	123	119	122	117	127	125
20	129	130	128	129	125	127	123	133	131
21	135	135	134	136	132	133	129	139	137
22	140	141	140	142	138	138	135	145	143
23	145	146	146	149	144	144	141	151	148
24	151	152	152	155	151	149	147	157	154
25	156	157	157	160	157	154	152	162	159
26	161	163	163	166	162	159	157	166	164
27	167	170	169	172	168	163	163	171	169
28	172	175	175	177	173	167	167	175	175
29	176	180	181	182	177	171	172	179	180
30	181	185	186	187	181	175	176	183	185
31	185	190	191	191	185	178	179	187	189
32	188	194	196	196	189	182	183	190	194
33	192	197	200	200	193	185	187	195	200
34	195	200	204	203	198	188	190	199	204
35	198	203	208	207	201	192	195	203	207
36	201	205	210	210	204	195	199	207	209
37	203	208	213	212	207	198	202	210	210
38	205	210	214	213	209	201	204	210	210
39	207	213	215	214	211	204	207	211	211
40	209	215	217	216	213	206	210	212	211
41	211	217	217	217	214	208	212	213	212

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 1 (°F)	TC # 2 (°F)	TC # 3 (°F)	TC # 4 (°F)	TC # 5 (°F)	TC # 6 (°F)	TC # 7 (°F)	TC # 8 (°F)	TC # 9 (°F)
42	212	219	218	218	216	210	213	215	212
43	213	221	220	220	217	211	215	217	213
44	214	223	221	222	219	213	217	220	214
45	215	225	223	224	221	214	220	222	215
46	217	228	226	227	223	216	223	225	217
47	221	231	228	230	225	218	226	228	219
48	224	235	231	233	227	221	229	232	221
49	229	239	234	236	231	225	232	235	223
50	234	242	237	240	234	228	236	239	225
51	239	247	240	244	237	232	240	243	228
52	245	251	244	248	240	236	244	247	230
53	250	256	249	253	244	240	249	251	233
54	255	261	253	258	248	244	253	256	236
55	261	267	258	263	252	249	258	261	240
56	266	273	264	268	257	254	263	266	243
57	272	280	269	274	261	260	269	272	247
58	277	286	276	281	266	265	274	278	251
59	283	293	282	287	271	271	280	284	256
60	289	301	290	294	277	277	286	290	260
Max Temp:	289	301	290	294	277	277	286	290	260
Max Allowed:	402	403	403	404	403	403	403	403	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 10 (°F)	TC # 11 (°F)	TC # 12 (°F)	TC # 13 (°F)	TC # 14 (°F)	TC # 15 (°F)	TC # 16 (°F)
0	79	78	78	78	78	78	78
1	79	78	78	78	78	78	78
2	78	78	78	78	78	78	78
3	78	78	78	78	78	78	77
4	79	79	78	78	78	78	77
5	79	79	78	78	78	78	78
6	79	79	79	79	78	78	78
7	79	79	79	79	79	78	78
8	81	80	80	80	79	79	79
9	82	82	82	81	80	80	80
10	84	84	83	83	82	81	81
11	86	87	85	85	84	82	83
12	89	90	88	88	85	84	85
13	92	94	91	91	88	86	87
14	95	98	95	95	91	89	90
15	99	101	99	99	95	92	93
16	103	105	103	103	98	95	96
17	107	109	108	108	103	99	100
18	111	113	112	114	107	103	103
19	115	118	117	120	111	107	107
20	120	122	123	126	116	111	112
21	124	126	128	132	121	115	116
22	129	131	133	138	126	119	120
23	134	135	139	144	131	123	124
24	138	139	144	150	137	127	129
25	143	144	149	156	142	132	133
26	148	148	155	161	148	136	137
27	152	152	160	166	153	140	142
28	157	157	165	171	158	145	146
29	161	161	170	176	163	149	150
30	165	165	175	181	167	153	154
31	170	169	179	186	172	157	158
32	174	173	184	190	175	161	162
33	178	177	189	193	179	165	166
34	182	180	193	196	183	169	170
35	186	184	197	199	186	172	173
36	191	188	200	201	190	176	177
37	195	192	203	203	193	180	181
38	199	195	206	205	196	183	184
39	203	198	208	207	198	187	188
40	207	201	210	208	201	190	191
41	210	204	211	210	204	193	194

OMEGA POINT LABORATORIES

Time (min)	TC # 10 (°F)	TC # 11 (°F)	TC # 12 (°F)	TC # 13 (°F)	TC # 14 (°F)	TC # 15 (°F)	TC # 16 (°F)
42	212	207	212	211	207	196	197
43	213	209	212	212	209	199	200
44	214	211	213	213	211	202	203
45	216	213	213	214	212	204	205
46	218	215	215	216	213	207	208
47	220	216	217	219	214	209	210
48	222	217	220	221	215	211	212
49	224	219	222	224	216	213	215
50	225	220	225	226	217	215	217
51	227	222	227	229	218	217	220
52	229	224	230	232	219	219	222
53	232	226	233	236	222	222	225
54	234	228	236	239	224	224	228
55	236	230	240	243	226	227	230
56	238	232	243	247	229	230	233
57	241	234	247	251	232	234	236
58	245	237	251	256	236	237	239
59	248	239	255	261	239	240	242
60	252	242	259	266	244	243	245
Max Temp:	252	242	259	266	244	243	245
Max Allowed:	404	403	403	403	403	403	403

Time (min)	TC # 17 (°F)	TC # 18 (°F)	TC # 19 (°F)	TC # 20 (°F)	TC # 21 (°F)	TC # 22 (°F)	TC # 23 (°F)
0	79	79	78	78	78	78	78
1	79	79	78	78	78	78	79
2	79	79	78	78	78	78	79
3	79	79	78	78	78	78	78
4	79	79	78	78	78	78	78
5	79	79	78	78	78	78	79
6	79	79	79	78	78	78	79
7	79	79	79	79	79	79	79
8	80	80	80	80	79	80	80
9	81	81	81	82	81	81	81
10	82	82	83	84	83	84	83
11	83	83	84	87	85	86	86
12	85	85	86	91	87	90	89
13	87	87	89	94	90	93	93
14	90	90	92	98	94	97	98
15	93	93	95	102	98	102	102
16	96	96	98	105	102	106	107
17	99	99	102	110	106	111	112
18	103	103	106	114	111	116	117
19	107	108	111	119	117	121	122
20	111	112	115	124	122	126	128
21	115	116	120	128	127	130	133
22	119	120	124	132	132	135	138
23	123	125	129	137	137	141	143
24	127	129	134	141	141	146	148
25	131	134	138	145	145	151	154
26	135	138	143	149	148	156	159
27	140	142	148	153	151	162	164
28	144	147	153	157	154	167	169
29	148	151	158	161	156	172	174
30	152	155	162	166	158	177	179
31	156	160	167	170	161	181	183
32	160	163	171	175	164	186	187
33	164	168	175	179	168	189	191
34	168	172	180	183	171	193	194
35	172	175	186	186	175	197	198
36	176	179	192	189	178	200	201
37	180	183	197	192	181	202	205
38	183	186	202	195	184	205	210
39	187	190	205	197	187	208	212
40	190	193	208	200	190	210	214
41	193	196	210	202	193	211	215

Time (min)	TC # 17 (°F)	TC # 18 (°F)	TC # 19 (°F)	TC # 20 (°F)	TC # 21 (°F)	TC # 22 (°F)	TC # 23 (°F)
42	196	199	210	204	196	213	217
43	199	201	211	206	198	214	219
44	202	204	211	208	201	216	222
45	204	206	212	209	203	219	226
46	206	208	214	211	204	222	230
47	209	210	215	212	206	224	234
48	211	212	217	215	207	227	239
49	213	213	218	217	208	231	243
50	215	215	220	222	209	233	248
51	218	216	222	225	210	237	252
52	220	218	224	229	211	240	257
53	223	220	227	235	212	244	261
54	226	223	230	241	212	249	266
55	228	225	233	246	213	253	271
56	231	228	236	251	214	257	275
57	234	232	240	255	216	262	280
58	238	235	243	260	219	266	285
59	241	238	247	265	222	271	290
60	244	242	251	271	227	275	295
Max Temp:	244	242	251	271	227	275	295
Max Allowed:	404	404	403	403	403	403	403

OMEGA POINT LABORATORIES

Time (min)	TC # 24 (°F)	TC # 25 (°F)	TC # 26 (°F)	TC # 27 (°F)	TC # 28 (°F)	TC # 29 (°F)	TC # 30 (°F)
0	79	79	79	79	79	80	79
1	79	79	79	79	79	80	79
2	79	79	79	79	79	80	79
3	79	79	79	79	79	80	79
4	79	79	79	79	79	80	79
5	79	79	79	79	79	80	79
6	79	80	79	79	79	80	80
7	79	80	80	80	80	81	81
8	80	81	81	80	81	83	82
9	81	82	82	81	82	85	84
10	83	84	83	82	84	87	86
11	86	86	85	84	86	89	89
12	89	89	88	86	88	92	91
13	92	92	91	88	91	96	95
14	96	96	94	91	94	99	99
15	101	100	99	94	98	103	103
16	106	105	104	98	102	108	108
17	111	111	109	102	107	113	113
18	116	117	115	107	112	118	118
19	122	123	121	112	117	124	123
20	127	129	127	117	122	130	129
21	133	136	133	123	128	136	135
22	139	142	139	129	133	142	142
23	144	148	145	136	138	147	148
24	150	154	151	143	144	153	154
25	155	160	156	149	149	159	160
26	161	166	161	155	154	164	166
27	166	172	167	161	159	170	171
28	172	177	172	166	164	175	177
29	177	183	177	171	168	180	182
30	182	188	181	176	173	185	188
31	187	193	186	181	177	190	193
32	191	197	190	184	181	195	198
33	196	201	193	189	185	200	203
34	202	204	197	194	189	206	206
35	206	206	200	199	193	210	208
36	209	208	203	203	197	212	209
37	210	210	206	205	201	213	210
38	211	211	209	207	205	213	211
39	212	213	211	209	207	214	211
40	214	214	213	211	210	214	212
41	215	216	215	211	212	215	213

OMEGA POINT LABORATORIES

Time (min)	TC # 24 (°F)	TC # 25 (°F)	TC # 26 (°F)	TC # 27 (°F)	TC # 28 (°F)	TC # 29 (°F)	TC # 30 (°F)
42	219	218	218	212	213	216	214
43	222	220	220	213	214	217	215
44	225	223	223	214	215	218	216
45	228	226	226	215	217	220	218
46	232	229	230	216	218	222	220
47	235	233	233	218	220	224	222
48	239	237	236	219	222	227	224
49	244	241	240	222	224	230	226
50	248	245	244	224	226	233	229
51	253	250	248	226	229	236	231
52	257	254	252	229	231	240	234
53	261	259	256	232	234	243	237
54	266	263	260	235	237	247	240
55	270	267	265	239	239	251	243
56	274	272	269	242	243	256	247
57	278	276	273	246	246	260	250
58	283	280	277	250	250	266	254
59	287	285	282	254	254	272	258
60	292	289	286	259	259	278	262
Max Temp:	292	289	286	259	259	278	262
Max Allowed:	404	404	404	404	404	405	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 31 (°F)	TC # 32 (°F)	TC # 33 (°F)	TC # 34 (°F)	TC # 35 (°F)	TC # 36 (°F)	TC # 37 (°F)
0	79	79	78	78	78	78	78
1	79	79	78	78	78	78	78
2	79	79	78	78	78	78	78
3	79	79	78	78	78	78	78
4	79	79	78	78	78	78	78
5	79	79	78	78	78	78	79
6	80	79	79	79	79	79	79
7	80	79	79	81	80	79	81
8	82	81	81	83	82	81	83
9	83	82	82	86	84	83	86
10	86	83	84	90	87	85	90
11	88	85	87	94	90	88	95
12	91	88	90	99	94	91	99
13	94	90	93	104	98	94	104
14	98	93	96	109	103	98	110
15	101	96	100	114	108	102	115
16	105	99	104	120	113	107	121
17	110	102	108	125	119	112	127
18	114	106	112	131	125	118	133
19	118	109	117	137	131	123	139
20	123	113	121	143	136	129	144
21	128	117	126	149	141	134	148
22	133	122	131	155	146	139	153
23	138	126	135	161	151	143	158
24	143	130	140	167	156	148	163
25	148	135	144	173	160	152	168
26	152	140	149	179	165	157	172
27	157	144	154	185	169	161	176
28	161	149	158	193	174	165	181
29	165	153	163	201	177	169	185
30	170	158	168	205	181	172	189
31	174	162	173	206	184	176	193
32	178	166	178	207	188	179	196
33	182	170	184	208	191	183	199
34	186	175	196	209	195	187	201
35	190	179	204	209	199	190	205
36	194	185	207	210	204	194	208
37	198	191	209	211	207	198	210
38	201	198	209	212	209	201	211
39	205	204	210	213	210	204	212
40	210	207	210	215	211	206	215
41	213	209	211	216	212	209	219

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 31 (°F)	TC # 32 (°F)	TC # 33 (°F)	TC # 34 (°F)	TC # 35 (°F)	TC # 36 (°F)	TC # 37 (°F)
42	214	210	211	218	214	212	223
43	215	211	212	220	216	215	227
44	216	212	212	221	218	219	230
45	218	213	214	224	220	223	234
46	220	213	216	226	223	228	238
47	221	214	217	229	226	232	242
48	223	215	219	232	229	236	247
49	225	215	221	236	232	241	252
50	226	216	224	240	236	246	257
51	228	217	226	244	240	251	263
52	230	219	229	249	244	255	269
53	233	220	232	254	249	260	275
54	235	222	235	260	254	265	281
55	237	224	239	266	259	270	288
56	240	226	243	272	265	275	294
57	244	228	246	279	270	280	301
58	247	231	251	286	277	284	307
59	251	233	255	293	283	289	312
60	255	236	260	300	290	294	318
Max Temp:	255	236	260	300	290	294	318
Max Allowed:	404	404	403	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 38 (°F)	TC # 39 (°F)	TC # 40 (°F)	TC # 41 (°F)	TC # 42 (°F)	TC # 43 (°F)	TC # 44 (°F)
0	78	78	78	78	77	77	78
1	78	78	78	78	77	77	78
2	78	78	78	78	77	77	78
3	78	78	78	78	77	77	78
4	78	78	78	78	77	77	78
5	78	78	78	78	77	77	78
6	79	79	79	78	77	77	78
7	81	80	80	79	77	78	79
8	83	81	82	80	78	79	79
9	85	83	84	81	79	80	81
10	88	85	86	83	80	82	82
11	91	87	89	85	82	84	85
12	94	90	92	87	84	87	88
13	98	93	96	90	86	91	92
14	103	97	101	94	89	96	97
15	107	101	105	97	91	100	101
16	112	105	109	102	94	105	106
17	116	109	114	106	98	110	111
18	121	113	118	111	101	115	116
19	126	118	122	115	105	120	122
20	131	122	127	120	109	126	127
21	136	127	131	125	113	131	134
22	140	132	135	130	117	136	140
23	145	136	139	135	121	142	146
24	150	141	144	140	126	147	152
25	154	145	148	145	130	153	158
26	159	150	152	150	134	158	164
27	164	155	156	154	138	163	169
28	169	159	160	159	143	169	174
29	173	164	164	162	147	173	179
30	178	168	168	166	152	178	183
31	183	172	172	170	156	181	186
32	188	177	175	174	159	184	189
33	194	181	179	177	163	187	192
34	199	185	183	180	167	190	194
35	204	190	186	184	170	192	196
36	208	195	190	187	174	194	199
37	211	200	194	191	178	196	200
38	212	203	197	194	181	198	202
39	213	207	201	198	185	200	203
40	215	209	204	201	188	203	205
41	217	211	206	204	191	205	206

OMEGA POINT LABORATORIES

Time (min)	TC # 38 (°F)	TC # 39 (°F)	TC # 40 (°F)	TC # 41 (°F)	TC # 42 (°F)	TC # 43 (°F)	TC # 44 (°F)
42	219	214	208	206	194	207	207
43	222	216	210	208	197	209	208
44	226	218	211	210	200	211	208
45	230	223	212	211	203	213	208
46	234	227	213	213	205	216	212
47	238	232	214	215	207	219	221
48	243	237	214	218	209	225	229
49	247	242	215	220	211	232	237
50	252	247	216	222	213	239	245
51	258	252	217	225	215	245	252
52	263	257	221	227	218	252	258
53	269	263	226	229	220	258	265
54	274	268	231	232	222	264	271
55	280	273	238	235	223	269	277
56	287	278	244	240	225	275	284
57	293	284	250	244	228	280	290
58	299	289	257	250	230	286	297
59	305	294	262	255	232	292	303
60	311	299	269	261	235	298	310
Max Temp:	311	299	269	261	235	298	310
Max Allowed:	403	403	403	403	402	402	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 45 (°F)	TC # 46 (°F)	TC # 47 (°F)	TC # 48 (°F)	TC # 49 (°F)	TC # 50 (°F)	TC # 51 (°F)
0	79	79	78	78	78	78	78
1	78	78	78	78	78	78	78
2	78	79	78	78	78	78	78
3	78	78	78	78	78	78	78
4	78	78	78	78	78	78	78
5	79	78	78	78	78	78	78
6	79	79	79	79	79	78	78
7	79	79	79	79	80	79	78
8	80	80	80	81	81	80	79
9	81	81	81	82	83	81	79
10	83	83	83	84	85	83	80
11	85	85	85	86	88	85	82
12	88	88	88	89	90	87	84
13	92	91	91	92	93	90	86
14	96	95	95	96	97	93	88
15	101	100	99	100	102	97	91
16	106	105	104	105	106	101	95
17	111	111	109	110	111	106	99
18	117	116	115	116	116	111	103
19	122	122	121	121	122	117	108
20	128	128	126	127	127	122	113
21	134	134	132	133	133	128	118
22	139	139	138	139	139	133	123
23	144	145	144	145	145	138	127
24	150	150	149	151	151	144	133
25	155	156	154	157	156	148	137
26	162	161	159	163	160	153	142
27	168	167	164	169	165	158	147
28	174	172	168	174	170	163	152
29	179	178	173	178	175	168	156
30	184	182	178	182	182	173	161
31	187	185	183	186	188	178	166
32	190	189	187	190	194	183	171
33	193	193	190	194	199	187	175
34	195	195	194	198	203	191	180
35	198	198	197	202	207	194	183
36	200	201	201	206	209	197	187
37	203	203	204	209	211	199	191
38	204	205	207	212	212	202	194
39	205	207	209	213	213	204	198
40	206	208	211	214	214	206	201
41	208	210	212	215	215	208	204

OMEGA POINT LABORATORIES

Time (min)	TC # 45 (°F)	TC # 46 (°F)	TC # 47 (°F)	TC # 48 (°F)	TC # 49 (°F)	TC # 50 (°F)	TC # 51 (°F)
42	211	211	213	215	216	210	207
43	212	213	214	216	217	212	210
44	213	215	215	216	219	214	212
45	215	218	216	217	222	216	215
46	223	222	218	219	225	219	218
47	230	227	220	220	228	222	221
48	236	233	222	222	232	225	225
49	243	238	226	224	236	229	228
50	249	244	229	227	240	232	232
51	256	250	234	231	244	236	236
52	263	256	238	235	249	240	240
53	269	262	243	240	254	244	245
54	277	268	248	245	260	249	250
55	284	274	254	251	265	254	255
56	292	281	261	257	272	259	260
57	299	288	268	264	278	264	266
58	307	296	275	271	285	270	272
59	314	303	283	279	292	276	277
60	321	311	292	287	299	283	284
Max Temp:	321	311	292	287	299	283	284
Max Allowed:	404	404	403	403	403	403	403

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 52 (°F)	TC # 53 (°F)	TC # 54 (°F)	TC # 55 (°F)	TC # 56 (°F)	TC # 57 (°F)	TC # 58 (°F)
0	78	78	78	78	78	78	78
1	78	78	78	78	78	78	78
2	78	78	78	78	78	78	78
3	78	78	78	78	78	78	78
4	78	78	78	78	78	78	78
5	78	78	78	78	78	78	78
6	78	78	78	78	78	78	78
7	78	79	78	78	78	78	78
8	79	80	79	79	79	79	78
9	80	81	80	80	79	80	79
10	81	83	81	81	80	81	80
11	82	85	83	82	82	83	81
12	85	87	85	84	83	85	82
13	87	90	87	86	85	87	84
14	91	94	90	89	88	89	87
15	95	98	94	92	90	92	89
16	99	101	97	95	93	95	92
17	103	106	102	98	97	99	96
18	108	110	106	102	100	102	99
19	113	116	111	107	104	106	103
20	118	121	116	111	107	109	107
21	123	126	121	116	112	113	111
22	128	132	126	121	116	117	115
23	133	137	132	126	120	121	119
24	138	142	137	131	125	125	123
25	144	148	143	136	129	129	127
26	149	153	149	142	133	134	132
27	154	159	155	147	138	138	136
28	160	164	162	152	143	142	140
29	165	170	168	157	147	146	144
30	170	176	174	162	151	150	149
31	174	181	179	166	156	154	152
32	179	186	185	171	160	158	157
33	183	191	189	176	165	163	161
34	187	195	193	181	169	166	165
35	191	199	197	186	173	171	169
36	194	203	200	190	176	175	173
37	198	206	203	193	180	179	177
38	201	209	206	196	184	183	181
39	204	212	208	199	187	189	185
40	208	215	211	202	191	193	188
41	211	218	213	204	194	197	191

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 52 (°F)	TC # 53 (°F)	TC # 54 (°F)	TC # 55 (°F)	TC # 56 (°F)	TC # 57 (°F)	TC # 58 (°F)
42	215	221	216	207	197	199	194
43	218	225	218	209	200	202	197
44	222	228	221	211	203	205	200
45	226	232	224	213	205	207	202
46	229	236	227	215	208	210	204
47	233	239	230	217	210	212	206
48	237	243	233	219	212	214	208
49	242	247	237	222	214	216	209
50	246	251	241	224	216	218	211
51	251	256	245	227	218	221	213
52	255	261	250	230	220	223	214
53	260	266	254	233	222	225	216
54	265	272	259	236	224	227	218
55	270	278	264	239	226	229	221
56	275	284	269	243	228	231	224
57	280	291	275	247	230	234	227
58	286	298	281	251	232	237	230
59	291	305	287	255	235	240	234
60	297	312	293	260	237	243	238
Max Temp:	297	312	293	260	237	243	238
Max Allowed:	403	403	403	403	403	403	403

OMEGA POINT LABORATORIES

Time (min)	TC # 59 (°F)	TC # 60 (°F)	TC # 61 (°F)	TC # 62 (°F)	TC # 63 (°F)	TC # 64 (°F)	TC # 65 (°F)
0	77	77	78	78	77	77	78
1	77	77	78	78	77	77	77
2	77	77	78	78	77	77	77
3	77	77	78	78	77	77	77
4	77	77	78	78	77	77	77
5	78	78	78	78	77	77	78
6	78	78	78	78	78	77	78
7	78	79	78	78	78	78	78
8	79	80	79	78	78	79	80
9	80	81	79	79	79	80	81
10	82	82	80	80	79	81	82
11	84	84	81	81	80	82	84
12	86	86	83	83	82	84	86
13	88	89	85	85	83	86	88
14	92	92	87	87	85	89	91
15	95	95	89	89	87	91	93
16	98	98	92	93	89	94	96
17	102	102	95	96	92	97	100
18	106	105	99	100	95	100	103
19	110	109	102	104	99	104	107
20	114	113	106	108	102	108	110
21	119	118	110	112	106	112	114
22	123	122	114	117	110	116	118
23	127	126	119	121	114	120	122
24	131	130	122	126	119	124	126
25	135	134	127	130	123	128	130
26	139	138	131	134	127	132	134
27	144	142	135	138	131	136	138
28	148	146	139	143	136	140	143
29	152	150	143	147	140	144	147
30	156	154	147	151	144	149	151
31	161	158	151	155	148	152	155
32	165	163	155	158	153	157	159
33	169	167	160	162	157	161	163
34	174	171	164	165	161	164	167
35	181	175	168	169	165	169	171
36	185	179	172	173	169	172	175
37	189	183	176	176	173	176	180
38	193	187	180	180	177	180	184
39	196	191	183	183	181	184	188
40	199	195	187	187	184	188	193
41	201	199	191	191	188	191	196

OMEGA POINT LABORATORIES

Time (min)	TC # 59 (°F)	TC # 60 (°F)	TC # 61 (°F)	TC # 62 (°F)	TC # 63 (°F)	TC # 64 (°F)	TC # 65 (°F)
42	204	202	194	194	191	195	200
43	206	205	197	197	194	198	202
44	209	208	200	200	197	200	205
45	211	211	202	202	199	203	207
46	213	214	205	204	202	205	209
47	215	217	207	205	203	207	211
48	218	220	210	207	204	209	213
49	220	223	211	208	206	211	216
50	222	226	212	209	207	213	218
51	225	229	213	210	208	215	221
52	228	232	214	211	209	217	224
53	231	235	215	213	210	219	227
54	234	238	217	214	210	222	230
55	238	240	219	216	211	224	233
56	241	244	221	217	212	227	237
57	245	247	223	219	214	230	241
58	250	250	226	221	216	233	245
59	254	253	228	223	218	236	249
60	259	257	231	225	221	240	253
Max Temp:	259	257	231	225	221	240	253
Max Allowed:	402	402	403	403	402	402	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 66 (°F)	TC # 67 (°F)	TC # 68 (°F)	TC # 69 (°F)	TC # 70 (°F)	TC # 71 (°F)	TC # 72 (°F)
0	78	78	78	78	78	77	77
1	78	78	78	78	78	77	77
2	78	78	78	78	78	77	77
3	78	78	78	78	78	77	77
4	78	78	78	78	78	77	77
5	78	78	78	78	78	77	77
6	78	78	78	78	78	78	78
7	78	78	78	79	79	78	78
8	79	79	79	79	80	79	80
9	80	80	80	81	81	80	81
10	81	80	82	82	82	81	83
11	83	82	83	84	84	82	86
12	85	83	85	85	86	84	89
13	87	85	87	88	89	86	93
14	89	87	90	90	91	89	97
15	92	89	93	94	94	92	102
16	95	92	96	97	98	95	107
17	98	95	99	100	101	98	112
18	101	98	103	104	105	102	119
19	105	102	107	108	109	106	125
20	109	105	110	111	113	109	132
21	113	109	114	115	117	113	139
22	117	113	118	120	121	117	147
23	121	118	122	124	126	121	154
24	125	122	127	128	130	125	161
25	129	126	130	132	134	130	166
26	133	130	135	137	138	134	172
27	137	134	139	141	142	138	177
28	142	139	143	145	147	142	183
29	146	143	147	150	150	146	187
30	150	147	151	154	154	150	191
31	154	151	155	158	158	154	194
32	158	155	159	162	162	158	197
33	162	159	163	167	166	162	199
34	166	164	167	172	170	166	201
35	170	168	171	177	175	170	202
36	174	173	175	182	179	174	203
37	178	177	180	187	183	178	204
38	182	182	184	191	187	181	205
39	186	186	187	195	191	185	205
40	190	190	191	198	193	188	206
41	193	193	194	201	197	191	207

OMEGA POINT LABORATORIES

Time (min)	TC # 66 (°F)	TC # 67 (°F)	TC # 68 (°F)	TC # 69 (°F)	TC # 70 (°F)	TC # 71 (°F)	TC # 72 (°F)
42	196	196	197	203	199	194	209
43	198	199	199	205	201	197	209
44	201	201	202	208	203	199	210
45	203	203	204	209	205	201	212
46	205	205	206	210	206	203	217
47	207	206	208	211	208	205	226
48	209	208	210	212	209	206	234
49	211	209	211	213	210	207	243
50	213	210	214	213	211	208	252
51	216	211	216	214	211	210	260
52	219	212	218	216	212	211	268
53	222	213	221	217	214	212	275
54	225	215	223	219	219	213	283
55	228	218	226	221	224	214	290
56	231	221	229	223	229	215	297
57	235	225	232	226	233	216	304
58	240	229	235	230	238	218	311
59	244	234	238	233	243	221	318
60	248	238	241	237	247	227	324
Max Temp:	248	238	241	237	247	227	324
Max Allowed:	403	403	403	403	403	402	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 73 (°F)	TC # 74 (°F)	TC # 75 (°F)	TC # 76 (°F)	TC # 77 (°F)	TC # 78 (°F)	TC # 79 (°F)
0	78	79	79	79	79	79	78
1	78	79	79	79	79	79	78
2	78	79	79	79	79	79	78
3	78	79	79	79	79	79	78
4	78	79	79	79	79	79	78
5	78	79	79	79	79	79	78
6	79	79	79	79	79	79	78
7	79	80	80	80	79	79	79
8	80	81	81	81	81	80	79
9	82	83	83	83	82	81	80
10	84	86	85	85	83	83	80
11	87	88	88	87	86	84	82
12	90	92	92	90	88	87	83
13	94	95	96	94	91	89	85
14	99	100	100	98	95	93	87
15	103	104	105	103	99	96	89
16	108	110	111	108	104	101	93
17	114	115	116	113	111	105	97
18	120	121	122	119	118	110	102
19	126	127	129	125	125	116	107
20	132	134	135	131	131	122	113
21	139	140	142	137	136	128	119
22	145	148	148	143	142	133	125
23	151	156	154	149	147	139	131
24	158	164	160	155	153	144	136
25	164	171	167	162	157	150	141
26	170	178	173	168	162	155	146
27	176	184	179	174	167	159	151
28	182	190	184	180	171	163	155
29	187	195	189	185	175	167	159
30	192	201	194	190	180	170	163
31	195	204	197	193	183	174	167
32	198	208	200	196	187	177	171
33	200	210	203	200	191	181	174
34	202	212	205	202	195	187	177
35	203	213	207	205	198	192	181
36	204	213	209	207	201	196	184
37	206	214	210	209	204	199	188
38	207	214	212	211	207	203	191
39	208	214	213	213	210	205	194
40	209	215	215	215	213	208	197
41	211	215	217	217	214	211	200

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 73 (°F)	TC # 74 (°F)	TC # 75 (°F)	TC # 76 (°F)	TC # 77 (°F)	TC # 78 (°F)	TC # 79 (°F)
42	212	216	220	219	214	214	202
43	214	216	224	221	215	215	205
44	215	217	229	224	216	216	207
45	219	218	235	228	218	217	209
46	224	221	241	232	220	218	211
47	232	225	248	236	222	220	213
48	239	231	255	241	225	222	215
49	246	238	262	247	228	224	217
50	254	245	269	252	231	226	219
51	261	253	277	259	235	229	222
52	268	262	285	266	238	232	225
53	276	271	292	273	243	235	228
54	283	281	300	281	247	238	231
55	290	291	308	288	252	241	234
56	298	301	316	296	257	245	237
57	306	310	323	304	262	248	240
58	313	320	330	312	267	252	244
59	321	328	337	319	273	257	247
60	328	337	343	326	280	261	251
Max Temp:	328	337	343	326	280	261	251
Max Allowed:	403	404	404	404	404	404	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 80 (°F)	TC # 81 (°F)	TC # 82 (°F)	TC # 83 (°F)	TC # 84 (°F)	TC # 85 (°F)	TC # 86 (°F)
0	78	78	78	78	78	78	78
1	78	78	78	78	78	78	78
2	78	78	78	78	78	78	78
3	78	78	78	78	78	78	78
4	78	78	78	78	78	78	78
5	78	78	78	78	78	78	78
6	78	78	78	78	78	78	78
7	78	78	78	78	78	78	79
8	79	79	79	79	79	79	79
9	79	79	79	79	79	80	80
10	80	80	80	80	80	81	82
11	81	81	81	82	81	82	83
12	81	83	82	83	83	83	85
13	83	84	84	85	86	85	87
14	85	87	87	88	89	88	90
15	87	90	90	91	92	90	93
16	89	94	93	95	96	93	96
17	92	98	97	99	100	97	99
18	96	102	101	103	104	100	102
19	100	107	105	107	109	104	106
20	105	112	110	112	113	108	110
21	110	118	115	117	118	112	114
22	115	124	120	122	123	117	118
23	120	129	125	127	128	121	122
24	126	134	130	132	132	126	126
25	131	140	135	137	137	130	131
26	136	145	140	143	142	135	135
27	141	150	145	148	147	140	139
28	146	156	151	154	152	145	143
29	151	161	156	160	156	149	147
30	155	166	161	165	160	153	151
31	160	171	167	170	164	157	155
32	164	176	173	175	168	161	159
33	168	181	178	179	172	165	163
34	171	185	183	183	176	169	168
35	175	189	187	187	180	173	172
36	179	193	192	191	184	177	176
37	183	196	195	194	187	181	180
38	186	199	199	197	191	184	183
39	189	202	202	200	194	188	187
40	193	204	205	203	197	191	190
41	196	207	207	205	200	195	194

OMEGA POINT LABORATORIES

Time (min)	TC # 80 (°F)	TC # 81 (°F)	TC # 82 (°F)	TC # 83 (°F)	TC # 84 (°F)	TC # 85 (°F)	TC # 86 (°F)
42	200	209	209	208	203	197	197
43	202	211	211	210	205	200	200
44	205	213	213	212	208	202	203
45	208	214	215	215	210	205	206
46	210	215	217	217	211	207	208
47	212	216	219	220	213	209	211
48	213	218	221	222	214	210	213
49	215	219	223	224	215	212	216
50	216	221	225	227	216	214	218
51	218	223	227	229	218	216	221
52	220	225	230	232	219	218	223
53	222	228	232	234	220	219	226
54	224	230	235	237	222	221	228
55	227	233	238	240	223	223	231
56	229	236	241	242	225	225	233
57	232	238	244	245	227	227	236
58	235	241	247	248	229	229	239
59	237	244	250	251	232	231	243
60	241	248	253	254	235	233	246
Max Temp:	241	248	253	254	235	233	246
Max Allowed:	403	403	403	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 87 (°F)	TC # 88 (°F)	TC # 89 (°F)	TC # 90 (°F)	TC # 91 (°F)	TC # 92 (°F)	TC # 93 (°F)
0	78	77	77	77	77	77	78
1	78	77	77	78	77	77	78
2	78	77	77	77	77	77	78
3	78	77	77	78	77	77	78
4	78	77	78	78	77	77	78
5	78	77	79	78	78	77	78
6	78	77	80	79	78	77	78
7	78	78	82	80	78	78	79
8	79	79	84	82	79	78	80
9	79	80	85	83	80	79	81
10	80	82	87	85	81	80	82
11	81	83	88	87	83	81	84
12	83	85	89	89	84	83	86
13	84	88	92	91	86	84	88
14	86	90	94	93	89	86	91
15	89	93	96	96	91	89	94
16	91	96	99	99	94	91	97
17	94	100	102	102	97	94	100
18	97	103	105	105	101	97	104
19	101	107	109	109	104	101	107
20	104	111	112	113	108	104	111
21	108	115	116	117	112	108	115
22	112	119	120	121	116	112	119
23	116	124	124	125	119	115	123
24	120	128	128	129	123	120	127
25	124	132	132	133	127	124	131
26	129	136	137	137	132	128	134
27	133	141	142	141	136	132	139
28	138	145	146	145	140	137	143
29	142	149	150	149	144	141	147
30	146	153	155	153	148	145	152
31	151	157	159	156	152	150	156
32	155	161	163	160	156	154	161
33	159	165	167	164	160	158	166
34	163	169	171	168	165	163	171
35	167	173	176	172	169	167	177
36	171	177	180	176	173	171	183
37	176	181	184	181	177	175	188
38	179	185	188	185	181	180	192
39	183	188	192	188	185	184	195
40	187	192	196	192	189	187	199
41	190	195	200	196	192	190	201

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 87 (°F)	TC # 88 (°F)	TC # 89 (°F)	TC # 90 (°F)	TC # 91 (°F)	TC # 92 (°F)	TC # 93 (°F)
42	193	198	203	199	196	193	204
43	196	201	207	202	199	196	206
44	199	203	210	205	202	199	208
45	202	206	213	208	204	201	210
46	205	209	216	210	207	203	213
47	206	211	219	213	209	205	215
48	207	214	222	215	211	207	218
49	208	216	225	217	214	209	221
50	209	218	228	219	216	211	223
51	210	221	231	222	218	213	226
52	211	223	234	224	220	215	229
53	212	226	237	227	223	217	232
54	213	229	240	230	226	220	236
55	215	232	244	234	229	222	239
56	216	235	247	237	232	225	242
57	218	238	250	241	235	227	246
58	220	241	254	245	239	231	249
59	222	245	257	249	243	234	253
60	224	249	261	254	247	238	257
Max Temp:	224	249	261	254	247	238	257
Max Allowed:	403	402	402	402	402	402	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI. September 20, 1994

Time (min)	TC # 94 (°F)	TC # 95 (°F)	TC # 96 (°F)	TC # 97 (°F)	TC # 98 (°F)	TC # 99 (°F)	TC # 100 (°F)
0	78	78	78	78	78	78	77
1	78	78	78	78	78	78	77
2	78	78	78	78	78	78	77
3	78	78	78	78	78	78	77
4	78	78	78	78	78	78	77
5	78	78	78	78	78	78	77
6	79	79	79	78	79	78	77
7	80	80	80	79	79	78	78
8	81	81	82	80	80	79	78
9	82	83	84	82	82	80	78
10	84	84	86	83	83	81	79
11	86	86	88	85	85	82	80
12	89	89	90	87	87	84	82
13	91	92	93	90	90	86	84
14	94	95	96	93	92	88	86
15	98	98	99	96	95	91	88
16	101	102	103	99	98	94	91
17	105	105	106	103	102	97	94
18	108	109	110	107	105	100	97
19	112	113	114	111	109	104	100
20	116	117	118	115	113	108	104
21	121	121	123	119	117	112	108
22	125	125	127	123	122	116	111
23	129	129	131	127	126	120	115
24	133	134	136	132	130	124	119
25	137	138	140	136	135	128	123
26	142	143	144	141	139	133	128
27	146	147	149	145	143	137	132
28	150	151	153	148	147	142	136
29	154	156	157	152	150	145	140
30	159	160	162	156	154	149	144
31	163	164	166	159	158	153	149
32	168	169	171	163	162	157	153
33	174	174	175	168	165	161	157
34	178	178	180	172	169	165	161
35	182	181	184	176	173	169	165
36	187	185	187	180	176	172	169
37	192	189	191	183	181	176	173
38	196	192	194	187	185	180	177
39	199	196	198	191	188	184	181
40	202	199	200	194	191	187	185
41	205	202	203	197	195	190	188

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 94 (°F)	TC # 95 (°F)	TC # 96 (°F)	TC # 97 (°F)	TC # 98 (°F)	TC # 99 (°F)	TC # 100 (°F)
42	207	206	205	200	198	193	191
43	209	209	208	203	201	196	194
44	212	211	210	204	203	199	197
45	214	214	212	207	206	202	199
46	217	217	214	208	207	205	201
47	220	220	215	209	208	207	203
48	223	223	217	208	209	208	204
49	226	227	221	210	211	210	206
50	229	230	225	213	212	210	207
51	233	234	230	216	213	211	208
52	236	238	234	219	214	211	208
53	240	242	238	223	217	212	209
54	244	246	242	226	220	212	210
55	247	250	247	230	223	212	210
56	251	254	251	234	226	213	211
57	255	258	255	238	229	214	212
58	259	262	259	243	233	219	213
59	263	266	263	248	237	222	214
60	267	270	267	253	242	227	216
Max Temp:	267	270	267	253	242	227	216
Max Allowed:	403	403	403	403	403	403	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 101 (°F)	TC # 102 (°F)	TC # 103 (°F)	TC # 104 (°F)	TC # 105 (°F)	TC # 106 (°F)
0	76	77	78	78	78	78
1	76	77	78	78	78	78
2	76	77	78	78	78	78
3	76	77	78	78	78	78
4	77	77	78	78	78	78
5	77	78	78	78	78	78
6	77	78	79	78	78	78
7	78	79	79	79	79	79
8	80	80	81	80	80	80
9	82	82	82	81	81	81
10	85	85	85	83	83	83
11	89	88	87	85	86	85
12	92	92	91	88	88	88
13	96	97	95	92	92	91
14	100	102	99	96	96	96
15	105	107	104	100	100	100
16	109	112	110	105	105	105
17	114	118	115	111	110	110
18	119	123	121	116	115	116
19	124	129	127	122	121	122
20	129	136	133	128	127	128
21	135	142	139	134	133	134
22	141	148	145	140	139	140
23	146	154	151	146	145	146
24	152	160	157	152	151	152
25	158	166	163	157	157	158
26	163	172	169	163	163	164
27	169	177	175	169	168	170
28	175	183	181	175	174	175
29	181	188	186	181	180	181
30	186	194	191	186	185	186
31	190	199	196	191	190	191
32	194	203	201	195	194	196
33	197	208	205	199	198	201
34	199	211	209	203	202	206
35	202	213	212	206	205	209
36	204	215	214	210	209	212
37	207	217	216	212	212	214
38	209	219	218	214	214	216
39	211	222	220	216	216	218
40	213	224	222	217	218	220
41	215	227	224	220	220	222

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 101 (°F)	TC # 102 (°F)	TC # 103 (°F)	TC # 104 (°F)	TC # 105 (°F)	TC # 106 (°F)
42	217	230	226	222	223	224
43	220	233	228	224	225	227
44	222	237	230	226	227	229
45	225	240	233	229	230	232
46	228	244	236	231	232	234
47	231	248	238	234	234	237
48	234	252	241	236	237	241
49	237	256	245	239	240	244
50	242	261	248	242	243	249
51	246	266	253	246	246	253
52	250	272	257	249	249	258
53	255	279	263	253	253	263
54	260	286	269	257	257	269
55	266	294	276	261	261	275
56	272	302	284	267	267	283
57	277	310	293	273	273	290
58	283	318	302	279	280	298
59	288	325	311	287	287	305
60	294	331	321	295	295	314
Max Temp:	294	331	321	295	295	314
Max Allowed:	401	402	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 107 (°F)	TC # 108 (°F)	TC # 109 (°F)	TC # 110 (°F)	TC # 111 (°F)	TC # 112 (°F)
0	78	77	77	76	76	76
1	78	77	77	76	76	76
2	78	77	77	76	76	76
3	78	77	77	76	76	76
4	78	77	77	76	76	76
5	78	77	78	76	76	76
6	78	77	78	76	76	77
7	79	77	78	77	77	77
8	80	80	79	77	77	79
9	81	85	80	78	78	80
10	83	89	82	80	79	82
11	85	90	84	82	81	85
12	88	94	87	84	83	88
13	91	100	90	87	85	92
14	95	105	94	90	88	96
15	100	110	98	94	92	101
16	104	116	103	98	96	106
17	110	120	108	102	100	111
18	116	124	114	107	106	116
19	122	128	120	112	112	122
20	128	134	127	118	118	128
21	134	141	134	124	124	134
22	140	146	140	130	131	141
23	146	151	146	137	137	147
24	152	157	152	144	143	154
25	158	163	158	150	149	161
26	164	168	164	157	154	167
27	170	173	170	162	161	173
28	176	177	175	168	167	179
29	182	181	181	172	172	185
30	187	186	187	177	177	191
31	192	190	192	182	181	196
32	197	194	198	187	186	201
33	203	198	204	191	190	206
34	207	202	207	196	193	209
35	211	205	210	201	196	210
36	213	207	212	204	199	209
37	214	209	213	206	202	211
38	216	211	214	208	205	212
39	217	212	215	209	207	215
40	218	213	217	210	209	218
41	220	214	218	211	211	220

OMEGA POINT LABORATORIES

Time (min)	TC # 107 (°F)	TC # 108 (°F)	TC # 109 (°F)	TC # 110 (°F)	TC # 111 (°F)	TC # 112 (°F)
42	222	216	219	212	212	223
43	224	218	221	212	213	225
44	227	220	223	213	214	228
45	230	223	226	214	215	232
46	233	226	229	215	217	235
47	236	228	232	217	220	239
48	241	231	235	219	222	243
49	245	235	240	221	224	246
50	250	238	244	224	227	250
51	256	242	249	227	230	255
52	262	245	255	229	233	260
53	269	250	261	233	236	265
54	276	254	267	236	239	270
55	284	259	274	240	242	276
56	292	264	281	244	246	283
57	300	270	288	249	250	289
58	308	276	296	254	254	297
59	315	282	303	259	258	303
60	323	290	311	265	263	311
Max Temp:	323	290	311	265	263	311
Max Allowed:	403	402	402	401	401	401

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 113 (°F)	TC # 114 (°F)	TC # 115 (°F)	TC # 116 (°F)	TC # 117 (°F)	TC # 118 (°F)
0	76	76	76	76	76	76
1	76	76	76	76	76	76
2	76	76	76	76	76	76
3	76	76	76	76	76	76
4	76	76	76	76	76	76
5	76	76	76	76	76	77
6	76	77	77	77	77	77
7	77	77	77	78	77	77
8	79	79	79	79	78	79
9	80	80	80	81	79	80
10	83	83	83	83	81	82
11	85	85	86	86	83	84
12	89	89	89	89	85	86
13	92	93	93	93	89	90
14	97	98	98	97	92	93
15	102	103	103	102	96	97
16	108	109	108	107	101	100
17	114	115	113	112	106	105
18	121	121	119	118	112	109
19	128	128	124	124	118	114
20	136	135	130	131	124	120
21	144	142	136	138	131	125
22	151	149	142	144	137	130
23	158	156	148	151	144	136
24	165	162	154	158	151	141
25	171	169	160	164	158	147
26	177	176	166	170	165	153
27	183	182	172	175	171	158
28	188	188	178	181	177	163
29	193	193	183	186	183	168
30	197	198	188	191	188	173
31	201	200	193	197	192	178
32	205	203	198	201	196	183
33	209	206	203	205	200	187
34	211	209	207	207	202	191
35	213	211	209	209	205	195
36	214	212	210	211	206	199
37	215	212	211	211	208	202
38	215	214	212	212	209	204
39	217	215	213	212	210	207
40	218	216	214	213	210	209
41	219	217	216	213	211	211

OMEGA POINT LABORATORIES

Time (min)	TC # 113 (°F)	TC # 114 (°F)	TC # 115 (°F)	TC # 116 (°F)	TC # 117 (°F)	TC # 118 (°F)
42	221	219	218	214	211	213
43	223	221	220	216	212	214
44	225	224	223	217	212	216
45	228	227	226	219	213	217
46	231	230	229	221	214	218
47	234	234	232	224	215	219
48	237	237	236	227	216	220
49	241	241	239	230	218	221
50	245	245	243	233	219	222
51	249	249	248	237	221	224
52	253	255	254	241	223	225
53	258	260	259	246	224	226
54	263	267	265	251	226	228
55	270	274	272	257	229	229
56	276	281	279	263	231	231
57	283	290	287	270	234	233
58	292	299	295	277	236	235
59	300	308	303	285	239	237
60	309	317	312	292	243	240
Max Temp:	309	317	312	292	243	240
Max Allowed:	401	401	401	401	401	401

OMEGA POINT LABORATORIES

Time (min)	TC # 119 (°F)	TC # 120 (°F)	TC # 121 (°F)	TC # 122 (°F)	TC # 123 (°F)	TC # 124 (°F)
0	76	76	77	77	77	76
1	76	76	77	77	77	76
2	76	76	77	77	76	76
3	76	76	77	77	76	76
4	76	76	77	77	76	76
5	77	76	77	77	77	76
6	77	76	77	77	77	76
7	78	77	77	77	77	77
8	79	77	78	77	77	77
9	80	79	78	78	78	78
10	82	81	79	79	78	78
11	84	85	80	80	79	79
12	87	87	82	81	81	81
13	89	91	84	83	82	83
14	92	94	86	85	84	85
15	95	97	88	88	86	88
16	99	100	91	91	89	91
17	102	104	95	95	91	94
18	106	108	98	99	95	98
19	110	112	102	104	98	102
20	115	117	107	108	102	106
21	119	121	111	113	106	110
22	124	126	115	118	110	114
23	129	130	120	123	114	118
24	134	135	125	129	118	122
25	140	139	129	135	122	127
26	145	144	134	140	127	131
27	150	148	139	145	131	135
28	155	153	143	150	135	140
29	160	157	148	155	140	145
30	164	161	152	159	144	151
31	169	165	156	164	149	156
32	172	169	160	168	153	160
33	176	173	165	172	158	163
34	180	177	169	177	162	167
35	184	181	173	181	166	170
36	188	185	177	184	171	174
37	191	189	180	187	175	178
38	195	193	184	191	180	182
39	198	198	188	194	184	186
40	201	202	191	197	189	189
41	204	204	194	200	193	192

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 119 (°F)	TC # 120 (°F)	TC # 121 (°F)	TC # 122 (°F)	TC # 123 (°F)	TC # 124 (°F)
42	206	208	198	203	198	194
43	209	210	201	205	203	197
44	211	213	203	208	207	200
45	213	217	206	210	210	203
46	215	219	207	211	211	206
47	216	220	209	212	212	209
48	218	222	210	212	213	210
49	219	224	212	213	213	212
50	220	225	213	213	214	212
51	221	227	214	213	214	213
52	222	229	216	214	214	213
53	223	231	218	215	215	214
54	224	233	219	216	215	214
55	225	234	222	216	215	214
56	227	237	224	217	216	215
57	229	239	226	218	216	216
58	230	242	228	219	217	216
59	232	244	231	220	217	217
60	235	247	233	221	218	218
Max Temp:	235	247	233	221	218	218
Max Allowed:	401	401	402	402	402	401

OMEGA POINT LABORATORIES

Time (min)	TC # 125 (°F)	TC # 126 (°F)	TC # 127 (°F)	TC # 128 (°F)	TC # 129 (°F)	TC # 130 (°F)
0	77	77	76	76	77	77
1	77	77	76	76	77	77
2	77	77	76	76	77	77
3	77	77	76	76	77	77
4	77	77	76	76	77	77
5	77	77	76	76	77	77
6	77	77	77	76	77	77
7	77	78	77	77	77	77
8	77	79	78	78	77	78
9	78	80	79	78	78	78
10	79	82	81	80	79	79
11	80	83	82	81	80	80
12	82	85	84	83	81	81
13	84	87	87	86	82	82
14	87	90	90	89	84	84
15	89	93	94	94	86	86
16	92	96	99	100	88	88
17	96	99	105	106	91	91
18	99	103	110	111	94	94
19	102	107	116	116	98	98
20	106	110	121	122	102	102
21	110	115	126	127	106	106
22	113	119	132	132	111	110
23	117	123	137	137	115	115
24	121	127	142	142	120	119
25	124	131	147	146	125	124
26	128	136	151	151	131	130
27	132	140	155	155	136	135
28	136	144	159	159	142	139
29	140	148	164	163	147	144
30	143	152	168	168	152	149
31	147	156	172	172	157	153
32	151	161	177	177	161	158
33	155	166	182	181	166	163
34	159	172	188	186	170	167
35	163	177	192	190	175	172
36	167	181	197	193	179	177
37	171	186	201	197	183	181
38	175	191	204	200	187	185
39	179	196	207	203	191	189
40	183	201	209	205	195	193
41	186	205	210	207	199	196

OMEGA POINT LABORATORIES

Time (min)	TC # 125 (°F)	TC # 126 (°F)	TC # 127 (°F)	TC # 128 (°F)	TC # 129 (°F)	TC # 130 (°F)
42	190	207	211	208	202	200
43	193	209	212	209	205	204
44	196	210	212	210	207	207
45	199	211	212	210	209	209
46	202	212	212	211	210	210
47	204	212	212	210	211	211
48	206	213	211	210	212	212
49	208	213	212	211	213	212
50	210	213	212	211	213	213
51	211	214	213	212	214	213
52	212	214	213	213	214	214
53	213	214	213	213	215	214
54	213	215	214	214	215	214
55	214	215	214	215	216	215
56	214	216	215	215	216	215
57	215	216	215	216	217	215
58	215	217	216	216	217	216
59	216	217	216	217	218	216
60	217	218	217	217	219	217
Max Temp:	217	218	217	217	219	217
Max Allowed:	402	402	401	401	402	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 131 (°F)	TC # 132 (°F)	TC # 133 (°F)	TC # 134 (°F)	TC # 135 (°F)	TC # 136 (°F)
0	78	78	78	78	78	78
1	77	78	78	78	78	78
2	77	78	78	78	78	78
3	77	78	78	78	78	78
4	78	78	78	78	78	78
5	77	78	78	78	78	78
6	78	78	78	78	78	78
7	78	78	79	78	79	78
8	78	79	80	79	79	79
9	79	79	81	80	80	79
10	80	80	82	81	81	80
11	81	81	83	82	82	81
12	82	83	85	84	84	83
13	83	84	87	86	86	85
14	85	86	89	88	88	87
15	87	89	92	91	91	89
16	90	92	95	94	95	92
17	93	95	98	98	99	94
18	96	98	102	102	103	97
19	100	103	106	106	108	101
20	103	107	110	110	113	105
21	107	111	115	115	118	108
22	111	116	119	120	123	112
23	116	120	123	125	127	117
24	120	125	128	130	132	121
25	125	129	133	135	136	125
26	129	134	138	140	141	130
27	134	139	142	144	145	134
28	138	143	147	149	150	139
29	143	148	151	153	154	143
30	147	153	156	157	158	147
31	152	158	160	161	162	151
32	156	162	164	165	165	155
33	161	166	168	169	169	159
34	166	170	172	173	172	163
35	170	175	176	177	176	167
36	175	179	180	181	180	171
37	187	184	184	184	184	175
38	200	190	187	188	187	178
39	204	196	191	191	191	182
40	206	201	194	195	195	186
41	208	204	197	198	198	189

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 131 (°F)	TC # 132 (°F)	TC # 133 (°F)	TC # 134 (°F)	TC # 135 (°F)	TC # 136 (°F)
42	209	205	201	201	201	193
43	210	207	204	205	204	196
44	211	208	206	207	208	201
45	211	209	208	209	210	205
46	211	209	210	211	212	209
47	212	210	211	212	212	210
48	212	210	212	212	212	211
49	212	211	213	213	213	212
50	212	212	213	214	213	212
51	213	213	214	214	214	213
52	213	213	215	215	214	213
53	213	214	215	215	214	213
54	214	215	216	216	215	214
55	214	216	216	216	216	214
56	215	217	217	217	216	214
57	215	217	218	217	216	215
58	216	218	218	218	217	216
59	216	219	219	219	217	216
60	217	220	220	220	218	217
Max Temp:	217	220	220	220	218	217
Max Allowed:	403	403	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI. September 20, 1994

Time (min)	TC # 137 (°F)	TC # 138 (°F)	TC # 139 (°F)	TC # 140 (°F)	TC # 141 (°F)	TC # 142 (°F)
0	77	77	78	78	79	78
1	77	77	78	78	79	78
2	77	77	78	78	78	78
3	77	76	78	78	78	78
4	77	77	78	78	78	78
5	77	77	78	78	79	79
6	77	77	78	79	79	79
7	77	78	80	80	79	80
8	77	80	81	81	80	82
9	78	82	84	83	82	84
10	79	84	87	85	83	87
11	80	87	91	89	86	91
12	81	90	95	92	89	95
13	83	94	100	96	92	100
14	85	99	106	102	97	105
15	87	104	112	107	101	111
16	90	110	118	114	106	116
17	92	115	124	120	112	122
18	95	121	130	127	118	128
19	98	126	137	135	124	134
20	101	132	143	142	130	140
21	105	138	149	149	137	147
22	109	143	155	155	143	153
23	112	149	161	162	149	159
24	116	155	167	168	155	166
25	120	160	172	174	161	172
26	124	166	178	179	167	178
27	128	172	183	184	173	184
28	132	177	188	189	179	189
29	136	182	193	194	185	194
30	141	187	197	198	190	199
31	145	191	201	202	195	204
32	149	196	204	205	199	208
33	153	200	210	209	204	211
34	158	204	211	212	207	213
35	162	208	215	215	210	214
36	166	209	216	217	213	215
37	171	211	218	218	215	217
38	175	212	220	220	217	218
39	179	213	221	221	219	220
40	182	214	221	222	221	222
41	186	215	223	223	222	225

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI. September 20, 1994

Time (min)	TC # 137 (°F)	TC # 138 (°F)	TC # 139 (°F)	TC # 140 (°F)	TC # 141 (°F)	TC # 142 (°F)
42	189	217	225	224	224	228
43	192	218	228	226	225	231
44	195	219	230	227	227	235
45	197	220	232	229	229	238
46	200	222	235	232	231	242
47	202	224	239	235	233	247
48	203	225	243	238	235	252
49	205	228	248	242	237	257
50	206	231	253	247	240	263
51	208	234	259	252	243	269
52	210	238	266	257	246	276
53	211	241	273	263	249	283
54	211	245	281	271	254	290
55	212	249	288	279	258	296
56	213	254	296	288	264	304
57	213	258	303	297	270	311
58	214	263	311	306	277	317
59	215	268	318	316	285	324
60	216	274	325	325	293	330
Max Temp:	216	274	325	325	293	330
Max Allowed:	402	402	403	403	404	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI. September 20, 1994

Time (min)	TC # 143 (°F)	TC # 144 (°F)	TC # 145 (°F)	TC # 146 (°F)	TC # 147 (°F)	TC # 148 (°F)
0	78	78	78	77	77	76
1	78	78	78	77	77	76
2	78	78	78	77	77	76
3	78	78	77	77	77	76
4	78	78	77	77	77	76
5	78	78	78	77	77	76
6	78	78	78	77	77	76
7	79	78	78	78	77	77
8	80	79	78	78	77	77
9	81	80	79	79	78	78
10	83	81	80	80	79	79
11	85	83	82	82	80	80
12	88	85	84	84	81	82
13	91	88	87	87	83	84
14	95	92	90	90	86	86
15	100	96	94	94	88	89
16	105	101	98	98	92	93
17	110	107	103	103	96	97
18	116	113	109	109	100	101
19	123	119	115	116	106	106
20	130	125	123	124	112	112
21	136	132	131	131	119	118
22	142	139	140	138	126	124
23	149	146	147	144	132	130
24	155	153	154	150	139	137
25	161	159	160	156	146	143
26	167	164	167	162	153	149
27	172	170	172	167	158	155
28	178	176	178	173	164	161
29	183	182	183	178	170	166
30	188	187	188	184	175	171
31	194	192	192	188	180	175
32	198	196	196	193	185	179
33	203	201	200	197	190	183
34	207	204	204	202	195	187
35	210	207	207	205	200	190
36	214	210	210	208	203	194
37	216	212	212	210	206	197
38	218	214	214	212	207	200
39	219	215	215	214	209	203
40	221	217	216	215	210	206
41	222	218	217	216	211	208

OMEGA POINT LABORATORIES

Time (min)	TC # 143 (°F)	TC # 144 (°F)	TC # 145 (°F)	TC # 146 (°F)	TC # 147 (°F)	TC # 148 (°F)
42	224	220	218	218	212	210
43	226	221	219	219	212	211
44	228	223	221	220	213	212
45	230	225	222	222	214	213
46	233	228	224	224	215	214
47	236	230	226	226	216	215
48	239	233	228	229	217	216
49	242	236	231	232	218	218
50	246	239	234	235	219	219
51	251	242	237	238	221	221
52	255	246	241	242	223	223
53	260	250	245	247	226	225
54	266	255	249	251	228	228
55	272	260	254	256	231	230
56	279	265	259	262	235	233
57	286	270	265	268	238	235
58	294	277	271	275	242	238
59	302	283	278	281	246	241
60	311	291	285	289	251	244
Max Temp:	311	291	285	289	251	244
Max Allowed:	403	403	403	402	402	401

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 149 (°F)	TC # 150 (°F)	TC # 151 (°F)	TC # 152 (°F)	TC # 153 (°F)	TC # 154 (°F)
0	76	76	76	76	76	77
1	76	76	76	76	76	77
2	76	76	76	76	76	77
3	76	76	76	76	76	77
4	76	76	76	76	76	77
5	76	76	76	76	77	77
6	77	76	76	76	77	77
7	77	77	77	77	78	77
8	78	78	78	78	79	78
9	79	79	79	79	80	79
10	81	81	81	81	83	81
11	83	84	83	84	85	83
12	86	87	86	87	88	86
13	89	90	89	90	92	89
14	93	94	93	94	96	93
15	97	99	98	98	100	97
16	102	103	102	102	104	101
17	107	108	106	107	109	105
18	113	112	111	111	114	110
19	119	117	116	116	119	115
20	124	122	121	121	124	120
21	129	127	126	126	130	125
22	135	133	131	131	135	131
23	141	139	136	136	141	135
24	147	146	142	142	146	140
25	153	153	148	147	152	145
26	158	160	153	152	157	150
27	164	168	158	157	162	155
28	170	177	164	162	167	160
29	175	184	168	167	172	164
30	180	186	174	172	177	169
31	185	192	179	177	182	173
32	189	197	185	182	186	177
33	194	202	190	187	190	181
34	199	207	195	192	195	185
35	203	210	199	197	199	189
36	206	214	203	202	203	192
37	208	217	207	206	207	196
38	209	218	210	210	211	200
39	210	219	211	212	212	203
40	211	221	213	213	212	207
41	212	222	214	215	213	210

OMEGA POINT LABORATORIES

Time (min)	TC # 149 (°F)	TC # 150 (°F)	TC # 151 (°F)	TC # 152 (°F)	TC # 153 (°F)	TC # 154 (°F)
42	213	223	215	217	214	213
43	214	225	217	218	217	215
44	216	227	219	220	219	217
45	219	230	221	222	222	219
46	222	232	224	224	224	222
47	226	234	226	226	228	224
48	229	236	229	229	231	226
49	232	239	232	232	234	229
50	235	242	235	235	238	232
51	238	245	238	238	242	235
52	241	248	242	241	246	238
53	245	252	245	244	250	242
54	248	256	249	248	255	247
55	252	260	253	251	260	251
56	256	264	258	255	266	256
57	260	268	262	260	272	260
58	264	273	267	265	279	266
59	268	277	271	270	286	270
60	272	282	275	276	294	275
Max Temp:	272	282	275	276	294	275
Max Allowed:	401	401	401	401	401	402

OMEGA POINT LABORATORIES

Time (min)	TC # 155 (°F)	TC # 156 (°F)	TC # 157 (°F)	TC # 158 (°F)	TC # 159 (°F)	TC # 160 (°F)
0	77	77	77	77	76	76
1	77	77	77	77	76	76
2	77	77	77	77	76	76
3	77	77	77	77	77	76
4	77	77	77	77	85	78
5	77	77	78	77	100	81
6	77	78	78	78	113	85
7	78	79	79	80	119	89
8	79	81	81	82	123	93
9	80	83	83	84	123	96
10	82	86	85	87	121	98
11	84	89	87	90	119	99
12	86	92	90	93	118	101
13	89	95	93	96	119	103
14	92	99	96	100	121	105
15	96	103	100	104	124	107
16	100	107	103	108	126	109
17	104	111	106	112	129	112
18	109	115	110	117	131	115
19	114	120	114	122	134	118
20	119	125	117	126	137	121
21	124	129	121	131	141	125
22	129	134	125	136	145	129
23	134	139	129	141	150	132
24	140	144	133	145	155	136
25	145	148	137	150	159	140
26	150	153	141	154	164	144
27	155	157	145	159	169	148
28	160	161	149	163	174	153
29	164	165	153	167	178	157
30	169	170	157	171	182	161
31	173	174	160	175	186	165
32	178	177	164	178	190	170
33	182	181	168	182	193	174
34	186	184	172	185	197	179
35	190	187	175	188	200	185
36	194	190	178	191	204	191
37	198	194	182	194	206	197
38	201	197	185	197	208	201
39	204	199	189	200	210	204
40	208	202	192	203	211	206
41	210	205	195	205	211	208

OMEGA POINT LABORATORIES

Time (min)	TC # 155 (°F)	TC # 156 (°F)	TC # 157 (°F)	TC # 158 (°F)	TC # 159 (°F)	TC # 160 (°F)
42	212	208	198	208	211	210
43	215	211	201	210	212	211
44	216	213	204	212	213	213
45	218	214	206	214	213	213
46	220	215	209	215	215	214
47	221	216	211	217	217	215
48	222	218	212	218	219	215
49	224	219	213	220	222	216
50	225	221	213	222	225	217
51	227	223	214	225	228	218
52	228	225	214	227	231	219
53	230	227	215	230	234	220
54	233	229	215	233	237	221
55	235	231	215	236	241	223
56	238	234	216	239	245	224
57	241	237	216	242	249	226
58	244	240	217	246	254	229
59	248	244	217	249	259	231
60	253	248	219	253	264	234
Max Temp:	253	248	219	253	264	234
Max Allowed:	402	402	402	402	401	401

OMEGA POINT LABORATORIES

Time (min)	TC # 161 (°F)	TC # 162 (°F)	TC # 163 (°F)	TC # 164 (°F)	TC # 165 (°F)	TC # 166 (°F)
0	76	76	77	77	77	77
1	76	76	77	76	77	77
2	76	76	77	77	77	77
3	76	76	77	76	77	77
4	76	76	77	76	77	77
5	76	76	77	77	77	77
6	76	77	77	77	78	78
7	77	77	77	77	79	78
8	77	77	78	78	80	80
9	78	78	78	79	81	81
10	79	78	79	80	83	83
11	81	80	80	81	84	85
12	82	81	82	82	86	87
13	84	82	83	84	88	89
14	86	84	85	86	90	91
15	88	86	87	89	93	94
16	91	88	90	91	96	97
17	93	91	93	95	99	100
18	96	94	96	98	103	104
19	99	97	100	102	107	108
20	103	100	104	106	112	113
21	106	104	109	111	116	119
22	110	108	114	115	121	125
23	114	112	119	120	126	133
24	118	116	125	125	131	140
25	122	120	131	130	137	147
26	126	125	137	135	142	153
27	131	129	143	139	148	159
28	135	133	149	145	154	165
29	140	138	156	149	161	171
30	144	143	163	155	168	176
31	149	148	170	160	175	182
32	153	154	177	164	182	187
33	158	159	184	169	188	191
34	163	163	189	174	195	195
35	169	168	194	179	199	199
36	177	172	197	183	202	202
37	186	177	200	188	205	204
38	195	181	203	192	206	205
39	201	185	205	197	208	207
40	205	189	206	201	209	208
41	207	193	208	204	209	209

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 161 (°F)	TC # 162 (°F)	TC # 163 (°F)	TC # 164 (°F)	TC # 165 (°F)	TC # 166 (°F)
42	209	196	209	207	210	210
43	211	199	210	208	210	211
44	211	201	211	210	211	211
45	212	203	212	211	212	212
46	212	206	212	212	212	213
47	213	208	213	213	213	213
48	213	210	214	213	213	214
49	213	212	214	214	214	214
50	214	213	215	214	214	215
51	214	213	215	215	215	215
52	214	214	216	215	215	215
53	215	215	216	216	215	216
54	215	215	217	216	215	216
55	216	216	217	216	216	216
56	217	217	218	217	216	217
57	217	218	219	217	216	217
58	218	219	220	217	217	218
59	219	220	221	218	217	218
60	220	221	222	218	218	219
Max Temp:	220	221	222	218	218	219
Max Allowed:	401	401	402	402	402	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 167 (°F)	TC # 168 (°F)	TC # 169 (°F)	TC # 170 (°F)	TC # 171 (°F)	TC # 172 (°F)
0	77	78	78	78	78	78
1	77	78	78	78	78	78
2	77	77	78	78	78	78
3	77	77	78	78	78	78
4	77	78	78	78	78	78
5	78	78	78	78	78	78
6	78	78	78	78	78	79
7	79	79	79	79	79	79
8	80	80	80	80	80	79
9	81	82	82	81	81	80
10	82	83	84	83	83	81
11	84	85	86	84	85	83
12	86	87	88	86	87	84
13	88	90	91	89	89	86
14	90	93	94	91	92	89
15	93	96	98	94	96	92
16	96	99	101	98	99	95
17	99	103	105	101	103	98
18	103	107	109	105	107	102
19	107	111	114	109	111	108
20	111	115	118	113	115	113
21	116	119	122	117	119	117
22	120	123	127	121	123	122
23	125	127	131	125	128	127
24	130	131	136	130	132	133
25	136	135	141	134	136	138
26	141	139	145	138	140	143
27	147	144	150	142	144	148
28	152	148	154	146	148	154
29	158	152	159	150	152	158
30	163	157	163	155	156	162
31	168	161	167	159	159	165
32	173	165	171	164	163	169
33	177	171	175	168	166	172
34	181	177	179	173	169	176
35	185	183	182	177	172	179
36	188	189	186	181	176	182
37	192	194	190	184	179	185
38	195	198	193	188	183	187
39	198	201	195	191	186	190
40	201	205	197	194	190	193
41	204	207	200	197	193	195

OMEGA POINT LABORATORIES

Time (min)	TC # 167 (°F)	TC # 168 (°F)	TC # 169 (°F)	TC # 170 (°F)	TC # 171 (°F)	TC # 172 (°F)
42	206	209	202	200	196	197
43	208	210	203	203	199	199
44	210	211	205	205	202	200
45	211	212	207	208	204	203
46	212	213	209	210	207	205
47	213	213	211	211	208	206
48	214	214	211	211	208	207
49	214	214	213	212	210	208
50	215	214	213	213	212	210
51	215	215	214	214	213	211
52	215	215	215	215	214	212
53	216	216	215	216	214	213
54	216	216	216	216	215	213
55	217	217	216	217	215	214
56	217	217	217	217	216	214
57	217	218	217	218	216	215
58	218	219	218	218	217	216
59	218	220	218	219	218	217
60	219	221	219	220	218	218
Max Temp:	219	221	219	220	218	218
Max Allowed:	402	403	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 173 (°F)	TC # 174 (°F)	TC # 175 (°F)	TC # 176 (°F)	TC # 177 (°F)	TC # 178 (°F)
0	78	77	76	78	79	79
1	78	77	76	78	79	79
2	78	77	76	78	79	79
3	78	77	76	78	79	79
4	78	77	76	78	79	79
5	78	77	76	78	79	79
6	78	77	77	79	79	80
7	79	77	77	80	80	81
8	79	78	79	81	82	83
9	80	78	81	84	84	86
10	80	78	84	86	87	89
11	82	79	87	90	90	93
12	83	80	90	94	94	96
13	84	81	94	98	98	100
14	86	82	98	103	102	104
15	88	84	103	108	107	108
16	91	86	108	114	112	113
17	93	88	114	119	117	117
18	96	90	119	124	122	121
19	99	93	124	130	127	125
20	103	96	129	135	132	129
21	107	99	134	141	137	133
22	111	102	138	145	142	137
23	115	105	143	150	146	141
24	119	109	147	155	151	145
25	124	113	152	159	155	149
26	128	117	156	164	159	152
27	133	120	160	168	163	155
28	138	124	165	172	167	159
29	143	128	169	175	170	162
30	149	133	174	180	174	165
31	155	137	179	183	177	167
32	161	141	183	187	180	170
33	169	145	188	191	183	173
34	177	150	193	195	186	175
35	182	154	198	198	189	178
36	188	159	202	202	192	181
37	192	163	204	205	195	183
38	194	167	206	207	198	186
39	196	171	207	209	200	189
40	198	176	207	210	202	191
41	200	179	208	211	205	194

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 173 (°F)	TC # 174 (°F)	TC # 175 (°F)	TC # 176 (°F)	TC # 177 (°F)	TC # 178 (°F)
42	202	183	209	212	208	196
43	204	187	209	213	210	199
44	205	190	209	214	211	201
45	207	193	210	215	212	204
46	208	196	211	217	213	206
47	208	199	211	218	214	208
48	209	201	212	220	214	210
49	210	202	213	223	215	213
50	211	204	213	226	216	215
51	211	205	214	229	218	216
52	212	206	214	232	219	218
53	212	207	216	236	221	221
54	212	208	218	239	223	223
55	213	209	220	243	225	225
56	213	209	222	248	227	228
57	214	210	225	252	229	231
58	214	210	230	258	231	235
59	215	210	234	263	234	238
60	215	211	239	268	237	242
Max Temp:	215	211	239	268	237	242
Max Allowed:	403	402	401	403	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 179 (°F)	TC # 180 (°F)	TC # 181 (°F)	TC # 182 (°F)	TC # 183 (°F)	TC # 184 (°F)
0	79	79	79	79	79	79
1	79	79	79	79	79	79
2	79	79	79	79	79	79
3	79	79	79	79	79	79
4	79	79	79	79	79	79
5	79	79	80	79	79	79
6	80	79	80	79	79	79
7	80	80	80	79	80	79
8	82	80	81	80	80	80
9	85	81	82	81	81	81
10	87	82	83	83	82	82
11	91	84	84	84	84	84
12	93	85	85	86	85	85
13	96	87	87	88	87	87
14	100	89	88	90	90	89
15	103	92	90	92	93	92
16	107	94	93	95	96	95
17	110	97	95	97	99	97
18	113	100	97	100	102	101
19	116	103	100	103	105	104
20	119	105	102	105	109	107
21	122	108	105	108	112	110
22	125	111	107	110	115	114
23	128	114	110	113	119	117
24	132	118	113	115	123	121
25	134	121	116	118	126	124
26	137	124	119	121	129	128
27	140	127	122	124	133	133
28	143	130	125	127	136	137
29	146	133	129	130	139	141
30	149	136	132	132	141	146
31	152	139	135	135	144	150
32	155	142	138	138	147	153
33	158	144	141	141	151	157
34	161	147	143	144	154	161
35	164	150	146	147	157	164
36	168	153	149	149	160	168
37	171	156	152	153	164	170
38	174	159	154	156	167	173
39	177	162	157	159	169	177
40	180	165	161	162	173	180
41	183	168	164	166	176	182

OMEGA POINT LABORATORIES

Time (min)	TC # 179 (°F)	TC # 180 (°F)	TC # 181 (°F)	TC # 182 (°F)	TC # 183 (°F)	TC # 184 (°F)
42	187	171	166	169	178	185
43	190	174	169	172	181	187
44	193	177	171	175	184	189
45	196	180	175	178	187	192
46	199	183	177	181	190	194
47	202	185	180	184	192	196
48	205	188	182	186	194	199
49	208	190	185	189	196	201
50	211	193	187	191	199	204
51	215	196	189	194	201	206
52	218	198	192	196	203	208
53	222	201	194	198	205	210
54	225	203	197	201	207	212
55	229	206	199	203	209	213
56	233	209	201	205	211	214
57	236	212	204	207	213	215
58	240	215	206	210	215	217
59	244	218	208	212	217	218
60	248	221	211	214	219	220
Max Temp:	248	221	211	214	219	220
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 185 (°F)	TC # 186 (°F)	TC # 187 (°F)	TC # 188 (°F)	TC # 189 (°F)	TC # 190 (°F)
0	79	79	79	79	80	79
1	79	79	79	79	80	79
2	79	79	79	79	80	79
3	79	79	79	79	80	79
4	79	79	79	79	80	79
5	79	79	80	79	80	79
6	80	80	82	79	80	80
7	80	80	85	80	80	80
8	81	81	87	81	81	80
9	81	82	89	83	81	81
10	83	83	91	85	82	83
11	84	84	94	88	83	84
12	86	86	97	91	85	86
13	88	88	102	95	86	89
14	90	90	107	99	88	91
15	92	92	113	104	91	94
16	95	95	118	109	93	97
17	98	98	123	113	96	100
18	101	101	128	118	99	103
19	104	105	132	122	102	107
20	107	108	135	126	105	111
21	110	111	138	130	107	114
22	114	115	141	133	111	118
23	117	118	144	136	114	121
24	121	122	146	139	117	125
25	125	125	148	142	121	129
26	129	129	150	145	124	132
27	135	132	153	148	127	136
28	142	135	156	151	130	141
29	149	138	159	153	133	145
30	155	142	163	156	136	149
31	161	145	166	159	140	152
32	166	148	169	161	143	156
33	171	152	171	164	147	160
34	176	155	173	166	151	163
35	179	159	175	168	155	166
36	181	162	178	171	159	170
37	185	166	180	173	163	173
38	187	170	183	175	166	176
39	193	173	184	177	169	179
40	196	176	186	179	174	182
41	198	180	188	182	178	184

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 185 (°F)	TC # 186 (°F)	TC # 187 (°F)	TC # 188 (°F)	TC # 189 (°F)	TC # 190 (°F)
42	200	184	191	184	181	187
43	201	187	192	186	185	190
44	202	191	194	188	188	193
45	204	195	197	190	190	196
46	205	197	198	193	194	198
47	206	199	200	195	197	201
48	207	201	200	197	199	203
49	207	203	202	199	200	206
50	208	205	203	201	201	209
51	209	206	204	203	203	212
52	209	208	205	204	202	214
53	210	209	207	206	203	217
54	211	210	209	207	205	218
55	213	211	210	208	208	221
56	214	213	211	209	210	223
57	215	214	212	210	210	226
58	215	215	213	211	212	230
59	216	217	214	212	212	233
60	218	219	215	213	214	237
Max Temp:	218	219	215	213	214	237
Max Allowed:	404	404	404	404	405	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 191 (°F)	TC # 192 (°F)	TC # 193 (°F)	TC # 194 (°F)	TC # 195 (°F)	TC # 196 (°F)
0	79	78	79	79	79	79
1	79	79	79	79	79	79
2	79	79	79	79	79	79
3	79	78	79	79	79	79
4	79	78	79	79	79	79
5	79	79	79	79	79	79
6	79	79	79	79	81	79
7	80	79	79	80	87	79
8	81	81	80	81	93	80
9	82	82	81	83	99	81
10	83	84	83	85	104	83
11	85	86	85	87	107	85
12	87	88	87	89	110	86
13	90	91	89	91	113	88
14	93	94	92	94	116	91
15	96	97	94	97	118	93
16	99	100	97	101	121	96
17	102	104	101	104	123	100
18	106	108	104	107	126	105
19	110	112	108	110	128	108
20	114	115	111	113	130	112
21	117	119	115	116	132	115
22	121	124	119	119	134	118
23	124	130	124	123	136	121
24	129	136	129	126	138	125
25	134	142	134	130	140	128
26	141	145	139	133	143	132
27	146	148	143	137	146	135
28	150	152	147	141	149	137
29	154	155	150	144	152	140
30	157	157	153	147	154	143
31	159	159	158	151	157	147
32	162	161	161	153	159	150
33	164	163	164	156	162	155
34	166	166	167	159	164	159
35	169	168	170	161	166	164
36	171	171	173	164	168	170
37	173	174	175	166	169	174
38	175	177	178	168	171	178
39	177	180	180	171	173	183
40	180	183	182	174	175	189
41	183	186	185	177	177	195

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 191 (°F)	TC # 192 (°F)	TC # 193 (°F)	TC # 194 (°F)	TC # 195 (°F)	TC # 196 (°F)
42	186	189	187	179	179	202
43	189	191	189	181	183	206
44	193	195	192	184	185	208
45	196	197	194	186	188	209
46	199	200	196	188	190	210
47	202	203	199	191	193	211
48	205	206	202	193	195	211
49	208	209	204	195	198	211
50	211	212	207	198	201	211
51	214	215	209	201	203	211
52	217	218	212	204	205	211
53	221	222	215	207	206	211
54	224	225	218	210	208	212
55	228	229	221	213	210	212
56	232	233	224	215	212	212
57	236	237	227	218	213	212
58	240	241	230	221	215	212
59	244	245	234	225	216	212
60	248	249	238	228	218	212
Max Temp:	248	249	238	228	218	212
Max Allowed:	404	403	404	404	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 197 (°F)	TC # 198 (°F)	TC # 199 (°F)	TC # 200 (°F)	TC #201 (°F)	TC #202 (°F)
0	79	79	79	78	77	76
1	79	79	79	78	77	76
2	79	79	79	78	77	76
3	79	79	79	78	77	76
4	79	79	79	78	77	76
5	79	79	79	78	77	76
6	79	79	79	78	77	76
7	80	79	80	78	78	76
8	81	79	83	79	78	77
9	82	80	86	80	78	78
10	84	81	88	81	79	79
11	85	82	91	83	80	80
12	87	83	93	85	82	82
13	88	85	95	87	83	84
14	91	87	97	90	85	86
15	94	89	100	93	88	89
16	98	91	102	96	91	93
17	103	94	105	99	94	97
18	108	97	108	101	97	101
19	112	101	112	105	101	105
20	115	104	117	108	104	109
21	118	108	123	112	108	113
22	121	113	130	116	112	117
23	124	117	137	121	115	121
24	126	122	145	126	119	125
25	130	127	151	132	123	129
26	134	131	157	140	127	133
27	137	135	161	150	130	136
28	140	138	165	156	134	140
29	142	141	167	160	138	143
30	145	144	169	164	142	146
31	148	147	172	168	146	149
32	150	150	174	173	150	152
33	153	152	176	177	153	155
34	156	155	178	180	156	157
35	159	158	180	183	159	160
36	162	161	183	185	163	163
37	165	164	185	187	168	165
38	168	167	187	189	174	168
39	171	171	188	191	179	170
40	174	175	190	193	184	173
41	177	180	192	194	188	175

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	TC # 197 (°F)	TC # 198 (°F)	TC # 199 (°F)	TC # 200 (°F)	TC #201 (°F)	TC #202 (°F)
42	180	186	194	196	192	177
43	184	190	196	198	196	179
44	187	194	199	200	198	182
45	191	197	201	201	200	184
46	196	201	203	203	202	186
47	202	204	204	204	203	189
48	208	207	206	205	204	192
49	211	210	207	206	205	194
50	212	210	207	207	206	197
51	212	211	208	208	207	200
52	213	211	208	208	207	202
53	213	211	209	208	208	204
54	210	211	209	209	208	206
55	209	211	210	209	209	207
56	209	211	210	209	209	209
57	209	211	210	209	210	210
58	210	211	210	209	210	210
59	210	212	210	210	211	211
60	211	212	211	210	211	211
Max Temp:	213	212	211	210	211	211
Max Allowed:	404	404	404	403	402	401

OMEGA POINT LABORATORIES

Time (min)	TC # 203 (°F)	TC # 204 (°F)	TC # 205 (°F)	TC # 206 (°F)	TC # 207 (°F)	TC # 208 (°F)
0	76	77	79	79	79	79
1	76	77	79	79	79	79
2	76	77	79	79	79	79
3	76	77	79	79	79	79
4	76	77	79	79	79	79
5	76	77	79	79	79	79
6	76	78	79	79	79	79
7	77	78	79	80	80	80
8	78	79	81	80	81	80
9	78	81	83	81	82	81
10	80	83	85	83	83	81
11	82	86	88	85	85	82
12	84	88	90	88	87	84
13	86	91	94	91	89	85
14	89	95	97	95	92	87
15	91	98	101	99	95	89
16	94	102	105	104	98	92
17	98	105	109	108	101	94
18	101	109	113	112	104	97
19	105	113	117	117	107	100
20	108	116	121	121	110	103
21	111	120	125	125	113	106
22	115	124	129	129	117	109
23	118	127	132	132	120	112
24	121	131	136	135	123	115
25	124	134	139	138	126	118
26	127	138	142	141	129	121
27	130	141	145	143	132	124
28	133	145	148	146	135	127
29	136	148	150	149	137	129
30	139	151	152	152	140	132
31	142	155	155	154	142	134
32	145	158	157	157	145	137
33	148	160	160	159	148	139
34	150	163	162	162	151	142
35	153	166	164	165	154	145
36	156	168	167	168	157	147
37	159	171	169	171	160	150
38	161	173	172	174	163	152
39	164	175	175	177	166	155
40	167	177	178	180	169	158
41	169	179	180	184	172	160

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 203 (°F)	TC # 204 (°F)	TC # 205 (°F)	TC # 206 (°F)	TC # 207 (°F)	TC # 208 (°F)
42	172	181	182	186	176	163
43	175	183	185	189	179	165
44	177	185	188	192	182	168
45	180	187	191	195	185	171
46	182	189	194	198	188	173
47	184	191	197	200	191	176
48	187	193	200	203	194	179
49	189	195	203	205	196	182
50	191	198	206	207	199	185
51	193	201	209	210	202	188
52	194	203	212	212	205	190
53	195	206	215	215	208	193
54	197	209	219	218	210	196
55	198	212	222	221	213	199
56	200	215	226	224	216	202
57	202	218	229	227	219	204
58	203	221	233	230	222	207
59	204	224	237	234	225	210
60	206	227	241	238	228	213
Max Temp:	206	227	241	238	228	213
Max Allowed:	401	402	404	404	404	404

OMEGA POINT LABORATORIES

Time (min)	TC # 209 (°F)	TC # 210 (°F)	TC # 211 (°F)	TC # 212 (°F)	TC # 213 (°F)	TC # 214 (°F)
0	79	79	79	79	80	79
1	79	79	79	79	80	79
2	79	79	79	79	80	79
3	79	79	79	79	80	79
4	79	79	79	79	80	79
5	79	79	79	79	80	80
6	79	79	80	79	80	80
7	80	79	80	79	80	81
8	80	80	81	80	81	83
9	80	81	82	81	82	85
10	81	82	83	82	83	86
11	82	83	85	83	85	89
12	83	85	86	85	87	92
13	85	86	88	87	89	94
14	87	88	91	89	92	97
15	89	91	93	92	95	100
16	91	93	96	95	99	103
17	94	95	98	99	102	106
18	97	98	101	102	105	110
19	99	101	104	106	109	113
20	102	104	107	109	112	116
21	105	107	111	112	114	119
22	108	110	114	115	117	121
23	111	113	117	119	120	124
24	113	117	120	122	123	128
25	116	120	124	125	127	131
26	120	123	127	128	130	135
27	123	126	130	131	133	138
28	126	130	133	134	136	142
29	129	133	136	137	140	145
30	131	137	139	139	143	149
31	134	140	142	142	147	153
32	137	143	145	146	151	157
33	139	145	148	149	154	161
34	142	147	152	152	158	164
35	145	150	155	155	162	168
36	147	152	158	159	165	171
37	150	155	161	162	169	175
38	153	158	163	165	173	178
39	155	160	167	169	177	182
40	158	163	174	172	180	186
41	161	166	178	175	183	188

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 209 (°F)	TC # 210 (°F)	TC # 211 (°F)	TC # 212 (°F)	TC # 213 (°F)	TC # 214 (°F)
42	163	168	181	177	185	191
43	166	171	180	179	188	193
44	168	174	183	182	191	195
45	171	176	185	185	194	197
46	174	179	187	187	196	199
47	177	182	189	189	199	200
48	180	184	191	192	201	202
49	183	186	193	194	204	204
50	185	189	194	197	207	206
51	188	191	194	199	209	208
52	191	194	195	202	212	211
53	194	196	198	205	215	213
54	197	199	199	207	217	216
55	200	201	201	210	220	218
56	202	203	202	212	223	221
57	205	205	203	214	226	223
58	208	207	203	217	229	225
59	211	209	204	219	232	227
60	214	211	205	221	235	230
Max Temp:	214	211	205	221	235	230
Max Allowed:	404	404	404	404	405	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 215 (°F)	TC # 216 (°F)	TC # 217 (°F)	TC # 218 (°F)	TC # 219 (°F)	TC # 220 (°F)
0	79	79	79	79	79	79
1	79	79	79	79	79	79
2	79	79	79	79	79	79
3	79	79	79	79	79	79
4	80	79	79	79	79	79
5	86	79	79	79	79	79
6	94	80	79	79	79	79
7	99	81	80	80	80	79
8	102	83	81	80	81	80
9	104	85	82	81	83	82
10	107	87	84	83	85	83
11	109	89	86	84	87	85
12	111	91	88	86	90	87
13	113	93	90	87	92	90
14	115	95	92	90	95	92
15	118	98	95	92	97	94
16	119	100	97	94	100	97
17	119	103	100	97	103	99
18	120	105	102	100	105	102
19	122	108	106	103	108	105
20	124	111	109	105	110	107
21	127	114	112	108	112	110
22	130	117	114	111	115	113
23	133	120	117	114	117	116
24	136	124	120	117	120	119
25	137	127	123	120	123	122
26	139	130	126	123	126	125
27	143	132	128	125	129	128
28	146	136	131	129	131	131
29	149	139	134	132	134	134
30	152	143	138	137	139	138
31	155	147	142	140	142	141
32	158	150	145	143	146	144
33	160	154	148	147	149	147
34	163	157	151	150	152	150
35	165	160	154	152	155	154
36	167	162	156	154	157	157
37	170	165	158	157	160	160
38	173	168	161	160	163	163
39	176	171	162	162	165	166
40	179	173	162	163	167	170
41	181	175	165	165	170	173

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 215 (°F)	TC # 216 (°F)	TC # 217 (°F)	TC # 218 (°F)	TC # 219 (°F)	TC # 220 (°F)
42	184	178	167	168	173	177
43	187	181	170	170	176	180
44	189	183	173	173	179	183
45	192	186	176	175	182	186
46	195	188	179	179	185	190
47	197	190	182	181	187	193
48	199	193	185	184	190	196
49	202	195	188	186	193	199
50	205	198	190	189	196	202
51	207	201	193	192	198	204
52	210	204	196	195	201	207
53	214	207	199	198	204	209
54	217	210	201	200	207	212
55	219	212	204	202	210	214
56	222	215	207	205	214	217
57	224	217	210	207	216	219
58	226	220	212	209	219	222
59	229	223	214	212	222	224
60	231	225	217	214	224	227
Max Temp:	231	225	217	214	224	227
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 221 (°F)	TC # 222 (°F)	TC # 223 (°F)	TC # 224 (°F)	TC # 225 (°F)	TC # 226 (°F)
0	79	79	79	79	78	79
1	79	79	79	79	78	78
2	79	79	79	79	78	78
3	79	79	79	79	78	78
4	79	79	79	79	78	78
5	79	79	79	79	78	78
6	79	79	79	79	78	78
7	80	79	80	79	79	79
8	80	80	81	80	79	79
9	82	81	83	81	80	80
10	83	82	84	82	81	80
11	85	84	86	83	82	81
12	86	85	88	85	83	82
13	88	87	90	86	85	84
14	90	89	93	88	87	86
15	93	91	96	90	89	88
16	95	94	99	92	91	90
17	98	96	103	94	93	92
18	101	99	106	97	96	95
19	104	102	109	99	100	98
20	107	105	112	102	102	101
21	110	108	115	105	106	104
22	113	111	117	108	109	108
23	116	114	120	111	112	111
24	119	117	123	114	115	115
25	122	120	126	117	118	120
26	125	123	128	120	121	125
27	128	127	131	123	124	129
28	131	130	135	126	127	134
29	135	133	138	129	130	137
30	138	136	140	131	133	142
31	142	139	143	134	136	146
32	145	142	145	137	138	150
33	148	144	147	140	141	153
34	151	147	149	142	143	156
35	155	150	152	145	145	159
36	158	152	154	148	147	162
37	161	155	156	150	150	165
38	164	158	159	153	152	167
39	167	161	162	156	154	169
40	170	163	164	158	157	171
41	172	166	166	161	159	173

