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DOCUMENT NO. 11960-97260

QA Record

FIRE ENDURANCE TEST OF THERMO-LAG® 330-1 FIRE PROTECTIVE ENVELOPES (Box Enclosures Encasing a Gang of Seven 4 in. Steel Conduits and Individual Enclosures on 3/4 in. Aluminum and Steel Conduits)

Project No. 11960-97260
(Volume 1 of 2)

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

December 1, 1994

Prepared For:

Tennessee Valley Authority
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in cooperation with

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OMEGA POINT LABORATORIES

ABSTRACT

A gang of seven 4 in. diameter steel conduits , a single 3/4 in. aluminum conduit and a single 3/4 in. diameter steel conduit, each 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 Conduits 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.

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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OMEGA POINT LABORATORIES

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(VOLUME 1 OF 2)

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 Conduits 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, 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.

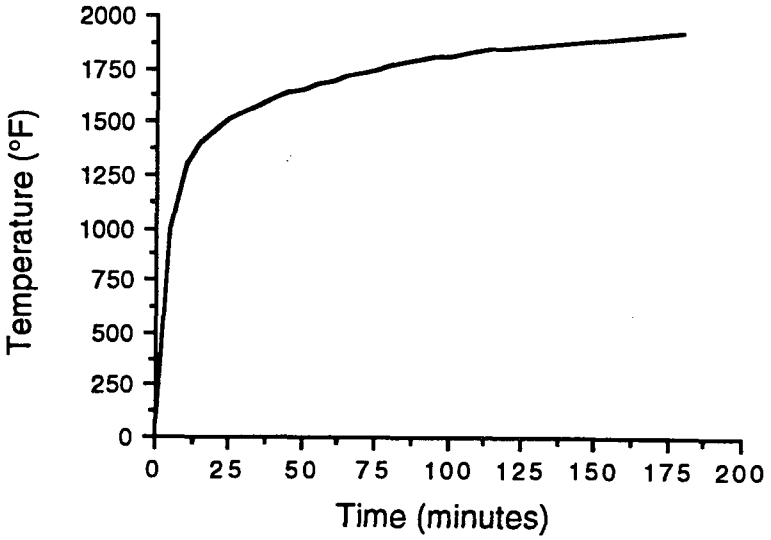
TEST PROCEDURE

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

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.

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.

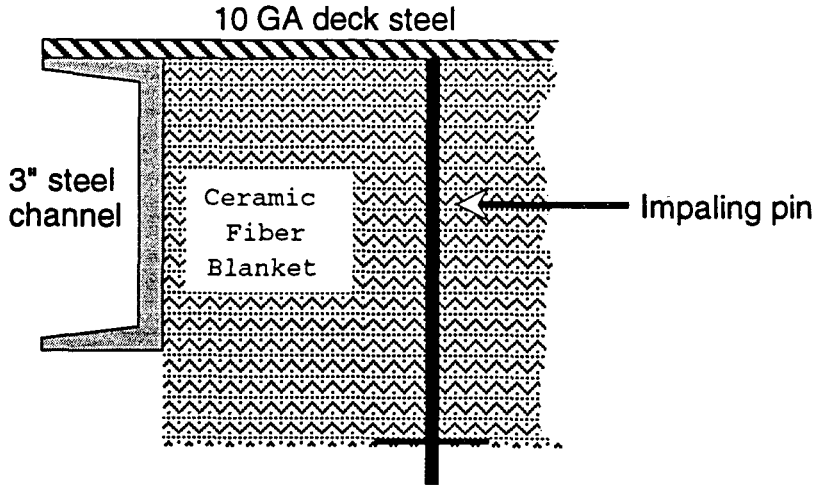
HOSE STREAM TEST

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 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 conduits used in the test were provided by various vendors, and were similar in design and representative of those installed in TVA's NPPs.

WEIGHT OF RACEWAY

RACEWAY	CONDUIT
4" Steel Conduit	9.54 lbs/lin.ft
4" Iron Condulet LB	22.3 lbs
3/4" Aluminum Conduit	0.36 lbs/lin.ft
3/4" Aluminum Condulet LB	0.50 lbs
3/4" Steel Conduit	1.04 lbs/lin.ft
3/4" Iron Condulet LB	1.18 lbs

* 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. Other materials supplied by TSI were Thermo-Lag® 330-1 Pre-Formed Conduit Sections (nominal 5/8 in. thick, 3 ft. long and 3/8 in. thick, 3 ft. long). 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 (CONDUITS)

A group of seven 4 in. diameter steel conduits was installed toward the front of the test deck. Each of the seven conduits passed through a rectangular blockout in the upper steel deck and entered an iron condulet LB (long side vertical). The conduit then extended horizontally, into a radial bend and then upward passing

again through the steel deck. The seven conduits had an overall horizontal dimension of 120 in. and were spaced 6-1/2 in. apart. Then conduits extended 36 in. under the test deck. All seven conduits were fastened to a central 4 in. square tube steel "trapeze" type support with a unistrut member welded across the top of the horizontal section.

A single 3/4 in. diameter steel conduit was installed in the rear left of the test deck. The 3/4 in. steel conduit passed through a rectangular blockout in the steel deck and entered a malleable iron condulet LB (long side vertical). The conduit then extended horizontally, into a radial bend and then upward passing again through the steel deck. The conduit had an overall horizontal dimension of 52-1/2 in. and extended 36 in. under the test deck. No support means was provided within the furnace cavity.

A single 3/4 in. diameter aluminum conduit was installed in the rear right of the test deck. The 3/4 in. aluminum conduit passed through a rectangular blockout in the steel deck and entered an aluminum condulet LB (long side vertical). The conduit then extended horizontally, into a radial bend and then upward passing again through the steel deck. The conduit had an overall horizontal dimension of 52-1/2 in. and extended 36 in. under the test deck. No support means was provided within the furnace cavity.

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

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 in the interior of each of the installed conduits.

In order to get a realistic measurement of the temperatures on the conduit surfaces, similar thermocouples were positioned nominally every 6 in. along the conduits, 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. The thermocouple leads were run along the conduits and passed through the test deck using the same blockout as the conduit.

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 (3/8 in. and 5/8 in. nominal thickness)

These panels were used to construct the top and bottom of the four-sided conduit enclosures (5/8 in. material), the LB enclosure (5/8 in. and 3/8 in. material), and to cover the structural support members (5/8 in. material).

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

This material was used to construct the end portion of the ganged conduit protective envelopes (5/8 in. material). This material was also used to cover the 3/4 in. diameter conduits (5/8 in. and 3/8 in. material).

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.

Application Methods

SEVEN 4 IN. CONDUITS IN A COMMON ENCLOSURE

Pre-Shaped Section/Separate Board Method - For this method of installation, nominal 5/8 in. pre-shaped conduit sections (appropriate for the size of the conduits) were installed on the outside edges of the outside conduits. Nominal 5/8 in. board materials (with the V-ribs flattened) was then cut to fit between the 180° outside sections forming a box with semi-circular ends. Threaded steel rod, fastened with fender washers and nuts, was then installed 18 in. o.c. between the inner conduits to secure the top and bottom boards to the conduits. All board material and pre-shaped conduit sections were pre-buttered on all interior surfaces that contacted the conduits and/or other panels. The board material was scored and folded to cover the conduit radial bends. Flat board material was used

on the ends of this section. Individual pre-shaped conduit sections were used on one end of the conduit run to demonstrate the interface methods where the conduits exited the deck. The LBs were enclosed in a single enclosure using the score and fold method. Other attributes of this installation are:

- Tie wires were installed 6 in. o.c., maximum.
- The "Generic TVA Upgrade" (described later in this text) was applied to the completed assembly.

"Generic TVA Upgrade" - A skim coat of trowel grade material was applied to the enclosure and eternal stress skin was installed in it while still wet. The external stress skin was secured to the enclosure with 1/2 in. long staples (as necessary), fender washers and nuts (where applicable). Another skim coat of trowel grade material was applied over the external stress skin and brush finished smooth.

INDIVIDUAL 3/4 IN. STEEL AND ALUMINUM CONDUITS

Pre-Shaped Section - The LB boxes for each conduit run were formed from a single piece of Thermo-Lag® 330-1, V-ribbed, nominal 5/8 in. thick panels with the V-ribs hammered flat. The panel for each LB box (sized as required for each condulet) was made by scoring to the internal stress skin such that the panel could be folded, along the scored lines, into a box configuration. The boxes were pre-buttered with Thermo-Lag® 330-1 Trowel Grade material and were secured with stainless steel tie wire until dry. Trowel grade material was also applied to the condulet to help hold the box in place. The stress skin flap along the vertical closure seam was folded over and covered with trowel grade material. Stainless steel tie wire was used to hold the box in place. All joints and seams were filled in with Thermo-Lag® 330-1 Trowel Grade material.

The conduits were enclosed with nominal 5/8 in. Thermo-Lag® 330-1 Pre-Shaped sections. Straight pre-shaped conduit sections were scored down to the internal stress skin in several places (to easier facilitate bending) and were bent to conform to the curvature of the 90° standard conduit bends. Despite the scored lines, the internal stress skin was torn in places during the forming procedure. These tears were covered with additional stress skin allowing a 1 in. to 2 in. overlap. The bent pre-shaped sections were pre-buttered with Thermo-Lag® 330-1 Trowel Grade material and held in place with stainless steel tie wire until dry. The scored lines and all seams and joints were filled in with Thermo-Lag® 330-1 Trowel Grade material.

3/4 in. Conduit Upgrade Techniques

After the assembly was dry, the LB boxes were covered with an additional layer of Thermo-Lag® 330-1, V-ribbed, nominal 3/8 in. thick panels with the V-ribs hammered flat. The overlay was installed in the same manner as the first layer. The conduits were then covered with an overlay consisting of Thermo-Lag® 330-1 pre-shaped conduit sections, nominal 3/8 in. thick. All interior surfaces of the panel pieces and pre-shaped conduit sections were pre-buttered with Thermo-Lag® 330-1 Trowel Grade material tamped solid with a hammer and temporarily held in place with stainless steel tie wire until dry. Stainless steel wire mesh was wrapped, in a single layer, over the material in the radial bend area of both conduits. The mesh was covered with a thin layer (approximately 1/8 in. thick) of Thermo-Lag® 330-1 Trowel Grade material. Once dry, the temporary ties were removed and the configurations were gone over with a rasp to smooth out the rough spots. A thin layer of Thermo-Lag® 330-1 Trowel Grade material was applied to all the configurations to fill in the low spots. The specimen was again allowed to dry overnight. Stainless steel tie wire was then applied with a maximum spacing of 6 in.

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 October 18, 1994, by Herbert W. Stansberry II, Project Manager, with the following persons present:

Jiet Singh	-	USNRC
J.J. Pierce	-	T.V.A.
Mark Salley	-	T.V.A.
Rick Woody	-	T.V.A.
Brian Gent	-	T.V.A.
Rich Lohman	-	TSI
Tim Hill	-	TSI
Jess Beitel	-	Hughes Associates
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 9:43 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 0:20 (min:sec) the outside surface of the test item was beginning to turn brown, and by 1:04 (min:sec) had ignited fairly uniformly across the exposed surfaces. By 3:32 (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 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. The layer of external stress skin was exposed in spots. 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 in the table on the following page.

LOCATION	MAX. TEMP. (°F)	AVG. TEMP. (°F)
3/4" ALUMINUM CONDUIT		
Conduit Surface	226	216
Conduit Bare #8	216	210
3/4" STEEL CONDUIT		
Conduit Surface	233	220
Conduit Bare #8	223	213
GANG OF SEVEN CONDUITS		
Rear Conduit Surface	287	228
Rear Conduit Bare #8	259	217
6th Conduit Surface	237	215
6th Conduit Bare #8	213	197
5th Conduit Surface	258	213
5th Conduit Bare #8	213	194
4th Conduit Surface	237	212
4th Conduit Bare #8	217	194
3rd Conduit Surface	228	216
3rd Conduit Bare #8	217	195
2nd Conduit Surface	261	216
2nd Conduit Bare #8	216	199
Front Conduit Surface	286	230
Front Conduit Bare #8	263	214

The average initial temperature for all thermocouples at the start of the test was 80°F, yielding an allowable temperature increase of 250°F, or 330°F actual for the average temperatures. (A 325°F increase above the 80°F initial temperature yields a maximum allowable individual temperature of 405°F, in accordance with ASTM E119-88.) All of the thermocouples on within the multiple conduit enclosures and within the junction box enclosure 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.

3/4 in. STEEL CONDUIT

LOCATION	OBSERVATION
Vertical section above condulet LB.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Inner layer completely intact.
Condulet LB enclosure.	Approximately 1 in. char depth across panels still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of panels totally consumed. Inner layer completely intact.
Horizontal section.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Between 1/2 in. and 5/8 in. uncharred material remaining in inner layer of material.
Radial bend.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Up to 5/8 in. uncharred material remaining in inner layer of material.
Vertical section above radial bend.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Inner layer completely intact.

3/4 in. ALUMINUM CONDUIT

LOCATION	OBSERVATION
Vertical section above condulet LB.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Inner layer completely intact.
Condulet LB enclosure.	Approximately 1 in. char depth across panels still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of panels totally consumed. Inner layer completely intact.
Horizontal section.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Between 1/2 in. and 5/8 in. uncharred material remaining in inner layer of material.
Radial bend.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Up to 5/8 in. uncharred material remaining in inner layer of material.
Vertical section above radial bend.	Approximately 1 in. char depth on sections still covering external stress skin below. Approximately 3/4 in. char depth under external stress skin. Outer layer of pre-shaped sections totally consumed. Inner layer completely intact.

MULTIPLE CONDUIT ENCLOSURE

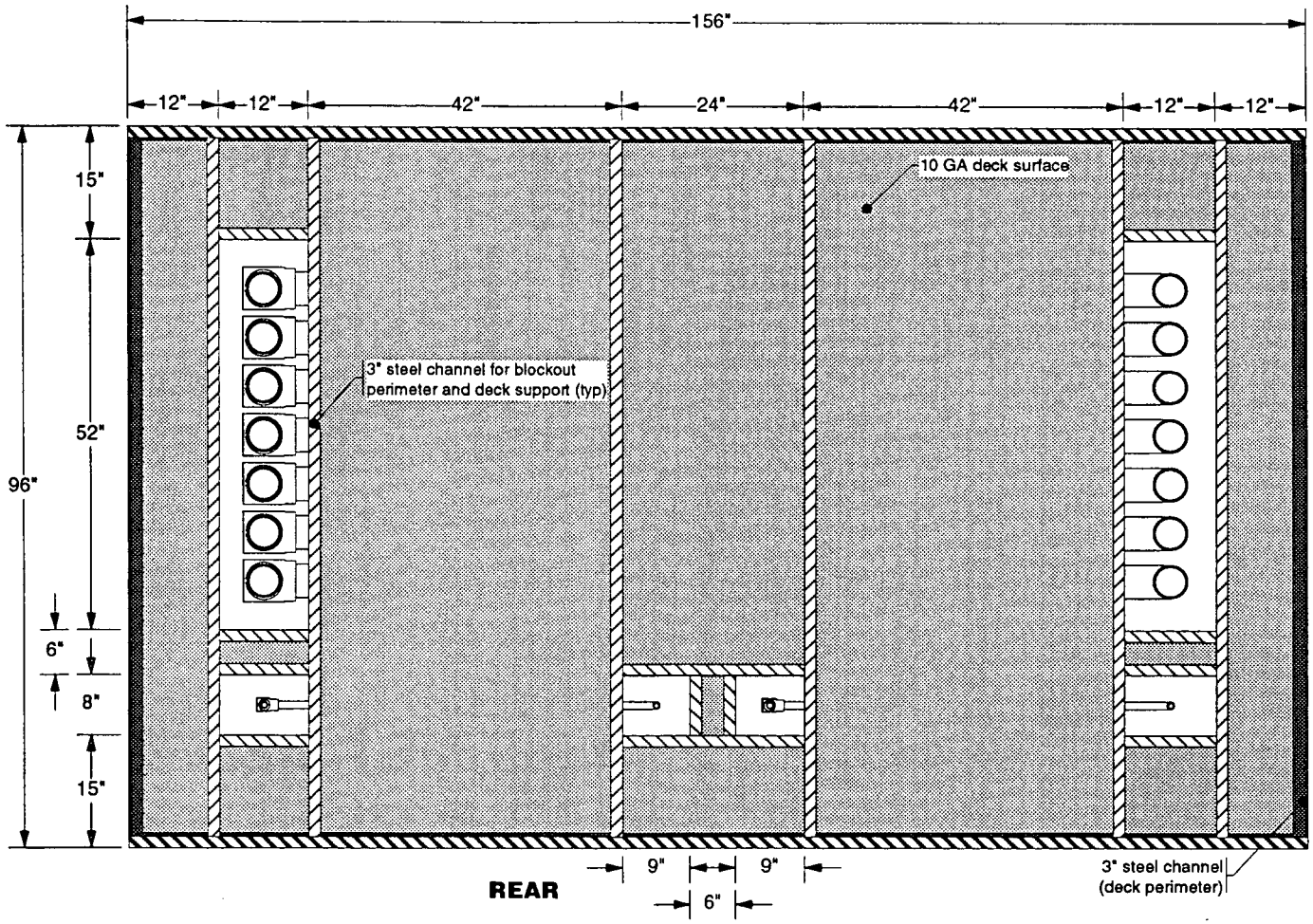
LOCATION	OBSERVATION
Vertical section above condulet LB.	Approximately 3/4 in. char depth on sections. Between 1/4 in. and 3/8 in. uncharred material remaining against conduit sections.
Condulet LB enclosure.	Approximately 3/4 in. char depth across panels still covering external stress skin below. Approximately 1/2 in. char depth under external stress skin. Approximately 3/8 in. uncharred material remaining. Material totally intact at interfaces with individual enclosures above LBs.
Horizontal section.	Approximately 3/4 in. char depth across panels still covering external stress skin below. Approximately 1/2 in. char depth under external stress skin. Approximately 3/8 in. uncharred material remaining. Material totally intact at interfaces with support members.
Radial bend.	Approximately 3/4 in. char depth across panels still covering external stress skin below. Approximately 1/2 in. char depth under external stress skin. Approximately 3/8 in. uncharred material remaining.
Vertical section above radial bend.	Approximately 3/4 in. char depth across panels still covering external stress skin below. Approximately 1/2 in. char depth under external stress skin. Approximately 3/8 in. uncharred material remaining.

CONCLUSIONS

The ganged conduit enclosures and two individually clad 3/4 in. conduits, 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.

Appendix A

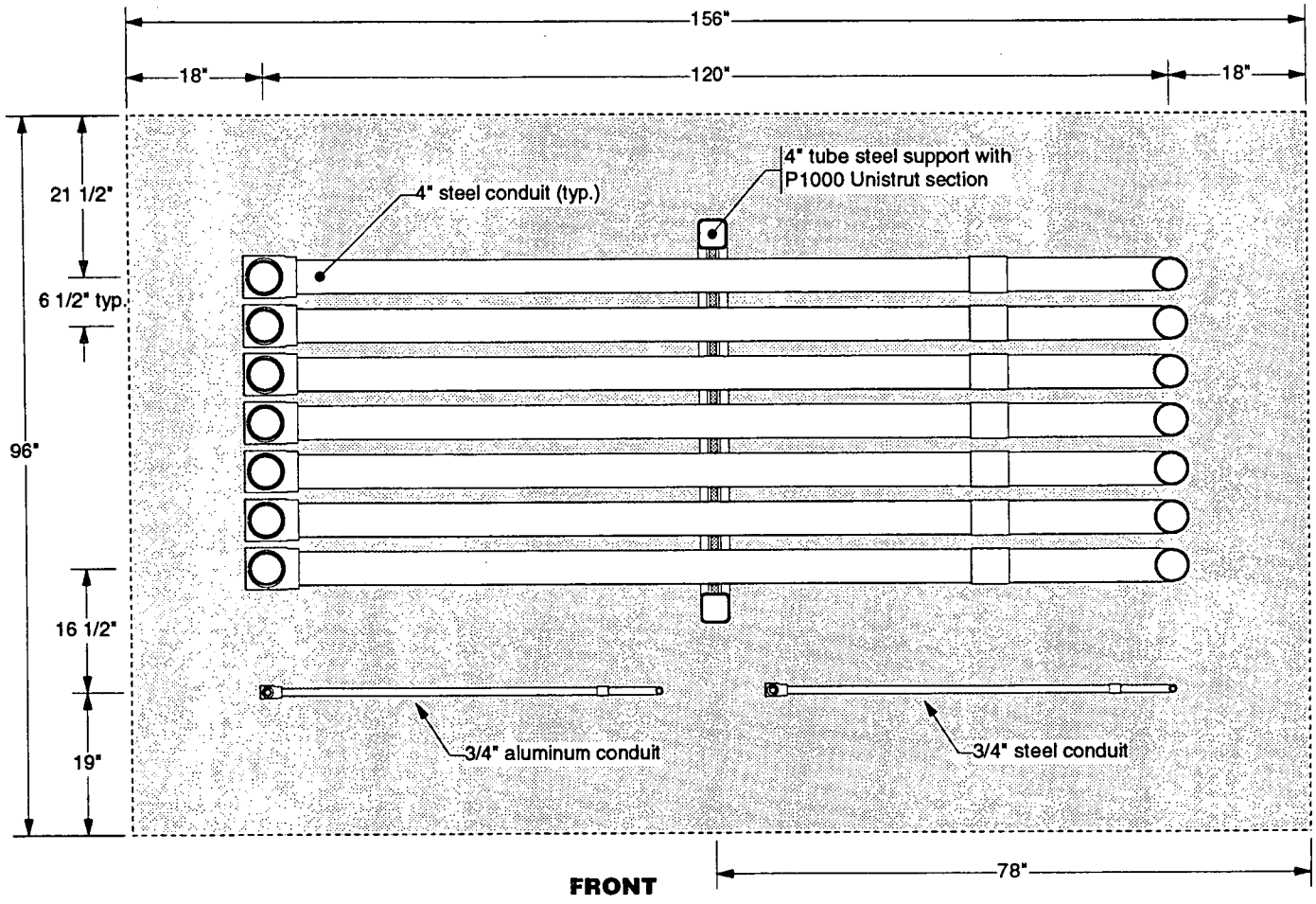
CONSTRUCTION DRAWINGS



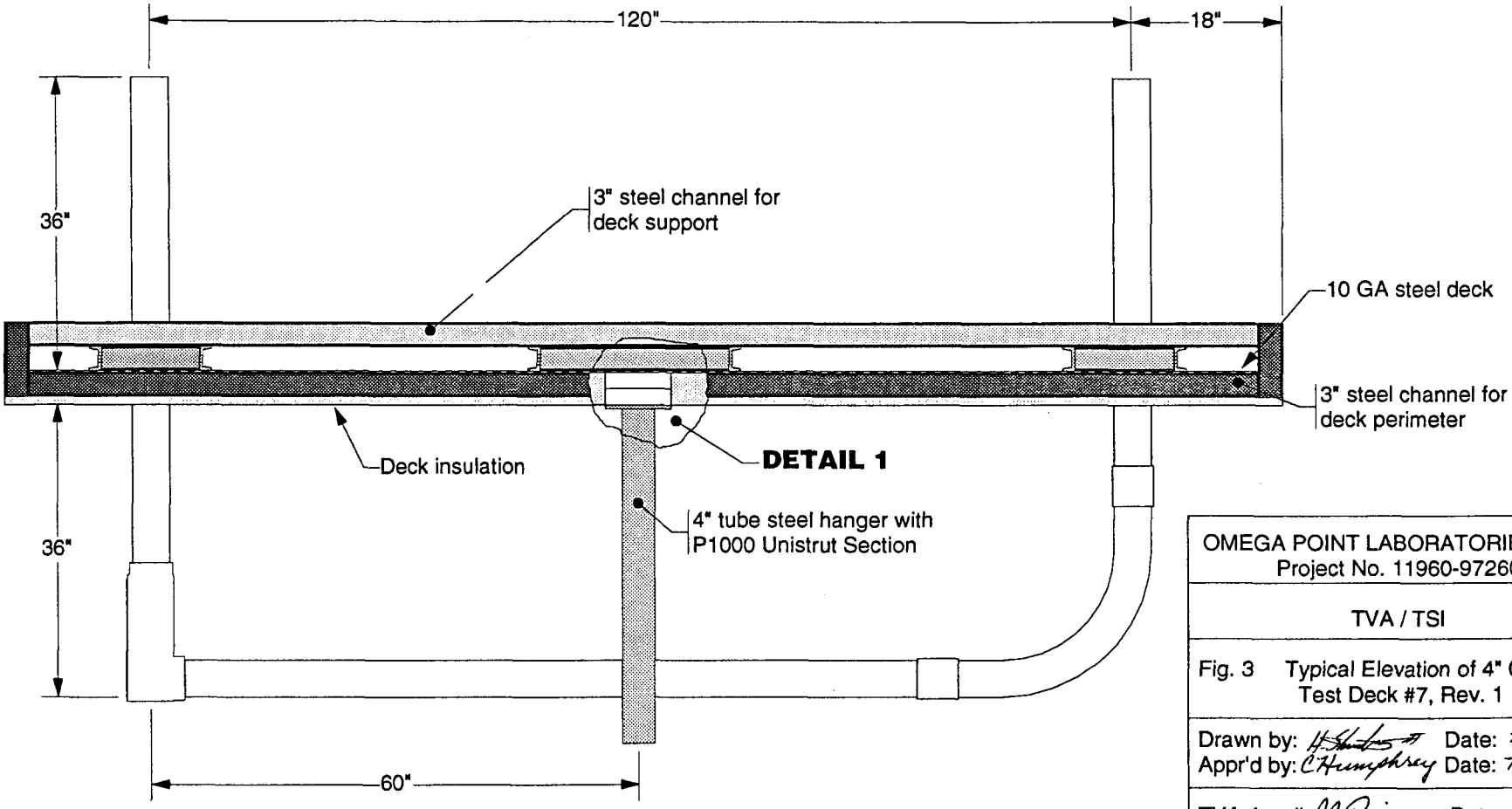
NOTE:
A silicon foam firestop was installed into each penetration blockout prior to testing.

LEFT

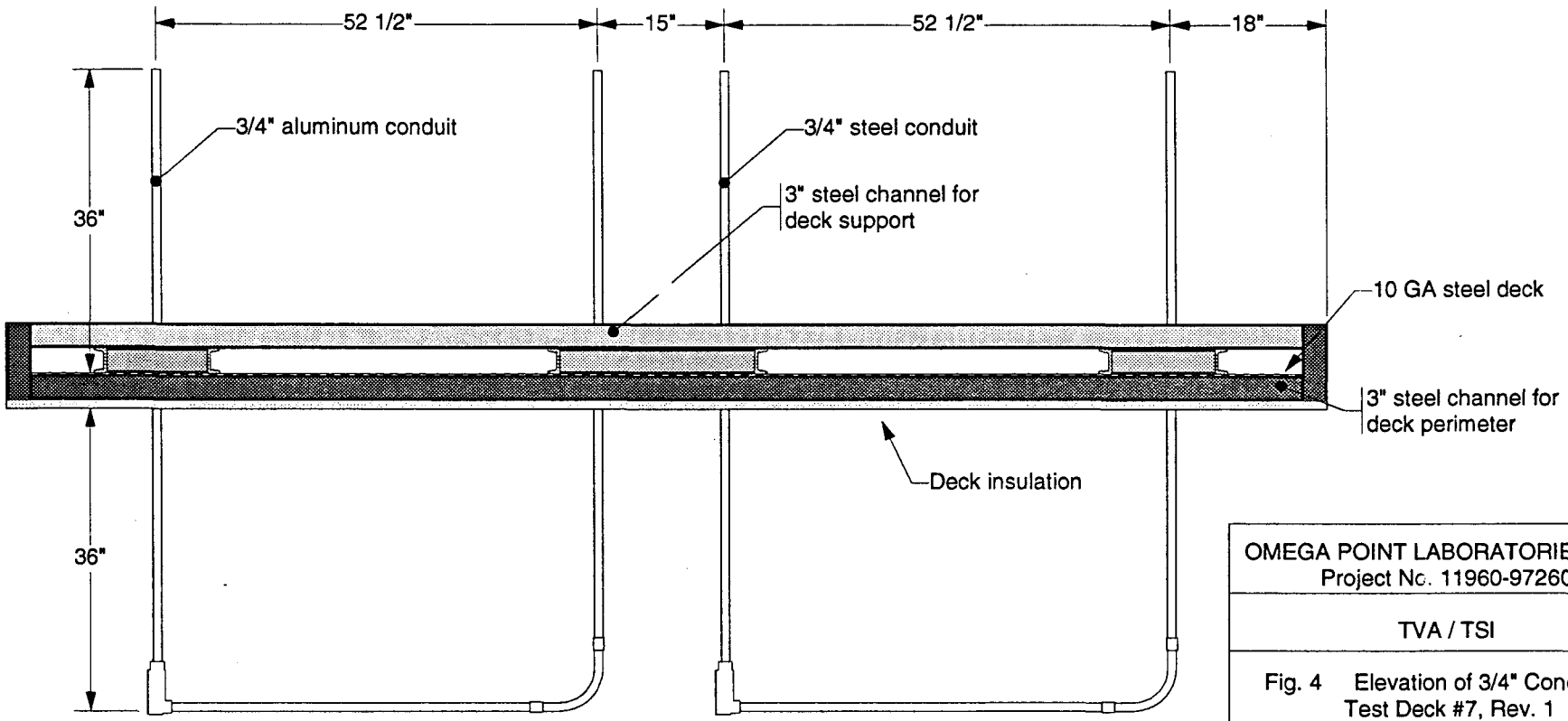
OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 1 Plan View (Above Deck) - Test Deck #7, Rev. 1
Drawn by: [signature] Date: 7/19/94 Appr'd by: C. Humphrey Date: 7/19/94
TVA Appr'l: [signature] Date: 7/19/94



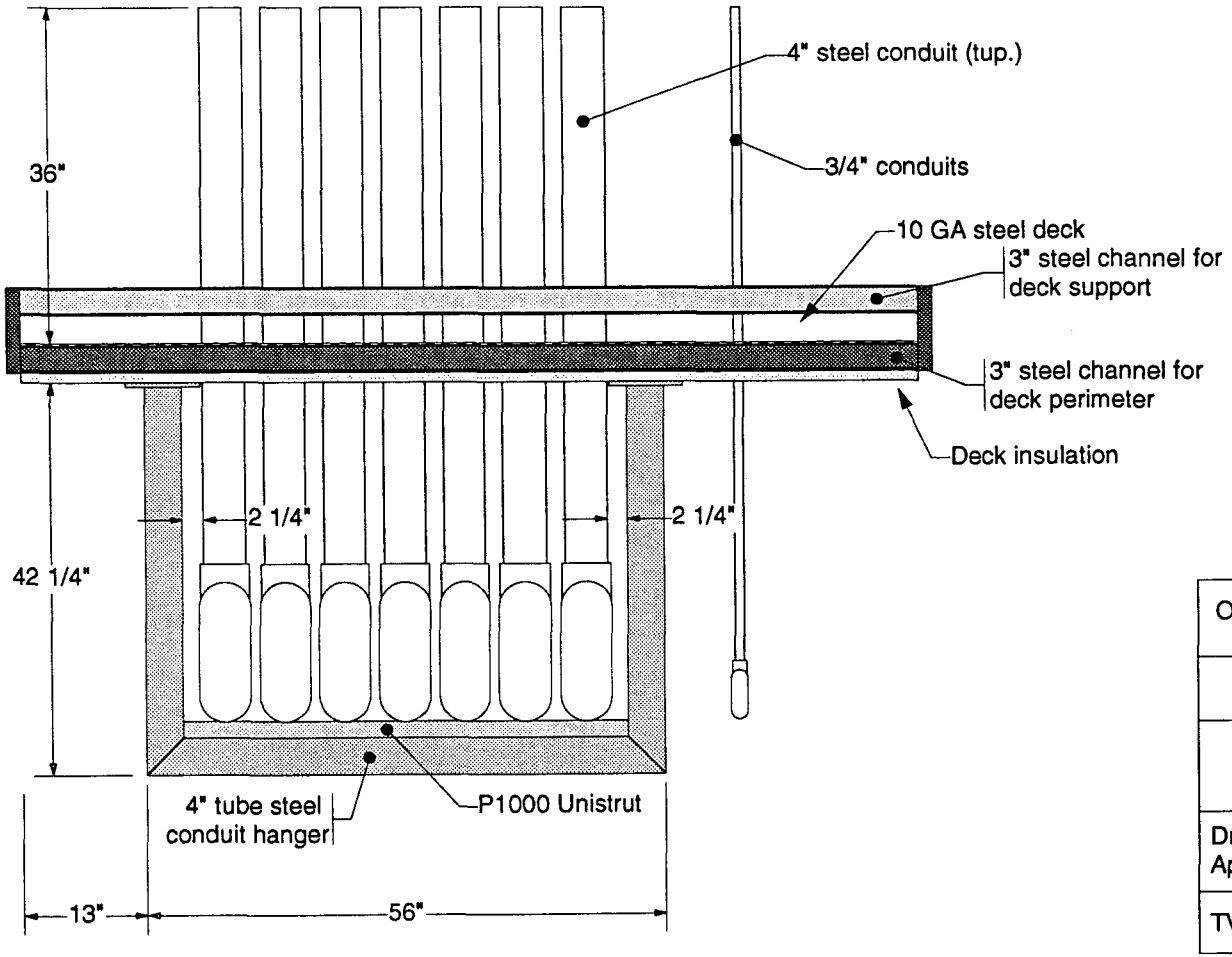
OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 2 Plan View (Below Deck) - Test Deck #7, Rev. 1
Drawn by: H Stanley Date: 7/19/94 Appr'd by: C Humphrey Date: 7/19/94
TVA Appr'l: JJ Pierce Date: 7/19/94



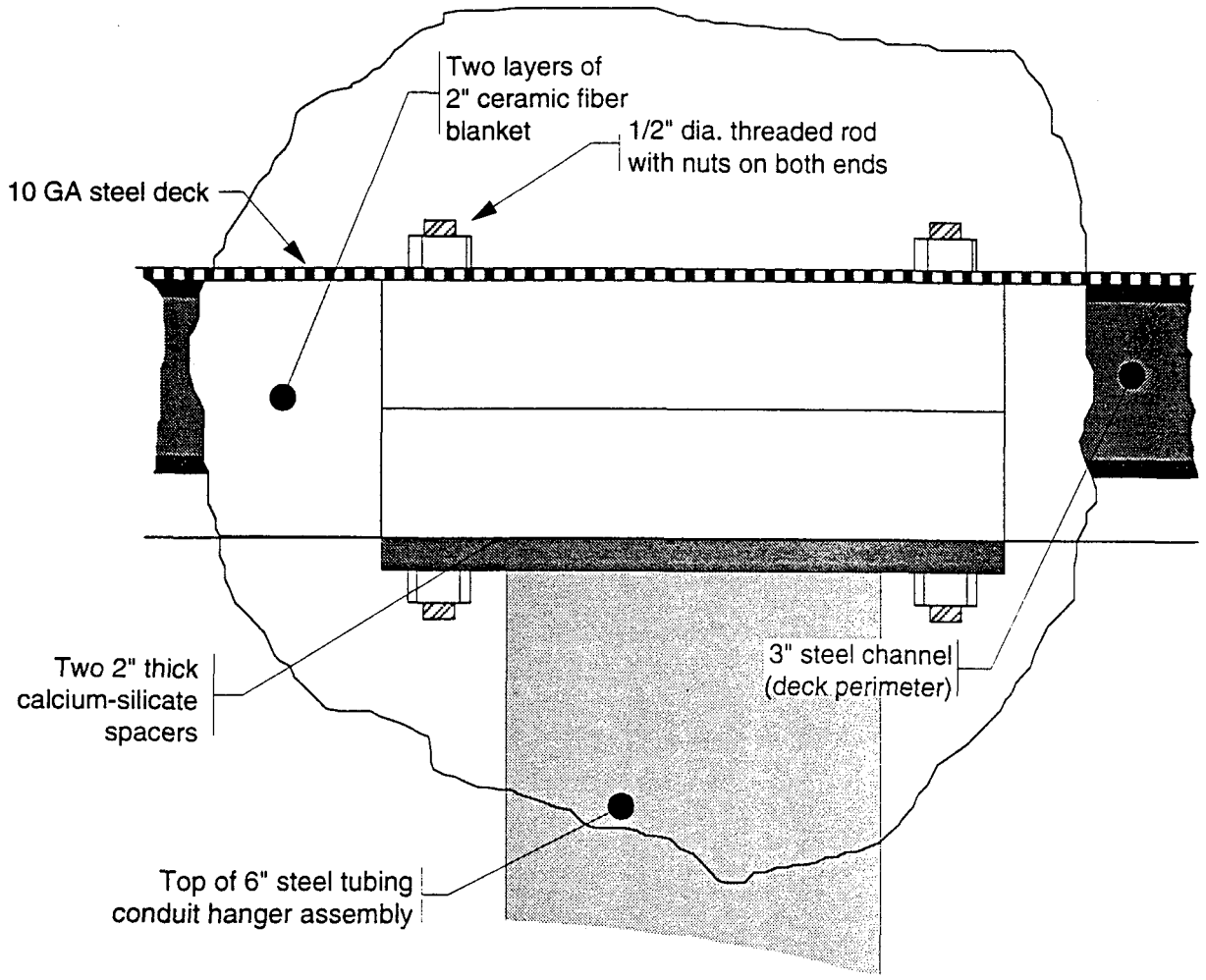
OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 3 Typical Elevation of 4" Conduit - Test Deck #7, Rev. 1
Drawn by: [signature] Date: 7/19/94 Appr'd by: C Humphrey Date: 7/19/94
TVA Appr'l: JJ Price Date: 7/19/94



OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 4 Elevation of 3/4" Conduits - Test Deck #7, Rev. 1
Drawn by: H. Shaw Date: 7/19/94 Appr'd by: C Humphrey Date: 7/19/94
TVA Appr'l: J.J. Price Date: 7/19/94



OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 5 Left End View - Test Deck #7, Rev. 1
Drawn by: [signature] Date: 7/14/94 Appr'd by: C. Humphrey Date: 7/19/94
TVA Appr'l: [signature] Date: 7/19/94



DETAIL 1

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 6 DETAIL 1 - Hanger Mount and Insulation

OMEGA POINT LABORATORIES

Appendix B

TEST PLAN

ONE HOUR FIRE ENDURANCE TESTS OF ELECTRICAL RACEWAYS PROTECTED WITH TSI THERMO-LAG FIRE BARRIER SYSTEMS

REVISION 1

PREPARED BY J.J. PIERCE

SIGNATURE J.J. Pierce

DATE 7/11/94

CHECKED BY MARK H. SALLEY

SIGNATURE

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 four 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 practice 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 exercised 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 Two Sided Boxed Conduits and Cable Tray Supports (Test Deck 4)

This slab will contain eight (8) 4-inch conduits arranged in two rows of four conduits each and two (2) 1-inch conduits that enter one side of the slab wall and run the entire length of the slab and exit the opposite wall. Between the two banks of conduits will be two sets of cable tray supports with a small section of tray attached (see drawing in Appendix A).

7.5.3 Three Sided Conduit Box and Large Junction Box (Test Deck 5)

This deck will be a wall test that contains five (5) 2-inch, one (1) 2½-inch, and one (1) 3-inch aluminum conduits that enter through the deck and immediately attach to LB fittings, turn and run parallel to the deck for approximately ten feet and terminate with a cap or plug on the end. Another group of conduits (two 1-inch steel) are routed in the same manner parallel to the above group. Another group of three 3-inch aluminum conduits will be mounted perpendicular to the above conduits and be approximately 3-feet long. A large junction box (60"x36"x24") will be mounted to the deck (see drawing in Appendix A).

7.5.4 Four Sided Conduit Boxes and Pull Box (Test Slab 6)

This slab will contain four configurations of conduits. One configuration will consist of eight 4-inch aluminum conduits (two rows of four) that enter through one wall of the slab and exit the opposite wall. One configuration consists of four 3-inch steel conduits (two rows of two) that enter through one wall of the slab and exit the opposite wall. One configuration consists of four 1-inch steel conduits (two rows of two) that enter through one wall of the slab and exit the opposite wall. One configuration consists of a 4-inch steel conduit entering through one wall of the slab and extending to a pull box (60"x12"x12"), exiting the pull box and exiting the opposite wall of the slab (see drawing in Appendix A).

7.5.5 Small Conduit and Large Ganged Conduits (Test Deck 7)

This deck consist of seven 4-inch steel conduits that each enter through the deck and extend down to a 90° elbow, turn horizontally for approximately eight feet and enter a LB and then exit through the deck. Two small conduits (¾" - one steel and one aluminum) enter through the deck and extend down to a 90° elbow, turn horizontally for approximately six feet and enter a LB and then exit through the deck (see drawing in Appendix A).

7.6 CABLE LOADING REQUIREMENTS

All 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 installed by OPL, with QC surveillance by OPL personnel. The thermocouple wires shall be calibrated (by Lot Number) prior to installation 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 structural 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 elapsed 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:

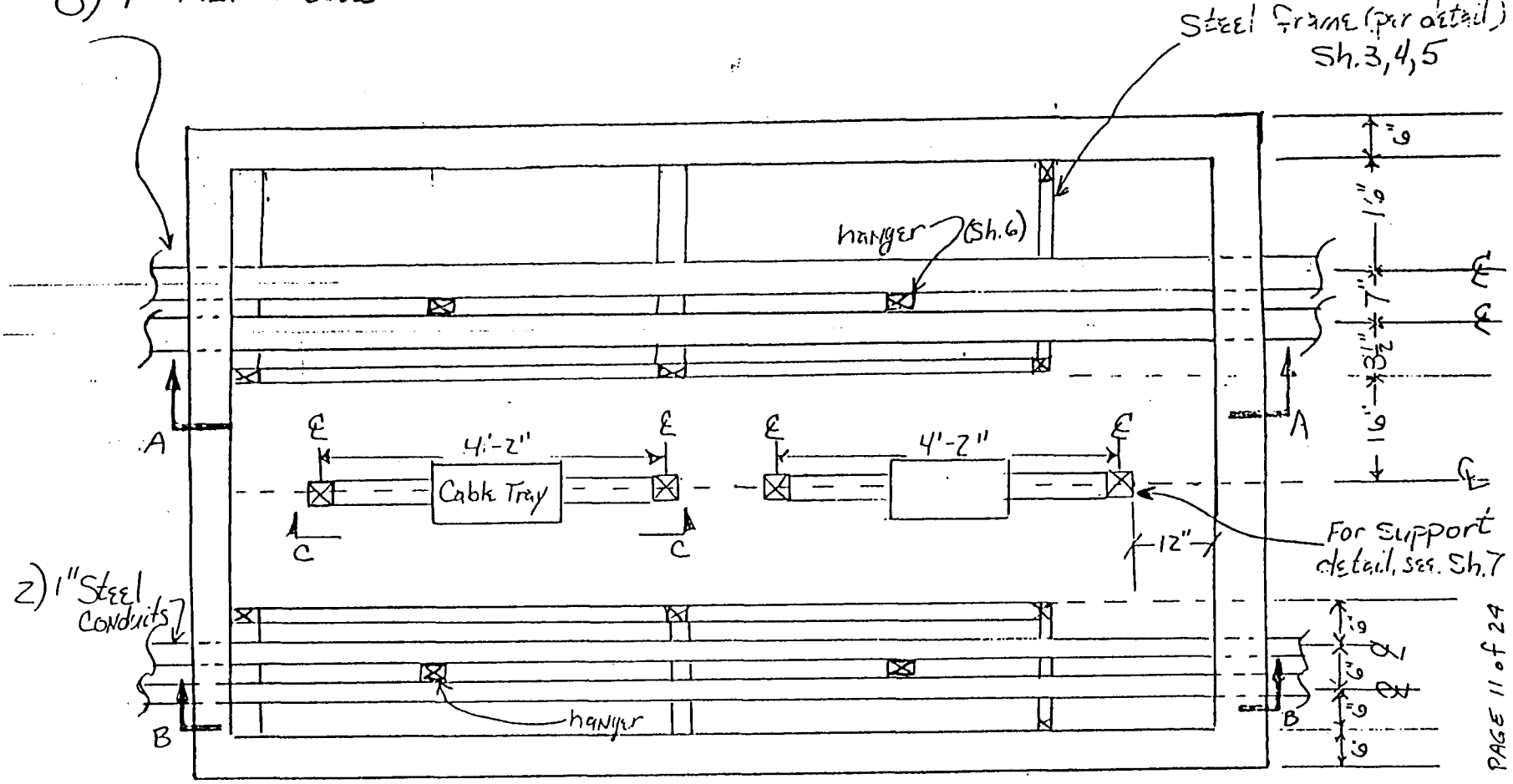
a. Date of the test
b. Location of the test
c. Description of the test furnace and test article
d. Calibration documentation of all thermocouples
e. Qualification and certification for QA personnel
f. Test procedures used
g. Acceptance criteria
h. Provide quality control records for:
   (1) Test article 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

8) 4" AL. Conduits



PLAN

Note: Conduit hangers alternate. Conduits fastened w/ 2 hole straps on one side only. Center supports to support conduits bottom.

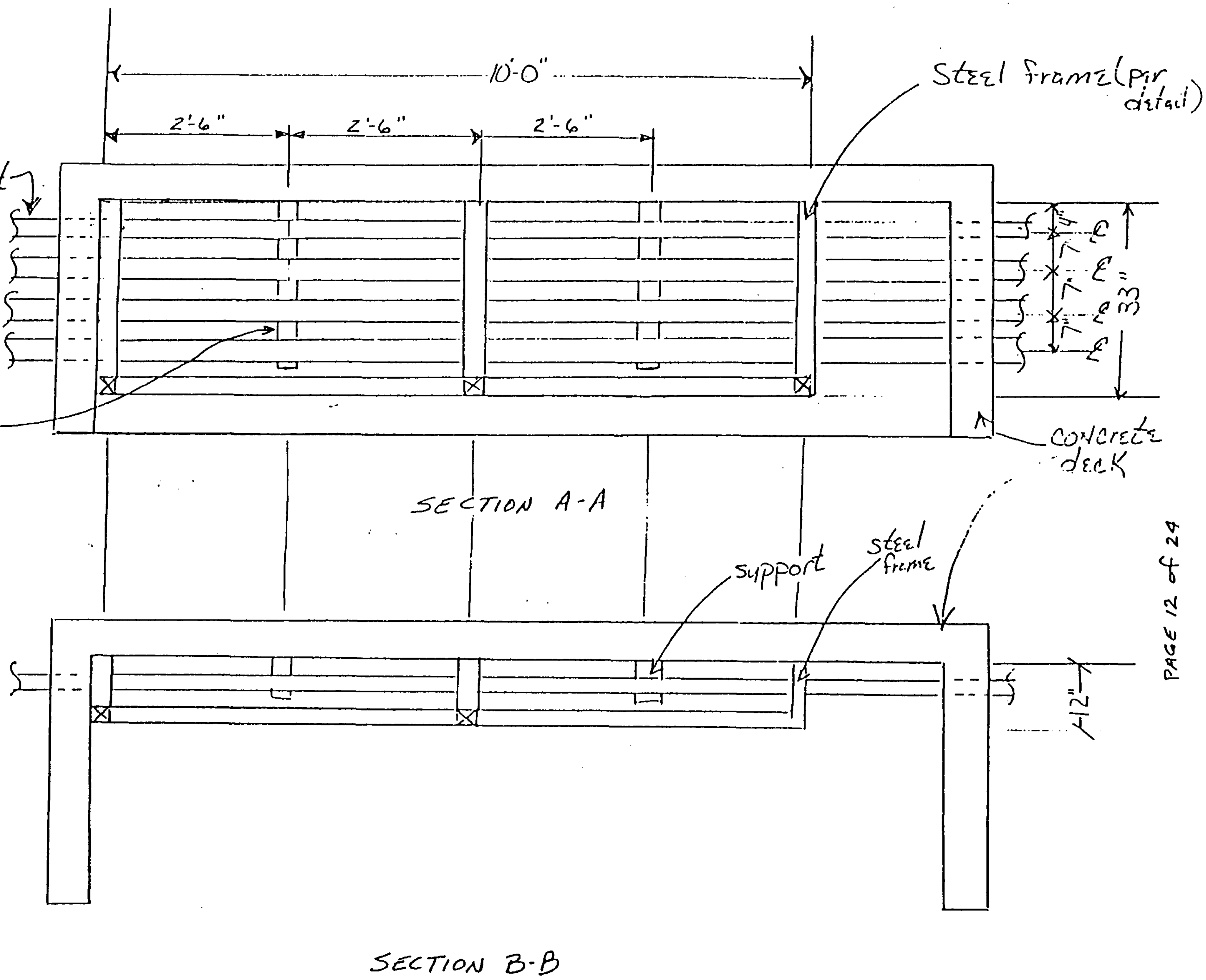
2-Sided Box

Test Deck #4

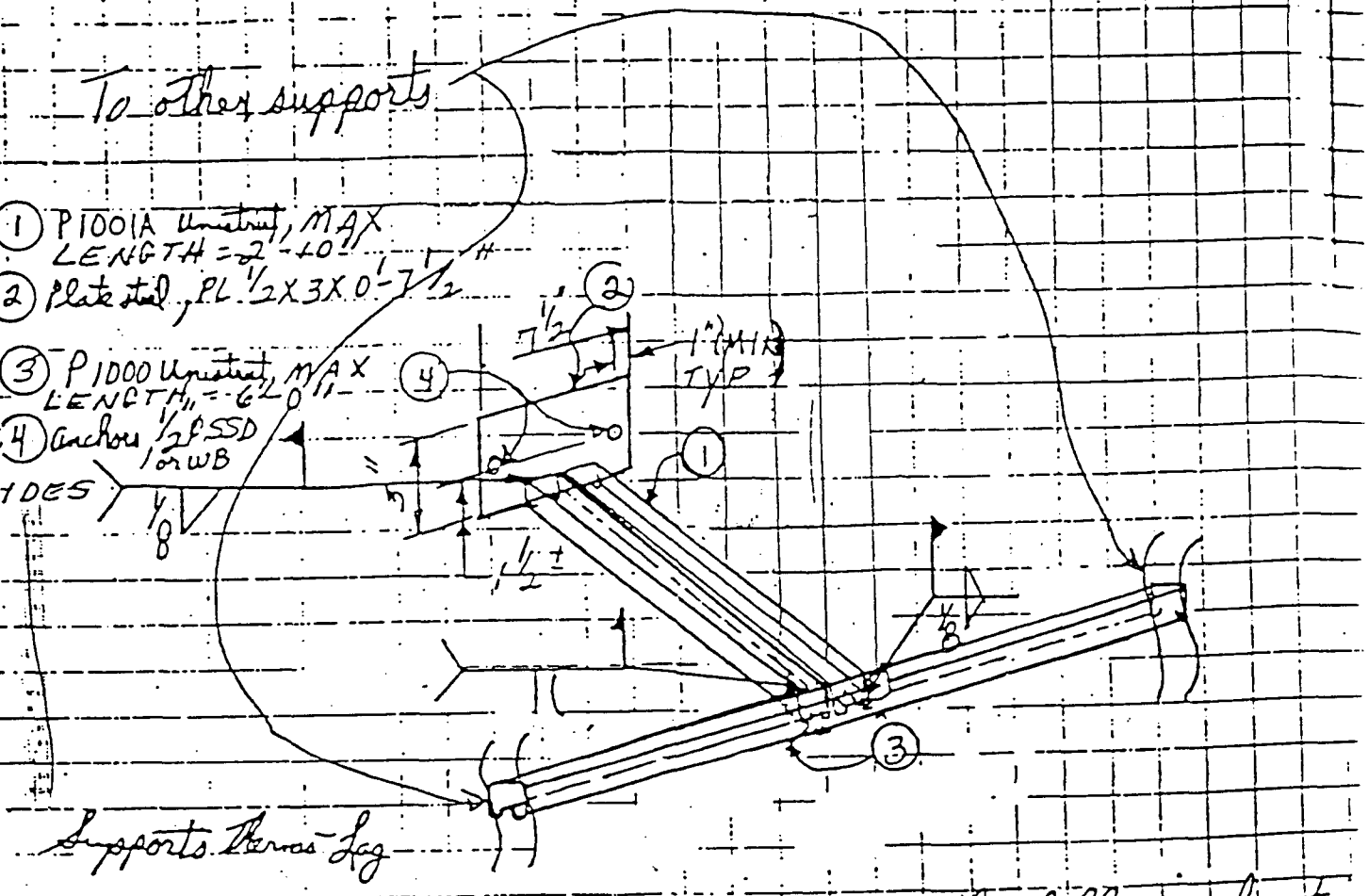
SHEET 7 OF 36

COMPUTED ____ DATE ____

CHECKED ____ DATE ____



3 of 7



Add the above support to drawing 48N1314-5 for the following locations

1-37½-113½ ≈10'-2" W of u at A1 Elev ≈ 761' 47A053-90 series can apply

WP 17605

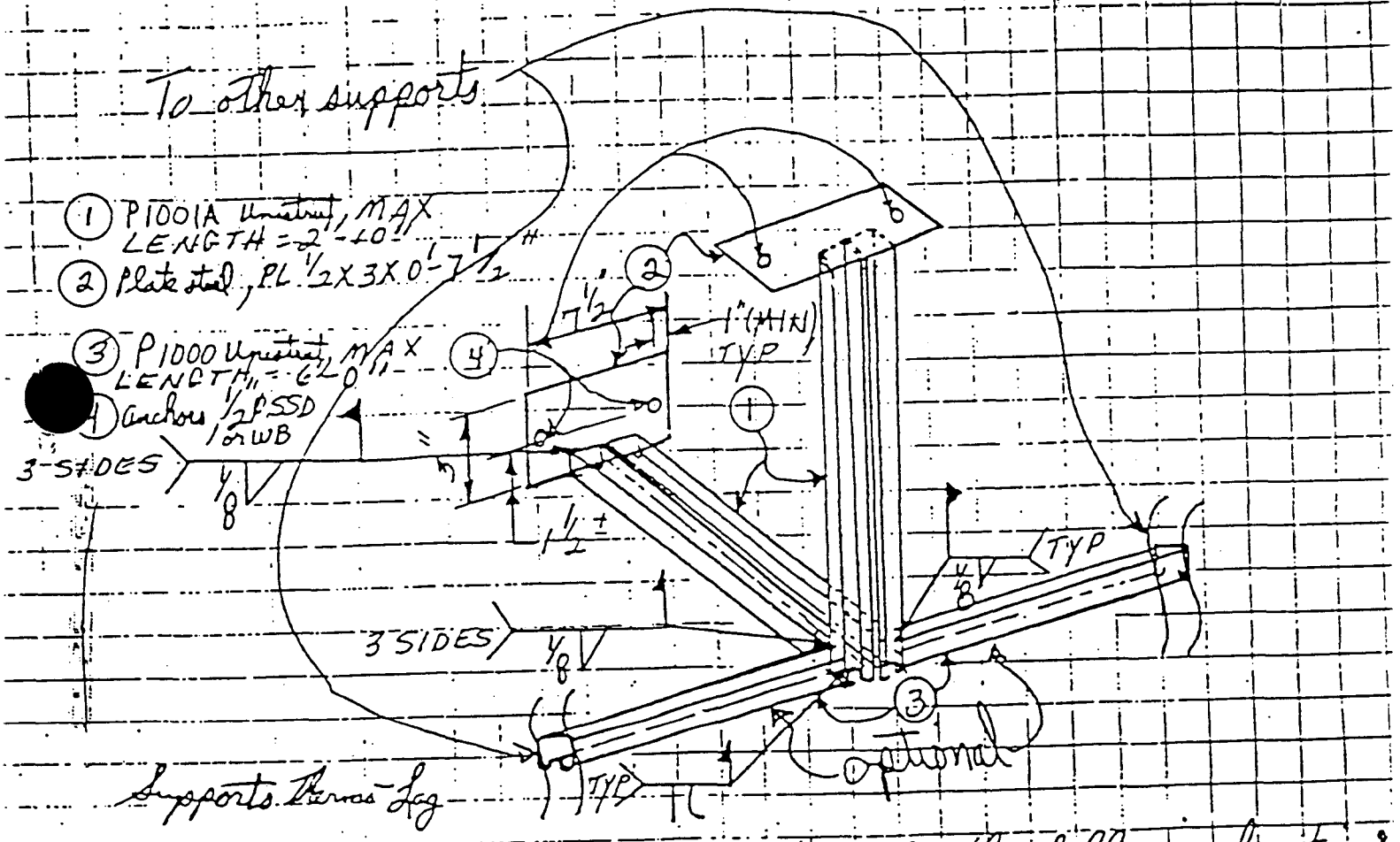
PAGE VI-59 of VI-101

FCR-3451 R1

E4.17

To other supports

(1) P1001A Unistrut, MAX LENGTH = 2'-10"
(2) Plate steel, PL 1/2 X 3 X 0'-7 1/2"
(3) P1000 Unistrut, MAX LENGTH = 6'-0"
(4) Anchors 1/2" SSD or WB



Add the above supports to drawing 48N1314-5 for the following locations:

11377-11377	(1) ≃ 6'7½" W of u at A1	Elev ≃ 761'
R2	(2) ≃ 15'11" W of u at A1	
	(3) ≃ 0'8" W of t at A1	
	(4) ≃ 11'4" W of t at A1	
	(5) ≃ 17'4" W of t at A1	

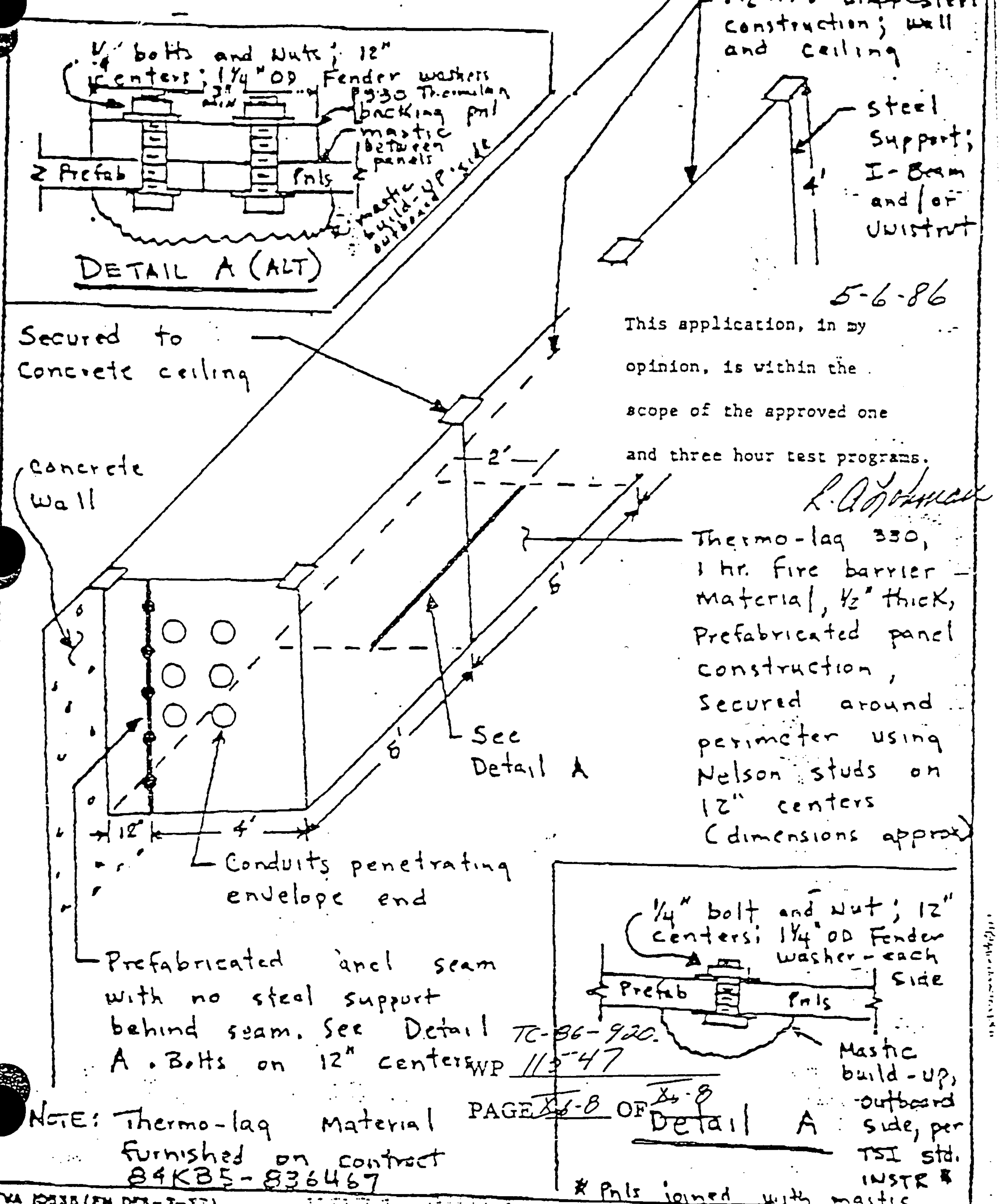
47A053-90 series can apply

WP 11605

PAGE VI-58 OF VI-10

FCR-3451 R2

TSI FIRE BARRIER INST - SPECIAL



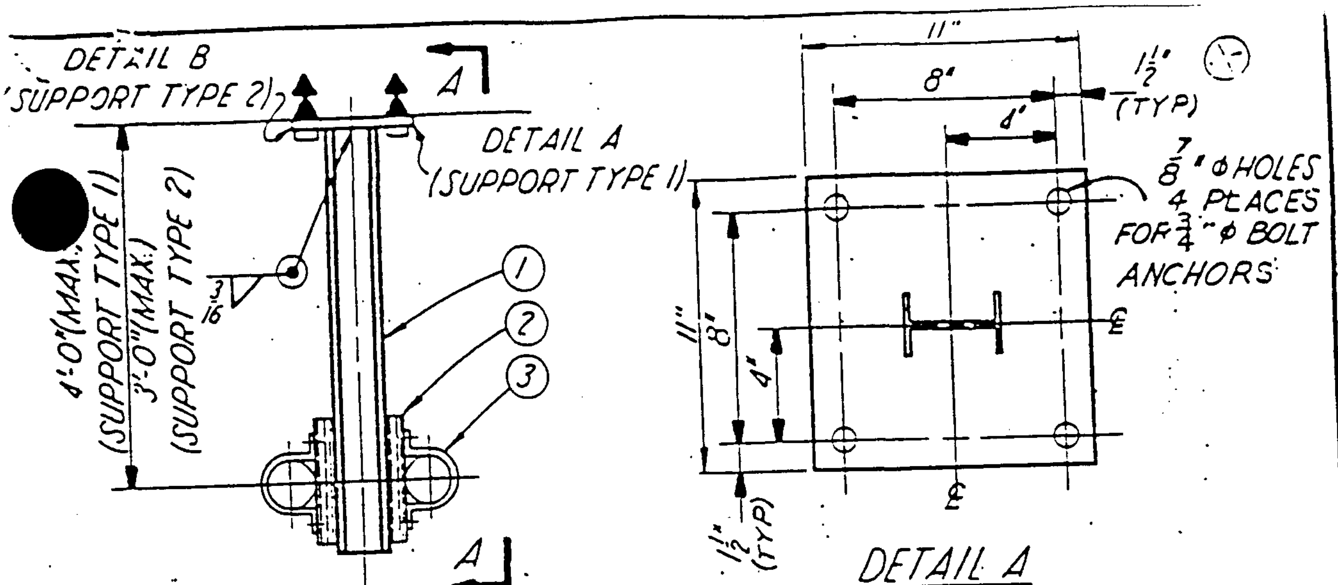
5-6-86

This application, in my opinion, is within the scope of the approved one and three hour test programs.

L. A. Johnson

TC-86-920
WP 113-47
PAGE 86-8 OF 86-8

NOTE: Thermo-laq Material furnished on contract 84KB5-836467



DETAIL A
(SUPPORT TYPE 1)

ELEVATION VIEW

TABLE A

SUPPORT TYPE	CONDUIT SIZE 1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	STEEL SIZE "A"
1	50	50	9	13	11	6	4	3	2	W6 X 15.5
2	30	30	7	9	9	5	3	3	2	W4 X 13

NOTES:
1. FOR GEN. NOTES & REQUIREMENTS SEE 47A056-1.
2. THE NO'S. GIVEN IN THE BLOCKS OF TABLE A ARE THE THEORETICAL NOT THE PHYSICAL LIMIT OF CONDUIT SIZES TO BE SUPPORTED. WHEN SEVERAL SIZES ARE MIXED, THE LIMITING NO. IS TO BE THAT OF THE CONDUIT SIZE W/ THE SMALLEST ALLOWABLE NO. BY ITSELF.
3. THIS SUPPORT CAN BE MOUNTED TO FLOORS, CEILING, & WALLS USING EMBED. STEEL OR THE PL W/ CONC. ANCHORS.
4. THIS SUPPORT CAN BE USED AS AN AXIAL FOR UP TO 25 FT OF CONDUIT WHEN USING OPTIONAL BRACE AS SHOWN IN SECTION A-A
5. UNISTRUT IS TO BE USED FOR THE ATTACHMENT OF CONDUIT. IT IS NOT NECESSARY FOR THE UNISTRUT TO RUN THE FULL LENGTH OF THE MAIN SUPPORT MEMBER.
6. COMPANION DWG 47A056-53A

NOTE *:
1. THIS DWG SHALL NOT BE USED AFTER NOV. 22 1985 WITHOUT PRIOR DE APPROVAL
2. THIS DWG HAS BEEN REPLACED BY 47A056-1053

NOT TO SCALE

SEISMIC CLASS I STRUCTURES

MECHANICAL
SEISMIC SUPPORT
CONDUIT

SEQUOYAH NUCLEAR PLANT Q
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

1 L6530	11-22-85											
ADDED NOTE *	RR 3770											
ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPR	SSD	

DSGN G.H. PIGG
DRWN CALVIN V. HENDERSON
CHKD W.G. MONROE
SUPV J.S. ARRINGTON
INSP
ENGINEER [signature]

SUBMITTED [signature] RECOMMENDED [signature] APPROVED R.M. [signature]

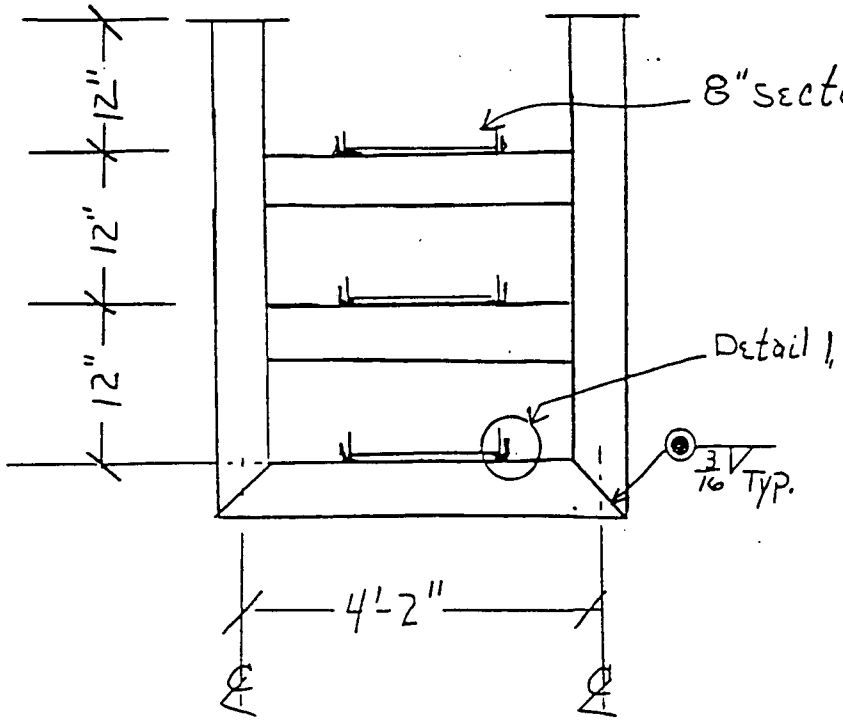
KNOXVILLE 10-23-75 45 M 47A056-53 R1

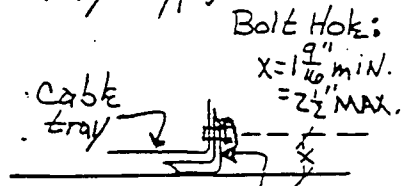
Test Deck #4

COMPUTED _____ DATE _____

CHECKED _____ DATE _____

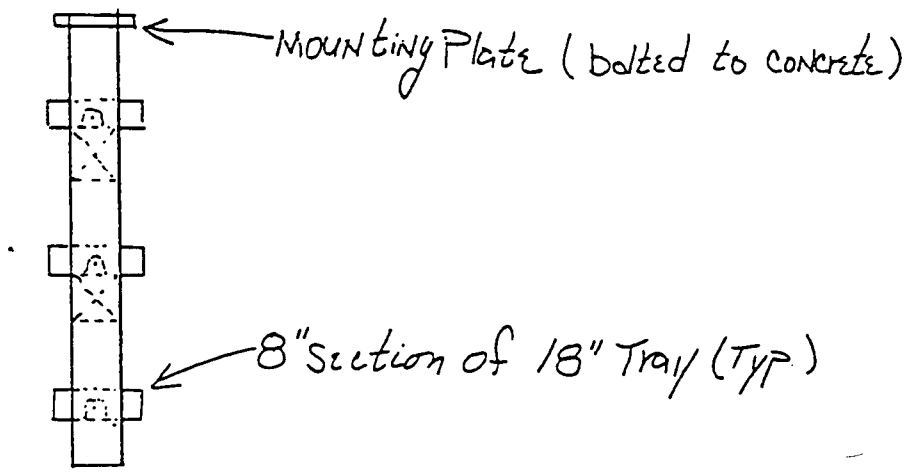
Cable Tray Support Details



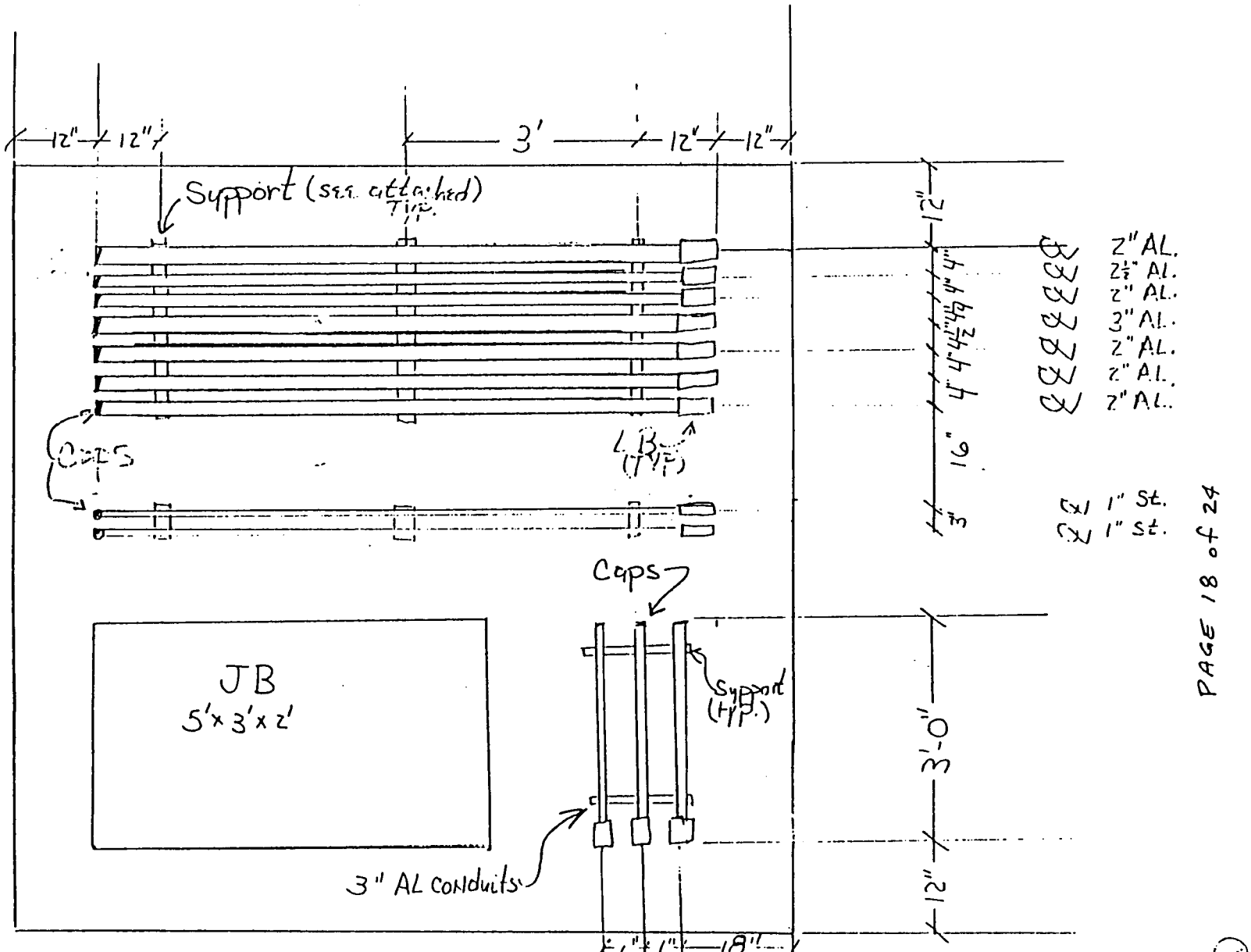


Detail 1

1) Bolt = 3/8" x 1", Hole = 7/16" ϕ
Head installed inside tray.



Notes: 1) Tube Steel 6"x6"x0.5", ASTM-A500 Grade B or ASTM A501
2) Weld size 1/16" less than tube thickness.
3)



Test Deck #5

- 3 sided - Boxed Conduits
- Large JB. (Wall Conduit)

Note: 1) Supports per attached detail. UNistrut to be cut flush with END of 2 hole strap.
2) LB to exit through back of deck
3) Conduit ends to be Capped

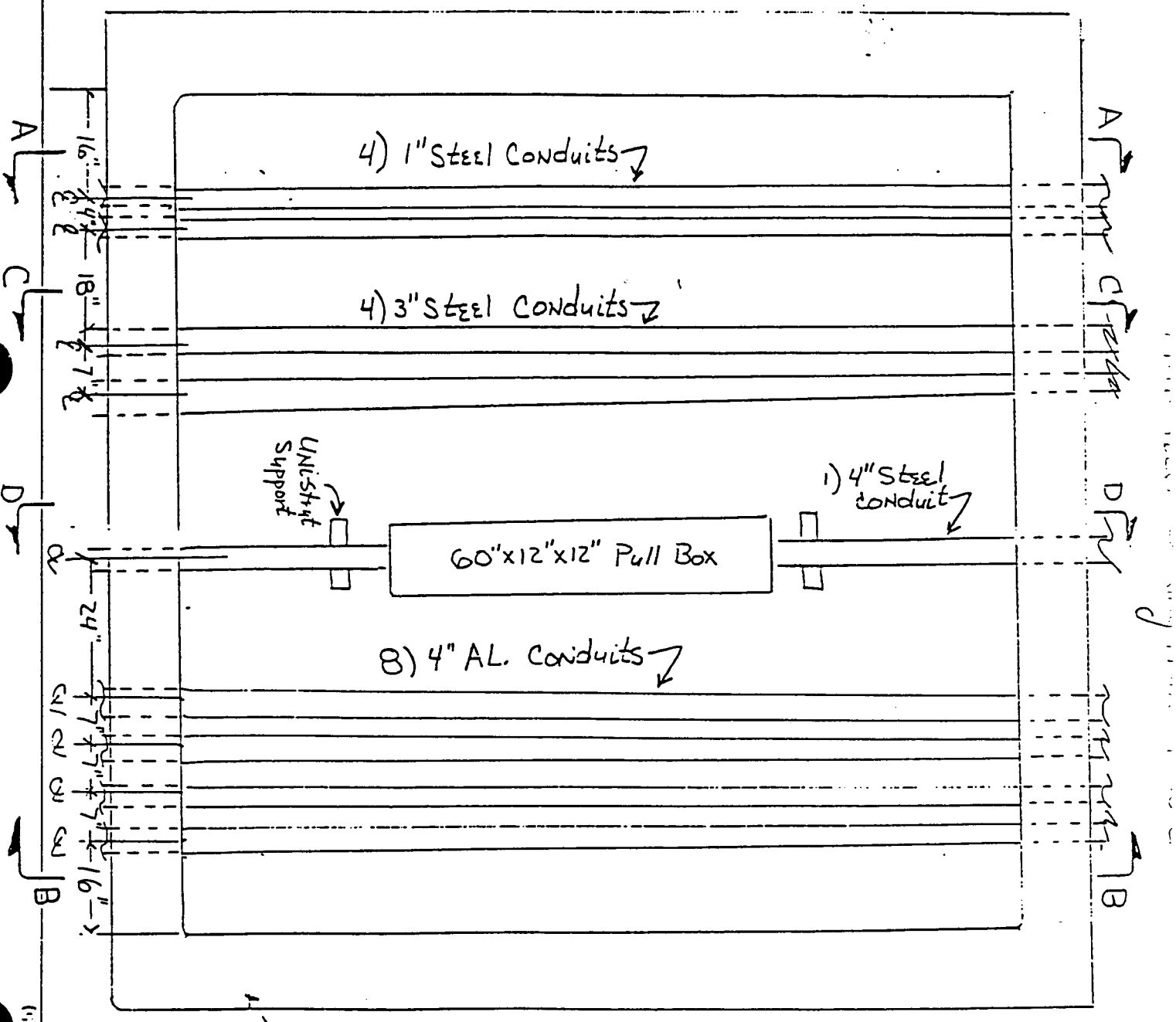
Typical Terminating Conduit Box SHEET 3 OF 3

Test Deck

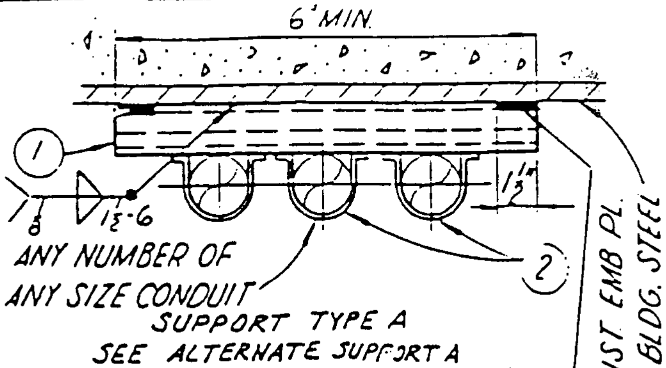
Concrete Wall

COMPUTED _____ DATE _____

CHECKED _____ DATE _____



NOTE *:
1. THIS DWG SHALL NOT BE USED AFTER NOV 22 1985 WITHOUT PRIOR OE APPROVAL
2. THIS DWG HAS BEEN REPLACED BY 47A056-1059



SUPPORT TYPE A
SEE ALTERNATE SUPPORT A

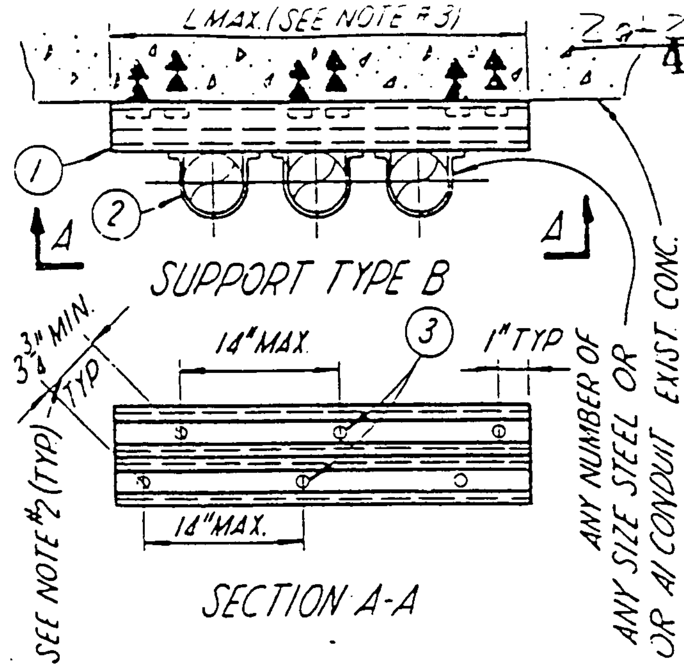


TABLE A — TYP BOTH ENDS 1/8 1 1/2"

COND. Ø	L AXIAL *
1/2"	50'
3/4"	50'
1"	40'
1 1/2"	25'
2"	25'
2 1/2"	10'
3"	10'
4"	10'
5"	10'

* L_{AXIAL} IS THE MAX LENGTH OF THE ATTACHED CONDUIT FOR WHICH THIS SUPPORT WILL PROVIDE AXIAL RESTRAINT. (SEE NOTE 6)

NOT TO SCALE

NOTES:

1. FOR GENERAL NOTES & SPECIFICATIONS SEE 47A056-1
2. BOLT ANCHORS MUST BE A MIN. OF 3 3/4" APART IN ACCORDANCE W/ GENERAL CONSTRUCTION SPECIFICATION G-32.
3. L MAX MAY VARY AS NEEDED AS LONG AS MAX BOLT ANCHOR SPACING OF 14" IS NOT EXCEEDED ON EITHER CHANNEL OF THE P1001A UNISTRUT.
4. CONDUITS MUST BE ATTACHED TO EITHER CHANNEL OF THE P1001A UNISTRUT BETWEEN BOLT ANCHORS SECURING THAT PARTICULAR CHANNEL.
5. THIS SUPPORT MAY BE ATTACHED TO WALLS, FLOORS, OR CEILINGS.
6. THIS COND. SUPPORT WILL PROVIDE AXIAL RESTRAINT FOR THE SIZES & LENGTHS OF CONDUIT ATTACHED TO IT AS SHOWN IN TABLE A. CONDUIT SIZES MAY BE MIXED WITH THE AXIAL SPAN FOR THE LARGEST CONDUIT BEING THE LIMITING AXIAL SPAN FOR ALL CONDUITS ATTACHED
7. BOLTING TO CONC. MAY BE COMBINED W/ WELDING TO EMBEDDED PLS. AS LONG AS THE MAX. DISTANCE BETWEEN THE ADJACENT BOLT & WELD IS NO MORE THAN 14".
8. COMPANION DWG 47A056-59A.

MK. NO	QTY.	MATL. DESCRIPTION
5	AS REQD	TS (SIZE AS REQD)
4	AS REQD	P1001 UNISTRUT (LENGTH VARIES)
3	AS REQD	3/8" Ø BOLT ANCHOR ASSEMBLIES
2	AS REQD	P2558 UNISTRUT PIPE STRAPS W/ NUTS, BOLTS, & FLAT WASHERS
1	1	P1001A UNISTRUT (LENGTH VARIES)

REV NO.	ECN NO.	DATE	DSGN	DRWN	CHKD	SUPV	ENGR	INSP	SUBM	RECM	APPD
5	L6530	11/27/85									
	ADDED NOTE * PER FCR 3770										
4											
	REVISED PER FCR 2598 R1										
3	LS1	1-14-83									
	REV. PER SQ-FCR-1121 FOR ECN L-5198										
2	S1	5-27-82		DL							
	ADDED NOTE 8										
1	S1	7-6-81				USA					
	ADDED NOTE 7 PER FCR E 696										

DSGN G.H. PIGG
DRWN C.V. HENDERSON
CHKD W.G. MONROE
SUPV J.S. ARRINGTON
INSP
ENGINEER [signature]

SEISMIC CLASS I STRUCTURE
MECHANICAL
SEISMIC SUPPORT
CONDUIT

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED / RECOMMENDED / APPROVED
KNOXVILLE 45IM 47A056-59 Q

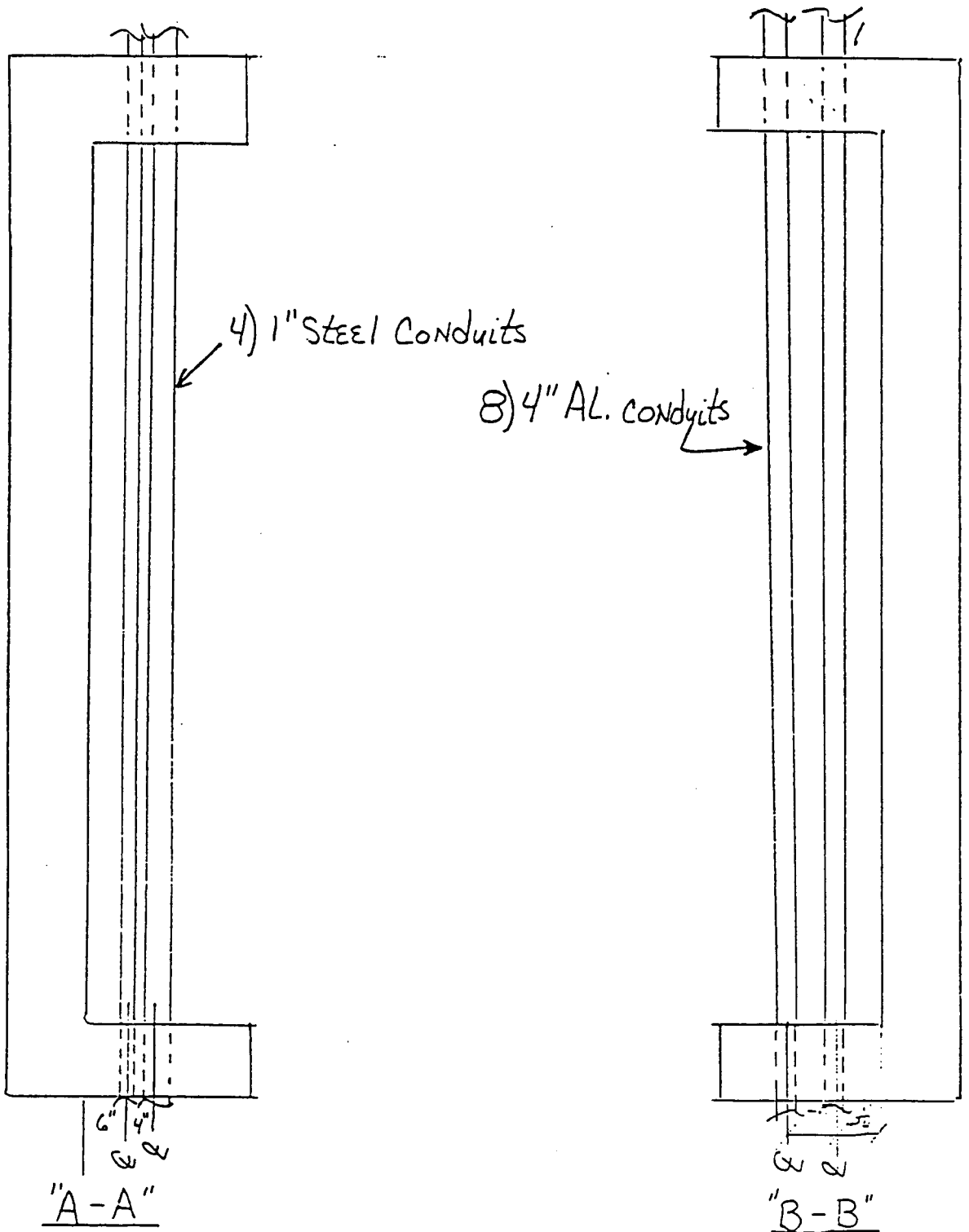
COMPUTED _____ DATE _____

CHECKED _____ DATE _____

Test Deck #6

Left View

Right View



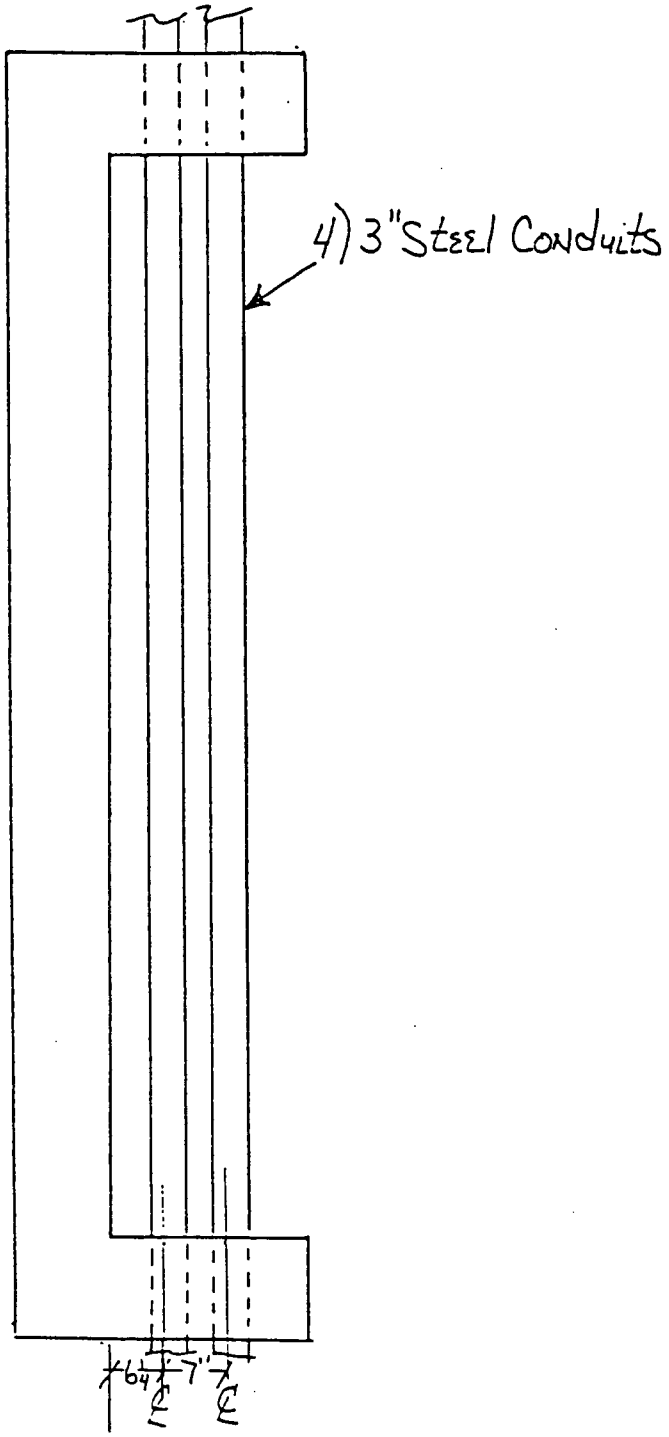
Note: Lab can pour concrete in place around conduits or sleeve and seal or core bore and seal around conduits.

COMPUTED _____ DATE _____

CHECKED _____ DATE _____

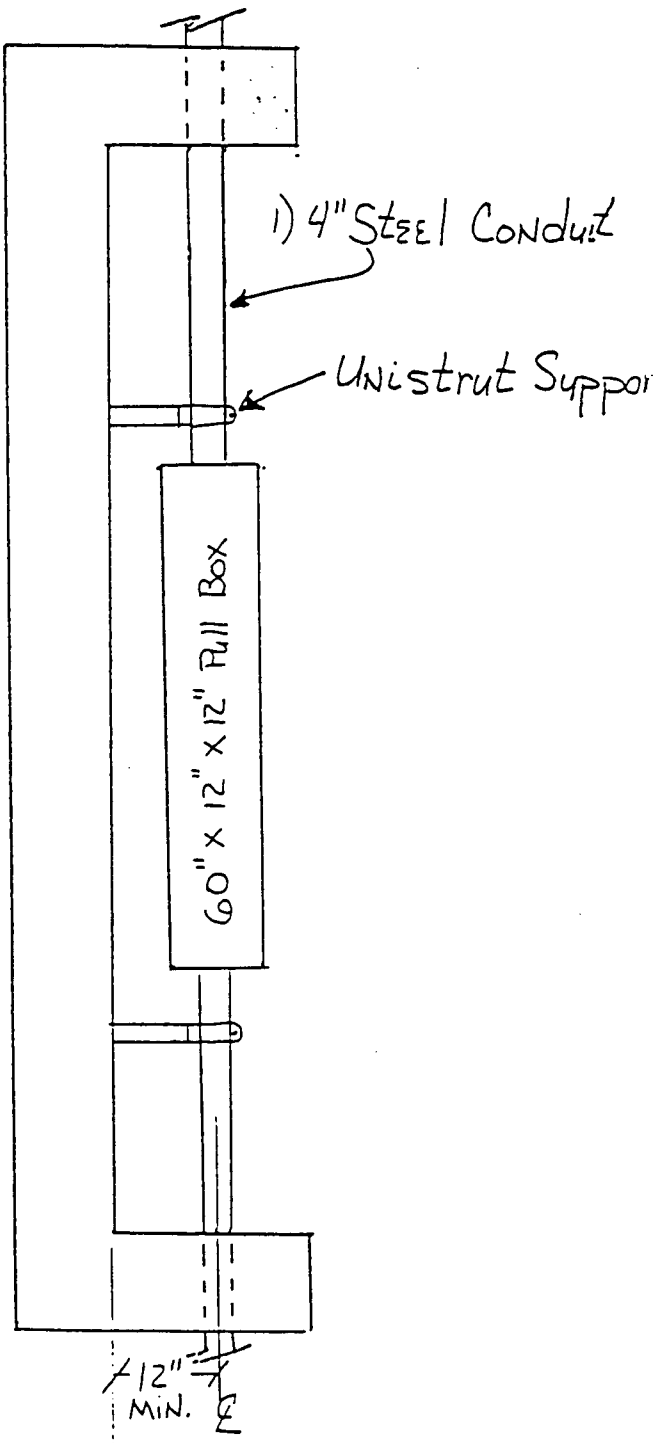
Test Deck #6

Left View



"C-C"

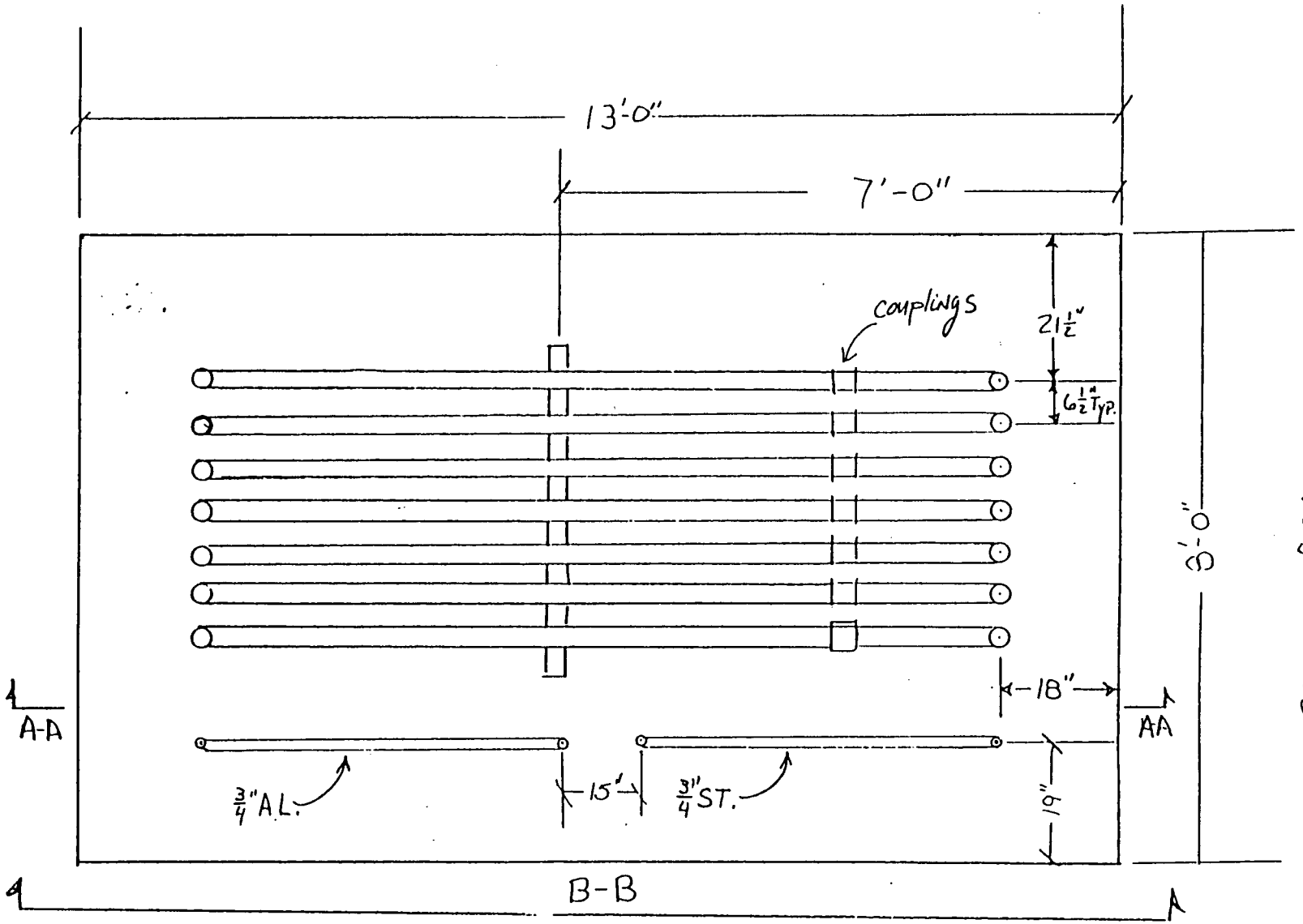
Left View



"D-D"

Note: 12" to ℄ is MIN. Lab may move out from wall on "D-D". Unistrut support by Lab.

Large Ganged Conduit Test Deck #7
Steel Deck - Horiz -
COMPUTED DATE
CHECKED DATE
1 of 2



7) 4" Steel conduits. Spaced 6½" on ℄

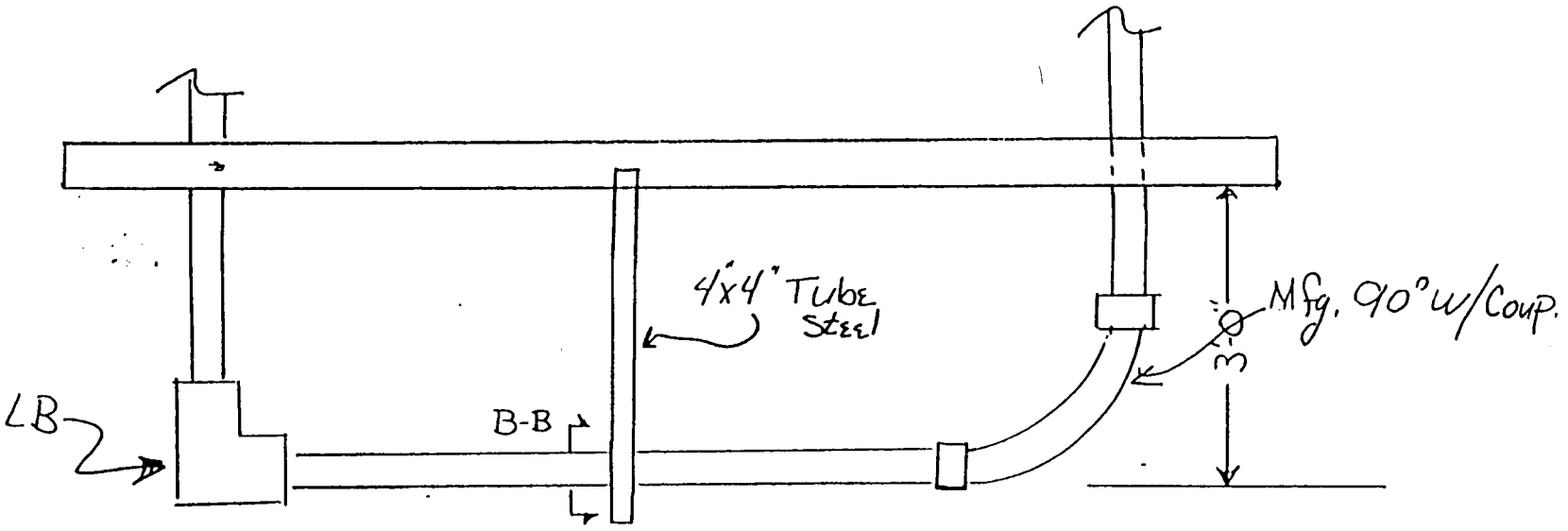
plan view

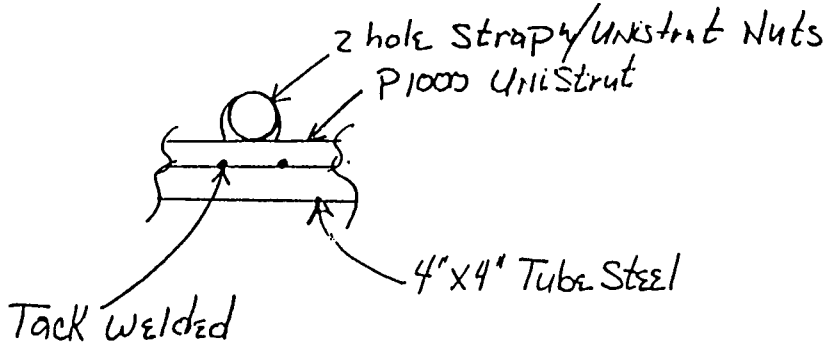
Large Ganged Conduits SHEET 02 OF 2 48

COMPUTED DATE

CHECKED DATE

Elevation A-A





Note: The two 3/4" conduits (1AL, 1ST) are the same configuration as Elevation A-A only half as Long. The conduits shall extend 3'-0" down from the test deck. No center support is required.

PAGE 24 of 24

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

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

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

Technical contact: Patrick M. Madden, NRR
(301) 504-2854

Lead Project Manager: Marsha K. Gamberoni, NRR
(301) 504-3024

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 <u>begins to degrade</u> 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 thermocouples within the test specimen at the onset of the fire exposure during 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 ute 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."

[redacted]il 24, 1986 Generic Letter 86-10, "Implementation of Fire Protection Requirements."

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 [redacted]erials."

[redacted]A 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 sulation resistance, whereas the high potential (Hi-Pot) test provides surance that the cable has sufficient dielectric strength to withstand the pplied 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.

he Megger tests (pre-fire, during the fire [if performed], and immediately ter the fire test conditions) should be done conductor-to-conductor for lti-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). Methods 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 barrier at the onset of the 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.

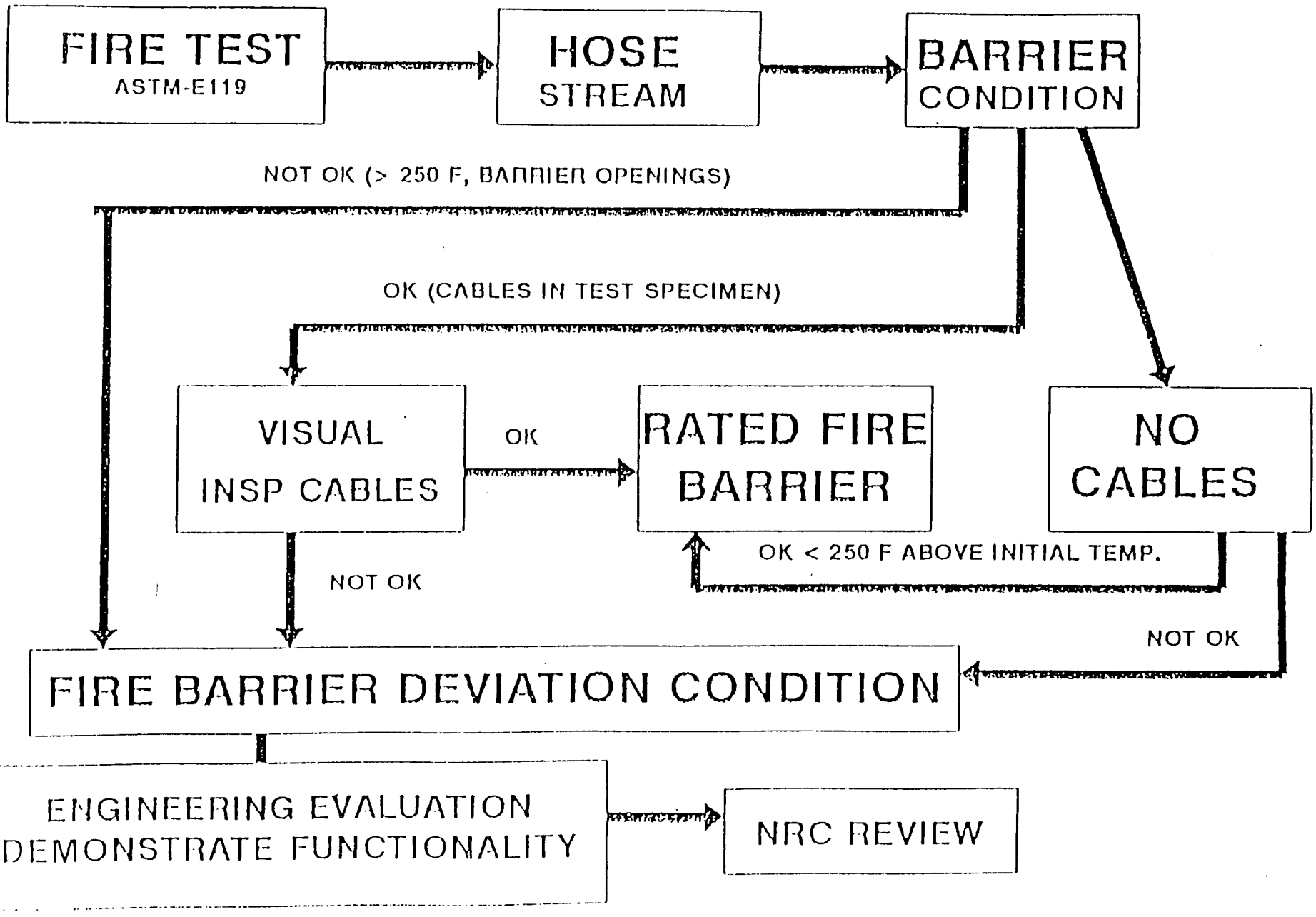
Note 4: This hose stream test method provides assurance that the cable tray or raceway fire barrier system has sufficient structural integrity to resist minor fire related barrier breaches caused by falling objects.

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



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.[4]

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.

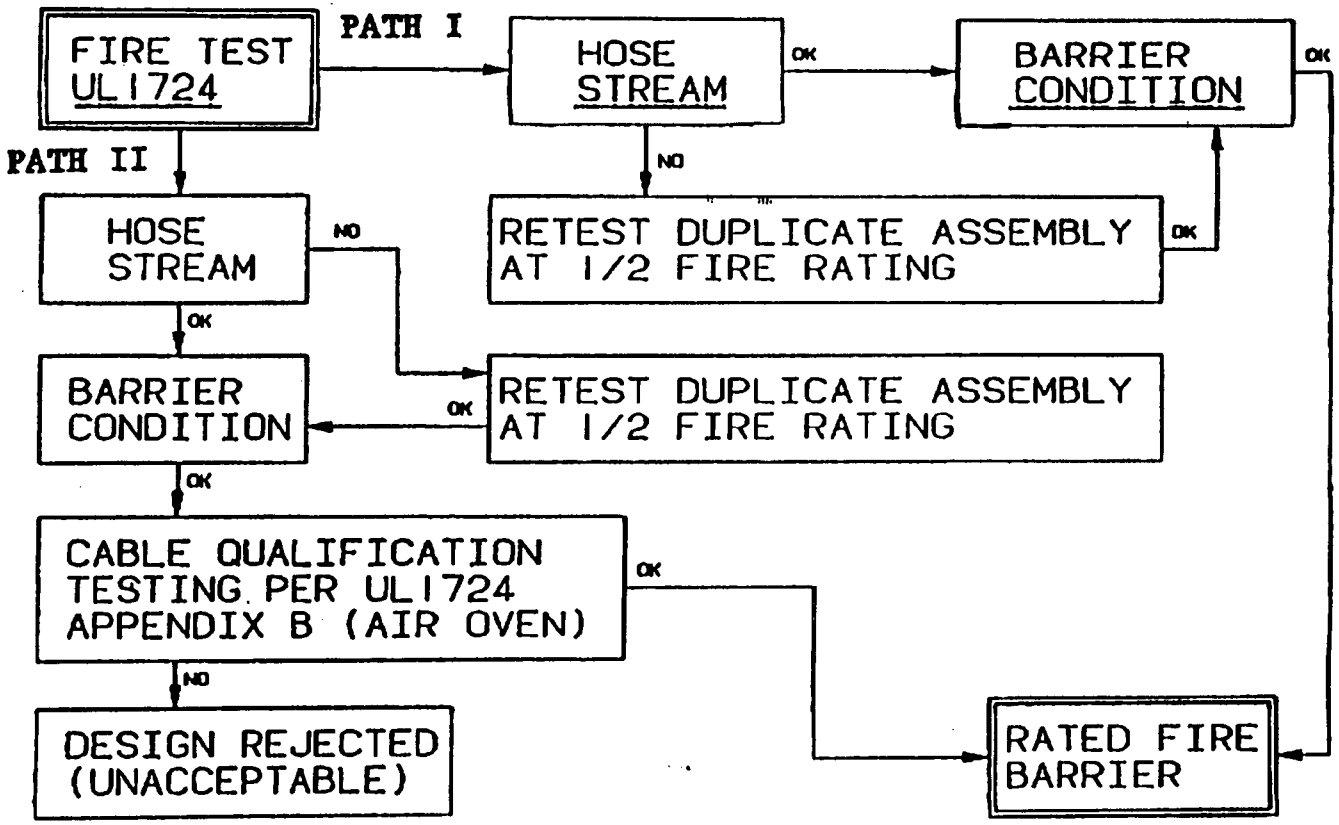
(4) Code of Federal Regulations, Title 10, Part 50, Energy, January 1, 1992.

(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

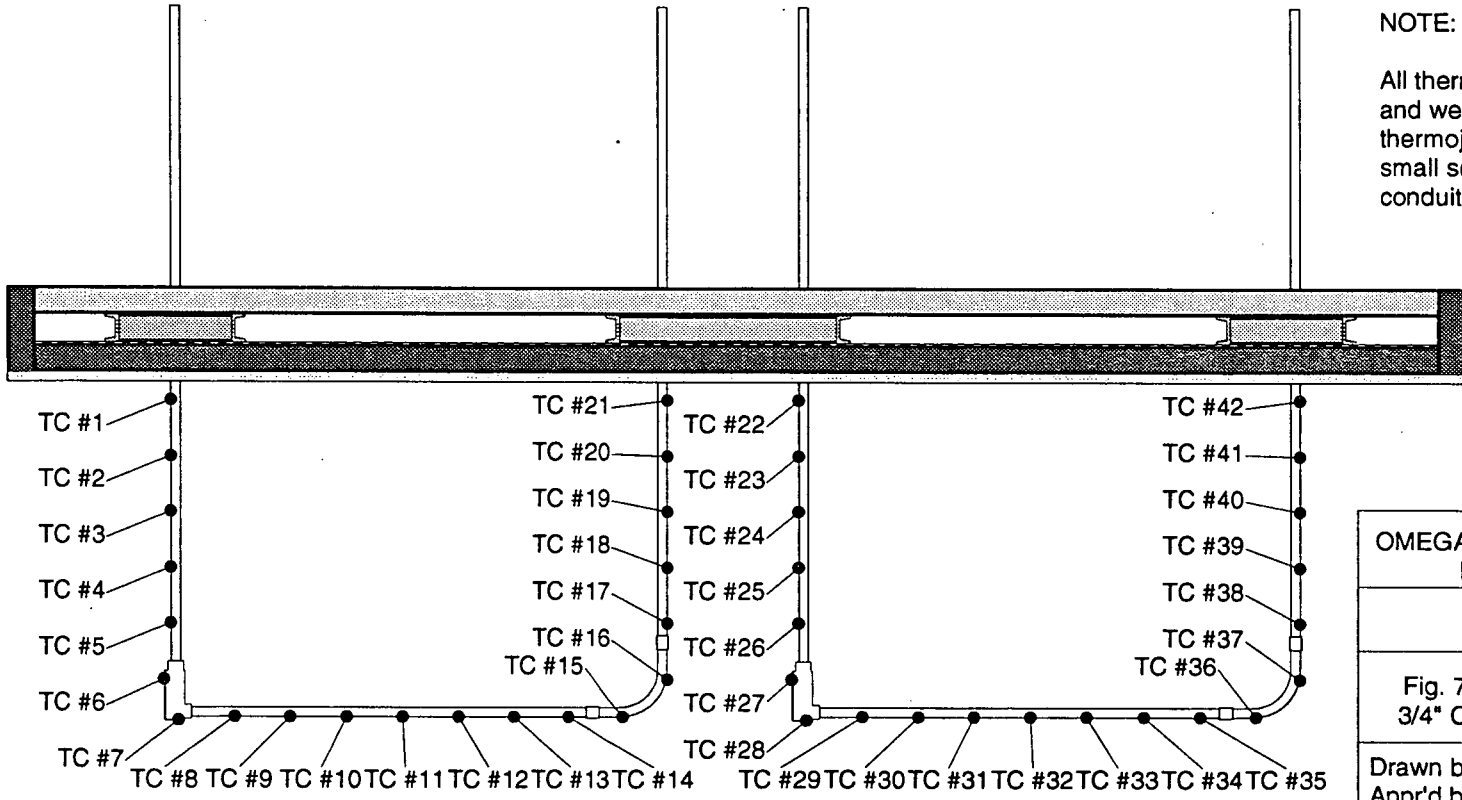


PATH I - RACEWAY $\Delta T_{avg.} \leq$ 250°F AND $\Delta T_{max.} \leq$ 325°F

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

Appendix C

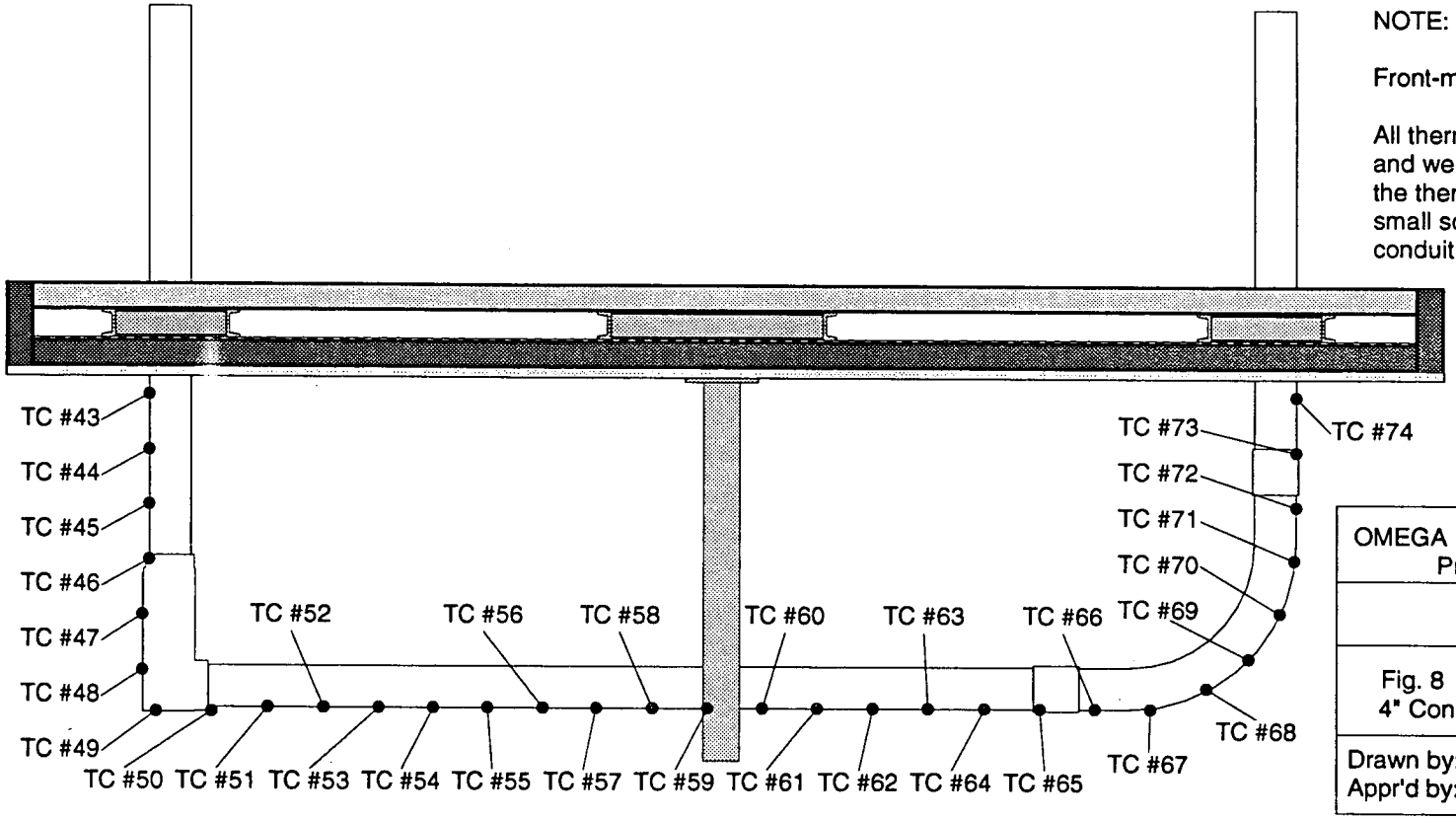
THERMOCOUPLE LOCATIONS



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 bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 7 Thermocouple Locations - 3/4" Conduits, Test Deck #7, Rev. 1
Drawn by: [illegible] Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

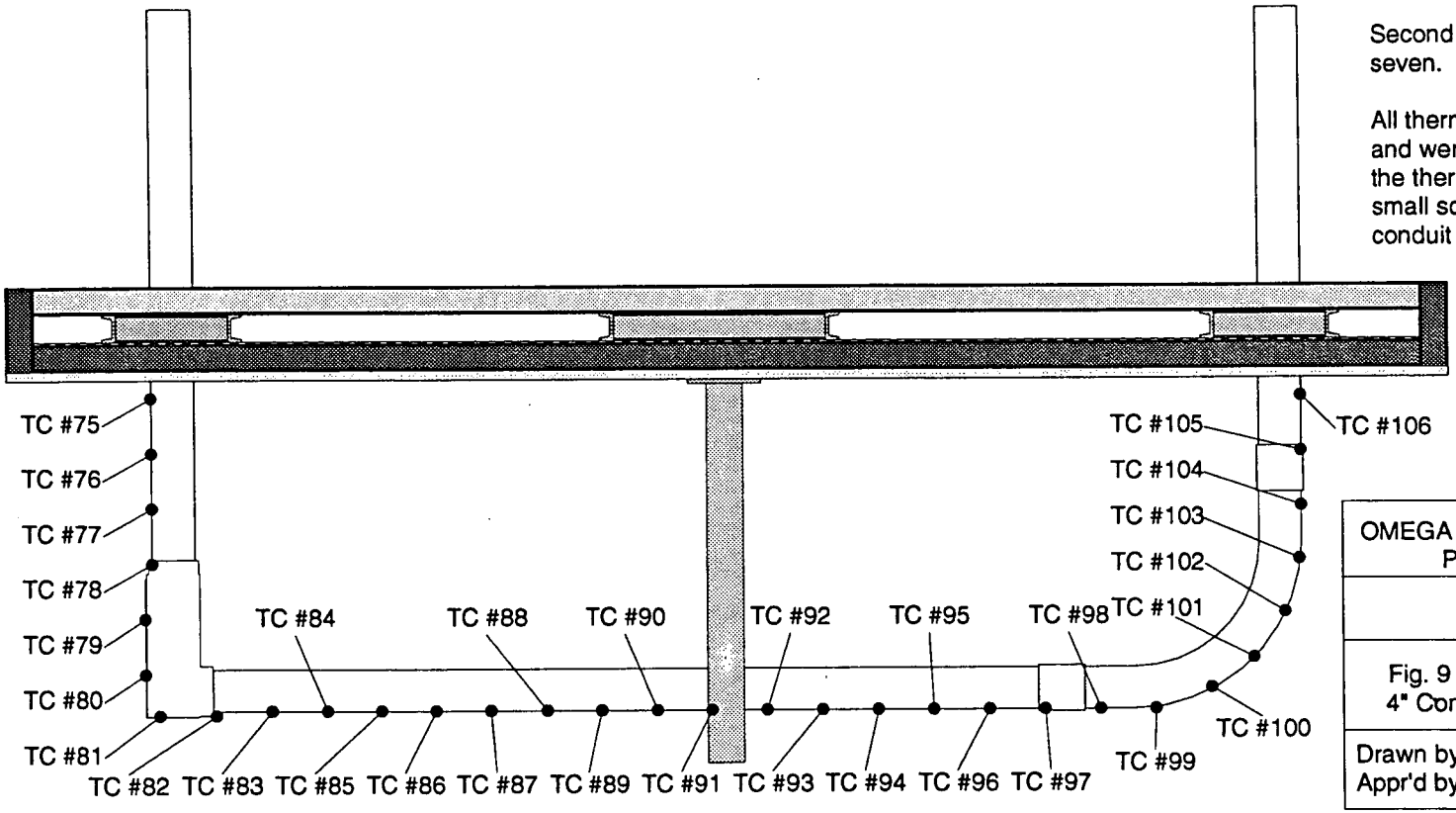


NOTE:

Front-most conduit in array of seven.