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 221 (°F)	TC # 222 (°F)	TC # 223 (°F)	TC # 224 (°F)	TC # 225 (°F)	TC # 226 (°F)
42	175	169	169	165	162	177
43	178	173	171	168	165	179
44	181	175	176	173	168	182
45	185	178	178	176	171	185
46	188	181	181	178	174	188
47	191	184	183	181	177	190
48	193	187	186	183	180	193
49	196	190	188	185	182	196
50	199	192	190	187	185	198
51	202	195	193	190	188	201
52	204	198	194	192	191	202
53	207	200	196	194	194	204
54	209	203	198	196	197	206
55	212	205	199	198	200	208
56	214	208	201	200	201	209
57	217	210	203	201	202	210
58	219	212	204	202	203	211
59	221	214	205	203	204	211
60	224	216	207	204	206	212
Max Temp:	224	216	207	204	206	212
Max Allowed:	404	404	404	404	403	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 227 (°F)	TC # 228 (°F)	TC # 229 (°F)	TC # 230 (°F)	TC # 231 (°F)	TC # 232 (°F)
0	78	78	77	75	74	74
1	78	78	77	75	74	74
2	78	78	77	75	74	74
3	78	78	77	75	74	74
4	78	78	77	75	74	74
5	78	78	77	75	74	74
6	78	78	77	75	74	74
7	78	78	77	75	75	75
8	79	78	77	76	75	76
9	79	79	78	76	76	77
10	79	79	78	77	77	79
11	80	80	79	78	78	81
12	81	81	80	79	80	83
13	83	83	82	81	82	85
14	84	85	84	82	84	88
15	86	87	86	85	86	91
16	88	90	89	88	89	94
17	91	93	92	91	92	97
18	94	96	95	95	95	101
19	97	100	99	99	99	105
20	100	103	103	103	103	109
21	104	107	106	107	107	113
22	107	110	110	111	111	117
23	110	114	114	116	116	121
24	114	117	118	120	121	125
25	118	121	121	124	126	128
26	121	124	125	128	131	132
27	125	128	128	132	136	136
28	129	131	131	135	143	139
29	132	134	134	138	150	143
30	136	137	137	140	156	146
31	143	139	140	143	162	149
32	150	142	142	146	168	152
33	157	145	145	149	173	156
34	164	148	148	152	176	159
35	169	151	151	154	178	162
36	175	154	153	157	179	164
37	178	158	156	159	180	167
38	182	160	159	162	182	170
39	185	163	162	164	184	173
40	188	166	164	167	185	175
41	191	168	167	169	189	177

OMEGA POINT LABORATORIES

Time (min)	TC # 227 (°F)	TC # 228 (°F)	TC # 229 (°F)	TC # 230 (°F)	TC # 231 (°F)	TC # 232 (°F)
42	193	171	170	171	192	179
43	196	174	172	174	195	181
44	198	176	175	176	196	183
45	200	179	177	179	199	185
46	202	182	180	181	200	187
47	204	185	183	183	201	188
48	205	188	185	185	202	190
49	207	190	187	188	203	191
50	207	192	189	189	205	192
51	208	195	191	191	206	193
52	209	197	193	193	206	194
53	209	198	195	195	207	195
54	210	200	197	196	208	196
55	210	201	199	198	208	197
56	210	202	201	200	209	199
57	211	204	202	201	209	200
58	211	204	203	203	210	201
59	212	205	204	203	211	203
60	212	206	205	205	213	204
Max Temp:	212	206	205	205	213	204
Max Allowed:	403	403	402	400	399	399

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 233 (°F)	TC # 234 (°F)	TC # 235 (°F)	TC # 236 (°F)	TC # 237 (°F)	TC # 238 (°F)
0	76	77	78	78	79	79
1	75	77	78	78	79	79
2	75	77	78	78	79	79
3	75	77	78	78	79	79
4	76	77	78	78	79	79
5	77	78	79	79	79	79
6	78	79	80	79	80	79
7	79	81	82	81	81	80
8	81	83	84	83	83	81
9	83	85	86	85	86	83
10	85	88	89	88	89	85
11	88	92	92	91	94	87
12	90	96	95	94	98	90
13	94	100	99	99	103	93
14	98	104	104	105	108	97
15	102	110	110	110	112	101
16	107	115	115	116	117	105
17	113	121	121	122	121	110
18	121	127	127	127	126	116
19	129	133	132	133	131	122
20	135	138	137	138	137	129
21	141	143	143	143	142	136
22	146	148	148	149	148	143
23	151	153	153	154	153	150
24	157	159	159	159	159	158
25	162	164	164	164	164	163
26	167	169	168	168	168	168
27	171	172	171	171	171	172
28	174	175	173	174	174	176
29	177	178	176	176	177	178
30	179	181	178	178	179	181
31	181	183	180	181	182	184
32	183	185	182	183	184	186
33	185	187	185	186	186	190
34	186	188	186	187	189	194
35	188	190	188	190	192	197
36	190	192	191	192	194	200
37	191	194	192	194	196	200
38	192	196	195	195	198	202
39	194	199	196	197	200	203
40	196	202	198	198	201	203
41	198	204	201	200	202	204

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 233 (°F)	TC # 234 (°F)	TC # 235 (°F)	TC # 236 (°F)	TC # 237 (°F)	TC # 238 (°F)
42	200	206	204	202	204	205
43	201	209	206	203	206	206
44	203	210	209	205	208	207
45	204	212	212	206	209	207
46	205	215	215	207	210	208
47	206	220	218	209	211	208
48	207	225	222	211	213	208
49	208	230	225	214	215	209
50	210	235	228	217	217	210
51	213	240	232	220	220	210
52	215	245	235	223	223	211
53	216	250	239	227	226	211
54	218	254	243	230	228	212
55	220	258	247	233	231	212
56	218	262	251	237	234	213
57	222	266	255	240	237	215
58	229	270	258	243	240	216
59	235	274	262	247	243	218
60	243	278	265	250	246	220
Max Temp:	243	278	265	250	246	220
Max Allowed:	401	402	403	403	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 239 (°F)	TC # 240 (°F)	TC # 241 (°F)	TC # 242 (°F)	TC # 243 (°F)	TC # 244 (°F)
0	79	79	79	79	79	79
1	79	79	79	79	79	79
2	79	79	79	79	79	79
3	79	79	79	79	79	79
4	79	79	79	79	79	79
5	79	79	79	79	79	79
6	79	79	79	79	79	79
7	80	79	79	79	80	80
8	81	80	80	80	81	81
9	82	82	81	81	82	83
10	84	83	82	83	84	85
11	86	85	83	84	86	87
12	89	87	85	86	88	89
13	92	90	87	89	91	92
14	96	93	90	92	94	95
15	100	96	93	94	97	99
16	104	100	96	97	101	102
17	109	103	99	101	104	106
18	114	107	102	104	108	109
19	119	111	105	107	111	113
20	124	115	108	111	115	117
21	129	119	112	114	118	120
22	134	123	115	118	122	124
23	139	127	118	121	125	127
24	144	132	121	124	129	131
25	149	137	124	127	132	134
26	154	142	127	130	135	138
27	158	146	130	133	139	140
28	162	151	133	135	141	143
29	166	155	136	137	144	146
30	170	160	139	140	147	149
31	173	164	142	144	149	152
32	177	168	146	147	152	155
33	180	172	150	150	155	158
34	183	175	154	153	159	162
35	188	179	157	156	163	167
36	190	182	161	160	168	172
37	192	185	164	164	172	178
38	195	188	168	169	175	185
39	197	190	171	172	179	195
40	198	193	174	176	182	200
41	199	196	177	179	187	202

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 239 (°F)	TC # 240 (°F)	TC # 241 (°F)	TC # 242 (°F)	TC # 243 (°F)	TC # 244 (°F)
42	201	198	180	182	195	204
43	202	201	183	185	202	205
44	204	203	186	187	207	207
45	205	205	189	191	209	208
46	206	205	191	196	210	209
47	207	206	193	204	211	209
48	207	207	195	209	211	210
49	208	207	198	210	211	210
50	208	208	200	211	211	210
51	209	209	203	211	211	210
52	209	210	206	212	211	210
53	210	211	208	212	211	211
54	210	211	209	212	211	211
55	211	212	210	212	211	211
56	211	212	211	212	212	211
57	211	213	212	212	212	211
58	211	213	212	212	212	211
59	212	213	213	213	212	212
60	212	214	214	213	212	212
Max Temp:	212	214	214	213	212	212
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 245 (°F)	TC # 246 (°F)	TC # 247 (°F)	TC # 248 (°F)	TC # 249 (°F)	TC # 250 (°F)
0	79	79	79	79	79	80
1	79	79	79	79	79	80
2	79	79	79	79	79	80
3	79	79	79	79	79	79
4	79	79	79	79	79	79
5	79	79	79	79	79	80
6	80	80	80	79	79	80
7	81	81	81	80	80	80
8	82	82	82	81	81	81
9	83	84	84	82	82	82
10	85	85	85	84	83	84
11	88	87	87	86	85	86
12	90	90	89	88	87	88
13	93	92	91	90	89	91
14	96	95	94	92	92	93
15	100	98	97	95	95	96
16	103	100	100	98	98	99
17	107	104	102	101	101	102
18	110	106	105	104	104	105
19	114	110	108	108	107	108
20	118	113	110	111	110	111
21	122	117	114	115	113	114
22	126	121	117	118	116	117
23	130	125	121	121	119	120
24	134	129	124	124	123	124
25	138	133	127	127	126	127
26	142	137	131	130	129	130
27	146	140	134	134	132	133
28	150	144	138	137	135	137
29	155	148	140	140	138	140
30	160	152	143	143	141	144
31	165	156	146	146	144	147
32	170	159	149	149	147	150
33	174	163	152	152	150	153
34	182	167	154	155	152	156
35	191	171	157	157	155	159
36	197	174	159	160	157	162
37	201	178	161	163	160	165
38	204	181	164	165	162	168
39	206	184	166	168	165	170
40	207	186	169	171	168	173
41	208	189	171	174	170	175

OMEGA POINT LABORATORIES

Time (min)	TC # 245 (°F)	TC # 246 (°F)	TC # 247 (°F)	TC # 248 (°F)	TC # 249 (°F)	TC # 250 (°F)
42	208	190	175	176	173	177
43	209	192	177	179	176	179
44	209	195	180	181	178	181
45	210	197	183	184	181	183
46	210	200	185	187	183	185
47	211	202	188	189	186	188
48	211	204	190	191	188	190
49	211	206	192	194	191	192
50	211	207	194	196	193	194
51	211	206	196	198	196	197
52	211	206	199	200	198	202
53	212	206	201	202	201	208
54	212	207	202	204	205	212
55	212	207	204	206	209	212
56	212	208	206	210	211	213
57	212	208	210	212	212	213
58	212	210	211	212	213	213
59	213	211	212	213	213	213
60	213	212	213	213	214	214
Max Temp:	213	212	213	213	214	214
Max Allowed:	404	404	404	404	404	405

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 251 (°F)	TC # 252 (°F)	TC # 253 (°F)	TC # 254 (°F)	TC # 255 (°F)	TC # 256 (°F)
0	80	80	deleted	deleted	deleted	deleted
1	80	80	deleted	deleted	deleted	deleted
2	80	80	deleted	deleted	deleted	deleted
3	80	80	deleted	deleted	deleted	deleted
4	80	80	deleted	deleted	deleted	deleted
5	80	80	deleted	deleted	deleted	deleted
6	80	80	deleted	deleted	deleted	deleted
7	81	81	deleted	deleted	deleted	deleted
8	82	82	deleted	deleted	deleted	deleted
9	84	84	deleted	deleted	deleted	deleted
10	86	86	deleted	deleted	deleted	deleted
11	88	88	deleted	deleted	deleted	deleted
12	90	92	deleted	deleted	deleted	deleted
13	93	97	deleted	deleted	deleted	deleted
14	96	104	deleted	deleted	deleted	deleted
15	99	112	deleted	deleted	deleted	deleted
16	103	121	deleted	deleted	deleted	deleted
17	106	128	deleted	deleted	deleted	deleted
18	110	135	deleted	deleted	deleted	deleted
19	114	141	deleted	deleted	deleted	deleted
20	118	144	deleted	deleted	deleted	deleted
21	122	149	deleted	deleted	deleted	deleted
22	126	154	deleted	deleted	deleted	deleted
23	130	158	deleted	deleted	deleted	deleted
24	135	161	deleted	deleted	deleted	deleted
25	139	164	deleted	deleted	deleted	deleted
26	143	168	deleted	deleted	deleted	deleted
27	147	170	deleted	deleted	deleted	deleted
28	151	173	deleted	deleted	deleted	deleted
29	156	175	deleted	deleted	deleted	deleted
30	160	177	deleted	deleted	deleted	deleted
31	162	179	deleted	deleted	deleted	deleted
32	165	181	deleted	deleted	deleted	deleted
33	168	182	deleted	deleted	deleted	deleted
34	170	184	deleted	deleted	deleted	deleted
35	173	187	deleted	deleted	deleted	deleted
36	176	191	deleted	deleted	deleted	deleted
37	179	195	deleted	deleted	deleted	deleted
38	182	197	deleted	deleted	deleted	deleted
39	185	200	deleted	deleted	deleted	deleted
40	186	203	deleted	deleted	deleted	deleted
41	187	203	deleted	deleted	deleted	deleted

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 251 (°F)	TC # 252 (°F)	TC # 253 (°F)	TC # 254 (°F)	TC # 255 (°F)	TC # 256 (°F)
42	188	203	deleted	deleted	deleted	deleted
43	188	203	deleted	deleted	deleted	deleted
44	189	202	deleted	deleted	deleted	deleted
45	190	202	deleted	deleted	deleted	deleted
46	190	202	deleted	deleted	deleted	deleted
47	191	201	deleted	deleted	deleted	deleted
48	192	201	deleted	deleted	deleted	deleted
49	193	202	deleted	deleted	deleted	deleted
50	195	202	deleted	deleted	deleted	deleted
51	197	203	deleted	deleted	deleted	deleted
52	199	203	deleted	deleted	deleted	deleted
53	201	204	deleted	deleted	deleted	deleted
54	206	205	deleted	deleted	deleted	deleted
55	209	206	deleted	deleted	deleted	deleted
56	210	208	deleted	deleted	deleted	deleted
57	211	209	deleted	deleted	deleted	deleted
58	212	210	deleted	deleted	deleted	deleted
59	212	210	deleted	deleted	deleted	deleted
60	213	212	deleted	deleted	deleted	deleted
Max Temp:	213	212	deleted	deleted	deleted	deleted
Max Allowed:	405	405	deleted	deleted	deleted	deleted

OMEGA POINT LABORATORIES

Time (min)	TC # 257 (°F)	TC # 258 (°F)	TC # 259 (°F)	TC # 260 (°F)	TC # 261 (°F)	TC # 262 (°F)
0	deleted	deleted	77	78	78	78
1	deleted	deleted	77	78	78	78
2	deleted	deleted	77	78	78	78
3	deleted	deleted	77	78	78	78
4	deleted	deleted	77	78	78	78
5	deleted	deleted	78	78	79	79
6	deleted	deleted	79	79	79	79
7	deleted	deleted	80	81	81	81
8	deleted	deleted	83	83	83	82
9	deleted	deleted	86	86	85	85
10	deleted	deleted	89	89	89	87
11	deleted	deleted	93	93	92	90
12	deleted	deleted	97	97	96	94
13	deleted	deleted	101	101	100	98
14	deleted	deleted	106	106	105	102
15	deleted	deleted	111	111	109	107
16	deleted	deleted	115	116	114	111
17	deleted	deleted	120	122	120	116
18	deleted	deleted	125	127	125	122
19	deleted	deleted	131	134	131	127
20	deleted	deleted	136	140	138	133
21	deleted	deleted	141	146	144	140
22	deleted	deleted	146	153	150	146
23	deleted	deleted	150	158	157	152
24	deleted	deleted	155	163	163	158
25	deleted	deleted	160	167	169	164
26	deleted	deleted	165	172	174	170
27	deleted	deleted	169	177	179	176
28	deleted	deleted	175	183	185	181
29	deleted	deleted	179	189	190	186
30	deleted	deleted	183	193	195	192
31	deleted	deleted	186	198	200	196
32	deleted	deleted	190	200	204	201
33	deleted	deleted	193	204	208	205
34	deleted	deleted	196	209	212	209
35	deleted	deleted	199	214	216	213
36	deleted	deleted	203	219	220	216
37	deleted	deleted	206	225	225	220
38	deleted	deleted	210	230	230	224
39	deleted	deleted	215	236	234	228
40	deleted	deleted	222	241	239	232
41	deleted	deleted	229	247	244	237

OMEGA POINT LABORATORIES

Time (min)	TC # 257 (°F)	TC # 258 (°F)	TC # 259 (°F)	TC # 260 (°F)	TC # 261 (°F)	TC # 262 (°F)
42	deleted	deleted	235	253	250	242
43	deleted	deleted	241	260	256	247
44	deleted	deleted	247	266	262	253
45	deleted	deleted	255	273	269	260
46	deleted	deleted	261	279	276	266
47	deleted	deleted	266	286	283	273
48	deleted	deleted	271	292	289	279
49	deleted	deleted	277	299	296	286
50	deleted	deleted	283	304	302	292
51	deleted	deleted	288	310	308	298
52	deleted	deleted	292	315	313	304
53	deleted	deleted	297	320	318	309
54	deleted	deleted	301	324	323	314
55	deleted	deleted	304	328	327	319
56	deleted	deleted	308	332	331	323
57	deleted	deleted	312	335	335	327
58	deleted	deleted	315	338	338	331
59	deleted	deleted	318	341	341	334
60	deleted	deleted	321	344	344	337
Max Temp:	deleted	deleted	321	344	344	337
Max Allowed:	deleted	deleted	402	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 263 (°F)	TC # 264 (°F)	TC # 265 (°F)	TC # 266 (°F)	TC # 267 (°F)	TC # 268 (°F)
0	79	79	79	79	79	78
1	79	79	79	79	79	78
2	79	79	79	79	79	78
3	79	79	79	79	79	78
4	79	79	79	79	79	78
5	79	79	79	79	79	78
6	79	79	79	79	79	79
7	80	80	79	79	79	79
8	82	81	80	80	80	80
9	84	83	82	81	81	81
10	86	85	83	82	82	82
11	89	87	85	84	84	83
12	92	90	88	86	85	85
13	95	93	91	89	88	87
14	99	97	94	91	90	90
15	104	101	97	94	93	92
16	108	105	101	98	97	96
17	113	109	105	101	100	99
18	118	114	109	105	104	103
19	124	119	113	109	108	106
20	129	124	118	113	111	110
21	134	130	122	117	116	115
22	140	135	127	122	120	119
23	146	141	131	126	124	123
24	152	146	136	131	128	127
25	158	151	141	135	132	132
26	164	157	146	139	136	136
27	170	162	151	144	140	139
28	175	168	157	149	144	143
29	181	174	162	154	149	147
30	186	179	167	159	153	151
31	191	184	172	163	157	155
32	195	188	177	168	162	159
33	200	193	182	173	166	164
34	203	198	186	177	171	168
35	207	203	191	182	175	173
36	211	207	195	186	180	177
37	215	211	200	190	184	182
38	219	216	204	194	188	186
39	222	220	208	198	192	190
40	226	224	213	202	196	194
41	230	229	217	206	200	197

OMEGA POINT LABORATORIES

Time (min)	TC # 263 (°F)	TC # 264 (°F)	TC # 265 (°F)	TC # 266 (°F)	TC # 267 (°F)	TC # 268 (°F)
42	235	233	221	210	203	201
43	239	237	225	214	207	204
44	245	242	229	218	210	208
45	250	247	233	221	213	211
46	256	250	237	225	217	214
47	261	255	241	228	219	217
48	267	259	245	232	222	220
49	273	263	250	235	225	222
50	278	268	255	239	228	225
51	284	273	259	242	231	228
52	290	277	264	246	234	230
53	295	282	268	249	236	232
54	300	286	272	252	239	235
55	306	291	276	256	242	237
56	310	295	280	259	244	240
57	315	299	284	263	247	242
58	319	304	288	266	250	245
59	322	308	291	269	253	248
60	326	312	295	273	256	251
Max Temp:	326	312	295	273	256	251
Max Allowed:	404	404	404	404	404	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 269 (°F)	TC # 270 (°F)	TC # 271 (°F)	TC # 272 (°F)	TC # 273 (°F)	TC # 274 (°F)
0	78	78	78	78	78	78
1	78	78	78	78	78	78
2	78	78	78	78	78	78
3	78	78	78	78	78	78
4	78	78	78	78	78	78
5	78	78	78	78	78	78
6	79	79	79	78	78	78
7	79	79	79	79	79	79
8	80	80	80	79	79	79
9	81	81	81	80	80	80
10	82	82	82	81	81	81
11	83	83	84	83	83	83
12	85	85	85	84	84	84
13	87	87	87	87	87	87
14	90	89	90	89	89	89
15	92	92	92	92	92	92
16	95	95	95	95	95	95
17	98	98	99	98	98	98
18	102	101	102	102	101	102
19	105	105	106	105	105	105
20	109	109	110	109	109	109
21	113	113	114	113	113	113
22	117	117	118	118	117	117
23	121	121	122	122	121	121
24	126	125	127	126	125	125
25	130	129	131	131	130	129
26	135	134	136	135	134	134
27	139	138	140	140	139	138
28	143	142	144	144	143	143
29	147	146	148	148	147	147
30	152	151	152	152	151	151
31	156	155	156	156	155	155
32	160	159	160	160	160	159
33	164	163	165	164	164	164
34	168	167	169	168	168	168
35	172	171	173	172	172	172
36	177	175	177	177	176	175
37	181	179	181	181	180	179
38	185	183	185	184	184	183
39	188	187	188	188	187	186
40	193	191	192	191	190	190
41	196	194	195	195	193	193

OMEGA POINT LABORATORIES

Time (min)	TC # 269 (°F)	TC # 270 (°F)	TC # 271 (°F)	TC # 272 (°F)	TC # 273 (°F)	TC # 274 (°F)
42	199	197	199	198	196	196
43	203	201	202	201	199	199
44	206	204	205	204	202	201
45	209	207	208	207	204	204
46	212	210	211	210	207	206
47	215	213	213	213	210	209
48	218	215	216	215	213	212
49	221	218	219	218	216	216
50	223	220	221	221	220	220
51	226	223	224	224	223	224
52	228	225	226	227	227	227
53	231	228	229	230	230	230
54	233	230	231	233	233	234
55	235	232	234	235	236	237
56	238	235	237	238	239	240
57	240	237	239	241	242	244
58	243	240	243	245	246	247
59	246	243	246	248	249	251
60	249	247	250	252	253	254
Max Temp:	249	247	250	252	253	254
Max Allowed:	403	403	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 275 (°F)	TC # 276 (°F)	TC # 277 (°F)	TC # 278 (°F)	TC # 279 (°F)	TC # 280 (°F)
0	78	78	78	78	77	76
1	78	78	78	78	77	76
2	78	78	78	78	77	76
3	78	78	78	78	77	76
4	78	78	78	78	77	76
5	78	78	78	78	77	76
6	78	78	78	78	78	76
7	79	79	79	79	78	76
8	79	79	79	79	79	77
9	80	80	80	80	80	77
10	81	81	82	81	81	77
11	83	83	83	83	83	78
12	84	85	85	85	85	78
13	86	87	87	87	86	79
14	89	90	90	89	89	80
15	92	92	92	92	92	81
16	95	95	95	95	94	82
17	98	99	98	98	97	83
18	101	102	102	102	101	84
19	105	106	105	105	104	86
20	109	109	109	109	108	88
21	113	113	113	113	112	90
22	116	117	117	117	115	92
23	120	121	121	121	119	94
24	124	125	125	124	123	96
25	128	129	129	128	127	99
26	133	133	133	133	131	102
27	137	137	137	137	135	105
28	141	142	141	141	140	108
29	145	146	146	145	144	112
30	150	150	150	149	148	116
31	154	154	154	153	152	120
32	158	158	158	157	156	124
33	162	162	162	161	160	129
34	166	166	166	165	164	134
35	171	170	170	169	168	139
36	174	174	174	173	172	144
37	178	178	178	177	176	150
38	182	182	182	181	180	155
39	185	185	185	184	184	161
40	189	188	188	188	187	166
41	192	191	191	191	191	171

OMEGA POINT LABORATORIES

Time (min)	TC # 275 (°F)	TC # 276 (°F)	TC # 277 (°F)	TC # 278 (°F)	TC # 279 (°F)	TC # 280 (°F)
42	195	194	195	194	193	177
43	198	197	197	196	196	182
44	200	200	200	199	199	186
45	203	202	202	201	201	189
46	205	204	204	203	203	193
47	207	206	206	205	204	195
48	210	208	207	206	206	198
49	213	210	209	208	207	200
50	217	212	210	209	208	201
51	222	217	212	210	209	202
52	225	222	214	211	210	203
53	229	226	215	212	210	204
54	233	230	221	214	211	205
55	236	234	227	218	211	206
56	240	238	232	225	212	206
57	243	241	237	230	212	207
58	246	245	241	236	213	207
59	250	249	245	240	213	207
60	254	253	250	244	216	208
Max Temp:	254	253	250	244	216	208
Max Allowed:	403	403	403	403	402	401

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 281 (°F)	TC # 282 (°F)	TC # 283 (°F)	TC # 284 (°F)	TC # 285 (°F)	TC # 286 (°F)
0	77	78	79	78	79	79
1	77	78	79	78	79	78
2	77	78	79	78	79	78
3	77	78	78	78	79	78
4	77	78	79	78	79	78
5	77	78	79	79	79	79
6	78	79	79	79	80	79
7	79	80	81	81	81	80
8	81	82	83	83	83	83
9	84	85	85	85	85	85
10	87	88	88	87	88	87
11	90	91	91	90	90	89
12	93	95	94	94	93	91
13	97	99	98	98	97	95
14	102	103	103	102	101	99
15	106	108	107	107	105	103
16	111	113	112	111	110	108
17	116	118	118	117	115	113
18	121	123	123	122	120	118
19	126	129	129	128	126	123
20	131	135	136	133	131	129
21	136	142	142	140	137	134
22	141	147	148	146	143	140
23	146	152	154	152	149	146
24	151	158	161	158	155	152
25	156	162	166	164	161	158
26	160	166	172	170	167	164
27	165	172	178	176	173	170
28	169	178	183	181	179	176
29	172	184	188	186	185	183
30	176	190	194	192	191	189
31	179	195	199	197	197	194
32	183	200	203	201	202	199
33	185	204	208	206	207	204
34	187	208	212	211	211	209
35	191	212	217	215	215	213
36	195	217	221	220	219	217
37	201	222	226	224	223	221
38	206	227	231	229	227	224
39	212	233	236	234	231	228
40	217	238	241	238	235	232
41	222	244	247	244	239	236

OMEGA POINT LABORATORIES

Time (min)	TC # 281 (°F)	TC # 282 (°F)	TC # 283 (°F)	TC # 284 (°F)	TC # 285 (°F)	TC # 286 (°F)
42	228	250	253	249	244	240
43	234	256	258	254	249	244
44	240	262	265	260	254	249
45	245	268	271	266	260	254
46	251	274	277	272	265	259
47	256	279	283	278	271	264
48	261	285	289	284	277	270
49	266	291	295	290	283	275
50	271	297	301	296	288	281
51	276	302	306	301	294	286
52	280	307	311	307	300	292
53	284	312	316	312	305	297
54	288	317	321	317	310	302
55	292	321	325	321	315	307
56	295	325	330	326	320	312
57	298	329	334	331	325	317
58	301	332	338	335	329	321
59	304	335	341	338	333	325
60	307	338	345	342	337	329
Max Temp:	307	338	345	342	337	329
Max Allowed:	402	403	404	403	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 287 (°F)	TC # 288 (°F)	TC # 289 (°F)	TC # 290 (°F)	TC # 291 (°F)	TC # 292 (°F)
0	76	78	78	78	78	78
1	76	78	78	78	78	78
2	76	78	78	78	78	78
3	77	78	78	78	78	78
4	77	78	78	78	78	78
5	77	78	78	78	78	78
6	78	78	78	78	78	78
7	79	79	78	79	79	79
8	78	80	79	79	79	79
9	80	82	80	80	80	80
10	82	83	81	81	81	81
11	84	85	83	83	83	83
12	89	88	85	85	85	85
13	93	91	88	87	87	88
14	96	94	91	90	90	90
15	100	98	94	93	93	94
16	105	102	97	96	96	97
17	110	106	101	100	100	101
18	114	111	105	104	104	105
19	119	116	110	108	108	109
20	124	121	115	113	113	114
21	129	126	120	118	118	119
22	135	131	125	123	123	124
23	140	136	130	128	128	129
24	145	142	136	134	134	134
25	152	148	141	139	140	139
26	158	154	147	145	146	145
27	164	160	153	151	151	150
28	170	166	158	157	157	155
29	176	171	164	162	163	161
30	182	177	169	168	168	166
31	187	182	174	173	174	171
32	192	187	179	179	179	175
33	197	192	184	184	184	180
34	201	196	189	189	189	185
35	205	201	194	194	193	189
36	209	205	199	198	198	194
37	213	209	203	203	202	198
38	216	213	207	207	206	202
39	220	217	211	211	210	206
40	224	220	216	215	214	210
41	227	224	220	219	218	214

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 287 (°F)	TC # 288 (°F)	TC # 289 (°F)	TC # 290 (°F)	TC # 291 (°F)	TC # 292 (°F)
42	231	228	224	224	222	217
43	236	232	228	228	226	221
44	240	237	233	233	231	224
45	237	241	238	238	235	228
46	241	246	243	243	240	232
47	246	251	247	248	245	236
48	251	256	252	253	249	240
49	256	261	258	259	254	244
50	262	266	263	264	260	248
51	267	271	268	269	265	252
52	272	277	273	274	269	256
53	276	282	278	278	274	260
54	281	287	283	283	278	264
55	286	292	288	287	282	267
56	291	297	292	292	286	271
57	297	301	297	295	290	275
58	301	305	301	299	293	278
59	305	309	304	303	297	282
60	306	313	308	306	301	286
Max Temp:	306	313	308	306	301	286
Max Allowed:	401	403	403	403	403	403

OMEGA POINT LABORATORIES

Time (min)	TC # 293 (°F)	TC # 294 (°F)	TC # 295 (°F)	TC # 296 (°F)	TC # 297 (°F)	TC # 298 (°F)
0	78	78	78	77	77	77
1	78	78	78	77	77	77
2	78	78	78	77	77	77
3	78	78	78	77	77	77
4	78	78	78	77	77	77
5	78	78	78	78	77	78
6	78	78	78	78	78	78
7	78	78	78	78	78	78
8	79	79	79	79	79	79
9	80	80	80	79	79	80
10	81	81	81	80	81	81
11	82	82	82	81	82	82
12	83	84	84	83	83	83
13	86	86	86	85	85	85
14	88	88	88	87	88	88
15	91	90	91	89	90	90
16	94	93	93	92	93	93
17	97	96	97	95	96	96
18	101	99	100	98	99	99
19	105	103	103	102	103	103
20	108	107	107	106	107	107
21	113	111	111	110	111	110
22	117	115	115	114	115	114
23	122	119	119	118	119	118
24	126	124	124	122	123	122
25	131	129	128	126	127	126
26	136	134	132	131	131	130
27	142	139	136	135	135	135
28	147	143	141	139	139	139
29	152	148	145	143	144	143
30	157	152	149	147	148	147
31	161	157	153	151	151	151
32	166	161	157	155	156	155
33	170	164	161	159	160	159
34	174	169	165	163	164	163
35	178	173	169	167	168	167
36	182	177	174	171	172	171
37	187	181	178	175	176	176
38	190	185	182	179	180	180
39	194	189	185	183	183	183
40	197	192	188	186	187	187
41	201	195	191	189	190	190

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI . September 20, 1994

Time (min)	TC # 293 (°F)	TC # 294 (°F)	TC # 295 (°F)	TC # 296 (°F)	TC # 297 (°F)	TC # 298 (°F)
42	204	199	194	192	193	193
43	207	201	197	195	196	196
44	210	204	199	198	198	199
45	213	206	202	200	201	202
46	215	208	203	202	203	203
47	216	210	205	204	204	205
48	218	212	206	205	206	206
49	221	214	208	206	207	208
50	224	216	209	207	208	209
51	227	218	211	208	209	210
52	229	219	213	209	210	211
53	232	221	215	210	211	212
54	234	222	217	210	212	213
55	237	225	221	211	213	214
56	241	228	225	212	215	216
57	245	231	228	212	218	221
58	249	236	231	213	223	227
59	254	239	235	215	229	232
60	258	243	239	218	234	237
Max Temp:	258	243	239	218	234	237
Max Allowed:	403	403	403	402	402	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 299 (°F)	TC # 300 (°F)	TC # 301 (°F)	TC # 302 (°F)	TC # 303 (°F)	TC # 304 (°F)
0	77	77	77	77	78	78
1	77	77	77	77	78	78
2	77	77	77	77	78	78
3	77	77	77	77	78	78
4	77	77	77	77	78	78
5	77	77	77	77	78	78
6	78	78	78	78	78	78
7	78	78	78	78	78	78
8	79	78	79	79	79	79
9	80	79	79	79	79	79
10	81	80	80	80	80	80
11	82	82	82	82	81	82
12	83	83	83	83	83	83
13	85	85	85	85	85	85
14	87	87	87	88	87	87
15	90	89	89	90	89	90
16	93	92	92	93	92	92
17	96	95	95	96	95	96
18	99	98	98	99	98	99
19	102	102	102	103	102	103
20	106	106	105	107	106	106
21	110	110	109	110	110	110
22	114	114	113	114	114	114
23	118	118	117	118	118	118
24	122	122	121	123	122	122
25	126	126	125	127	126	126
26	130	130	130	131	130	130
27	134	134	134	135	134	135
28	139	139	138	139	139	139
29	143	143	142	143	143	143
30	147	147	146	147	147	147
31	151	151	150	152	151	151
32	155	155	154	156	155	155
33	159	159	159	160	159	159
34	163	163	163	164	163	163
35	167	167	167	168	167	167
36	171	171	171	172	171	171
37	175	175	175	176	175	175
38	179	179	179	180	179	179
39	183	183	183	184	183	183
40	187	186	186	187	187	186
41	190	190	190	190	190	190

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 299 (°F)	TC # 300 (°F)	TC # 301 (°F)	TC # 302 (°F)	TC # 303 (°F)	TC # 304 (°F)
42	193	193	193	194	193	193
43	196	196	196	196	196	196
44	199	198	198	199	198	198
45	201	201	200	201	201	200
46	203	203	203	203	203	202
47	205	204	204	205	204	204
48	207	206	206	206	206	206
49	208	208	207	208	207	207
50	210	209	209	209	209	208
51	211	210	210	211	210	209
52	213	211	211	212	211	211
53	214	213	212	213	212	212
54	216	215	214	215	215	213
55	218	217	216	217	217	215
56	221	219	218	221	221	218
57	225	223	222	225	225	222
58	229	227	226	229	230	227
59	233	231	231	234	234	232
60	238	236	235	238	238	237
Max Temp:	238	236	235	238	238	237
Max Allowed:	402	402	402	402	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 305 (°F)	TC # 306 (°F)	TC # 307 (°F)	TC # 308 (°F)	TC # 309 (°F)	TC # 310 (°F)
0	78	77	78	78	78	77
1	78	77	78	78	78	77
2	78	77	78	78	78	77
3	78	77	78	78	78	77
4	78	77	78	78	78	77
5	78	77	78	78	78	77
6	78	78	78	78	78	77
7	78	78	78	78	78	78
8	79	78	79	79	79	78
9	79	79	80	80	79	79
10	81	80	80	81	81	79
11	82	81	82	82	82	80
12	83	83	83	84	83	82
13	85	85	85	86	85	84
14	88	87	88	88	88	85
15	90	90	90	91	90	88
16	93	92	93	94	93	90
17	96	96	97	97	96	93
18	99	99	100	100	100	96
19	103	103	103	104	103	99
20	107	106	107	108	107	102
21	111	110	111	111	111	106
22	115	114	115	115	114	109
23	118	118	119	119	118	113
24	122	122	123	123	122	117
25	126	126	127	127	126	120
26	131	130	131	131	130	125
27	135	134	135	135	135	129
28	139	139	139	140	139	133
29	143	143	143	144	143	137
30	147	147	147	148	147	142
31	151	151	151	152	151	146
32	155	155	155	155	155	150
33	159	159	159	160	159	155
34	163	163	163	164	163	159
35	168	167	167	168	167	164
36	172	171	171	172	171	169
37	176	175	176	176	176	173
38	180	179	179	180	180	177
39	183	183	183	183	183	181
40	187	186	187	187	187	185
41	190	189	190	190	190	188

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 305 (°F)	TC # 306 (°F)	TC # 307 (°F)	TC # 308 (°F)	TC # 309 (°F)	TC # 310 (°F)
42	193	193	193	193	193	192
43	196	195	196	196	196	194
44	198	198	198	198	198	197
45	200	200	200	200	200	199
46	202	202	202	202	202	201
47	204	204	204	204	204	203
48	205	205	205	205	205	205
49	207	207	206	206	207	206
50	208	208	208	207	207	207
51	209	209	209	208	208	208
52	210	210	210	209	209	208
53	211	211	211	210	210	209
54	212	212	212	210	210	210
55	213	214	213	211	211	210
56	215	217	215	212	212	211
57	218	220	215	212	212	211
58	220	224	217	213	214	212
59	225	229	221	215	216	212
60	232	234	228	218	219	213
Max Temp:	232	234	228	218	219	213
Max Allowed:	403	402	403	403	403	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 311 (°F)	TC # 312 (°F)	TC # 313 (°F)	TC # 314 (°F)	TC # 315 (°F)	TC # 316 (°F)
0	77	78	78	78	78	78
1	77	78	78	78	78	78
2	77	78	78	78	78	78
3	77	78	78	78	78	78
4	77	78	78	78	78	78
5	77	78	78	78	79	78
6	77	79	79	79	79	78
7	78	79	80	79	80	79
8	79	81	81	81	81	80
9	80	84	83	83	83	82
10	81	87	86	86	85	84
11	83	90	90	89	88	87
12	85	94	94	93	92	90
13	87	98	98	97	96	94
14	90	103	103	102	101	98
15	92	108	108	107	106	103
16	95	113	113	112	111	107
17	98	118	119	117	116	113
18	102	123	124	123	122	118
19	105	129	130	129	128	124
20	109	135	136	136	134	130
21	112	141	143	142	140	136
22	116	147	149	148	147	143
23	120	152	155	155	153	149
24	125	158	161	161	160	155
25	129	164	168	167	166	162
26	134	169	173	173	172	168
27	139	175	179	180	178	174
28	145	180	184	186	185	180
29	151	188	190	192	191	186
30	157	192	195	197	196	192
31	162	196	199	202	202	197
32	167	199	205	208	207	203
33	173	203	208	214	213	208
34	178	206	213	219	218	213
35	183	208	219	223	223	218
36	188	211	224	228	228	223
37	191	216	228	232	233	227
38	195	217	233	237	237	232
39	197	223	237	241	242	236
40	199	231	242	246	247	241
41	201	239	248	251	252	246

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 311 (°F)	TC # 312 (°F)	TC # 313 (°F)	TC # 314 (°F)	TC # 315 (°F)	TC # 316 (°F)
42	202	246	254	256	256	250
43	203	252	260	261	261	255
44	203	258	266	266	266	260
45	204	264	271	272	271	264
46	206	270	277	277	276	269
47	206	275	283	282	281	274
48	207	279	288	287	286	279
49	207	284	293	293	291	284
50	208	288	298	298	296	289
51	209	292	303	303	301	294
52	210	296	308	308	305	298
53	212	300	313	312	310	303
54	215	304	317	317	315	308
55	218	308	321	321	319	313
56	220	312	326	326	324	317
57	224	316	330	330	328	322
58	230	320	334	335	333	327
59	233	324	338	339	337	331
60	237	328	342	343	342	336
Max Temp:	237	328	342	343	342	336
Max Allowed:	402	403	403	403	403	403

OMEGA POINT LABORATORIES

Time (min)	TC # 317 (°F)	TC # 318 (°F)	TC # 319 (°F)	TC # 320 (°F)	TC # 321 (°F)	TC # 322 (°F)
0	78	77	77	76	76	76
1	78	77	77	76	76	76
2	78	77	77	76	76	76
3	78	77	77	76	76	76
4	78	77	77	76	76	76
5	78	77	77	76	76	76
6	78	78	77	77	77	77
7	79	78	78	77	77	78
8	80	79	79	78	78	79
9	81	80	80	79	80	80
10	83	82	82	81	82	83
11	86	85	84	84	84	85
12	89	87	87	87	87	88
13	92	91	91	90	90	92
14	96	95	95	94	94	96
15	101	99	99	98	98	100
16	105	104	104	102	102	104
17	110	109	109	108	107	109
18	116	114	114	113	112	114
19	122	120	120	119	118	120
20	127	126	126	124	124	126
21	133	132	132	130	130	132
22	140	138	137	136	136	138
23	145	143	143	142	141	144
24	152	149	149	147	148	151
25	158	155	154	153	154	157
26	164	160	159	159	160	163
27	170	166	163	165	166	169
28	176	173	170	171	172	175
29	182	179	177	177	178	181
30	187	184	183	183	184	187
31	192	190	189	188	190	193
32	197	195	194	194	195	198
33	202	200	199	199	201	204
34	207	204	204	204	206	209
35	212	209	208	209	211	215
36	217	213	212	213	216	220
37	221	217	216	217	221	225
38	225	221	220	221	226	231
39	230	225	224	225	231	236
40	234	229	228	229	236	242
41	239	233	232	233	240	247

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 317 (°F)	TC # 318 (°F)	TC # 319 (°F)	TC # 320 (°F)	TC # 321 (°F)	TC # 322 (°F)
42	243	238	236	237	245	252
43	248	242	240	241	249	257
44	252	247	245	245	253	262
45	257	251	249	249	257	266
46	262	256	254	252	261	271
47	266	261	258	256	263	275
48	271	266	262	260	266	277
49	276	271	267	264	269	280
50	281	276	271	268	273	283
51	286	281	276	273	276	287
52	291	286	281	277	280	291
53	296	291	285	282	284	294
54	301	296	290	286	288	298
55	306	300	295	291	293	302
56	311	305	300	295	297	307
57	316	310	304	300	301	311
58	320	315	309	304	305	315
59	325	319	313	308	310	319
60	330	324	318	313	314	323
Max Temp:	330	324	318	313	314	323
Max Allowed:	403	402	402	401	401	401

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 323 (°F)	TC # 324 (°F)	TC # 325 (°F)	TC # 326 (°F)	TC # 327 (°F)	TC # 328 (°F)
0	76	76	76	76	77	77
1	76	76	76	76	76	77
2	76	76	76	76	77	77
3	76	76	76	76	77	77
4	76	76	76	76	77	77
5	76	77	76	77	77	77
6	77	77	77	78	77	77
7	78	78	78	79	78	78
8	79	79	80	80	79	79
9	81	81	82	83	81	80
10	84	84	85	86	82	81
11	87	87	88	88	85	83
12	90	90	91	91	87	85
13	94	94	95	95	90	88
14	98	98	99	98	93	90
15	102	102	103	102	96	93
16	107	106	107	106	100	96
17	112	111	112	111	104	100
18	118	116	117	115	108	104
19	123	121	122	120	112	108
20	129	127	128	125	116	111
21	135	133	133	130	121	116
22	141	139	138	135	126	120
23	147	144	144	139	130	125
24	153	150	149	144	135	129
25	159	156	154	149	140	134
26	165	162	160	154	145	138
27	171	167	165	159	150	143
28	177	173	170	164	155	148
29	182	178	176	169	159	152
30	188	184	181	174	164	157
31	193	189	186	179	169	161
32	198	194	192	185	173	166
33	204	199	197	190	178	170
34	209	205	202	195	182	174
35	214	210	208	200	187	179
36	219	215	213	205	192	183
37	224	221	218	210	197	188
38	230	226	224	215	201	192
39	235	232	229	220	206	196
40	241	237	235	225	211	201
41	246	243	240	230	216	205

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 323 (°F)	TC # 324 (°F)	TC # 325 (°F)	TC # 326 (°F)	TC # 327 (°F)	TC # 328 (°F)
42	252	249	245	235	219	210
43	258	254	251	240	224	214
44	263	260	256	245	229	218
45	268	265	261	250	233	222
46	274	271	266	254	238	226
47	279	276	271	259	242	230
48	284	280	276	263	246	233
49	288	285	280	267	250	237
50	291	289	284	271	253	241
51	295	294	288	275	257	244
52	299	298	292	278	261	248
53	304	302	296	282	264	251
54	308	306	300	286	268	254
55	312	310	304	290	271	257
56	316	314	308	294	275	260
57	321	318	312	298	278	263
58	325	323	316	301	282	266
59	329	327	320	305	285	270
60	333	331	324	309	289	273
Max Temp:	333	331	324	309	289	273
Max Allowed:	401	401	401	401	402	402

OMEGA POINT LABORATORIES

Time (min)	TC # 329 (°F)	TC # 330 (°F)	TC # 331 (°F)	TC # 332 (°F)	TC # 333 (°F)	TC # 334 (°F)
0	77	77	77	77	77	77
1	77	77	77	77	77	77
2	77	77	77	77	77	77
3	77	77	77	77	77	77
4	77	77	77	77	77	77
5	77	77	77	77	77	77
6	77	77	77	77	77	77
7	78	77	77	77	78	77
8	78	78	78	78	78	78
9	79	79	79	79	79	79
10	81	80	80	80	80	80
11	82	81	82	82	82	81
12	84	83	83	83	83	83
13	86	85	85	85	85	85
14	88	87	88	87	88	87
15	91	90	90	90	90	90
16	94	93	93	93	93	92
17	97	96	96	96	96	96
18	100	99	99	99	99	99
19	104	103	103	103	103	102
20	108	106	107	107	106	106
21	112	110	111	111	110	109
22	116	114	115	115	114	113
23	120	118	118	119	118	117
24	125	122	123	123	122	121
25	129	126	127	127	126	125
26	133	131	131	132	130	130
27	138	135	136	136	134	134
28	142	139	140	140	138	138
29	147	143	144	144	143	142
30	151	147	149	148	147	146
31	155	151	153	153	151	151
32	159	155	157	157	155	155
33	163	159	161	161	159	159
34	167	163	165	165	163	163
35	171	167	169	169	167	167
36	175	171	173	173	172	171
37	179	174	177	177	176	175
38	183	179	181	182	180	179
39	187	182	184	185	184	183
40	191	186	188	189	188	187
41	195	189	191	193	191	191

OMEGA POINT LABORATORIES

Time (min)	TC # 329 (°F)	TC # 330 (°F)	TC # 331 (°F)	TC # 332 (°F)	TC # 333 (°F)	TC # 334 (°F)
42	199	193	194	196	195	194
43	202	195	198	199	197	197
44	206	198	200	202	200	200
45	209	201	203	205	203	202
46	213	203	206	206	205	205
47	216	205	209	209	208	207
48	219	207	211	211	209	209
49	223	210	214	213	212	212
50	227	214	217	215	214	213
51	230	219	220	217	216	214
52	233	223	224	220	218	214
53	237	227	227	222	220	215
54	240	230	230	224	222	215
55	242	232	233	226	224	216
56	245	235	236	229	226	219
57	248	238	239	232	229	223
58	250	240	242	234	232	228
59	253	243	244	236	235	232
60	257	246	248	244	239	236
Max Temp:	257	246	248	244	239	236
Max Allowed:	402	402	402	402	402	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 335 (°F)	TC # 336 (°F)	TC # 337 (°F)	TC # 338 (°F)	TC # 339 (°F)	TC # 340 (°F)
0	77	77	76	77	77	77
1	77	77	76	77	77	77
2	77	77	76	77	77	77
3	76	77	76	77	77	77
4	77	77	76	76	77	77
5	77	77	76	77	77	77
6	77	77	77	77	77	77
7	77	77	77	77	77	77
8	78	78	78	78	78	78
9	79	79	79	78	78	79
10	80	80	80	79	79	80
11	82	82	81	80	81	81
12	84	83	83	81	82	83
13	86	86	85	83	84	85
14	88	88	87	85	86	87
15	91	91	90	88	88	89
16	93	93	93	90	91	92
17	96	96	96	93	94	95
18	100	100	99	96	97	98
19	103	103	102	100	100	102
20	107	107	106	103	104	105
21	111	111	110	107	108	109
22	114	115	114	111	112	113
23	118	119	118	115	116	117
24	123	123	122	119	120	121
25	127	127	126	123	124	125
26	131	131	131	128	128	130
27	135	135	135	132	133	134
28	139	140	139	136	137	138
29	143	144	144	140	141	142
30	148	149	148	145	145	147
31	152	153	152	149	150	151
32	156	158	157	153	154	155
33	161	162	161	157	158	159
34	165	166	165	161	162	163
35	169	170	169	165	166	167
36	173	174	173	169	170	171
37	178	178	177	173	174	175
38	182	182	181	178	178	179
39	185	185	184	181	182	183
40	189	189	188	185	186	187
41	192	193	192	189	189	190

OMEGA POINT LABORATORIES

Time (min)	TC # 335 (°F)	TC # 336 (°F)	TC # 337 (°F)	TC # 338 (°F)	TC # 339 (°F)	TC # 340 (°F)
42	196	196	195	192	192	193
43	199	199	198	195	195	196
44	202	201	200	197	198	198
45	204	203	202	200	200	201
46	207	206	204	202	202	203
47	209	207	205	204	204	204
48	211	207	206	205	205	206
49	212	208	208	206	207	207
50	212	209	208	207	207	208
51	213	210	209	208	208	209
52	213	211	210	209	209	209
53	213	212	210	210	210	210
54	214	212	211	210	211	211
55	216	213	212	211	211	212
56	219	215	213	211	212	213
57	225	218	213	212	213	216
58	231	223	216	214	215	219
59	236	230	220	216	217	223
60	242	237	228	220	221	228
Max Temp:	242	237	228	220	221	228
Max Allowed:	402	402	401	402	402	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 341 (°F)	TC # 342 (°F)	TC # 343 (°F)	TC # 344 (°F)	TC # 345 (°F)	TC # 346 (°F)
0	77	78	78	78	78	78
1	77	78	78	78	78	78
2	77	78	78	78	78	78
3	77	78	78	78	78	78
4	77	77	78	78	78	78
5	77	78	78	78	78	78
6	78	78	78	78	78	78
7	78	78	78	78	79	78
8	79	79	79	79	79	79
9	79	79	80	80	80	80
10	80	80	81	81	82	81
11	81	82	82	83	83	82
12	83	83	83	84	85	84
13	84	85	85	86	87	86
14	87	87	87	89	90	88
15	89	89	90	92	93	91
16	92	92	92	94	96	93
17	95	95	95	98	99	97
18	98	98	99	101	102	100
19	101	101	102	104	106	103
20	105	105	106	108	110	107
21	109	109	109	112	113	111
22	113	112	113	116	117	114
23	117	116	117	120	121	118
24	121	120	121	124	125	122
25	125	125	125	128	129	126
26	129	129	129	132	134	130
27	133	133	134	137	138	134
28	138	138	138	141	142	138
29	142	142	142	145	146	142
30	146	146	147	150	151	147
31	150	150	151	154	155	151
32	154	154	155	158	159	155
33	159	158	159	162	163	159
34	163	163	163	166	167	163
35	167	167	167	170	171	167
36	171	171	171	174	175	171
37	175	175	175	177	179	175
38	179	179	179	181	182	179
39	183	182	183	185	186	183
40	186	186	186	188	189	186
41	190	189	190	191	192	189

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 341 (°F)	TC # 342 (°F)	TC # 343 (°F)	TC # 344 (°F)	TC # 345 (°F)	TC # 346 (°F)
42	193	192	193	194	194	192
43	195	195	195	196	197	195
44	198	198	198	199	199	198
45	200	200	200	201	201	200
46	202	203	202	203	203	202
47	204	204	204	204	205	203
48	205	205	205	205	206	205
49	207	207	207	206	207	206
50	208	208	207	207	208	207
51	209	209	209	208	209	208
52	209	209	209	209	210	208
53	210	210	210	210	210	209
54	210	210	210	210	211	209
55	211	211	211	211	212	210
56	212	212	212	213	212	210
57	213	213	214	214	212	210
58	216	215	216	215	212	210
59	221	219	219	213	213	211
60	226	223	222	216	213	211
Max Temp:	226	223	222	216	213	211
Max Allowed:	402	403	403	403	403	403

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 347 (°F)	TC # 348 (°F)	TC # 349 (°F)	TC # 350 (°F)	TC # 351 (°F)	TC # 352 (°F)
0	77	76	75	76	78	78
1	77	76	75	76	78	78
2	77	76	75	76	78	78
3	77	76	75	76	78	78
4	77	76	75	76	78	78
5	77	76	75	76	78	79
6	77	76	76	76	78	80
7	78	76	76	77	79	82
8	78	76	77	78	80	84
9	79	76	78	79	82	87
10	80	77	80	81	84	91
11	81	77	82	83	86	94
12	83	78	85	85	88	97
13	85	79	88	87	91	101
14	87	80	91	90	94	106
15	89	81	94	93	97	110
16	92	83	97	96	100	114
17	94	84	100	99	103	118
18	97	86	104	102	106	122
19	100	88	107	105	110	127
20	104	89	111	109	114	131
21	107	92	114	112	117	135
22	111	93	118	116	121	139
23	114	96	122	119	125	143
24	118	98	125	123	128	148
25	123	101	128	127	132	152
26	127	104	132	131	136	156
27	131	106	135	134	139	160
28	135	110	138	137	143	164
29	140	113	140	141	146	167
30	144	118	143	144	150	171
31	148	122	146	148	153	175
32	153	127	149	151	157	179
33	157	133	151	154	160	182
34	161	139	154	157	163	186
35	166	145	157	160	164	188
36	170	152	159	162	168	192
37	174	159	162	165	172	195
38	178	166	164	168	176	198
39	182	172	167	170	179	201
40	185	178	169	173	179	204
41	189	183	171	175	181	206

OMEGA POINT LABORATORIES

Time (min)	TC # 347 (°F)	TC # 348 (°F)	TC # 349 (°F)	TC # 350 (°F)	TC # 351 (°F)	TC # 352 (°F)
42	192	187	173	177	185	209
43	195	190	176	179	189	212
44	197	193	177	182	192	215
45	199	196	179	184	192	216
46	201	199	181	186	195	219
47	203	201	184	190	199	222
48	204	202	186	193	202	225
49	206	203	188	197	205	228
50	207	205	189	199	207	230
51	208	205	191	201	210	233
52	208	206	193	204	213	236
53	209	207	195	207	216	239
54	210	207	196	209	218	242
55	210	208	197	210	221	245
56	210	208	199	212	223	248
57	210	208	199	214	226	251
58	210	208	201	216	228	254
59	210	209	202	219	231	258
60	211	209	204	223	234	261
Max Temp:	211	209	204	223	234	261
Max Allowed:	402	401	400	401	403	403

OMEGA POINT LABORATORIES

Time (min)	TC # 353 (°F)	TC # 354 (°F)	TC # 355 (°F)	TC # 356 (°F)	TC # 357 (°F)	TC # 358 (°F)
0	79	79	79	79	79	79
1	79	79	79	79	79	79
2	79	79	79	79	79	79
3	79	79	79	79	79	79
4	80	79	79	79	79	79
5	82	80	79	79	80	80
6	85	81	80	80	80	80
7	88	82	81	81	82	82
8	92	84	82	83	84	83
9	96	87	83	85	86	85
10	101	89	85	87	89	88
11	106	92	87	89	91	90
12	111	95	88	92	94	93
13	115	98	91	94	97	96
14	120	101	93	97	99	98
15	125	105	96	100	102	101
16	130	108	98	103	105	104
17	136	112	101	106	108	107
18	140	116	104	109	111	111
19	145	120	107	112	115	114
20	150	124	110	116	119	118
21	155	128	112	120	122	122
22	159	132	115	123	126	126
23	164	135	118	126	130	130
24	168	139	121	130	134	133
25	173	143	125	133	137	137
26	177	147	128	137	141	141
27	181	150	130	140	145	145
28	185	154	133	143	148	149
29	189	157	135	144	151	152
30	193	160	135	143	155	156
31	197	163	137	140	156	160
32	201	166	137	136	151	162
33	205	169	136	134	151	161
34	208	171	138	135	149	160
35	211	174	140	137	149	160
36	214	177	142	139	150	160
37	217	179	144	141	152	161
38	219	182	146	143	152	161
39	221	184	148	144	151	161
40	224	187	150	145	153	161
41	227	189	153	148	155	162

OMEGA POINT LABORATORIES

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Time (min)	TC # 353 (°F)	TC # 354 (°F)	TC # 355 (°F)	TC # 356 (°F)	TC # 357 (°F)	TC # 358 (°F)
42	230	192	156	149	156	164
43	233	194	158	151	158	165
44	236	197	161	154	158	167
45	239	200	164	157	157	168
46	241	202	167	161	161	170
47	244	205	169	164	163	171
48	247	208	172	166	168	173
49	250	210	174	168	170	174
50	253	213	177	171	173	176
51	256	216	179	174	175	177
52	259	219	181	176	177	180
53	262	222	184	179	181	183
54	266	224	186	182	184	184
55	269	227	189	185	186	186
56	272	230	191	188	189	186
57	275	233	194	191	190	188
58	278	236	196	193	192	190
59	282	239	199	194	194	192
60	285	242	201	195	196	194
Max Temp:	285	242	201	195	196	194
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 359 (°F)	TC # 360 (°F)	TC # 361 (°F)	TC # 362 (°F)	TC # 363 (°F)	TC # 364 (°F)
0	79	79	79	79	79	80
1	79	79	79	79	79	80
2	79	79	79	80	79	80
3	79	79	80	82	79	80
4	79	80	87	138	81	80
5	80	81	98	151	89	80
6	81	84	102	152	93	82
7	82	86	104	150	95	83
8	84	88	106	150	96	84
9	86	90	105	136	96	85
10	88	91	104	125	96	86
11	91	93	102	118	95	88
12	93	95	102	117	95	89
13	96	97	104	118	96	90
14	99	100	106	118	97	91
15	102	102	109	118	98	93
16	106	105	111	118	100	95
17	109	108	113	118	102	97
18	112	111	116	118	104	98
19	116	114	118	118	105	100
20	120	117	119	119	107	101
21	123	120	122	126	108	103
22	127	124	126	131	111	104
23	130	127	129	135	114	106
24	134	131	133	140	117	108
25	138	135	136	137	119	111
26	141	139	139	141	121	113
27	145	143	143	143	123	115
28	149	147	147	148	126	117
29	153	151	151	150	129	119
30	157	155	155	155	131	121
31	160	158	159	158	134	123
32	163	162	163	161	136	125
33	166	165	169	167	139	128
34	167	167	177	173	141	130
35	167	169	181	175	145	133
36	167	172	184	175	148	136
37	168	173	188	177	150	138
38	168	175	196	186	153	140
39	168	176	199	189	156	143
40	168	177	199	187	158	144
41	168	179	198	182	159	146

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI . September 20, 1994

Time (min)	TC # 359 (°F)	TC # 360 (°F)	TC # 361 (°F)	TC # 362 (°F)	TC # 363 (°F)	TC # 364 (°F)
42	169	180	198	182	160	148
43	170	182	200	186	163	149
44	172	184	203	188	166	152
45	173	186	203	189	168	154
46	174	186	203	191	169	155
47	176	187	203	192	171	157
48	178	189	205	194	173	160
49	180	190	206	196	175	162
50	182	193	208	197	178	165
51	184	195	211	200	180	167
52	185	198	217	204	183	170
53	188	200	224	210	187	174
54	190	202	229	214	186	176
55	190	205	228	214	186	179
56	191	206	232	217	188	181
57	194	208	231	218	190	184
58	195	211	233	219	192	185
59	196	212	233	210	192	185
60	198	214	232	214	191	185
Max Temp:	198	214	233	219	192	185
Max Allowed:	404	404	404	404	404	405

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI . September 20, 1994

Time (min)	TC # 365 (°F)	TC # 366 (°F)	TC # 367 (°F)	TC # 368 (°F)	TC # 369 (°F)	TC # 370 (°F)
0	79	79	79	79	79	79
1	80	79	79	79	79	79
2	80	79	79	79	79	79
3	79	79	79	79	79	79
4	80	79	79	79	79	79
5	80	80	80	79	79	81
6	81	81	80	80	80	84
7	82	83	82	82	82	89
8	84	85	84	84	84	94
9	86	88	85	86	86	99
10	89	90	88	88	89	103
11	91	94	90	91	92	106
12	94	96	93	94	94	110
13	96	99	96	97	97	113
14	99	103	99	100	101	116
15	101	106	102	104	104	119
16	104	110	106	107	107	121
17	107	113	109	110	110	123
18	109	116	113	114	113	125
19	111	119	116	117	116	127
20	114	122	120	121	119	130
21	116	126	124	124	122	134
22	118	129	128	128	125	138
23	121	132	131	131	128	142
24	123	136	135	135	132	147
25	126	139	139	138	135	151
26	129	143	142	142	138	151
27	132	146	145	145	140	151
28	134	149	148	147	142	153
29	137	151	151	150	143	155
30	139	155	154	151	145	158
31	141	157	156	153	147	161
32	143	160	159	154	149	163
33	147	163	161	155	150	165
34	150	166	163	156	151	166
35	153	168	165	157	152	167
36	156	170	166	158	153	168
37	158	173	167	158	154	170
38	161	175	169	159	156	172
39	163	177	170	161	158	174
40	164	178	172	162	160	176
41	165	180	174	164	162	178

OMEGA POINT LABORATORIES

Time (min)	TC # 365 (°F)	TC # 366 (°F)	TC # 367 (°F)	TC # 368 (°F)	TC # 369 (°F)	TC # 370 (°F)
42	167	182	175	166	163	181
43	169	184	177	167	164	183
44	170	187	178	169	166	186
45	172	189	178	169	167	188
46	174	191	181	171	169	192
47	177	194	184	173	171	195
48	180	197	186	175	173	198
49	183	200	188	176	176	201
50	186	203	190	178	178	203
51	189	207	193	181	181	204
52	192	210	197	184	183	206
53	195	214	200	187	184	209
54	199	218	202	190	186	211
55	203	221	206	192	188	213
56	206	225	209	196	190	215
57	210	229	212	199	192	217
58	210	232	216	202	195	218
59	214	235	219	206	198	219
60	218	238	223	209	200	221
Max Temp:	218	238	223	209	200	221
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 371 (°F)	TC # 372 (°F)	TC # 373 (°F)	TC # 374 (°F)	TC # 375 (°F)	TC # 376 (°F)
0	79	79	79	78	78	77
1	79	79	79	78	78	77
2	79	79	79	78	78	77
3	79	79	79	78	78	77
4	79	79	79	79	78	78
5	81	80	79	79	78	78
6	85	82	81	81	79	80
7	90	86	85	83	81	82
8	96	92	91	86	84	85
9	101	98	96	90	87	88
10	106	103	101	94	90	92
11	111	107	105	98	94	96
12	115	110	108	103	98	100
13	119	113	112	107	102	104
14	123	117	116	111	107	109
15	126	121	119	115	111	113
16	129	123	122	118	115	117
17	132	125	124	122	119	121
18	135	128	127	125	123	125
19	139	131	130	129	126	129
20	142	135	133	133	130	134
21	146	139	137	137	134	138
22	150	143	141	141	138	142
23	154	147	145	144	142	147
24	158	151	149	148	146	151
25	162	155	153	152	150	155
26	165	158	156	156	154	159
27	167	162	159	159	158	163
28	170	165	162	163	161	167
29	173	168	165	166	164	170
30	176	171	168	168	167	173
31	179	173	170	171	170	176
32	183	175	172	174	173	179
33	185	177	175	177	176	182
34	188	179	177	179	178	184
35	190	182	179	182	181	187
36	193	184	181	184	184	190
37	196	186	184	187	186	191
38	198	188	186	189	189	193
39	201	190	188	192	191	196
40	203	192	191	195	194	198
41	206	195	193	198	196	200

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 371 (°F)	TC # 372 (°F)	TC # 373 (°F)	TC # 374 (°F)	TC # 375 (°F)	TC # 376 (°F)
42	210	198	196	201	198	202
43	214	201	199	204	201	205
44	217	204	203	207	204	207
45	221	207	206	210	207	210
46	225	210	210	214	210	213
47	229	214	214	217	213	216
48	233	217	218	221	216	219
49	237	221	222	225	220	223
50	239	225	226	229	223	226
51	240	222	229	233	227	230
52	243	228	233	237	231	234
53	246	232	237	241	235	238
54	249	236	241	245	239	242
55	252	240	245	249	243	246
56	255	244	249	253	247	250
57	258	247	253	257	251	255
58	260	251	257	261	256	259
59	262	255	261	265	259	264
60	265	259	265	268	263	268
Max Temp:	265	259	265	268	263	268
Max Allowed:	404	404	404	403	403	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 377 (°F)	TC # 378 (°F)	TC # 379 (°F)	TC # 380 (°F)	TC # 381 (°F)	TC # 382 (°F)
0	76	75	75	78	80	80
1	76	75	75	78	80	80
2	76	75	75	78	80	80
3	76	75	75	78	79	80
4	77	75	75	78	80	81
5	77	75	75	78	79	82
6	79	76	75	78	79	83
7	81	77	75	78	80	83
8	84	78	76	78	80	83
9	87	80	76	78	80	83
10	91	82	76	78	81	84
11	95	84	76	79	81	84
12	99	87	77	79	82	85
13	103	90	77	80	82	86
14	108	93	78	81	83	87
15	112	96	79	82	84	88
16	116	99	80	83	86	89
17	120	102	81	84	87	91
18	124	105	82	85	88	92
19	129	109	84	86	90	94
20	133	112	85	88	91	96
21	136	115	87	90	93	98
22	140	118	88	91	95	100
23	144	121	90	93	96	102
24	149	124	92	95	98	105
25	152	127	94	97	100	109
26	156	131	96	99	102	113
27	160	134	98	101	104	117
28	164	137	100	103	106	122
29	168	140	103	105	108	127
30	171	143	105	107	111	130
31	174	146	107	110	113	133
32	177	149	110	112	115	137
33	181	152	112	114	118	138
34	184	155	114	116	121	139
35	186	158	116	119	123	140
36	187	161	118	121	126	141
37	188	163	120	124	129	143
38	192	166	123	127	132	144
39	195	169	126	130	135	146
40	198	171	129	134	138	148
41	201	174	132	137	140	149

OMEGA POINT LABORATORIES

Time (min)	TC # 377 (°F)	TC # 378 (°F)	TC # 379 (°F)	TC # 380 (°F)	TC # 381 (°F)	TC # 382 (°F)
42	204	177	135	141	143	150
43	206	179	138	144	145	151
44	207	182	141	147	147	153
45	210	185	143	150	149	154
46	214	187	146	153	151	156
47	218	191	148	155	152	157
48	221	194	150	158	154	159
49	226	197	152	160	156	161
50	229	200	154	162	157	162
51	233	204	156	165	159	164
52	235	204	158	167	161	166
53	239	205	160	170	162	168
54	243	208	163	173	164	171
55	247	210	165	175	166	173
56	251	215	167	178	168	175
57	255	220	169	180	170	177
58	260	223	171	182	172	180
59	262	225	173	184	175	183
60	266	229	176	186	177	187
Max Temp:	266	229	176	186	177	187
Max Allowed:	401	400	400	403	405	405

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 383 (°F)	TC # 384 (°F)	TC # 385 (°F)	TC # 386 (°F)	TC # 387 (°F)	TC # 388 (°F)
0	81	80	80	deleted	75	77
1	81	80	80	deleted	75	77
2	81	80	80	deleted	75	77
3	81	80	80	deleted	75	77
4	81	80	80	deleted	75	77
5	81	80	80	deleted	75	77
6	81	80	80	deleted	75	77
7	81	80	80	deleted	75	77
8	81	81	81	deleted	75	77
9	81	82	82	deleted	75	77
10	81	82	83	deleted	75	78
11	82	83	84	deleted	76	78
12	82	84	85	deleted	76	79
13	82	85	86	deleted	77	81
14	83	86	88	deleted	78	83
15	84	87	89	deleted	79	86
16	84	89	91	deleted	81	90
17	85	90	93	deleted	83	96
18	86	92	95	deleted	86	101
19	87	94	97	deleted	89	107
20	88	96	100	deleted	93	119
21	89	98	102	deleted	100	135
22	90	100	105	deleted	106	145
23	91	103	107	deleted	112	153
24	93	105	110	deleted	119	164
25	94	108	113	deleted	125	171
26	96	111	116	deleted	130	177
27	98	113	119	deleted	135	182
28	99	117	122	deleted	140	186
29	101	119	125	deleted	147	189
30	103	122	128	deleted	152	191
31	105	125	130	deleted	157	193
32	107	128	134	deleted	162	196
33	109	131	137	deleted	167	198
34	111	134	140	deleted	170	197
35	113	137	143	deleted	173	195
36	114	140	146	deleted	176	196
37	116	143	150	deleted	177	197
38	118	145	152	deleted	179	198
39	120	148	154	deleted	183	198
40	121	151	158	deleted	187	200
41	123	154	161	deleted	190	201

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 383 (°F)	TC # 384 (°F)	TC # 385 (°F)	TC # 386 (°F)	TC # 387 (°F)	TC # 388 (°F)
42	125	157	163	deleted	193	202
43	126	159	165	deleted	194	203
44	128	162	168	deleted	196	204
45	130	164	171	deleted	197	204
46	132	167	173	deleted	199	205
47	133	169	175	deleted	200	205
48	135	171	178	deleted	200	205
49	137	173	180	deleted	200	206
50	139	175	181	deleted	200	206
51	141	177	184	deleted	199	206
52	143	180	187	deleted	200	205
53	145	182	190	deleted	199	205
54	147	184	191	deleted	199	204
55	149	185	193	deleted	199	204
56	151	187	194	deleted	199	203
57	153	188	196	deleted	199	202
58	155	189	197	deleted	198	201
59	157	191	198	deleted	198	201
60	158	192	199	deleted	198	201
Max Temp:	158	192	199		200	206
Max Allowed:	406	405	405		400	402

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 389 (°F)	TC # 390 (°F)	TC # 391 (°F)	TC # 392 (°F)	TC # 393 (°F)	TC # 394 (°F)
0	78	79	80	79	deleted	deleted
1	78	79	80	79	deleted	deleted
2	78	79	80	79	deleted	deleted
3	78	79	80	79	deleted	deleted
4	78	79	80	79	deleted	deleted
5	78	79	80	79	deleted	deleted
6	78	79	80	79	deleted	deleted
7	78	79	80	80	deleted	deleted
8	79	80	80	81	deleted	deleted
9	80	82	80	82	deleted	deleted
10	82	85	81	84	deleted	deleted
11	84	87	81	87	deleted	deleted
12	86	90	82	89	deleted	deleted
13	90	94	83	92	deleted	deleted
14	94	100	84	95	deleted	deleted
15	100	106	86	98	deleted	deleted
16	109	113	88	101	deleted	deleted
17	116	119	90	104	deleted	deleted
18	123	124	92	106	deleted	deleted
19	133	130	94	109	deleted	deleted
20	144	136	96	112	deleted	deleted
21	153	142	99	114	deleted	deleted
22	159	147	102	117	deleted	deleted
23	163	152	105	120	deleted	deleted
24	169	156	108	123	deleted	deleted
25	174	160	110	126	deleted	deleted
26	177	164	113	128	deleted	deleted
27	181	167	116	131	deleted	deleted
28	186	170	119	134	deleted	deleted
29	190	173	122	137	deleted	deleted
30	193	177	124	140	deleted	deleted
31	196	181	127	143	deleted	deleted
32	199	187	130	146	deleted	deleted
33	201	194	134	148	deleted	deleted
34	201	203	139	150	deleted	deleted
35	198	205	184	153	deleted	deleted
36	198	206	200	158	deleted	deleted
37	199	207	205	165	deleted	deleted
38	201	207	207	169	deleted	deleted
39	203	208	208	171	deleted	deleted
40	205	208	209	177	deleted	deleted
41	206	208	209	176	deleted	deleted

OMEGA POINT LABORATORIES

Project No. 97187 TVA/ TSI September 20, 1994

Time (min)	TC # 389 (°F)	TC # 390 (°F)	TC # 391 (°F)	TC # 392 (°F)	TC # 393 (°F)	TC # 394 (°F)
42	207	209	210	177	deleted	deleted
43	208	210	210	178	deleted	deleted
44	209	210	211	180	deleted	deleted
45	209	211	211	183	deleted	deleted
46	209	211	211	185	deleted	deleted
47	208	211	211	186	deleted	deleted
48	208	212	211	188	deleted	deleted
49	208	212	211	189	deleted	deleted
50	208	212	211	191	deleted	deleted
51	209	212	211	193	deleted	deleted
52	209	212	211	195	deleted	deleted
53	208	212	211	197	deleted	deleted
54	208	212	210	199	deleted	deleted
55	207	212	210	202	deleted	deleted
56	207	212	209	205	deleted	deleted
57	206	211	208	208	deleted	deleted
58	204	210	207	210	deleted	deleted
59	203	210	206	212	deleted	deleted
60	203	209	205	214	deleted	deleted
Max Temp:	209	212	211	214		
Max Allowed:	403	404	405	404		

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	E119 Std (°F)	Furnace Avg (°F)	Support TC # 1 (°F)	Support TC # 2 (°F)	Support TC # 3 (°F)	Support TC # 4 (°F)	Support TC # 5 (°F)	Support TC # 6 (°F)
0	68	77	77	78	77	78	78	79
1	254	133	77	78	78	78	78	79
2	440	297	77	78	80	78	78	79
3	627	598	77	78	83	78	78	79
4	813	884	77	80	86	80	79	80
5	1000	1089	78	81	90	81	81	80
6	1060	1229	80	84	94	83	84	81
7	1120	1319	83	89	96	85	87	83
8	1180	1369	92	100	99	91	92	87
9	1240	1348	106	122	104	100	101	92
10	1300	1289	118	145	111	112	115	101
11	1327	1237	129	159	117	127	131	113
12	1346	1248	140	169	123	143	144	125
13	1364	1311	150	177	128	158	153	137
14	1380	1380	159	185	133	170	162	148
15	1395	1426	164	191	139	180	168	159
16	1410	1459	170	194	147	187	172	169
17	1423	1452	176	196	154	193	176	178
18	1436	1415	181	198	161	197	180	183
19	1448	1390	186	200	168	200	185	187
20	1459	1398	190	203	174	204	190	191
21	1470	1430	195	205	181	206	195	195
22	1480	1469	198	207	189	207	200	200
23	1490	1510	200	210	197	208	204	204
24	1499	1530	202	215	202	210	207	207
25	1508	1539	204	220	202	215	208	209
26	1517	1533	205	228	204	219	210	210
27	1525	1506	207	238	205	223	211	214
28	1533	1493	209	248	206	232	223	224
29	1541	1502	211	259	207	242	234	232
30	1548	1531	213	270	208	252	245	239
31	1555	1561	217	281	209	262	255	248
32	1562	1578	221	293	210	273	266	256
33	1569	1589	224	305	211	283	276	265
34	1576	1589	228	316	212	294	286	274
35	1582	1585	232	328	215	304	296	282
36	1588	1573	237	340	218	315	306	291
37	1594	1571	242	351	220	325	316	300
38	1600	1584	248	362	224	335	325	309
39	1606	1585	255	373	228	346	335	317
40	1612	1594	263	384	234	356	345	326

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	E119 Std (°F)	Furnace Avg (°F)	Support TC # 1 (°F)	Support TC # 2 (°F)	Support TC # 3 (°F)	Support TC # 4 (°F)	Support TC # 5 (°F)	Support TC # 6 (°F)
41	1617	1601	270	395	239	367	354	335
42	1622	1599	278	406	246	377	364	344
43	1627	1601	287	417	253	387	373	353
44	1633	1607	295	428	260	397	383	362
45	1638	1637	304	438	267	407	392	371
46	1642	1655	313	449	274	417	402	380
47	1647	1649	322	460	282	426	411	388
48	1652	1638	331	471	289	436	420	397
49	1656	1631	340	482	297	445	429	405
50	1661	1632	349	493	305	454	439	414
51	1665	1633	358	505	313	463	448	422
52	1669	1655	368	516	321	471	457	431
53	1674	1677	377	527	329	481	467	439
54	1678	1689	386	537	337	490	477	447
55	1682	1694	396	548	345	498	486	456
56	1686	1684	405	559	353	507	495	464
57	1690	1671	414	570	361	516	504	473
58	1693	1685	424	580	369	525	513	481
59	1697	1707	433	591	378	533	523	490
60	1701	1717	443	602	386	542	532	498

Time (min)	Support TC # 7 (°F)	Support TC # 8 (°F)	Support TC # 9 (°F)	Support TC # 10 (°F)	Support TC # 11 (°F)	Support TC # 12 (°F)	Ambient (°F)	Furnace # 1 (°F)
0	77	78	79	77	78	79	76	76
1	77	78	79	77	78	79	76	120
2	77	78	79	77	78	79	76	199
3	77	78	79	77	78	79	76	320
4	77	78	79	77	79	79	76	471
5	77	80	79	77	82	82	77	628
6	78	82	80	78	85	83	77	770
7	79	85	82	80	89	85	77	880
8	80	91	85	81	93	88	77	963
9	83	102	89	84	99	92	77	1000
10	93	120	95	90	110	117	77	991
11	105	142	101	99	125	138	77	964
12	116	163	109	110	140	153	77	1007
13	129	175	117	121	154	164	77	1095
14	141	184	126	132	163	170	78	1169
15	152	188	135	142	171	176	78	1227
16	161	190	145	152	178	181	78	1267
17	168	193	157	162	184	186	78	1268
18	173	194	169	170	190	190	78	1236
19	178	194	181	179	196	194	78	1212
20	183	195	188	189	201	199	78	1249
21	187	196	192	196	204	203	78	1322
22	190	198	196	201	207	206	79	1413
23	195	202	201	204	209	208	79	1471
24	200	205	205	205	210	210	79	1488
25	203	207	207	206	212	210	79	1479
26	205	208	209	207	217	211	79	1472
27	206	209	213	207	221	212	79	1474
28	207	210	222	207	228	219	79	1478
29	208	212	231	207	236	223	80	1503
30	208	214	242	208	244	231	80	1531
31	209	217	251	208	253	241	80	1558
32	209	220	260	209	261	251	80	1574
33	211	223	268	210	269	262	80	1586
34	212	235	277	212	278	274	81	1591
35	216	249	285	215	287	284	80	1597
36	219	260	293	217	297	295	81	1592
37	223	270	301	222	307	306	81	1597
38	228	281	310	227	317	316	81	1602
39	233	291	318	232	327	327	81	1599
40	239	301	326	237	338	338	81	1612

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	Support TC # 7 (°F)	Support TC # 8 (°F)	Support TC # 9 (°F)	Support TC # 10 (°F)	Support TC # 11 (°F)	Support TC # 12 (°F)	Ambient (°F)	Furnace # 1 (°F)
41	245	312	335	243	348	348	81	1629
42	252	322	344	249	358	358	81	1632
43	259	332	352	255	368	368	81	1638
44	267	342	361	262	378	378	81	1645
45	274	351	369	269	388	388	81	1672
46	282	360	378	276	399	397	82	1699
47	290	370	386	284	409	406	82	1685
48	298	379	395	291	420	415	81	1663
49	306	388	404	299	430	425	81	1638
50	314	398	412	307	440	434	82	1628
51	323	407	421	315	450	443	82	1639
52	331	416	430	324	460	452	82	1675
53	340	425	439	332	471	461	83	1711
54	348	434	447	340	481	470	83	1750
55	357	444	455	348	490	478	83	1763
56	365	453	463	357	499	487	83	1726
57	373	462	471	365	509	495	83	1698
58	382	471	479	374	519	504	83	1712
59	390	480	487	382	529	513	83	1724
60	399	490	495	390	539	521	84	1731

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	Furnace # 2 (°F)	Furnace # 3 (°F)	Furnace # 4 (°F)	Furnace # 5 (°F)	Furnace # 6 (°F)
0	77	78	78	78	78
1	119	158	113	145	144
2	205	325	226	360	281
3	331	565	421	720	531
4	493	808	650	1059	799
5	673	1027	897	1269	1037
6	843	1207	1110	1392	1218
7	970	1324	1267	1474	1329
8	1061	1384	1349	1519	1397
9	1083	1378	1387	1460	1371
10	1059	1320	1361	1382	1309
11	1022	1272	1335	1320	1261
12	1061	1286	1355	1307	1278
13	1201	1320	1350	1377	1338
14	1311	1356	1362	1467	1403
15	1361	1389	1377	1530	1430
16	1387	1424	1407	1571	1459
17	1357	1449	1476	1527	1455
18	1305	1436	1513	1464	1426
19	1268	1422	1542	1418	1404
20	1297	1436	1544	1412	1414
21	1352	1465	1530	1443	1442
22	1416	1490	1513	1486	1474
23	1464	1522	1517	1536	1514
24	1511	1534	1510	1569	1534
25	1526	1545	1514	1588	1551
26	1517	1557	1535	1571	1550
27	1479	1522	1525	1520	1505
28	1471	1505	1503	1497	1490
29	1495	1502	1501	1504	1494
30	1519	1534	1516	1546	1527
31	1531	1566	1535	1590	1559
32	1543	1578	1551	1613	1568
33	1545	1586	1565	1627	1575
34	1559	1583	1571	1621	1571
35	1550	1575	1573	1609	1560
36	1530	1564	1567	1588	1545
37	1537	1563	1564	1581	1541
38	1548	1574	1574	1600	1557
39	1539	1573	1581	1594	1555
40	1566	1588	1578	1603	1571

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	Furnace # 2 (°F)	Furnace # 3 (°F)	Furnace # 4 (°F)	Furnace # 5 (°F)	Furnace # 6 (°F)
41	1579	1589	1582	1614	1573
42	1566	1578	1588	1610	1561
43	1571	1575	1594	1607	1557
44	1586	1579	1590	1611	1565
45	1614	1625	1596	1654	1619
46	1634	1648	1603	1680	1638
47	1618	1640	1613	1677	1627
48	1604	1632	1614	1661	1619
49	1573	1617	1621	1659	1603
50	1573	1624	1623	1654	1612
51	1585	1625	1625	1645	1608
52	1622	1644	1624	1673	1636
53	1657	1671	1632	1701	1663
54	1681	1670	1633	1711	1670
55	1683	1678	1637	1719	1674
56	1657	1673	1646	1712	1664
57	1640	1662	1642	1698	1650
58	1652	1680	1645	1711	1669
59	1708	1706	1669	1718	1706
60	1766	1709	1664	1713	1726

OMEGA POINT LABORATORIES

Project No. 97187 TVA / TSI September 20, 1994

Time (min)	Furnace # 7 (°F)	Furnace # 8 (°F)	Furnace # 9 (°F)	Furnace # 10 (°F)
0	78	78	76	76
1	153	124	136	121
2	331	295	397	353
3	656	573	938	929
4	997	867	1322	1371
5	1237	1116	1478	1528
6	1399	1312	1500	1541
7	1506	1443	1495	1503
8	1551	1518	1479	1468
9	1494	1524	1400	1379
10	1418	1468	1312	1273
11	1353	1426	1225	1188
12	1342	1417	1231	1199
13	1384	1420	1338	1288
14	1452	1448	1454	1378
15	1524	1484	1503	1431
16	1572	1521	1526	1454
17	1548	1547	1475	1417
18	1492	1520	1408	1353
19	1456	1524	1354	1300
20	1450	1526	1344	1306
21	1474	1531	1380	1356
22	1509	1530	1452	1411
23	1552	1548	1511	1459
24	1577	1551	1544	1482
25	1593	1561	1550	1481
26	1575	1560	1533	1458
27	1534	1541	1503	1455
28	1514	1522	1487	1460
29	1522	1525	1495	1484
30	1558	1553	1528	1501
31	1602	1582	1560	1527
32	1628	1604	1577	1539
33	1645	1623	1590	1548
34	1639	1621	1591	1547
35	1632	1619	1587	1552
36	1613	1609	1575	1552
37	1605	1602	1577	1546
38	1628	1616	1587	1555
39	1623	1622	1591	1574
40	1629	1618	1598	1575

Time (min)	Furnace # 7 (°F)	Furnace # 8 (°F)	Furnace # 9 (°F)	Furnace # 10 (°F)
41	1639	1623	1604	1576
42	1637	1626	1603	1584
43	1640	1632	1610	1591
44	1645	1629	1618	1598
45	1678	1650	1644	1615
46	1699	1664	1661	1627
47	1700	1668	1647	1618
48	1690	1667	1629	1601
49	1692	1676	1624	1604
50	1687	1677	1625	1614
51	1683	1673	1629	1620
52	1703	1680	1658	1639
53	1717	1682	1683	1655
54	1720	1682	1703	1672
55	1728	1692	1702	1668
56	1731	1699	1680	1650
57	1723	1698	1664	1637
58	1734	1704	1684	1656
59	1730	1711	1711	1684
60	1716	1701	1739	1703

Appendix E

QUALITY ASSURANCE

Quality Assurance Statement

Omega Point Laboratories, Inc. is an independent, wholly owned company incorporated in the state of Texas, devoted to engineering, inspection, quality assurance and testing of building materials, products and assemblies. The company has developed and implemented a Quality Assurance Program designed to provide its clients with a planned procedure of order and document processing for inspection and testing services it provides to assure conformity to requirements, codes, standards and specifications. The Program is designed to meet the intent of ANSI 45.2 Quality Assurance Program Requirements for Nuclear Power Plants, and complies with the requirements of the ASME Code, SPPE, Military Standards and other less stringent programs. It is the Laboratory's intention to adhere strictly to this Program, to assure that the services offered to its clients remains of the highest quality and accuracy possible.

The overall responsibility of the supervision, operation and coordination of this Quality Assurance Program is that of the Quality Assurance Manager, a person not involved with the performance of the inspection or testing services, and who is under the full time employ of the Laboratory. This individual is responsible for implementing and enforcing all procedures presented in the Quality Assurance Manual and the Procedures Manual. All personnel involved with activities which fall under the scope of this Program are required to cooperate with the letter and intent of this Program.

All QA Surveillance documents remain on file at the Laboratory, and are available for inspection by authorized personnel in the performance of an on-site QA Audit. All materials, services and supplies used herein were obtained with appropriate QA Certifications of Compliance, which may be found in the following pages.