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 bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 8 Thermocouple Locations - 4" Conduit #1, Test Deck #7, Rev. 1
Drawn by: H. Shelton Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

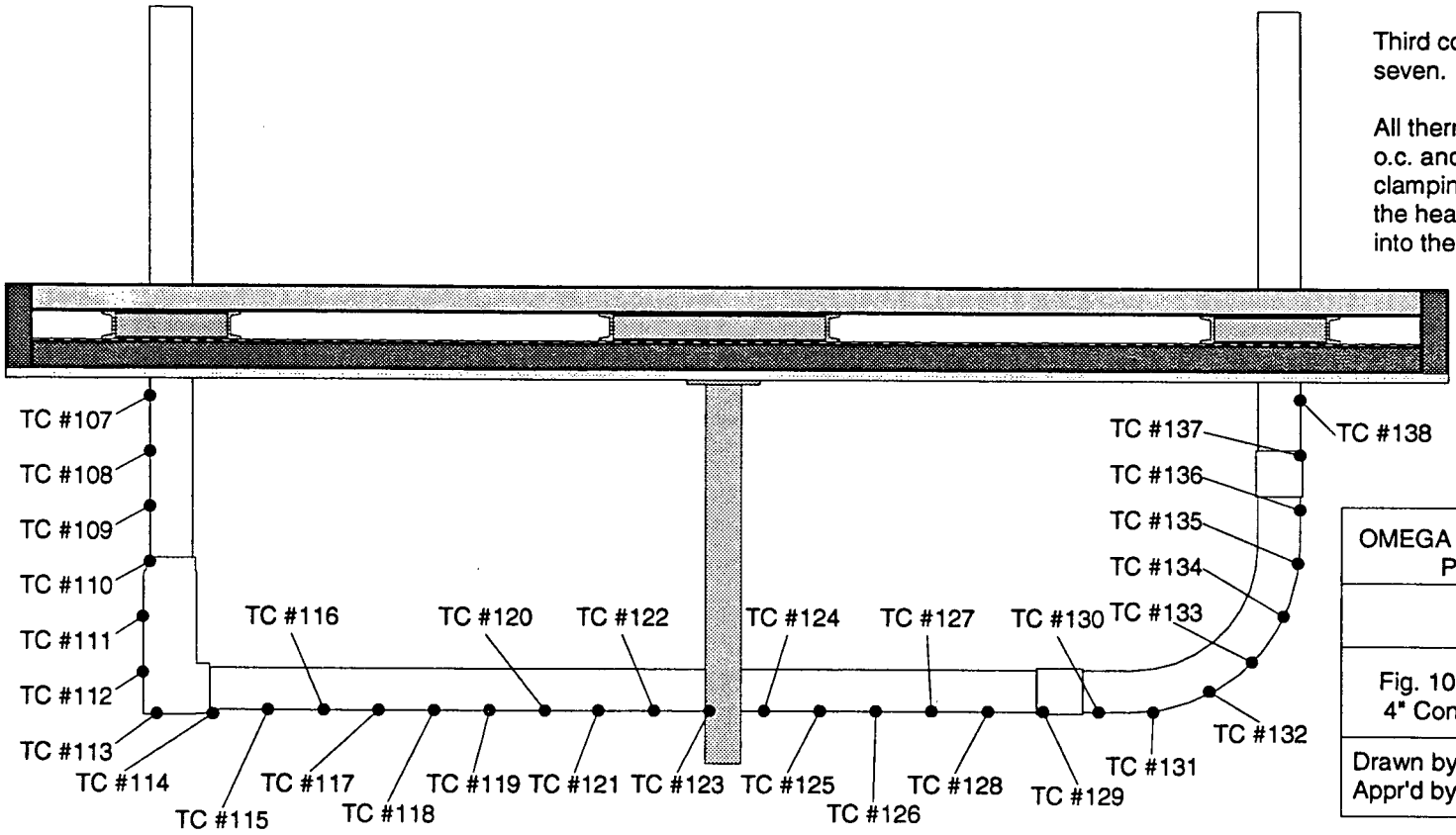


NOTE:

Second conduit from front in array of seven.

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 bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 9 Thermocouple Locations - 4" Conduit #2, Test Deck #7, Rev. 1
Drawn by: [signature] Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

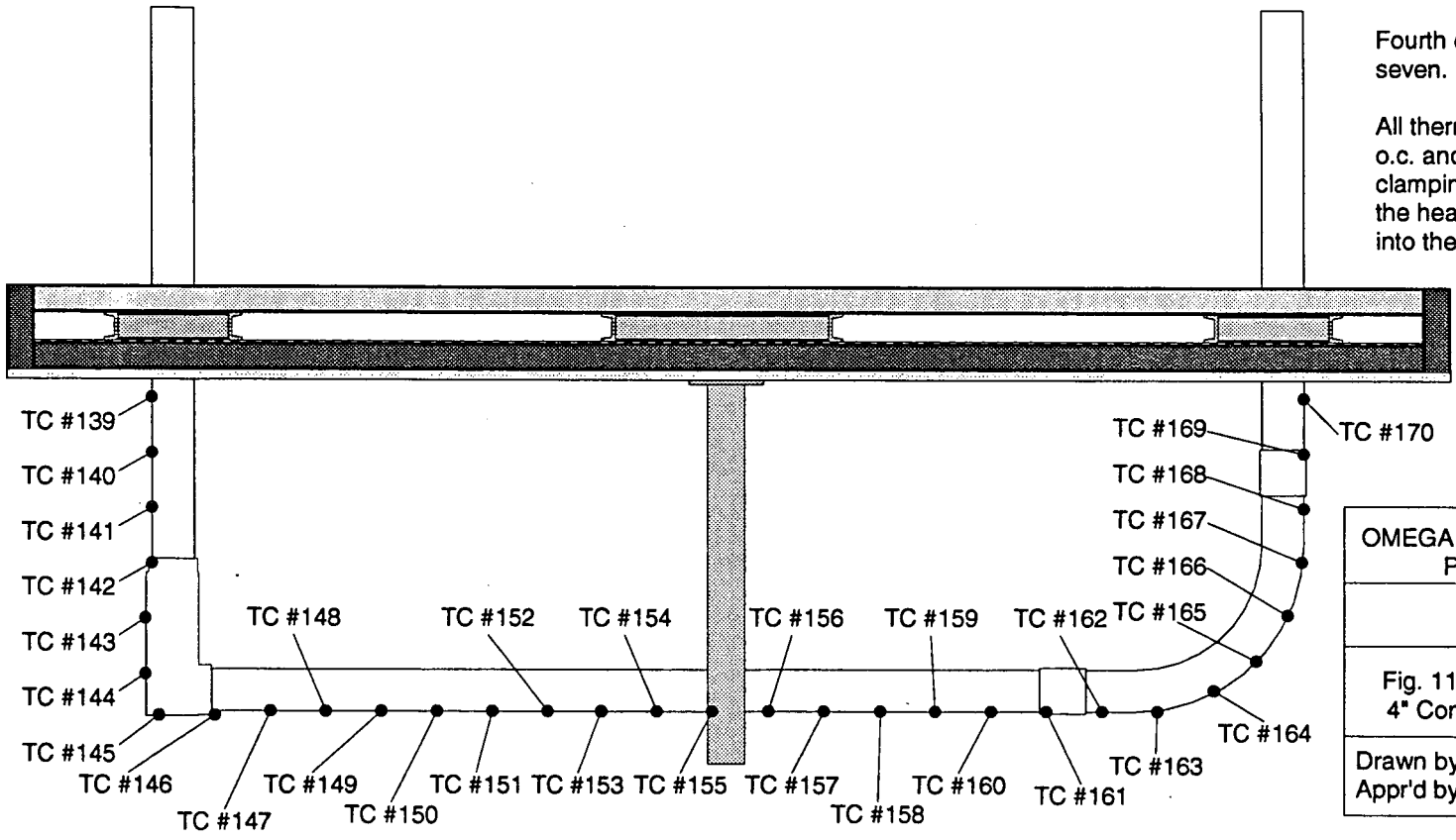


NOTE:

Third conduit from front in array of seven.

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 bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 10 Thermocouple Locations - 4" Conduit #3, Test Deck #7, Rev. 1
Drawn by: [signature] Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

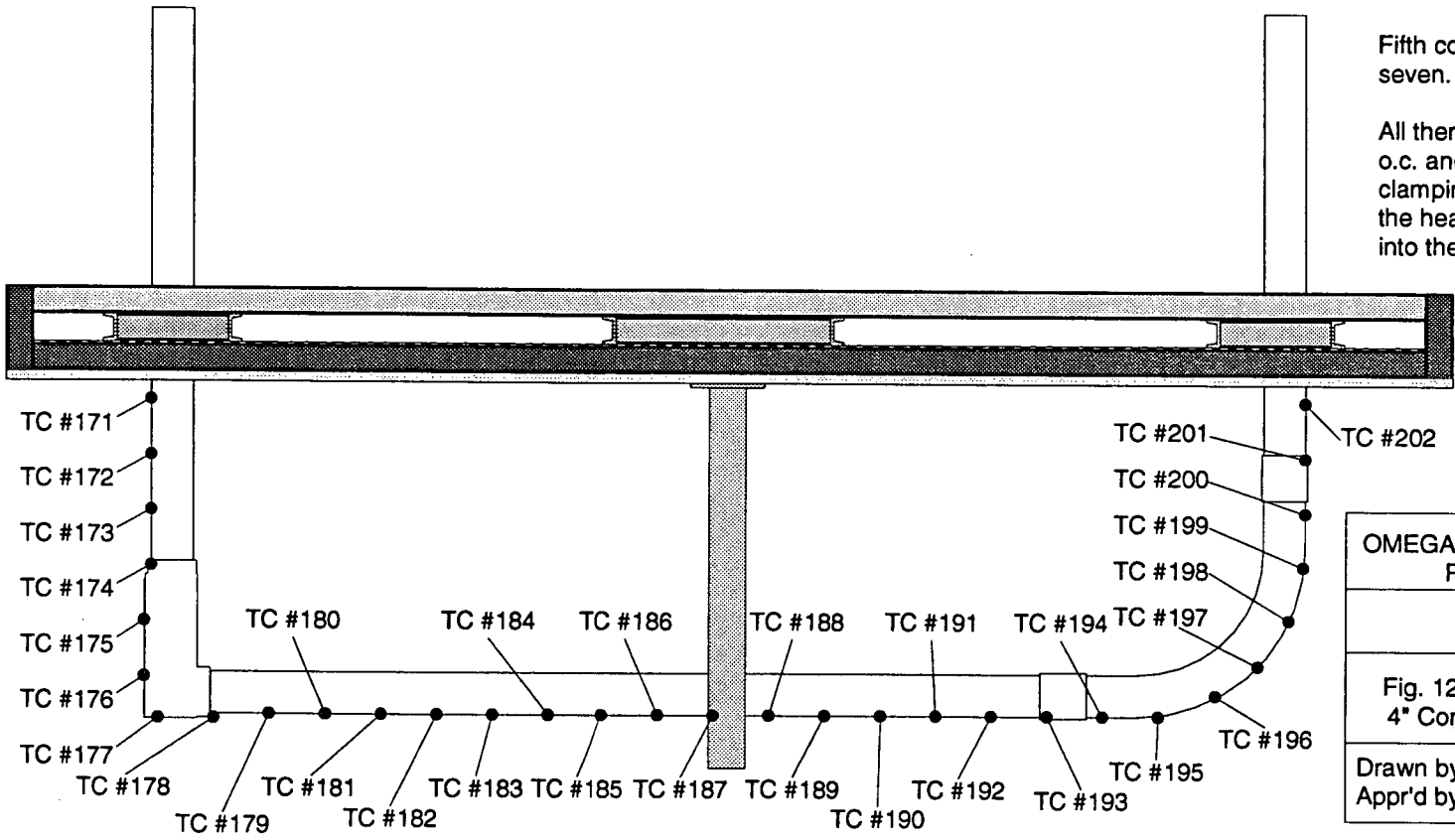


NOTE:

Fourth conduit from front in array of seven.

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 bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 11 Thermocouple Locations - 4" Conduit #4, Test Deck #7, Rev. 1
Drawn by: H. [illegible] Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

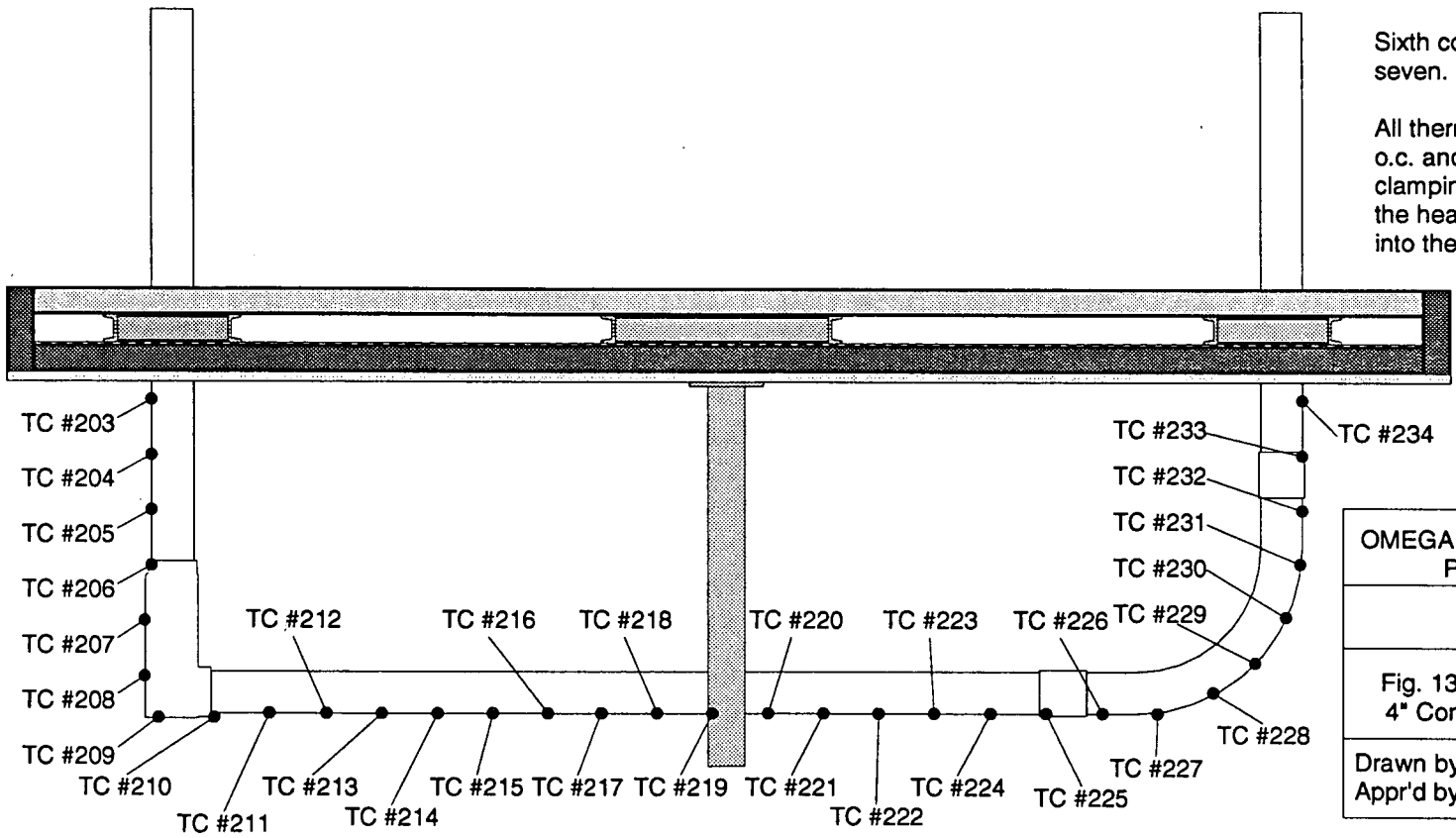


NOTE:

Fifth conduit from front in array of seven.

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 bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 12 Thermocouple Locations - 4" Conduit #5, Test Deck #7, Rev. 1
Drawn by: [illegible] Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94



NOTE:

Sixth conduit from front in array of seven.

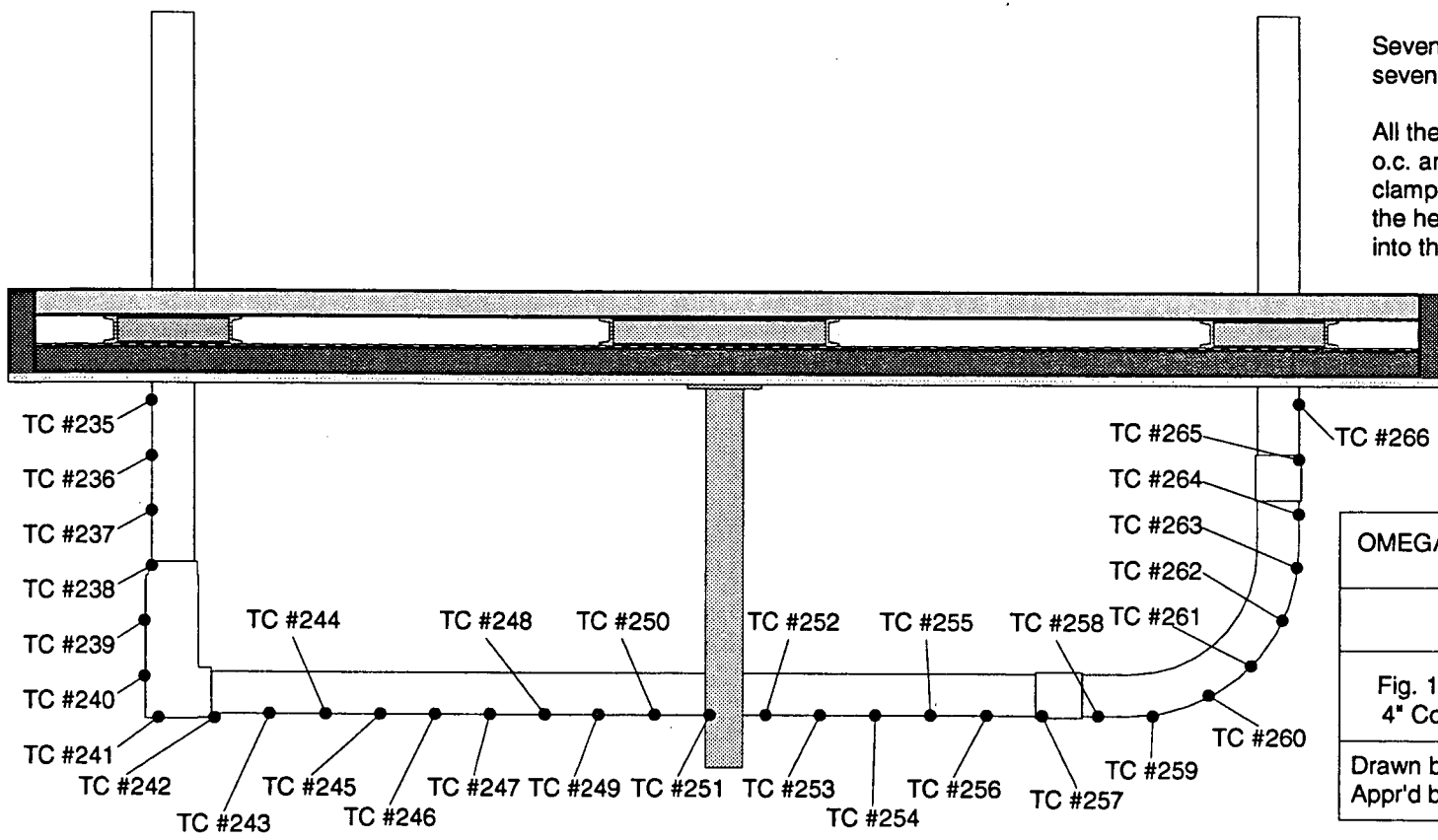
All thermocouples were spaced 6" o.c. and were held in place by clamping the thermojunction under the head of a small screw tapped into the bottom conduit surface.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 13 Thermocouple Locations - 4" Conduit #6, Test Deck #7, Rev. 1
Drawn by: H. Stanton IV Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

NOTE:

Seventh conduit from front in array of seven.

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 bottom conduit surface.



OMEGA POINT LABORATORIES, INC. Project No. 11960-97260
TVA / TSI
Fig. 14 Thermocouple Locations - 4" Conduit #7, Test Deck #7, Rev. 1
Drawn by: H. Hunter Date: 7/25/94 Appr'd by: C Humphrey Date: 7/25/94

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

OTE:
his 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 #: 97260

Test Deck #: 7

Item: Aluminum 3/4" Conduit Surface

TC Number	Description of exact physical location
E1	On outside surface of the conduit, 2" below deck insulation.
E2	On outside surface of the conduit, 6" below previous thermocouple.
E3	On outside surface of the conduit, 6" below previous thermocouple.
E4	On outside surface of the conduit, 6" below previous thermocouple.
E5	On outside surface of the conduit, 6" below previous thermocouple.
E6	On outside surface of the condulet, 6" below previous thermocouple.
E7	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E8	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E9	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E10	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E11	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E12	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E13	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E14	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E15	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E16	On outside surface of the conduit elbow, 6" from previous thermocouple.
E17	On outside surface of the conduit, 6" above previous thermocouple.
E18	On outside surface of the conduit, 6" above previous thermocouple.
E19	On outside surface of the conduit, 6" above previous thermocouple.
E20	On outside surface of the conduit, 6" above previous thermocouple.
E21	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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. 97260

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 #: 97260

Test Deck #: 7

Item: Steel 3/4" Conduit Surface

TC Number	Description of exact physical location
E22	On outside surface of the conduit, 2" below deck insulation.
E23	On outside surface of the conduit, 6" below previous thermocouple.
E24	On outside surface of the conduit, 6" below previous thermocouple.
E25	On outside surface of the conduit, 6" below previous thermocouple.
E26	On outside surface of the conduit, 6" below previous thermocouple.
E27	On outside surface of the condulet, 6" below previous thermocouple.
E28	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E29	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E30	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E31	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E32	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E33	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E34	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E35	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E36	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E37	On outside surface of the conduit elbow, 6" from previous thermocouple.
E38	On outside surface of the conduit, 6" above previous thermocouple.
E39	On outside surface of the conduit, 6" above previous thermocouple.
E40	On outside surface of the conduit, 6" above previous thermocouple.
E41	On outside surface of the conduit, 6" above previous thermocouple.
E42	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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. 97260

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 #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Front-most 4" Conduit in Array

TC Number	Description of exact physical location
E43	On outside surface of the conduit, 2" below deck insulation.
E44	On outside surface of the conduit, 6" below previous thermocouple.
E45	On outside surface of the conduit, 6" below previous thermocouple.
E46	On outside surface of the condulet, 6" below previous thermocouple.
E47	On outside surface of the condulet, 6" below previous thermocouple.
E48	On outside surface of the condulet, 6" below previous thermocouple.
E49	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E50	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E51	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E52	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E53	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E54	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E55	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E56	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E57	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E58	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E59	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E60	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E61	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E62	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E63	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E64	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E65	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E66	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E67	On outside surface of the conduit elbow, 6" from previous thermocouple.
E68	On outside surface of the conduit elbow, 6" from previous thermocouple.
E69	On outside surface of the conduit elbow, 6" from previous thermocouple.
E70	On outside surface of the conduit elbow, 6" from previous thermocouple.
E71	On outside surface of the conduit elbow, 6" from previous thermocouple.
E72	On outside surface of the conduit elbow, 6" from previous thermocouple.
E73	On outside surface of the conduit, 6" above previous thermocouple.
E74	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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. 97260

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 #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Second 4" Conduit From Front

TC Number	Description of exact physical location
E75	On outside surface of the conduit, 2" below deck insulation.
E76	On outside surface of the conduit, 6" below previous thermocouple.
E77	On outside surface of the conduit, 6" below previous thermocouple.
E78	On outside surface of the condulet, 6" below previous thermocouple.
E79	On outside surface of the condulet, 6" below previous thermocouple.
E80	On outside surface of the condulet, 6" below previous thermocouple.
E81	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E82	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E83	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E84	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E85	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E86	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E87	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E88	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E89	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E90	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E91	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E92	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E93	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E94	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E95	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E96	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E97	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E98	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E99	On outside surface of the conduit elbow, 6" from previous thermocouple.
E100	On outside surface of the conduit elbow, 6" from previous thermocouple.
E101	On outside surface of the conduit elbow, 6" from previous thermocouple.
E102	On outside surface of the conduit elbow, 6" from previous thermocouple.
E103	On outside surface of the conduit elbow, 6" from previous thermocouple.
E104	On outside surface of the conduit elbow, 6" from previous thermocouple.
E105	On outside surface of the conduit, 6" above previous thermocouple.
E106	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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. 97260

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Project #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Third 4" Conduit From Front

TC Number	Description of exact physical location
E107	On outside surface of the conduit, 2" below deck insulation.
E108	On outside surface of the conduit, 6" below previous thermocouple.
E109	On outside surface of the conduit, 6" below previous thermocouple.
E110	On outside surface of the condulet, 6" below previous thermocouple.
E111	On outside surface of the condulet, 6" below previous thermocouple.
E112	On outside surface of the condulet, 6" below previous thermocouple.
E113	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E114	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E115	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E116	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E117	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E118	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E119	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E120	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E121	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E122	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E123	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E124	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E125	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E126	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E127	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E128	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E129	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E130	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E131	On outside surface of the conduit elbow, 6" from previous thermocouple.
E132	On outside surface of the conduit elbow, 6" from previous thermocouple.
E133	On outside surface of the conduit elbow, 6" from previous thermocouple.
E134	On outside surface of the conduit elbow, 6" from previous thermocouple.
E135	On outside surface of the conduit elbow, 6" from previous thermocouple.
E136	On outside surface of the conduit elbow, 6" from previous thermocouple.
E137	On outside surface of the conduit, 6" above previous thermocouple.
E138	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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 #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Fourth 4" Conduit From Front

TC Number	Description of exact physical location
E139	On outside surface of the conduit, 2" below deck insulation.
E140	On outside surface of the conduit, 6" below previous thermocouple.
E141	On outside surface of the conduit, 6" below previous thermocouple.
E142	On outside surface of the condulet, 6" below previous thermocouple.
E143	On outside surface of the condulet, 6" below previous thermocouple.
E144	On outside surface of the condulet, 6" below previous thermocouple.
E145	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E146	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E147	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E148	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E149	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E150	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E151	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E152	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E153	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E154	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E155	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E156	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E157	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E158	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E159	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E160	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E161	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E162	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E163	On outside surface of the conduit elbow, 6" from previous thermocouple.
E164	On outside surface of the conduit elbow, 6" from previous thermocouple.
E165	On outside surface of the conduit elbow, 6" from previous thermocouple.
E166	On outside surface of the conduit elbow, 6" from previous thermocouple.
E167	On outside surface of the conduit elbow, 6" from previous thermocouple.
E168	On outside surface of the conduit elbow, 6" from previous thermocouple.
E169	On outside surface of the conduit, 6" above previous thermocouple.
E170	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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 #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Fifth 4" Conduit From Front

TC Number	Description of exact physical location
E171	On outside surface of the conduit, 2" below deck insulation.
E172	On outside surface of the conduit, 6" below previous thermocouple.
E173	On outside surface of the conduit, 6" below previous thermocouple.
E174	On outside surface of the condulet, 6" below previous thermocouple.
E175	On outside surface of the condulet, 6" below previous thermocouple.
E176	On outside surface of the condulet, 6" below previous thermocouple.
E177	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E178	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E179	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E180	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E181	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E182	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E183	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E184	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E185	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E186	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E187	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E188	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E189	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E190	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E191	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E192	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E193	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E194	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E195	On outside surface of the conduit elbow, 6" from previous thermocouple.
E196	On outside surface of the conduit elbow, 6" from previous thermocouple.
E197	On outside surface of the conduit elbow, 6" from previous thermocouple.
E198	On outside surface of the conduit elbow, 6" from previous thermocouple.
E199	On outside surface of the conduit elbow, 6" from previous thermocouple.
E200	On outside surface of the conduit elbow, 6" from previous thermocouple.
E201	On outside surface of the conduit, 6" above previous thermocouple.
E202	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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 #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Sixth 4" Conduit From Front

TC Number	Description of exact physical location
E203	On outside surface of the conduit, 2" below deck insulation.
E204	On outside surface of the conduit, 6" below previous thermocouple.
E205	On outside surface of the conduit, 6" below previous thermocouple.
E206	On outside surface of the condulet, 6" below previous thermocouple.
E207	On outside surface of the condulet, 6" below previous thermocouple.
E208	On outside surface of the condulet, 6" below previous thermocouple.
E209	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E210	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E211	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E212	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E213	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E214	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E215	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E216	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E217	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E218	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E219	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E220	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E221	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E222	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E223	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E224	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E225	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E226	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E227	On outside surface of the conduit elbow, 6" from previous thermocouple.
E228	On outside surface of the conduit elbow, 6" from previous thermocouple.
E229	On outside surface of the conduit elbow, 6" from previous thermocouple.
E230	On outside surface of the conduit elbow, 6" from previous thermocouple.
E231	On outside surface of the conduit elbow, 6" from previous thermocouple.
E232	On outside surface of the conduit elbow, 6" from previous thermocouple.
E233	On outside surface of the conduit, 6" above previous thermocouple.
E234	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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 #: 97260

Test Deck #: 7

Item: 4" Conduit Surface

Seventh 4" Conduit From Front

TC Number	Description of exact physical location
E235	On outside surface of the conduit, 2" below deck insulation.
E236	On outside surface of the conduit, 6" below previous thermocouple.
E237	On outside surface of the conduit, 6" below previous thermocouple.
E238	On outside surface of the condulet, 6" below previous thermocouple.
E239	On outside surface of the condulet, 6" below previous thermocouple.
E240	On outside surface of the condulet, 6" below previous thermocouple.
E241	On outside, bottom surface of the condulet, 4 1/2" below and 1 1/2" right of previous thermocouple.
E242	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E243	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E244	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E245	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E246	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E247	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E248	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E249	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E250	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E251	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E252	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E253	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E254	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E255	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E256	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E257	On outside, bottom surface of the conduit, 6" from previous thermocouple.
E258	On outside, bottom surface of the conduit elbow, 6" from previous thermocouple.
E259	On outside surface of the conduit elbow, 6" from previous thermocouple.
E260	On outside surface of the conduit elbow, 6" from previous thermocouple.
E261	On outside surface of the conduit elbow, 6" from previous thermocouple.
E262	On outside surface of the conduit elbow, 6" from previous thermocouple.
E263	On outside surface of the conduit elbow, 6" from previous thermocouple.
E264	On outside surface of the conduit elbow, 6" from previous thermocouple.
E265	On outside surface of the conduit, 6" above previous thermocouple.
E266	On outside surface of the conduit, 6" above previous thermocouple, 2" below deck insulation.

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 #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Aluminum 3/4" Conduit

TC Number	Description of exact physical location
C267	On bare #8 wire in conduit, 2" below deck insulation.
C268	On bare #8 wire in conduit, 6" below previous thermocouple.
C269	On bare #8 wire in conduit, 6" below previous thermocouple.
C270	On bare #8 wire in conduit, 6" below previous thermocouple.
C271	On bare #8 wire in conduit, 6" below previous thermocouple.
C272	On bare #8 wire in conduit, 6" below previous thermocouple.
C273	On bare #8 wire in conduit, 6" below previous thermocouple.
C274	On bare #8 wire in conduit, 6" below previous thermocouple.
C275	On bare #8 wire in conduit, 6" below previous thermocouple.
C276	On bare #8 wire in conduit, 6" below previous thermocouple.
C277	On bare #8 wire in conduit, 6" below previous thermocouple.
C278	On bare #8 wire in conduit, 6" below previous thermocouple.
C279	On bare #8 wire in conduit, 6" below previous thermocouple.
C280	On bare #8 wire in conduit, 6" below previous thermocouple.
C281	On bare #8 wire in conduit, 6" below previous thermocouple.
C282	On bare #8 wire in conduit, 6" below previous thermocouple.
C283	On bare #8 wire in conduit, 6" below previous thermocouple.
C284	On bare #8 wire in conduit, 6" below previous thermocouple.
C285	On bare #8 wire in conduit, 6" below previous thermocouple.
C286	On bare #8 wire in conduit, 6" below previous thermocouple.
C287	On bare #8 wire in 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.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

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Project #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Steel 3/4" Conduit

TC Number	Description of exact physical location
C288	On bare #8 wire in conduit, 2" below deck insulation.
C289	On bare #8 wire in conduit, 6" below previous thermocouple.
C290	On bare #8 wire in conduit, 6" below previous thermocouple.
C291	On bare #8 wire in conduit, 6" below previous thermocouple.
C292	On bare #8 wire in conduit, 6" below previous thermocouple.
C293	On bare #8 wire in conduit, 6" below previous thermocouple.
C294	On bare #8 wire in conduit, 6" below previous thermocouple.
C295	On bare #8 wire in conduit, 6" below previous thermocouple.
C296	On bare #8 wire in conduit, 6" below previous thermocouple.
C297	On bare #8 wire in conduit, 6" below previous thermocouple.
C298	On bare #8 wire in conduit, 6" below previous thermocouple.
C299	On bare #8 wire in conduit, 6" below previous thermocouple.
C300	On bare #8 wire in conduit, 6" below previous thermocouple.
C301	On bare #8 wire in conduit, 6" below previous thermocouple.
C302	On bare #8 wire in conduit, 6" below previous thermocouple.
C303	On bare #8 wire in conduit, 6" below previous thermocouple.
C304	On bare #8 wire in conduit, 6" below previous thermocouple.
C305	On bare #8 wire in conduit, 6" below previous thermocouple.
C306	On bare #8 wire in conduit, 6" below previous thermocouple.
C307	On bare #8 wire in conduit, 6" below previous thermocouple.
C308	On bare #8 wire in 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.

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Project #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Front-most 4" Conduit in Array

TC Number	Description of exact physical location
C309	On bare #8 wire in conduit, 2" below deck insulation.
C310	On bare #8 wire in conduit, 6" below previous thermocouple.
C311	On bare #8 wire in conduit, 6" below previous thermocouple.
C312	On bare #8 wire in conduit, 6" below previous thermocouple.
C313	On bare #8 wire in conduit, 6" below previous thermocouple.
C314	On bare #8 wire in conduit, 6" below previous thermocouple.
C315	On bare #8 wire in conduit, 6" below previous thermocouple.
C316	On bare #8 wire in conduit, 6" below previous thermocouple.
C317	On bare #8 wire in conduit, 6" below previous thermocouple.
C318	On bare #8 wire in conduit, 6" below previous thermocouple.
C319	On bare #8 wire in conduit, 6" below previous thermocouple.
C320	On bare #8 wire in conduit, 6" below previous thermocouple.
C321	On bare #8 wire in conduit, 6" below previous thermocouple.
C322	On bare #8 wire in conduit, 6" below previous thermocouple.
C323	On bare #8 wire in conduit, 6" below previous thermocouple.
C324	On bare #8 wire in conduit, 6" below previous thermocouple.
C325	On bare #8 wire in conduit, 6" below previous thermocouple.
C326	On bare #8 wire in conduit, 6" below previous thermocouple.
C327	On bare #8 wire in conduit, 6" below previous thermocouple.
C328	On bare #8 wire in conduit, 6" below previous thermocouple.
C329	On bare #8 wire in conduit, 6" below previous thermocouple.
C330	On bare #8 wire in conduit, 6" below previous thermocouple.
C331	On bare #8 wire in conduit, 6" below previous thermocouple.
C332	On bare #8 wire in conduit, 6" below previous thermocouple.
C333	On bare #8 wire in conduit, 6" below previous thermocouple.
C334	On bare #8 wire in conduit, 6" below previous thermocouple.
C335	On bare #8 wire in conduit, 6" below previous thermocouple.
C336	On bare #8 wire in conduit, 6" below previous thermocouple.
C337	On bare #8 wire in conduit, 6" below previous thermocouple.
C338	On bare #8 wire in conduit, 6" below previous thermocouple.
C339	On bare #8 wire in conduit, 6" below previous thermocouple.
C340	On bare #8 wire in 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.

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Project #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Second 4" Conduit From Front

TC Number	Description of exact physical location
C341	On bare #8 wire in conduit, 2" below deck insulation.
C342	On bare #8 wire in conduit, 6" below previous thermocouple.
C343	On bare #8 wire in conduit, 6" below previous thermocouple.
C344	On bare #8 wire in conduit, 6" below previous thermocouple.
C345	On bare #8 wire in conduit, 6" below previous thermocouple.
C346	On bare #8 wire in conduit, 6" below previous thermocouple.
C347	On bare #8 wire in conduit, 6" below previous thermocouple.
C348	On bare #8 wire in conduit, 6" below previous thermocouple.
C349	On bare #8 wire in conduit, 6" below previous thermocouple.
C350	On bare #8 wire in conduit, 6" below previous thermocouple.
C351	On bare #8 wire in conduit, 6" below previous thermocouple.
C352	On bare #8 wire in conduit, 6" below previous thermocouple.
C353	On bare #8 wire in conduit, 6" below previous thermocouple.
C354	On bare #8 wire in conduit, 6" below previous thermocouple.
C355	On bare #8 wire in conduit, 6" below previous thermocouple.
C356	On bare #8 wire in conduit, 6" below previous thermocouple.
C357	On bare #8 wire in conduit, 6" below previous thermocouple.
C358	On bare #8 wire in conduit, 6" below previous thermocouple.
C359	On bare #8 wire in conduit, 6" below previous thermocouple.
C360	On bare #8 wire in conduit, 6" below previous thermocouple.
C361	On bare #8 wire in conduit, 6" below previous thermocouple.
C362	On bare #8 wire in conduit, 6" below previous thermocouple.
C363	On bare #8 wire in conduit, 6" below previous thermocouple.
C364	On bare #8 wire in conduit, 6" below previous thermocouple.
C365	On bare #8 wire in conduit, 6" below previous thermocouple.
C366	On bare #8 wire in conduit, 6" below previous thermocouple.
C367	On bare #8 wire in conduit, 6" below previous thermocouple.
C368	On bare #8 wire in conduit, 6" below previous thermocouple.
C369	On bare #8 wire in conduit, 6" below previous thermocouple.
C370	On bare #8 wire in conduit, 6" below previous thermocouple.
C371	On bare #8 wire in conduit, 6" below previous thermocouple.
C372	On bare #8 wire in 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

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

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 #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Third 4" Conduit From Front

TC Number	Description of exact physical location
C373	On bare #8 wire in conduit, 2" below deck insulation.
C374	On bare #8 wire in conduit, 6" below previous thermocouple.
C375	On bare #8 wire in conduit, 6" below previous thermocouple.
C376	On bare #8 wire in conduit, 6" below previous thermocouple.
C377	On bare #8 wire in conduit, 6" below previous thermocouple.
C378	On bare #8 wire in conduit, 6" below previous thermocouple.
C379	On bare #8 wire in conduit, 6" below previous thermocouple.
C380	On bare #8 wire in conduit, 6" below previous thermocouple.
C381	On bare #8 wire in conduit, 6" below previous thermocouple.
C382	On bare #8 wire in conduit, 6" below previous thermocouple.
C383	On bare #8 wire in conduit, 6" below previous thermocouple.
C384	On bare #8 wire in conduit, 6" below previous thermocouple.
C385	On bare #8 wire in conduit, 6" below previous thermocouple.
C386	On bare #8 wire in conduit, 6" below previous thermocouple.
C387	On bare #8 wire in conduit, 6" below previous thermocouple.
C388	On bare #8 wire in conduit, 6" below previous thermocouple.
C389	On bare #8 wire in conduit, 6" below previous thermocouple.
C390	On bare #8 wire in conduit, 6" below previous thermocouple.
C391	On bare #8 wire in conduit, 6" below previous thermocouple.
C392	On bare #8 wire in conduit, 6" below previous thermocouple.
C393	On bare #8 wire in conduit, 6" below previous thermocouple.
C394	On bare #8 wire in conduit, 6" below previous thermocouple.
C395	On bare #8 wire in conduit, 6" below previous thermocouple.
C396	On bare #8 wire in conduit, 6" below previous thermocouple.
C397	On bare #8 wire in conduit, 6" below previous thermocouple.
C398	On bare #8 wire in conduit, 6" below previous thermocouple.
C399	On bare #8 wire in conduit, 6" below previous thermocouple.
C400	On bare #8 wire in conduit, 6" below previous thermocouple.
C401	On bare #8 wire in conduit, 6" below previous thermocouple.
C402	On bare #8 wire in conduit, 6" below previous thermocouple.
C403	On bare #8 wire in conduit, 6" below previous thermocouple.
C404	On bare #8 wire in 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.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

NOTE:
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Project #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Fourth 4" Conduit From Front

TC Number	Description of exact physical location
C405	On bare #8 wire in conduit, 2" below deck insulation.
C406	On bare #8 wire in conduit, 6" below previous thermocouple.
C407	On bare #8 wire in conduit, 6" below previous thermocouple.
C408	On bare #8 wire in conduit, 6" below previous thermocouple.
C409	On bare #8 wire in conduit, 6" below previous thermocouple.
C410	On bare #8 wire in conduit, 6" below previous thermocouple.
C411	On bare #8 wire in conduit, 6" below previous thermocouple.
C412	On bare #8 wire in conduit, 6" below previous thermocouple.
C413	On bare #8 wire in conduit, 6" below previous thermocouple.
C414	On bare #8 wire in conduit, 6" below previous thermocouple.
C415	On bare #8 wire in conduit, 6" below previous thermocouple.
C416	On bare #8 wire in conduit, 6" below previous thermocouple.
C417	On bare #8 wire in conduit, 6" below previous thermocouple.
C418	On bare #8 wire in conduit, 6" below previous thermocouple.
C419	On bare #8 wire in conduit, 6" below previous thermocouple.
C420	On bare #8 wire in conduit, 6" below previous thermocouple.
C421	On bare #8 wire in conduit, 6" below previous thermocouple.
C422	On bare #8 wire in conduit, 6" below previous thermocouple.
C423	On bare #8 wire in conduit, 6" below previous thermocouple.
C424	On bare #8 wire in conduit, 6" below previous thermocouple.
C425	On bare #8 wire in conduit, 6" below previous thermocouple.
C426	On bare #8 wire in conduit, 6" below previous thermocouple.
C427	On bare #8 wire in conduit, 6" below previous thermocouple.
C428	On bare #8 wire in conduit, 6" below previous thermocouple.
C429	On bare #8 wire in conduit, 6" below previous thermocouple.
C430	On bare #8 wire in conduit, 6" below previous thermocouple.
C431	On bare #8 wire in conduit, 6" below previous thermocouple.
C432	On bare #8 wire in conduit, 6" below previous thermocouple.
C433	On bare #8 wire in conduit, 6" below previous thermocouple.
C434	On bare #8 wire in conduit, 6" below previous thermocouple.
C435	On bare #8 wire in conduit, 6" below previous thermocouple.
C436	On bare #8 wire in 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

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

NOTE:
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Project #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Fifth 4" Conduit From Front

TC Number	Description of exact physical location
C437	On bare #8 wire in conduit, 2" below deck insulation.
C438	On bare #8 wire in conduit, 6" below previous thermocouple.
C439	On bare #8 wire in conduit, 6" below previous thermocouple.
C440	On bare #8 wire in conduit, 6" below previous thermocouple.
C441	On bare #8 wire in conduit, 6" below previous thermocouple.
C442	On bare #8 wire in conduit, 6" below previous thermocouple.
C443	On bare #8 wire in conduit, 6" below previous thermocouple.
C444	On bare #8 wire in conduit, 6" below previous thermocouple.
C445	On bare #8 wire in conduit, 6" below previous thermocouple.
C446	On bare #8 wire in conduit, 6" below previous thermocouple.
C447	On bare #8 wire in conduit, 6" below previous thermocouple.
C448	On bare #8 wire in conduit, 6" below previous thermocouple.
C449	On bare #8 wire in conduit, 6" below previous thermocouple.
C450	On bare #8 wire in conduit, 6" below previous thermocouple.
C451	On bare #8 wire in conduit, 6" below previous thermocouple.
C452	On bare #8 wire in conduit, 6" below previous thermocouple.
C453	On bare #8 wire in conduit, 6" below previous thermocouple.
C454	On bare #8 wire in conduit, 6" below previous thermocouple.
C455	On bare #8 wire in conduit, 6" below previous thermocouple.
C456	On bare #8 wire in conduit, 6" below previous thermocouple.
C457	On bare #8 wire in conduit, 6" below previous thermocouple.
C458	On bare #8 wire in conduit, 6" below previous thermocouple.
C459	On bare #8 wire in conduit, 6" below previous thermocouple.
C460	On bare #8 wire in conduit, 6" below previous thermocouple.
C461	On bare #8 wire in conduit, 6" below previous thermocouple.
C462	On bare #8 wire in conduit, 6" below previous thermocouple.
C463	On bare #8 wire in conduit, 6" below previous thermocouple.
C464	On bare #8 wire in conduit, 6" below previous thermocouple.
C465	On bare #8 wire in conduit, 6" below previous thermocouple.
C466	On bare #8 wire in conduit, 6" below previous thermocouple.
C467	On bare #8 wire in conduit, 6" below previous thermocouple.
C468	On bare #8 wire in 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.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

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 #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Sixth 4" Conduit From Front

TC Number	Description of exact physical location
C469	On bare #8 wire in conduit, 2" below deck insulation.
C470	On bare #8 wire in conduit, 6" below previous thermocouple.
C471	On bare #8 wire in conduit, 6" below previous thermocouple.
C472	On bare #8 wire in conduit, 6" below previous thermocouple.
C473	On bare #8 wire in conduit, 6" below previous thermocouple.
C474	On bare #8 wire in conduit, 6" below previous thermocouple.
C475	On bare #8 wire in conduit, 6" below previous thermocouple.
C476	On bare #8 wire in conduit, 6" below previous thermocouple.
C477	On bare #8 wire in conduit, 6" below previous thermocouple.
C478	On bare #8 wire in conduit, 6" below previous thermocouple.
C479	On bare #8 wire in conduit, 6" below previous thermocouple.
C480	On bare #8 wire in conduit, 6" below previous thermocouple.
C481	On bare #8 wire in conduit, 6" below previous thermocouple.
C482	On bare #8 wire in conduit, 6" below previous thermocouple.
C483	On bare #8 wire in conduit, 6" below previous thermocouple.
C484	On bare #8 wire in conduit, 6" below previous thermocouple.
C485	On bare #8 wire in conduit, 6" below previous thermocouple.
C486	On bare #8 wire in conduit, 6" below previous thermocouple.
C487	On bare #8 wire in conduit, 6" below previous thermocouple.
C488	On bare #8 wire in conduit, 6" below previous thermocouple.
C489	On bare #8 wire in conduit, 6" below previous thermocouple.
C490	On bare #8 wire in conduit, 6" below previous thermocouple.
C491	On bare #8 wire in conduit, 6" below previous thermocouple.
C492	On bare #8 wire in conduit, 6" below previous thermocouple.
C493	On bare #8 wire in conduit, 6" below previous thermocouple.
C494	On bare #8 wire in conduit, 6" below previous thermocouple.
C495	On bare #8 wire in conduit, 6" below previous thermocouple.
C496	On bare #8 wire in conduit, 6" below previous thermocouple.
C497	On bare #8 wire in conduit, 6" below previous thermocouple.
C498	On bare #8 wire in conduit, 6" below previous thermocouple.
C499	On bare #8 wire in conduit, 6" below previous thermocouple.
C500	On bare #8 wire in 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.

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THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97260

NOTE:
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Project #: 97260

Test Deck #: 7

Item: Bare #8 AWG Copper Wire in Seventh 4" Conduit From Front

TC Number	Description of exact physical location
C501	On bare #8 wire in conduit, 2" below deck insulation.
C502	On bare #8 wire in conduit, 6" below previous thermocouple.
C503	On bare #8 wire in conduit, 6" below previous thermocouple.
C504	On bare #8 wire in conduit, 6" below previous thermocouple.
C505	On bare #8 wire in conduit, 6" below previous thermocouple.
C506	On bare #8 wire in conduit, 6" below previous thermocouple.
C507	On bare #8 wire in conduit, 6" below previous thermocouple.
C508	On bare #8 wire in conduit, 6" below previous thermocouple.
C509	On bare #8 wire in conduit, 6" below previous thermocouple.
C510	On bare #8 wire in conduit, 6" below previous thermocouple.
C511	On bare #8 wire in conduit, 6" below previous thermocouple.
C512	On bare #8 wire in conduit, 6" below previous thermocouple.
C513	On bare #8 wire in conduit, 6" below previous thermocouple.
C514	On bare #8 wire in conduit, 6" below previous thermocouple.
C515	On bare #8 wire in conduit, 6" below previous thermocouple.
C516	On bare #8 wire in conduit, 6" below previous thermocouple.
C517	On bare #8 wire in conduit, 6" below previous thermocouple.
C518	On bare #8 wire in conduit, 6" below previous thermocouple.
C519	On bare #8 wire in conduit, 6" below previous thermocouple.
C520	On bare #8 wire in conduit, 6" below previous thermocouple.
C521	On bare #8 wire in conduit, 6" below previous thermocouple.
C522	On bare #8 wire in conduit, 6" below previous thermocouple.
C523	On bare #8 wire in conduit, 6" below previous thermocouple.
C524	On bare #8 wire in conduit, 6" below previous thermocouple.
C525	On bare #8 wire in conduit, 6" below previous thermocouple.
C526	On bare #8 wire in conduit, 6" below previous thermocouple.
C527	On bare #8 wire in conduit, 6" below previous thermocouple.
C528	On bare #8 wire in conduit, 6" below previous thermocouple.
C529	On bare #8 wire in conduit, 6" below previous thermocouple.
C530	On bare #8 wire in conduit, 6" below previous thermocouple.
C531	On bare #8 wire in conduit, 6" below previous thermocouple.
C532	On bare #8 wire in 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.

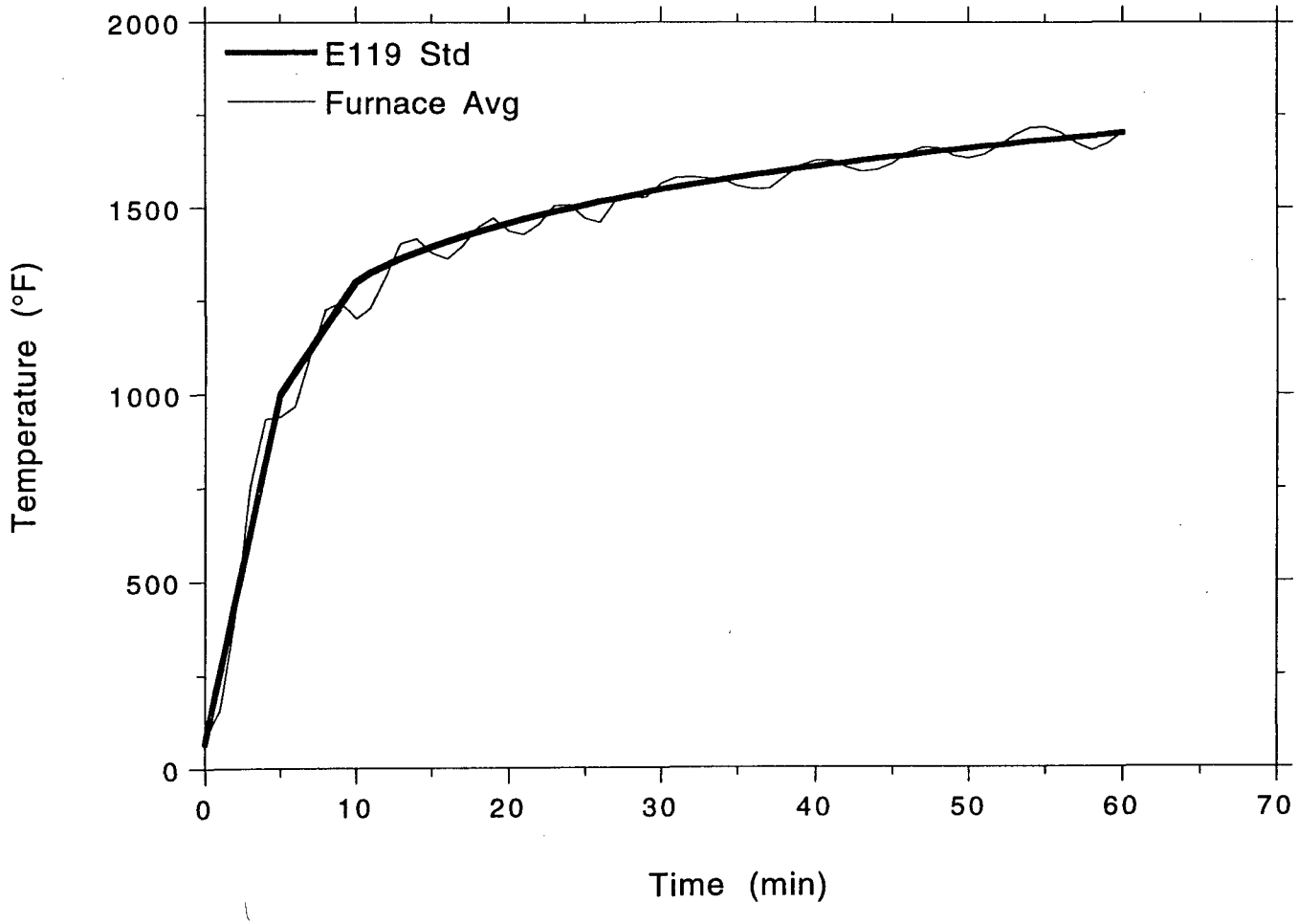
PLEASE USE THE BACK OF THIS SHEET FOR DRAWINGS, IF NECESSARY

Appendix D

TEST DATA

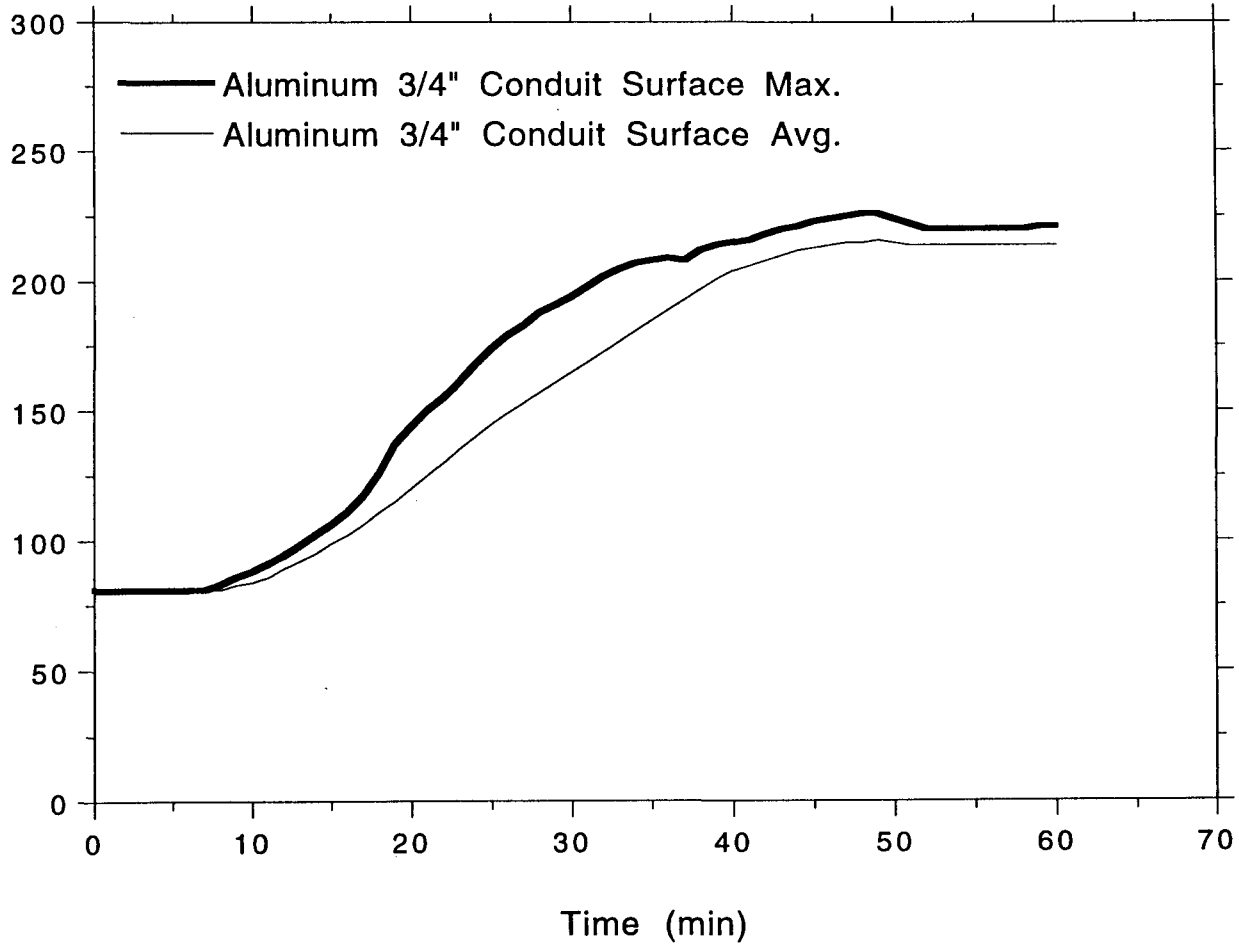
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Furnace Temperature



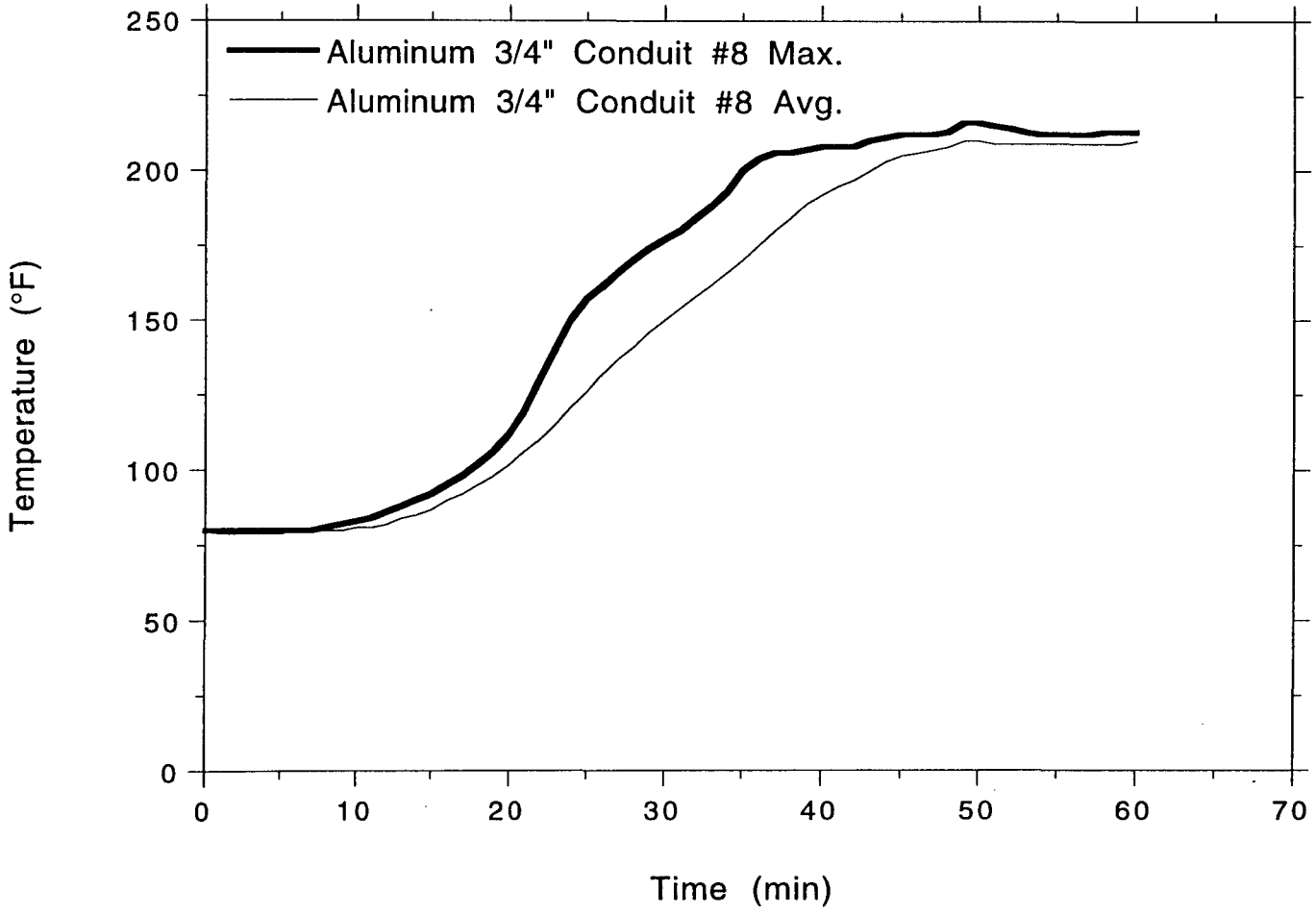
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



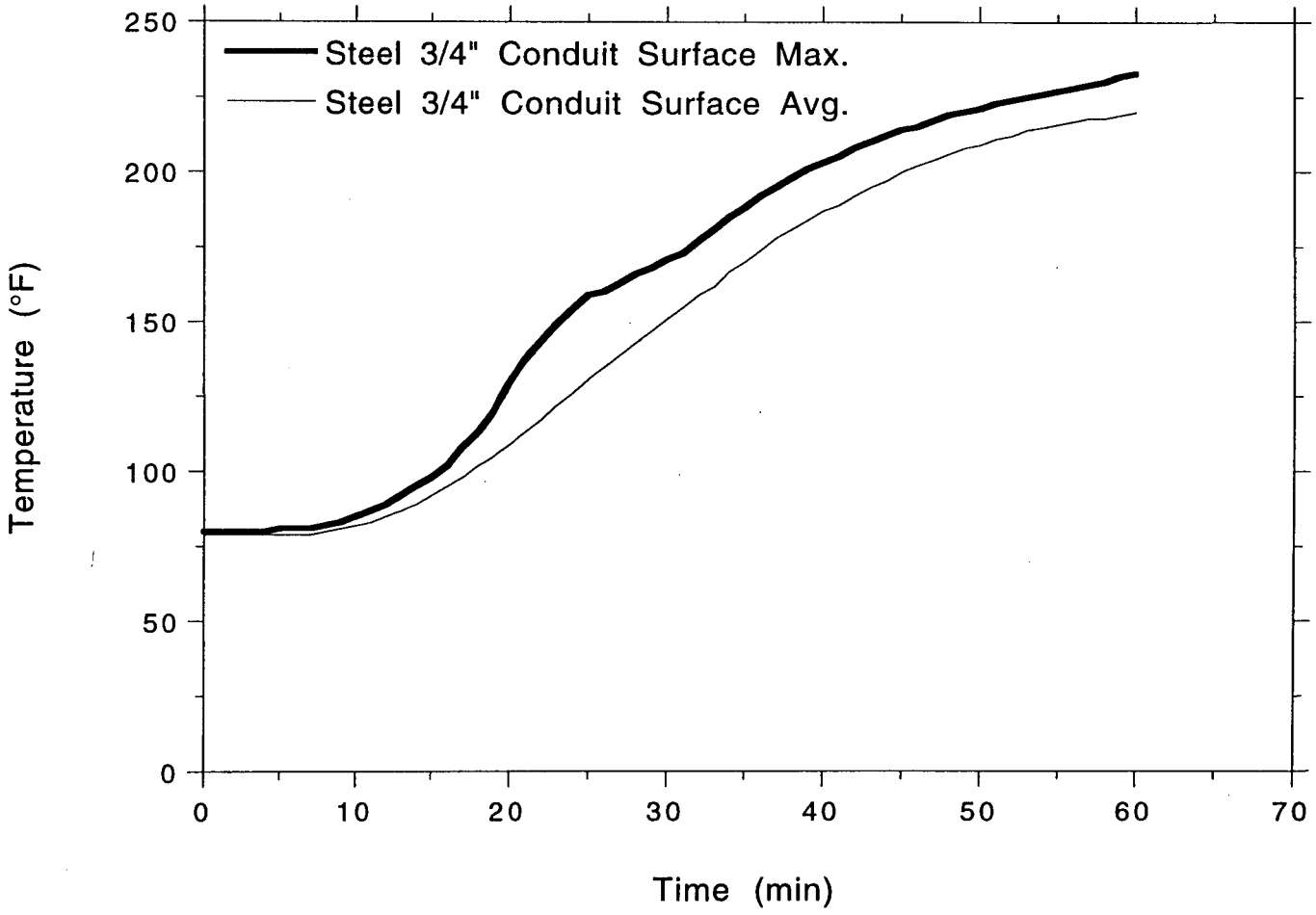
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



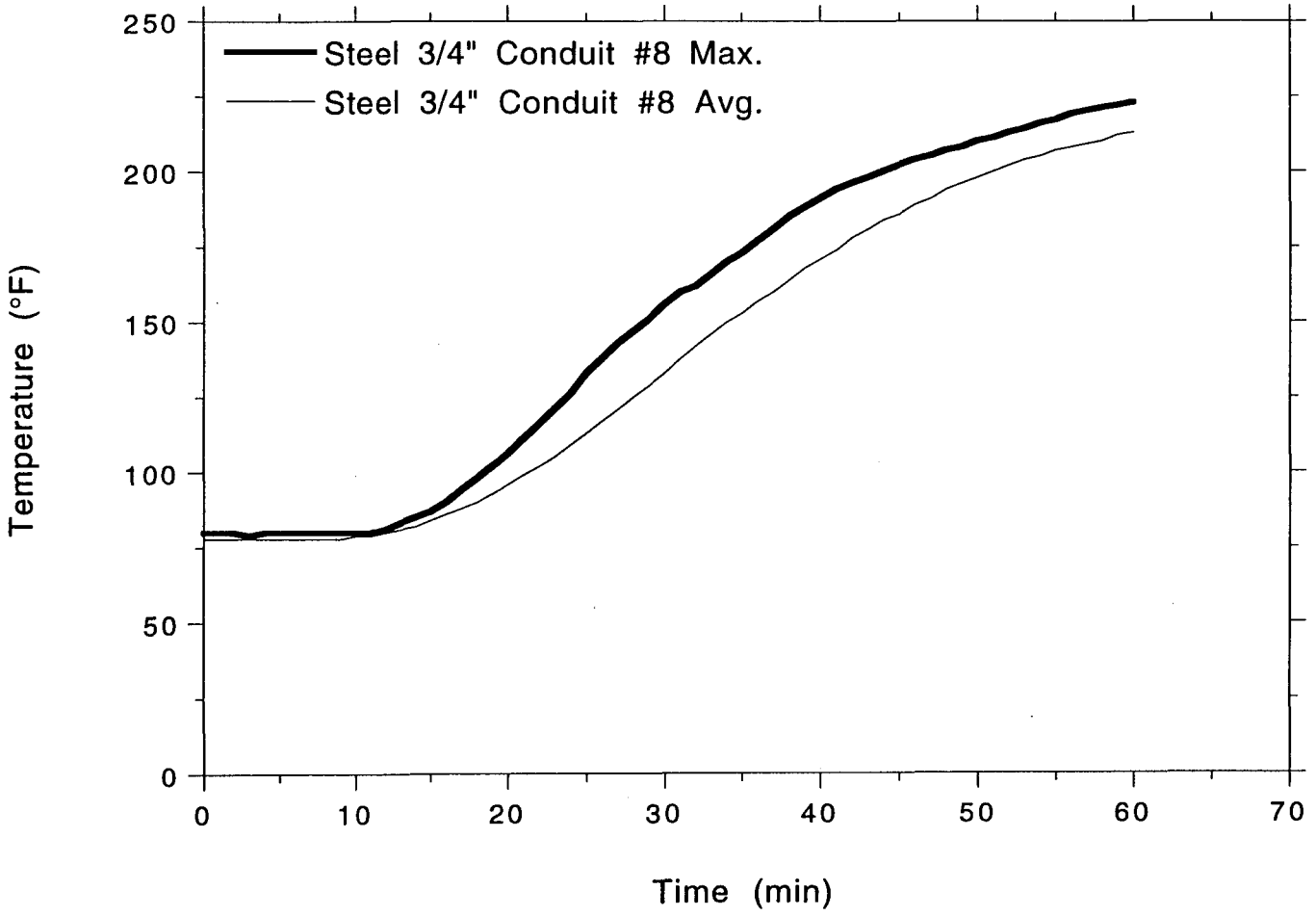
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



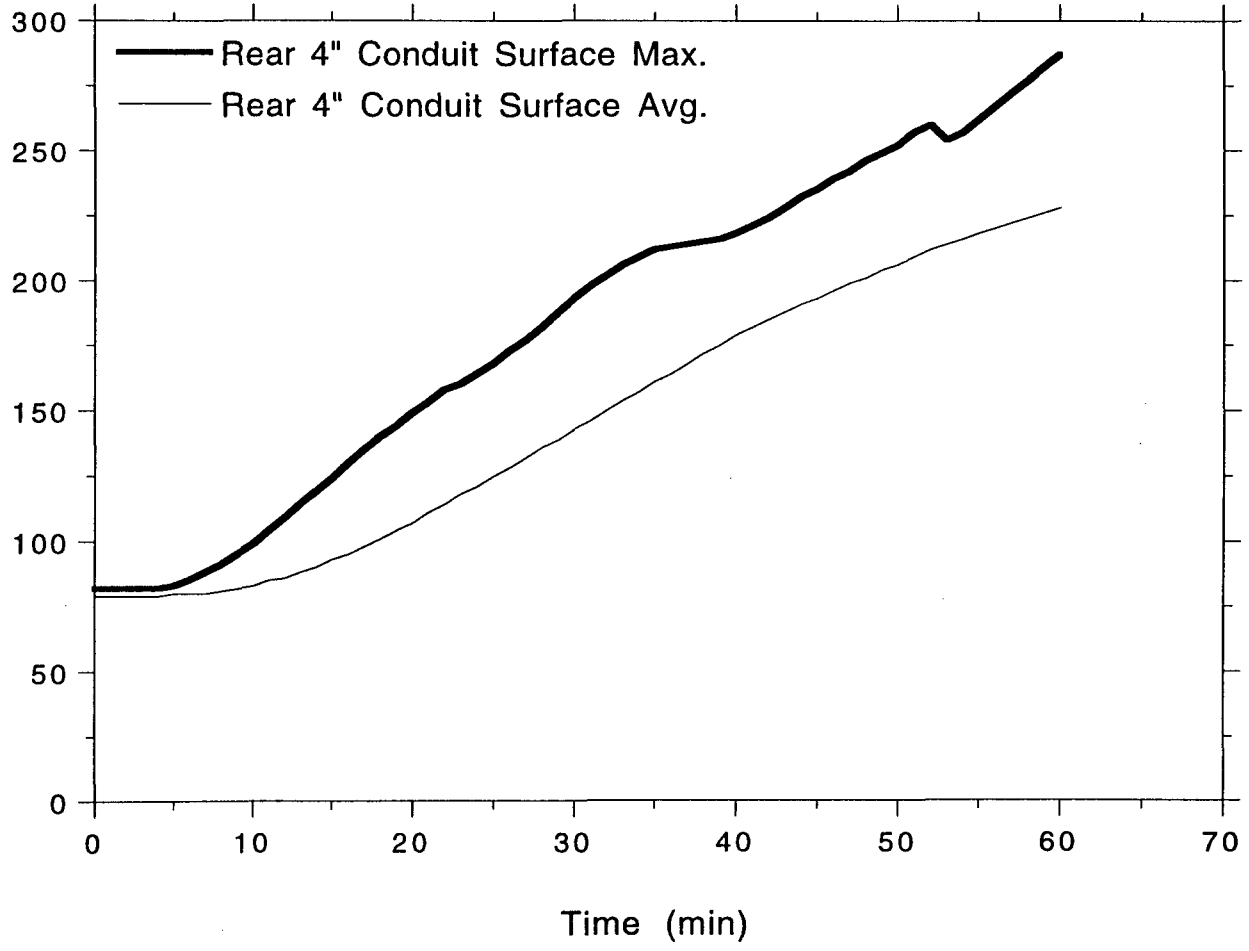
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



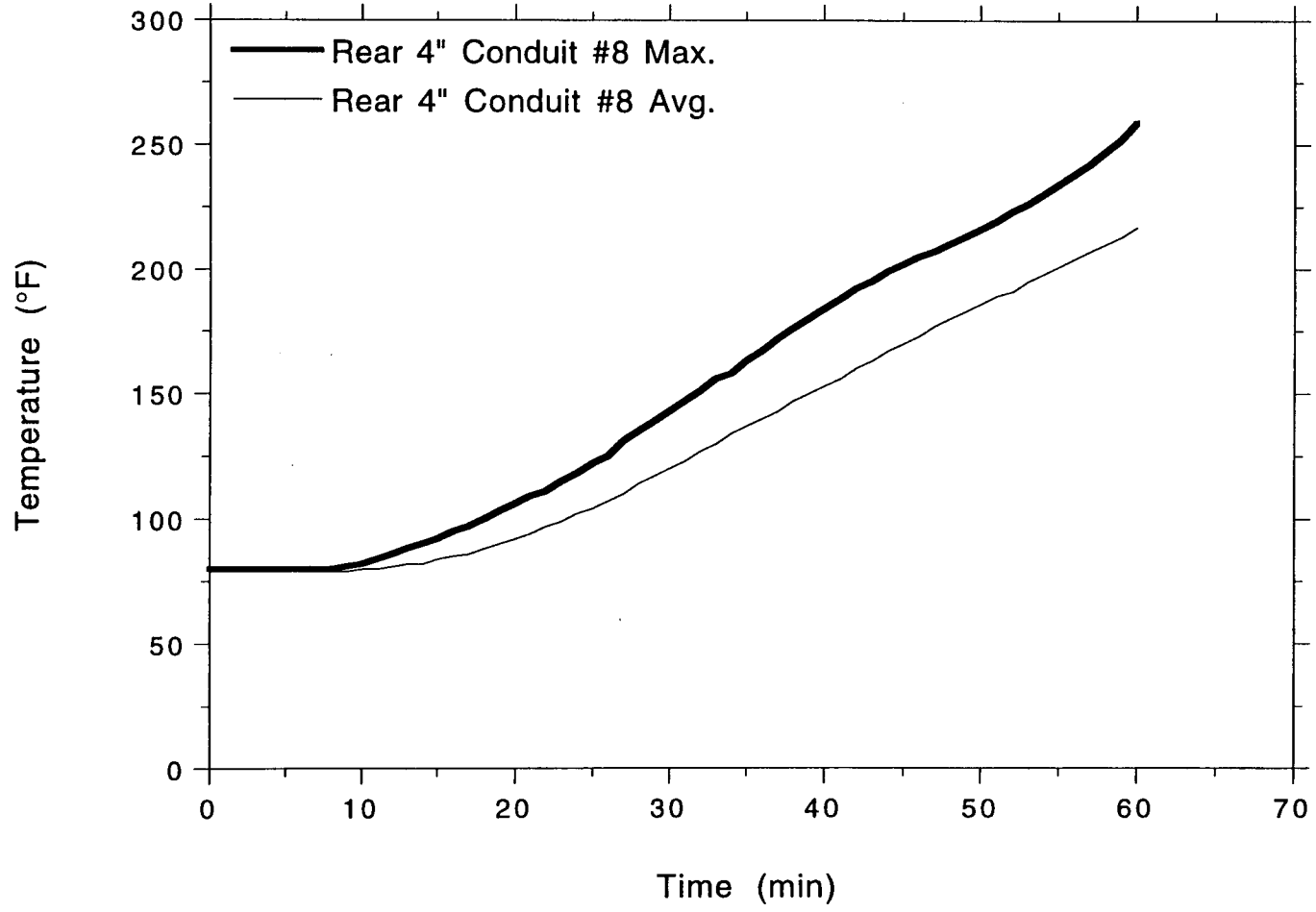
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



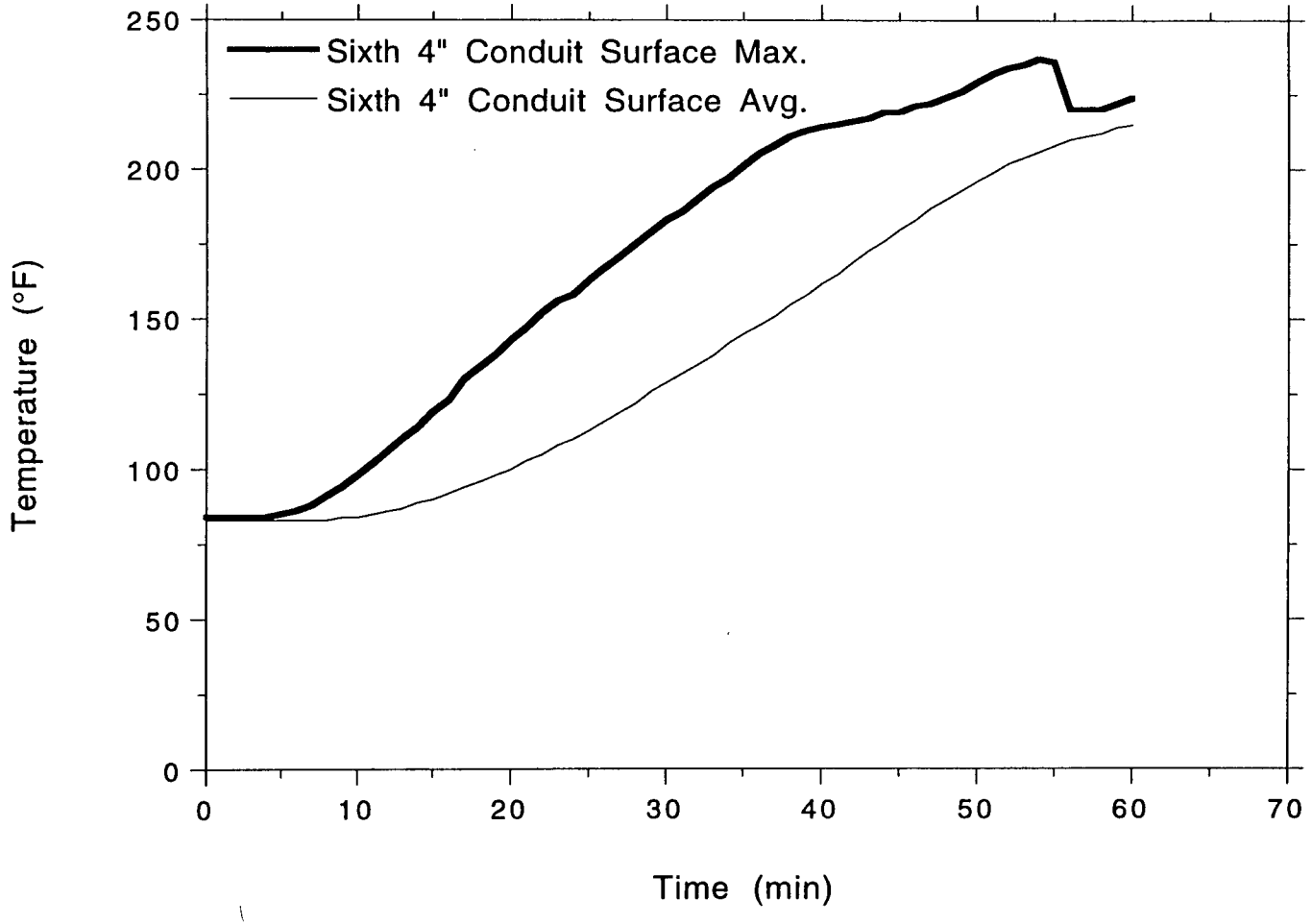
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



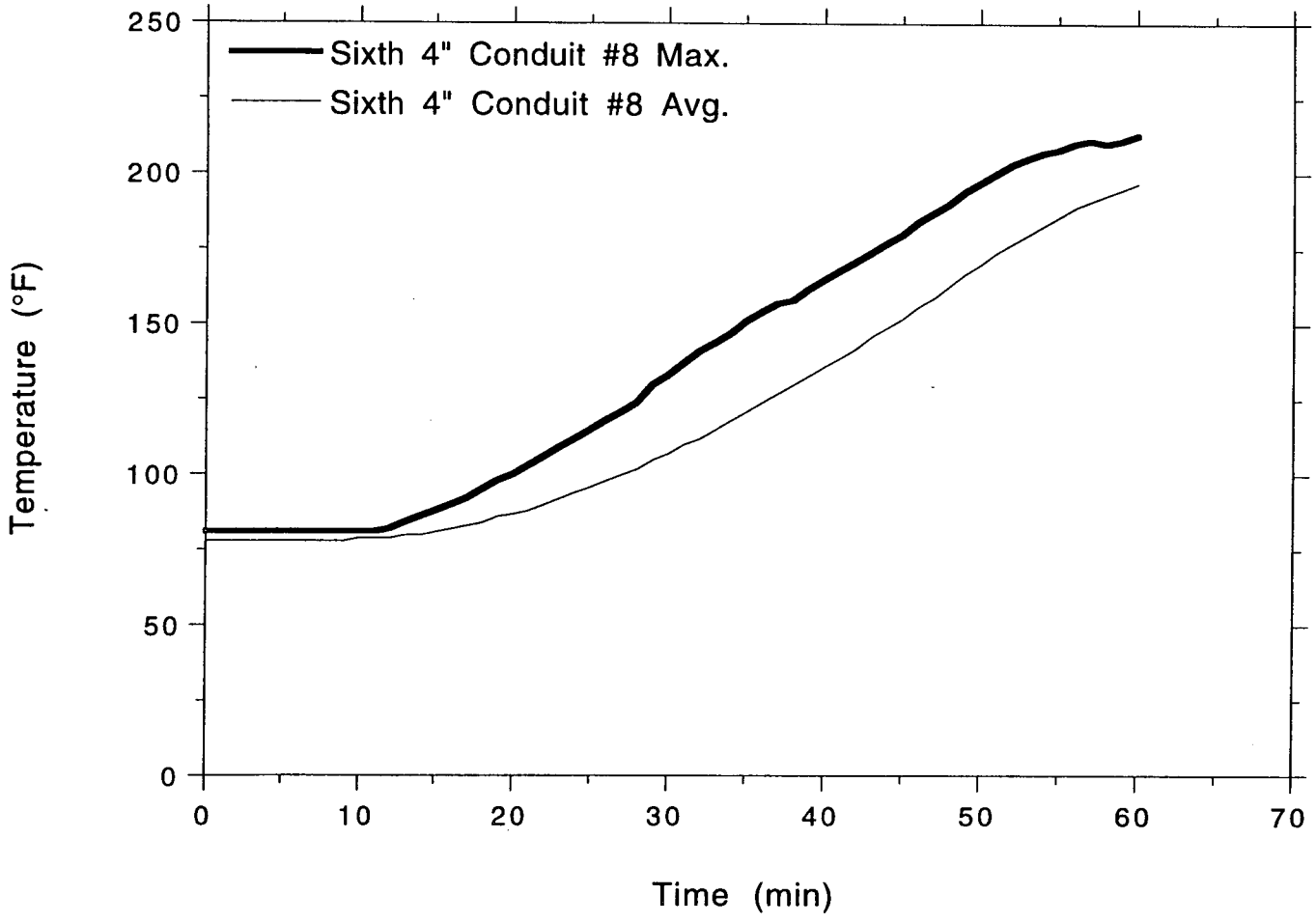
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



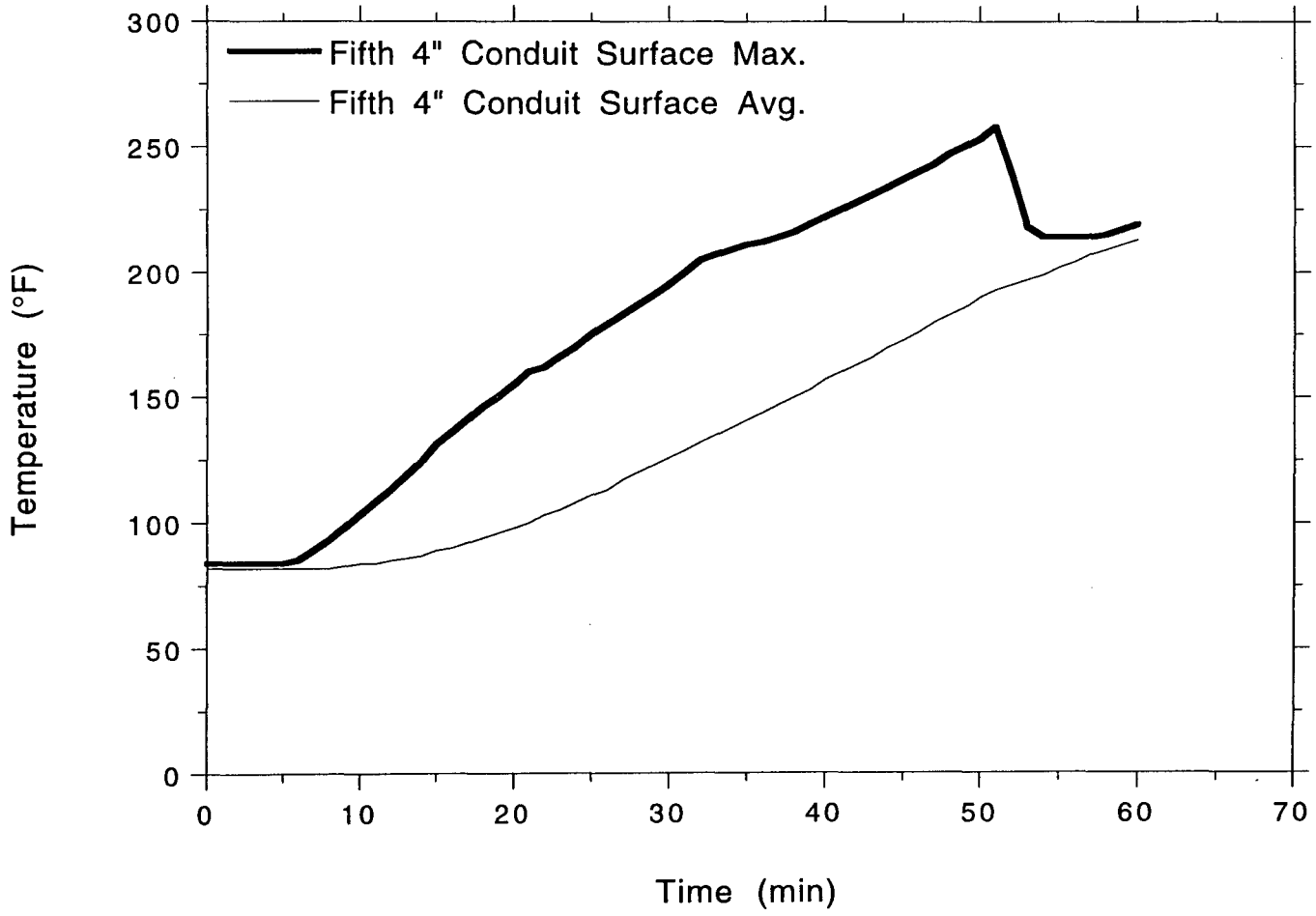
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



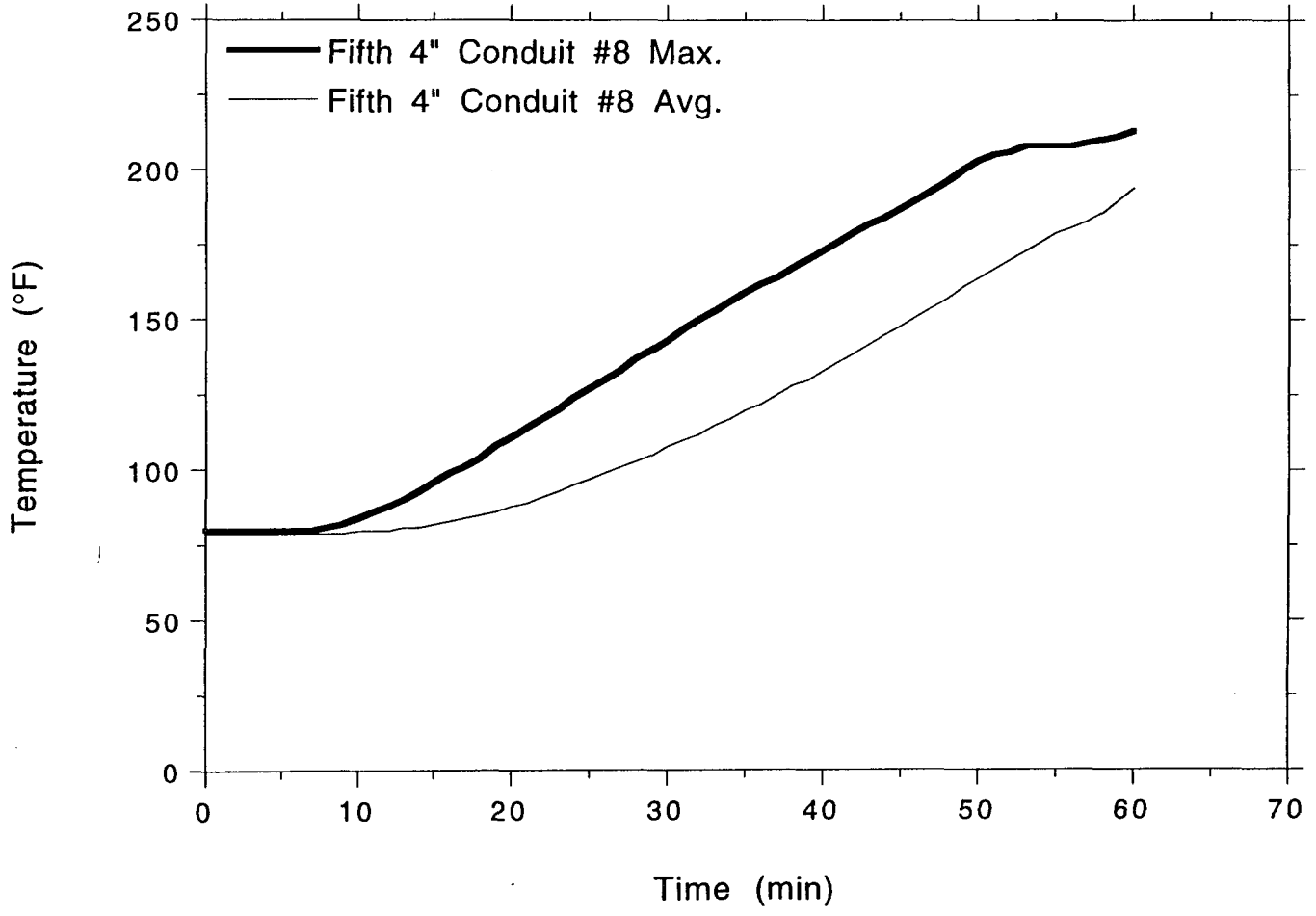
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



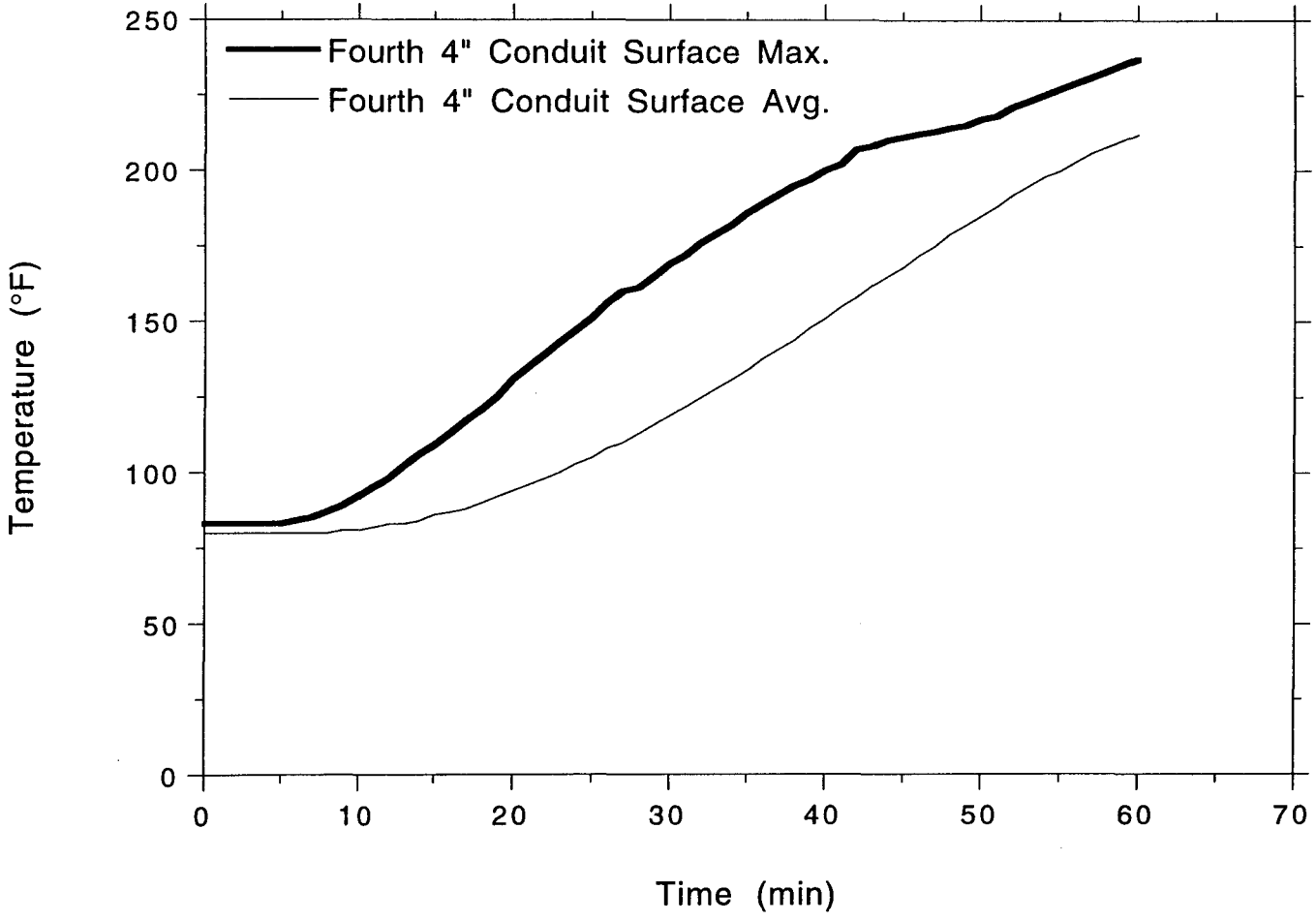
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



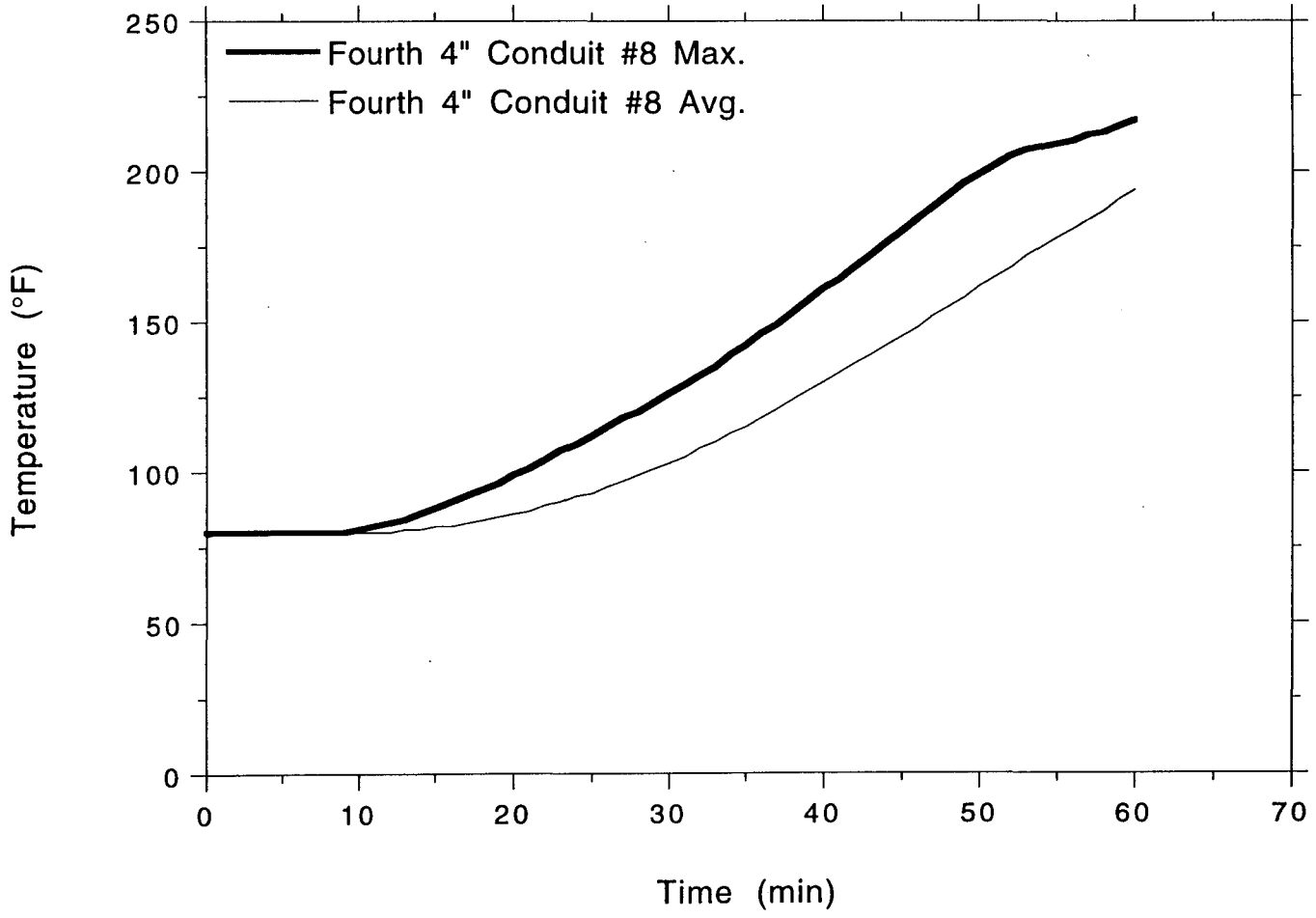
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



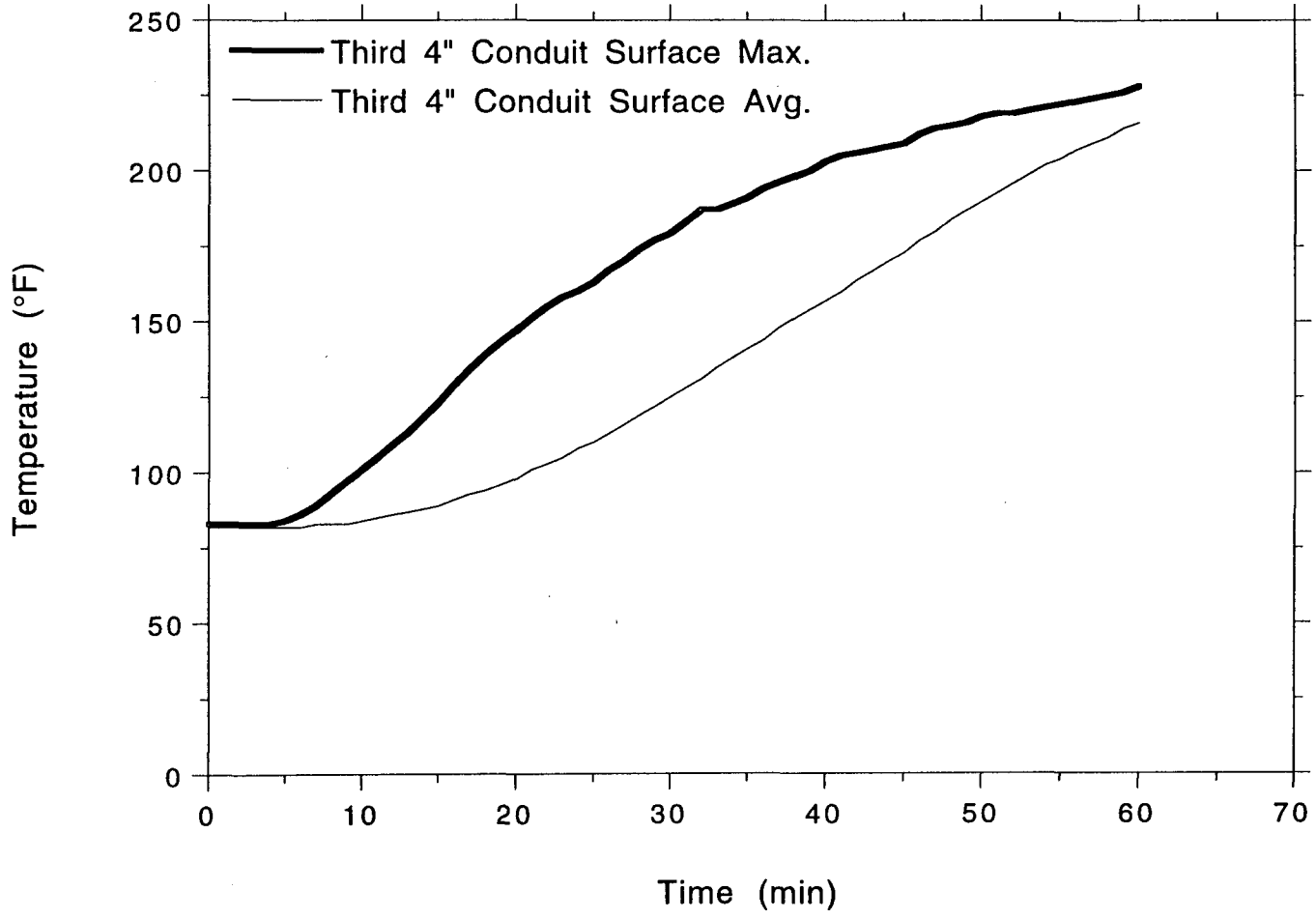
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



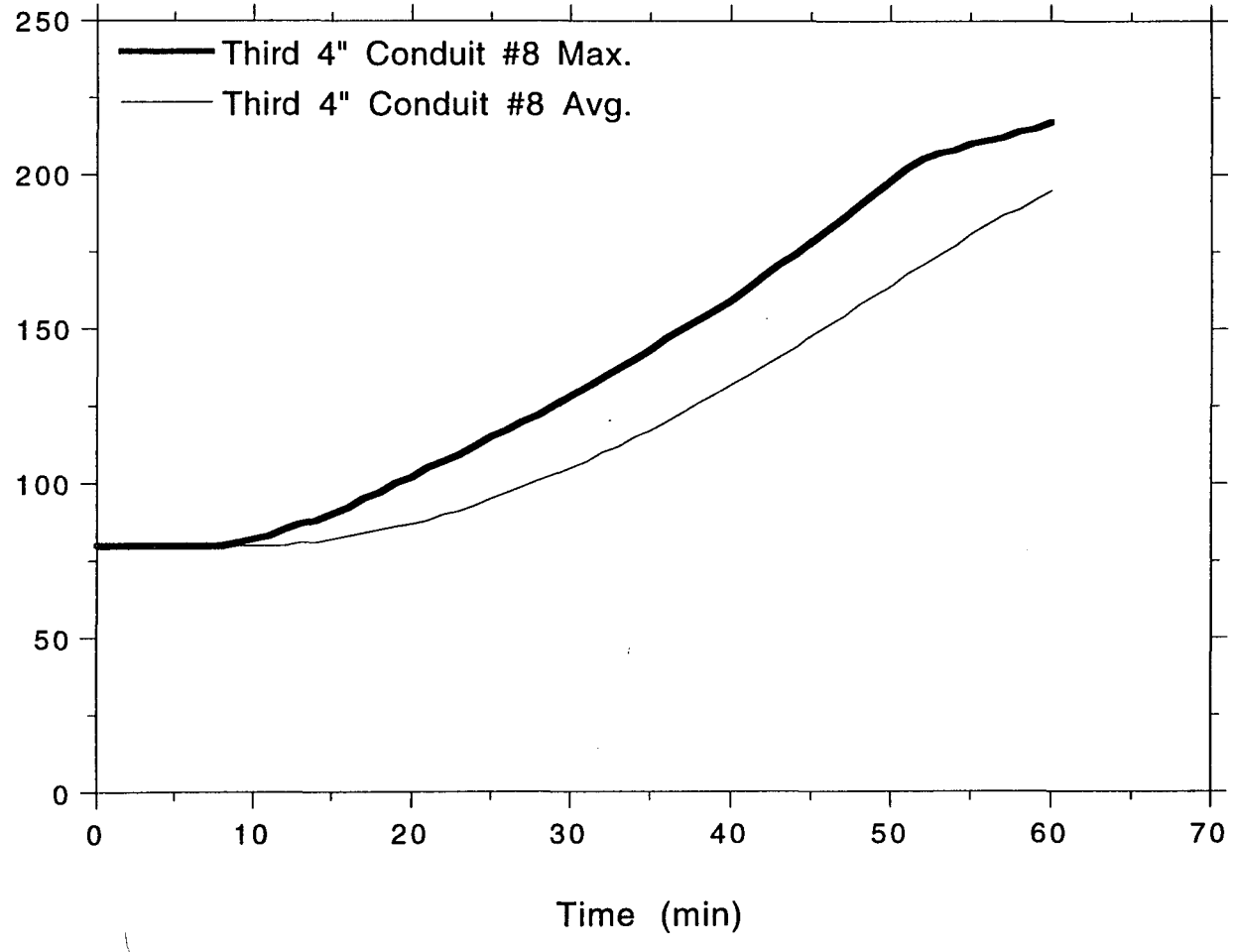
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



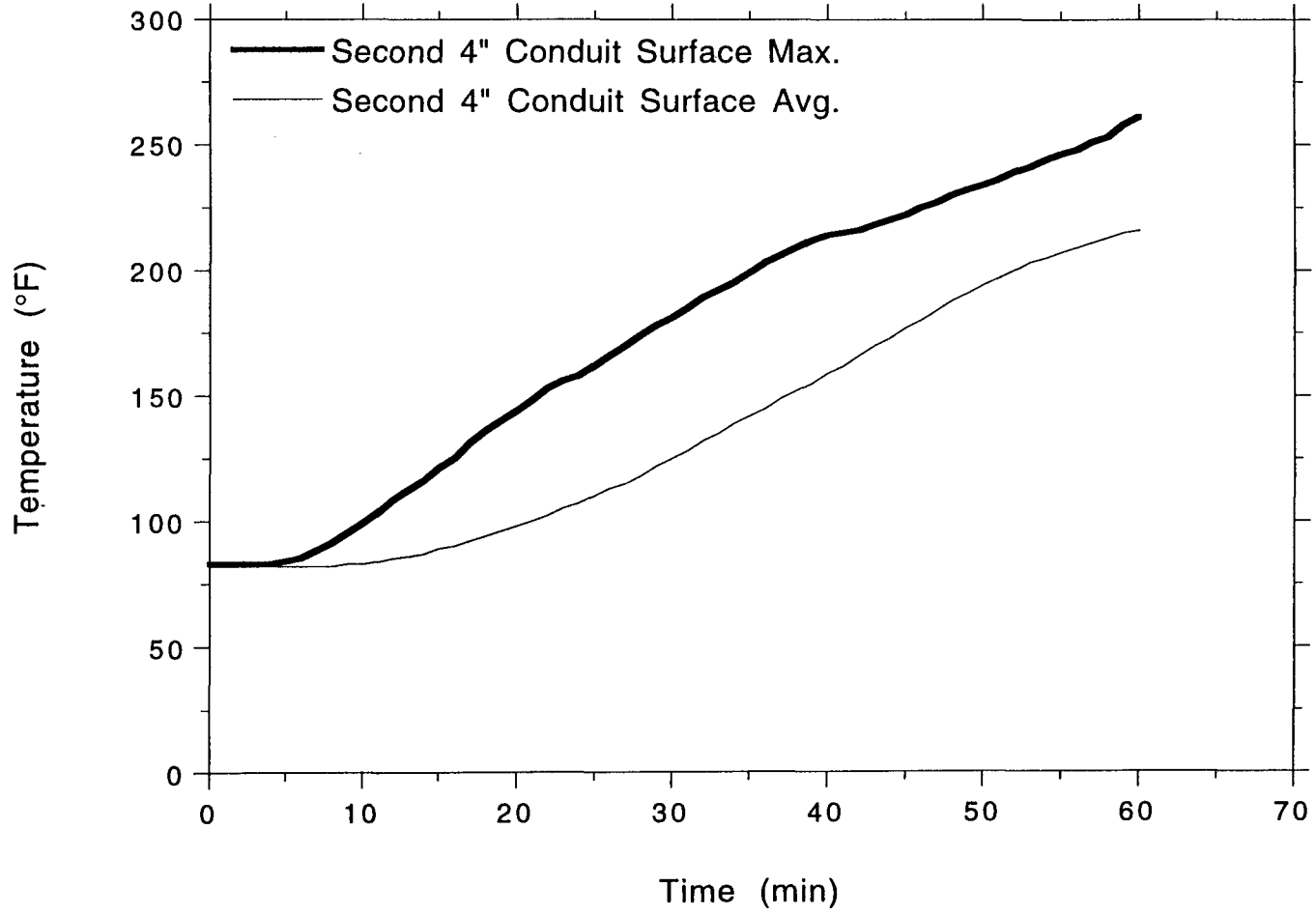
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



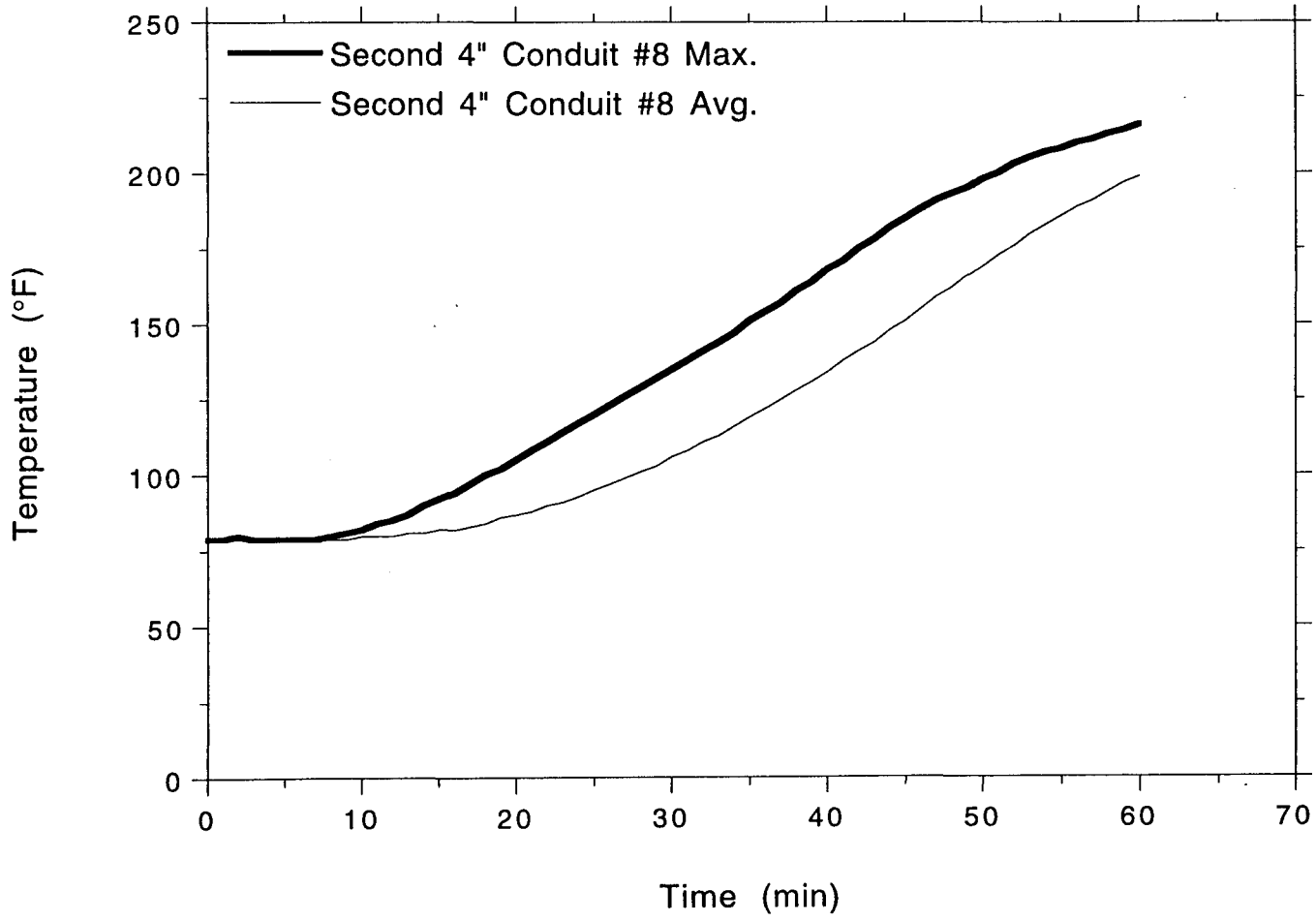
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