OMEGA POINT LABORATORIES

ACCEPTABILITY DOCUMENTATION

TEST DECK #3: PROJECT NO. 97187

The following signatures attest to the review and acceptance of each attribute listed regarding the above-noted test article:

I. CABLE TRAY/CONDUIT ASSEMBLY

C Humphrey — Omega Point Laboratories, Inc. — 7/19/94 Date

J.J. Price — TVA / TSI — 7/27/94 Date

II. ELECTRICAL CABLE INSTALLATION

C Humphrey — Omega Point Laboratories, Inc. — 7/25/94 Date

J.J. Price — TVA / TSI — 7/27/94 Date

III. THERMOCOUPLE INSTALLATION

C Humphrey — Omega Point Laboratories, Inc. — 7/27/94 Date

J.J. Price — TVA / TSI — 7/27/94 Date

Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, Texas 78112-9784
210-635-8100 / FAX: 210-635-8101
800-966-5253

IV. FIRE PROTECTION BARRIER

C Humphrey — 9/2/94
Omega Point Laboratories, Inc. — Date

J.J. Price — 9/20/94
TVA / TSI — Date

V. FINAL PRE-BURN INSPECTION

C Humphrey — 9/19/94
Omega Point Laboratories, Inc. — Date

J.J. Price — 9/19/94
TVA / TSI — Date

Event Log

OMEGA POINT LABORATORIES

EVENT LOG

TSI / TVA

Client # 11960

PROJECT NUMBERS:

97185
97186
97187

OMEGA POINT LABORATORIES, INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112
1-800-966-5253

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Revision 0 of Test plan received from TVA.	6/27/94	CH
Material ordered for test deck construction by OPL.	6/27	CH
Construction begins on test deck #1, project 97185, by OPL technicians.	6/29	CH
Cable trays are installed in Test Deck #1 by OPL technicians.	7/7/94	CH.
Shipment of Thermodag material is received from TSI.	7/8/94	CH
Thermocouples are installed on cable tray rails on Test Deck #1.	7/8	CH
Test Deck #2 construction begins.	7/8	CH
Cable loading begins in Test Deck #1.	7/11	CH
Thermocouple placement is verified on tray rails on Test Deck #1.	7/11	CH
Thermocouples are installed by OPL technicians in Test Deck #2.	7/11	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Construction is started on the test deck by OPL welders for Test Deck # 3.	7/12/94	CH
Revision 1 of Test plan received from TVA.	7/13	CH
Quality Control verifies test deck dimensions on project #97186, Test Deck #2.	7/13	CH
Conduit drop for thermocouples on Test deck #2 is installed.	7/15	CH
Verification of thermocouples on Test Deck # 2 is completed by OPL QA/QC personnel.	7/15	CH
All cable loading and thermocouple installation and verification by QA is completed on Test Deck # 1. Cable fill on left tray has been changed to a total of 289, 4/C 16AWG cables.	7/15/94	CH
Purchase order received for the release of construction on the next four test decks. Another event log will be used to record these tests.	7/18/94	CH
J. J. Pierce and crew arrive	7/18	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
at Omega Point to begin the installation process.	7/18/94	CH
Construction of the test article continues and the thermocouple installation begins on Test Deck #3.	7/18/94	CH
Cutting and dry fitting of the ThermoLag K Sub panels is started on Test Deck #1 by Steve Treadway and Jimmy Starnes, the TVA installers on site.	7/19	CH
Trowel grade Thermo Lag 330-1 is applied to the Thermo Lag panels on the side rails of the cable trays on Test Deck #1 by TVA installers. This trowel grade Thermo Lag will be pre-buttered onto the panels at all surfaces where it lays against the metal tray rails, and all butt joints and seams. Panels are held in place with stainless steel tie wire. The outside edge of the 90° bend on the cable	7/20	CH
	7/20	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Trays are stitched with stainless steel wire at 3" or less intervals on Test Deck #1 cable trays.	7/20/94	CH
All insulation is done according to the TVA installation procedures. Stress skin overlapping patch is applied to butt joints and fastened with 1/2" staples on Test Deck #1.	7/20	CH
Cable tray fill continues on Test Deck #3 by OPL technicians.	7/21	CH
Test Deck #1 Cable tray with 289 cables (full tray on left side of test deck) is fitted with a transition piece to accomodate excess fill at inside 90° angle on cable tray. This piece is made with a 2" strap skin overlap held with staples. Detailed on TVA data sheet dated 7/21/94.	7/21	CH
3" Conduit section of Test Deck	7/22/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
#1 is covered with the first layer of preshaped Thermo Lag sections. The score and fold method of applying Thermo Lag to the 90° elbow is used. Sections are held with the stainless steel tie wire.	7/22/94	CH
Thermo Lag wrap using the Vribbed board and the 18" cable trays is completed on all three trays of Test Deck #1 by TVA installers.	7/22	CH
Cable fill is completed on Test Deck #3 by OPL technicians.	7/23	CH
Second layer of pre-shaped Thermo Lag conduit sections are applied to the 3" conduit on Test Deck #1.	7/25	CH
Trowel grade Thermo-Lag is applied over trays and conduit of Test Deck #1 before finish stainless steel tie wires are applied	7/25	CH
Amarjit Singh, USNRC on site	7/25/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U.- shaped steel trays

ITEM	DATE	INITIALS
over the cable trays on Test Deck #1.	7/25/94	CH
Two more TVA installers arrive at Omega Point Labs. Gary Cole Arnold Wright	7/26	CH
TVA installers begin the installation of the cable tray supports, (called T-Bag Supports) between the cable trays on Test Deck #3.	7/26	CH
TVA installers measured, cut and installed T-Bag supports on Test Deck #2.	7/26	CH
Final skim coat put on Test Deck #1. 3-M insulation material applied over 3" conduit in 5 layers. a collar over the 3M-Thermo Bag joint is installed using the 3-M material overlapping 3" on each side with 2 layers. Stainless steel tie wire holds over the taped edges on Test Deck #1.		
Omega Point technicians	7/26/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
install the cable tray cover over the filled 18" cable tray.	7/26/94	CH
OPL technicians complete the thermocouples placed on the cable tray cover of Test Deck #3. TVA installers begin the cutting and dry fitting of Thermo Lag 330-10 panels to the cable tray on Test Deck #3. Thermocouple verification is completed on this deck by OPL QA/QC.	7/27/94	CH
Installation of the V ribbed Thermo-Lag panels proceeds on Test Deck #2 using the all-thread rods with washers and tie wire to support the bottom panels.	7/28	CH
Thermo-Lag V ribbed panels are cut and dry-fitted to Test Deck #3 using the score & fold method by TVA installers.	7/28	CH
Installation of panels using the trowel grade	7/29	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Thermo-Lag proceeds on both Test Deck #2 and #3 by TVA installers. Panels are held in place using stainless steel tie wire.	7/29/94	CH
Supports on Test Deck #2 are insulated using the 18" rule.	7/29	CH
Some V-ribs on the Thermo-Lag pieces are hammered flat on both Test Deck #2 and #3 to achieve a tight fit.	7/29	CH
The 2" conduit was insulated on Test Deck #2. This conduit was installed only as a means to get thermocouple wires from deck. There is no instrumentation on the conduit.	7/29	CH
Stress skin is applied to supports and tray on Test Deck #2. Skin coat of Thermo-Lag trowel grade is applied over the stress skin.	7/30/94	CH

EVENT LOG

TVA/TSI

Client #11960

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This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Bottom curved section of Test Deck #3 was fitted with a 2" overlap of steel skin which was attached to bottom tray with tie wire every 6". Used 4" conduit sections to fit the 5" conduit using a filler strip, cut to fit.	7/30/94	CH
The end thermocouple on the 1" airdrop is attached to the inside of the cable bundle. This TC is no. 392 on Test Deck #3. The end TC for the 5" airdrop is attached to the horizontal cable section TC number 385.	7/30	CH
Top and bottom surfaces of Test Deck #2 are covered with steel skin and held with staples.	8/1	CH
Rich Johnson with TSI on site to witness installation.	8/1	CH
Pat Madden, USNRC on site.	8/1	CH
Steel skin overlap is	8/1	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
stitched every 3"-5" on Test Deck #2.	8/1/94	CH
5" air drop on Test Deck #3 was filled with scrap Thermo-Lag pieces and the trowel grade Thermo-Lag material. This method was taken out to try another ~~application~~ installation method.	8/2/94	CH
The new installation procedure determined by TVA for the 5" air drops on Test Deck #3 involves using a bundle of cables (40% fill with a count of 44 cables) inside the Thermo-Lag conduit sections.	8/2/94	CH
It has been decided by D. Pierce TVA Proj. Mgr. that the moisture readings will not be required due to the amount of steel stress skin wire used which effects readings,		

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
and TVA's intent to wait a full 30 days to cure the trowel grade material.	8/2/94	CH
The insulation continues on Test Deck #3 with the application of stress skin stapled over the Thermo-Lag 330-1 panels.	8/2	CH
Attached 6" wide flat panel pieces over the seams on the top & bottom of the double tray intersection. Threaded bolts are cut off flush with the nuts. Thermo-Lag putty covers the bolts and nuts and is held in place by a 6" square of stress skin stapled to panel on Test Deck #2. A final coat of trowel grade is applied over the entire assembly.	8/2	CH
The 1" diameter airdrop is covered with two layers of the preformed Thermo-Lag	8/3/94	CH

EVENT LOG

TVA/TSI

Client #11960

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97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
conduit sections with stress skin reinforcing at curved radius between layers on Test Deck #3.	8/3/94	CH
Assembly surfaces smoothed and tie wires installed on Test Deck #2. This deck is completed except for 3M material to be applied later on supports.	8/3	CH
Deck #3 continues with the application of stress skin & the skim coat of trowel grade material.	8/4	CH
Biff Bradley from NEI has released one bucket of the Thermo Lag 330-1 trowel grade material (batch no. 94-05093, expiration date Jan '95) to be used on this project. This bucket will be replaced by future shipment of material to TVA from TSI).	8/4	CH
Final polish and skim of Test Deck #3 is done by TVA installers and Deck #3 is completed.	8/5	CH

EVENT LOG

TVA/TSI

Client #11960

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97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U.- shaped steel trays

ITEM	DATE	INITIALS
TVA installers return to continue insulation of Test # 7 and repair is done to completed test decks.	8/23/94	CH
This repair consists of adding Therms-Lag Trowel grade material to shrinkage cracks, pounding in any protruding staples and adding trowel grade skim coat to cover these staple heads or any stress skin wire showing.	8/23	CH
Twelve buckets of NET Therms-Lag Trowel grade material have been transferred to the TVA stock by an authorization letter from Biff Bradley. This material is from batch number 93-11649 with the expiration date extended to January 1995 by TSI.	8/23	CH
The TVA installers on site are: John H. Stewart, Sr. ~~Gary Cole~~ CH Ben Loveless		

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Arnold Wright Bernard McQueen	8/23/94	CH
Daniele Dadinot, USNRC is on site to witness installation of Thermo-Lag, arriving 8/22.	8/23	CH
Mark Salley, TVA Proj. Mgr on site to coordinate efforts.	8/23	CH
Test Deck #1 has one layer of M-20-A MAT manufactured by 3M applied to the bare sections of the structural support steel above the 18" Thermo-Lag wrap. Thermo-couples were attached to the metal before wrapping to give informational ouch readings (not a test requirement). Deck #1 is complete.	9/1/94	CH
Test Deck #2 has two layers of the 3M M-20-A MAT wraps applied over the structural steel supports after the thermocouples were added. Test Deck #2 is completed.	9/1/94	CH
Test Deck #3 has three	9/1/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
layers of the same 3M product applied over the steel supports after thermocouples were added. All 3M wrap is secured with the foil tape and stainless steel tie wires on decks #1, #2 and #3.	9/1/94	CH
Omega Point technicians begin pouring foam seal fire stops around cable trays and conduits at the penetration points through the test decks on decks #1, #2 and #3.	9/1/94	CH
Foam fire stops are completed on test decks #1, #2 & #3 by OPL technicians	9/2/94	CH
DD Pierce and Bill Baker of TVA arrive at Omega Point to inspect test decks ready for testing.	9/6/94	CH
Pat Madden, USNRC on site. Rich Lohman TSI, and Mark Talley, TVA	9/6/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
arrive at Omega Point to witness tomorrows test.	9/6/94	CH
Thermocouple extensions are added to Test Deck #1 due to programming problems with the new data acquisition system. all TC extensions are verified by QA/QC.	9/6	CH
Test Deck #1 has been inspected by TVA and OPL QA/QC and is approved for testing. Final pre burn inspection process is verified by Pete Stansberry OPL Project manager.	9/7/94	CH
Test Deck #1 has been placed on the test furnace.	9/7	CH
On site at Omega Point to witness the fire test of Test Deck #1 are: Dee Priest Omega Point Labs Connie Humphrey " " " Kerry Hitchcock " " " Richard Beasley " " " Pete Stansberry " " "	9/7/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Laudencio Castanon Omega Point Labs	9/7/94	CH
Cleda Patton " " "		
J.J. Pierce TVA		
Bill Baker TVA		
Mark Talley TVA		
Pat Madden USNRC		
Rich Johnson TSI		
Ben Fowlers TVA (Installer)		
Bernard McQueen " "		
Temperature at time of test start of Test Deck #1 is 85°F with the relative humidity at 63%. The one hour test of deck #1 began at 9:47 am and is completed by 10:47 am. The fire test is followed by the hose stream test after the test deck is removed from the furnace. The hose stream uses the fog nozzle (OPL equipment #92LE003) with a pressure of 75 psi and a 30° spray from a distance of five feet for five minutes.	9/7/94	CH
	CH	(#92 LE003)
	9/7/94	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
After the hose stream test of deck #1 the assembly was dismantled by OPC technicians with the condition of the Thermo-Lag, electrical cables and thermocouple wire documented by Herb Stansberry and OPC QA/QC personnel.	9/7/94	CH
Thermocouple extensions are added to Test Deck #2 in preparation of tomorrow's test.	9/7	CH
Verification of thermocouple extensions on Test Deck #2 is verified by OPC QA/QC.	9/8/94	CH
Test Deck #2 has been mounted on the test furnace and all thermo-couples are attached to the data acquisition equip-ment. Herb Stansberry, OPC Proj. Mgr. has completed the preburn checklist.	9/8	CH
On site at Omega Point to	9/8	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
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97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
witness the fire test of Test Deck # 2 are:	9/8/94	CH
Dez Brezt Omega Point Labs		
Cledy Patton " " "		
Herb Stansberry " " "		
Connie Humphrey " " "		
Kerry Hitchcock " " "		
Richard Beasley " " "		
Laudencio Castañon " " "		
Pat Madden US NRC		
Rich Johnson TSI		
Jd Pierce TVA		
Bill Baker "		
Mark Talley "		
The fire test of Test Deck #2 is started at 9:27 am. The temperature is 82°F with the relative humidity at 75%. The test is completed after one hour and is followed by the hose stream test using the fog nozzle (PSI gauge 92LE003) with a 30° spray pattern and a pressure of 75 psi.	9/8/94 9/8	CH CH

EVENT LOG

TVA/TSI

Client #11960

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97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
The hose is held at a distance of five feet for a five minute duration.	9/8/94	CH
Following the test of Test deck #2, the Therm-Lag material was stripped away and the condition of the materials was documented by the OPL staff.	9/8	CH
Deck #3 is given the final pre-burn inspection by TVA and OPL staff and is approved for testing.	9/19	CH
The test article is placed on the test furnace and the thermocouples are attached to the data acquisition system.	9/19	CH
Final pre-burn inspection is performed by Herb Stansberry, OPG Project manager.	9/20	CH
On site to witness the fire test of Test Deck #3 are: Rubin Feldman TSI	9/20	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
This Log is to be used to document the date and item for each step during the completion of test projects referenced below. The assigned project numbers and description for each of the test assemblies are:

97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
Edward Connell USNRC	9/20/94	CH
JJ Pierce TVA		
Mark Talley "		
Deg Priest Omega Point Labs		
Connie Humphrey " " "		
Cleda Patton " " "		
Herb Stansberry " " "		
Kerry Hitchcock " " "		
Richard Beasley " " "		
Laudencio Castanon " " "		
Ben Loveless TVA (installer)		
Bernard McQueen " "		
Temperature at time of test start was 73° with the relative humidity at 73%. The test of deck #3 began at 9:56 am and was completed in one hour. This test was followed by the hose stream test. The hose stream test uses the 30° spray fog nozzle (OPL Equipment 92LE.003 pressure gage) with a pressure of 75 psi from a distance of 50 feet for 5 minutes	9/20	CH
	9/20	CH
	9/20/94	CH

EVENT LOG

TVA/TSI

Client #11960

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97185 #1 (3) 18" L- shaped steel tray with (1) 3" L - shaped steel conduit
97186 #2 Double 18" steel tray intersection
97187 #3 (1) 18" U - shaped steel tray with cover and (3) nested 18" U - shaped steel trays

ITEM	DATE	INITIALS
After the hose stream test, the test article was dismantled and examined by OPL personnel.	9/20/94	CH
- end -		

Installation Details

OMEGA POINT LABORATORIES

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked Trays WP/WR NO. 97137 Test Deck 3

LOT/CONTRACT NO. ~~94-03047~~ (Panel) EXPIRATION DATE N/A

CRAFTSMAN JL Pierce DATE 7/26/94

QC INSPECTOR C Humphrey DATE 7/26/94

TYPICAL DRAWING NO. 47W243-11 & 12

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE	JLP 7/26/94	
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Measure & cut T-Lag supports. Drill and install All-Thread rods. Install supports on the trays. Supports are within dimensional tolerances.
Min thickness 1/2" Max thickness 3/4"
Began measuring T-Lag panels for stacked trays.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked Trays WP/WR NO. 97187 Test Deck 3

LOT/CONTRACT NO. 94-03028 & 94-03847 EXPIRATION DATE N/A

CRAFTSMAN JL Price DATE 7/27/94

QC INSPECTOR C Humphrey DATE 7/27/94

TYPICAL DRAWING NO. 47W243-11 & 12

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	JLP 7/27/94	
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Lot Number 94-02012
Marked & cut panel pieces to fit trays. Used both score and fold method and individual piece method. Max thickness 3/4", min thickness 1/2"

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked & Raised Cover WP/WR NO. 97-186 TEST DECK 3

LOT/CONTRACT NO. 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN J.A. Pierce DATE 7/28/94

QC INSPECTOR C Patton DATE 7-28-94

TYPICAL DRAWING NO. 47W293-11 & 12

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	ok	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE	J.A.P 7/28/94	
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Panel Lot # 94-03028, 94-02012, 94-03047, 94-02053, 94-03018
Hammered some ribs flat to achieve tight fit.
Use both individual piece & score and fold methods.
Panel lot # 94-02053

ATTACHMENT 1

DATA SHEET

RACEWAY ID STACKED TRAYS WP/WR NO. 97187 TEST DECK 3

LOT/CONTRACT NO. TROWEL 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN J. Prince DATE 7/29/94

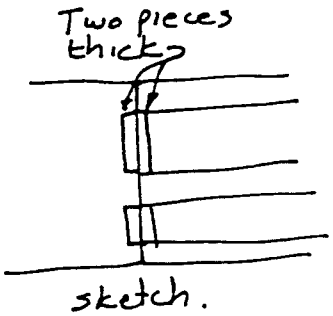
QC INSPECTOR _____ DATE _____

TYPICAL DRAWING NO. 47W243-11 & 12

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	ok	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	YES	
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE	ok	
MESH OVERLAPS		

REMARKS: Installed pieces on tray. Install double layer of 5/8" panel where box transitions to individual tray wrap (see sketch)



sketch.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked Trays WP/WR NO. 97187-TEST DECK 3

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN J.J. Pierce DATE 7/30/94

QC INSPECTOR Veda Patton DATE 7-30-94

TYPICAL DRAWING NO. 47W243-11 & 12

MONITORING POINTS

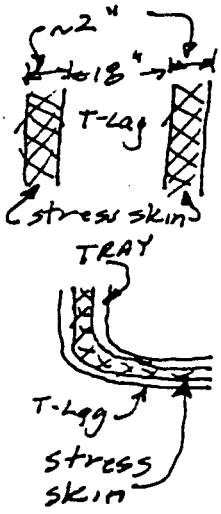
	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

Panel Lot # 94-02053 THICKNESS MAX 3/4" MIN 1/2"

REMARKS: Continued installing the pre-cut/fitted pieces on the trays. Bottom piece on curved section was cut to fit bottom of tray with ~2" overlap of stress skin which was turned up onto tray side rails. This piece attached to bottom tray with tie wire on ~6" spacing. Had to use 4" conduit pieces cut to fit around the 5" conduit.

4" Conduit Lot #s 92-09051, 94-03018

Max thickness "1/16" min 1/2"



ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked & Raise Cov. WP/WR NO. 97187 - TEST DECK 3

LOT/CONTRACT NO. TROWEL 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN J.J. Price DATE 8/1/94

QC INSPECTOR C Humphrey DATE 8/1/94

TYPICAL DRAWING NO. 77W293-11 & 12

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	OK	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	YES	
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE	N/A	
MESH OVERLAPS	N/A	

5/8" Panel Lot # 94-02053 (max 3/4" - min 1/2")

REMARKS: 1" CONDUIT Sections (MAX 3/4", min 1/2") Lot 94-02053
5" Air Drop - Cut strips of scrap panel to fit inside air drop. Peal off stress skin, butter, and fill the void inside the air drop.
Began measuring & cutting pieces for supports.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked & Raise Cover WP/WR NO. 97187 - Test Deck 3

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN JF Pierce DATE 8/2/94

QC INSPECTOR C Humphrey DATE 8/2/94

TYPICAL DRAWING NO. 77W243-11 & 12

MONITORING POINTS	Raised Cover Tray FIRST LAYER	Stacked Trays SECOND LAYER
FASTENER SPACING		N/A
SEAMS OFFSET	NA	N/A
JOINTS OFFSET	NA	N/A
18" RULE		N/A
CIRCUMFERENCE		N/A
SURFACE APPEARANCE		N/A
MESH OVERLAPS		YES

REMARKS: Removed T-Lag from 5" Air Drop. Add cables to 5" Air Drop. Make up cable bundle ~~(44-4C #10)~~ 44-4C #16 ✓ MS 12/5/94. Cable bundle diameter ~ 4" OD. Install stress skin on the stacked tray configuration. Installed preformed conduit sections (4" sections cut to fit 5" conduit) for 5" Air Drop. Prebuttered inside sections. CP 12/5/94

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked & Raised Cover WP/WR NO. 97187 -Test Deck 3

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE Dec 94

CRAFTSMAN J.J. Pierce DATE 8/3/94

QC INSPECTOR C Humphrey DATE 8/3/94

TYPICAL DRAWING NO. 47W243

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: 1" Conduit (5/8") Lot # 94-02053 (max 3/4", min 1/2")
1" Conduit (3/8") Lot # 94-04005 (max 1/2", min 1/4")
Panel Lot # 94-03047 (max 3/4", min 1/2")

ATTACHMENT 1

DATA SHEET

RACEWAY ID Stacked & Cover Trays WP/WR NO. 97187 - Test Deck 3

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN JJ Pierce DATE 8/4/94

QC INSPECTOR C Humphrey DATE 8/4/94

TYPICAL DRAWING NO. 47W243

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	N/A
JOINTS OFFSET	NA	N/A
18" RULE	JJP 8/4/93	YES
CIRCUMFERENCE		N/A
SURFACE APPEARANCE		
MESH OVERLAPS		2" MIN

REMARKS: Cover with stress skin and skim coat of trowel. Obtained a (one) bucket of trowel (Lot # 94-05093, expiration date Jan 95) from NEI. Will replace with a bucket from our next shipment.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Raised Cover & Stacked WP/WR NO. 97187 - Test Deck 3

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE DEC 94/Jan 95

CRAFTSMAN JJ Pierce DATE 8/5/94

QC INSPECTOR C Humphrey DATE 8/5/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	N/A
JOINTS OFFSET	NA	N/A
18" RULE	8/5/94	YES
CIRCUMFERENCE		N/A
SURFACE APPEARANCE		ok
MESH OVERLAPS		YES

REMARKS: Applied finishing touches of skim coat. Allowed to dry for 2+ hours and smoothed with Scotch-Brite pads & water.

APPENDIX 7.1

G-98 REV. 0 SRN-98-01

Of 1454

Sheet 1 of 2

ATTACHMENT 1

DATA SHEET

RACEWAY ID _____ WP/WR NO. _____

LOT/CONTRACT NO. 93-11049 Trowel Grade EXPIRATION DATE JAN.95

CRAFTSMAN [signature] DATE 8/23/94

QC INSPECTOR [signature] DATE 8/23/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	-SEE NOTE*	—
SEAMS OFFSET	NA	—
JOINTS OFFSET	NA	—
18" RULE	NA	—
CIRCUMFERENCE	NA	—
SURFACE APPEARANCE	SEE REMARKS -	—
MESH OVERLAPS	—	—

REMARKS: During curing the decks experienced small cracks where trowel grade material cured. Additionally 1-2 small areas (< 2 sq.in.), you could visually see stress skin under the cured Thermo-Lag. Per G-98 these areas would have been re-skimed. (Note, add these requirements to G-98.) Decks worked are #3:97187, #2:97186, #1:97185

*Note: Deck #3 does not have final tie wire installed yet.

WBEP - 7197A

SUBJECT Thermo-Lag Testing PROJECT

COMPUTED BY [signature] DATE 8/23/94 CHECKED BY C Humphreys DATE 8/23/94

Notes to Add to G-98

1) The ERFBS shall be considered operational after the QA sign-off and before the completion of the 30 day cure time. After the 30 day cure time the ERFBS shall be reinspected and work orders written for any small shrinkage cracks or visable stress skin. These small shrinkage cracks or visable stress skin does not make the ERFBS in-operable. The work order shall be processed as soon as possible but in no case longer than 30 days.

2) For air drops the inside stress skin shall be inspected to ensure there are no stray strands of wire before installing on the cable.

APPENDIX 7.1

C-98 REV. 0 SEN-98-01

ATTACHMENT 1

DATA SHEET

Sheet 1 of 1

RACEWAY ID 97187 WP/WR NO. Test Deck #3

LOT/CONTRACT NO. None EXPIRATION DATE —

CRAFTSMAN [signature] DATE 8/31/94

QC INSPECTOR Cleda Patton DATE 8-31-94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	Complete	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: The final tie wires were added on 6" centers.

ATTACHMENT 1

DATA SHEET

RACEWAY ID 97187 WP/WR NO. Test Deck #3 Sheet 1 of 2

LOT/CONTRACT NO _____ EXPIRATION DATE _____

CRAFTSMAN [signature] DATE 9/1/94

QC INSPECTOR [signature] DATE 9-1-94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING		
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Test Deck #3 had three (3) Layers of M-20-A MAT (Manufactured by 3M) applied to the Structural Steel supports above the 18" of Thermo-Lag protecting the raceway. The purpose will be to determine the thermal protection provided to support steal & Thermo-Lag/3M interface by ~~two~~ three (3) Layers of M-20-A.

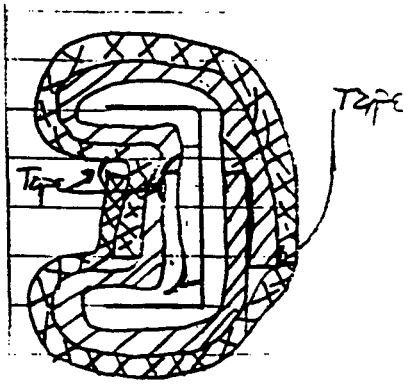
MW 9/1/94

This deck is complete and ready to test.

SUBJECT 97187 PROJECT Test Deck #3

COMPUTED BY [signature] DATE 9/1/94 CHECKED BY [signature] DATE 9-1-94

Thermo-Lag / 3M Interface

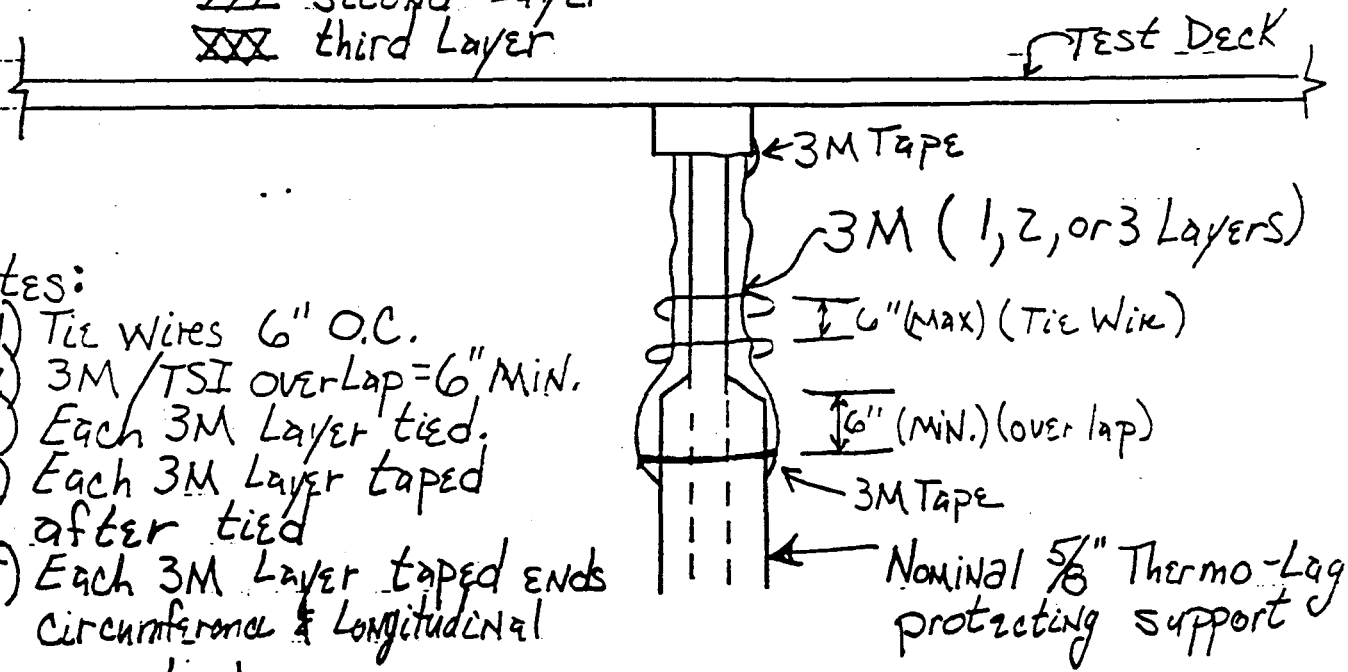


Deck #3

(3-Layer 3M)

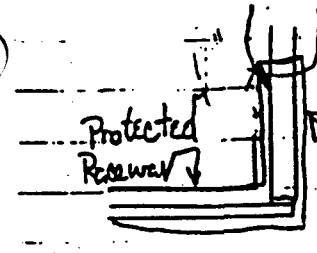
Plan View

Legend = first Layer
/// Second Layer
XXX third Layer



Notes:
1) Tie Wires 6" O.C.
2) 3M/TSI overLap = 6" MIN.
3) Each 3M Layer tied.
4) Each 3M Layer taped after tied
5) Each 3M Layer taped ends Circumferonce & Longitudinal

Elevation



ThermoLag 18" on steel from protected raceway.

50-390 TVA WATTS BAR 1

PHASE 2 THERMO-LAG FIRE BARRIER
QUALIFICATION FIRE TEST RESULTS

REC'D W/LTR DTD 12/23/94....9501120202

50-390 (18) 12/23/94

-NOTICE-

THE ATTACHED FILES ARE OFFICIAL RECORDS OF THE INFORMATION & REPORTS MANAGEMENT BRANCH. THEY HAVE BEEN CHARGED TO YOU FOR A LIMITED TIME PERIOD AND MUST BE RETURNED TO THE RECORDS & ARCHIVES SERVICES SECTION P1-22 WHITE FLINT. PLEASE DO NOT SEND DOCUMENTS CHARGED OUT THROUGH THE MAIL. REMOVAL OF ANY PAGE(S) FROM DOCUMENT FOR REPRODUCTION MUST BE REFERRED TO FILE PERSONNEL.

-NOTICE-

9501120202

Certifications of Calibration and Conformance

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97332-38
RECEIVED FROM PMC
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1416 - 11960
DATE RECEIVED 8-16-94
DATE INSPECTED 8-16-94
INSPECTED BY: CBatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	CONID MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
TC Plug	11400	200	200	0	T-1 Plug	Y	Y	Good	None	X			
TC Jack	11400	200	200	0	T-2 Jack	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Janice Welch
PMC Corporation
57 Harvey Road

Londonderry NH 03053

PO Number: 1140-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/15/94	UPS Red Label		8-16-94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	T-1 Plug	100		
2.	T-2 Jack	100		

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-15-94

Special Instructions

Shipment Must Include Certificate of Conformance on Materials.

Ordered By: Cleda Patton

Project #: TSI/TVA AMPACITY

Total	
Shipping	
Tax	
Invoice Total	

PMC CORPORATION
1170 N. GILBERT STREET, ANAHEIM, CA. 92801 • FAX (800) 753-5595 • PHONE (714) 563-0332

SPECIALIZING IN WIRE, CABLE & TEMPERATURE SENSORS

SOLD TO

OMEGA POINT LABS
16015 SHADY FALLS RD.
ELMENDORF. TX 78112

SHIP TO

OMEGA POINT LABS
16015 SHADY FALLS RD.
ELMENDORF, TX 78112
ATTN: CLETA

DATE RECEIVED	CUSTOMER NO.	PMC JOB NO.
8-15-94		TC-6229

REQUESTED SHIP	CUSTOMER P.O. NUMBER	SHIP VIA	TERMS
8-15-94	11400	UPS/RED	NET 15

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QTY. BACK ORDERED	QTY. SHIPPED
1	100	T-1 PLUG	0	100
2	100	T-2 JACK	0	100

SPECIAL INSTRUCTIONS:

2850

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8-15-94	UPS	1	9#	X			X	JP

White - Anaheim Office • Goldenrod - New Hampshire Office • Canary - Packing Slip 22

PMC

CERTIFICATE OF CONFORMANCE

TO Omega Point Labs
16015 Shady Falls Rd.
Elmendorf, TX 78112

DATE 8-15-94
CUSTOMER PO# 1140Q
JOB # TC-6229

PMC P/N	QUANTITY	CUSTOMER P/N	SPEC
T-1 (Plug)	100		
T-2 (Jack)	100		

ADDITIONAL INFORMATION (IF REQUIRED):

This is to certify the materials furnished on this shipment are in conformance with the requirements, specifications, and drawings of the above referenced customer purchase order. Inspection and test records are on file and available for customer review.

Quality Assurance Inspector 8/15/94

Quality Assurance Manager

1170 N. GILBERT STREET
ANAHEIM, CA.
92801
(714) 563-0332
FAX (800) 753-5595

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-87; 97257-260
RECEIVED FROM PMC
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1417 - 11960
DATE RECEIVED 8-22-94
DATE INSPECTED 8-22-94
INSPECTED BY: CBatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
TC Wire	1123Q	40K	37K	0	KK-TA/TA-24	Y	Y	Good	None	X			LOT #'s: 105966-972; 106460; 106837-839 Order is considered complete within 10% of original amount CH

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Janice Welch
PMC Corporation
57 Harvey Road

Londonderry NH 03053

PO Number: 1123-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
6/28/94	UPS Blue Label	MS-1123Q-97185	7-11-94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Teflon Coated Thermocouple Wire KK-TA/TA-24	40,000		
2.	Calibration data	1		

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Humphrey
Date 6/28/94

Special Instructions

Include Certificates of Conformance to ASTM E230-93 Special Limits of Error and Calibration data required to 200°F, 400°F, 600°F, 800°F and 1000°F traceable to NIST

Ordered By: Constance A. Humphrey

Project #: ~~OPL Equipment~~ CH
TVA/TSI
Proj # 97185

Recvd 8/22/94 12,550ft
8/23/94 6,175ft.
Recvd 9/8/94 5,000ft
9/20/94 13,856'

Total	
Shipping	
Tax	
Invoice Total	

OMEGA POINT LABORATORIES
MATERIAL PURCHASING SPECIFICATIONS

SPECIFICATION NUMBER: MS--11230-97185

VENDOR: PMC

VENDOR PRODUCT NUMBER: KK-TA/TA-24

PRODUCT DESCRIPTION: Teflon Coated Thermocouple Wire

Material as defined above shall be provided in accordance with the Critical Characteristics as listed below:

TEST	DESCRIPTION	SPECIFICATION RANGES MINIMUM	MAXIMUM
ASTM E230-93	Std. Temperature-EMF Tables for Standardized Thermocouples	Temp. Range +32°F to +545°F Special Limits of Error ±2°F	

QUALITY ASSURANCE REQUIREMENTS

1.0 QUALITY PROGRAM

Seller shall furnish this item in accordance with Quality Program approved by Omega Point Laboratories. Material specified herein is to be produced and tested in accordance with vendor quality standards, methods, guidelines and manufacturing instructions as defined in that Quality Program.

2.0 QUALITY VERIFICATION

Receiving Inspection - Buyer shall inspect items upon receipt to verify compliance with purchase order requirements. Rejected items shall be returned at seller's expense.

Document Review - Final acceptance shall be based on satisfactory review of required certifications and/or supporting documents.

3.0 CERTIFICATIONS

3.1 Certification that supplied materials comply with this material specification and listing Critical Characteristics shall be provided. This certificates shall reference Omega Point Labs purchase order number and specification number for all material furnished under this specification. This Certification shall be signed by the appropriate vendor representative.

3.2 The material furnished under this specification shall be a product that complies with the following:

3.2.1 Has been tested and passed all tests specified herein.

3.2.2 Manufacturing methods for this material have not changed. Vendor will advise Omega Point in writing of any changes in the manufacturing prior to material manufacture.

3.2.3 Raw materials used in the manufacture of this material meet Vendor specifications.

4.0 AUDITS/RIGHTS OF ACCESS

Omega Point Labs reserves the right to audit your facility to verify compliance with the purchase order and specification requirements with a minimum ten (10) day notice.

5.0 IDENTIFICATION

Seller shall identify each item with a unique traceability number by physical marking or tagging. These identification numbers shall be traceable to certifications and packing lists.

6.0 PACKING/SHIPPING

All materials shall be packaged in air tight, moisture free containers and shall be free of foreign substances such as dirt, oil, grease or other deleterious materials.

All materials shall be suitably crated, boxed or otherwise prepared for shipment to prevent damage during handling and shipping.

QUALITY ASSURANCE APPROVAL

C Humphrey

Title Quality Assurance Mgr.

Date 6/28/94

CH

AVL Verification

Class: B

OMEGA POINT LABORATORIES

OMEGA POINT LABORATORIES
COMMERCIAL GRADE DEDICATION

PURCHASING SPEC. NO: MS-1123Q-97185

PRODUCT: Thermocouple Wire

MANUFACTURER: PMC Corporation
57 Harvey Road
Londonderry, NH 03053

SUPPLIER: (same)
ADDRESS:
CITY:
STATE/ZIP:
PHONE: (603) 432-9473

TECHNICAL EVALUATION

DESCRIPTION: Teflon Coated Thermocouple Wire

DOES IT PERFORM SAFETY FUNCTION? YES:
Material testing and equipment calibration

DOES ITEM MEET CRITERIA OF CGI DEFINITION? Yes

Item meets all three criteria of CGI listed below:

a) not subject to design or specification requirements that are unique to nuclear facilities; and

b) used in applications other than nuclear facilities; and

c) is ordered from manufacturer or supplier on the basis of specifications set forth in the manufacturers published product description.

TECHNICAL EVALUATION PERFORMED BY:

Project Manager
Date 6/28/94

VERIFIED BY:

C Humphrey
Q/A Manager
Date 6/28/94

PRODUCT: Teflon Coated Thermocouple Wire

SPEC NO: KK-TA/TA-24

IDENTIFICATION OF CRITICAL CHARACTERISTICS:

TEST	DESCRIPTION	SPECIFICATION RANGES MINIMUM	MAXIMUM
ASTM E230-93	Std. Temperature-EMF Tables for Standardized Thermocouples	Temp. Range +32°F to +545°F Special Limits of Error ±2°F	

IDENTIFICATION OF CRITICAL CHARACTERISTICS PERFORMED BY:

PROJECT MANAGER
DATE 6/28/94

VERIFIED BY:

C. Humphrey
Q/A MANAGER
DATE 6/28/94

PRODUCT: KK-TA/TA-24 Thermocouple Wire

SPEC NO: MS-1123Q-97185

ACCEPTANCE METHOD:

METHOD

Source Verification

Performance Record

Purchase order to vendor includes the Omega Point Material Specification listing critical characteristics of CGI material.

All shipments to include appropriate Certification documents listing all critical characteristics.

Material receiving shall include verification of Compliance Report with prescribed critical characteristics. Copies of Compliance Report and verification to be attached to the receiving report.

ACCEPTANCE METHOD DETERMINATION BY:

C Humphrey

DATE: 6/28/94

PFA Insulated Thermocouple Wire

PRODUCT CODE: TA/TA

Our customers have grown to expect only the highest quality products from PMC. We are continuously committed to meet the specific needs of industry and our customers. This construction includes Teflon* PFA insulataion extruded on the single conductors which are then laid parallel and jacketed with Teflon PFA.

Teflon PFA (perfluoroalkoxy) was released in 1972 by Dupont. It possesses similar properties of the other Teflon products such as outstanding electrical characteristics, resistance to virtually all chemicals and excellent flame resistance.

PFA is a true thermoplastic material extrudable by conventional means, and available in long continuous lengths. This construction provides flexibility and toughness with stress crack resistance, resistance to weather, non-aging characterisics, and low coefficient of friction for ease of pulling through conduit.

Like TFE, suggested upper continuous temperature is 500°F (260°C), however, it does not have TFE's solder iron resistance.

The thermocouple grade products shown are used to form temperature sensors and the extension grade products become the interconnecting link in the temperature sensing system.

You will find our qualified sales and engineering staff eager to assist in selecting a design to meet the requirements of your specific application. Variations of this construction are available upon request, including aluminum Mylar* to reduce noise problems found in so many of today's plants.

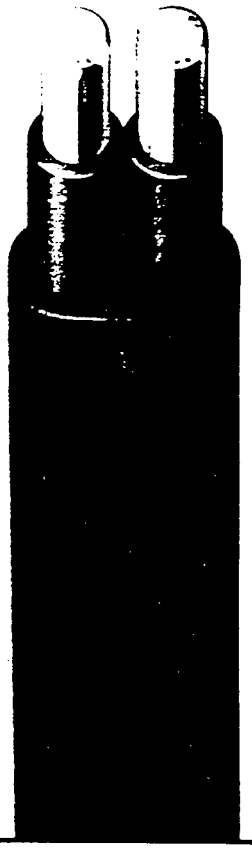
Typical applications include aircraft and automotive engine testing, rapid transit cables, and down hole cable in the oil industry.

*Registered trademark of E.I. DuPont Inc.

Calibrated conductors for high system accuracy

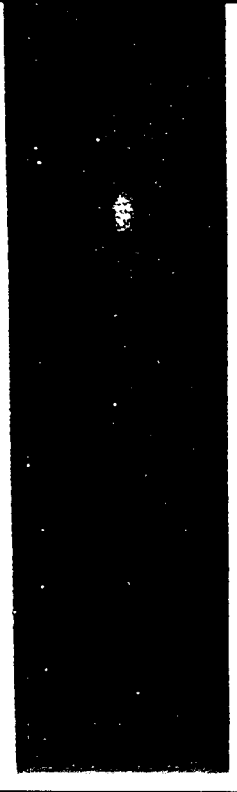
500°F (260°C) PFA insulation for improved electrical properties and high temperature applications

500°F (260°C) PFA jacket for chemical inertness to solvents, acids and oils



GRADE OF WIRE	GAUGE SIZE	WIRE TYPE	PART NUMBERS				
			TYPE J	TYPE K	TYPE T	TYPE E	TYPE N
THERMOCOUPLE	20	SOLID	J-TA/TA-20	K-TA/TA-20	T-TA/TA-20	E-TA/TA-20	N-TA/TA-20
THERMOCOUPLE	24	SOLID	J-TA/TA-24	K-TA/TA-24	T-TA/TA-24	E-TA/TA-24	N-TA/TA-24
THERMOCOUPLE	30	SOLID	J-TA/TA-30	K-TA/TA-30	T-TA/TA-30	E-TA/TA-30	N-TA/TA-30

The above part numbers represent the more popular constructions. However, other designs are available upon request.



PMC CORPORATION
57 Harvey Road
Londonderry, NH
03053

Tel. (603) 432-9473
FAX (603) 432-0435

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Color code & initial calibration tolerances for thermocouple wire

THERMOCOUPLE TYPE		COLOR CODE		INITIAL CALIBRATION TOLERANCES		
WIRE ALLOYS	ANSI SYMBOL	+/- INDIVIDUAL	JACKET	TEMPERATURE RANGE	STANDARD LIMITS	SPECIAL LIMITS
*Iron (+) vs. Constantan™ (-)	J	WHITE/RED	BROWN	+ 32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +1400°F (+750°C)	± 4°F (2.2°C) ± .75%	± 2°F (1.1°C) ± .4%
Chromel™ (+) vs. *Alumel™ (-)	K	YELLOW/RED	BROWN	-330°F (-200°C) to -165°F (-110°C) -165°F (-110°C) to +32°F (0°C) +32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +2300°F (+1250°C)	± 2% ± 4°F (2.2°C) ± 4°F (2.2°C) ± .75%	± 2°F (1.1°C) ± .4%
Copper (+) vs. Constantan™ (-)	T	BLUE/RED	BROWN	- 330°F (-200°C) to -85°F (-65°C) -85°F (-65°C) to +270°F (+130°C) +270°F (+130°C) to +660°F (+350°C)	± 1.5% ±1.8°F (1°C) ± .75%	± .8% ± .9°F (.5°C) ± .4%
Chromel ™ (+) vs. Constantan ™ (-)	E	PURPLE/RED	BROWN	-330°F (-200°C) to -270°F (-170°C) -270°F (-170°C) to +480°F (+250°C) +480°F (+250°C) to +640°F (+340°C) +640°F (+340°C) to +1600°F (+900°C)	±1% ±3°F (1.7°C) ±3°F (1.7°C) ± .5%	± 1.8°F (1°C) ± 1.8° F (1°C) ± .4% ± .4%
Nicrosil™ (+) vs. Nisil™ (-)	N	ORANGE/RED	BROWN	+ 32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +2300°F (+1250°C)	± 4°F (2.2°C) ± .75%	± 2° F(1.1°C) ± .4%

Color code and initial calibration tolerances for extension wire

*Iron vs. Constantan™	JX	WHITE/RED	BLACK	+ 32°F (0°C) to +400°F (+200°C)	± 4°F (2.2°C)	± 2°F (1.1°C)
Chromel™ vs. *Alumel™	KX	YELLOW/RED	YELLOW	+32°F (0°C) to +400°F (+200°C)	± 4°F (2.2°C)	± 2°F (1.1°C)
Copper vs. Constantan™	TX	BLUE/RED	BLUE	-75°F (-60°C) to +210°F (+100°C)	± 2°F (1.1° C)	± 1°F (.5°C)
Chromel™ vs. Constantan™	EX	PURPLE/RED	PURPLE	+32°F (0°C) to +400°F (+200°C)	± 3°F (1.7°C)	± 2°F (1.1°C)
Nicrosil™ vs. Nisil™	NX	ORANGE/RED	ORANGE	+32°F (0°C) to +400°F (+200°C)	± 4°F (2.2°C)	± 2°F (1.1°C)
Copper vs. Copper Alloy	SX RX	BLACK/RED	GREEN	+75°F (+25°C) to +400°F (+200°C)	± 12°F (7°C)	

* Magnetic
™Trade Mark, Hoskins Mfg. Co.

NOTE – Percent limits apply directly to temperatures in °C units, but for °F equivalents are applied to the numbers of °F above or below the ice point (+32°F). (i.e., Limit (°F) = (Temp. °F – 32°F) X Percentage)

Thermocouple wire cannot be expected to meet the limits of error at temperatures below the ice point unless specified at time of purchase.

TA/TA physical properties

INSULATION CHARACTERISTICS	INSULATION	JACKET
SPECIFIC GRAVITY	2.15	2.15
DUROMETER HARDNESS	55	55
TENSILE STRENGTH p.s.i. (min.)	4000 p.s.i.	4000 p.s.i.
ELONGATION %(min.)	300%	300%
MINIMUM BEND RADIUS	5 X O.D.	10 X O.D.
ABRASION RESISTANCE	VERY GOOD	VERY GOOD
CUT THROUGH RESISTANCE	GOOD	GOOD
MOISTURE RESISTANCE	EXCELLENT	EXCELLENT
SOLDER IRON RESISTANCE	VERY GOOD	VERY GOOD
SERVICE TEMPERATURE	500°F(260°C) CONTINUOUS 550°F(288°C) SINGLE EXPOSURE	500°F(260°C) CONTINUOUS 550°F(288°C) SINGLE EXPOSURE
FLAME TEST	NON-FLAMMABLE	NON-FLAMMABLE

GAUGE SIZE	NOMINAL INSULATION WALL (INCHES)	NOMINAL JACKET WALL (INCHES)	NOMINAL DIAMETER (INCHES)	APPROX. SHIP. WEIGHT LBS. PER 1000 FT
20	.008	.010	.068 X .116	12
24	.008	.010	.056 X .092	7
30	.004	.006	.030 X .048	2

PRICING POLICY > Shipments will be invoiced at PMC's prices in effect at time of shipment. Quotations are given with an escalation clause and prices, terms, and conditions are subject to change without prior notice. PMC will, however, make every attempt to hold to current quoted prices. All prices quoted are in United States currency, and shall be subject to correction for errors. Unless otherwise stated in writing to PMC.

REELS, SPOOLS & COILS > All shipments, unless specified otherwise by PMC, are made on non-returnable reels, spools or coils in one continuous length.

SHORTAGES & RETURNS > All claims for shortage or incorrect material must be made within 10 days after receipt of the goods to which such claim pertains. Goods may only be returned for credit within 1 month of the date of authorization. Goods that are special in any way shall not be returned to PMC. Material returned for any reason, without written authorization will be refused and returned at shipper's expense. A return request must be processed through our Londonderry, N.H. sales office.

TOLERANCES > Due to allowances in manufacturing processes for wire, cable and similar products, PMC reserves the right to ship a variation of ± 10% from the quantity of such goods ordered. Physical tolerances shown are nominal. Shipping weights are an average of all types of conductors and are listed for estimating only. These weights can vary substantially due to different types of spools, reels and/or conductors.

The material contained in this document is presented in good faith and believed to be reliable and accurate. However, because testing conditions may vary and material quality or information that may be provided in whole or part by others may be beyond our control, no warranty, expressed or implied, is given and PMC Corporation can assume no liability for results obtained or damages incurred through the application of the data tests presented. NOTE: PMC reserves the right to substitute an equal product on all registered trademark items.

PMC CORPORATION
57 HARVEY ROAD, LONDONDERRY, N.H. 03053 • (603) 432-WIRE
SPECIALIZING IN WIRE, CABLES & TEMPERATURE

SOLD TO

OMEGA POINT LABS, INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

SHIP TO

OMEGA POINT LABS, IN
16015 SHADY FALLS RO
ELMENDORF, TX 78

78238

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG001	60	50	60	18794

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP	CODE
11830			1. MFT 5. METERS 2. CFT 6. FEET 3. POUNDS 7. LOT 4. EACH NET 8. OTHER

SHIP VIA	F.O.B.	TERMS
UPS BLUE	LONDONDERRY, NH	

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QUANTITY SHIPPED
1	20000.00	KK-TG/TG-24 REF. MS11230-97185 SCHED. SHIP 8/5/94	18,705'
2	20000.00	KK-TG/TG-24 REF. MS11230-97185 SCHED. SHIP 8/31/94	
3	1.00	CALIBRATION AT 200, 400, 600, 800 AND 1000°F (7) CAL DATA REQUIRED	

UNIT PRICES ARE BASED ON COPPER AT $ lb., SILVER AT $ /TROY OZ. HOWEVER UNIT PRICES INVOICED WILL BE BASED ON MATERIAL COST ON DATE OF SHIPMENT.

SPECIAL INSTRUCTIONS:

UPS SDA

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8/16/94	—	4	129#	✓		✓		

PACKING SLIP

PMC CORPORATION
57 HARVEY ROAD, LONDONDERRY, N.H. 03053 • (603) 432-WIRE

SPECIALIZING IN WIRE, CABLES & TEMPERATURE

SOLD TO

OMEGA POINT LABS, INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

78238

SHIP TO

OMEGA POINT LABS, INC
16015 SHADY FALLS ROA[illegible]
ELMENDORF, TX 781[illegible]

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG001	60	60	00	[illegible]

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP
11120		

SHIP VIA	F.O.B.	TERMS
UPS BLUE	LONDONDERRY, NH	NET 10

CODE
1. MFT
2. CFT
3. POUNDS
4. EACH NET
5. METERS
6. FEET
7. LOT
8. OTHER

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QUANTITY SHIPPED
2	20000.00	KK-TA(T)-24 REF. MC11230-27135 SCHED. SHIP 8/31/94	5000
3	1.00	CALIBRATION AT 200, 400, 600, 800, AND 1000°F I/C CAL DATA REQUIRED	

UNIT PRICES ARE BASED ON COPPER AT $ /lb., SILVER AT $ /TROY OZ. HOWEVER UNIT PRICES INVOICED WILL BE BAS[ED] [O]N MATERIAL COST ON DATE OF SHIPMENT.

SPECIAL INSTRUCTIONS: UPS Blue

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8-21-94		1	34	✓		✓		[illegible]

PACKING SLIP

475

PMC CORPORATION
57 HARVEY ROAD, LONDONDERRY, N.H. 03053 • (603) 432-WIRE
SPECIALIZING IN WIRE, CABLES & TEMPERATURE

SOLD TO

OMEGA POINT LABS, INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

78238

SHIP TO

OMEGA POINT LABS, INC
16015 SHADY FALLS RD.
ELMENDORF, TX 7811

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG001	60	50	40	13774

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP	CODE
11030			1. MFT 5 METERS 2. CFT 6 FEET 3. POUNDS 7 LOT 4. EACH NET 8 OTHER

SHIP VIA	F.O.B.	TERMS
UPS BLUE	LONDONDERRY, NH	NET 15

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QUANTITY SHIPPED
	15000.00	KK-TA TP-24 REF. MS11830-97185	13856
3	1.00	CALIBRATION AT 300, 400, 500, 800 AND 1000°F I/O CAL DATA REQUIRED	1

UNIT PRICES ARE BASED ON COPPER AT $ /lb., SILVER AT $ /TROY OZ. HOWEVER UNIT PRICES INVOICED WILL BE BASED ON MATERIAL COST ON DATE OF SHIPMENT.

AL INSTRUCTIONS:

UPS BLUE

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
7/29/94	—	2	93	✓			✓	

PACKING SLIP

PMC

CERTIFICATE OF CONFORMANCE

TO OMEGA POINT LABS INC.
16015 SHADY FALLS RD.
ELMENDORF, TX 78112

DATE 8/15/94
CUSTOMER PO# 11230
JOB # 18794

PMC P/N	QUANTITY	CUSTOMER P/N	SPEC
KK-TA/TA-24	18,705'		MS11230-97185

THE FOLLOWING WIRE SPOOLS HAVE BEEN MANUFACTURED FROM BARE WIRE SPOOL #105966, REEL NOS. 20752, 20753; SPOOL NOS. 105967, 105968, 105969, 105970, 105971 AND 105972, REEL NOS. 18242, 17623.

ADDITIONAL INFORMATION (IF REQUIRED):

SPOOL NO.	IN ERROR 200°F	IN ERROR 400°F	IN ERROR 600°F	IN ERROR 800°F	IN ERROR 1000°F
105966 - INSIDE	-0.5	+0.4	-1.9	-2.2	-0.8
105966 - OUTSIDE	+0.1	+1.1	-1.0	-1.1	+0.4
105967 - INSIDE	-0.2	0	-2.2	-2.0	+0.4
105968					
105969					
105970					
105971					
105972 - OUTSIDE	+0.1	+0.7	-1.2	-0.9	+1.4

ALL SPOOLS ARE TAKEN FROM LARGE MASTER SPOOLS IN ROTATION. CALIBRATION SHOWS BEGINNING OF FIRST SPOOL AND END OF LAST SPOOL.
CALIBRATION RESULTS ARE TRACEABLE TO NIST AND MEET SPECIAL LIMITS OF ERROR AS DEFINED IN ASTM-E-230 AND COMPLY TO MIL STD. 45662.

This is to certify the materials furnished on this shipment are in conformance with the requirements, specifications, and drawings of the above referenced customer purchase order. Inspection and test records are on file and available for customer review.

Quality Assurance Inspector

Quality Assurance Manager

57 HARVEY ROAD
LONDONDERRY, NH
03053
(603) 432-WIRE
FAX (603) 432-0435

PMC

CERTIFICATE OF CONFORMANCE

TO OMEGA POINT LABS INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

DATE 8/31/94
CUSTOMER PO# 11230
JOB # 18794-2

PMC P/N	QUANTITY	CUSTOMER P/N	SPEC
KK-TA/TA-24	5000'		MS-1123Q-97185

THE FOLLOWING WIRE SPOOL HAS BEEN MANUFACTURED FROM BARE WIRE REEL NOS. (POS.) 18554 AND (NEG.) 18555

ADDITIONAL INFORMATION (IF REQUIRED):

SPOOL NO.	IN ERROR 200°	IN ERROR 400°	IN ERROR 600°	IN ERROR 800°	IN ERROR 1000°
106460 - INSIDE	+1.0	-0.1	-2.1	-2.2	+0.2
106460 - OUTSIDE	+1.0	-0.2	-2.0	-2.0	+0.3

CALIBRATION SHOWS THE BEGINNING AND END ON SPOOL 106460.

CALIBRATION RESULTS ARE TRACEABLE TO NIST AND MEET SPECIAL LIMITS OF ERROR AS DEFINED IN ASTM-E-230 AND COMPLY TO MIL STD 45662.

This is to certify the materials furnished on this shipment are in conformance with the requirements, specifications, and drawings of the above referenced customer purchase order. Inspection and test records are on file and available for customer review.

John Robinson
Quality Assurance Inspector

Quality Assurance Manager

57 HARVEY ROAD
LONDONDERRY, NH
03053
(603) 432-WIRE
FAX (603) 432-0435

PMC

CERTIFICATE OF CONFORMANCE

TO OMEGA POINT LABS
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

DATE 9/15/94
CUSTOMER PO# 11230
JOB # 18794-2

PMC P/N	QUANTITY	CUSTOMER P/N	SPEC
KK-TA/TA-24	13,856'		MS11230-97185

THE FOLLOWING WIRE SPOOLS 106837, 106838 AND 106839 HAVE BEEN MANUFACTURED FROM BARE WIRE REELS 18554 (POSITIVE) AND 18555 (NEGATIVE).

ADDITIONAL INFORMATION (IF REQUIRED):

SPOOL NOS.	IN ERROR 200°F	IN ERROR 400°F	IN ERROR 600°F	IN ERROR 800°F	IN ERROR 1000°F
106837	+0.3	-0.5	-2.4	-2.3	-0.1
106838					
106839	+0.1	-0.4	-2.3	-1.9	-0.4

ALL SPOOLS ARE TAKEN FROM LARGE MASTER SPOOLS IN ROTATION. CALIBRATION SHOWS THE BEGINNING OF FIRST SPOOL AND END OF LAST SPOOL. CALIBRATION RESULTS ARE TRACEABLE TO NIST AND MEET SPECIAL LIMITS OF ERROR AS DEFINED IN ASTM-E-230 AND COMPLY TO MIL STD-45662.

This is to certify the materials furnished on this shipment are in conformance with the requirements, specifications, and drawings of the above referenced customer purchase order. Inspection and test records are on file and available for customer review.

John Robinson
Quality Assurance Inspector

Thomas M. Collins
Quality Assurance Manager

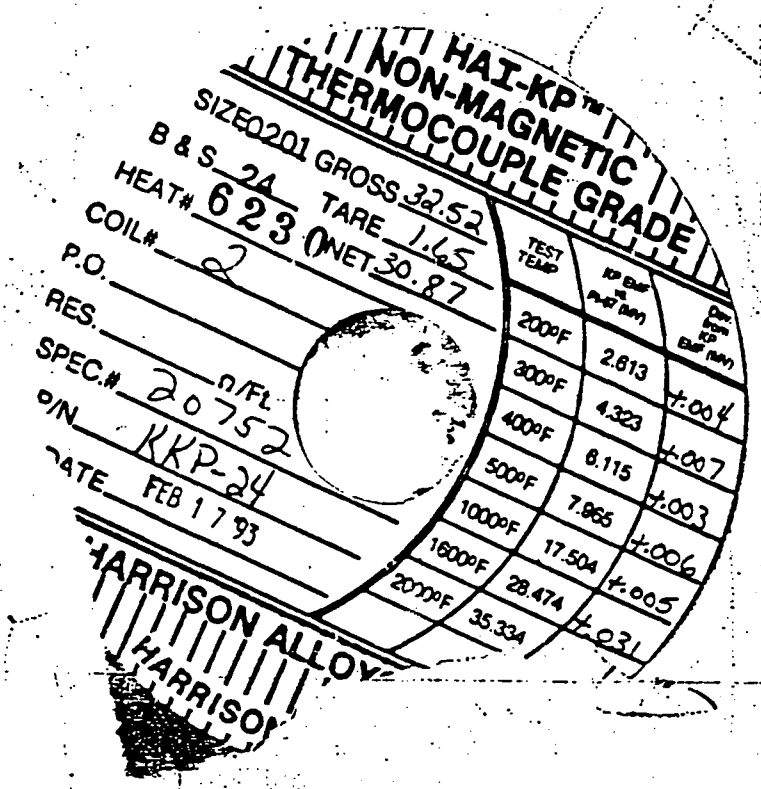
57 HARVEY ROAD
LONDONDERRY, NH
03053
(603) 432-WIRE
FAX (603) 432-0435

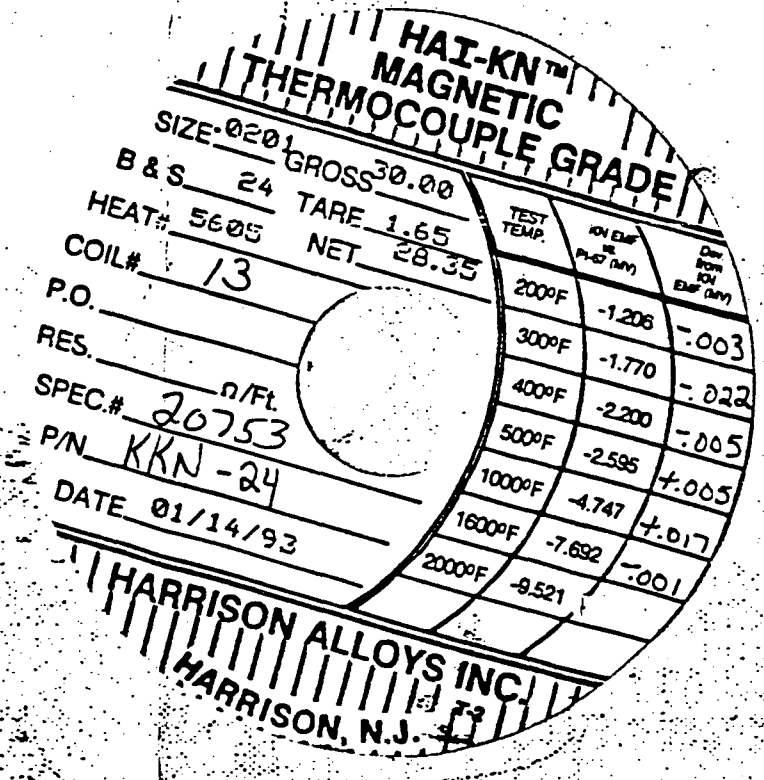
good KK material to Special Limitson

Run # 6518

1-13-94

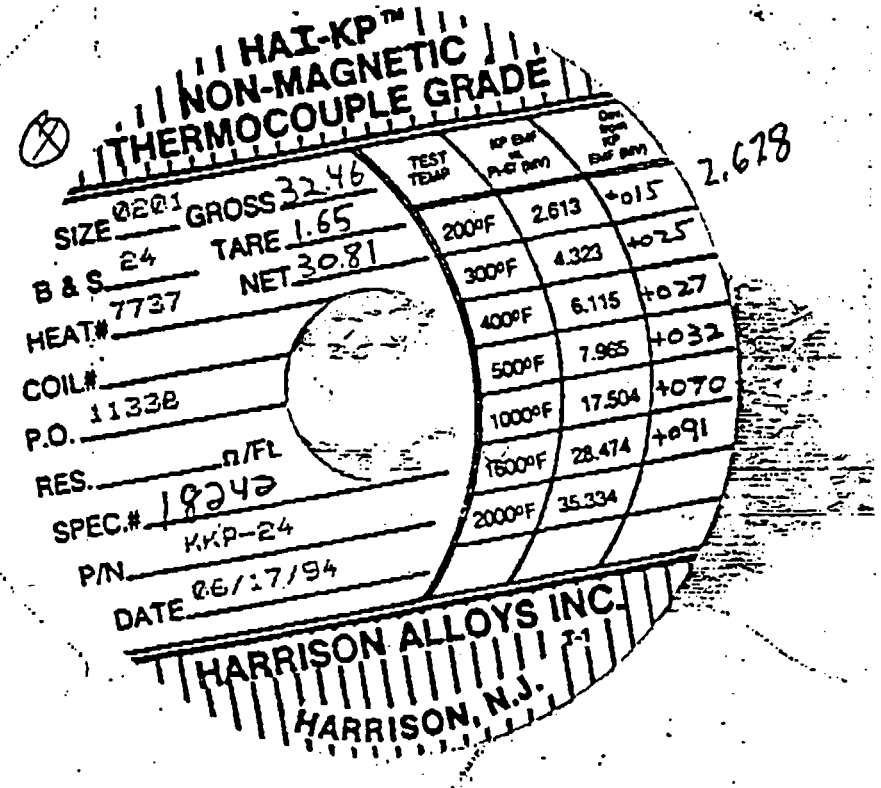
Wire used from Spool 105-946.





Bare Wire Reel # 18242 used on Spool #5 480

105-967, 105-968, 105-969, 105-970, 105-971 & 105-972



2.678

481

Bare Wire Reel # 17623 Used
on Spool #'s 105-967, 105-968, 105-969
105-970, 105-971 & 105-972

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 33.31
B & S 24 TARE 1.65
NET 31.66
HEAT# 5605
COIL# 14
P.O.
RES. Ω/Ft.
SPEC.# 17623
P/N KKN-24
DATE 01/14/93

TEST TEMP.	EMF (mV)	Dev. from KN EMF (mV)
200°F	-1.206	-.003
300°F	-1.770	-.015
400°F	-2.200	+.002
500°F	-2.595	+.014
1000°F	-4.747	+.018
1600°F	-7.692	-.008
2000°F	-9.521	

HARRISON ALLOYS INC.
HARRISON, N.J.

These Two Reels were used in The Manufacture of Spool # 106460

T.C.

HAI-KP™
NON-MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 32.64
B & S 24 TARE 1.65
HEAT# 6748 NET 30.99
COIL# 6
P.O. P11338REPL
RES. _____ Ω/Ft.
SPEC.# 18554
P/N KKP-24
DATE 07/27/94

TEST TEMP	KP EMF vs. Pt-67 (MV)	Dev. from KP EMF (MV)
200°F	2.613	-.001
300°F	4.323	-.003
400°F	6.115	-.005
500°F	7.965	-.013
1000°F	17.504	-.026
1600°F	28.474	-.002
2000°F	35.334	-.125

HARRISON ALLOYS INC.
HARRISON, N.J.

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 31.64
B & S 24 TARE 1.65
HEAT# 2975 NET 29.99
COIL# 2
P.O. P11338 REPL
RES. _____ Ω/Ft.
SPEC.# 18555
P/N KKN-24
DATE 05/15/94

TEST TEMP.	KN EMF vs. Pt-67 (MV)	Dev. from KN EMF (MV)
200°F	-1.206	-.003
300°F	-1.770	-.013
400°F	-2.200	-.062
500°F	-2.595	+.002
1000°F	-4.747	-.036
1600°F	-7.692	-.101
2000°F	-9.521	-.180

HARRISON ALLOYS INC.
HARRISON, N.J.

HAI-KP™
NON-MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 32.64
B & S 24 TARE 1.65
HEAT# 6748 NET 30.99
COIL# 6
P.O. P11338REPL
RES. _____ Ω/Ft.
SPEC.# 18554
P/N KKP-24
DATE 07/27/94

TEST TEMP	KP EMF vs Pt-67 (MV)	Dev. from KP EMF (MV)
200°F	2.613	-.001
300°F	4.323	-.003
400°F	6.115	-.005
500°F	7.965	-.013
1000°F	17.504	-.026
1600°F	28.474	-.002
2000°F	35.334	-.125

HARRISON ALLOYS INC.
HARRISON, N.J.

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 31.64
B & S 24 TARE 1.65
HEAT# 2975 NET 29.99
COIL# 2
P.O. P11338 REPL
RES. _____ Ω/Ft.
SPEC.# 18555
P/N KKN-24
DATE 05/15/94

TEST TEMP.	KN EMF vs Pt-67 (MV)	Dev. from KN EMF (MV)
200°F	-1.206	-.003
300°F	-1.770	-.013
400°F	-2.200	-.062
500°F	-2.595	+.002
1000°F	-4.747	-.036
1600°F	-7.692	-.101
2000°F	-9.521	-.180

HARRISON ALLOYS INC.
HARRISON, N.J.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97257-97260
RECEIVED FROM PMC
PROJECT LOCATION Omega Point Labs

REPORT NUMBER H35-11960
DATE RECEIVED 9-7-94
DATE INSPECTED 9-8-94
INSPECTED BY: D Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
TeWire	1139Q	12K	12K	0	KK-TA/TA-24	Y	Y	Good	None	X			Spool #'s 106461 - inside, 106462 and 106463 - outside.

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Janice Welch
PMC Corporation
57 Harvey Road

Londonderry NH 03053

PO Number:

1139-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/5/94	UPS Ground	MS-1139Q-11960	8/26/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	KK-TA/TA-24	12,000		
2.	Calibration Data	1		

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-5-94

Special Instructions

Include Certificates of Conformance to ASTM E230-93 Special Limits of Error and Calibration data required to 200°F, 400°F, 600°F, 800°F and 1000°F traceable to NIST

Ordered By: Cleda Patton

Project #: 11960

Total	
Shipping	
Tax	
Invoice Total	

PMC CORPORATION
57 HARVEY ROAD, LONDONDERRY, N.H. 03053 • (603) 432-WIRE
SPECIALIZING IN WIRE, CABLES & TEMPERATURE

SOLD TO

OMEGA POINT LABS. INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112
78208

SHIP TO

OMEGA POINT LABS, I[illegible]
16015 SHADY FALLS [illegible]
ELMENDORF, TX 78[illegible]

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
8/11/94	OMEG001	60	30	20	[illegible]

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP
11390	8/31/94	8/31/94

SHIP VIA	F.O.B.	TERMS
UPS	LONDONDERRY, NH	NET 30

CODE

1. MFT
2. CFT
3. POUNDS
4. EACH NET
5. METERS
6. FEET
7. LOT
8. OTHER

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QUANTITY SHIPPED
1	12000.00	RR-1R-TA-24 REF. MS11390-11960	12285
2	1.00	CALIBRATION AT 200, 400, 600, 800 AND 1000°F T.C CAL DATA REQUIRED	1

UNIT PRICES ARE BASED ON COPPER AT $ lb., SILVER AT $ /TROY OZ. HOWEVER UNIT PRICES INVOICED WILL BE BASED ON MATERIAL COST ON DATE OF SHIPMENT.

[illegible]AL INSTRUCTIONS:

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8-31-94	—	2	83	✓			✓	[illegible]

PACKING SLIP

PMC

CERTIFICATE OF CONFORMANCE

TO OMEGA POINT LABORATORIES INC. DATE 8/31/94

16015 SHADY FALLS ROAD CUSTOMER PO# 1139-Q

ELMENDORF, TX 78112-9784 JOB # 18959

PMC P/N	QUANTITY	CUSTOMER P/N	SPEC
KK-TA/TA-24	12,285'		MS-11390-11960

ALL OF THE FOLLOWING WIRE SPOOLS HAVE BEEN MANUFACTURED FROM BARE WIRE REEL NOS. (POS.) 18578 AND (NEG.) 18579

ADDITIONAL INFORMATION (IF REQUIRED):

SPOOL NOS.	IN ERROR 200°	IN ERROR 400°	IN ERROR 600°	IN ERROR 800°	IN ERROR 1000°
106461 - INSIDE	+0.5	-0.2	-2.4	-2.6	-0.3
106462					
106463 - OUTSIDE	+0.6	-0.1	-2.1	-2.3	-0.1

ALL SPOOLS ARE TAKEN FROM LARGE MASTER SPOOLS IN ROTATION. CALIBRATION SHOWS BEGINNING OF FIRST SPOOL AND END OF LAST SPOOL.
CALIBRATION RESULTS ARE TRACEABLE TO NIST AND MEET SPECIAL LIMITS OF ERROR AS DEFINED IN ASTM-E-230 AND COMPLIES TO MIL STD 45662.

This is to certify the materials furnished on this shipment are in conformance with the requirements, specifications, and drawings of the above referenced customer purchase order. Inspection and test records are on file and available for customer review.

John Robinson
Quality Assurance Inspector

Thomas M. Coffey
Quality Assurance Manager

57 HARVEY ROAD
LONDONDERRY, NH
03053
(603) 432-WIRE
FAX (603) 432-0435

These Two Rods were used To Manufacture Job No: 18959

T.C.

good KK.
Special Limits
8-16-94

HAI-KP™
NON-MAGNETIC
THERMOCOUPLE GRADE

SIZE #20 GROSS 31.78
B & S 24 TARE 1.65
HEAT# 2981 NET 30.13
COIL#
P.O. 11338
RES. Ω/Ft.
SPEC.# 18578
P/N KKP -24
DATE 08/09/94

TEST TEMP	KP EMF vs PLAT (MV)	DIFF FROM STD EMF (MV)
200°F	2.613	+.002
300°F	4.323	+.007
400°F	6.115	-.002
500°F	7.985	-.004
1000°F	17.504	-.004
1600°F	28.474	+.033
2000°F	35.334	

HARRISON ALLOYS INC.
HARRISON, N.J.
T-1

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE #20 GROSS 32.04
B & S 24 TARE 1.65
HEAT# 2879 NET 30.39
COIL# 1
P.O. 11338
RES. Ω/Ft.
SPEC.# 18579
P/N KKN-24
DATE 08/09/94

TEST TEMP.	KN EMF vs PLAT (MV)	DIFF FROM STD EMF (MV)
200°F	-1.206	-.003
300°F	-1.770	-.017
400°F	-2.200	-.006
500°F	-2.586	-.001
1000°F	-4.747	-.016
1600°F	-7.692	-.065
2000°F	-9.521	-.141

HARRISON ALLOYS INC.
HARRISON, N.J.
T-2

OMEGA POINT LABORATORIES
COMMERCIAL GRADE DEDICATION

PURCHASING SPEC. NO: MS-113902-11960

PRODUCT: Thermocouple Wire

MANUFACTURER: PMC Corporation
57 Harvey Road
Londonderry, NH 03053

SUPPLIER: (same)
ADDRESS:
CITY:
STATE/ZIP:
PHONE: (603) 432-9473

TECHNICAL EVALUATION

DESCRIPTION: Teflon Coated Thermocouple Wire

DOES IT PERFORM SAFETY FUNCTION? YES:
Material testing and equipment calibration

DOES ITEM MEET CRITERIA OF CGI DEFINITION? Yes

Item meets all three criteria of CGI listed below:

a) not subject to design or specification requirements that are unique to nuclear facilities; and

b) used in applications other than nuclear facilities; and

c) is ordered from manufacturer or supplier on the basis of specifications set forth in the manufacturers published product description.

TECHNICAL EVALUATION PERFORMED BY:

Project Manager
Date 8/5/94

VERIFIED BY:

C Humphrey
Q/A Manager
Date 8/5/94

PRODUCT: Teflon Coated Thermocouple Wire

SPEC NO: KK-TA/TA-24
MS-1139@-11960

IDENTIFICATION OF CRITICAL CHARACTERISTICS:

TEST	DESCRIPTION	SPECIFICATION RANGES MINIMUM	MAXIMUM
ASTM E230-93	Std. Temperature-EMF Tables for Standardized Thermocouples	Temp. Range +32°F to +545°F Special Limits of Error ±2°F	

IDENTIFICATION OF CRITICAL CHARACTERISTICS PERFORMED BY:

PROJECT MANAGER
DATE 8/5/94

VERIFIED BY:

C Humphrey
Q/A MANAGER
DATE 8/5/94

PRODUCT: KK-TA/TA-24 Thermocouple Wire

SPEC NO: MS- 11390-11960

ACCEPTANCE METHOD:

METHOD

Source Verification

Performance Record

Purchase order to vendor includes the Omega Point Material Specification listing critical characteristics of CGI material.

All shipments to include appropriate Certification documents listing all critical characteristics.

Material receiving shall include verification of Compliance Report with prescribed critical characteristics. Copies of Compliance Report and verification to be attached to the receiving report.

ACCEPTANCE METHOD DETERMINATION BY:

C Humphrey

DATE: 8/5/94

OMEGA POINT LABORATORIES
MATERIAL PURCHASING SPECIFICATIONS

SPECIFICATION NUMBER: MS-11390-11960

VENDOR: PMC

VENDOR PRODUCT NUMBER: KK-TA/TA-24

PRODUCT DESCRIPTION: Teflon Coated Thermocouple Wire

Material as defined above shall be provided in accordance with the Critical Characteristics as listed below:

TEST	DESCRIPTION	SPECIFICATION RANGES MINIMUM	MAXIMUM
ASTM E230-93	Std. Temperature-EMF Tables for Standardized Thermocouples	Temp. Range +32°F to +545°F Special Limits of Error ±2°F	

QUALITY ASSURANCE REQUIREMENTS

1.0 QUALITY PROGRAM

Seller shall furnish this item in accordance with Quality Program approved by Omega Point Laboratories. Material specified herein is to be produced and tested in accordance with vendor quality standards, methods, guidelines and manufacturing instructions as defined in that Quality Program.

2.0 QUALITY VERIFICATION

Receiving Inspection - Buyer shall inspect items upon receipt to verify compliance with purchase order requirements. Rejected items shall be returned at seller's expense.

Document Review - Final acceptance shall be based on satisfactory review of required certifications and/or supporting documents.

3.0 CERTIFICATIONS

3.1 Certification that supplied materials comply with this material specification and listing Critical Characteristics shall be provided. This certificates shall reference Omega Point Labs purchase order number and specification number for all material furnished under this specification. This Certification shall be signed by the appropriate vendor representative.

3.2 The material furnished under this specification shall be a product that complies with the following:

3.2.1 Has been tested and passed all tests specified herein.

3.2.2 Manufacturing methods for this material have not changed. Vendor will advise Omega Point in writing of any changes in the manufacturing prior to material manufacture.

3.2.3 Raw materials used in the manufacture of this material meet Vendor specifications.

4.0 AUDITS/RIGHTS OF ACCESS

Omega Point Labs reserves the right to audit your facility to verify compliance with the purchase order and specification requirements with a minimum ten (10) day notice.

5.0 IDENTIFICATION

Seller shall identify each item with a unique traceability number by physical marking or tagging. These identification numbers shall be traceable to certifications and packing lists.

6.0 PACKING/SHIPPING

All materials shall be packaged in air tight, moisture free containers and shall be free of foreign substances such as dirt, oil, grease or other deleterious materials.

All materials shall be suitably crated, boxed or otherwise prepared for shipment to prevent damage during handling and shipping.

QUALITY ASSURANCE APPROVAL

C Humphrey

Title Quality Assurance Mgr.

Date 8/5/94

CH

AVL Verification

Class: B

OMEGA POINT LABORATORIES

PFA Insulated Thermocouple Wire

PRODUCT CODE: TA/TA

Our customers have grown to expect only the highest quality products from PMC. We are continuously committed to meet the specific needs of industry and our customers. This construction includes Teflon* PFA insulataion extruded on the single conductors which are then laid parallel and jacketed with Teflon PFA.

Teflon PFA (perfluoroalkoxy) was released in 1972 by Dupont. It possesses similar properties of the other Teflon products such as outstanding electrical characteristics, resistance to virtually all chemicals and excellent flame resistance.

PFA is a true thermoplastic material extrudable by conventional means, and available in long continuous lengths. This construction provides flexibility and toughness with stress crack resistance, resistance to weather, non-aging characterisics, and low coefficient of friction for ease of pulling through conduit.

Like TFE, suggested upper continuous temperature is 500°F (260°C), however, it does not have TFE's solder iron resistance.

The thermocouple grade products shown are used to form temperature sensors and the extension grade products become the interconnecting link in the temperature sensing system.

You will find our qualified sales and engineering staff eager to assist in selecting a design to meet the requirements of your specific application. Variations of this construction are available upon request, including aluminum Mylar* to reduce noise problems found in so many of today's plants.

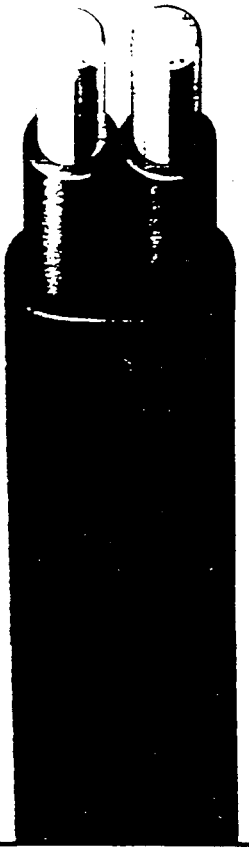
Typical applications include aircraft and automotive engine testing, rapid transit cables, and down hole cable in the oil industry.

*Registered trademark of E.I. DuPont Inc.

Calibrated conductors for high system accuracy

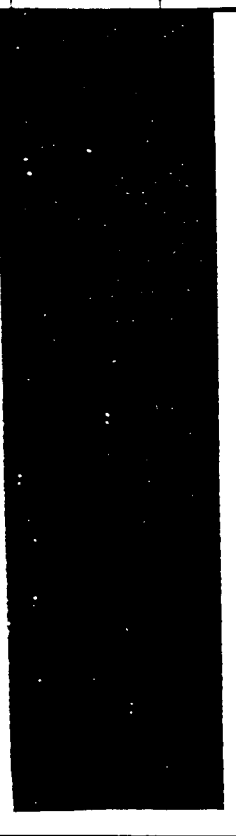
500°F (260°C) PFA insulation for improved electrical properties and high temperature applications

500°F (260°C) PFA jacket for chemical inertness to solvents, acids and oils



GRADE OF WIRE	GAUGE SIZE	WIRE TYPE	PART NUMBERS				
			TYPE J	TYPE K	TYPE T	TYPE E	TYPE N
THERMOCOUPLE	20	SOLID	J-TA/TA-20	K-TA/TA-20	T-TA/TA-20	E-TA/TA-20	N-TA/TA-20
THERMOCOUPLE	24	SOLID	J-TA/TA-24	K-TA/TA-24	T-TA/TA-24	E-TA/TA-24	N-TA/TA-24
THERMOCOUPLE	30	SOLID	J-TA/TA-30	K-TA/TA-30	T-TA/TA-30	E-TA/TA-30	N-TA/TA-30

The above part numbers represent the more popular constructions. However, other designs are available upon request.



PMC CORPORATION
57 Harvey Road
Londonderry, NH
03053

Tel. (603) 432-9473
FAX (603) 432-0435

© 1990 PMC Corporation

Color code & initial calibration tolerances for thermocouple wire

THERMOCOUPLE TYPE		COLOR CODE		INITIAL CALIBRATION TOLERANCES		
WIRE ALLOYS	ANSI SYMBOL	+/- INDIVIDUAL	JACKET	TEMPERATURE RANGE	STANDARD LIMITS	SPECIAL LIMITS
*Iron (+) vs. Constantan™ (-)	J	WHITE/RED	BROWN	+ 32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +1400°F (+750°C)	± 4°F (2.2°C) ± .75%	± 2°F (1.1°C) ± .4%
Chromel™ (+) vs. *Alumel™ (-)	K	YELLOW/RED	BROWN	-330°F (-200°C) to -165°F (-110°C) -165°F (-110°C) to +32°F (0°C) +32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +2300°F (+1250°C)	± 2% ± 4°F (2.2°C) ± 4°F (2.2°C) ± .75%	 ± 2°F (1.1°C) ± .4%
Copper (+) vs. Constantan™ (-)	T	BLUE/RED	BROWN	- 330°F (-200°C) to -85°F (-65°C) -85°F (-65°C) to +270°F (+130°C) +270°F (+130°C) to +660°F (+350°C)	± 1.5% ±1.8°F (1°C) ± .75%	± .8% ± .9°F (.5°C) ± .4%
Chromel ™ (+) vs. Constantan ™ (-)	E	PURPLE/RED	BROWN	-330°F (-200°C) to -270°F (-170°C) -270°F (-170°C) to +480°F (+250°C) +480°F (+250°C) to +640°F (+340°C) +640°F (+340°C) to +1600°F (+900°C)	±1% ±3°F (1.7°C) ±3°F (1.7°C) ± .5%	± 1.8°F (1°C) ± 1.8°F (1°C) ± .4% ± .4%
Nicrosil™ (+) vs. Nisil™ (-)	N	ORANGE/RED	BROWN	+ 32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +2300°F (+1250°C)	± 4°F (2.2°C) ± .75%	± 2° F(1.1°C) ± .4%

Color code and initial calibration tolerances for extension wire

*Iron vs. Constantan™	JX	WHITE/RED	BLACK	+ 32°F (0°C) to +400°F (+200°C)	± 4°F (2.2°C)	± 2°F (1.1°C)
Chromel™ vs. *Alumel™	KX	YELLOW/RED	YELLOW	+32°F (0°C) to +400°F (+200°C)	± 4°F (2.2°C)	± 2°F (1.1°C)
Copper vs. Constantan™	TX	BLUE/RED	BLUE	-75°F (-60°C) to +210°F (+100°C)	± 2°F (1.1° C)	± 1°F (.5°C)
Chromel™ vs. Constantan™	EX	PURPLE/RED	PURPLE	+32°F (0°C) to +400°F (+200°C)	± 3°F (1.7°C)	± 2°F (1.1°C)
Nicrosil™ vs. Nisil™	NX	ORANGE/RED	ORANGE	+32°F (0°C) to +400°F (+200°C)	± 4°F (2.2°C)	± 2°F (1.1°C)
Copper vs. Copper Alloy	SX RX	BLACK/RED	GREEN	+75°F (+25°C) to +400°F (+200°C)	± 12°F (7°C)	

* Magnetic
™Trade Mark, Hoskins Mfg. Co.

NOTE – Percent limits apply directly to temperatures in °C units, but for °F equivalents are applied to the numbers of °F above or below the ice point (+32°F). i.e., Limit (°F) = (Temp. °F – 32°F) X Percentage.

Thermocouple wire cannot be expected to meet the limits of error at temperatures below the ice point unless specified at time of purchase.

TA/TA physical properties

INSULATION CHARACTERISTICS	INSULATION	JACKET
SPECIFIC GRAVITY	2.15	2.15
DUROMETER HARDNESS	55	55
TENSILE STRENGTH p.s.i. (min.)	4000 p.s.i.	4000 p.s.i.
ELONGATION %(min.)	300%	300%
MINIMUM BEND RADIUS	5 X O.D.	10 X O.D.
ABRASION RESISTANCE	VERY GOOD	VERY GOOD
CUT THROUGH RESISTANCE	GOOD	GOOD
MOISTURE RESISTANCE	EXCELLENT	EXCELLENT
SOLDER IRON RESISTANCE	VERY GOOD	VERY GOOD
SERVICE TEMPERATURE	500°F(260°C) CONTINUOUS 550°F(288°C) SINGLE EXPOSURE	500°F(260°C) CONTINUOUS 550°F(288°C) SINGLE EXPOSURE
FLAME TEST	NON-FLAMMABLE	NON-FLAMMABLE

GAUGE SIZE	NOMINAL INSULATION WALL(INCHES)	NOMINAL JACKET WALL(INCHES)	NOMINAL DIAMETER (INCHES)	APPROX. SHIP. WEIGHT LBS. PER 1000 FT
20	.008	.010	.068 X .116	12
24	.008	.010	.056 X .092	7
30	.004	.006	.030 X .048	2

PRICING POLICY > Shipments will be invoiced at PMC's prices in effect at time of shipment. Quotations are given with an escalation clause and prices, terms, and conditions are subject to change without prior notice. PMC will, however, make every attempt to hold to current quoted prices. All prices quoted are in United States currency, and shall be subject to correction for errors. Unless otherwise stated in writing to PMC.

:ELS, SPOOLS & COILS > All shipments, unless specified otherwise by PMC, are made on non-returnable reels, spools or coils in one continuous length.

ES & RETURNS > All claims for shortage or incorrect material must be made within 10 days after receipt of the goods to which such claim pertains. Goods may only be returned for credit within 1 month of the date of authorization. Goods that are special in any way shall not be returned to PMC. Material returned for any reason, without written authorization will be refused and returned at shipper's expense. A return request must be processed through our Londonderry, N.H. sales office.

TOLERANCES > Due to allowances in manufacturing processes for wire, cable and similar products, PMC reserves the right to ship a variation of ±10% from the quantity of such goods ordered. Physical tolerances shown are nominal. Shipping weights are an average of all types of conductors and are listed for estimating only. These weights can vary substantially due to different types of spools, reels and/or conductors.

The material contained in this document is presented in good faith and believed to be reliable and accurate. However, because testing conditions may vary and material quality or information that may be provided in whole or part by others may be beyond our control, no warranty, expressed or implied, is given and PMC Corporation can assume no liability for results obtained or damages incurred through the application of the data tests presented. NOTE: PMC reserves the right to substitute an equal product on all registered trademark items.

Omega Point Laboratories, Inc.
16015 Shady Falls Rd..
Elmendorf, Texas 78112
800-966-5253 FAX 210-635-8101

Certificate of Calibration

Certification No.:	92021
Calibration Date:	5-23-94
Recalibration Date:	11-23-94
Manufacturer:	Omega Point Laboratories, Inc.
Model No.:	200 Channel DAU
Serial No.:	1042
Equipment Description:	200 Channel Data Acquisition System with Fluke Computer Front End and Extender Chassis
Calibration Sources:	Digicator Digital Calibrator, Model #CL-466, Serial #703297

PERFORMANCE:

Better than -0.49 / +0.84 on all 200 channels

Cailibration Performed/Approved by:

Herbert W. Stansberry II,
Fire Test Technologist

OMEGA POINT LABORATORIES

Omega Point Laboratories, Inc.

16015 Shady Falls Rd..
Elmendorf, Texas 78112
800-966-5253 FAX 210-635-8101

Certificate of Calibration

Certification No.:	92022
Calibration Date:	5-28-94
Recalibration Date:	11-28-94
Manufacturer:	Omega Point Laboratories, Inc.
Model No.:	100 Channel DAU
Serial No.:	1041
Equipment Description:	100 Channel Data Acquisition System with Fluke Computer Front End
Calibration Sources:	Digicator Digital Calibrator, Model #CL-466, Serial #703297

PERFORMANCE:

Better than -0.62 / +1.49 on all 100 channels

Cailibration Performed/Approved by:

Herbert W. Stansberry II,
Fire Test Technologist

OMEGA POINT LABORATORIES

© GOES 748

Omega Point Laboratories, Inc.