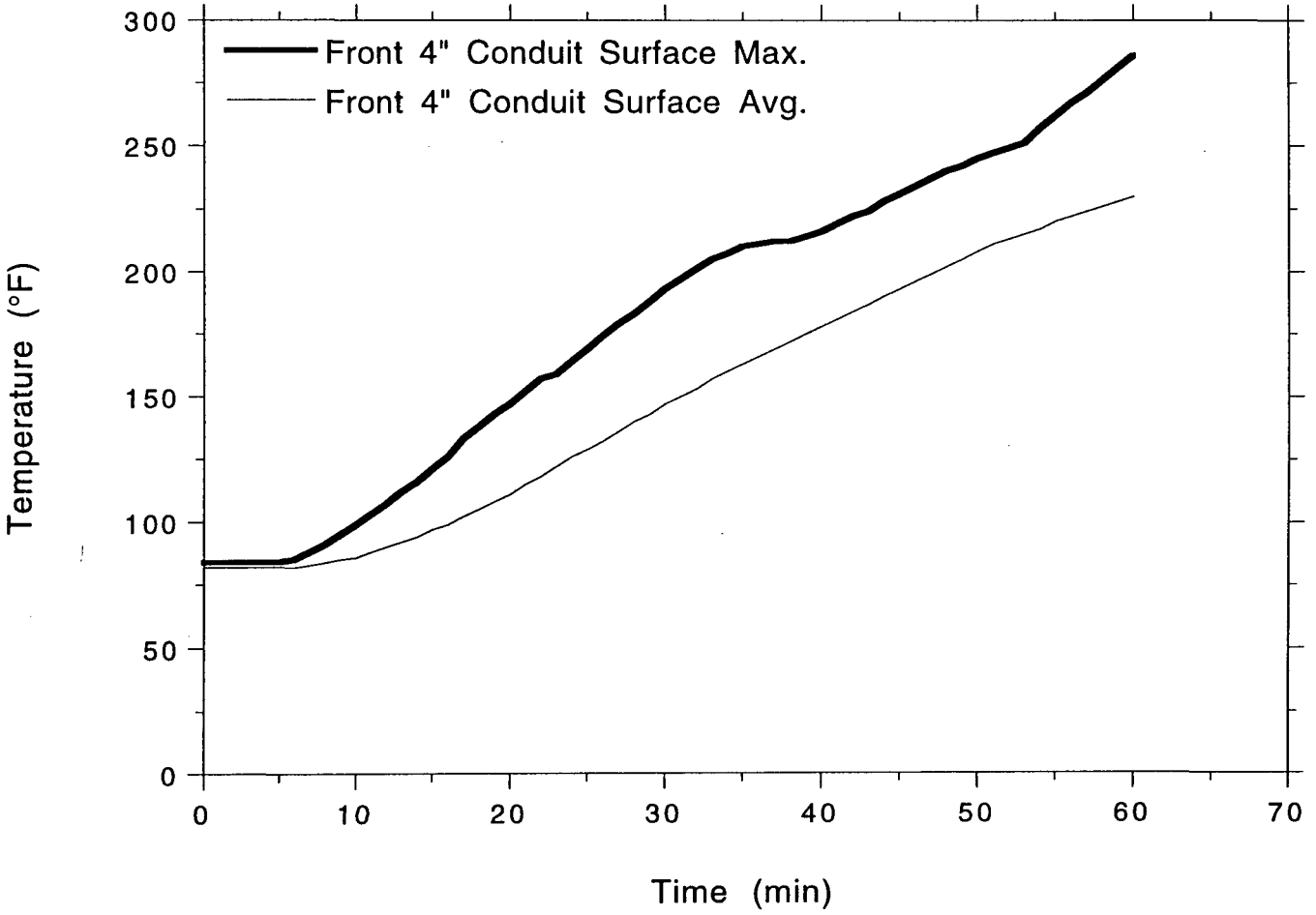
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



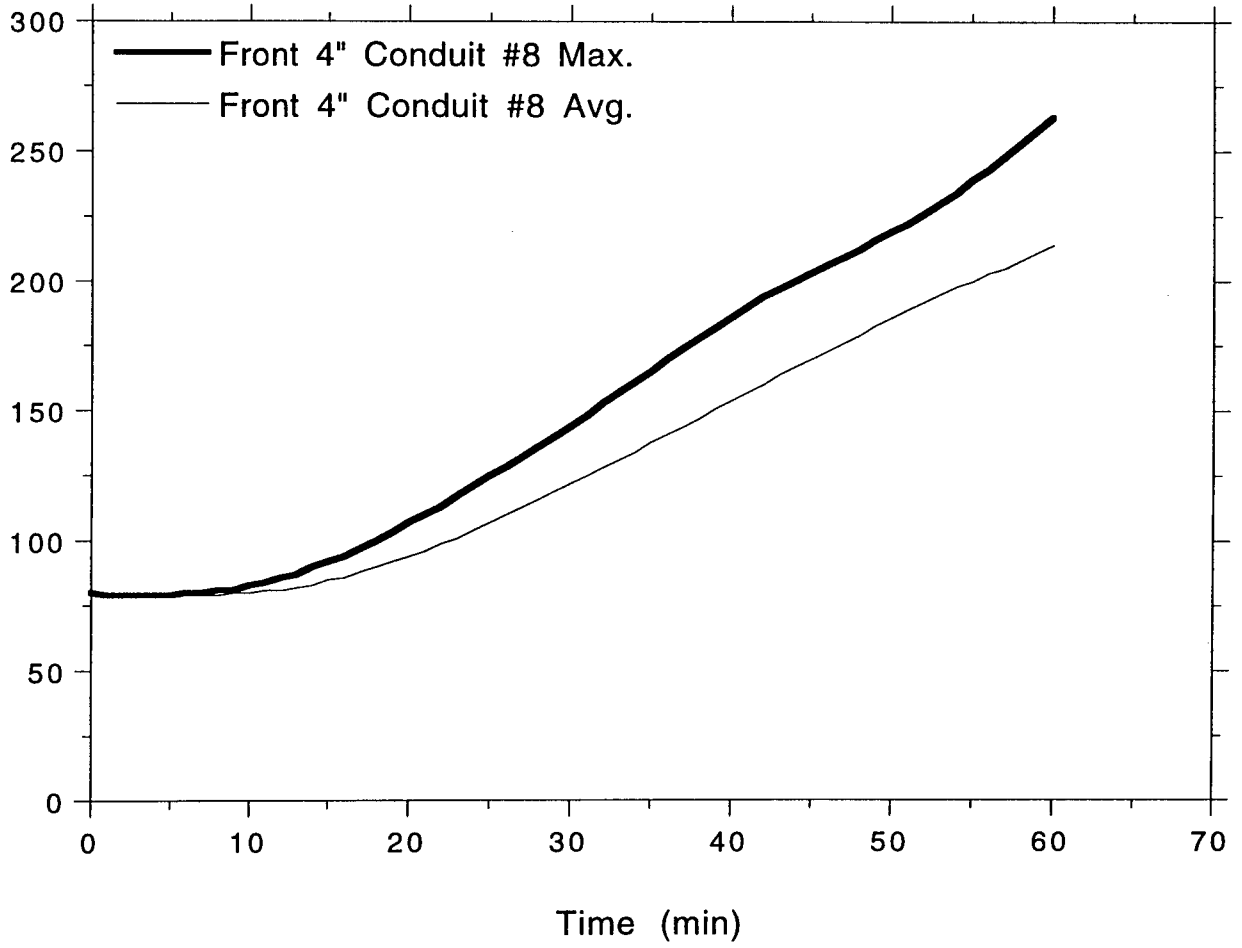
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



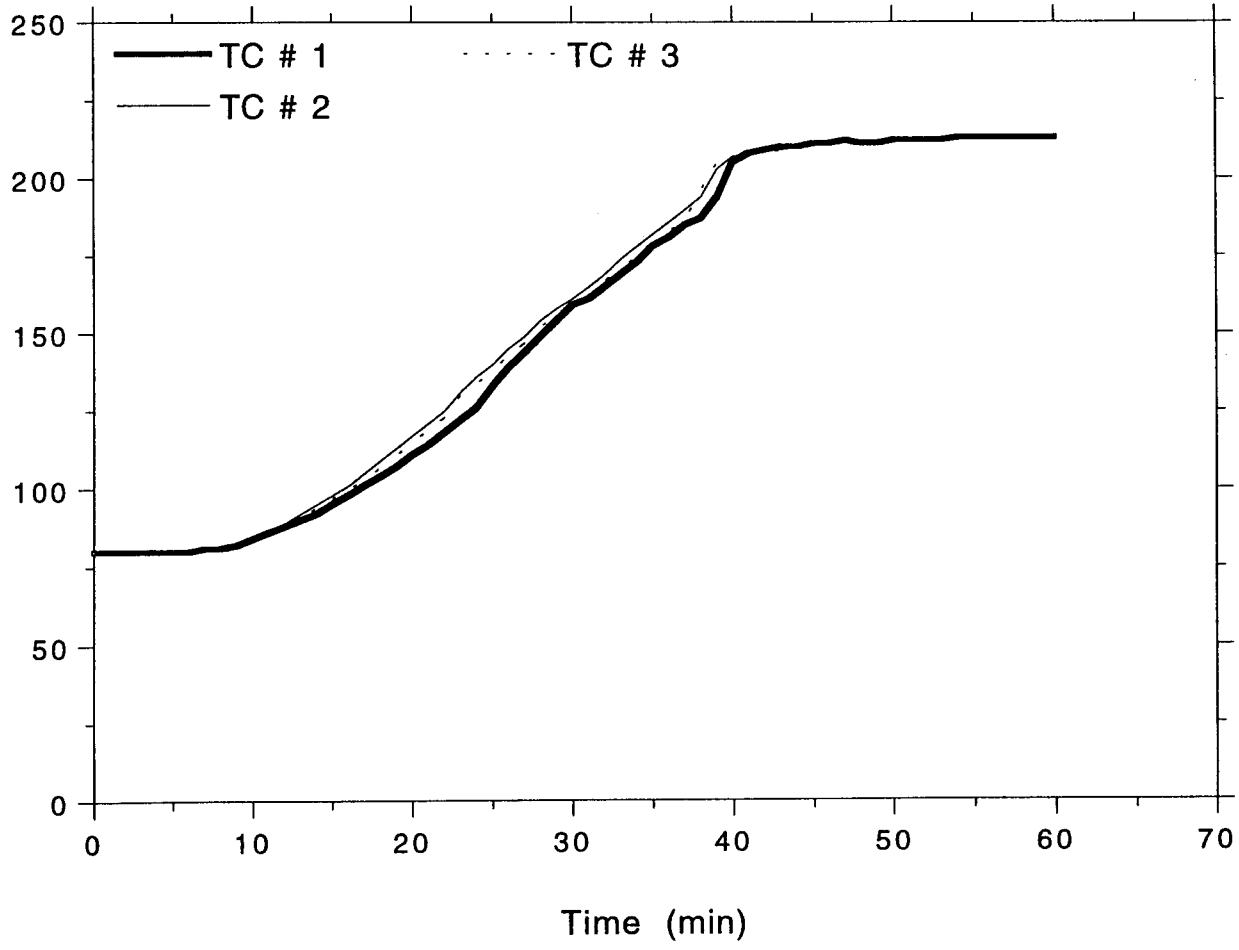
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



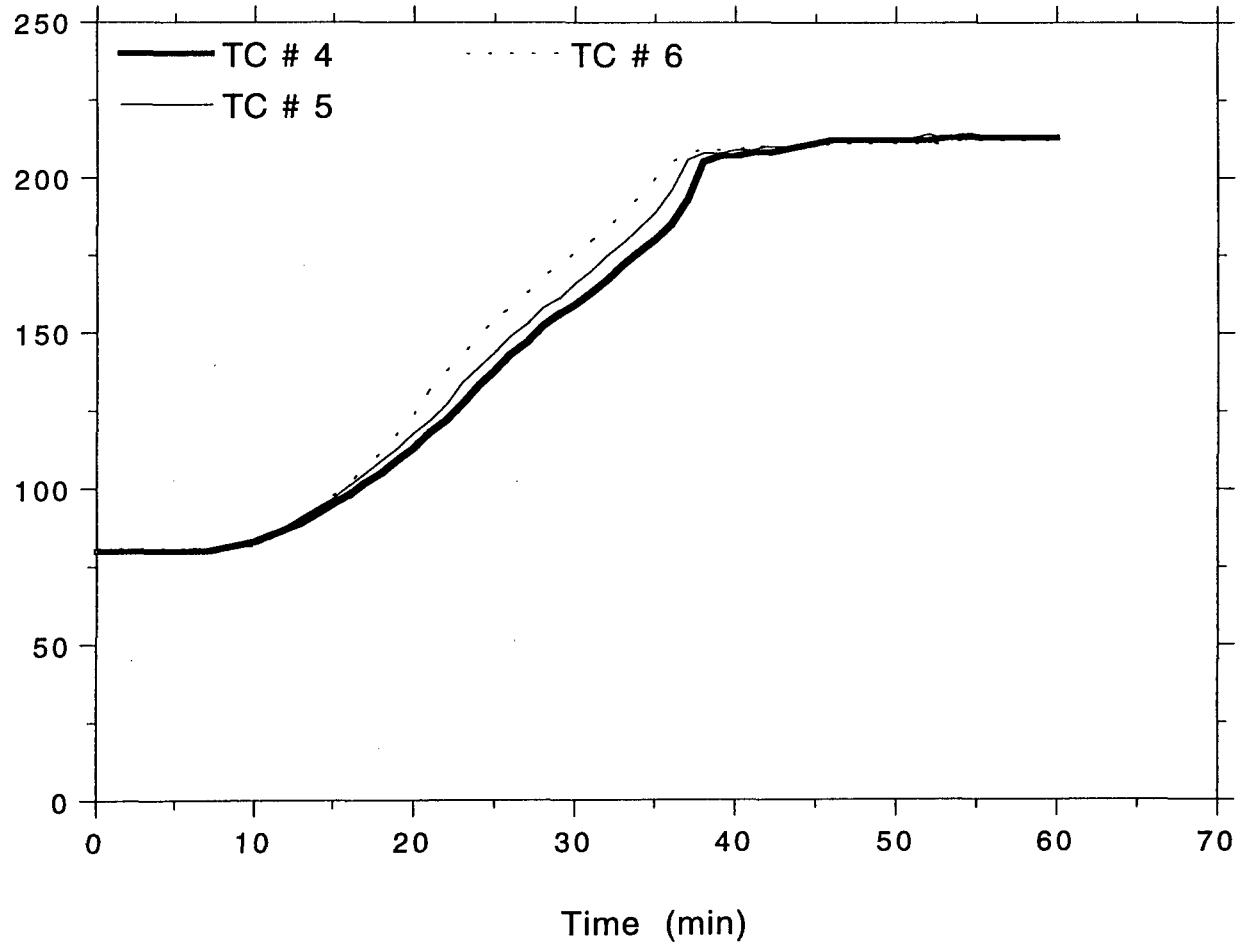
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



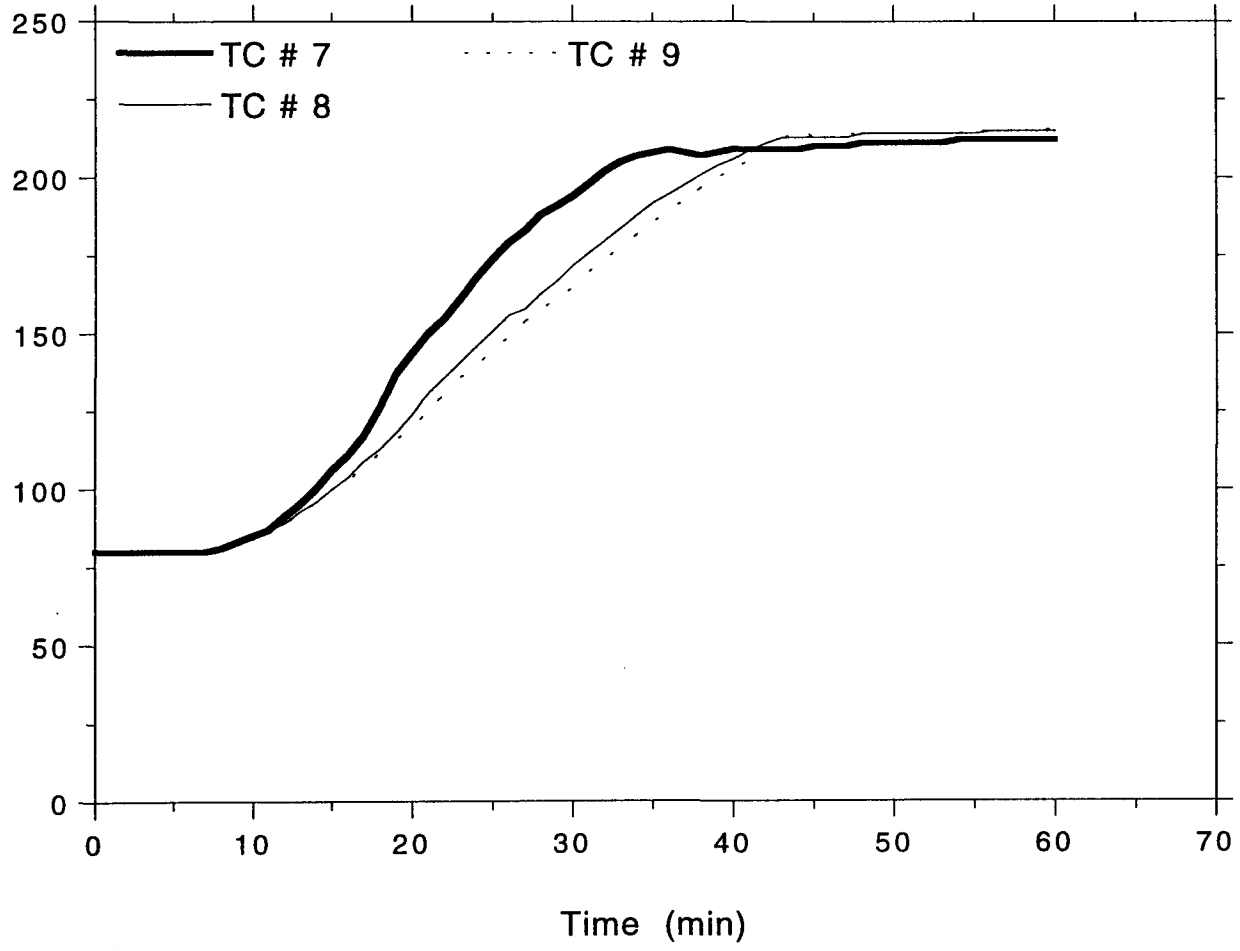
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



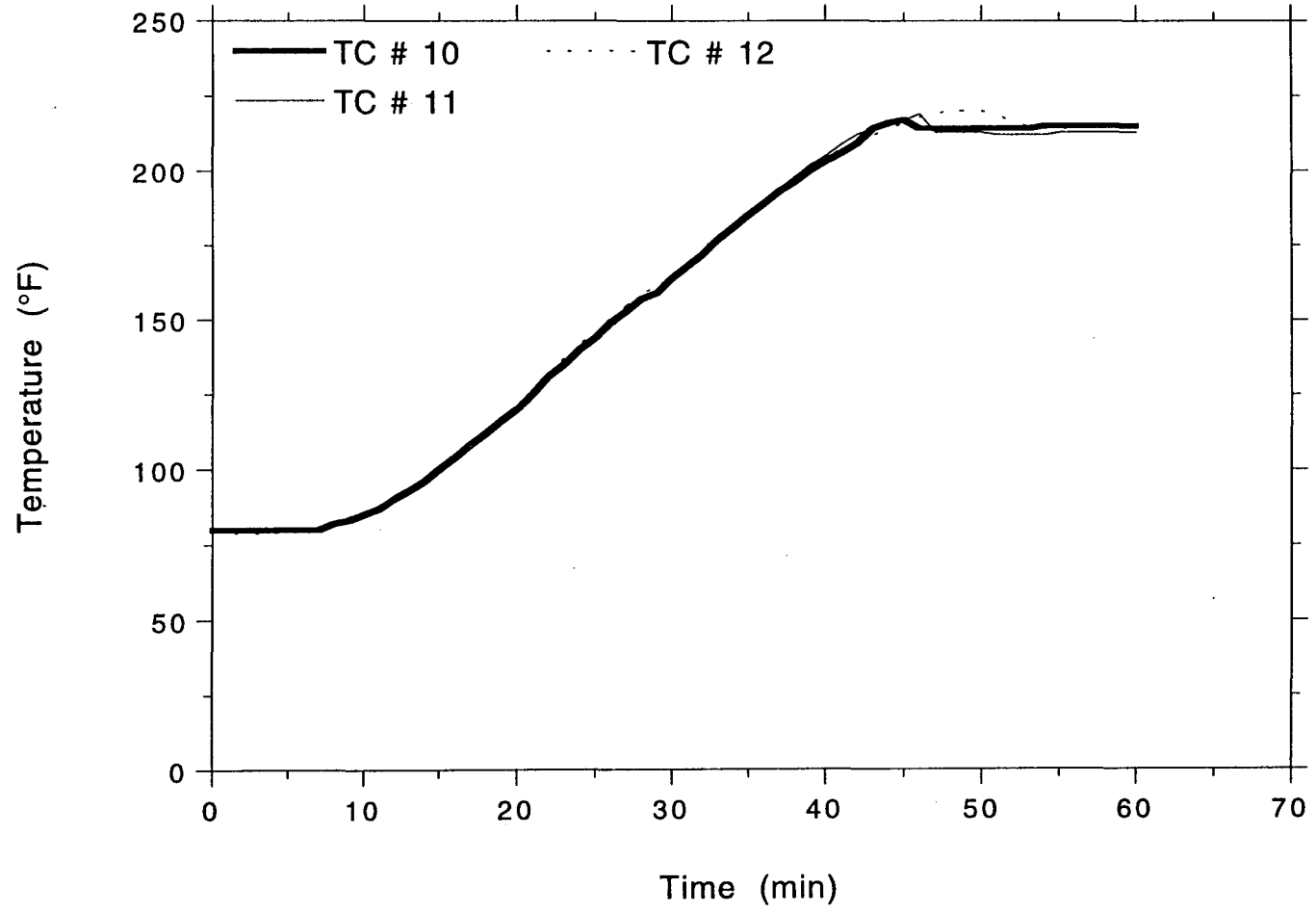
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



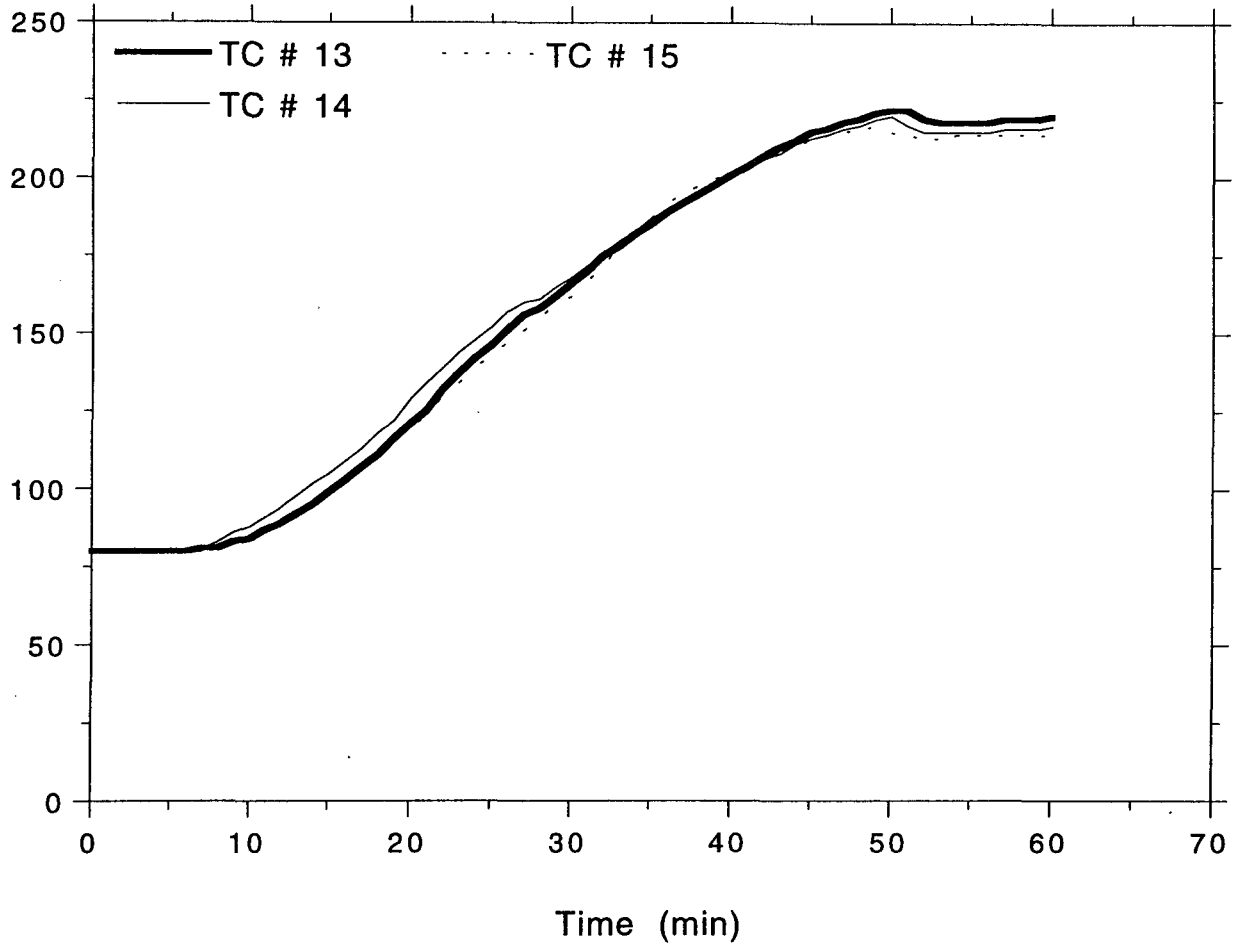
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



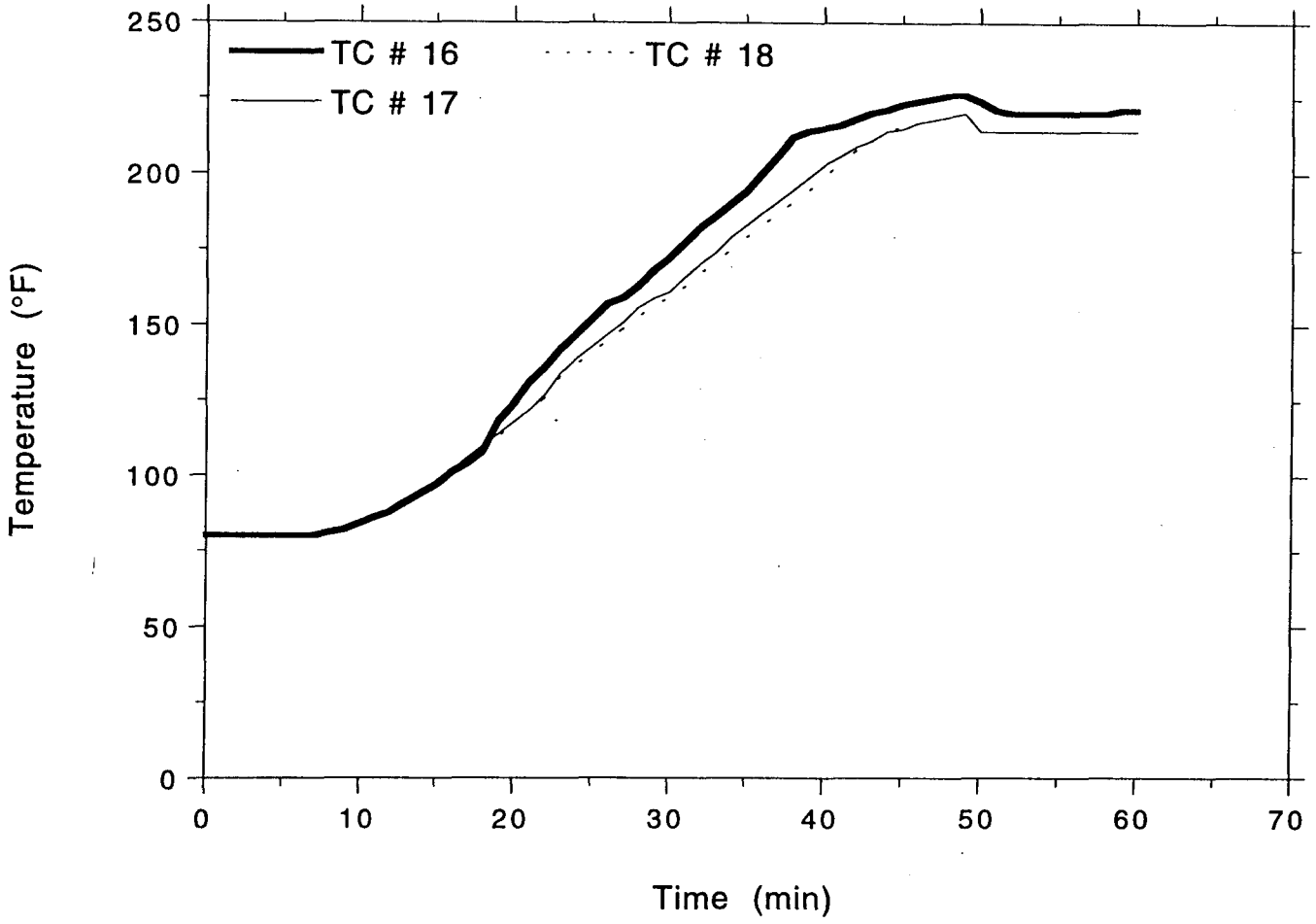
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



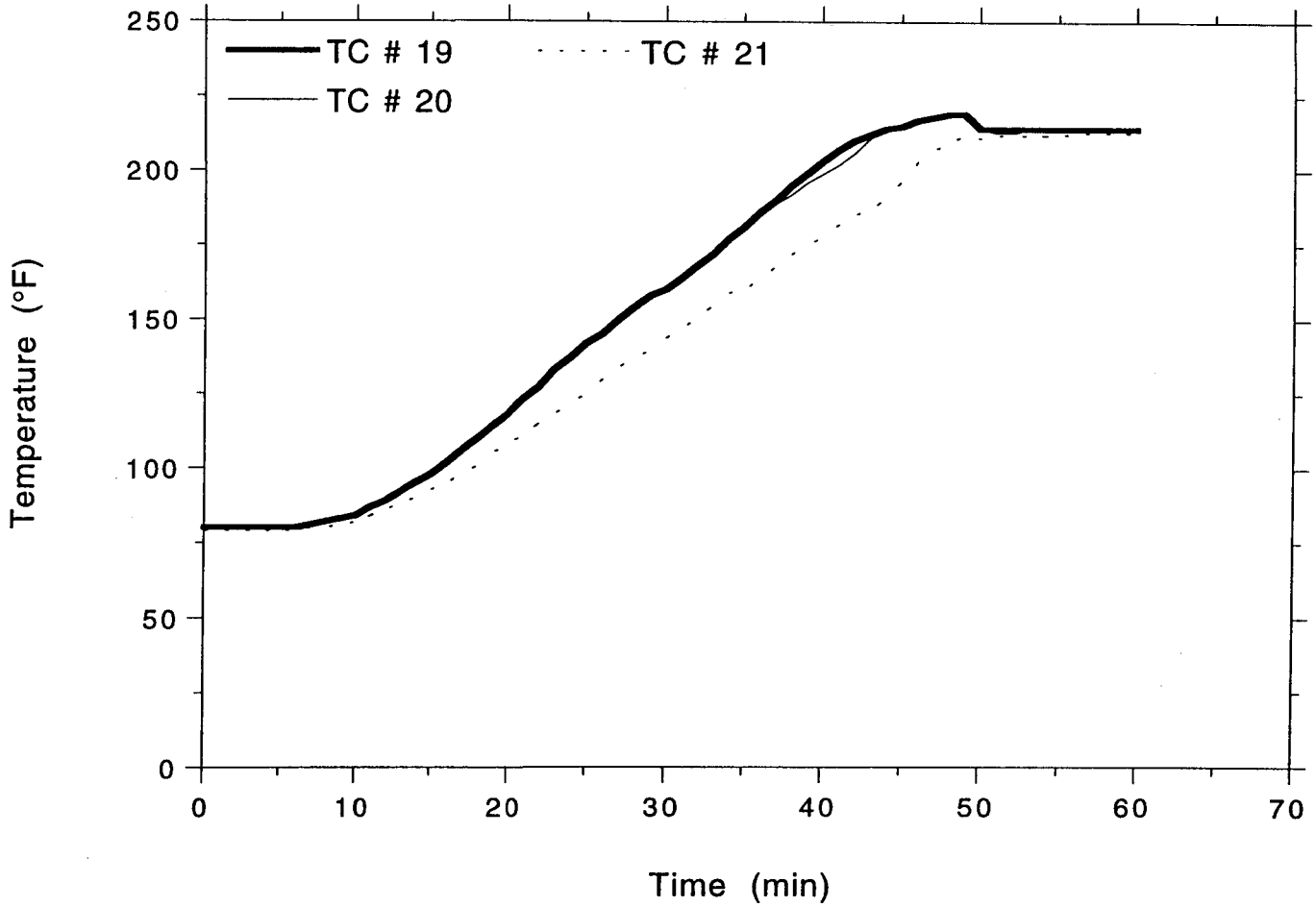
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



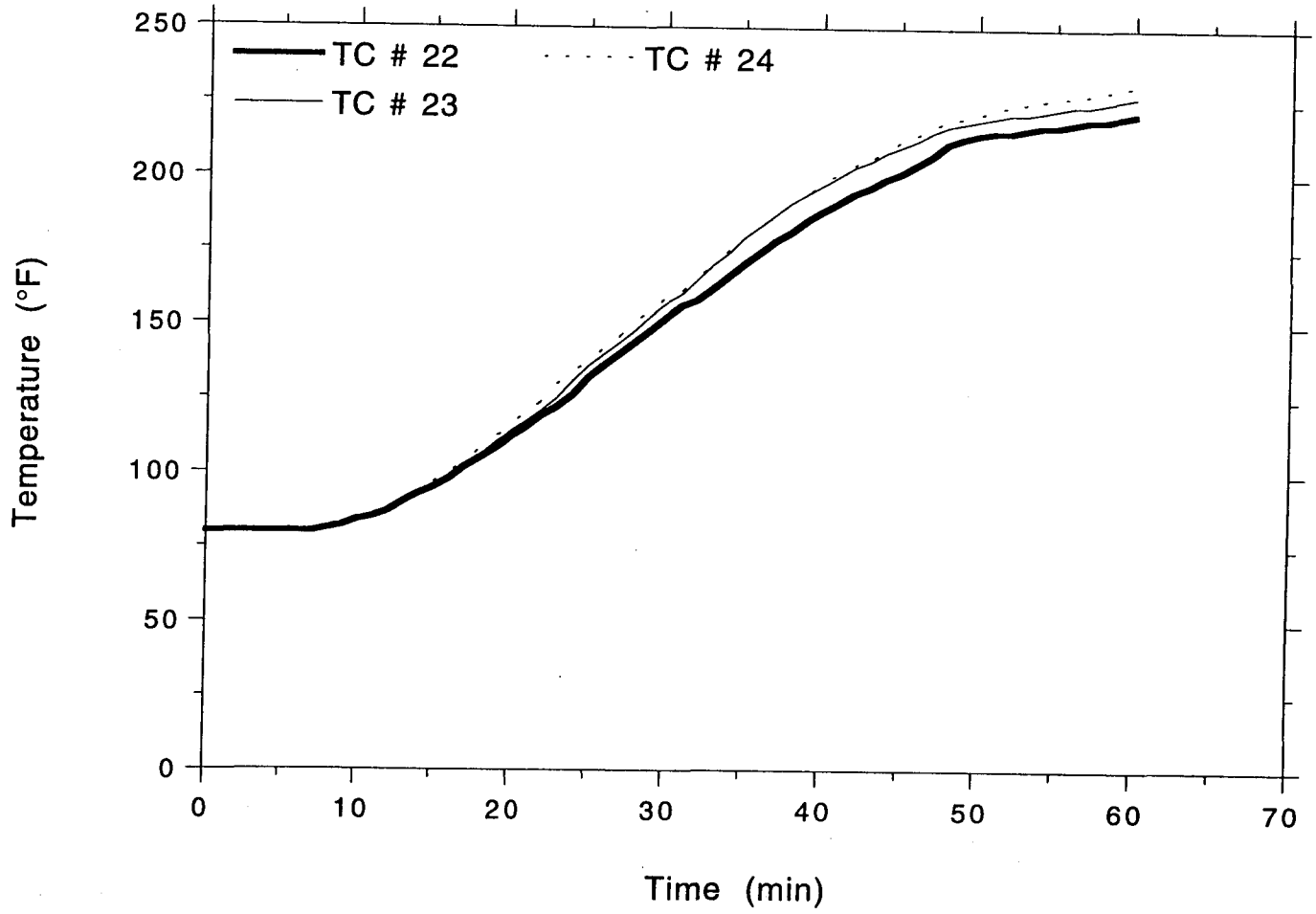
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



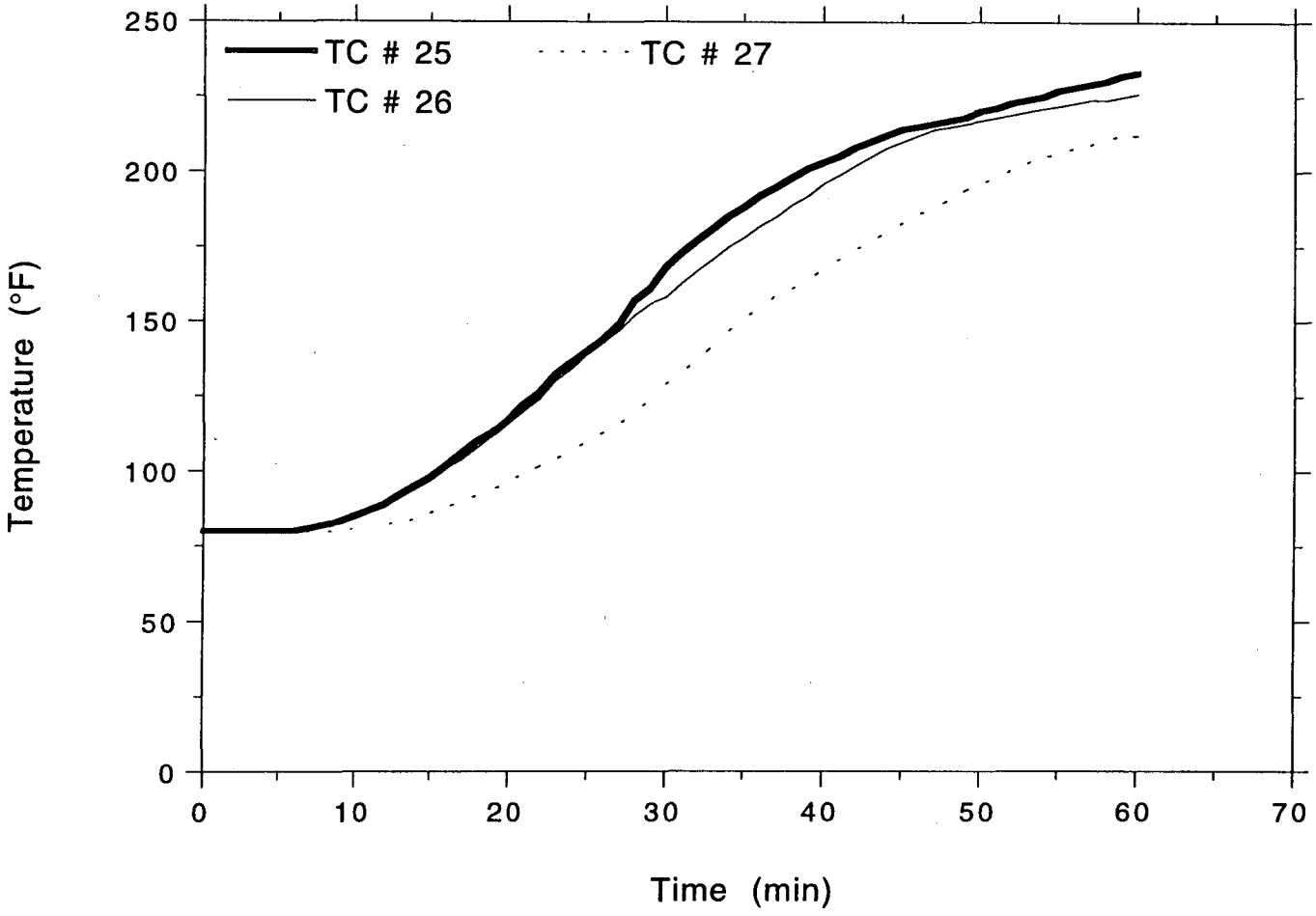
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



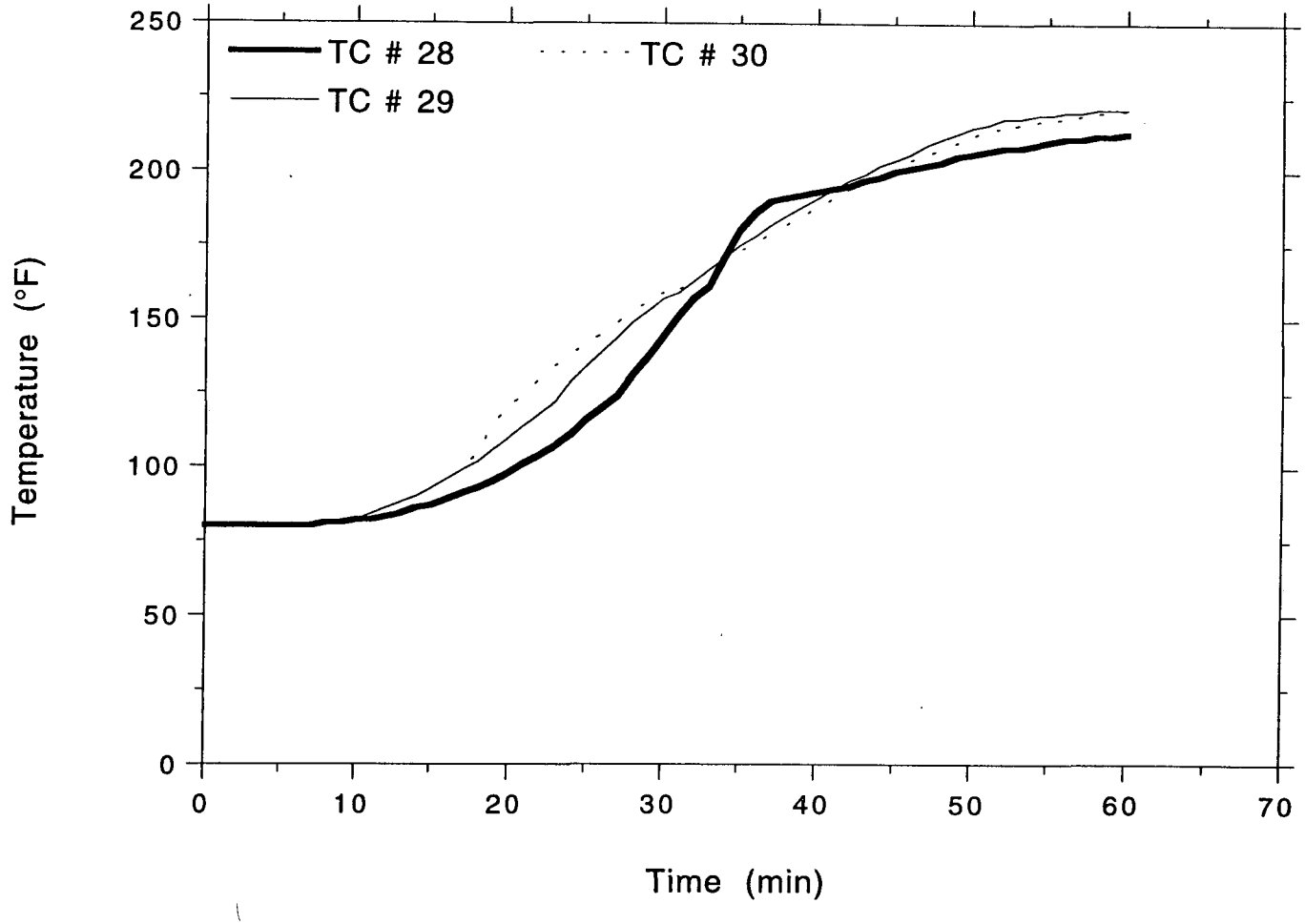
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



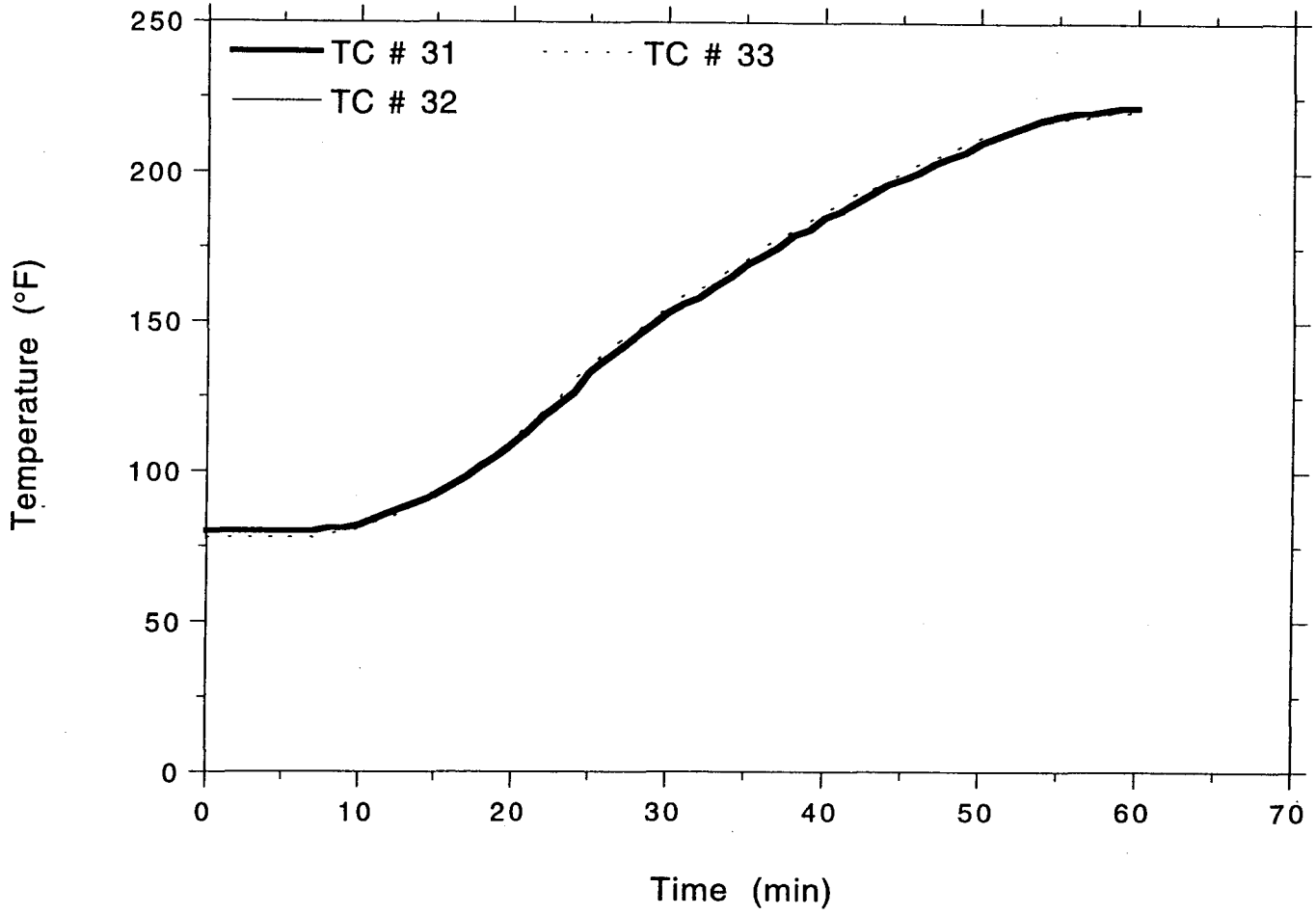
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



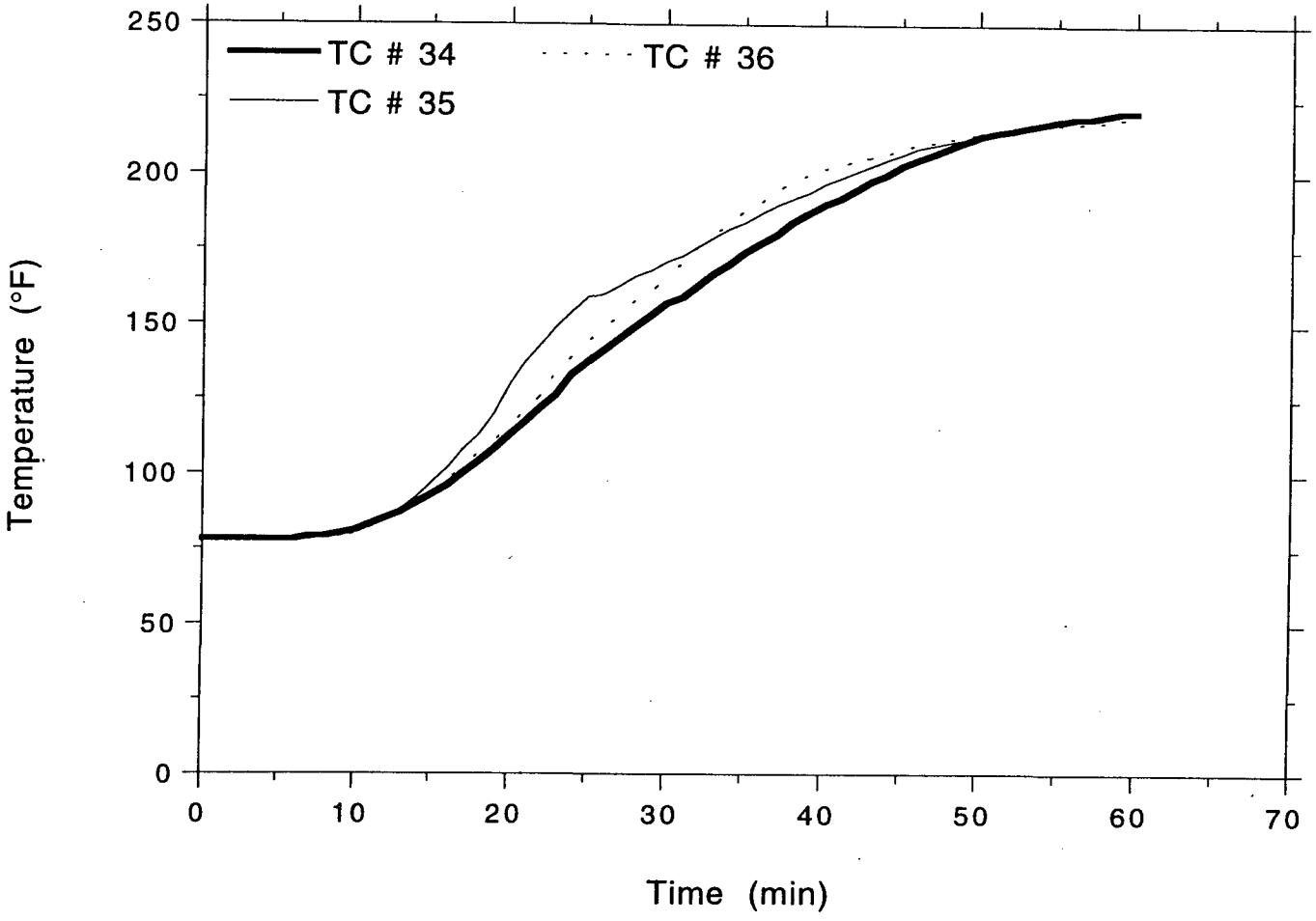
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



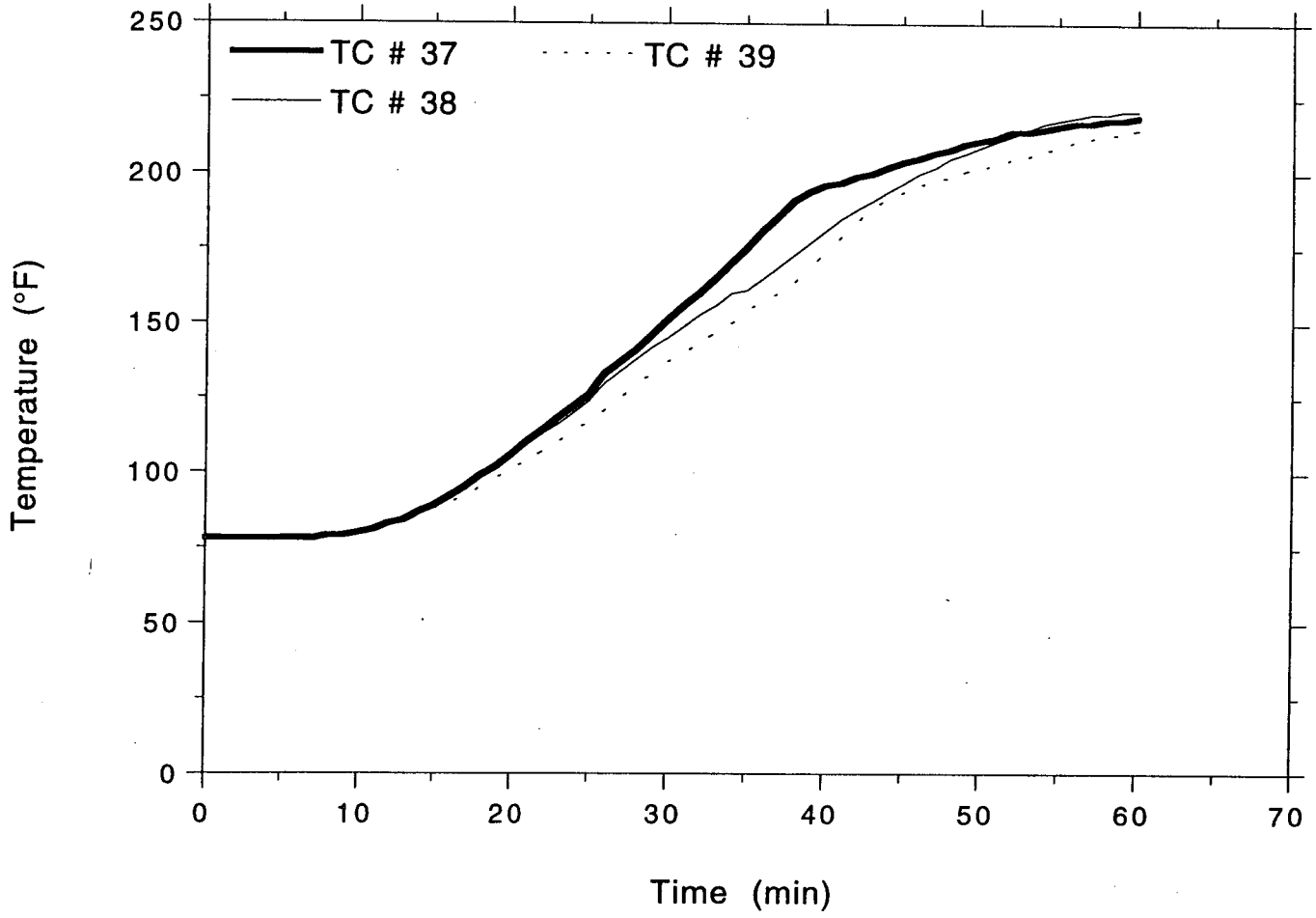
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



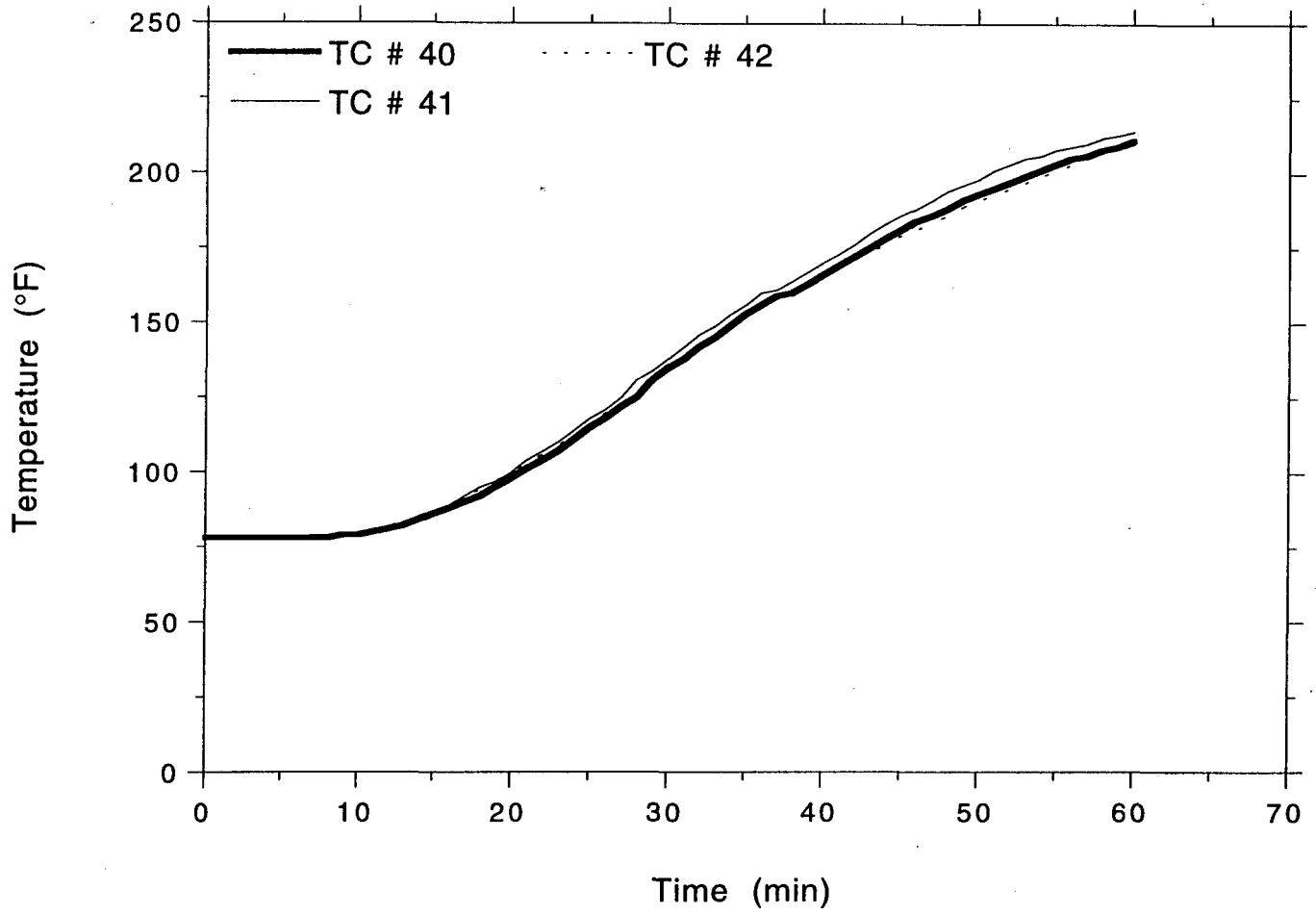
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



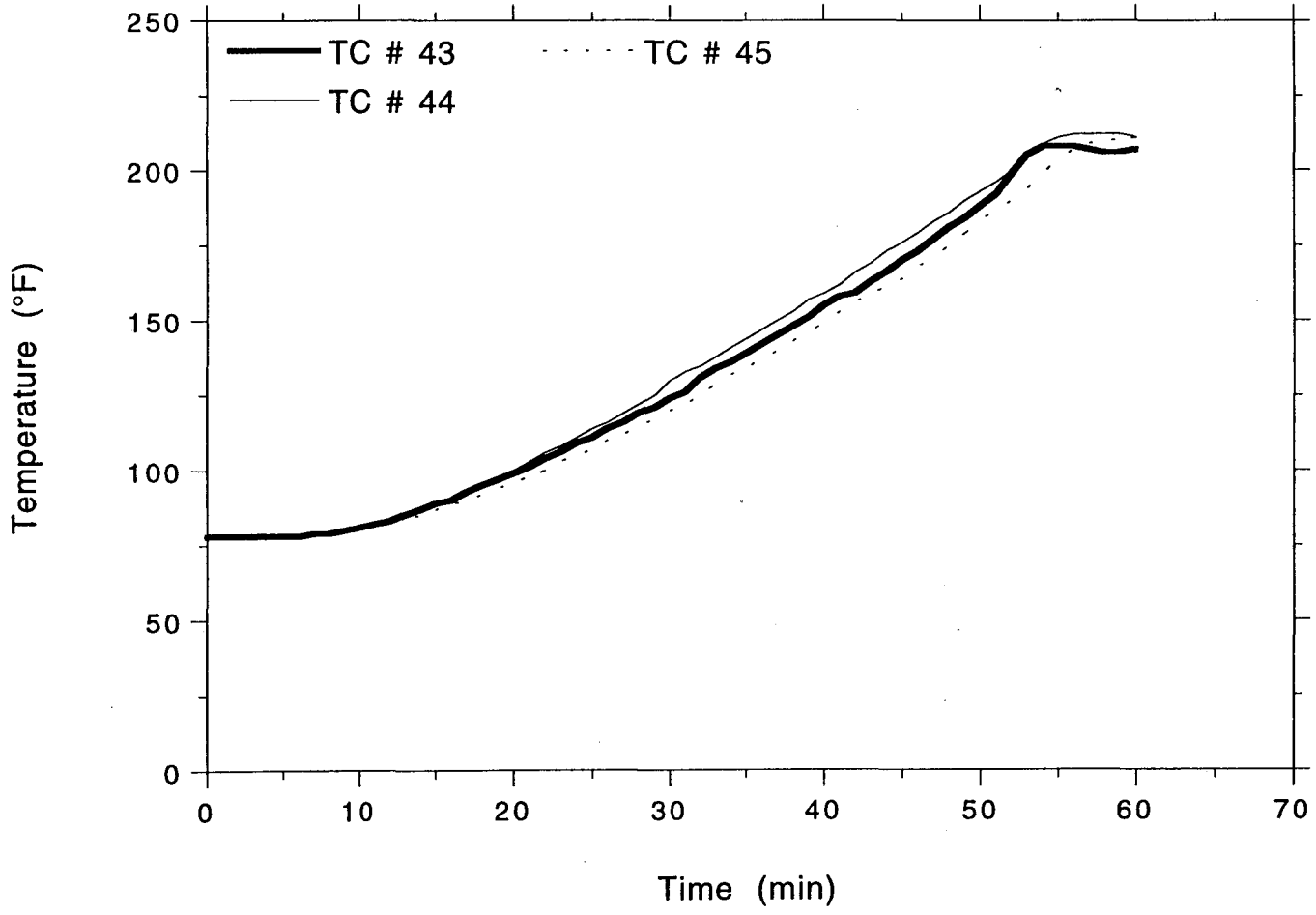
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



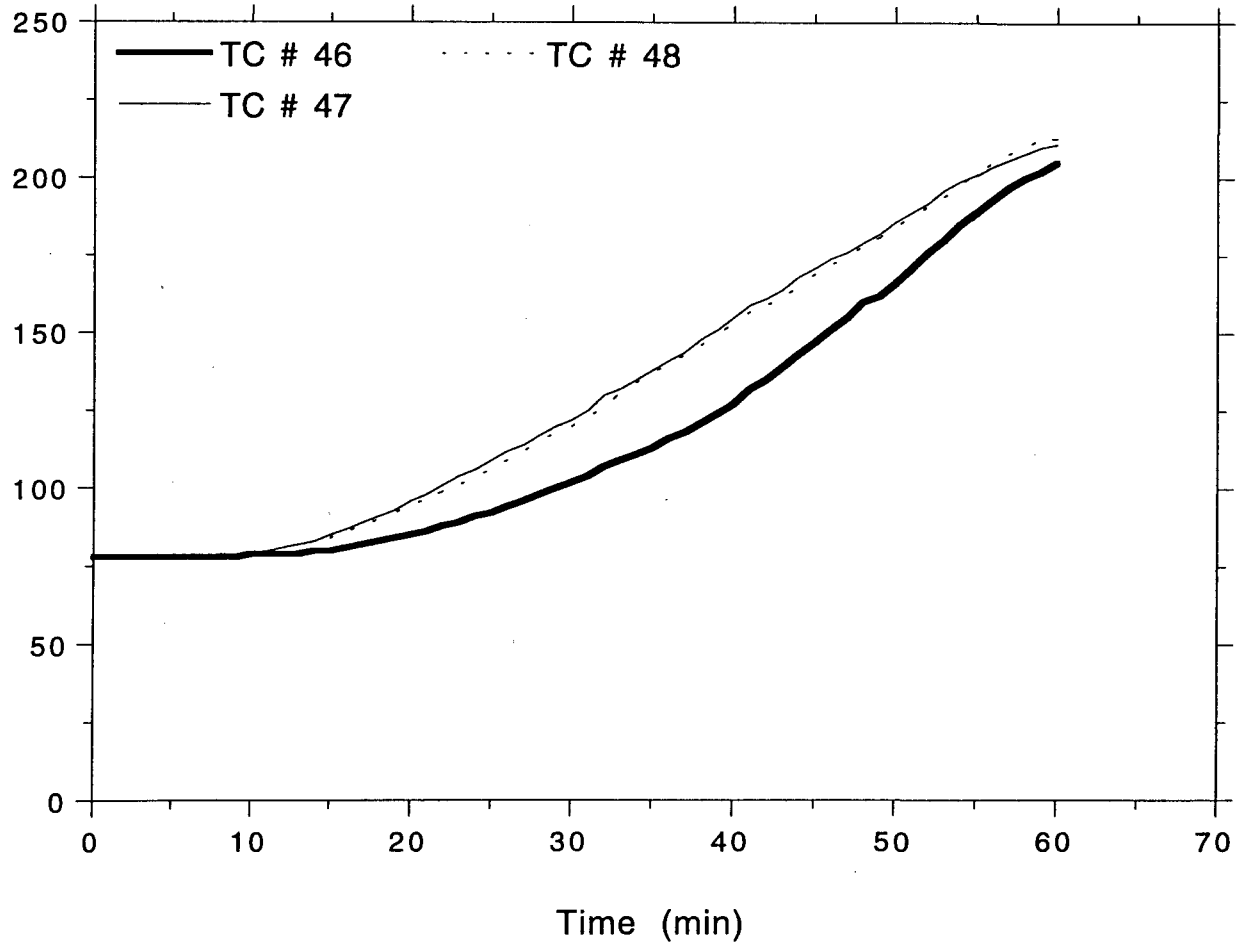
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



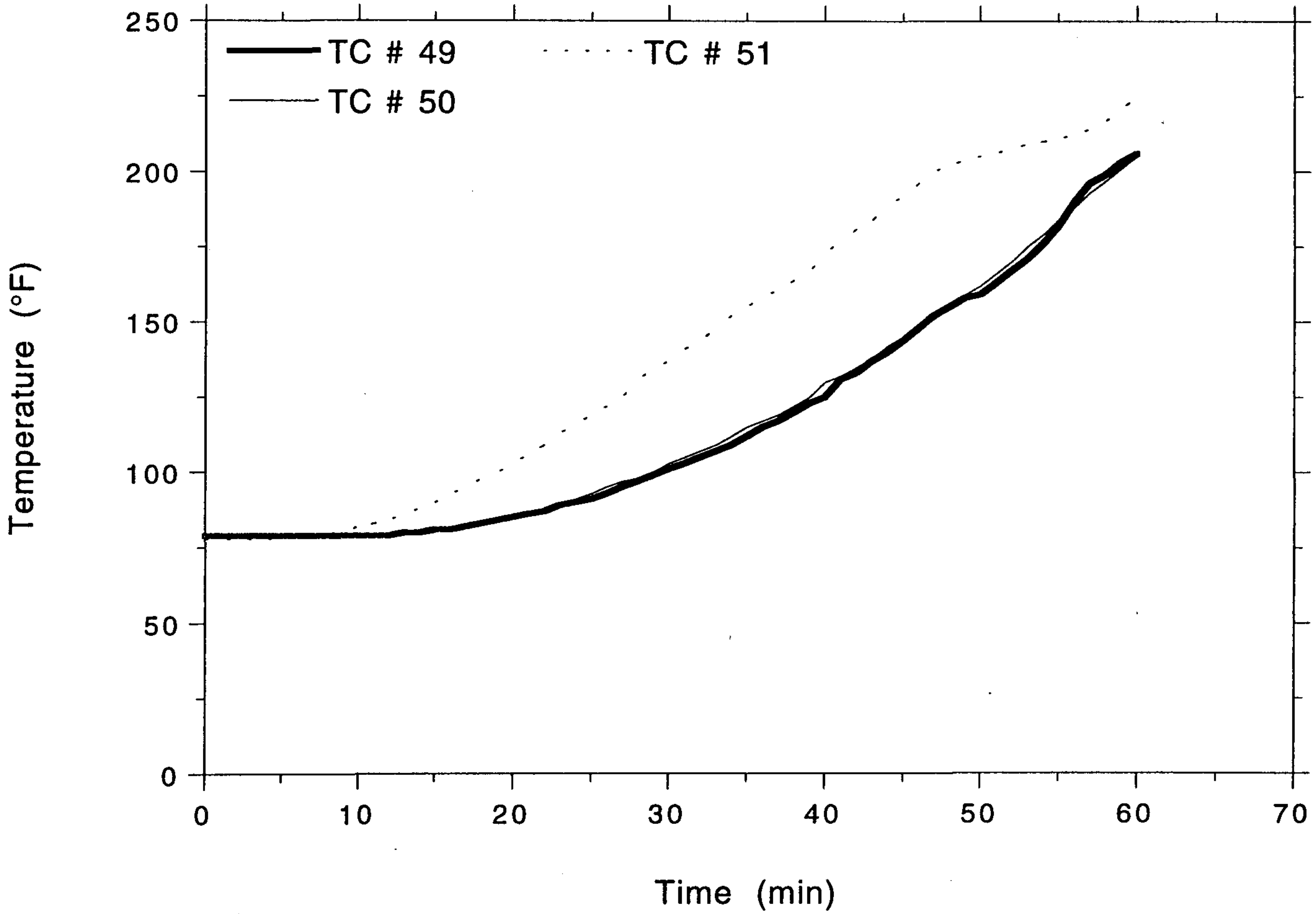
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit

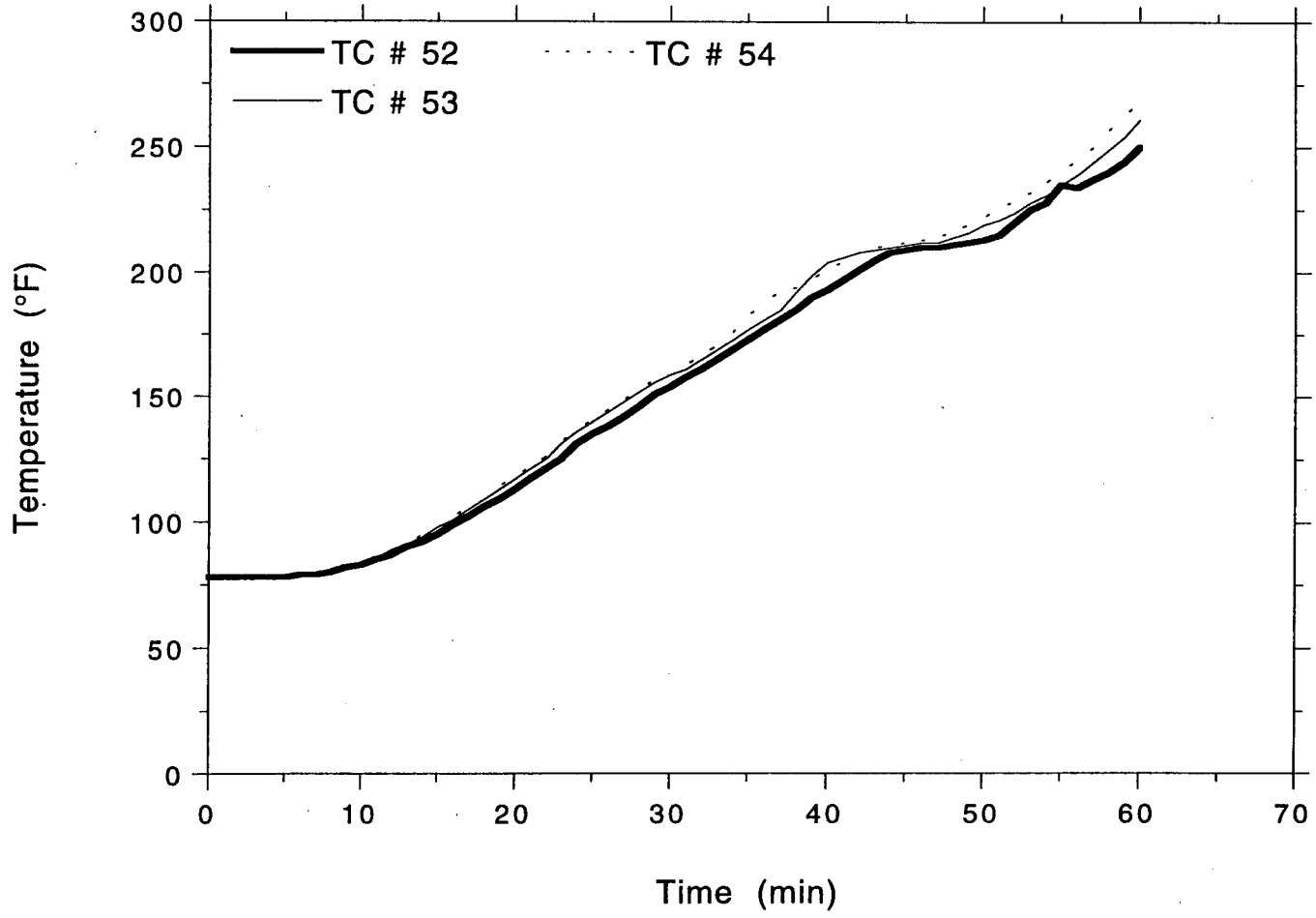


OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit

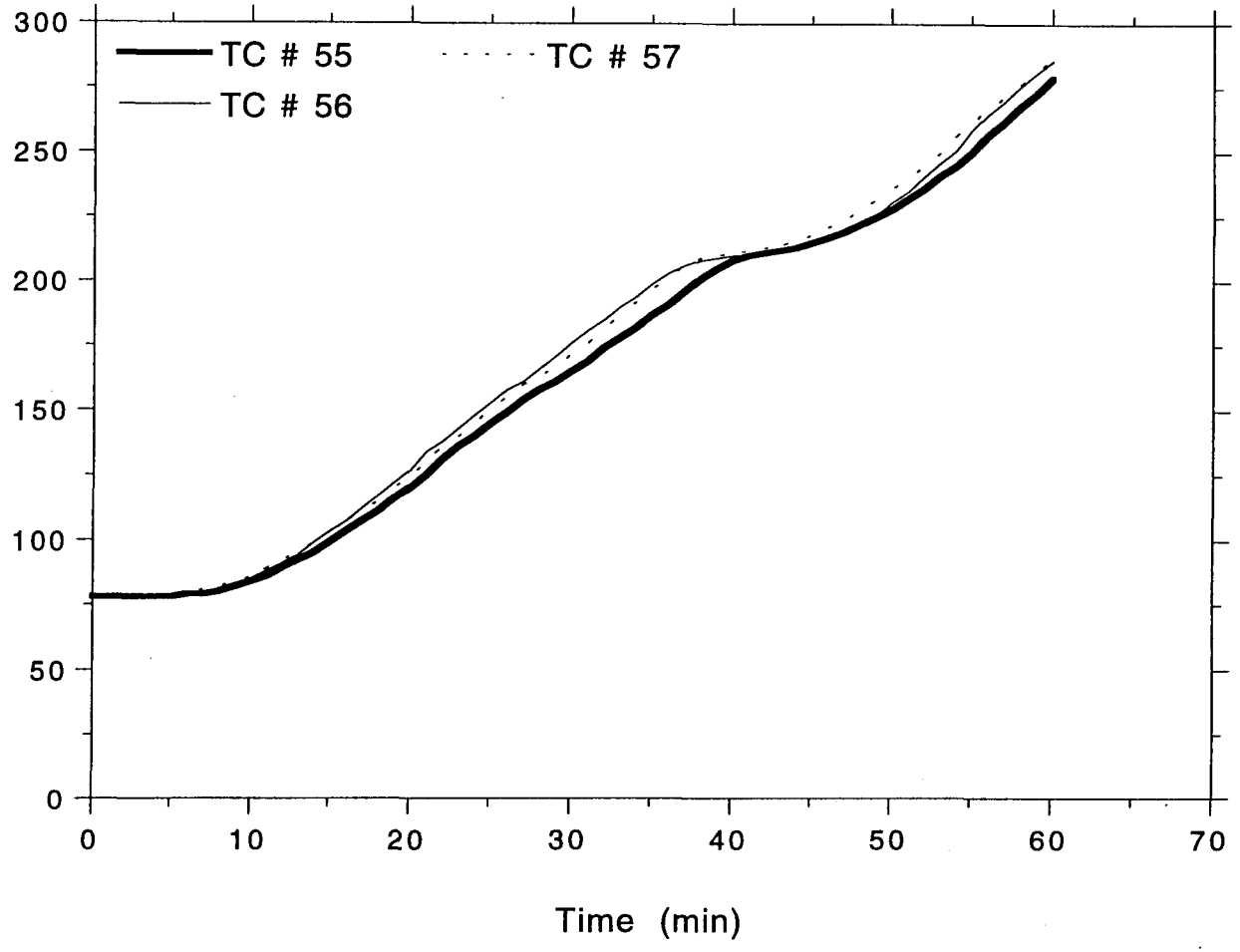


TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



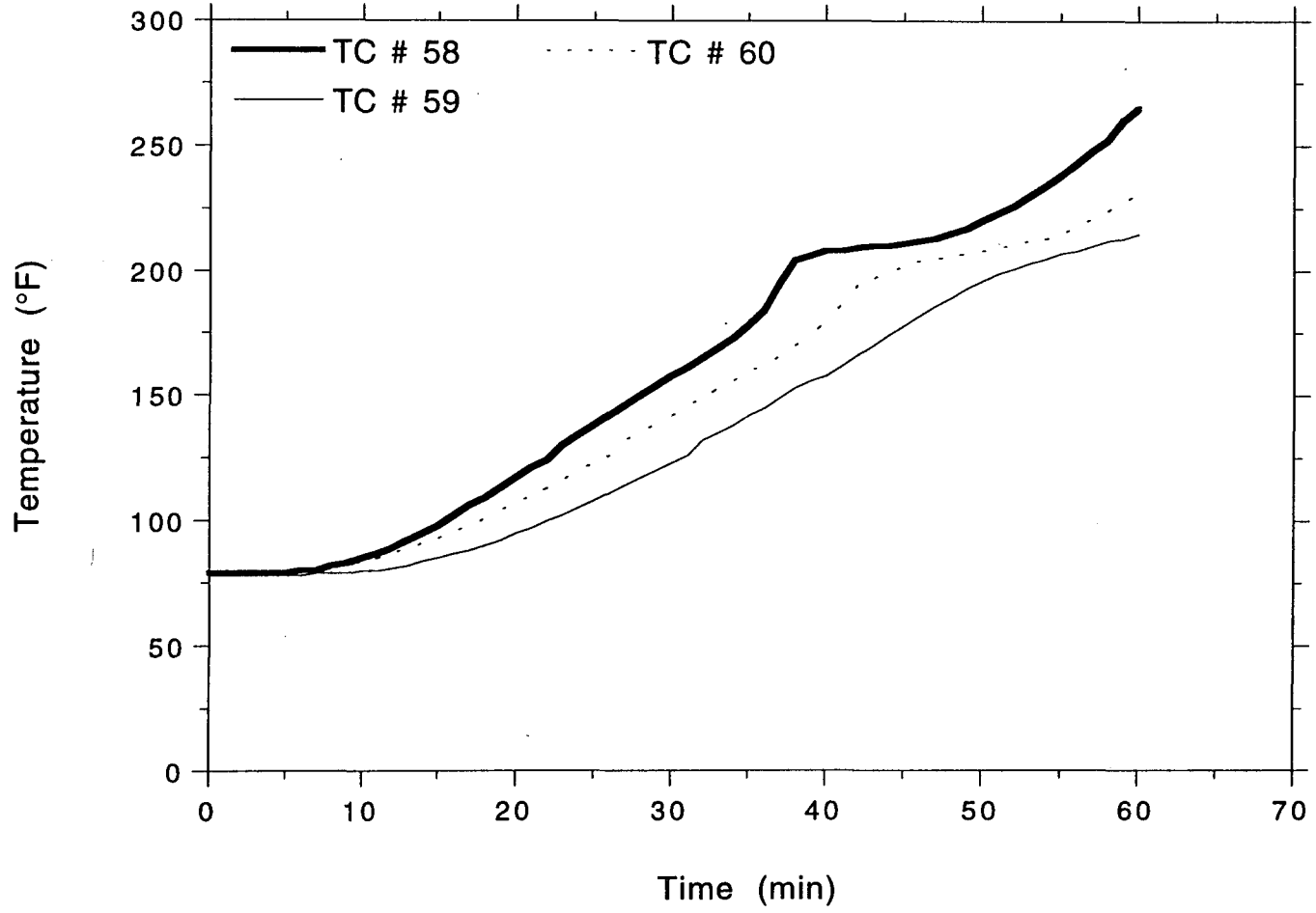
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



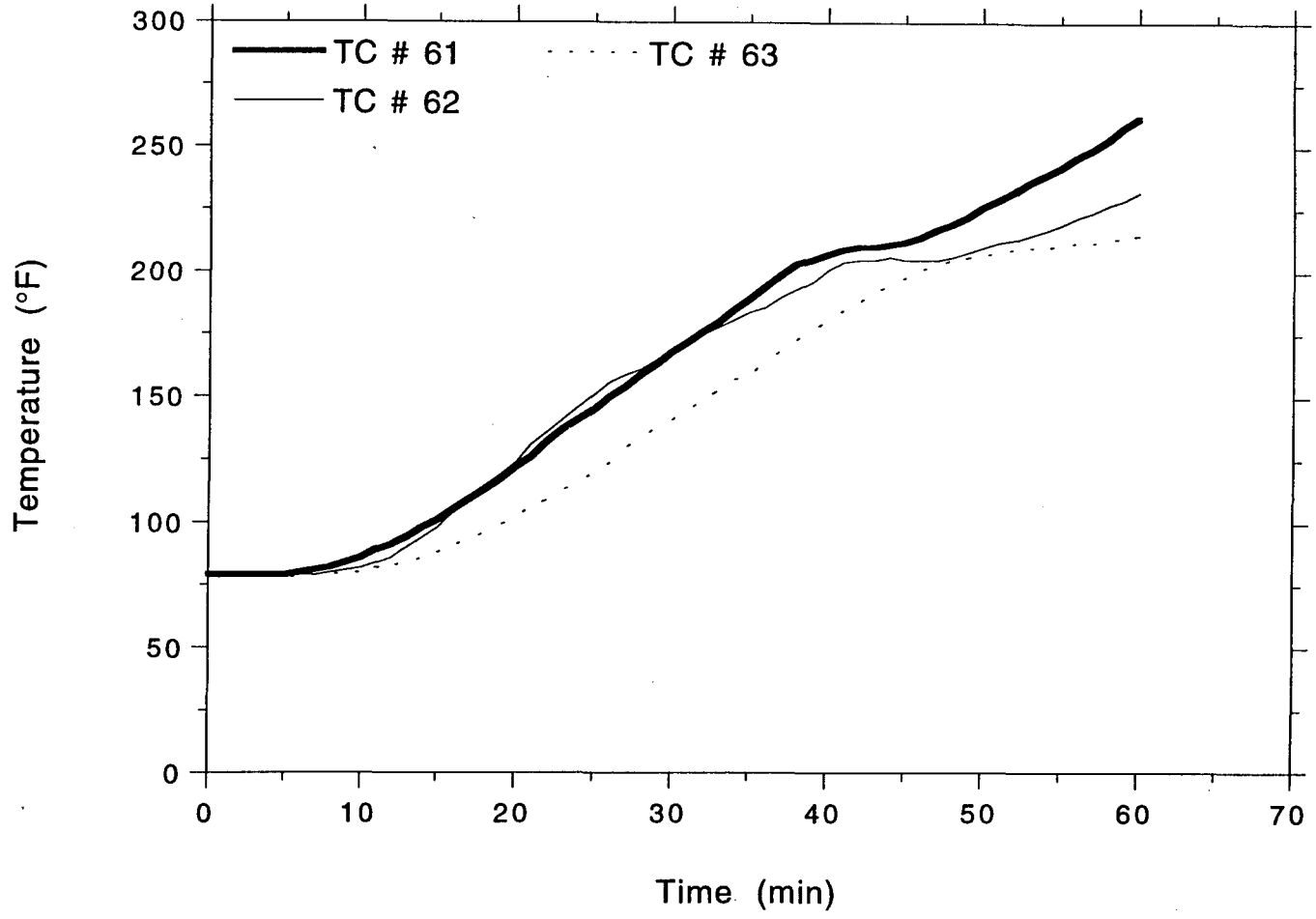
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



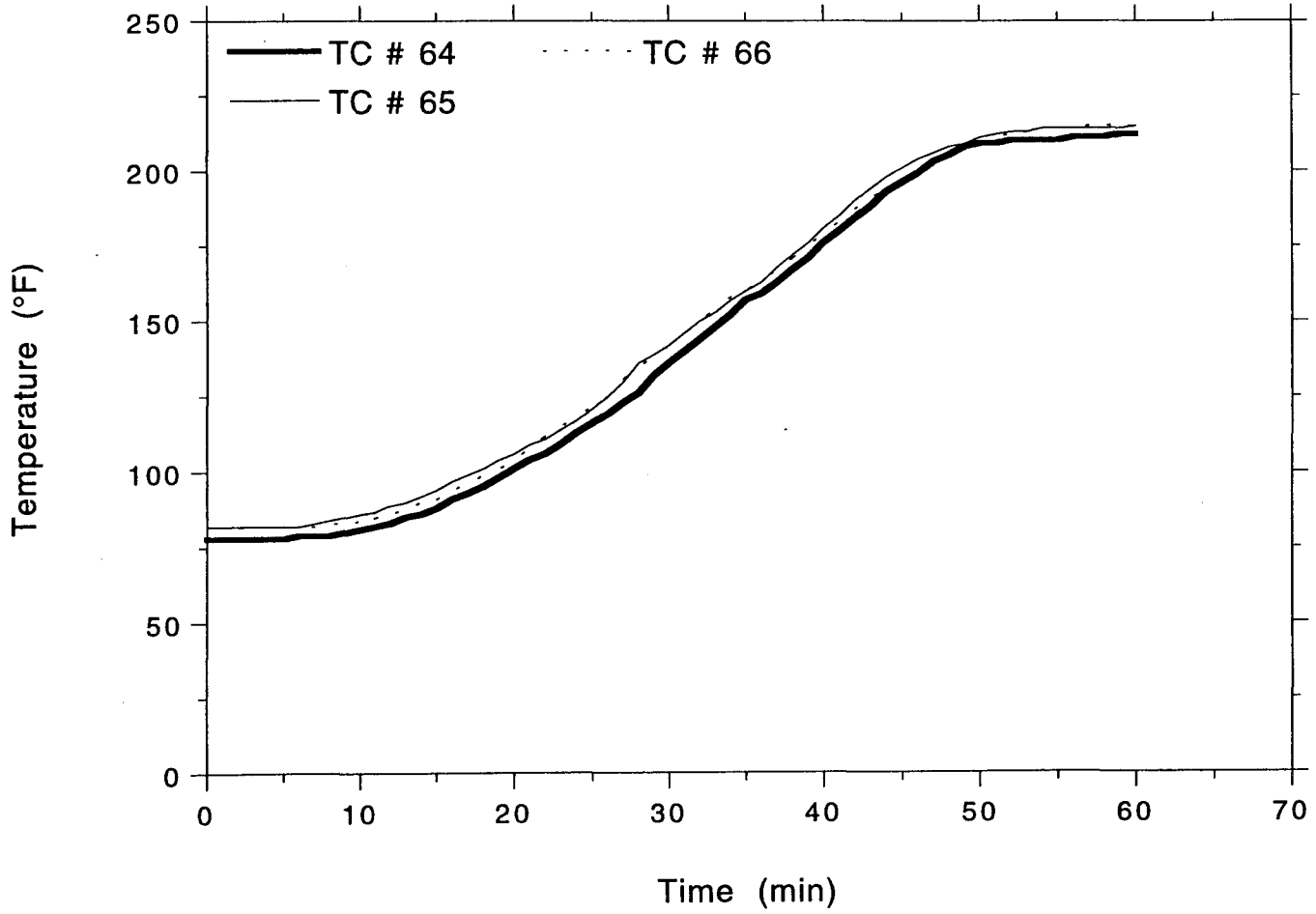
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



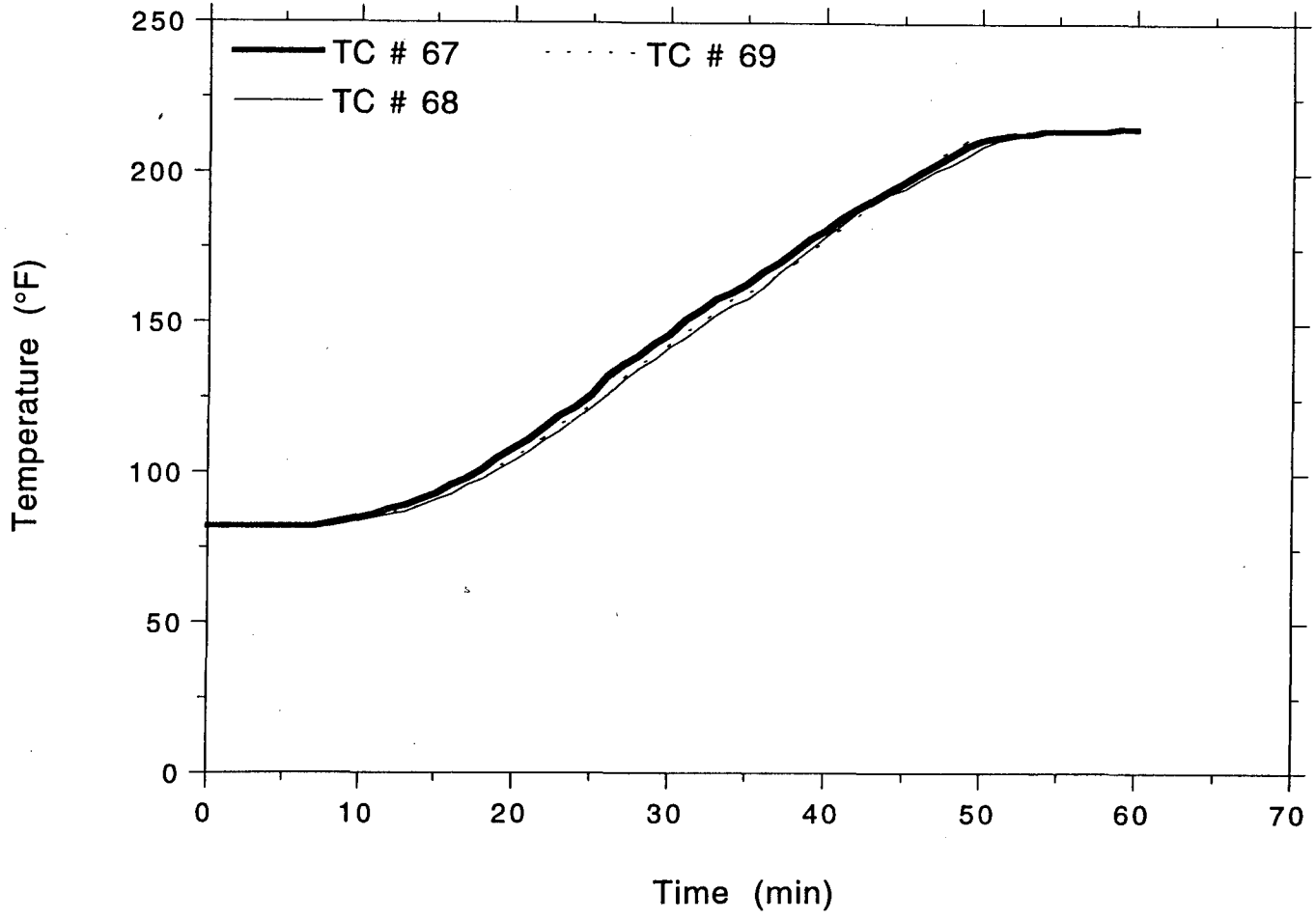
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



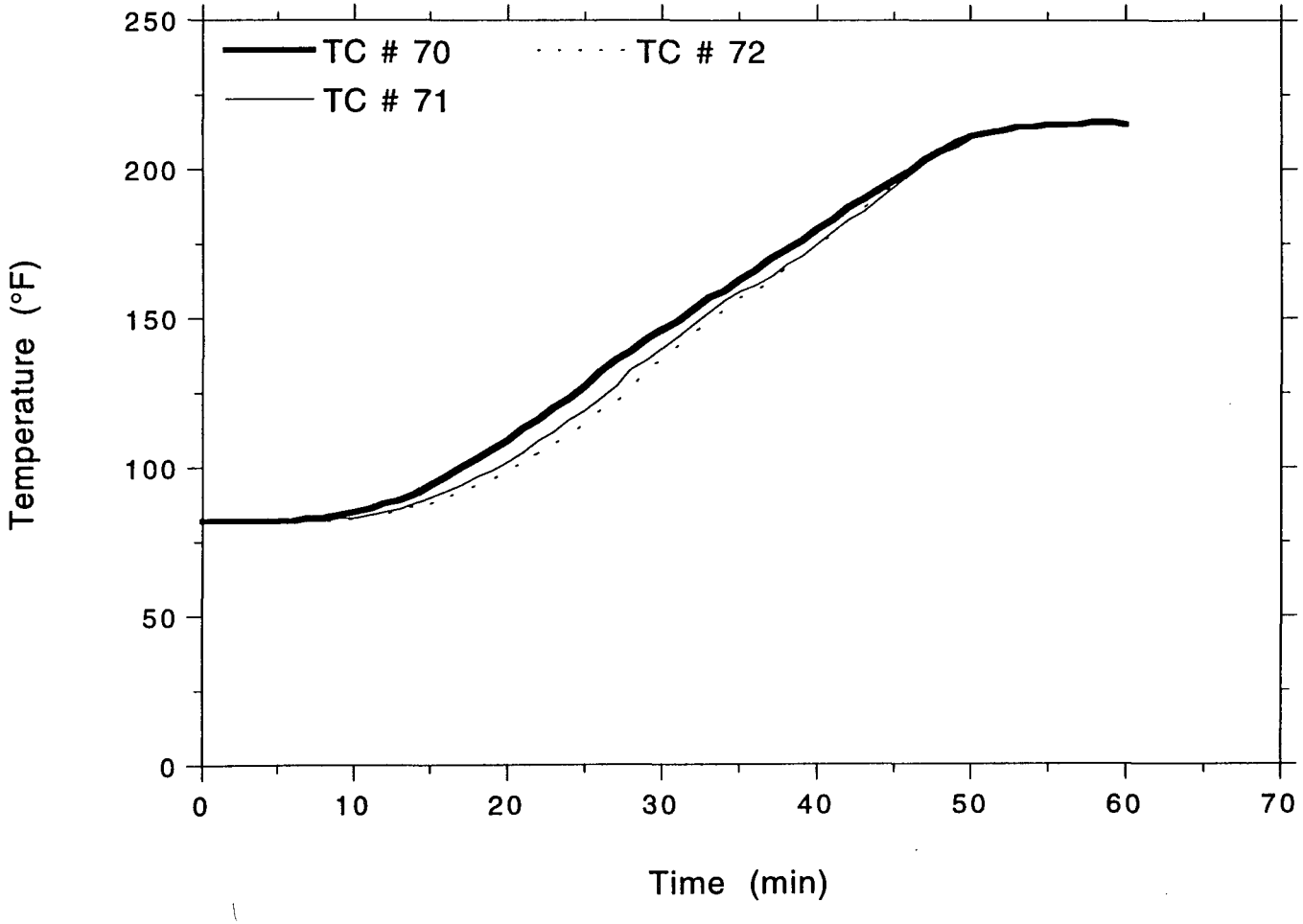
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



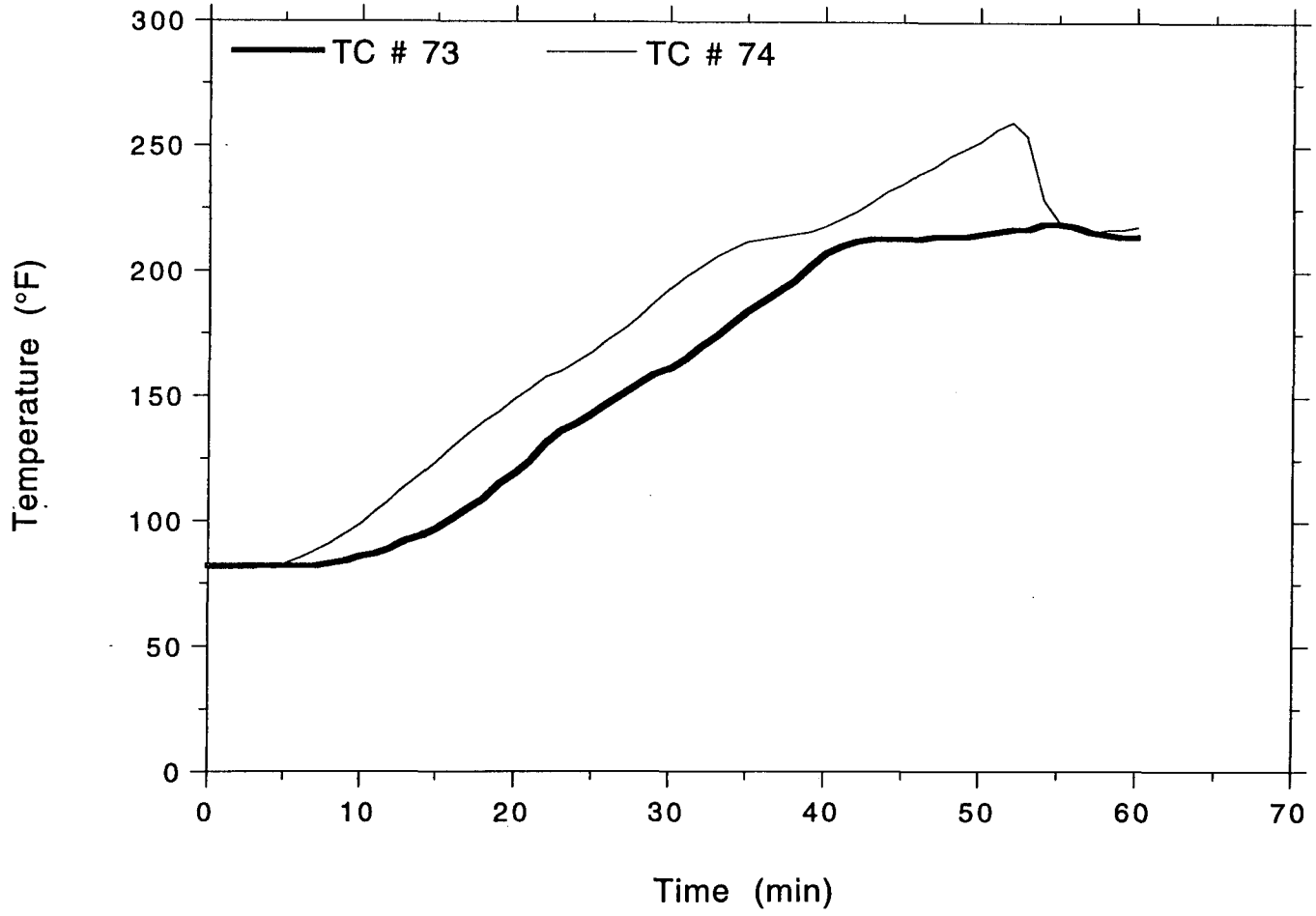
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



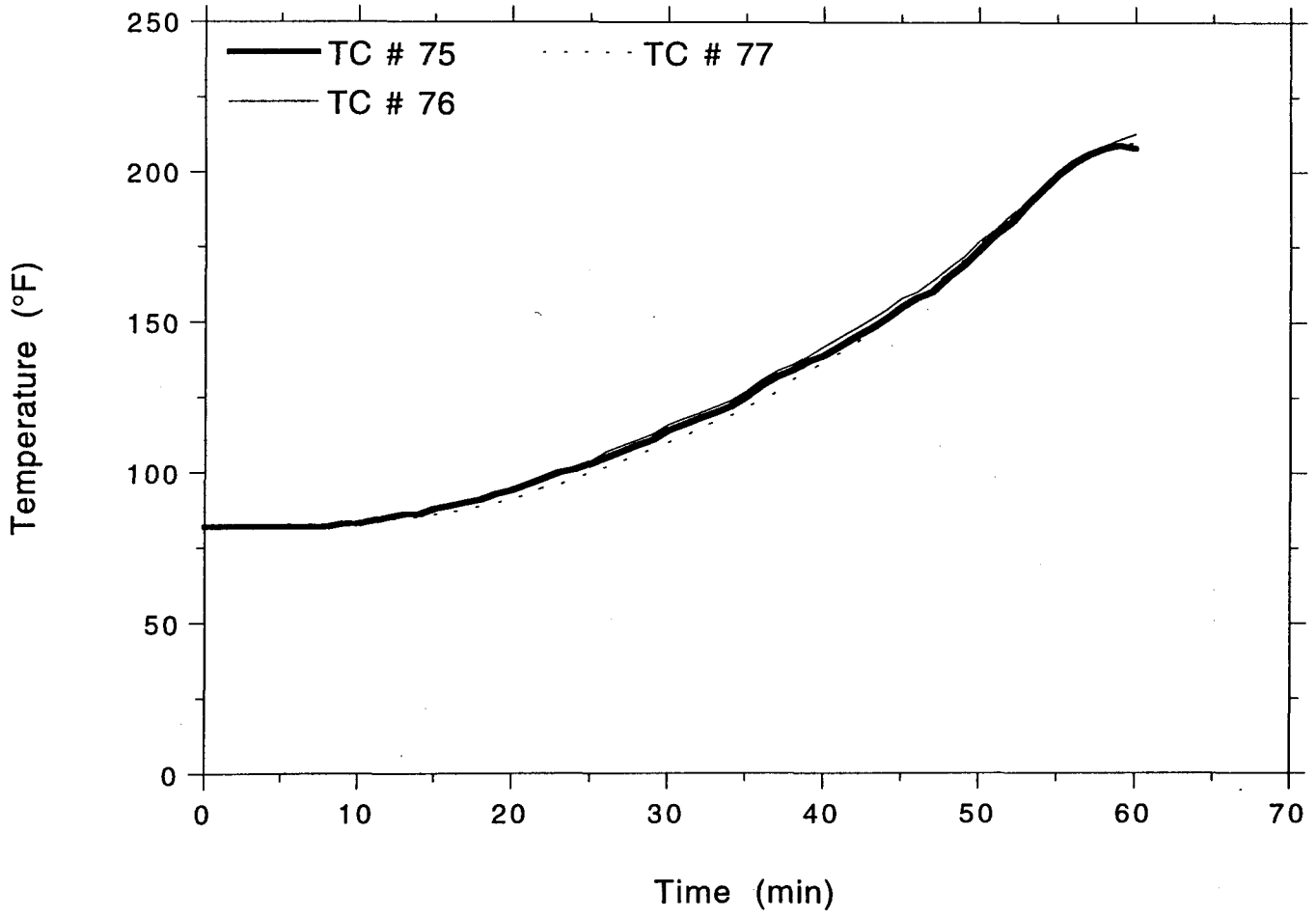
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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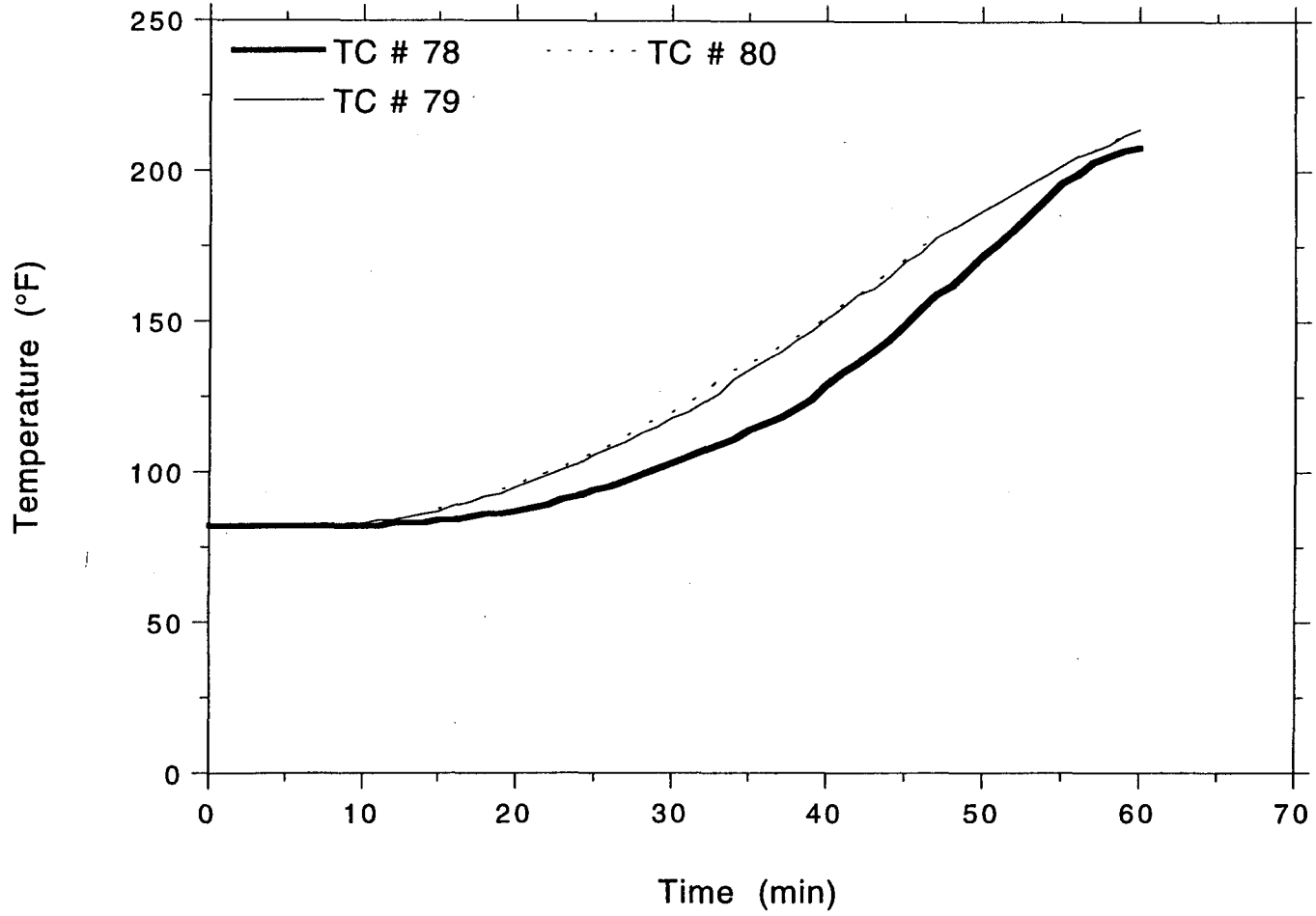

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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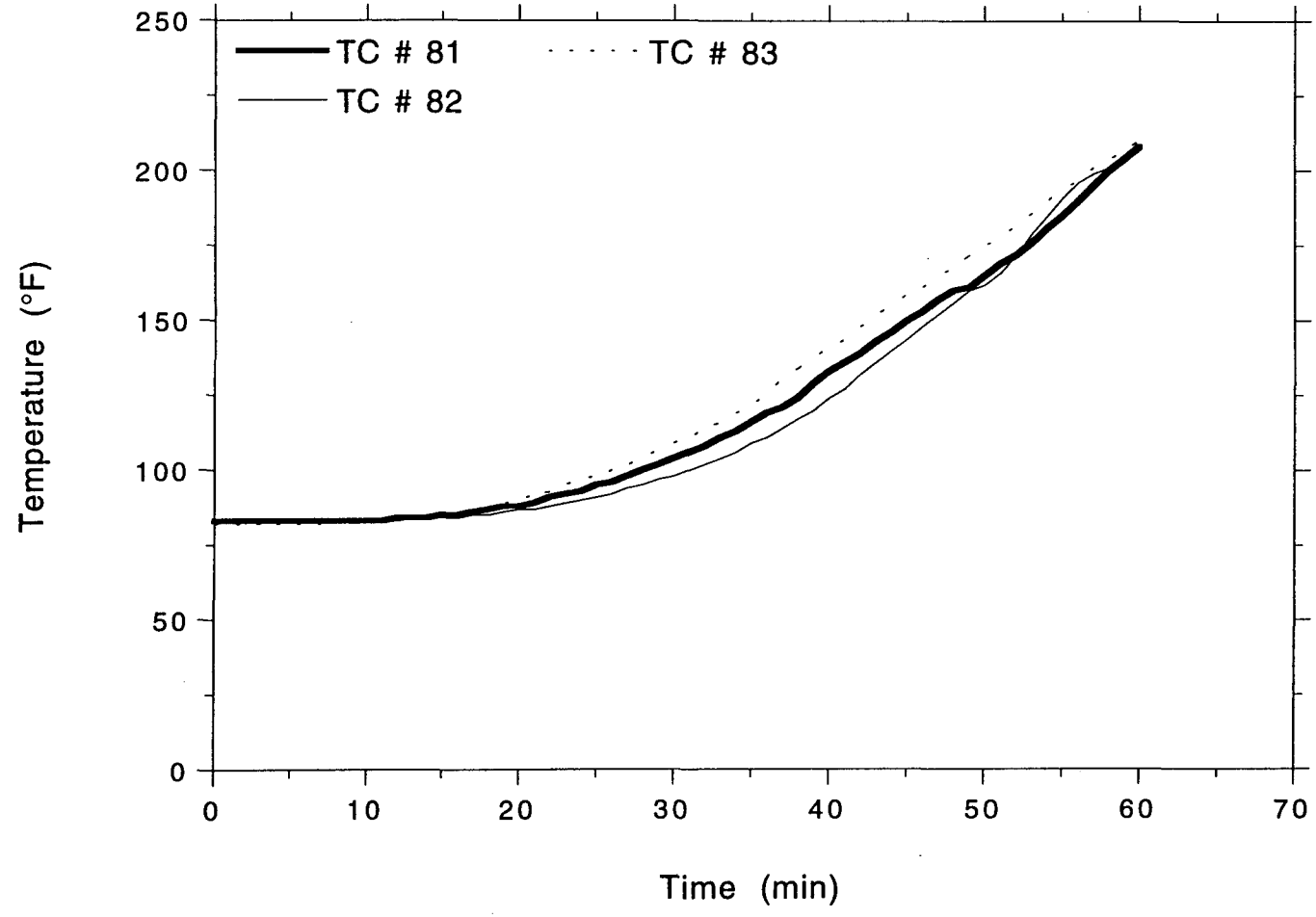

OMEGA POINT LABORATORIES

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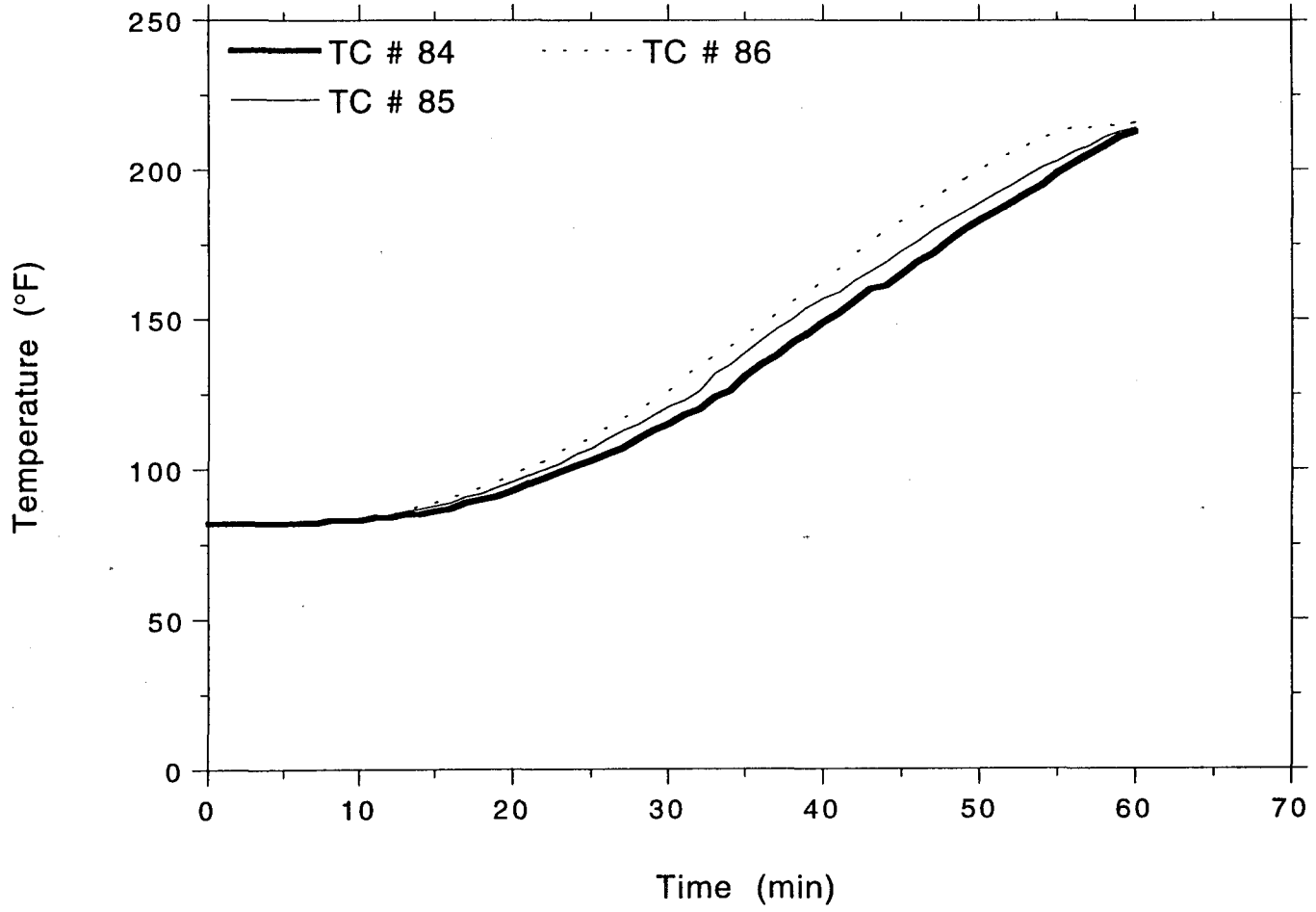

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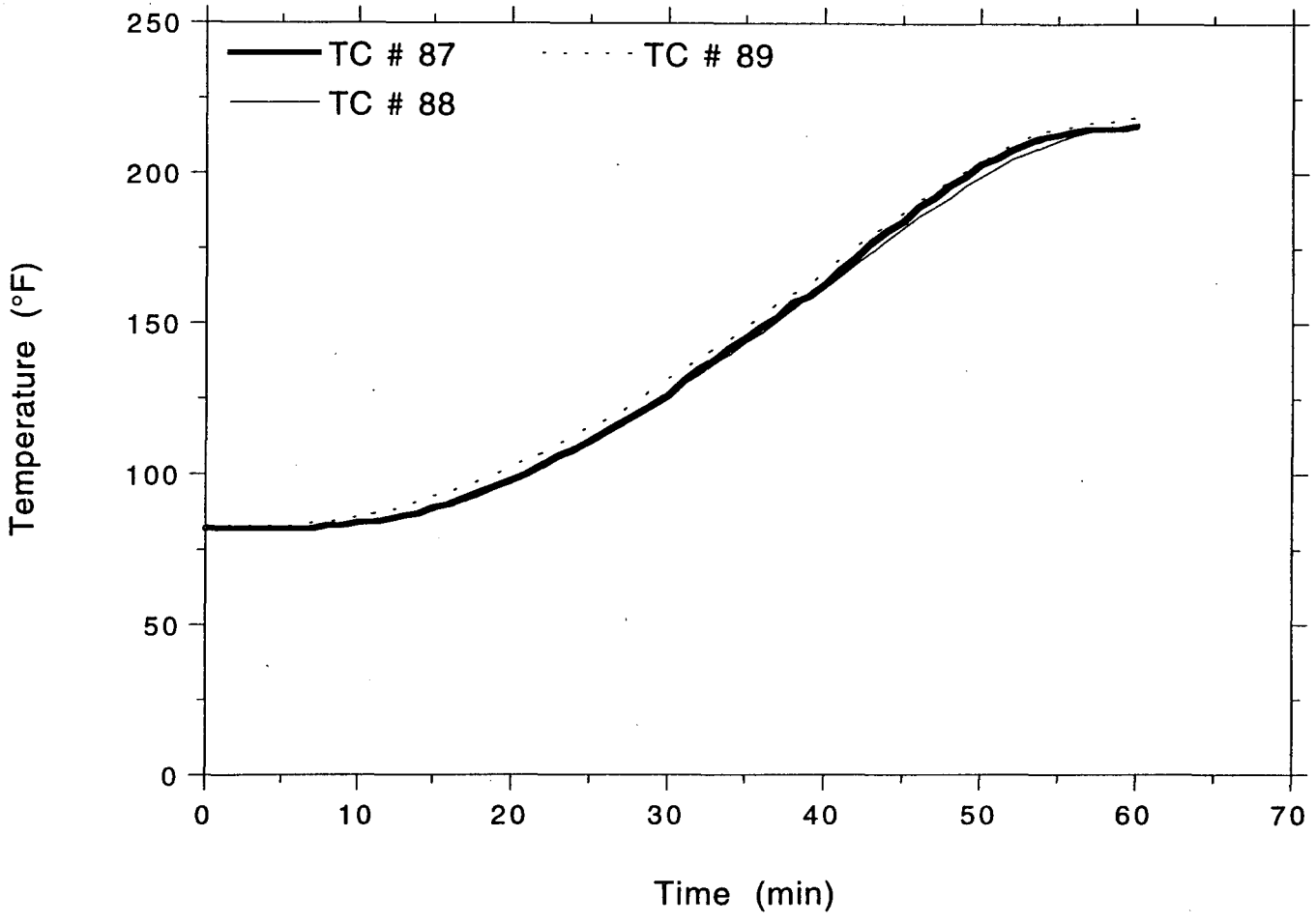
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

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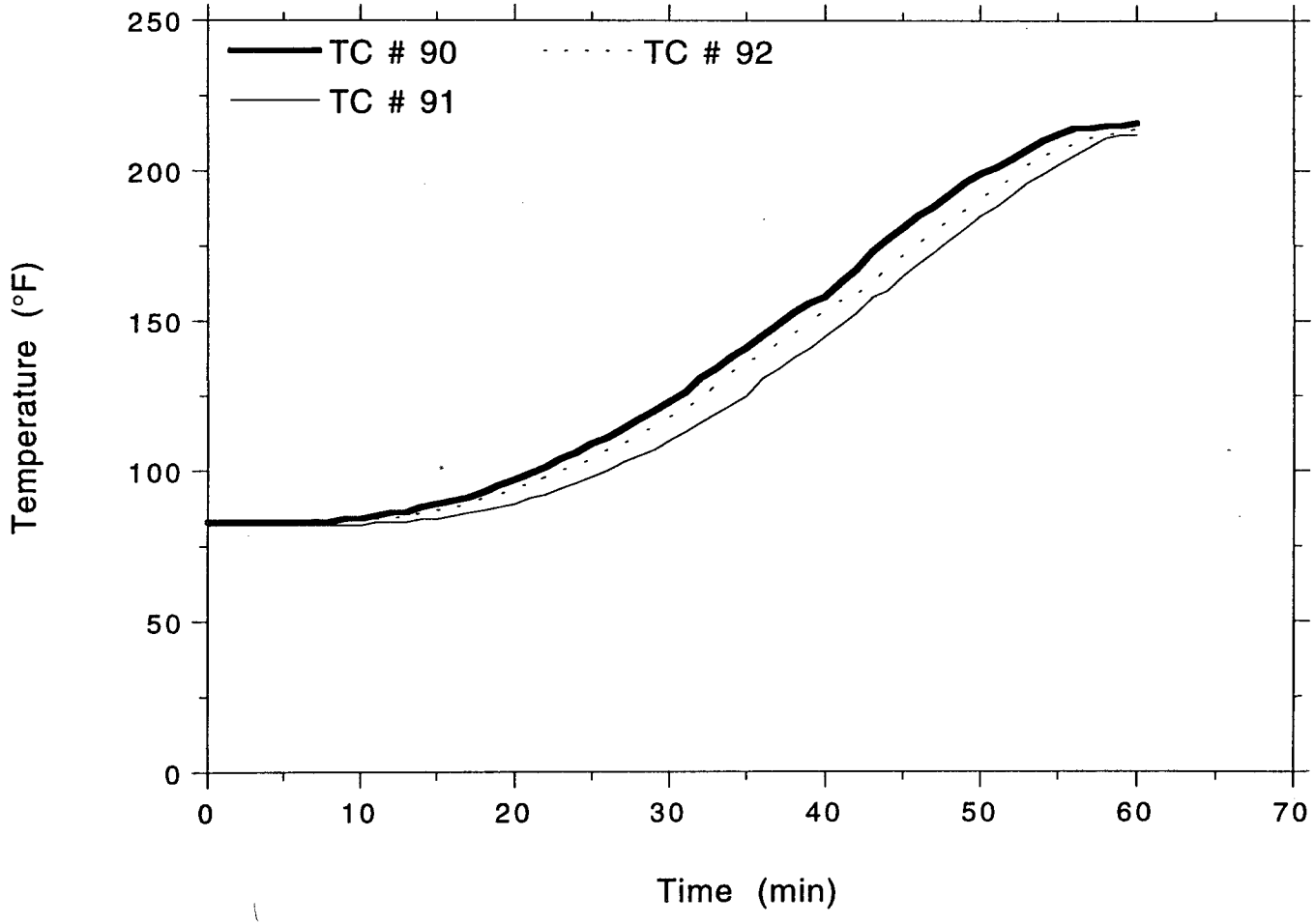
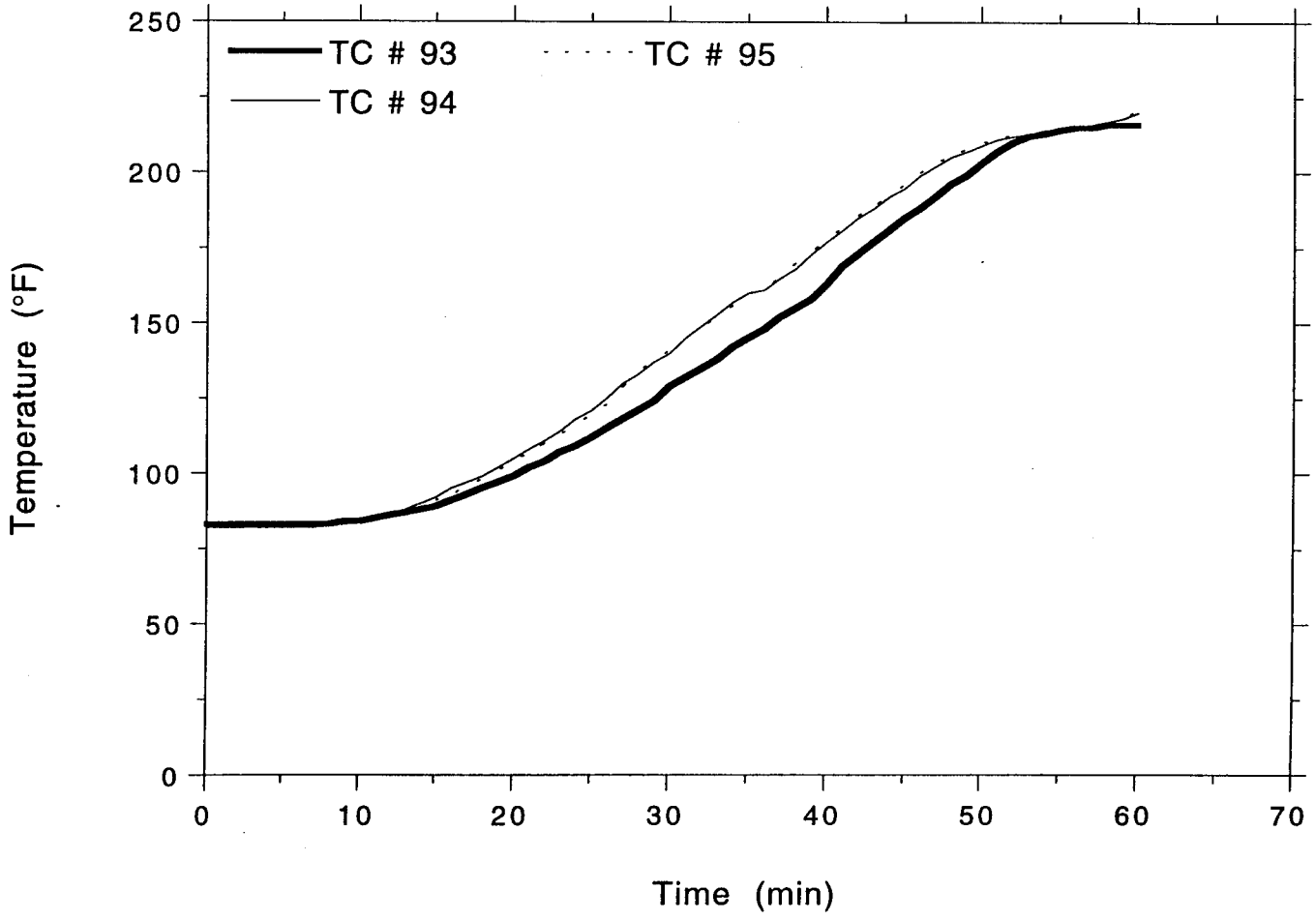
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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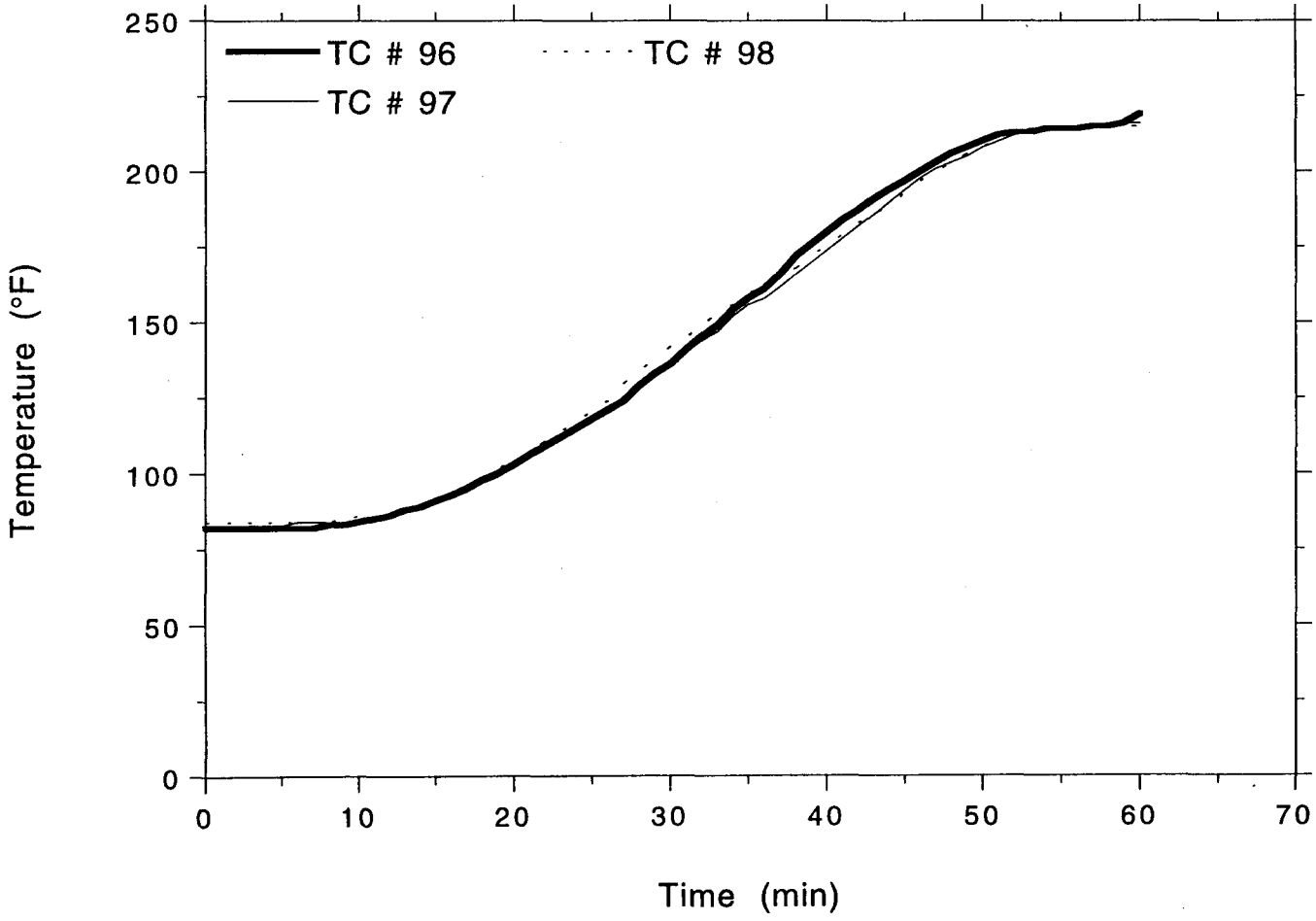

OMEGA POINT LABORATORIES

TSI/TVA
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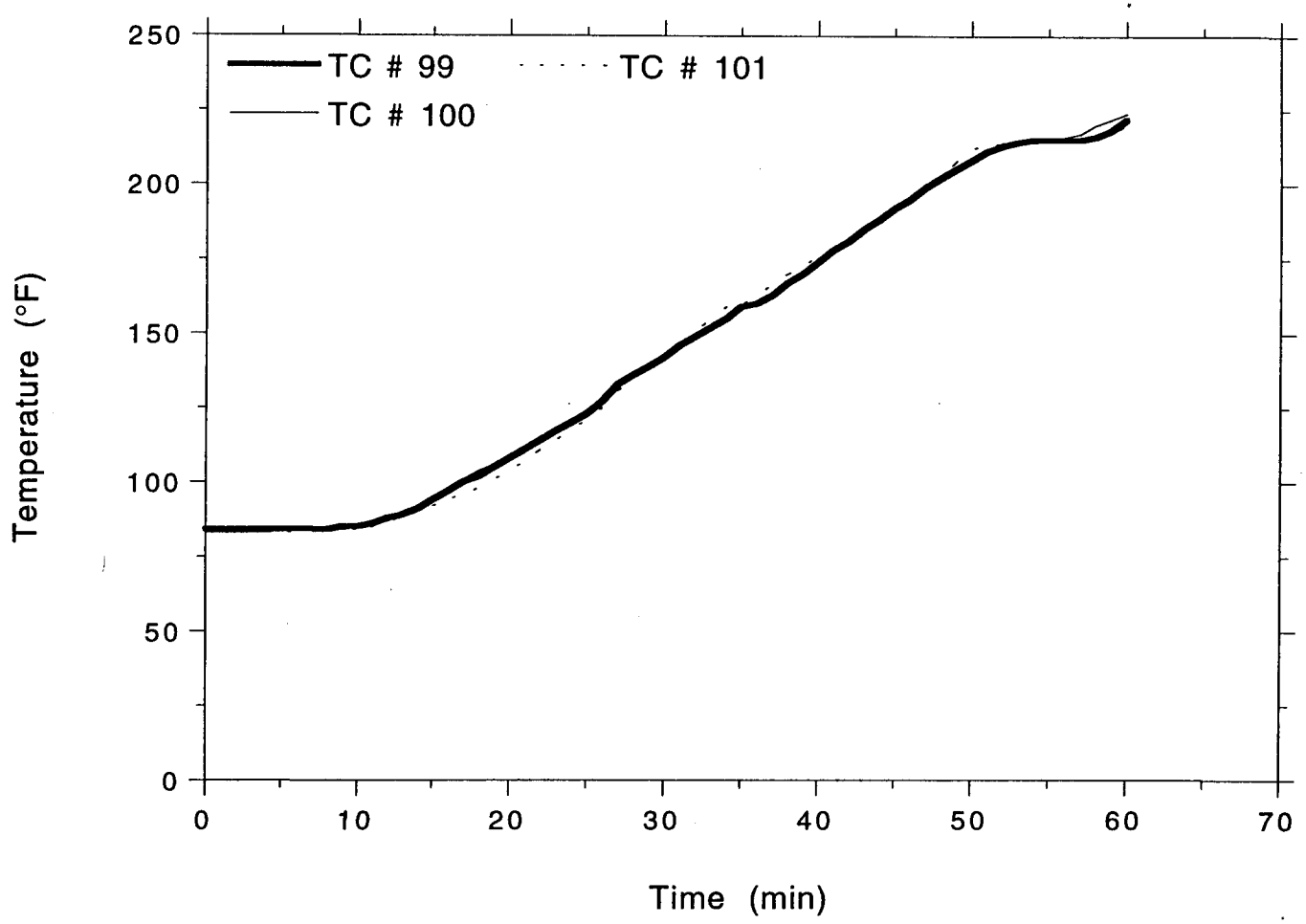
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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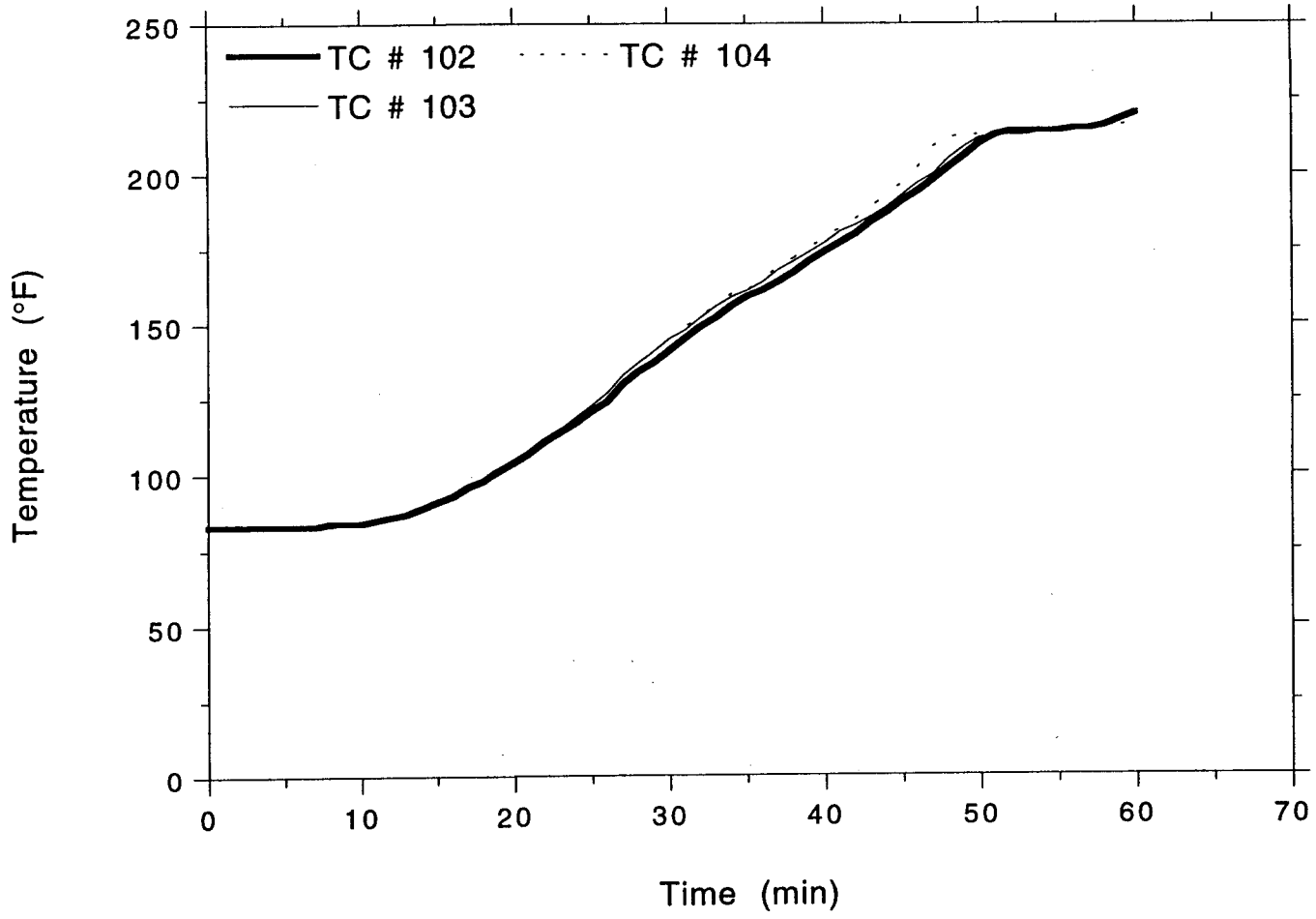
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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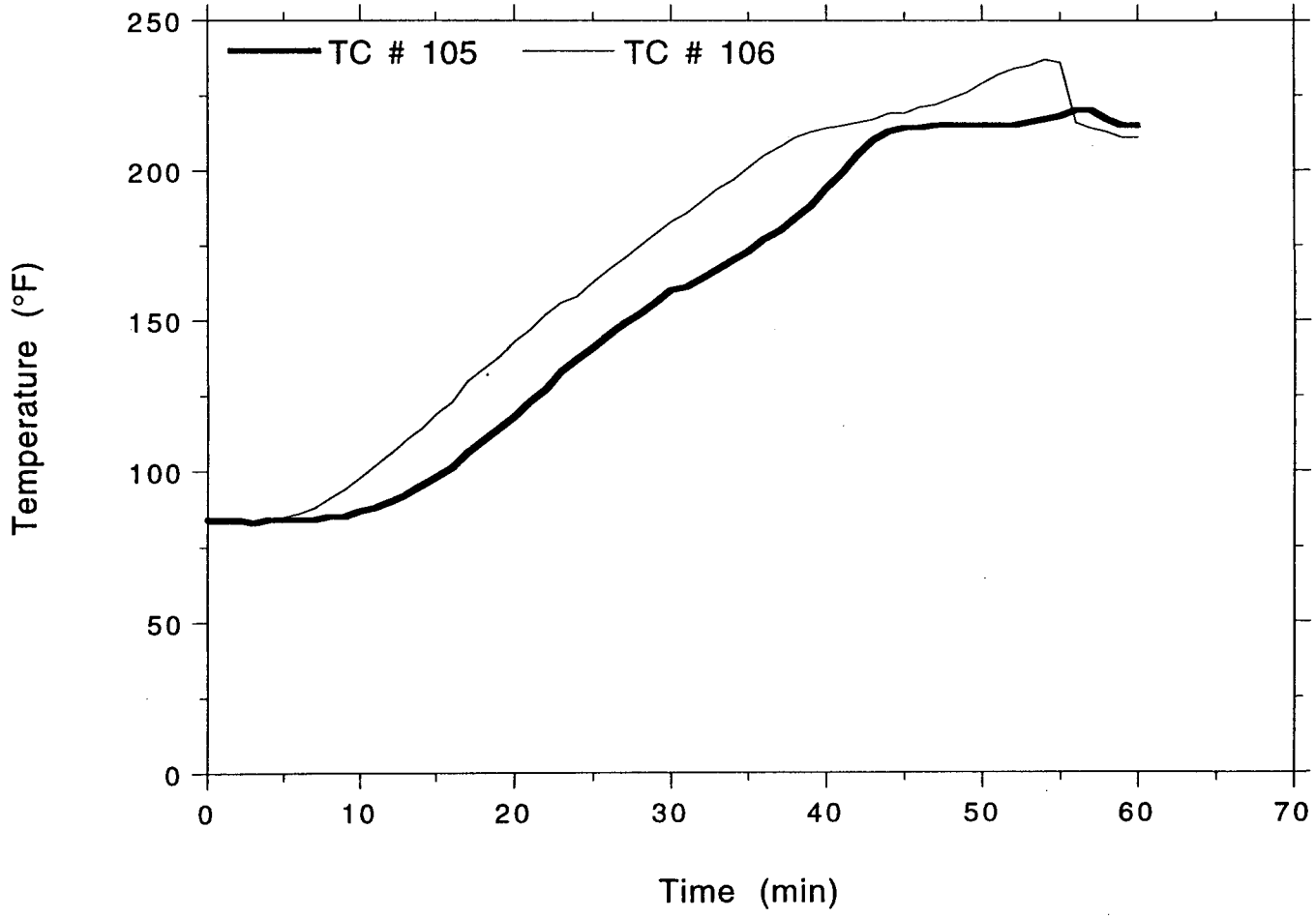
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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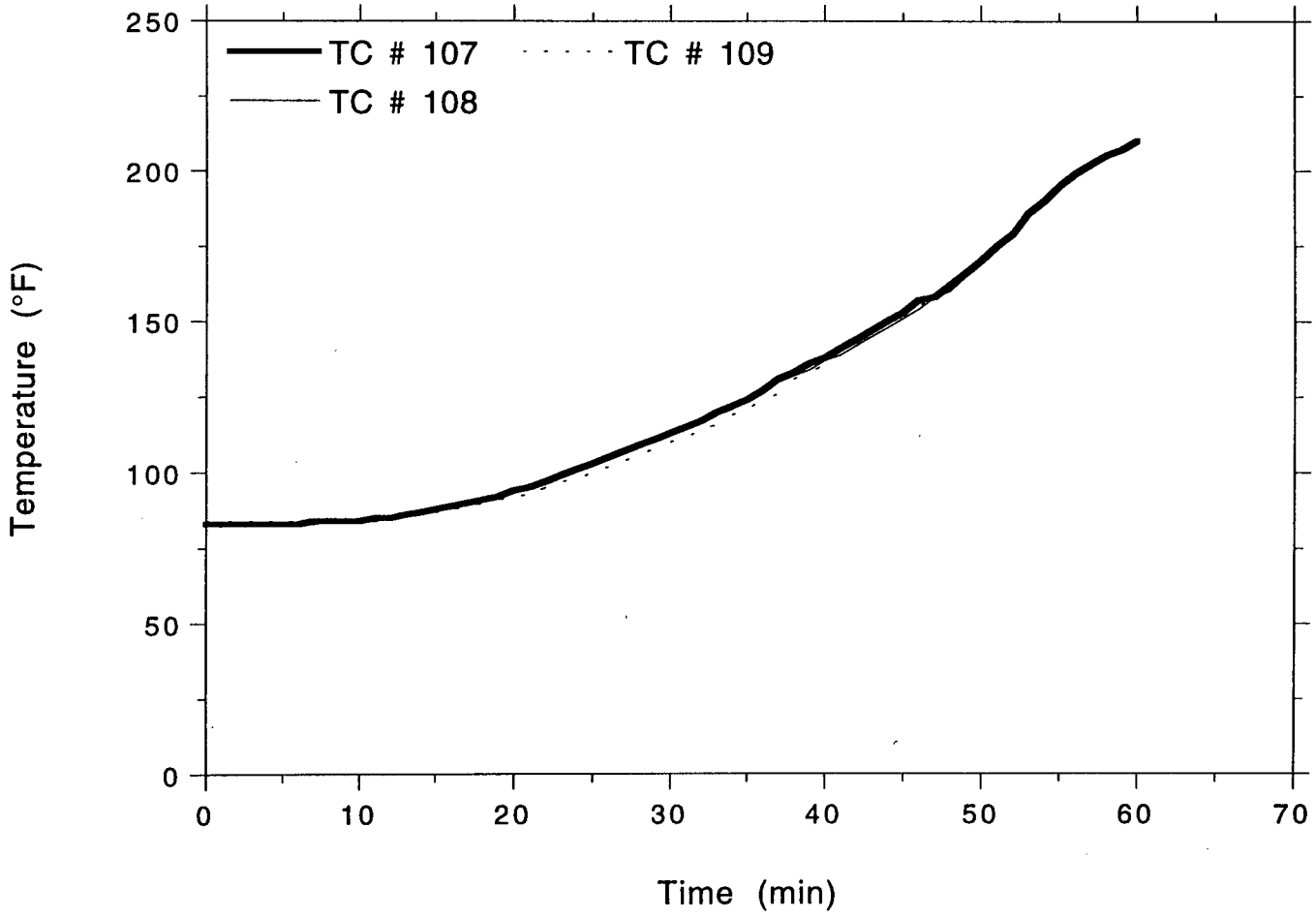
5th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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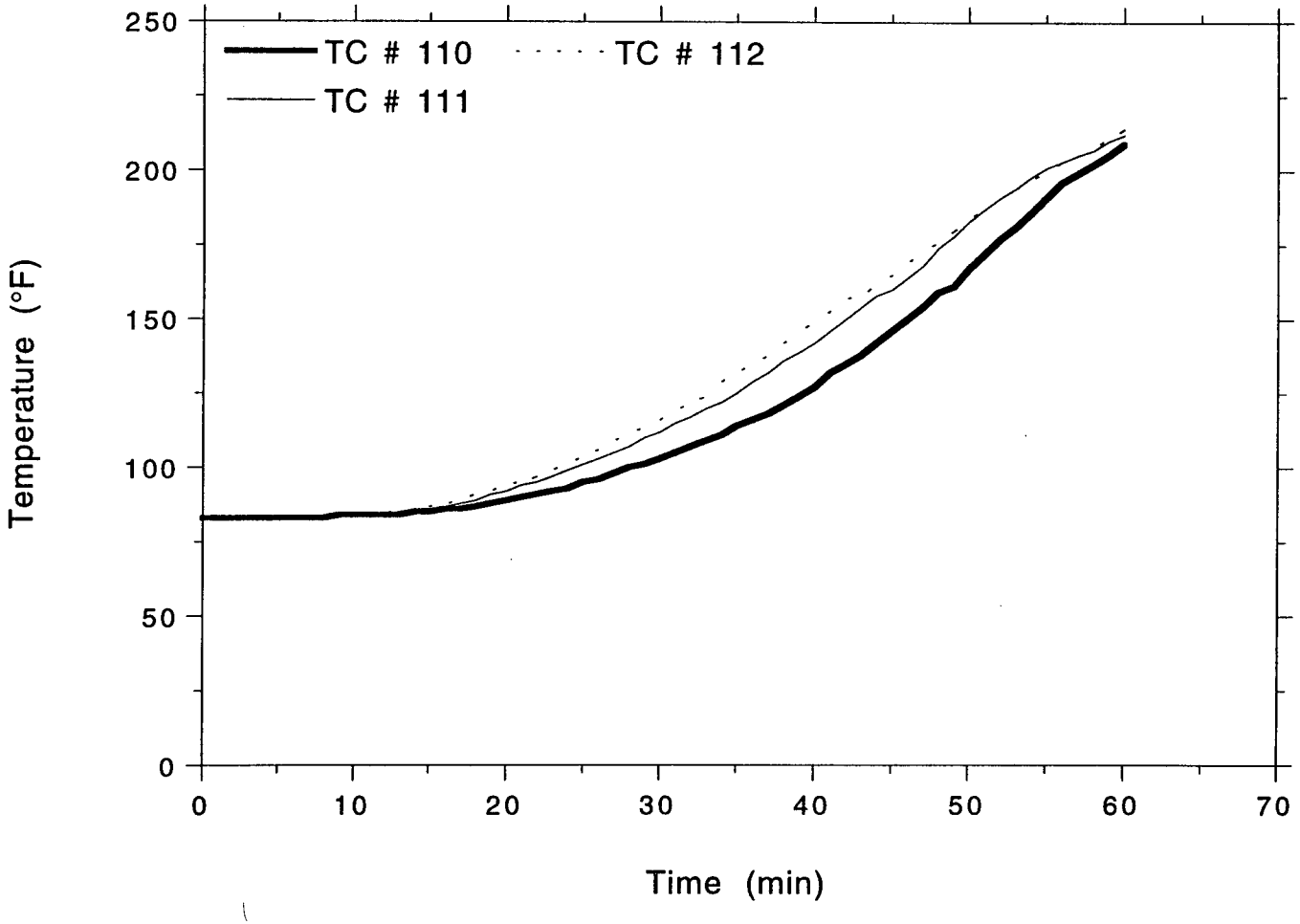
5th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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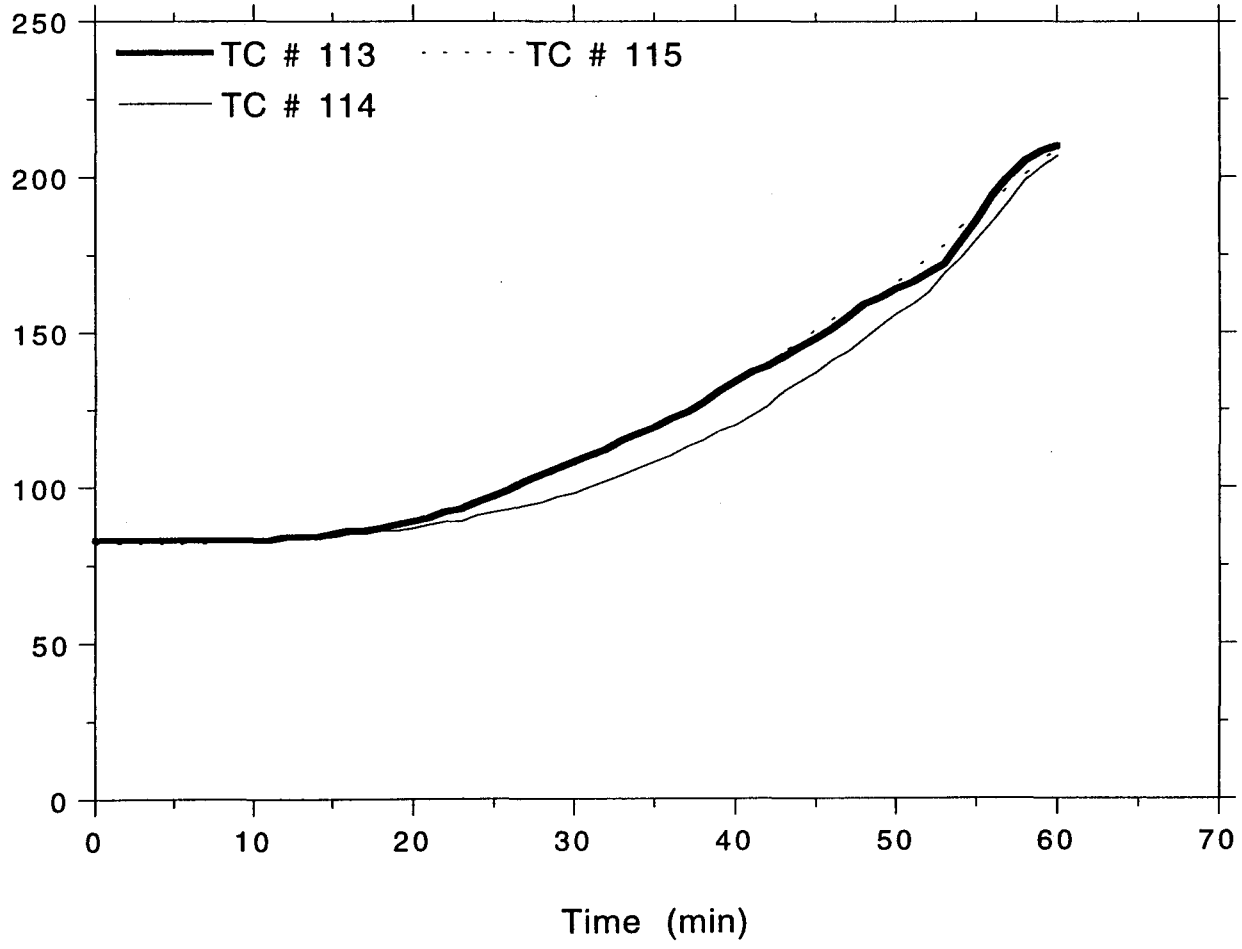
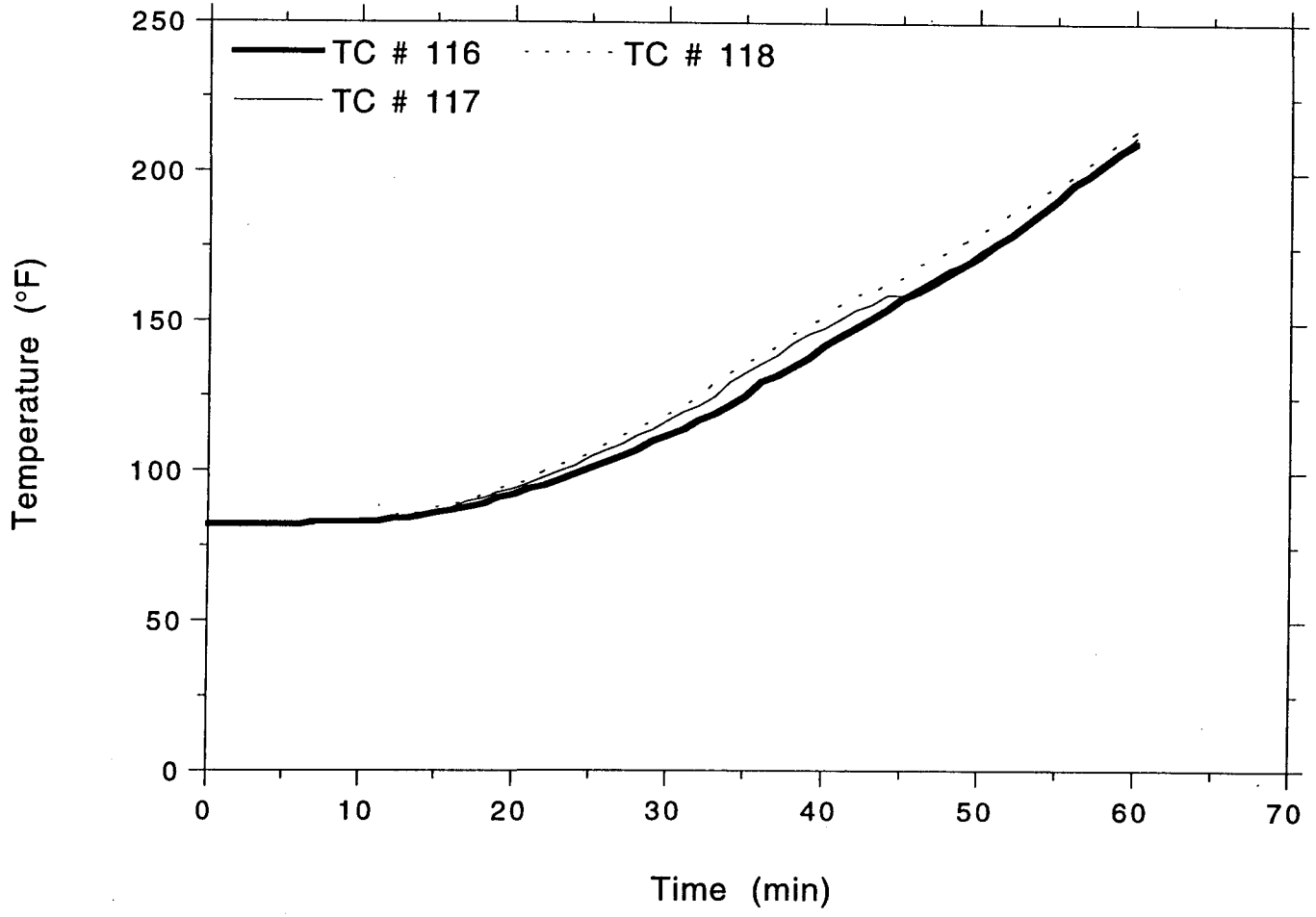


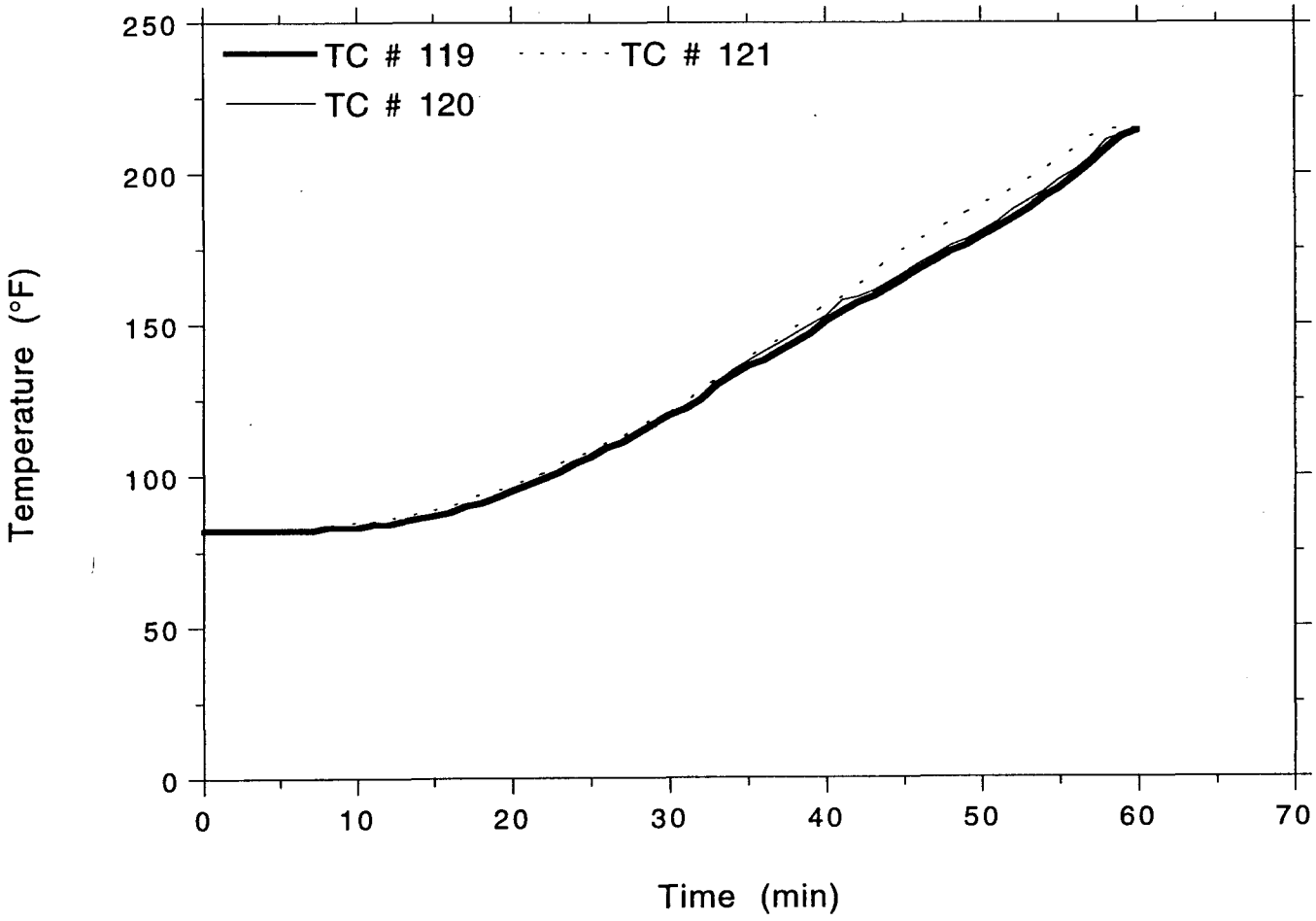
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



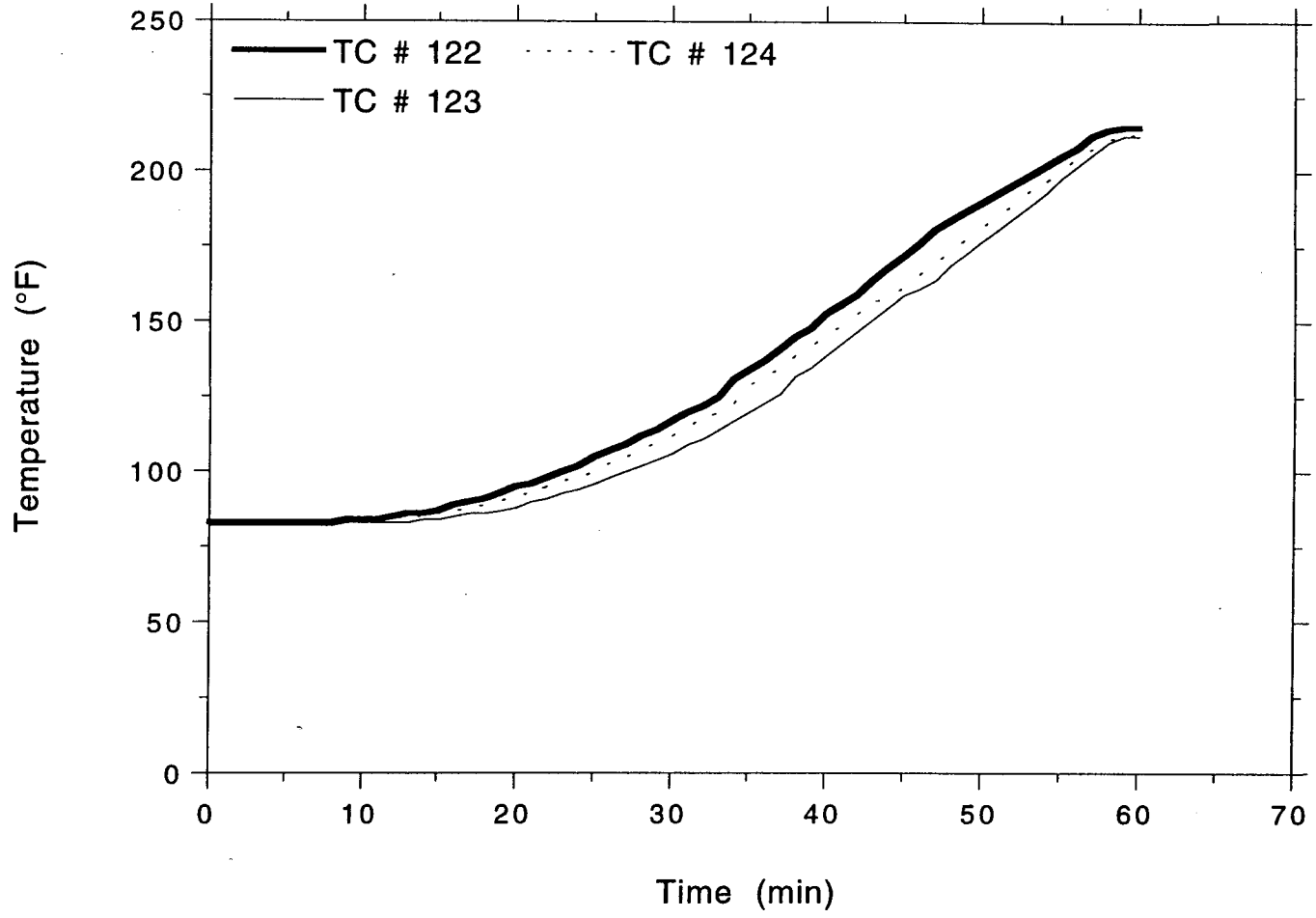
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



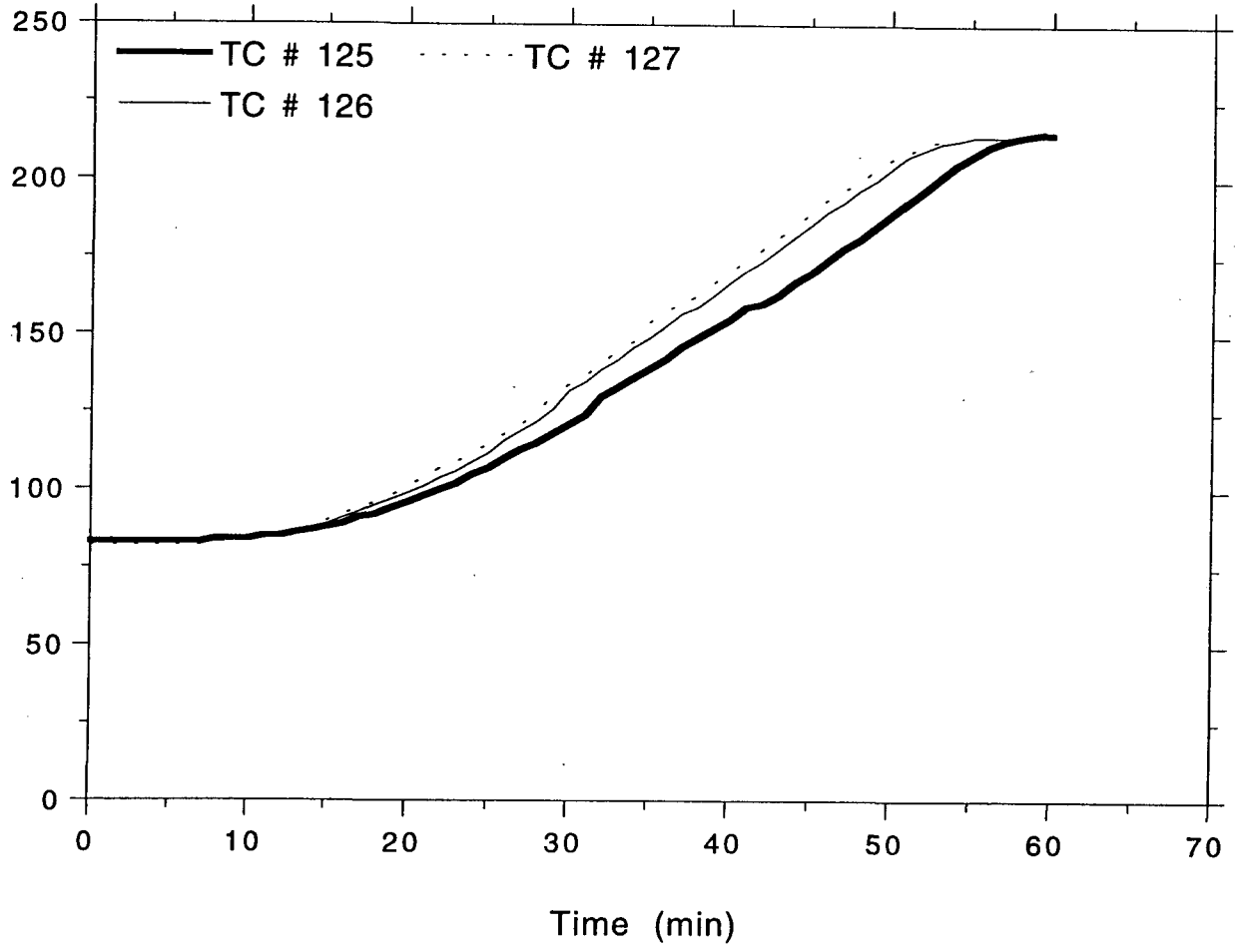
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



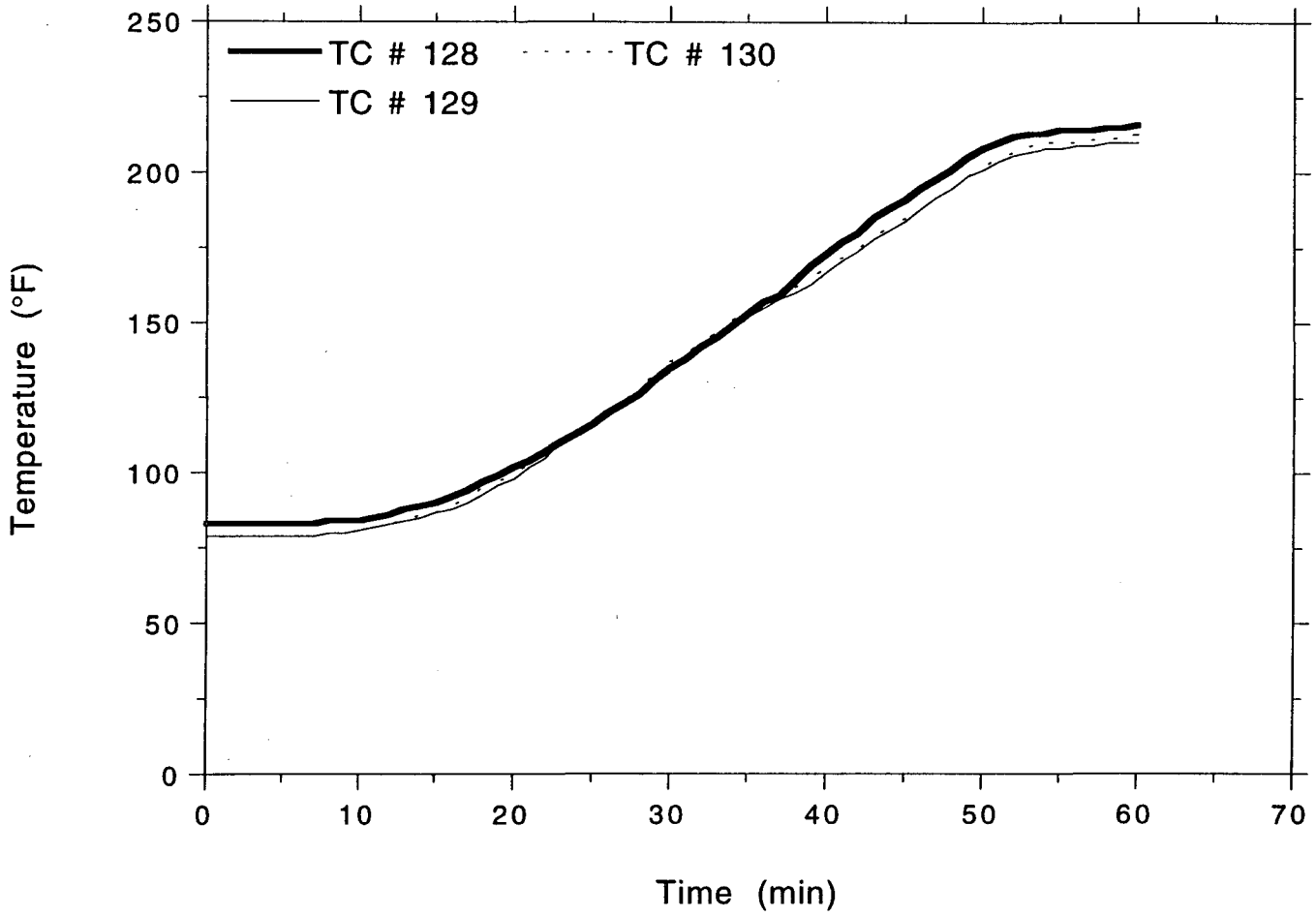
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



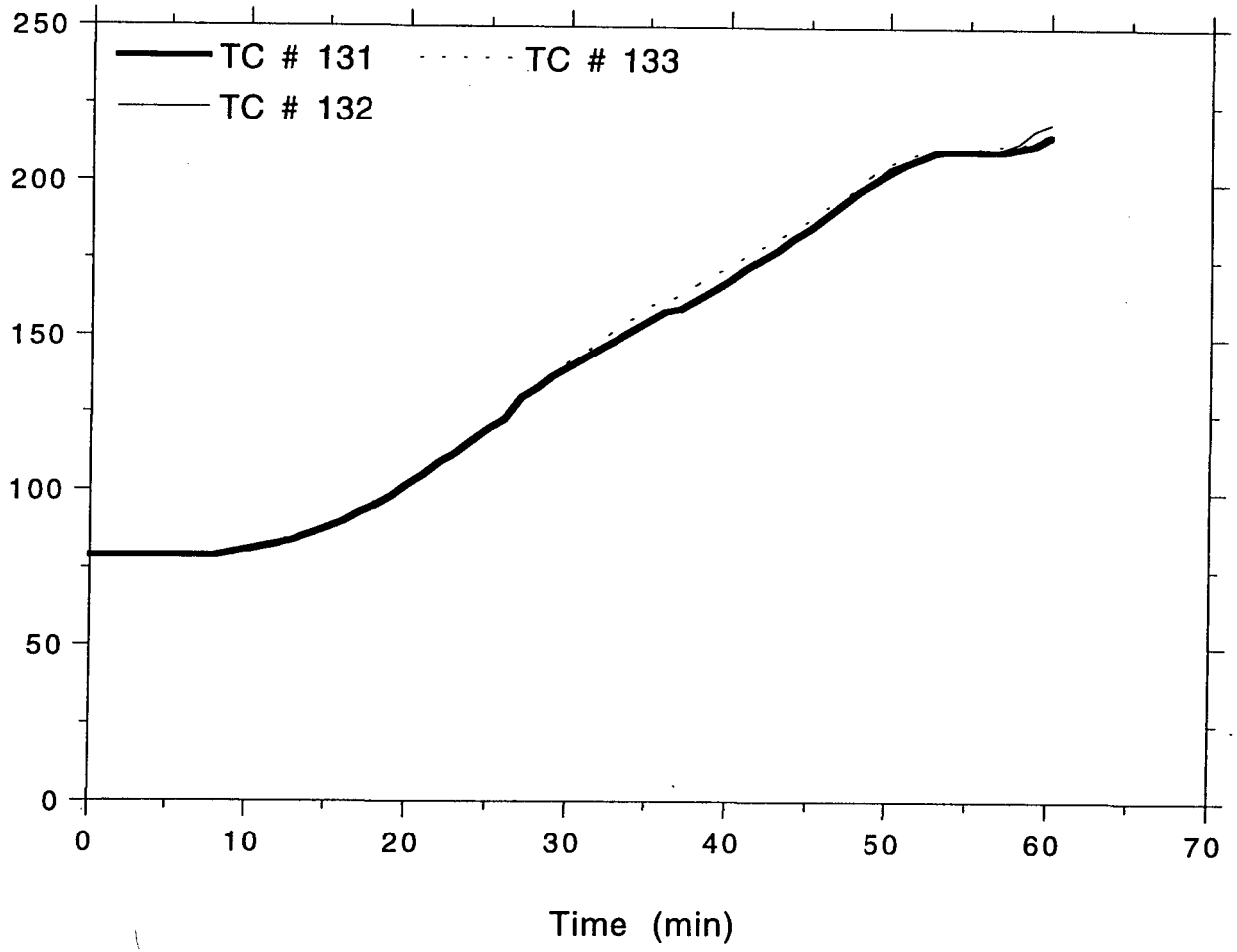
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



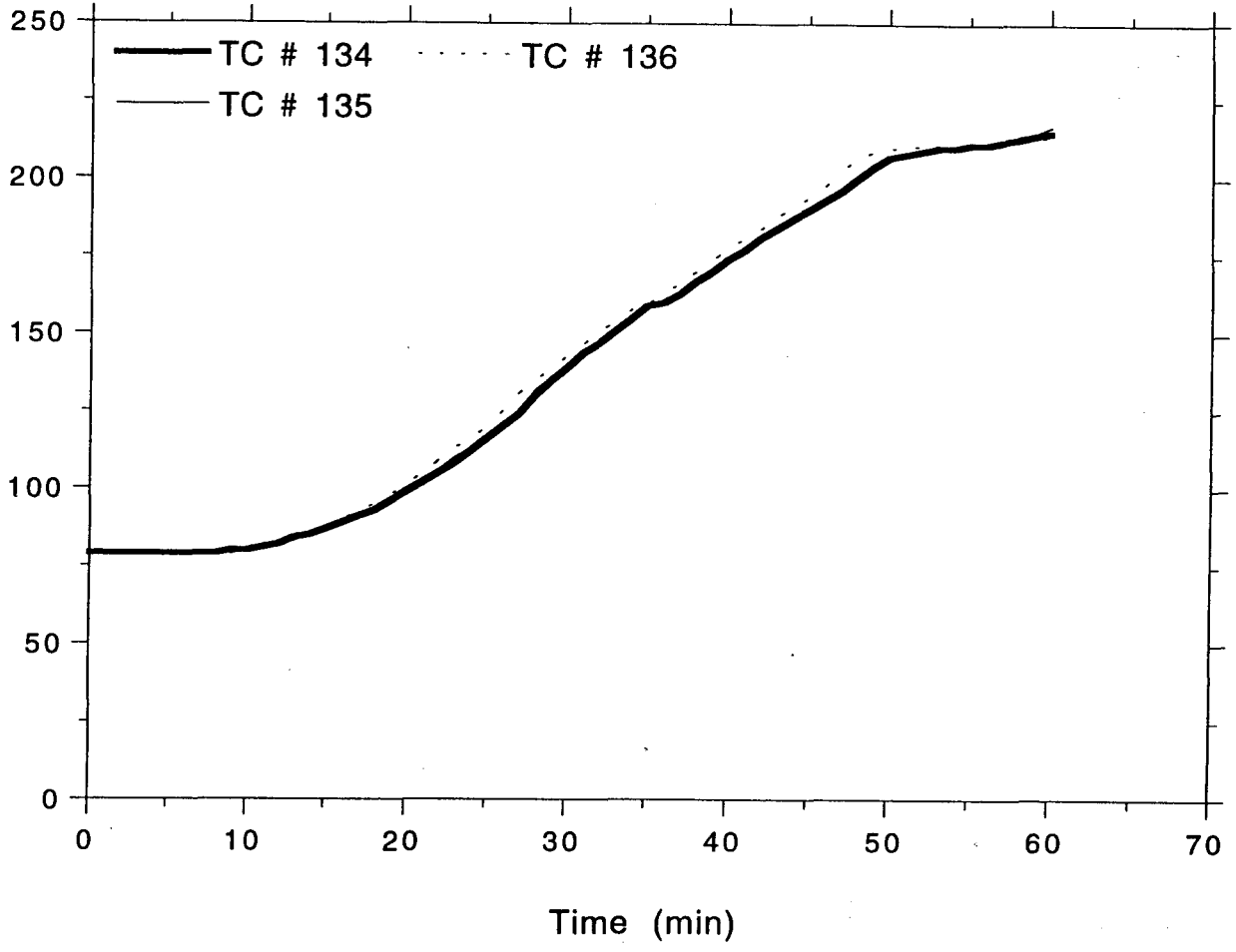
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



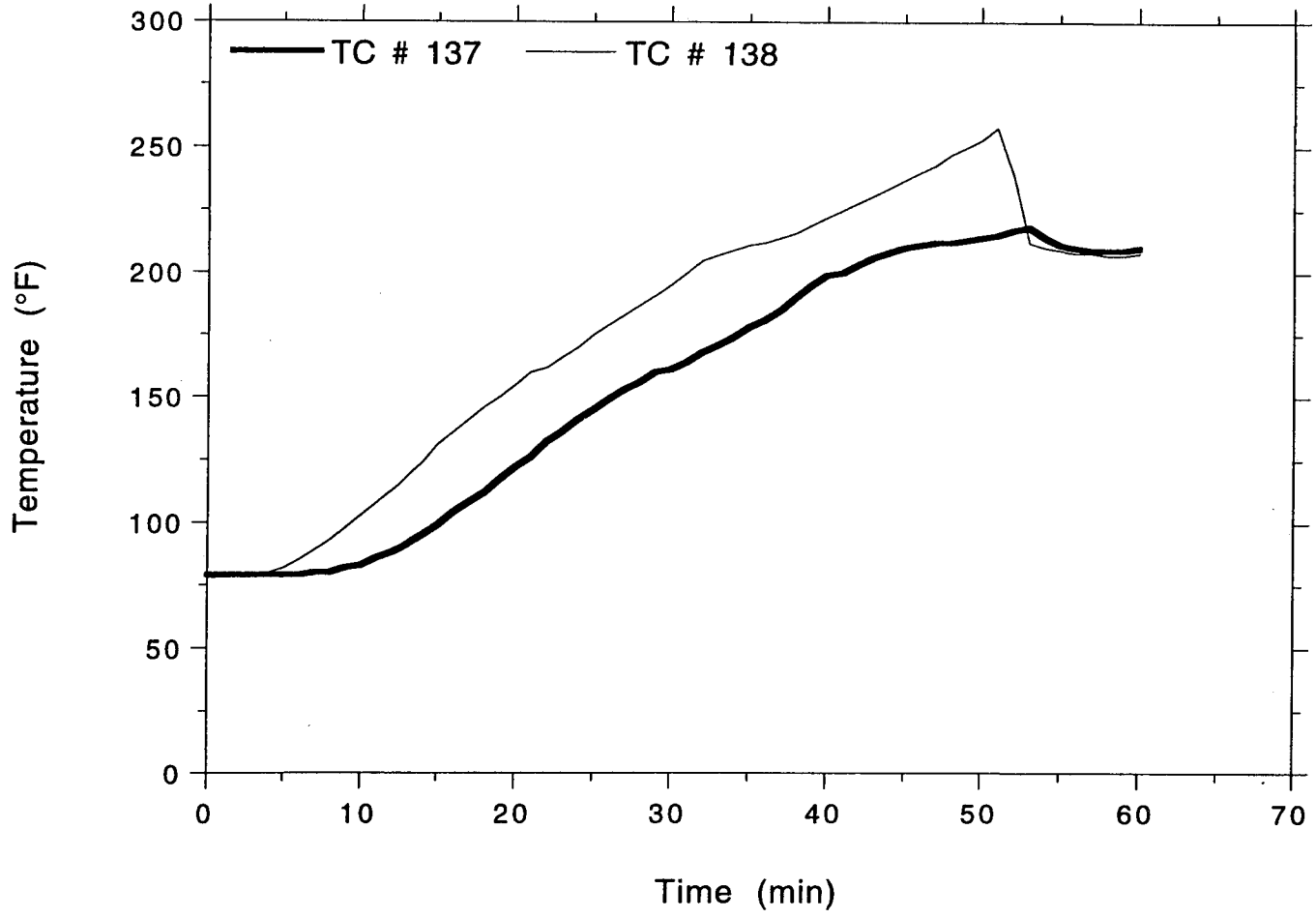
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



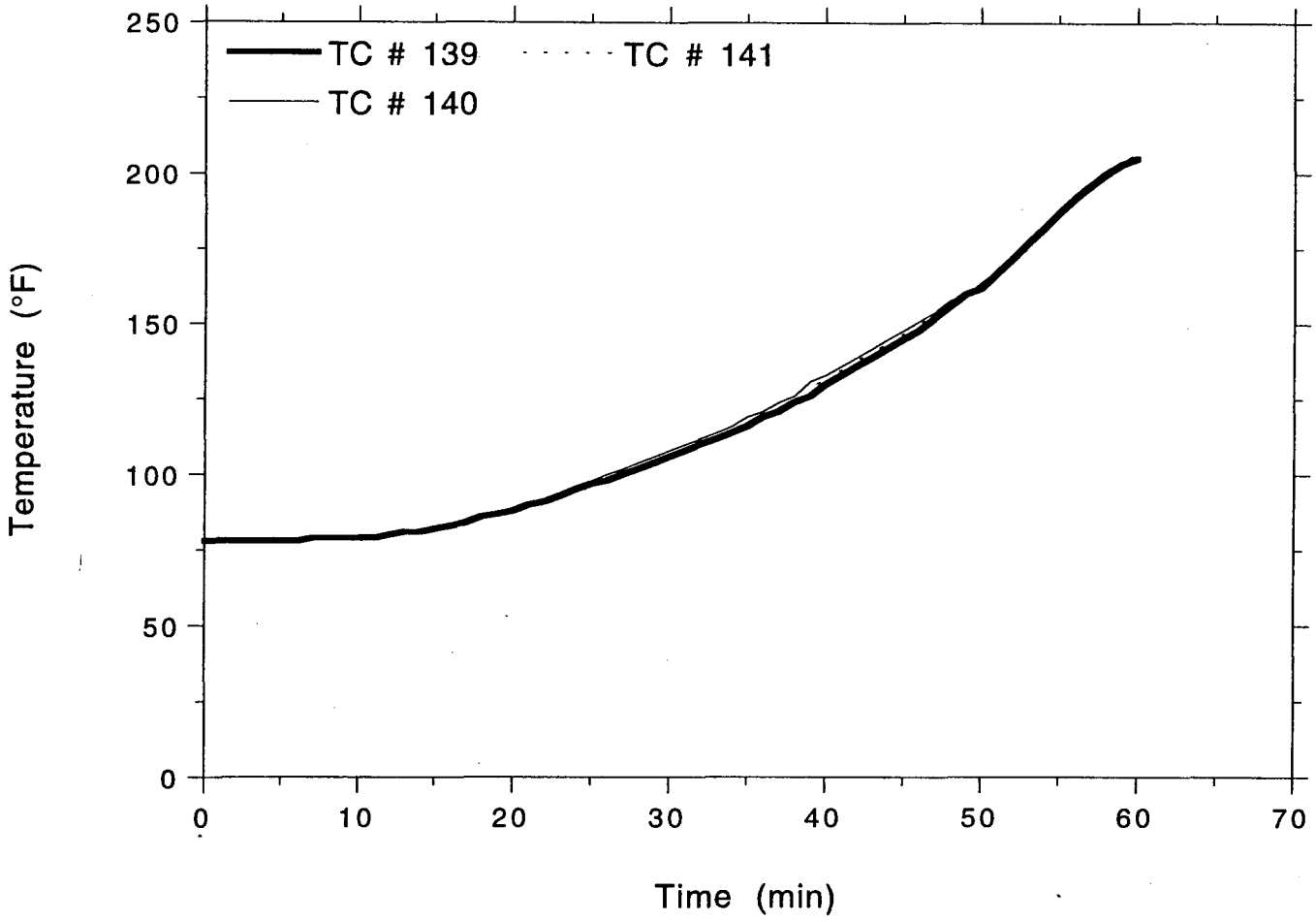
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



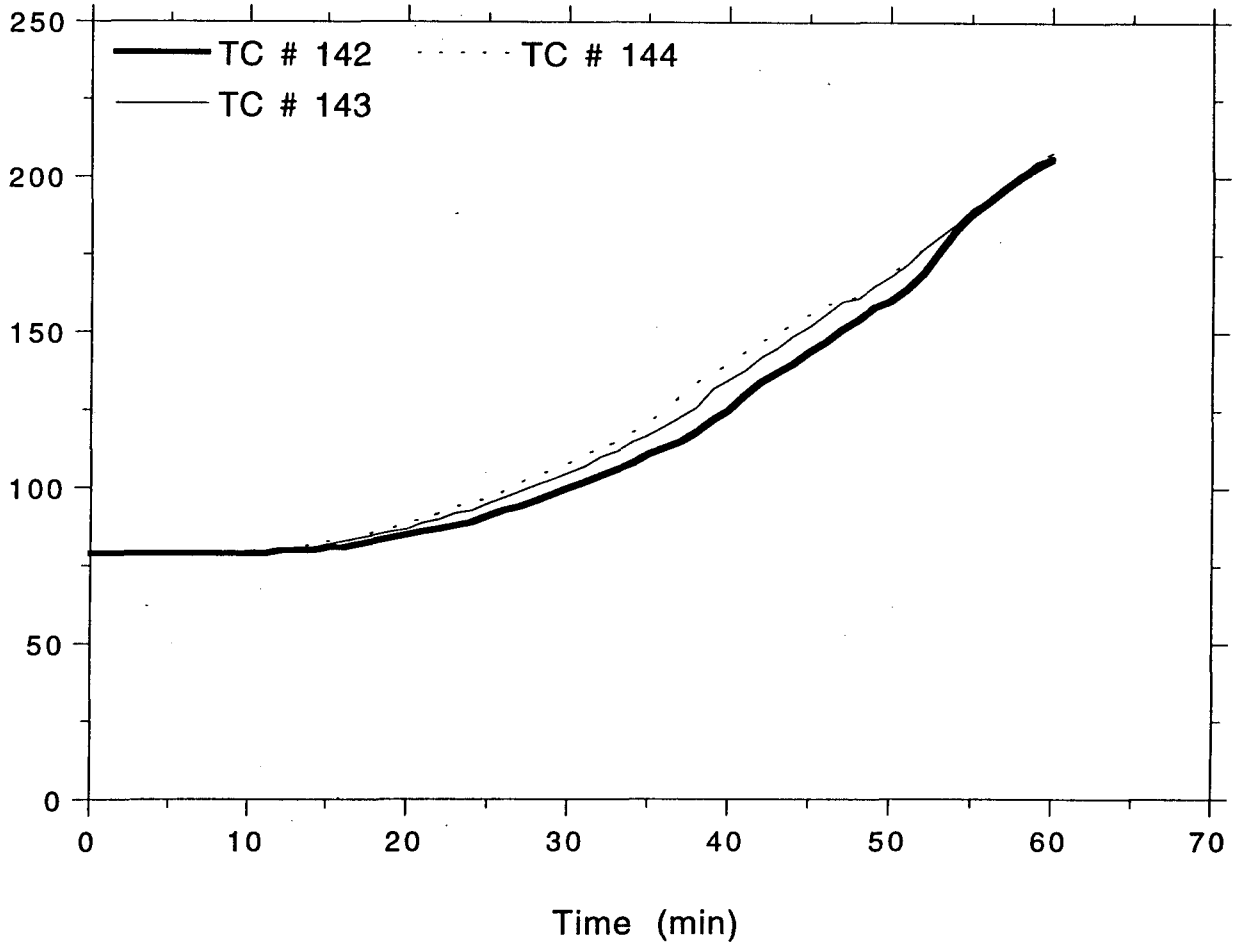
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



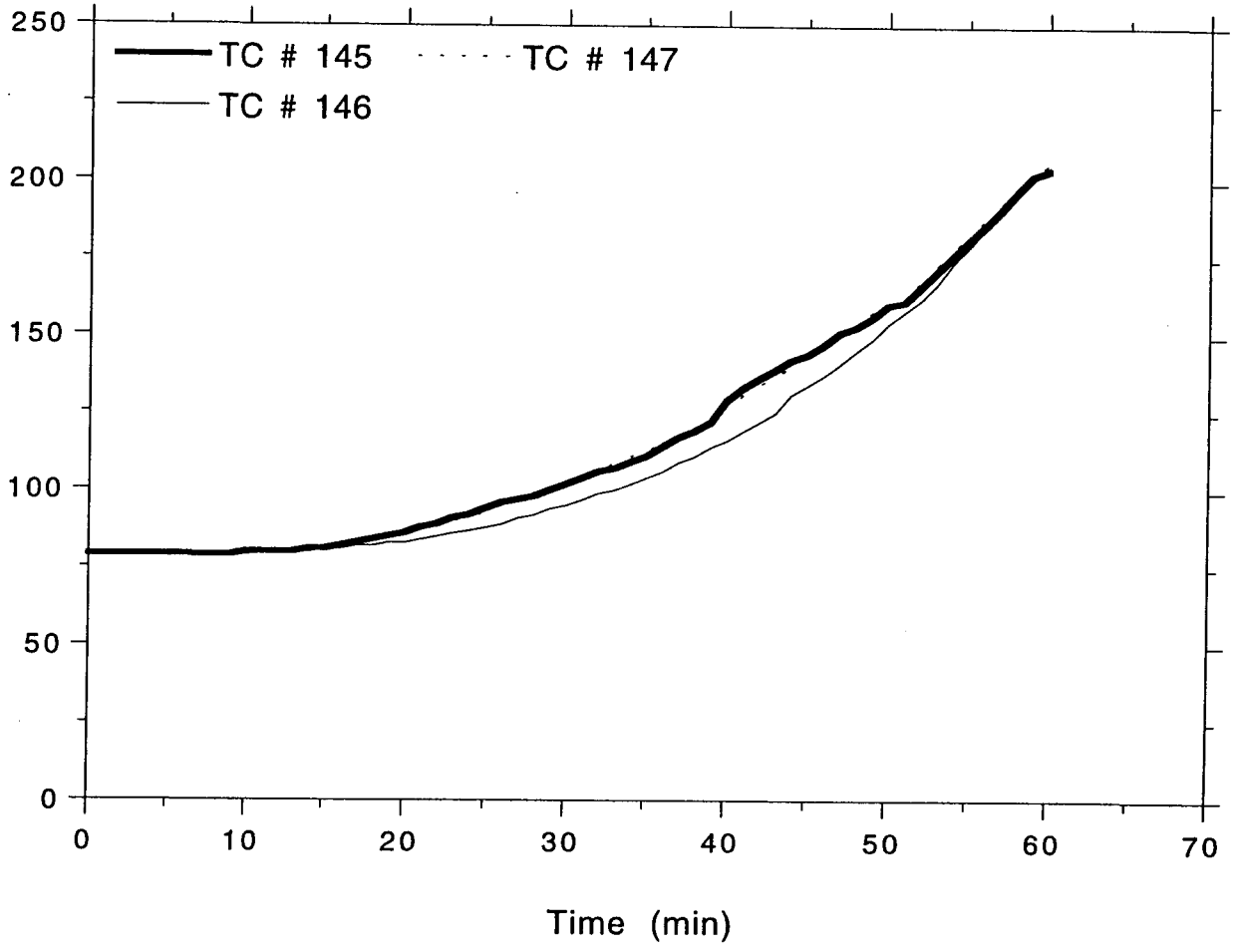
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



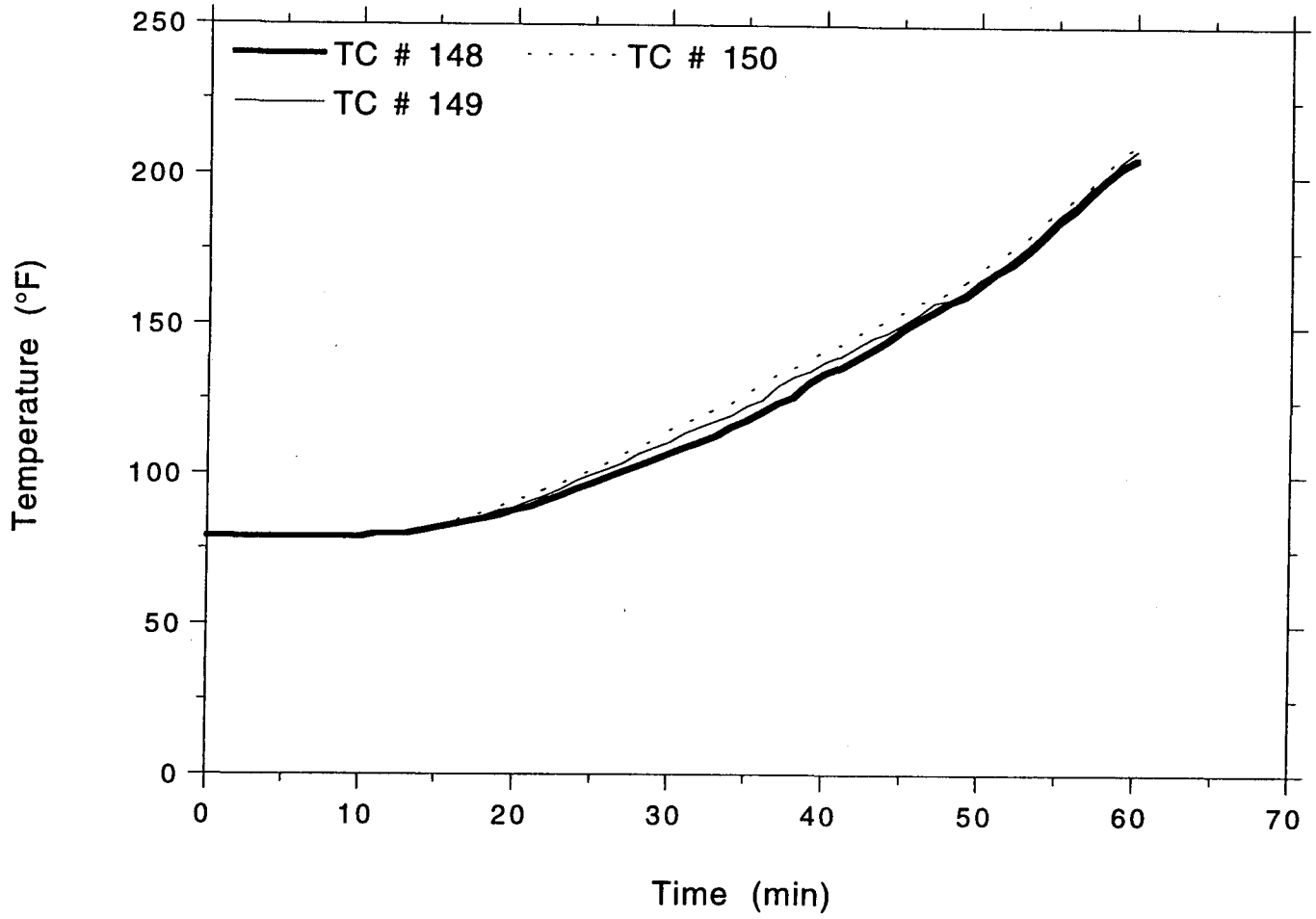
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



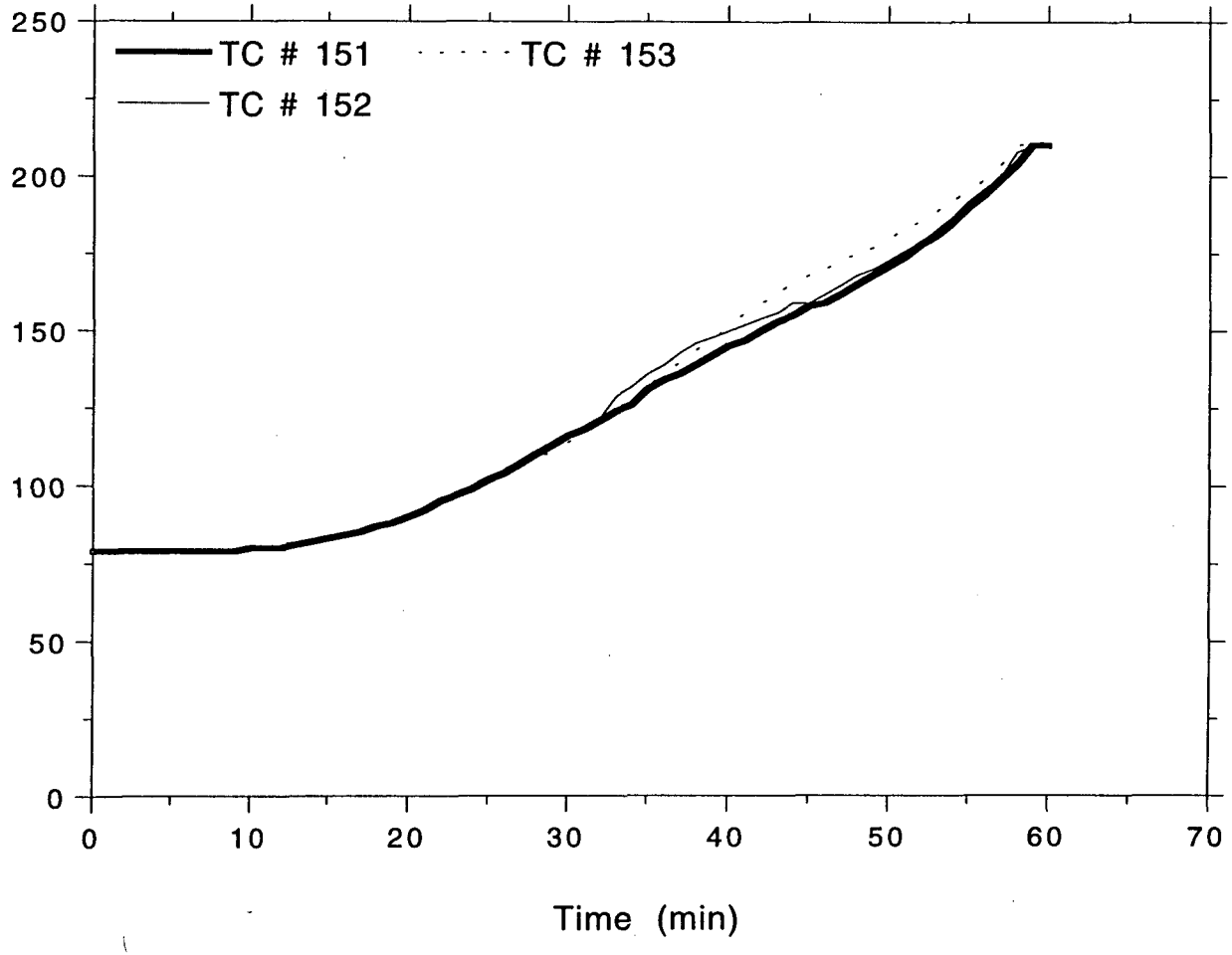
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



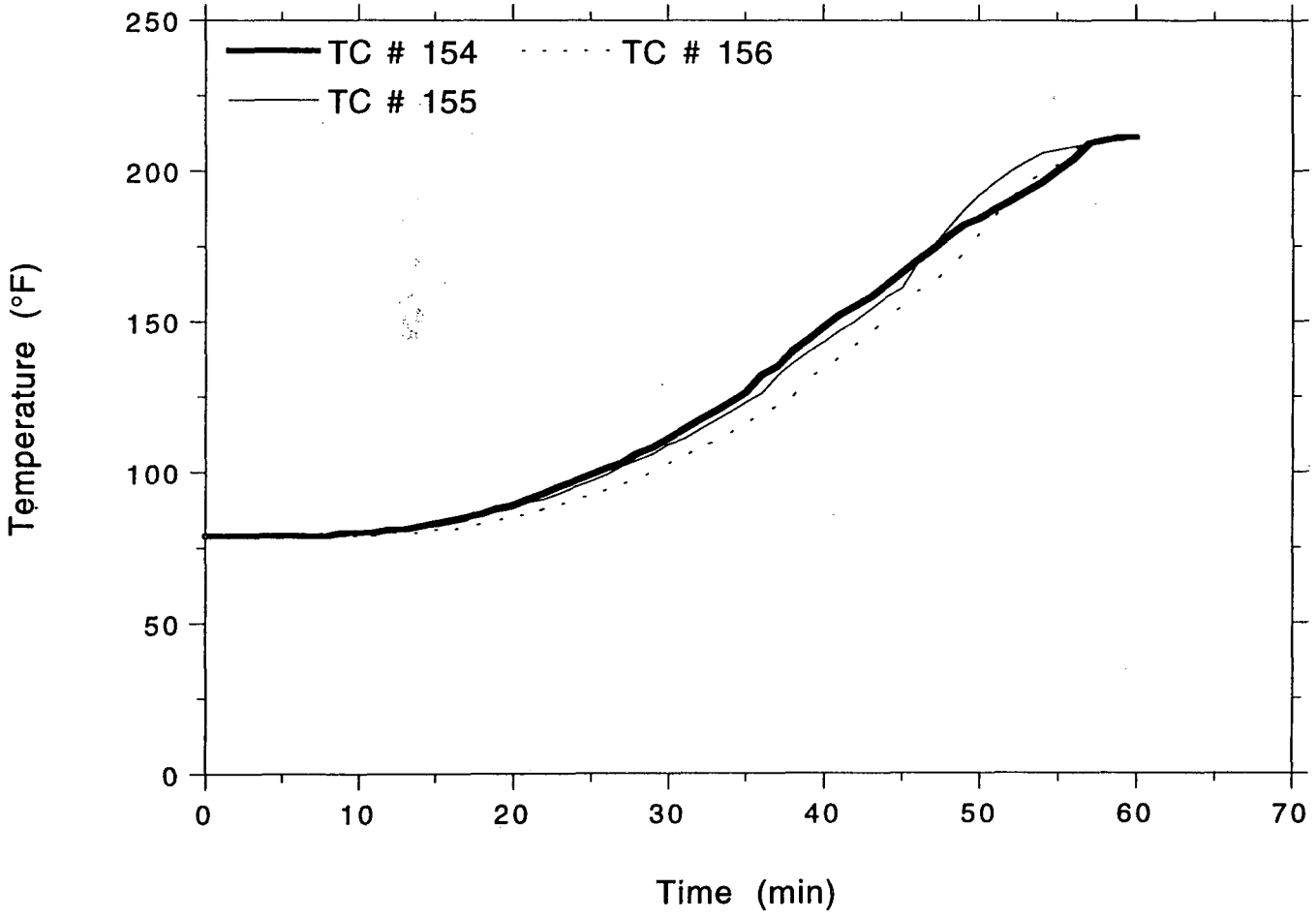
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



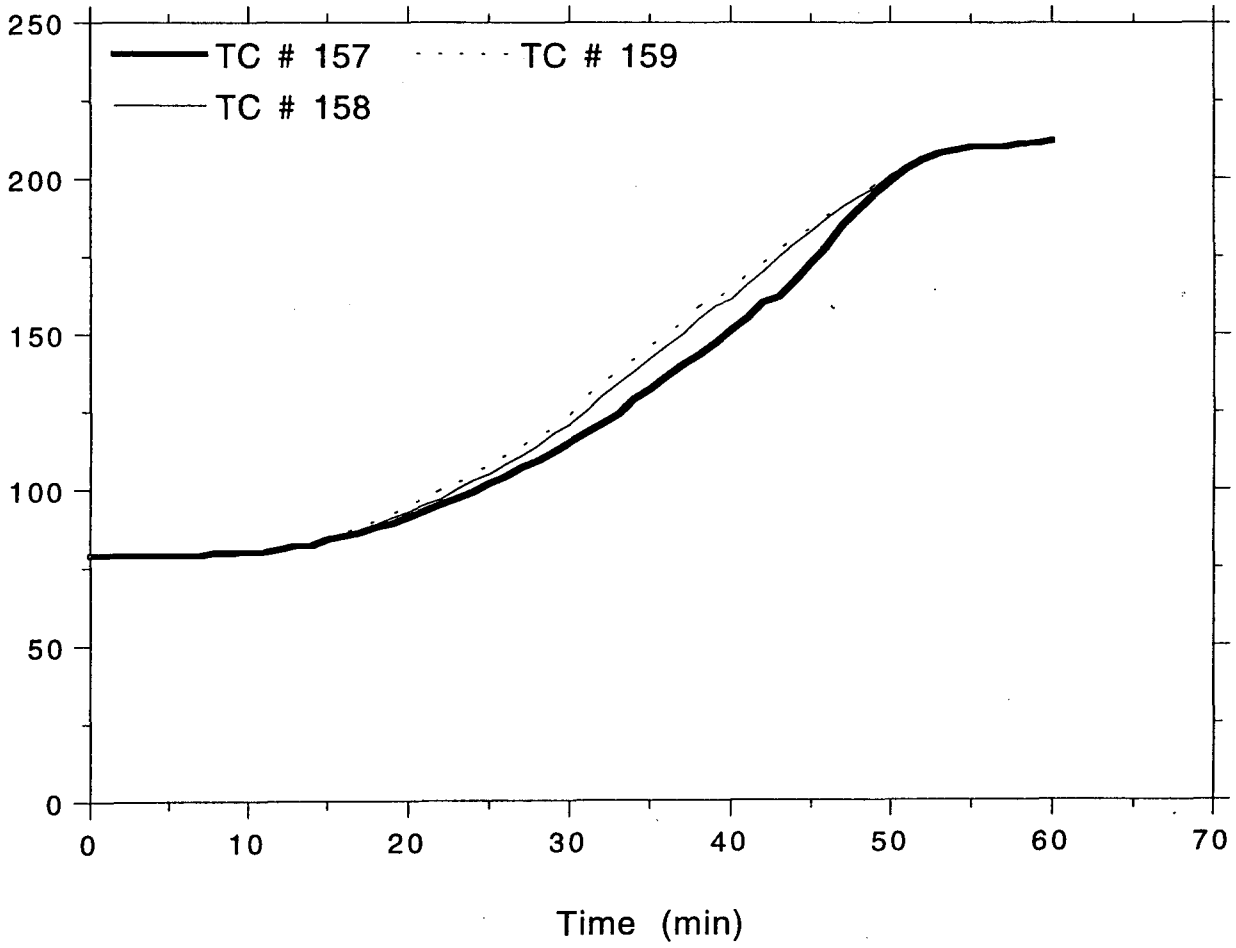
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



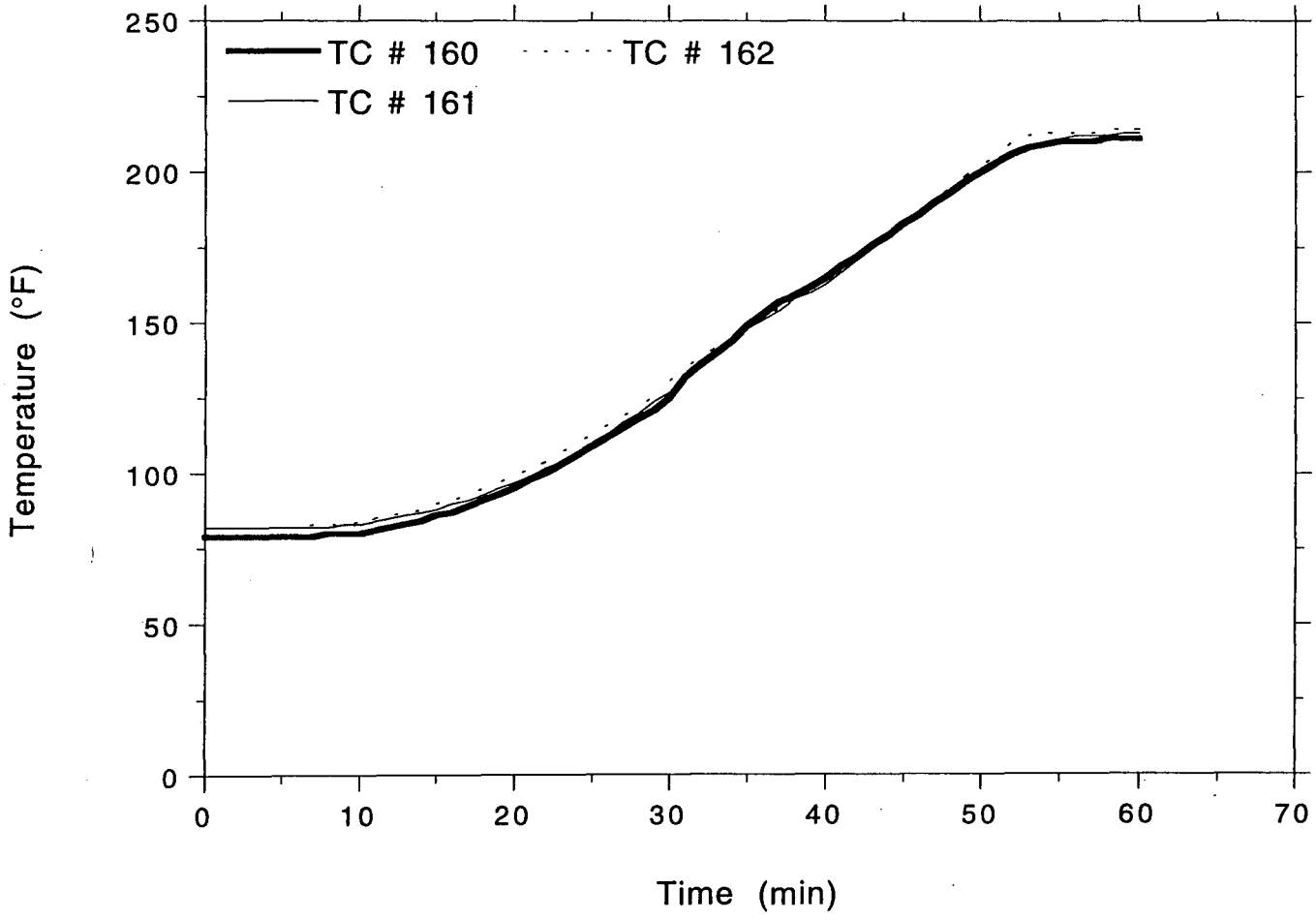
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



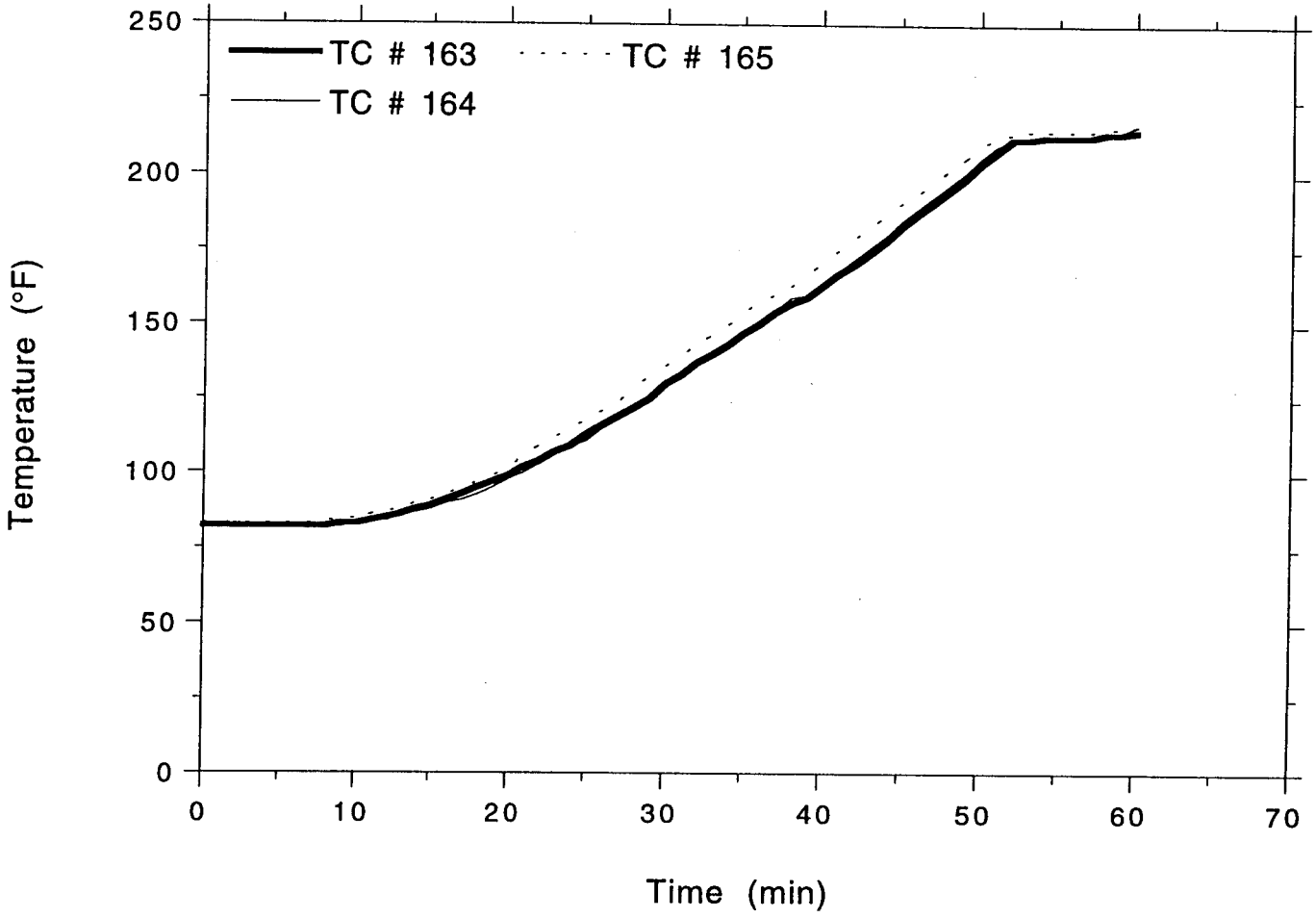
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



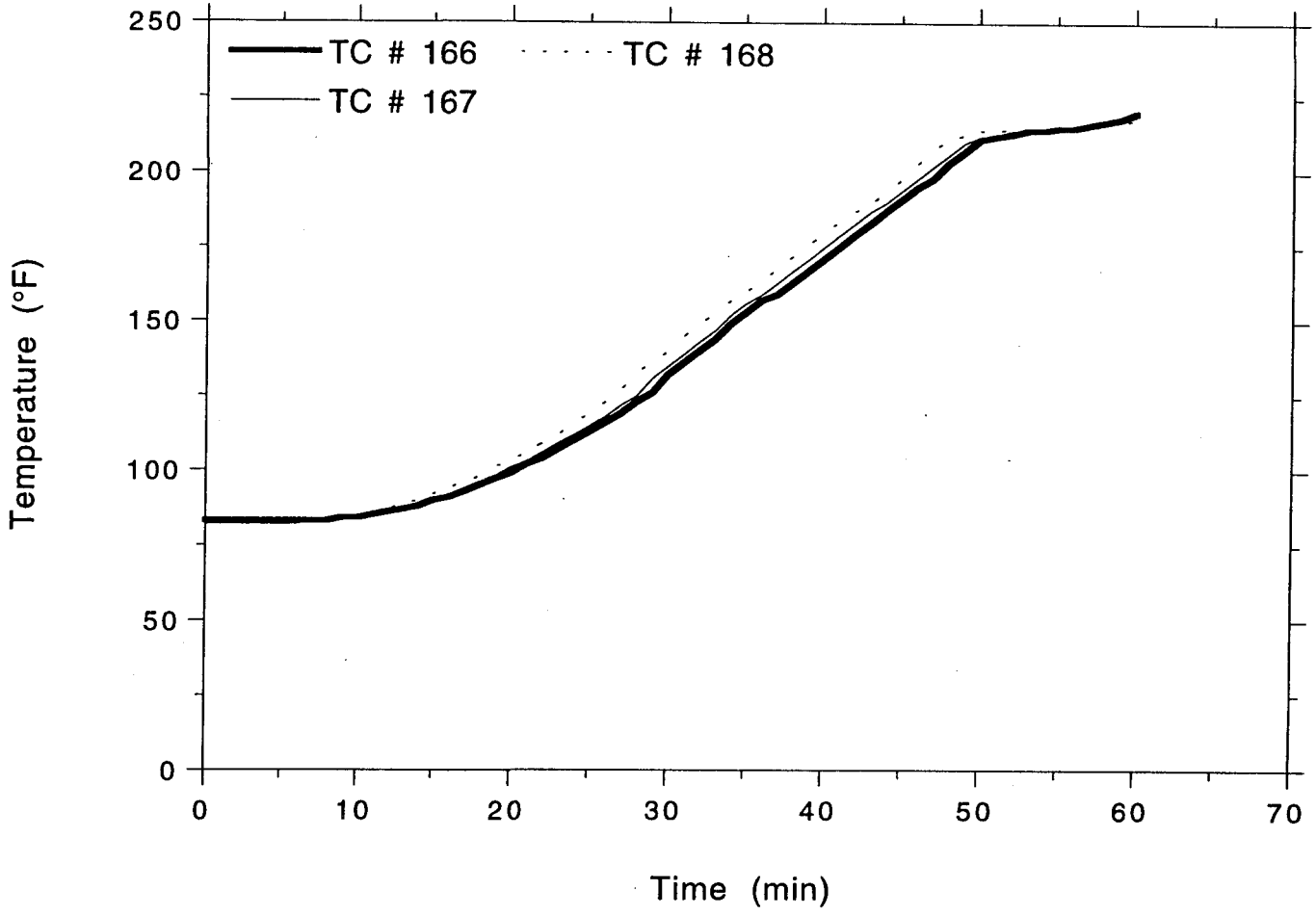
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



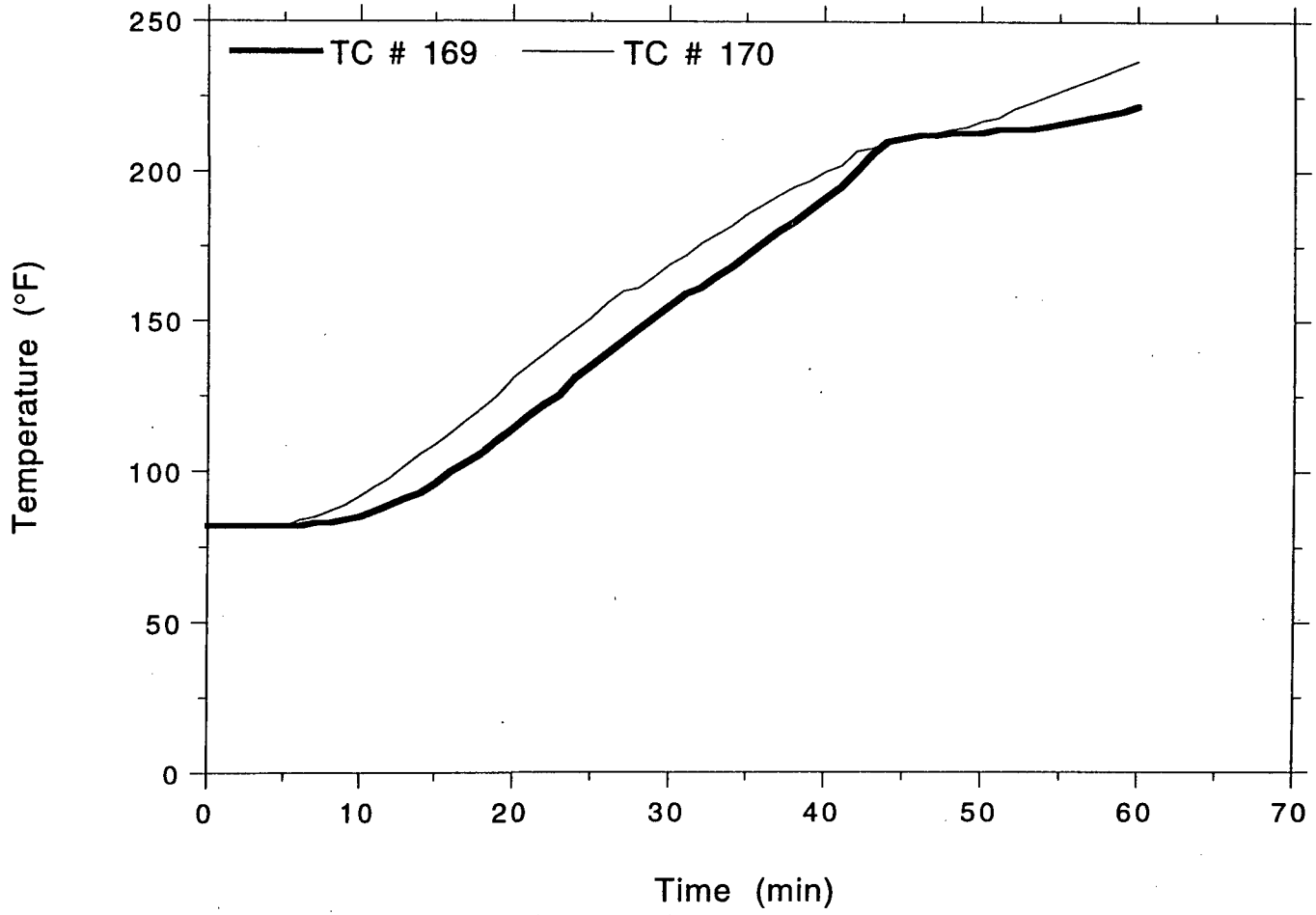
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



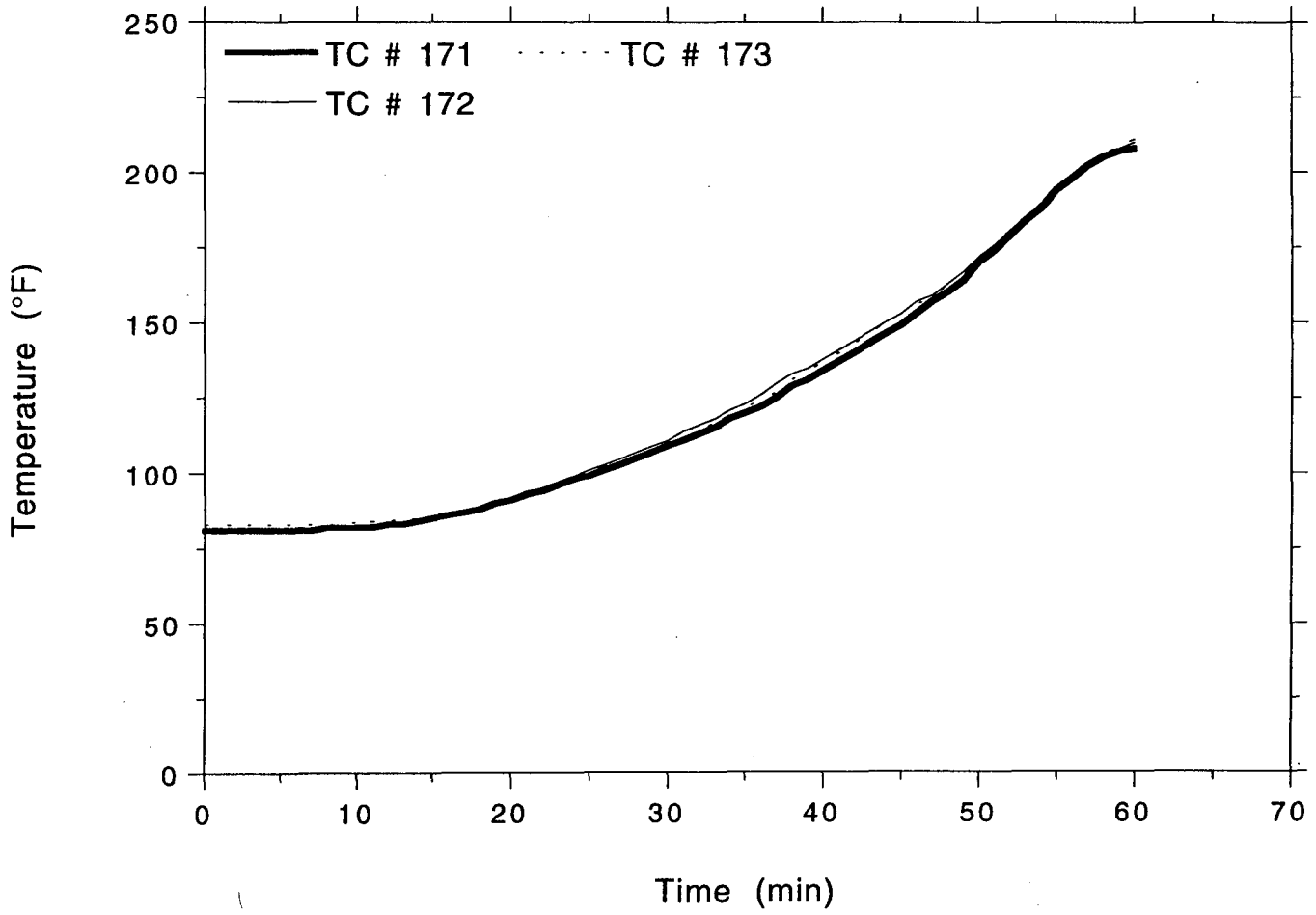
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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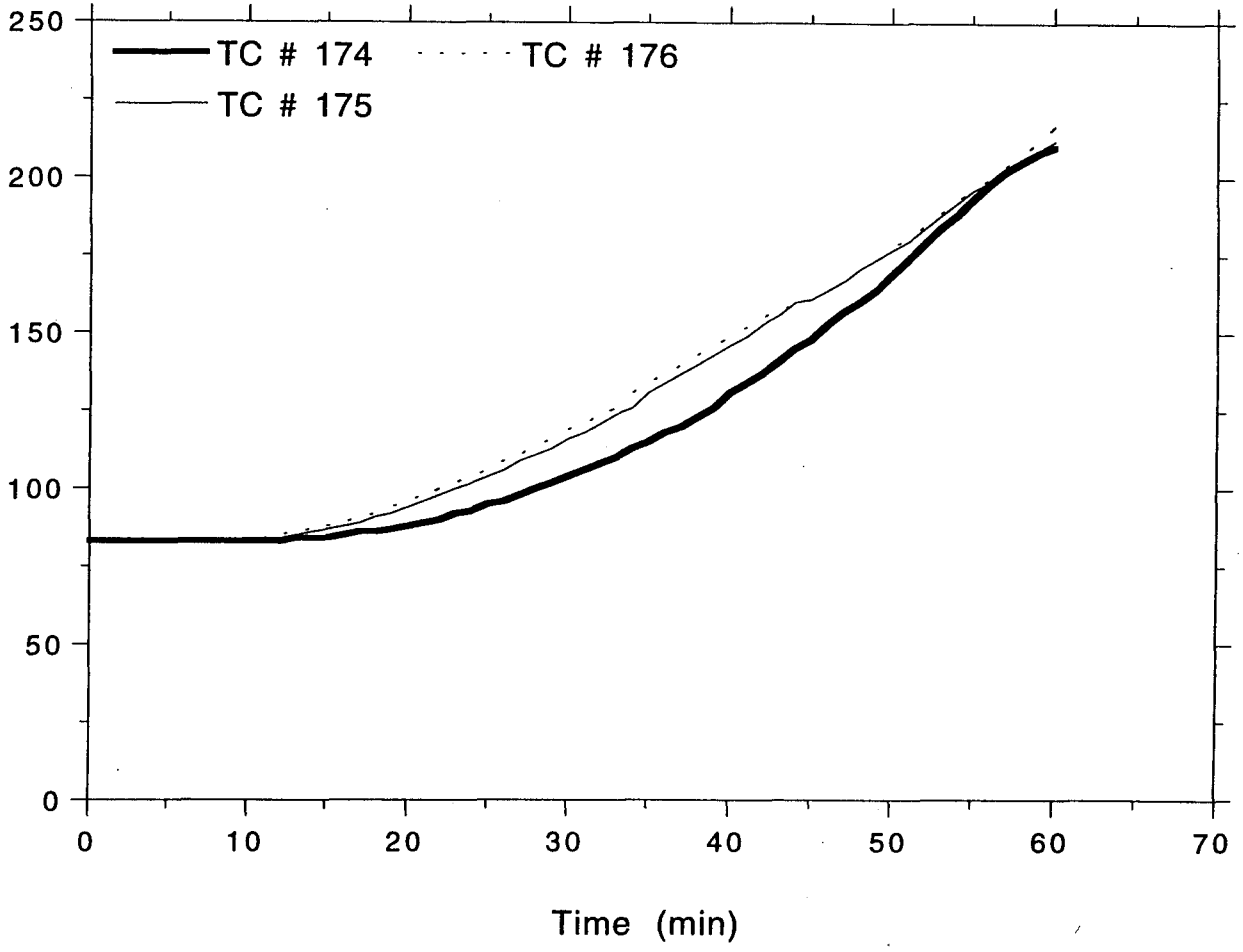
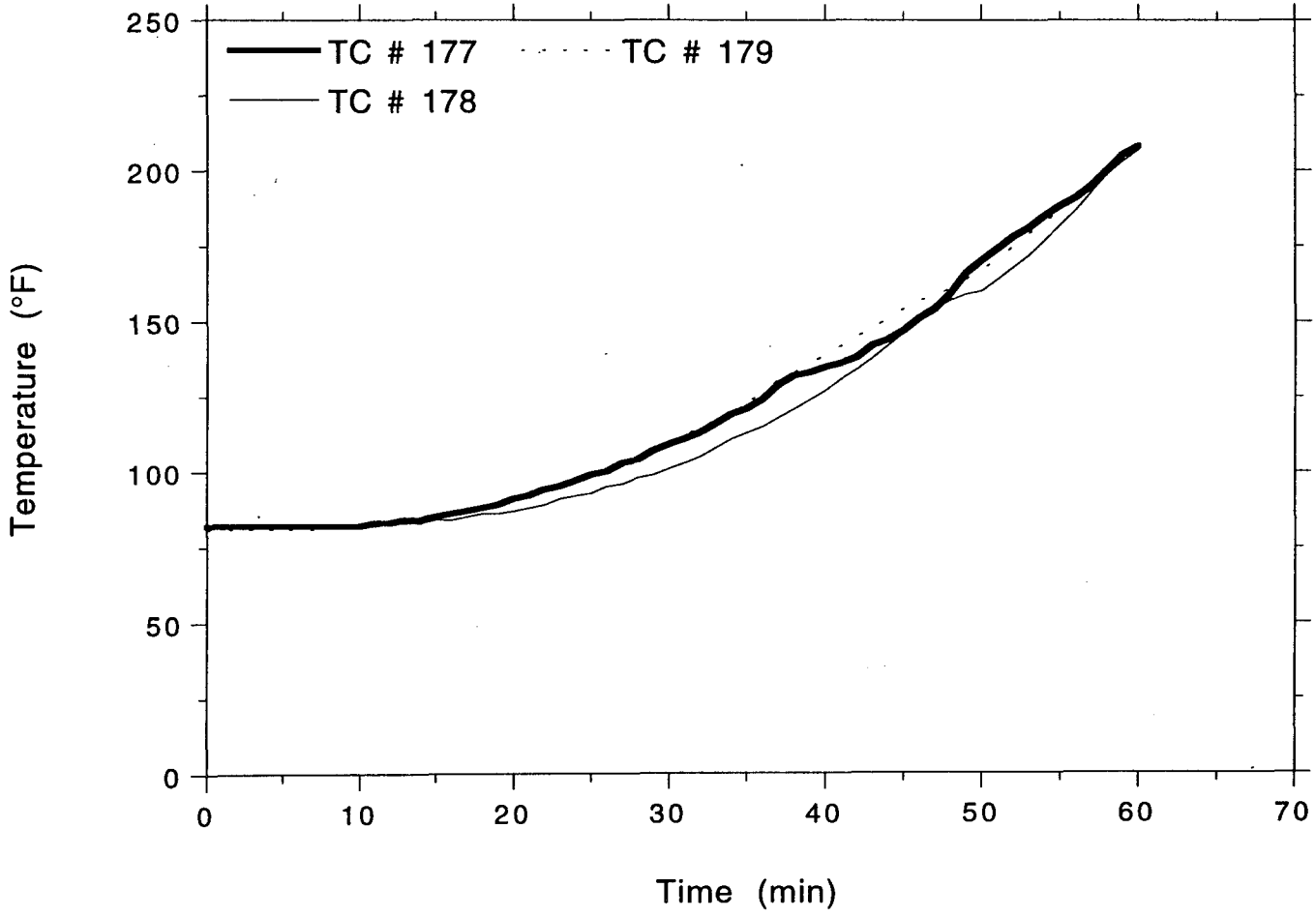