16015 Shady Falls Rd..
Elmendorf, Texas 78112
800-966-5253 FAX 210-635-8101

Certificate of Calibration

Certification No.:	92023
Calibration Date:	9-14-94
Recalibration Date:	3-14-95
Manufacturer:	Omega Point Laboratories, Inc.
Model No.:	416 Channel DAU
Serial No.:	72594-72604,72606-72614
Equipment Description:	416 Channel Data Acquisition System with TempScan 1000, 6 TempScan EXP/10 Extension Units & 13 TC/32 Cards
Calibration Sources:	Digicator Digital Calibrator, Model #CL-466, Serial #703297

PERFORMANCE:

Better than -1.21 / +1.54 on all 416 channels

Cailibration Performed/Approved by:

Herbert W. Stansberry II,
Fire Test Technologist

OMEGA POINT LABORATORIES

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME Omega Point Labs
CLIENT/PROJECT NUMBER OPL Equipment
RECEIVED FROM Rothe
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1411 . OPL
DATE RECEIVED 8-1-94
DATE INSPECTED 8-1-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	CONTD MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Digital Temp. Calibr.	1131-0	1	1	0	Serial NO 703297	Y	Y	Good	None	X			Calibration Service - Arrived in Spec. at Rothe.

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Rothe Development
4614 Sinclair Road

San Antonio TX 78222

PO Number: 1131-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/19/94	Their Truck		8-2-94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Digital Calibrator SN# 703297 - Calibration Service	1	$60.00	$60.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 7-19-94

Special Instructions

Please include Certificate of Calibration and Calibration Data Sheets

Ordered By: Cleda Patton

Project #: OPL Equipment

Total	$60.00
Shipping	
Tax	
Invoice Total	**$60.00**

EQUIPMENT DELIVERY RECEIPT

501

Rothe Development, Inc.
Metrology Services Division
[redacted] Sinclair Rd.
[redacted]ntonio, TX 78222-2099
(210)648-3131

Date: 08/01/94
Control: 556

Company: Omega Point Laboratories
Contact: Ms. Connie Humphrey
Address: 16015 Shady Falls Road
City: Elmendorf, TX 78112-9784
Phone: 635-8100

Item	W.O. #	Customer P.O.	Mfgr.	Model	Serial No.	Description
1	44184	1131-Q	Omega	CL-466-L-1	703297	Digital Temp Calibrator

[redacted]ved by:

Date:

RDI 3003

Rothe Development, Inc.

4614 SINCLAIR RD. SAN ANTONIO, TEXAS 78222-2099

210-648-3131 FAX: 210-648-4091

METROLOGY SERVICES DIVISION
PRECISION MEASUREMENT EQUIPMENT LABORATORY
TRACEABLE TO NIST

502

CHARGE # 107 CONTROL # 556 - 8477

WORK ORDER # 44184

CUSTOMER

RECEIVED FROM Omega Point Laboratories DATE 07/20/94

ADDRESS 16015 Shady Falls Road PHONE# 635-8100
Elmendorf, TX 78112-9784

CONTACT (NAME) Ms. Connie Humphrey FAX#

PURCHASE ORDER # 1131-Q

CUSTOMER COMMENTS TAXABLE 8.25%

ITEM

MFG Omega

MODEL CL-466-L-1

SERIAL # 703297

TYPE Digital Temp Calibrator

ACCES. RCVD. Power cord
Probe Handle

- [ ] REPAIR
- [ ] OPERATIONAL CHECK
- [x] CALIBRATION

CALIBRATION DATE 29 July 94

DATE DUE 29 Jan 95

CALIBRATION INTERVAL 6 mo.

- [x] RECEIVED IN SPECS.
- [ ] RECEIVED INOPERATIVE
- [ ] RECEIVED OUT OF SPECS.

CKT REF #	QTY.	MFG PART #	DESCRIPTION	COST

THIS IS NOT AN INVOICE

ROTHE TECH.	OUR P.O. #
WW	
REPAIR LABOR HRS.	SERVICE CODE
	J

PARTS TOTAL	
REPAIR LABOR	
SHIPPING	
TEAR DOWN CHARGE	
CALIBRATION	160.00
TAX	12.40
TOTAL	172.40

R #'s 20,30,208,150

COMMENTS CAL DATA PROVIDED

WORK PERFORMED:

Cal'd

EM. 74 °F

H. 34 %

SPECS: (MFG) RDI

PROCEDURE: (MFG) RDI OTHER

RDI 2002

SHIP VIA: _____ DATE: _____ RECEIVED BY: _____

Rothe Development Inc.

Metrology Services Division

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 210-648-3131 FAX 210-648-4091

Certificate of Calibration

\# 35555

CAL DATE: 07/29/94

DUE DATE: 01/29/95

ISSUED TO: Omega Point Laboratories
16015 Shady Falls Road
Elmendorf, TX 78112-9784
635-8100

CONTROL: 556 - 8477

SPECIFICATIONS: MFG
PROCEDURE: MFG
WORK ORDER #: 44184
CUSTOMER PO #: 1131-Q

MFG Omega

MODEL CL-466-L-1

SERIAL # 703297

TYPE Digital Temp Calibrator

RECEIVED IN-SPECS [x]
OUT-OF-SPECS [ ]

All Calibration measurements performed at ROTHE DEVELOPMENT INC. METROLOGY SERVICES meet the requirements of MIL-STD-45662A, and are traceable to the National Institute of Standards and Technology through Primary NIST Calibration or Secondary Calibration performed by other Metrological facilities. Ambient conditions: Temperature 74oF , Relative Humidity 34%

Test Report Number and Calibration Standards Used

Ref #	Model #	Mfgr	Serial #	Description	Cal Date	Int	Cal Due
TR 20	5700A	FLUKE	4605002	CALIBRATOR	05/25/94	3	08/25/94
TR 30	3458A	HP	2823A01926	DMM	05/25/94	3	08/25/94
TR 208	PT138P	Logan	9424-3	TEMPERATURE PROBE	06/14/94	12	06/14/95
TR 150	TRC-III	OMEGA	41007	ICE POINT REFERENCE	11/02/93	12	11/02/94

Test Report Numbers

DCV FLUKE CERT# DH70
ACV FLUKE CERT# DP30
[redacted]NIST TEST# 250839
[redacted]NIST TEST# 251316
Hz WWVB Transmission

INSPECTED BY Jose A Mendoza
COMMENTS:

RDI 1001

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA : OMEGA CL-466

CUSTOMER: Omega Point Laboratories DATE: 29 July 94

WORK ORDER: 44184 TECH: 11

SERIAL: 703297 INST NO: 8477

CAL DATA TAKEN

INCOMING ✓

OUTGOING ✓

CONDITION

IN TOLERANCE ✓

OUT OF TOLERANCE

TYPE J	DEG F	READING	TOL
-5.760	-200	-199.7	+/- .6
-3.492	-100	-99.8	+/- .6
0.000	32	32.1	+/- .6
1.942	100	100.1	+/- .6
7.947	300	300.0	+/- .6
14.108	500	500.0	+/- .6
21.785	750	750.0	+/- .6
29.515	1000	1000.0	+/- .6
37.688	1250	1250.0	+/- .6
46.503	1500	1500.0	+/- .6
53.525	1700	1700.0	+/- .6

	DEG C	READING	TOL
-4.632	-100	-99.8	+/- .5
0.000	0	.0	+/- .5
5.268	100	100.0	+/- .5
16.325	300	299.9	+/- .5
33.096	600	599.9	+/- .5
51.875	900	900.0	+/- .5

TYPE K	DEG F	READING	TOL
-2.699	-100	-100.0	+/- 1.2
0.000	32	32.0	+/- .8
1.520	100	100.0	+/- .8
6.092	300	299.9	+/- .8
10.560	500	499.8	+/- .8
16.349	750	749.7	+/- .8
22.251	1000	999.7	+/- .8
28.148	1250	1249.8	+/- .8
33.913	1500	1499.9	+/- .8
39.485	1750	1750.0	+/- .8
44.856	2000	2000.1	+/- .8
49.996	2250	2250.2	+/- .8
54.845	2500	2500.3	+/- .8

TYPE K	DEG C	READING	TOL
-3.553	-100	-99.6	+/- .8
0.000	0	.0	+/- .5
4.095	100	100.0	+/- .5
12.207	300	299.9	+/- .5
20.640	500	499.8	+/- .5
31.214	750	749.9	+/- .5
41.269	1000	1000.0	+/- .5
50.633	1250	1250.1	+/- .5
54.125	1350	1350.2	+/- .5

TYPE T	DEG F	READING	TOL
-5.341	-300	-300.3	+/- 1.5
-4.149	-200	-200.3	+/- 1.5
-2.581	-100	-100.3	+/- 1.5
0.000	32	31.8	+/- .6
1.518	100	99.7	+/- .6
6.647	300	299.7	+/- .6
12.572	500	499.8	+/- .6
19.095	700	699.9	+/- .6

	DEG C	READING	TOL
-5.439	-190	-190.3	+/- 1.0
-3.378	-100	-100.2	+/- 1.0
0.000	0	-.1	+/- .4
4.277	100	99.8	+/- .4
9.286	200	199.8	+/- .4
14.860	300	299.9	+/- .4
20.252	390	389.9	+/- .4

TYPE E	DEG F	READING	TOL
-8.404	-300	-299.8	+/- .7
-6.471	-200	-200.1	+/- .7
-3.976	-100	-100.1	+/- .7
0.000	32	31.9	+/- .7
2.281	100	99.8	+/- .7
9.708	300	299.7	+/- .7
17.942	500	499.8	+/- .7
28.854	750	749.8	+/- .7
40.056	1000	999.8	+/- .7
51.246	1250	1250.0	+/- .7
62.240	1500	1500.0	+/- .7
75.024	1800	1800.1	+/- .7

	DEG C	READING	TOL
-5.237	-100	-99.8	+/- .4
0.000	0	.0	+/- .4
6.317	100	99.9	+/- .4
21.033	300	299.9	+/- .4
36.999	500	499.8	+/- .4
53.110	700	699.9	+/- .4
68.783	900	900.0	+/- .4
76.358	1000	1000.0	+/- .4

MV INPUT	READING	TOL
-10	-9.99	.01% OF
0	0.00	RDG+/-2CT
10	9.99	
30	29.99	
50	49.99	
75	75.00	
100	100.00	

MA INPUT	READING	TOL
0	.000	.01% OF
5	4.999	RDG+/-2CT
10	10.000	
15	15.000	
20	20.001	

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME Omega Point Labs
CLIENT/PROJECT NUMBER OPL Equipment
RECEIVED FROM Rothe Development
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1377 . OPL
DATE RECEIVED 2-28-94
DATE INSPECTED 2-28-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Digital Calibrater	11129	1	1	—	SN# 703297	Y	Y	good	None	X			Calibration services only
Delmhorst Moisture Detector	11129	1	1	—	model BD-8 SN# 5855	Y	Y	good	None	X			

FORM
1/29/93

ORIGINAL
507

OMEGA POINT LABORATORIES
CALIBRATION DATA SHEET

DIGITAL CALIBRATOR
OMEGA ENGINEERING MODEL CL 466-L
SN# 703297

Calibration Date 2/24/94 Next Cal. Due on or before: 8/24/94

Calibration Frequency: Every six months.

Equipment to be returned to qualified facility for recalibration against suitable NBS / Mil. Std.45662 / 10 CFR 50 standards.

Sent to (for Calibration): Rothe Development
4614 Sinclair Rd.
San Antonio, TX
78222

Ship Date: 2/14/94
Return Date: 2/28/94
P.O. #: 11120

Attach calibration label to the Digital Calibrator and any supporting documentation ("As Returned" specifications) to this form.

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Rothe Development
4614 Sinclair Road

San Antonio TX 78222

PO Number: 1112-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	F.O.B.	Date Required	Terms
2/14/94	Their Truck			30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Digital Calibrater SN# 703297 - Calibration Service	1	~~$60.00~~ 160.00	~~$60.00~~ 173.20 incl. Tax
2.	Delmhorst Moisture Detector Model BD-8, SN# 5855 Calibration Service	1	~~$160.00~~ 40.00	~~$160.00~~ 43.30

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 2-14-94

Special Instructions

Certificates of Calibration traceable to NIST

Ordered By: Constance A. Humphrey
Project #: OPL Equipment

Total	~~$220.00~~
Shipping	216.50
Tax	
Invoice Total	~~$220.00~~ 216.50

EQUIPMENT DELIVERY RECEIPT

Rothe Development, Inc.
Metrology Services Division
[redacted] Sinclair Rd.
[redacted]Antonio, TX 78222-2099
(210)648-3131

Date: 02/25/94
Control: 556

Company: Omega Point Laboratories
Contact: Ms. Connie Humphrey
Address: 16015 Shady Falls Road
City: Elmendorf, TX 78112-9784
Phone: 635-8100

Item	W.O. #	Customer P.O.	Mfgr.	Model	Serial No.	Description
1	42180	1112-Q	Omega	CL-466-L-1	703297	Digital Temp Calibrator
2	42181	1112-Q	Delmhorst	BD-8	5855	Moisture Detector

[redacted]ved by:

Date:

Rothe Development, Inc.

4614 SINCLAIR RD. SAN ANTONIO, TEXAS 78222-2099

210-648-3131 FAX: 210-648-4091

METROLOGY SERVICES DIVISION
PRECISION MEASUREMENT EQUIPMENT LABORATORY
TRACEABLE TO NIST

511

CHARGE # 107 CONTROL # 556 - 8477

WORK ORDER # 42180

RECEIVED FROM Omega Point Laboratories DATE 02/14/94

ADDRESS 16015 Shady Falls Road
Elmendorf, TX 78112-9784 PHONE# 635-8100

CONTACT (NAME) Ms. Connie Humphrey FAX#

PURCHASE ORDER # 1112-Q

CUSTOMER COMMENTS TAXABLE 8.25% Before + After DATA Required

ITEM

MFG Omega

MODEL CL-466-L-1

SERIAL # 703297

TYPE Digital Temp Calibrator

ACCES. RCVD. Probe handle

- [ ] REPAIR
- [x] OPERATIONAL CHECK
- [x] CALIBRATION

CALIBRATION DATE 24FEB94

DATE DUE 24AUG94

CALIBRATION INTERVAL 6 mo.

- [x] RECEIVED IN SPECS.
- [ ] RECEIVED INOPERATIVE
- [ ] RECEIVED OUT OF SPECS.

CKT REF #	QTY.	MFG PART #	DESCRIPTION	COST

THIS IS NOT AN INVOICE

ROTHE TECH.	OUR P.O. #
WW	
REPAIR LABOR HRS.	SERVICE CODE
	J

PARTS TOTAL		
REPAIR LABOR		
SHIPPING		
TEAR DOWN CHARGE		
CALIBRATION	160.00	
TAX	13	20
TOTAL	173	20

R #'s 20, 30, 150, 243

COMMENTS CAL DATA PROVIDED

WORK PERFORMED: Optimized mV + mA functions.

Cal'd

EM. 72 °F

H. 27 %

SPECS: (MFG) RDI

PROCEDURE: (MFG) RDI OTHER

RDI 2002

SHIP VIA: _____ DATE: _____ RECEIVED BY: _____

Rothe Development Inc.

Metrology Services Division

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 210-648-3131 FAX 210-648-4091

Certificate of Calibration

33929

CAL DATE: 02/24/94

DUE DATE: 08/24/94

ISSUED TO: Omega Point Laboratories
16015 Shady Falls Road
Elmendorf, TX 78112-9784
635-8100

CONTROL: 556 - 8477

SPECIFICATIONS: MFG
PROCEDURE: MFG
WORK ORDER #: 42180
CUSTOMER PO #: 1112-Q

MFG Omega

MODEL CL-466-L-1

SERIAL # 703297

TYPE Digital Temp Calibrator

RECEIVED IN-SPECS [x]
OUT-OF-SPECS [ ]

All Calibration measurements performed at ROTHE DEVELOPMENT INC. METROLOGY SERVICES meet the requirements of MIL-STD-45662A, and are traceable to the National Institute of Standards and Technology through Primary NIST Calibration or Secondary Calibration performed by other Metrological facilities. Ambient conditions: Temperature 72oF , Relative Humidity 27% .

Test Report Number and Calibration Standards Used

Ref #	Model #	Mfgr	Serial #	Description	Cal Date	Int	Cal Due
TR 20	5700A	FLUKE	4605002	CALIBRATOR	11/26/93	3	02/26/94
TR 30	3458A	HP	2823A01926	DMM	11/26/93	3	02/26/94
TR 150	TRC-III	OMEGA	41007	ICE POINT REFERENCE	11/02/93	12	11/02/94
TR 243	138P	LOGAN	9350-1	TEMPERATURE PROBE	12/21/93	12	12/21/94

Test Report Numbers
DCV FLUKE CERT# DH70
ACV FLUKE CERT# DP30
[illegible] NIST TEST# 250839
[illegible] NIST TEST# 251316
Hz WWVB Transmission

INSPECTED BY Jose A Mendoza
COMMENTS:

ROTHE DEVELOPMENT METROLOGY SERVICES

CALIBRATION DATA : OMEGA CL-466

WORK ORDER # 42180

CUSTOMER Omega Point Labs.

SERIAL 703297

DATE 24FEB94

TECH # 11

RECEIVED IN SPECS ✓ RECEIVED OUT OF SPECS _____

RECEIVED INOPERATIVE _____

TYPE J	DEG F	INCOMING	OUTGOING	TOL
-5.760	-200	-200.0	-200.0	+/- .6
-3.492	-100	-100.0	-100.0	+/- .6
0.000	32	32.0	32.0	+/- .6
1.942	100	99.9	99.9	+/- .6
7.947	300	299.8	299.8	+/- .6
14.108	500	499.8	499.8	+/- .6
21.785	750	749.8	749.8	+/- .6
29.515	1000	999.8	999.8	+/- .6
37.688	1250	1249.8	1249.8	+/- .6
46.503	1500	1500.0	1500.0	+/- .6
53.525	1700	1700.0	1700.0	+/- .6

	DEG C	INCOMING	OUTGOING	TOL
-4.632	-100	-100.0	-100.0	+/- .5
0.000	0	.0	.0	+/- .5
5.268	100	99.9	99.9	+/- .5
16.325	300	299.8	299.8	+/- .5
33.096	600	599.8	599.8	+/- .5
51.875	900	899.9	899.9	+/- .5

TYPE K	DEG F	INCOMING	OUTGOING	TOL
-2.699	-100	-100.0	-100.0	+/- 1.2
0.000	32	32.0	32.0	+/- .8
1.520	100	100.0	100.0	+/- .8
6.092	300	299.9	299.9	+/- .8
10.560	500	499.8	499.8	+/- .8
16.349	750	749.7	749.7	+/- .8
22.251	1000	999.7	999.7	+/- .8
28.148	1250	1249.7	1249.7	+/- .8
33.913	1500	1499.8	1499.8	+/- .8
39.485	1750	1749.8	1749.8	+/- .8
44.856	2000	2000.0	2000.0	+/- .8
49.996	2250	2250.0	2250.0	+/- .8
54.845	2500	2500.0	2500.0	+/- .8

TYPE K	DEG C	INCOMING	OUTGOING	TOL
-3.553	-100	-99.6	-99.6	+/- .8
0.000	0	.0	.0	+/- .5
4.095	100	99.9	99.9	+/- .5
12.207	300	299.9	299.9	+/- .5
20.640	500	499.8	499.8	+/- .5
31.214	750	749.8	749.8	+/- .5
41.269	1000	999.9	999.9	+/- .5
50.633	1250	1250.0	1250.0	+/- .5
54.125	1350	1350.0	1350.0	+/- .5

TYPE T	DEG F	INCOMING	OUTGOING	TOL
-5.341	-300	-300.4	-300.4	+/- 1.5
-4.149	-200	-200.3	-200.3	+/- 1.5
-2.581	-100	-100.2	-100.2	+/- 1.5
0.000	32	31.9	31.9	+/- .6
1.518	100	99.8	99.8	+/- .6
6.647	300	299.8	299.8	+/- .6
12.572	500	499.9	499.9	+/- .6
19.095	700	699.9	699.9	+/- .6

	DEG C	INCOMING	OUTGOING	TOL
-5.439	-190	-190.1	-190.1	+/- 1.0
-3.378	-100	-100.0	-100.0	+/- 1.0
0.000	0	-.0	-.0	+/- .4
4.277	100	99.8	99.8	+/- .4
9.286	200	199.9	199.9	+/- .4
14.860	300	299.9	299.9	+/- .4
20.252	390	389.9	389.9	+/- .4

TYPE E	DEG F	INCOMING	OUTGOING	TOL
-8.404	-300	-299.7	-299.7	+/- .7
-6.471	-200	-200.0	-200.0	+/- .7
-3.976	-100	-100.0	-100.0	+/- .7
0.000	32	32.0	32.0	+/- .7
2.281	100	99.8	99.8	+/- .7
9.708	300	299.6	299.6	+/- .7
17.942	500	499.7	499.7	+/- .7
28.854	750	749.8	749.8	+/- .7
40.056	1000	999.6	999.6	+/- .7
51.246	1250	1249.8	1249.8	+/- .7
62.240	1500	1499.8	1499.8	+/- .7
75.024	1800	1799.9	1799.9	+/- .7

	DEG C	INCOMING	OUTGOING	TOL
-5.237	-100	-99.9	-99.9	+/- .4
0.000	0	-.0	-.0	+/- .4
6.317	100	99.9	99.9	+/- .4
21.033	300	299.9	299.9	+/- .4
36.999	500	499.8	499.8	+/- .4
53.110	700	699.9	699.9	+/- .4
68.783	900	899.9	899.9	+/- .4
76.358	1000	999.9	999.9	+/- .4

MV INPUT	INCOMING	OUTGOING	TOL
-10	-9.99	-9.99	.01% OF
0	.00	.00	RDG+/-2CT
10	9.99	9.99	
30	29.99	29.99	
50	49.98	49.99	
75	74.98	74.99	
100	99.98	100.00	

MA INPUT	INCOMING	OUTGOING	TOL
0	.001	.000	.01% OF
5	4.997	4.999	RDG+/-2CT
10	9.997	9.999	
15	14.997	15.000	
20	19.996	20.000	

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME Omega Point Labs
CLIENT/PROJECT NUMBER OPL Equip
RECEIVED FROM Metroplex Metrology
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1371 - OPL
DATE RECEIVED 2-2-94
DATE INSPECTED 2-2-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
0-100 PSI GAGE	11030	1	1	-	SN. 92LE003	Y	Y	good	None	X			Calibration Services only
0-60 PSI GAGE	11030	1	1	-	SN92LE002	Y	Y	good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Floyd Passmore
Metroplex Metrology Lab
2312 Municipal Parkway

Bedford TX 76021

PO Number: 1103-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	F.O.B.	Date Required	Terms
1/13/94	UPS Ground			30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	0-100 psi Pressure gauge Model No. JD-GF Serial No. 92 LE 003	1	$25.00	$25.00
2.	0-60 psi Pressure gauge Model No. JC-GF Serial NO. 92 LE 002	1	$25.00	$25.00
	plus tax & shipping			

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 1-13-94

Special Instructions

Please include Certificates of Calibration and Calibration Data

Ordered By: Cleda Patton

Project #: OPL Equipment

Total	$50.00
Shipping	
Tax	
Invoice Total	$50.00

TEST Nº 424132

METROPLEX METROLOGY LABORATORY INCORPORATED
P.O. BOX 210249 BEDFORD, TEXAS 76095-7249
2312 MUNICIPAL PARKWAY BEDFORD, TEXAS 76021-4642
METRO (817) 267-4999

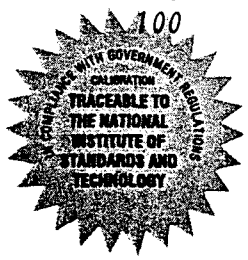
Certificate of Calibration

We certify the accuracy of this Mc Daniel Controls, Inc. 0 to 100 Liquid Filled PSI Gage, Mod.# None, S/N 92LE003, subdivided in 1 lb. increments, property of Omega Point Laboratories, Inc., 16015 Shady Falls Road, Elmendorf, Texas. The accuracy of this instrument has been determined from **Reference Standards** which have been calibrated from **Master Standards** which were certified by **The National Institute of Standards and Technology.**

The accuracy of this pressure gage meets all the requirements of **Federal Specifications GGG-G-76E, GG-G-66-B** and **Instrument Calibration Procedure (I.C.P.) No. D25A and M20.** The calibration certification of this instrument is in compliance with **MIL-STD-45662A.** This instrument has been calibrated in an upright position at 72°F 45%RH.

Instrument used in calibration: Chandler Dead Weight Tester, S/N 20759 (Cal. 12/28/93 Due 12/28/94). **NIST Test #737/229495. Expires: 10-2-94.**
Received Condition: In Tolerance
Technician ID: #4

LABORATORY WEIGHT PRESSURE	DISPLAYED INDICATED PRESSURE OF PSI GAGE	DEVIATION OF PSI GAGE	LIMITS OF UNCERTAINTY
10	10	0	0
20	20	0	0
30	30	0	0
40	39.9	-.1	.1%
50	49.2	-.8	.1%
60	59.3	-.7	.1%
70	69.3	-.7	.1%
80	79.4	-.6	.1%
90	89.4	-.6	.1%
100	100.5	+.5	.1%



TEST IN COMPLIANCE WITH MIL-STD-45662A

President

Weta Passmore
Date Cal: 1-20-94
Date Due: 1-20-95

WP/kb

INVOICE

No. 42531519

METROPLEX METROLOGY LABORATORY

PHONE Metro (817) 267-4999
FAX (817) 540-1410

Refer to above number in correspondence regarding this charge.

2312 MUNICIPAL PARKWAY

PLEASE REMIT TO P.O. BOX 210249
BEDFORD, TEXAS 76095-7249

BEDFORD, TEXAS 76021 February 1, 1994

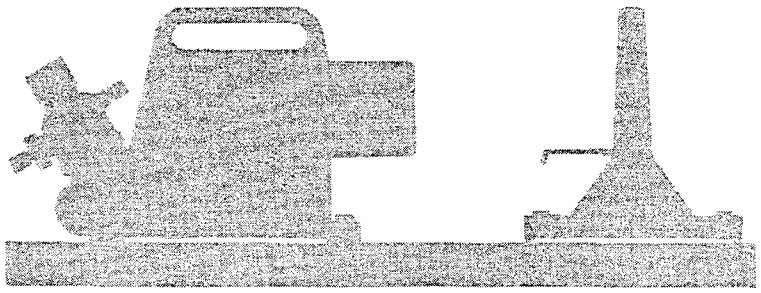
SOLD TO
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

SHIP TO
Same

(214) 635-8100

VIA UPS CUSTOMER P/O NO. 1103-Q TERMS *NET 30* F.O.B. BEDFORD, TEXAS

Item No.	Qty.	DESCRIPTION	Unit Price	Amount
1	1	McDaniel Controls, Inc. 0-100 Liquid Filled PSI Gage, S/N 92LE0003 Cal. & Cert.		
2	1	McDaniel Controls, Inc. 0-60 Liquid Filled PSI Gage, S/N 92LE002 Cal. & Cert.		



IF YOUR REMITTANCE IS POSTMARKED BY 2/16/94, YOU MAY DEDUCT $1.20 FROM THIS INVOICE. (DISCOUNT EXCLUDES TAX.)
OUR TERMS ARE NET 30 DAYS FROM THE DATE OF THIS INVOICE.

Parts	Tools	Calibration Certification	Repairs	Shipping & Handling	Tax	TOTAL	73.65
		60.00		8.04	5.61		

Cust.# 11549
bb
p

Masters at Repairs and Calibration of Precision Measuring Instruments

Please Pay ▲

PACKING SLIP

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES 17 PIECES GROSS WEIGHT 9440 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 1"	16 Pieces	F94-02053
Item 01	16 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

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AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158400 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 4"	5 Pieces	F9-105037
	3 Pieces	F92-09051
	10 Pieces	F92-11018
	10 Pieces	F94-03018
Item 02		
	28 Pieces (In 2 Cartons)	
No Shelf Life On Conduit		

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 238100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 1"	16 Pieces	F94-04005
Item 03 No Shelf Life On Conduit	16 Pieces (In 1 Carton)	

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 338300 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	8 Pieces	F94-02053
Item 04	8 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 438300 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	3 Pieces 5 Pieces	F92-10009 F93-06008
Item 05	8 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1384X6 - THERMO-LAG 330 RIBBED PANEL NOMINAL 3/8" THICK, 4'x6½' NOM.	1 PANEL	F93-11048
	4	F94-02012
	1	F94-03018
ITEM 06	1	F94-06051
	7 PANELS (ON 1 PALLET)	

NO SHELF LIFE LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O Bryant
David O'Bryant
Manager Quality Control

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1584X6 - THERMO-LAG RIBBED PANEL, NOMINAL 5/8" 4' X 6½' ITEM 07	1	F93-11048
	9	F94-02012
	6	F94-02053
	9	F94-03018
	7	F94-03028
	14	F94-03047
	46 PANELS (ON 4 PALLETS)	
NO SHELF LIFE ON PANELS		

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O Bryant
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO-LAG 330-1 SUBLIMING COATING TROWEL GRADE ITEM 08 1 x 5 gallon pail containing temperature recorder EXP. DATE: DECEMBER 1994 SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES	2000 LB. (40 x 50 Lb. Pails) (ON 2 PALLETS)	94-05093

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O Bryant
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

21334

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT 30 JUNE 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-05093	2000 LB. (40 x 50 LB. PAILS	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 +

ITEM 08

EXPIRATION DATE: DECEMBER 1994

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: Danielle Bryant DATE: 30 JUNE 1994

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STRESS SKIN-ASTM E437 type 304 stainless steel, plain weave, 8 x 8 square mesh wire cloth, 0.017 dia. wire, or equal.	100 LB. (IN 1 CARTON)	F062494

Item 09

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O'Bryant
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STAINLESS STEEL TIE WIRE 16 Gauge, Annealed type 304	100 LB. (3 ROLLS)	N/A
Item 10		
STAINLESS STEEL BANDING Type 304 Thickness: .0.020" x 0.5" x 200 Ft. Rolls	3 Rolls	070693
STAINLESS STEEL CLIPS SIZE. 1/2" WIDE X 0.020"	1 CARTON (1000 CLIPS)	112691
ITEM 11	(ALL ABOVE ITEMS IN 1 CARTON)	

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O Bryant
Manager Quality Control

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158340 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 3/4"	10 Pieces	F94-02053
Item 12	10 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

PACKING LIST

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 238340 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3/4"	2 Pieces	F92-02005
	1 Piece	F92-03029
	1 Piece	F94-02012
	6 Pieces	F94-04005
Item 13	10 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185.8687
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1393 - 11960
DATE RECEIVED 7-8-94
DATE INSPECTED 7-8-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Temp. Recorder	NA	0	1	0	Recorder # 0301 Chart tape # 27	Y	N	Good	None	X			Receiving Verifications Only. Temperature Recorder has been returned to TSI. CP
Thermo Lag 1" pre shaped conduit	NA	0	16	0	Part # 158100 F94-02053	Y	Y	Good	None	X			
Thermo Lag 4" pre shaped conduit	NA	0	5	0	Part # 158400 F9-105037	Y	Y	Good	None	X			
Thermo Lag 4" pre shape Conduit	NA	0	3	0	Part # 158400 F92-09051	Y	Y	Good	None	X			
Thermo Lag 4" pre shaped conduit	NA	0	10	0	Part # 158400 F92-11018	Y	Y	Good	None	X			
Thermo Lag 4" pre shaped Conduit	NA	0	10	0	Part # 158400 F94-03018	Y	Y	Good	None	X			
Thermo Lag 1" pre shaped conduit	NA	0	16	0	Part # 238100 F94-04005	Y	Y	Good	None	X			
Thermo Lag 3" pre shaped conduit	NA	0	8	0	Part # 338300 F94-02053	Y	X	Good	None	X			
Thermo Lag 3" pre shaped Conduit	NA	0	3	0	Part # 438300 F92-10009	Y	Y	Good	None	X			
Thermo Lag 3" pre shaped conduit	NA	0	5	0	Part # 438300 F93-06008	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	1	0	Part # 1384X6 F93-11048	X	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	4	0	Part # 1384X6 F94-02012	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	1	0	Part # 1384X6 F94-03018	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	1	0	Part # 1384X6 F94-06057	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	1	0	Part # 1584X6 F93-11048	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	9	0	Part # 1584X6 F94-02012	Y	Y	Good	None	X			

FORM
1/29/93

55

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185, 86887
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1393 - 11960
DATE RECEIVED 7-8-94
DATE INSPECTED 7-8-94
INSPECTED BY: C. Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	6	0	Part# 1584X6 F94-02053	Y	Y	Good	None	X			Receiving Verification only. Expedite on travel grade is December 1994
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	9	0	Part# 1584X6 F94-03018	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	7	0	Part# 1584X6 F94-03028	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	14	0	Part# 1584X6 F94-03047	X	Y	Good	None	X			
Thermo Lag 330-1 Trowel grade	NA	0	40	0	94-05093	X	Y	Good	None	X			
Stress-Skin	NA	0	100lb	0	F062494	Y	Y	Good	None	X			
Stainless Steel Rivets	NA	0	100lb	0	16ga, Type 304	Y	Y	Good	None	X			
Stainless Steel Banding	NA	0	3rolls	0	070693	Y	Y	Good	None	X			
Stainless steel Clips	NA	0	1000	0	112691	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	10	0	Part# 158340 F94-02053	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	2	0	Part# 238340 F92-02005	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	1	0	Part# 238340 F92-03029	Y	Y	Good	None	X			
Thermo Lag 3/4" pre Shaped Conduit	NA	0	1	0	Part# 238340 F94-02012	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	6	0	Part# 238340 F94-04005	X	X	Good	None	X			

FORM
1/29/93

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES 17 PIECES GROSS WEIGHT 9440 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 1"	16 Pieces	F94-02053
Item 01	16 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158400 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 4"	5 Pieces	F9-105037
	3 Pieces	F92-09051
	10 Pieces	F92-11018
Item 02	10 Pieces	F94-03018
	28 Pieces (In 2 Cartons)	
No Shelf Life On Conduit		

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David O'Bryant

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 238100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 1"	16 Pieces	F94-04005
Item 03 No Shelf Life On Conduit	16 Pieces (In 1 Carton)	

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 338300 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	8 Pieces	F94-02053
Item 04	8 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant

David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 438300 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	3 Pieces 5 Pieces	F92-10009 F93-06008
Item 05	8 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1384X6 - THERMO-	1 PANEL	F93-11048 ✓
LAG 330 RIBBED PANEL	4	F94-02012 ✓
NOMINAL 3/8" THICK, 4'x6½' NOM.	1	F94-03018 ✓
	1	F94-06051 ✓
ITEM 06	7 PANELS (ON 1 PALLET)	

NO SHELF LIFE LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O'Bryant
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1584X6 - THERMO-	1	F93-11048 ✓
LAG RIBBED PANEL, NOMINAL 5/8"	9	F94-02012 ✓
4' X 6½'	6	F94-02053 ✓
	9	F94-03018 ✓
ITEM 07	7	F94-03028 ✓
	14	F94-03047 ✓
	46 PANELS (ON 4 PALLETS)	

NO SHELF LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O'Bryant
Manager Quality Control

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE ITEM 08 1 x 5 gallon pail containing temperature recorder EXP. DATE: DECEMBER 1994 SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES	2000 LB. (40 x 50 Lb. Pails) (ON 2 PALLETS)	94-05093

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O'Bryant
David O'Bryant
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

21334

TSI

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT 30 JUNE 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-05093	2000 LB. (40 x 50 LB. PAILS	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 +

ITEM 08

EXPIRATION DATE: DECEMBER 1994

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: David O Bryant DATE: 30 JUNE 1994 PAGE NO. 1

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STRESS SKIN-ASTM E437 type 304 stainless steel, plain weave, 8 x 8 square mesh wire cloth, 0.017 dia. wire, or equal.	100 LB. (IN 1 CARTON)	F062494

Item 09

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O'Bryant
Manager Quality Control

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STAINLESS STEEL TIE WIRE 16 Gauge, Annealed type 304	100 LB. (3 ROLLS)	N/A
Item 10		
STAINLESS STEEL BANDING Type 304 Thickness: .0.020" x 0.5" x 200 Ft. Rolls	3 Rolls	070693
STAINLESS STEEL CLIPS SIZE. 1/2" WIDE X 0.020"	1 CARTON (1000 CLIPS)	112691
ITEM 11	(ALL ABOVE ITEMS IN 1 CARTON)	

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 30 June 1994
BILL OF LADING: 21334
MODE: DYNAMIC TRANSIT PREPAID

David O'Bryant
Manager Quality Control

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Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158340 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 3/4"	10 Pieces	F94-02053
Item 12	10 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant

David O Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

TSI

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

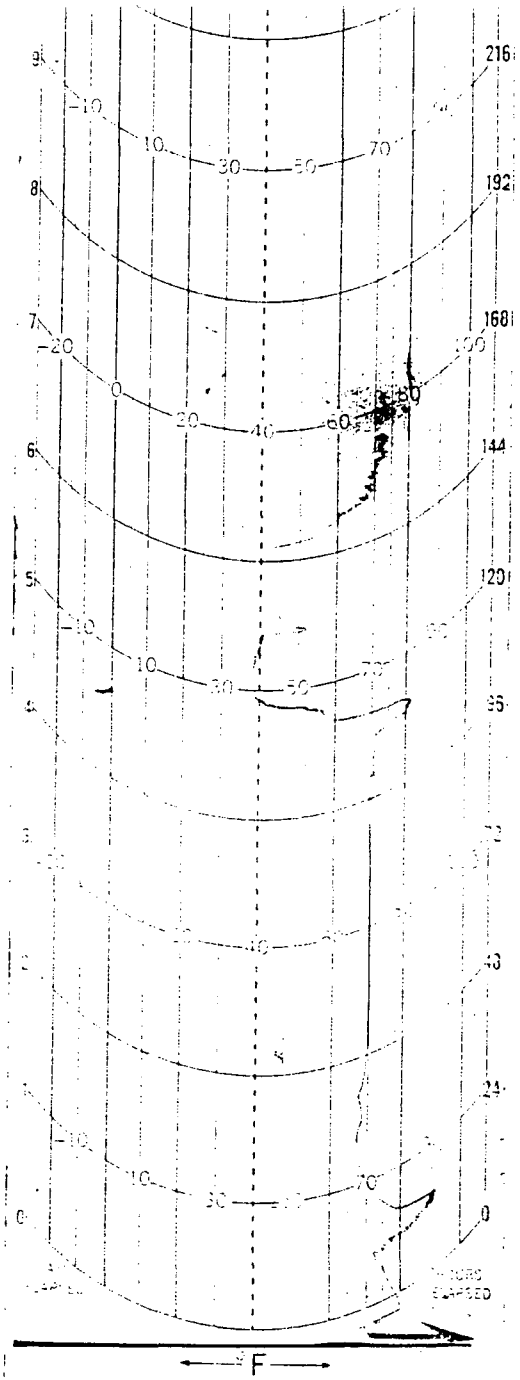
PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 238340 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3/4"	2 Pieces	F92-02005
	1 Piece	F92-03029
	1 Piece	F94-02012
	6 Pieces	F94-04 05
Item 13	10 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
David O'Bryant
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID



CAR No. _____

CITY: San Antonio / TX

CONSIGNEE: Omega Paint

CAR CONT: _____

PER: _____

CITY: St. Louis

SHIPPER: T&I

DATE: 6-30-94 TIME: 1:30 pm

INSTR. No. _____

CHART 27

1. LOAD CARTRIDGE – ADVANCE CHART.

32 DAY (–30° + 110° F)

PART NO. 840-95

PARTLOW THERMA-GARD

NEW HARTFORD, N.Y. 13413

START

...subject to the classifications and tariffs in effect on the date of issue of this Original Bill of Lading,

SHORT FORM — ORIGINAL — NOT NEGOTIABLE

549

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

From THERMAL SCIENCE, INC.
ST. LOUIS, MISSOURI 63026

CONTRACT ORDER TV 92362V

Carrier DYNAMIC TRUCK PREPAID PROTECTIVE SERVICE — 6/8 30 19 94 — Shipper's No. 21334

Consigned to OMEGA POINT LABORATORY % TVA CONTRACT TV 92362V — Agent's No.

Destination 16015 SHADY FALLS ROAD (Mail or street address of consignee—For purposes of notification only)

Route ELMENDORFF, TEXAS 78112 — State of — County of

Delivering Carrier — Vehicle or Car Initial — No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	*Weight (Subject to Correction)	Class or Rate	Check Column
1	✓	CARTON TVA PART #158100	100 lb.		
2	✓	16 PCS. 1" ITEM 01			
	✓	CARTONS TVA PART NO. 158400	300		
1	✓	28 PCS. 4" ITEM 02			
	✓	CARTON TVA PART NO. 238100	150		
1	✓	16 PCS. 1" ITEM 03			
	✓	CARTON TVA PART NO. 338300	90		
1	✓	8 PCS. 3 INCH (UPGRADE) ITEM 04			
	✓	CARTON TVA PART NO. 438300	90		
1	✓	8 PCS. 3" (UPGRADE) ITEM 05			
	✓	PALLET TVA PART NO. 1384X6	700		
4	✓	7 EA. THERMO LAG 330 RIBBED PANEL 3/8" THICKNESS 4'x6½' NOM ITEM 06			
	✓	PALLETS TVA PART NO. 1584X6	5200 lb.		
2	✓	46 PANELS THERMO LAG 330 RIBBED PANEL 5/8" THICKNESS NOM 4'x6½' ITEM 7			
	✓	PALLETS CONTAINING: 40 x 50 LB. PAILS	2400		
	✓	[redacted] THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE ITEM 08 TVA PART TG-330-			
1	✓	1 x 5 gal. pail containng temp.recorder			
	✓	STORE ABOVE 32 F AND BELOW 100F AT ALL TIMES			
8	✓	CARTON CONTAINING STRESS SKIN ASTM E437	120 lb.		
	✓	TYPE 304 -SS Wire/plain weave 8x8 square			
	✓	mesh wire cloth 0.017" DIA. Wire ITEM 09			
	✓	CARTON CONTAINING:			
	✓	3 Rolls SS Banding ITEM [redacted] 11	140 Lb		
	✓	3 Rolls (100 Lb.) SS TIE WIRE TYPE 304			
	✓	ITEM 10			
	✓	1 BOX OF 1000 [redacted] SS CLIPS ITEM 11			
	✓	CARTON TVA PART NO. 158340	50		
	✓	3/4" [redacted] 50 PCS. ITEM 12			
	✓	CARTON TVA PART NO. 238340	100		
	✓	SIZE: 3/4 INCH UPGRADE ITEM 13 (10 PCS.)			

Subject to Section 7 conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per (Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

TO BE PREPAID

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per (The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$

C. O. D. SHIPMENT

C. O. D. Amt.

Collection Fee

Total Charges

...oxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated...

...ertify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according ...able regulations of the Department of Transportation.

...ent moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

...nprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.

...e the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

...f declared value of the property is hereby specifically stated by the shipper to be not exceeding

...NT IS CORRECTLY DESCRIBED.

...EIG... LBS.

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. (NOTE: Preprinting certificates containing sub 48 CFR 173, 430 (a) in effect January 30, 1978, may be used through June 30, 1978.)

Per Shipper

...MAL SCIENCE, INC.

Shipper, Per

...ost office address of shipper 2200 Cassens Dr., St. Louis, MO 63026

Agent, Per

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-87, 97257-60
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1413 - 11960
DATE RECEIVED 8-3-94
DATE INSPECTED 8-3-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Stress Skin	NA	0	1	0	SS-008-0170-36	Y	Y	good	None	X			1 roll - 100' x 36" - 8x8 mesh .017 wire Receiving Verification Only

FORM
1/29/93

PACKING LIST 551

SOLD TO
3500
Thermal Science
2200 Cassens Drive
St. Louis, MO

63026

SHIP TO
~~Thermal Science~~
Omega Point Laboratories
16015 Shady Falls Road
Elmendorff, Texas

78112

CUSTOMER ORDER NO.	DATE SHIPPED
12472	8-2-94
DATE ORDER RECEIVED	SHIPPED VIA
8/2/94	UPS Next Day
OUR ORDER NO.	
12492	
RESALE NO./STATUS	
Interstate 0	
FREIGHT TERMS	

KG	INIT.	CONTACT
UPS-NEXT DAY AIR	Ken	Denise

QUANTITY ORDERED*	DESCRIPTION						QUANTITY SHIPPED*
	PART NUMBER	MESH	WIRE	MATERIAL	WIDTH	CODE	
300.00	SS-008-0170-36 M016	8X8	.017	304SS	36"	A	300.00

Attn: Richard Lohman

1 ROLL 100'-0" X 36"

MATERIAL RECEIVED BY _____

*UNIT OF MEASURE IS SQ. FT. UNLESS OTHERWISE NOTED.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97257-604 97332-38
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1430 - 11960
DATE RECEIVED ~~8-29-94~~ 8/31/94
DATE INSPECTED ~~8-29-94~~ 8/31/94 CH
INSPECTED BY: C Patton 8/31/94 CH

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	CONID MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Stress Skin	NA	0	2rolls	0	SS-008-010-48	Y	N	Good	None	X			Receiving Verification Only
SS Tie Wire	NA	0	25lbs	0	16ga annealed type 304	Y	Y	GOOD	None	X			

FORM
1/29/93

PACKING LIST 553

SOLD TO
6573
Thermal Science
2200 Cassens Drive
St. Louis, MO

63026

SHIP TO
[redacted]
Omega Point Laboratories
C/O TVA, Attn: Mark Sallee
16015 Shady Falls Road
Elmendorff, Texas
78112

CUSTOMER ORDER NO.	DATE SHIPPED
12569	
DATE ORDER RECEIVED	**SHIPPED VIA**
8/26/94	UPS NxtDay Air
OUR ORDER NO.	
12569	
RESALE NO./STATUS	
Interstate 0	
FREIGHT TERMS	

TING	INIT.	CONTACT
UPS-NEXT DAY AIR	Ken	Denise

QUANTITY ORDERED*	DESCRIPTION	QUANTITY SHIPPED*
600.00	SS-008-0170-48 8X8 .017 304SS 48" A I606	600.00
	150'-0" x 48"	

MATERIAL RECEIVED BY _____

*UNIT OF MEASURE IS SQ. FT. UNLESS OTHERWISE NOTED.

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 26 AUGUST 1994

TEMPERATURE RECORDER N/A CHART TAPE NO. N/A

TOTAL NO. OF PACKAGES 1 CARTON GROSS WEIGHT 30 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STAINLESS STEEL TIE WIRE 16 Gauge, Annealed type 304	25 LBS.	N/A

Item 10

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

DATE: 26 AUGUST 1994
BILL OF LADING: 21416
MODE: UPS PREPAID

David O'Bryant
David O'Bryant
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

555

TSI

8/3/94

Cal Banning
Vectra c/o Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, Texas 78112

Dear Sir:

The in-house retain sample of Thermo-Lag 330-1 Trowel Grade batch #93-11049, was examined and tested. The results were within our published quality control standards.

Based on these results, the expiration date could be extended to read January 1995. The new expiration date would not include the extension of the original written warranty or any implied warranty.

Note that the sample tested was not received from the storage facilities of Omega Point Laboratories.

Regards,

David O'Bryant
QC Manager

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. 1085-0 c/o #1 DATE: 10 Dec 1993

TEMPERATURE RECORDER 030128 CHART TAPE NO. 10

TOTAL NO. OF PACKAGES see pg 1 GROSS WEIGHT see pg 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
Thermo-Lag 330-1 Subliming Coating - Trowel Grade Mfg. Date Nov. 24, 1993 Item 9	70 X 50 Lb Pail (3500 Lbs)	93-11049
Shelf Life: Six (6) months from date of shipment Storage Conditions: Above 32°F and below 100°F		
Temperature Recorder Item 10	1 Recorder	N/A

This will certify that the above listed THERMO-LAG Materials, shipped under Purchase Order No. 1085-0 c/o #1, to Omega Point Laboratories San Antonio, TX, Meet the requirements of "Specifications for the Procurement of Fire Barrier Materials 0784-00001-S-01, Rivision 3" for Nuclear Management and Resources Council (NUMARC) 1776 Eye Street, N.W., Suite 300, Washington, D.C. The material meets the requirements of the purchase order. This material does not contain asbestos.

DATE: 10 Dec 1993
BILL OF LADING: 21069
MODE OF TRANSPORT: C.V. SOHN PREPAID

B.E. EVANS
MANAGER OF QUALITY CONTROL

CERTIFICATE OF ANALYSIS

CUSTOMER

Omega Point Laboratories
6868 Alamo Downs Parkway
San Antonio, TX 78238

DATE OF SHIPMENT December 10, 1993
PURCHASE ORDER NO: 1085-Q c/o #1
RELEASE NO:
CUSTOMER PART NO: Item #9

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
93-11049	70 X 50 Lb. Pails	A-2	Wt/Gallon	10.13	10.5 ± 1.5
Mfg. Date: Nov. 24, 1993	(3500 Lbs)	A-3	pH	8.36	8 +

#9

Temperature Recorder (1) with the shipment

Material Expiration Date: June 1994

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY TO LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: B Elvin DATE: December 10, 1993

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ThermoLag 330-1

DATE PRINTED.: 8/24/89
DATE REVISED: 7/7/89
By A. Thorpe

THERMAL SCIENCE INC
2200 Cassens Dr
Fenton , MO 63026
PHONE: (314) 349-1233
EMERGENCY PHONE: (314) 349-1267

HMIS HAZARD RATINGS

LEAST	0	HEALTH HAZARD	2*
SLIGHT	1	FLAMMABILITY HAZARD	0
MODERATE	2	REACTIVITY HAZARD	0
HIGH	3	MAXIMUM PERSONAL PROTECTION	B
EXTREME	4		

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: Thermolag 330-1

PRODUCT CLASS : Latex Fire Resistive Coating

D.O.T. HAZARD CLASS: none
D.O.T. Shipping Name: Cold Water Paint
D.O.T. UN Number:

SECTION II - PHYSICAL DATA

APPEARANCE AND ODOR :Milky white pasty mastic, ammoniacal odor

BOILING POINT (at 760 mm Hg): 220-240 F
VAPOR PRESSURE (at 20C or 68F): nil
EVAPORATION RATE (ether = 1) much slower
VAPOR DENSITY (air = 1) : 0.6
Volatile Organic Content (VOC) : < 0.1 lb/gal

SPECIFIC GRAVITY (water = 1): 1.3
WEIGHT PER GALLON (lbs.): 10.6
PERCENT VOLATILES BY VOLUME: 45
SOLUBILITY IN WATER: Very

SECTION III - HAZARDOUS COMPONENTS

TRADE NAME	CAS #	PERCENT BY VOLUME	OCCUPATIONAL EXPOSURE LIMITS OSHA PEL	ACGIH TLV
Crystalline Silica (quartz) (total dust)	14808-60-7	1-5 %	30 mg/m^3 %SiO2 +2	
(respirable dust)			10 mg/m^3 %SiO2 +2	0.1 mg/m^3
Ammonia	1336-21-6	< 0.1 %	50 ppm	25 ppm
Fibrous glass,continuous filament (total dust)	65997-17-3	1-5 %	15 mg/m^3	10 mg/m^3
(respirable dust)			5 mg/m^3	

* Indicates toxic chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372
Carcinogenicity of Silica: NTP: No IARC: Yes Z List: Yes OSHA Reg: Not as carcinogen
Appears on Table Z-3 for Mineral Dusts in 29 CFR § 1910.1000
IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans(vol 42,1987) concludes that there is sufficient evidence for the carcinogenicity of crystalline silica to experimental animals, and there is limited evidence for the carcinogenicity of crystalline silica to humans. IARC Class 2A.
Carcinogenicity of fibrous glass: NTP: No IARC: Yes Z List: No OSHA Reg: No
IARC categorized fibrous glass as not classifiable with respect to human carcinogenicity.

MATERIAL SAFETY DATA SHEET PRODUCT NAME: ThermoLag 330-1

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION
OSHA : Non-combustible
DOT : Non-combustible

FLASH POINT : None
TEST METHOD:

FLAMMABILITY LIMITS LEL: NA UEL: NA

EXTINGUISHING MEDIA :

SPECIAL FIRE FIGHTING PROCEDURES :Wet Product will not burn but will smoke and spatter if exposed to flames. Firefighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS : Sealed containers may rupture if overheated. Cool with water spray.

HAZARDOUS DECOMPOSITION PRODUCTS : Thermal oxidative decomposition can produce toxic gases, including oxides of nitrogen and carbon monoxide.

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE STABLE	X	CONDITIONS TO AVOID: Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID) : Strong Oxidizers, Strong Bases

HAZARDOUS POLYMERIZATION	MAY OCCUR WILL NOT OCCUR X	CONDITIONS TO AVOID : Not applicable

SECTION VI - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See HAZARDOUS COMPONENTS list in Section III.

EFFECTS OF OVEREXPOSURE :
Eyes: Direct contact with product may result in eye irritation.
Skin: Prolonged or repeated contact with product may cause skin irritation.
Breathing: Excessive inhalation can cause irritation of the mucous membranes of the nose, throat and respiratory tract, headache and nausea.
Swallowing:

FIRST AID PROCEDURES :
If in Eyes: Flush with flowing water immediately and continously for 15minutes. Consult medical personnel.
If on Skin: Thoroughly wash exposed area with soap and water. Remove and wash contaminated clothing before reuse. Destroy contaminated shoes. Consult medical personnel if swelling or reddening occurs.
If Swallowed: If conscious, give two glasses of water to drink. Get immediate medical attention.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED : Keep unnecessary people away. Contain spill with inert material (sand, earth, ect) and transfer the material to containers for recovery or disposal. Keep spill out of sewers and open bodies of water. Floors may be slippery, care should be exercized to avoid falls.

WASTE DISPOSAL METHOD : Burn in adaquate incinerator or bury in an approved landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE : Mechanical local exhaust at point of mist release is preferred.

RESPIRATORY PROTECTION : None required if good ventilation is maintained. Otherwise wear MSHA/NIOSH approved respirator suitable for vapor, mist or dust concentrations encountered.

PROTECTIVE GLOVES : Impervious, cotton lined rubber EYE PROTECTION : Safety glasses.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE : Use only with adaquate ventilation. Prevent prolonged breathing of vapor or mist. Prevent contact with eyes. Do not take internally. Keep out of the reach of children.

STORAGE TEMP. MAX 100 F MIN 32 F

OTHER PRECAUTIONS :

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. It is the user's responsibility to determine the suitability of this information for the adoption of the necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

NUCLEAR ENERGY INSTITUTE

August 23, 1994

Ms. Connie Humphry
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Dear Connie:

This letter authorizes Omega Point to release up to twelve containers of trowel grade Thermo-Lag 330 material from NEI stock (batch number 93-11049) to Mark Salley of TVA, in exchange for an equal number of containers of trowel grade material from TVA stock to be delivered later this week.

Please contact me if you have any questions.

Sincerely,

Biff Bradley
Senior Project Manager

REB/

1776 I STREET, NW SUITE 400 WASHINGTON, DC 20006-3708 PHONE 202.739.8000 FAX 202.785.4019

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TUA
CLIENT/PROJECT NUMBER 11960-97185-87, 97258 thru 97320, 97332 thru 97338
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1421 . 11960
DATE RECEIVED 8-25-94
DATE INSPECTED 8-25-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Temperature Recorder	NA	0	1	0	Chart # 71 #40	Y	X	Good	None	X			Receiving Verification only
Thermo Lag 330-1 Trowel grade	NA	0	15	0	94-05093	Y	Y	Good	None	X			
" "	NA	0	45	0	94-08008	Y	Y	Good	None	X			
Thermo Lag 330-1 Ribbed Panel	NA	0	10	0	158400 F94-02012	Y	X	Good	None	X			
" "	NA	0	1	0	158400 F94-03028	X	Y	Good	None	X			
" "	NA	0	4	0	158400 F94-03047	Y	Y	Good	None	X			
" "	NA	0	7	0	158400 F94-04005	Y	Y	Good	None	X			
" "	NA	0	16	0	158400 F94-07014	Y	Y	Good	None	X			
" "	NA	0	1	0	158400 F94-07023	Y	Y	Good	None	X			
4" Thermo Lag 330-1 Preshaped Conduit	NA	0	1	0	158400 F92-08038	X	Y	Good	None	X			
4" Thermo Lag Preshaped Conduit	NA	0	1	0	158400 F92-10031	Y	Y	Good	None	X			
" "	NA	0	4	0	158400 F94-06051	Y	Y	Good	None	X			
" "	NA	0	8	0	158400 F94-06082	Y	Y	Good	None	X			
" "	NA	0	15	0	158400 F94-07003	Y	Y	Good	None	X			
1" Thermo Lag 330-1 Preshaped Conduit	NA	0	7	0	238100 F94-07023								
" "	NA	0	3	0	238100 F94-08003								

FORM
1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960 97185-87 & 97332-38 97258-60
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1421 . 11960
DATE RECEIVED 8-25-94
DATE INSPECTED 8-25-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
3/4" Thermo Lag 330-1 Preshaped conduit	NA	0	4	0	158340 F94-02053	Y	Y	Good	None	X			Receiving Verification Only
" "	NA	0	6	0	158340 F94-03047	Y	Y	Good	None	X			
" "	NA	0	10	0	238340 F94-07014	Y	Y	Good	None	X			
1" Thermo Lag 330-1 Preshaped Conduit	NA	0	1	0	158100 F92-11009	X	Y	Good	None	X			
" "		0	5	0	158100 F93-09045	Y	Y	Good	None	X			
" "		0	3	0	158100 F93-09047	Y	Y	Good	None	X			
" "		0	1	0	158100 F94-06051	X	X	Good	None	X			
Stress Skin type 304	NA	0	1	0	TYPE 304 8x8 0.017dia	Y	Y	Good	None	X			

FORM
1/29/93

THIS SHIPPING ORDER

must be legibly filled in, in Ink, in Indelible Pencil, or by Permanent Carboniess Impression, and retained by the Agent.

564

CEIVE, subject to the classifications and tariffs in effect on the date of the issue of this Shipping Order, the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

TVA CONTRACT NO. TV92363V

rc THERMAL SCIENCE, INC.
t ST. LOUIS, MISSOURI 63026

8/18 19 94 Shipper's No. 21398

Carrier DYNAMIC TRANSIT PREPAID Agent's No.

(Mail or street address of consignee—For purposes of notification only.)

Consigned to TENNESSEE VALLEY AUTHORITY c/o OMEGA POINT LABORATORIES

Destination 16015 SHADY FALLS ROAD State of County of

Route ELMENDORFF, TX 78112

Delivering Carrier Vehicle or Car Initial No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Subject to Correction)	Class or Rate	Check Column
2		PALLETS CONTAINING: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE TVA PART NO. TG-330 60 x 50 LB. PAILS STORE ABOVE 32F AT ALL TIMES 1 x 5 Gal. Pail Containing Temp. Recorder	3250 LBS.		
3		PALLETS CONTAINING: THERMO LAG PREFABRICATED PANELS TVA PART NO. 1584X6 30 PANELS 5/8" NOMINAL 4' x 6'	3500 LBS.		
2		PALLETS CONTAINING: ✓ 8 CARTONS: TVA PART NO. 158400 29 PIECES 4"	200 LBS.		
		✓ 1 CARTON: TVA PART NO. 238340 10 PIECES 3/4"	90 LBS.		
		✓ 1 CARTON: TVA PART NO. 158340 10 PIECES 3/4"	90 LBS.		
		✓ 1 CARTON: TVA PART NO. 158100 10 PIECES 1"	80 LBS.		
		✓ 1 CARTON: TVA PART NO. 238100 10 PIECES 1"	90 LBS.		
		[redacted]	[redacted]		
		✓ 1 CARTON: STAINLESS SKIN ASTM E437 Type 304 ss-plain weave 8x8 square mesh wire cloth	50 LBS.		

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per
(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per
(The signature here acknowledges only the amount prepaid.)

Charges Advanced:
$

☐ C. O. D. SHIPMENT
C. O. D. Amt
Collection Fee
Total Charges

The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.
NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed of declared value of the property is hereby specifically stated by the shipper to be not exceeding

THIS [redacted] IS CORRECTLY DESCRIBED.
CORRECT WEIGHT IS LBS.

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. NOTE Preprinted certificates complying with 49 CFR 173, 430 (a) in effect on June 30, 1978, may be used through June 30, 1979

Per Shipper

THERMAL SCIENCE, INC. Shipper, Per

Agent must detach and retain this Shipping Order and must sign the Original Bill of Lading.

Permanent post office address of shipper 2200 Cassens Dr., St. Louis, MO 63026

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT NO. TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES 7 PALLETS GROSS WEIGHT 7350 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE	750 LBS. (15 x 50 LB. PAILS)	94-05093
EXP. DATE: FEBRUARY 1995 1 x 5 Gallon pail containing Temperature Recorder	2250 LBS. (45 x 50 LB. PAILS)	94-08008
SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT	3000 LBS. (60 x 50 LB. PAILS)	

STORE ABOVE 32F AND BELOW
100F AT ALL TIMES

This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

21398

CERTIFICATE OF ANALYSIS

CUSTOMER

TENNESSEE VALLEY AUTHORITY
% OMEGA POINT LABORATORY
16015 SHADY FALLS RD.
ELMENDORF, TEXAS 78112

DATE OF SHIPMENT 18 AUGUST 1994
PURCHASE ORDER NO: TESTING/
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-05093	750 LB. (15 x 50 LB. PAILS	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 +

EXP. DATE: FEB. 1995

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: David O Bryant DATE: 18 AUGUST 1994 PAGE NO. 1

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21398

CERTIFICATE OF ANALYSIS

CUSTOMER

TENNESSEE VALLEY AUTHORITY
%OMEGA POINT LABORATORY
16015 SHADY FALLS RD.
ELMENDORF, TEXAS 78112

DATE OF SHIPMENT 18 AUGUST 1994
PURCHASE ORDER NO: TESTING/
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-08008	2250 LB. (45 x 50 LB. PAILS)	A-2	WT/GALLON	10.01	10.5 ± 1.5
		A-3	pH	8.31	8 +

EXP. DATE: FEB. 1995

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: Harold O'Bryant DATE: 18 AUGUST 1994 PAGE NO. 1

568

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1584X6	1	F94-02012
THERMO LAG RIBBED PANEL	1	F94-03028
NOMINAL 5/8"	4	F94-03047
4' x 6½'	7	F94-04005
	16	F94-07014
	1	F94-07023
	30 PANELS (ON 3 PALLETS)	

NO SHELF LIFE ON PANELS

This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
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PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 158400	1 PIECE	F92-08038
THERMO LAG PRESHAPED	1 PIECE	F92-10031
CONDUIT SECTIONS	4 PIECES	F94-06051
THICKNESS: 0.625" ± 0.125" NOMINAL	8 PIECES	F94-06082
SIZE: 4"	15 PIECES	F94-07003
	29 PIECES (IN 2 CARTONS)	

NO SHELF LIFE ON CONDUIT

This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

570

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 238100 THERMO LAG PRESHAPED CONDUIT SECTIONS THICKNESS: 0.375" ± 0.125" NOMINAL SIZE: 1"	7 PIECES 3 PIECES 10 PIECES (IN 1 CARTON)	F94-07023 F94-08003

NO SHELF LIFE ON CONDUIT

This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 158340 THERMO LAG PRESHAPED CONDUIT SECTIONS THICKNESS: 0.625" ± 0.125" NOMINAL SIZE: 3/4"	4 PIECES 6 PIECES 10 PIECES (IN 1 CARTON)	F94-02053 F94-03047

NO SHELF LIFE ON CONDUIT

This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

572

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 238340 THERMO LAG PRESHAPED CONDUIT SECTIONS THICKNESS: 0.375" ± 0.125" NOMINAL SIZE: 3/4"	10 PIECES (IN 1 CARTON)	F94-07014

NO SHELF LIFE ON CONDUIT

This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

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PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 158100	1 PIECE	F92-11009
THERMO LAG PRESHAPED CONDUIT	5 PIECES	F93-09045
SECTIONS	3 PIECES	F93-09047
THICKNESS: 0.625" ± 0.125" NOMINAL	1 PIECES	F94-06051
SIZE: 1"	10 PIECES (IN 1 CARTON)	

NO SHELF LIFE ON CONDUIT

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David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

574

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AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STRESS SKIN-ASTM E437 Type 304 stainless steel, plain weave 8x8 square mesh wire cloth 0.017 dia. wire	50 LBS. (IN 1 CARTON)	N/A

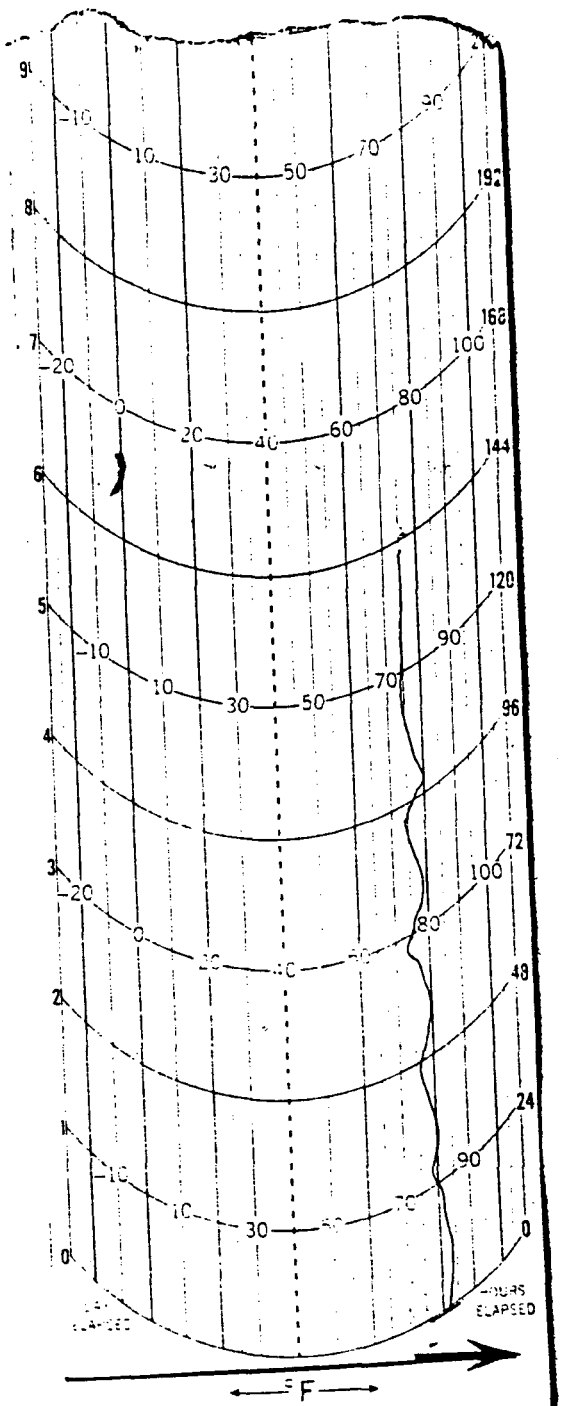
This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207



CAR NO.:
CITY: San Antonio, TX
CONSIGNEE: IVA/c/o Omega Point
CAR CONT.:
PER:
CITY: St. Louis
SHIPPER: IST
DATE: 7/18/94 TIME: 9:50
INSTR. NO.:

CHART 71

32 DAY (–30° + 110° F)

PART NO. 840-95

PARTLOW THERMA-GARD

NEW HARTFORD, N.Y. 13413

START

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1439 - 11960
DATE RECEIVED 9-26-94
DATE INSPECTED 9-26-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Thermo-Lag panel 1"X4'X6½'	NA	0	1	0	F94-08003	Y	N	Good	NONE	X			Thermo-Lag 330-1 trowel grade update 3/95
" "	NA	0	20	0	F94-08021	Y	Y	Good	None	X			
" "	NA	0	1	0	F94-08022	Y	Y	Good	None	X			
Thermo-Lag 770-1 Panels 3/8"X40"X94"	NA	0	11	0	F94-08026	Y	Y	Good	None	X			
" "	NA	0	19	0	F94-08030	Y	Y	Good	None	X			
Thermo-Lag Panel 5/8"X4'X6½'	NA	0	1	0	F94-08003	Y	Y	Good	None	X			
" "	NA	0	2	0	F94-08022	Y	Y	Good	None	X			
" "	NA	0	14	0	F94-08044	Y	Y	Good	None	X			
Stainless steel Banding ½"X0.20"X200'	NA	0	8 Rolls	0	NA	Y	Y	Good	None	X			
Stainless Steel Clips ½"	NA	0	1K	0	NA	Y	Y	Good	None	X			
Stainless Steel tie wire 16 gauge	NA	0	1 Roll	0	NA	Y	Y	Good	None	X			
Stress Skin-ASTM E437. 8X8 sq. mesh 0.017 dia	NA	0	1 Roll	0	NA	Y	Y	Good	None	X			
Thermo-Lag preshaped Conduit 5"	NA	0	5	0	F94-08003	Y	Y	Good	None	X			
" "	NA	0	11	0	F94-08021	Y	Y	Good	None	X			
Thermo-Lag 330-1 Trowel Grade	NA	0	10	0	94-08008	Y	Y	Good	None	X			
Temp recorder	NA	0	1	0	#41	Y	Y	Good	None	X			

FORM
1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TUA
CLIENT/PROJECT NUMBER 11960 - 97553-55
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1439 - 11960
DATE RECEIVED 9-26-94
DATE INSPECTED 9-26-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Thermo-Lag 770-1 Trowel grade	NA	0	20	0	94-09009	Y	Y	GOOD	None	X			Thermo-Lag 770-1 trowel grade expires 3/95

FORM
1/29/93

Page 2 of 2

5-17

STRAIGHT BILL OF LADING – SHORT FORM – ORIGINAL – NOT NEGOTIABLE

578

RECEIVED, subject to the classifications and tariffs in effect on the date of issue of this Original Bill of Lading,

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

From **THERMAL SCIENCE, INC.**
ST. LOUIS, MISSOURI 63026

CONTRACT ORDER NO. TV92362V

9/23 19 94 Shipper's No. 21467

Carrier DYNAMIC TRANSIT PREPAID Agent's No.

Consigned to OMEGA POINT LABORATORIES c/o TVA CONTACT NO. TV92362V
(Mail or street address of consignee—For purposes of notification only.)

Destination 16015 SHADY FALLS State of County of

Route ELMENDORFF, TX 78112

Delivering Carrier Vehicle or Car Initial No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Sub. to Correction)	Class or Rate	Check Column
3		PALLETS CONTAINING: THERMO LAG PANELS 22 PANELS NOMINAL 1" 4' x 6½' ITEM 01	4400#		
2		PALLETS CONTAINING: THERMO LAG PANELS 17 PANELS NOMINAL 5/8" 4'x6½' ITEM 02	1700#		
2		CARTONS CONTAINING: THERMO LAG PRESHAPED CONDUIT 16 PCS. 1.250" +-0.250" SIZE: 5" ITEM-03	200#		
2		PALLETS CONTAINING: THERMO LAG 770-1 PANELS 30 PANELS 3/8" NOM. 40"x94" NOM. ITEM 04	2250#		
		PALLETS CONTAINING: THERMO LAG 330-1 COATING-TROWEL GRADE 10 x 50 LB. PAILS ITEM 05 STORE ABOVE 32f AND BELOW 100F AT ALL TIMES	550#		
		PALLETS CONTAINING: THERMO LAG 770-1 COATING-TROWEL GRADE 20 x 50 LB. PAILS ITEM 06 STORE ABOVE 32f AND BELOW 100f AT ALL TIMES	1100#		
		STAINLESS STEEL BANDING ITEM 07 1/2" x 0.20" x 200 ft. 8 ROLLS	80#		
		STAINLESS STEEL CLIPS ½" ITEM 08 1000 clips (1 box)	10#		
		STAINLESS STEEL TIE WIRE ITEM 09 16 gauge 1 ROLL	10#		
		STRESS SKIN-ASTM E437 type 304 ITEM 10 stainless steel, plain weave 8 x 8 sq. mesh wire cloth 0.017 dia. wire 1 ROLL	25#		

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per
(Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per
(The signature here acknowledges only the amount prepaid.)

Charges Advanced:
$

C. O. D. SHIPMENT
C. O. D. Amt.
Collection Fee
Total Charges

† The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

† This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.
* If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
† Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.
NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed of declared value of the property is hereby specifically stated by the shipper to be not exceeding

THIS SHIPMENT IS CORRECTLY DESCRIBED.
CORRECT WEIGHT IS LBS.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation." NOTE: Preprinted certificate complying with 49 CFR 173, 430 (a) in effect on June 30, 1978, may be used through June 30, 1979.

Per Shipper

THERMAL SCIENCE, INC. Shipper, Per Agent, Per

Permanent post office address of shipper **2200 Cassens Dr., St. Louis, MO 63026**

TSI

PACKING LIST.

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES _____ GROSS WEIGHT 10,300 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO LAG RIBBED PANEL NOMINAL 1 " 4' x 6½'	1 PANEL	F94-08003
	20 PANELS	F94-08021
	1 PANEL	F94-08022
	22 PANELS (on 3 pallets)	

ITEM 01

NO SHELF LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓ THERMO-LAG 770-1 PANELS 3/8" NOMINAL 40" x 94" NOMINAL	11 PANELS 19 PANELS 30 PANELS (on 2 pallets)	F94-08026 F94-08030

ITEM 04

NO SHELF LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG RIBBED PANEL NOMINAL 5/8" 4' x 6½' NOMINAL	1 PANEL 2 PANELS 14 PANELS	F94-08003 F94-08022 F94-08044
	17 PANELS (on 2 pallets)	
ITEM 02		

NO SHELF LIFE FOR PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

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PACKING LIST

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓Stainless Steel Banding 1/2" x 0.20" x 200 ft. ITEM 07	8 ROLLS	N/A
✓Stainless steel clips 1/2" ITEM 08	1 BOX (1000 clips)	N/A
✓Stainless steel tie wire 16 gauge ITEM 09	1 ROLL	N/A

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
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PACKING LIST

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓STRESS SKIN-ASTM E437 type 304 stainless steel, plain weave 8 x 8 square mesh wire cloth 0.017 dia. wire, or equal.	1 ROLL	N/A

ITEM 10

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO-LAG Preshaped Conduit Sections Thickness: 1.250" ± 0.250" Size: 5"	5 PIECES 11 PIECES 16 PIECES (in 2 cartons)	F94-08003 F94-08021

Item 03

NO SHELF LIFE ON CONDUIT

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
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TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE	500 LBS. (10 x 50 Lb. Pails)	94-08008

ITEM 05

EXP. DATE: MARCH 1995

✓1 x 5 Gal. Pail containing
Temperature recorder

SHELF LIFE SIX MONTHS
FROM DATE OF SHIPMENT

STORE ABOVE 32F AND BELOW 100F
AT ALL TIMES

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT: 23 SEPTEMBER 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-08008	500 LBS. (10 x 50 Lb. Pails)	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 ÷

EXPIRATION DATE:

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: David O Bryant DATE: 23 Sept 1994

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO LAG 770-1 COATING TROWEL GRADE ITEM 06 EXP. DATE: MARCH 1995 1 x 5 Gal. Pail containing Temperature Recorder SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT STORE ABOVE 32F AND BELOW 100F AT ALL TIMES	1000 LBS. (20 x 50 Lb. Pails)	94-09009

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT 23 SEPTEMBER 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

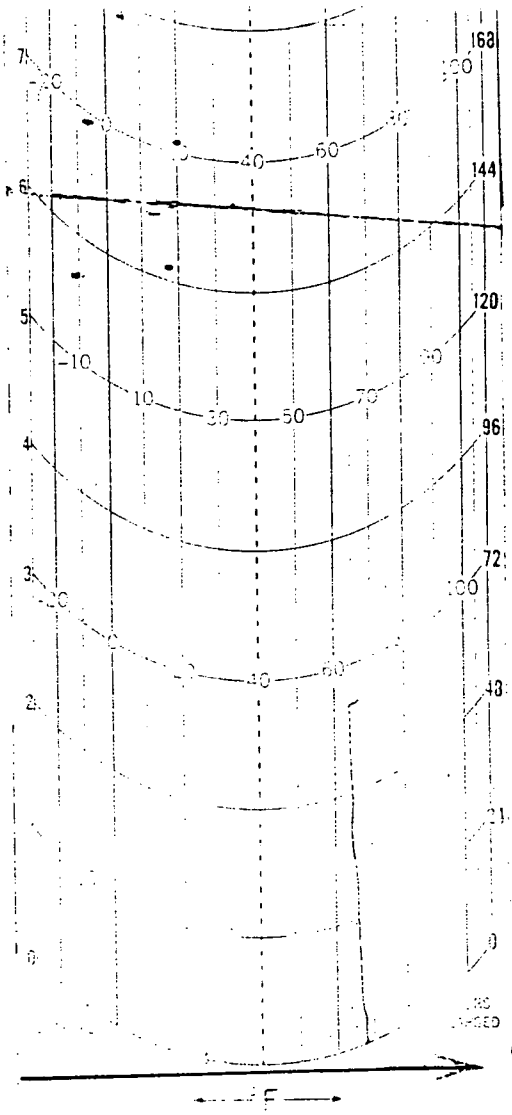
LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-09009	1000 LBS. (20 x 50 Lb. Pails)	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 +

EXPIRATION DATE:

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: David O Bryant DATE: 23 Sept 1994



CAR NO. _____

CITY San Antonio, Tx

CONSIGNEE: TVA / Omega Point

CAR CONT: _____

PER: _____

CITY: St. Louis

SHIPPER: TSL

DATE: 9-23-94 TIME: 10:15 am

INSTR. NO. _____

CHART 71

TO COMPOSE - ADVANCE CHART.

32 DAY (–30° + 110° F)

PART NO. 840-95

PARTLOW THERMA-GARD

NEW HARTFORD, N.Y. 13413

START

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Thermo-Lag 770

DATE PRINTED: 9/24/92
DATE REVISED: 1/15/91
By A. Thorpe

THERMAL SCIENCE, INC.
2200 Cassens Dr.
Fenton , MO 63026

PHONE: (314) 349-1233
EMERGENCY PHONE: (314) 349-1267

HMIS HAZARD RATINGS

LEAST	0	HEALTH HAZARD	2
SLIGHT	1	FLAMMABILITY HAZARD	0
MODERATE	2	REACTIVITY HAZARD	0
HIGH	3	MAXIMUM PERSONAL	
EXTREME	4	PROTECTION	B

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME:	Thermo-Lag 770	D.O.T. HAZARD CLASS:	none
		D.O.T. Shipping Name:	Cold Water Paint
PRODUCT CLASS :	Latex Fire Resistive Coating	D.O.T. UN Number:	none

SECTION II - PHYSICAL DATA

APPEARANCE AND ODOR :Milky white, pasty mastic, no odor.

BOILING POINT (at 760 mm Hg) :	220-240 F	SPECIFIC GRAVITY (water = 1):	1.16
VAPOR PRESSURE (at 20°C or 68°F):	nil	WEIGHT PER GALLON (lbs.) :	9.7
EVAPORATION RATE (ether = 1) :	much slower	PERCENT VOLATILES BY VOLUME:	40
VAPOR DENSITY (air = 1) :	0.6	SOLUBILITY IN WATER:	Yes
Volatile Organic Content (VOC) :	0.18 lb/gal	pH	7–8

SECTION III - HAZARDOUS COMPONENTS

TRADE NAME	CAS #	PERCENT BY VOLUME	OCCUPATIONAL EXPOSURE LIMITS OSHA PEL	ACGIH TLV
Ethylene Glycol	107-21-1	1.2 %		50 ppm
* Vinyl Acetate	108-05-4	<0.15	10 ppm 20ppm STEL	10 ppm 20ppm SHORT
Fibrous glass,continuous filament (total dust) (respirable dust)	65997-17-3	2 %	 15 mg/m^3 5 mg/m^3	 10 mg/m^3

* Indicates toxic chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372
Carcinogenicity of fibrous glass: NTP: No IARC: Yes Z List: No OSHA Reg: No
IARC categorized fibrous glass as not classifiable with respect to human carcinogenicity.
Vinyl Acetate Monomer, a residual componet of this product, is a possible human cancer hazard based on tests with laboratory animals. Vinyl Acetate has not been identified as a carcinogen by NTP, IARC or OSHA. Total residual monomer does not exceed 0.15%.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION
OSHA : Non-combustible
DOT Non-combustible

FLASH POINT : None
TEST METHOD:

FLAMMABILITY LIMITS LEL: Not Applicable UEL: Not Applicable

EXTINGUISHING MEDIA : Non-flammable (aqueous emulsion).

SPECIAL FIRE FIGHTING PROCEDURES :Wet Product will not burn but will smoke and spatter if exposed to flames. Firefighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS : Sealed containers may rupture if overheated. Cool with water spray.

HAZARDOUS DECOMPOSITION PRODUCTS : Thermal oxidative decomposition can produce toxic gases, including oxides of nitrogen and carbon monoxide.

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE STABLE	 X	CONDITIONS TO AVOID: Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID) : Strong Oxidizers, Strong Bases

HAZARDOUS POLYMERIZATION	MAY OCCUR WILL NOT OCCUR X	CONDITIONS TO AVOID : Not applicable

SECTION VI - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE :
Eyes: Direct contact with product may result in eye irritation.
Skin: Prolonged or repeated contact with product may cause skin irritation.
Breathing: Excessive inhalation can cause irritation of the mucous membranes of the nose, throat and respiratory tract, headache and nausea.
Swallowing: Excessive exposure may cause central nervous system effects, cardio-pulmonary effects, and kidney failure.

FIRST AID PROCEDURES :
If in Eyes: Flush with flowing water immediately and continuously for 15 minutes. Consult medical personnel.
If on Skin: Thoroughly wash exposed area with soap and water. Remove and wash contaminated clothing before reuse.. Consult medical personnel if swelling or reddening occurs.
If Swallowed: If conscious, give two glasses of water to drink. Get immediate medical attention.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED : Keep unnecessary people away. Contain spill with inert material (sand, earth, etc.) and transfer the material to containers for recovery or disposal. Keep spill out of sewers and open bodies of water. Floors may be slippery, care should be exercised to avoid falls.

WASTE DISPOSAL METHOD : Burn in adequate incinerator or bury in an approved landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE : Mechanical local exhaust at point of mist release is preferred.

RESPIRATORY PROTECTION : None required if good ventilation is maintained. Otherwise wear MSHA/NIOSH approved respirator suitable for vapor, mist or dust concentrations encountered.

PROTECTIVE GLOVES: Impervious, cotton lined rubber EYE PROTECTION: Safety glasses.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE : Use only with adequate ventilation. Prevent prolonged breathing of vapor or mist. Prevent contact with eyes. Do not take internally. Keep out of the reach of children.

STORAGE TEMP. MAX 100 F MIN 32 F

OTHER PRECAUTIONS :

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. It is the user's responsibility to determine the suitability of this information for the adoption of the necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Thermo-Lag 330-1

DATE PRINTED: 9/24/92
DATE REVISED: 7/7/89
By A. Thorpe

THERMAL SCIENCE, INC.
2200 Cassens Dr.
Fenton , MO 63026

PHONE: (314) 349-1233
EMERGENCY PHONE: (314) 349-1267

HMIS HAZARD RATINGS

LEAST	0	HEALTH HAZARD	2*
SLIGHT	1	FLAMMABILITY HAZARD	0
MODERATE	2	REACTIVITY HAZARD	0
HIGH	3	MAXIMUM PERSONAL	
EXTREME	4	PROTECTION	B

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: Thermo-Lag 330-1

PRODUCT CLASS : Latex Fire Resistive Coating

D.O.T. HAZARD CLASS: none
D.O.T. Shipping Name: Cold Water Paint
D.O.T. UN Number:

SECTION II - PHYSICAL DATA

APPEARANCE AND ODOR :Milky white pasty mastic, ammoniacal odor

BOILING POINT (at 760 mm Hg) :	220-240 F	SPECIFIC GRAVITY (water = 1):	1.3
VAPOR PRESSURE (at 20°C or 68°F):	nil	WEIGHT PER GALLON (lbs.) :	10.6
EVAPORATION RATE (ether = 1) :	much slower	PERCENT VOLATILES BY VOLUME:	45
VAPOR DENSITY (air = 1) :	0.6	SOLUBILITY IN WATER:	Very
Volatile Organic Content (VOC) :	< 0.1 lb/gal		

SECTION III - HAZARDOUS COMPONENTS

TRADE NAME	CAS #	PERCENT BY VOLUME	OCCUPATIONAL EXPOSURE LIMITS OSHA PEL	ACGIH TLV
Crystalline Silica (quartz)	14808-60-7	1-5 %		
(total dust)			30 mg/m^3 %SiO2 +2	
(respirable dust)			10 mg/m^3 %SiO2 +2	0.1 mg/m^3
Ammonia	1336-21-6	< 0.1 %	50 ppm	25 ppm
Fibrous glass,continuous filament	65997-17-3	1-5 %		
(total dust)			15 mg/m^3	10 mg/m^3
(respirable dust)			5 mg/m^3	

* Indicates toxic chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372
Carcinogenicity of Silica: NTP: No IARC: Yes Z List: Yes OSHA Reg: Not as carcinogen
Appears on Table Z-3 for Mineral Dusts in 29 CFR § 1910.1000
IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans(vol 42,1987) concludes that there is sufficient evidence for the carcinogenicity of crystalline silica to experimental animals, and there is limited evidence for the carcinogenicity of crystalline silica to humans. IARC Class 2A.
Carcinogenicity of fibrous glass: NTP: No IARC: Yes Z List: No OSHA Reg: No
IARC categorized fibrous glass as not classifiable with respect to human carcinogenicity.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION
OSHA : Non-combustible
DOT Non-combustible

FLASH POINT : None
TEST METHOD:

FLAMMABILITY LIMITS LEL: NA UEL: NA

EXTINGUISHING MEDIA : Non-flammable (aqueous emulsion).

SPECIAL FIRE FIGHTING PROCEDURES :Wet Product will not burn but will smoke and spatter if exposed to flames. Firefighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS : Sealed containers may rupture if overheated. Cool with water spray.

HAZARDOUS DECOMPOSITION PRODUCTS : Thermal oxidative decomposition can produce toxic gases, including oxides of nitrogen and carbon monoxide.

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE STABLE	 X	CONDITIONS TO AVOID: Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID) : Strong Oxidizers, Strong Bases

HAZARDOUS POLYMERIZATION	MAY OCCUR WILL NOT OCCUR X	CONDITIONS TO AVOID : Not applicable

SECTION VI - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE :
Eyes: Direct contact with product may result in eye irritation.
Skin: Prolonged or repeated contact with product may cause skin irritation.
Breathing: Excessive inhalation can cause irritation of the mucous membranes of the nose, throat and respiratory tract, headache and nausea.
Swallowing: Excessive exposure may cause central nervous system effects, cardio-pulmonary effects, and kidney failure.

FIRST AID PROCEDURES :
If in Eyes: Flush with flowing water immediately and continuously for 15 minutes. Consult medical personnel.
If on Skin: Thoroughly wash exposed area with soap and water. Remove and wash contaminated clothing before reuse. Destroy contaminated shoes. Consult medical personnel if swelling or reddening occurs.
If Swallowed: If conscious, give two glasses of water to drink. Get immediate medical attention.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED : Keep unnecessary people away. Contain spill with inert material (sand, earth, etc.) and transfer the material to containers for recovery or disposal. Keep spill out of sewers and open bodies of water. Floors may be slippery, care should be exercised to avoid falls.

WASTE DISPOSAL METHOD : Burn in adequate incinerator or bury in an approved landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE : Mechanical local exhaust at point of mist release is preferred.

RESPIRATORY PROTECTION : None required if good ventilation is maintained. Otherwise wear MSHA/NIOSH approved respirator suitable for vapor, mist or dust concentrations encountered.

PROTECTIVE GLOVES: Impervious, cotton lined rubber EYE PROTECTION: Safety glasses.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE : Use only with adequate ventilation. Prevent prolonged breathing of vapor or mist. Prevent contact with eyes. Do not take internally. Keep out of the reach of children.

STORAGE TEMP. MAX 100 F MIN 32 F

OTHER PRECAUTIONS :

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. It is the user's responsibility to determine the suitability of this information for the adoption of the necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1446 - 11960
DATE RECEIVED 10/11/94
DATE INSPECTED 10/11/94
INSPECTED BY: C Humphrey

ITEM NO.	ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS SEE	ACCEPTANCE Accept	Hold	Reject	REMARKS
1.	TEST ARTICLE 3 STEEL COLUMNS	N/A	0	3	0	SIZE 16" X 36"	N	N	GOOD	REMARKS NONE CH	X			TEST ARTICLES (ITEMS 1-6) REC'D WITH THIS SHPMT, BUT ARE NOT PART OF PROJECTS #97553 THRU #97555. RECEIVING VERIFICATION ONLY. CH
2.	TEST ARTICLE 1 STEEL COLUMN	N/A	0	1	0	SIZE 10" X 36"	N	N	"	"	X			
3.	TEST ARTICLE U SHAPE	N/A	0	1	0	CLADDED U-SHAPE	N	N	"	"	X			
4.	TEST ARTICLE CONDUIT 3"	N/A	0	1	0	3" X 10 FT CLADDED	N	N	"	"	X			
5.	TEST ARTICLE CONDUIT 1 1/2"	N/A	0	1	0	1 1/2" X 10FT CLADDED	N	N	"	"	X			
6.	TEST ARTICLE 18" CABLE TRAY	N/A	0	1	0	18" X 12 FT. CLADDED	N	N	"	"	X			
7.	THERMO-LAG 1" 330-1 PANELS	N/A	0	7	0	lot NUMBERS F94-08021	Y	Y	"	NONE	X			
	"	N/A	0	1	0	F94-08022	Y	Y	"	"	X			
8.	THERMO-LAG 330-1 TROWEL GRADE	N/A	0	10	0	94-08008	Y	Y	"	"	X			
9.	THERMO-LAG 770-1 TROWEL GRADE	N/A	0	20	0	94-09009	Y	Y	"	"	X			
10.	TEMPERATURE CHART RECORDER	N/A	0	1	0	CHART #27	N	N	"	RETURNED TO TSI	X			
11.	1" THERMO-LAG 330 CONDUIT SECTIONS	N/A	0	3	0	lot No. F92-06031	Y	Y	"	NONE	X			
	"	N/A	0	6	0	F93-06008	Y	Y	"	"	X			
	"	N/A	0	3	0	F93-06046	Y	Y	"	"	X			
	"	N/A	0	4	0	F93-09045	Y	Y	"	"	X			
	"	N/A	0	1	0	F93-09069	Y	Y	"	"	X			

FORM 1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1446-11960
DATE RECEIVED 10/11/94
DATE INSPECTED 10/11/94
INSPECTED BY: C. Humphrey

ITEM NO.	ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
11.	1" THERMO-LAG 330 CONDUIT SECTIONS	N/A	0	7	0	lot No. F94-08021	Y	Y	GOOD	NONE	X			CHART RECORDER RETURNED TO TSI. TEMPERATURES RECORDED ARE WITHIN ACCEPTABLE RANGE. C/H
12.	12" THERMO-LAG 330 CONDUIT SECTIONS	N/A	0	3	0	F94-08021	Y	Y	"	"	X			
	"	N/A	0	13	0	F94-08022	Y	Y	"	"	X			
13.	THERMO-LAG HIGH TEMP FABRIC	N/A	0	1	0	440-75 42" X 60YD.	Y	Y	"	"	X			RECEIVING VERIFICATION ONLY.