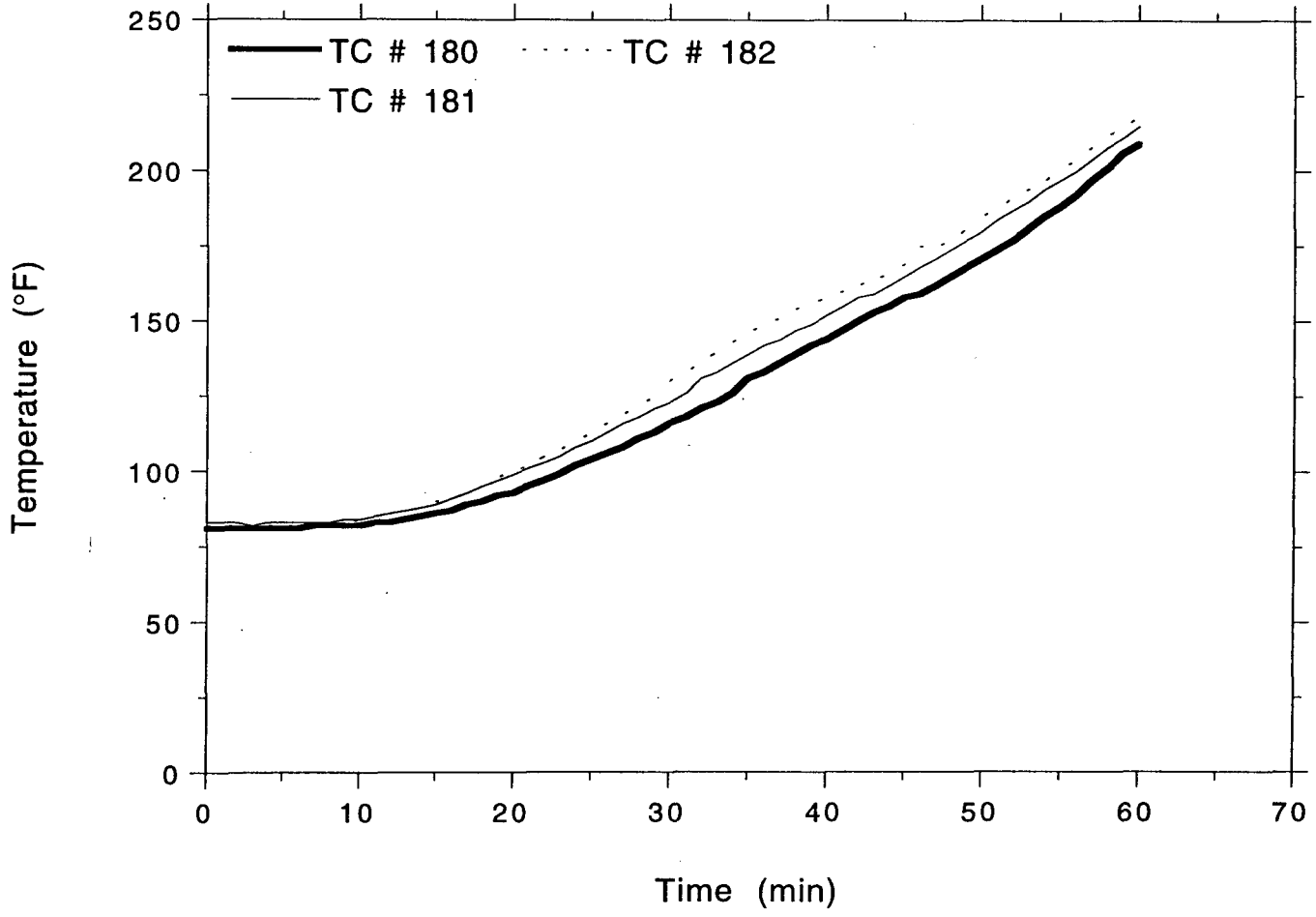
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



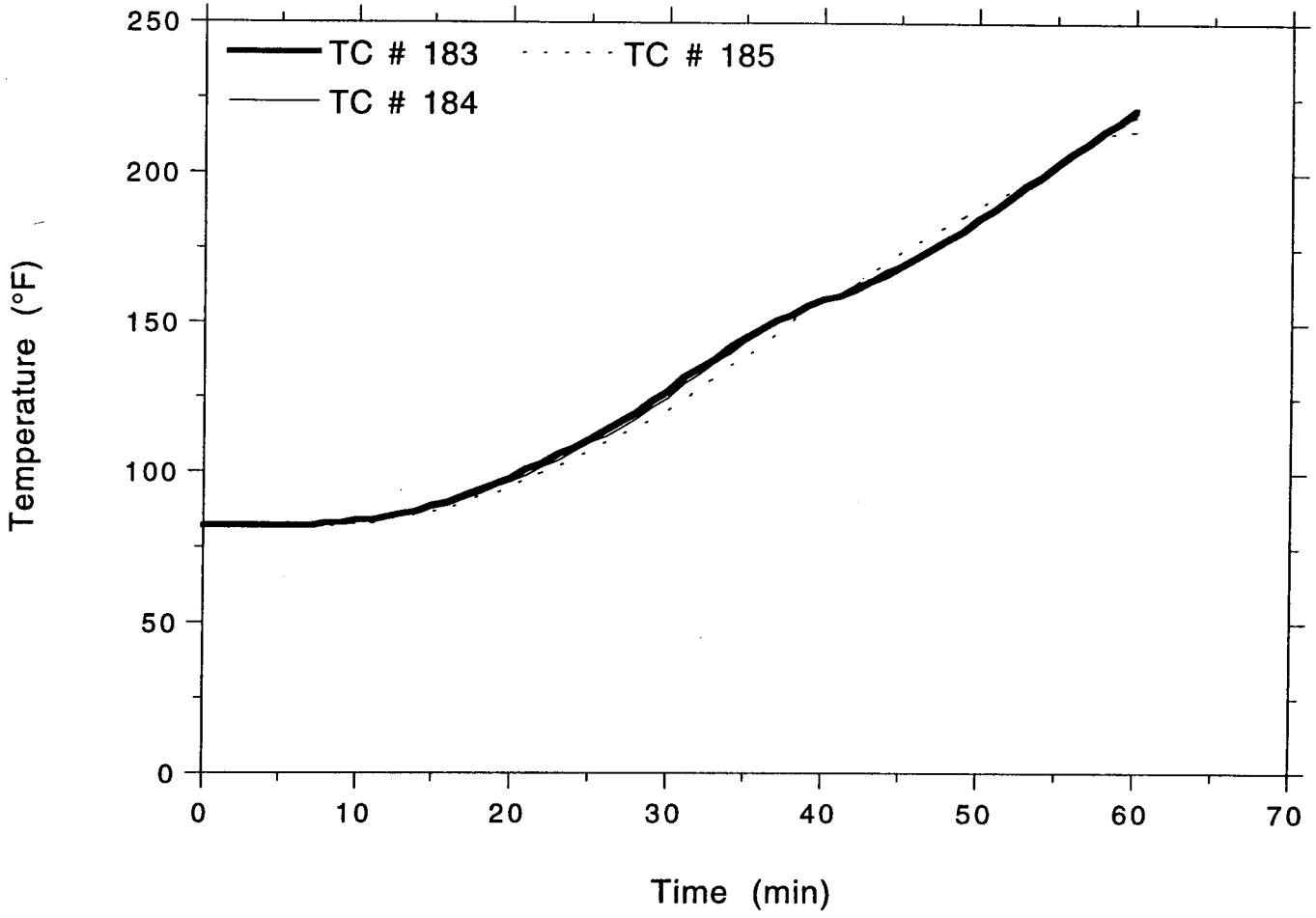
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



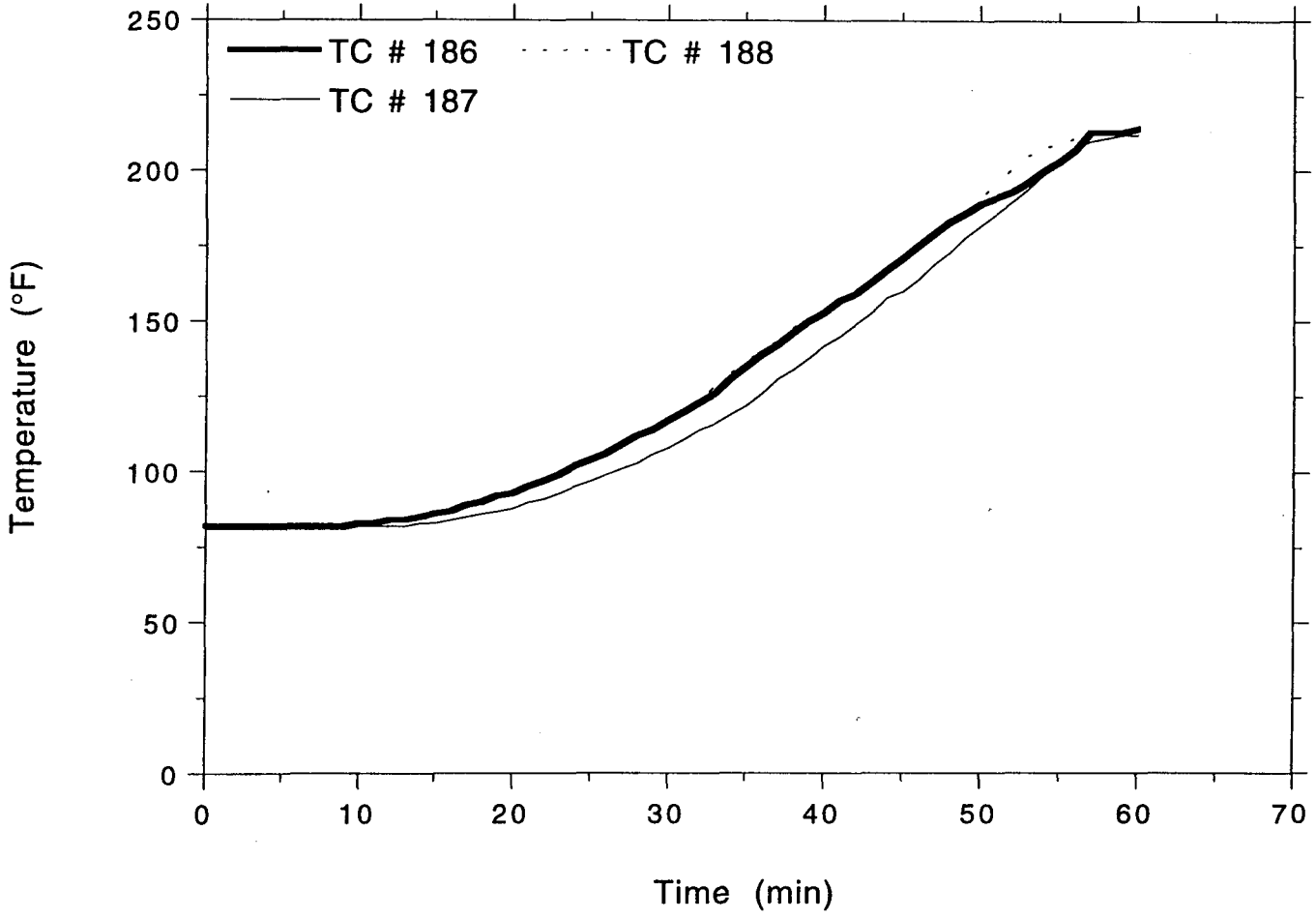
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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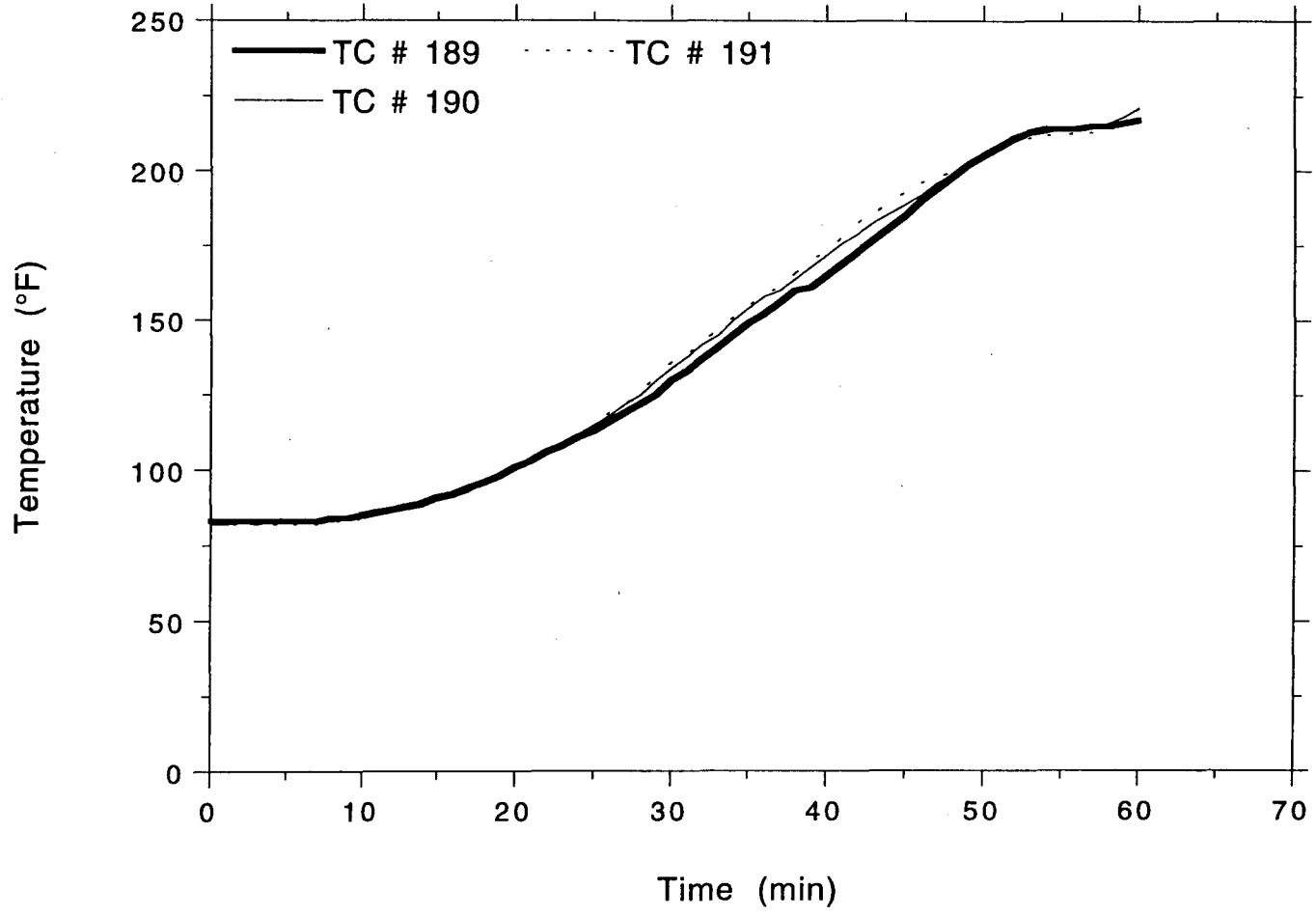

OMEGA POINT LABORATORIES

TSI/TVA
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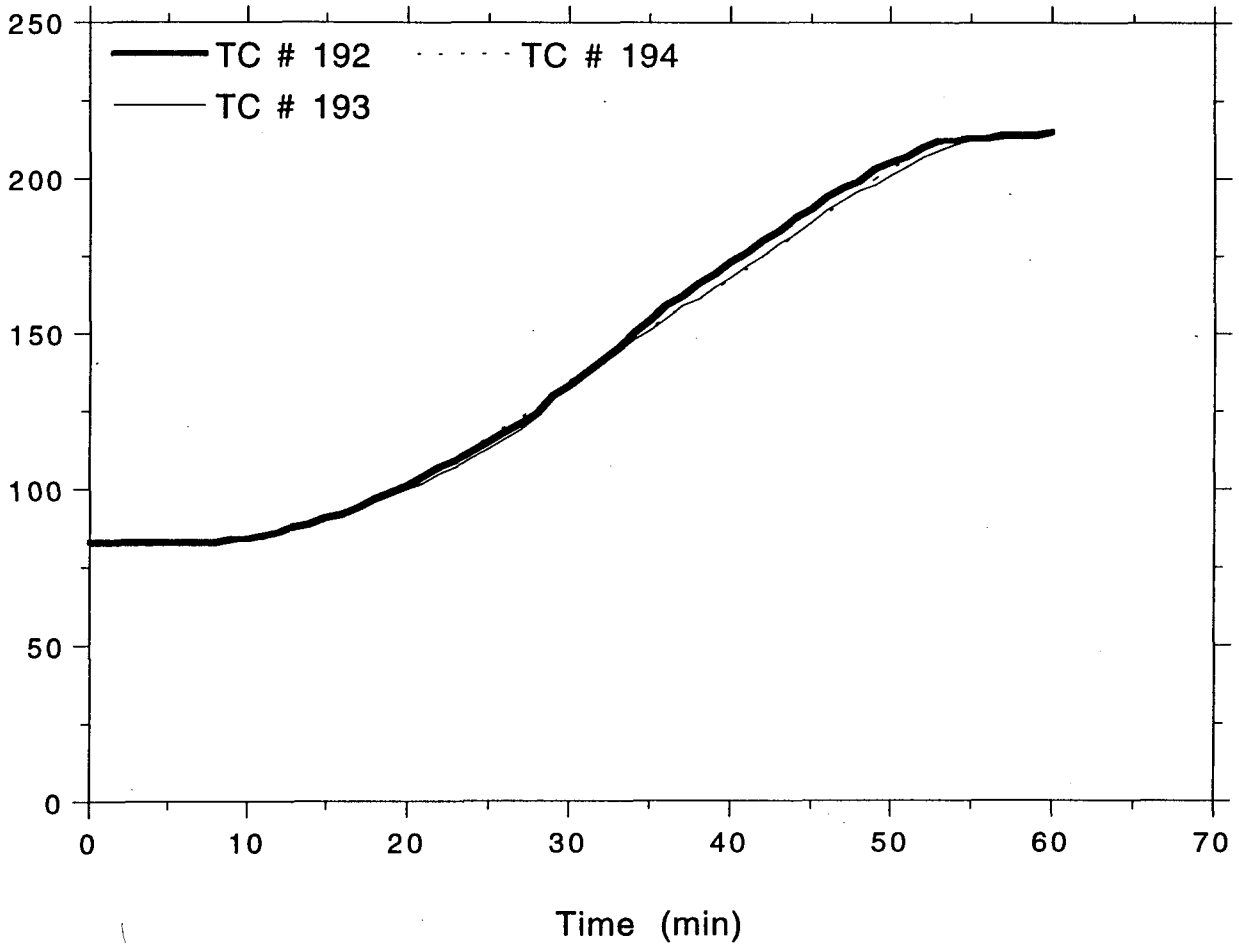

OMEGA POINT LABORATORIES

TSI/TVA
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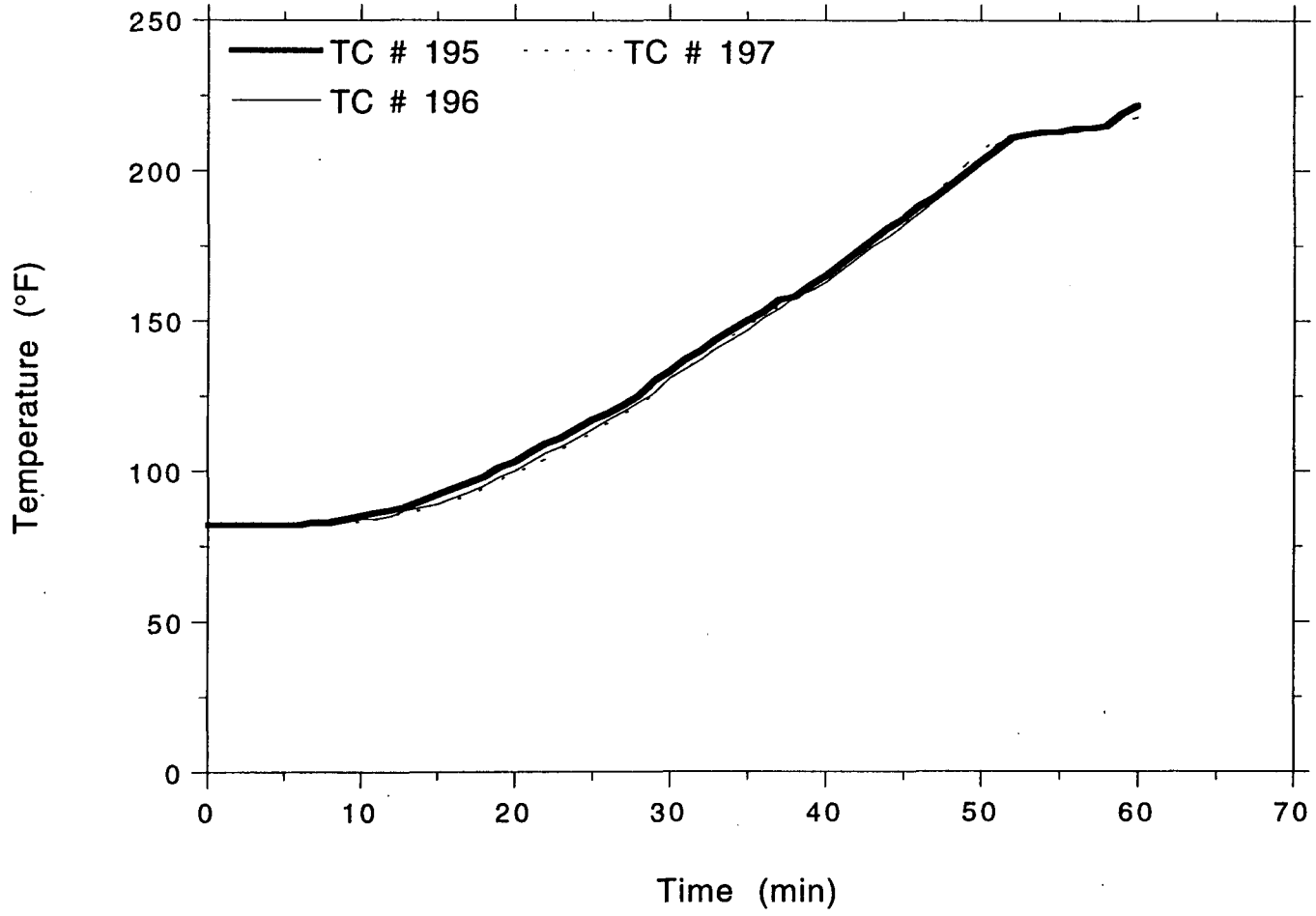

OMEGA POINT LABORATORIES

TSI/TVA
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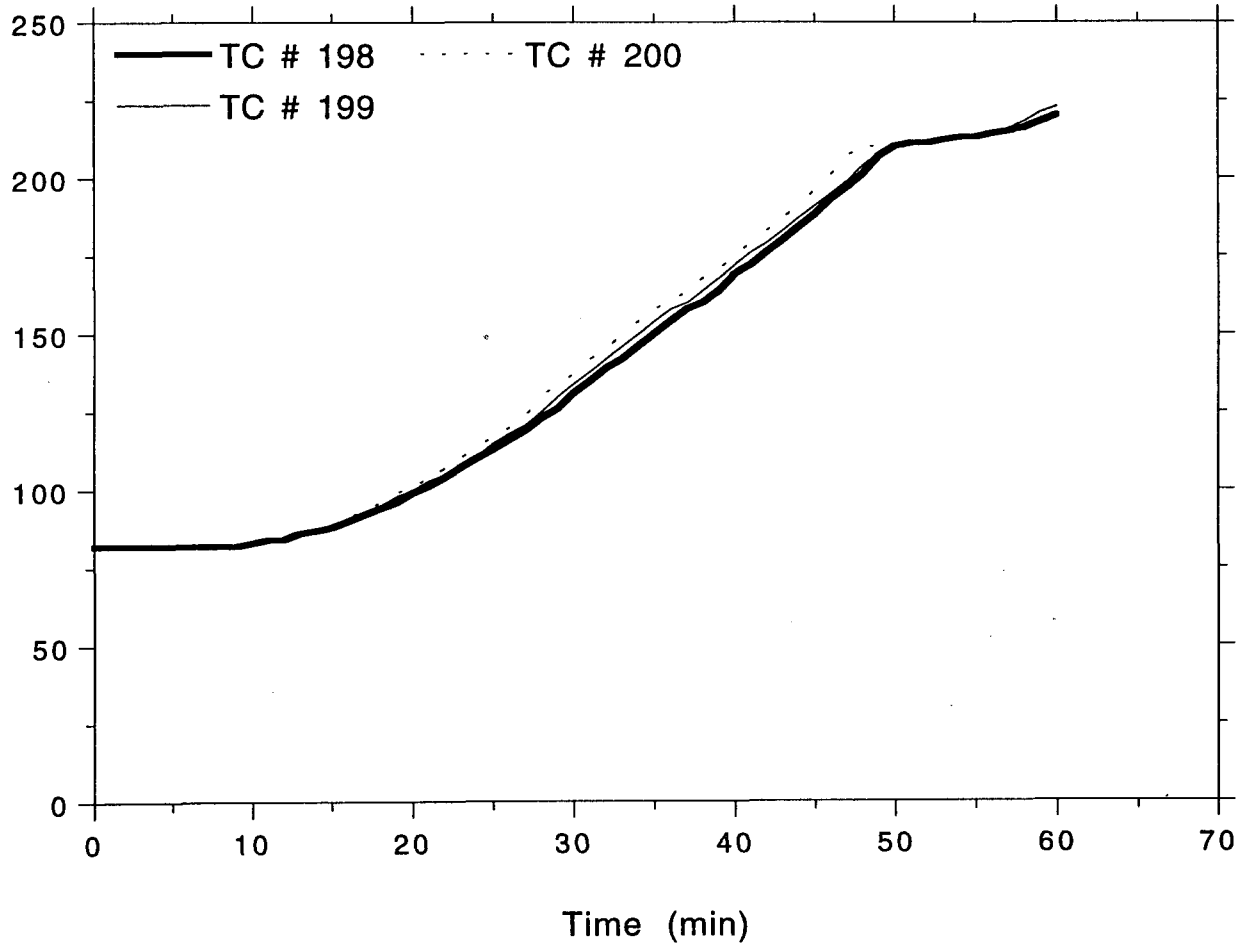

OMEGA POINT LABORATORIES

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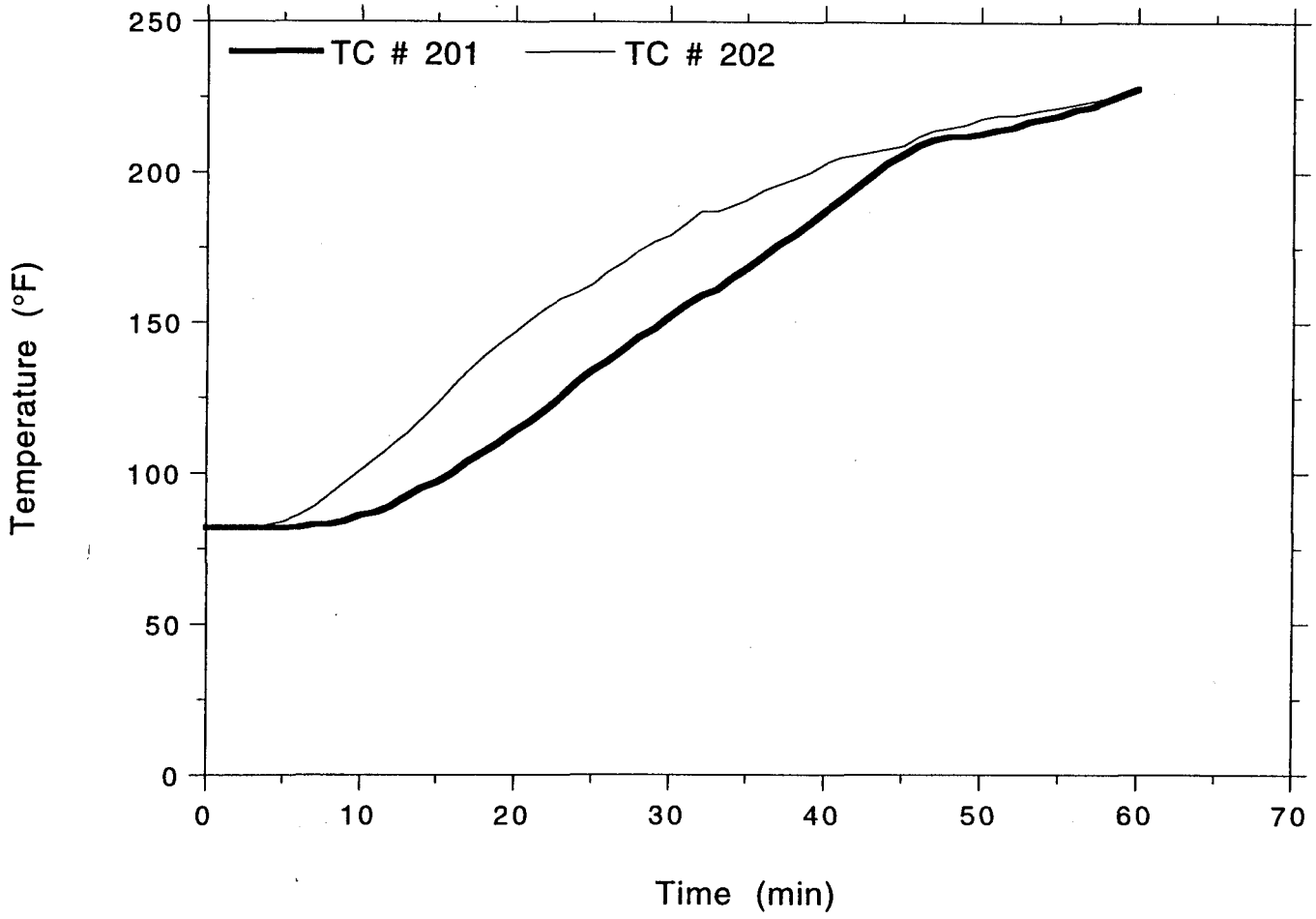

OMEGA POINT LABORATORIES

TSI/TVA
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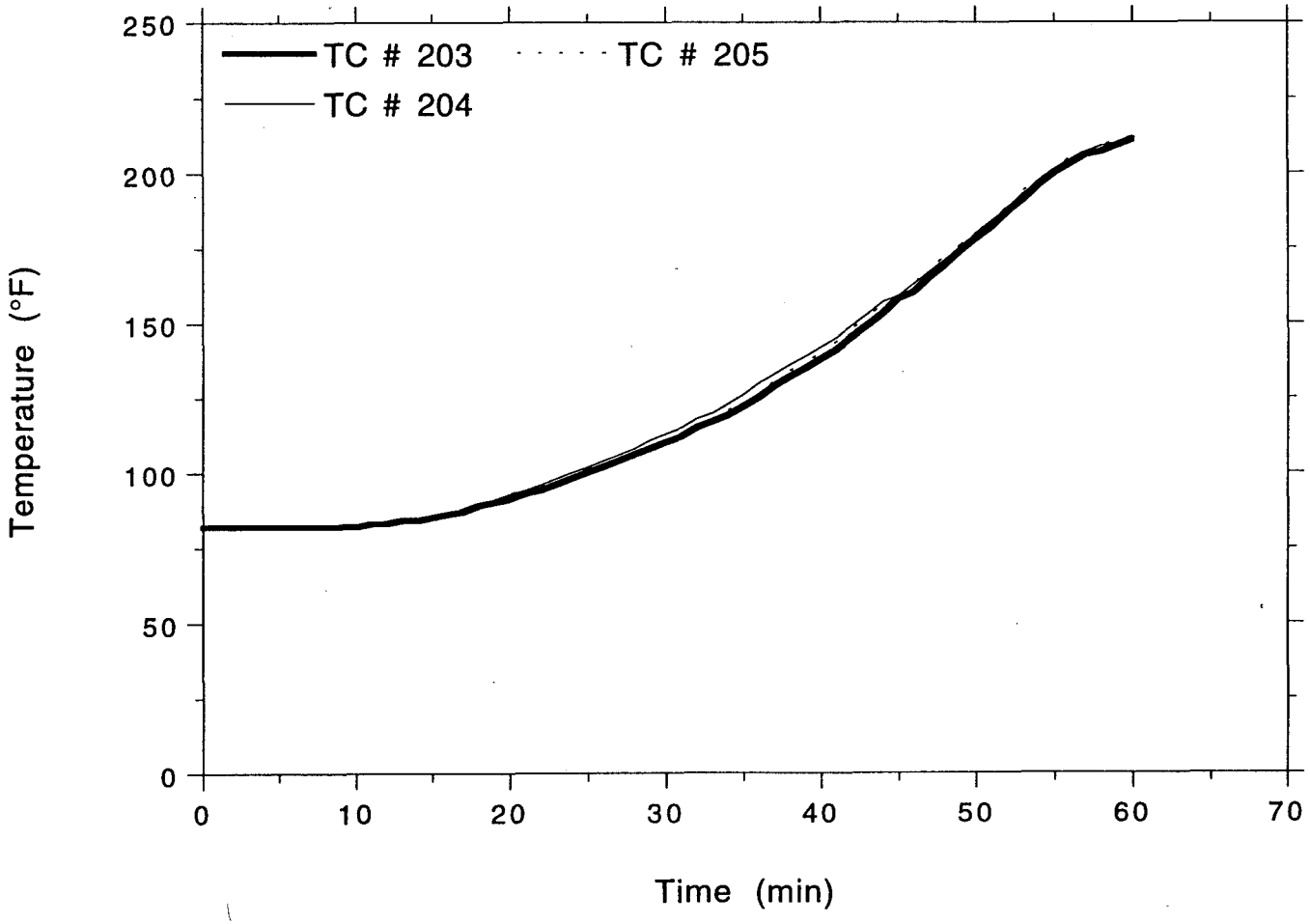

OMEGA POINT LABORATORIES

TSI/TVA
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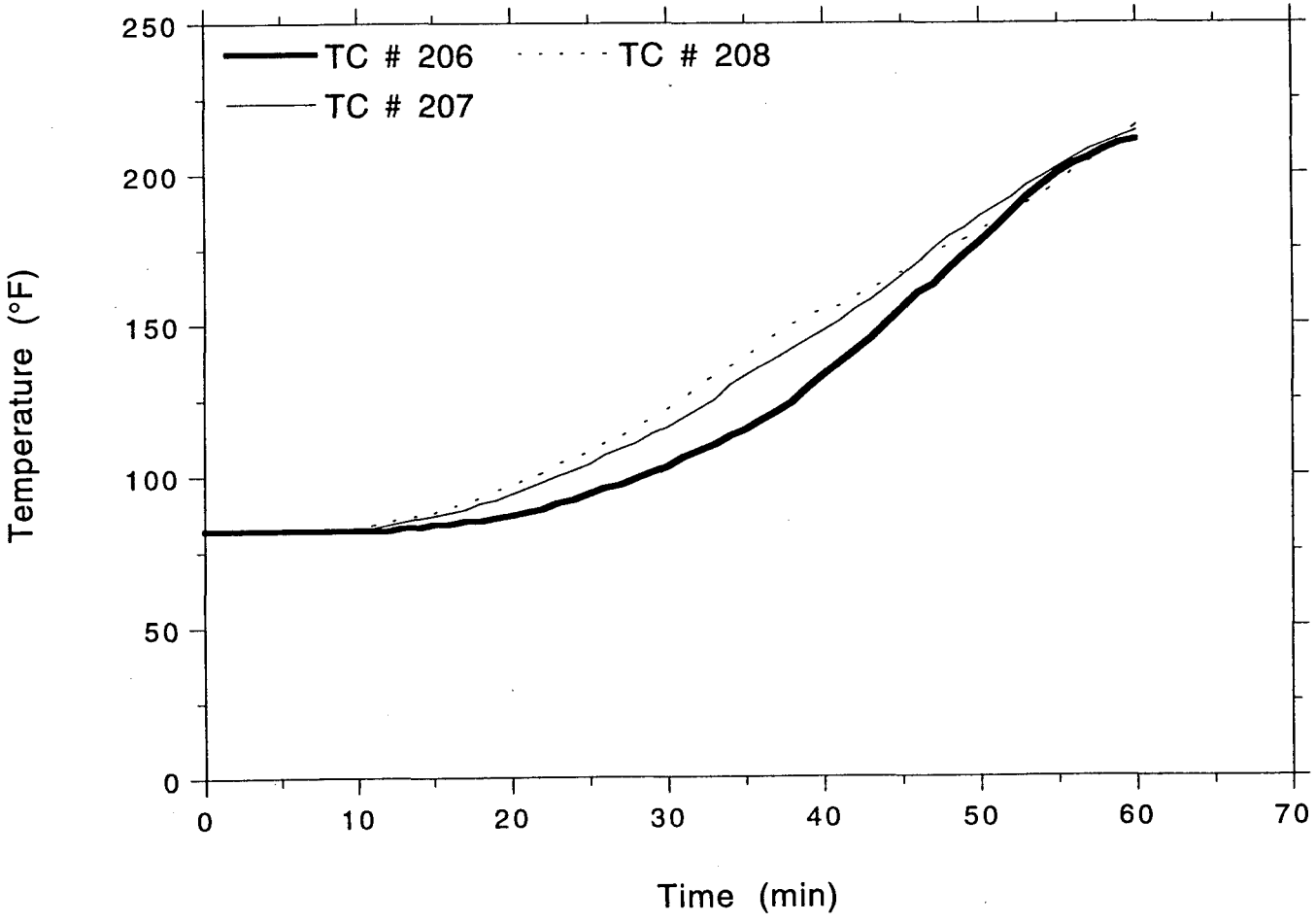

OMEGA POINT LABORATORIES

TSI/TVA
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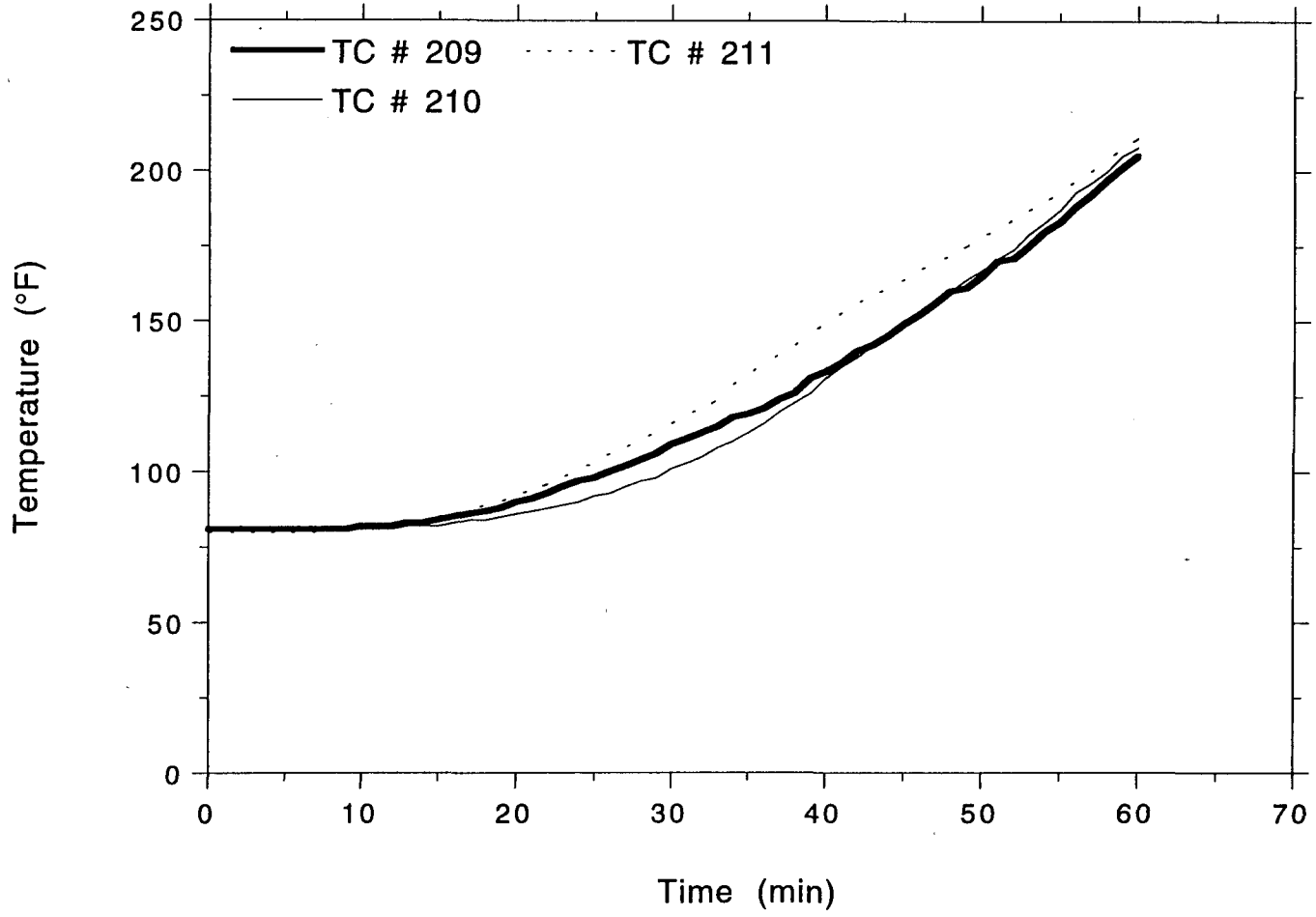

OMEGA POINT LABORATORIES

TSI/TVA
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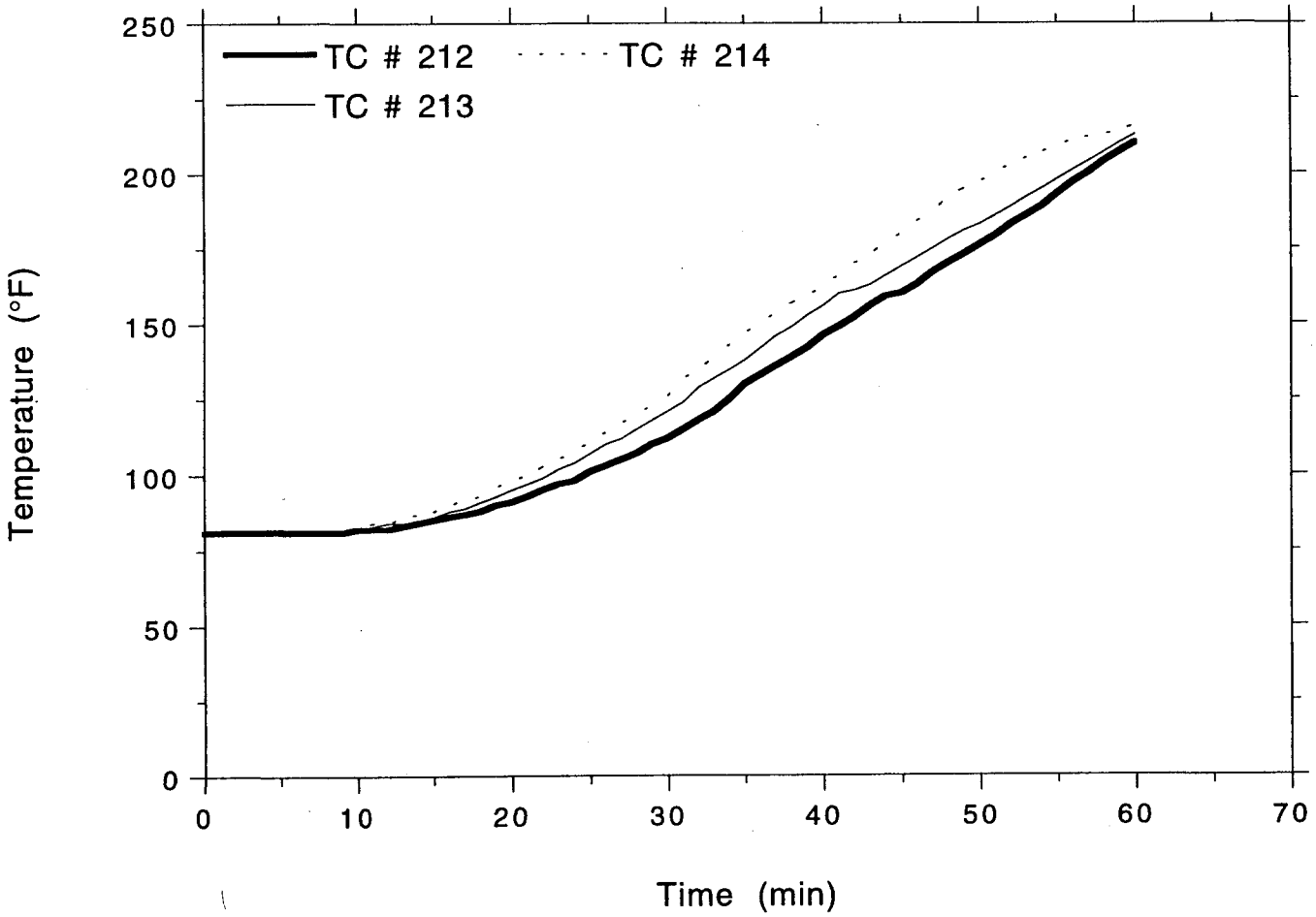

OMEGA POINT LABORATORIES

TSI/TVA
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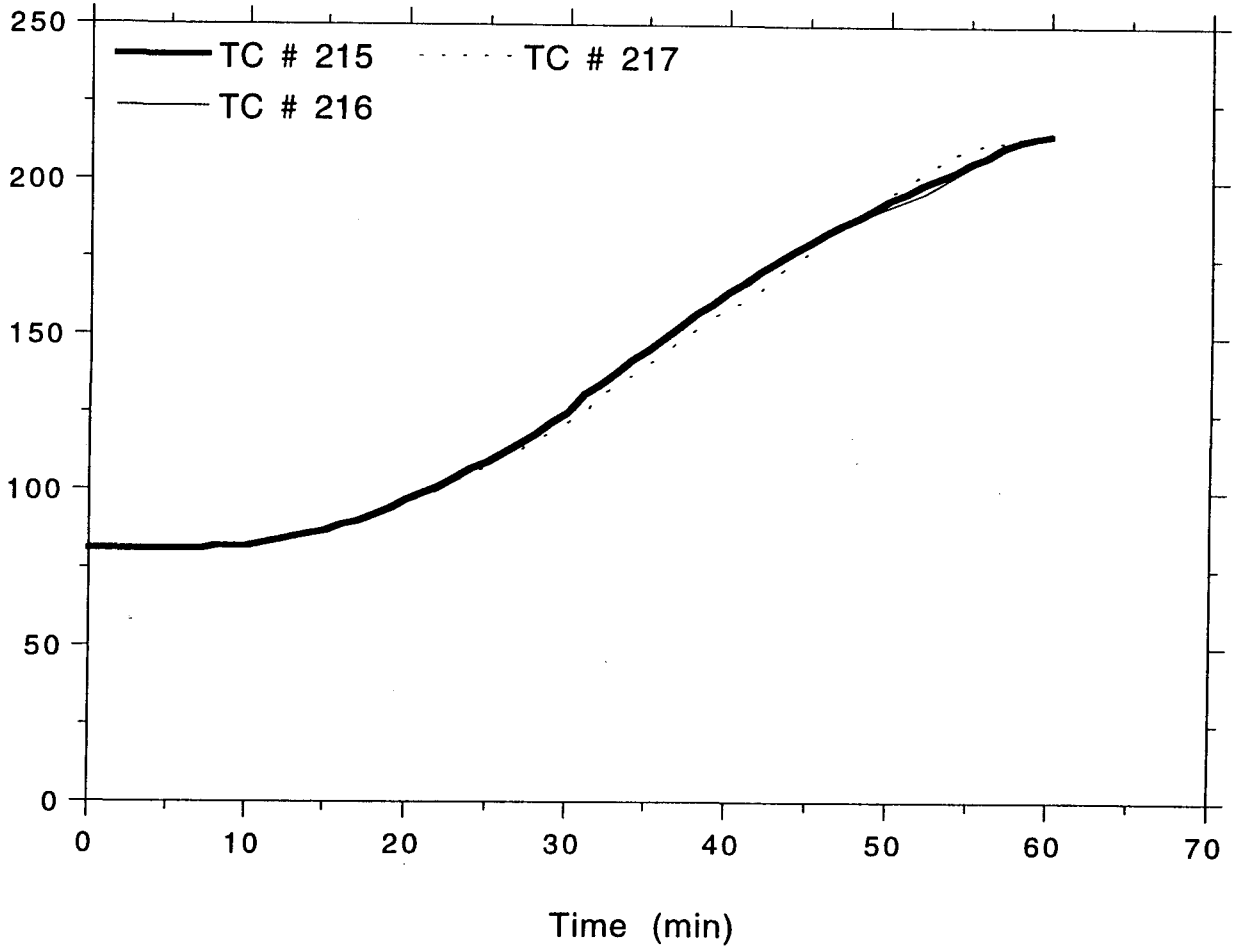

OMEGA POINT LABORATORIES

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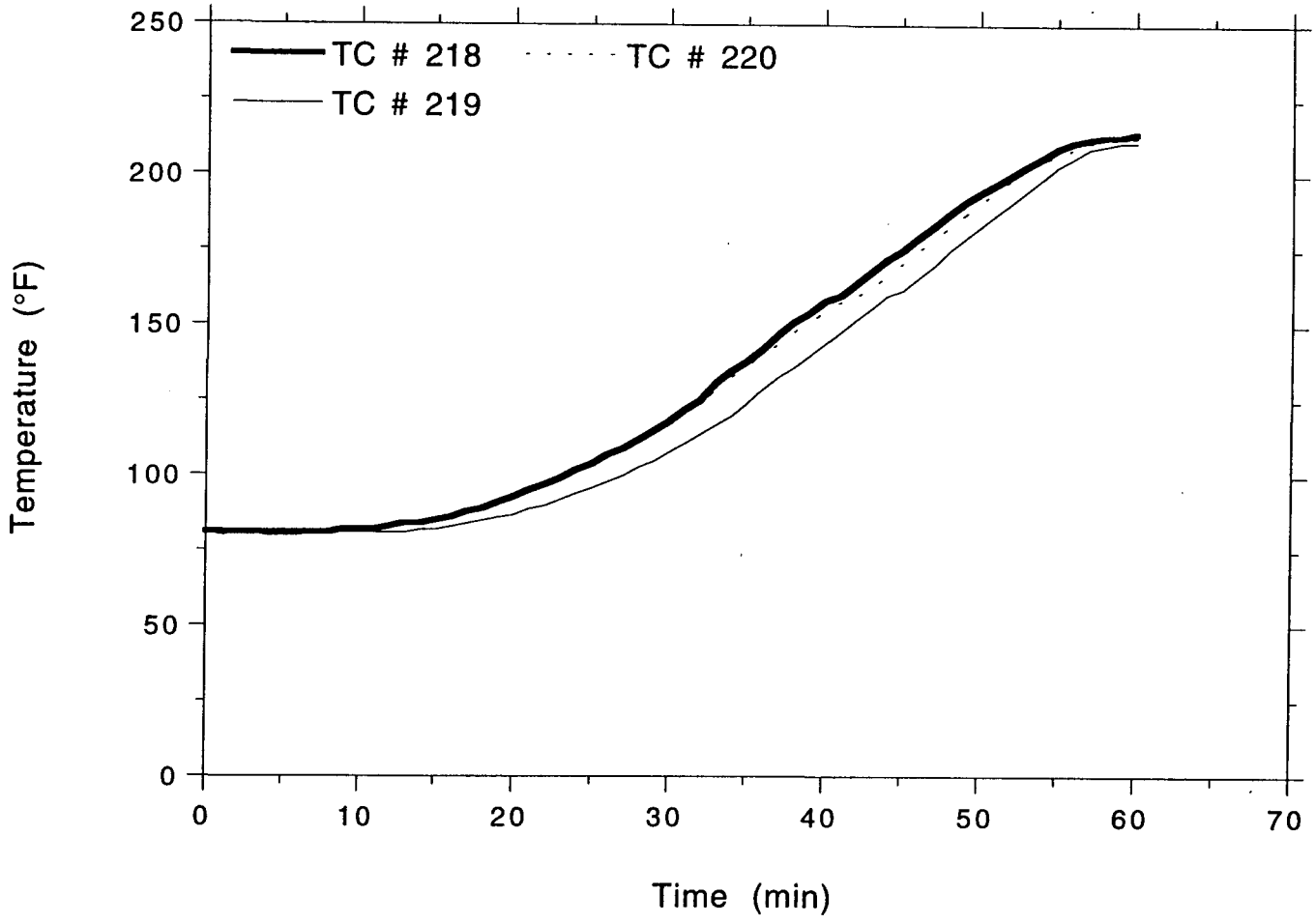

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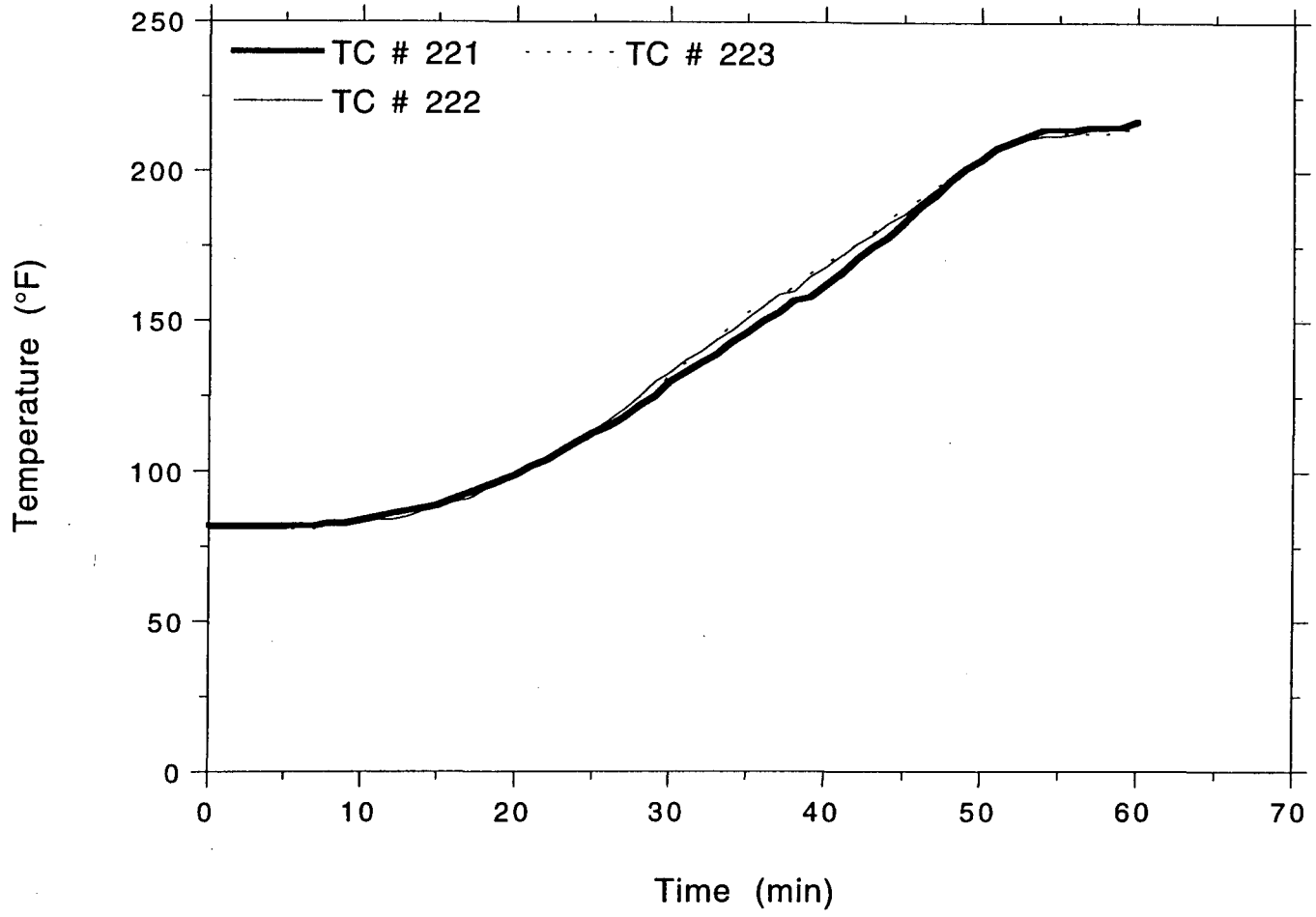

OMEGA POINT LABORATORIES

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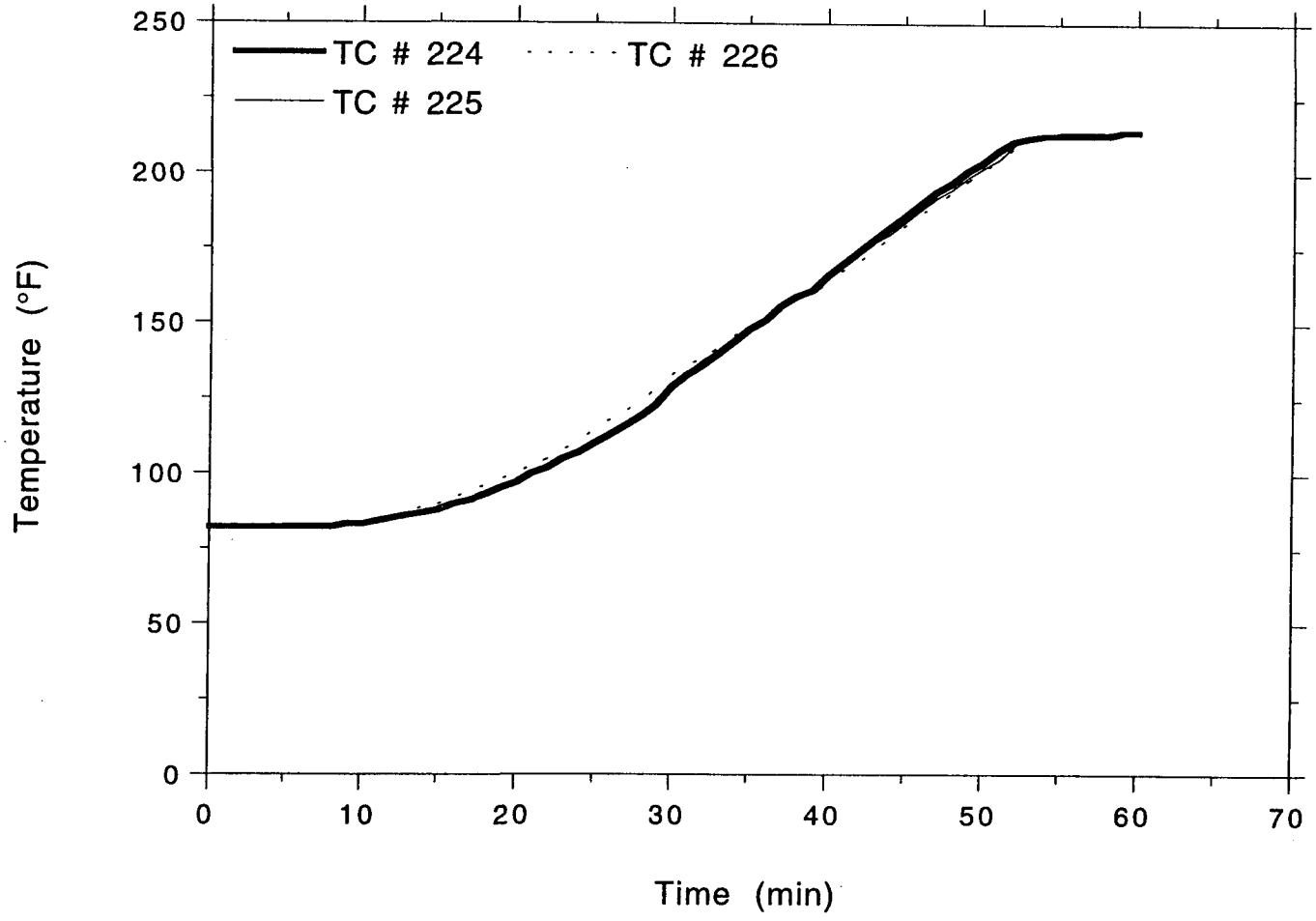

OMEGA POINT LABORATORIES

TSI/TVA
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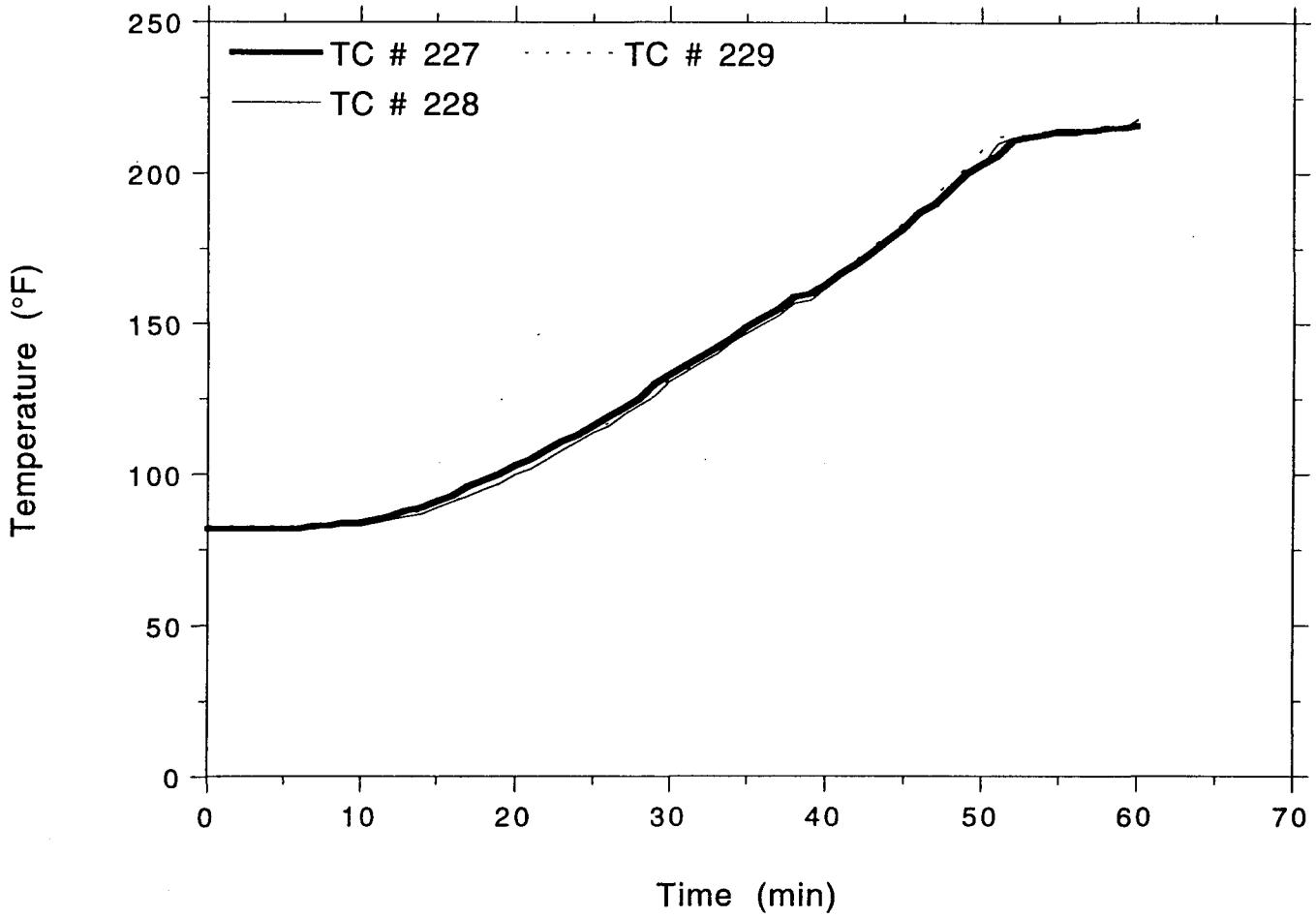

OMEGA POINT LABORATORIES

TSI/TVA
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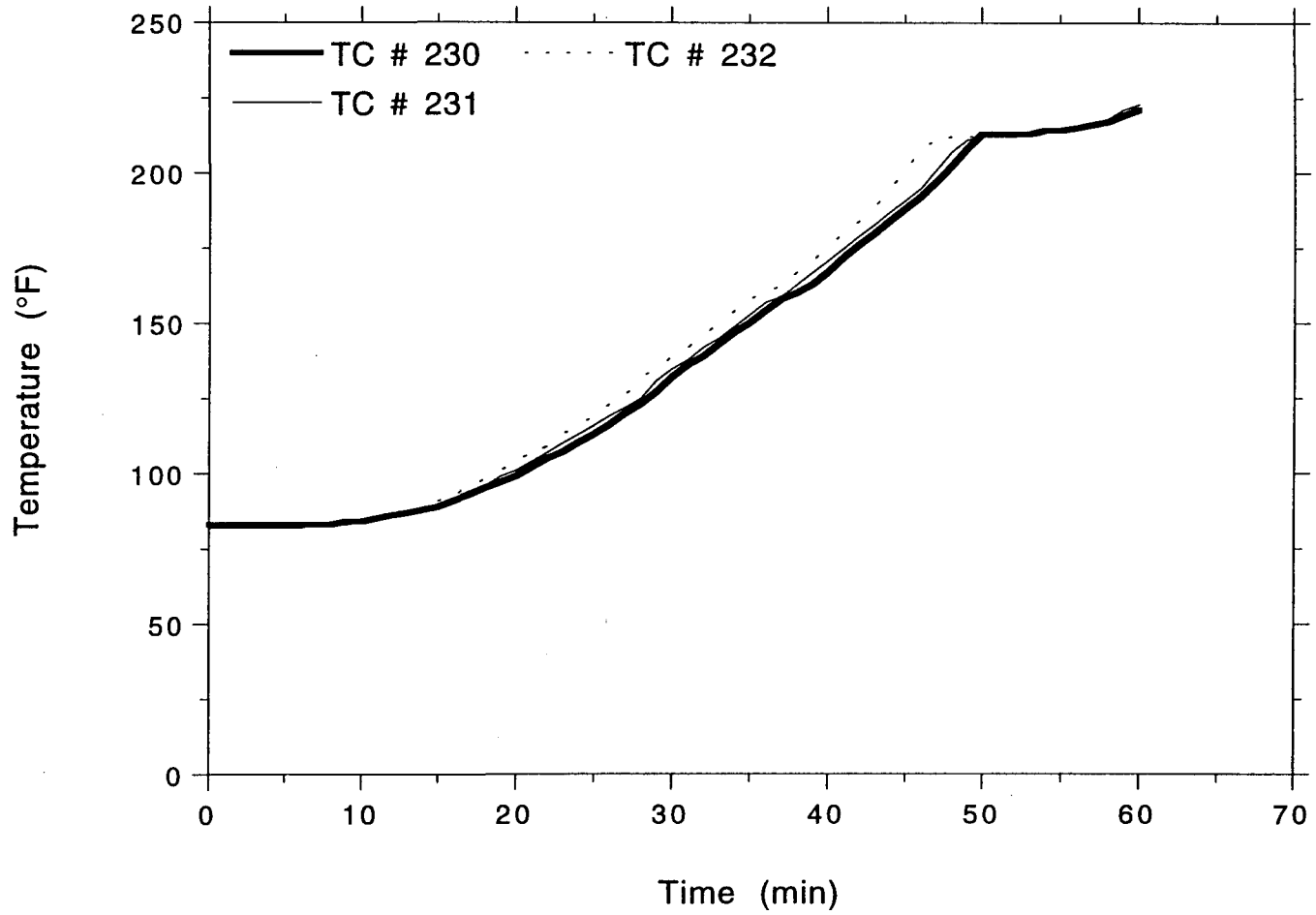
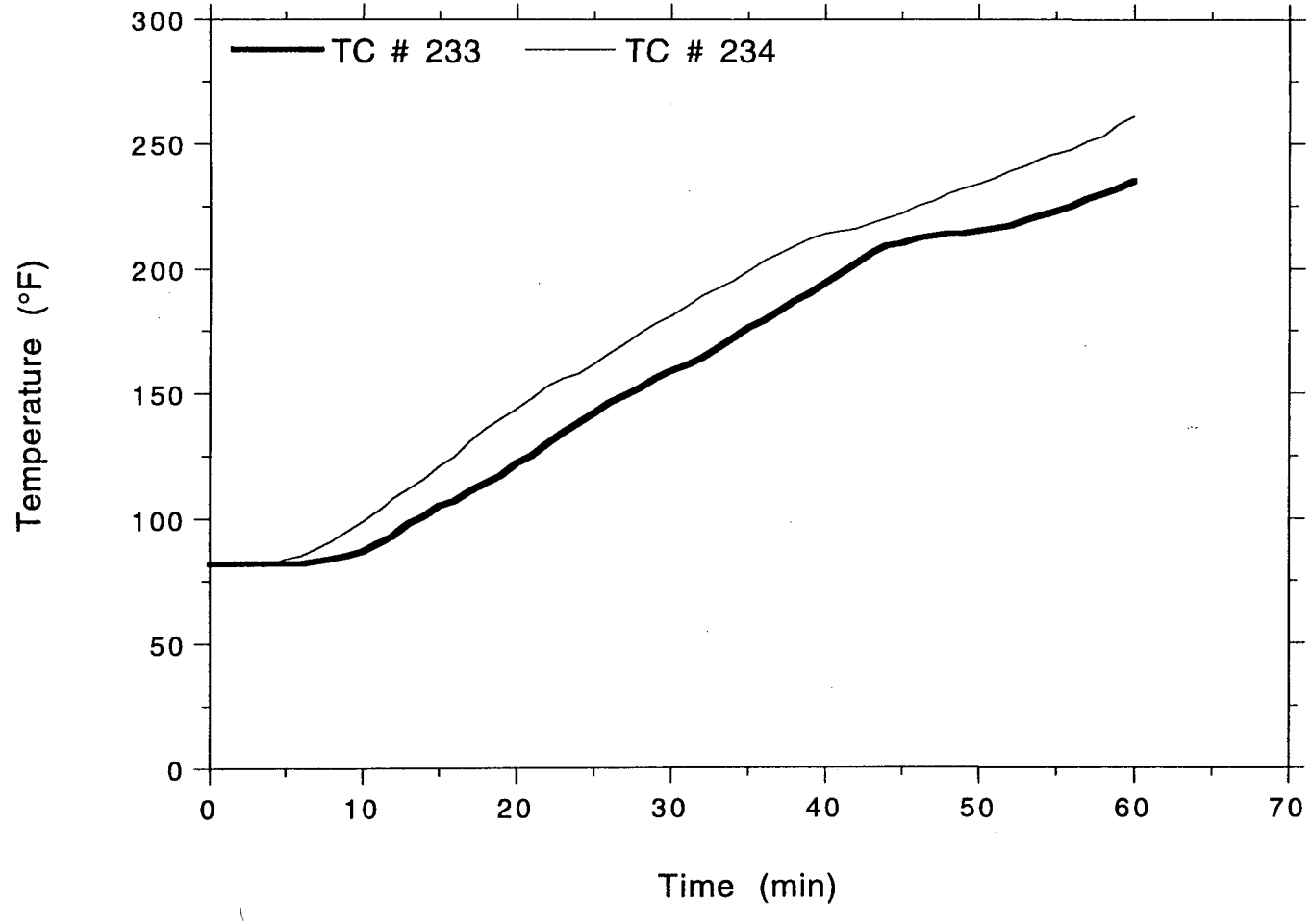


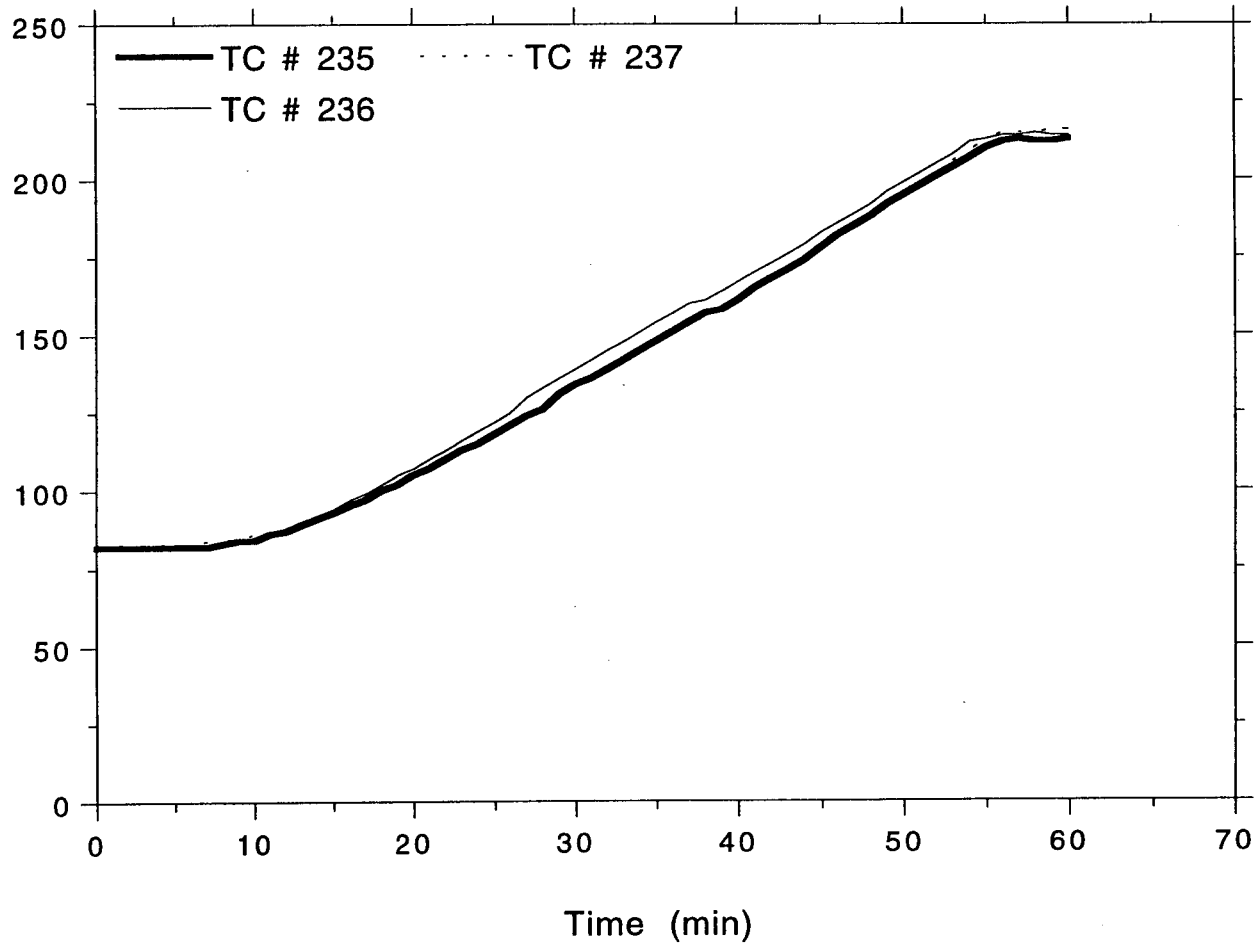
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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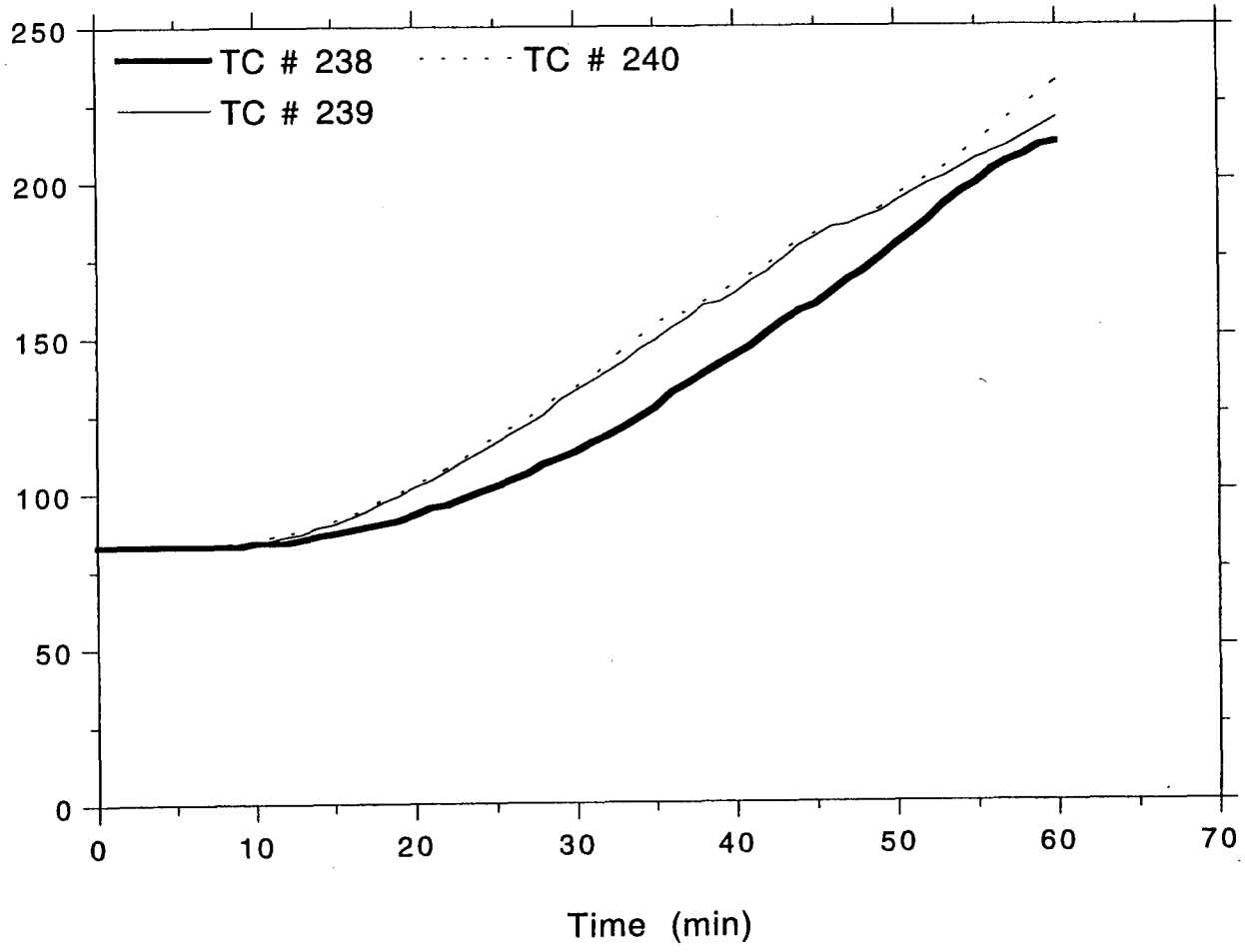
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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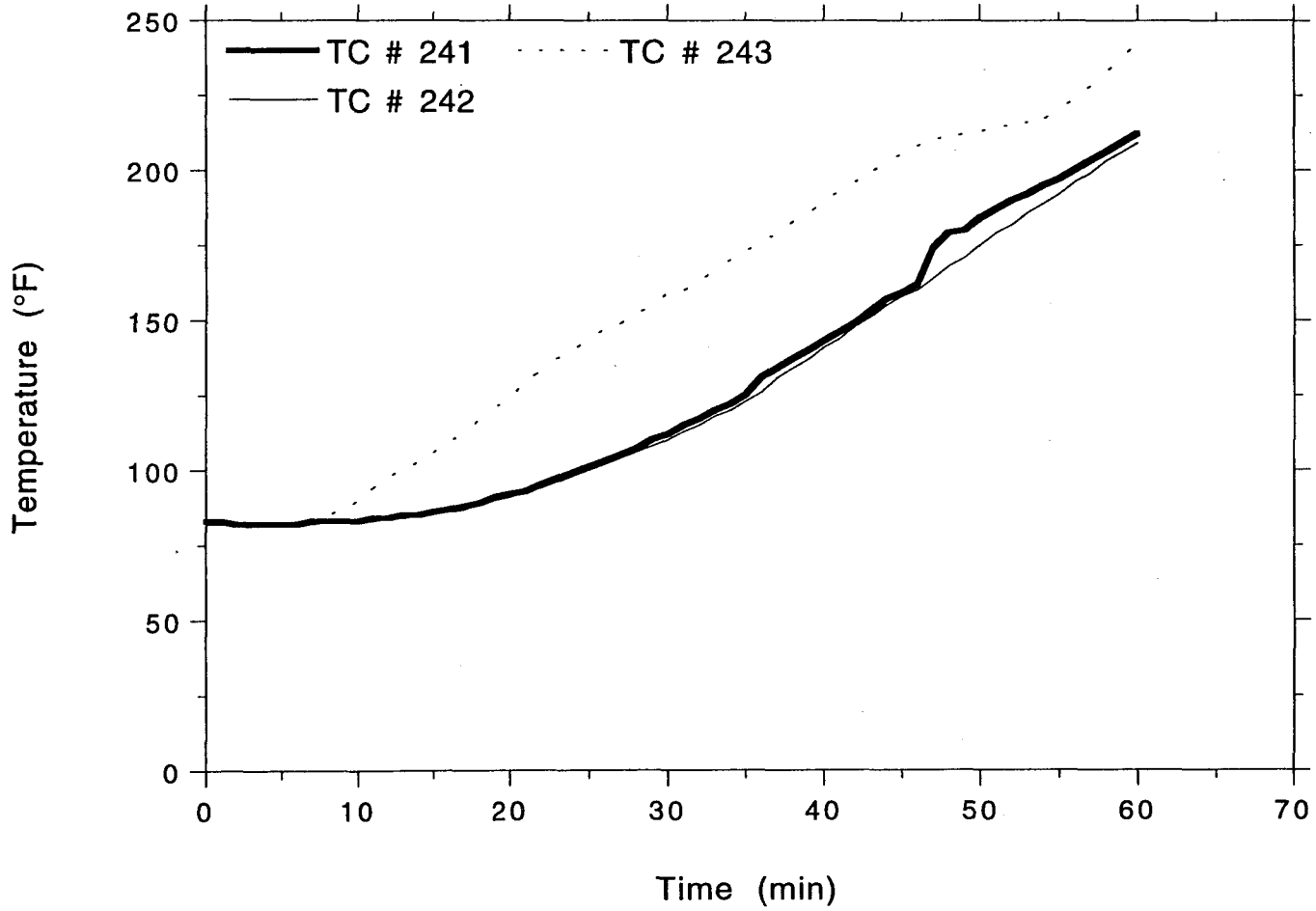
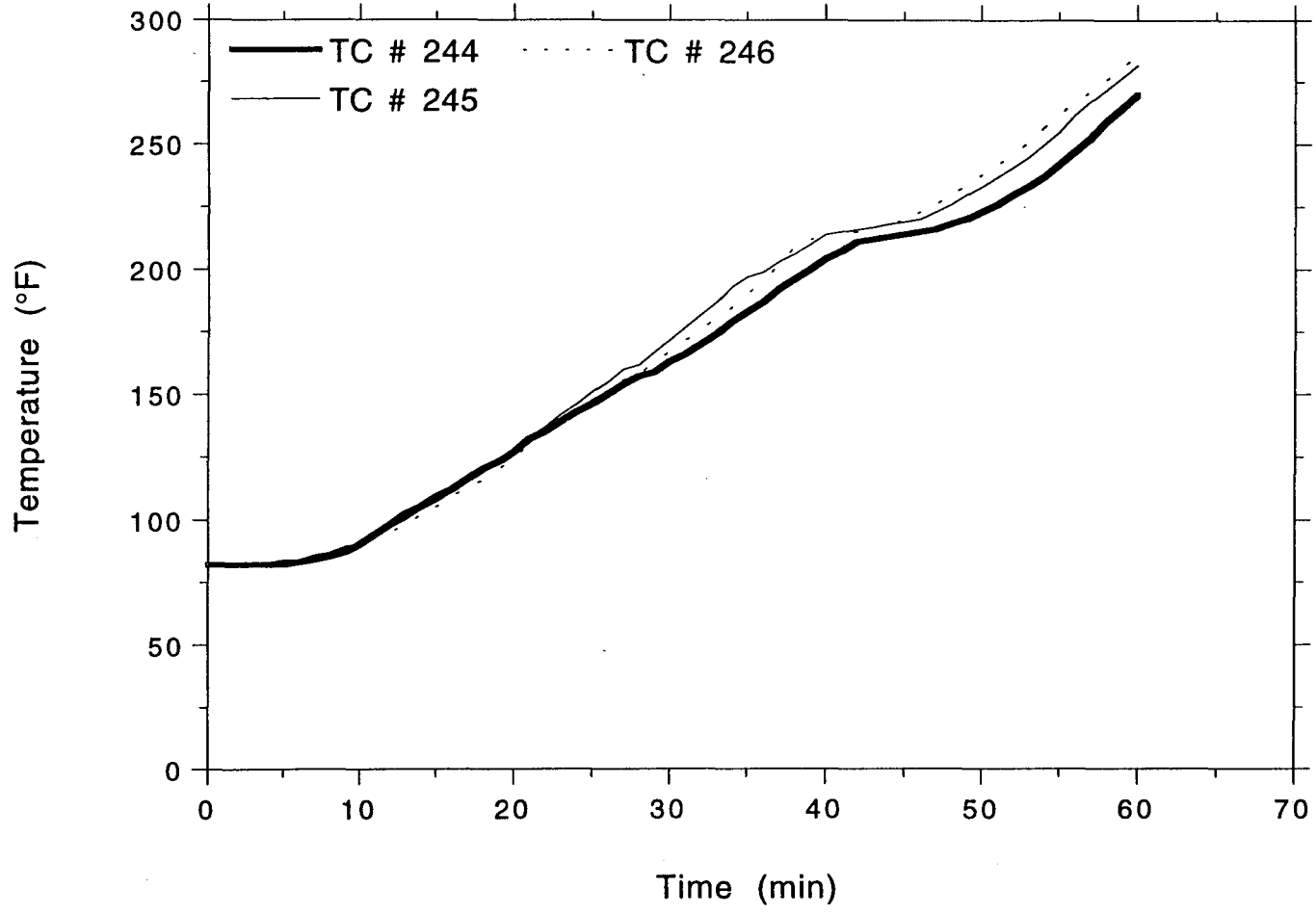


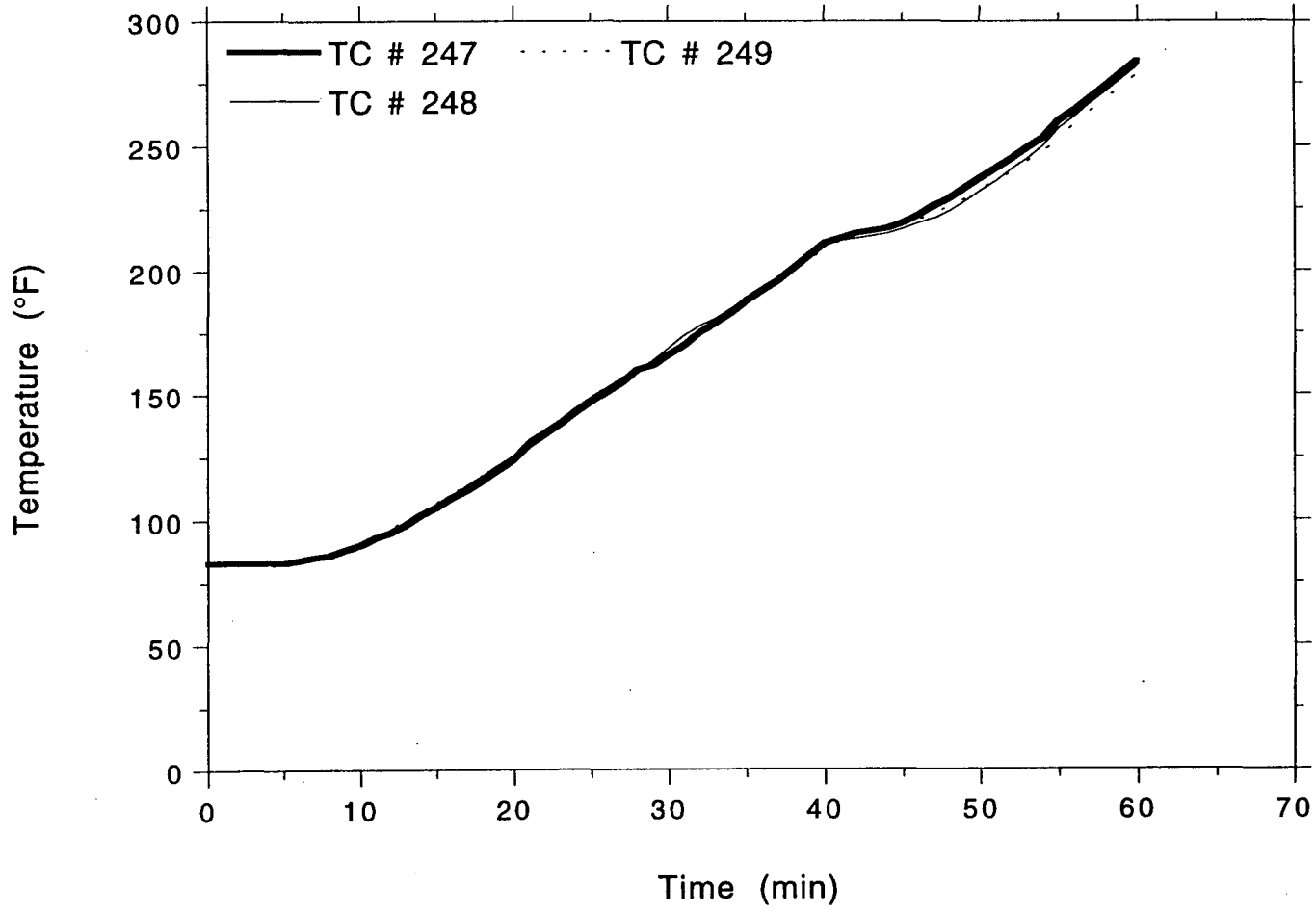
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



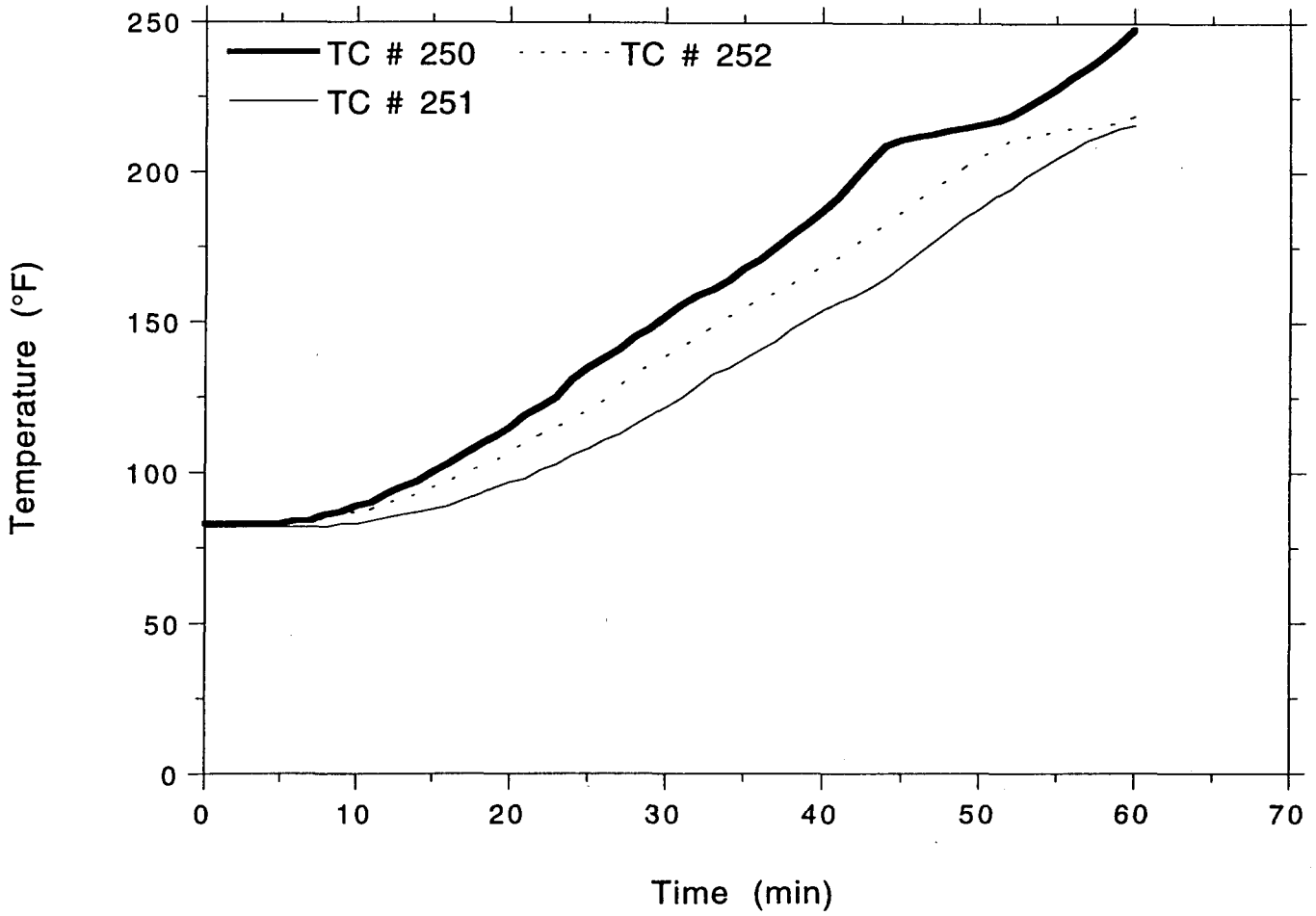
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



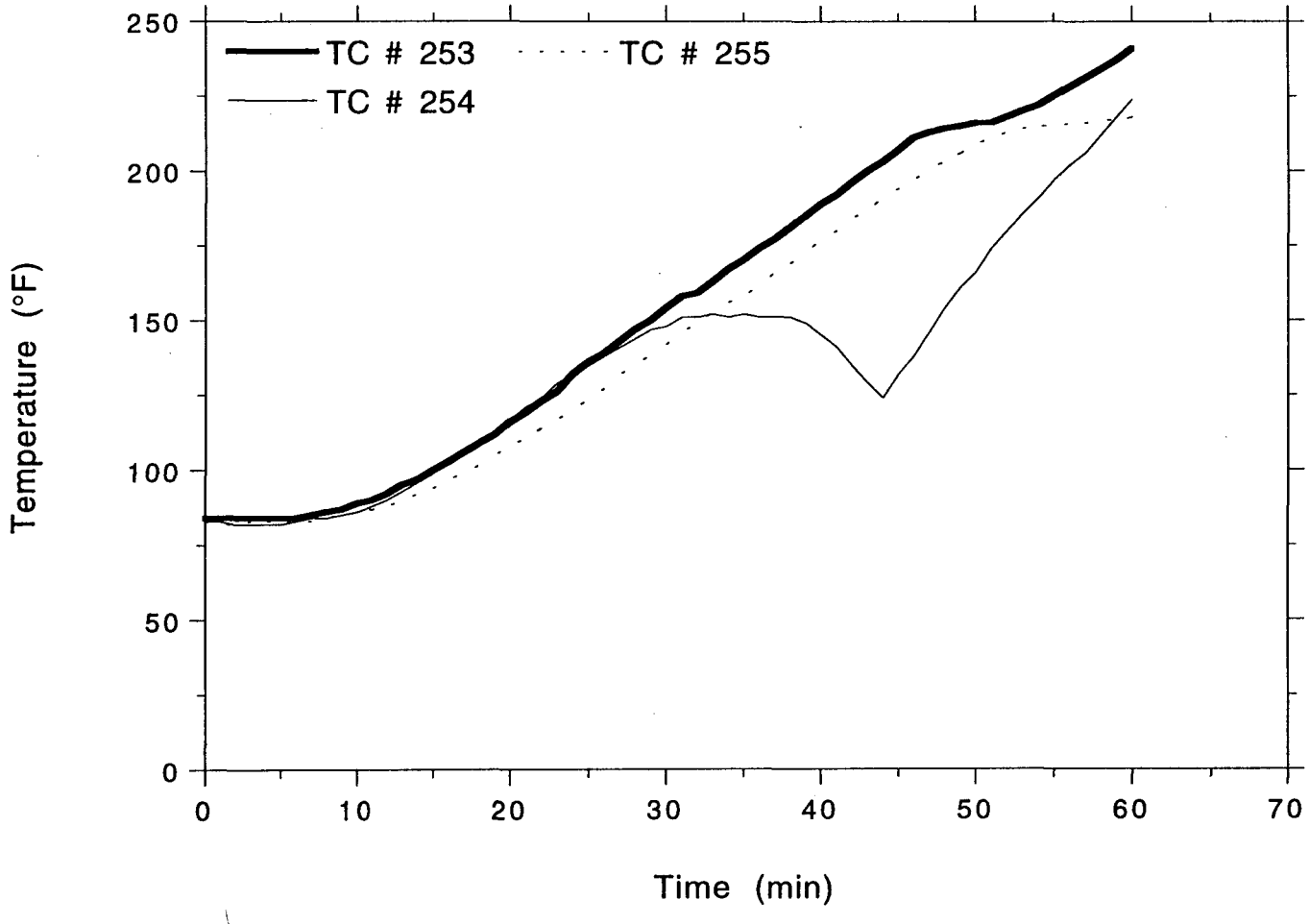
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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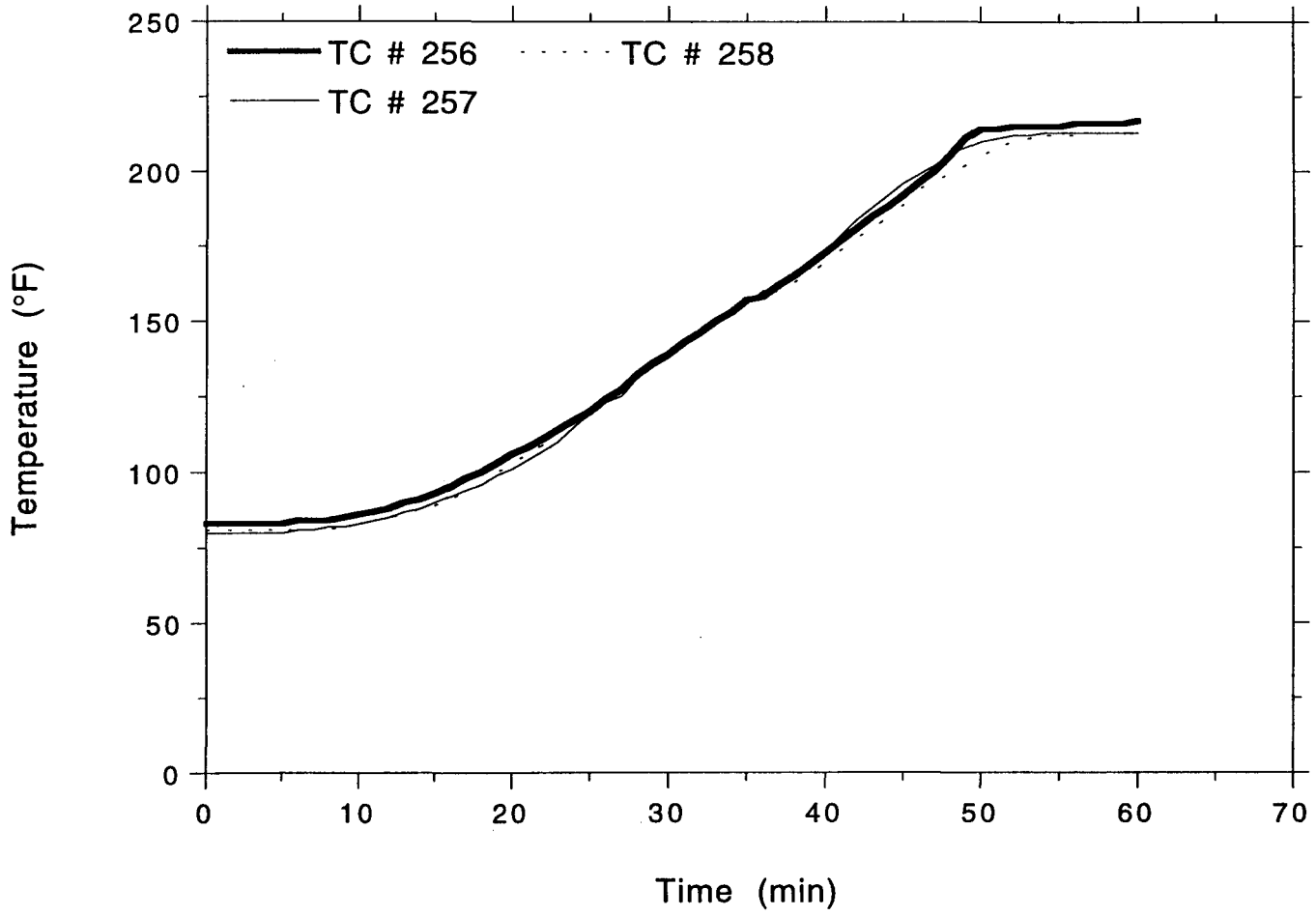
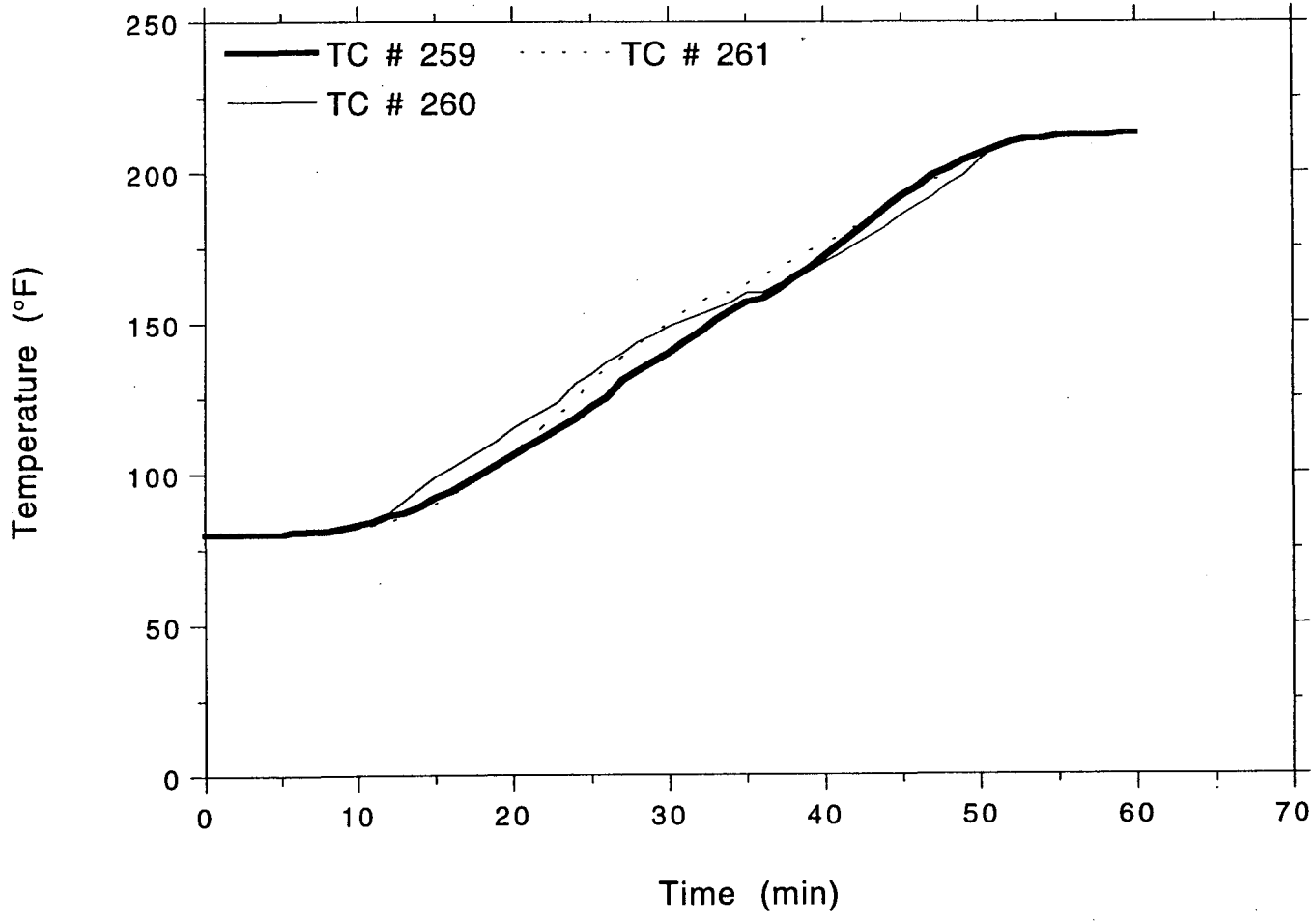
Front 4" Steel Conduit



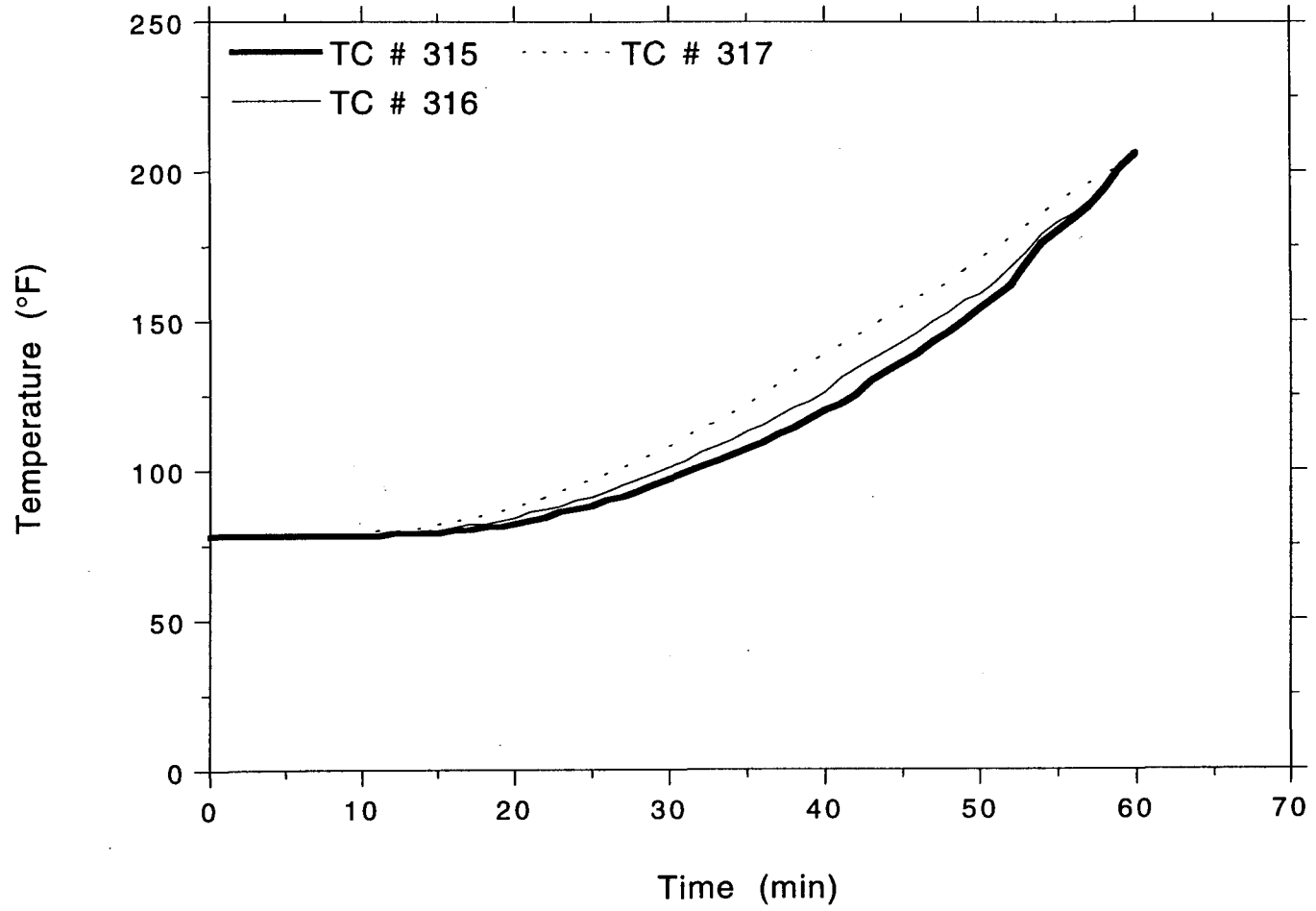
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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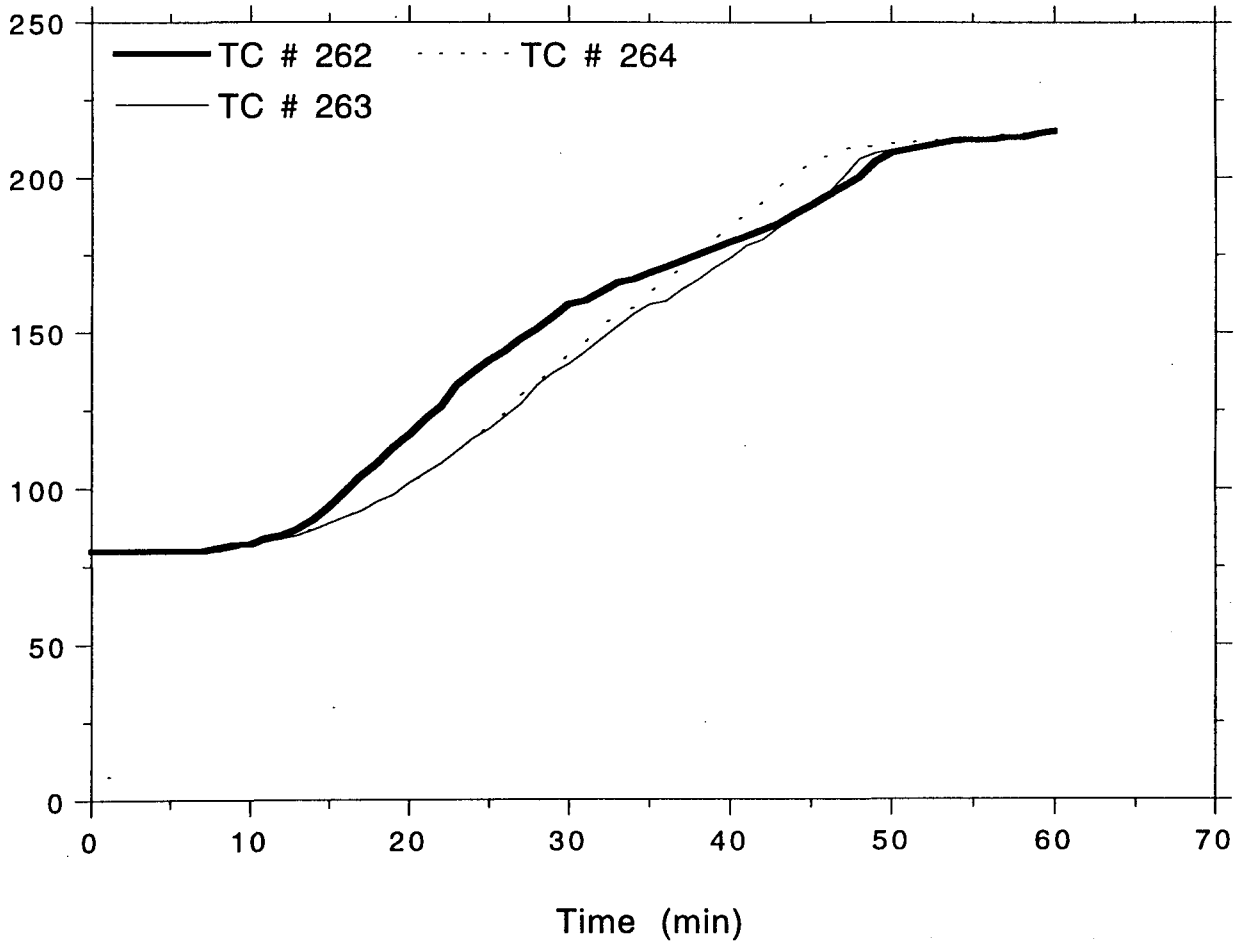
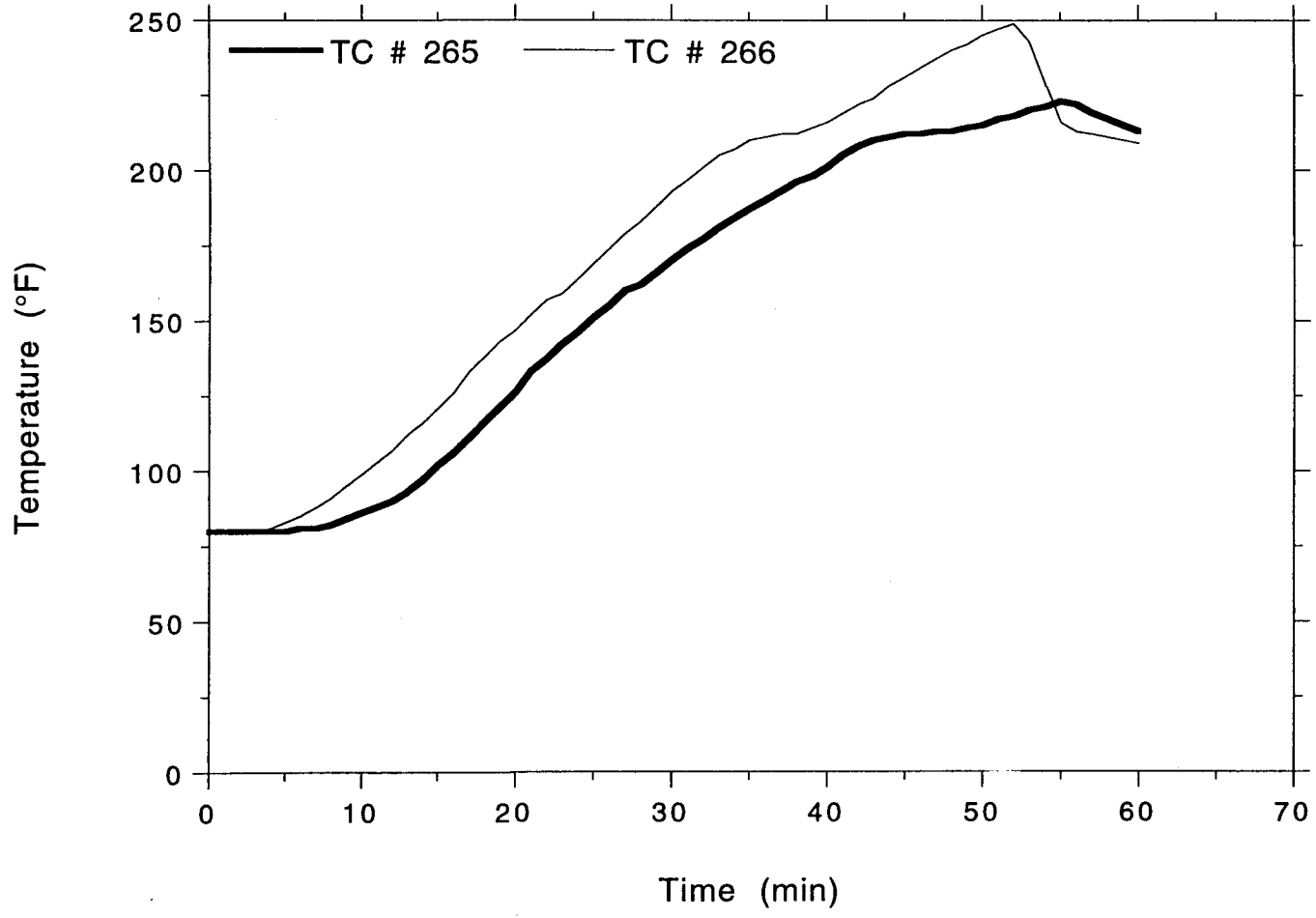