FORM
1/29/93

AMERICAN LOOSE LEAF BUSINESS PRODUCTS CO. BOSTON

STRAIGHT BILL OF LADING — SHORT FORM — ORIGINAL — NOT NEGOTIABLE

598

RECEIVED, subject to the classifications and tariffs in effect on the date of issue of this Original Bill of Lading,

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

From **THERMAL SCIENCE, INC.** TVA CONTRACT #92362V

At **ST. LOUIS, MISSOURI 63026** 10/7/94 19 ____ Shipper's No. 21494

Carrier DYNAMIC TRUCK PREPAID Agent's No. ____

Consigned to TENNESSEE VALLEY AUTHORITY % OMEGA POINT LABORATORY
(Mail or street address of consignee—For purposes of notification only.)

Destination 16015 SHADY FALLS ROAD State of ____ County of ____

Route ____

Delivering Carrier ELMENDORFF, TX 78112 Vehicle or Car Initial ____ No. ____

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Sub. to Correction)	Class or Rate	Check Column
1		PALLET CONTAINING 3 COLUMNS 16 x 50 1 COLUMN 10 x 49 3 FT. LONG (ED TAYLOR)	800 Lb		
1		PALLET CONTAINING 3 INCH CONDUIT U SHAPE TEST ARTICLE	400 LB.		
1		PALLET CONTANING: 3 INCH CONDUIT 10 FT. STRAIGHT 1½ INCH CONDUIT 10 FT. STRAIGHT	100 LB		
1		PALLET CONTAINING: 18 INCH CABLE TRAY 12 FT	500 LB.		
		TVA ORDER/ 21494			
1		PALLET CONTAINING: 8 PANELS SIZE: 4' x 6½' NOMINAL THICKNESS: 1.25" + 0.250" ITEM 1	1800 LB.		
1		PALLET CONTANINING: 10 x 50 LB. PAILS THERMO LAG 330-1 SUBLIMING COATING ITEM 5 20 x 50 LB. PAILS THERMO LAG XXXX 770-1 COATING ITEM 6 1 x 5 gal. pail CONT. TEMP. RECORDER STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES	1750 LB.		
1		CARTONS OF THERMO LAG 330 PRESHAPED CONDUIT SIZE 1" x 250" 24 Pcs. (11) CARTON OF 2" x 1.250" 16 Pc. (12)	125 lb. 100 Lb.		
1		CARTON CONTAINING: 1 ROLL THERMO LAG 440-75 HI TEMP FABRIC SIZE: 42 INCH X 60 YDS. 30 LB.			

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per ____
(Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

PPd

Received $ ____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per ____
(The signature here acknowledges only the amount prepaid.)

Charges Advanced:
$ ____

† The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

† This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

* If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

† Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.

NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The ____ of declared value of the property is hereby specifically stated by the shipper to be not exceeding ____

THIS SHIPMENT IS CORRECTLY DESCRIBED.

CORRECT WEIGHT IS ____ LBS.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation." NOTE: Preprinted certificates complying with 49 CFR 173, 430 (a) in effect on June 30, 1976, may be used through June 30, 1979.

Per ____ Shipper

C. O. D. SHIPMENT

C. O. D. Amt. ____

Collection Fee ____

Total Charges ____

THERMAL SCIENCE, INC. Shipper, Per Jane Elizalde Agent, Per ____

Permanent post office address of shipper **2200 Cassens Dr., St. Louis, MO 63026**

THERMAL SCIENCE INC.

PACKING LIST

SHIP TO:

OMEGA POINT LAB.
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

P.O.# TEST ARTICLE
RELEASE NO:
DATE: 7 OCTOBER 1994
BILL OF LADING:
MODE: TRUCK LINE
CARRIER: DYNAMIC TRUCK PPD

TEMPERATURE RECORDER NO: NA
CHART TAPE NO: NA

TOTAL NO. OF PACKAGES: 3 PALLETS
GROSS WEIGHT: 1000 LBS

PRODUCT DESCRIPTION	NET QUANITY	BATCH LOT NUMBER	NUMBER OF ITEMS PER BATCH/LOT
TEST ARTICLES			
3 INCH CONDUIT U SHAPE (ON 1 PALLET	1	NA	1
3 INCH CONDUIT STRAIGHT 10 FT.	1	NA	1
1½ INCH CONDUIT STRAIGHT 10 FT. (ON 1 PALLET	1	NA	1
18 INCH CABLE TRAY 12 FT. (ON 1 PALLET	1	NA	1

Scott Pozarek
HEAD OF SHIPPING

THERMAL SCIENCE INC.

PACKING LIST

SHIP TO:

OMEGA POINT LAB.
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

P.O.# TEST ARTICLE
RELEASE NO:
DATE: 7 OCTOBER 1994
BILL OF LADING:
MODE: TRUCK LINE
CARRIER: DYNAMIC TRUCK PPD

TEMPERATURE RECORDER NO: NA
CHART TAPE NO: NA

TOTAL NO. OF PACKAGES: 1 PALLET
GROSS WEIGHT: 800 LB. LBS

PRODUCT DESCRIPTION	NET QUANITY	BATCH LOT NUMBER	NUMBER OF ITEMS PER BATCH/LOT
COLUMNS 16 X 50	3	NA	3
10 X 49	1	NA	1
3 FOOT LONG/			
(ED TAYLOR)			

Scott Pozarek
HEAD OF SHIPPING

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER 007763 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES 5 PCS. GROSS WEIGHT 3805 LB.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330 PREFABRICATED PANELS SIZE: 4' x 6½' NOMINAL THICKNESS: 1.250" ± 0.250"	7 PANELS	F94-08021
	1	F94-08022
ITEM 1	8 PANELS (ON 1 PALLET)	

NO SHELF LIFE ON PANEL

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER SEE PAGE 1 CHART TAPE NO. SEE PAGE 1

TOTAL NO. OF PACKAGES SEE PAGE 1 GROSS WEIGHT SEE PAGE 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE ITEM 5 EXP. DATE: MARCH 1995 1 x 5 gal. pail containing temp. recorder SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES	500 LB. (10 x 50 LB. PAILS)	94-08008

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

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Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER SEE PAGE 1 CHART TAPE NO. SEE PAGE 1

TOTAL NO. OF PACKAGES SEE PAGE 1 GROSS WEIGHT SEE PAGE 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 770-1 COATING	1000 LB.	94-09009
TROWEL GRADE	(20 x 50 LB. PAILS)	
ITEM 6		
EXP. DATE: MARCH 1995		
SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT		
STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES		

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCT. 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

21494

CERTIFICATE OF ANALYSIS

CUSTOMER

TENNESSEE VALLEY AUTHORITY
OMEGA POINT LABORATORY
16015 SHADY FALLS ROAD
ELMENDORFF, TX 78112

DATE OF SHIPMENT 7 OCTOBER 1994
PURCHASE ORDER NO: CONTRACT TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-08008	500 LB. (10 x 50 Lb. PAILS)	A-2	WT/GALLON	10.01	10.5 ± 1.5
		A-3	pH	8.31	8 +

EXP. DATE: MARCH 1995

ITEM 5

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: David O Bryant DATE: 7 OCTOBER 1994 PAGE NO. 1

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER SEE PAGE 1 CHART TAPE NO. SEE PAGE 1

TOTAL NO. OF PACKAGES SEE PAGE 1 GROSS WEIGHT SEE PAGE 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330 PRESHAPED CONDUIT SECTION	3 PCS.	F92-06031
	6	F93-06008
	3	F93-06046
SIZE: 1"	4	F93-09045
THICKNESS: 1.250" ± 0.250"	1	F93-09069
	7	F94-0802i
ITEM 11	24 PCS.	
NO SHELF LIFE ON CONDUIT	(IN 1 CARTON)	

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER SEE PAGE 1 CHART TAPE NO. SEE PAGE 1

TOTAL NO. OF PACKAGES SEE PAGE 1 GROSS WEIGHT SEE PAGE 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330 PRESHAPED CONDUIT SECTIONS	3 PIECES	F94-08021
	13	F94-08022
SIZE: 2" THICKNESS: 1.250" ± 0.250"	16 PCS. (IN 1 CARTON)	
NO SHELF LIFE ON CONDUIT		
ITEM 12		

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER SEE PAGE 1 CHART TAPE NO. SEE PAGE 1

TOTAL NO. OF PACKAGES SEE PAGE 1 GROSS WEIGHT SEE PAGE 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 440-75 HIGH TEMPERATURE FABRIC	1 ROLL	NA

SIZE: 42 INCH WIDE X 60 YDS.

ITEM 14

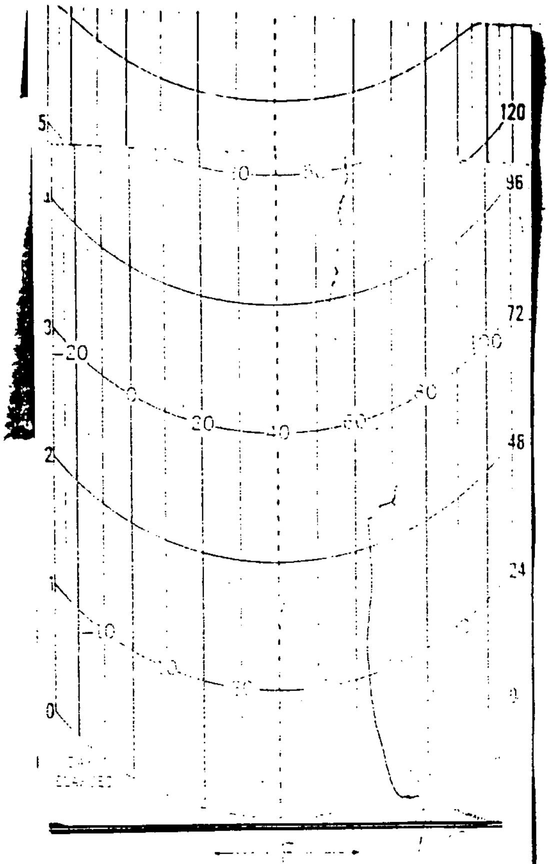
This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207



CAR No.

CITY: San Antonio, TX.

CONSIGNEE: TVA - Omaha - [illegible]

CAR CONT.

PER:

CITY: St. Louis

SHIPPER: TSI

DATE: 10-8-94 TIME 8215

INSTR. No.

CHART 27

2. FILL IN DATA

1. LOAD CARTRIDGE

32 DAY (-30° + 110° F)

PART NO. 840-95

PARTLOW THERMA-GARD

NEW HARTFORD, N.Y. 13413

START

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ThermoLag 330-1

DATE PRINTED.: 8/24/89
DATE REVISED: 7/7/89
By A. Thorpe

THERMAL SCIENCE INC
2200 Cassens Dr
Fenton , MO 63026
PHONE: (314) 349-1233
EMERGENCY PHONE: (314) 349-1267

HMIS HAZARD RATINGS			
LEAST	0	HEALTH HAZARD	2*
SLIGHT	1	FLAMMABILITY HAZARD	0
MODERATE	2	REACTIVITY HAZARD	0
HIGH	3	MAXIMUM PERSONAL PROTECTION	B
EXTREME	4		

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: Thermolag 330-1

PRODUCT CLASS : Latex Fire Resistive Coating

D.O.T. HAZARD CLASS: none
D.O.T. Shipping Name: Cold Water Paint
D.O.T. UN Number:

SECTION II - PHYSICAL DATA

APPEARANCE AND ODOR :Milky white pasty mastic, ammoniacal odor

BOILING POINT (at 760 mm Hg) : 220-240 F
VAPOR PRESSURE (at 20C or 68F): nil
EVAPORATION RATE (ether = 1) much slower
VAPOR DENSITY (air = 1) : 0.6
Volatile Organic Content (VOC) : < 0.1 lb/gal

SPECIFIC GRAVITY (water = 1): 1.3
WEIGHT PER GALLON (lbs.) : 10.6
PERCENT VOLATILES BY VOLUME: 45
SOLUBILITY IN WATER: Very

SECTION III - HAZARDOUS COMPONENTS

TRADE NAME	CAS #	PERCENT BY VOLUME	OCCUPATIONAL EXPOSURE LIMITS OSHA PEL	ACGIH TLV
Crystalline Silica (quartz) (total dust)	14808-60-7	1-5 %	30 mg/m^3 %SiO2 +2	
(respirable dust)			10 mg/m^3 %SiO2 +2	0.1 mg/m^3
Ammonia	1336-21-6	< 0.1 %	50 ppm	25 ppm
Fibrous glass,continuous filament (total dust)	65997-17-3	1-5 %	15 mg/m^3	10 mg/m^3
(respirable dust)			5 mg/m^3	

* Indicates toxic chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372
Carcinogenicity of Silica: NTP: No IARC: Yes Z List: Yes OSHA Reg: Not as carcinogen
Appears on Table Z-3 for Mineral Dusts in 29 CFR § 1910.1000
IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans(vol 42,1987) concludes that there is sufficient evidence for the carcinogenicity of crystalline silica to experimental animals, and there is limited evidence for the carcinogenicity of crystalline silica to humans. IARC Class 2A.
Carcinogenicity of fibrous glass: NTP: No IARC: Yes Z List: No OSHA Reg: No
IARC categorized fibrous glass as not classifiable with respect to human carcinogenicity.

MATERIAL SAFETY DATA SHEET PRODUCT NAME: ThermoLag 330-1

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION
OSHA : Non-combustible
DOT : Non-combustible

FLASH POINT : None
TEST METHOD:

FLAMMABILITY LIMITS LEL: NA UEL: NA

EXTINGUISHING MEDIA :

SPECIAL FIRE FIGHTING PROCEDURES :Wet Product will not burn but will smoke and spatter if exposed to flames. Firefighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS : Sealed containers may rupture if overheated. Cool with water spray.

HAZARDOUS DECOMPOSITION PRODUCTS : Thermal oxidative decomposition can produce toxic gases, including oxides of nitrogen and carbon monoxide.

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE STABLE	X	CONDITIONS TO AVOID: Not applicable
INCOMPATIBILITY (MATERIALS TO AVOID) : Strong Oxidizers, Strong Bases			
HAZARDOUS POLYMERIZATION	MAY OCCUR WILL NOT OCCUR	X	CONDITIONS TO AVOID : Not applicable

SECTION VI - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See HAZARDOUS COMPONENTS list in Section III.

EFFECTS OF OVEREXPOSURE :
Eyes: Direct contact with product may result in eye irritation.
Skin: Prolonged or repeated contact with product may cause skin irritation.
Breathing: Excessive inhalation can cause irritation of the mucous membranes of the nose, throat and respiratory tract, headache and nausea.
Swallowing:

FIRST AID PROCEDURES :
If in Eyes: Flush with flowing water immediately and continously for 15minutes. Consult medical personnel.
If on Skin: Thoroughly wash exposed area with soap and water. Remove and wash contaminated clothing before reuse. Destroy contaminated shoes. Consult medical personnel if swelling or reddening occurs.
If Swallowed: If conscious, give two glasses of water to drink. Get immediate medical attention.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED : Keep unnecessary people away. Contain spill with inert material (sand, earth, ect) and transfer the material to containers for recovery or disposal. Keep spill out of sewers and open bodies of water. Floors may be slippery, care should be exercized to avoid falls.

WASTE DISPOSAL METHOD : Burn in adaquate incinerator or bury in an approved landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE : Mechanical local exhaust at point of mist release is preferred.

RESPIRATORY PROTECTION : None required if good ventilation is maintained. Otherwise wear MSHA/NIOSH approved respirator suitable for vapor, mist or dust concentrations encountered.

PROTECTIVE GLOVES : Impervious, cotton lined rubber EYE PROTECTION : Safety glasses.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE : Use only with adaquate ventilation. Prevent prolonged breathing of vapor or mist. Prevent contact with eyes. Do not take internally. Keep out of the reach of children.

STORAGE TEMP. MAX 100 F MIN 32 F

OTHER PRECAUTIONS :

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. It is the user's responsibility to determine the suitability of this information for the adoption of the necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Thermo-Lag 770

DATE PRINTED: 9/24/92
DATE REVISED: 1/15/91
By A. Thorpe

THERMAL SCIENCE, INC.
2200 Cassens Dr.
Fenton , MO 63026

PHONE: (314) 349-1233
EMERGENCY PHONE: (314) 349-1267

HMIS HAZARD RATINGS

LEAST	0	HEALTH HAZARD	2
SLIGHT	1	FLAMMABILITY HAZARD	0
MODERATE	2	REACTIVITY HAZARD	0
HIGH	3	MAXIMUM PERSONAL	
EXTREME	4	PROTECTION	B

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME:	Thermo-Lag 770	D.O.T. HAZARD CLASS:	none
		D.O.T. Shipping Name:	Cold Water Paint
PRODUCT CLASS :	Latex Fire Resistive Coating	D.O.T. UN Number:	none

SECTION II - PHYSICAL DATA

APPEARANCE AND ODOR :Milky white, pasty mastic, no odor.

BOILING POINT (at 760 mm Hg) :	220-240 F	SPECIFIC GRAVITY (water = 1):	1.16
VAPOR PRESSURE (at 20°C or 68°F):	nil	WEIGHT PER GALLON (lbs.) :	9.7
EVAPORATION RATE (ether = 1) :	much slower	PERCENT VOLATILES BY VOLUME:	40
VAPOR DENSITY (air = 1) :	0.6	SOLUBILITY IN WATER:	Yes
Volatile Organic Content (VOC) :	0.18 lb/gal	pH	7–8

SECTION III - HAZARDOUS COMPONENTS

TRADE NAME	CAS #	PERCENT BY VOLUME	OCCUPATIONAL EXPOSURE LIMITS OSHA PEL	ACGIH TLV
Ethylene Glycol	107-21-1	1.2 %		50 ppm
* Vinyl Acetate	108-05-4	<0.15	10 ppm 20ppm STEL	10 ppm 20ppm SHORT
Fibrous glass,continuous filament (total dust) (respirable dust)	65997-17-3	2 %	 15 mg/m^3 5 mg/m^3	 10 mg/m^3

* Indicates toxic chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372
Carcinogenicity of fibrous glass: NTP: No IARC: Yes Z List: No OSHA Reg: No
IARC categorized fibrous glass as not classifiable with respect to human carcinogenicity.
Vinyl Acetate Monomer, a residual componet of this product, is a possible human cancer hazard based on tests with laboratory animals. Vinyl Acetate has not been identified as a carcinogen by NTP, IARC or OSHA. Total residual monomer does not exceed 0.15%.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION
OSHA : Non-combustible
DOT Non-combustible

FLASH POINT : None
TEST METHOD:

FLAMMABILITY LIMITS LEL: Not Applicable UEL: Not Applicable

EXTINGUISHING MEDIA : Non-flammable (aqueous emulsion).

SPECIAL FIRE FIGHTING PROCEDURES :Wet Product will not burn but will smoke and spatter if exposed to flames. Firefighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS : Sealed containers may rupture if overheated. Cool with water spray.

HAZARDOUS DECOMPOSITION PRODUCTS : Thermal oxidative decomposition can produce toxic gases, including oxides of nitrogen and carbon monoxide.

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE STABLE	X	CONDITIONS TO AVOID: Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID) : Strong Oxidizers, Strong Bases

HAZARDOUS POLYMERIZATION	MAY OCCUR WILL NOT OCCUR X	CONDITIONS TO AVOID : Not applicable

SECTION VI - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE :
Eyes: Direct contact with product may result in eye irritation.
Skin: Prolonged or repeated contact with product may cause skin irritation.
Breathing: Excessive inhalation can cause irritation of the mucous membranes of the nose, throat and respiratory tract, headache and nausea.
Swallowing: Excessive exposure may cause central nervous system effects, cardio-pulmonary effects, and kidney failure.

FIRST AID PROCEDURES :
If in Eyes: Flush with flowing water immediately and continuously for 15 minutes. Consult medical personnel.
If on Skin: Thoroughly wash exposed area with soap and water. Remove and wash contaminated clothing before reuse. . Consult medical personnel if swelling or reddening occurs.
If Swallowed: If conscious, give two glasses of water to drink. Get immediate medical attention.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED : Keep unnecessary people away. Contain spill with inert material (sand, earth, etc.) and transfer the material to containers for recovery or disposal. Keep spill out of sewers and open bodies of water. Floors may be slippery, care should be exercised to avoid falls.

WASTE DISPOSAL METHOD : Burn in adequate incinerator or bury in an approved landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE : Mechanical local exhaust at point of mist release is preferred.

RESPIRATORY PROTECTION : None required if good ventilation is maintained. Otherwise wear MSHA/NIOSH approved respirator suitable for vapor, mist or dust concentrations encountered.

PROTECTIVE GLOVES: Impervious, cotton lined rubber EYE PROTECTION: Safety glasses.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE : Use only with adequate ventilation. Prevent prolonged breathing of vapor or mist. Prevent contact with eyes. Do not take internally. Keep out of the reach of children.

STORAGE TEMP. MAX 100 F MIN 32 F

OTHER PRECAUTIONS :

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. It is the user's responsibility to determine the suitability of this information for the adoption of the necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97553-555
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1448 - 11960
DATE RECEIVED 10-14-94
DATE INSPECTED 10-14-94
INSPECTED BY: Cleda Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	CONtD MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Thermo Lag 770-1 Panels	NA	0	5	0	F94-08026	Y	Y	GOOD	None	X			Receiving verification only.
" "	"	0	40	0	F94-08030	Y	Y	GOOD	None	X			
" "	"	0	18	0	F94-09009	Y	Y	GOOD	None	X			
Thermo Lag Pre Shaped Conduit 4"	NA	0	8	0	F94-08021	Y	Y	GOOD	None	X			

FORM
1/29/93

...Impression, and retained by the Agent.

C-6

RECEIVE, subject to the classifications and tariffs in effect on the date of the issue of this Shipping Order,

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

From THERMAL SCIENCE, INC. ST. LOUIS, MISSOURI 63026 — 10/12/ 19 94 — Shipper's No.

Carrier DYNAMIC TRUCK PREPAID — Agent's No.

Consigned to TENNESSEE VALLEY AUTHORITY % OMEGA POINT LAB

(Mail or street address of consignee—For purposes of notification only.)

Destination 16015 SHADY FALLS RD — State of — County of

Route ELMENDORFF, TX 78112

Delivering Carrier — Vehicle or Car Initial — No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Sub. to Correction)	Class or Rate	Check Column
4		PALLETS CONTAINING: 63 PANELS - THERMO-LAG 770-1 panels SIZE: 40 INCH X 94 INCH THICKNESS: 3/8 INCH ITEM 4	4800 LB.		
1		CARTON CONTAINING: 8 PCS. - THERMO-LAG 330 PRESHAPED CONDUIT SECTIONS SIZE: 4 INCH THICKNESS: 1.250" ± 0.250" ITEM 13			
		DELIVER THURSDAY 10/13/94 SURE !!!!!!!			

2

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per _____ (Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Prepaid

Received $ _____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per _____ (The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$ _____

C. O. D. SHIPMENT

C. O. D. Amt. _____

Collection Fee _____

Total Charges _____

† The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

† This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

* If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

† Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.

NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed of declared value of the property is hereby specifically stated by the shipper to be not exceeding _____

THIS SHIPMENT IS CORRECTLY DESCRIBED.

CL [redacted] WEIGHT IS _____ LBS.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation." NOTE: Preprinted certificates complying with 49 CFR 173, 430 (a) in effect on June 30, 1978, may be used through June 30, 1979.

Per _____ Shipper

THERMAL SCIENCE, INC. Shipper, Per _____

Permanent post office address of shipper **2200 Cassens Dr., St. Louis, MO 63026**

Agent must detach and retain this Shipping Order and must sign the Original Bill of Lading.

50-390 TVA WATTS BAR 1

PHASE 2 THERMO-LAG FIRE BARRIER
QUALIFICATION FIRE TEST RESULTS

REC'D W/LTR DTD 12/23/94....9501120202

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: OCTOBER 1994

TEMPERATURE RECORDER NA CHART TAPE NO. NA

TOTAL NO. OF PACKAGES 5 PIECES GROSS WEIGHT 5000 LB.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 770-1 PANELS SIZE: 40 INCH X 94 INCH THICKNESS: 3/8 INCH	5 PANELS	F94-08026
	40	F94-08030
	18	F94-09009
	63 PANELS	

ITEM 4

NO SHELF LIFE ON PANEL

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 12 OCTOBER 1994
BILL OF LADING: 21499
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: OCTOBER 1994

TEMPERATURE RECORDER NA CHART TAPE NO. NA

TOTAL NO. OF PACKAGES SEE PAGE 1 GROSS WEIGHT SEE PAGE 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330 PRESHAPED CONDUIT SECTION	8 PCS.	F94-08021
SIZE: 4 INCH THICKNESS: 1.250" ± 0.250"	8 PCS. (IN 1 CARTON)	
ITEM 13		
NO SHELF LIFE ON CONDUIT		

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 12 OCTOBER 1994
BILL OF LADING: 21499
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

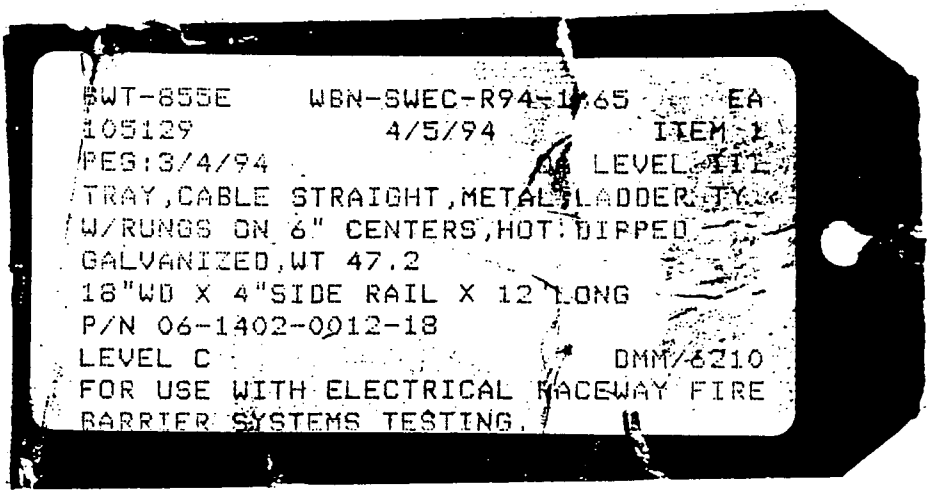
Q/A RECEIVING REPORT

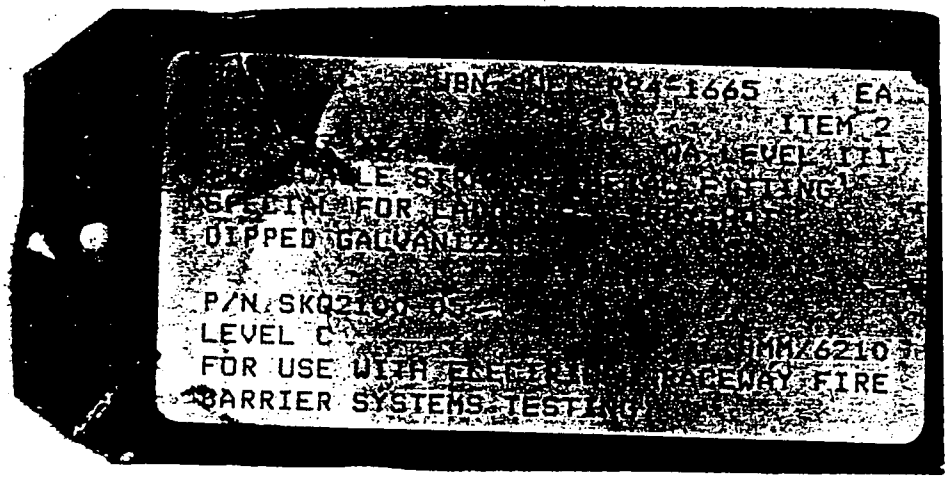
CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11210/TBD
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1384 - 11210
DATE RECEIVED 5-23-94
DATE INSPECTED 5-31-94
INSPECTED BY:

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
galv. Double Crosses	NA	0	6	0	SKQ2100-05	Y	N	Poor	None	X			Receiving Verification only; material used upon delivery; 6 pieces were damaged (4) double crosses and (2) ladders
galv. ladders	NA	0	5	0	06-1402-0012-18	Y	N	Poor	None	X			

FORM
1/29/93


SWT-855E WBN-SWEC-R94-1665 EA
105129 4/5/94 ITEM 1
PEG:3/4/94 QA LEVEL III
TRAY,CABLE STRAIGHT,METAL LADDER TY.
W/RUNGS ON 6" CENTERS,HOT DIPPED
GALVANIZED,WT 47.2
18"WD X 4"SIDE RAIL X 12 LONG
P/N 06-1402-0012-18
LEVEL C DMM/6210
FOR USE WITH ELECTRICAL RACEWAY FIRE
BARRIER SYSTEMS TESTING.


EA
ITEM 2
QA LEVEL III
LEVEL C
DMM/6210
FOR USE WITH
RACEWAY FIRE

SHAUDY FALLS RD 8 OU
ELMENDORF TX 78112
05916702
PO# NONE
20

264/06 OVNT
FREIGHT BILL NUMBER 345 608 583
CITY RTE/BYD SCAC 2M
DEST SNT
OVERNITE PHONE NUMBER (210)662-0966
PICK UP DATE 05/16/94
ORIG KNX

TENNESSEE VALLEY AUTHORITY 345 608
WATTS BAR NUCLEAR PLANT
SPRING CITY TN 37381
00994265
ADV CAR NONE
BL#
AD
OV 61.75
BD

Peggy

OVERNITE TRANSPORTATION COMPANY

345 608 583

COLLECT THIS AMOUNT $6
DRIVER COL

# PCS	HM	PT	DESCRIPTION OF ARTICLES AND SPECIAL MARKINGS	WEIGHT	NMFC	RATE	CHARGES
2		SK	2 HANDLING UNIT(S) CABLE TRAYS 58.00% DISCOUNT 80205	300	061220-02	49.01 LESS	147. 85.

OVERNITE

1 pcs Banded Damage
1 loose upon Del

TTL PCS 2 | TTL WT 300

DELIVERY EXCEPTIONS

SIGNATURE | FIRM | ODOM 009 | ARRIVE 9:16 | DEPART 9:45 | TOTAL CHARGES 61.75 C

RECEIVED THE ABOVE PROPERTY IN GOOD CONDITION EXCEPT AS NOTED

DATE 5-23-94 | PCS 1 | INITIALS RDW

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TS1/TVA
CLIENT/PROJECT NUMBER 11960-97185, 86687
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1396 . 11960
DATE RECEIVED 7-15-94
DATE INSPECTED 7-15-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
1" C-Clamps	NA	0	16	0	512	Y	N	Good	None	X			Receiving verification Only.
2" C-Clamps	NA	0	16	0	515	Y	N	good	None	X			
2.5" C-Clamps	NA	0	3	0	516	Y	N	good	None	X			
3" C-Clamps	NA	0	12	0	517	X	N	good	None	X			
4" C-Clamps	NA	0	53	0	519	Y	N	good	None	X			
5" C-Clamps	NA	0	3	0	520	X	N	good	None	X			
Junction Box	NA	0	2	0	A3L60436124	Y	N	good	None	X			
3/4" 90° steel	NA	0	1	0	GAL34ELL	Y	N	good	None	X			
3/4" 90° Alum	NA	0	1	0	AL434ELL	X	N	good	None	X			
1" Cap	NA	0	2	0	PLG100R	Y	N	good	None	X			
2" Cap	NA	0	5	0	PLG200A	X	N	good	None	X			
3" Cap	NA	0	1	0	PLG300A	Y	N	good	None	X			
3/4" Alum Coupling	NA	0	2	0	NA	Y	N	good	None	X			
4" LB's (conduit outlets) w/covers + gaskets	NA	0	7	0	NA	X	N	good	None	X			

FORM
1/29/93

SHIPPING TICKET

623

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR ATHENS, AL 35611 7/14 19 94

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER-NGR-N6P8-BFNP

SHIP TO
OMEGA POINT LAB
16015 SHADY FALLS ROAD
ELKENDORF, TX 78112-9784

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)
DEBIT

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1		CONDUIT, C-CLAMP, 1", #512		16	EA		
2		CONDUIT C-CLAMP, 2", #515		16	EA		
3		CONDUIT C-CLAMP, 2.5", #516		3	EA		
4		CONDUIT C-CLAMP, 3", #517		12	EA		
5		CONDUIT C-CLAMP, 4", #519		53	EA		
6		CONDUIT C-CLAMP, 5", 520		3	EA		
7		JUNCTION BOX, #A3L60H3612LP		2	EA		
8		ELBOW, 90 DEG, 3/4", STEEL, #GAL34ELL		1	EA		
9		ELBOW, 90 DEG, 3/4", ALUM, #ALU34ELL		1	EA		
10		ELBOW, 90 DEG, 4", STEEL, #GAL4ELL		7	EA		
11		CAP, 1", #PLG100R		2	EA		
12		CAP, 2", #PLG200A		5	EA		
		CAP, 3", #PLG300A		1	EA		
		COUPLING, 3/4", ALUMINUM		2	EA		
15		CONDUIT OUTLET, 4"		7	EA		

QA-G

REF: 1023000

FOR THERMO-LAG FIRE TESTING

3 PALLETS @ 1056LB

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 7/14/19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT FED EX

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER DTR
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

0115008526

TRACKING NUMBER

624

RECIPIENT'S COPY

1 Date: 7-14-94

From (Your Name) Please Print: DANNY T. ROBINSON

Your Phone Number (Very Important): (205-729-4641

Company: TVA/BROWNS FERRY NUCLEAR PLT

Department/Floor No.:

Street Address: BROWNS FERRY ROAD

City: ATHENS

State: AL

ZIP Required: 35611

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

2 To (Recipient's Name) Please Print:

Recipient's Phone Number (Very Important): ( )

Company: OMEGA POINT LAB

Department/Floor No.:

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 16015 SHADY FALLS ROAD

City: ELMENDORF

State: TX

ZIP Required: 78112-9784

3 PAYMENT
- 1 [X] Bill Sender
- 2 [ ] Bill Recipient's FedEx Acct. No.
- 3 [X] Bill 3rd Party FedEx Acct. No.
- 4 [ ] Bill Credit Card
- 5 [ ] Cash/Check

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here

Street Address:

City: State: ZIP Required:

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)
- 11 [ ] OTHER PACKAGING
- 16 [ ] FEDEX LETTER*
- 12 [ ] FEDEX PAK*
- 13 [ ] FEDEX BOX
- 14 [ ] FEDEX TUBE

Standard Overnight (Delivery by next business afternoon. No Saturday delivery†)
- 51 [ ] OTHER PACKAGING
- 56 [ ] FEDEX LETTER*
- 52 [ ] FEDEX PAK*
- 53 [ ] FEDEX BOX
- 54 [ ] FEDEX TUBE

Economy Two-Day (Delivery by second business day †)
- 30 [ ] ECONOMY**

* Economy Letter Rate not available. Minimum charge. One pound Economy rate.

Government Overnight (Restricted for authorized users only)
- 46 [ ] GOVT LETTER
- 41 [ ] GOVT PACKAGE

Freight Service (For packages over 150 lbs.)
- 70 [ ] OVERNIGHT FREIGHT** (Confirmed reservation required)
- 80 [X] TWO-DAY FREIGHT**

† Delivery commitment may be later in some areas.

** Declared value limit $500. Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
- [X] HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
- 2 [X] DELIVER WEEKDAY

Saturday Service
- 31 [ ] HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
- 3 [ ] DELIVER SATURDAY (Extra charge) (Not available to all locations)
- 9 [ ] SATURDAY PICK-UP (Extra charge)

Special Handling
- 4 [ ] DANGEROUS GOODS (Extra charge)
- 6 [ ] DRY ICE, Dangerous Goods Shipper's Declaration not required. Class 9, UN 1845, ____ x ____ kg, 904 (i)
- [ ] DESCRIPTION
- 12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

6

PACKAGES	WEIGHT in Pounds Only	YOUR DECLARED VALUE (See right)
1	223	
1	458	
1	375	
Total 3	Total 1056	Total

DIM SHIPMENT (Chargeable Weight)

[ ] _____ lbs.

L x W x H

Received At
- 1 [ ] Regular Stop
- 2 [X] On-Call Stop
- 3 [ ] Drop Box
- 4 [ ] B.S.C.
- 5 [ ] Station

7 Release Signature:

Emp. No. | Date

- [ ] Cash Received
- [ ] Return Shipment
- [ ] Third Party
- [ ] Chg. To Del.
- [ ] Chg. To Hold

Street Address:

City: State: Zip:

Received By: X

Date/Time Received: FedEx Employee Number:

Federal Express Use

Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

REVISION DATE 3/94
PART #137204 FXEM 5/94
FORMAT #158

158

© 1992-93 FEDEX
PRINTED IN U.S.A.

5/20/94

TO:

Omega Point Lab
16015 Shady Falls Road
Elmendorf, Texas
78112-9784

Sirs,

This Material is being supplied to you by the TVA Browns Ferry Nuclear Plant in support of the Thermolag Fire and Ampacity Testing your facility is working on.

If you have any questions or need additional information please contact D.P. Burrell at 205-729-7589.

R.P. Hyde
Lead Procurement Engineer
Browns Ferry Nuclear Plant

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185-87
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1388 - 11960
DATE RECEIVED 6-28-94
DATE INSPECTED 6-28-94
INSPECTED BY: A Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
12" Radial Bend	NA	–	1	–	06-1079-9112-12-4	Y	N	Good	None	X			Receiving Verification Only. (1) 18" cable tray is damaged; (1) 24" cable tray is damaged & (2) 18" covers are damaged on one end.
18" Radial Bend	NA	–	4	–	06-1079-9112-18-4	Y	N	"	"	X			
18" Radial Bend Cover	NA	–	1	–	40-2000-9112-18-2	Y	N	"	"	X			
24" Radial Bend	NA	–	2	–	06-1079-9112-24-4	Y	N	"	"	X			
12" Cable Tray	NA	–	3	–	06-1079-0012-12	Y	N	"	"	X			
18" Cable Tray	NA	–	10	–	06-1079-0012-18	Y	N	"	"	X			
24" Cable Tray	NA	–	5	–	06-1079-0012-24	Y	N	"	"	X			
18" Cable Tray Covers	NA	–	2	–	galv sheeting 4½" turned edges	X	N	"	"	X			
Splice plates	NA	–	49pr	–	1079-1302-02	Y	N	"	"	X			
Hinged Splice plts	NA	–	12pr	–	1079-1302-02	Y	N	"	"	X			
Cable 16AWG	NA	–	1 reel	–	Reel #12963	X	N	"	"	X			
Nuts/Bolts	NA	–	~~488~~	–	N/A	Y	N	"	"	X			

FORM
1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA / TS1
CLIENT/PROJECT NUMBER 11210 - TBD
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1386 - 11210
DATE RECEIVED 6-3-94
DATE INSPECTED 6-6-94
INSPECTED BY: C. Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
3/4" Alumn Conduit	NA	-	2	-	AVK-542K	Y	N	Good	None	X			Receiving verification only
2" Alum Conduit	NA	-	5	-	AVK-543K	Y	N	"	"	X			Non-safety related material.
2.5" Alum Conduit	NA	-	1	-	BBN-621X	Y	N	"	"	X			
3" Alum Conduit	NA	-	2	-	BDF-089A	Y	N	"	"	X			
4" Alum Conduit	NA	-	22	-	BEV-087A	Y	N	"	"	X			
3/4" Steel Conduit	NA	-	2	-	AWD-014Y	Y	N	"	"	X			
1" Steel Conduit	NA	-	10	-	AWD-015W	Y	N	"	"	X			
3" Steel Conduit	NA	-	5	-	AWD-019L	Y	N	"	"	X			
4" Steel Conduit	NA	-	14	-	AWD-020F	Y	N	"	"	X			
5" Steel Conduit	NA	-	1	-	BBY-741J	Y	N	"	"	X			
3/4" Alum LB	NA	-	1	-	BTY-197J	Y	N	"	"	X			
2" Alum LB	NA	-	5	-	BTY-256W	Y	N	"	"	X			
2.5" Alum LB	NA	-	1	-	BTY-260H	Y	N	"	"	X			
3" Alum LB	NA	-	4	-	BTY-265V	Y	N	"	"	X			
3/4" Steel LB	NA	-	1	-	BTY-196L	Y	N	"	"	X			
1" Steel LB	NA	-	2	-	BTM-778C	Y	N	"	"	X			

FORM
1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11210
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1386 - 11210
DATE RECEIVED 6-3-94
DATE INSPECTED 6-6-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
4" Steel LB	NA	-	5	-	BTY-191Y	Y	N	Good	None	X			Receiving Verification Only NON SAFETY-RELATED MATERIAL C&I
3/4" Steel Coupling	NA	-	2	-	BEV-325X	Y	N	"	"	X			
1" Steel Coupling	NA	-	4	-	BLD-538F	Y	N	"	"	X			
3" Steel Coupling	NA	-	3	-	BKR-844C	Y	N	"	"	X			
4" Steel Coupling	NA	-	15	-	BGD-652A	Y	N	"	"	X			
3/4" Alum Coupling	NA	-	2	-	BTV-644K	Y	N	"	"	X			
2" Alum Coupling	NA	-	5	-	BEV-326V	Y	N	"	"	X			
2.5" Alum Coupling	NA	-	1	-	BGW-557N	Y	N	"	"	X			
3" Alum Coupling	NA	-	4	-	BET-731P	Y	N	"	"	X			
4" Alum Coupling	NA	-	8	-	BET-732M	Y	N	"	"	X			

FORM
1/29/93

SHIPPING TICKET

SHIPPER: TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN: NEAR, ATHENS, AL. 35611 5-25-94 629

SHIPPING STOREROOM: BROWNS FERRY NUCLEAR PLANT

AUTHORITY: DAN OLIVER, SUPV., M&PS

SHIP TO

OMEGA POINT LAB
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT 000512L

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1.	2	Conduit, 3/4" Aluminum	AVK-542M	2	PC		
2.	5	Conduit, 2" Aluminum	AVK-543K	5	PC		
3.	1	Conduit, 2.5" Aluminum	BBH-521X	1	PC		
4.	2	Conduit, 3" Aluminum	BDF-089A	2	PC		
5.	22	Conduit, 4" Aluminum	BEV-087A	22	PC		
6.	2	Conduit, 3/4" Stl (AWD-014Y)	AWD-014Y	2	PC		
7.	XX 10	Conduit, 1" Stl (AWD-015W)	AWD-015W	10	PC		
8.	5	Conduit, 3" Stl	AWD-019L	5	PC		
9.	14	Conduit, 4" Stl	AWD-020F	14	PC		
10.	1	Conduit, 5" Stl	BBY-741J	1	PC		
11.	1	Conduit LB, 3/4" aluminum	BTY-197J	1	EA		
12.	5	Conduit LB, 2" aluminum	BTY-256W	5	EA		
13.	1	Conduit LB, 2.5" aluminum	BTY-260H	1	EA		
14.	4	Conduit LB, 3" aluminum	BTY-265V	4	EA		
15.	1	Conduit LB, 3/4" Stl	BTY-196L	1	EA		
16.	X 2	Conduit LB, 1" Stl	BTM-778C	2	EA		
17.	7	Conduit LB, 4" Stl	BTY-191Y	7	EA		
18.	2	Conduit Coupling, 3/4" Stl	BEV-325X	2	EA		
19.	4	Conduit Coupling, 1" Stl	BLD-538F	4	EA		
20.	3	Conduit Coupling, 3" Stl	BKR-344G	3	EA		
21.	15	Conduit Coupling, 4" Stl	BGD-652A	15	EA		
22.	2	Conduit Coupling, 3/4" Aluminum	BTY-644K	2	EA		
23.	5	Conduit Coupling, 2" Aluminum	BEV-326V	5	EA		
24.	1	Conduit Coupling, 2.5" Aluminum	BGW-557M	1	EA		
25.	4	Conduit Coupling, 3" Aluminum	BET-731P	4	EA		
26.	8	Conduit Coupling, 4" Aluminum	XBET-732M	8	EA		

This material shipped per memo from Claudia Dyar of 5-25-94 for Thermolag Test

REFERENCE TRACKING #9400031847
QA III
SHIPPED BY OVERNITE PER INSTRUCTIONS FROM K. WRIGHT/F. PRIEST

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 5-25- 19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT OVERNITE

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM 1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER C. W. BURT
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

CONSIGNEE CUSTOMER COPY (BLUE)

OMEGA POINT LAB
16015 SHADY FALLS RD
[?]ENDORF TX 78112
6358100

PO# NONE

31

INBOUND TRAILER	FREIGHT BILL NUMBER	CITY RTE/BYD SCAC	DEST	PICK UP DATE	ORIG	OVERNITE PHONE NUMBER
288858 OVNT	391 634 025	2M	SNT	05/25/94	DCT	(210)662-0966

SHIPPER
TVA
NUCLEAR PLANT
BROWNS FERRY RD
ATHENS AL 35611
02521271 (205)729-2000

391 634 025

ADV CAR
BL# 5569400740
AD OV BD

DELIVERY RECEIPT COPY: 1

JP

OVERNITE TRANSPORTATION COMPANY

391 634 025

COLLECT THIS AMOUNT ▼
$.0
$.0

# PCS	HM	PT	DESCRIPTION OF ARTICLES AND SPECIAL MARKINGS	WEIGHT	NMFC	RATE	CHARGES
4		SK	4 HANDLING UNIT(S) CONDUIT & FITTING SECTION 7 SIGNED BILL TO: 00501491 80205	2567	050940-00		

OVERNITE

1-2"x10' HO Conduit bent
Roger [signature] 6-2-94

4 ◄ TTL PCS TTL WT ► 2567

DELIVERY EXCEPTIONS	SIGNATURE	FIRM	ODOM	ARRIVE	DEPART	TOTAL CHARGES
	Cleda Patton					P
			DATE	PCS	INITIALS	

RECEIVED THE ABOVE PROPERTY IN GOOD CONDITION EXCEPT AS NOTED

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA
CLIENT/PROJECT NUMBER 11210
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1383 - 11210
DATE RECEIVED 5-9-94
DATE INSPECTED 5-10-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
3" gal. conduit	NA	-	2	-	72009260 AWA-019L	Y	N	Good	None	X			Receiving Verification Only
3" 90 Elbow	NA	-	1	-	1008122 BLN-258A	Y	N	Good	None	X			
3" Pipe Strap Retaining	NA	-	3	-	42981B BIN-409R	Y	N	Good	None	X			

FORM
1/29/93

SHIPPING TICKET

632

SHIPPER MARK WILLIAMS

POINT OF ORIGIN SPRING CITY,TN 37381 4-28-94 19___

SHIPPING STOREROOM NUCLEAR STORES WBHP

AUTHORITY MARK WILLIAMS

SHIP TO
OMEGA POINT LABORATORIES,INC
16015 SHADY FALLS ROAD
ELMENDORF,TX 78112-9784

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)
DEBIT
RECORD ONLY

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
		THIS MATERIAL TO USED IN A FIRE TESTING PROGRAM SHIP PER J.J. PIERCE MAT BOUGT ON 575 NO 784401					
1	2	CONDUIT 3 in,galv. 720092260	AWD-0191	2	pc		
2	1	ELBOW 90 deg,3 in 1008122	BLB-258A	1	ea		
3	3	STRAP RETAINING 3 in PIPE 429818	BJH-409R	3	ea		
		ALL ITEMS QA 3					
		5/2/94 THIS MATERIAL CONTAINS NO RADIOACTIVITY					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 4-28-94 19___ G. B. L. No. TV_____ METHOD OF SHIPMENT MOTOR

S – SHIPPER'S COPY

RETAINED BY SHIPPER AS RECORD OF SHIPMENT.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185,86.487
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1397 - 11960
DATE RECEIVED 7-18-94
DATE INSPECTED 7-18-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
3/4" Strap C-Clamp	NA	0	4	0	NA	Y	N	good	None	X			Receiving Verification Only
2.5" plug	NA	0	1	0	NA	Y	N	good	None	X			

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY
SHIPPING TICKET

No. 856-94-00877

634

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR ATHENS, AL. 35611 07/15 19 94

SHIPPING ROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV. M&PS

SHIP TO

OMEGA POINT LAB
16015 SHADY FALLS RD.
ELSENDORF, TX. 78112

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT

0005121

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1		STRAP 3/4" MAL IRON		4	EA		
2		PLUG 2 1/2".		1	EA		
		THIS MATERIAL SHIPPED FOR THERMOLAG TEST.					
		REF : TRACKING # 9400031847					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 07/15 19 94 G. B. L. No. TV

METHOD OF SHIPMENT FED EXP

3 – SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM 1677

COST CARRIER'S CHARGE

DELIVERY CHARGES

TOTAL COST

MATERIAL RECEIVED 19

NAME OF CARRIER

MATERIAL CHECKED IN BY

STORES LEDGER POSTED BY

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL — PACKAGE TRACKING NUMBER 011500853[illegible]

4159[illegible] 011500853[illegible]

RECIPIENT'S COPY

1 Date 7-15-94

From (Your Name) Please Print

Your Phone Number (Very Important) (205)729-4641

Company: TVA/BROWNS FERRY NUCLEAR PLT

Department/Floor No.

Street Address: BROWNS FERRY ROAD

City: ATHENS State: AL ZIP Required: 3 5 6 1 1

2 To (Recipient's Name) Please Print

Recipient's Phone Number (Very Important) ( )

Company: Omega Point Lab

Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 1615 Shady Hill Rd

City: Elizabeth State: TX ZIP Required: 7[illegible]

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)
- 11 ☒ OTHER PACKAGING *
- 16 ☐ FEDEX LETTER *
- 12 ☐ FEDEX PAK *
- 13 ☐ FEDEX BOX
- 14 ☐ FEDEX TUBE

Standard Overnight (Delivery by next business afternoon. No Saturday delivery†)
- 51 ☐ OTHER PACKAGING
- 56 ☐ FEDEX LETTER *
- 52 ☐ FEDEX PAK *
- 53 ☐ FEDEX BOX
- 54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day †)
- 30 ☐ ECONOMY**

** Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only)
- 46 ☐ GOVT LETTER
- 41 ☐ GOVT PACKAGE

Freight Service (for packages over 150 lbs.)
- 70 ☐ OVERNIGHT FREIGHT ** (Confirmed reservation required)
- 80 ☐ TWO-DAY FREIGHT **

† Delivery commitment may be later in some areas. * Declared Value Limit $500 ** Call for delivery schedule

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
- 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
- 2 ☒ DELIVER WEEKDAY

Saturday Service
- 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
- 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
- 9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
- 4 ☐ DANGEROUS GOODS (Extra charge)
- 6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
  Dry Ice 9 UN 1845 ____ X ____ kg. 904 III
- ☐ _____
- 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6

PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE (See right)
1		
Total 1	Total	Total

DIM SHIPMENT (Chargeable Weight)
☐ ____ ____ ____ lbs.
L x W x H

Received At
1 ☐ Regular Stop 3 ☐ Drop Box
2 ☒ On-Call Stop 4 ☐ B.S.C. 5 ☐ Station

7 Release Signature:

Emp. No. Date

- ☐ Cash Received
- ☐ Return Shipment
- ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold

Street Address

City State Zip

Received By: X

Date/Time Received FedEx Employee Number

Federal Express
Base Charges
Declared Value Charge
Other *
Other 2
Total Charges

REVISION DATE 3.94
PART #[illegible] ITEM
FORMAT #158
158
PRINTED IN U.S.A.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185,86,87
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1392.11960
DATE RECEIVED 7-7-94
DATE INSPECTED 7-8-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
4" gal. conduit	NA	0	2	0	NA	Y	N	Good	None	X			Receiving Verification Only
1" gal. conduit	NA	0	3	0	NA	Y	N	Good	None	X			

FORM
1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-972~~57~~-60+97332-38
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1429 - 11960
DATE RECEIVED 8-29-94
DATE INSPECTED 8-29-94
INSPECTED BY: A Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
4" LB Cover	NA	0	5	0	BMB329W	Y	N	Good	None	X			Receiving Verification Only
4" gasket	NA	0	5	0	BMB330P	Y	N	Good	None	X			
1" LB Cover	NA	0	2	0	BPP177F	Y	N.	Good	None	X			
2½-3" LB Covers	NA	0	5	0	BBT792M	Y	N.	Good	None	X			
2½-3" gaskets	NA	0	5	0	BGP836C	X	N.	Good	None	X			
2" gasket	NA	0	5	0	BGK730W	Y	N.	Good	None	X			
1" gasket	NA	0	2	0	BPQ043N	Y	N.	Good	None	X			
2" LB Cover	NA	0	5	0	AQP157N	Y	N	Good	None	X			

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY

SHIPPING TICKET

No. 862-94-0974 638

SHIPPER J.M. WILLIAMS

POINT OF ORIGIN NEAR SPRING,CITY, TN 37381 8-26 19 94

SHIPPING STOREROOM WATTS BAR NUCLEAR PLANT

AUTHORITY R.D. HALL PROJ MGR N.E.

TO

OMEGA POINT LABORATORIES, INC
16015 SHADY FALLS RD
ELMENDORF, TX 78112
ATTN: MARK SALLEY

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT

00014P9

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1		4 IN LB	BMB329W	5	EA		
2		4 IN GASKET	BMB330P	5	EA		
3		1 IN LG COVER	BPP177P	2	EA		
4		2-1/2 - 3 IN LB COVER	BBT792M	5	EA		
5		2-1/2 -3 IN LB GASKET	BGP636C	5	EA		
6		1 IN GASKET BPQ043M		2	EA		
7		2IN GASKET	BGK730W	5	EA		
8		2 IN LB COVER AQP157M		5	EA		
		QA LEVEL III					
		FOR TESTING					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

CFC

DATE SHIPPED 8-26 19 94 G. B. L. No. TV

METHOD OF SHIPMENT UPS-NDA

INSPECTOR'S COPY

SHIPMENT TO TVA POINTS – TO CONSIGNEE UNDER SEPARATE COVER. CONSIGNEE RECORDS DATE SHIPMENT WAS RECEIVED, NOTES ANY EXCEPTIONS AND SIGNS CERTIFICATE, ALSO ATTACHES COPY OF FREIGHT OR EXPRESS ARRIVAL NOTICE AND FORWARDS TO ACCOUNTING OFFICE.
SHIPMENTS TO OUTSIDE POINTS – SHIPPER ENTERS AMOUNT OF TRANSPORTATION CHARGEABLE TO TVA WITH ACCOUNT NUMBER TO BE CHARGED AND FORWARDS TO ACCOUNTING OFFICE WITH THE ORIGINAL.

I CERTIFY THAT THE ARTICLES OR SERVICES LISTED ABOVE HAVE BEEN RECEIVED IN QUANTITY AND QUALITY SPECIFIED. EXCEPT AS NOTED.

RECEIVED 19 SIGNED

CARRIER TITLE

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-87 + 97332-38 97257-60
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1425 . 11960
DATE RECEIVED 8-26-94
DATE INSPECTED 8-26-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
1" galv Conduit	NA	0	100'	0	AWD-015W	Y	N	Good	None	X			Receiving Verification Only

FORM
1/29/93

TVA 144 (FD-5-70)

SHIPPING TICKET

No. 35694-01057 640

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR, ATHENS, AL. 35611 8-24- 1994

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., MAPS

SHIP TO
OMEGA POINT LAB
16015 SHADY FALLS ROAD
KLEBERDORF, TX 78112

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)
DEBIT
0005131

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1.	100	Conduit, Metal, Rigid steel, Galv., 1.0 IN. Dia X 10 FT LG	AWD-015W	100	FT		
		Shipped per the attached letter. Thermolag Fire and Ampacity Testing.					
		QA III					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 8-24 1994 G. B. L. No. TV N/A METHOD OF SHIPMENT FEDEX

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
CARRIER
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

5/20/94

TO:

Omega Point Lab
16015 Shady Falls Road
Elmendorf, Texas
78112-9784

Sirs,

This Material is being supplied to you by the TVA Browns Ferry Nuclear Plant in support of the Thermolag Fire and Ampacity Testing your facility is working on.

If you have any questions or need additional information please contact D.P. Burrell at 205-729-7589.

Claudia Hyde for

R.P. Hyde
Lead Procurement Engineer
Browns Ferry Nuclear Plant

642

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL PACKAGE TRACKING NUMBER 9569284303

4131M 9569284303

RECIPIENT'S COPY

1 Date

From (Your Name) Please Print | Your Phone Number (Very Important)

Company | Department/Floor No.

Street Address

City | State | ZIP Required

2 To (Recipient's Name) Please Print | Recipient's Phone Number (Very Important)

Company | Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)

City | State | ZIP Required

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice)

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address
City | State | ZIP Required

3 PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct. No. 3 ☐ Bill 3rd Party FedEx Acct. No. 4 ☐ Bill Credit Card 5 ☐ Cash/Check

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning)
- 11 ☐ OTHER PACKAGING
- 16 ☐ FEDEX LETTER*
- 12 ☐ FEDEX PAK*
- 13 ☐ FEDEX BOX
- 14 ☐ FEDEX TUBE

Standard Overnight (Delivery by next business afternoon; no Saturday)
- 51 ☐ OTHER PACKAGING
- 56 ☐ FEDEX LETTER*
- 52 ☐ FEDEX PAK*
- 53 ☐ FEDEX BOX
- 54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day †)
- 30 ☐ ECONOMY*

* Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only)
- 46 ☐ GOVT LETTER
- 41 ☐ GOVT PACKAGE

Freight Service (for packages over 150 lbs.)
- 70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
- 80 ☐ TWO-DAY FREIGHT**

† Delivery commitment may be later in some areas.
*Declared Value Limit $500.
**Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
- ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
- ☒ DELIVER WEEKDAY

Saturday Service
- 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
- 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
- 9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
- 4 ☐ DANGEROUS GOODS (Extra charge)
- 6 ☐ DRY ICE — Dangerous Goods Shipper's Declaration not required
  Dry Ice 9, UN 1845, ____ X ____ kg. 904 III
  ☐ DESCRIPTION
- 12 ☐ HOLDAY DELIVERY (If offered) (Extra charge)

6 | Package | Weight Only | YOUR DECLARED VALUE (See right)
Total | Total | Total

DIM SHIPMENT (Chargeable Weight)
☐ ... lbs.
L x W x H

Received At
1 ☐ Regular Stop | 3 ☐ Drop Box
2 ☐ On-Call Stop | 4 ☐ B.S.C. | 5 ☐ Station

7 Release Signature:

Emp. No. | Date
- ☐ Cash Received
- ☐ Return Shipment
- ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold

Street Address
State | Zip

Received By:
X
Date/Time Received | FedEx Employee Number

Federal Express Use
Base Charges
Other 1
Other 2
Total Charges

REVISION DATE 3/94
PART #137204 FXEM 4/94
FORMAT #158
158

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OMEGA POINT LABORATORIES

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960 - 97185-87+97257-60
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1414 - 11960
DATE RECEIVED 8-10-94
DATE INSPECTED 8-10-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
1" steel Conduit	NA	7	7	0	AWD-015W	Y	N	GOOD	None	X			Receiving Verification only 10' lengths for a total 70 feet CP

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY
SHIPPING TICKET

No. S5694-01017

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR, ATHENS, AL. 35611 8-8 19 94

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., MEPS

SHIP TO MR QUECA POINT LABS
10015 SHADY FALLS ROAD
KLEINDORF, TX 78112

ACCT NO. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT 0005151 RECORD ONLY

BILL TO

CREDIT 0002065

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1.	70	Conduit, metal rigid steel, Galv., Thickwall, 1.0 IN DIA X 10 FT LG.	AWD-015W	70	FT		
		SENT FOR FIRE TESTING PROGRAM					
		QA III					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

E SHIPPED 8-8 19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT FEDEX (TWO DAY PRT)

5 – SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM 1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER
MATERIAL CHECKED IN BY C. H. BURT
STORES LEDGER
POSTED BY

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 0115008830

4159M 0115008830

RECIPIENT'S COPY

1 Date 8-8-94

From (Your Name) Please Print — Your Phone Number (205-729-…)

Company

Street Address

City ATHENS — State AL — ZIP Required 356…

2 To (Recipient's Name) Please Print — Department/Floor No.

Company

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 1601 … Falls …

City Elmendorf — State TX — ZIP Required 78112

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here — Street Address — City — State — ZIP Required

3 PAYMENT 1 Bill Sender 2 Bill Recipient's FedEx Acct. No. 3 Bill 3rd Party FedEx Acct. No. 4 Bill Credit Card 5 Cash/Check

4 SERVICES 5 DELIVERY AND SPECIAL HANDLING 6 PACKAGES / WEIGHT In Pounds Only / YOUR DECLARED VALUE

OTHER PACKAGING — OTHER PACKAGING — DELIVER WEEKDAY

FEDEX LETTER — 52 FEDEX PAK — 31 HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)

13 FEDEX BOX — 53 FEDEX BOX — 3 DELIVER SATURDAY (Extra charge) (Not available to all locations)

14 FEDEX TUBE — 54 FEDEX TUBE — 9 SATURDAY PICK-UP (Extra charge)

Economy Two-Day — Government Overnight (Restricted for authorized users only) — Special Handling

30 ECONOMY* — 46 GOV'T LETTER — 41 GOV'T PACKAGE — 4 DANGEROUS GOODS (Extra charge) — DRY ICE

Freight Service (for packages over 150 lbs.)

70 OVERNIGHT FREIGHT** — 80 TWO-DAY FREIGHT — 12 HOLIDAY DELIVERY (Extra charge)

1 / 125 — Total 125

DIM SHIPMENT (Chargeable Weight) L x W x H

Received At: Regular Stop — 3 Drop Box — 4 B.S.C. — 5 Station — On-Call Stop

Emp. No. — Date — Cash Received — Return Shipment — Third Party — Chg. To Del. — Chg. To Hold

Street — City — State — Zip

Received By: X

Date/Time Received — FedEx Employee Number

7 Release Signature

Federal Express Use — Base Charges — Declared Value Charge — Other 1 — Other 2 — Total Charges

REVISION DATE 3/94
PART #137204 FXEM 5/94
FORMAT #158

158

© 1994 FEDEX PRINTED IN U.S.A.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-87 & 97332-38 97257-60
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1426 - 11960
DATE RECEIVED 8-26-94
DATE INSPECTED 8-26-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Junction Box	0	0	1	0	Ref # 94-5349	Y	N/A	Good	None	X			Receiving Verification Only
1'X1'X5'													NOTE: CH

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY
SHIPPING TICKET

No. G 578597
647

SHIPPER TVA - HORACE CROWDEN

POINT OF ORIGIN MUSCLE SHOALS, AL. 8-24- 19 94

SHIPPING STOREROOM POWER SERVICE SHOPS

AUTHORITY BPN-K-94-0071

TO

OMEGA POINT LAB
16015 Shady Falls Road
Elmendorf, Texas 78112
ATTN: W. D. Black

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT

Record Only

BILL TO

Same

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC — ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1		Junction box		1	ea		

Per: C. Allsbrooks
REF: 94-5349

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

7 — EXTRA COPY TO _____

TO DIVISION OF PURCHASING, CHATTANOOGA.

TO PURCHASING FOR ALL PERSONAL PROPERTY SHIPMENTS AUTHORIZED BY FORM 81, TRANSFER ORDER, OR USED AS EXTRA COPY AS REQUIRED.

5/20/94

TO: N. D. Black

Omega Point Lab
16015 Shady Falls Road
Elmendorf, Texas
78112-9784

Sirs,

This Material is being supplied to you by the TVA Browns Ferry Nuclear Plant in support of the Thermolag Fire and Ampacity Testing your facility is working on.

If you have any questions or need additional information please contact D.P. Burrell at 205-729-7589.

R.P. Hyde
Lead Procurement Engineer
Browns Ferry Nuclear Plant

Q/A RECEIVING REPORT

OMEGA POINT LABORATORIES

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960/97553-55
RECEIVED FROM TVA
PROJECT LOCATION OPL

REPORT NUMBER 14421 11960
DATE RECEIVED 10/6/94
DATE INSPECTED 10/6/94
INSPECTED BY: C Humphrey

ITEM DESCRIPTION	P.O. NO. OR ORDER NO.	QUANTITY			I.D. NO.	CNTRL MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
5" STEEL CONDUIT	N/A	0	4	0	BBY-741J	Y	N	OK	NONE	X			Receiving verification only.
3" " "	"	0	2	0	AWD-019L	Y	N	OK	"	X			
2" " "	"	0	2	0	AWD-017C	Y	N	OK	"	X			
3" IRON LB	"	0	1	0	BBM-589C	Y	N	OK	"	X			
3" LB COVER	"	0	1	0	BTX-383T	Y	N	OK	"	X			
3" LB GASKET	"	0	1	0	BTY-337W	Y	N	OK	"	X			
2" LB COVER	"	0	1	0	BTX-381Y	Y	N	OK	"	X			
2" LB GASKET	"	0	1	0	BTY-336Y	Y	N	OK	"	X			
1" IRON LB	"	0	2	0	BTM-778C	Y	N	OK	"	X			
1" LB COVER	"	0	2	0	BTX-375R	Y	N	OK	"	X			
1" LB GASKET	"	0	2	0	BTY-329V	Y	N	OK	"	X			

FORM
1/4/89

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY
SHIPPING TICKET

No. S3694-00010 650

SHIPPER TENNESSEE VALLEY AUTHORITY POINT OF ORIGIN NEAR, ATHENS, AL. 35611 10-4- 1994

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT AUTHORITY DAN OLIVER, SUPV., MAPS

SHIP TO
OMEGA POINT LAB
16015 SHADY FALLS ROAD
KLEMDORF, TX 78112

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)
DEBIT
00035LG

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1.	40	5" Conduit	BBY-741J	40	FT		
2.	20	3" Conduit	AWD-019L	20	FT		
3.	20	2" Conduit	AWD-017Q	20	FT		
4.	1	3" Iron LB	BBM-589C	1	EA		
5.	1	3" LB Cover	BTX-383T	1	EA		
6.	1	3" LB Gasket	BTY-337W	1	EA		
7.	1	2"LB Cover	BTX-381Y	1	EA		
8.	1	2" LB Gasket	BTY-336Y	1	EA		
9.	2	1" Iron LB	BTM-778C	2	EA		
10.	2	1" LB Cover	BTX-375R	2	EA		
11.	2	1" LB Gasket	BTY-329V	2	EA		

This material supplied to support the Thermolag Fire and Ampacity Testing

QA III

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

HSVA #74

DATE SHIPPED 10-4- 1994 G. B. L. No. TV N/A METHOD OF SHIPMENT FEDEX TWO-DAY FRT

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER C. W. BURT
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

4230M— 2819333775 ... CALL 800-238-5355 TOLL FREE. ... PUERTO RICO AND ALL NON U.S. LOCATIONS.

AIRBILL
PACKAGE TRACKING NUMBER 28193337...

651

RECIPIENT'S COPY

1 [redacted]

From (Your Name) Please Print: C. J. Burt
Date: 10-4-94

Company: TVA/BROWNS FERRY NUCLEAR PLT
Your Phone Number (Very Important): (205) 729-4641
Department/Floor No.

Street Address: BROWNS FERRY RD

City: ATHENS
State: AL
ZIP Required: 35611

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

2 To (Recipient's Name) Please Print
Recipient's Phone Number (Very ...): ( )
Company: Omega Point ...
Department/Fl...
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 16015 Shady Falls Road
City: Elmendorf
State: TX
ZIP Required: 78112

3 PAYMENT
1 ☐ Bill Sender
2 ☐ Bill Recipient's FedEx Acct. No.
3 ☐ Bill 3rd Party FedEx Acct. No.
4 ☐ Bill Credit Card
5 ☐ Cash/Check
[redacted]

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address
City
State
ZIP Required

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)	Standard Overnight (Delivery by next business afternoon, No Saturday delivery†)
11 ☐ OTHER PACKAGING	51 ☐ OTHER PACKAGING
16 ☐ FEDEX LETTER*	56 ☐ FEDEX LETTER*
12 ☐ FEDEX PAK*	52 ☐ FEDEX PAK*
13 ☐ FEDEX BOX	53 ☐ FEDEX BOX
14 ☐ FEDEX TUBE	54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day†)	Government Overnight (Restricted for authorized users only)
30 ☐ ECONOMY*	46 ☐ GOV'T LETTER
*Economy Letter Rate not available. Minimum charge: One pound Economy rate.	41 ☐ GOV'T PACKAGE

Freight Service (for packages over 150 lbs.)
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
80 ☒ TWO-DAY FREIGHT**

† Delivery commitment may be later in some areas.
*Declared Value Limit $500.
**Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
2 ☒ DELIVER WEEKDAY

Saturday Service
31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
4 ☐ DANGEROUS GOODS (Extra charge)
6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice, 9, UN 1845, ____ x ____ kg. 904 III
☐ DESCRIPTION
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6

PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE (See right)
1	200	
1	827	
Total	Total 827	Total
1	200	

DIM SHIPMENT (Chargeable Weight) ☐ 336 lbs.
120 x 48 x 42

Received At
1 ☐ Regular Stop
2 ☒ On-Call Stop
3 ☐ Drop Box
4 ☐ B.S.C.
5 ☐ Station

Emp. No. | Date
☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold
Street Address
City | State | Zip
Received By:
X
Date/Time Received | FedEx Employee Number

7 Release Signature:

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 4/94
PART #145412 FXEM 5/94
FORMAT #160

160

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PRINTED IN U.S.A.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TS1
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1447-11960
DATE RECEIVED 10/12/94
DATE INSPECTED 10/12/94
INSPECTED BY: C Humphrey

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
5" CONDUIT STRAP	N/A	0	6	0	P2558-50	Y	N	GOOD	NONE	X			RECEIVING VERIFICATION ONLY OK
2" " "	"	0	3	0	N2558-20EG	Y	N	"	"	X			
1" " "	"	0	6	0	N2558-10EG	Y	N	"	"	X			

FORM
1/29/93

652

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY

SHIPPING TICKET

No. 850-15485 653

SHIPPER L. J. Wheeler POINT OF ORIGIN Soddy Daisy, Tn 10-11 19 94

SHIPPING STOREROOM Sequoyah Nuclear Stores AUTHORITY L. J. Wheeler

SHIP TO

Omega Point Laboratories
16015 Shady Falls Rd
Elmendorf, Texas 78112
ATTN: Kent Brown

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT

00014PG

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1	6	5" two Hole conduit strap P|N P2558-50 RD 964707 It 11 3-13-85	BLT-609G	6	EA		
2	3	2" two hole conduit strap P|N N2558-20EG Lot C0350 1008070 It 2 2-18-94	Bla-296W	3	EA		
	6	1" two hole conduit straps P|N N2558-10EG lot C0149 RD 331168 Item 5 4-6-93	AWH-628T	6	Ea		

Shipped per WBN Peg package T#9941008800
and memo from Larry Mays to P. Truss

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 10-11 19 94 B. L. No. TV METHOD OF SHIPMENT Fed Ex

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

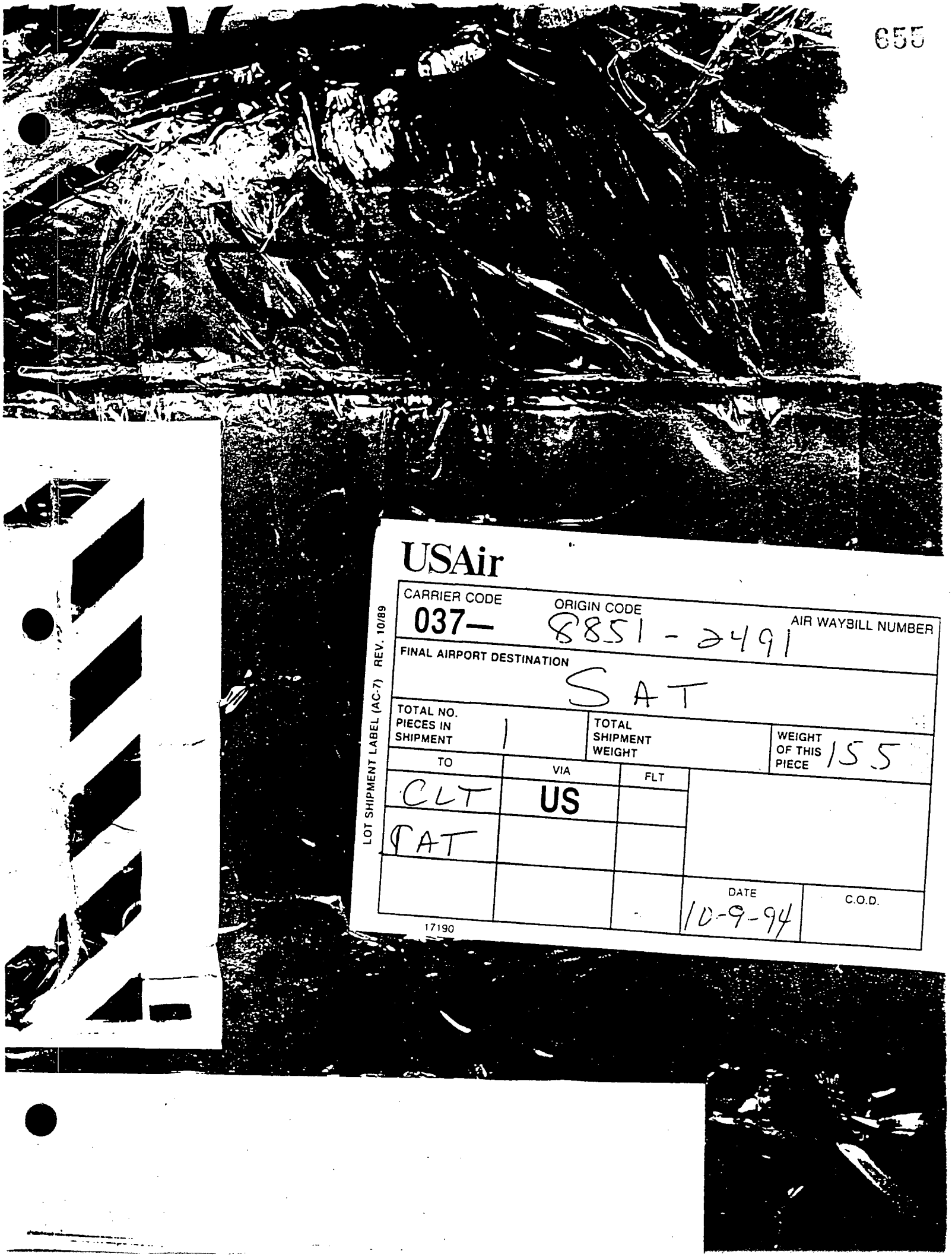
Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1445.11960
DATE RECEIVED 10/10/94
DATE INSPECTED 10/10/94
INSPECTED BY: C Humphrey

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
5" LB WITH COVERS + GASKETS	N/A	0	2	0	LB500-M	Y	N	Good	None	X			RECEIVING VERIFICATION ONLY. NO MATERIAL CERTS RECEIVED. NO PACKING LIST RECEIVED. CH
2" LB	N/A	0	1	0	LB200-M	Y	N	"	"	X			

FORM
1/29/93



USAir

LOT SHIPMENT LABEL (AC-7) REV. 10/89

CARRIER CODE	ORIGIN CODE	AIR WAYBILL NUMBER
037—	8851 - 2491	

FINAL AIRPORT DESTINATION: SAT

TOTAL NO. PIECES IN SHIPMENT	TOTAL SHIPMENT WEIGHT	WEIGHT OF THIS PIECE
1		155

TO	VIA	FLT
CLT	US	
SAT		

DATE: 10-9-94

C.O.D.

17190

☐ REGULAR
☐ PREPAID
☐ COLLECT

CAMPBELL DELIVERY SERVICE, INC.
P.O. BOX 460289
SAN ANTONIO, TEXAS 78246-0289
PHONE (210) 826-8110
RRC NO. 4756

656

№ 1274

CARRIER Sonic

DATE

SHIPPER

ADDRESS

CITY

AIRBILL NO. TEH 31453

CONSIGNEE Omega Plant Labs

ADDRESS 1015 Shady Falls [illegible]

CITY Fredericksburg TX 78177 [illegible]

NO PIECES	DESCRIPTION	WEIGHT		
1	1 Ken Kent Bloom			
	REFERENCE NO.			
	US 8851-2491	155		

Carrier & liability not more than $50.00 unless a greater value is declared. Carrier is not responsible for concealed damage nor for freight claims after 48 hours. Shipment is accepted in apparent good order except as noted

DRIVER

DRIVER

SHIPPERS SIG

DRIVER

TIME

C.O.D. AMOUNT →

DRIVER

RECEIVED GOOD ORDER

DATE

BUS/AIRLINE CHARGES →

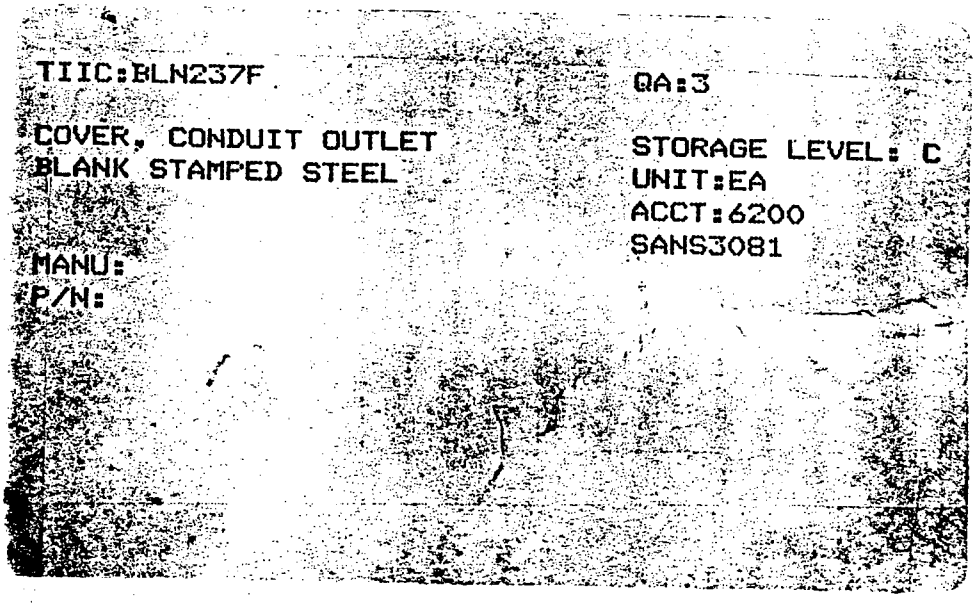
TIME

DATE

TOTAL →

BTY259N WBN-SWEC-R93-7273 EA
1006841 12-28-93 IT# 2
QA LEVEL III PEG DATE: 12-9-93
CONDUIT OUTLET,ELEC,MI,2",
THD RIGID HUB,TYPE LB,
P/N: LB-200-M
STORAGE LEVEL C MED/6230

BLN236H WBN EA.
44286B-01 03-12-90
QA. LEVEL III STORAGE LEVEL C
COND. OUTLET,ELECT. TYPE LB,FORM 35
PN:LB500-M
MFG:APPLETON ELECT.
SANE3606 NS/6200 RDR



OMEGA POINT LABORATORIES

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA

CLIENT/PROJECT NUMBER 11960-97185, 86+87

RECEIVED FROM Toltec

PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1390 - 11960

DATE RECEIVED 7-6-94

DATE INSPECTED 7-6-94

INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	CONID MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Channel	1125Q	10	10	—	CAN3X4.1#X20	Y	Y	GOOD	NONE	X			
3"X4.10 Channel X 20													
ANGLE IRON 4"X4"X½X20	1125Q	1	1	—	ANG 4XC07	Y	Y	GOOD	NONE	X			

FORM
1/29/93

658

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Toltec Steel Products, Inc
5390 Dietrich Road

San Antonio TX 78219

PO Number: 1125-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/5/94	Their Truck		7-6-94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Channel 3"x4.1	10	$23.58	$235.80
2.	Angle Iron 4"x4"x1/2" 20 ft. sections	1	$66.05	$66.05

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 7-5-94

Special Instructions

Please include MTR's (Material Test Reports)

Ordered By: Cleda Patton
Project #: 11960 - 97185

Total	$301.85
Shipping	
Tax	
Invoice Total	**$301.85**

* * * * * * * * * * * * * * * *
* S A L E S O R D E R 28564 *
* * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

M+R's attached

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 1125-Q
PLACED BY: CLEDA
TELEPHONE #: (512) 635-8100
SHIP VIA:
COMMENTS:

ORDER DATE: 7/05/94
REQUEST DATE: 7/05/94
SALESMAN: CASEY HARMS

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	[illegible]	10	CHN 3X4.1#X20	3" X 4.1# CHANNEL X 20	820	28.75	235.75
02	[illegible]	1	ANG 4XC07	4 X 4 X 1/2 X 20	256	25.80	66.05

TOTAL WEIGHT: 1076 LBS

RECEIVED BY: Richard Rusby

NET BEFORE TAX	301.80
TAX.....	23.39
GRAND TOTAL...	325.19

STRUCTURAL METALS, INC.
BOX 911, SEGUIN, TEXAS 78156-0911
512-372-8200

CERTIFIED TEST REPORT

WE HEREBY CERTIFY THAT THE FOLLOWING DATA IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

The following tests conform to the requirements of the specifications listed.

DAN SCHACHT
QUALITY CONTROL MANAGER

12/ 8/92

SIN# S76813
BOL NO B9374105

INV NO V145995
INV DATE 12/07/92

S 768400
O TOL TEC PRODUCTS
L 5390 DIETRICH
D SAN ANTONIO TX
T 78219
O

S 8000
H TOL TEC
I P/U @ MILL
P TX
T
O

HEAT NO	SECTION	SPECIFICATION	T #	YIELD PSI	TENSILE PSI	ELONG %	ELONG IN	R.A. %	BEND TEST DIAM	BEND TEST RSL	DATE ROLLED	LB/F
01099	F 4X1/2	ASTM A36-89	1	49000	73500	31.0	8				060492	4.7
01109	F 5X3/8	ASTM A36-89	1	50500	70200	32.0	8				060492	6.1
01415	L 3X2X1/4	ASTM A36-89	1	53800	77700	29.0	8				062392	4.0
02376	L 2.5X2.5X1/4	ASTM A36-89	1	55000	76500	28.5	8				081792	3.9
02888	L 4X4X1/2	ASTM A36-89	1	51200	75500	29.0	8				091592	12.6
02973	SQ 1	ASTM A36-89	1	50000	72000	21.0	8				091992	3.3
03369	L 1.25X1.25X1/8	A36 MODIFIED	1	56900	85900	21.0	8				102292	0.9
03559	RD 1	ASTM A36-89	1	53500	75200	23.0	8				102992	2.6

HEAT NO	C	MN	P	S	SI	CU	CR	NI	MO	CB	V	AL	CE		BHN
01099	.16	0.79	.012	.035	.21	.49	0.18	0.24	.051	.001	.0020	.002	.00		
01109	.17	0.70	.007	.030	.19	.38	0.09	0.13	.046	.001	.0020	.001	.00		
01415	.17	0.77	.015	.041	.18	.52	0.19	0.17	.047	.000	.0020	.001	.00		
02376	.20	0.74	.009	.025	.21	.55	0.08	0.19	.045	.000	.0010	.003	.00		
02888	.20	0.63	.010	.038	.19	.60	0.14	0.15	.041	.000	.0110	.001	.00		
02973	.19	0.65	.008	.024	.16	.43	0.08	0.14	.042	.000	.0010	.001	.00		
03369	.21	0.79	.018	.027	.18	.55	0.20	0.18	.043	.000	.0040	.001	.00		
03559	.19	0.68	.011	.031	.16	.39	0.10	0.15	.041	.000	.0010	.001	.00		

REMARKS: THIS STEEL IS MELTED AND MANUFACTURED IN THE USA AND IS FREE FROM MERCURY CONTAMINATION IN THE PROCE

FOR ADDITIONAL COPIES
CALL ACCOUNTING
(512) 372-8225.

STRUCTURAL METALS, INC.
BOX [redacted], SEGUIN, TEXAS 78156-0911
210-372-8200

CERTIFIED TEST REPORT

The following tests conform to the requirements of the specifications listed.

WE HEREBY CERTIFY THAT THE FOLLOWING DATA IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

DAN SCHACHT
QUALITY CONTROL MANAGER

4/29/94

N\	S115812	S	768400	S	8000
L NO	B9418932	O	TOL TEC PRODUCTS	H	TOL TEC
		L	5390 DIETRICH	I	P/U ^ MILL
		D	SAN ANTONIO TX	F	SEGUIN TX
V NO	V183809	T	78219	T	
V DATE	04/28/94	O		O	

AT O	SECTION		SPECIFICATION	T #	YIELD PSI	TENSILE PSI	ELONG %	IN	R.A. %	BEND TEST DIAM	RSL	DATE ROLLED	LB/FT
281	C 3X4.1	20	ASTM A36-91	1	52500	75600	31.0	8				110293	4.100
245	F 3X3/8	20	ASTM A36-91	1	51800	75000	27.0	8				122093	3.720
489	L 3X3X3/16	20	ASTM A36-91	1	54200	75300	31.0	8				010394	3.670
433	L 4X4X1/4	20	ASTM A36-91	1	54200	77000	31.0	8				021894	6.600
394	\4 REBAR	20	ASTM A615-93 GRADE 60 AASHTO M31	1	66000	103000	13.0	8		1.750	OK	042394	0.640
395	\4 REBAR	20	ASTM A615-93 GRADE 60 AASHTO M31	1	65500	102000	12.6	8		1.750	OK	042394	0.640
572	L 4X3X3/8	20	ASTM A36-93a	1	52100	76300	32.5	8				040994	8.500
651	L 4X3X1/4	20	ASTM A36-93a	1	53100	73900	30.0	8				041094	5.750

AT O	C	MN	P	S	SI	CU	CR	NI	MO	CB	V	AL	CE		BHN	
281	.17	0.74	.012	.034	.21	.39	0.17	0.18	.052	.000	.0010	.002	.00			517
245	.16	0.71	.011	.035	.23	.45	0.13	0.16	.051	.000	.0010	.002	.00			517
489	.17	0.77	.011	.031	.24	.39	0.09	0.16	.064	.001	.0030	.003	.00			517
433	.17	0.70	.007	.020	.20	.39	0.12	0.18	.061	.000	.0010	.001	.00			517
394	.35	0.96	.012	.036	.25	.38	0.12	0.16	.046	.001	.0020	.002	.00			517
395	.37	0.96	.014	.040	.24	.46	0.10	0.15	.038	.001	.0030	.002	.00			517
572	.15	0.86	.009	.022	.22	.44	0.17	0.21	.044	.000	.0020	.000	.00			517
651	.15	0.77	.012	.027	.23	.43	0.25	0.20	.056	.002	.0030	.001	.00			517

RKS: 100% MELTED AND MANUFACTURED IN THE USA AND FREE FROM MERCURY CONTAMINATION IN THE PROCESS

FOR ADDITIONAL COPIES
CALL ACCOUNTING
(210) 372-8225.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185, 97260, 97285 & 97338
RECEIVED FROM Toltec
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1422 - 11960
DATE RECEIVED 8-23-94
DATE INSPECTED 8-23-94
INSPECTED BY: O Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	CONFD MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
6"X6"X1/2X40' Tubing	11440	40'	40'	0	TUB6X6C09X40	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Toltec Steel Products, Inc
5390 Dietrich Road

San Antonio TX 78219

PO Number: 1144-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/23/94	Their Truck		8/24/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Tubing-6" x 6" x 1/2"	40'		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-23-94

Special Instructions

Please include MTR's

Ordered By: Cleda Patton

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	**$0.00**

* * * * * * * * * * * * * * * * *
* S A L E S O R D E R 29230 *
* * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 1144 Q
PLACED BY: KERRY
SHIP VIA:
COMMENTS:

TELEPHONE #: (512) 635-8100

ORDER DATE: 8/23/94
SALESMAN: CASEY HARMS

REQUEST DATE: 8/23/94

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	1	1	TUB 6X6X09X40	6 X 6 X 500 X 40	1410	1999.00	799.60
02	0	0		MUST HAVE MTR **	0	.00	.00
03	2	2	ANG 3X3X03X25ALUM	3 X 3 X 1/4 X 25 ALUMINUM	56	255.00	141.53

WEIGHT: 1466 LBS
RECEIVED BY:

NET BEFORE TAX	941.13
TAX.....	72.94
GRAND TOTAL...	1014.07

... AND ADDRESS OF PRODUCER'S PLANT ... PRODUCTRICE
FIRMA U[redacted]NSCHRIFT DES HERSTELLERWERKS

VALE[redacted]
USINE DE [redacted]TEL
57480 RETTEL FRANCE

PAGE-SHEET-S[redacted] 1

CERTIFICAT DE RECEPTION
INSPECTION CERTIFICATE - ABNAHMEPRUFZEUGNIS
MODELE 3.1.B (A49.001) DIN 50049

ACHETEUR - PURCHASER - BESTELLER
FRANCOSTEEL CORPORATION SALES
HOUSTON
UNITED STATES

NO.COMMANDE ACHETEUR
PURCHASER'S ORDER N°
BESTELLUNG NR
FNY 553 - 8190 Q

NO COMMANDE USINE
PLANT ORDER NUMBER
WERKSBESTELL NUMMER
3-M -20227

AVIS D'EXPEDITION N°
DISPATCH NOTE N°
VERSANDANZEIGE NR
8 -130487

POSTE / ITEM / POST	DIMENSIONS EN POUCES / DIMENSIONS / ABMESSUNGEN	QUANTITE TOTALE-TOTAL QUANTITY-GESAMTMENGE: NOMBRE-NUMBER ANZAHL	LONGUEUR (FEET) LENGTH-LANGE	MASSE (LBS) MASS - MASSE
2	6" X 6" X ,500"	8	320,01	11221
3	7" X 7" X 3/8"	5	200,00	6569
6	8" X 8" X ,500"	2	79,98	3946
11	12" X 2" X ,250"	10	400,00	9016
12	12" X 4" X ,250"	6	239,99	6239

NUANCE D'ACIER - STEEL GRADE - STAHLSORTE
ASTM A 500 GRADE B ERW

NORME OU SPECIFICATION DU PRODUIT
PRODUCT STANDARD OR SPECIFICATION
PRODUKTNORM BZW.- SPEZIFIKATION
STRUCTURAL SQUARE AND RECTANGULAR TUBES
ERW ASTM A 500 GRADE B (WITH MIN. PSI YIELD 46000)

ANALYSE SUR TUBES EN % - PIPES ANALYSIS - ROHRANALYSE

POSTE / ITEM / POST	NO DE LA COULEE / NUMBER OF CAST / NUMMER DES GUSSES	C	MN	P	S	SI	AL	BO	CR	MO	V	CU	TI	NI	NB	SN
2	14836	0,126	1,440	0,012	0,007											
2	24904	0,160	1,450	0,018	0,008											
3	26255	0,131	1,400	0,016	0,009											
6	15158	0,158	1,430	0,013	0,007											
11	15158	0,158	1,430	0,013	0,007											
12	26401	0,169	1,510	0,020	0,007											

TRACTION - TENSILE TEST - ZUGVERSUCH
EPROUVETTE - TEST PIECE - PROBE

POSTE: VALEURS GARANTIES - GUARANTEED VALUES
GEWAHRLEISTETE WERTE

POSTE / ITEM / POST	RE (PSI)	RM (PSI)	A %	RM(A-2)
2	68655	74691	25,2	
2	71936	77592	25,2	
3	62073	71936	28,6	
6	69905	75662	28,5	
11	61348	71791	32,9	
12	63669	75937	32,2	

POSTE / ITEM / POST	ESSAI HYDRAULIQUE / HYDRAULIC TEST / WASSERPRUFDRUCK	
2	S	BAR
2	S	BAR
3	S	BAR
6	S	BAR
11	S	BAR
12	S	BAR

NOUS ATTESTONS QUE LES PRODUITS SONT CONFORMES AUX STIPULATIONS DE LA COMMANDE
WE CERTIFY THAT THE DELIVRED PRODUCTS COMPLY WITH THE REQUIREMENTS OF THE ORDER.
ES WIRD BESTATIGT, DAS DIE GELIEFERTEN-ERZEUGNISSE DEN BESTIMMUNGEN DER BESTELLUNG ENTSPRECHEN.

RESPONSABLE SECTEUR QUALITE: M. SZKOLNIK
PRODUCTEUR / PRODUCER / HERSTELLER

DATE DATUM: 29/11/93

To: Kenny
Heat: B.5
6X6X500
Sq Tube

XT 77444

666

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-87+97332-38 97257-60+
RECEIVED FROM Soltec
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1427 . 11960
DATE RECEIVED 8-25-94
DATE INSPECTED 8-25-94
INSPECTED BY: C Humphrey

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Angle Iron	11460	1	1	0	ANG-3½x2½x¼05	Y	Y	Good	None	X			
3½" x 2½" x ⅜" x 20'													

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Toltec Steel Products, Inc
5390 Dietrich Road

San Antonio TX 78219

PO Number: 1146-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Kerry M. Hitchcock
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/25/94	Their Truck		8-25-94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	3-1/2"x2-1/2"x3/8" angle iron	1	$44.57	$44.57

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements"
QA Approval C Patton
Date 8-25-94

Special Instructions

Please include MTR's.

Ordered By: Kerry Hitchcock

Project #: TSI/TVA

Total	$44.57
Shipping	
Tax	$3.45
Invoice Total	$48.02

* * * * * * * * * * * * * * * * *
* S A L E S O R D E R 29259 *
* * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 11460
PLACED BY:
SHIP VIA:
COMMENTS:

TELEPHONE #: (210) 635-8100

ORDER DATE: 8/25/94
SALESMAN: CASEY HARMS

REQUEST DATE: 8/25/94

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
1	1	1	ANB 3-1/2X2-1/2XC05	3-1/2 X 2-1/2 X 5/8 X 20	144	30.95	44.57

TOTAL WEIGHT: 144 LBS

RECEIVED BY: _____

NET BEFORE TAX	44.57
TAX.....	3.45
GRAND TOTAL...	48.02

CO·STEEL LASCO
A Division of Co-Steel Inc.
Hopkins St. South, Whitby, Ontario, Canada L1N 5T1
TEL: WHITBY 905-668-8811 • TORONTO 416-364-6136
FAX: 905-668-6469 DUNS 20-183-2094

MATERIAL LISTED BELOW WAS SHIPPED ON BILL OF LADING AND LOADING REPORT NUMBER

TESTING LABORATORY REPORT
COMPTE RENDU DU LABORATOIRE D'ESSAI

• PHYSICAL PROPERTIES • PROPRIÉTÉS PHYSIQUES • CHEMICAL ANALYSIS • ANALYSE CHIMIQUE

JUL. 18,1994 20:25

097068

3373.4

O'NEAL STEEL
108 BOGGSTOWN RD.
SHELBYVILLE, INDIANA
U.S.A.
46176

ATTENTION--

CUST. ORDER NUMBERS / N° DE COMM. DU CLIENT: SEE * BELOW

PAGE # 01

MATERIAL TESTED / MATÉRIAU ÉPROUVÉ | HEAT NO. / N° DE CHALEUR | YIELD STRENGTH / LIMITE D'ÉLASTICITÉ | TENSILE STRENGTH / RÉSISTANCE DE TRACTION | ELONGATION GAUGE LENGTH / ALLONGEMENT LONGUEUR DE JAUGE | BEND TEST / ESSAI DE PLIAGE | GRADE / NUANCE

CHANNELS
7 @ 14.75 C6255 58995 PSI 78671 PSI 25.0% IN ASTM-A36-91 SA-36 ASTM A709 GR36

MATERIAL SPECS: 33081 PART #: PART NAME:
* B-31613

C	MN	P	S	SI
0.1700	0.6700	0.0050	0.0160	0.1500

ANGLES - STRUCTURAL
3 1/2 X 2 1/2 X 1/2 C3387 50240 PSI 75932 PSI 29.0% IN 8 IN ASTM-A36-91 SA-36 ASTM 709 GR36

MATERIAL SPECS: 0105961 PART #: PART NAME:
* B-07177

C	MN	P	S	SI
0.1900	0.7600	0.0040	0.0150	0.1860

ANGLES - STRUCTURAL
4 X 4 X 5/16 C6904 52263 PSI 78902 PSI 28.0% IN 8 IN ASTM-A36-91 SA-36 ASTM 709 GR36

MATERIAL SPECS: 01 10841 PART #: PART NAME:
* F-04643

C	MN	P	S	SI
0.2100	0.8500	0.0070	0.0200	0.2080

ROUND BARS-NON-ALLOY
1 1/8 INCH DIAM C6745 49536 PSI 73057 PSI 30.0% IN 8 IN ASTM-A36-91 SA-36 ASTM 709 GR36

MATERIAL SPECS: 03 15951 PART #: PART NAME:
* X-23757

C	MN	P	S	SI
0.1900	0.7300	0.0050	0.0240	0.1900

CO·STEEL LASCO A DIVISION OF CO-STEEL INC. CERTIFIES THAT THE ABOVE RESULTS ARE A TRUE AND

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 1960-97185-87, 97257-60
RECEIVED FROM Joltec Steel
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1404 . 11960
DATE RECEIVED 7-21-94
DATE INSPECTED 7-21-94
INSPECTED BY: C Batton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Plate ½"x12"x20'	11320	1	1	0	PLT ½X12	Y		Good	None	X			
Sq tubing 4"x4"x¼"x20'	11320	1	1	0	TUBAXCOLX20	X		Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Toltec Steel Products, Inc
5390 Dietrich Road

San Antonio TX 78219

PO Number: 1132-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	Cleda Patton Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/20/94	Their Truck		7/21/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	1/2"x 12"x20' Plate	1	$126.40	$126.40
2.	4"x4"x1/4" x24' Square Tubing	1	$103.22	$103.22

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 1-20-94

Special Instructions

Please include MTR's (Material Test Reports)

Ordered By: Cleda Patton

Project #: TSI/TVA-Deck 7

Total	$229.62
Shipping	
Tax	$17.80
Invoice Total	$247.42

* * * * * * * * * * * * * * * * *
* S A L E S O R D E R 28761 *
* * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 11329
PLACED BY: CLETA
SHIP VIA:
COMMENTS:

TELEPHONE #: (512) 635-8100

ORDER DATE: 7/20/94
SALESMAN: CASEY HARMS

REQUEST DATE: 7/20/94

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01		1	FLT 1/2X12	1/2 X 12 X 20	40B	30.95	125.40
02	1	1	TUB 4XC06X20	4 X 4 X 250 X 20	244	516.10	103.22

WEIGHT: 652 LBS

RECEIVED BY: Jane Reynolds

NET BEFORE TAX	229.62
TAX.....	17.80
GRAND TOTAL...	247.42

B/L # 72969

NUCOR STEEL
A Division of Nucor Corporation
JEWETT, TEXAS 75846 PH (903) 626-4461

Date 12/94

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH RD.
SAN ANTONIO, TX 78219

CERTIFIED MILL TEST REPORT

43579

SOLD TO: TOLTEC
5390 DETRICH RD.
SAN ANTONIO TX 78219

SHIP TO: TOLTEC
5390 DETRICH RD

8 INCH SCALE

SIZE / GRADE	HEAT NUMBER	CUSTOMER PO NUMBER	TENSILE PSI	YIELD PSI	ELONG %	C	Mn	Si	S	P	V	Nb	Cu	Cr	Ni	Mo
1/2 X 12 ASTM A36-93/ASME SA36-89	345-0467	#534	73600	50000	27	.17	.74	.26	.03	.02	.000	.000	.48	.09	.11	.033
3/4 X 12 ASTM A36-93/ASME SA36-89	334-2690	#534	73700	49100	23	.13	.72	.21	.03	.01	.000	.000	.26	.14	.10	.031
1/2 X 10 ASTM A529-92 GD 50	343-0813	#534	81800	56400	21	.23	.90	.26	.04	.02	.000	.000	.40	.16	.12	.040
3/8 X 8 ASTM A36-93/ASME SA36-89	343-0790	#534	65500	47700	25	.16	.75	.22	.04	.02	.000	.000	.38	.10	.12	.038
2 X 1 X 1/8 ASTM A36-93/ASME SA36-89	332-2362	#534	80000	59500	28	.15	.82	.24	.04	.02	.000	.000	.37	.20	.16	.049
2 X 2 X 1/4 ASTM A36-93/ASME SA36-89	341-1165	#534	70500	50400	30	.15	.75	.22	.04	.02	.000	.000	.48	.17	.17	.057
4 X 3 X 3/8 ASTM A36-93/ASME SA36-89	342-0736	#534	63700	43800	27	.13	.71	.16	.03	.02	.000	.000	.33	.10	.10	.024
3 X 4.1 ASTM A36-93/ASME SA36-89	341-1085	#534	70500	49800	25	.12	.82	.25	.03	.01	.000	.000	.60	.13	.11	.034
6 X 8.2 ASTM A36-93/ASME SA36-89	343-0661	#534	72300	54400	24	.20	.85	.25	.04	.02	.000	.000	.55	.15	.13	.057

CHIEF METALLURGIST

MELTED AND MANUFACTURED IN U.S.A.

HANNA

Certification 391000 5/12/94 075

ipped Hanna Steel Corporation
ro: Tube Division
3600 Avenue C
P.O. Box 558
Fairfield AL 35064

Cust P.O.: 8731
Date Shipped: 5/11/94
Load Tally 3-44104
Invoice # 394103

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH RD.
SAN ANTONIO, TX 78219

RECEIVED
MAY 16 1994

il Sunbelt Metal Service Inc
:
P O Box 43839
Austin TX 78745

Ship To:
Sunbelt Metal Service Inc
South Loop 4
Buda TX 78610

Item	Heat #	ASTM Grade	Description	Yield	Tensile	Elong	Rockwell
7150712			2X3 RECT 3/16 HRA500 20.000FT				
NTINUED							
53179	01403	A500 B		66,000	76,000	26.0	B84
53179	45472	A500 B		68,500	76,500	27.0	B86
53184	51226	A500 B		62,000	73,000	28.0	B82
	Total Weight	7,826					

Heat #	C	MN	P	S	SI
01403	.170	.790	.012	.007	.020
45472	.170	.780	.017	.009	.030
51226	.160	.740	.015	.013	.020

4600412	5 SQ 1/4	HRA500	40.000FT				
55060	1304854	A500 B		65,000	75,500	31.0	B84
	Total Weight	5,616					

Heat #	C	MN	P	S	SI
1304854	.170	.720	.011	.012	.005

4301112	2 SQ 11GA	HRA500	20.000FT				
3223	C85226	A500 B		55,000	69,000	30.0	B80
3224	C85226	A500 B		55,000	69,000	30.0	B80
	Total Weight	6,100					

Heat #	C	MN	P	S	SI
C85226	.180	.750	.013	.009	.017

nna Steel Corporation
12 Commerce Avenue
). Box 558
irfield, Alabama 35064
)5) 780-1111
)NS No. 00-402-9294

SUBJECT TO TERMS AND CONDITIONS ON BACK

Milton Stewart
Metallurgist

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97257
RECEIVED FROM Toltec
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1440 . 11960
DATE RECEIVED 9-23-94
DATE INSPECTED 9-26-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Angle iron	11540	4	4	0	ANG1-1/2XC01	Y	Y	Good	None	X			
1½"x1½"x⅛"x20													

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Toltec Steel Products, Inc
5390 Dietrich Road

San Antonio TX 78219

PO Number: 1154-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Kerry M. Hitchcock
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
9/17/94	Their Truck		9/21/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	1-1/2"x1-1/2"x1/8"x20' Angle Iron ANG 1-1/2xCO1	4	$6.51	$26.03

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 9-17-94

Special Instructions

Please include MTR's.

Ordered By: Kerry Hitchcock

Project #: TSI/TVA

Total	$26.03
Shipping	
Tax	$2.02
Invoice Total	$28.05

* * * * * * * * * * * * * * * *
* S A L E S O R D E R 24569 *
* * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5890 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

BILL TO: 000477
OMEGA POINT LABORATORIES
16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES
16015 SHADY FALLS
ELMENDORF, TEXAS 78112-0000

PURCHASE ORDER: 1154 Q
PLACED BY: KERRY
SHIP VIA:
COMMENTS:

TELEPHONE #: (210) 635-9104

ORDER DATE: 5/01/94
SALESMAN: CASEY MARIE

REQUEST DATE: 5-6-94

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	4	4	ANG 1-1/2X1/8	1-1/2 X 1-1/8 X 1/8 X 20	98	26.03	26.03
02	1	0		****MILL CERTS REQUIRED	0	.00	.00

TOTAL WEIGHT: 98 LBS

RECEIVED BY: Richard L. Beasley

NET BEFORE TAX	26.03
TAX.....	2.02
GRAND TOTAL...	28.05

STRUCTURAL METALS, INC.
BO[illegible]911, SEGUIN, TEXAS 78156-0911
512[illegible]72-8200

CERTIFIED TEST REPORT

The following tests conform to the requirements of the specifications listed.

IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

QUALITY CONTROL MANAGER

3/ 2/93

INV# SB2439
DEL NO B9379472

S 170000 TOLTEC STEEL PRODUCTS, INC.
O [illegible] OPERATION RD.
L P O BOX SAN ANTONIO, TX 78219
D HOUSTON TX
T 77241
O

S 8001 TOLTEC STEEL PRODUCTS, INC.
H
I P/U @ THE MILL 9999 OPERATION RD.
P SEGUIN SAN ANTONIO, TX 78219
T TX
O

HEAT NO	SECTION	SPECIFICATION	T #	YIELD PSI	TENSILE PSI	ELONG %	ELONG IN	R.A. %	BEND TEST DIAM	BEND TEST RSL	DATE ROLLED	LB/FT
2360	L 2.5X2.5X3/16	ASTM A36-89	1	53300	75000	31.5	8				081692	2.95
3396	L 1.5X1.5X1/8	ASTM A36-89	1	55700	75200	23.0	8				101992	1.20
4032	L 2X2X1/4	ASTM A36-89	1	52200	74600	27.5	8				113092	3.09
4885	L 3X2X3/16	ASTM A36-91	1	55400	77800	29.0	8				011393	3.02
			2	55400	77200	29.0						
5193	L 3X3X1/2	ASTM A36-91	1	60000	79900	25.0	8				012793	9.40
0496	L 3.5X3.5X1/4	ASTM A36-89	1	55600	77000	35.0	8				040792	5.74

HEAT NO	C	MN	P	S	SI	CU	CR	NI	MO	CB	V	AL	CE		BHN	
2360	.16	0.81	.009	.031	.21	.52	0.10	0.18	.048	.000	.0020	.003	.00			1145
3396	.19	0.65	.007	.031	.20	.34	0.11	0.11	.034	.000	.0010	.001	.00			1145
4032	.19	0.61	.011	.035	.17	.43	0.09	0.16	.046	.000	.0010	.002	.00			1145
4885	.20	0.63	.006	.028	.21	.41	0.10	0.16	.041	.000	.0010	.002	.00			1145
5193	.20	0.76	.007	.021	.21	.28	0.13	0.17	.069	.000	.0170	.003	.00			1145
0496	.18	0.72	.010	.030	.20	.48	0.11	0.14	.032	.000	.0020	.000	.00			1145

MARKS:

THIS STEEL IS MELTED AND MANUFACTURED IN THE USA AND IS FREE FROM MERCURY CONTAMINATION IN THE PROCES

FOR ADDITIONAL COPIES
CALL ACCOUNTING
(512) 372-8225.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185, 86+87, 97257-60
RECEIVED FROM Summers
PROJECT LOCATION Omega Point Labs

REPORT NUMBER B99 . 11960
DATE RECEIVED 7-7-94
DATE INSPECTED 7-7-94
INSPECTED BY: A. Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
7 Strand Bare #8	1121Q	1K	1K	0	BASTR7SD8	Y	Y	Good	None	X			
Copper Wire													

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Summers Electric
2400 Brockton

San Antonio TX 78217

PO Number: 1121-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
6/27/94	Their Truck		6/30/94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	7 Strand Bare #8 Copper Wire BARE8STR	1000	$0.69	$690.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 6-27-94

Special Instructions

Please include all Certificates of Conformance to Catalog Specifications

Ordered By: Cleda Patton

Project #: 11960

Total	$690.00
Shipping	
Tax	
Invoice Total	$690.00

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

ORIGINAL

PACKING SLIP

NUMBER	PAGE
080330601	1

06-JUL-1994, 11:26

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

Inv Ans

SOLD TO: 09640800
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ATTN: ACCOUNTS PAYABLE DEPT.
ELMENDORF, TX 78112

SHIP TO:
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD

ELMENDORF, TX 78112

243

4hr 3MAll

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
1121-Q		KERRY	DEL

TCI-8:30

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
28-JUN-1994	03-JUL-1994	Our Truck	PC	243	000	10th, Net 20th

LINE	QTY ORD	QTY B/O	QTY SHIP	PART NUMBER / DESCRIPTION	BIN LOC / VEND	INST	UNIT PRICE	U/M	EXTENDED PRICE
002	1000	0	1000	COP BARE-8 STR SOFT DRAWN BARE C	33500	Y	140.00	M	140.00
	3000	0	3000	3M 06228 STD CABLE TIE	19-E-5 06228		20.48	C	614.40

Freight, if applicable, to be billed later

SUB TOTAL	754.40
FREIGHT	.00
TAX	58.46
TOTAL	812.86

PICKED BY: [signature] CHECKED BY: [signature] DATE: 7/6/94 CUSTOMER SIGNATURE: [signature]

MASTER FORM #2150

SERVICE WIRE CO.

MANUFACTURER

CULLODEN, WV (304)743-8600 PITTSBURGH, PA (412)325-1666 HOUSTON, TX (713)674-6666

THIS MATERIAL IS MADE TO APPROPRIATE UL, ASTM, OR CUSTOMER STANDARDS AS SPECIFIED BY THE ORDER.

MADE BY:

SHIP TO:
SUMMERS-SAN ANTONIO
2400 BROCKTON
PO BOX 17747
SAN ANTONIO TX 78217

ORDER NO: 355686

SHIP/SPECIAL INSTRUCTIONS:
PP/ADD FOB ORIGIN
MARK PO # 510026009
510026009

#79 TX 779-675

66287011695

MFG DATE

BASTR7SD8
8 AWG 7STR
BARE CU STRAND SD

CUTTING

DRAWING

STRANDING

CABLING

ARMOR

JACKET

INSULATION

TESTING

GROSS TARE NET 1000 FEET

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 7-3-94 we, Summers Electric, provided the material called for on your Purchase Order # 1121-Q on our Bill of Lading (shipping document) # 080330601, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 7-20-94
Signature: John Hank
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

OMEGA POINT LABORATORIES

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-187 + 97257 to 97260
RECEIVED FROM Summers
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1406 - 11960
DATE RECEIVED 7-22-94
DATE INSPECTED 7-22-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Galv Cond Strap	1134Q	7	7	0	KINC105-4	Y	Y	GOOD	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

John Harnett
Summers Electric
2400 Brockton

San Antonio TX 78217

PO Number: 1134-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	Kerry M. Hitchcock Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/22/94	Pick up		7/22/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Galv Cond Strap-KIN C105-4	7	$2.36	$16.49

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 7-22-94

Special Instructions

Please include Certificate of Conformance

Ordered By: Kerry Hitchcock

Project #: 11960 -group 1

Total	$16.49
Shipping	
Tax	$1.27
Invoice Total	$17.76

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

CONTROL

PACKING SLIP

NUMBER	PAGE
080764101	1

22-JUL-1994, 08:53

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

TYA.

SOLD TO: 08643800
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ATTN: ACCOUNTS PAYABLE DEPT.
ELMENDORF, TX 78112

SHIP TO:
OMEGA POINT LABORATORIES
2400 BROCKTON
SAN ANTONIO, TX 78217

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
34Q			WC

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
-JUL-1994	22-JUL-1994	Will Call	PC	236	000	10th, Net 20th

LINE	QTY. ORD.	QTY. B.O.	QTY. SHP.	PART NUMBER / DESCRIPTION	BIN LOC. / UPC	INST	UNIT PRICE	UM	EXTENDED PRICE
1	7	0	7	KIN C105-4 GALV COND STRAP	24-A-2 75951		235.63	C	16.49

SUB TOTAL	:	16.49
FREIGHT	:	.00
TAX	:	1.27
TOTAL	:	17.76

MASTER FORM #2250

PICKED BY [ ] CHECKED BY [ ] DATE [ ] CUSTOMER SIGNATURE [Kerry Hutchison]

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 7-22-94 we, Summers Electric, provided the material called for on your Purchase Order # 1134Q on our Bill of Lading (shipping document) # 080764101, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 7-26-94
Signature: John Harris
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

Q/A RECEIVING REPORT

OMEGA POINT LABORATORIES

CLIENT/PROJECT NAME TSI/TUA
CLIENT/PROJECT NUMBER 119160-97185-87-97257-60
RECEIVED FROM Summers Electric
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1418 .11960
DATE RECEIVED 8-23-94
DATE INSPECTED 8-23-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Junction box flat cover 12ga. Welded Ends	1141Q	1	1	0	MS? 12x12x60	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Summers Electric
2400 Brockton

San Antonio TX 78217

PO Number: 1141-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Kerry M. Hitchcock
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/18/94			8-22-94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Junction Box 12ga 12"x12"x60"	1	$186.00	$186.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval cPatton
Date 8-19-94

Special Instructions

Must meet NEMA 1 specifications.

Ordered By: Kerry Hitchcock

Project #: TVA/TSI
Proj# 97259
Test deck #6

Total	$186.00
Shipping	
Tax	$14.42
Invoice Total	$200.42

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

CUSTOMER

PACKING SLIP 691

PACKING SLIP NUMBER	PAGE
081251801	1

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

18-AUG-1994, 10:43

SOLD TO: 08643800
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ATTN: ACCOUNTS PAYABLE DEPT.
ELMENDORF, TX 78112

SHIP TO:
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
.41Q		KERRY	DEL

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
3-AUG-1994	18-AUG-1994	Our Truck	PC	236	000	10th, Net 20th

LINE	QTY. ORD.	QTY. B.O.	QTY. SHP.	PART NUMBER / DESCRIPTION	BIN LOC. / UPC	NST	UNIT PRICE	UM	EXTENDED PRICE
01	1	0	1	MS? 12X12X60		Y	186.00	E	186.00

WELDED ENDS 12X60 FLAT COVER 12 GA. NEMA 1
PAD

Freight, if applicable, to be billed later

SUB TOTAL	:	186.00
FREIGHT	:	.00
TAX	:	14.42
TOTAL	:	200.42

DELIVER TODAY 8-23 PLEASE CD

PICKED BY | CHECKED BY | DATE 8/23 | CUSTOMER SIGNATURE Richard Beasley 1:00

MASTER FORM #2250

692

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 8-18-94 we, Summers Electric, provided the material called for on your Purchase Order # 11410 on our Bill of Lading (shipping document) # 08125 1801, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 9-27-94
Signature: John Hamm
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-97187 +97332-97267-97260 97338
RECEIVED FROM Summers Electric
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1420 - 11960
DATE RECEIVED 8-24+25-94
DATE INSPECTED 8-24+25-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
4" steel locknut	11450	4	4	0	BPT 110	X	X	Good	None	X			
4" gal Cond Strap	11450	25	25	0	KIN-C105-4	Y	X	Good	None	X			
3" gal Cond Strap	11450	15	15	0	KIN-C105-3	Y	Y	Good	None	X			
2½" gal cond strap	11450	5	5	0	KIN-C105-2½	Y	Y	Good	None	X			
2" gal Cond Strap	11450	20	20	0	KIN-C105-2	Y	Y	Good	None	X			
3" sq Head Plugs	11450	3	3	0	APP PLG300S	Y	Y	Good	None	X			
1" gal Cond Strap	11450	10	10	0	KINC105-1	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Summers Electric
2400 Brockton

San Antonio TX 78217

PO Number: 1145-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	Kerry M. Hitchcock Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/24/94	Their Truck			

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	4" Steel Locknut - BPT 110	4	$1.65	$6.60
2.	Galv Cond Strap - KIN C105-4	25	$2.36	$59.00
3.	Galv Cond Strap - KIN C105-3	15	$1.71	$25.65
4.	Galv Cond Strap - KIN C105-2-1/2	5	$1.58	$7.90
5.	Galv Cond Strap - KIN C105-2	20	$1.31	$26.20
6.	Galv Cond Strap - KIN C105-1	10	$0.95	$9.50
7.	3" SQ Head Plug - APP PLG300S	3	$12.73	$38.19

Special Instructions

Please include Certificate of Conformance.

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-24-94

Ordered By: Kerry Hitchcock

Project #: TSI/TVA

Total	$173.04
Shipping	
Tax	$13.42
Invoice Total	$186.46

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

CUSTOMER

PACKING SLIP 695

FROM: 318 W. JOSEPHINE
SAN ANTONIO, TX 78212

NUMBER	PAGE
178378001	1

24-AUG-1994, 12:15

SOLD TO: 08643800
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ATTN: ACCOUNTS PAYABLE DEPT.
ELMENDORF, TX 78112

SHIP TO: OMEGA POINT LABORATORIES
318 W JOSEPHINE
SAN ANTONIO, TX 78212

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
1450		KERRY	WC

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
4-AUG-1994	24-AUG-1994	Will Call	PC	226	000	10th. Net 20th

LINE	QTY. ORD.	QTY. B.O.	QTY. SHP.	PART NUMBER / DESCRIPTION	BIN LOC. / UPC	NST	UNIT PRICE	UM	EXTENDED PRICE
01	4	0	4	BPT 110 4-IN STEEL LOCKNUT	11-B-3 00110		165.00	C	6.60
02	25	0	25	KIN C105-4 GALV COND STRAP	17-A-1 75951		235.63	C	58.91
03	15	0	15	KIN C105-3 GALV COND STRAP	17-A-1 75945		171.22	C	25.68
04	5	0	5	KIN C105-2-1/2 GALV COND STRAP	17-A-1 75942		158.45	C	7.92
05	20	0	20	KIN C105-2 GALV COND STRAP	17-A-1 75939		131.00	C	26.20
06	10	0	10	KIN C105-1 GALV COND STRAP	17-A-1 75930		95.05	C	9.51

SUB TOTAL	:	134.82
FREIGHT	:	.00
TAX	:	10.46
TOTAL	:	145.28

REV. 8/94

MASTER FORM #2263 SE-TX

PICKED BY [ ] CHECKED BY [ ] DATE [ ] RECEIVED BY [ ]

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

CUSTOMER

PACKING SLIP 696

PACKING SLIP NUMBER	PAGE
081360401	1

24-AUG-1994, 12:16

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

SOLD TO: 08643800
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ATTN: ACCOUNTS PAYABLE DEPT.
ELMENDORF, TX 78112

SHIP TO:
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
1450		KERRY	DEL

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
4-AUG-1994	24-AUG-1994	Our Truck	PC	236	000	10th, Net 20th

LINE	QTY. ORD.	QTY. B.O.	QTY. SHP.	PART NUMBER / DESCRIPTION	BIN LOC. / UPC	NST	UNIT PRICE	UM	EXTENDED PRICE
02	3	0	3	APP PLG300S 3-IN SQ HEAD PLUG	27-C-3 65260		12.73	E	38.19

DELIVER TOMORROW IS OK

SUB TOTAL	:	38.19
FREIGHT	:	.00
TAX	:	2.96
TOTAL	:	41.15

MASTER FORM #2250

PICKED BY | CHECKED BY | DATE 8/24/94 | CUSTOMER SIGNATURE Richard Z Beasley

697

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 8-24-94 we, Summers Electric, provided the material called for on your Purchase Order # 11450 on our Bill of Lading (shipping document) # 081360401, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 9-27-94
Signature: John Harris
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

698

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 8-24-94 we, Summers Electric, provided the material called for on your Purchase Order # 1145Q on our Bill of Lading (shipping document) # 178378001, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 9-27-94
Signature: John Harris
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960/97553-55
RECEIVED FROM B-Line Systems
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1443.11960
DATE RECEIVED 10/5/94
DATE INSPECTED 10/11/94
INSPECTED BY: C Humphreys

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
12" steel cable tray	1157Q	2	2	0	248P-09-12-144	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Sue Messerlie
B-Line Systems
509 West Monroe

Highland IL 62249

PO Number: 1157-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
9/28/94	UPS Red Label			

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	12" steel cable tray 248P-09-12-144	2		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 9-28-94

Special Instructions

See attached purchasing specifications and Quality Assurance Requirements.

Ordered By: Constance A. Humphrey

Project #: TSI-97553-55

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

VENDOR PURCHASING SPECIFICATION AND QUALITY ASSURANCE REQUIREMENTS

Vendor B-Line

Purchase Order No. 11570

Any or all of the following Quality Assurance requirements shall be incorporated as conditions to this procurement when corresponding box is marked. Failure to comply with any requirement specified herein may result in rejection and/or return of shipment at seller's expense.

1.0 QUALITY PROGRAM

☒ Seller shall furnish all items on this Purchase Order in accordance with Quality Program approved by Buyer.

2.0 QUALITY VERIFICATION

When additional quality verification activities are required as a condition to this procurement, invoices will not be paid until satisfactory completion of such activities. Excessive rejection rates may result in removal from buyer's Approved Vendors List.

☒ Receiving Inspection - Buyer shall inspect items upon receipt to verify compliance with purchase order requirements. Rejected items shall be returned at seller's expense.

☐ Independent Laboratory Tests - Samples of materials furnished shall be tested independently for conformance to specification requirements proir to final acceptance. Rejected materials shall be returned at seller's expense.

☐ Document Review - Final acceptance shall be based on satisfactory review of required certifications and other supporting documents.

3.0 CERTIFICATIONS

When certifications are required as a condition to this procurement, the seller shall furnish one reproducible copy either with or prior to each shipment. Shipments will not be accepted and invoices will not be paid until certifications are in buyer's possession.

PURCHASING SPECIFICATIONS
PAGE 2 OF 3

VENDOR B-Line
PURCHASE ORDER NO. 11570

☒ Certificate of Compliance/Conformance Required - Certification that materials and/or services comply with purchase order requirements. Certification shall reference purchase order number and traceability numbers (when applicable).

☐ Certified Test Report Required - Certification that material complies with applicable material specification(s) and the purchase order. Include actual results of required tests.

☐ Certificate of Calibration Required - Certification shall be traceable to National Bureau of Standards. (Renamed NIST, Nat. Institute of Science & Technology)

4.0 AUDITS/RIGHT OF ACCESS

☐ The buyer reserves the right to audit your facility to verify compliance with purchase order, code and specification requirements with minimum of ten (10) days notice.

☒ Shipments shall only originate from facilities approved by the buyer.

☐ Buyer reserves the right to inspect any or all work included in this order at seller's facility with as early notice as practicable.

5.0 IDENTIFICATION

☒ Seller shall identify each item with a unique traceability number by physical marking or tagging. Traceability numbers shall be traceable to certifications and packing lists.

☐ Seller shall identify each container with a unique identification number. The identification number shall be traceable to certifications and packing lists.

6.0 10 CFR, PART 21

☒ The material, equipment and/or services to be furnished under the provisions of this purchase order are involved in the testing of basic components of a Nuclear Regulatory Commission (NCR) licensed facility. Accordingly, the seller is subject to the provisions of 10 CFR, Part 21 (Reporting of Defects and Non-compliance)

PURCHASING SPECIFICATIONS
PAGE 3 OF 3

VENDOR B-Line
PURCHASE ORDER NO. 1157Q

7.0 PACKING/SHIPPING

☐ All materials shall be packaged in air tight, moisture free containers and shall be free from all foreign substances such as dirt, oil, grease or other deleterious material.

☒ All materials and equipment shall be suitably crated, boxed or otherwise prepared for shipment to prevent damage during handling and shipping. Wherever practical, equipment shall be palletized for ease of unloading and storage at destination. each container shall be clearly marked with buyer's purchase order number.

QUALITY ASSURANCE APPROVAL C Humphrey DATE 9/28/94

704

SHIPPING ORDER

15:56:40

S

B-LINE® SYSTEMS, INC.
509 West Monroe Street
Highland, Illinois 62249-0326
Phone: 618-654-2184

RS1 SYM

SHIPPING ORDER NO.
8942-9261

DATE
9/29/94

0026073

SOLD TO:

OMEGA POINT LABORATORY
16015 SHADDY FALLS RD

ELMENDORF TX 78112

Belair 9-30 9P

SHIP TO:

OMEGA POINT LABORATORY
16015 SHADDY FALLS RD

ELMENDORF TX 78112

1-CTN=6 #

8942926 1

PAGE NO. 1 OF 1 TERMS - NET 30 DAYS

CUST. ORDER NO.	DATE RECEIVED	LAST SHIPPED	SHIPPING DATE	VIA	COL	PPD	CHG	ALLC
11579	9/29/94		10/03/94	AE		X	X	

DIV.	SALESMAN	SHIP FROM	F.O.B.	DATE SHIPPED	B/L	WEIGHT
7	8800 E	TROY	TROY	10-3-94	358077	79#

TOM FENOGLIO

1 of 2 - 73

ORDERED	DUE	SHIPPED	BACK ORDER	UNIT	*	PART NUMBER	DESCRIPTION
3	2	2	—	PC		248P09-12-144 STR SECTION	ITM 1
						____ BUNDLE(S) OF ____ PC(S) EA.	
		S/O				1126-34200 9/29/94 WGT. 36.1600	971-3204 ML
2	2	2	—	PR		9ZN-8004 SPLICE PLATE	ITM 2
						LOCATION: I002 H05-2	
						____ CARTON(S) OF ____ PR(S) EA.	
						WGT. 2.4000	703-0000 ML

FREIGHT CHARGES FROM TROY TO FOLLOW

TOTAL WEIGHT 77.1200

ANY SHORTAGE OR DAMAGE CLAIM MUST BE REPORTED IN WRITING TO ADDRESS SHOWN ABOVE, WITHIN TEN (10) DAYS FROM DATE OF SHIPMENT.

FORM 102 A

[redacted]

705

CERTIFICATE OF CONFORMANCE

P. O. No.: 1157Q REV. —

SPECIFICATION: CATALOG CT3 REV. —

PRIME VENDOR: B-LINE SYSTEMS, INC.

SUPPLIER: SAME

ADDRESS: 509 WEST MONROE ST., HIGHLAND, ILLINOIS 62249

DESCRIPTION OF EQUIPMENT: 248P09-12-144, 9ZN-8004

IDENTIFICATION: ON ATTACHED SHIPPING ORDER 8942-9261

APPROVED EXCEPTIONS: NONE

M.T.R.'S ATTACHED: NONE

SUPPLIERS CERTIFICATION

This is to certify that the products identified herein have been manufactured/supplied under B-Line Systems approved quality assurance program and are in comformance with the procurement quality requirements including applicable codes, standards, and specifications as identified in the above referenced documents. Any supporting documentation will be forwarded or retained in accordance with purchase order requirements.

Rich Cain
Signature

10/11/94
Date

QUALITY ASSURANCE INSPECTOR
Title

B-LINE SYSTEMS, INC.
Organization

B-LINE ® SYSTEMS, INC.
509 West Monroe Street
Highland, IL 62249, U.S.A
Phone: 618/654-2184

AF AMERICAN Freightways®

PAGE 01 OF 01

800-826-3875

P. O. Box 840, Harrison, Arkansas 72602-0840 (ARFW)

FREIGHT BILL NUMBER
Refer To This Number

014 6371503 RO

CONSIGNEE
02215441
OMEGA POINT LABORATORY

16015 SHADDY FALLS RD
ELMENDORF TX 78112

SHIPPER
00950456 P3067
B LINE SYSTEMS

EXIT ARFW DOCK
SAINT LOUIS MO 63147

DATE: 10/03/94
ORIGIN: STL
DEST.: SAT
B/L#: 0035 8077

PCS	HM	DESCRIPTION	WT (LBS)	NMFC	CLASS	RATE	TOTAL CHARGES
		PO1#: 11570					
1		BRACES BRACKETS NOI O OR S 3/16" OR THICKER	6	104600-00	050		
1		CABLE RACKS TRAYS TROUGHS OR CABLE WAY STL 16 GA OR THICKER SECTION 7 SIGNED	73	061220-01	060		
2			79			PPD	4.20

RECEIVED IN GOOD CONDITION EXCEPT AS NOTED
FIRM:

BY: June Elizalde

DELIVERED BY: R Knight

DATE: 10-5-94

CONSIGNEE COPY

003

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME T51/TVA
CLIENT/PROJECT NUMBER 11960-97257-60+97332-38
RECEIVED FROM U.S. Sales
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1428.11960
DATE RECEIVED 8-26-94
DATE INSPECTED 8-29-94
INSPECTED BY: D Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	CONTD MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Pipe Clamps 1"	11420	10	10	-	P-2558-10	Y		Good	None	X			Complete Shipment
Pipe Clamps 4"	11420	40	40	-	P-2558-40	Y		Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Johnny Boyd
U.S. Sales Company, Inc.
318 W. Melrose Place

San Antonio TX 78212

PO Number: 1142-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/19/94	Their Truck		8/22/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	P1000 Channel	20'		$0.00
2.	P1001 Channel	40'		$0.00
3.	P2558-40 4" pipe straps	40		$0.00
4.	P2558-10 1" pipe straps	10		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-19-94

Special Instructions

Please include all Certificates of Conformance to Catalog Specifications

Ordered By: Constance A. Humphrey
Project #: TVA/TS

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

709

U. S. SALES COMPANY, INC.

CONTRACTORS SPECIALTIES
"SINCE 1948"
318 W. MELROSE PLACE
SAN ANTONIO, TEXAS 78212

PHONE 829-7044

Sold To: OMEGA POINT LABS Date: 8/26/94

Invoice: 21630

YOUR ORDER NO.	JOB NAME	Terms: 2% – 10 days, Net 30 days
1142 G		

QUANTITY	DESCRIPTION	LIST	UNIT	DISCOUNT	AMOUNT
10	D-255E-10 1 PIPE CLAMPS CC				
30	P-2553-40 4 - - -				
	BACK ORDERED TO D-255-40				

TAX

TOTAL

Received By C Humphrey ☐ Tax Exempt

U. S. SALES COMPANY, INC.

CONTRACTORS SPECIALTIES
"SINCE 1948"
318 W. MELROSE PLACE
SAN ANTONIO, TEXAS 78212

PHONE 829-7044

Sold To: Omega Point Labs Date: 8/30/84

Invoice: 21664

YOUR ORDER NO.	JOB NAME	Terms: 2% – 10 days, Net 30 days
1142 Q		

QUANTITY	DESCRIPTION	LIST	UNIT	DISCOUNT	AMOUNT
10	P-2559-4D 4 Hole Deck Strap				

TAX

TOTAL

Received By Jane Clifford

☐ Tax Exempt

U.S. Sales Co., Inc.

318 W. Melrose Place
San Antonio, Texas 78212
(210) 829-7044

August 30, 1994

CERTIFICATION OF COMPLIANCE

Omega Point Labs
16015 Shady Falls Rd.
Elmendorf, Texas 78112-9784

Attn: Cleda

Customer Order No. 1142 Q

Material: 20' P-1000 (PS-200)
40' P-1001 (PS-200 2T3)
10 P-2558-10
40 P-2558-40

This is to certify that the materials shipped to fill the above order have been manufactured in accordance with standard manufacturing procedures and specifications for these products.

U. S. SALES CO.

Johnny Boyd

Johnny Boyd, President

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960- 97185-87, 97257-60, 97832-38
RECEIVED FROM U.S. Sales
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1419 - 11960
DATE RECEIVED 8-23.
DATE INSPECTED CP's
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Channel	11420	20'	20'	0	P-1008 (PS-200)	Y		Good	None	X			partial shipment
Channel	11420	40'	40'	0	P-1001 (PS-200 2T3)	X		Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Johnny Boyd
U.S. Sales Company, Inc.
318 W. Melrose Place

San Antonio TX 78212

PO Number: 1142-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/19/94	Their Truck		8/22/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	P1000 Channel	20'		$0.00
2.	P1001 Channel	40'		$0.00
3.	P2558-40 4" pipe straps	40		$0.00
4.	P2558-10 1" pipe straps	10		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-19-94

Special Instructions

Please include all Certificates of Conformance to Catalog Specifications

Ordered By: Constance A. Humphrey
Project #: TVA/TS1

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

U. S. SALES COMPANY, INC.

CONTRACTORS SPECIALTIES
"SINCE 1948"
318 W. MELROSE PLACE
SAN ANTONIO, TEXAS 78212

PHONE 829-7044

Sold To: Omega Point Labs

Date: 8/23/84

Invoice: 21596

YOUR ORDER NO.	JOB NAME	Terms: 2% – 10 days, Net 30 days
1142 Q		

QUANTITY	DESCRIPTION	LIST	UNIT	DISCOUNT	AMOUNT
20	P-1000 Channel to E.G. ([illegible])				
40	P-1001 " " " ([illegible]-200273)				

TAX

TOTAL

Received By Richard O. Beasley

☐ Tax Exempt

U.S. Sales Co., Inc.

318 W. Melrose Place
San Antonio, Texas 78212
(210) 829-7044

August 30, 1994

CERTIFICATION OF COMPLIANCE

Omega Point Labs
16015 Shady Falls Rd.
Elmendorf, Texas 78112-9784

Attn: Cleda

Customer Order No. 1142 Q

Material: 20' P-1000 (PS-200)
40' P-1001 (PS-200 2T3)
10 P-2558-10
40 P-2558-40

This is to certify that the materials shipped to fill the above order have been manufactured in accordance with standard manufacturing procedures and specifications for these products.

U. S. SALES CO.

Johnny Boyd

Johnny Boyd, President

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-87. 97257-60 97332-38
RECEIVED FROM Hilti, Inc
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1431 . 11960
DATE RECEIVED 8-30-94
DATE INSPECTED 8-30-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Kwikbolt	11480	200	200	0	0004536O5	Y	Y	Good	None	X			
1/2"X 2 1/4"													

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Hilti, Inc.
853 Isom Road

San Antonio TX 78216

PO Number:

1148-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	Cleda Patton Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/29/94	Their Truck		8/30/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Hilti Bolt 1/4" x 2-1/4"	200		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-29-94

Special Instructions

Please include Certificate of Conformance.

Ordered By: Cleda Patton

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

718

HILTI®

No. 459353-01

* *FIRST ORIGINAL* * * *FIRST ORIGIN

13635 STEMMONS FREEWAY
FARMERS BRANCH, TX 75234

OMEGA POINT LABORATORIES
16015 SHADY FALL ROAD

ELMENDORF TX 78112

NOTES:
CLETA 0 - -

CUST. PO #
1148Q

ORDER DATE	ORDER #	SLS #	SLS NAME	SHIP LOC.	X-REF# = Y
08/29/94	459353-01	1750	RICHARD CARPENTER	51	08/29/94-16:16:32

ACCT. #	ACCT. NAME AND CUSTOMER PURCHASE ORDER NO.	DDAATT
8989177	OMEGA POINT LABORATORIES 1148Q	58-07-01

THANK YOU FOR CALLING HILTI CUSTOMER SERVICE 1-800-879-8000
DICK DAVITO EXT 6109

NE	ITEM #	ITEM DESCRIPTION	DUE	SHIP	B/O	BIN-LOC
1	000453605	KWIK BOLT II 14-214(100/BX) * * * END OF SHIPPER * * *	2	2		R5
		HILTI IS CLASSIFIED AS A LARGE BUSINESS				

SHIPMENT MODE
☐ LOCAL ☐ BUS
☐ TRUCK ☐ AIR
☐ UPS ☐ WAL IN

CARRIER

BILL OF LADING #

FREIGHT COST

CHARGE TO CUSTOME
☐ YES ☐ NO

NO. OF PACKAGES

WEIGHT
_____LBS_____OZ

DATE SHIPPED

PICKED BY
GG

CHECKED BY

ECEIVED BY

DATE RECEIVED

PACKED BY

TLE

202-6 (1-92) 000964502

PACKING SLIP

SUBJECT TO TERMS AND CONDITIONS ON REVERSE SIDE

HILTI®

No. 459353-01

* *FIRST ORIGINAL* *
13635 STEMMONS FREEWAY
FARMERS BRANCH, TX 75234

OMEGA POINT LABORATORIES
16015 SHADY FALL ROAD

ELMENDORF TX 78112

NOTES:
CLETA 0 - -

CUST. PO #
1148Q

HILTI®

No. 459353-01

* *FIRST ORIGINAL* *
13635 STEMMONS FREEWAY
FARMERS BRANCH, TX 75234

SHIP TO
OMEGA POINT LABORATORIES
16015 SHADY FALL ROAD

ELMENDORF TX 78112

NOTES:
CLETA 0 - -

CUST. PO #
1148Q

ORDER DATE	ORDER #	SLS #	SLS NAME	SHIP LOC.	X-REF# = Y
08/29/94	459353-01	1750	RICHARD CARPENTER	51	08/29/94-16:16:23

ACCT. #	ACCT. NAME AND CUSTOMER PURCHASE ORDER NO.	DDAATT
8999177	OMEGA POINT LABORATORIES 1148Q	58-07-01

THANK YOU FOR CALLING HILTI CUSTOMER SERVICE 1-800-879-8000
DICK DAVITO EXT 6109

LINE	ITEM #	ITEM DESCRIPTION	DUE	SHIP	B/O	BIN-LOC
1	000453605	KWIK BOLT II 14-214(100/BX)	2	2		R5
		* * * END OF SHIPPER * * *				
		HILTI IS CLASSIFIED AS A LARGE BUSINESS				

SHIPMENT MODE
☐ LOCAL ☐ BUS
☐ TRUCK ☐ AIR
☐ UPS ☐ WAI IN

CARRIER

BILL OF LADING #

FREIGHT COST

CHARGE TO CUST
☐ YES ☐

NO. OF PACK

WEIGHT
_____LBS.

DATE SHI

PICKED

CHECK
2

PACI
2

RECEIVED BY

DATE RECEIVED

TITLE

F202-6 (1-92) 000964502

COPY

SUBJECT TO TERMS AND CONDITIONS ON REVE

720

5400 South 122nd East Ave.
P.O. Box 21148
Tulsa, OK 74121
Phone (918) 252-6000
Telex No. 6886124
Fax No. (918) 252-6558

Date: September 13, 1994

Customer: Omega Point Laboratories

Customer P.O.: 1148-Q

Subject: **Certificate of Conformance**

Quantity: 2 Boxes 1/4 x 2 1/4 HKBII(Item #000453605)

To Whom it May Concern:

This is to certify that Hilti Kwik-Bolt II is manufactured in compliance with our standard specifications which state the following:

A. **Stud bolt material is AISI 1038** except for the following bolt sizes which are **AISI 11L41: 3/8 x 7, 3/4 x 12 and all 1" diameter bolts.** The **AISI 1038** bolt material meets the chemical requirements for **ASTM Specification A510** while the **AISI 11L41** material meets the chemical requirements for **ASTM Specification A108.**

B. The expansion **wedges** are made from **AISI 1010** steel except for the 3/4" x 12" and all 1" diameter which are made of AISI 304 Stainless Steel.

C. **Hex Nuts** are of commercial manufacture, meeting **ASTM A563, Gr. A,** and ANSI B18.2.2.

D. **Washers** are fabricated from SAE standard material in accordance with ASA Standard #B27.2-1965 SAE 1005/1020, superseded by **ANSI B18.22.1 1965 (R-1975).**

E. **Kwik-Bolts** conform to the description provided in Federal Specification **FF-S-325, Group II Type 4 Class I, Interim Amendment-3, dated July 16, 1965.**

F. **Bolts, Nuts and Washers** are **zinc plated** in accordance with **ASTM B633-85, Type III, SC1.**

The above products were manufactured in Tulsa, Oklahoma and supplied in accordance with Hilti's QA program, BHB-NQP-101 Rev. I, dated 01/94, 10CFR part 21 and 10 CFR 50 Appendix B. Additionally, they meet the requirements of the above referenced purchase order number.

Sincerely,

J. Metcalf
Quality/Environmental Engineer

JM
coc2a

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI-TVA
CLIENT/PROJECT NUMBER 1960-97258 #5
RECEIVED FROM Hilti
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1432.11960
DATE RECEIVED 8-30-94
DATE INSPECTED 8-30-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
KwikBolt II 3/8"x3 3/4"	11510	200	200	0	000453647	Y		Good	None	X			
KwikBolt II 1/2"x7"	11510	100	100	0	000453795	Y		Good	None	X			
Drill Bit 6"x1/2"	11510	1	1	0	000280370	Y		Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Hilti, Inc.
853 Isom Road

San Antonio TX 78216

PO Number: 1151-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Kerry M. Hitchcock
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/31/94	Their Truck		8/31/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Kwik Bolt II 3/8"x3-3/4" 000453647	200		$0.00
2.	Drill Bit 1/2"x6" 000280370	1		$0.00
3.	Kwik Bolt II 1/2"x7" 000453795	100		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Tatton
Date 8-31-94

Special Instructions

Please include Certificate of Conformance.

Ordered By: Kerry Hitchcock

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	**$0.00**

HILTI®

Tulsa, Oklahoma 74146
Phone (918) 252-6000

T/S NO.	T/S NAME	STORE NO.	ASSIGNED F.O. NO.	X REFERENCE NO.

☐-NEW ACC'T. ☐ ADDRESS/NAME CHANGE

CUSTOMER PHONE NUMBER ( ) —

PURCHASE ORDER NUMBER 115/Q

N: ACCOUNT NUMBER 5981177

BILL TO
NAME Omega Fruitt
STREET
P.O. BOX
CITY STATE ZIP

SHIP TO
CITY STATE ZIP

MARKET CODES

MARKET ☐1 = Trans. ☐2 = Util. ☐3 = Telecom ☐4 = Non-Res. ☐5 = Res.

NATURE ☐1 = Maint. ☐2 = Renov. ☐3 = New Const. ☐4 = OEM ☐5 = Manufacturing ☐6 = Resale ☐7 = Export

SOLD TO GOV AGENCY ☐1 = Local ☐2 = State. ☐3 = Fed. ☐4 = Not Sold to Gov. Agency

SOLD FOR GOV PROJECT ☐1 = Local ☐2 = State. ☐3 = Fed. ☐4 = Not Sold to Gov. Project

POINT OF SALE: ☐1 = Office ☐2 = Job Site

KEY JOB SITE: YES NO IF YES KEY JOB SITE #

TAX STATUS T E

COMPLETE ONLY IF APPLICABLE
① Ship to T/S For Delivery ② Confirms Prior Whse. Shipmt.

IF TAX EXEMPT FORWARD CERTIFICATE TO TULSA

APPROVAL #
CUSTOMER SITE
PROMO
CONTRACT #

LINE NO.	CAT. NO.	DATED MAT. *	DESCRIPTION/NOTES	TOTAL QTY. ORDERED	DELIVERED QTY. VAN	DELIVERED QTY. STORE	TO BE SHIPPED QTY. STORE	TO BE SHIPPED QTY. WHSE	UNIT PRICE	$ AMOUNT
			KB3/633/4	2		2				
			KB1/2 7	1		1				
			Tec1/2 6	1		1				

NOTES/SHIPPING INSTRUCTIONS

DELIVERY: ☐ COMPLETE ☐ PARTIAL AS SHOWN BALANCE TO BE SHIPPED.

CASH ☐ CHECK #

AMT. REC'D. $

DRIVER'S LICENSE # STATE EXP. DATE

PHONED IN ORDER ☐ NAME

LINE NO.	TOOL MODEL	PRODUCT SERIAL NO.

ITEMS INDICATED BY (*) HAVE LIMITED SHELF LIFE. RETURNS FOR CREDIT MORE THAN (30) THIRTY DAYS PAST INVOICE DATE WILL NOT BE ACCEPTED.

CUSTOMER'S INITIALS X KMH

Salesmen are not authorized to make warranties regarding specific applications —

CUSTOMER'S SIGNATURE X [signature]

DATE 8-30-94 TITLE Tech

TOTAL ORDER
$
TAX
FREIGHT
NET ORDER $
SHIP C.O.D. $
APPROVED BY
DATE ENTERED TIME
S.E. OPERATOR

SUBJECT TO TERMS AND CONDITIONS ON REVERSE SIDE.

TOOLS WARRANTED TO ORIGINAL PURCHASER ONLY

000965350 F-333 (2/92)

5400 South 122nd East Ave.
P.O. Box 21148
Tulsa, OK 74121
Phone (918) 252-6000
Telex No. 6866124
Fax No. (918) 252-6558

Date: September 13, 1994

Customer: Omega Point Laboratories

Customer P.O.: 1151-Q

Subject: **Certificate of Conformance**

Quantity: 2 Boxes 3/8 x 3 3/4 HKBII(Item #000453647)
1 Box 1/2 x 7 HKBII(Item #000453795)

To Whom it May Concern:

This is to certify that Hilti Kwik-Bolt II is manufactured in compliance with our standard specifications which state the following:

A. **Stud bolt material** is **AISI 1038** except for the following bolt sizes which are **AISI 11L41: 3/8 x 7, 3/4 x 12 and all 1" diameter bolts.** The **AISI 1038** bolt material meets the chemical requirements for **ASTM Specification A510** while the **AISI 11L41** material meets the chemical requirements for **ASTM Specification A108.**

B. The expansion **wedges** are made from **AISI 1010** steel except for the 3/4" x 12" and all 1" diameter which are made of AISI 304 Stainless Steel.

C. **Hex Nuts** are of commercial manufacture, meeting **ASTM A563, Gr. A,** and ANSI B18.2.2.

D. **Washers** are fabricated from SAE standard material in accordance with ASA Standard #B27.2-1965 SAE 1005/1020, superseded by **ANSI B18.22.1 1965 (R-1975).**

E. **Kwik-Bolts** conform to the description provided in Federal Specification **FF-S-325, Group II Type 4 Class I, Interim Amendment-3, dated July 16, 1965.**

F. **Bolts, Nuts and Washers** are **zinc plated** in accordance with **ASTM B633-85, Type III, SC1.**

The above products were manufactured in Tulsa, Oklahoma and supplied in accordance with Hilti's QA program, BHB-NQP-101 Rev. I, dated 01/94, 10CFR part 21 and 10 CFR 50 Appendix B. Additionally, they meet the requirements of the above referenced purchase order number.

Sincerely,

J. Metcalf
Quality/Environmental Engineer

JM
coc2a

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97553-55+
RECEIVED FROM Hilti 97257
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1441 - 11960
DATE RECEIVED 9/30/94
DATE INSPECTED 9/30/94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Hilti quick Bolt II 2¼"x¼"	1159Q	200	200	0	KB¼-2¼	Y	Y	Good	None	X			
Hilti Quick Bolt II ¼"x4½"	1159Q	100	100	0	KB¼-4½	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Steve Hood
Hilti, Inc.
853 Isom Road

San Antonio TX 78216

PO Number: 1159-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
9/29/94	Pick up		9/30/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Hilti Quick Bolt II 1/4"x 2-1/4"	200		$0.00
2.	Hilti Quick Bolt II 1/4"x4 1/2" CH	100		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 9/29/94

Special Instructions

Certificate of Compliance/conformance

Ordered By: Cleda Patton

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

CUSTOMER COPY

727

Tulsa, Oklahoma 74146
Phone (918) 252-6000

T/S NO.	T/S NAME	STORE NO.	ASSIGNED F.O. NO.	X REFERENCE NO.

☐ -NEW ACC'T. ☐ ADDRESS/NAME CHANGE

ACCOUNT NUMBER 898177

CUSTOMER PHONE NUMBER ( ) -

PURCHASE ORDER NUMBER 1159 Q

BILL TO
NAME
STREET
P.O. BOX
CITY | STATE | ZIP

SHIP TO
CITY | STATE | ZIP

MARKET CODES

MARKET	☐ 1 = Trans. ☐ 2 = Util. ☐ 3 = Telecom ☐ 4 = Non-Res. ☐ 5 = Res.
NATURE	☐ 1 = Maint. ☐ 2 = Renov. ☐ 3 = New Const. ☐ 4 = OEM ☐ 5 = Manufacturing ☐ 6 = Resale ☐ 7 = Export
SOLD TO GOV AGENCY	☐ 1 = Local ☐ 2 = State. ☐ 3 = Fed. ☐ 4 = Not Sold to Gov. Agency
SOLD FOR GOV PROJECT	☐ 1 = Local ☐ 2 = State. ☐ 3 = Fed. ☐ 4 = Not Sold to Gov. Project
POINT OF SALE:	☐ 1 = Office ☐ 2 = Job Site
KEY JOB SITE:	YES NO IF YES KEY JOB SITE #

TAX STATUS T E

COMPLETE ONLY IF APPLICABLE
① Ship to T/S For Delivery ② Confirms Prior Whse. Shipmt.

IF TAX EXEMPT FORWARD CERTIFICATE TO TULSA

APPROVAL #
CUSTOMER SITE
PROMO
CONTRACT #

LINE NO.	CAT. NO.	DATED MAT. *	DESCRIPTION/NOTES	TOTAL QTY. ORDERED	DELIVERED QTY. VAN	DELIVERED QTY. STORE	TO BE SHIPPED QTY. STORE	TO BE SHIPPED QTY. WHSE	UNIT PRICE	$ AMOUNT
1			ICB 1/4-3/4	2		2				
2			ICB 1/4-4 1/2	1		1				

NOTES/SHIPPING INSTRUCTIONS

DELIVERY: ☐ COMPLETE ☐ PARTIAL AS SHOWN BALANCE TO BE SHIPPED.

CASH ☐ CHECK #

AMT. REC'D. $

DRIVER'S LICENSE # STATE EXP. DATE

PHONED IN ORDER ☐ NAME

LINE NO.	TOOL MODEL	PRODUCT SERIAL NO.

ITEMS INDICATED BY (*) HAVE LIMITED SHELF LIFE. RETURNS FOR CREDIT MORE THAN (30) THIRTY DAYS PAST INVOICE DATE WILL NOT BE ACCEPTED.

CUSTOMER'S INITIALS
X

Salesmen are not authorized to make warranties regarding specific applications —

CUSTOMER'S SIGNATURE X Kerry Hatcher

DATE 9/30 TITLE

TOTAL ORDER

$

TAX

FREIGHT

NET ORDER $

SHIP C.O.D. $

APPROVED BY

DATE ENTERED TIME

S.E. OPERATOR

SUBJECT TO TERMS AND CONDITIONS ON REVERSE SIDE.

TOOLS WARRANTED TO ORIGINAL PURCHASER ONLY

000965350 F-333 (2/92)

5400 South 122nd East Ave.
P.O. Box 21148
Tulsa, OK 74121
Phone (918) 252-6000
Telex No. 6868124
Fax No. (918) 252-6558

Date: October 13, 1994

Customer: Omega Point Laboratories Inc.

Customer P.O.: 1159-Q

Subject: **Certificate of Conformance**

Quantity: 2 Boxes 1/4 x 2 1/4 HKBII(Item #000453605)
1 Box 1/4 x 4 1/2 HKBII(Item #000453787)

To Whom it May Concern:

This is to certify that Hilti Kwik-Bolt II is manufactured in compliance with our standard specifications which state the following:

A. **Stud bolt material** is **AISI 1038** except for the following bolt sizes which are **AISI 11L41: 3/8 x 7, 3/4 x 12 and all 1" diameter bolts.** The **AISI 1038** bolt material meets the chemical requirements for **ASTM Specification A510** while the **AISI 11L41** material meets the chemical requirements for **ASTM Specification A108.**

B. The expansion **wedges** are made from **AISI 1010** steel except for the 3/4" x 12" and all 1" diameter which are made of AISI 304 Stainless Steel.

C. **Hex Nuts** are of commercial manufacture, meeting **ASTM A563, Gr. A,** and ANSI B18.2.2.

D. **Washers** are fabricated from SAE standard material in accordance with ASA Standard #B27.2-1965 SAE 1005/1020, superseded by **ANSI B18.22.1 1965 (R-1975).**

E. **Kwik-Bolts** conform to the description provided in Federal Specification **FF-S-325, Group II Type 4 Class I, Interim Amendment-3, dated July 16, 1965.**

F. **Bolts, Nuts and Washers** are **zinc plated** in accordance with **ASTM B633-85, Type III, SC1.**

The above products were manufactured in Tulsa, Oklahoma and supplied in accordance with Hilti's QA program, BHB-NQP-101 Rev. I, dated 01/94.

Sincerely,

J. Metcalf
Quality/Environmental Engineer

JM
coc2a

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-874 97257-60
RECEIVED FROM Ramsey Electric Supply Co.
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1407 - 11960
DATE RECEIVED 7-26-94
DATE INSPECTED 7-26-94
INSPECTED BY: C. Patterson

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
4"x12"x24" Ladders	NA	0	5	0	06-1079-0012-24	Y	N	Good	None	X			Receiving Verification Only
24" flngd std Cover	NA	0	1	0	2000-0012-24	Y	N						
Adj. Riser Conn. Pair	NA	0	2	0	06-1079-1307-02	Y	N	Good	None	X			
Cover Conn 1" flg 3" Gap	NA	0	50	0	06-1079-1895-30	Y	N	Good	None	X			

FORM
1/29/93

729

WESTERN, INC. Manufacturers

623 OLYMPIC BLVD. P.O. BOX 1399
MONTEBELLO, CALIFORNIA 90640-1399
TELEPHONE (213) 723-8919
FAX (213) 728-5023

INVOICE NO. 14739

SOLD TO

Ramsey Electric Supply Co.
2310 Rossville Blvd.
Chattanooga, TN 37401

SHIP TO

Omega Point Lab
16015 Shady Falls Rd.
Elmendorf, TX 78112

Attn: Jim TVA Field Eng.
MARK: 1029342

DATE OF INVOICE	DATE OF ORDER	CUSTOMER ORDER NO.	SALESMAN
7/25/94	7/22/94	0020056	PROF L @

SHIP VIA	PART. DEL.	COMPLETE DELIVERY
Emery Air Frt ACCT# 541-015-053 3rd Party Billing		

ITEM NO.	CATALOG NUMBER	DESCRIPTION	QUANTITY TOTAL ORDER	PREV. SHIPPED	THIS SHIP'T	BACK ORDERED
1	06-1D79-0012-24	4" Stl Ladder 12'L 24"W	5	0	5	
2	2000-0012-24	Flngd Stl Cover, Str 24"W	1	0	1	
3	06-1D79-1307-02	Adj. Riser Conn. Pair	2	0	2	
4	06-1D79-1895-30	Cover Conn. 1"Flg 3" Gap	50	0	50	

PLEASE PAY FROM THIS INVOICE - NO OTHER STATEMENT WILL BE SENT. THANK YOU. NO ADJUSTMENTS WILL BE MADE ON SHORTAGE OR DEFECTIVE MERCHANDISE UNLESS CLAIM IS MADE WITHIN 30 DAYS FROM RECEIPT OF SHIPMENT. MERCHANDISE IS NOT SUBJECT TO RETURN FOR CREDIT UNLESS AUTHORIZED BY THIS COMPANY.
INTEREST AT A RATE OF 1½% PER MONTH WILL BE CHARGED ON ALL PAST DUE INVOICE.

TERMS: NO GOODS TO BE RETURNED OR CREDITED WITHOUT OUR CONSENT. GOODS COVERED BY THIS INVOICE WERE PRODUCED IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE FAIR LABOR STANDARDS ACT OF 1938, AS AMENDED. PRICES ARE IN ACCORDANCE WITH GOVERNMENTAL REGULATIONS. WHILE PRICES SHOWN ARE THE CURRENT PRICES, ORDER WILL BE BILLED AT PREVAILING PRICES AT TIME OF SHIPMENT.

THANK YOU

PACKING LIST

STOP!

READ THIS NOTICE

THIS SHIPMENT IS YOUR PROPERTY

The carrier accepted responsibility for safe delivery when he accepted and signed for your merchandise. When it arrives:

- Check tray, fittings and miscellaneous details including hardware for external damage.
- Check part count and make sure you received everything that is shown on the packing list.

IF THERE IS A PROBLEM:

1. Make a note of the damage on the face of the shipping receipt. Example: "2 damaged 12' Trays - Feb 25 - John Doe." You may now accept the shipment and you can keep the damaged material or let the carrier keep it. Do not ship it back to P-W and do not throw it away. If you let the carrier keep it, make a note of that on the receipt too. Don't assume that the carrier or yourself will remember what happened to the items later. If you lose the damaged material the claim is dead. If the carrier loses it, it's his problem.
2. Make a detailed note for yourself, like "Bent Rungs, two 1C31-0012-12, returned to Terminal." The part numbers are on a sticker attached to the part. You'll need this to reorder and it could come in handy later.
3. Call the carrier's Claims department and they will fax you a damage claim form. They may send an inspector to look at the part(s). When they pay you, they probably will want the damaged parts for possible salvage value.
4. Call your Distributor and reorder whatever is damaged. The sooner you do, the sooner you will have your replacement parts.

THE CARRIER OWES YOU:

- The value of whatever was damaged, and:
- The costs for re-shipping.

For instance, in the above example, you are owed the value of the two pieces of tray and whatever it costs to ship the two replacement pieces.

Many carriers will ship the replacement pieces free to save themselves the hassle of processing the claim for the freight. Notify your Distributor of any such arrangement because in order to get your free shipment, the carrier will usually require the shipper to note on the bill of lading something like "Ship Free - See Joe, Seattle Terminal." If this is not on the bill of lading you'll get charged for the shipment and then you'll have to file a claim for that.

IN SHORT:

- **NOTE IRREGULARITIES ON THE SHIPPING RECEIPT**
- **FILE YOUR CLAIM RIGHT AWAY**
- **GET YOUR REPLACEMENT PARTS STARTED IMMEDIATELY**
- **DON'T LOSE TRACK OF YOUR DAMAGED PARTS!**

The carrier wants your, and our, business. Satisfy his needs for documentation and verification and he'll be happy to pay your claim.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185-87, 97257-
RECEIVED FROM Southwestern Wire Cloth CO
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1403 - 11960
DATE RECEIVED 7-20-94
DATE INSPECTED 7-20-94
INSPECTED BY: C Dalton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Tie Wire .062"	NA	0	100±	0	30455.062"	Y	N	Good	None	X			Receiving Verification Only.

FORM
1/29/93

732

Southwestern Wire Cloth

P.O. BOX 35608
TULSA, OKLAHOMA 74153
(918) 251-2679
FAX (918) 251-0375

1831 W. SAM HOUSTON PARKWAY N.
HOUSTON, TEXAS 77043
(713) 973-2959
FAX (713) 973-1857

ORDER NO: 733
PAGE:
DATE:
REQ. SHIP DATE:

SOLD TO

SHIP TO

CUSTOMER P. O.	ORDER DATE	SLSP	TERMS	SHIPPED FROM	SHIPPED VIA	FREIGHT

QUANTITY ORDERED	QUANTITY SHIPPED	QUANTITY B.O.	PART NUMBER	DESCRIPTION	U/M
	100				

Sherry #6

SEE REVERSE SIDE FOR ADDITIONAL TERMS AND CONDITIONS OF SALE

PACKING LIST

This Memorandum is an acknowledgement that a Bill of Lading has been issued and is not the Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

58098 734

SMC #5183
ICC-MC 190566

Cannonball Trucking, Inc.

P.O. Box 262523, Houston, Texas 77207-2523 • 644-7300
Fax # (713) 644-9431

S[redacted]S B/L NO.
[redacted]S ORDER NO.
CONSIGNEES ORDER NO.
RELEASE NO.

CTI W/B NO.
CTI CONTROL NO.
DATE 7-20-94

INTRASTATE ☐
ICC ☐ LOCAL ☐

FROM: SHIPPER Southwestern Wire Cloth	TO: CONSIGNEE Omega Point Laboratory
STREET ADDRESS 1631 W Belt North	STREET ADDRESS 16015 Shady Falls St.
CITY Hou, TX STATE ZIP	CITY Elmendorf STATE TX ZIP 78112
LOCATION DOCK SHIP	LOCATION DOCK SHIP
LEASE RIG. WELL NO.	LEASE RIG. WELL NO.

DRIVER	TRUCK NO.	TRAILER NO.	EQUIPMENT USED	LENGTH	WIDTH	HEIGHT
Sherry	#6		-0-			

BILL TO:	TARIFF MILEAGE	REGULATED BY	TARIFF
SPECIAL INSTRUCTIONS:	PLUS MILEAGE	ITEM NO.	COLUMN NO.

# PCS.	COMMODITY OR SERVICE RENDERED	HRS/WEIGHT	RATE	AMOUNT
2	Rolls Wire	100#		
[redacted]	FUEL SURCHARGE			
☐	EXTRA STOPS			
☐	EXCLUSIVE USE OF VEHICLE REQUESTED			
☐	EXPEDITED SERVICE REQUESTED			
	TOTAL →			

C.O.D. CHARGE TO BE PAID BY { SHIPPER ☐ CONSIGNEE ☐

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

(Signature of Shipper)

If charges are to be prepaid, write or stamp here. "To be Prepaid."

If charges are to be C.O.D. the carrier accepts no such responsibility, unless amount is here specified and this section signed by consignor.

$ C.O.D. Amount

Signature of Shipper

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per
(The signature here acknowledges only the amount prepaid.)

$ Charges Advanced

PICK-UP RECORD (To be completed at Shipper's location)

SHIPPER NOTIFIED OF ARRIVAL		LOADING BEGAN		LOADING COMPLETED		UNIT RELEASED	
Date	Time	Date	Time	Date	Time	Date	Time

REASON FOR DELAY IN LOADING (IF ANY)
I hereby certify that the dates and time shown above are correct.
SHIPPER CO. NAME ________ BY ________ SHIPPER'S AGENT TITLE ________

DELIVERY RECORD AND RECEIPT (to be completed at Delivery location)

CONSIGNEE NOTIFIED OF ARRIVAL		UNLOADING BEGAN		UNLOADING COMPLETED		UNIT RELEASED	
Date	Time	Date	Time	Date	Time	Date	Time

REASON FOR DELAY IN UNLOADING (IF ANY)
I hereby certify that the dates and time shown above are correct.
CONSIGNEE CO. NAME ________ BY ________ CONSIGNEE'S AGENT TITLE ________

RECEIVE, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER'S NAME		RECEIVER'S NAME	
		RECEIVED ABOVE ARTICLES IN GOOD ORDER	CONSIGNEE
BY	DATE	BY [signature]	DATE 7-20-94

[redacted]t moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's weight.
[redacted]ere the rate is dependent on value, shippers are required to state in writing the agreed
[redacted]value of property hereby specifically stated by the shipper to be not exceeding: $ per
[redacted]stood and agreed that payment in full for work authorized hereunder shall be due seven (7) days after date hereof and if not paid in full within thirty (30) days, all amounts due shall carry interest at the rate of eighteen (18%) per cent per annum, in the event the claim is referred to an attorney for handling, the defendant shall bear full responsibility for all legal fees and any interest expense subsequent thereto."

CARRIER	I hereby certify that the dates and time shown is correct.
CANNONBALL TRUCKING, INC. P.O.BOX 262523 Houston, Texas 77207-2523	CARRIER CANNONBALL TRUCKING,INC. DATE 7-20-94 DRIVER Sherry #6

Permanent post office address of carrier

All Amounts due under this waybill are due and payable in Houston, Harris County, Texas

CONSIGNEE COPY

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TUA
CLIENT/PROJECT NUMBER 11960-97185.86+87
RECEIVED FROM Alamo Bolt & Screw
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1394 . 11960
DATE RECEIVED 7-11-94
DATE INSPECTED 7-12-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
1/2" Medium Lock Washers	11260	1K	1K	0	1/2" Lock Washers	Y	Y	Good	None	X			
1/2" nuts	11260	1K	1K	0	1/2" Galvanized Hex Nuts	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

736

Vendor:

Randy
Alamo Bolt & Screw, Inc.
10101 Jones Maltsberger

San Antonio TX 78216

PO Number:

1126-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/11/94	Their Truck		7-12-94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	1/2" Medium Lock Washers	1000	$0.02	$23.00
2.	1/2" Finished Hex Nuts	1000	$0.04	$40.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 7-11-94

Special Instructions

Please include Certification of Conformance.

Ordered By: Cleda Patton

Project #: TSI/TVA

Total	**$63.00**
Shipping	
Tax	**$4.88**
Invoice Total	**$67.88**

ALAMO Bolt and Screw, Inc.

INVOICE NO.: 0279340

10101 JONES MALTSBERGER
SAN ANTONIO, TX. 78216
512-342-9544

TO:
OMEGA POINT LABORATORIES
16015 SHADY FALLS RD.
ELMENDORF, TX. 78112

SHIP TO:
OMEGA POINT LABORATORIES
16015 SHADY FALLS RD.
ELMENDORF, TX. 78112

ACCOUNT NO.	SALESMAN NO.	PURCHASE ORDER NO.	SHIP VIA	COL	PPD	DATE SHIPPED	TERMS	INVOICE DATE	PAGE
073666	99D	11260	DEL AM				NET 10	07/11/94	1

QTY. ORDERED	QTY. SHIPPED	QTY. BACK ORDERED	PROD. LINE	PART NO.	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
1000	1000		SLW	1/2	MEDIUM LOCK WASHERS ZINC	2.30	23.00
1000	1000		HNC	1/2	FINISHED HEX NUTS NC ZINC	4.00	40.00

2 BOXS

WE APPRECIATE YOUR BUSINESS.

THANK YOU

RECEIVED BY: [signature]

IVAN

SALE AMOUNT	63.00
SALES TAX	4.38
TOTAL	67.38

ALAMO
Bolt and Screw, Inc.
10101 JONES MALTSBERGER
SAN ANTONIO, TEXAS 78216
PHONE: 342-9544
AREA CODE 210
FAX: (210) 342-9594

June 18, 1992

To Whom It May concern:

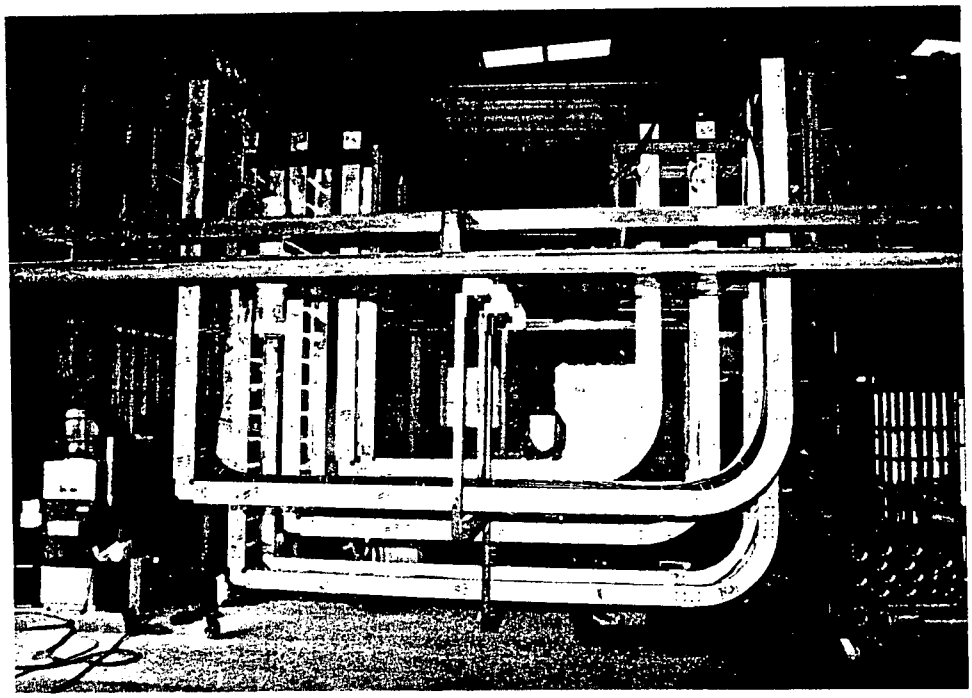
I hereby certify that on 7/11/94 we, ALAMO Bolt & Screw provided the material called for on your Purchase Order # 1126-9 on our Bill of Lading (shipping document) # 279340 in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 7/25/94
Signature: Susan K. DeBord
Title: Office Manager

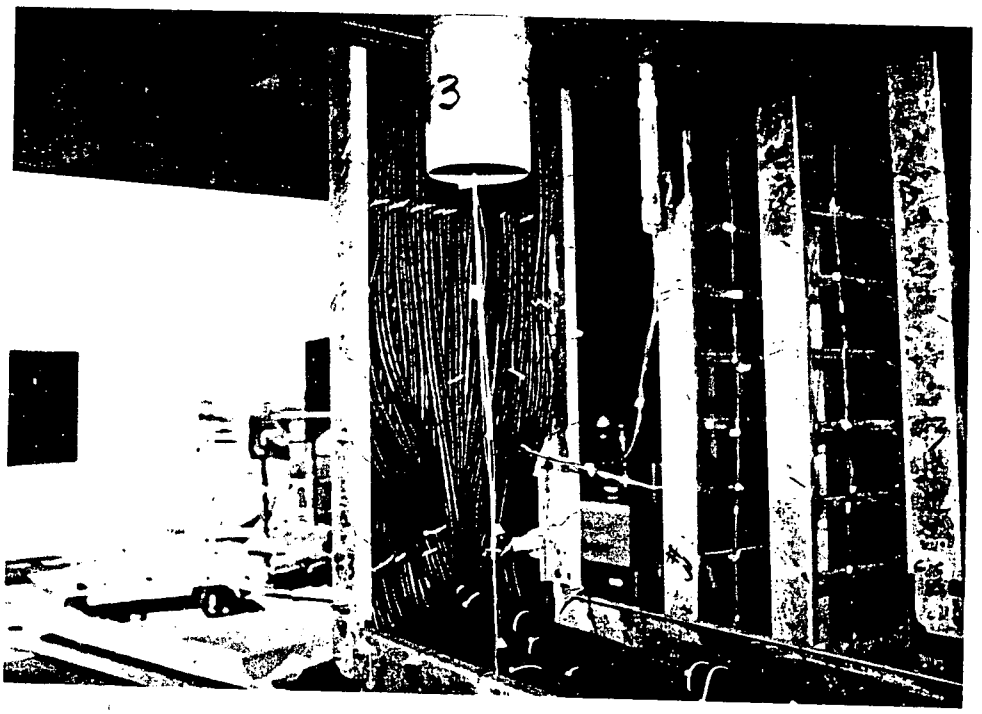
Appendix F

PHOTOGRAPHS

OMEGA POINT LABORATORIES

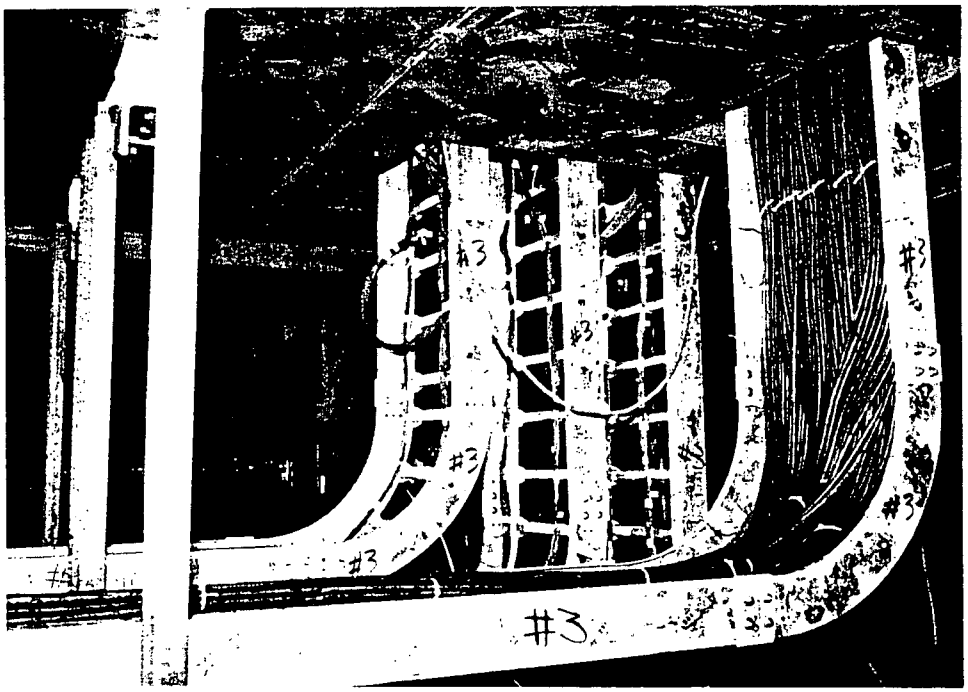


View of rear tray system (front tray system in background).



Cables installed in vertical section of rear tray above squared bend.

OMEGA POINT LABORATORIES

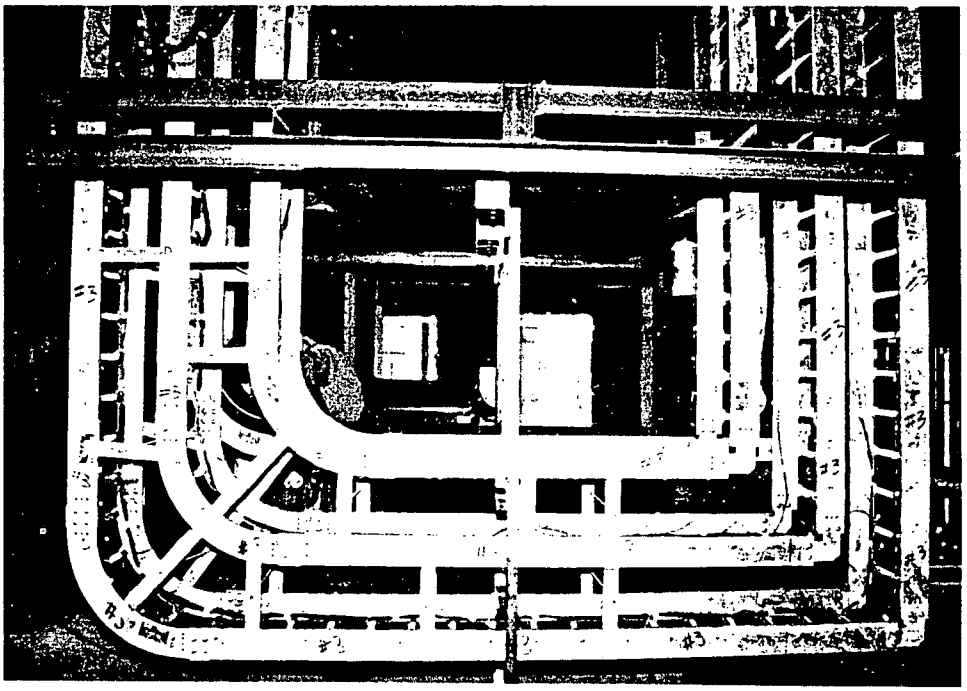


Cables installed in vertical section of rear tray above radial bend.

Cable tray cover installed over cables with stand-offs.

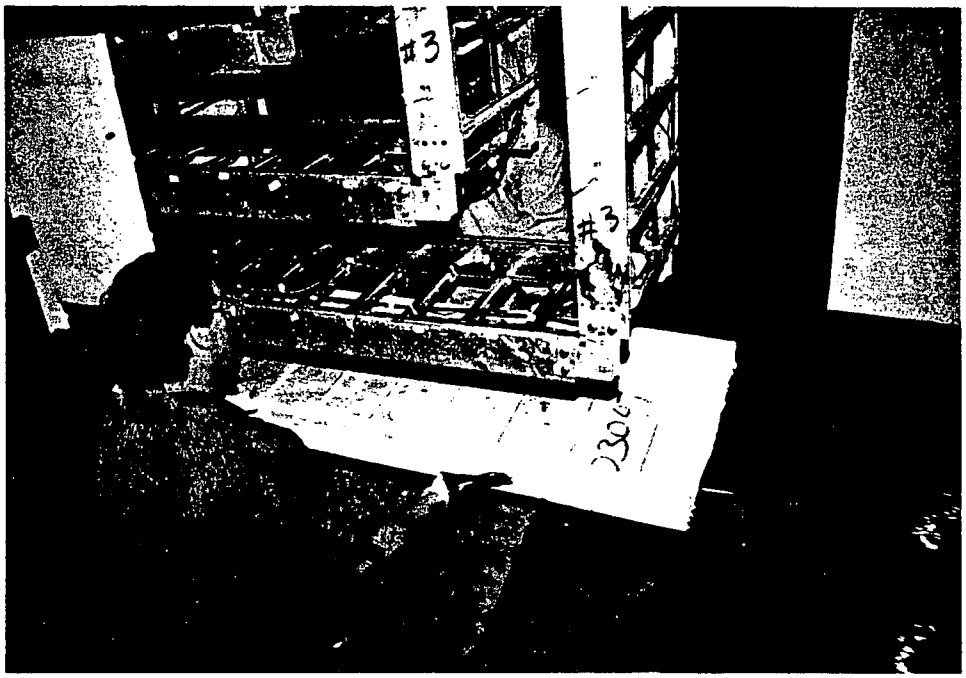
OMEGA POINT LABORATORIES

Thermocouples installed onto tray cover.

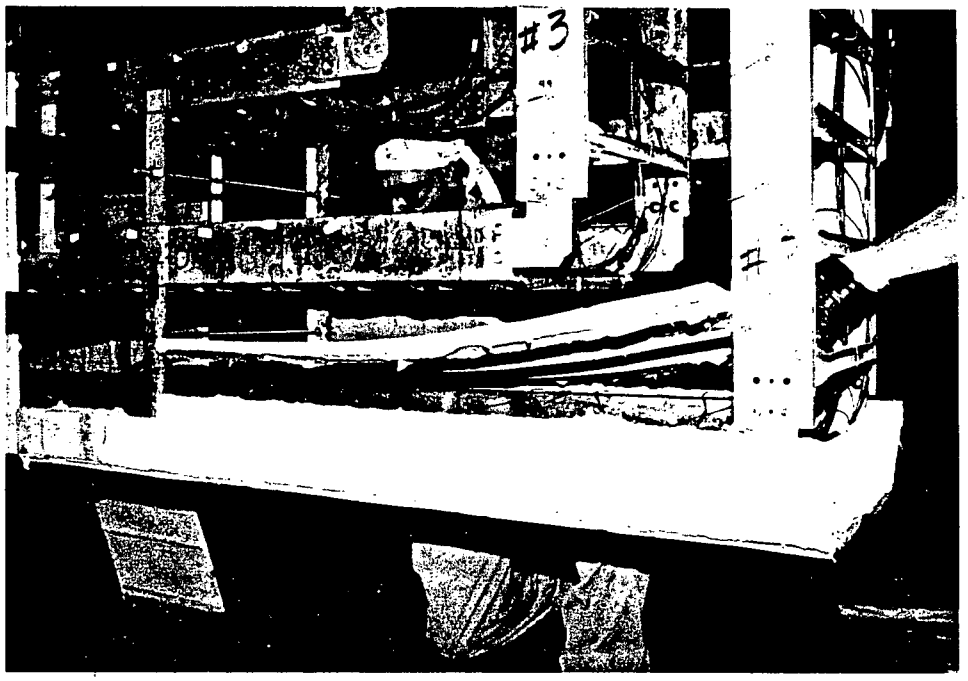


View of front cable tray system (note sheet metal supports with threaded rod installed to support side panels).