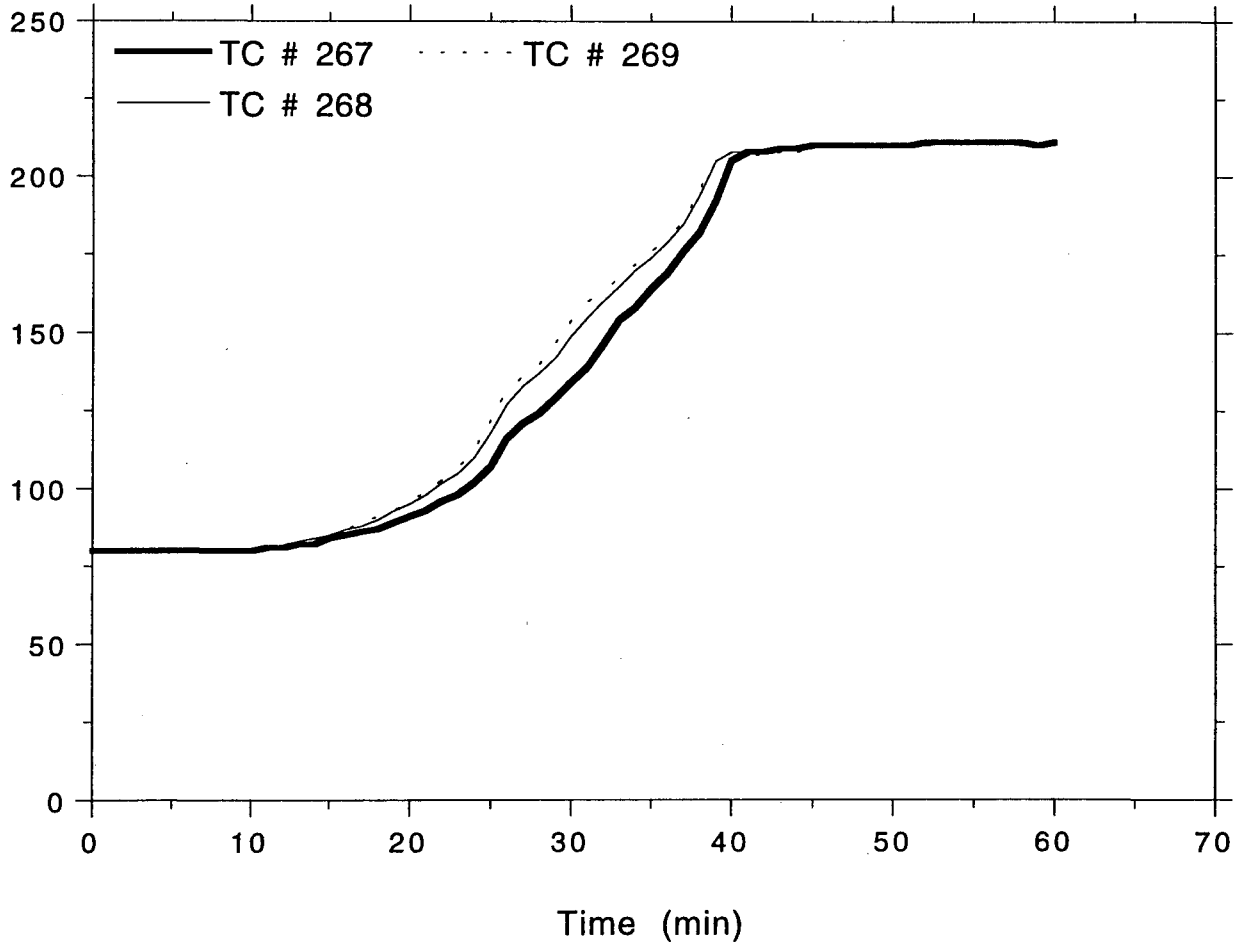
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



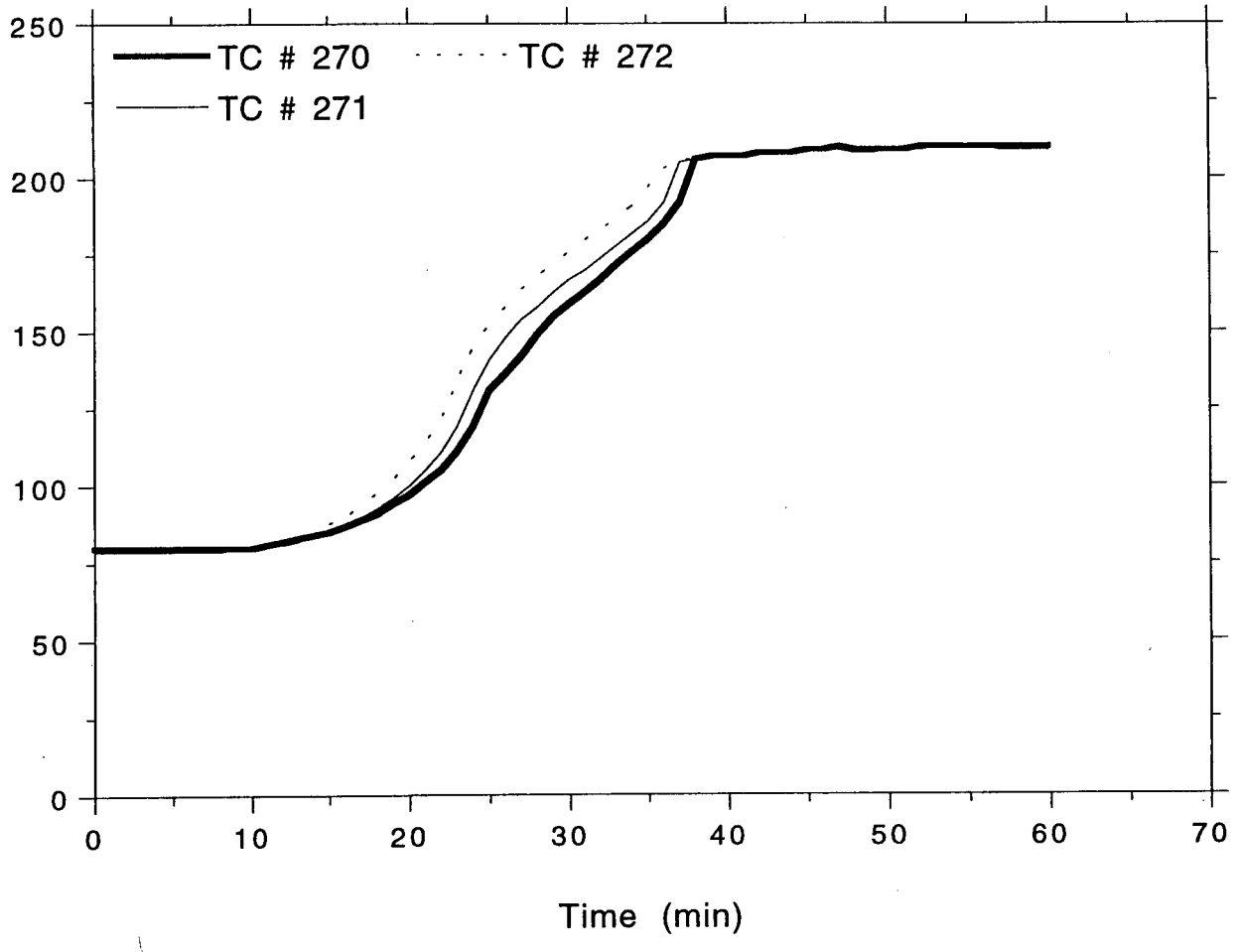
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



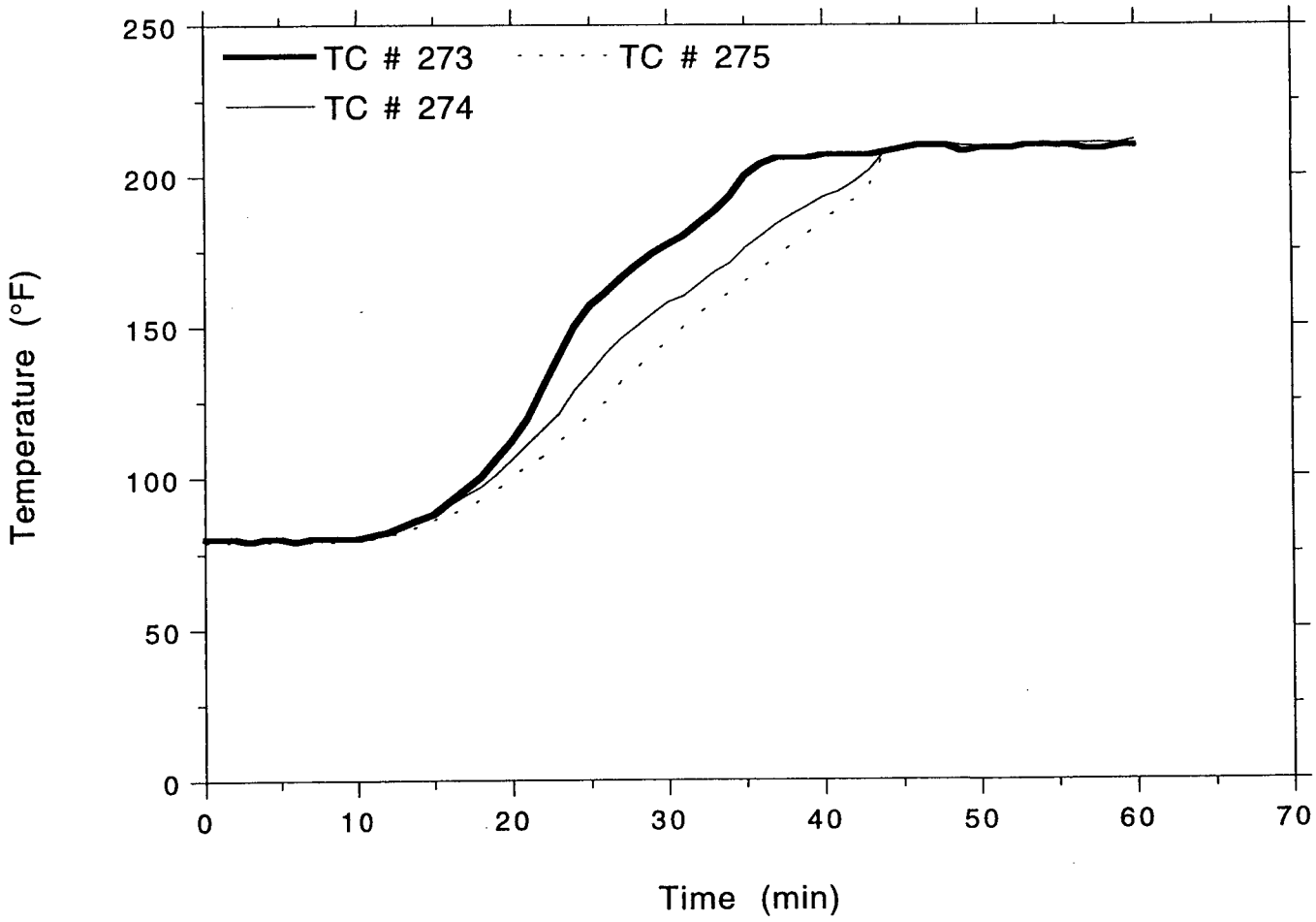
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



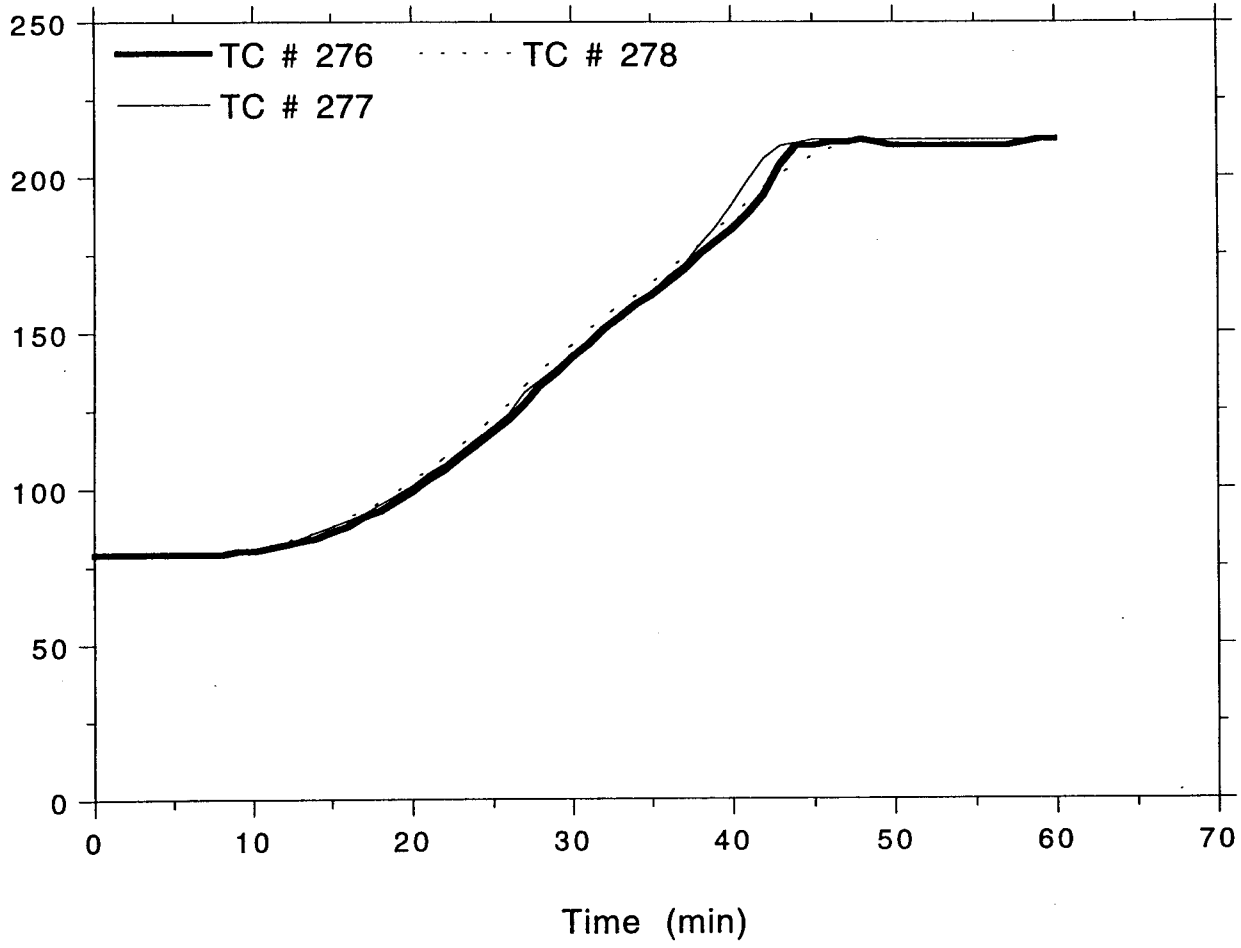
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



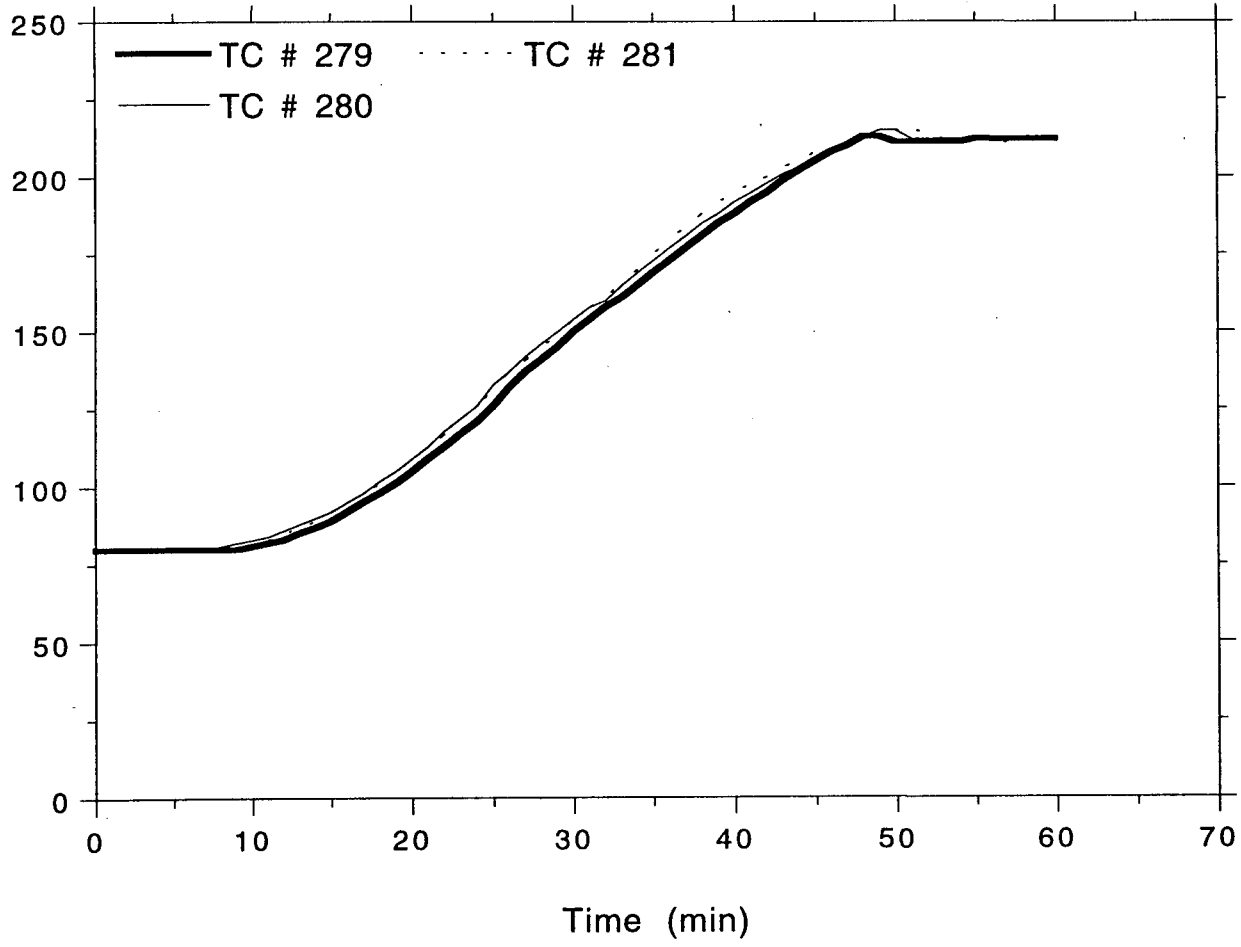
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



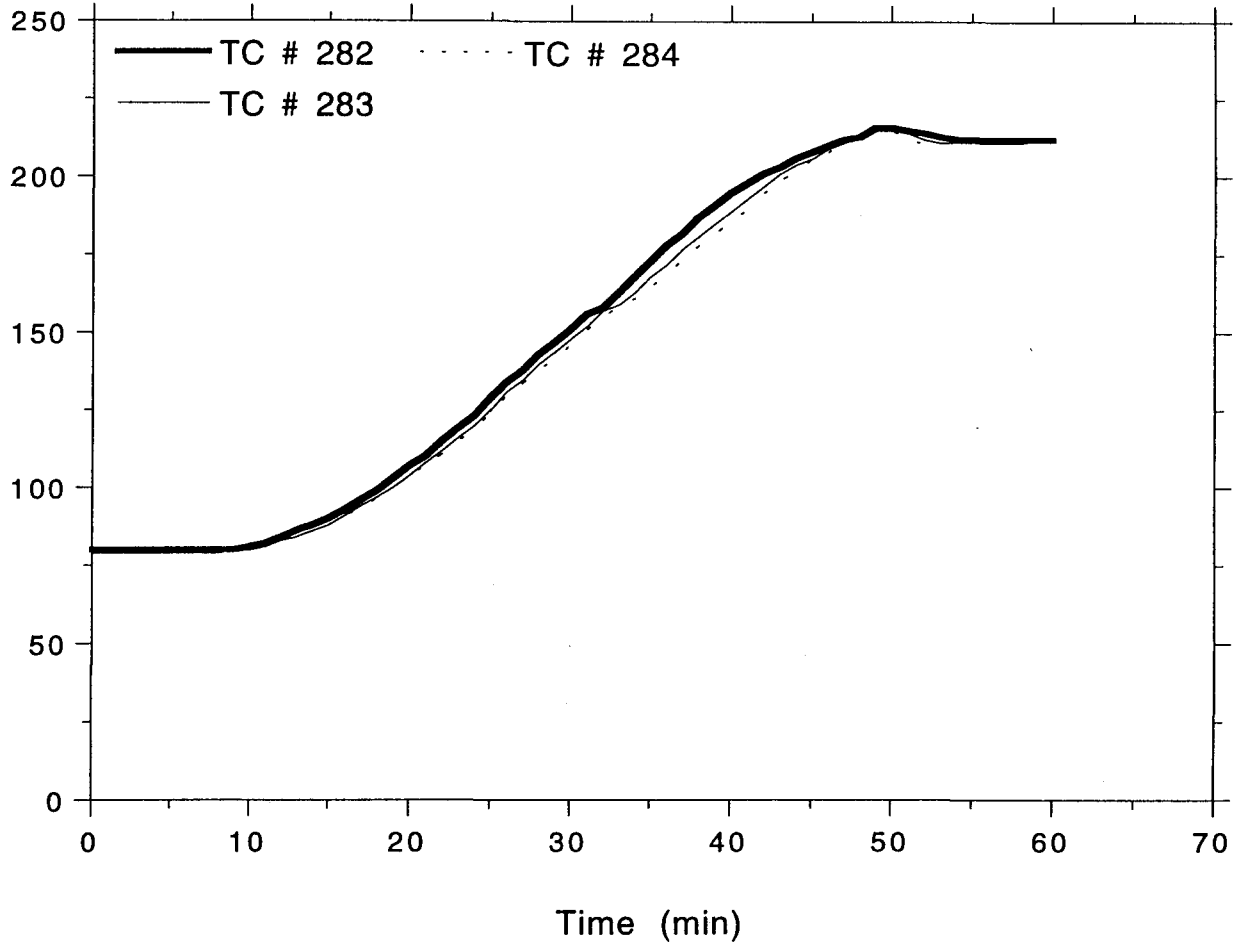
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



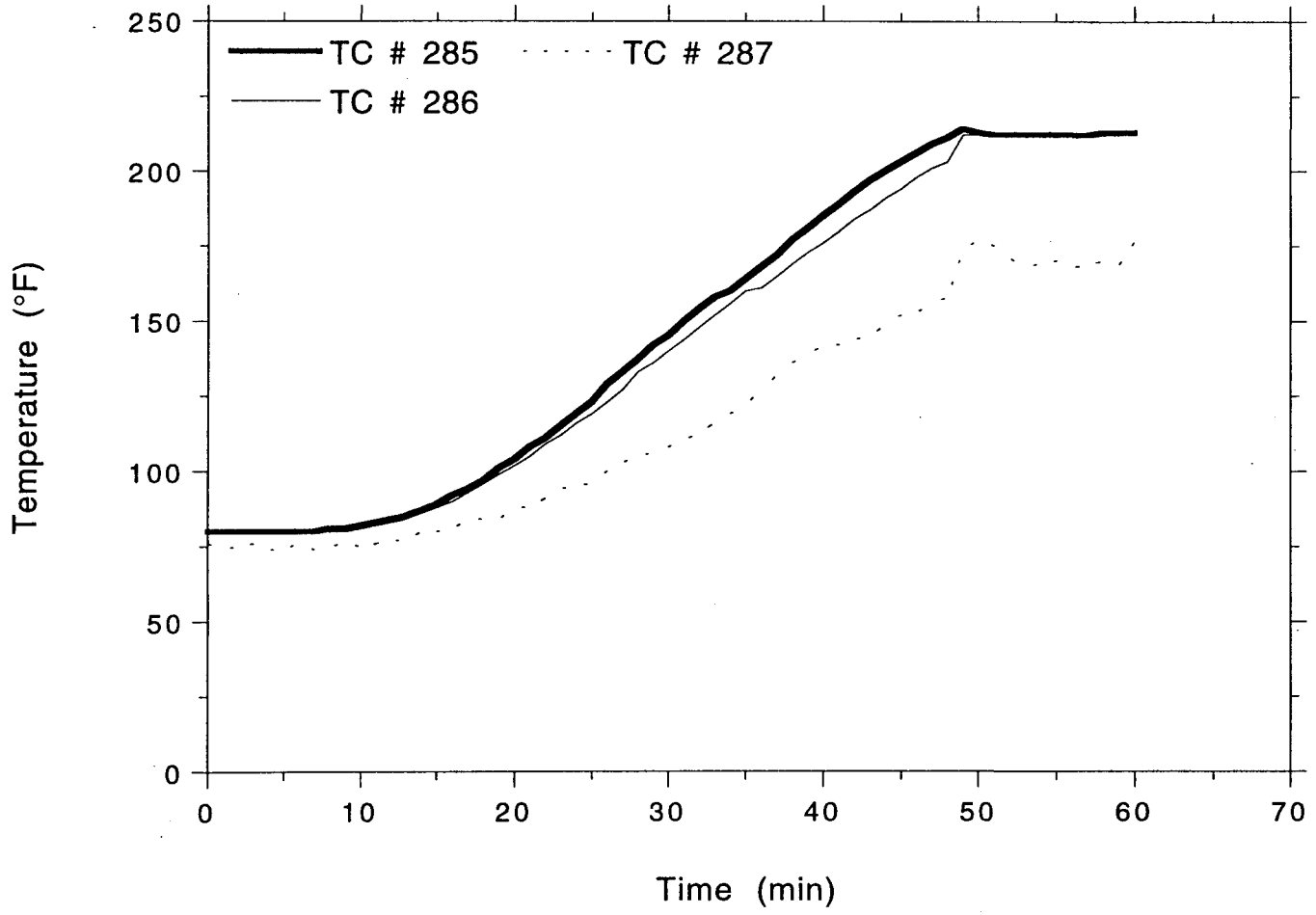
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



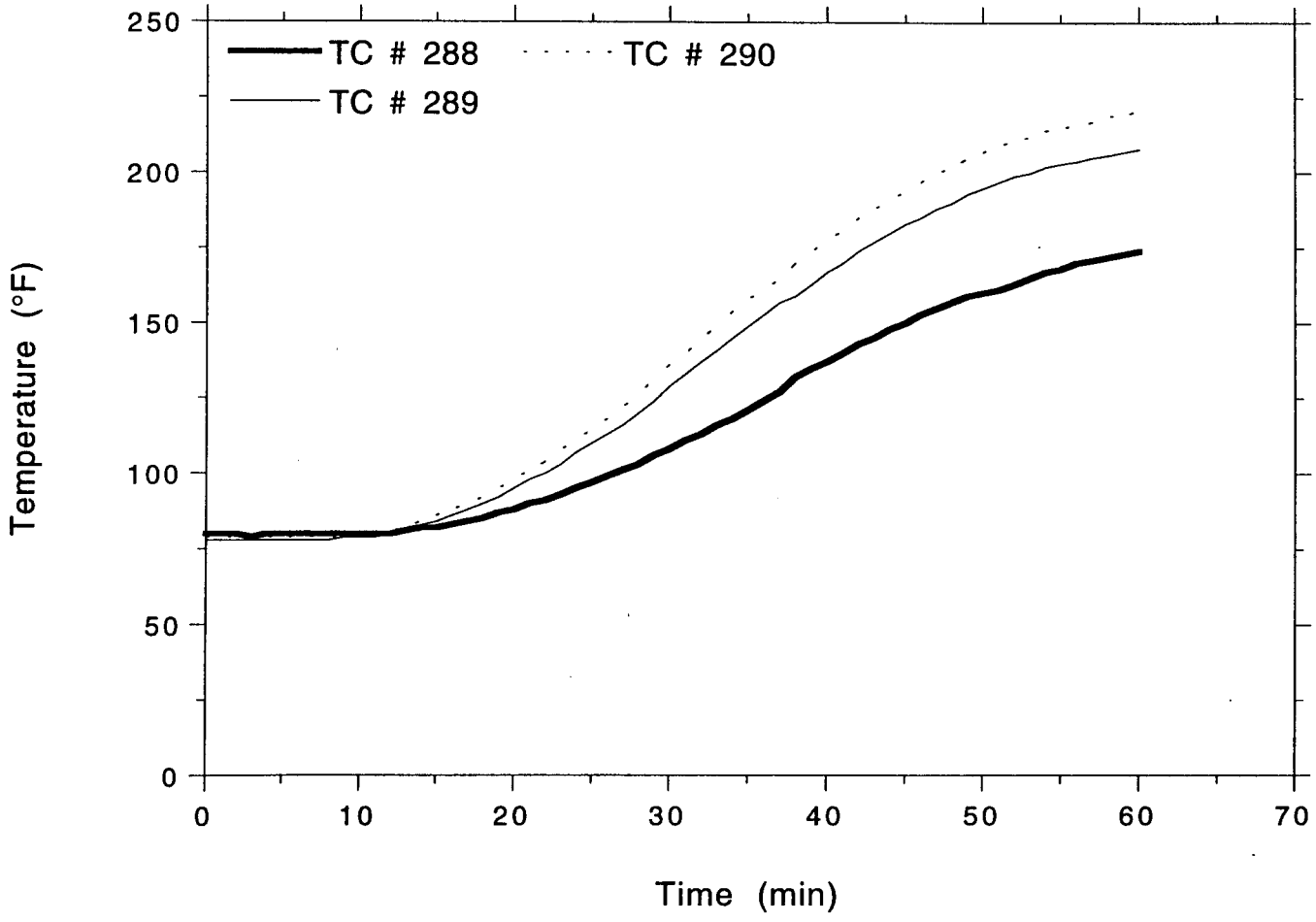
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Aluminum Conduit



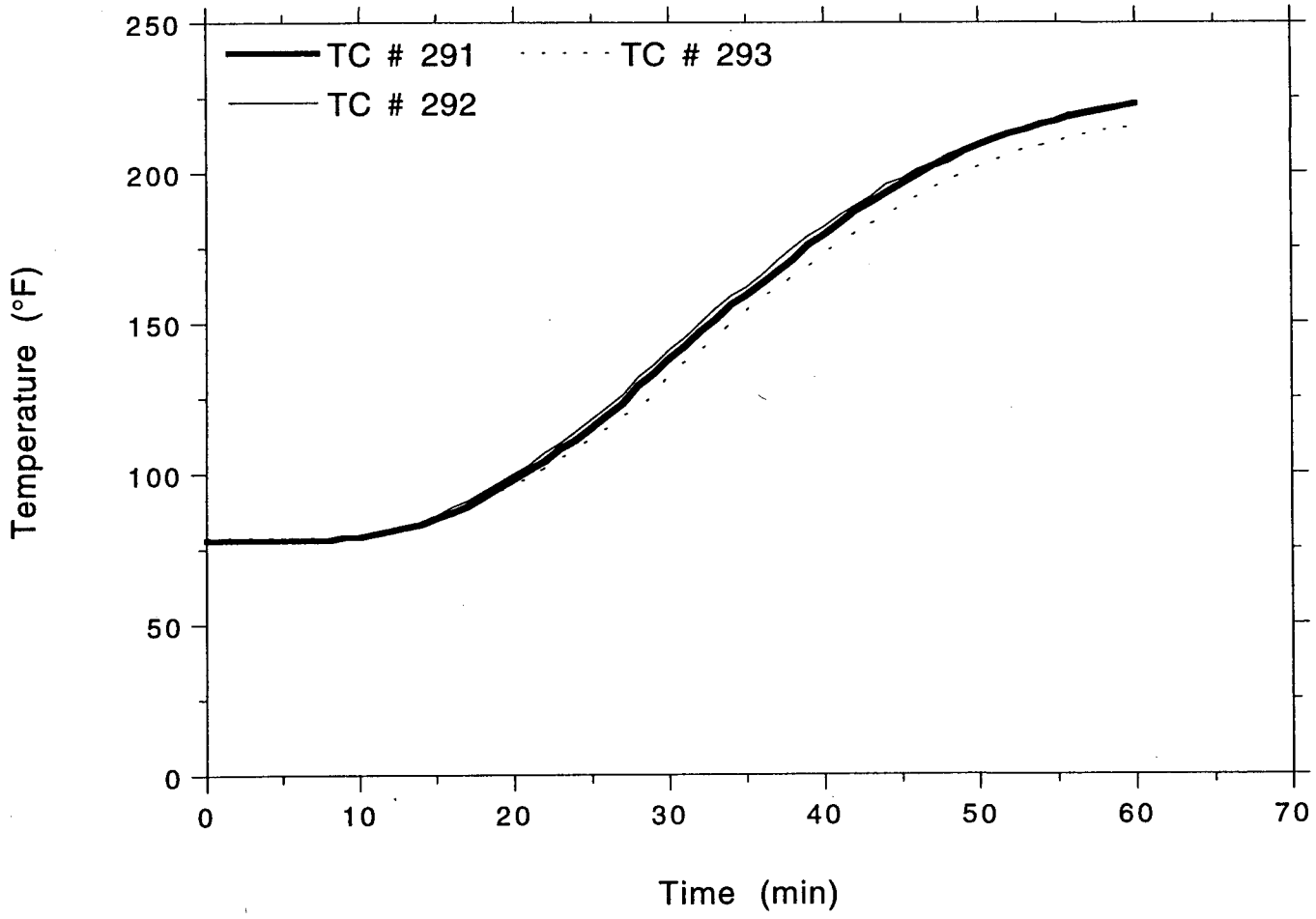
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



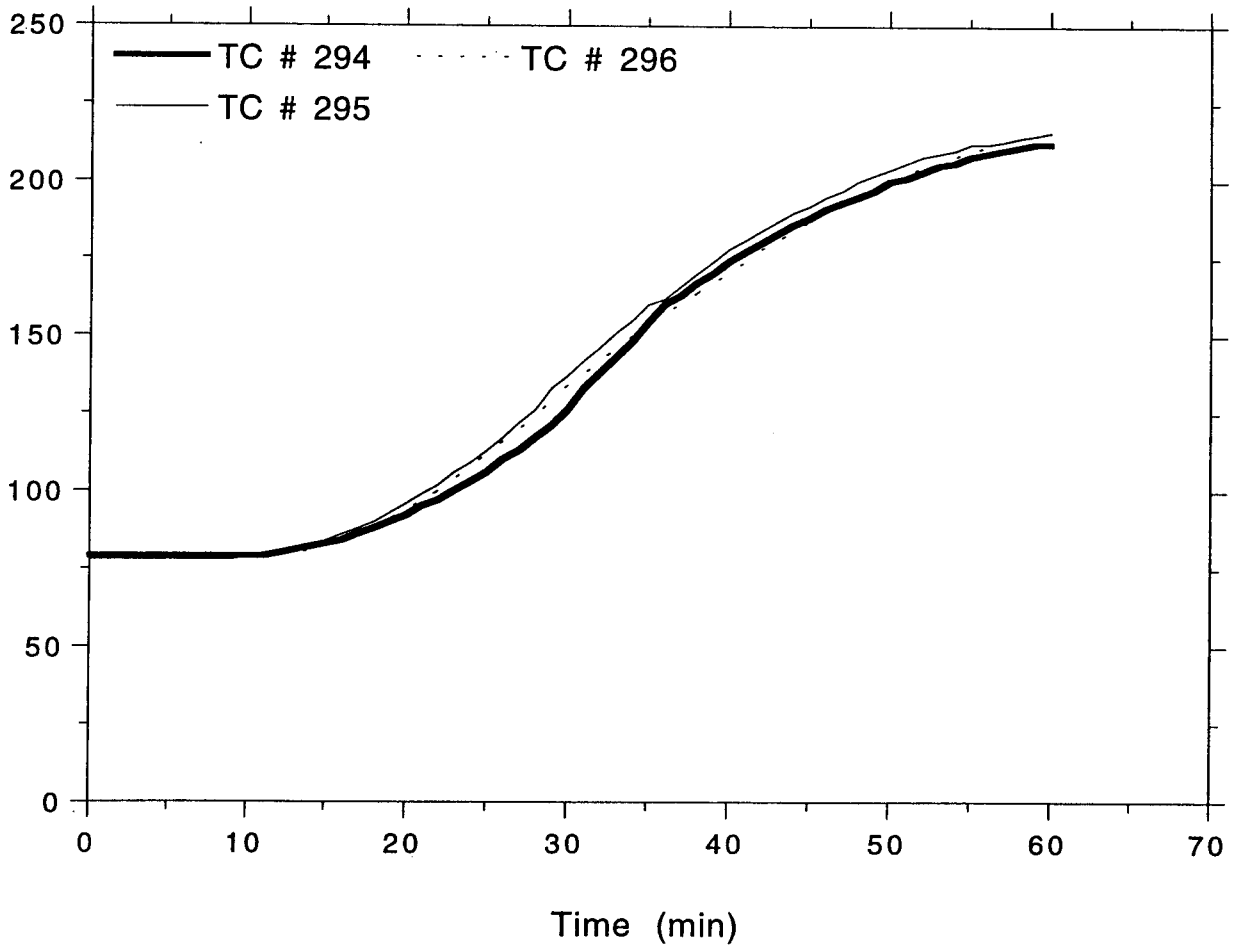
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



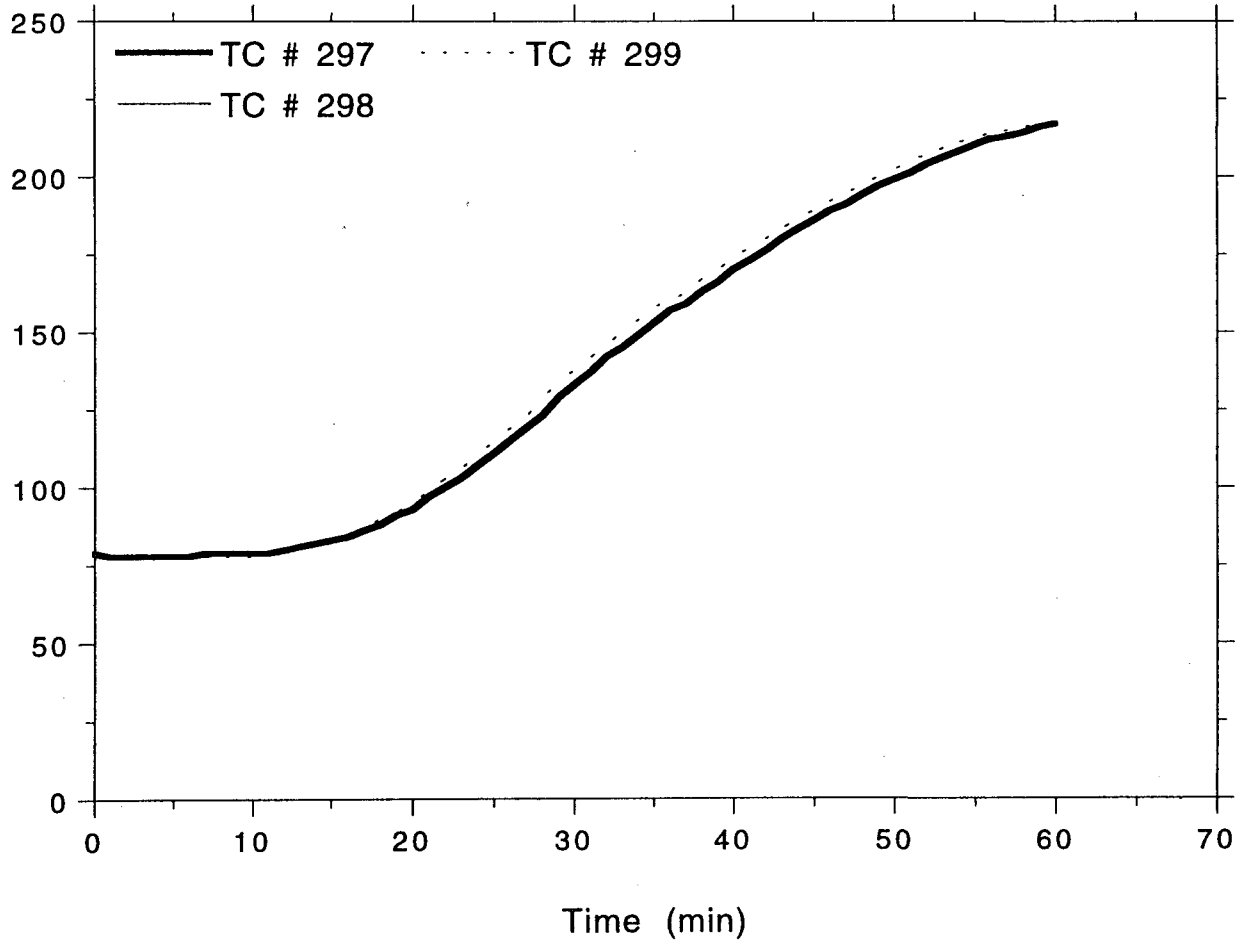
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



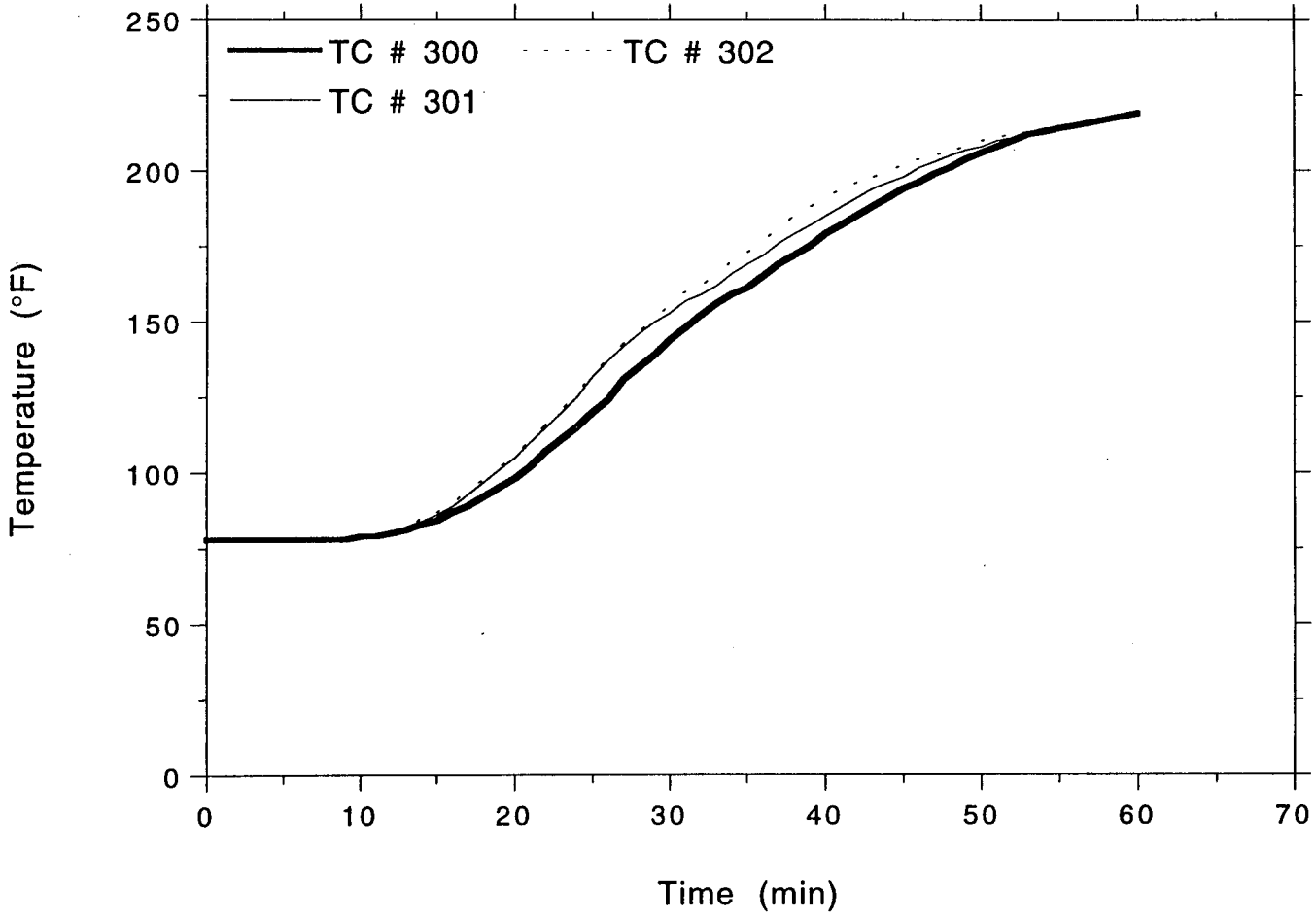
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



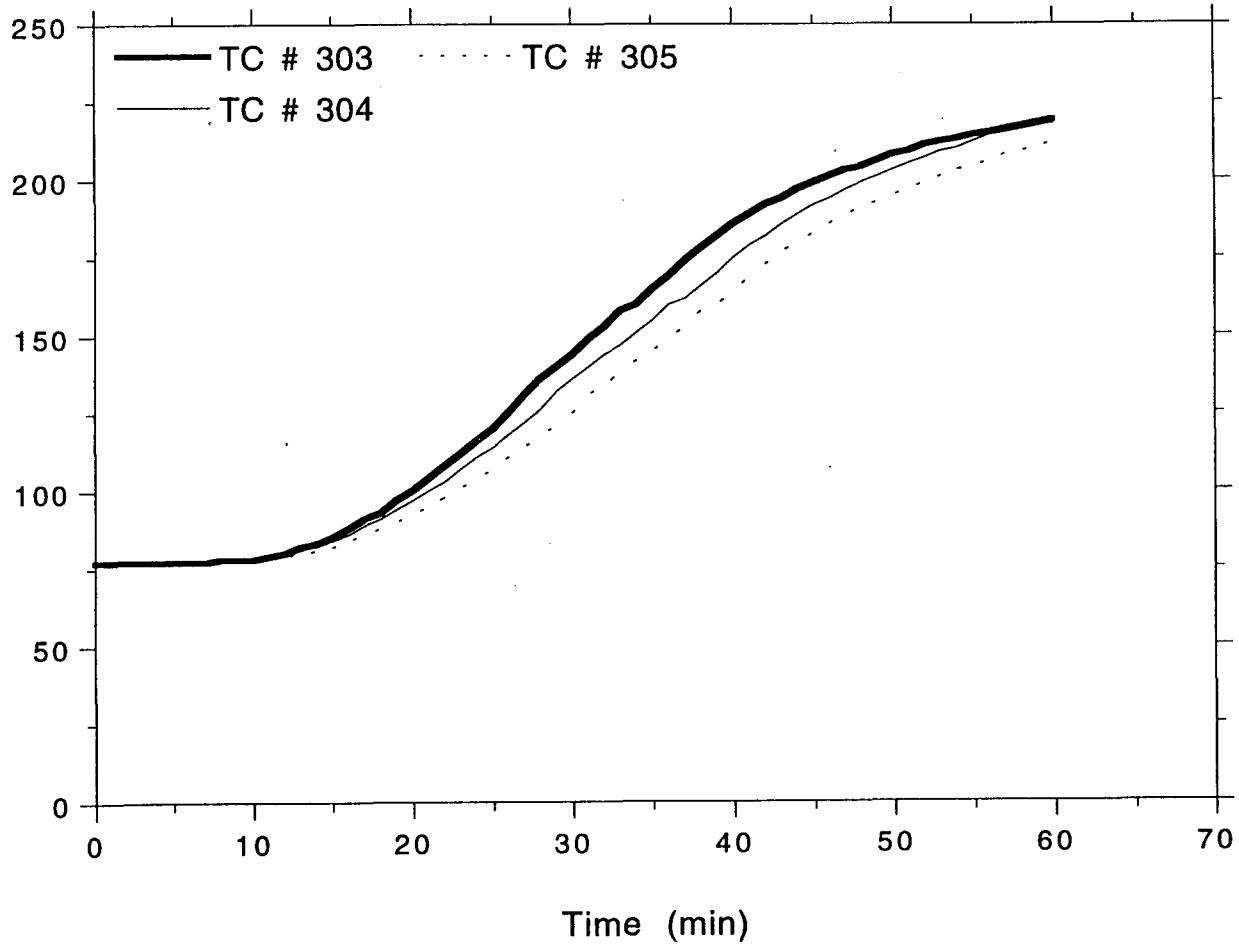
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



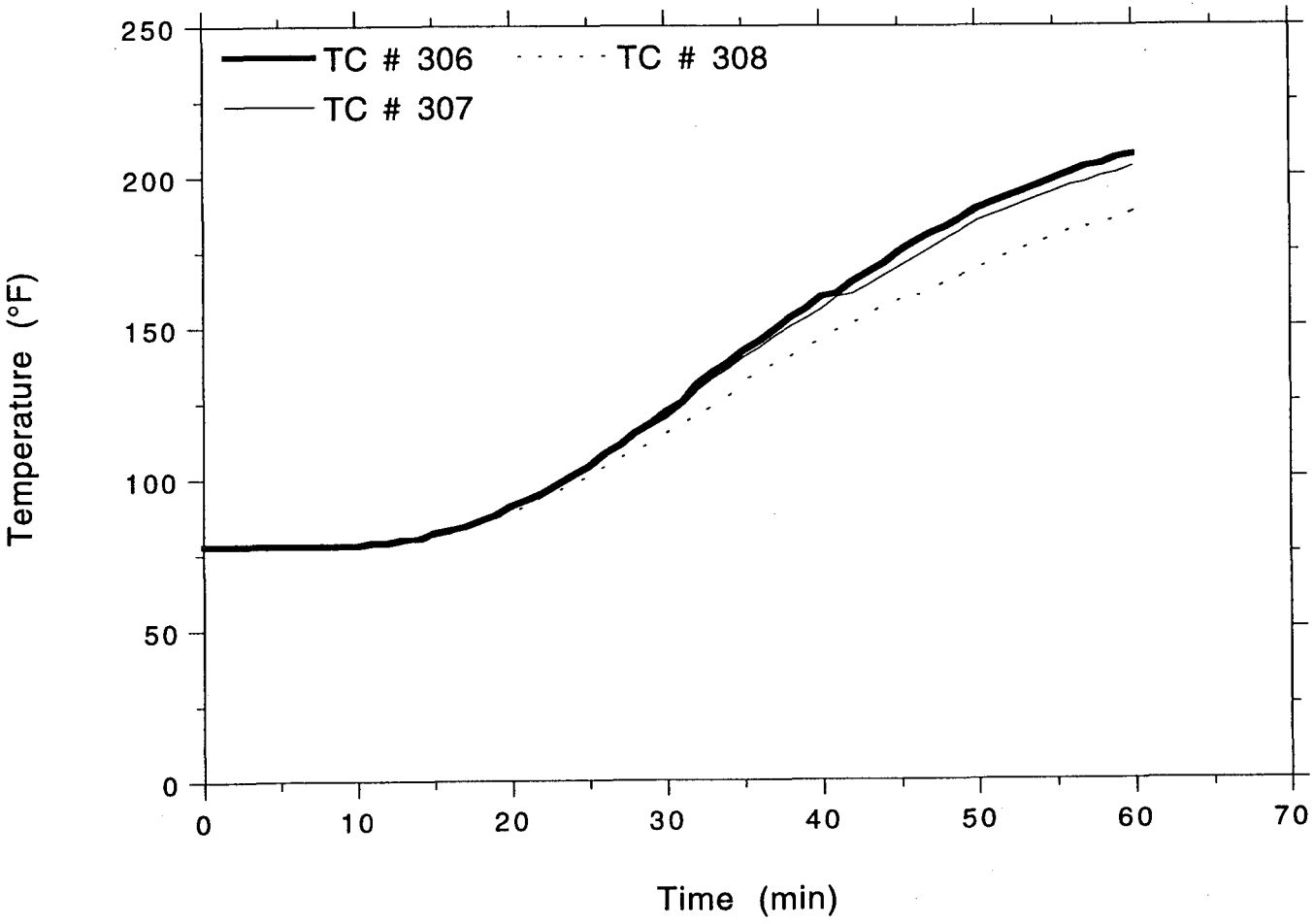
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



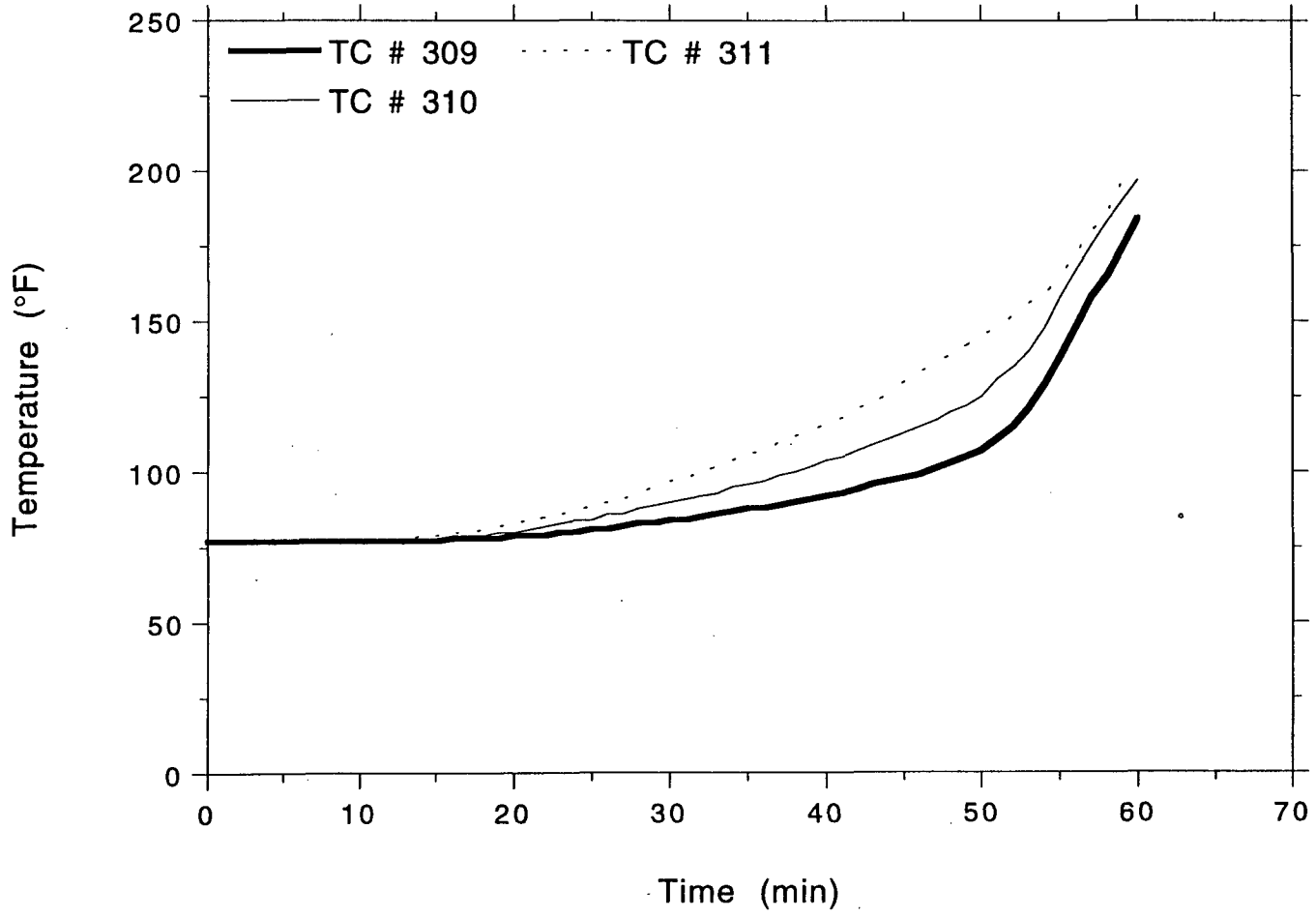
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3/4" Steel Conduit



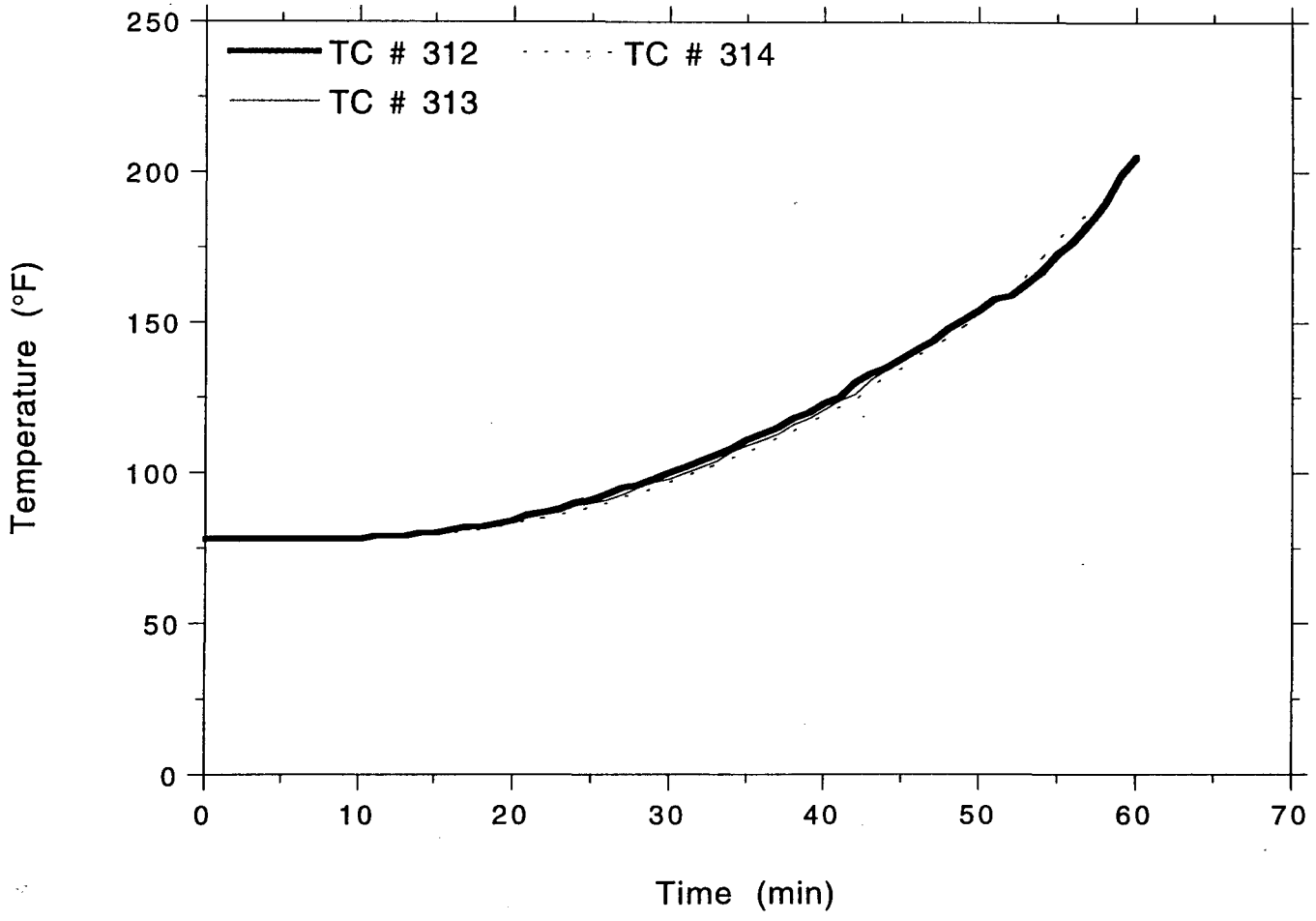
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



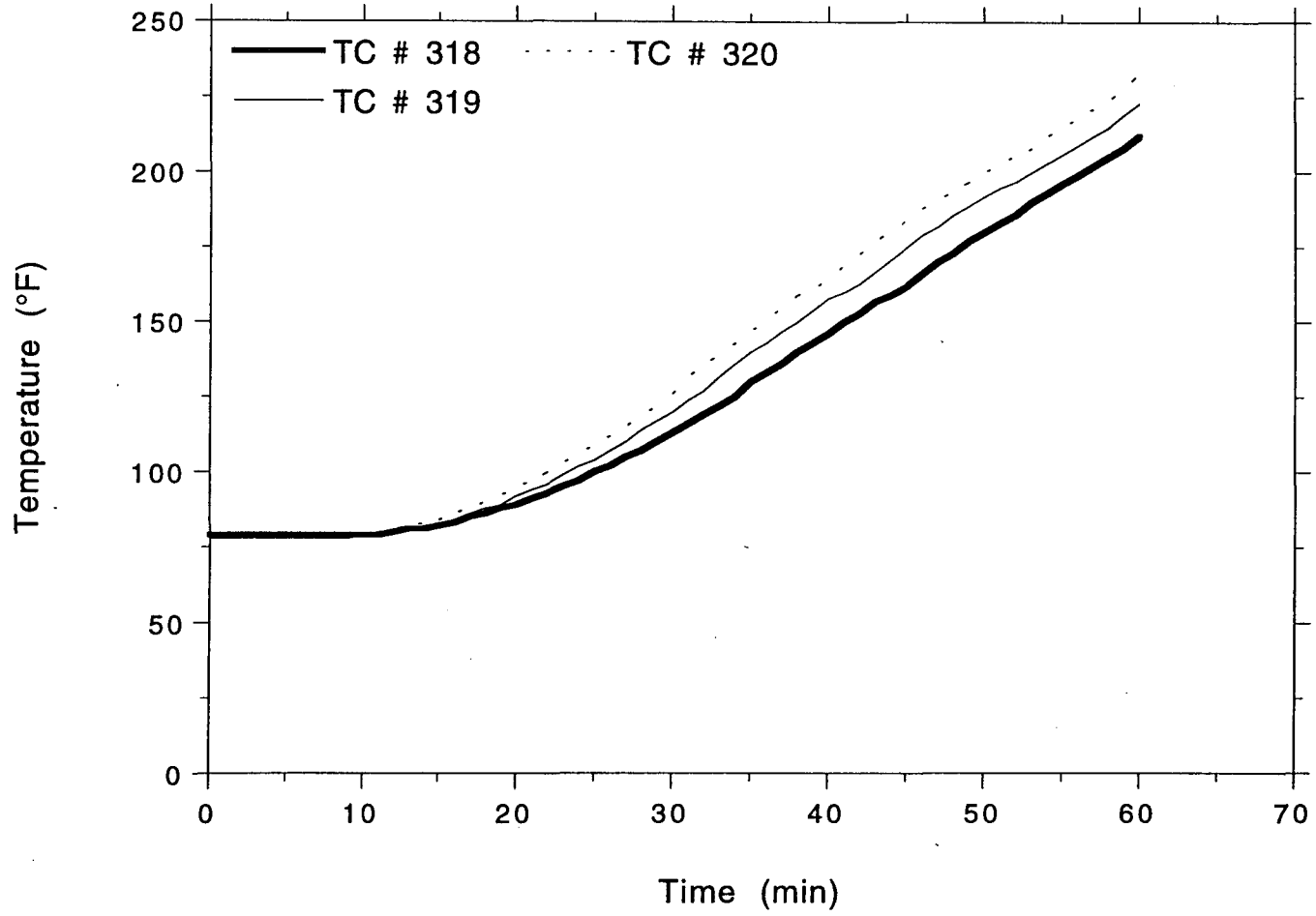
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



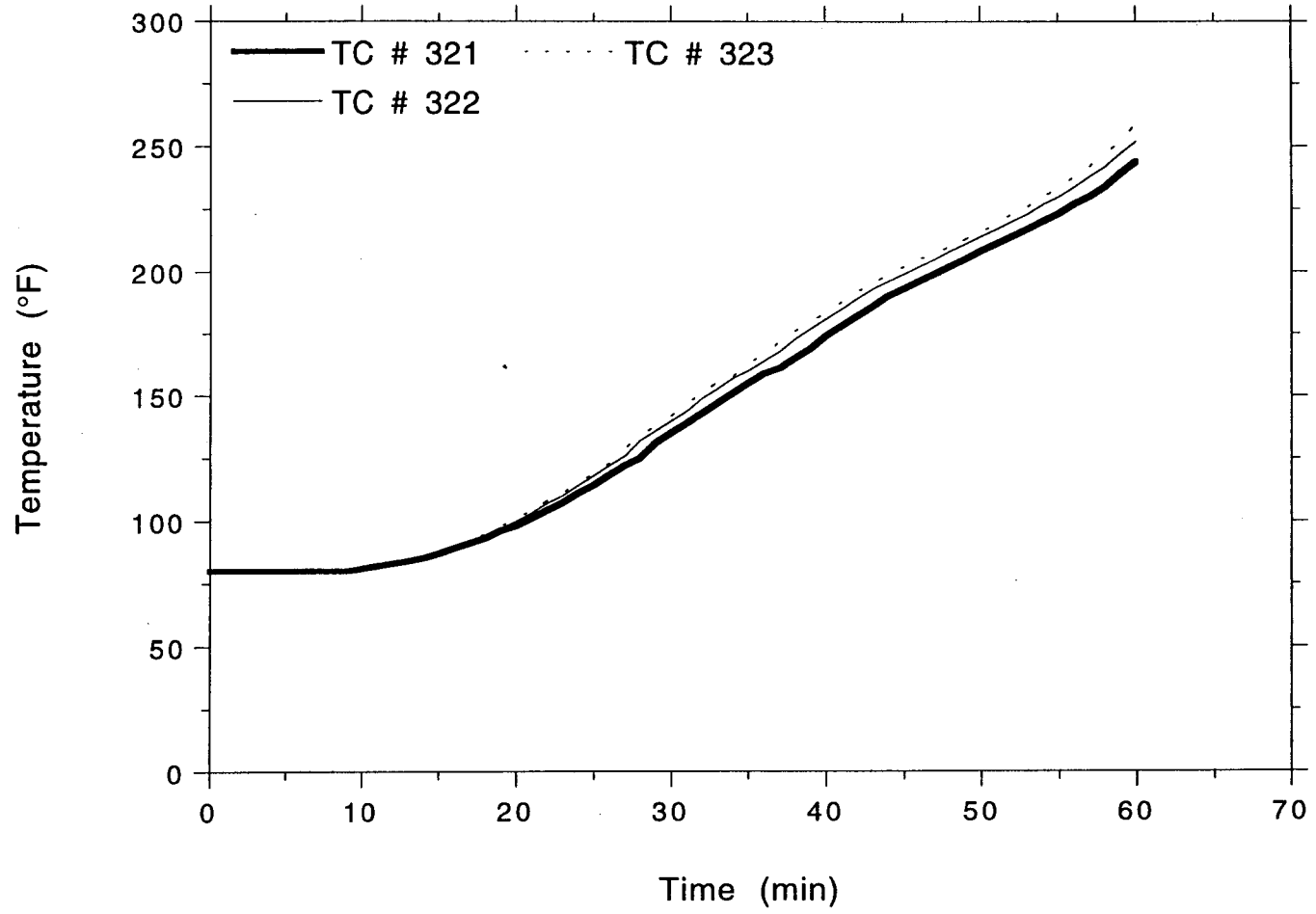
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



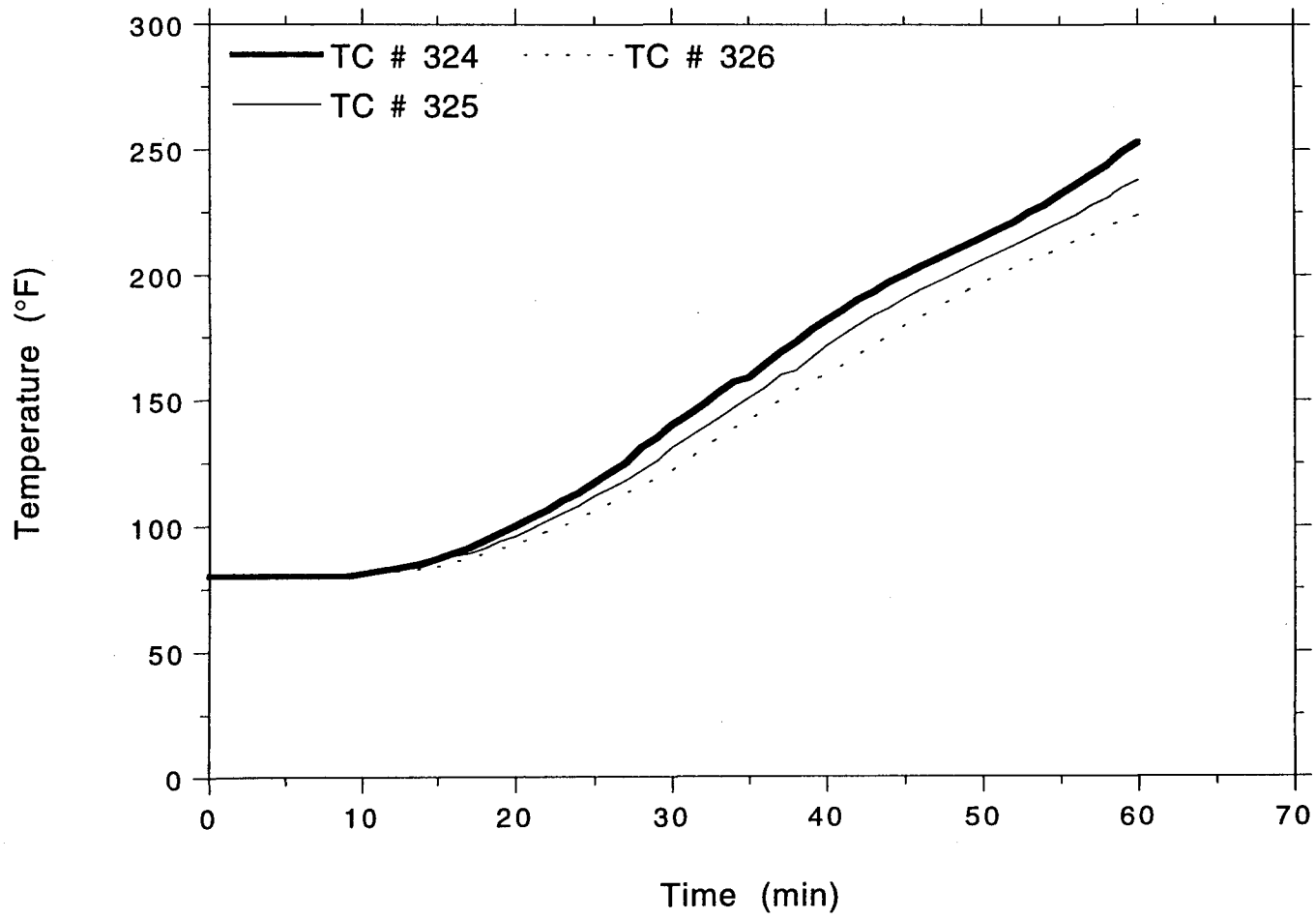
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



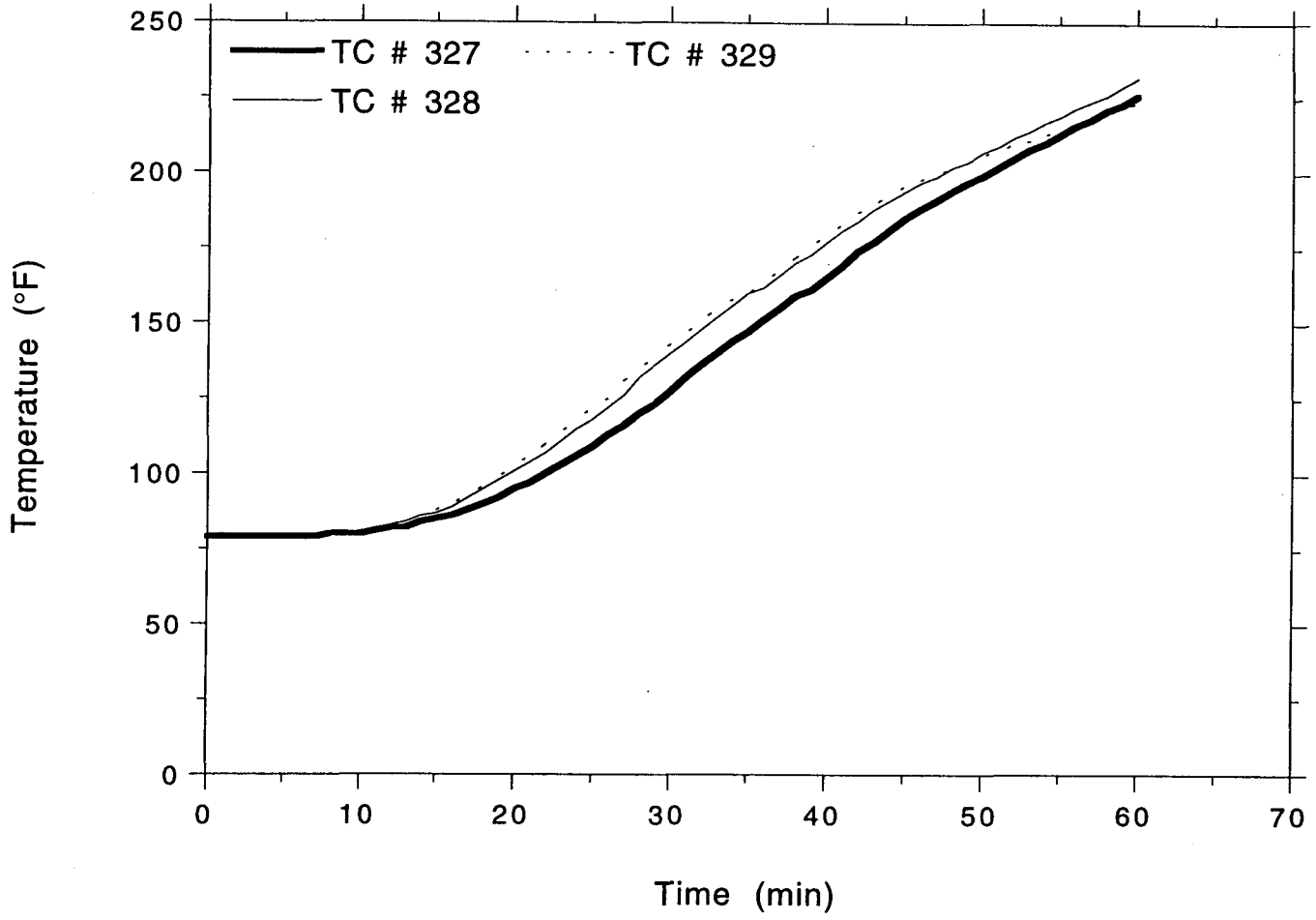
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



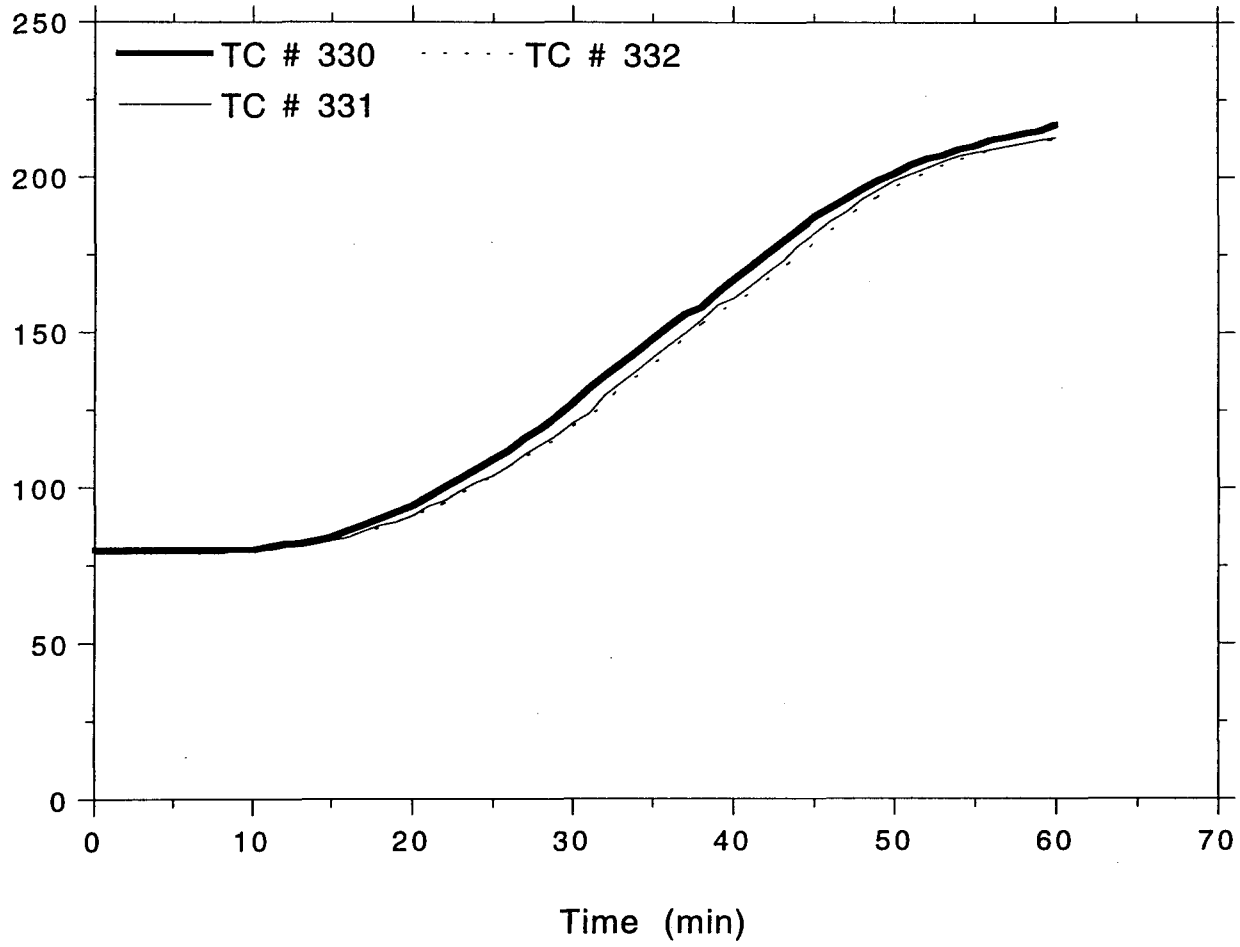
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



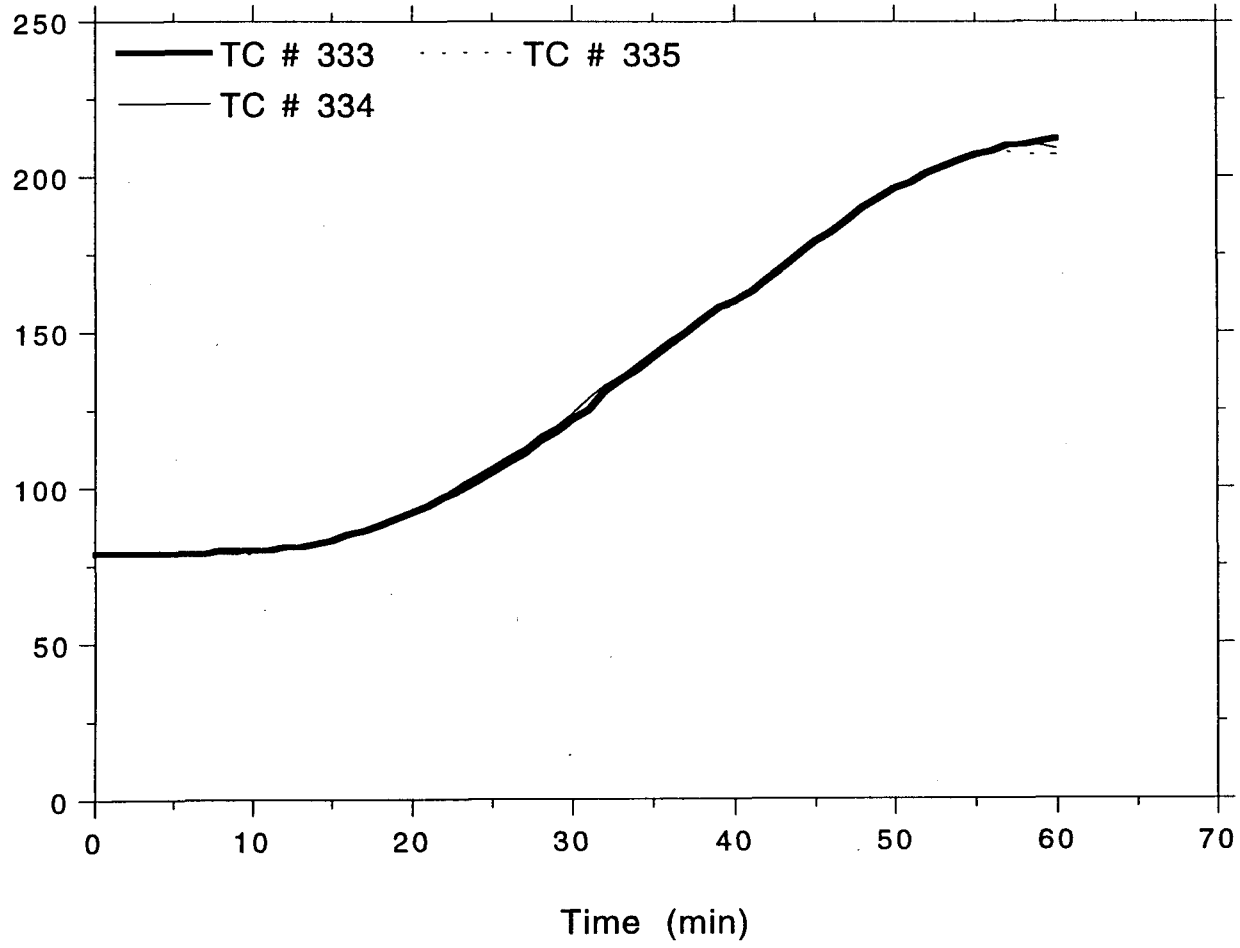
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



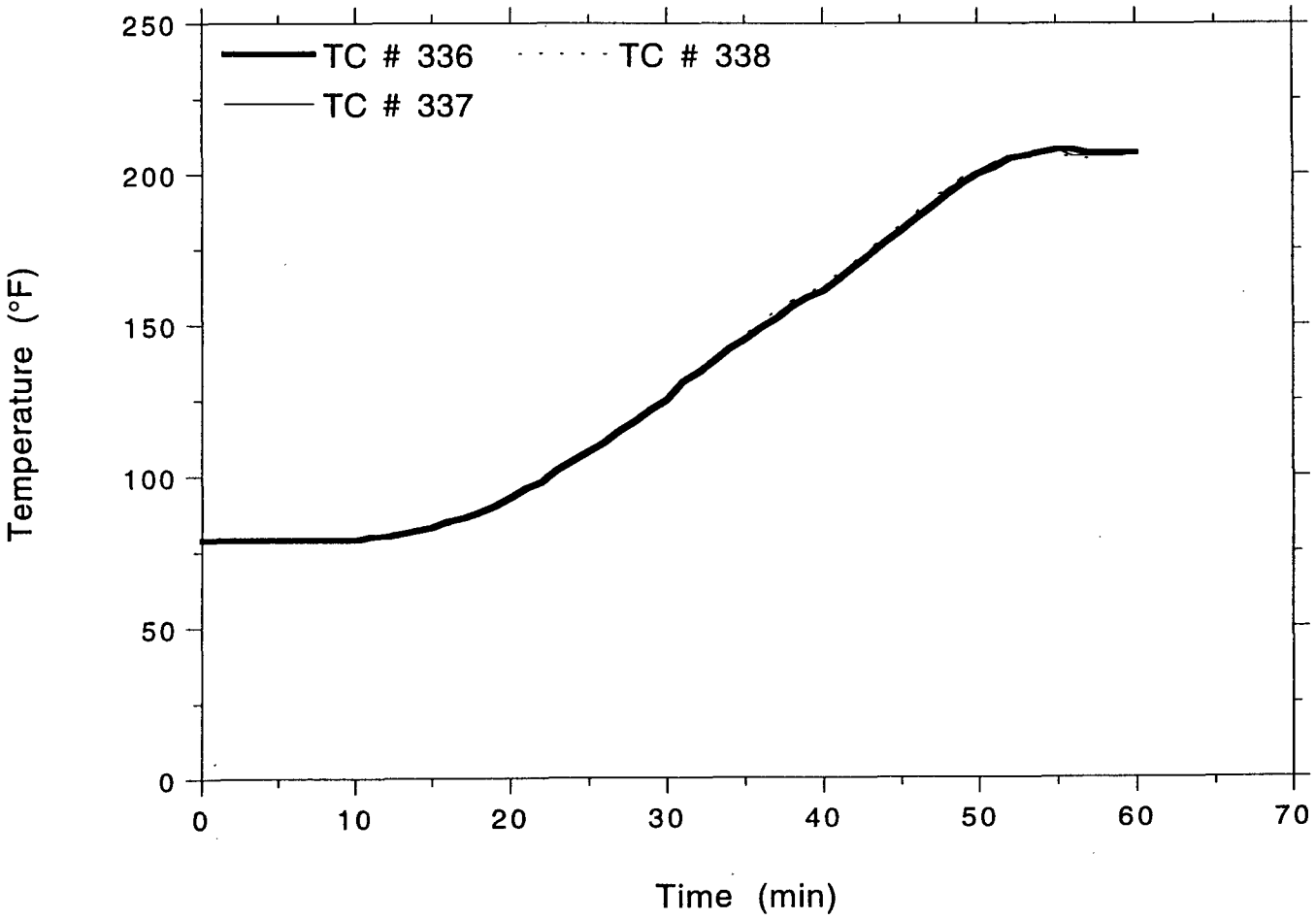
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



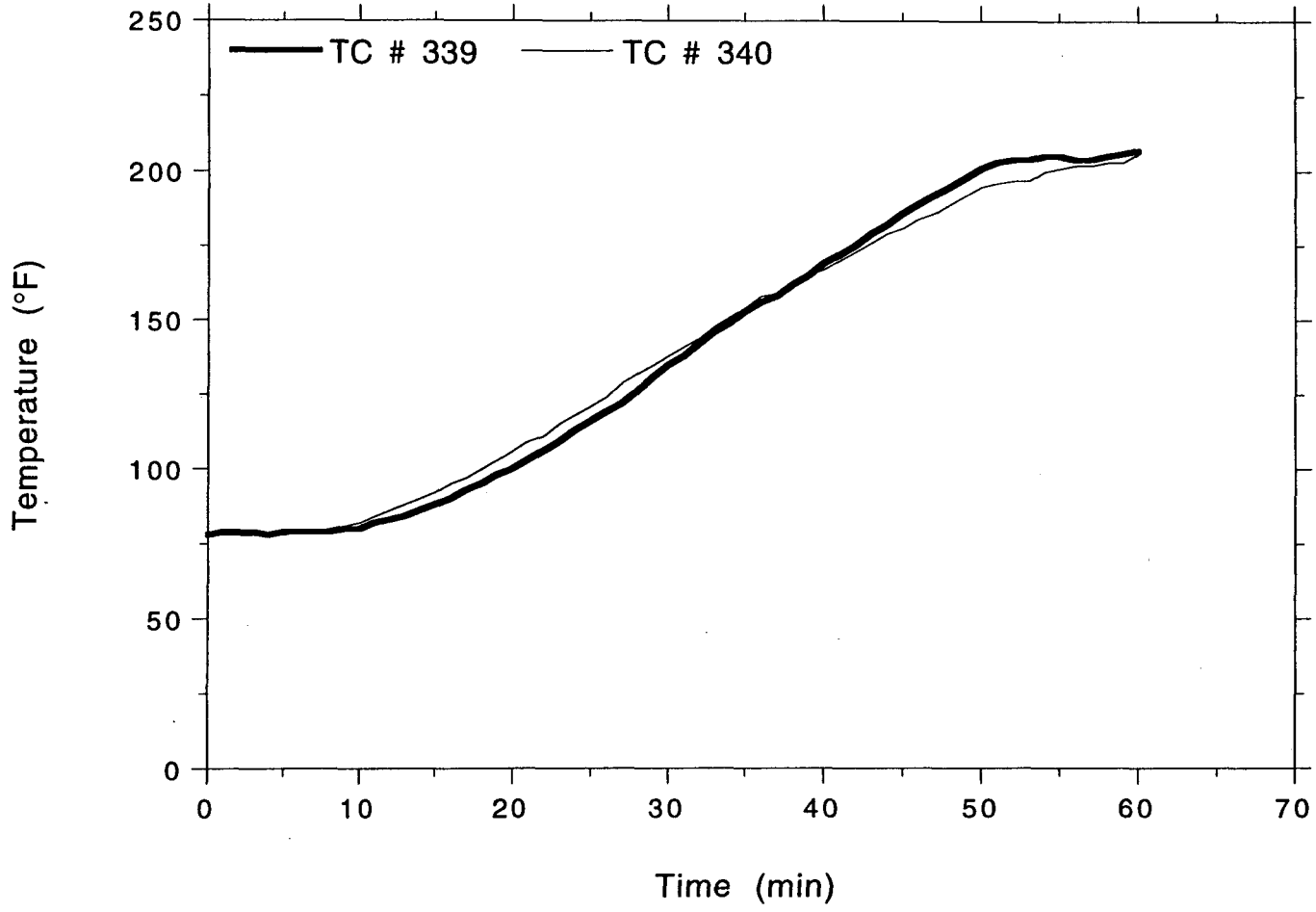
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



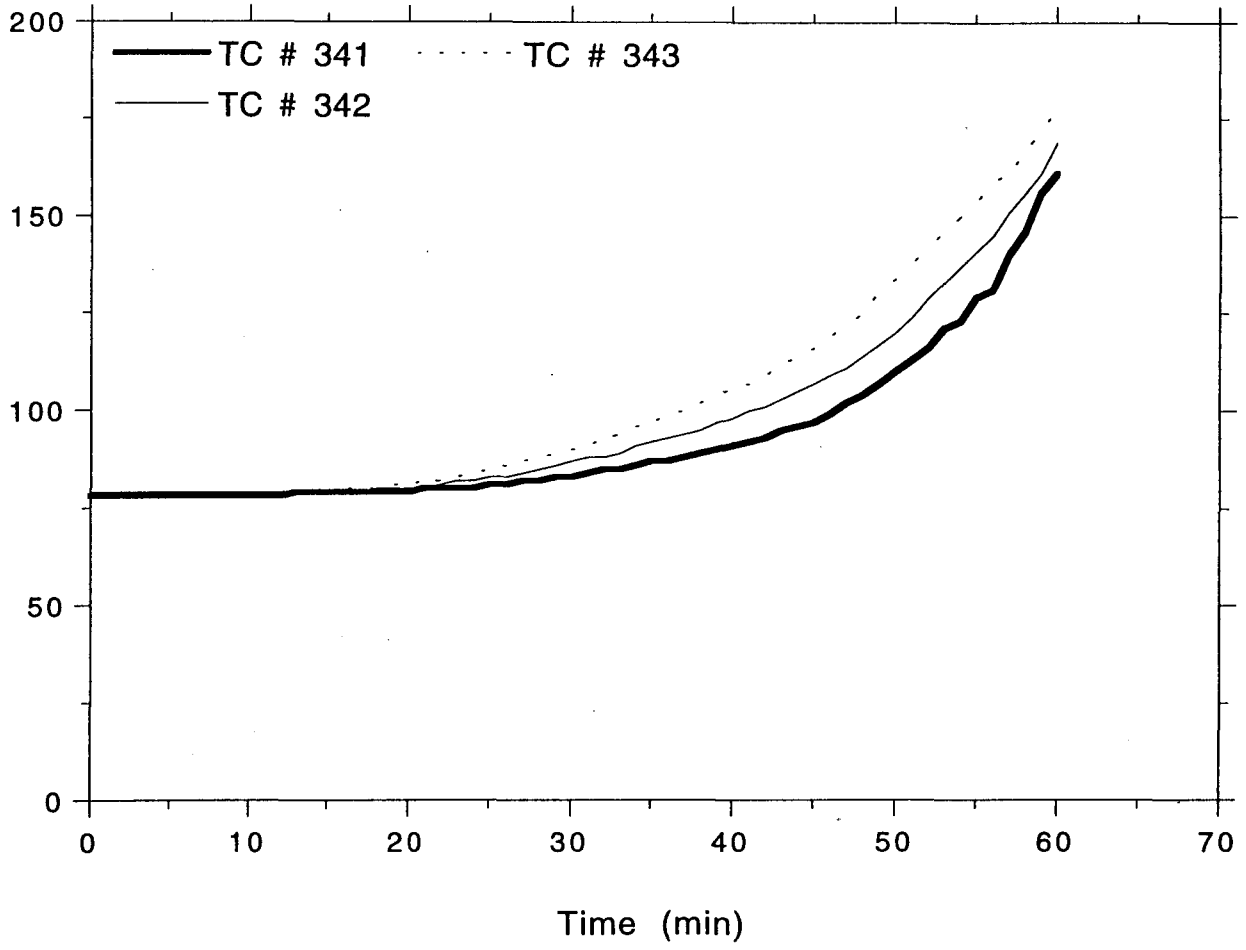
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Rear 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

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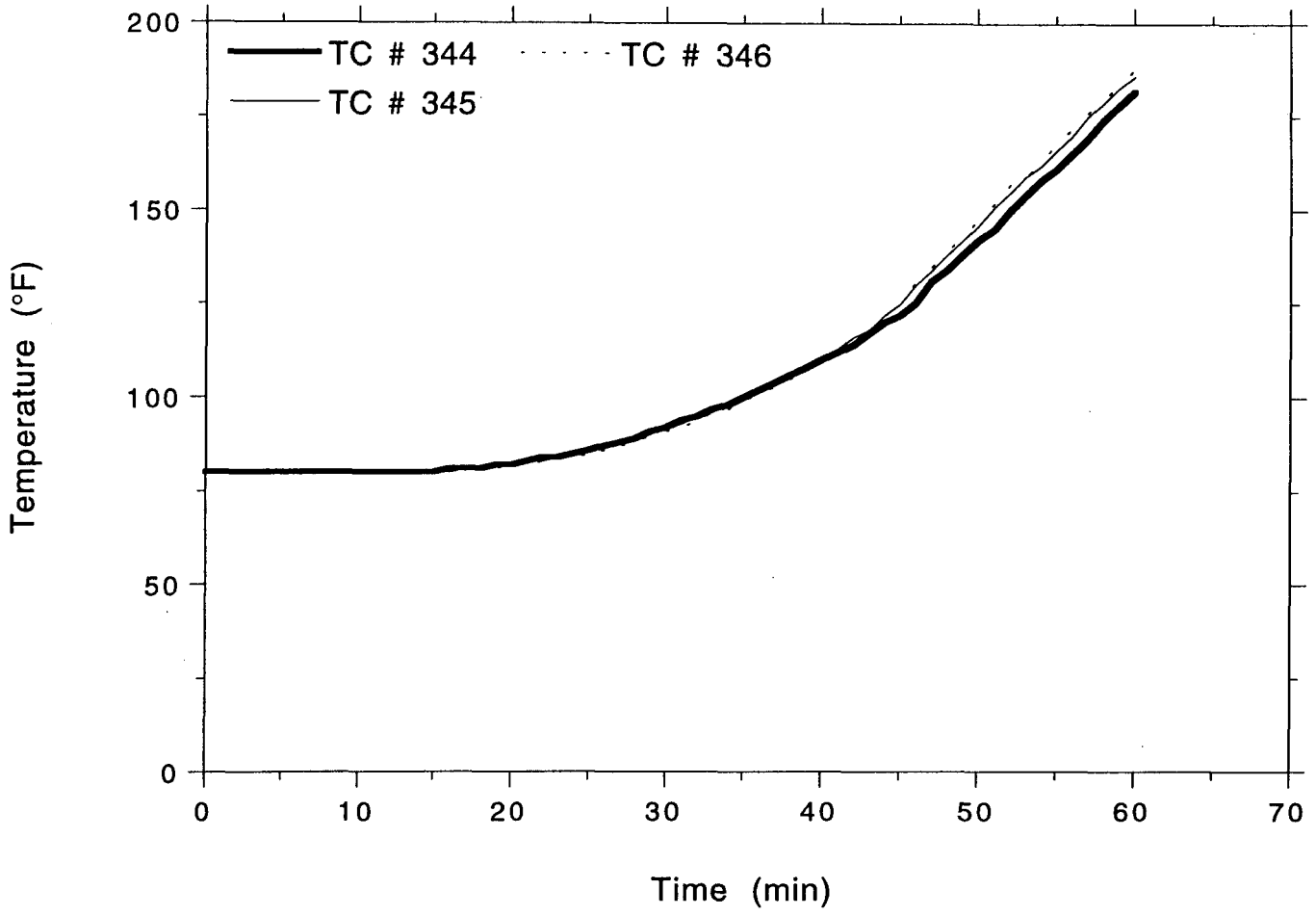

OMEGA POINT LABORATORIES

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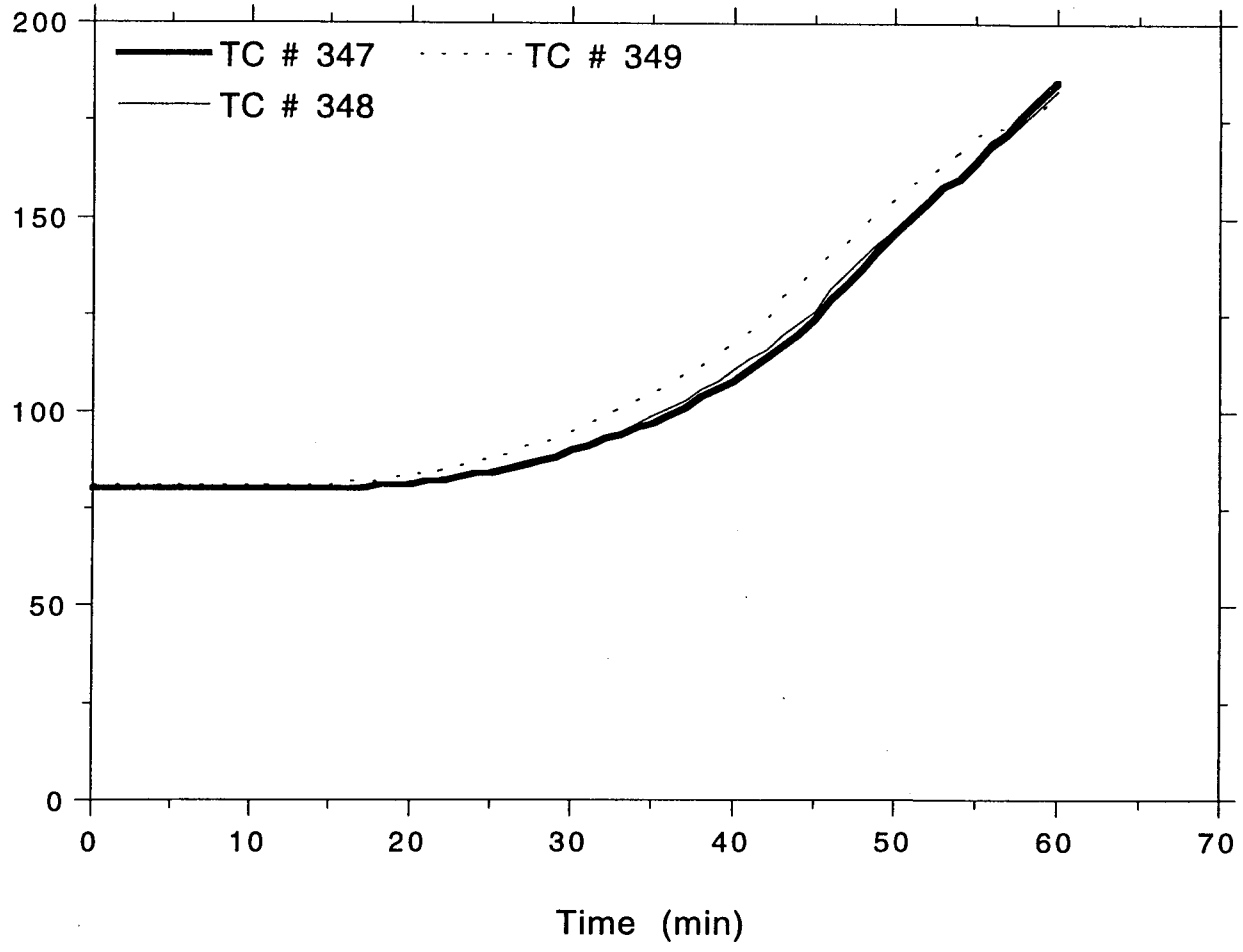

OMEGA POINT LABORATORIES

TSI/TVA
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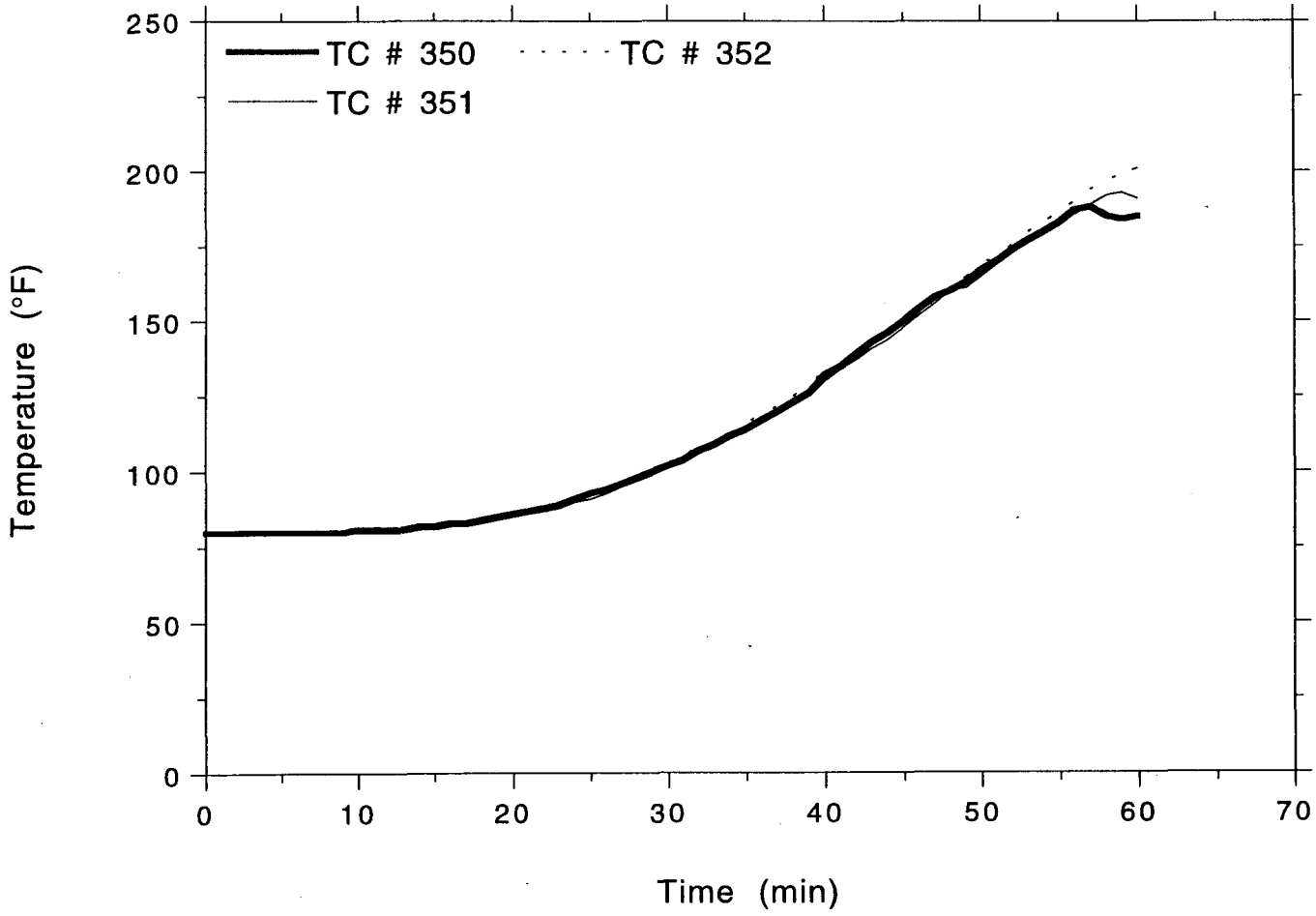

OMEGA POINT LABORATORIES

TSI/TVA
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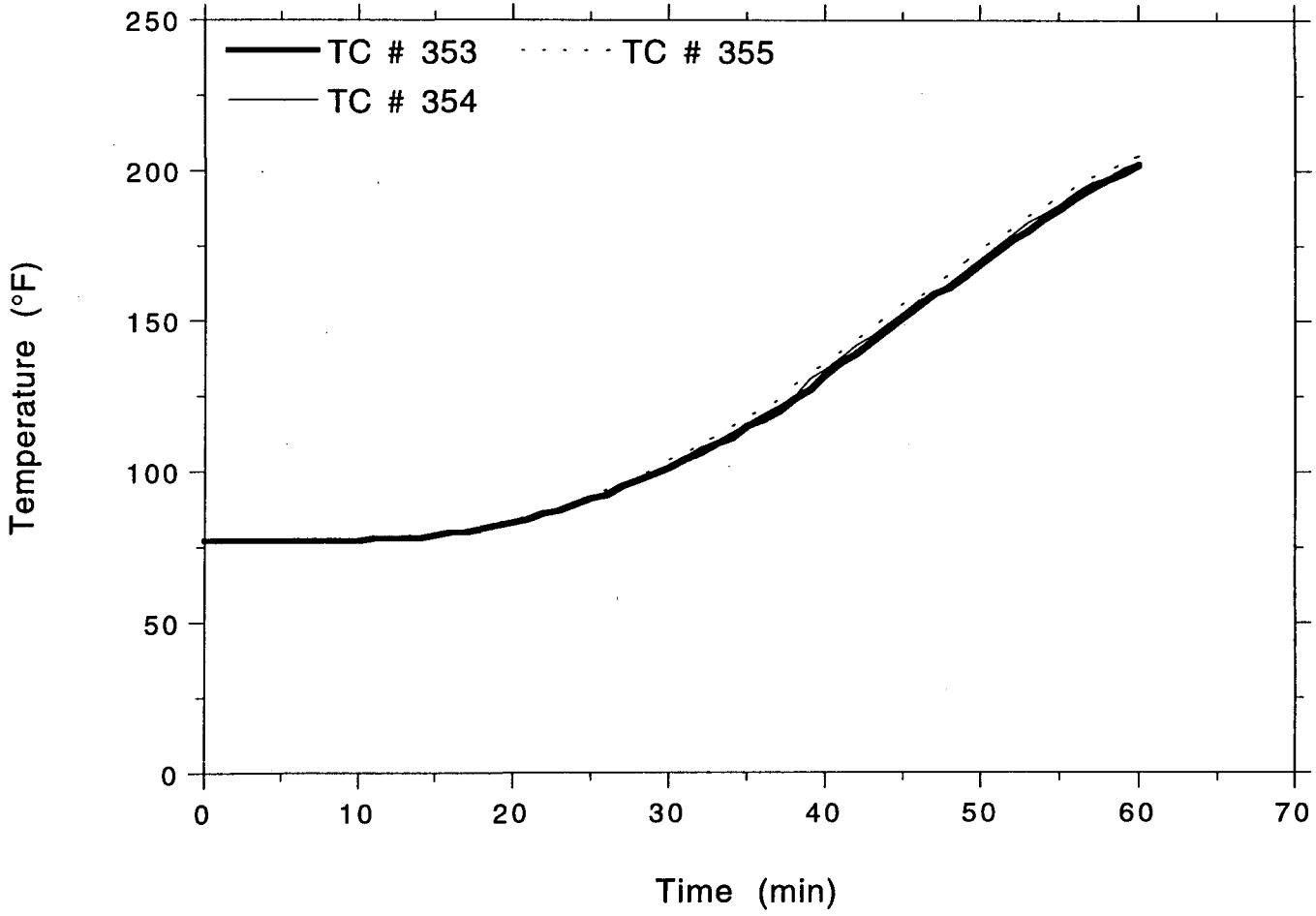

OMEGA POINT LABORATORIES

TSI/TVA
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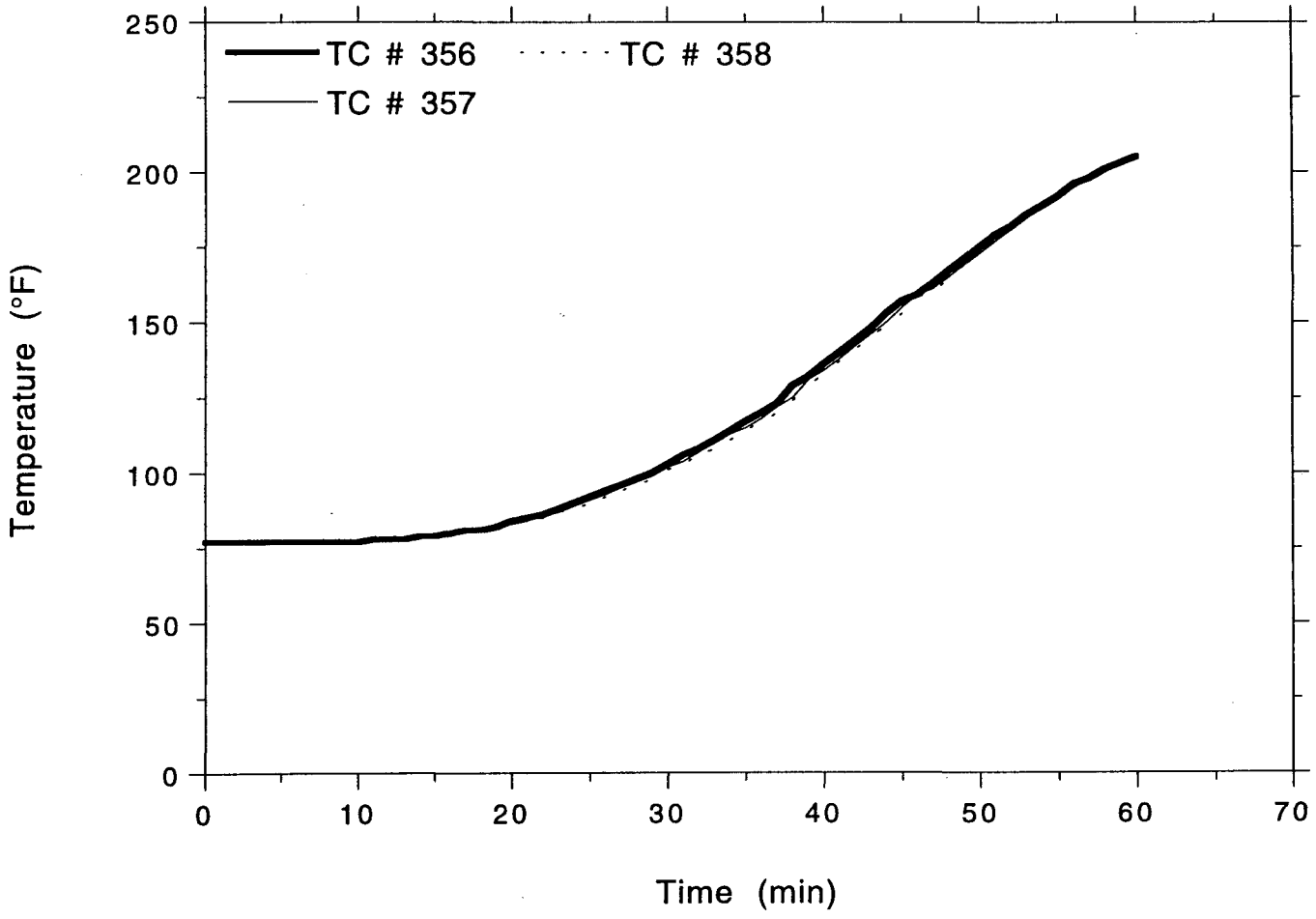

OMEGA POINT LABORATORIES

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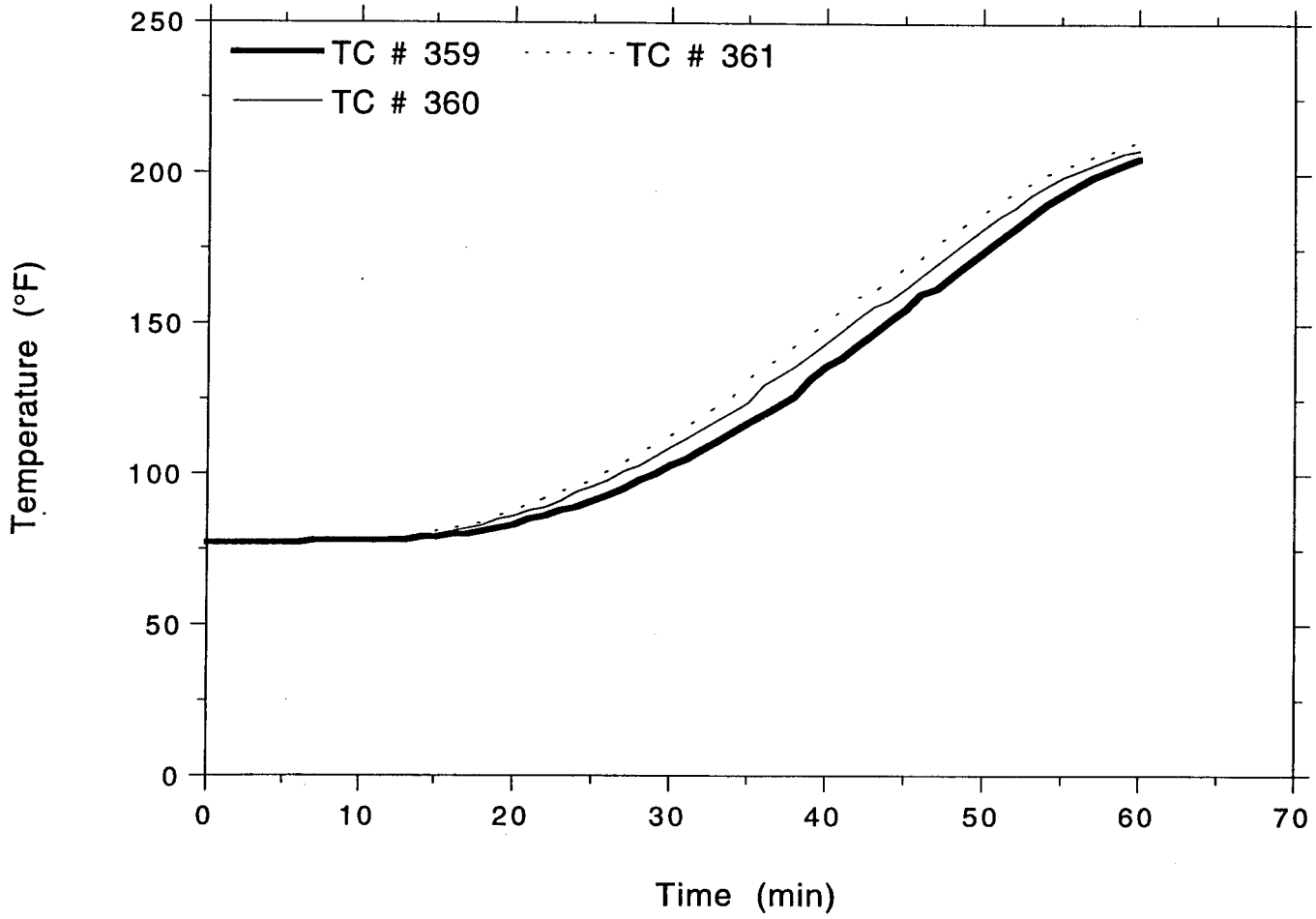