OMEGA POINT LABORATORIES



Scored and folded panel installed on bottom of bottom front.



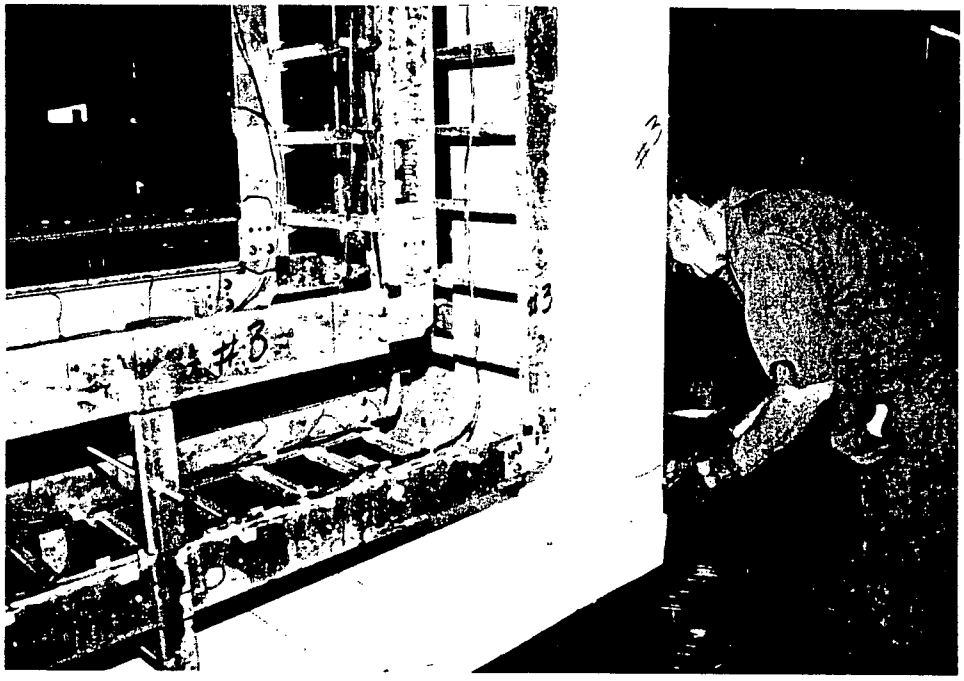
Panel installed on top of bottom front tray (note tie wires around bottom).

OMEGA POINT LABORATORIES

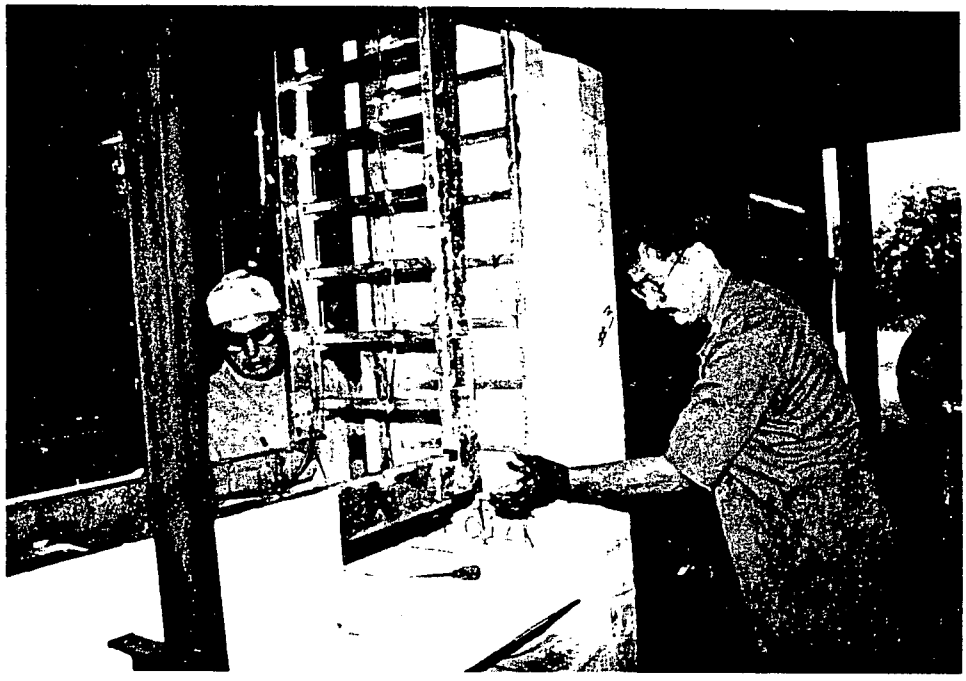
Scored and folded panel installed on outside vertical section of bottom tray.

Pre-buttered panel installed on inside vertical section of bottom tray.

OMEGA POINT LABORATORIES

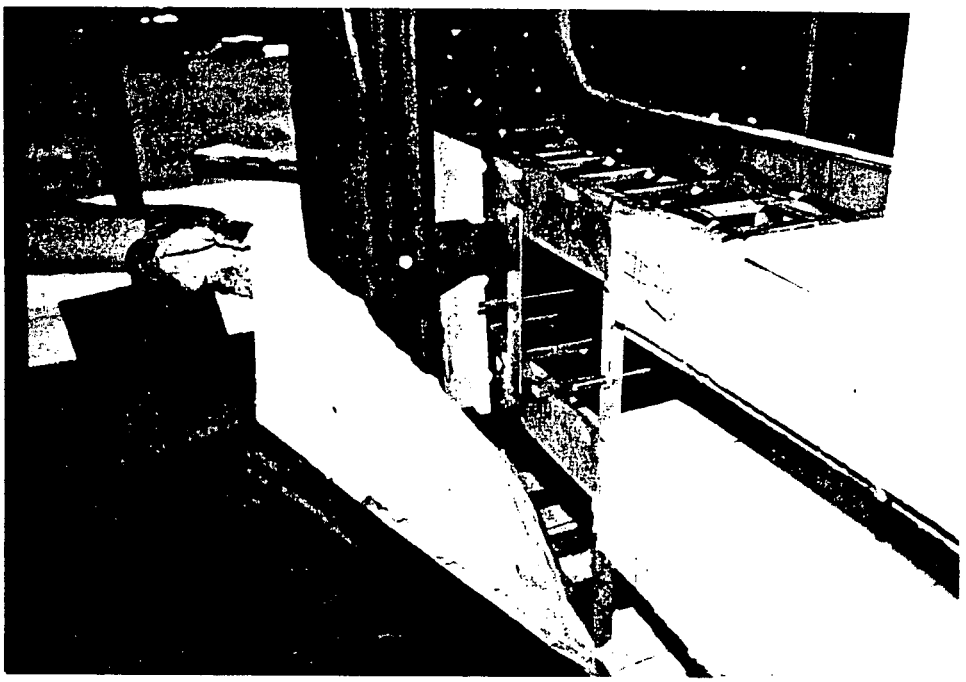


Panels secured with stainless steel tie wires.

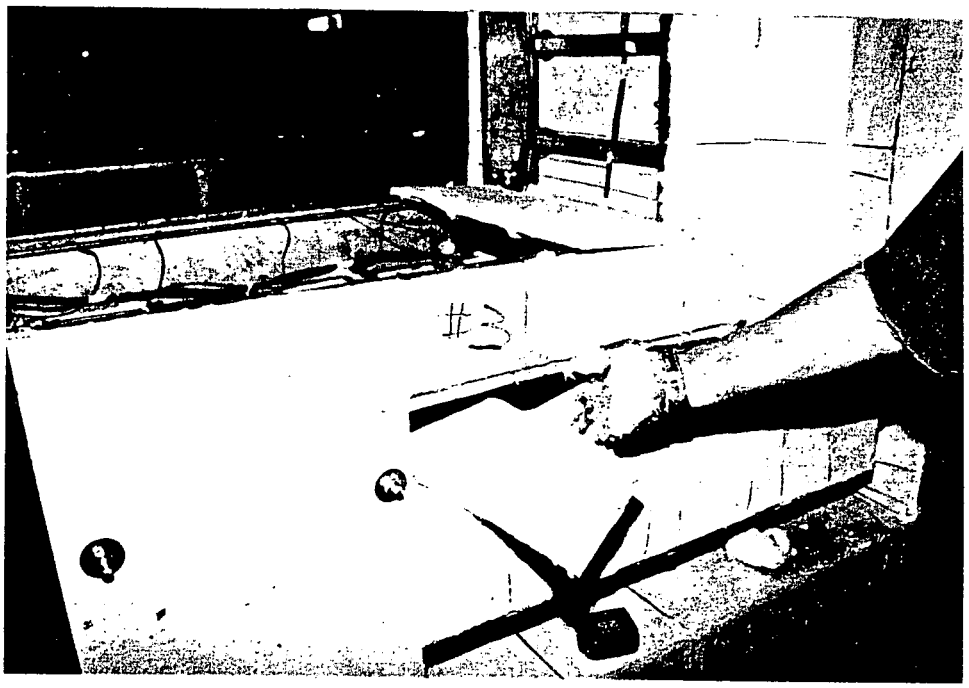


Scored and folded panel installed on outside vertical section of middle tray.

OMEGA POINT LABORATORIES



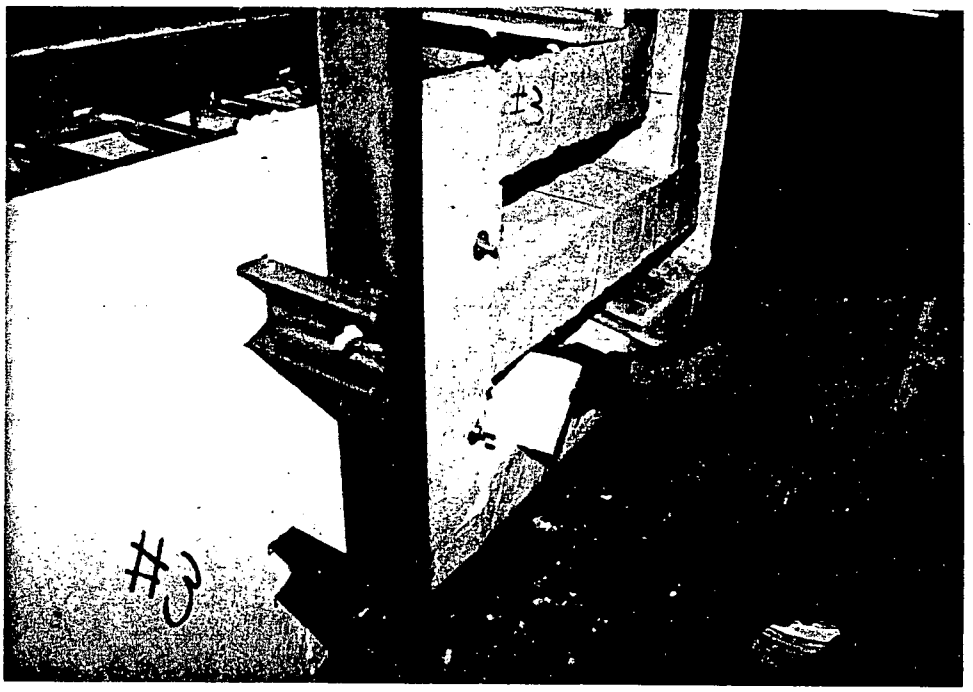
Pre-buttered panel installed on common enclosure portion of tray assembly.



Pre-buttered panel installed between top and middle trays.

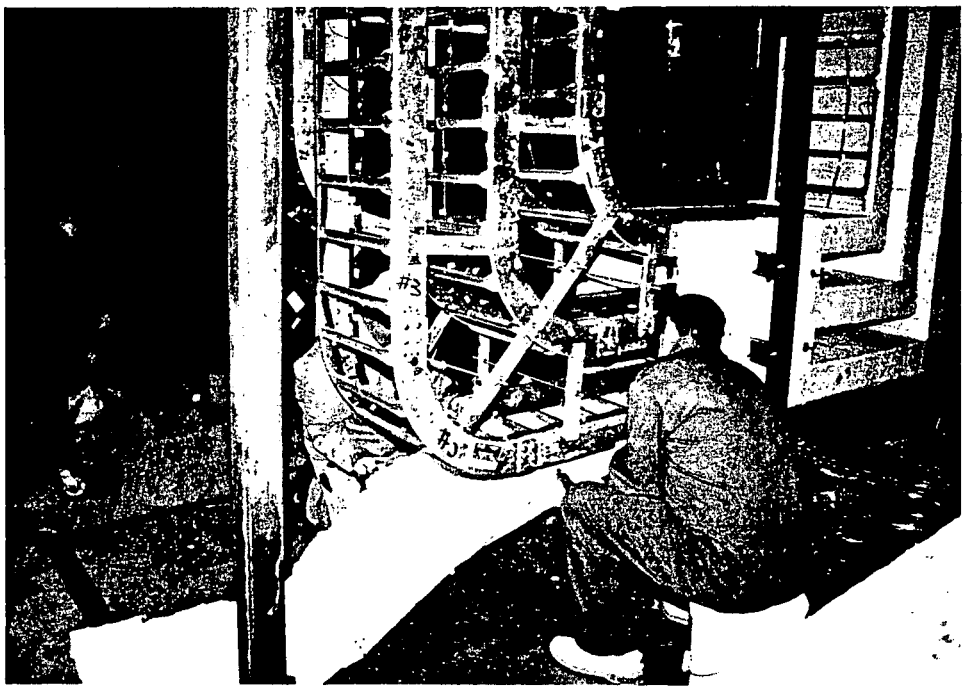
OMEGA POINT LABORATORIES

Pre-buttered panel installed on common enclosure portion of tray assembly.

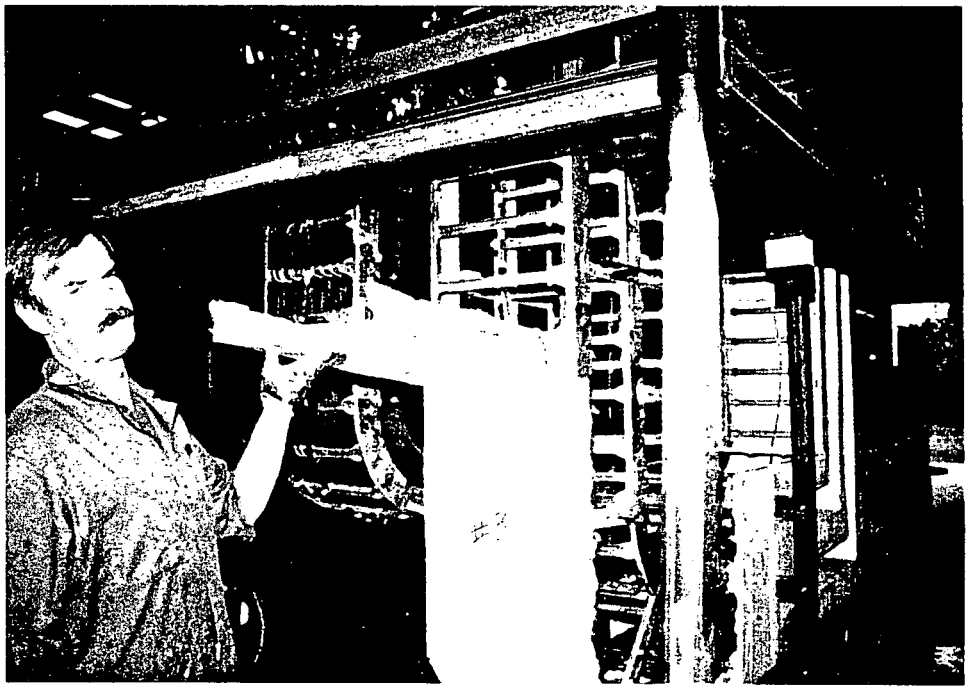


Pre-buttered panel installed between middle and bottom tray.

OMEGA POINT LABORATORIES

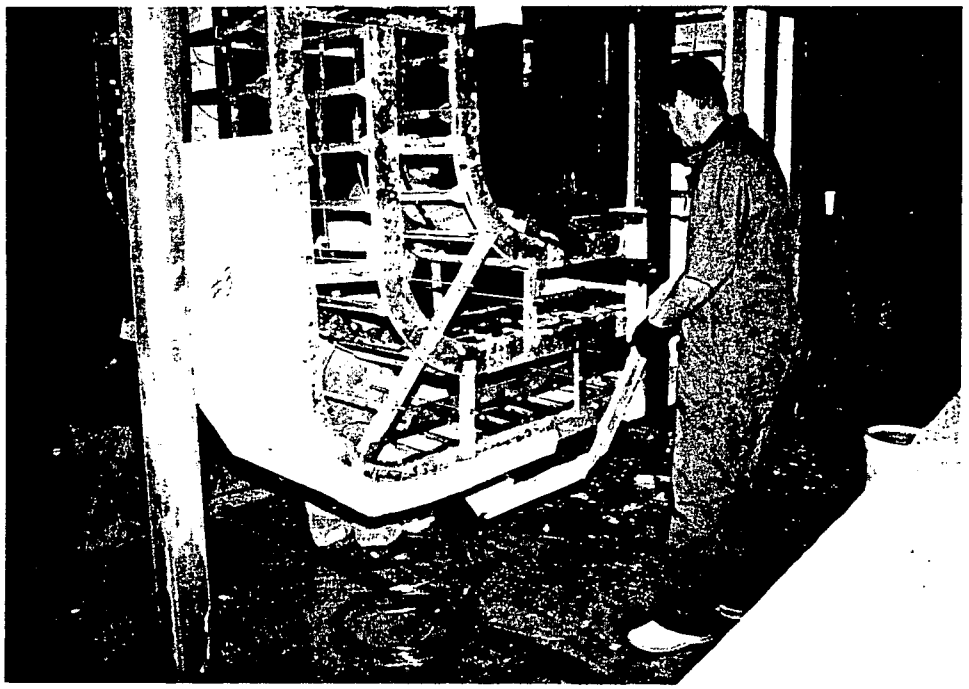


Scored and folded panel installed on radial bend of common enclosure portion.

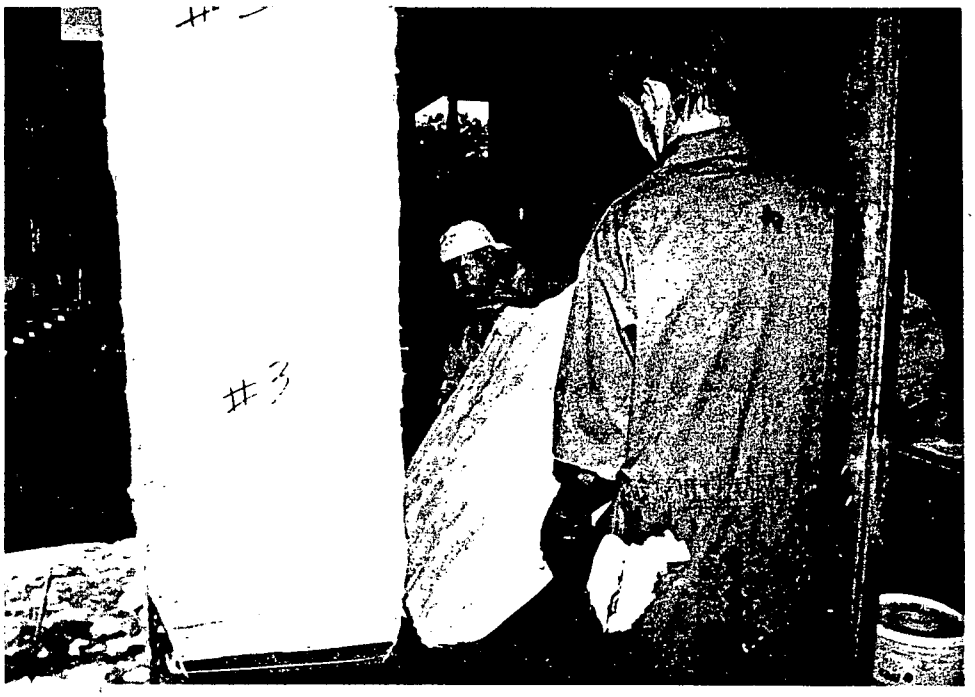


Pre-buttered panels installed on vertical section above radial bends.

OMEGA POINT LABORATORIES



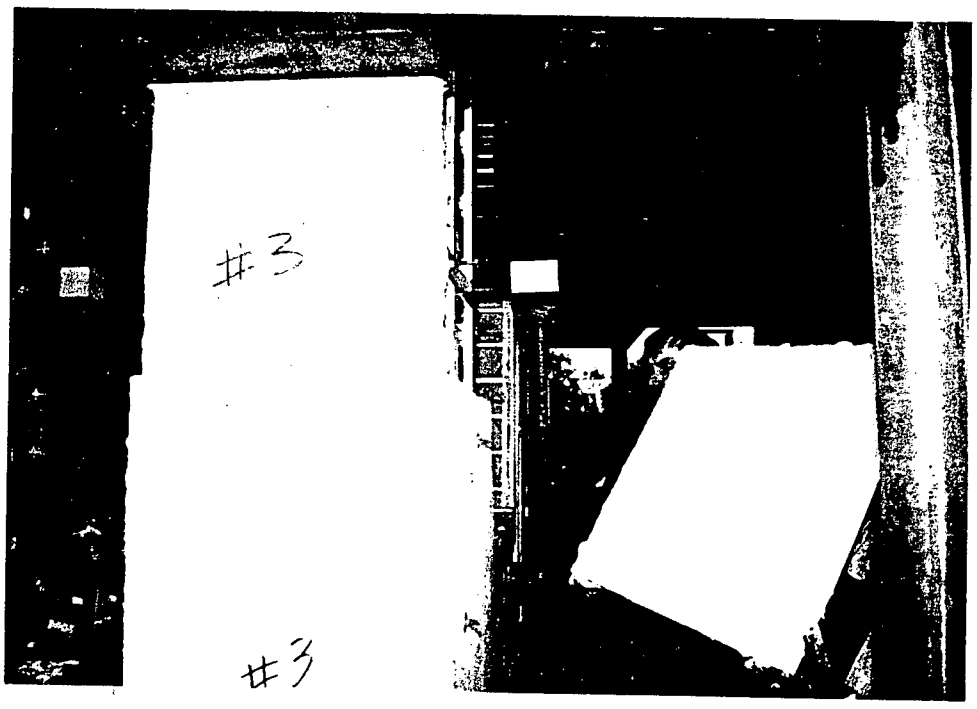
Scored and folded panel installed in common enclosure portion of trays.



Pre-buttered panel installed onto side of common enclosure portion of trays.

OMEGA POINT LABORATORIES

Pre-buttered panel installed onto side of common enclosure portion of trays.



Pre-buttered panels installed onto side of vertical portion of common enclosure.

OMEGA POINT LABORATORIES

Scored and folded panel installed on top of common enclosure portion of trays.

Pre-buttered panel installed on inside vertical section of top tray.

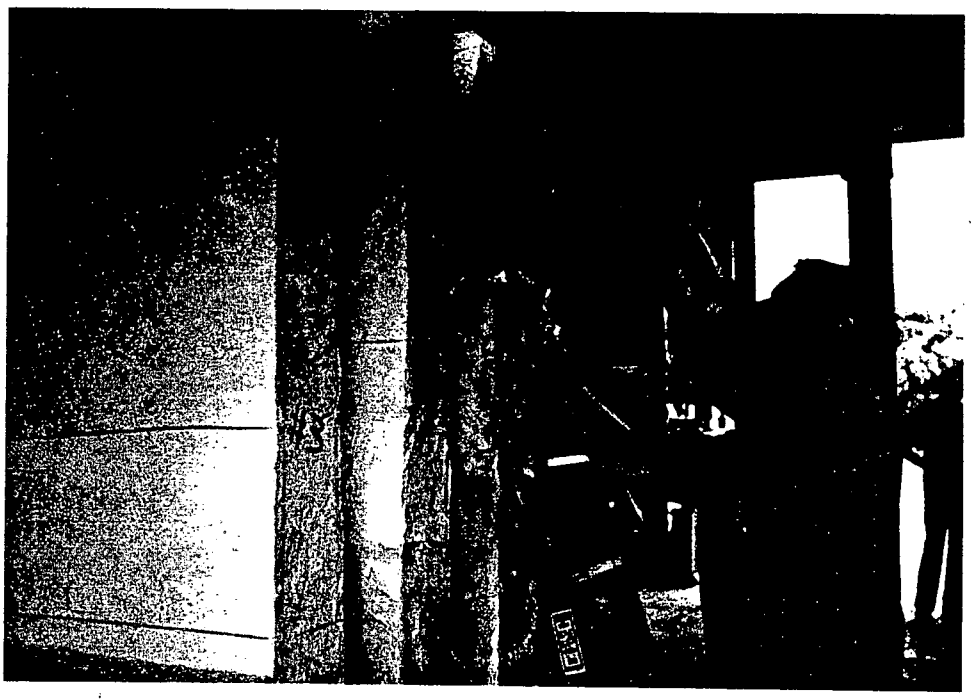
OMEGA POINT LABORATORIES

External stress skin overlay secured with staples.

External stress skin installed on vertical section of bottom tray.

OMEGA POINT LABORATORIES

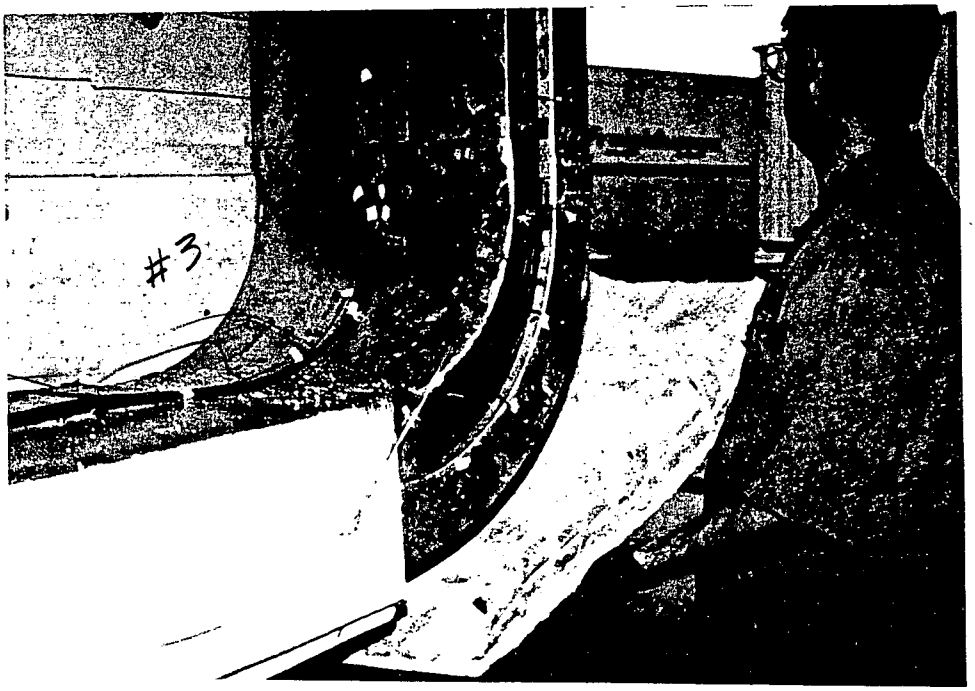
External stress skin secured with staples.



External stress skin secured with staples.

OMEGA POINT LABORATORIES

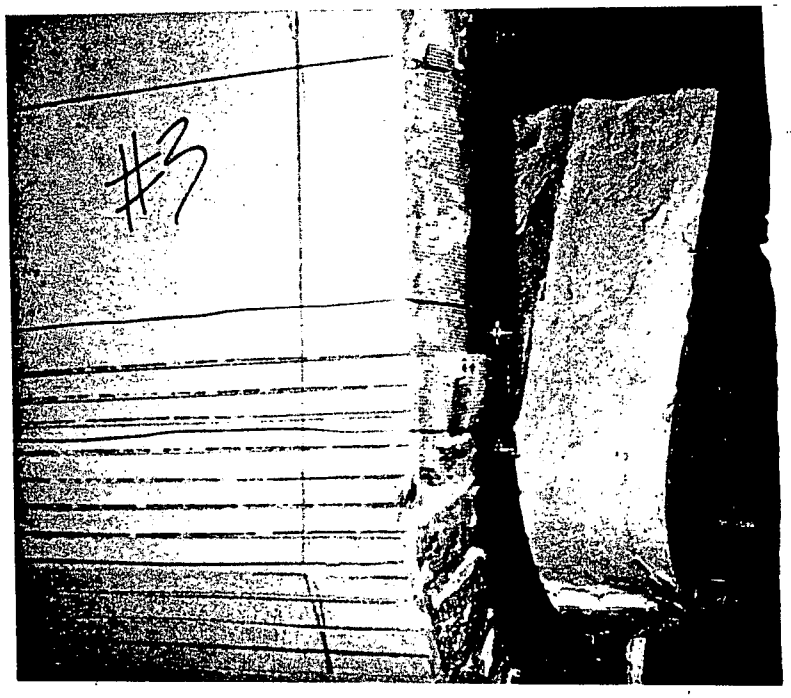
Pre-buttered panel installed on bottom of rear tray.



Scored and folded panel installed on bottom of radial bend on rear tray.

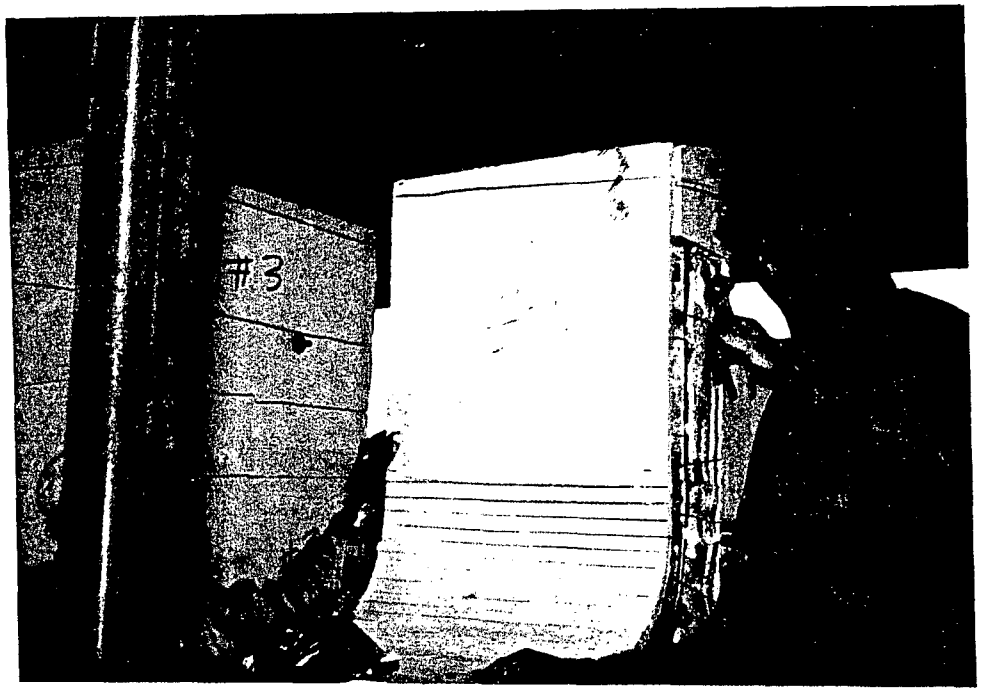
OMEGA POINT LABORATORIES

Scored and folded panel installed on vertical portion of rear tray over radial bend.

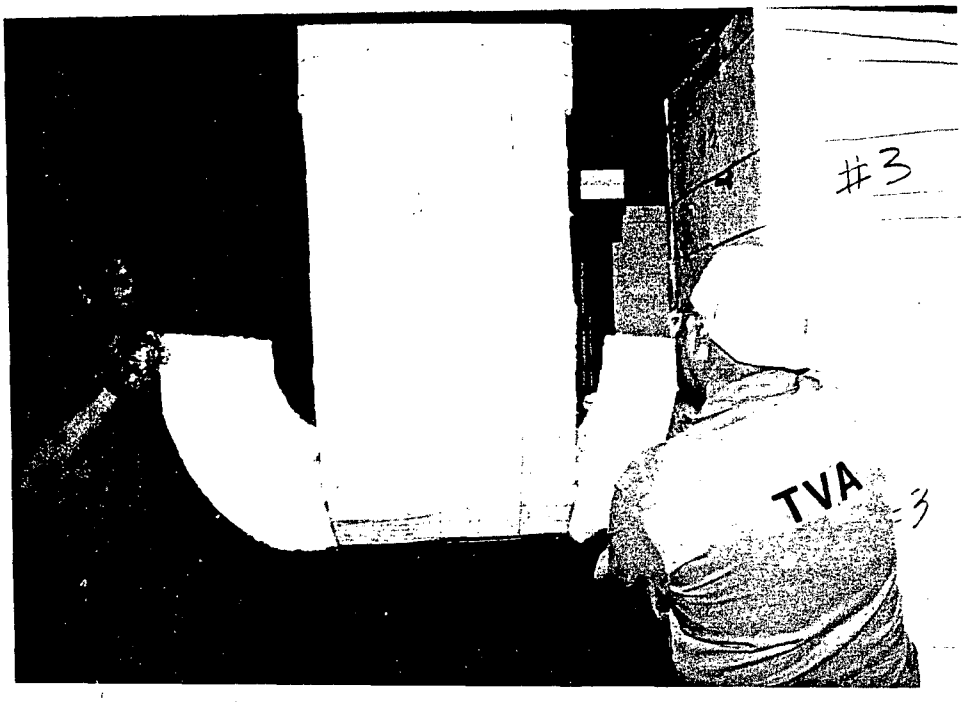


Pre-buttered, scored and folded panel installed on inside of rear tray radial bend.

OMEGA POINT LABORATORIES

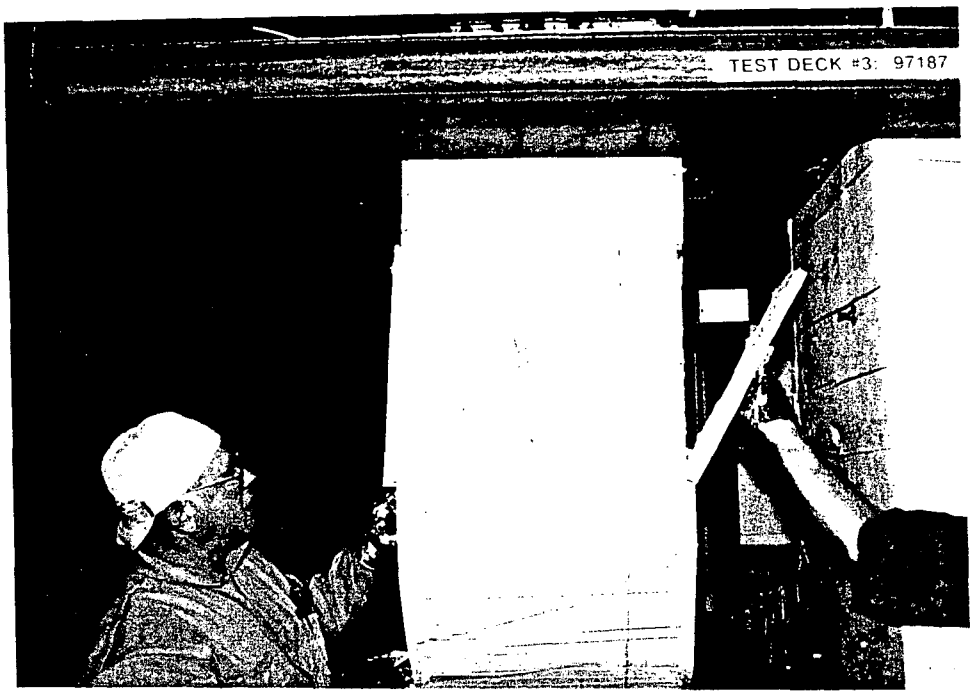


Panels secured to tray with stainless steel tie wires.



Pre-buttered panels installed on sides of radial bend on rear tray.

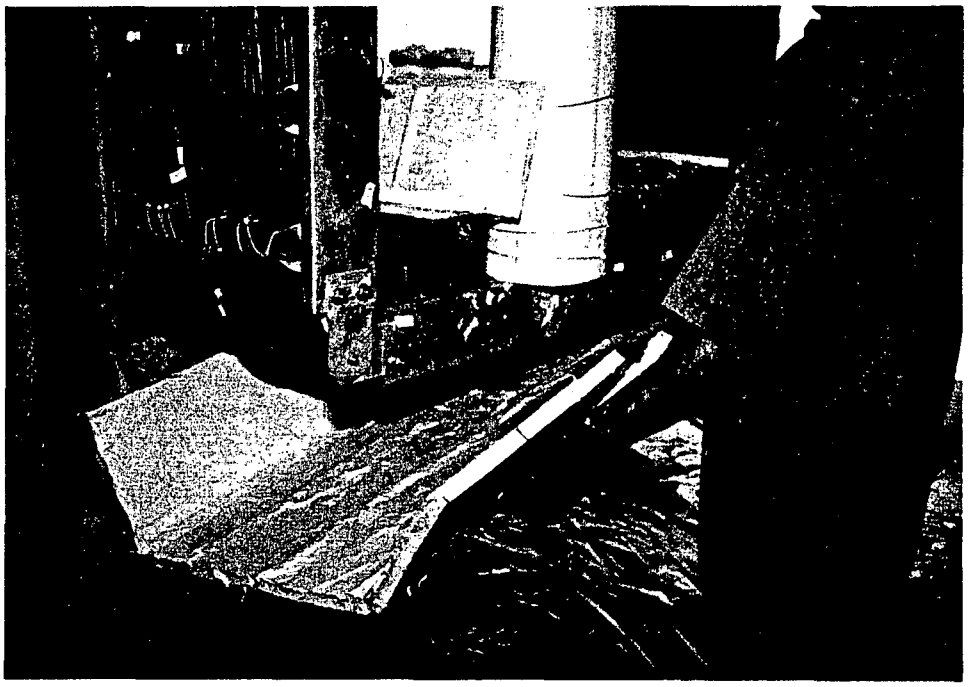
OMEGA POINT LABORATORIES



Pre-buttered panels installed on sides of tray above radial bend on rear tray.

Pre-buttered panels installed on top of rear tray.

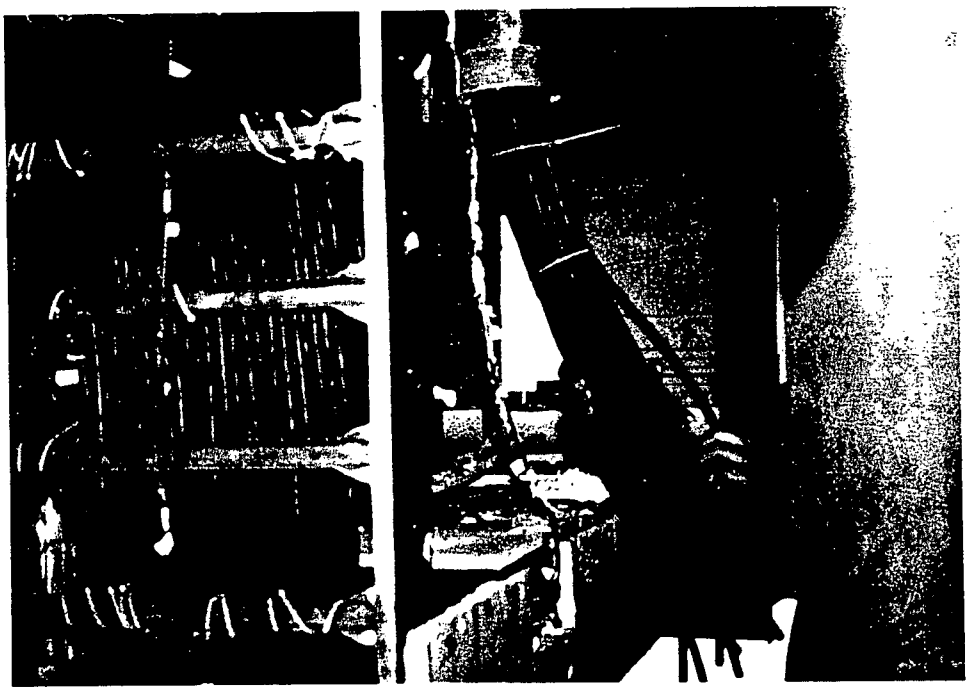
OMEGA POINT LABORATORIES



Pre-buttered, scored and folded panel installed on bottom of rear tray.

Pre-buttered panel installed on top of rear tray.

OMEGA POINT LABORATORIES



Cables installed into 5 in. air drop.

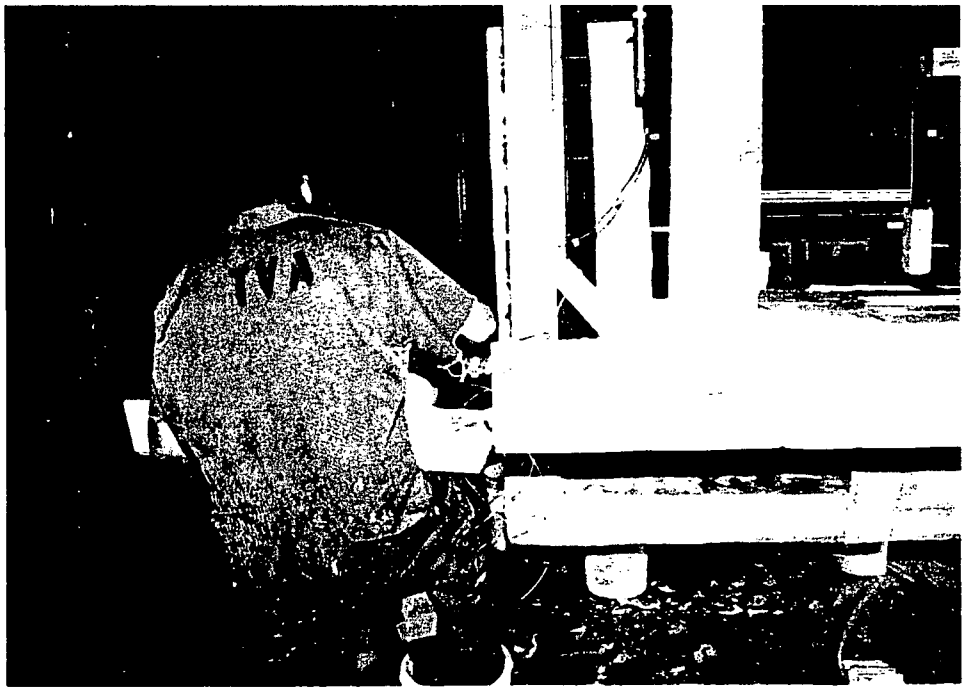
Cables from 5 in. air drop inserted into tray cavity.

OMEGA POINT LABORATORIES

Pre-buttered, pre-shaped conduit sections installed over cables in 5 in. air drop.

Pre-shaped conduit sections extending over 5 in. conduit stub in air drop.

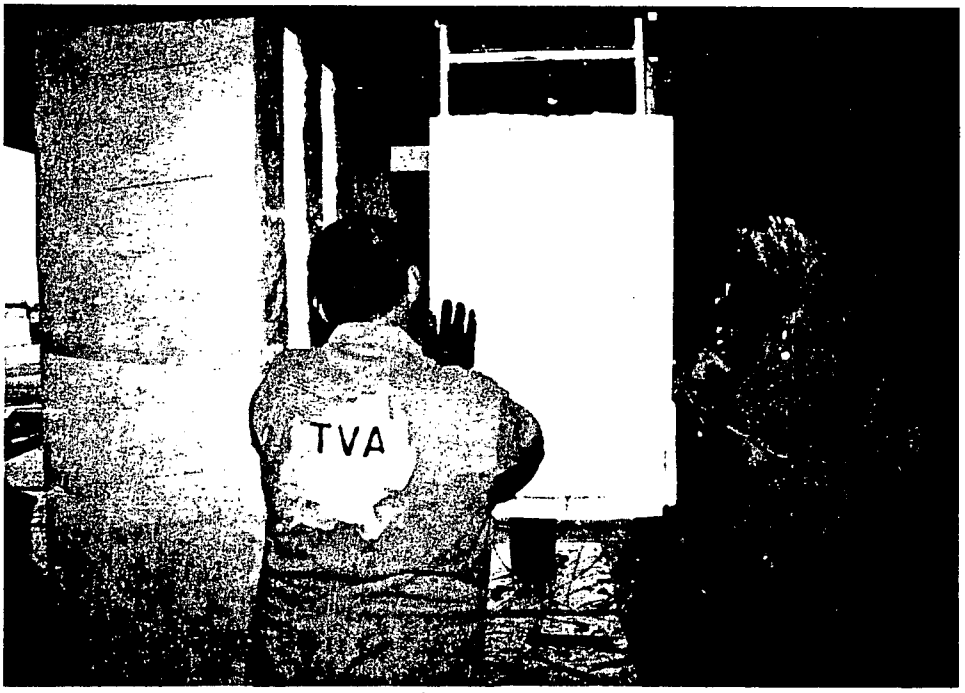
OMEGA POINT LABORATORIES



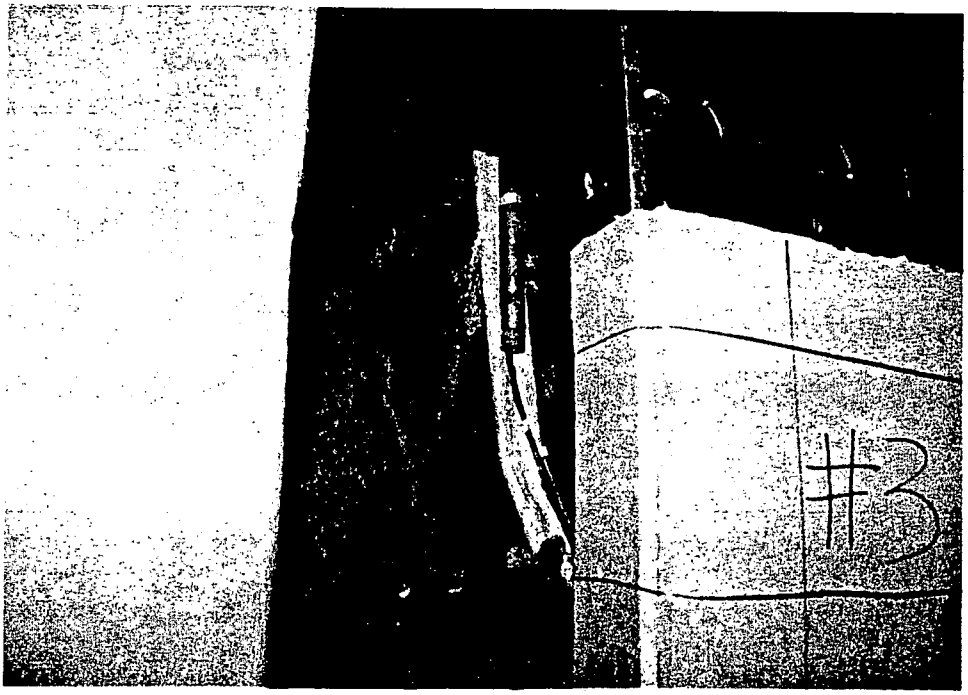
Scored and folded panel installed on vertical section of rear tray (note tie wires for stitches at bottom joint of panel).

Panel installed at angle in corner of rear tray squared bend.

OMEGA POINT LABORATORIES

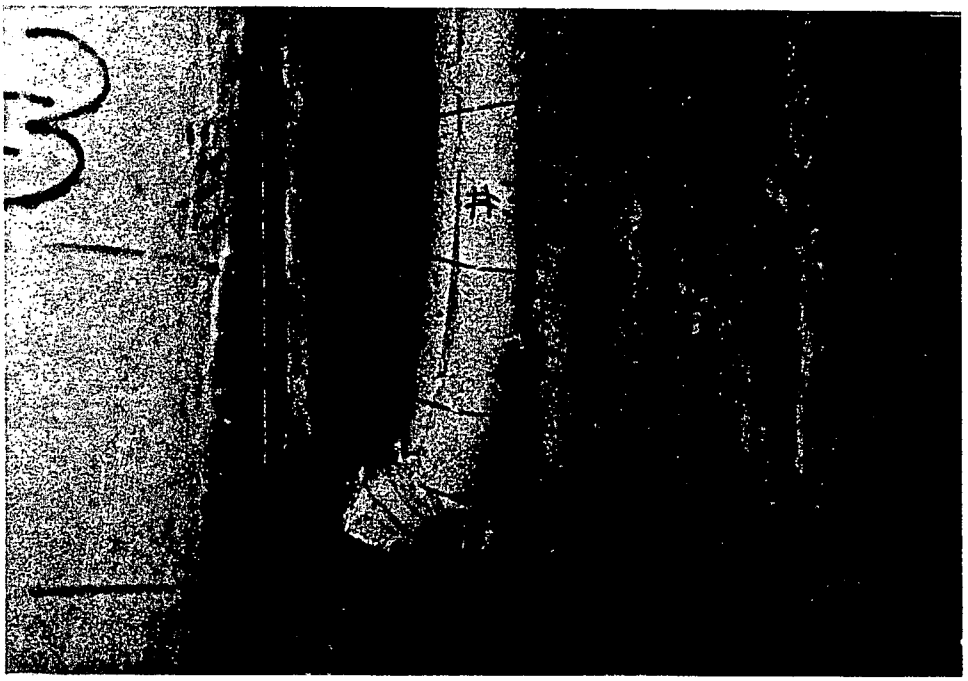


Panels secured with stainless steel tie wires.

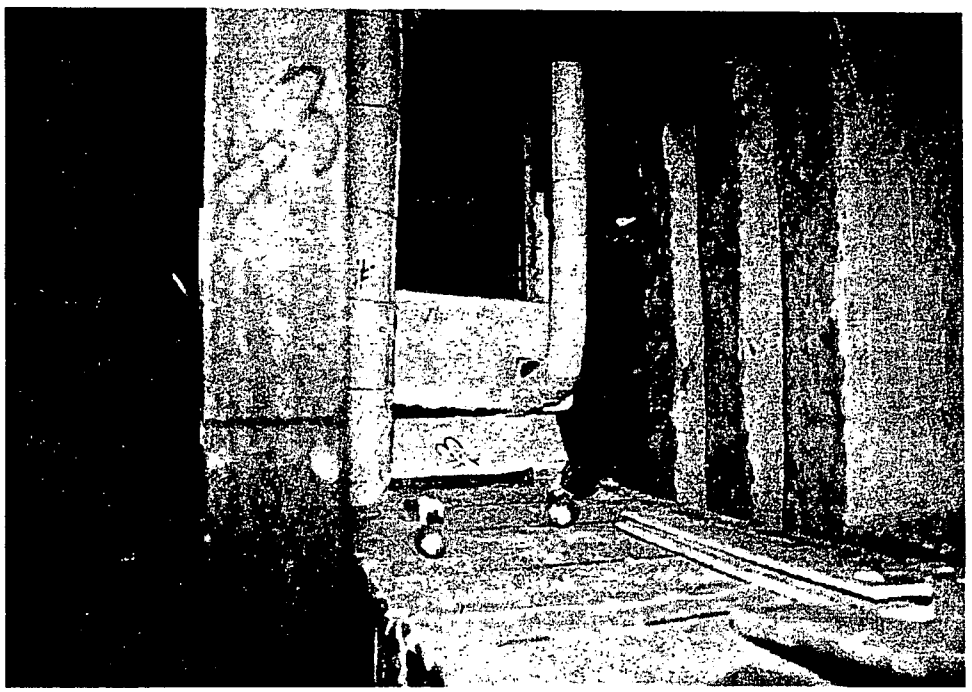


Bent pre-shaped conduit sections installed in 1 in. air drop.

OMEGA POINT LABORATORIES

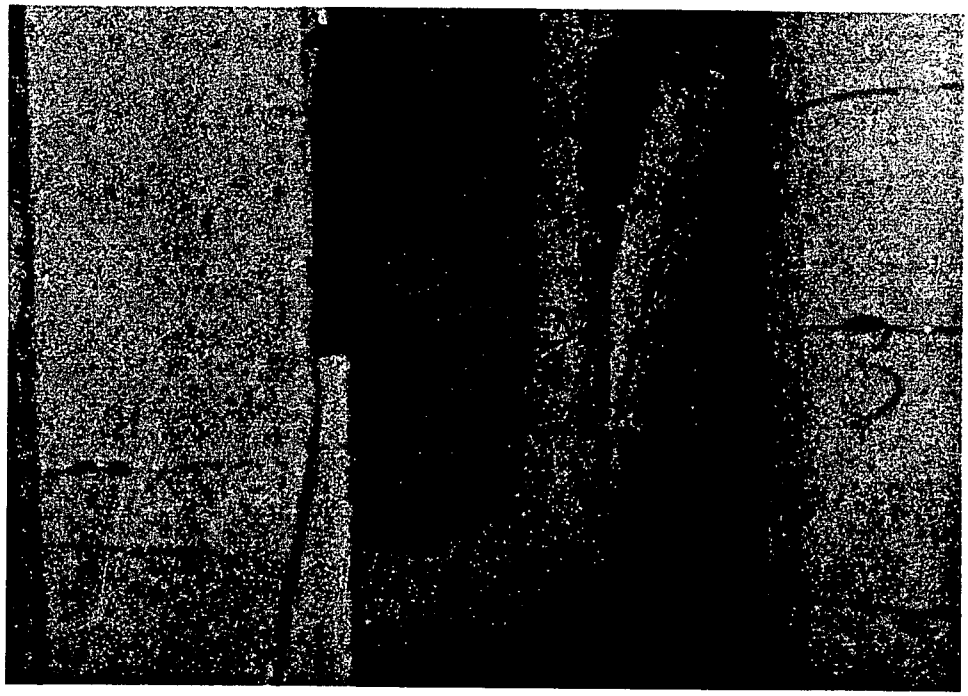


Pre-shaped conduit sections in 1 in. air drop secured with stainless steel tie wires.



Panel installed at air drop location.

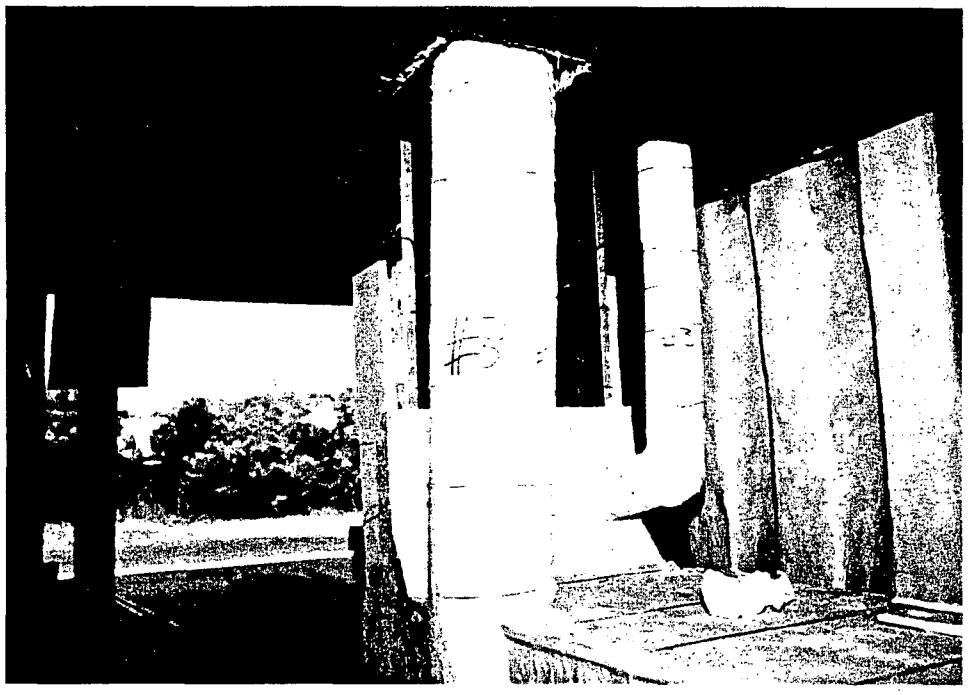
OMEGA POINT LABORATORIES



Overlay of pre-shaped conduit sections installed on 1 in. air drop.

Overlay of pre-shaped conduit sections installed on 1 in. air drop.

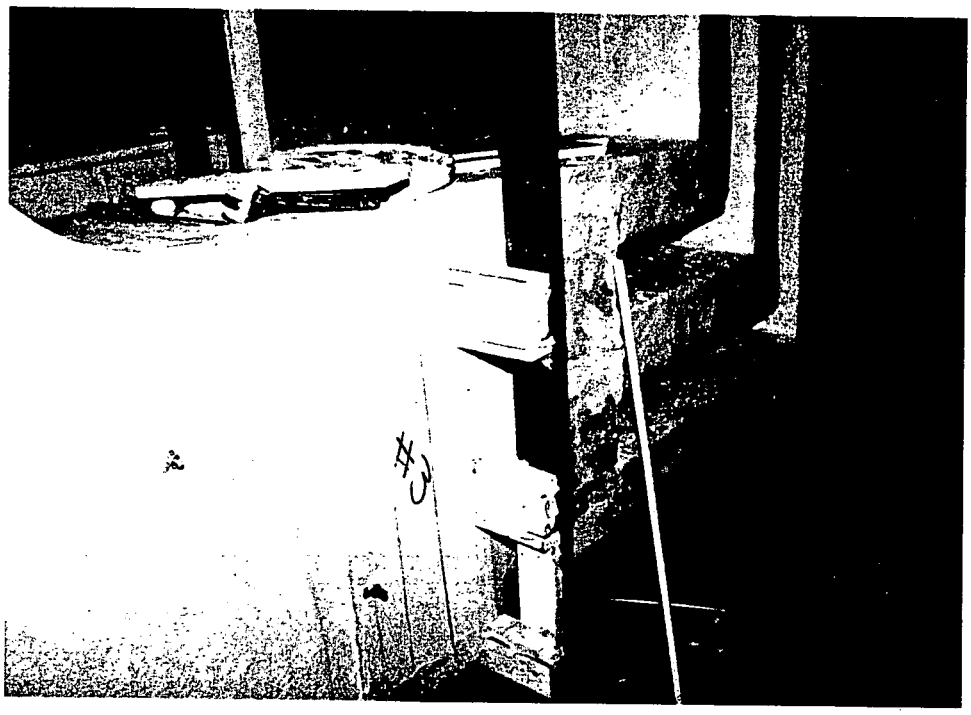
OMEGA POINT LABORATORIES



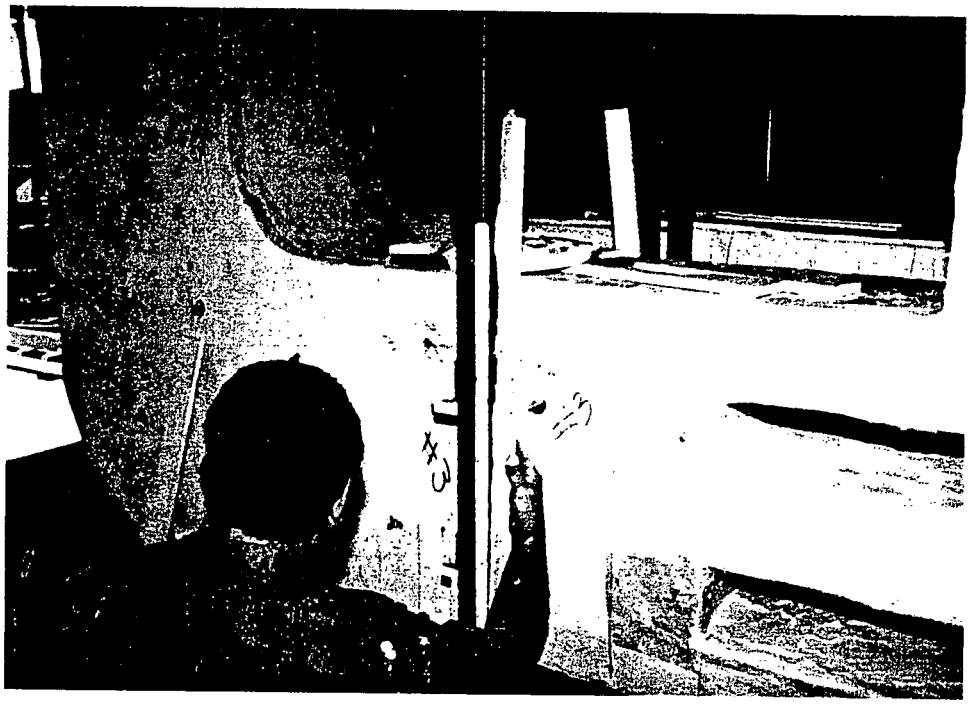
Overlay of pre-shaped conduit sections installed on 1 in. air drop.

Pre-buttered panels installed on support members.

OMEGA POINT LABORATORIES



Pre-buttered panels installed on support members.



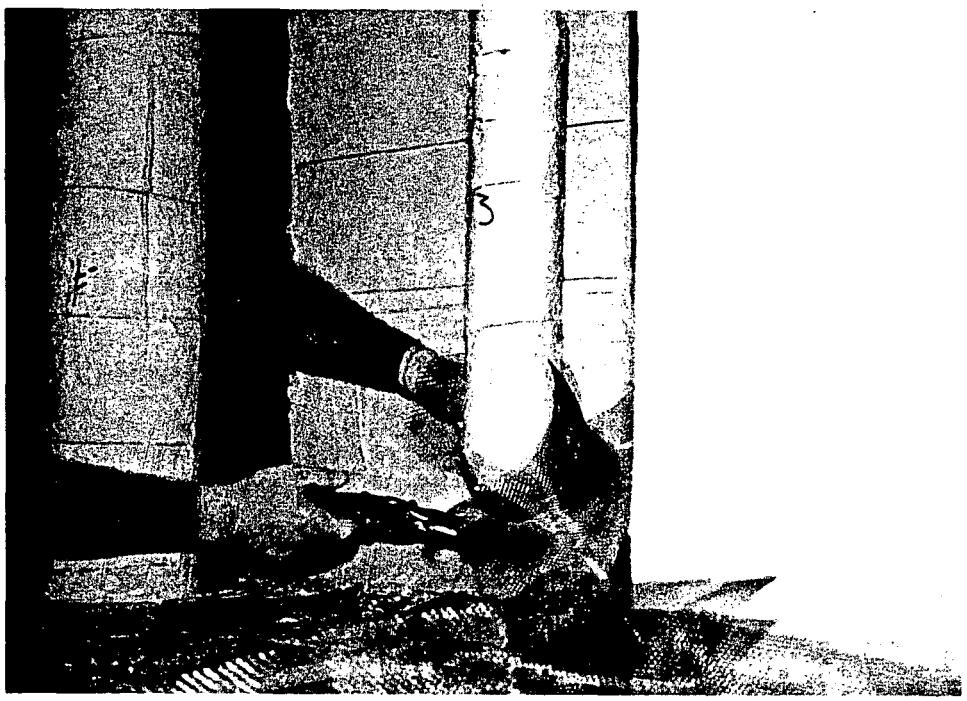
Pre-buttered panels installed on support members.

OMEGA POINT LABORATORIES

Pre-buttered panels installed on support members.

External stress skin overlay stapled into place on trays.

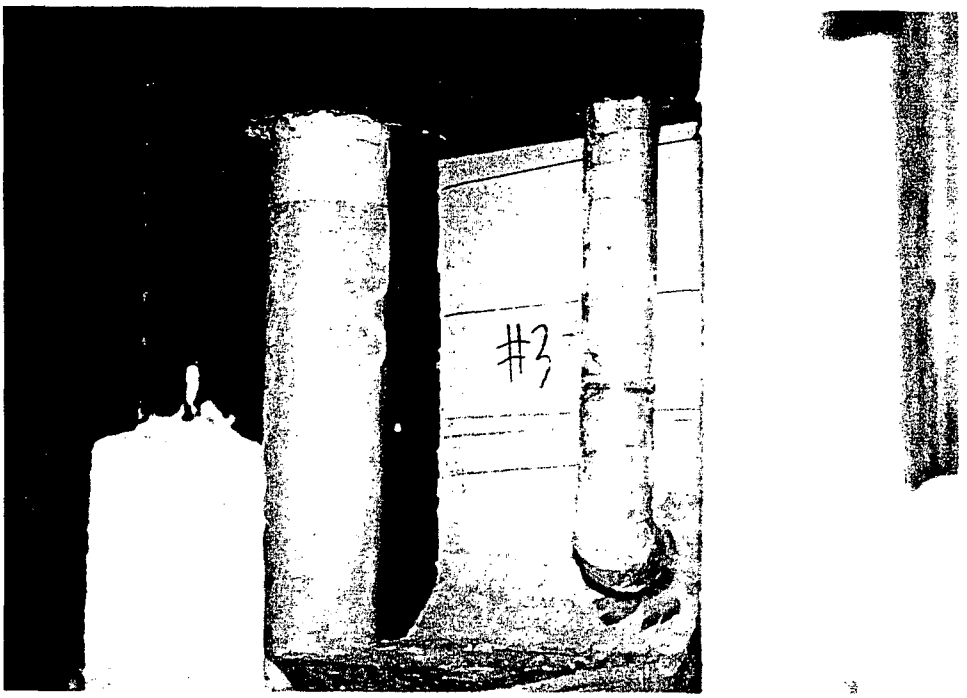
OMEGA POINT LABORATORIES



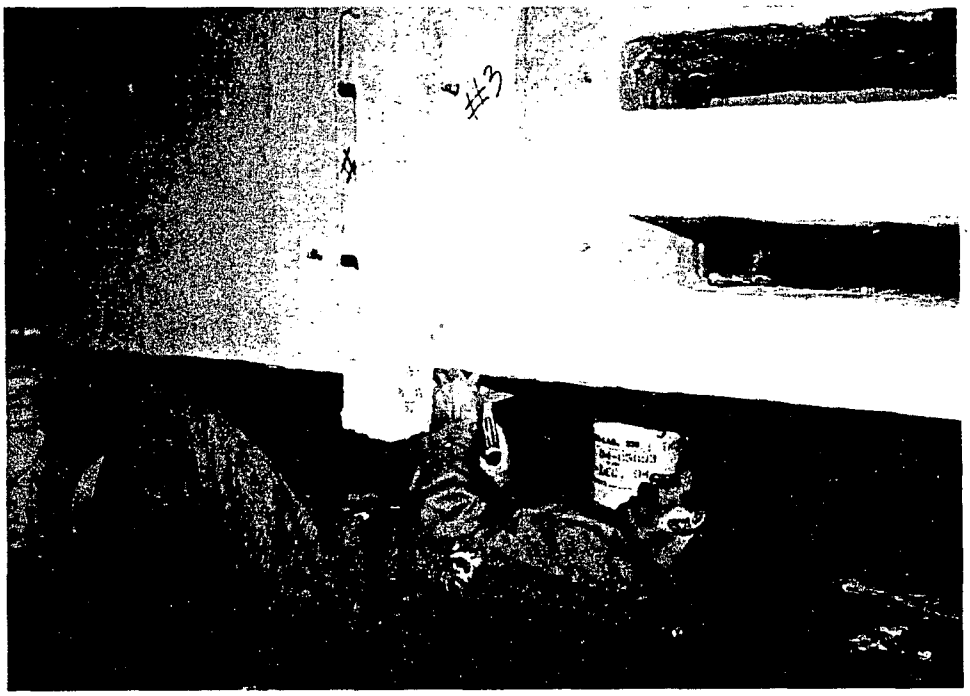
External stress skin overlay installed on 1 in. air drop.

External stress skin overlay installed on 5 in. air drop.

OMEGA POINT LABORATORIES

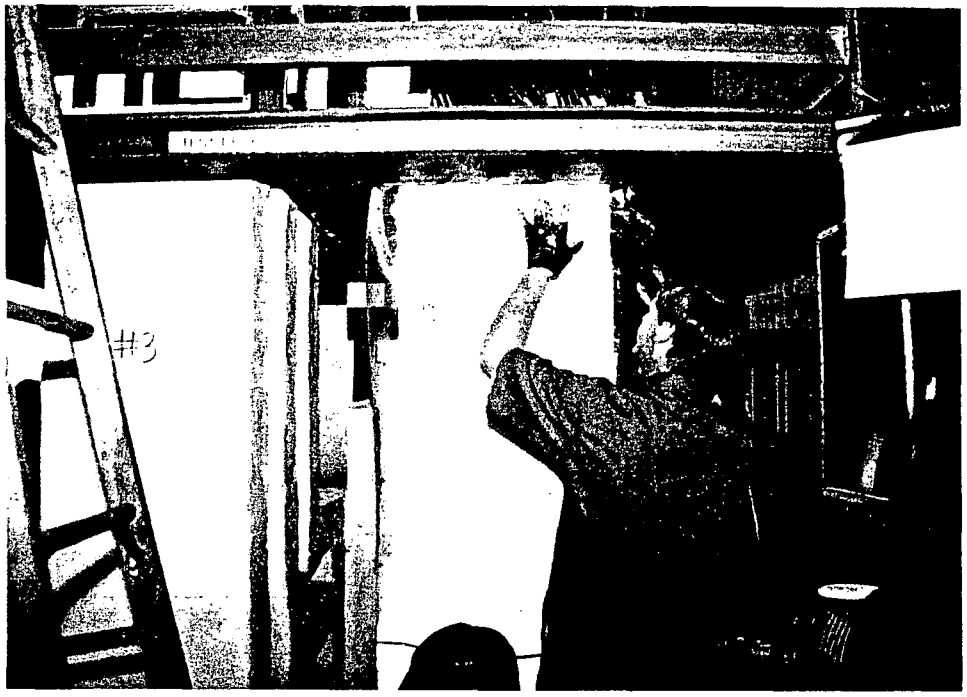


External stress skin overlay installed on 1 in. and 5 in. air drops.

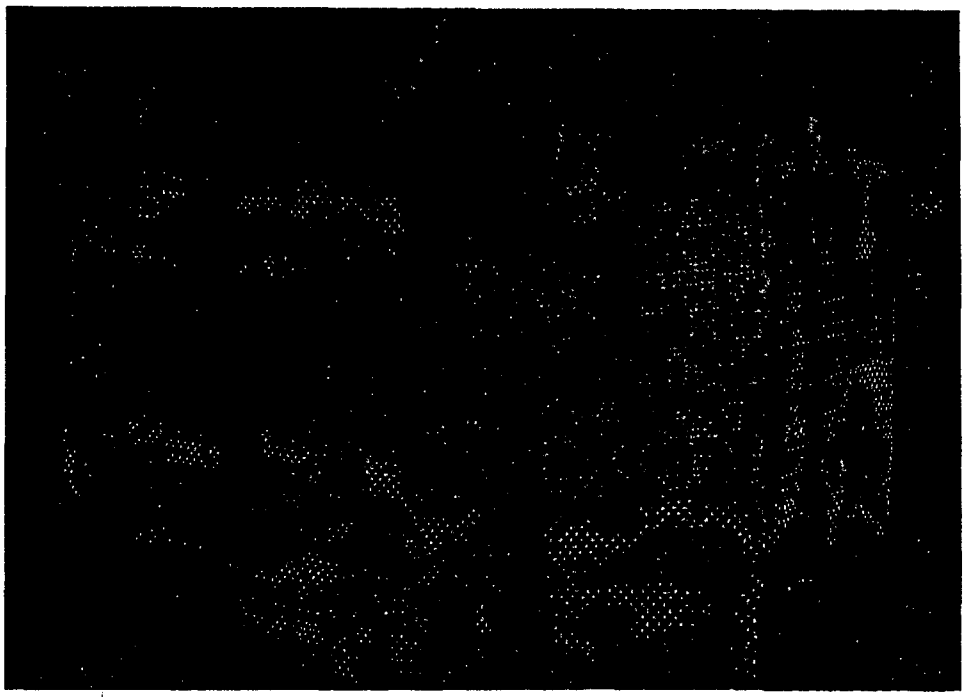


External stress skin overlay stapled in place on support members.

OMEGA POINT LABORATORIES

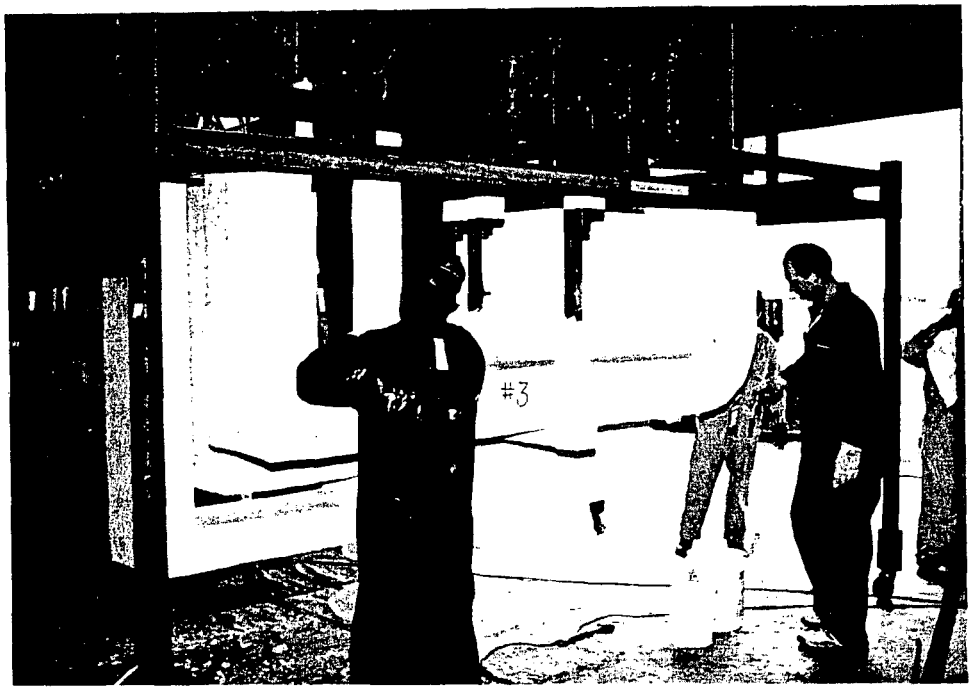


External stress skin overlay installed on rear tray vertical section.

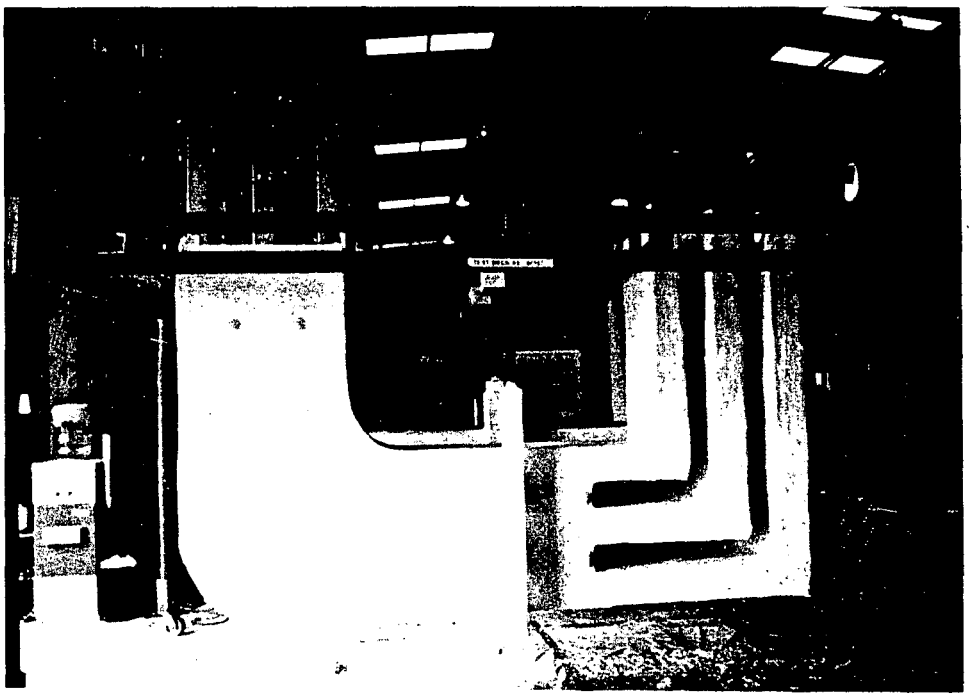


Stitches installed at overlap joints in external stress skin.

OMEGA POINT LABORATORIES

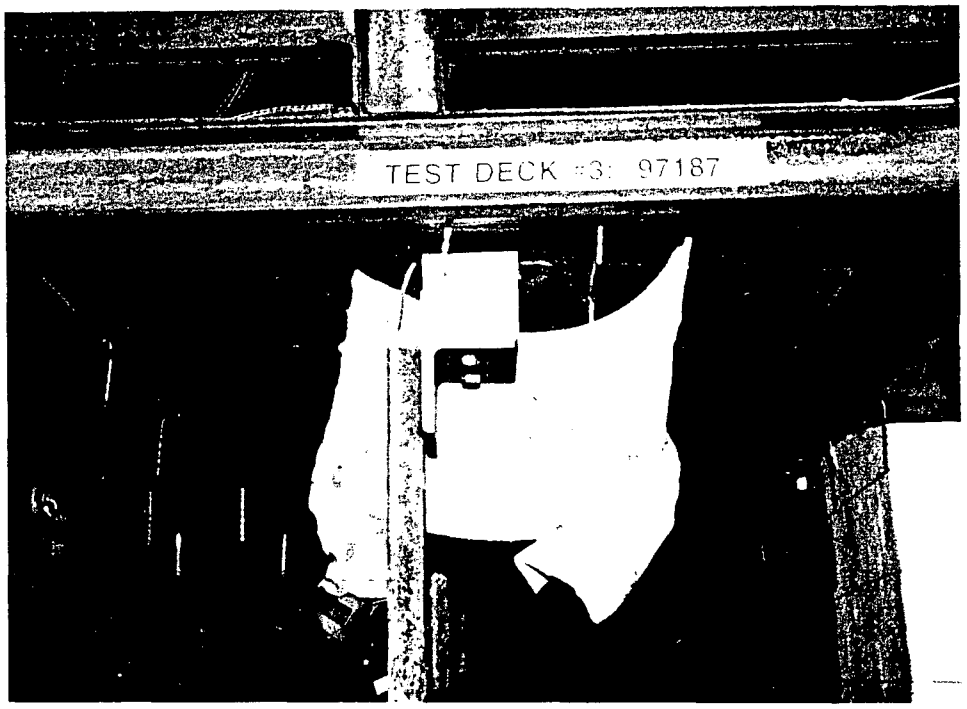


Trowel grade skim coat installed over entire assembly.



View of installed enclosure on tray assemblies.

OMEGA POINT LABORATORIES

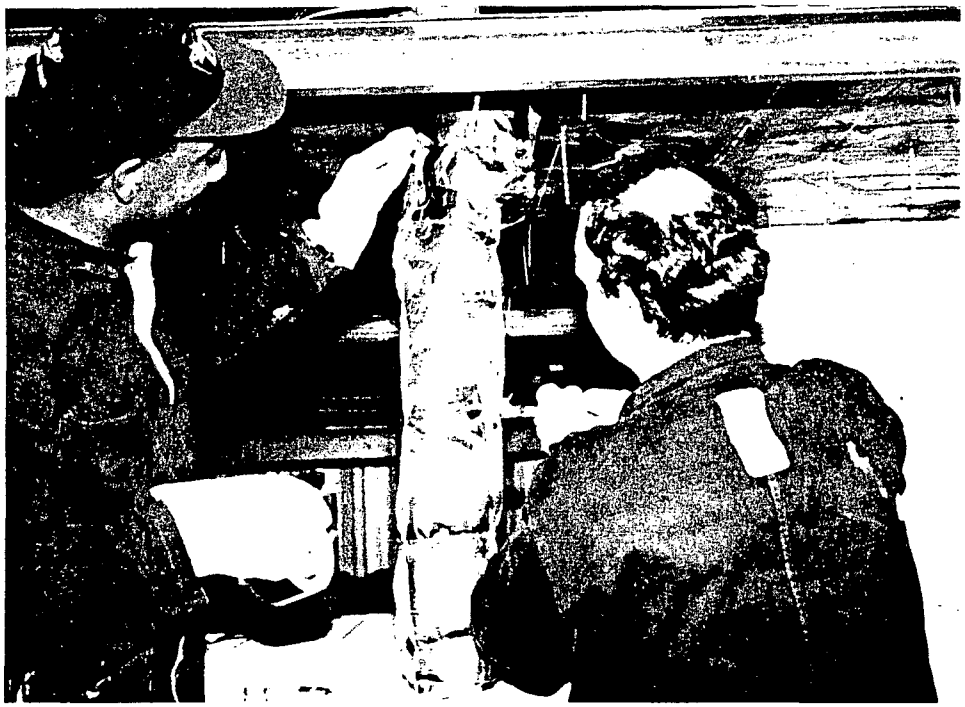


3M material installed on tops of support members.

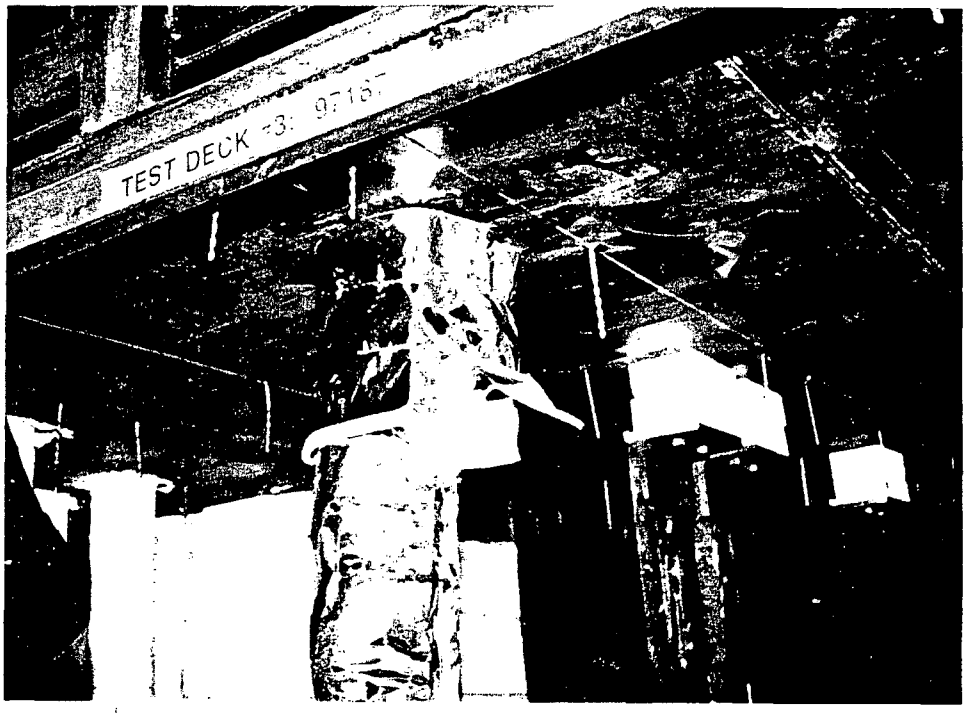
3M material installed on tops of support members.

First layer of 3M material installed on support members.

Second layer of 3M material installed on tops of support members.



Second layer of 3M material installed and secured with stainless steel tie wires.



Third and final layer of 3M material installed on supports.

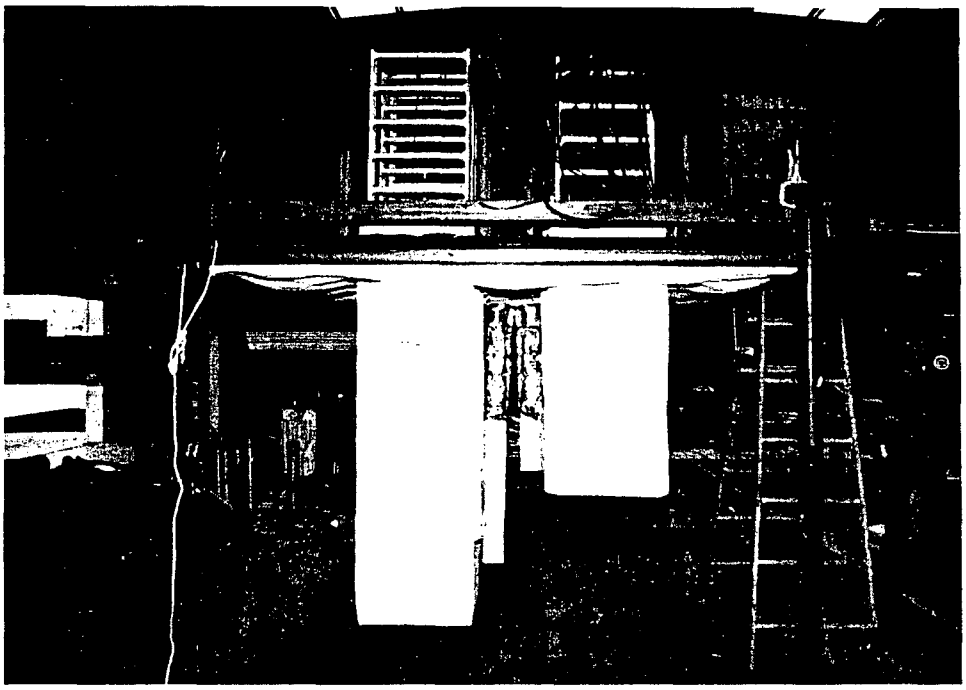
OMEGA POINT LABORATORIES

Third and final layer of 3M material installed on supports.

Third and final layer of 3M material installed on supports and secured.

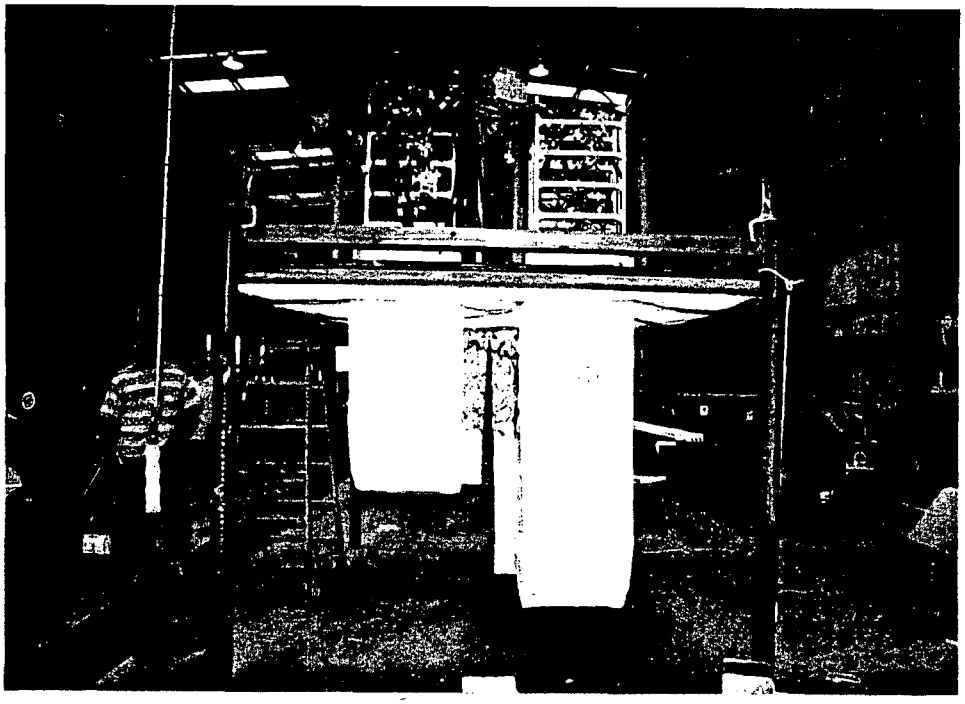
OMEGA POINT LABORATORIES

Front view of completed test assembly.

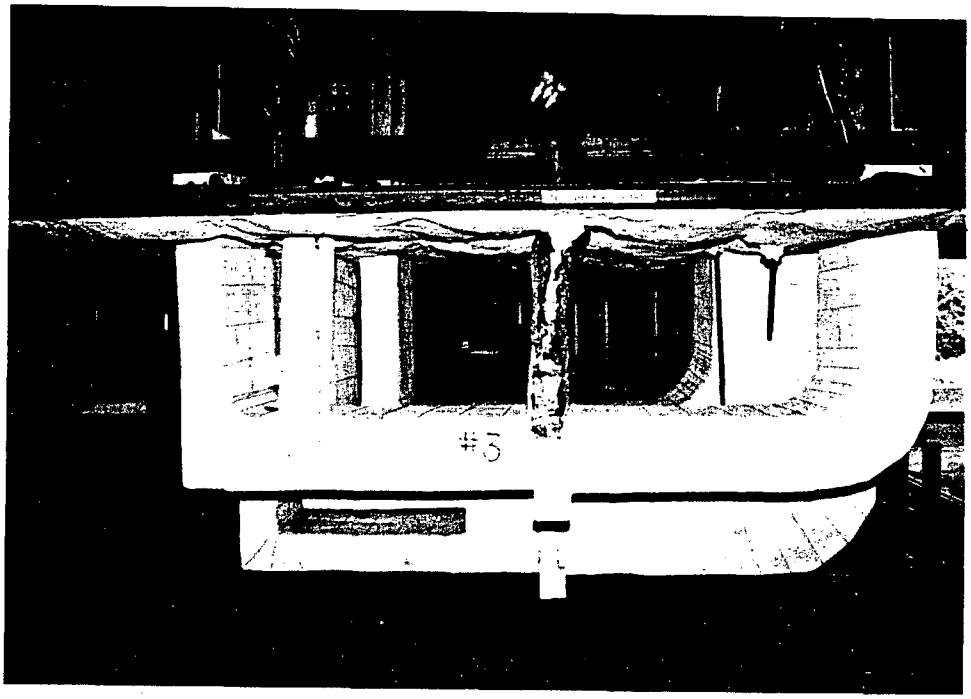


Right end view of completed test assembly.

OMEGA POINT LABORATORIES

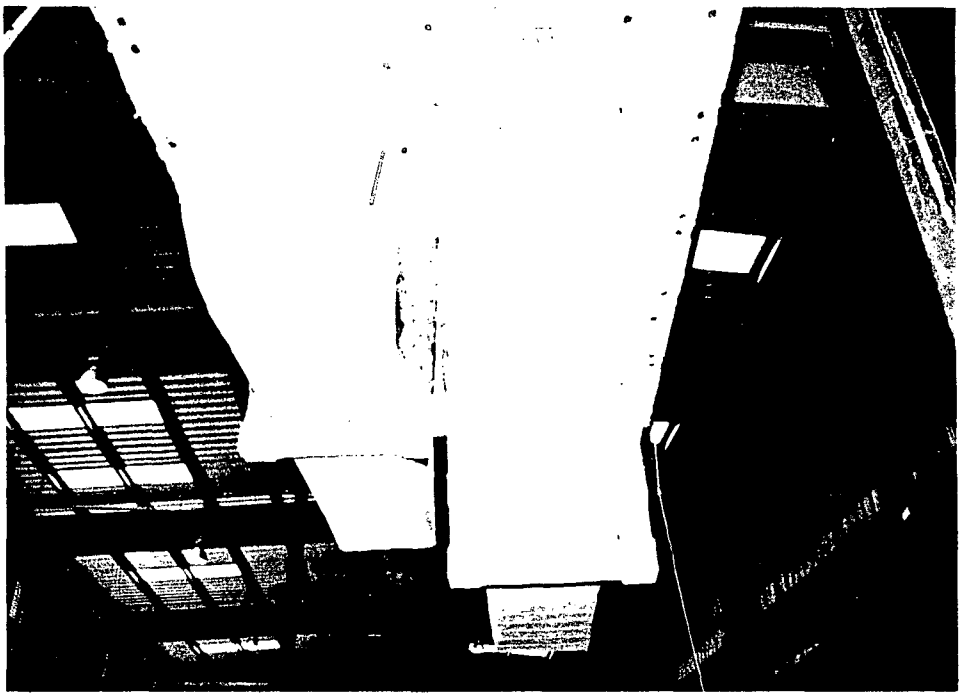


Left end view of completed test assembly.

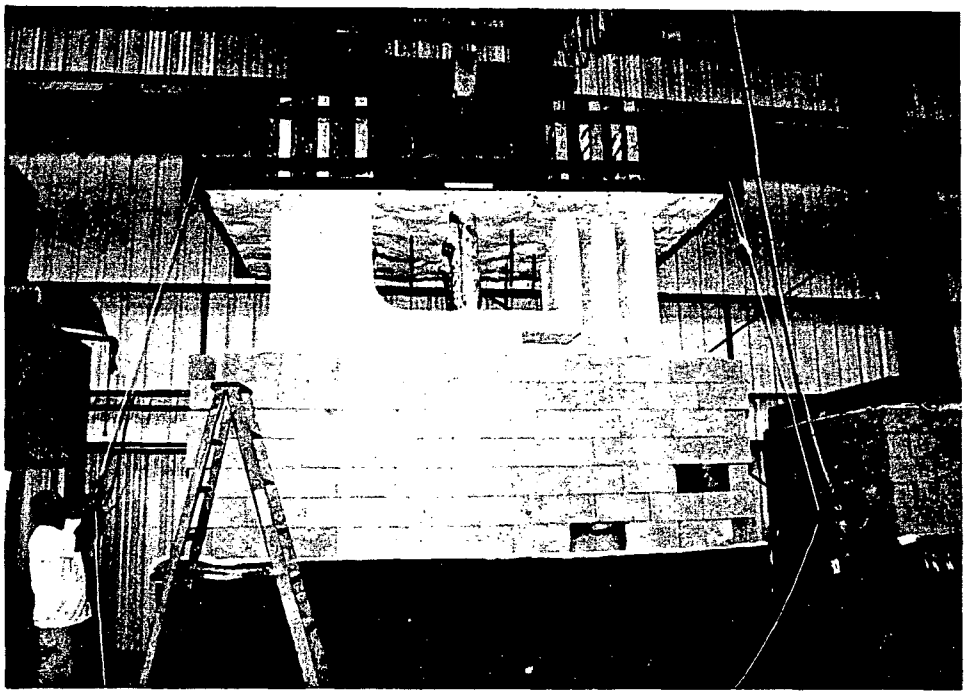


Rear view of completed test assembly.

OMEGA POINT LABORATORIES

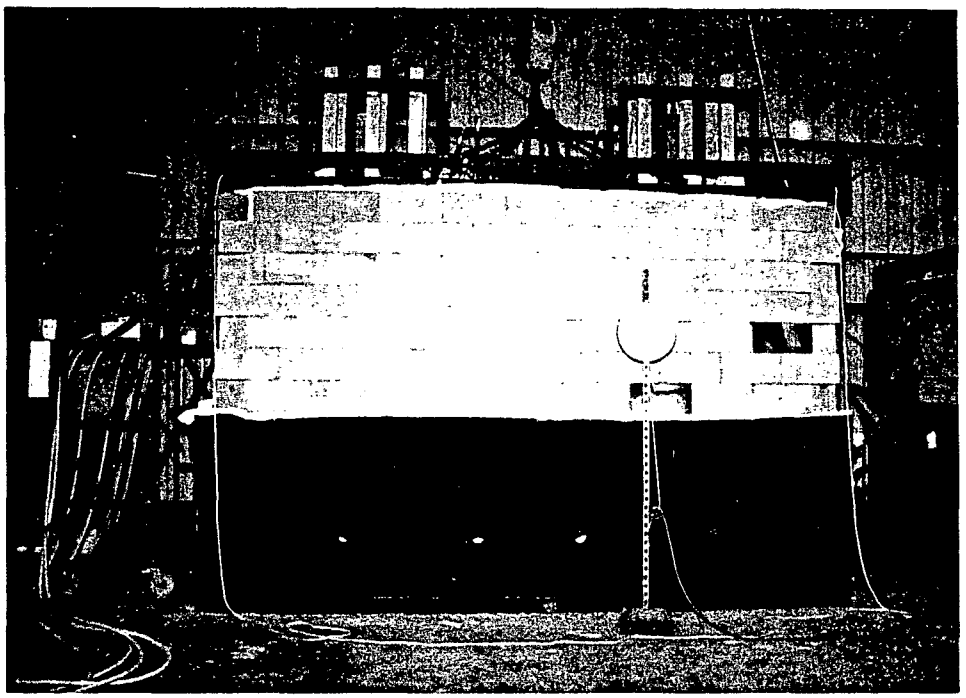


Underside view of completed test assembly.

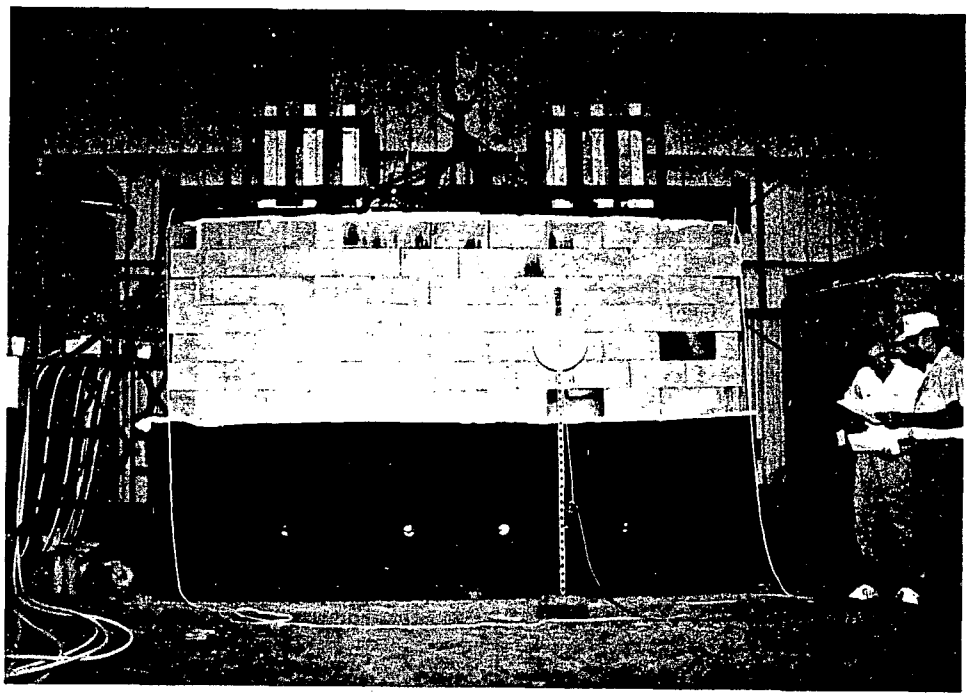


Test deck lowered onto furnace.

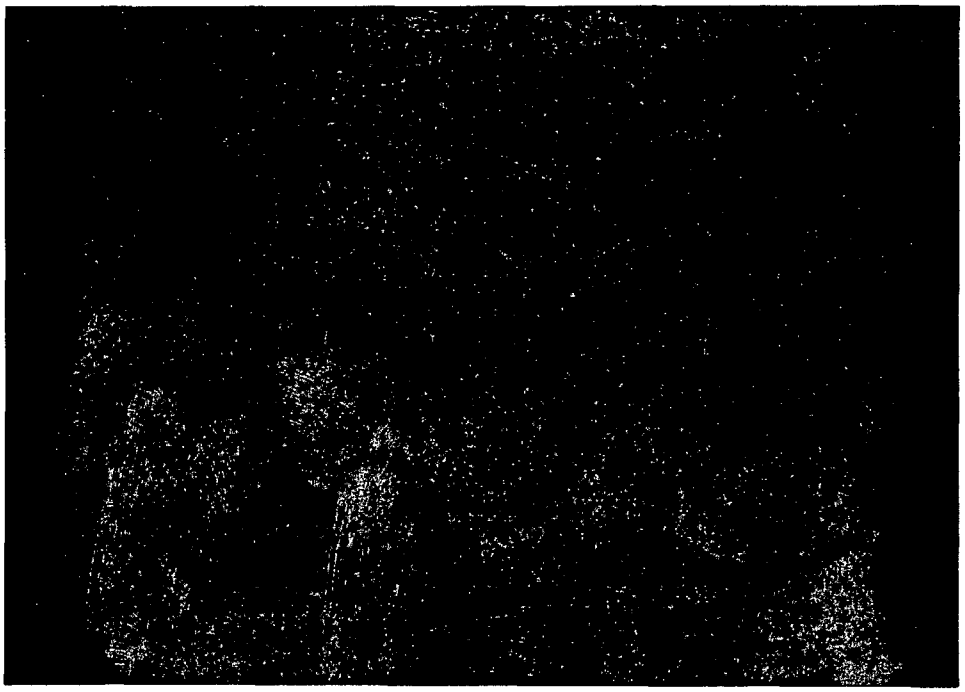
OMEGA POINT LABORATORIES



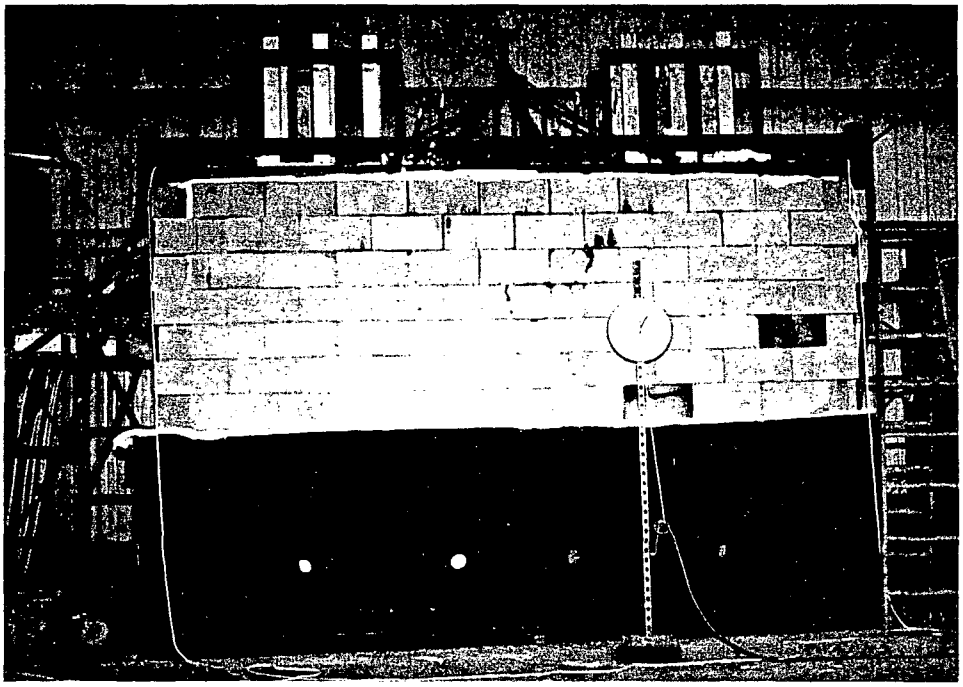
Test furnace prior to start of test.



Test furnace at approximately thirty minutes.

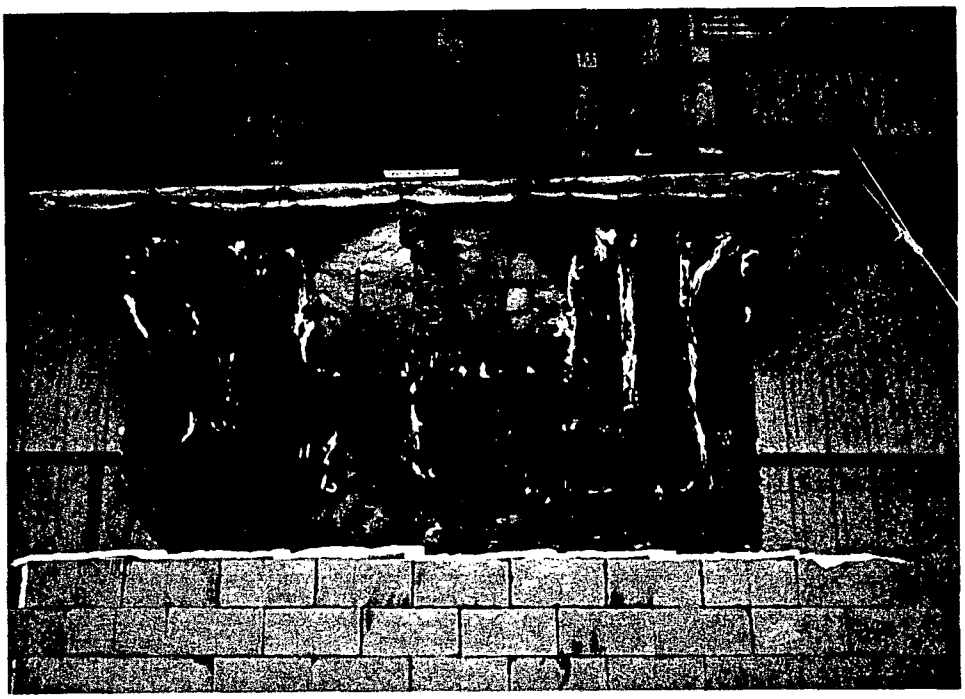


Interior of furnace during fire exposure.

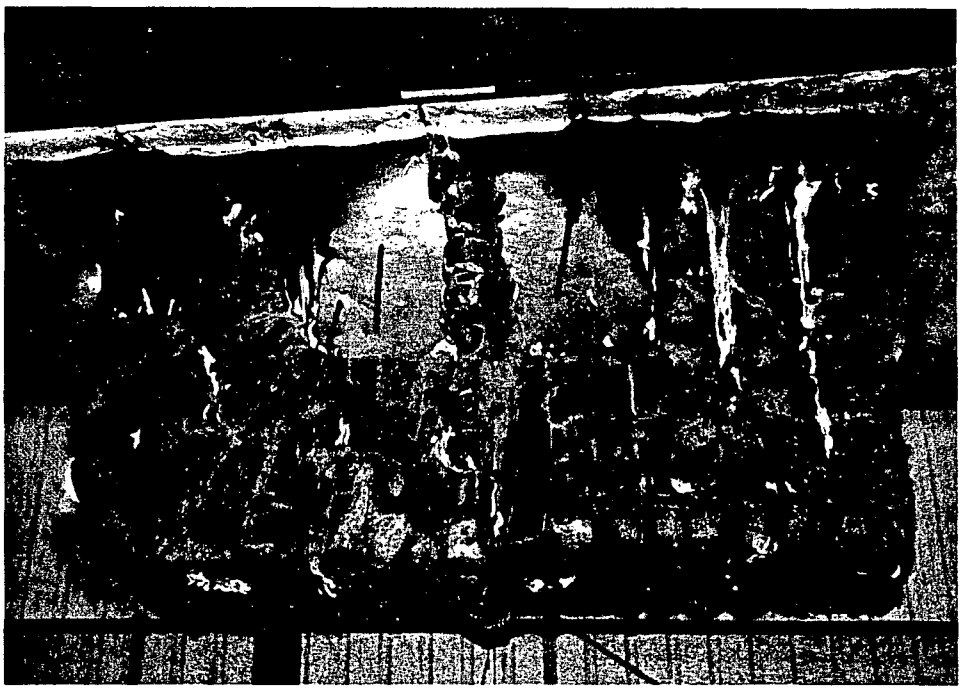


Test furnace at end of exposure period (one hour).

OMEGA POINT LABORATORIES



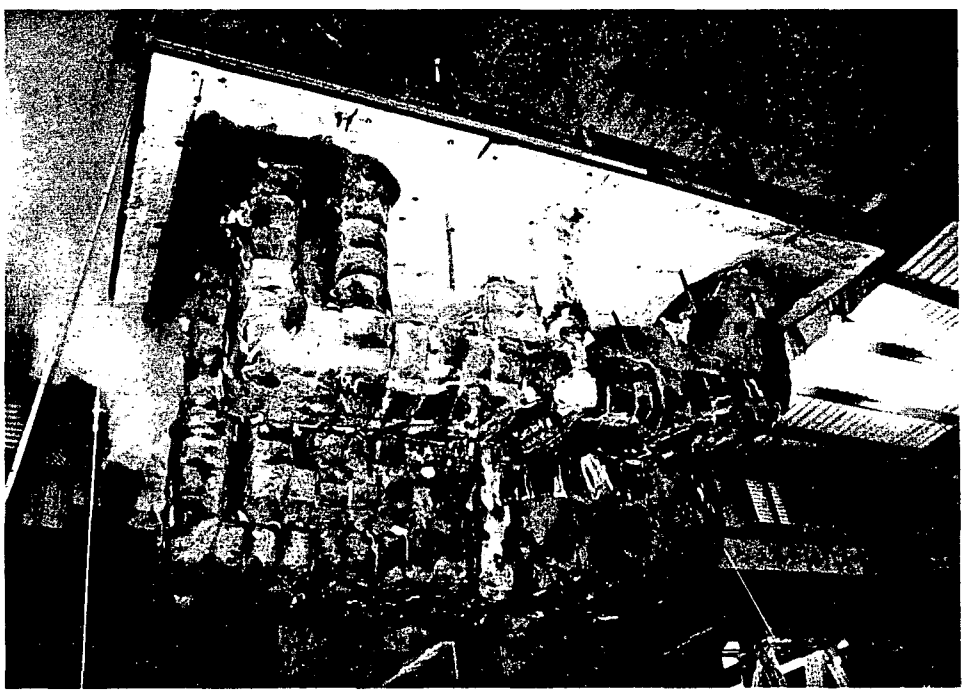
Test deck lifted from furnace.



Front view of test article.

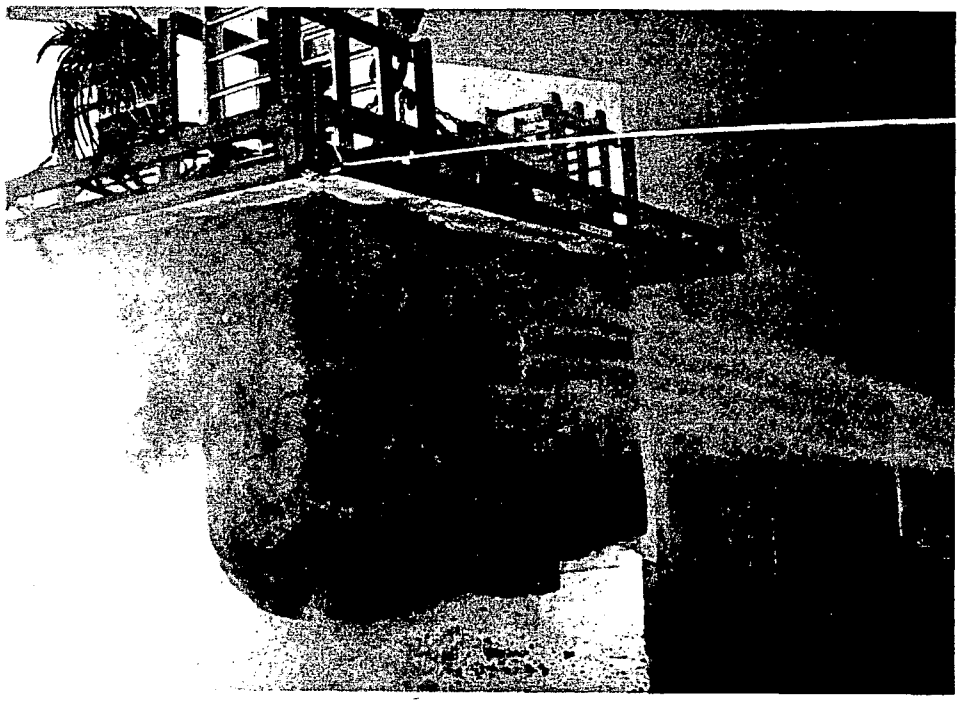
OMEGA POINT LABORATORIES

Underside view of test article.

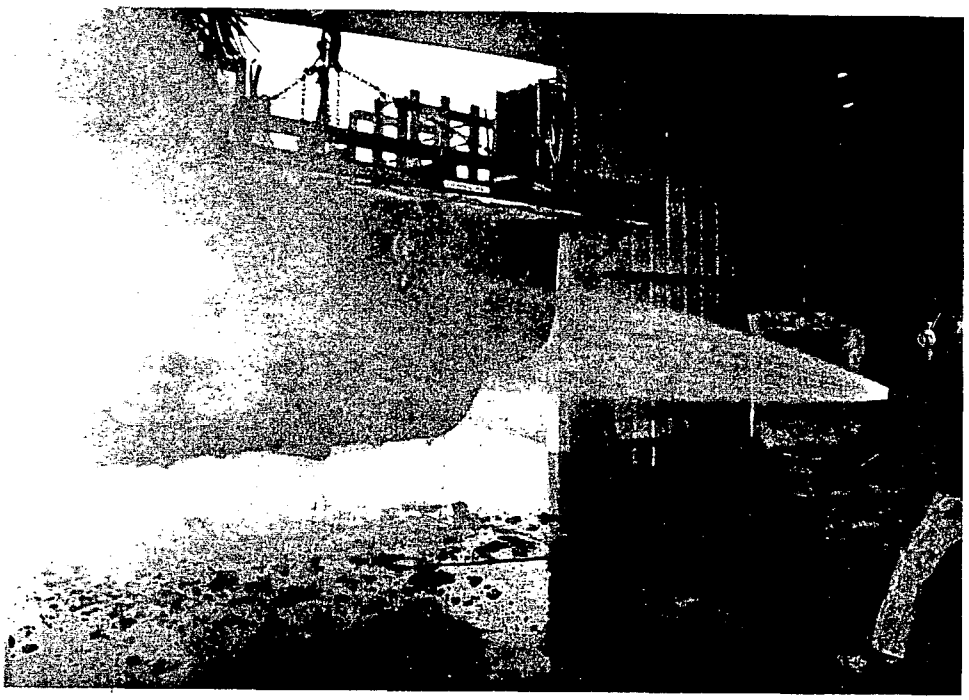


Rear view of test article.

OMEGA POINT LABORATORIES



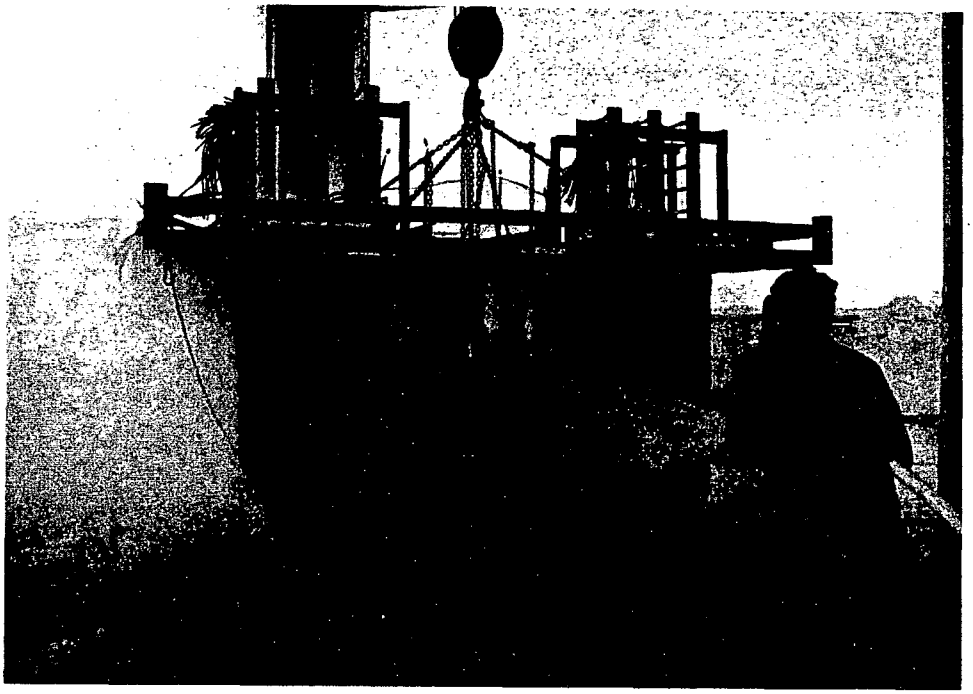
Water hose stream test.



Water hose stream test.

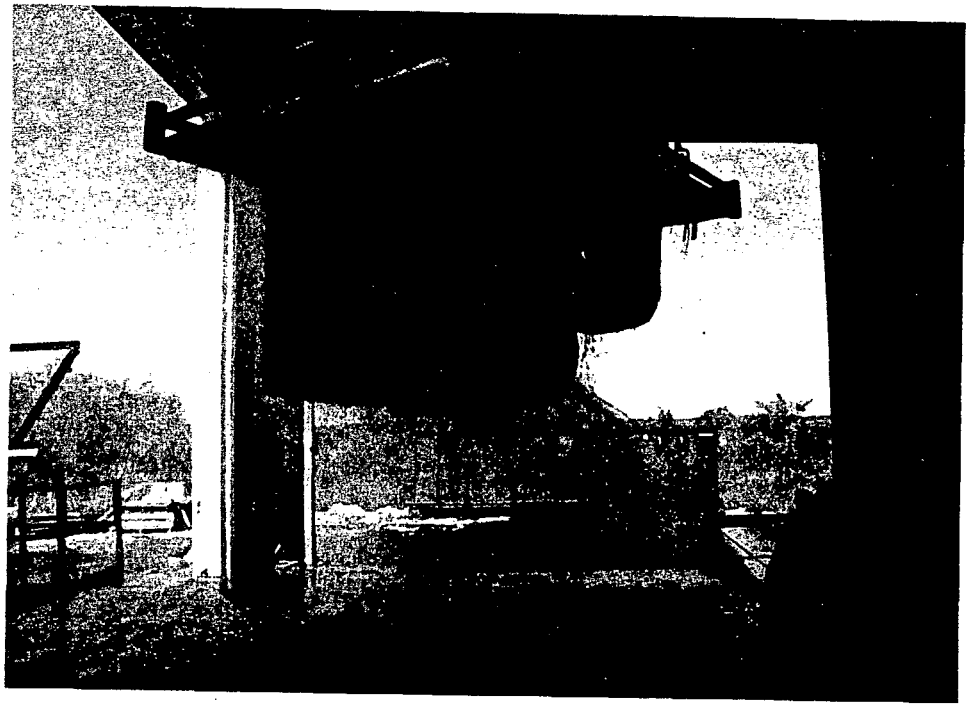
OMEGA POINT LABORATORIES

Water hose stream test.

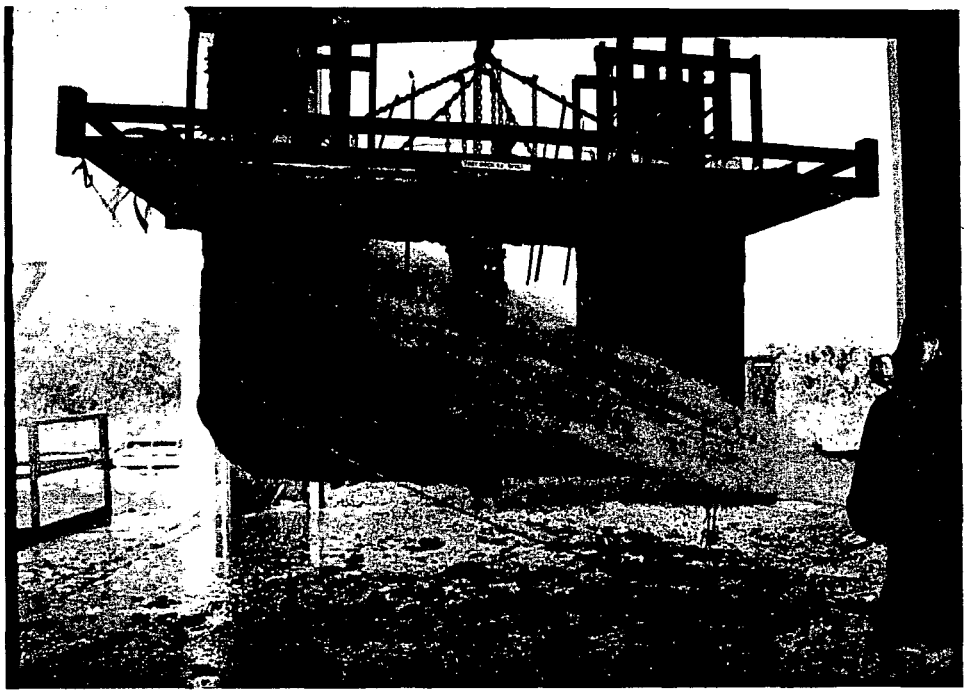


Water hose stream test.

OMEGA POINT LABORATORIES

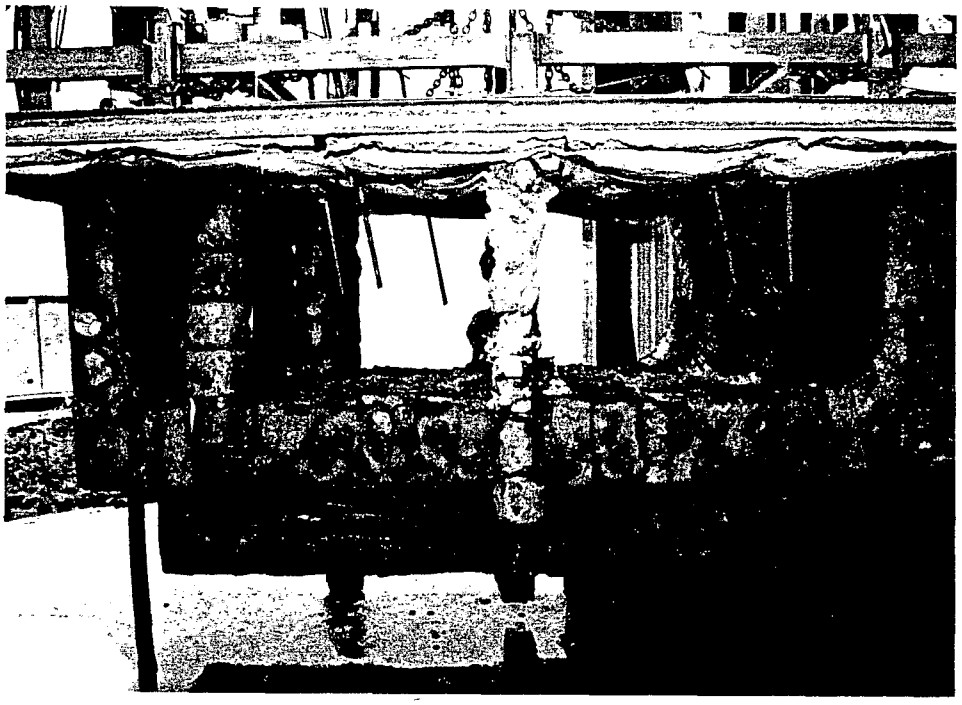


Water hose stream test.

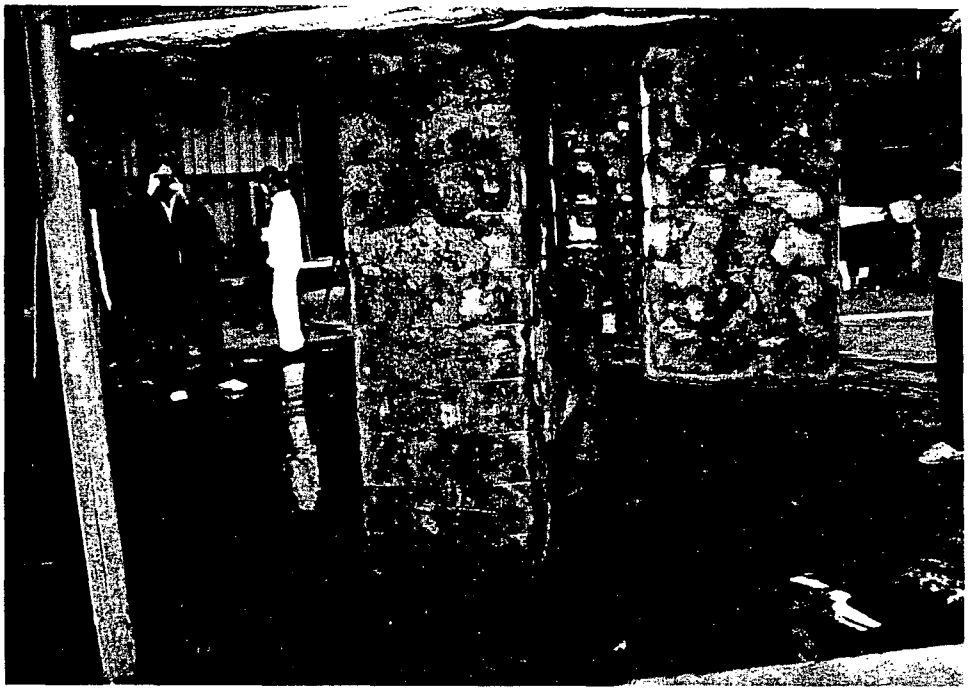


Water hose stream test.

OMEGA POINT LABORATORIES

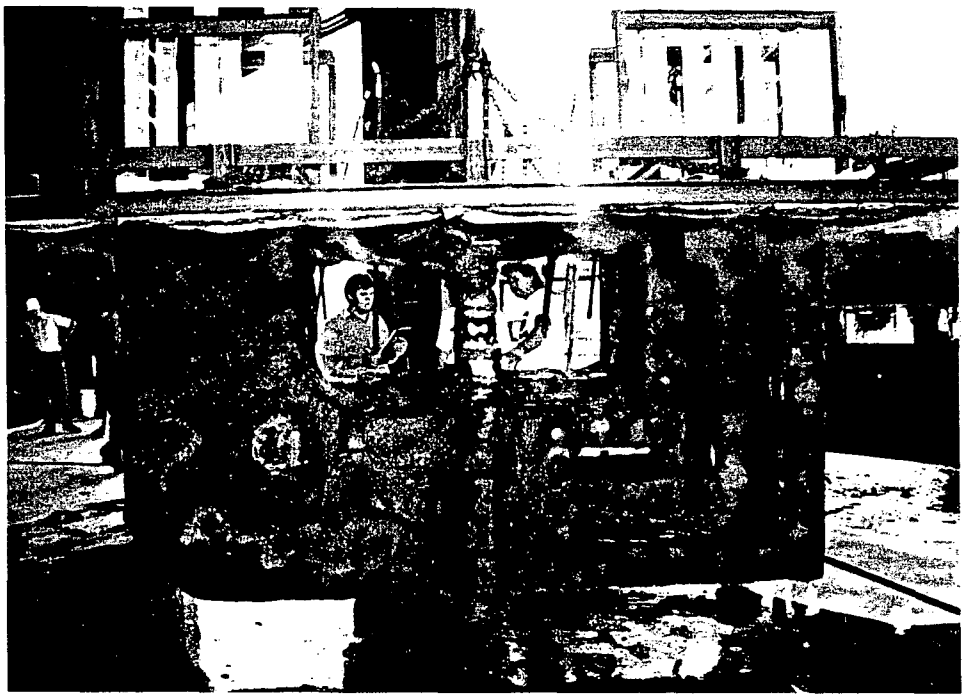


Rear of test article after hose stream.



Left end of test article after hose stream.

OMEGA POINT LABORATORIES



Front of test article after hose stream.

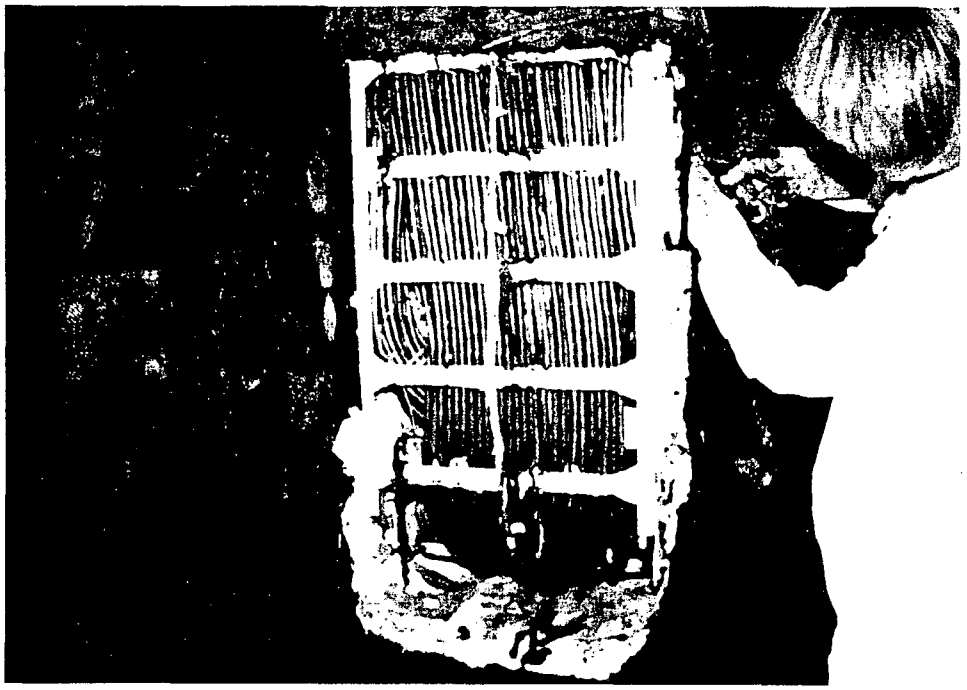
Air drops after hose stream.

OMEGA POINT LABORATORIES

Support members after hose stream.

External stress skin removed from rear tray.

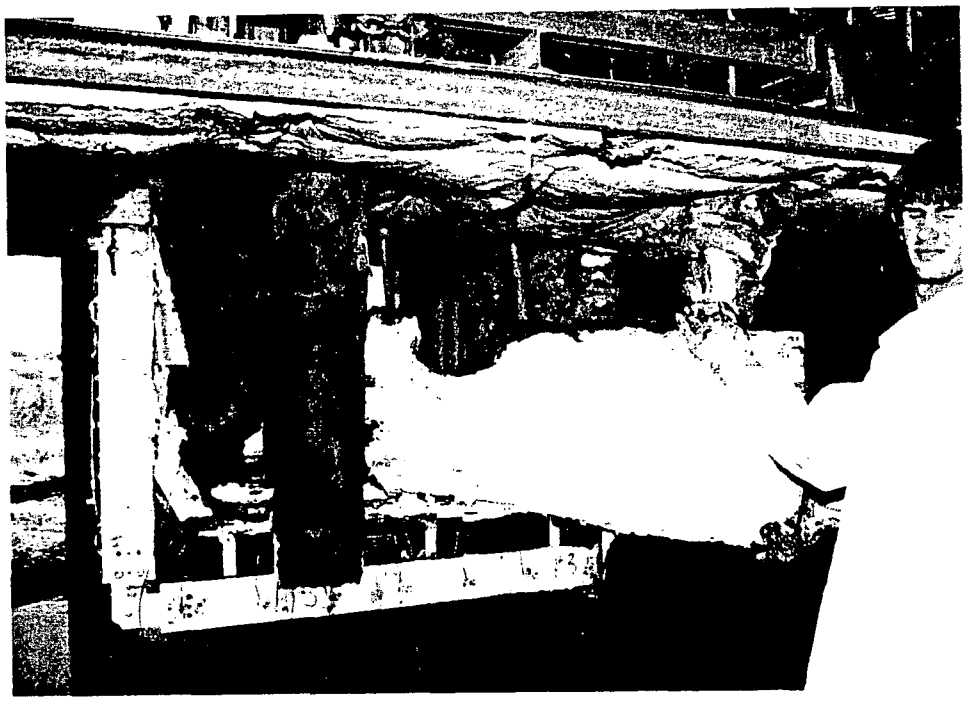
OMEGA POINT LABORATORIES



Cables in vertical section of rear tray.

Material removed from horizontal portion of rear tray.

OMEGA POINT LABORATORIES



Material removed from top of rear tray.

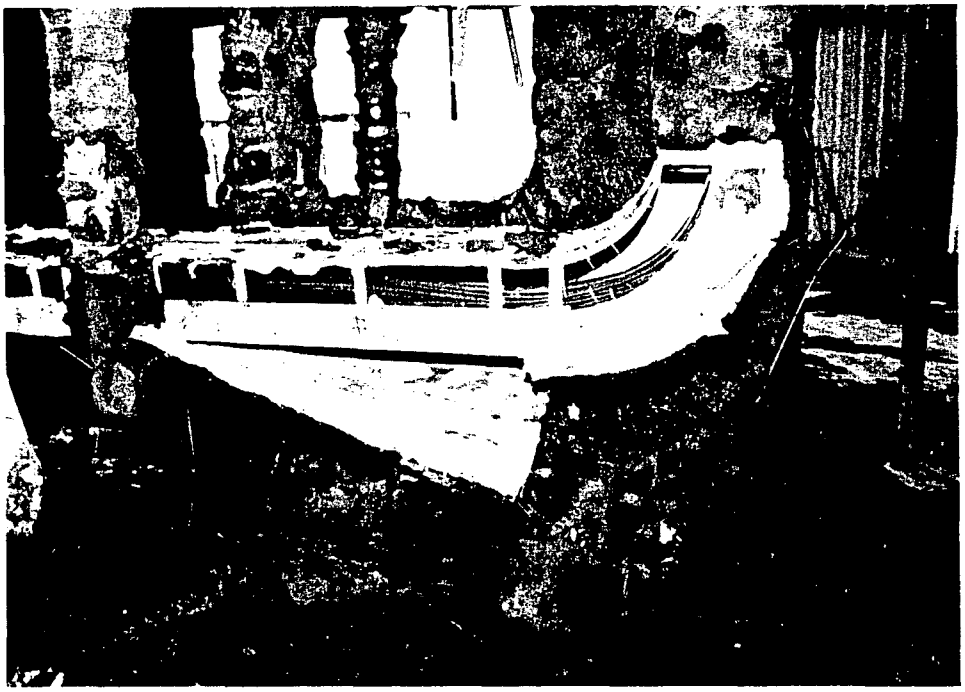
Material removed from top of rear tray.

OMEGA POINT LABORATORIES

Material removed from inside radial section of rear tray.

Material removed from side of rear tray radial bend.

OMEGA POINT LABORATORIES

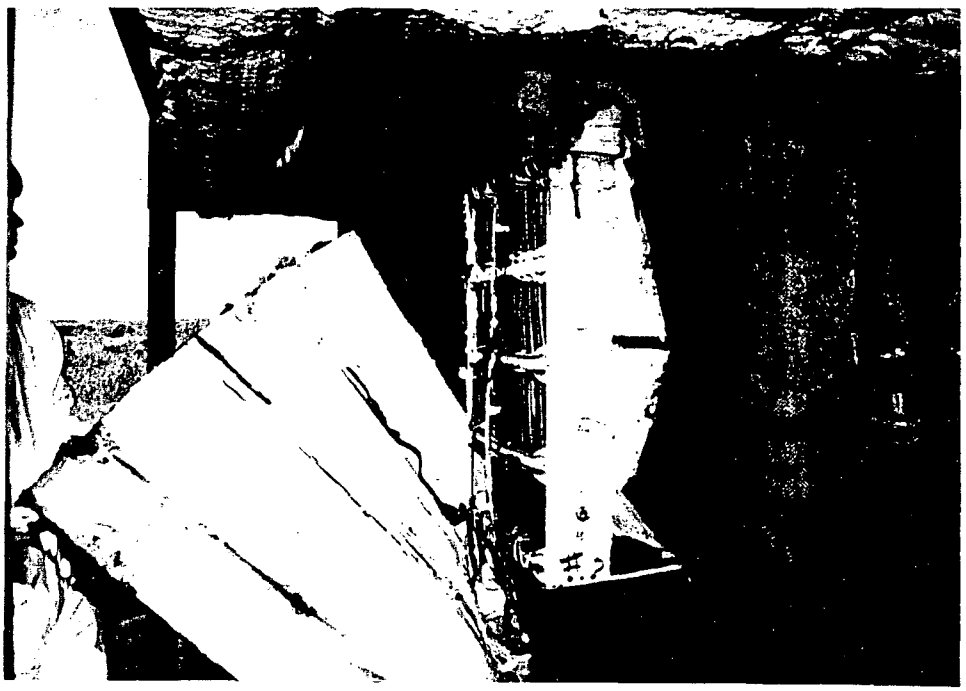


Material removed from bottom of rear tray.

Material removed from support under rear tray.

OMEGA POINT LABORATORIES

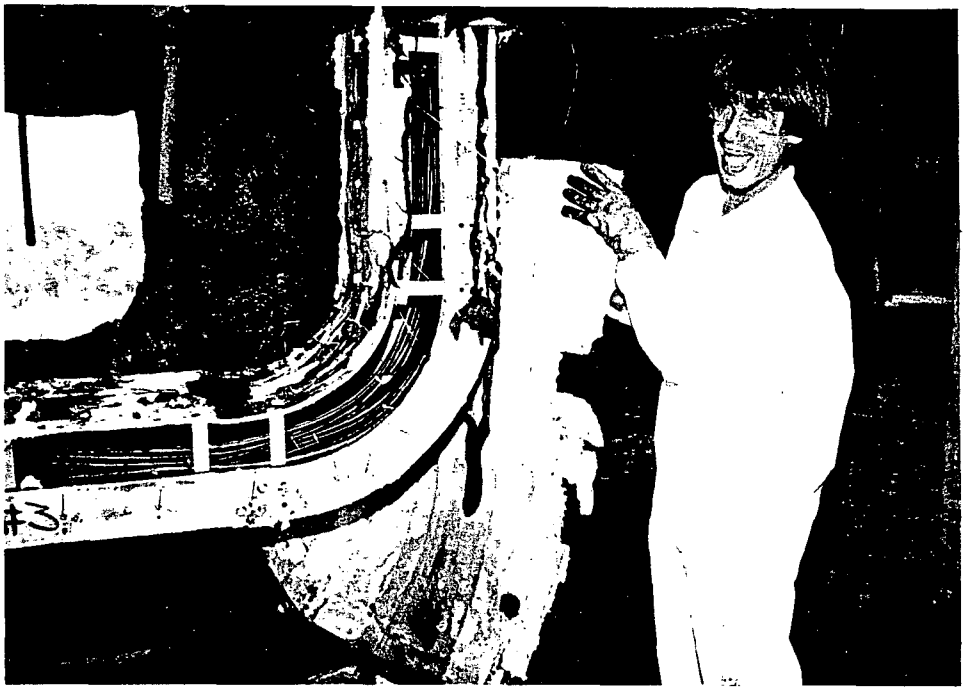
External stress skin removed from rear tray.



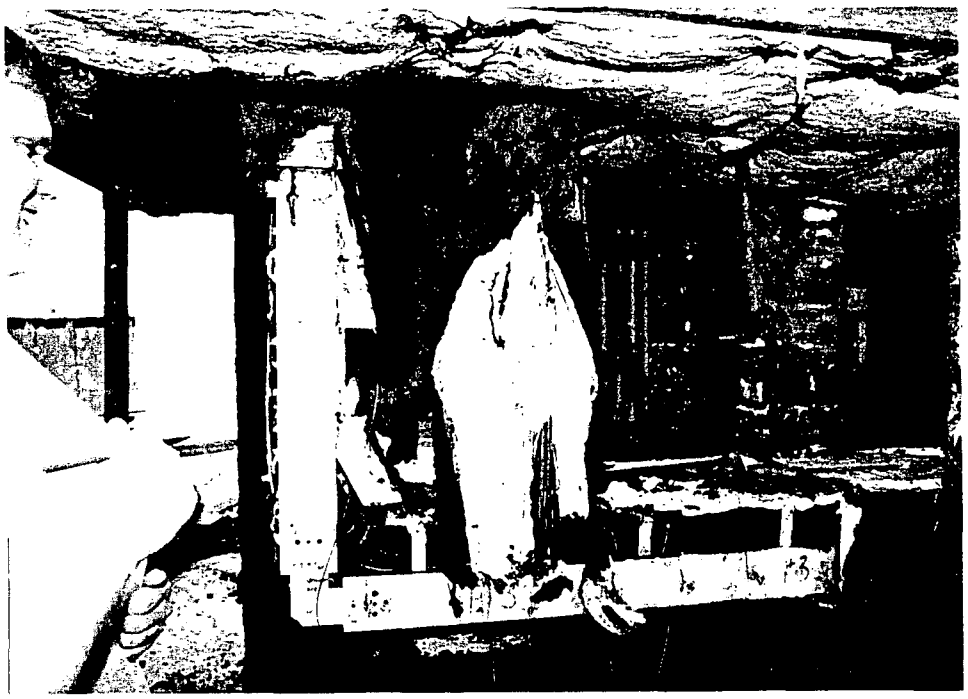
Material removed from vertical section of rear tray (note black material on panel and on cables is drips of silicone which occured during seal installation).

OMEGA POINT LABORATORIES

Material removed from side of rear tray over radial bend.



Material removed from outside of rear tray radial bend (note black material on panel and on cables is drips of silicone which occured during seal installation).

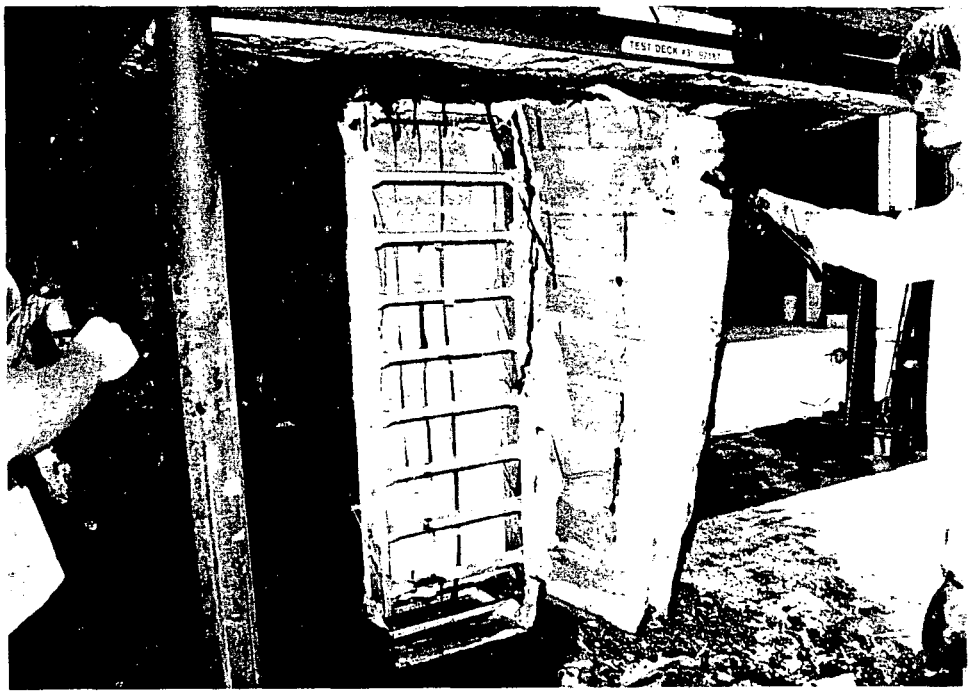


Material removed from 5 in. air drop.

Material removed from 1 in. air drop (note black material on cables is drips of silicone which occured during seal installation).

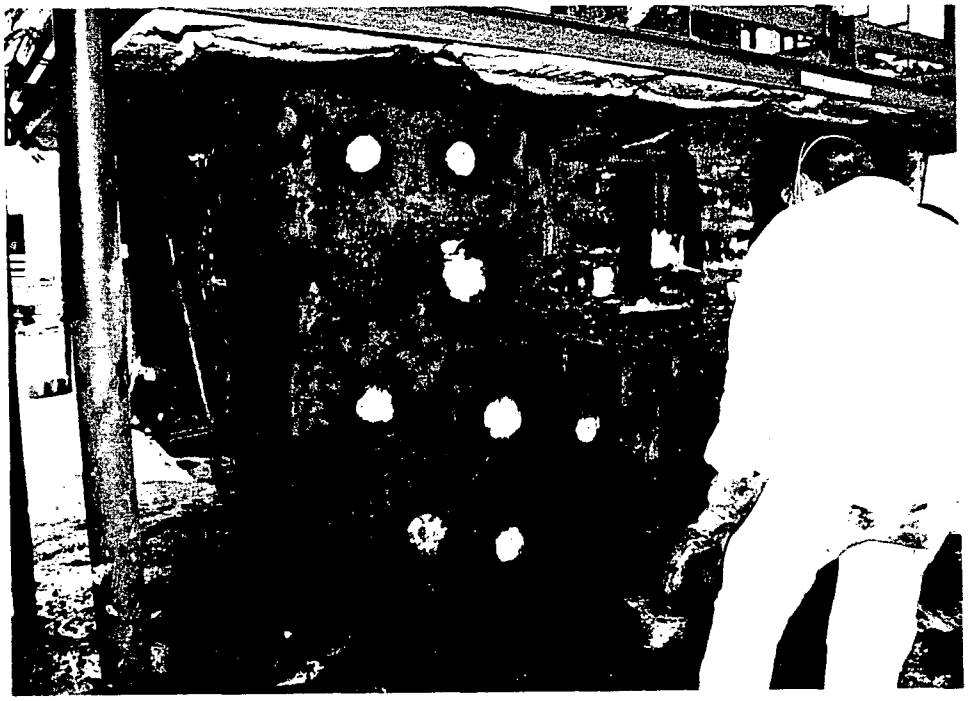
OMEGA POINT LABORATORIES

Material removed from outside of bottom tray vertical section.

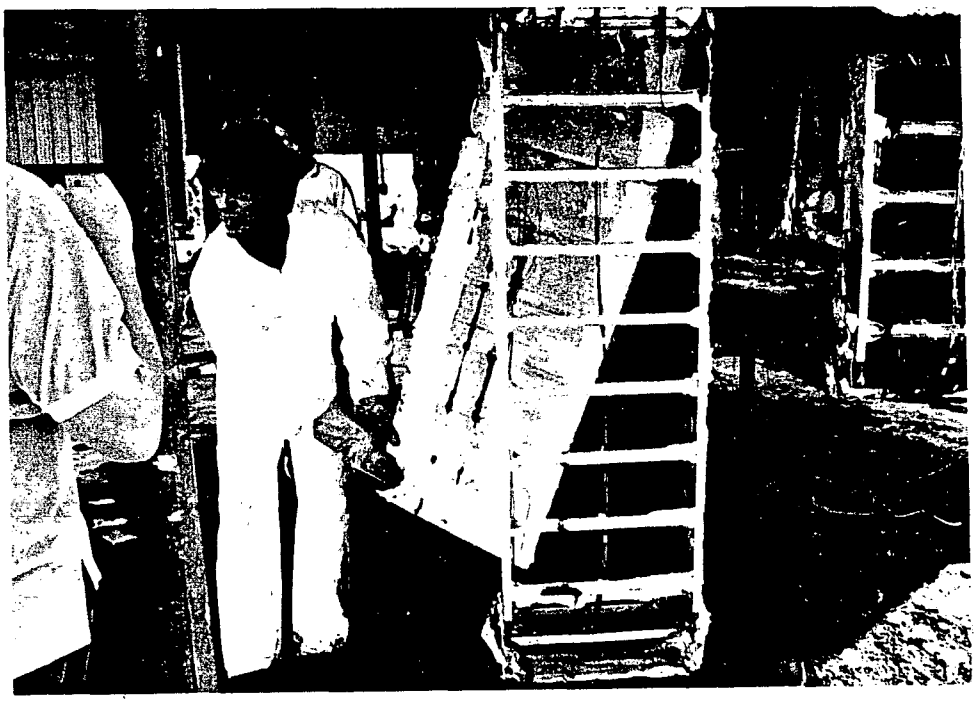


Interior of bottom tray vertical section.

OMEGA POINT LABORATORIES



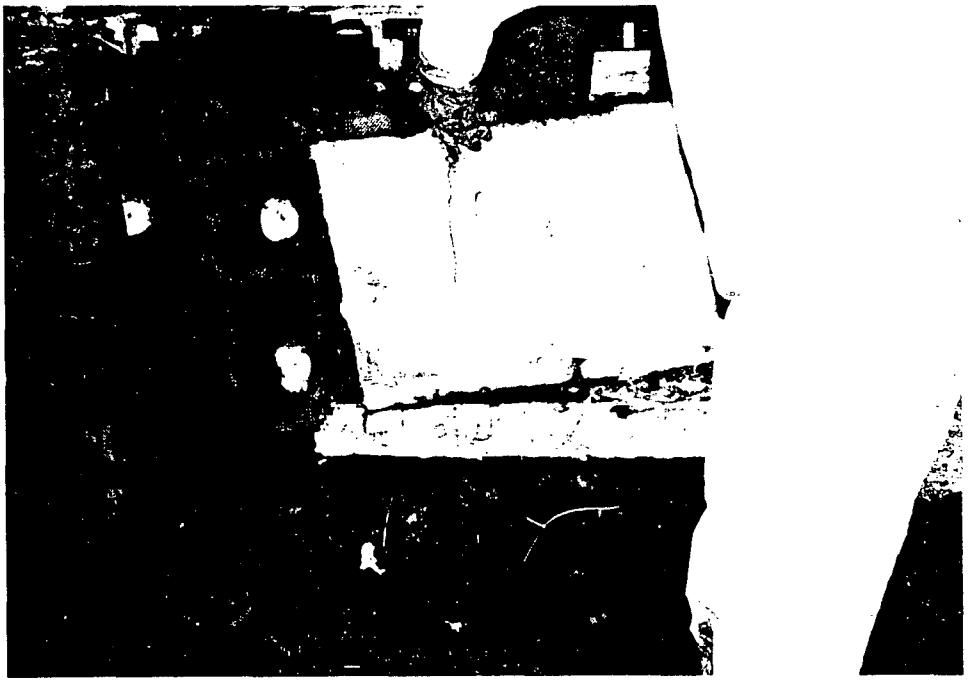
Mounds of trowel grade removed from side of common enclosure.



Material removed from vertical section of bottom tray.

OMEGA POINT LABORATORIES

Material removed from bottom of bottom tray.



Material removed from top of top tray.

OMEGA POINT LABORATORIES

Material removed from vertical section of middle tray.

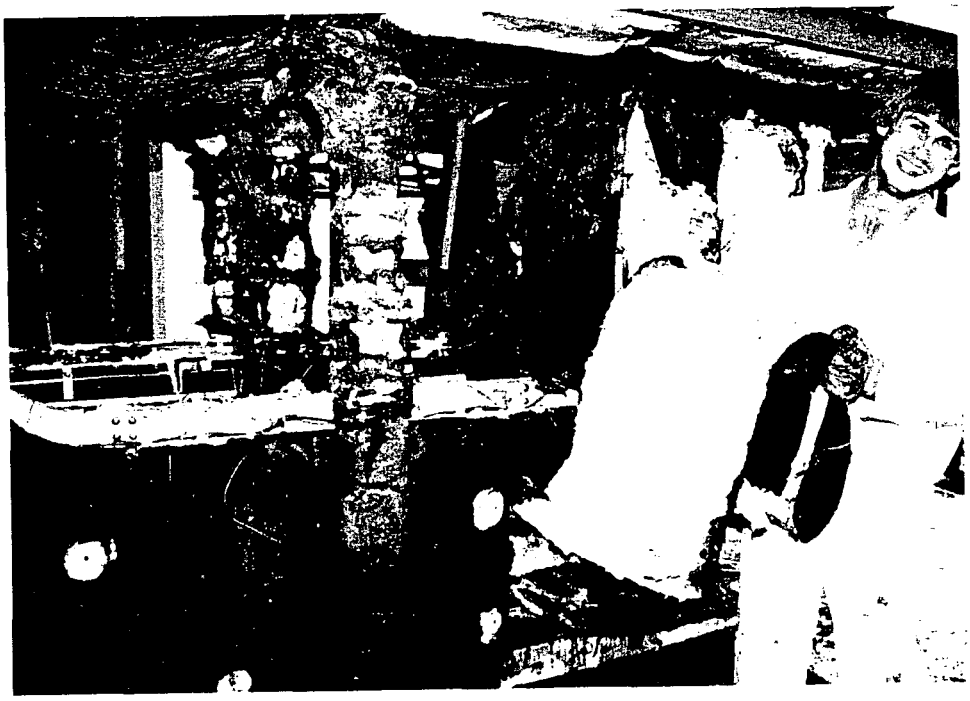
Material removed from horizontal section of middle tray.

OMEGA POINT LABORATORIES

Material removed from vertical section of top tray.

Material removed from top of common enclosure.

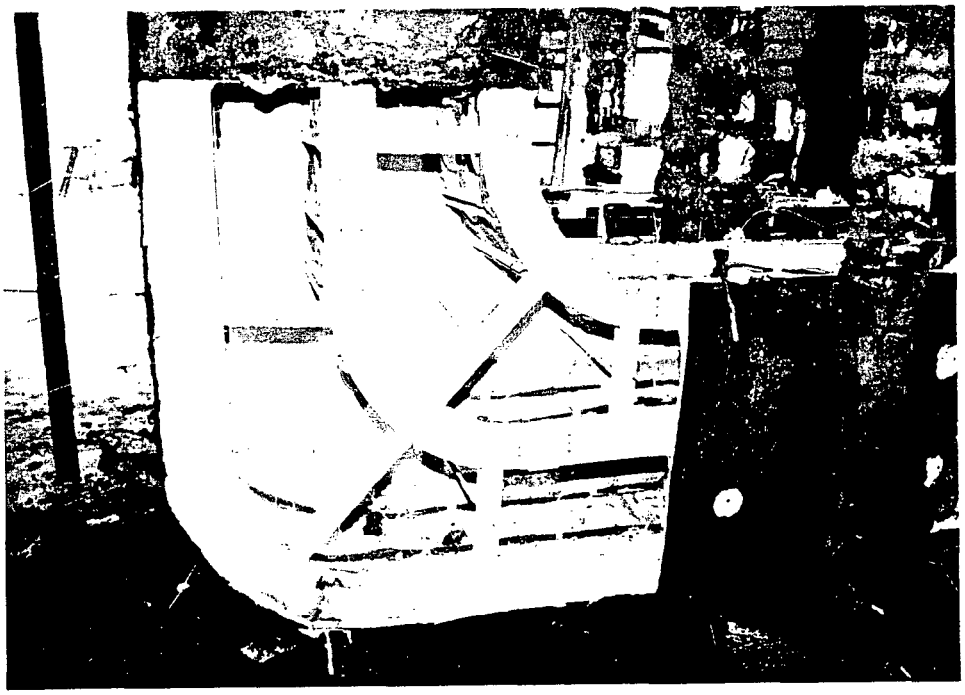
OMEGA POINT LABORATORIES



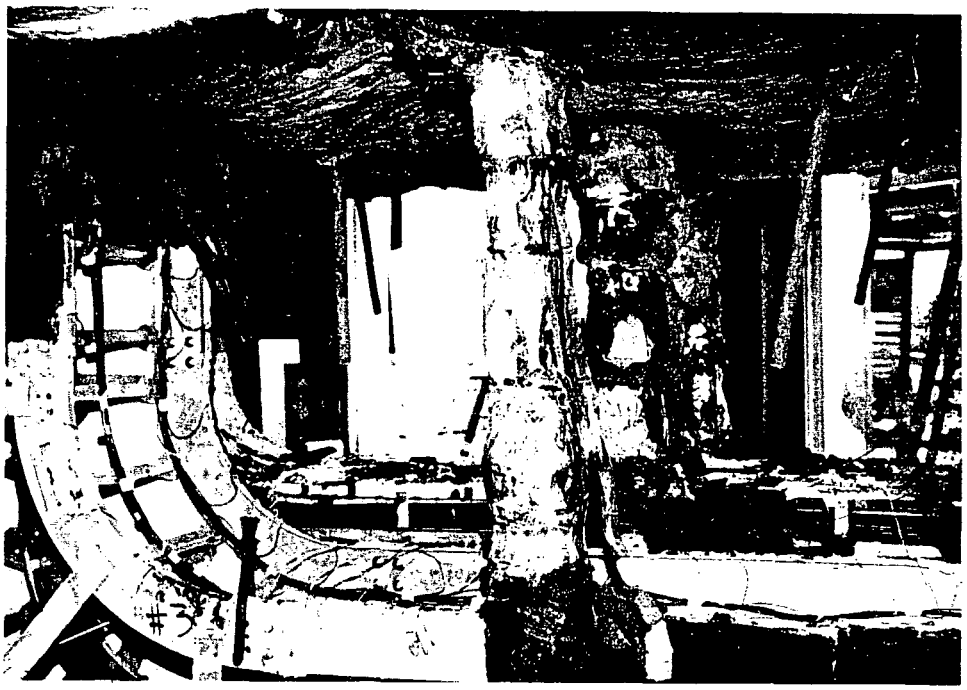
Material removed from top of triple tray assembly.

Material removed from front of front tray assembly.

OMEGA POINT LABORATORIES

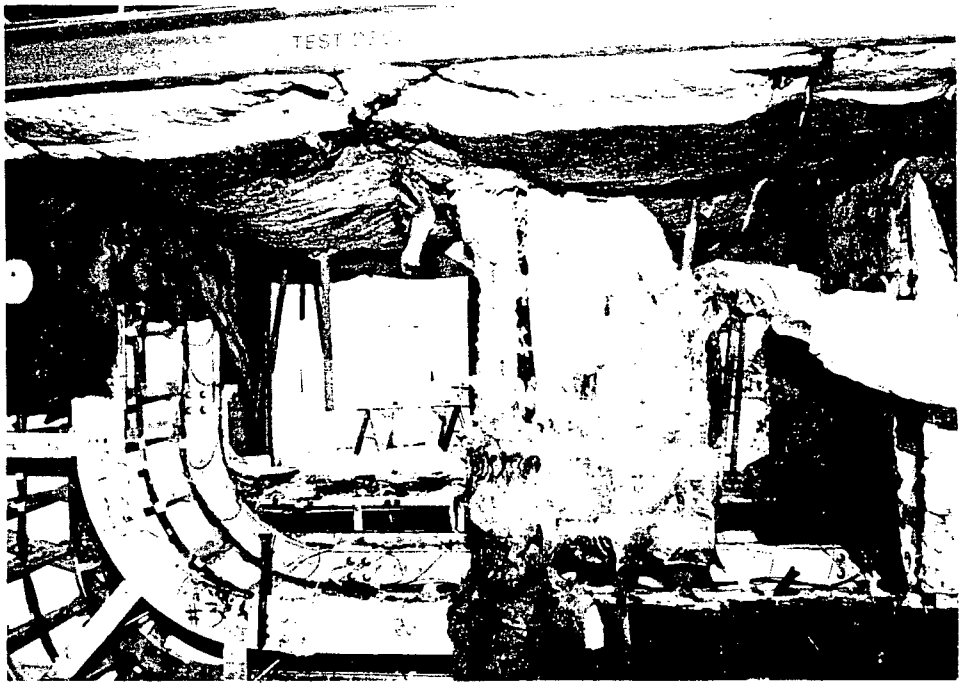


Interior of common enclosure.



Material removed from support member vertical section.

OMEGA POINT LABORATORIES



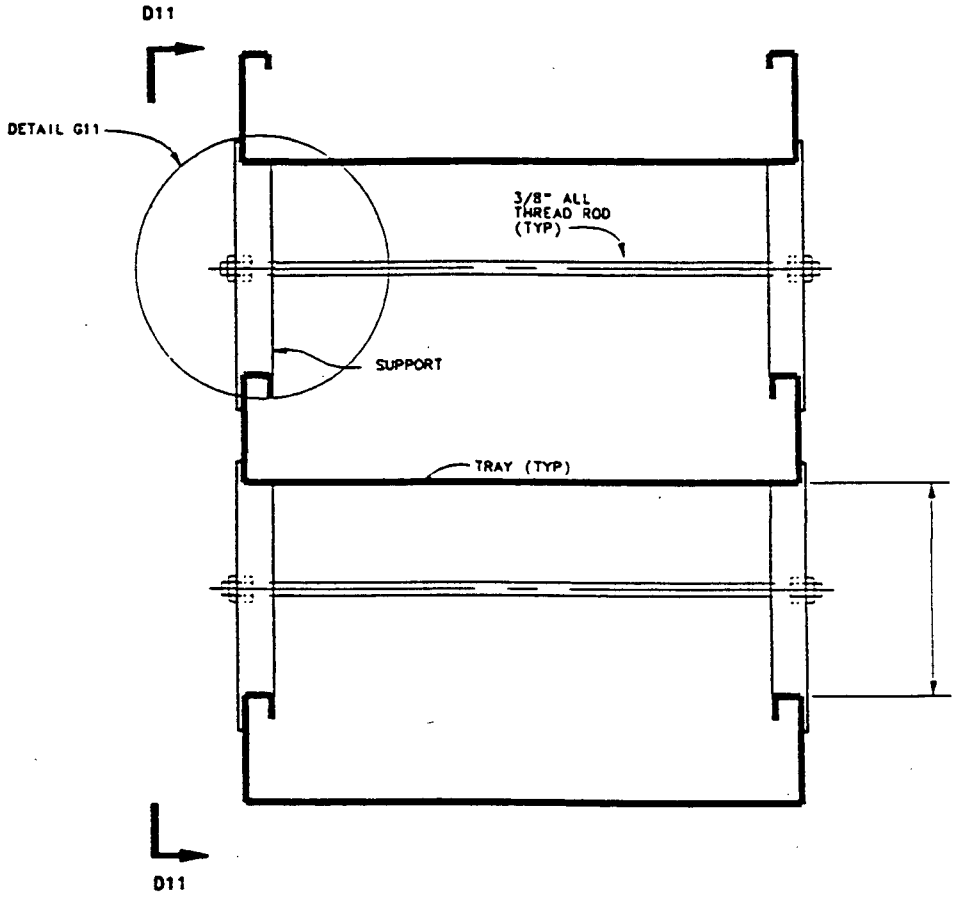
3M material removed from vertical portion of support member.

OMEGA POINT LABORATORIES

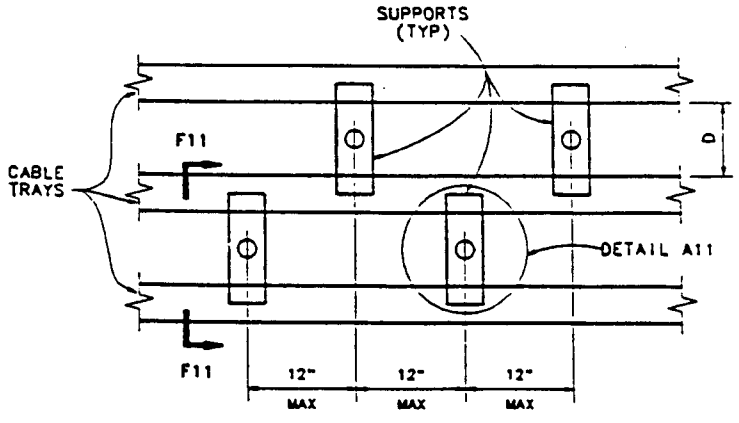
Appendix G

THERMO-LAG® 330-1 INSTALLATION DETAILS

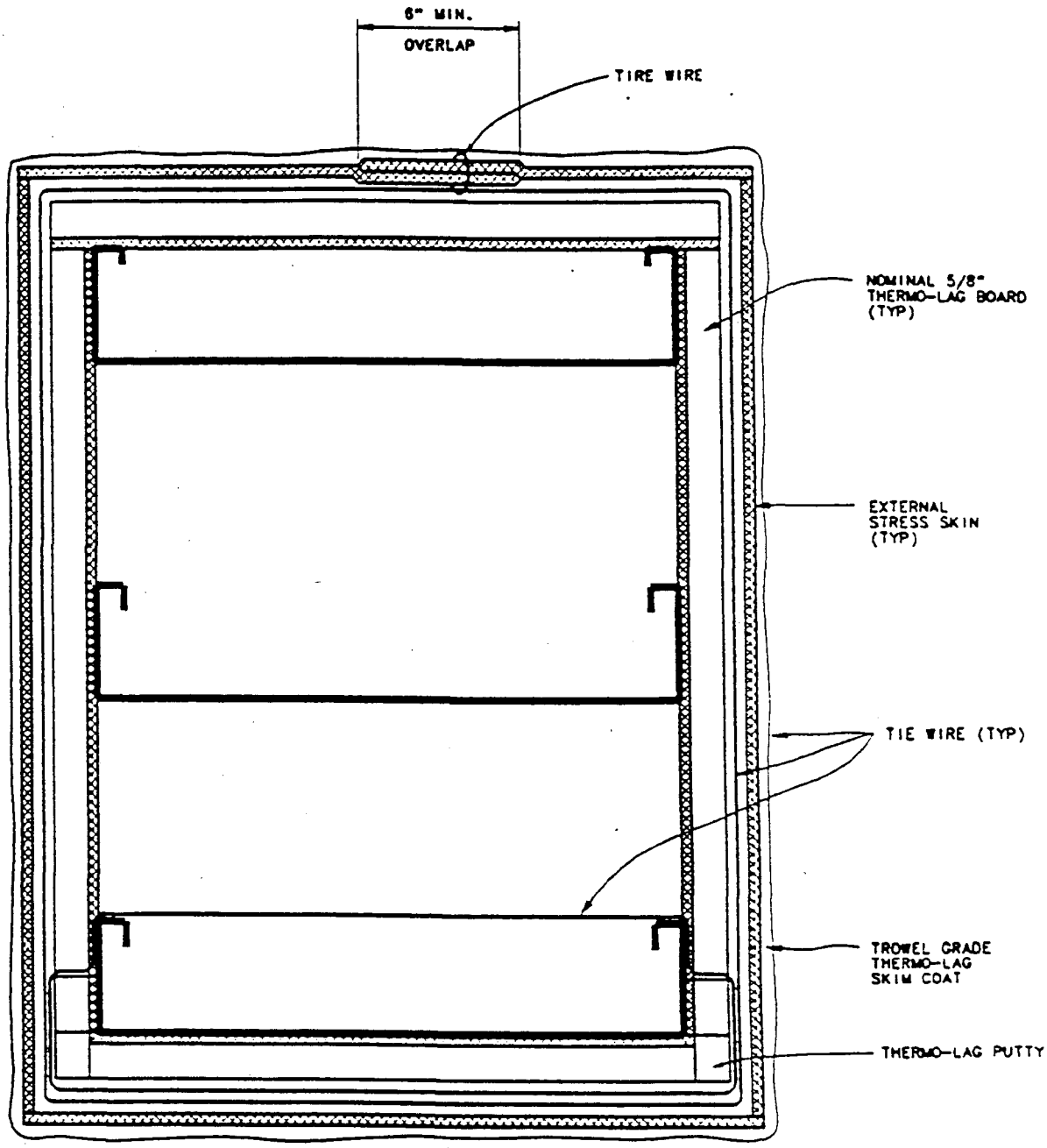
OMEGA POINT LABORATORIES



A11-A11
TIE ROD SUPPORT STACKED TRAYS

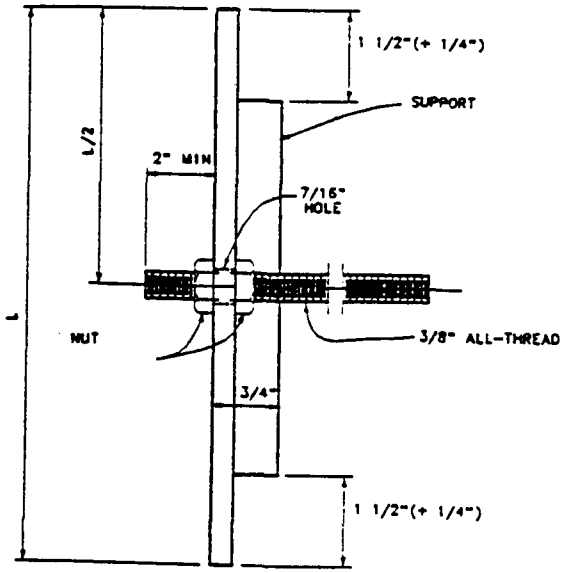


D11-D11
TYPICAL STACK TRAYS
(N.T.S.)

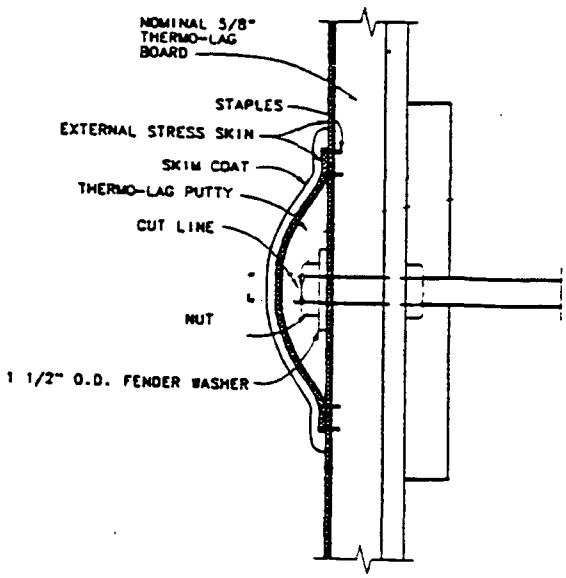


C11–C11
SCORE & FOLD METHOD
(TIE ROD & SUPPORTS NOT SHOWN–SEE A11–A11 & DET H11)

(N.T.S.)

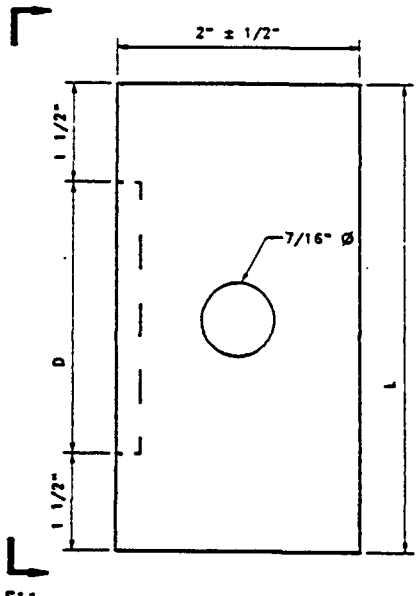


DET G11
SUPPORT WITH ROD
(N.T.S.)



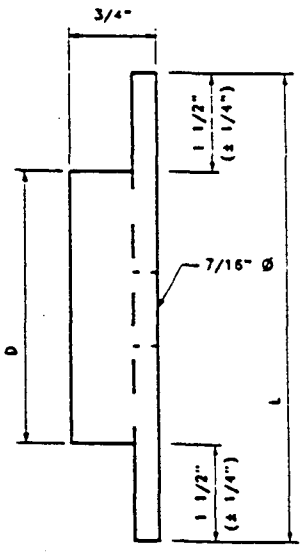
DET H11
SUPPORT WITH THERMO-LAG ATTACHED
(N.T.S.)

F11

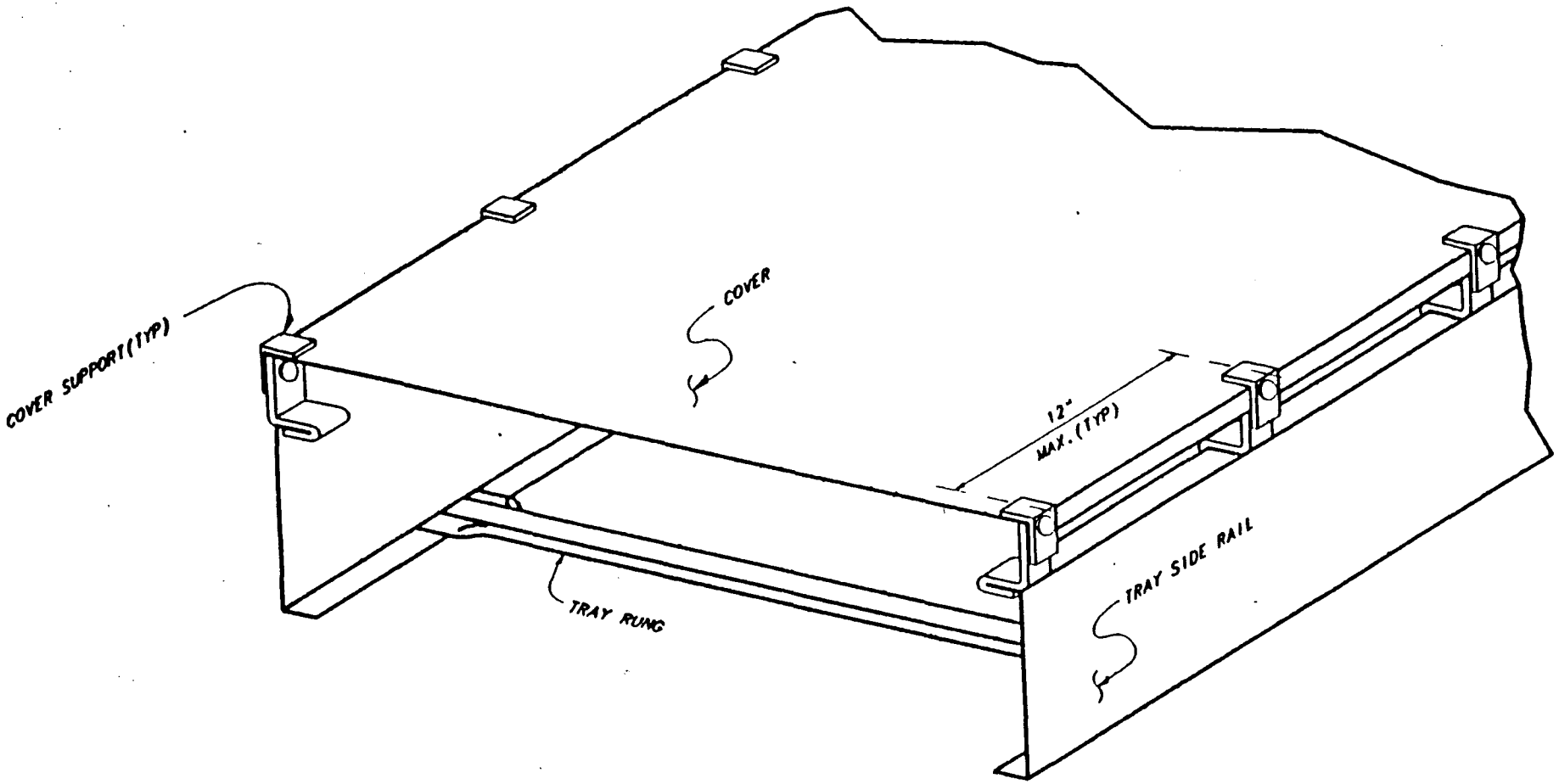


F11

E11-E11
SUPPORT SIDE VIEW
(N.T.S.)

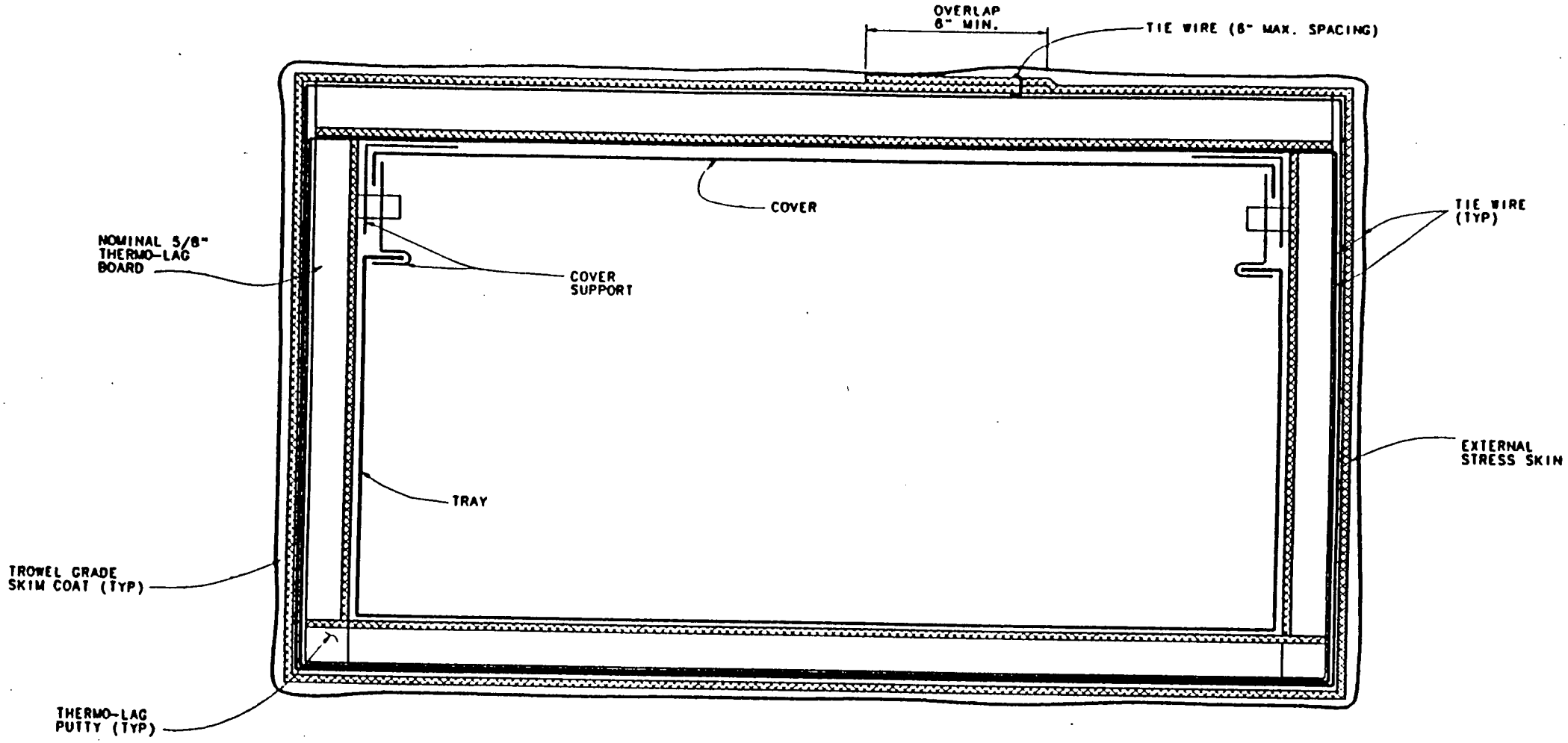


F11-F11
STEEL SUPPORT
(N.T.S.)



TYPICAL TRAY WITH RAISED COVER BEFORE INSTALLING THERMO-LAG

N.T.S.



SECTION A13-A13
SCORE & FOLD METHOD
TRAYS WITH RAISED COVERS
N.T.S.

TEST REPORT TRANSMITTAL FORM

To: Rubin Feldman
Thermal Science, Inc.
2200 Cassens Drive
St. Louis, MO 63026
(314) 349-1233

Re: Project No. 11960-97187

Enclosed, please find our final report on the above referenced project. Should you notice any errors or omissions, please bring them to our attention immediately and we will correct the problem as quickly as possible.

Two additional copies of this report are being prepared for you and will be shipped at a later date. An additional copy of the test report will also be sent to TVA at a later date.

We appreciate your business and look forward to working with you again soon.

Sincerely,

Herbert W. Stansberry II,
Fire Test Technologist

c.c. Mark H. Salley
TVA
Watts Bar Nuclear Plant IOB-1M
P.O. Box 2000
Highway 68 near Spring City
Spring City, TN 37381
(6 copies)

Box 1 of 2

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