OMEGA POINT LABORATORIES

TSI/TVA
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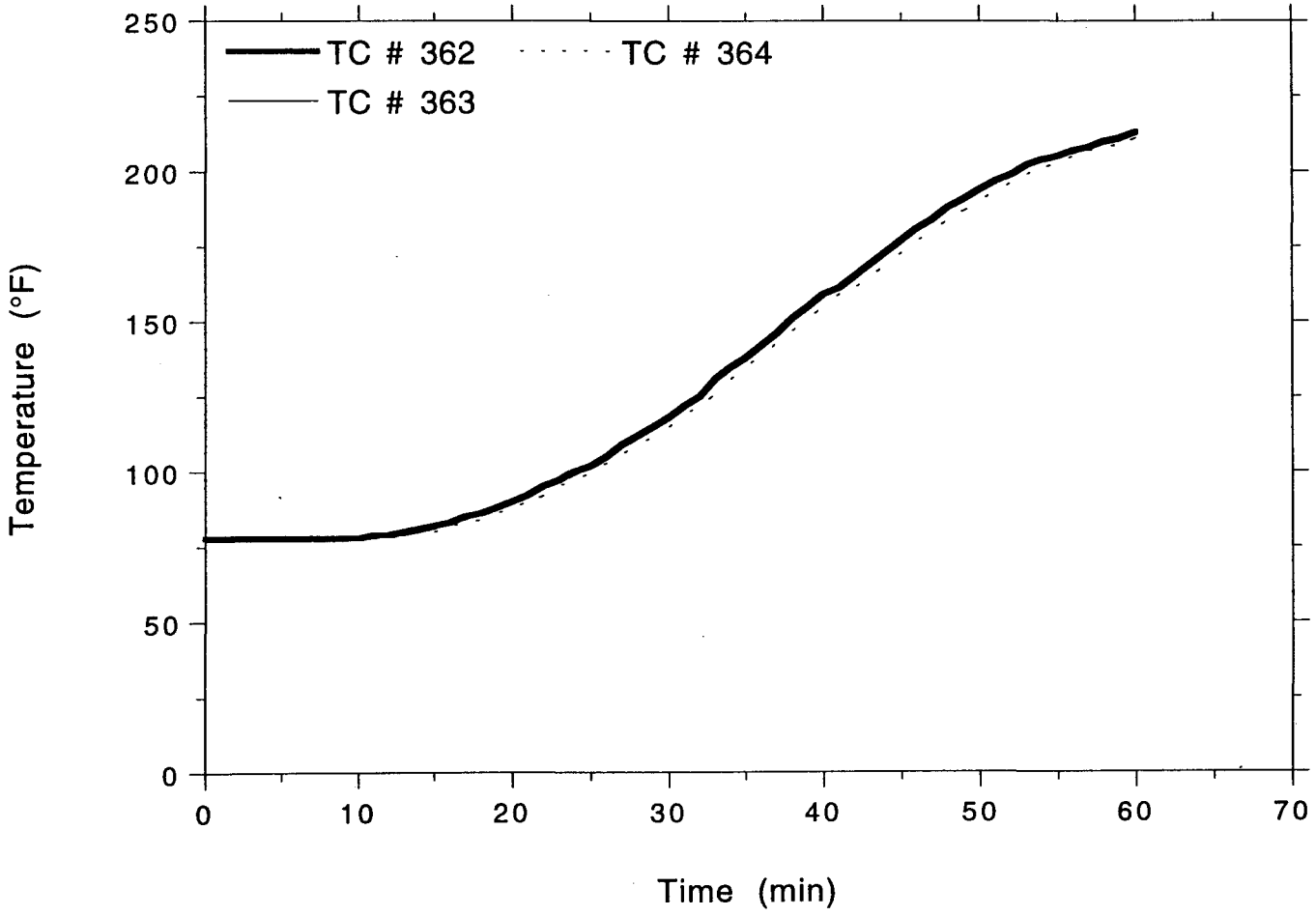

OMEGA POINT LABORATORIES

TSI/TVA
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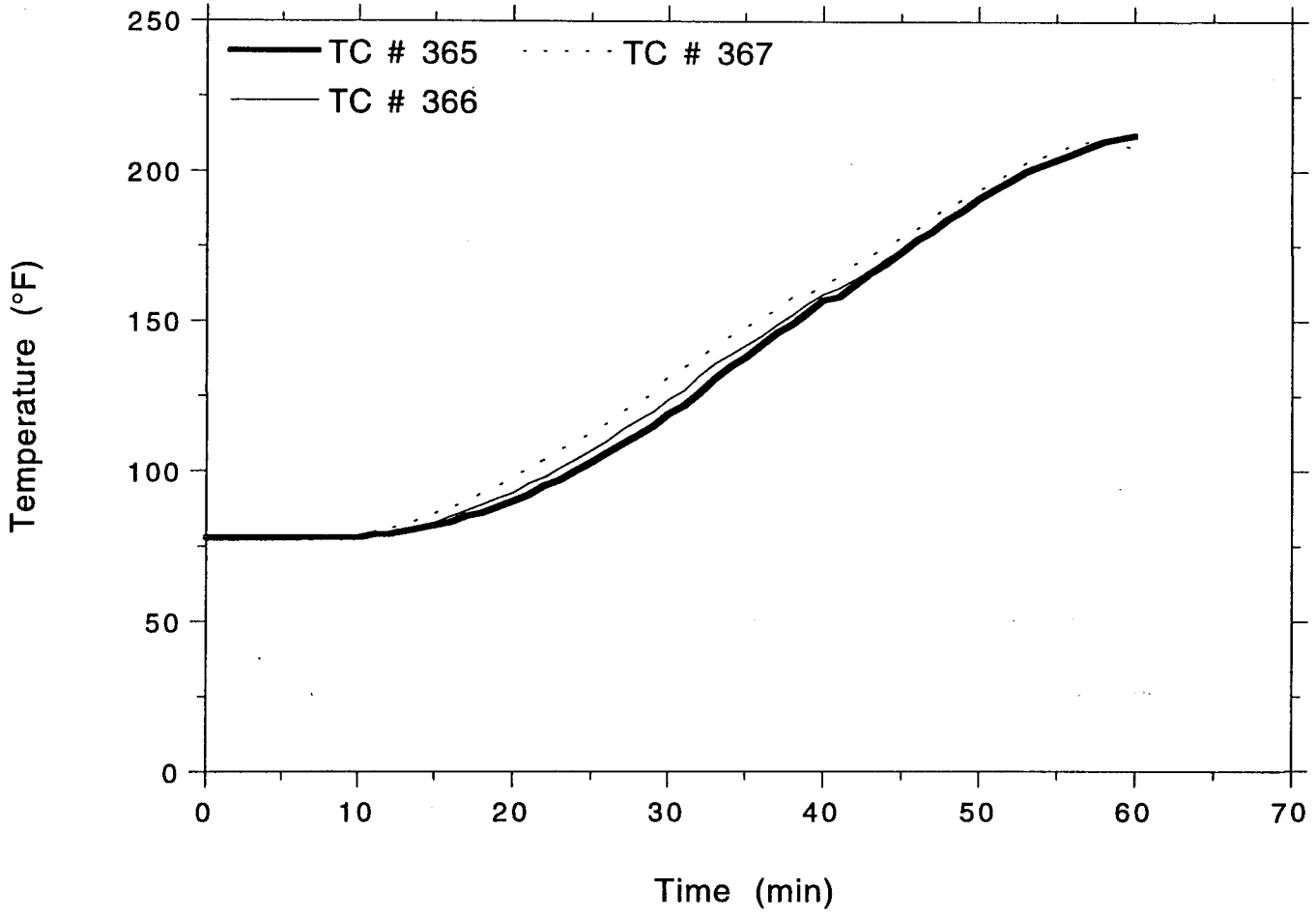

OMEGA POINT LABORATORIES

TSI/TVA
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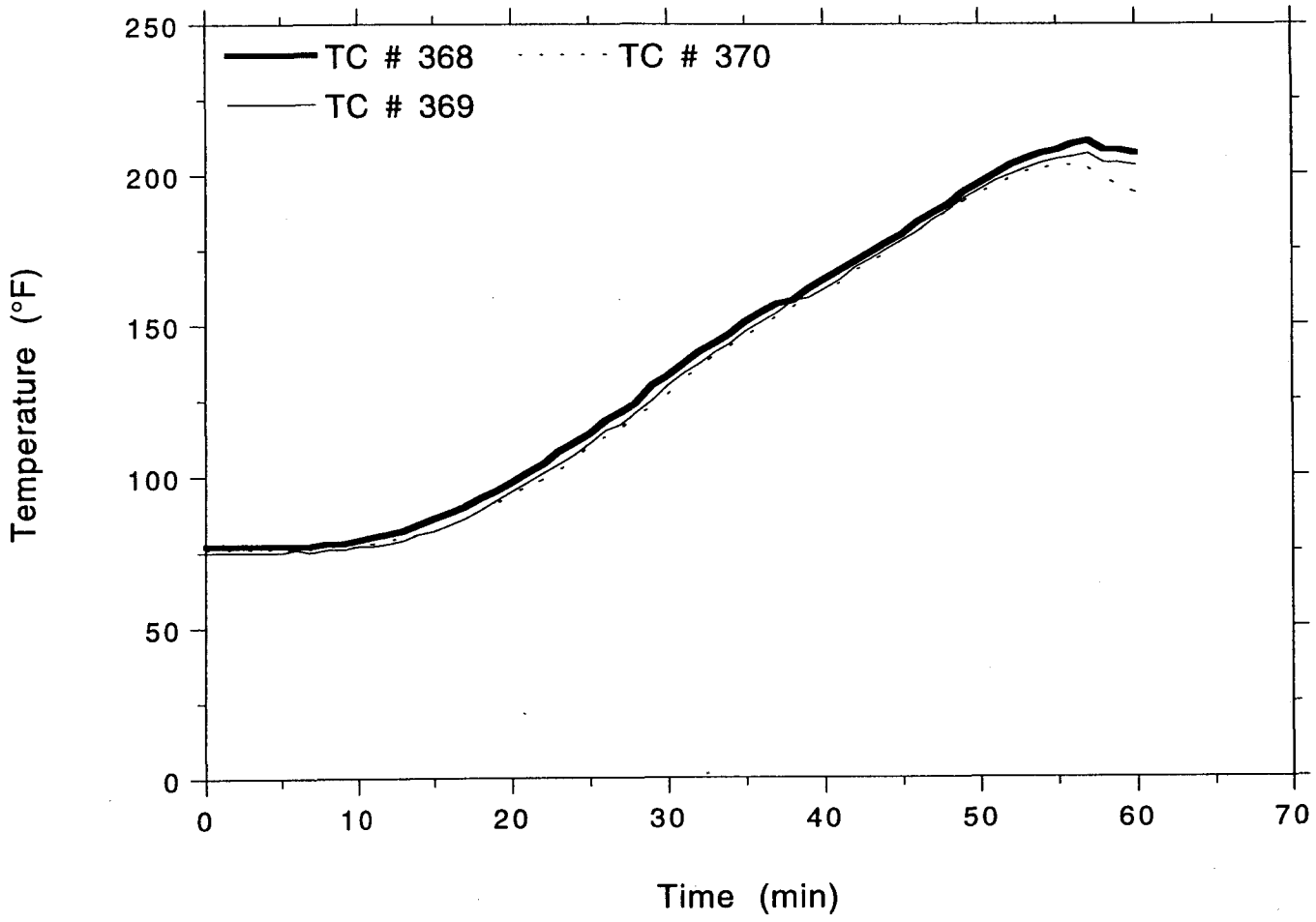
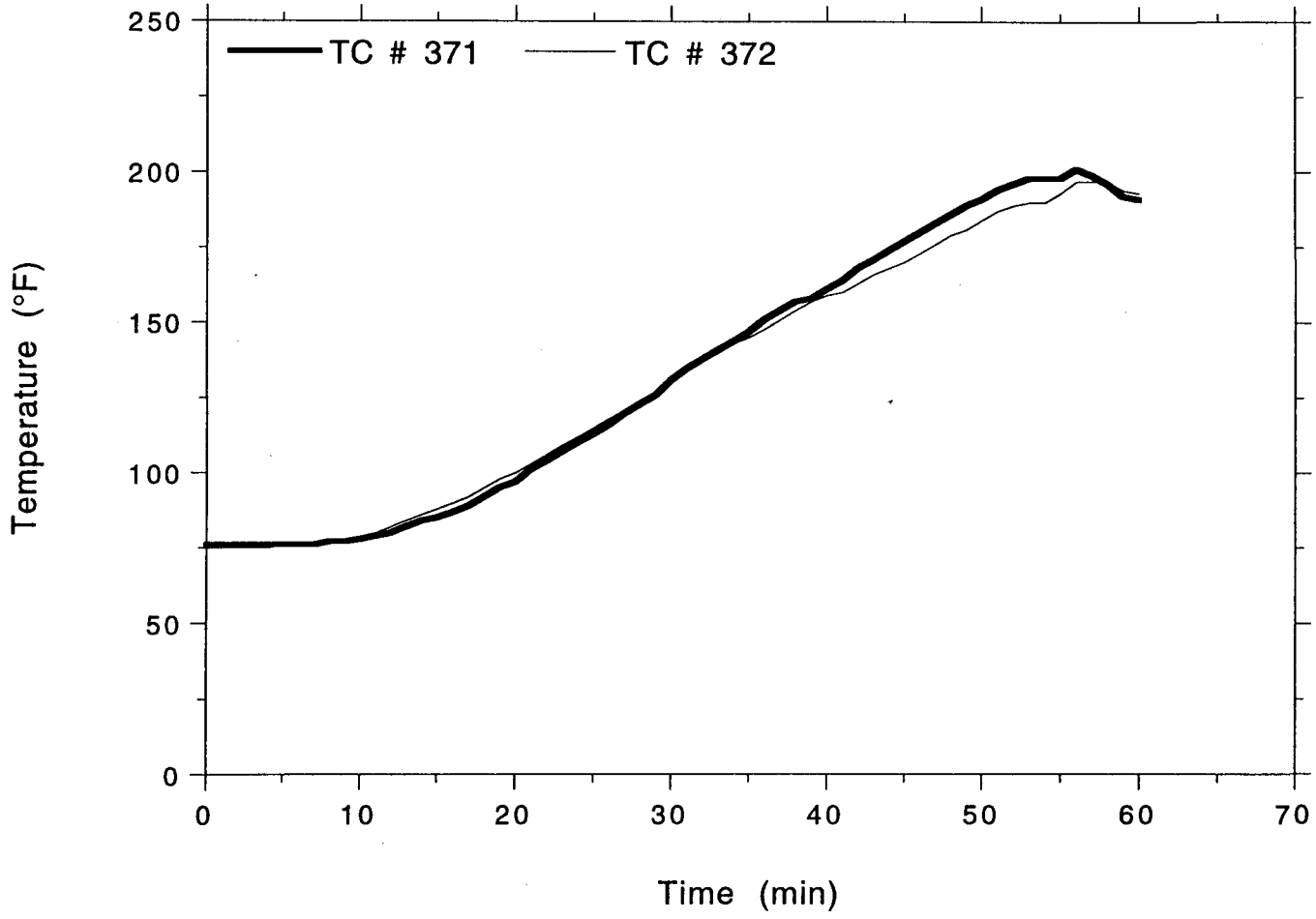


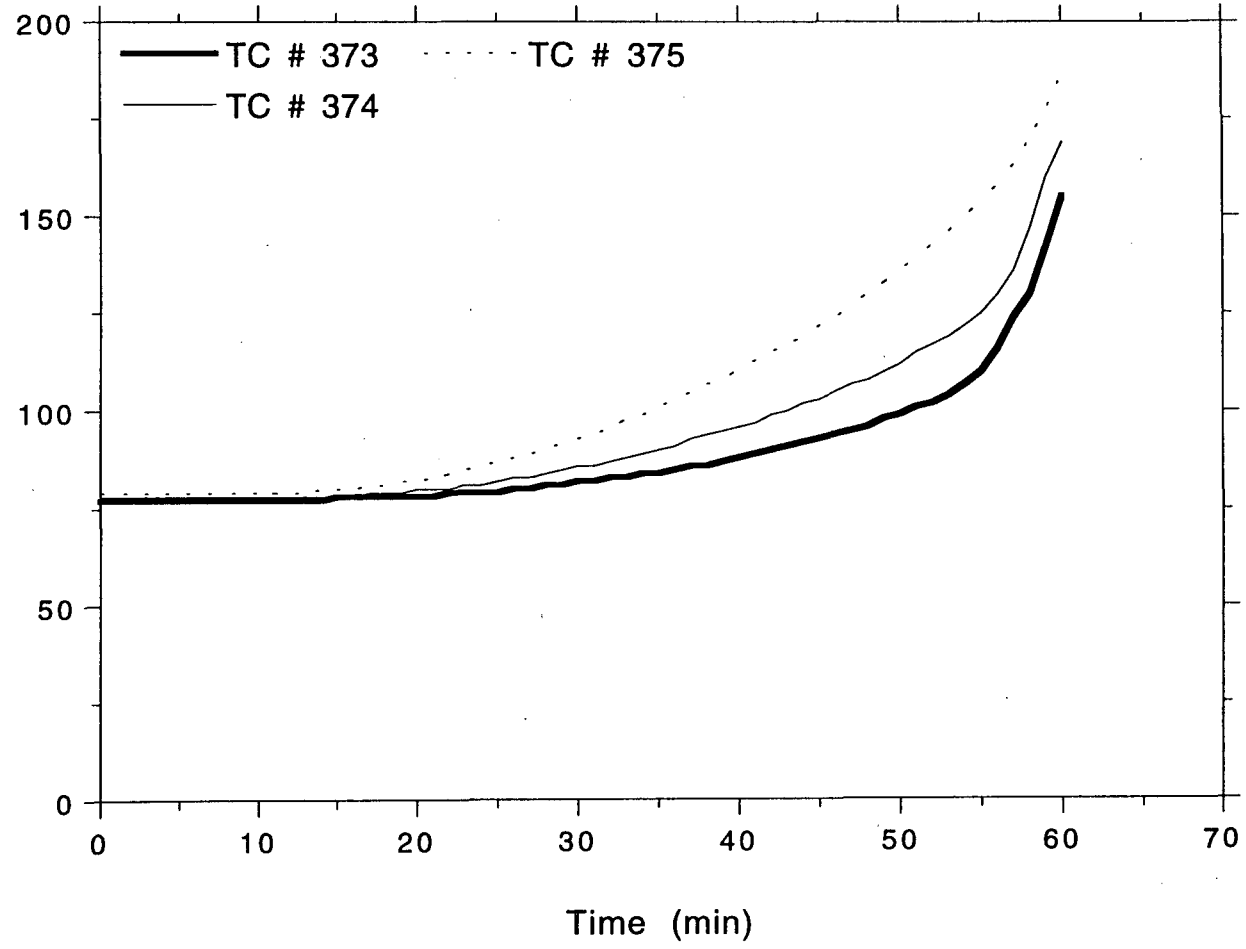
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
6th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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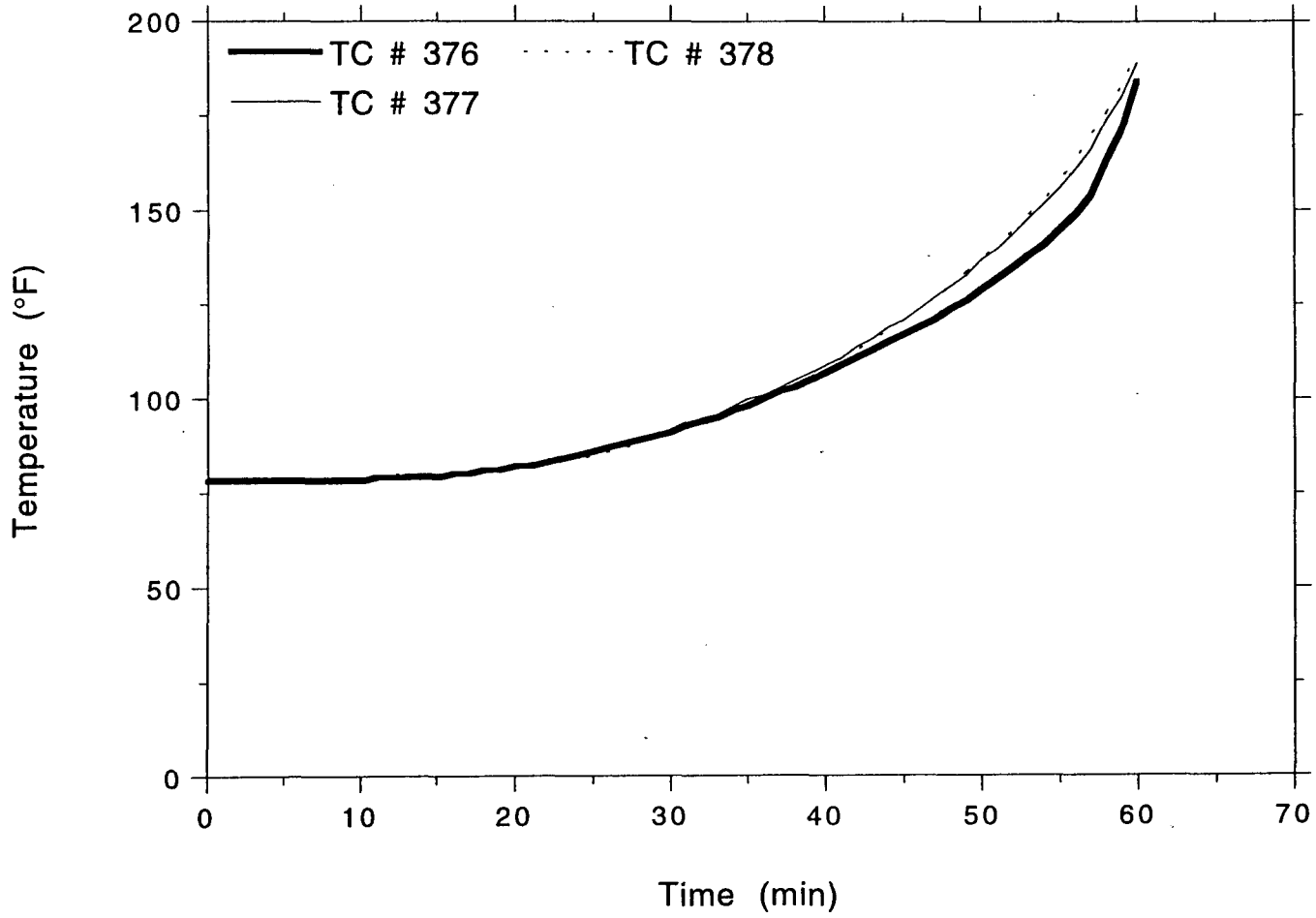

OMEGA POINT LABORATORIES

TSI/TVA
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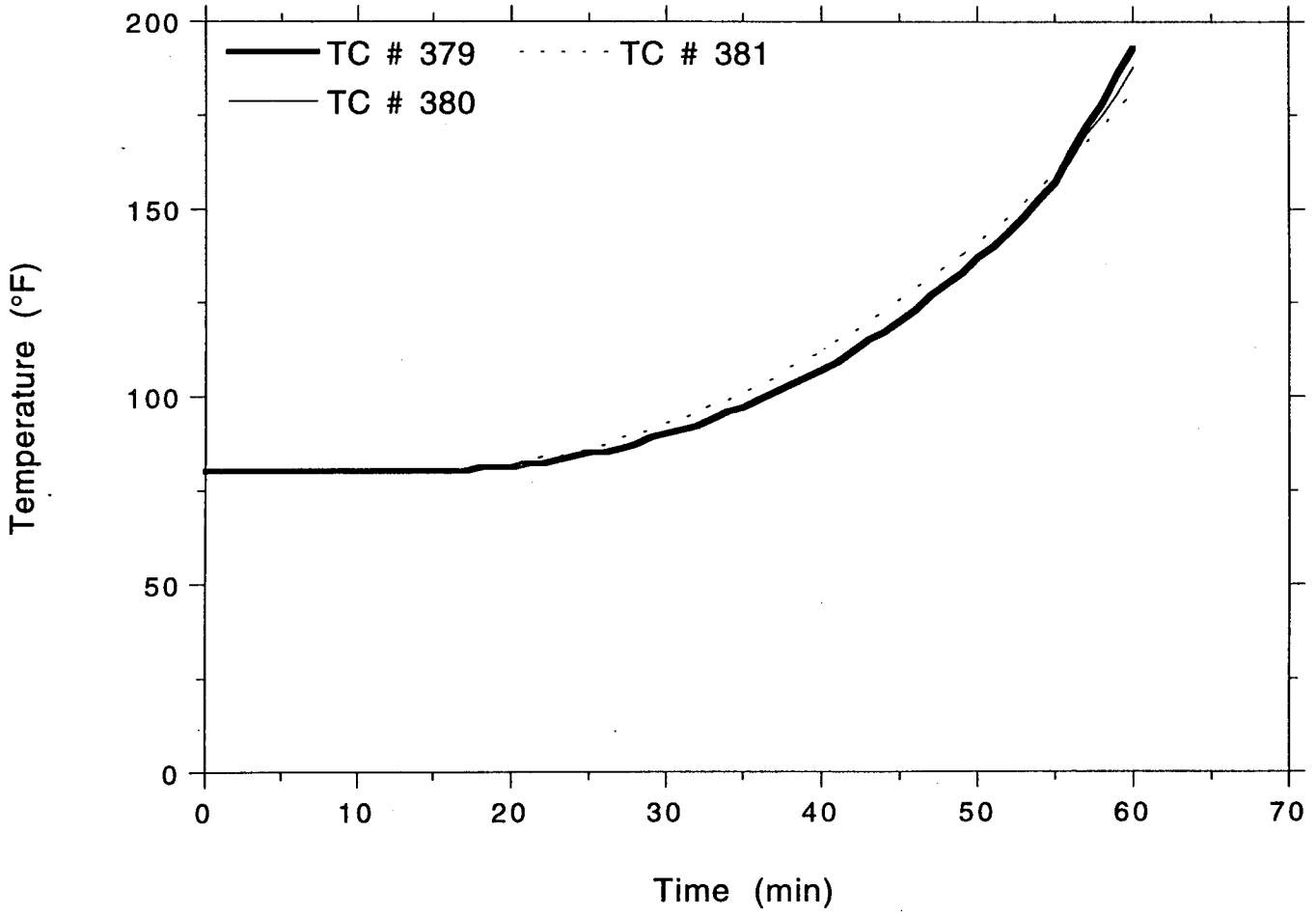
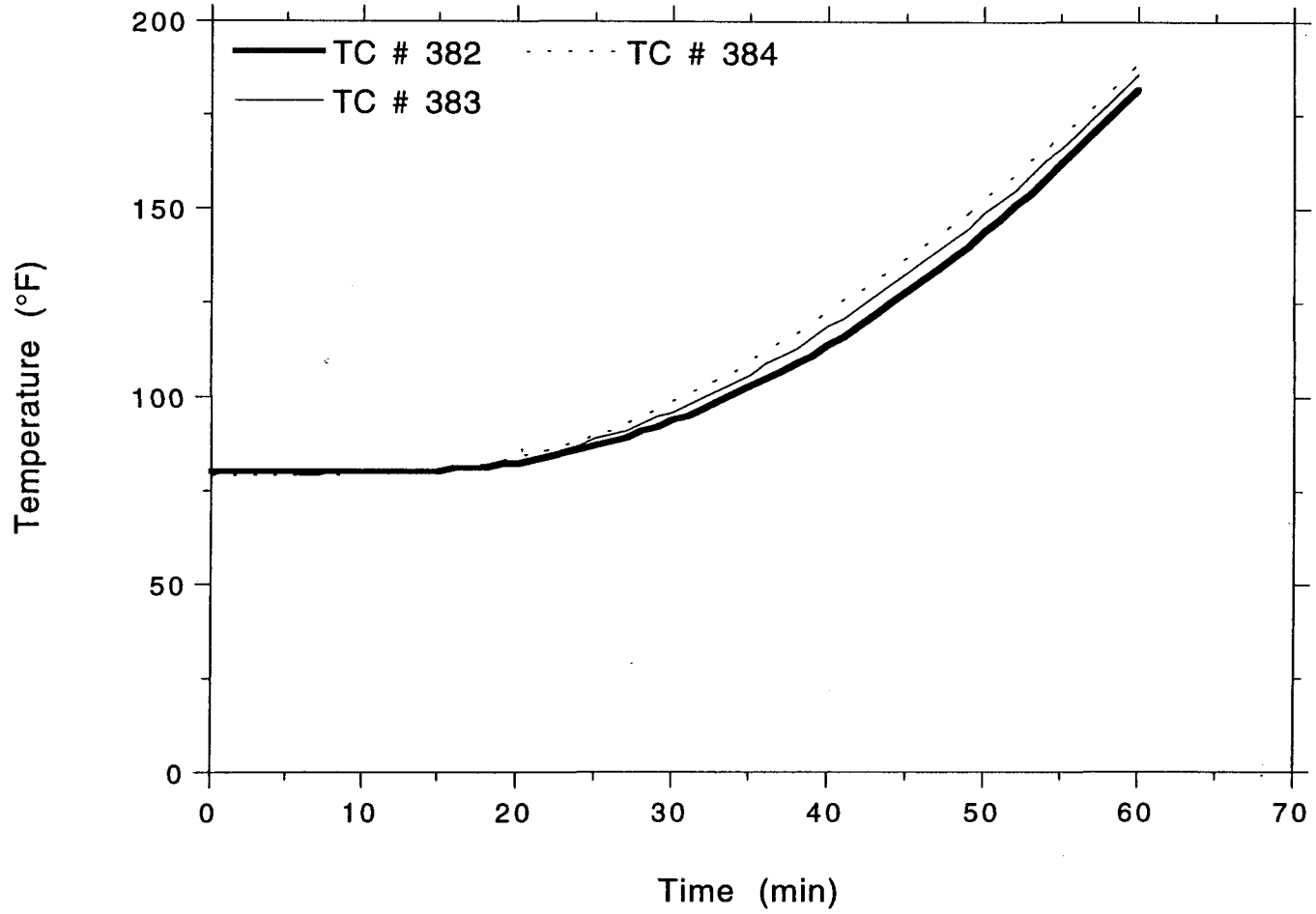
5th 4" Steel Conduit



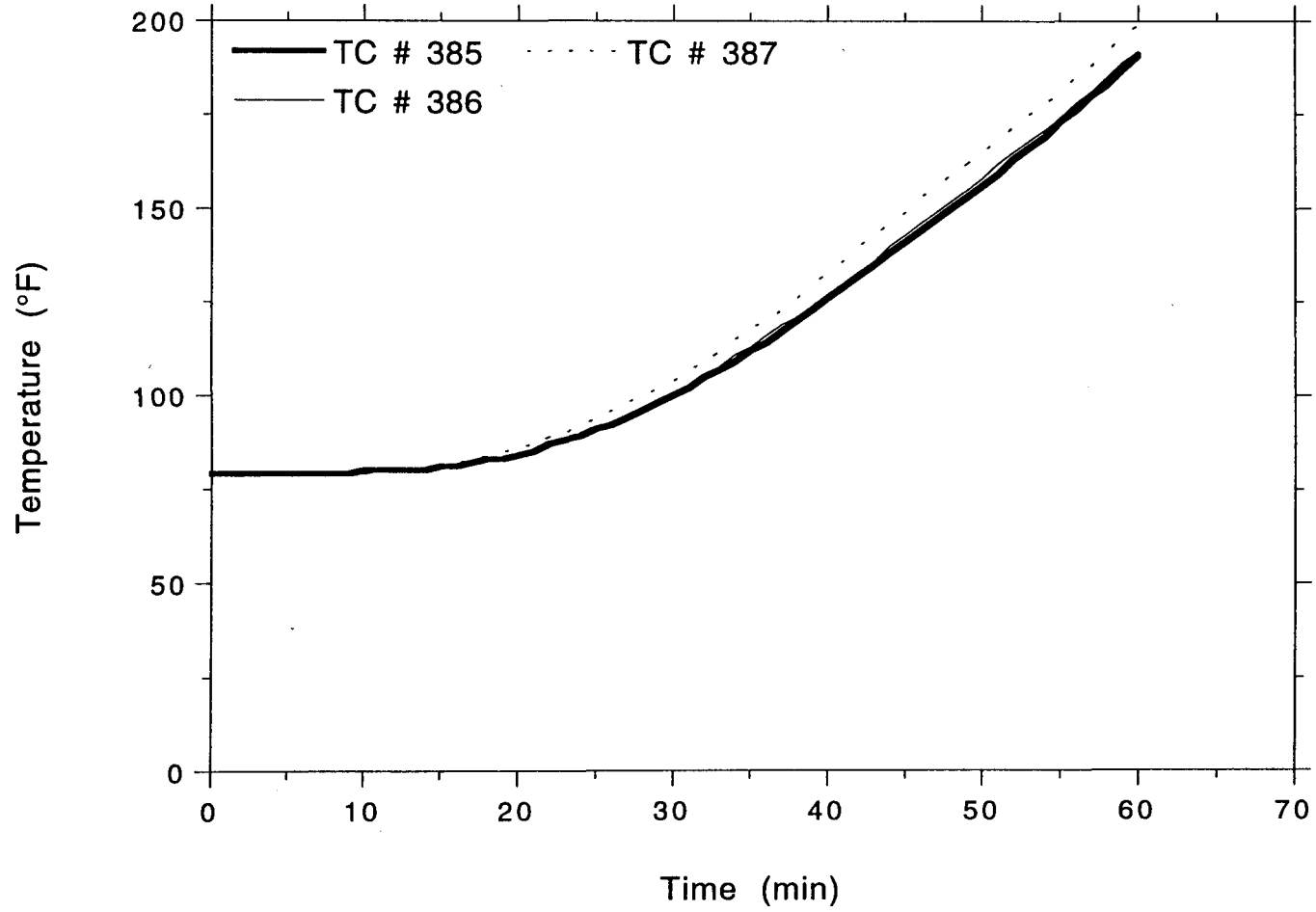
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



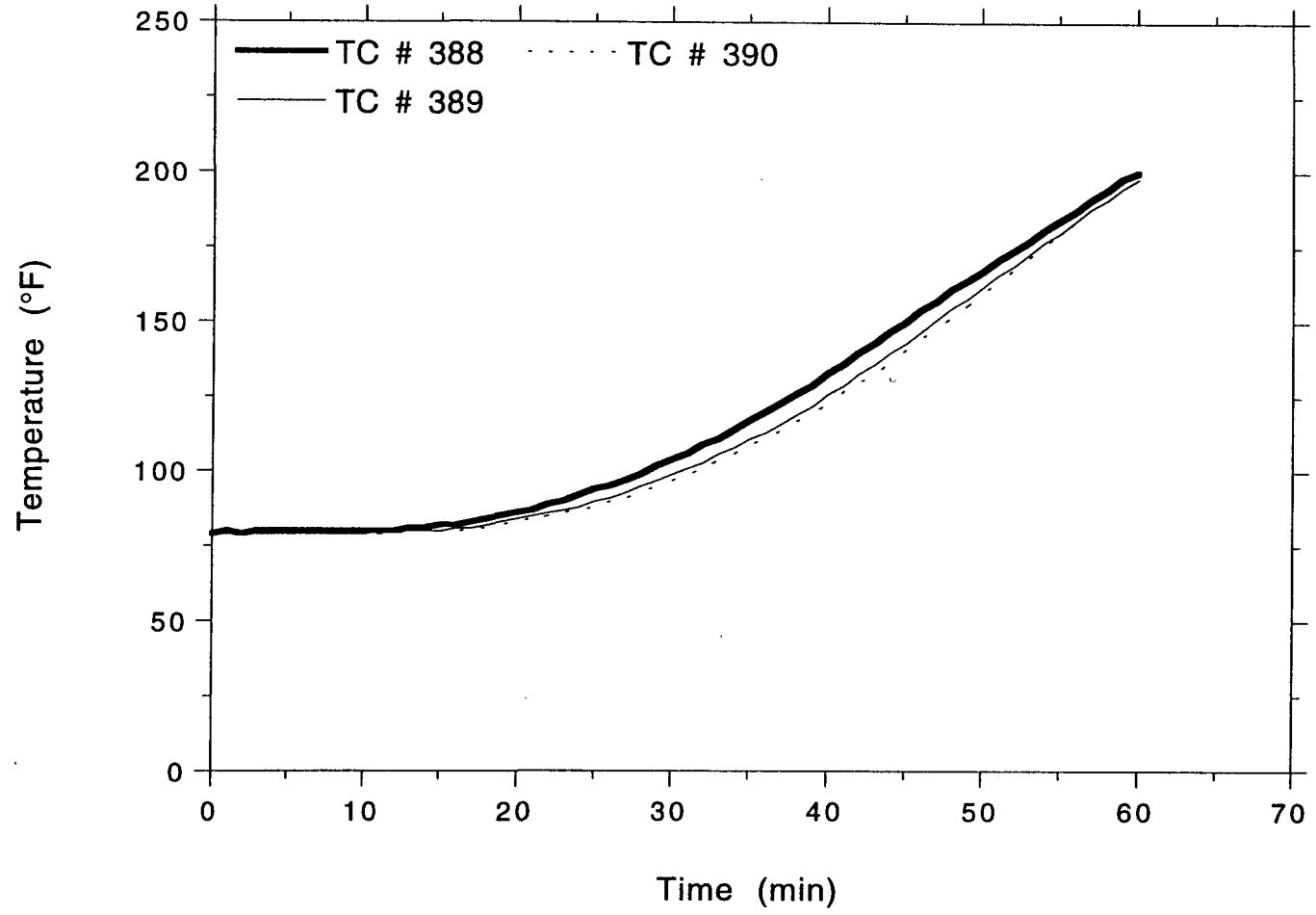
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



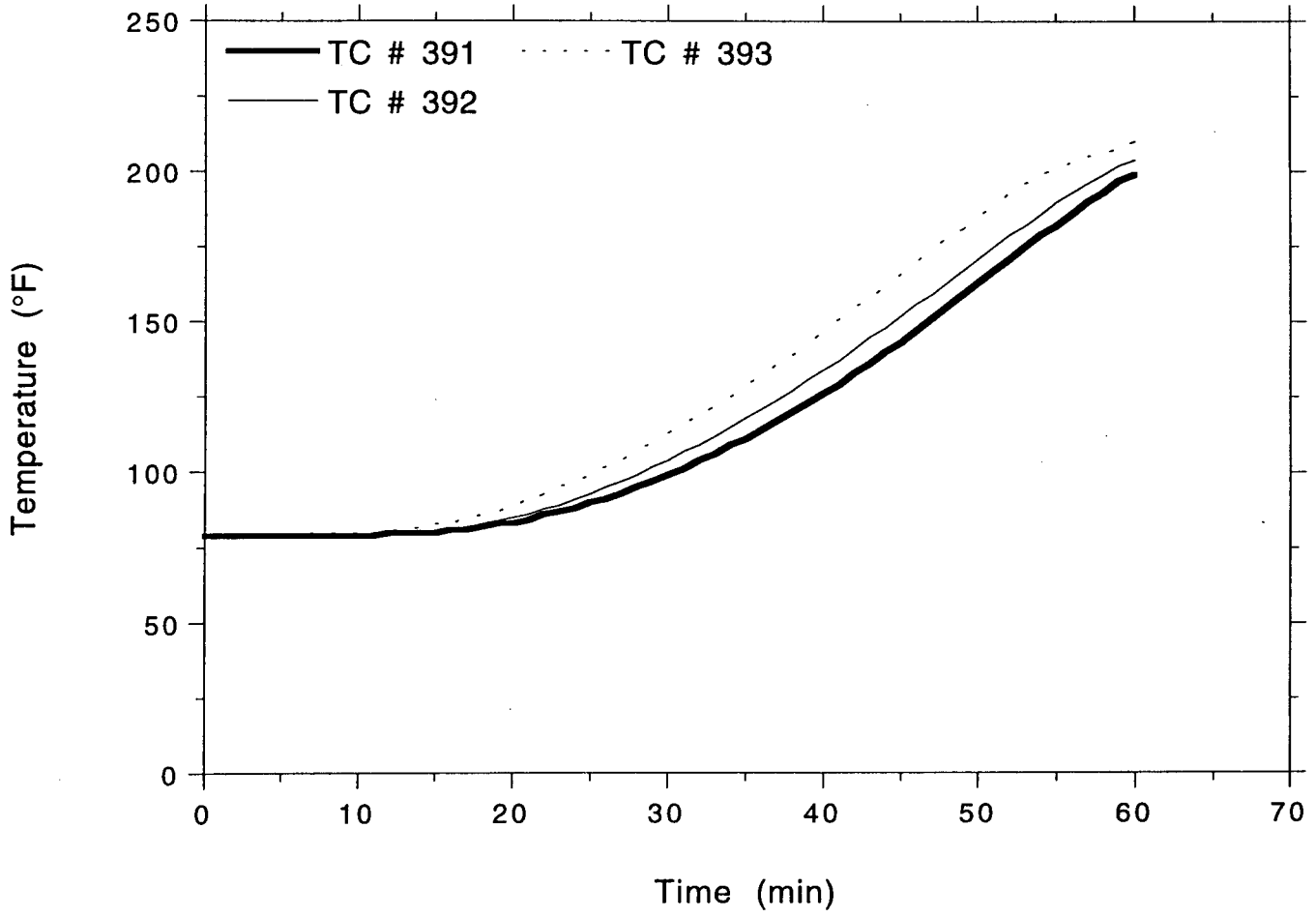
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



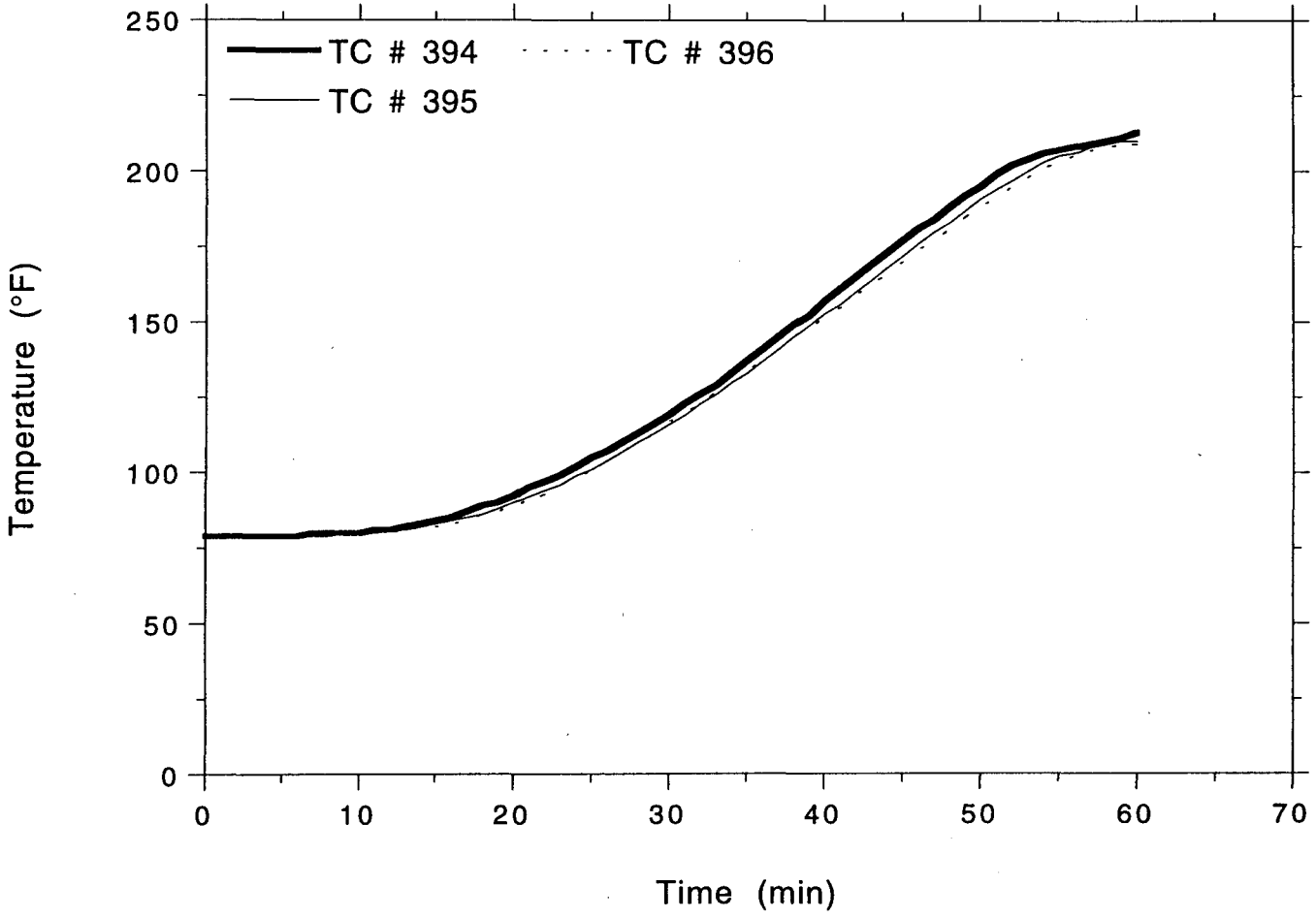
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



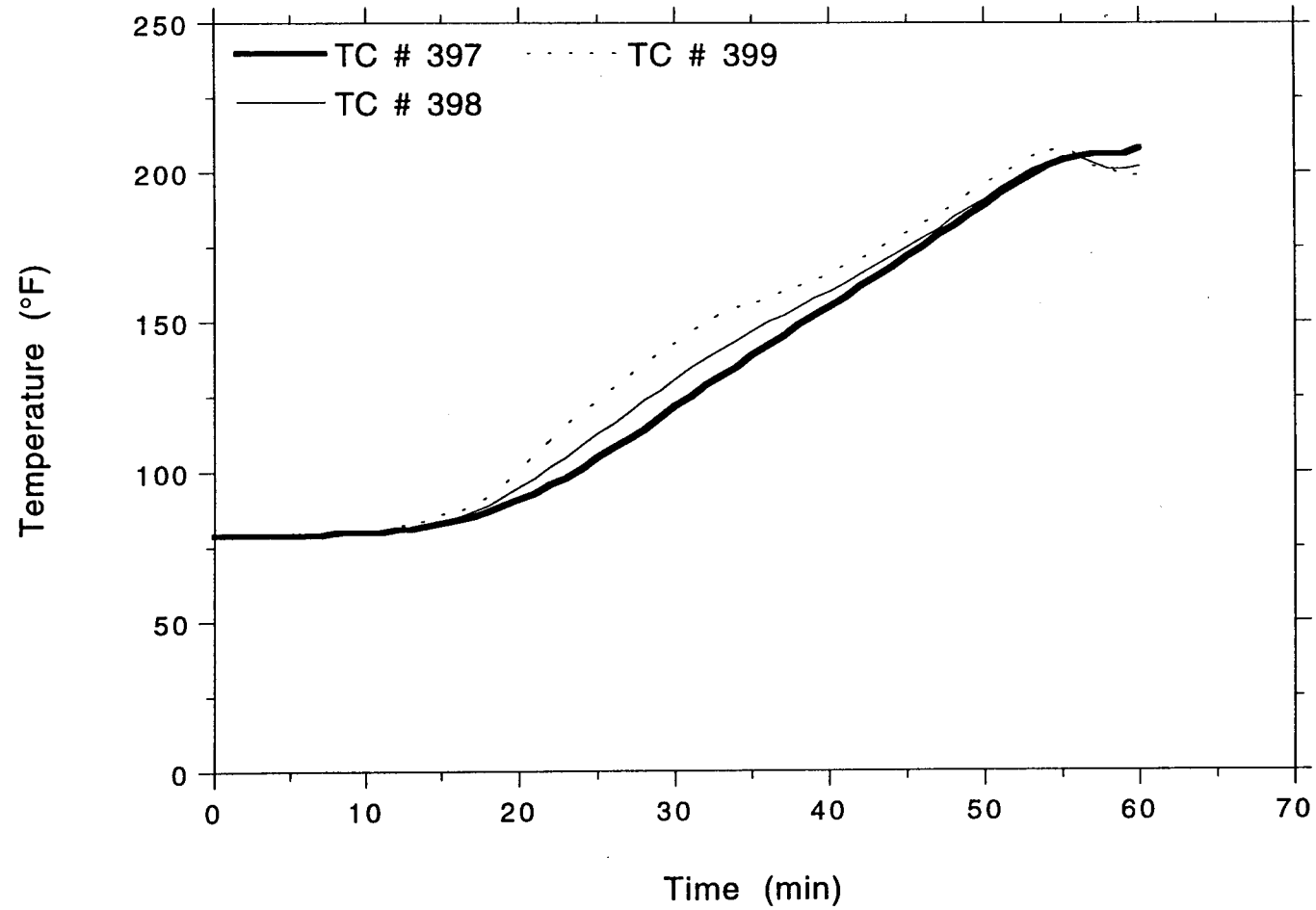
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



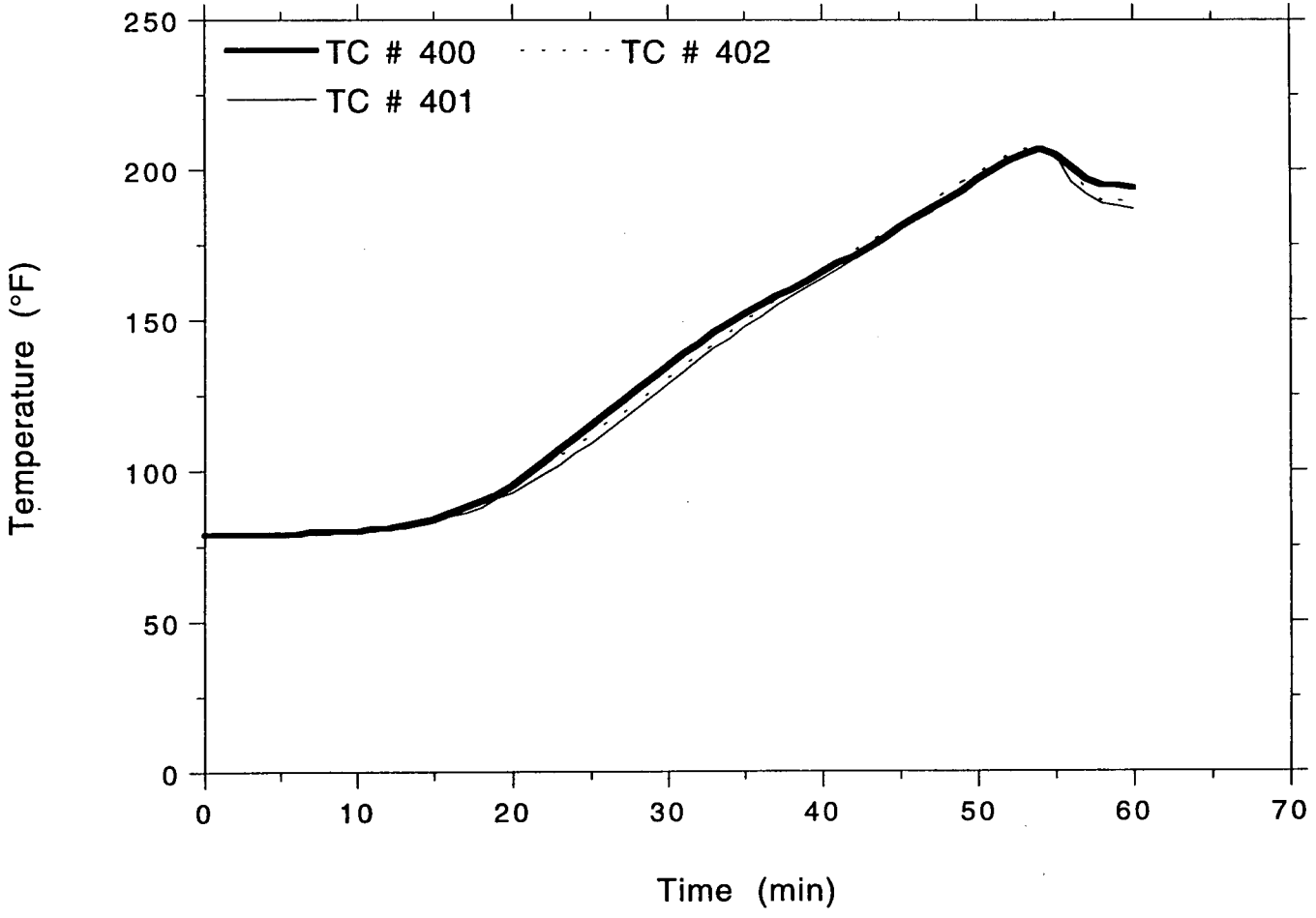
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



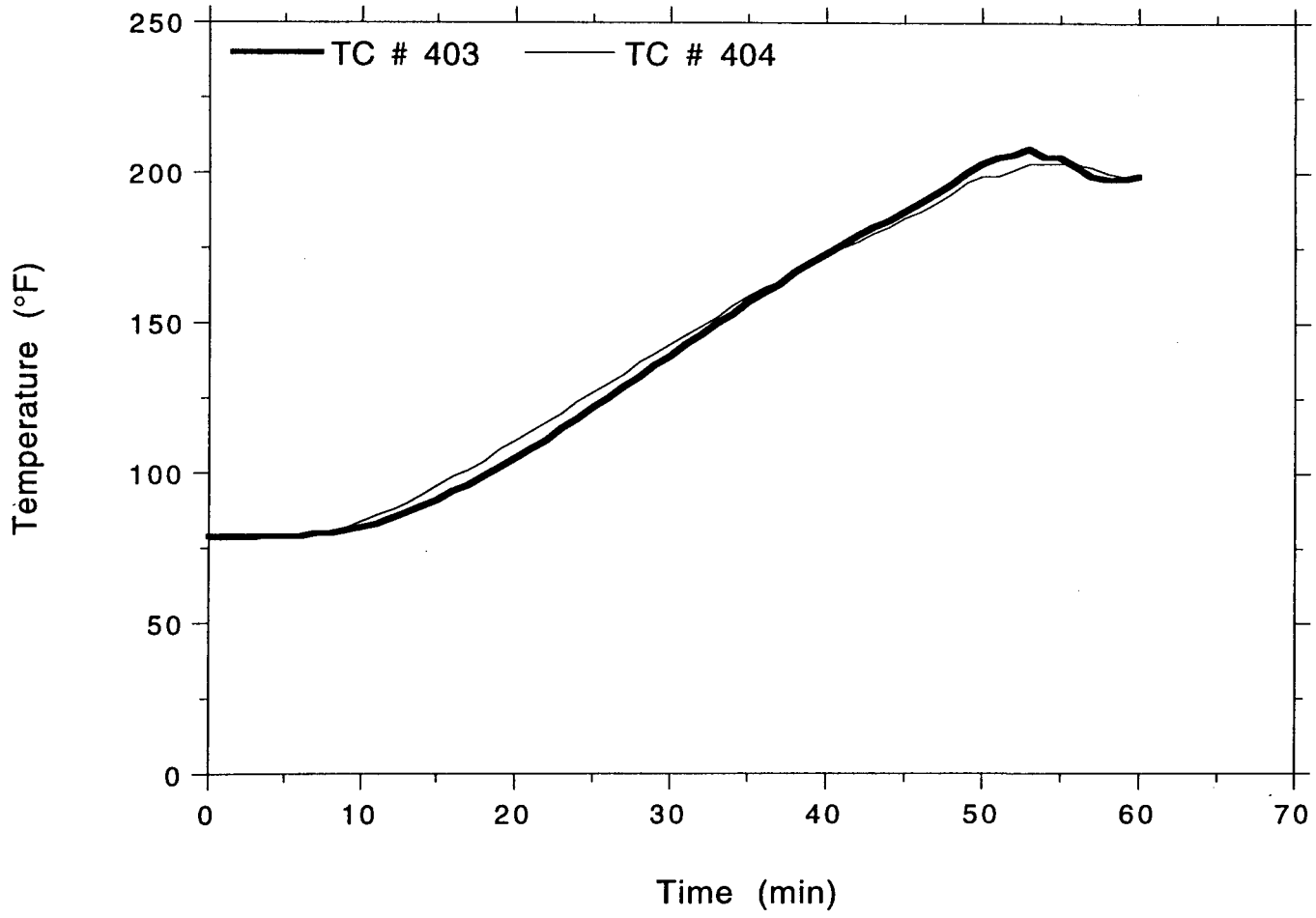
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



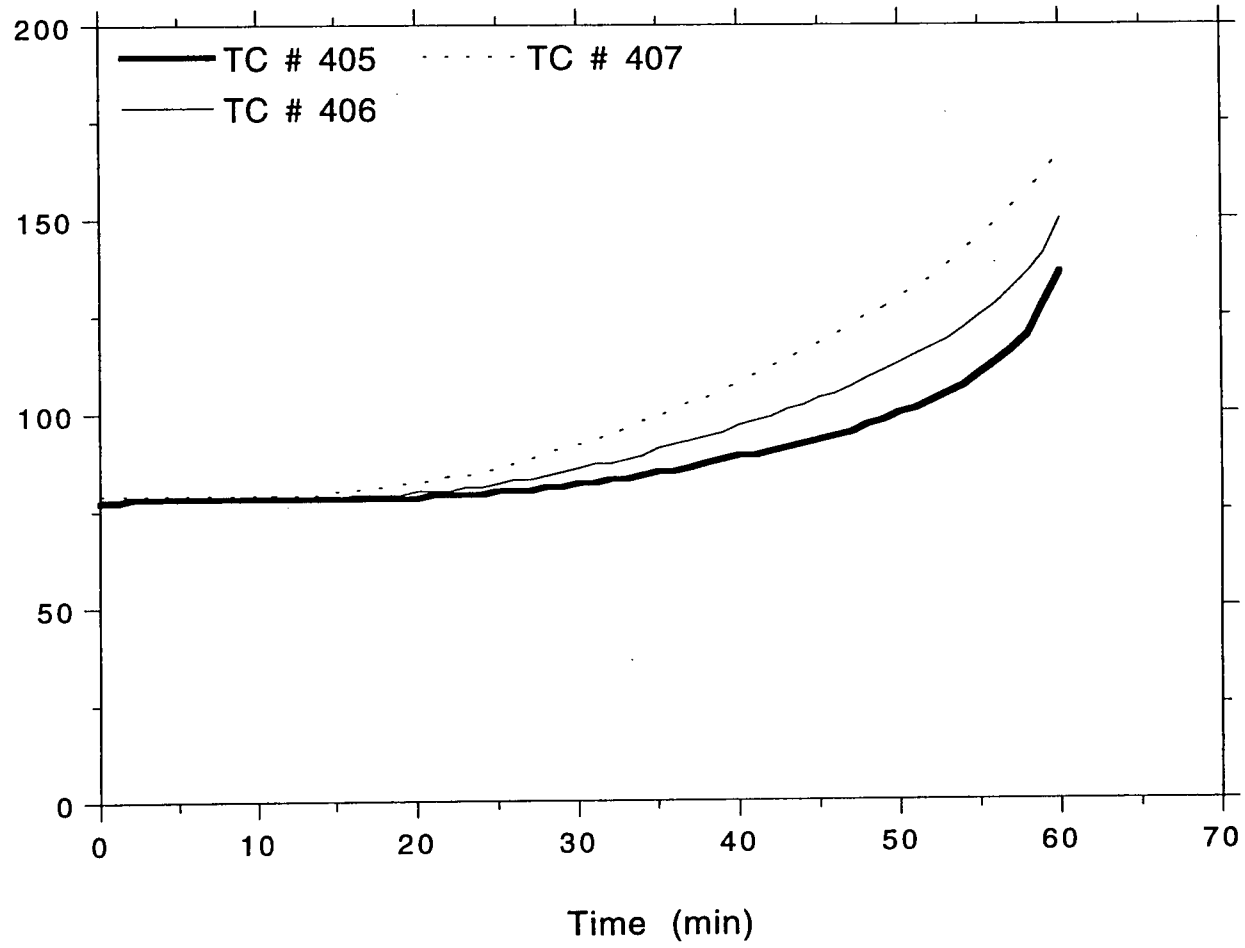
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
5th 4" Steel Conduit



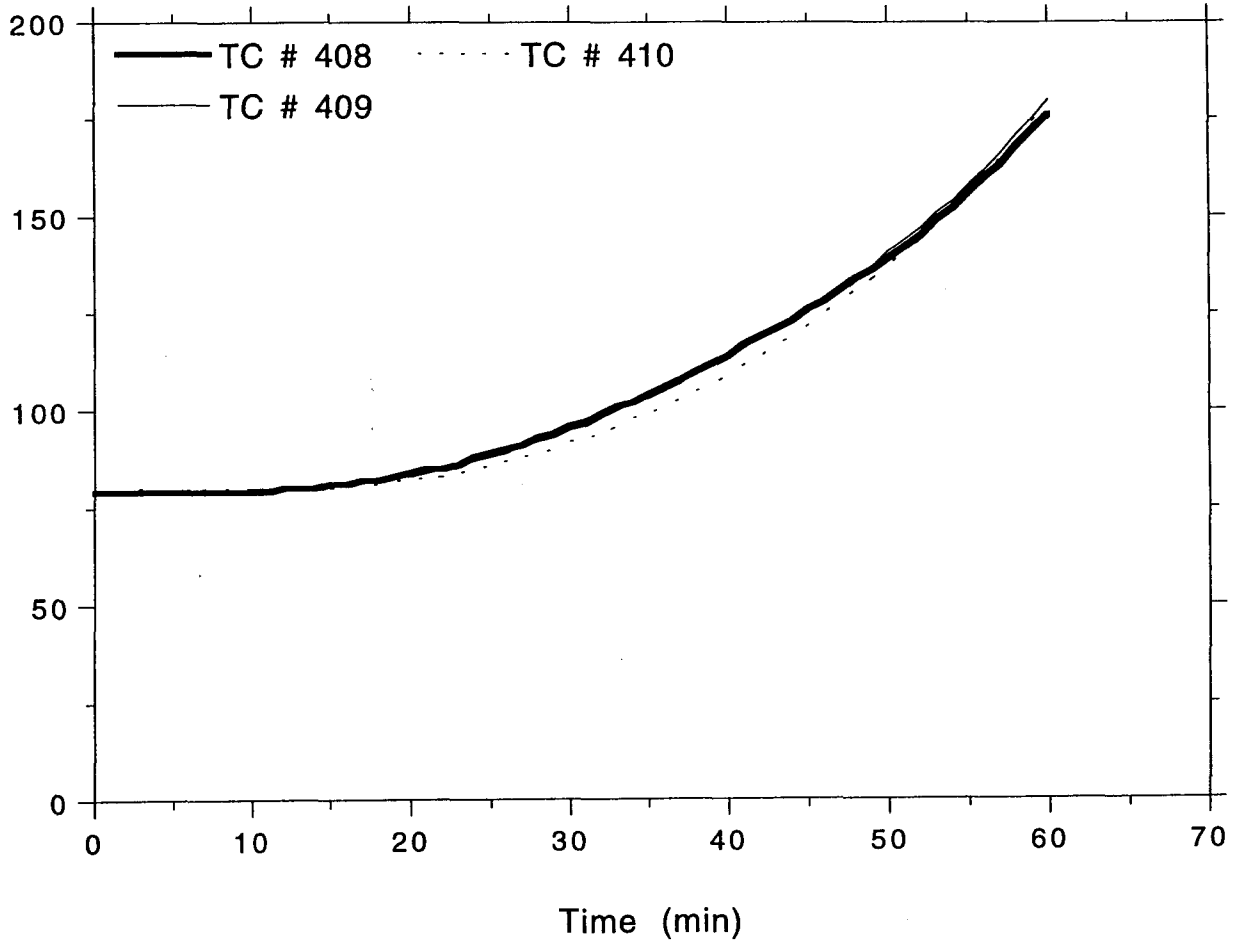
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



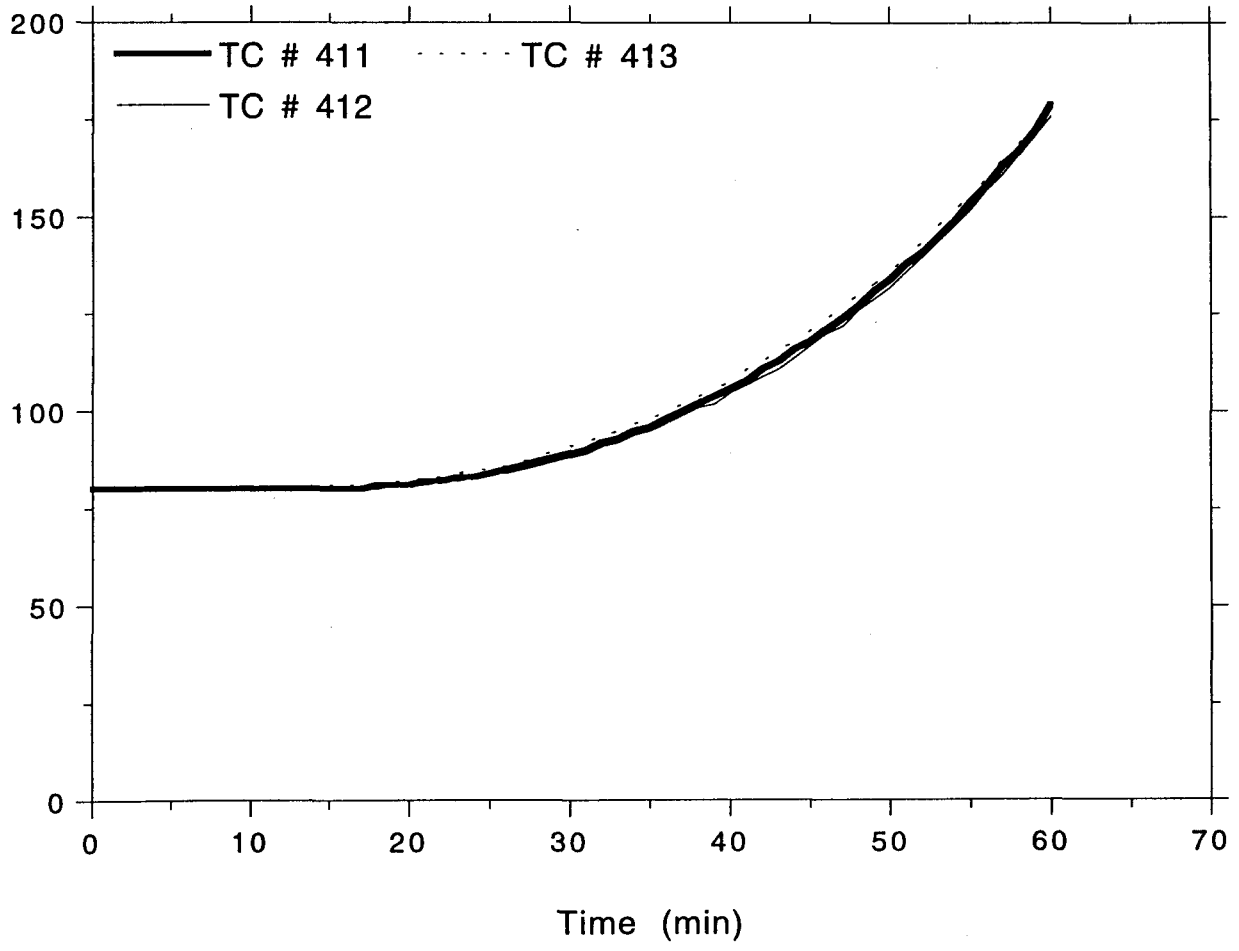
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



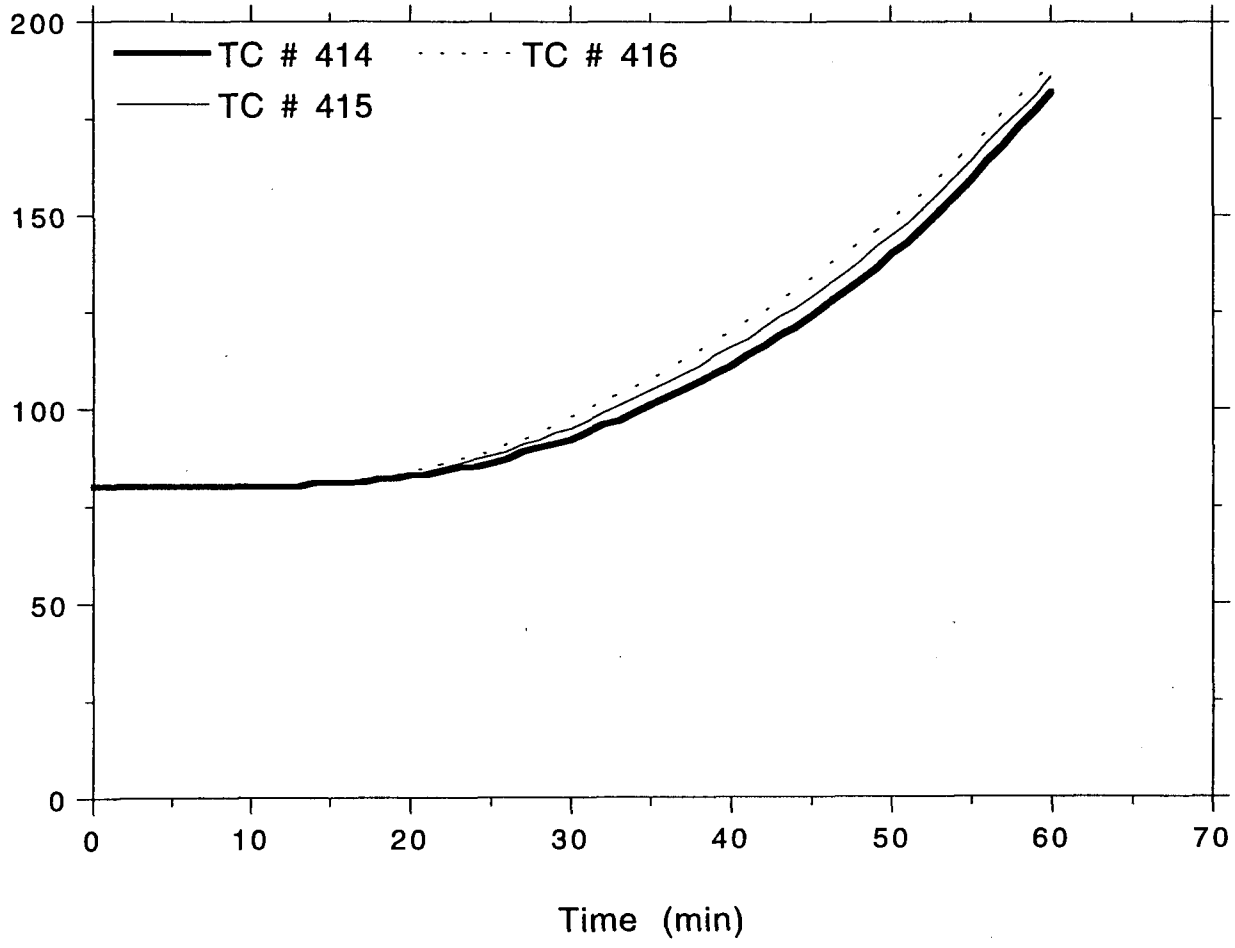
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



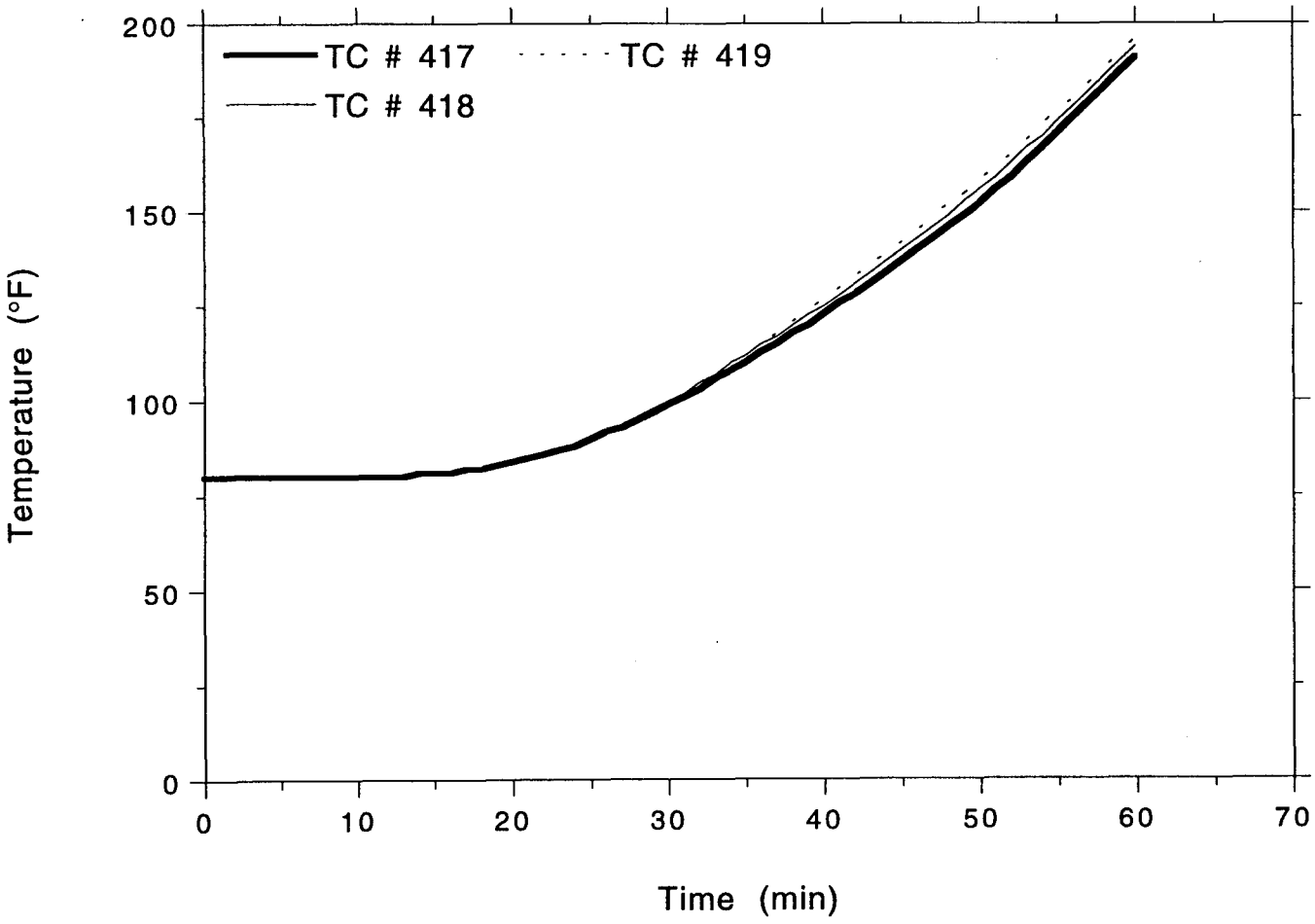
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



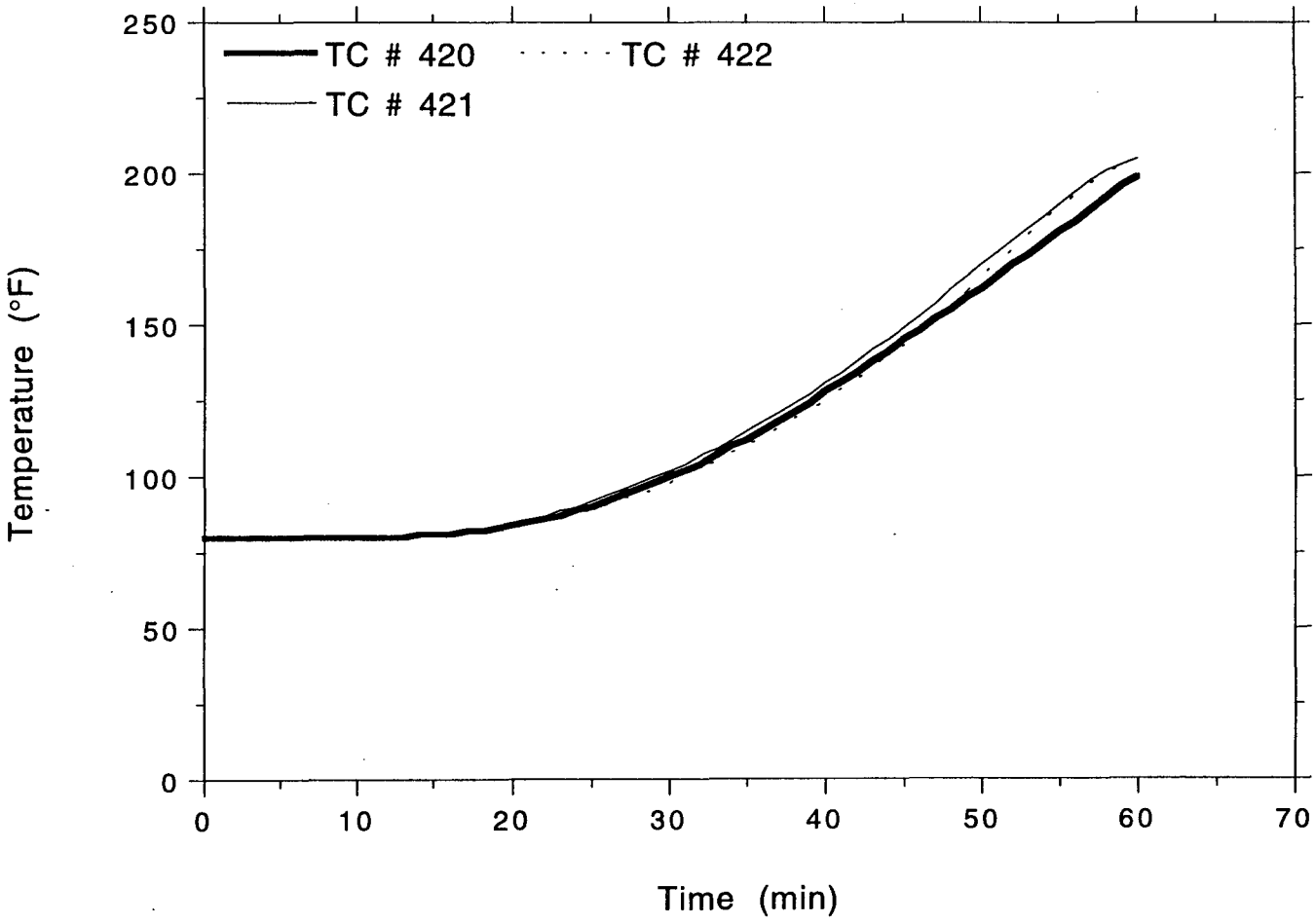
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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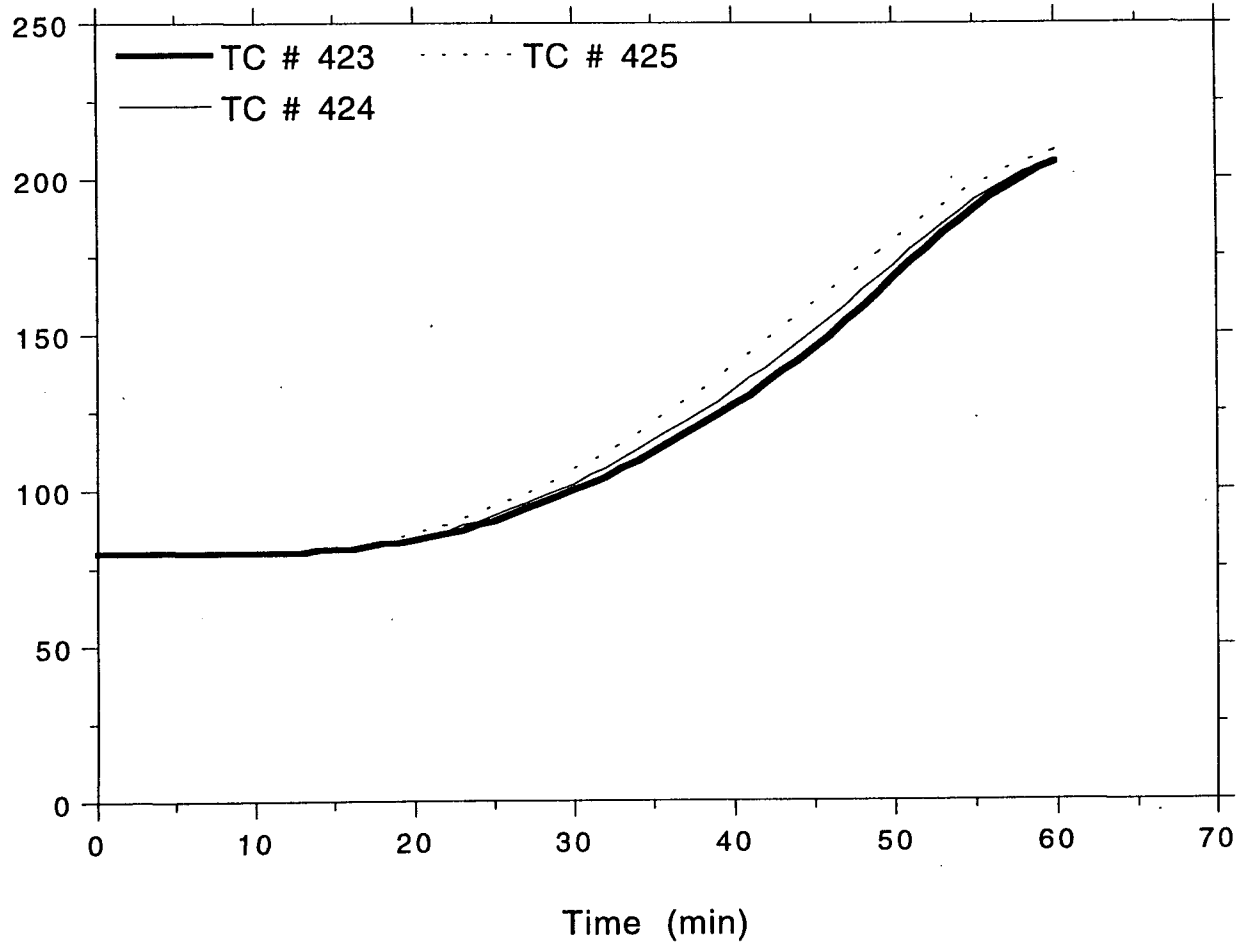
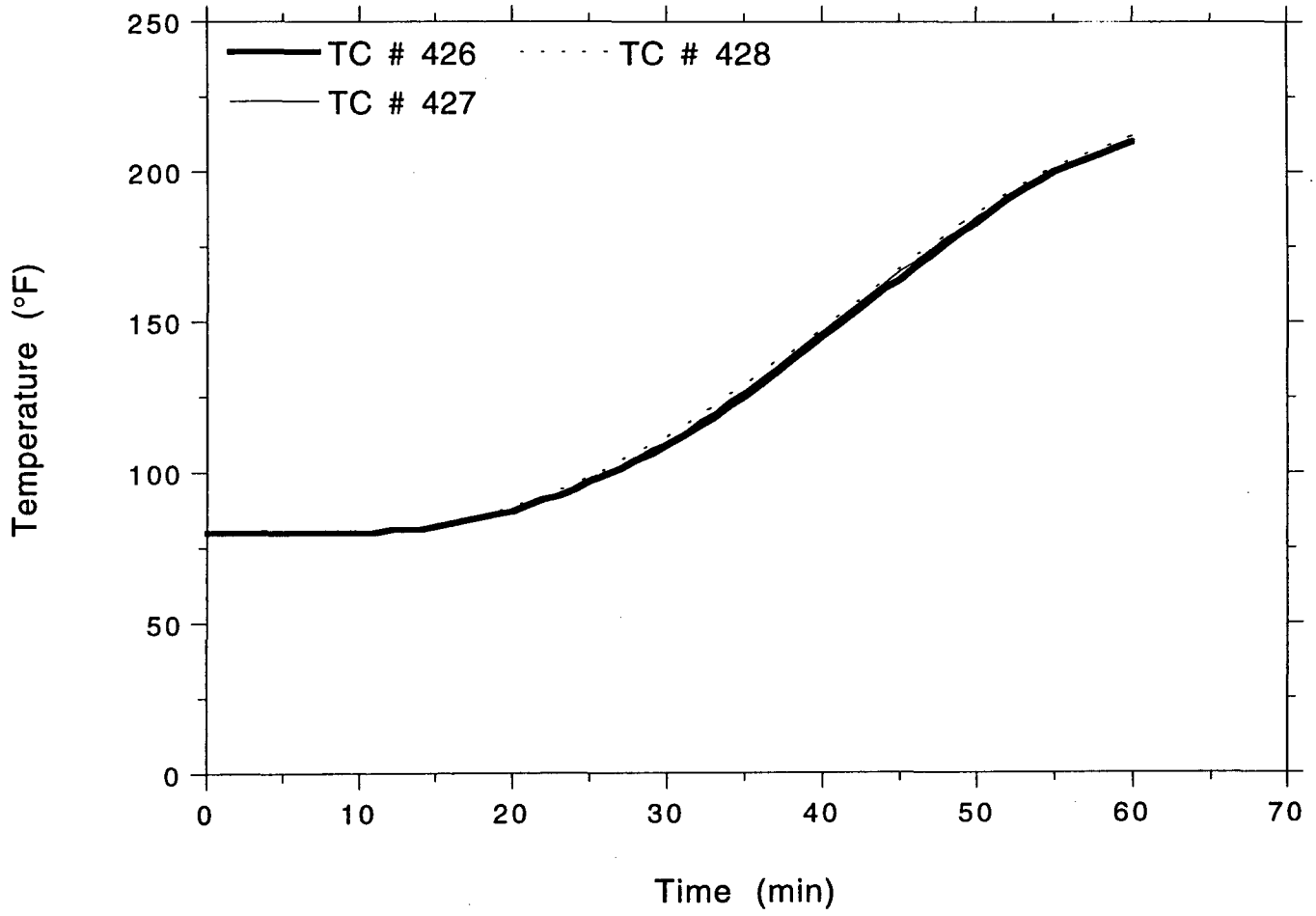


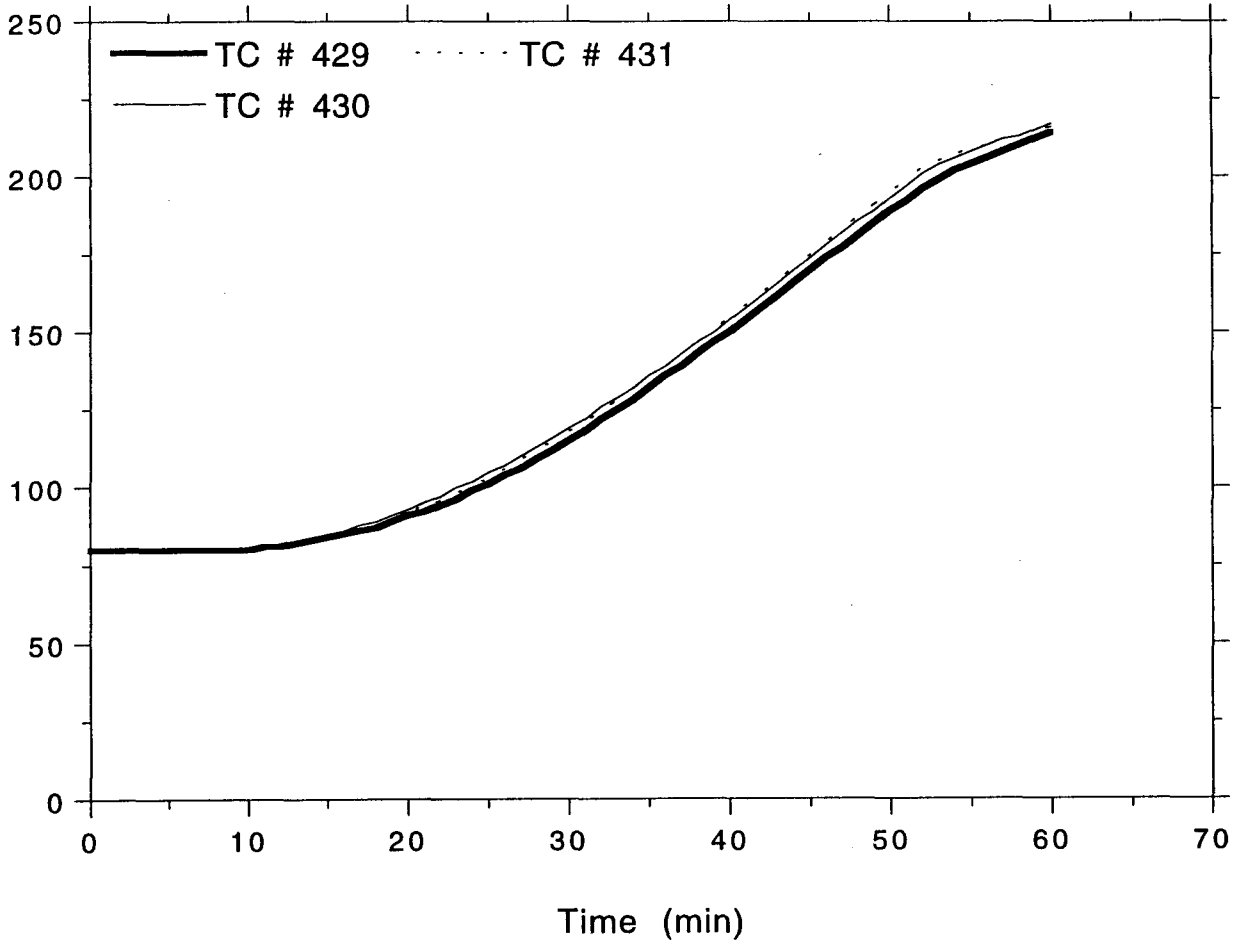
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
4th 4" Steel Conduit



OMEGA POINT LABORATORIES

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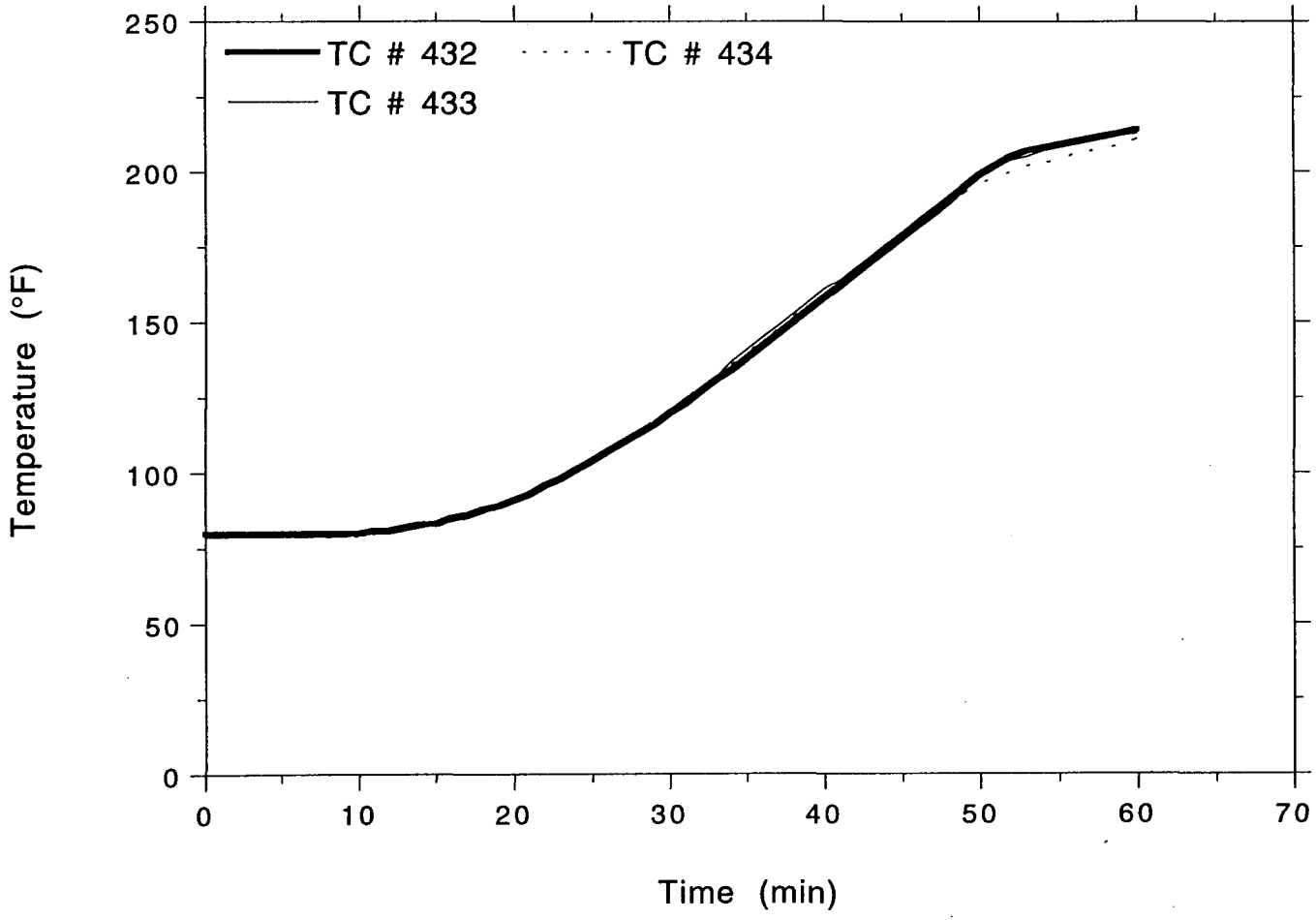

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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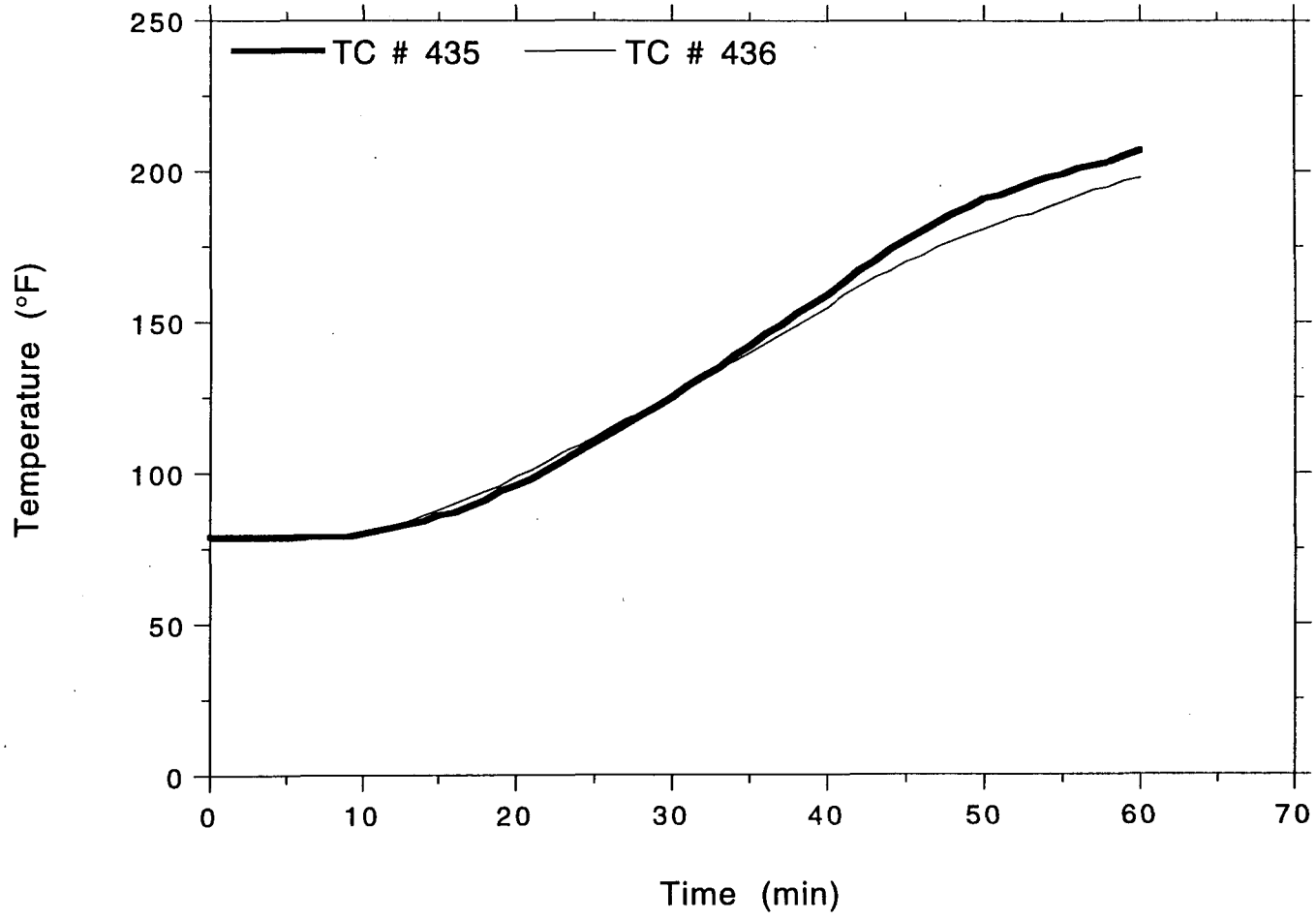

OMEGA POINT LABORATORIES

TSI/TVA
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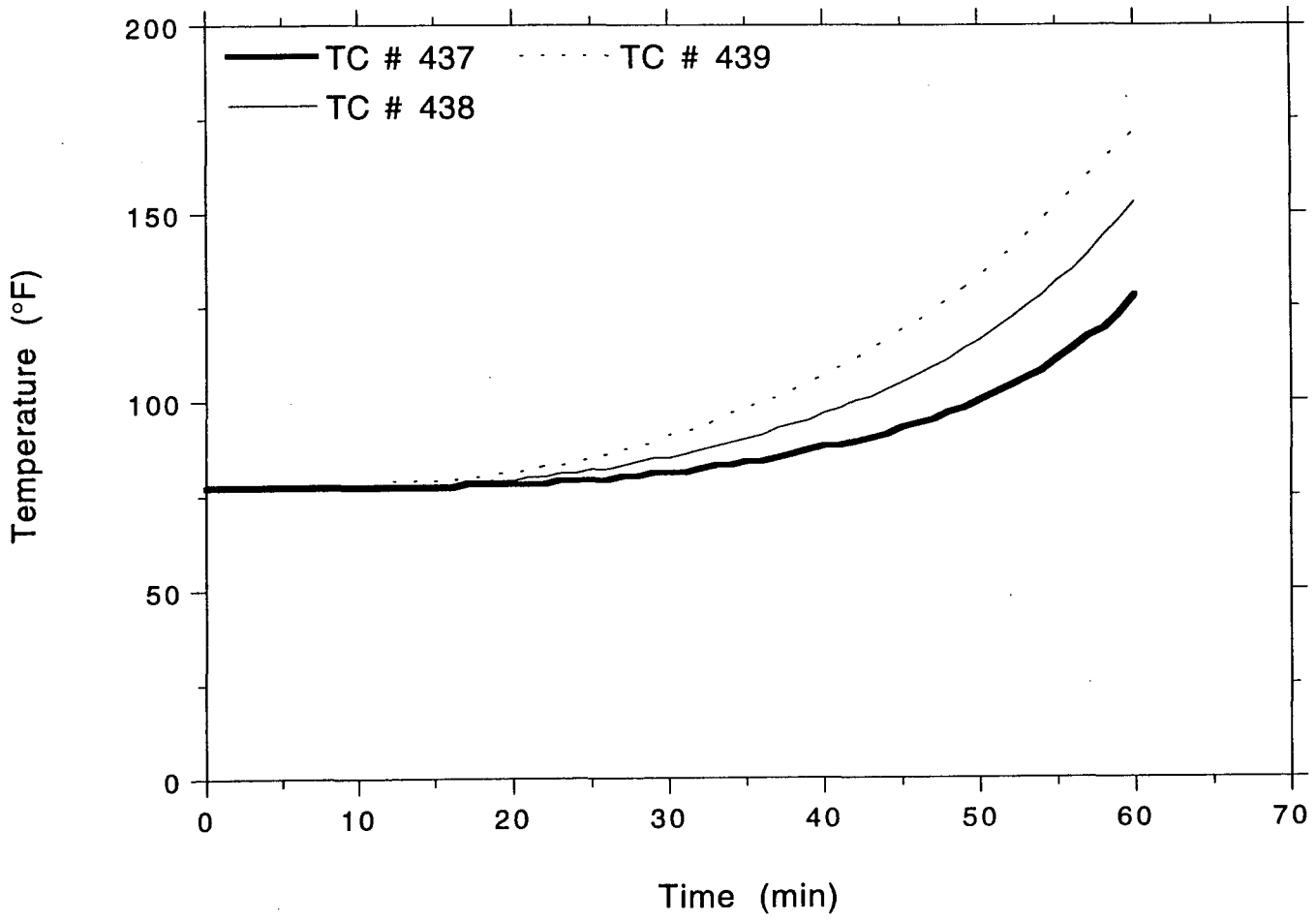
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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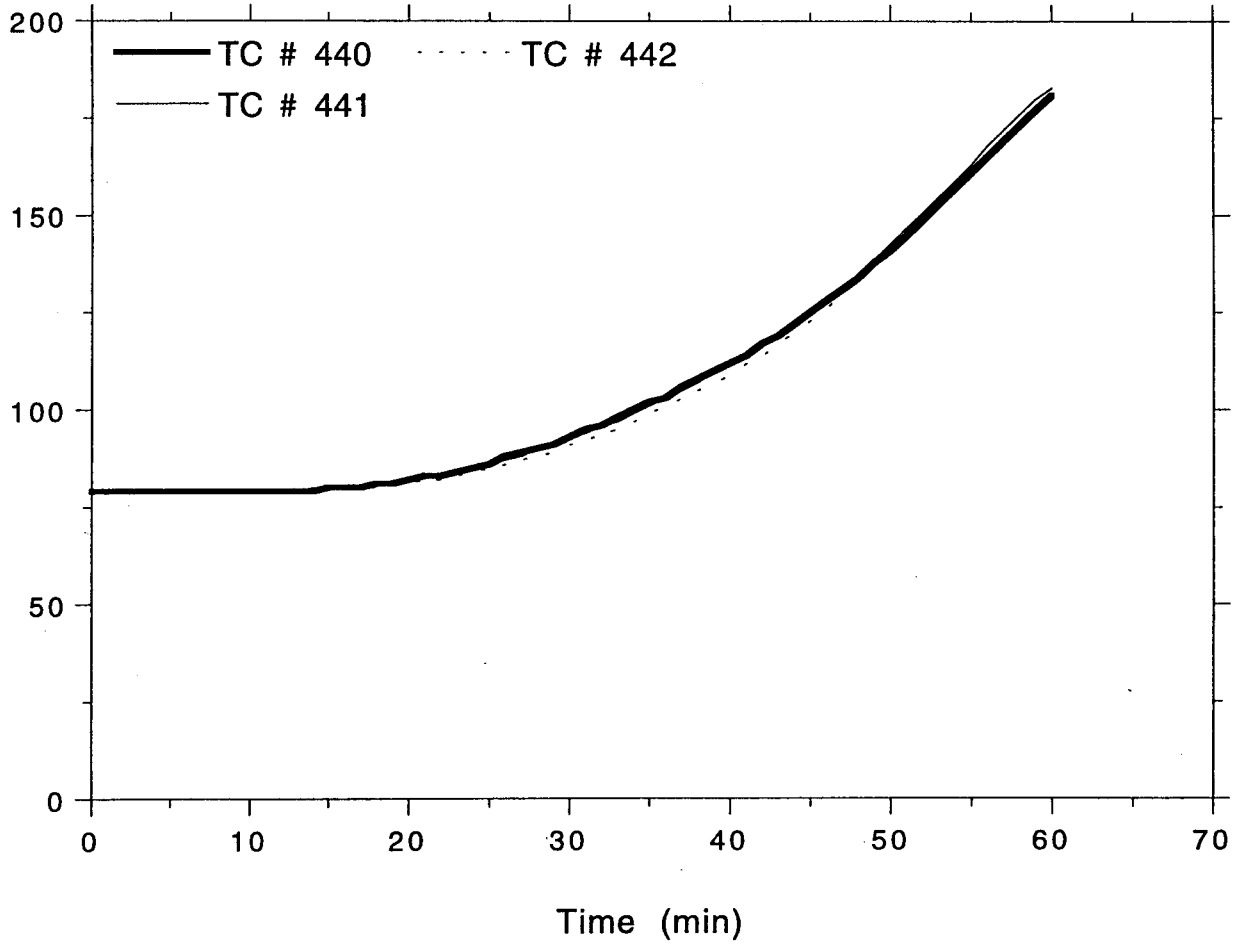
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

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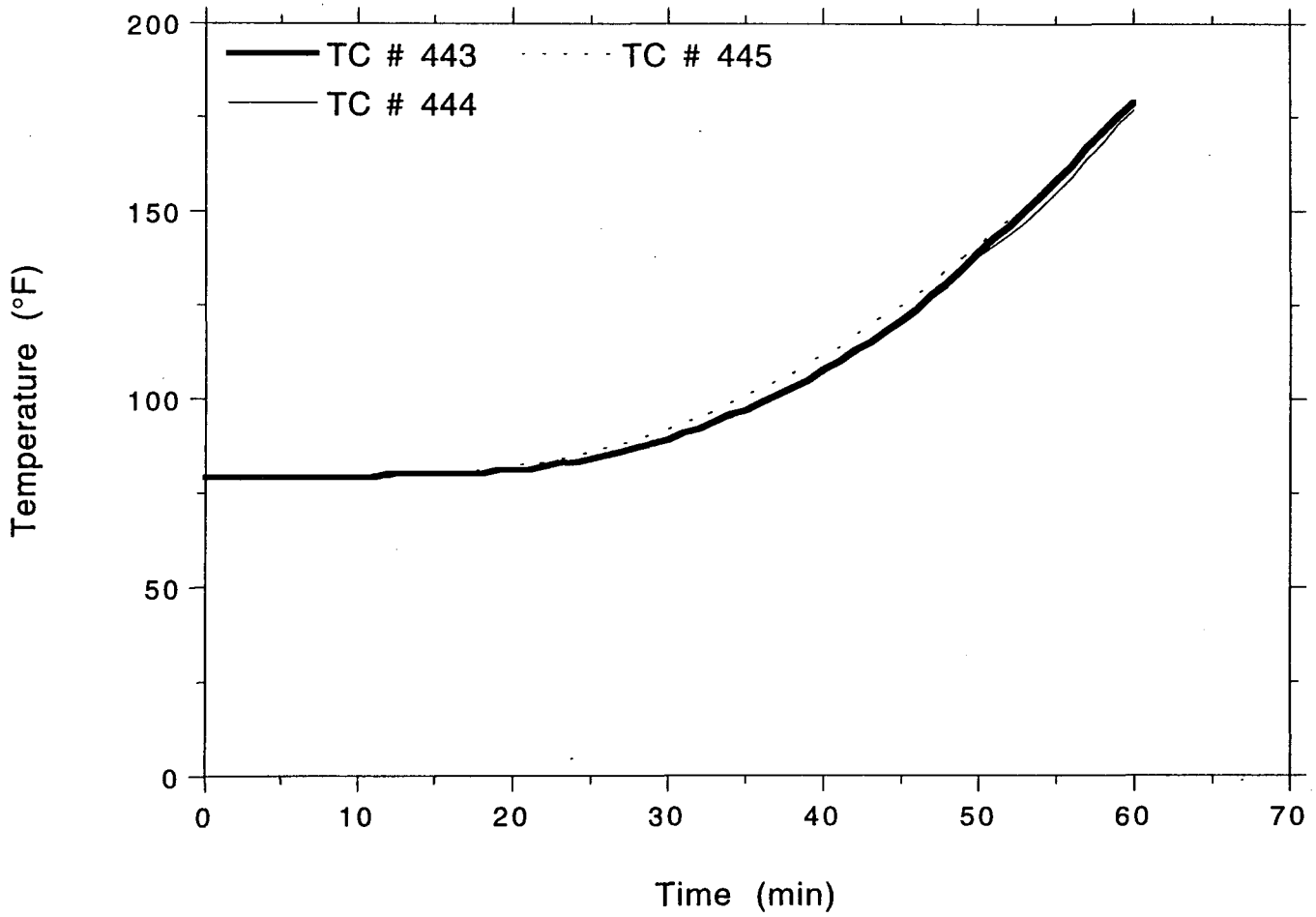

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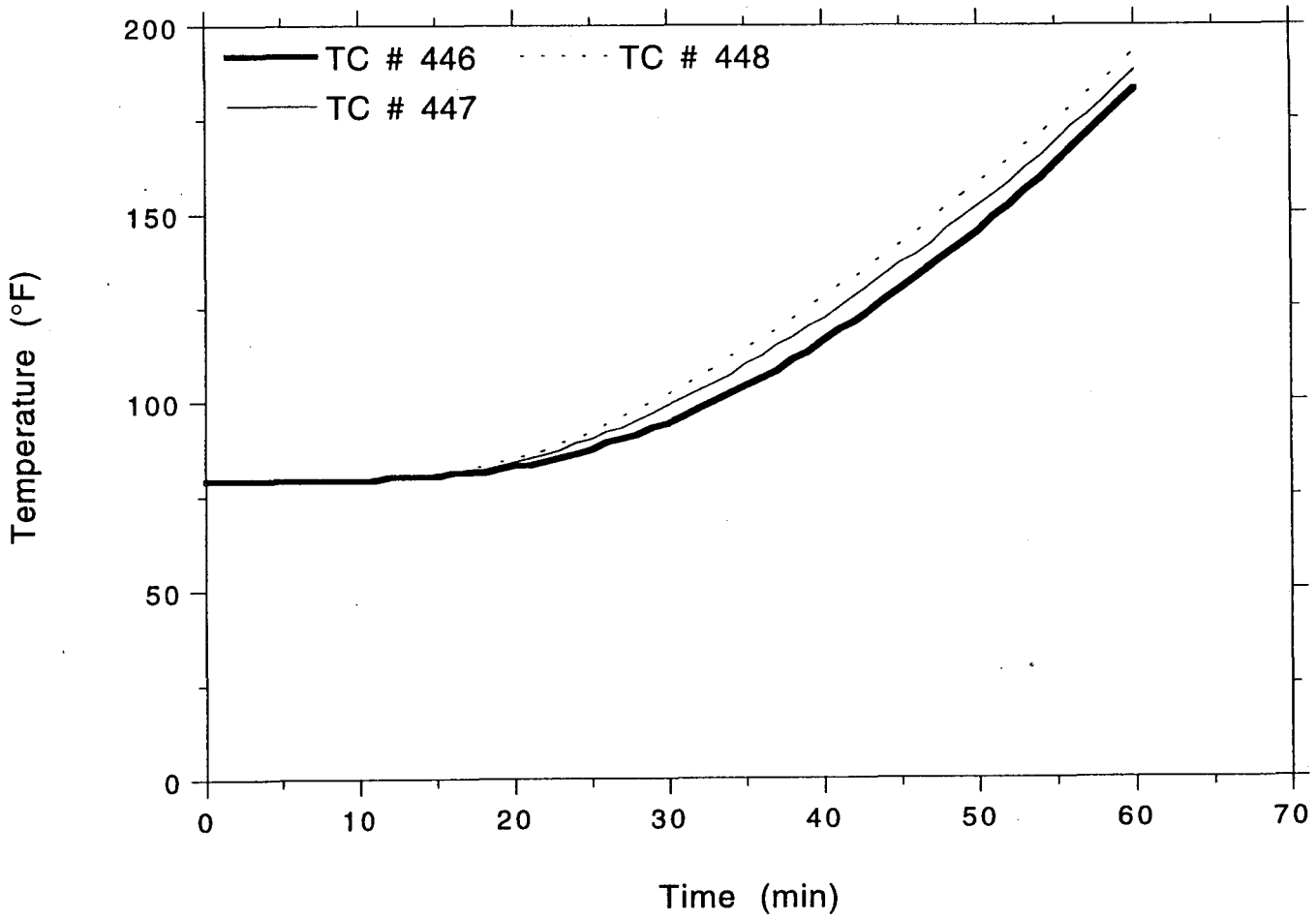
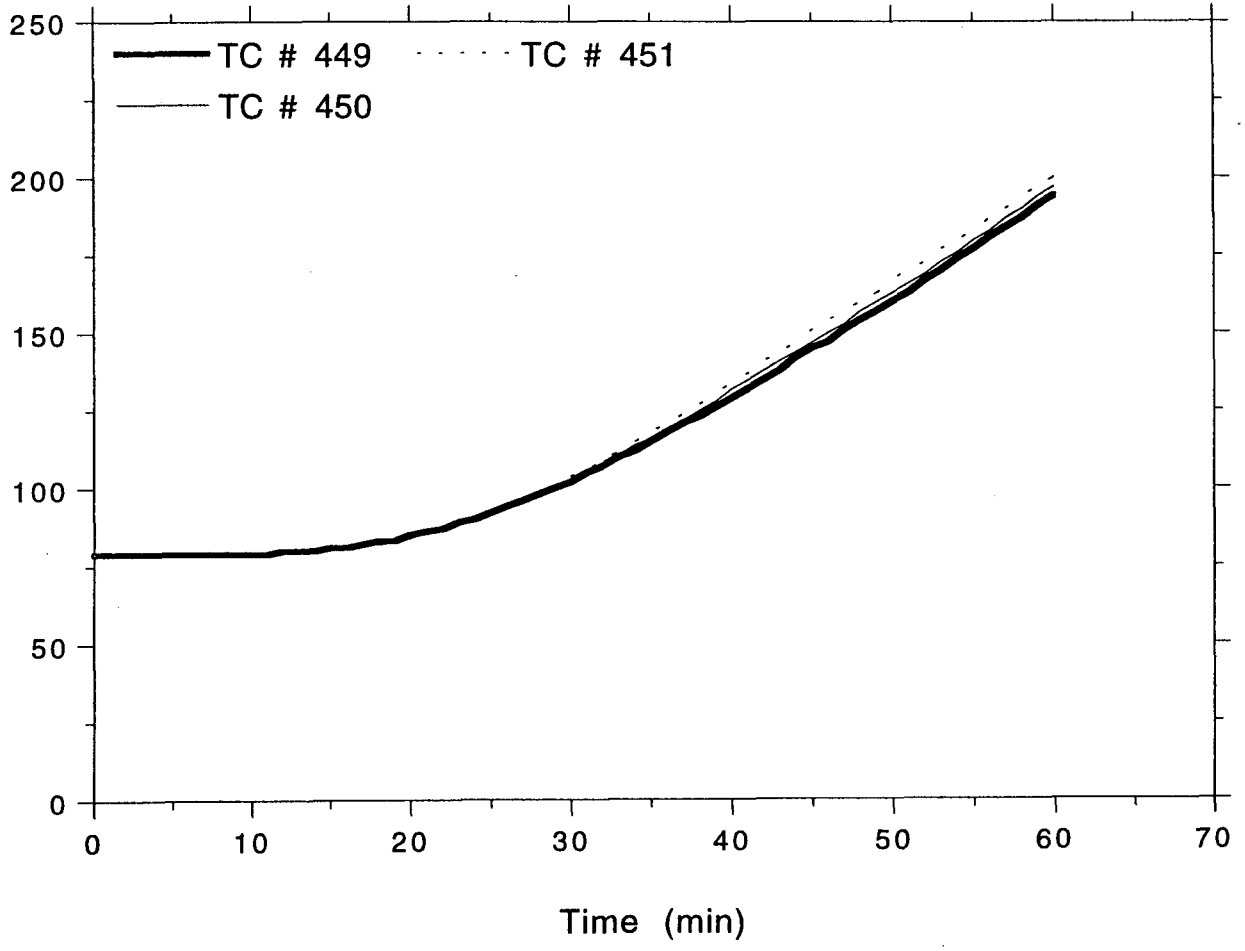


OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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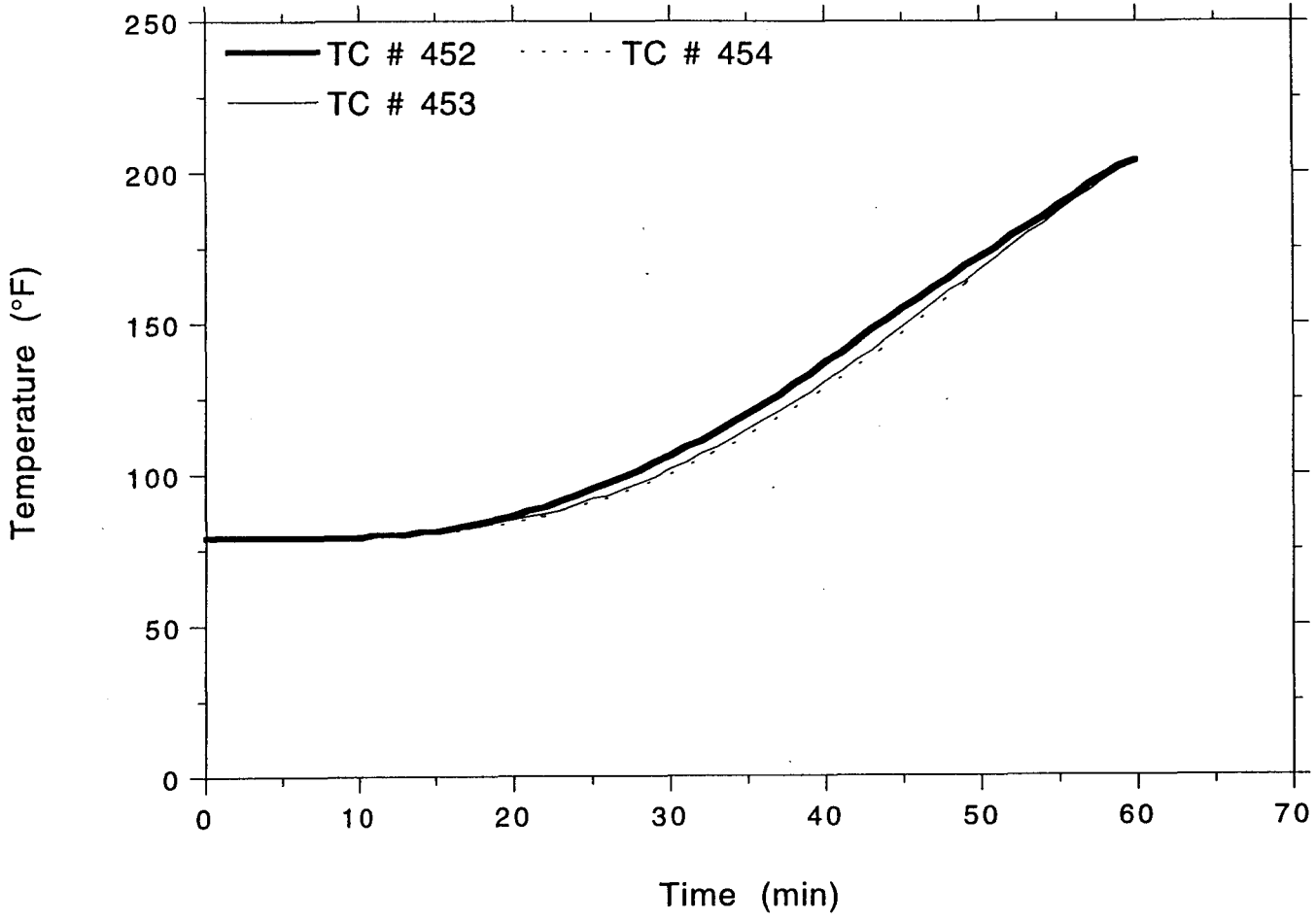
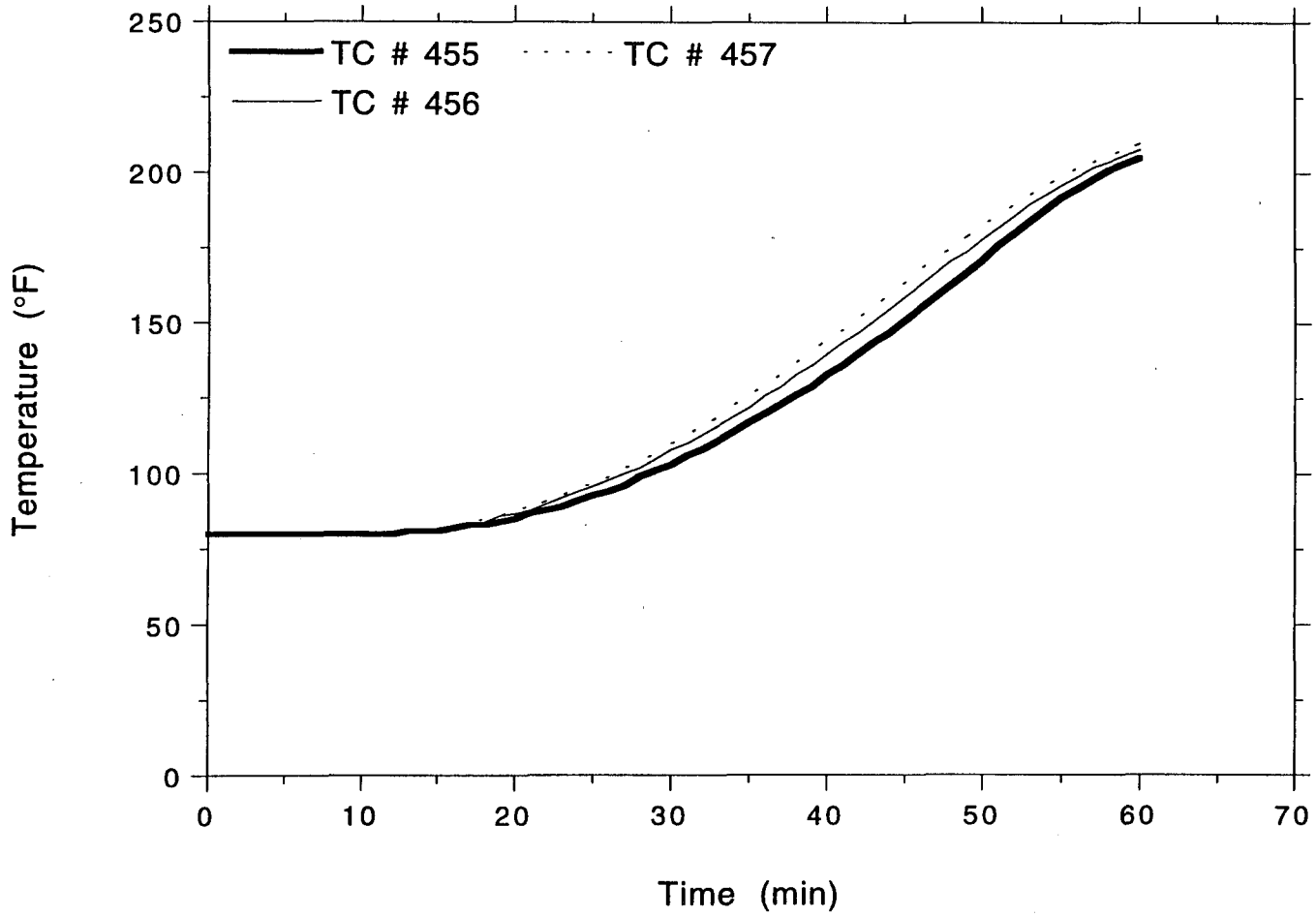


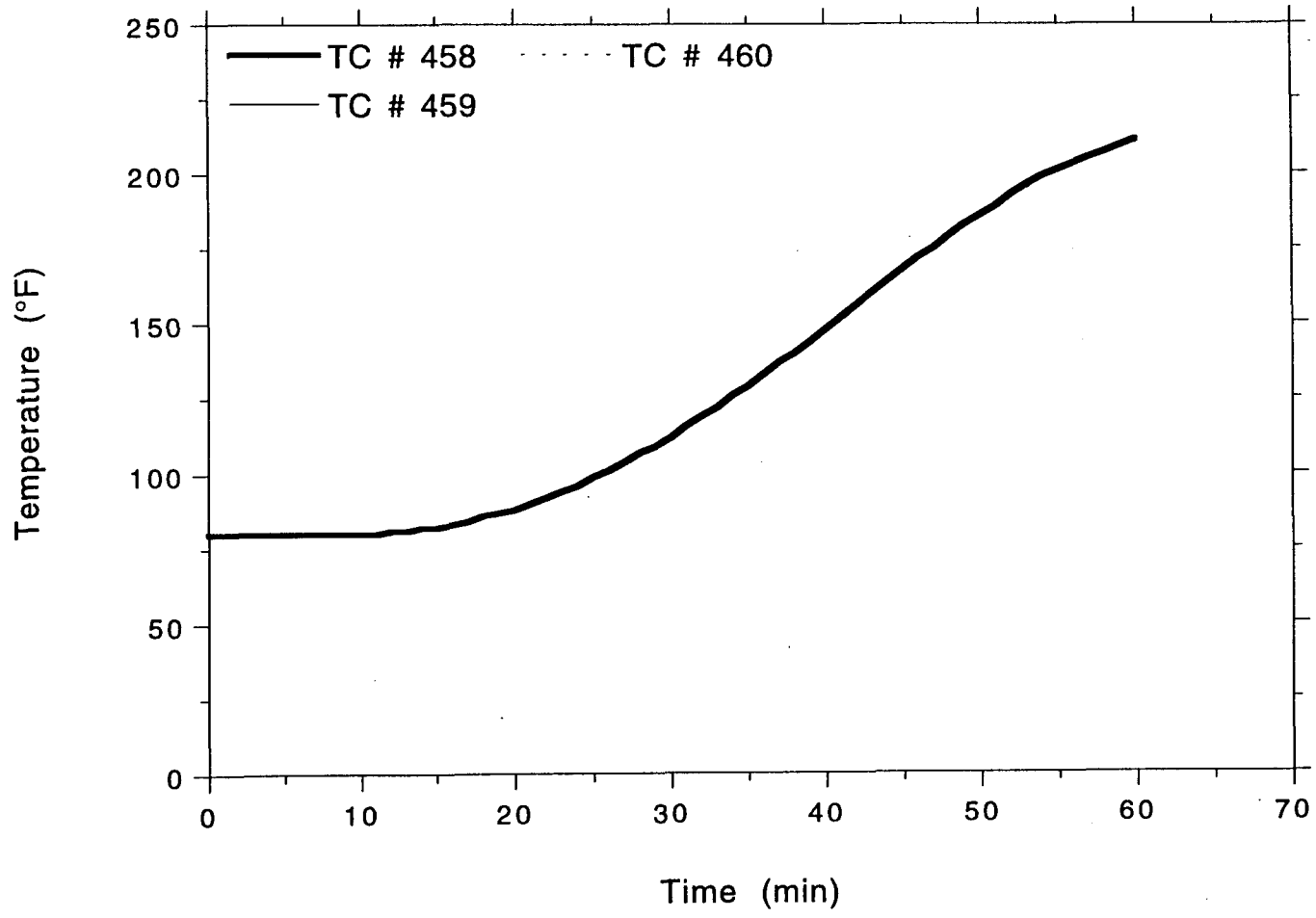
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

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Project No. 11960-97260
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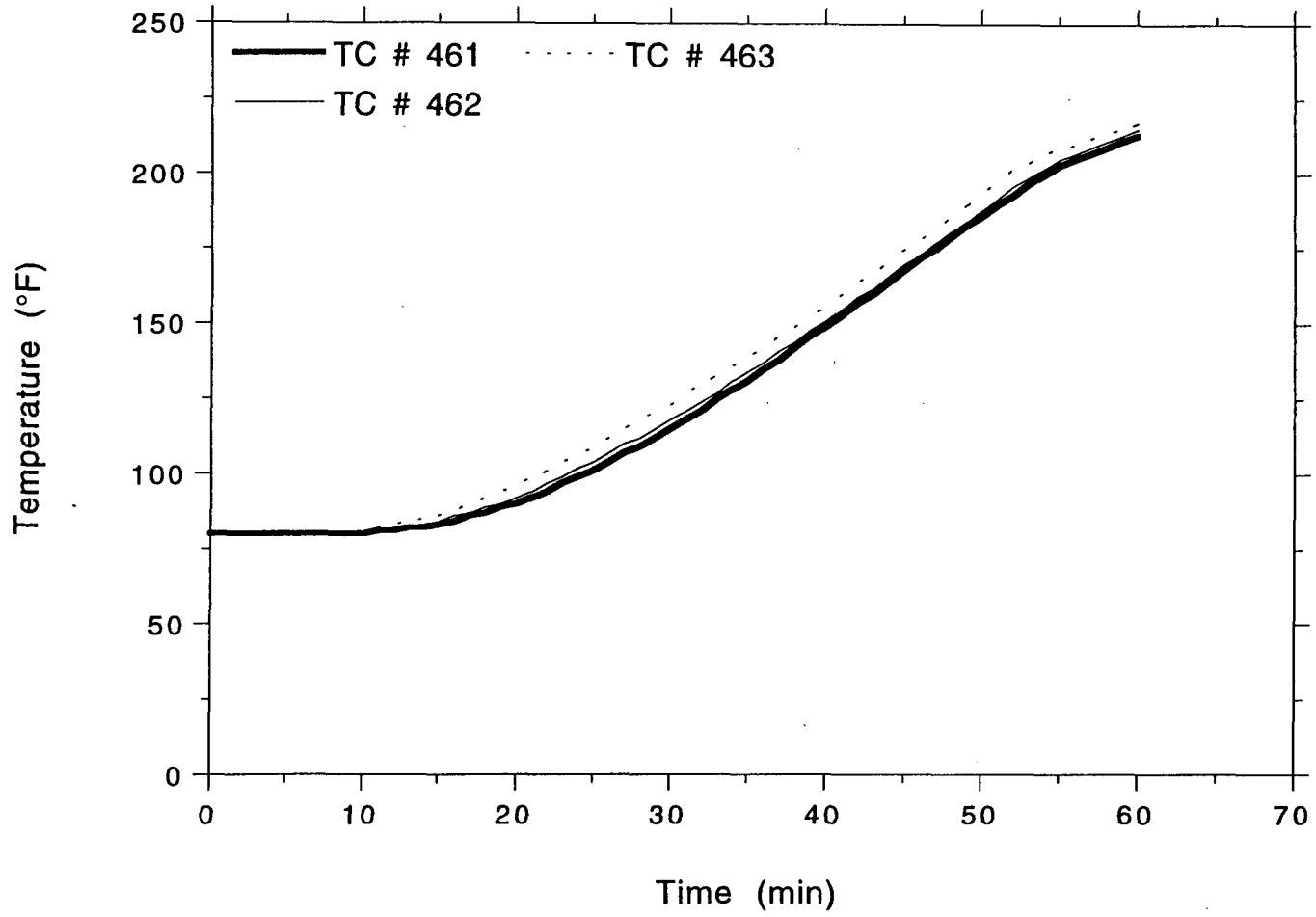

OMEGA POINT LABORATORIES

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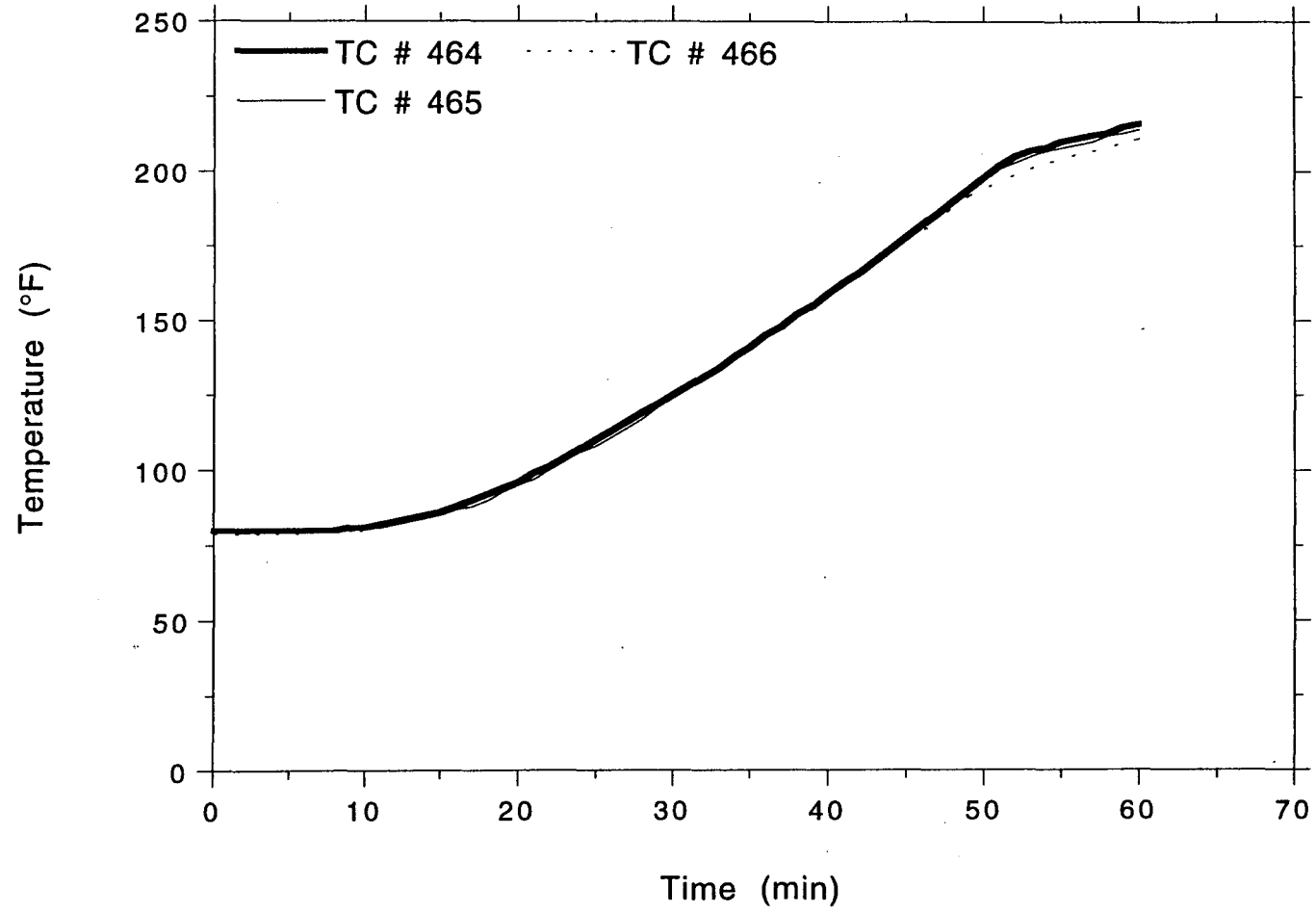

OMEGA POINT LABORATORIES

TSI/TVA
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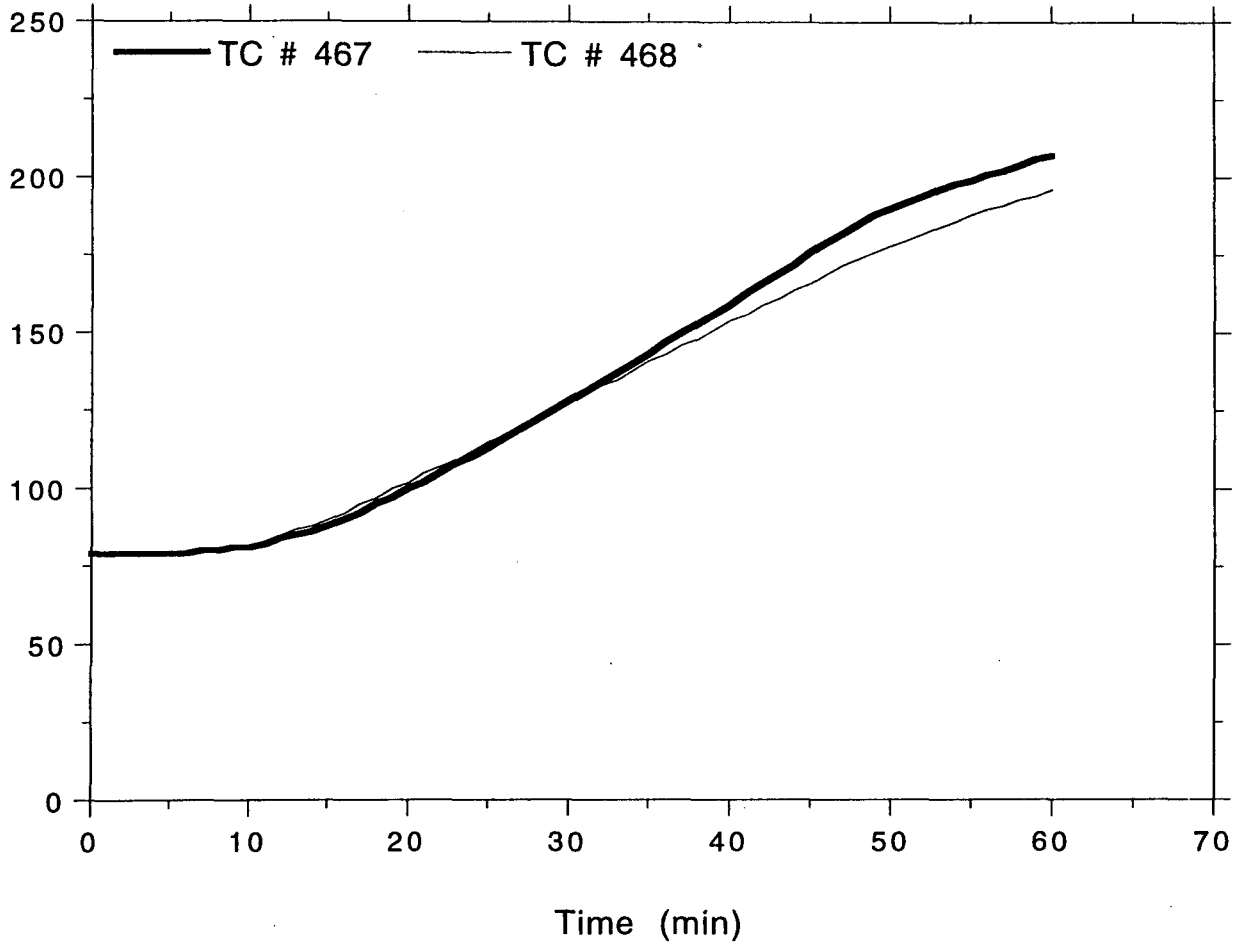
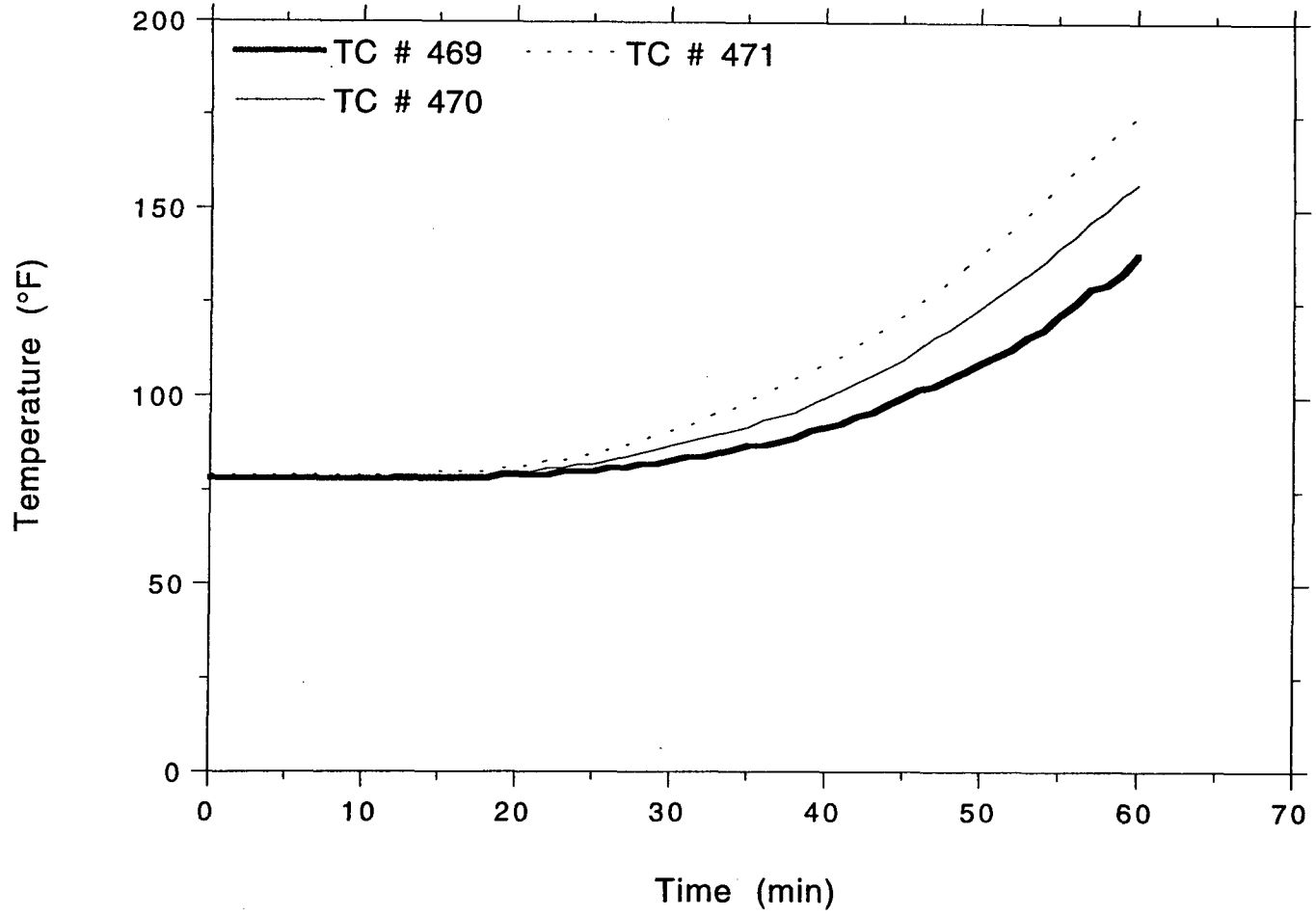
3rd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



OMEGA POINT LABORATORIES

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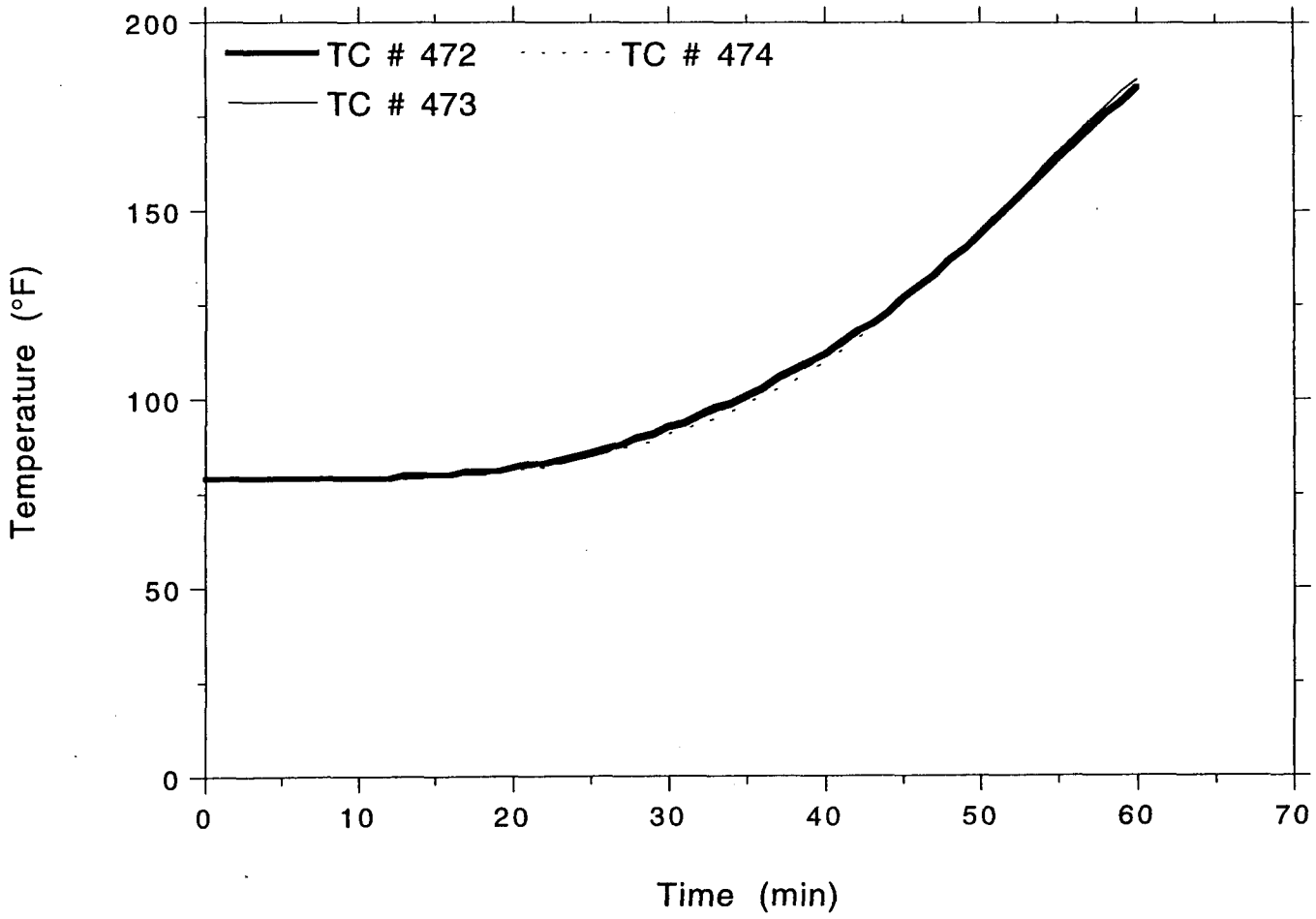
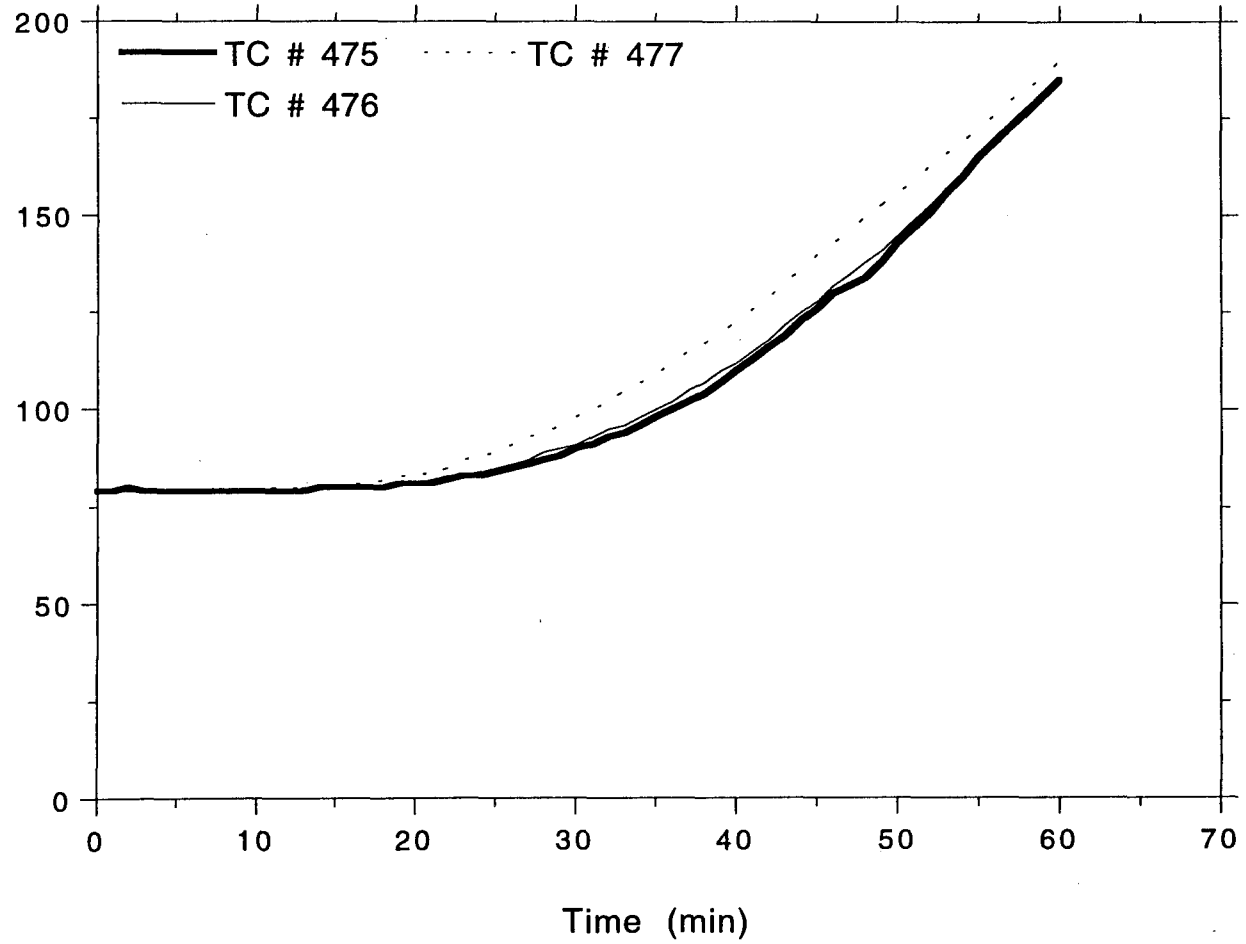
Project No. 11960-97260
2nd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



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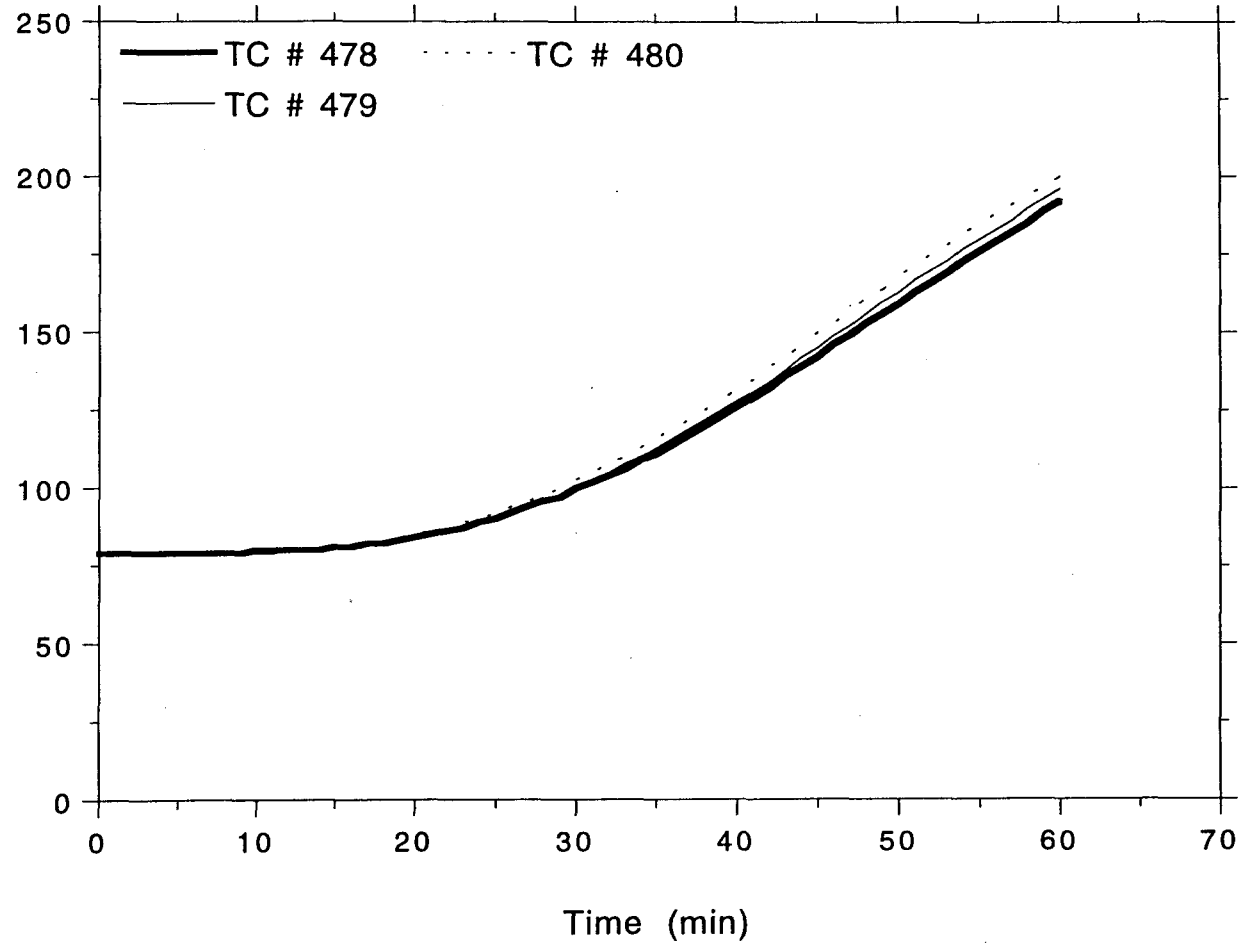
TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



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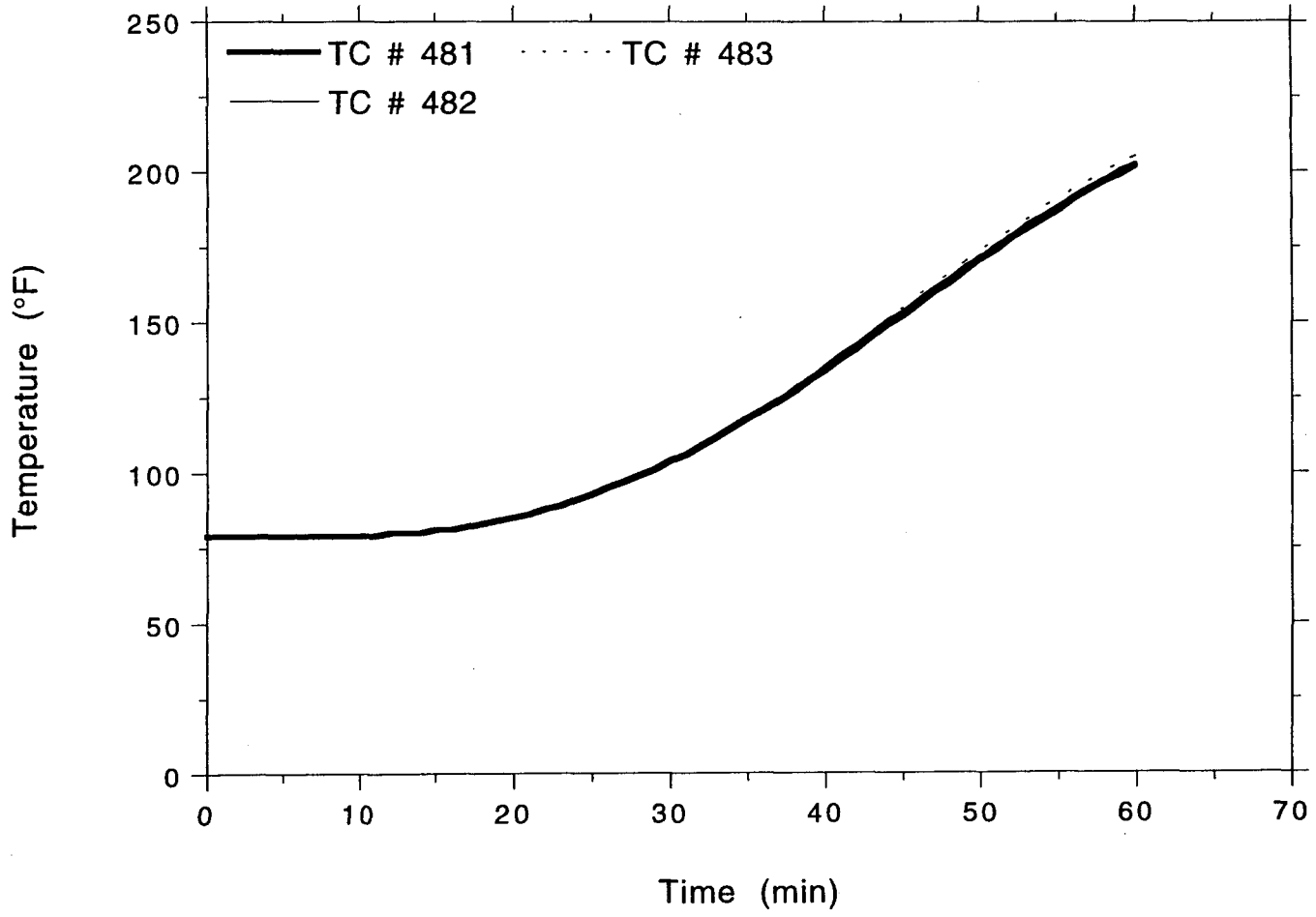

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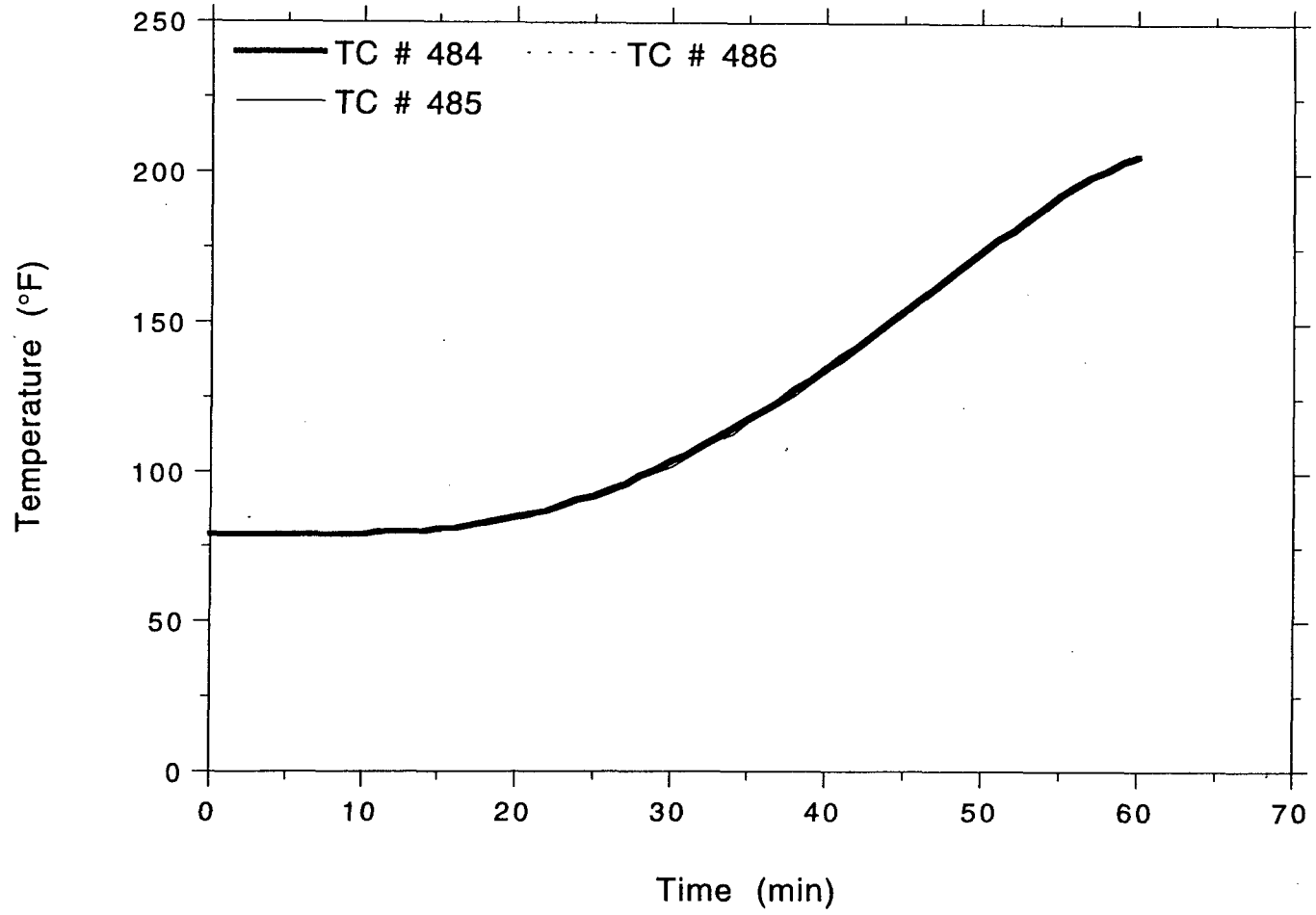

OMEGA POINT LABORATORIES

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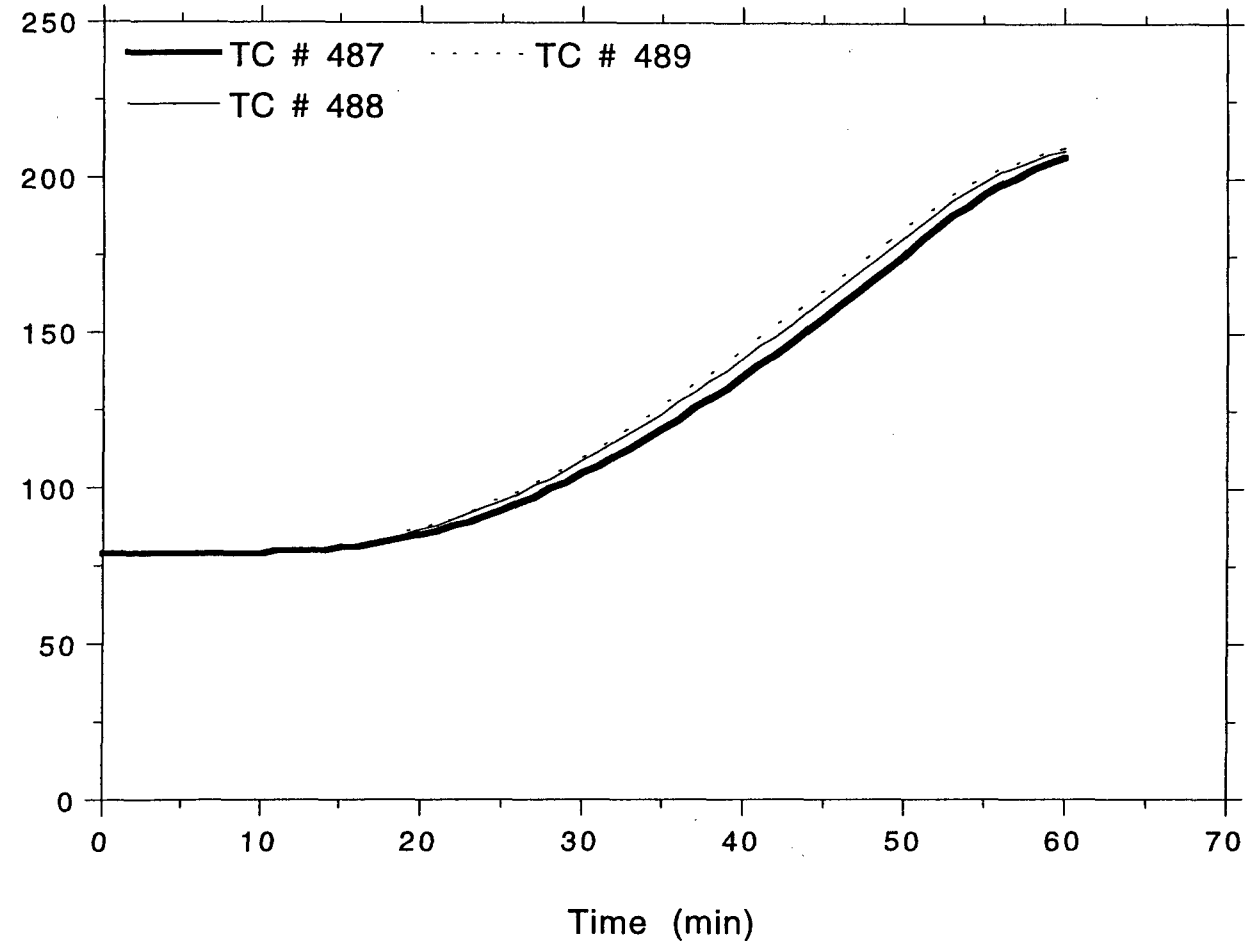
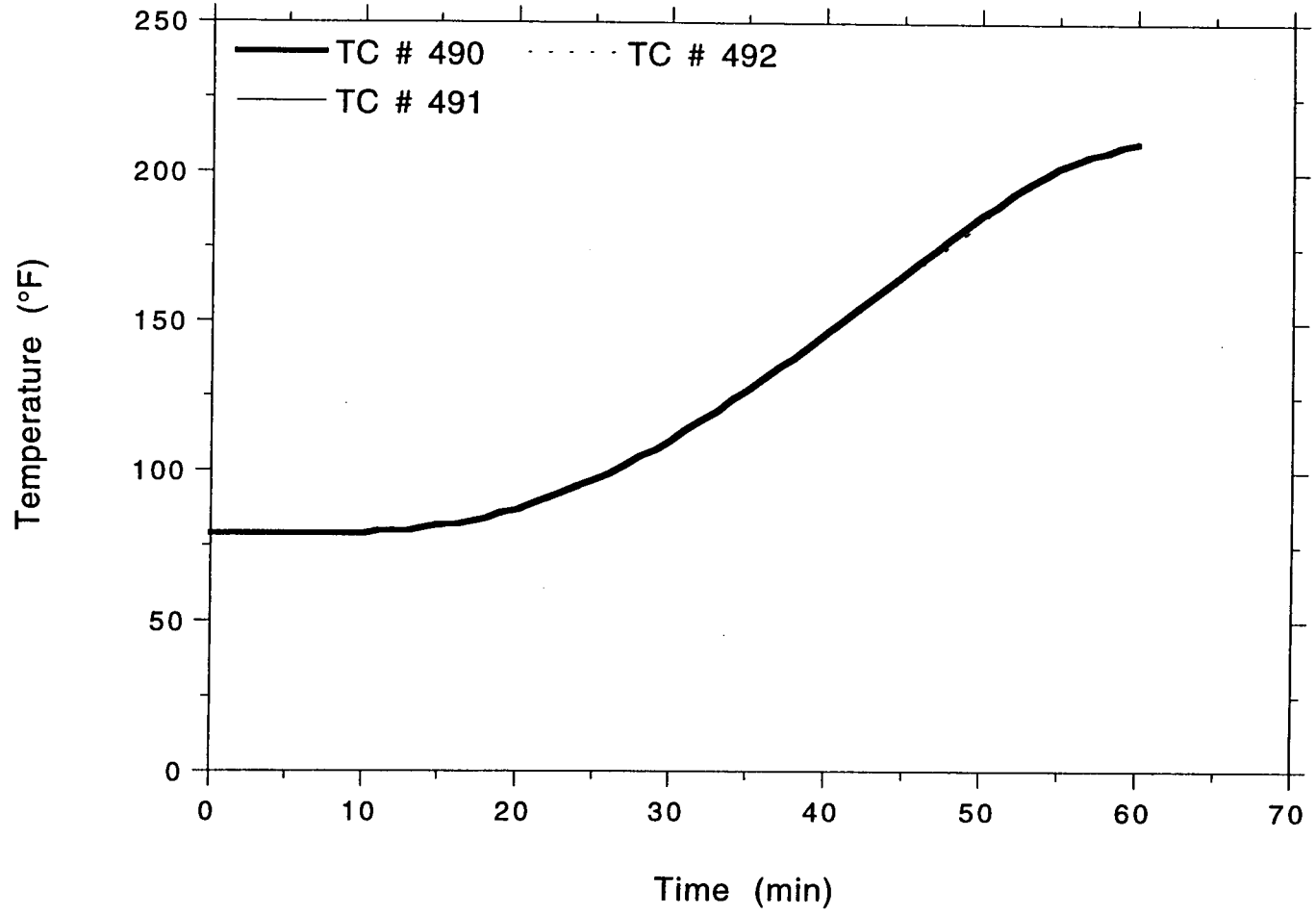


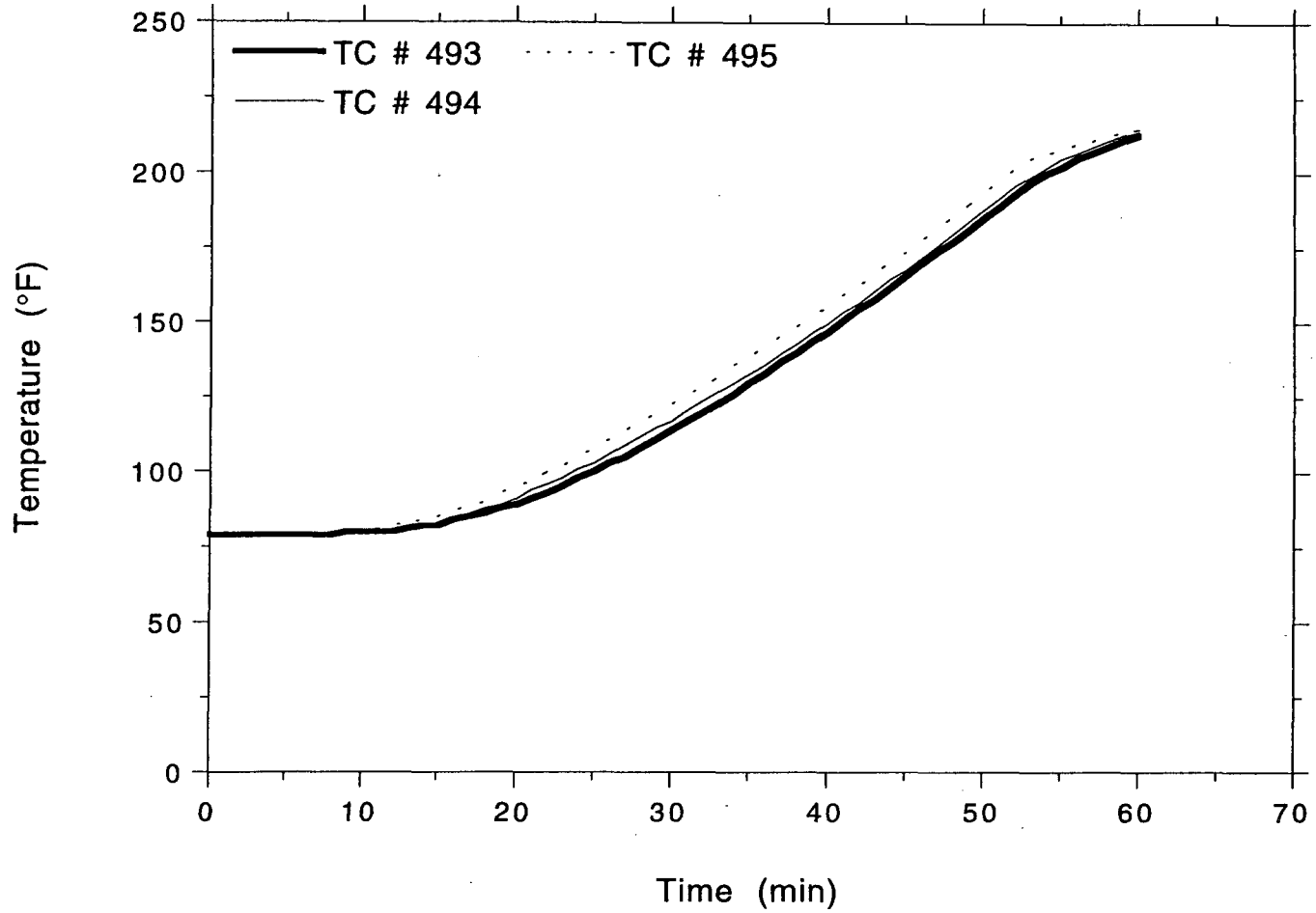
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
2nd 4" Steel Conduit



OMEGA POINT LABORATORIES

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Project No. 11960-97260
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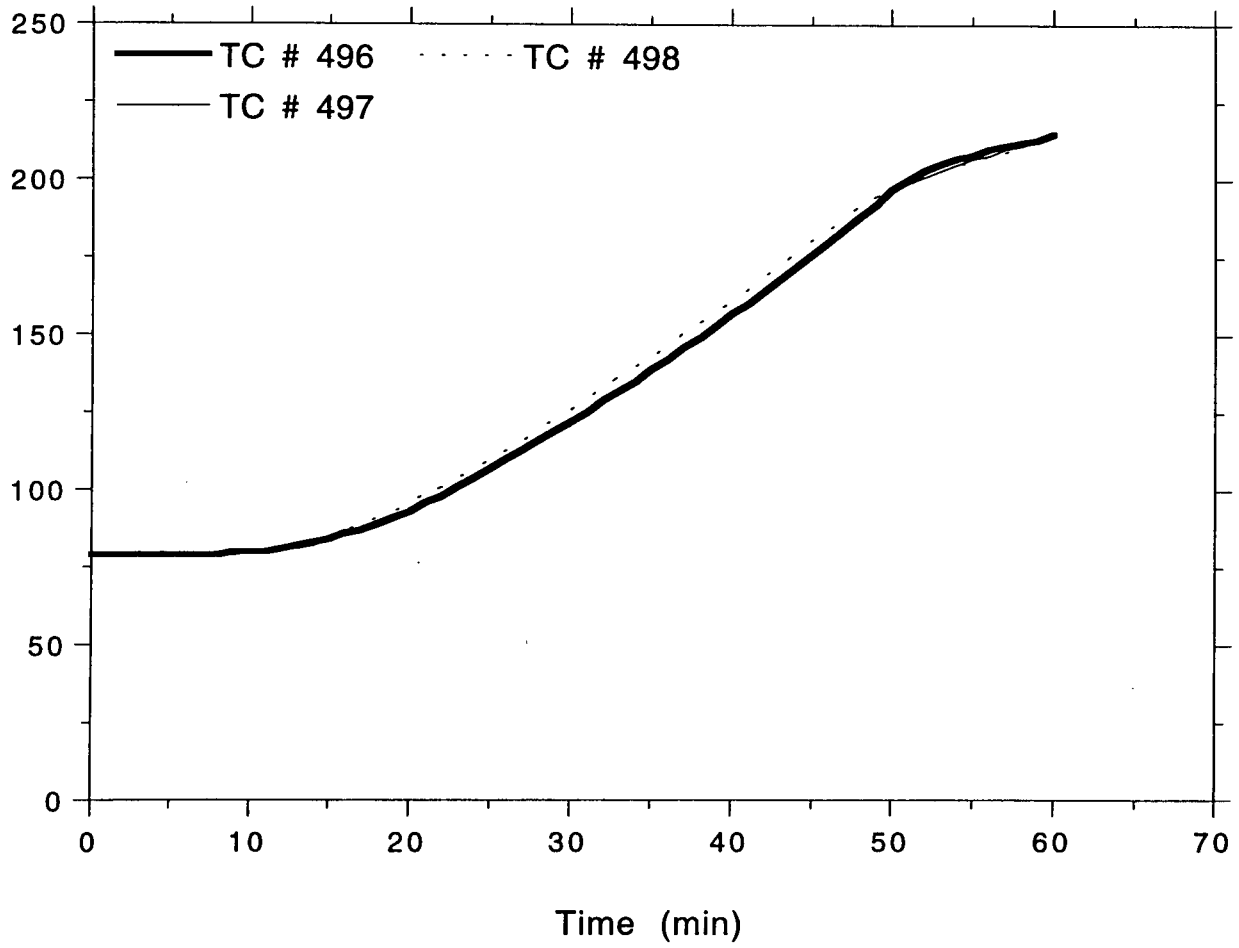

OMEGA POINT LABORATORIES

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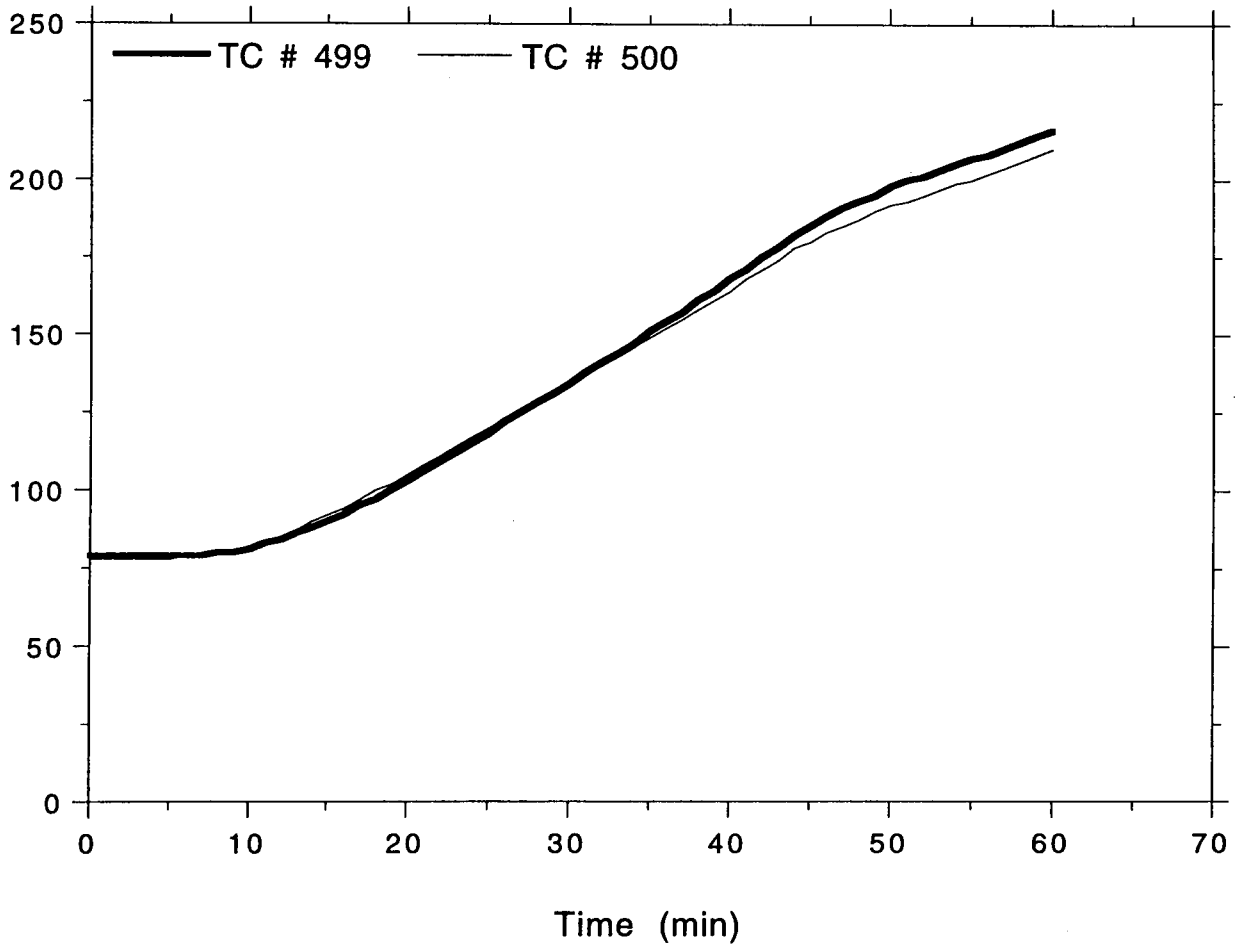

OMEGA POINT LABORATORIES

TSI/TVA
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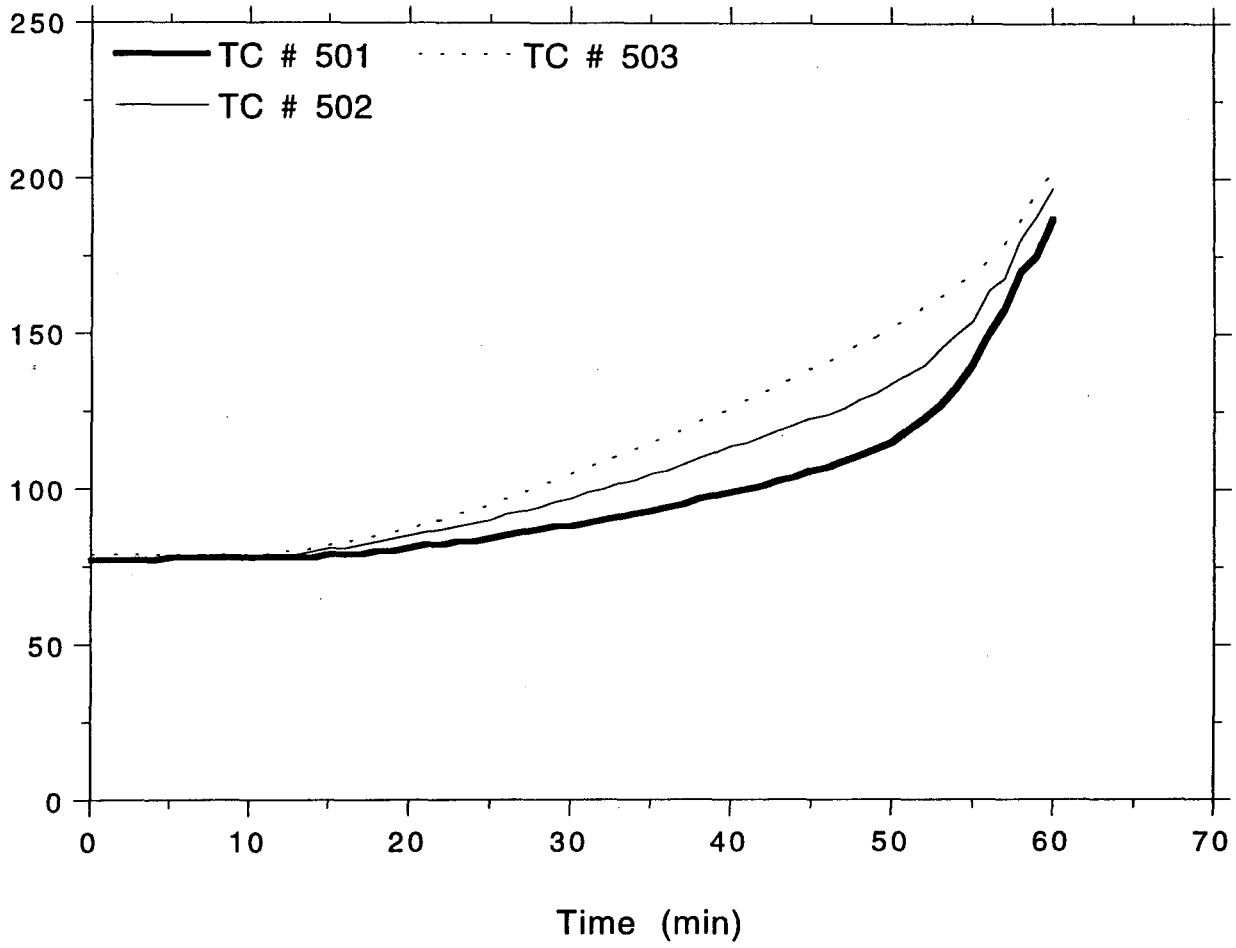

OMEGA POINT LABORATORIES

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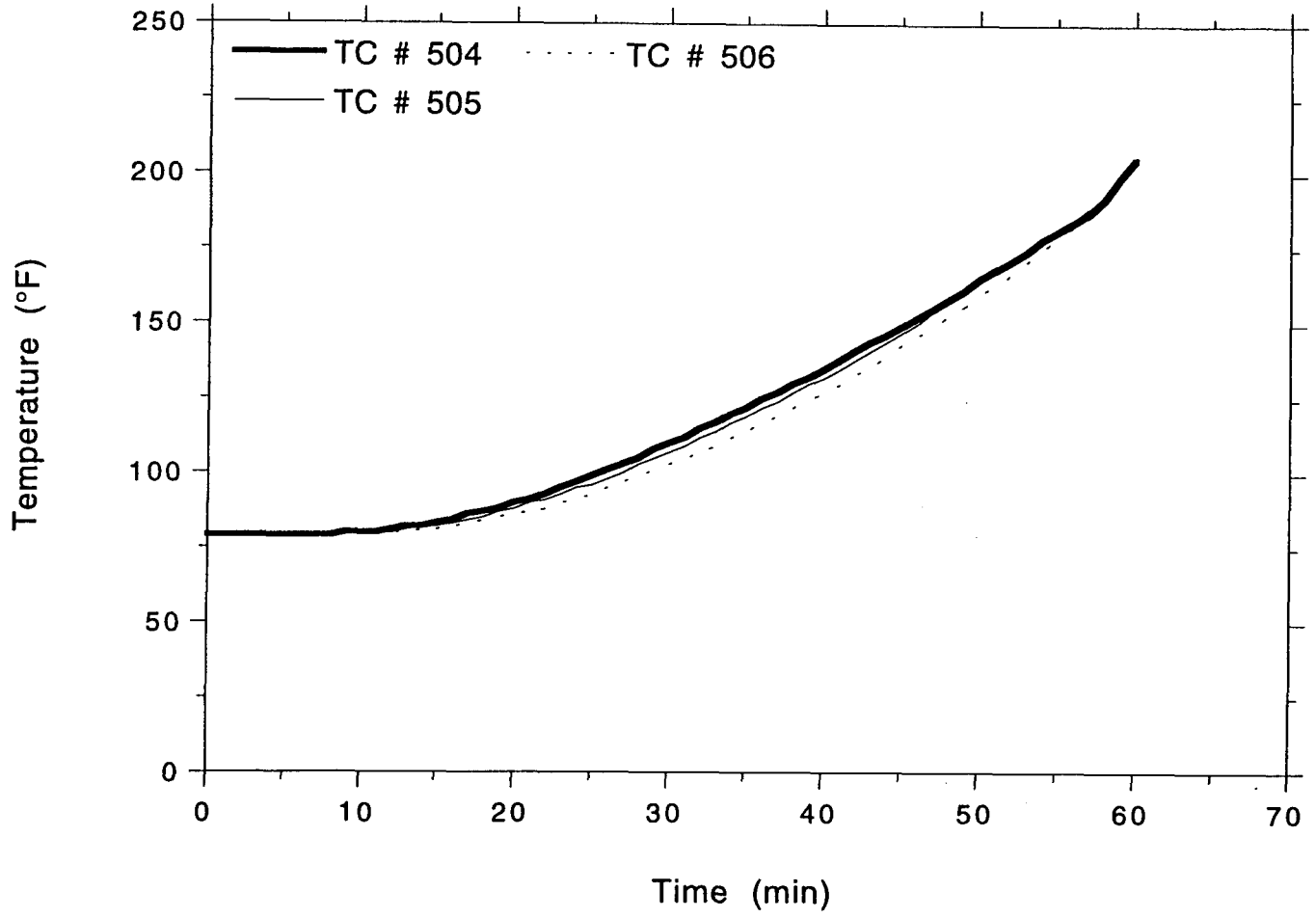

OMEGA POINT LABORATORIES

TSI/TVA
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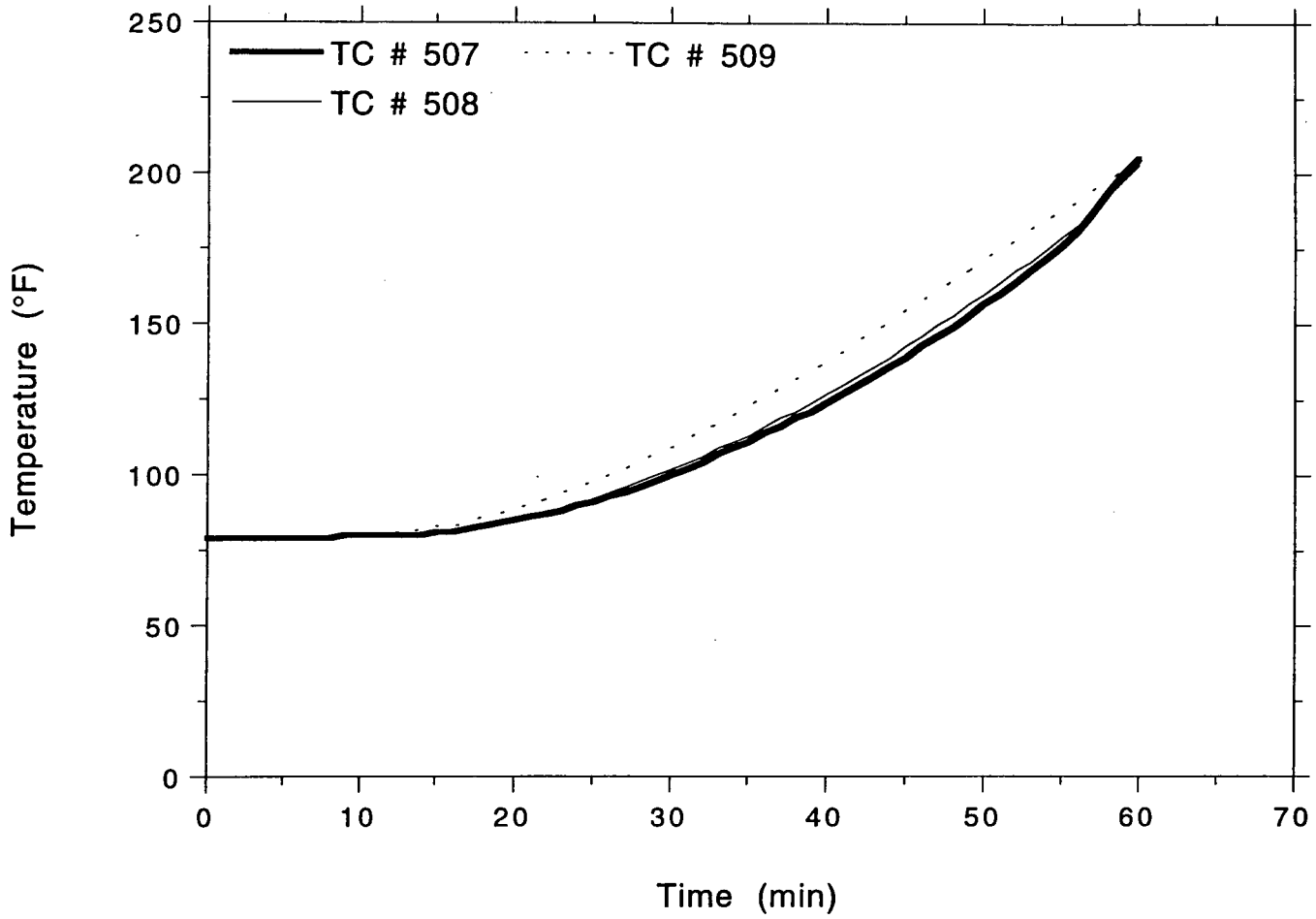

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
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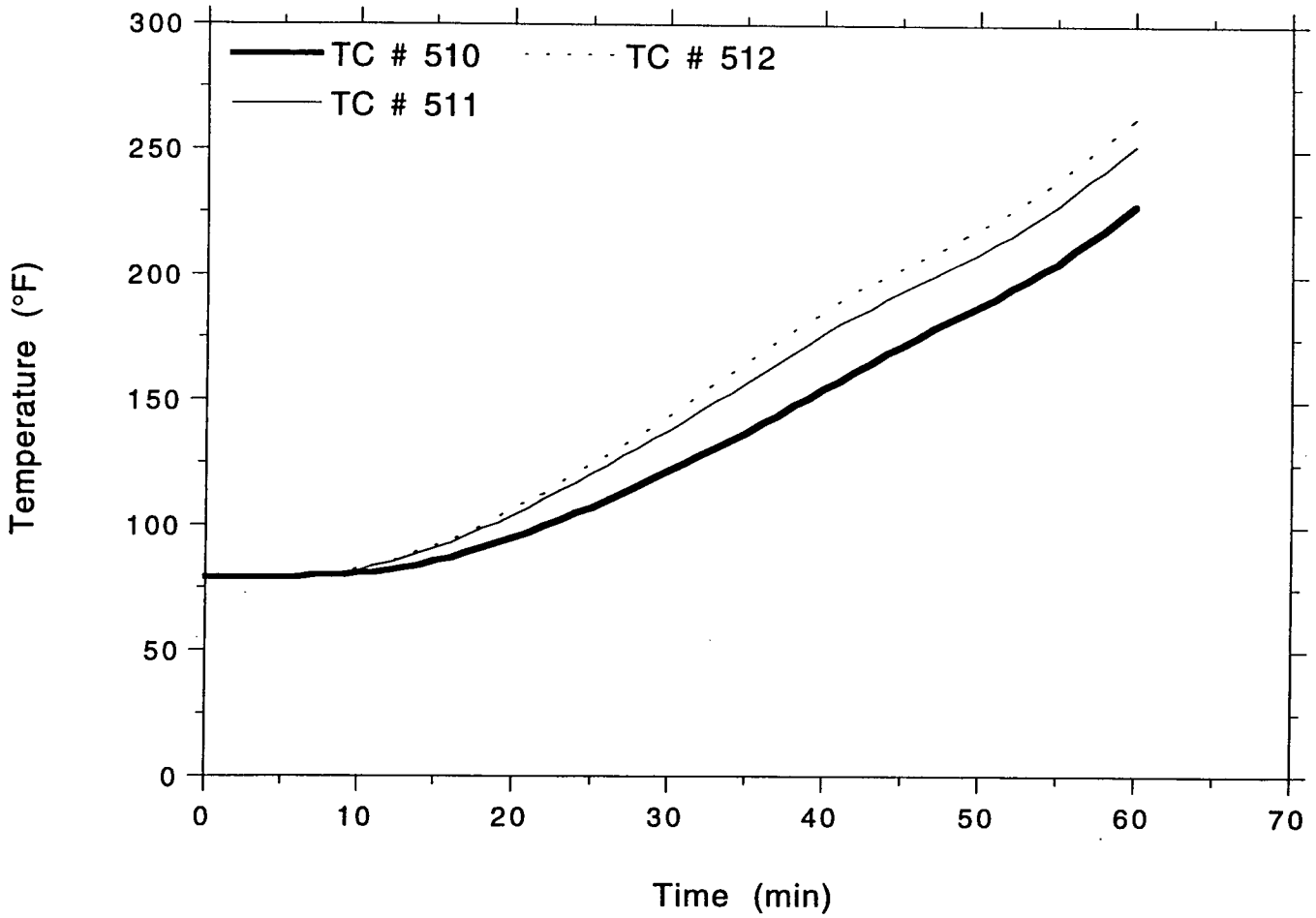
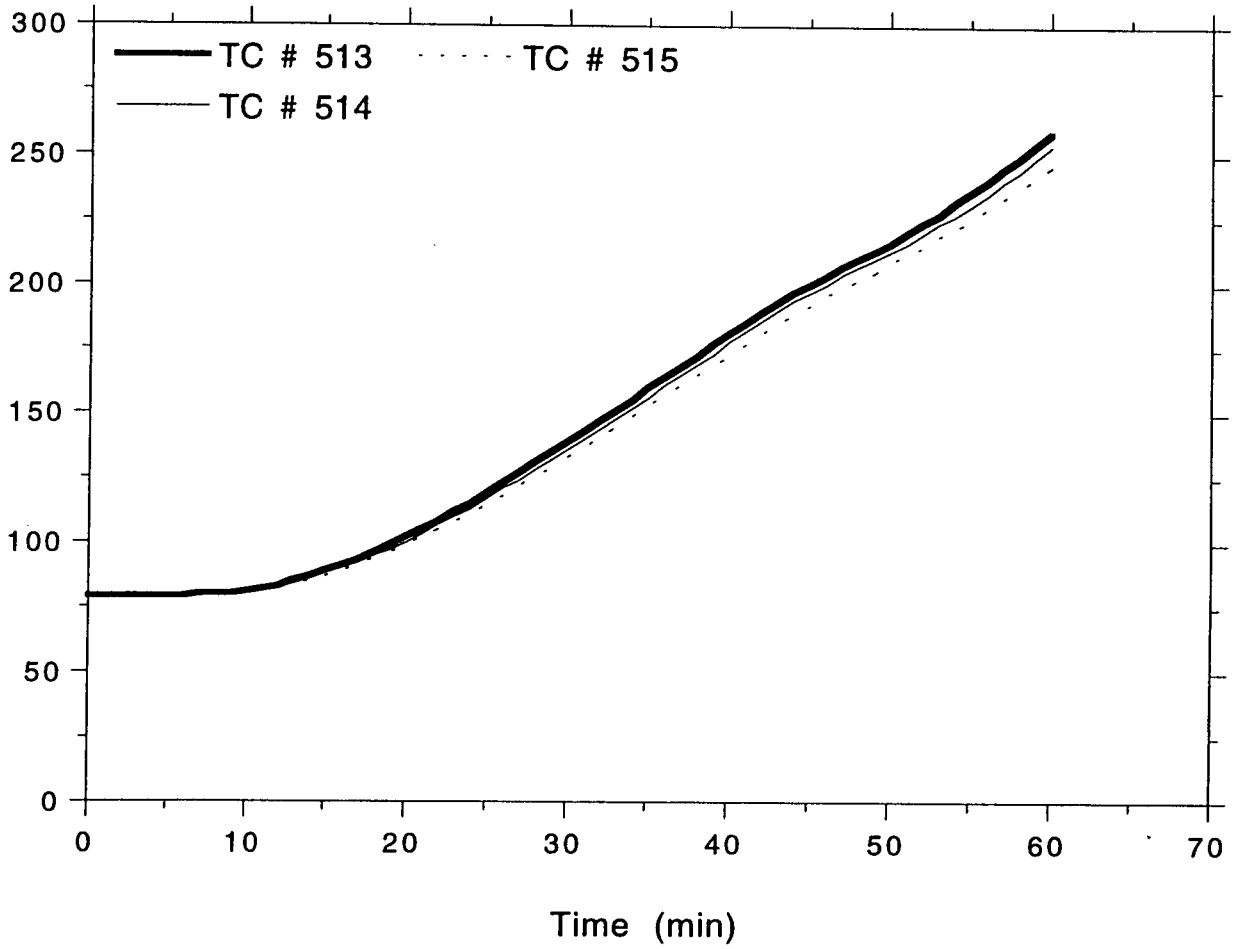


OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

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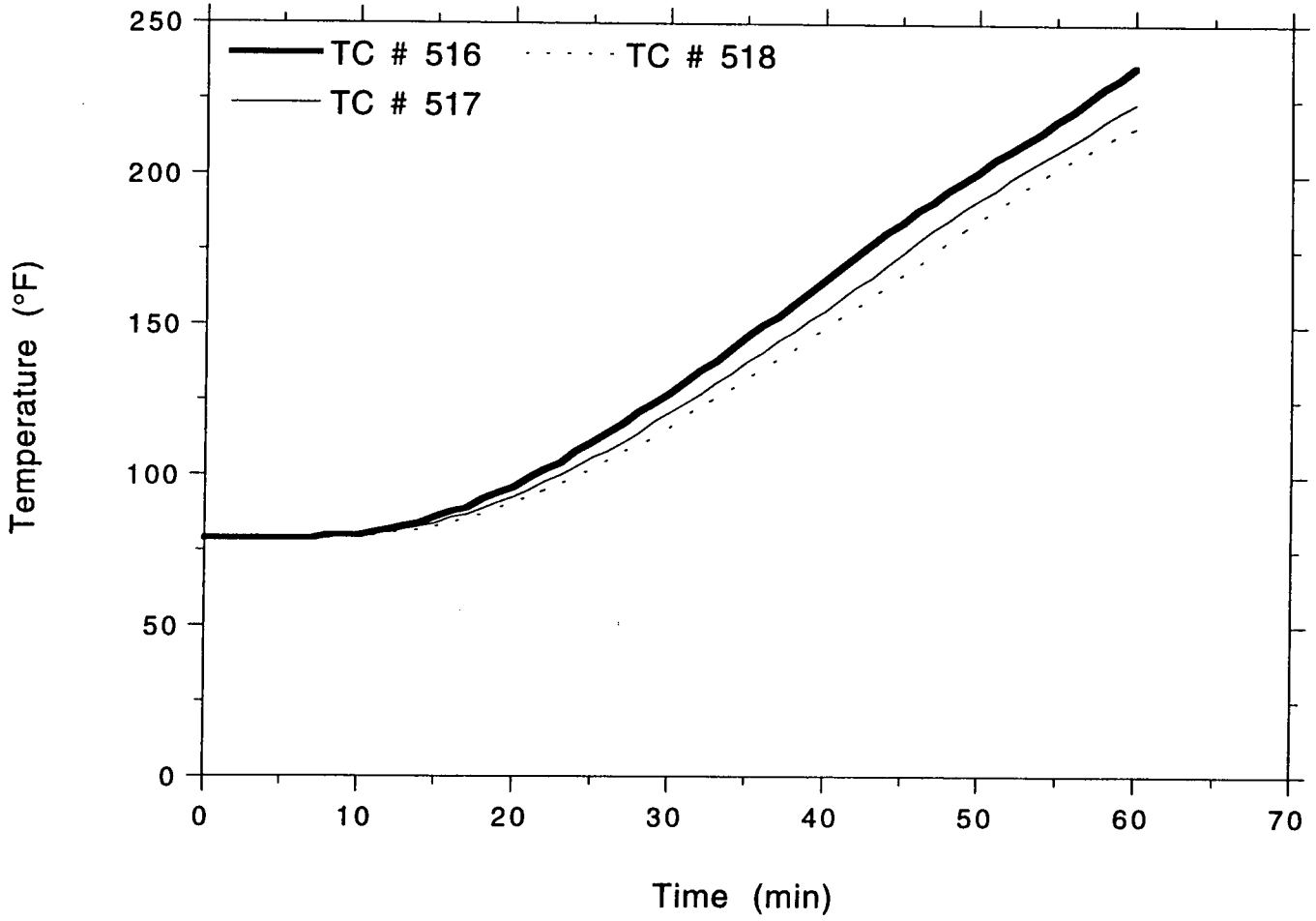
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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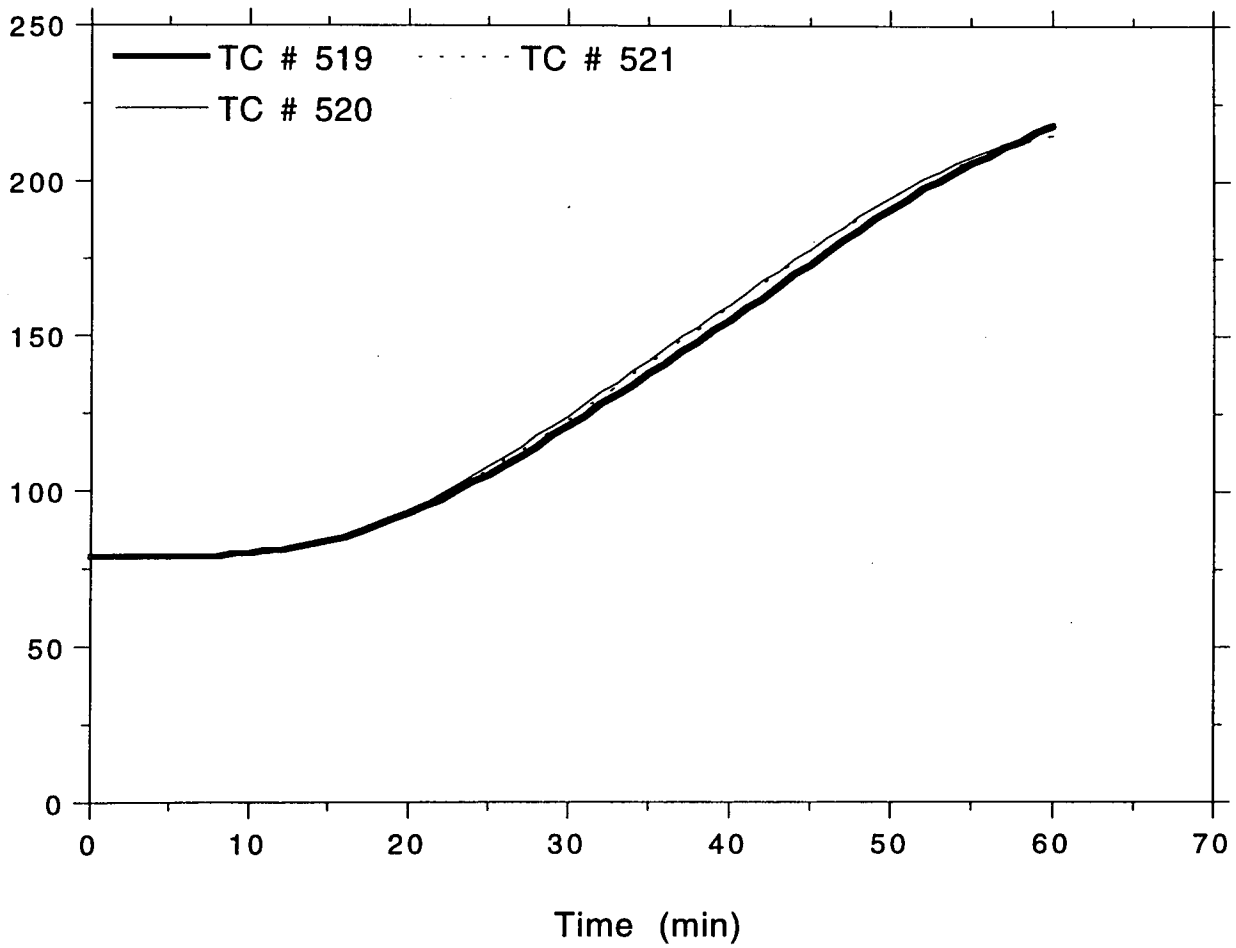
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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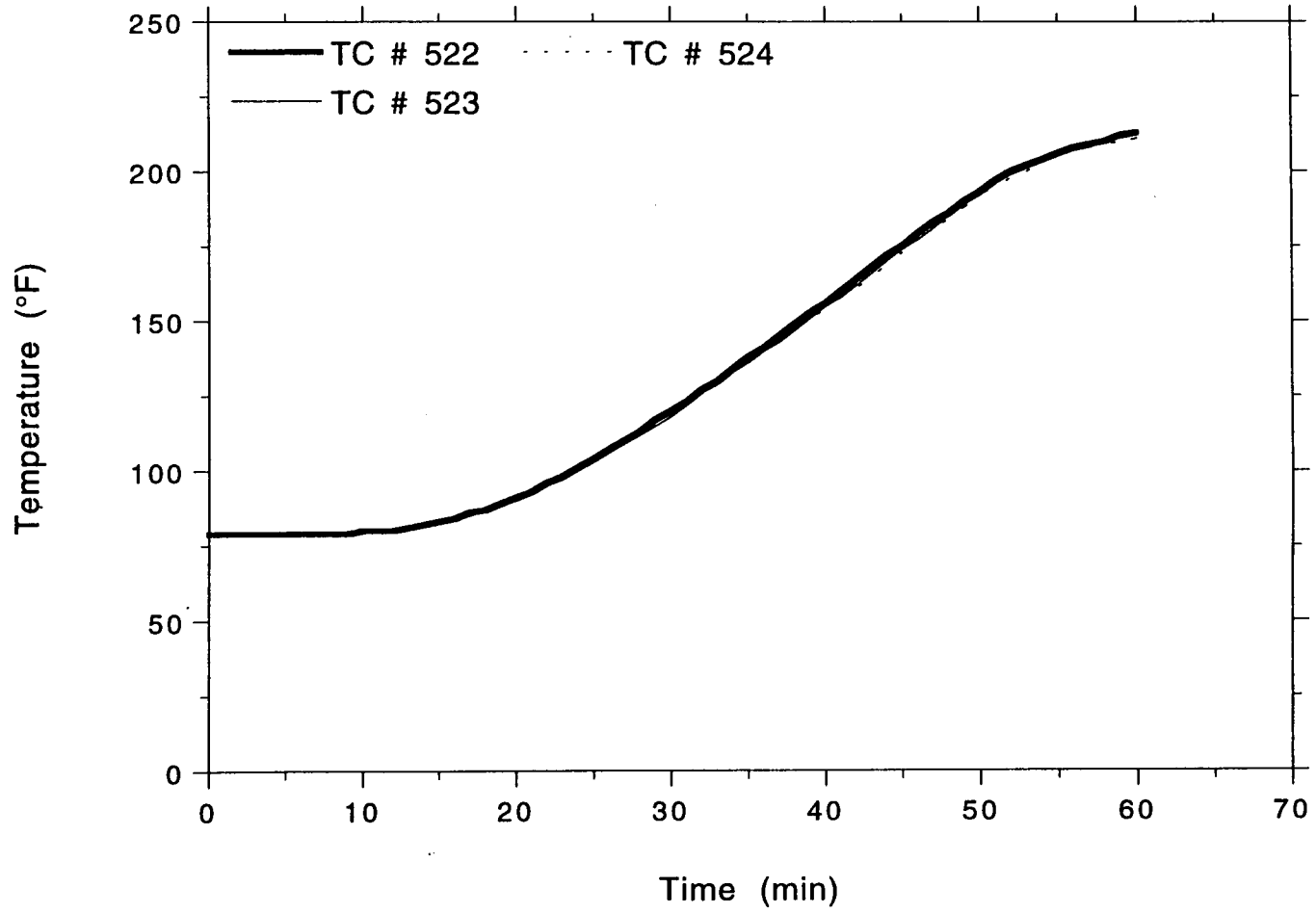
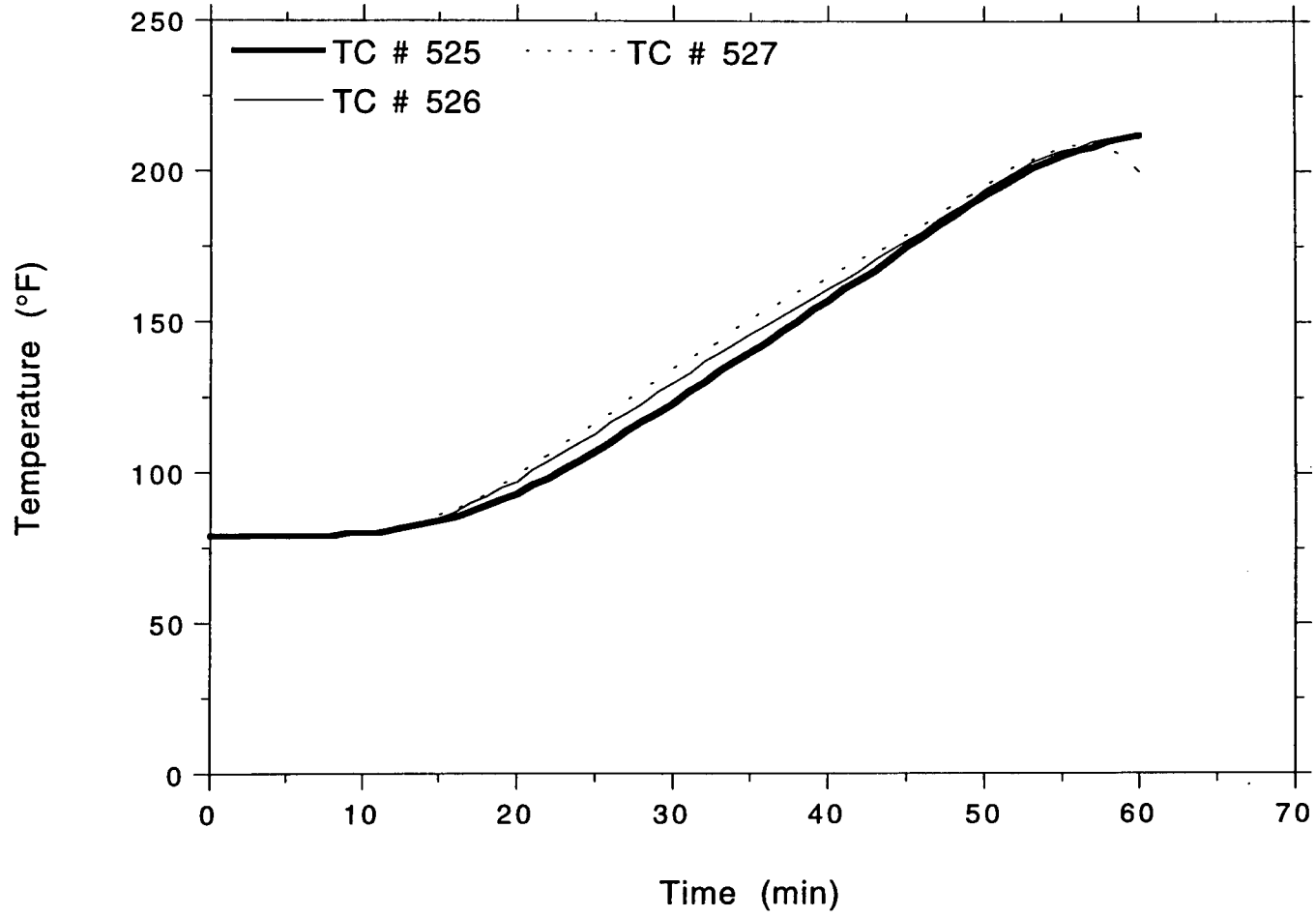


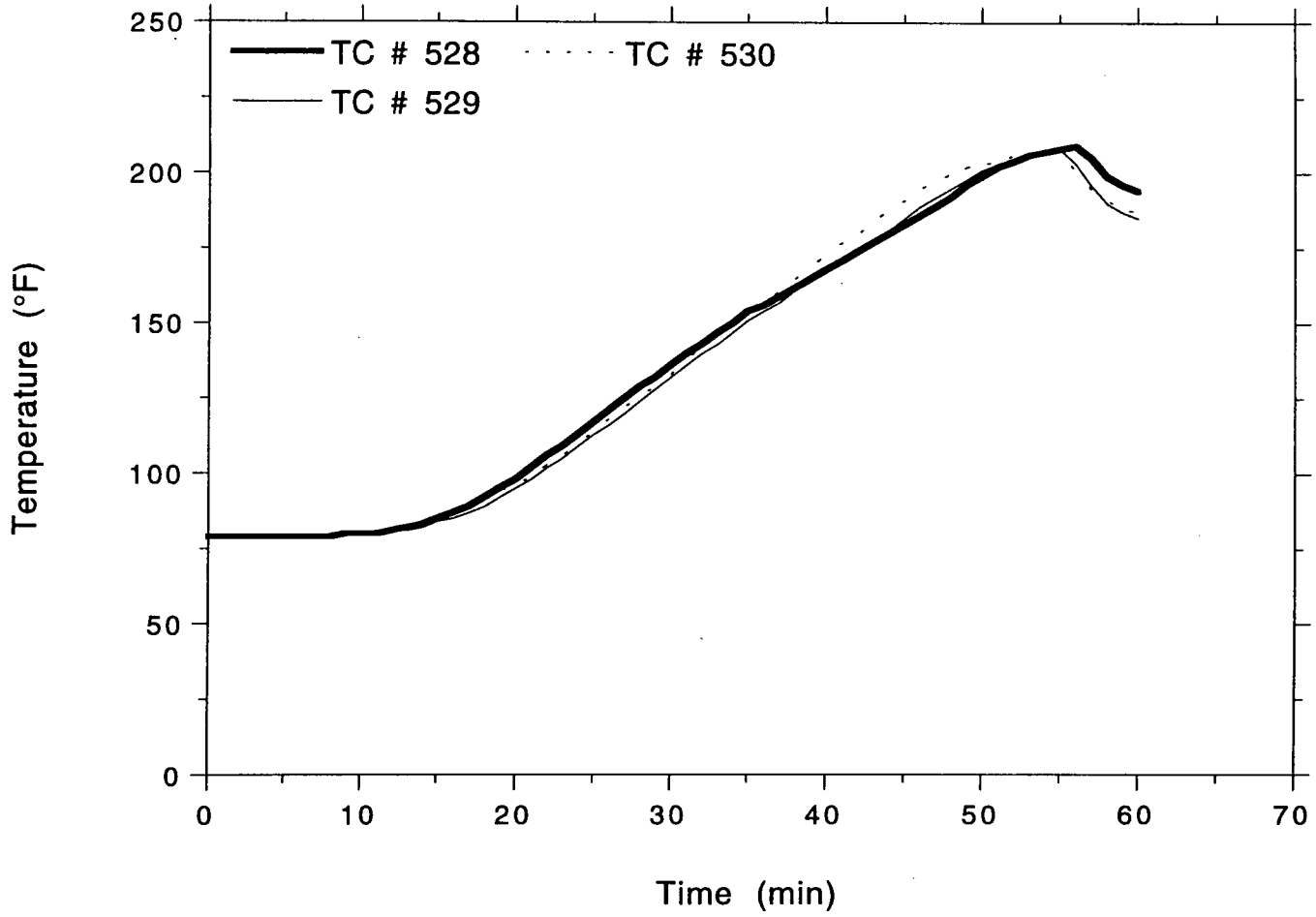
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



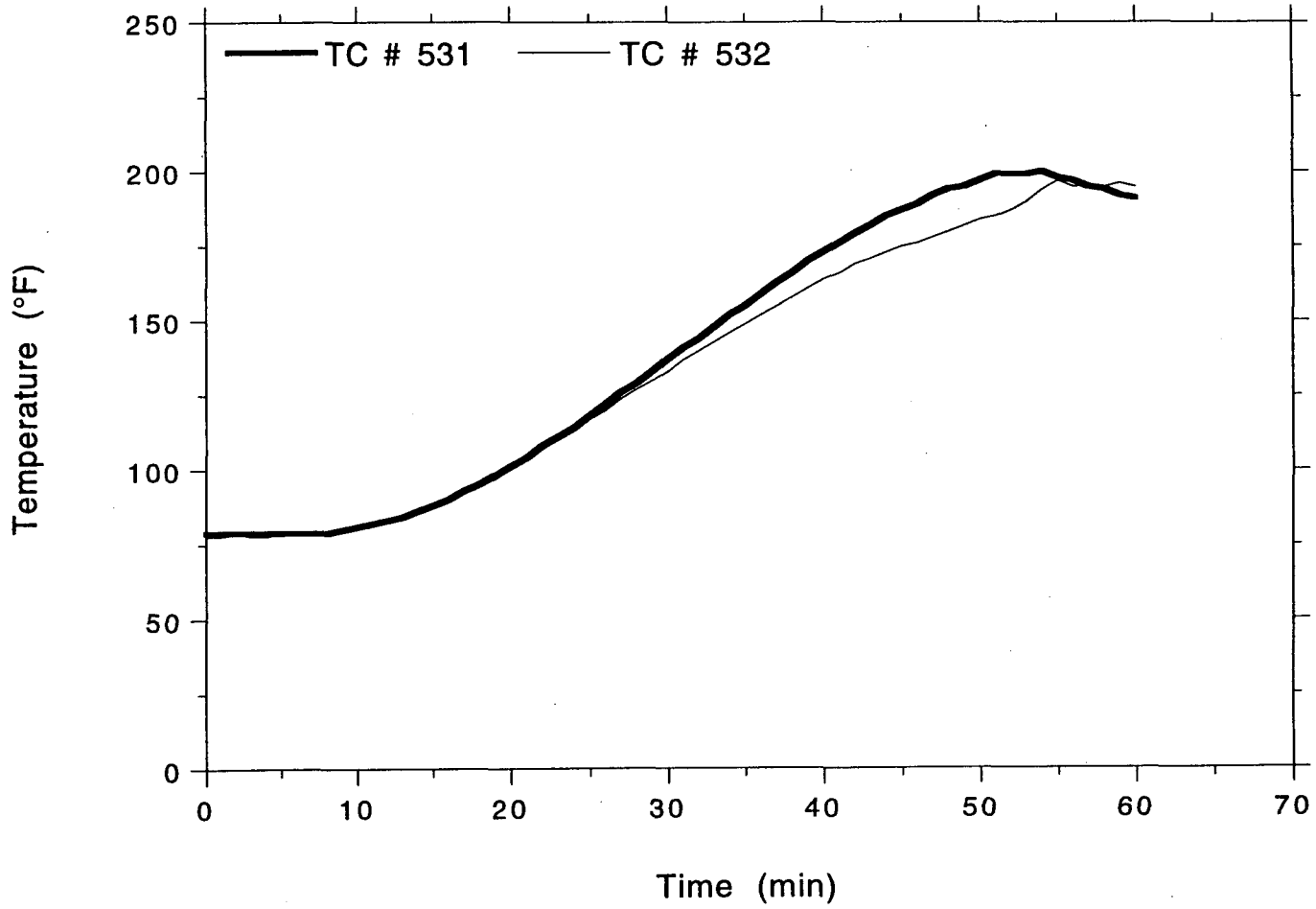
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97260
Front 4" Steel Conduit



OMEGA POINT LABORATORIES

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 (8) 12/23/94

9501120202

FIRE ENDURANCE TEST OF THERMO-LAG® 330-1 FIRE PROTECTIVE ENVELOPES (Box Enclosures Encasing a Bank of Seven 4 in. Steel Conduits and Individual Enclosures on 3/4 in. Aluminum and Steel Conduits)

Project No. 11960-97260
(Volume 2 of 2)

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

December 1, 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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(VOLUME 2 OF 2)

Appendix D

TEST DATA (continued)

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	Aluminum 3/4" Conduit Surface Max (°F)	Aluminum 3/4" Conduit Surface Avg (°F)	Aluminum 3/4" Conduit Bare #8 AWG Max (°F)	Aluminum 3/4" Conduit Bare #8 AWG Avg (°F)
0	81	80	80	80
1	81	80	80	79
2	81	80	80	79
3	81	80	80	79
4	81	80	80	79
5	81	80	80	79
6	81	80	80	80
7	81	81	80	80
8	83	81	81	80
9	86	83	82	80
10	88	84	83	81
11	91	86	84	81
12	94	89	86	82
13	98	92	88	84
14	102	95	90	85
15	106	99	92	87
16	111	102	95	90
17	117	106	98	92
18	126	111	102	95
19	137	115	106	98
20	144	120	112	102
21	150	125	119	106
22	155	130	130	110
23	161	135	140	115
24	168	140	150	121
25	174	145	157	126
26	179	149	161	132
27	183	153	166	137
28	188	157	170	141
29	191	161	174	146
30	194	165	177	150
31	198	169	180	154
32	202	173	184	158
33	205	177	188	162
34	207	181	193	166
35	208	185	200	170
36	209	189	204	175

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	Aluminum 3/4" Conduit Surface Max (°F)	Aluminum 3/4" Conduit Surface Avg (°F)	Aluminum 3/4" Conduit Bare #8 AWG Max (°F)	Aluminum 3/4" Conduit Bare #8 AWG Avg (°F)
37	208	193	206	180
38	212	197	206	184
39	214	201	207	189
40	215	204	208	192
41	216	206	208	195
42	218	208	208	197
43	220	210	210	200
44	221	212	211	203
45	223	213	212	205
46	224	214	212	206
47	225	215	212	207
48	226	215	213	208
49	226	216	216	210
50	224	215	216	210
51	222	214	215	209
52	220	214	214	209
53	220	214	213	209
54	220	214	212	209
55	220	214	212	209
56	220	214	212	209
57	220	214	212	209
58	220	214	213	209
59	221	214	213	209
60	221	214	213	210
Max Temp:	226	216	216	210
Max Allowed:	406	330	405	330

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	3/4" Steel Conduit Surface Max (°F)	3/4" Steel Conduit Surface Avg (°F)	3/4" Steel Conduit Bare #8 AWG Max (°F)	3/4" Steel Conduit Bare #8 AWG Avg (°F)
0	80	79	80	78
1	80	79	80	78
2	80	79	80	78
3	80	79	79	78
4	80	79	80	78
5	81	79	80	78
6	81	79	80	78
7	81	79	80	78
8	82	80	80	78
9	83	81	80	78
10	85	82	80	79
11	87	83	80	79
12	89	85	81	80
13	92	87	83	81
14	95	89	85	82
15	98	92	87	84
16	102	95	90	86
17	108	98	94	88
18	113	102	98	90
19	120	105	102	93
20	130	109	106	96
21	137	113	111	99
22	143	117	116	102
23	149	122	121	105
24	154	126	126	109
25	159	131	133	113
26	160	135	138	117
27	163	139	143	121
28	166	143	147	125
29	168	147	151	129
30	171	151	156	133
31	173	155	160	138
32	177	159	162	142
33	181	162	166	146
34	185	167	170	150
35	188	170	173	153
36	192	174	177	157

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	Steel Conduit 3/4" Surface Max (°F)	Steel Conduit 3/4" Surface Avg (°F)	Steel Conduit 3/4" Bare #8 AWG Max (°F)	Steel Conduit 3/4" Bare #8 AWG Avg (°F)
37	195	178	181	160
38	198	181	185	164
39	201	184	188	168
40	203	187	191	171
41	205	189	194	174
42	208	192	196	178
43	210	195	198	181
44	212	197	200	184
45	214	200	202	186
46	215	202	204	189
47	217	204	205	191
48	219	206	207	194
49	220	208	208	196
50	221	209	210	198
51	223	211	211	200
52	224	212	213	202
53	225	214	214	204
54	226	215	216	205
55	227	216	217	207
56	228	217	219	208
57	229	218	220	209
58	230	218	221	210
59	232	219	222	212
60	233	220	223	213
Max Temp:	233	220	223	213
Max Allowed:	405	329	405	328

OMEGA POINT LABORATORIES

Time (min)	4" Conduit Rear-most Surface Max (°F)	4" Conduit Rear-most Surface Avg (°F)	4" Conduit Rear-most Bare #8 AWG Max (°F)	4" Conduit Rear-most Bare #8 AWG Avg (°F)
0	82	79	80	79
1	82	79	80	79
2	82	79	80	79
3	82	79	80	79
4	82	79	80	79
5	83	80	80	79
6	85	80	80	79
7	88	80	80	79
8	91	81	80	79
9	95	82	81	79
10	99	83	82	80
11	104	85	84	80
12	109	86	86	81
13	114	88	88	82
14	119	90	90	82
15	124	93	92	84
16	130	95	95	85
17	135	98	97	86
18	140	101	100	88
19	144	104	103	90
20	149	107	106	92
21	153	111	109	94
22	158	114	111	97
23	160	118	115	99
24	164	121	118	102
25	168	125	122	104
26	173	128	125	107
27	177	132	131	110
28	182	136	135	114
29	188	139	139	117
30	193	143	143	120
31	198	146	147	123
32	202	150	151	127
33	206	154	156	130
34	209	157	158	134
35	212	161	163	137
36	213	164	167	140

OMEGA POINT LABORATORIES

TVA / TSI Project No. 97260 October 18, 1994

Time (min)	4" Conduit Rear-most Surface Max (°F)	4" Conduit Rear-most Surface Avg (°F)	4" Conduit Rear-most Bare #8 AWG Max (°F)	4" Conduit Rear-most Bare #8 AWG Avg (°F)
37	214	168	172	143
38	215	172	176	147
39	216	175	180	150
40	218	179	184	153
41	221	182	188	156
42	224	185	192	160
43	228	188	195	163
44	232	191	199	167
45	235	193	202	170
46	239	196	205	173
47	242	199	207	177
48	246	201	210	180
49	249	204	213	183
50	252	206	216	186
51	257	209	219	189
52	260	212	223	191
53	254	214	226	195
54	257	216	230	198
55	262	218	234	201
56	267	220	238	204
57	272	222	242	207
58	277	224	247	210
59	282	226	252	213
60	287	228	259	217
Max Temp:	287	228	259	217
Max Allowed:	407	329	405	329

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 2nd from rear Surface Max (°F)	4" Conduit 2nd from rear Surface Avg (°F)	4" Conduit 2nd from rear Bare #8 AWG Max (°F)	4" Conduit 2nd from rear Bare #8 AWG Avg (°F)
0	84	83	81	78
1	84	83	81	78
2	84	83	81	78
3	84	83	81	78
4	84	83	81	78
5	85	83	81	78
6	86	83	81	78
7	88	83	81	78
8	91	83	81	78
9	94	84	81	78
10	98	84	81	79
11	102	85	81	79
12	106	86	82	79
13	110	87	84	80
14	114	89	86	80
15	119	90	88	81
16	123	92	90	82
17	130	94	92	83
18	134	96	95	84
19	138	98	98	86
20	143	100	100	87
21	147	103	103	88
22	152	105	106	90
23	156	108	109	92
24	158	110	112	94
25	163	113	115	96
26	167	116	118	98
27	171	119	121	100
28	175	122	124	102
29	179	126	130	105
30	183	129	133	107
31	186	132	137	110
32	190	135	141	112
33	194	138	144	115
34	197	142	147	118
35	201	145	151	121
36	205	148	154	124

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 2nd from rear Surface Max (°F)	4" Conduit 2nd from rear Surface Avg (°F)	4" Conduit 2nd from rear Bare #8 AWG Max (°F)	4" Conduit 2nd from rear Bare #8 AWG Avg (°F)
37	208	151	157	127
38	211	155	158	130
39	213	158	162	133
40	214	162	165	136
41	215	165	168	139
42	216	169	171	142
43	217	173	174	146
44	219	176	177	149
45	219	180	180	152
46	221	183	184	156
47	222	187	187	159
48	224	190	190	163
49	226	193	194	167
50	229	196	197	170
51	232	199	200	174
52	234	202	203	177
53	235	204	205	180
54	237	206	207	183
55	236	208	208	186
56	220	210	210	189
57	220	211	211	191
58	220	212	210	193
59	222	214	211	195
60	224	215	213	197
Max Temp:	237	215	213	197
Max Allowed:	409	333	406	328

OMEGA POINT LABORATORIES

TVA / TSI Project No. 97260 October 18, 1994

Time (min)	4" Conduit 3rd from rear Surface Max (°F)	4" Conduit 3rd from rear Surface Avg (°F)	4" Conduit 3rd from rear Bare #8 AWG Max (°F)	4" Conduit 3rd from rear Bare #8 AWG Avg (°F)
0	84	82	80	79
1	84	82	80	79
2	84	82	80	79
3	84	82	80	79
4	84	82	80	79
5	84	82	80	79
6	85	82	80	79
7	89	82	80	79
8	93	82	81	79
9	98	83	82	79
10	103	84	84	80
11	108	84	86	80
12	113	85	88	80
13	118	86	90	81
14	124	87	93	81
15	131	89	96	82
16	136	90	99	83
17	141	92	101	84
18	146	94	104	85
19	150	96	108	86
20	155	98	111	88
21	160	100	114	89
22	162	103	117	91
23	166	105	120	93
24	170	108	124	95
25	175	111	127	97
26	179	113	130	99
27	183	117	133	101
28	187	120	137	103
29	191	123	140	105
30	195	126	143	108
31	200	129	147	110
32	205	132	150	112
33	207	135	153	115
34	209	138	156	117
35	211	141	159	120
36	212	144	162	122

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 3rd from rear Surface Max (°F)	4" Conduit 3rd from rear Surface Avg (°F)	4" Conduit 3rd from rear Bare #8 AWG Max (°F)	4" Conduit 3rd from rear Bare #8 AWG Avg (°F)
37	214	147	164	125
38	216	150	167	128
39	219	153	170	130
40	222	157	173	133
41	225	160	176	136
42	228	163	179	139
43	231	166	182	142
44	234	170	184	145
45	237	173	187	148
46	240	176	190	151
47	243	180	193	154
48	247	183	196	157
49	250	186	200	161
50	253	190	203	164
51	258	193	205	167
52	239	195	206	170
53	218	197	208	173
54	214	199	208	176
55	214	202	208	179
56	214	204	208	181
57	214	207	209	183
58	215	209	210	186
59	217	211	211	190
60	219	213	213	194
Max Temp:	258	213	213	194
Max Allowed:	409	332	405	329

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 4th from rear Surface Max (°F)	4" Conduit 4th from rear Surface Avg (°F)	4" Conduit 4th from rear Bare #8 AWG Max (°F)	4" Conduit 4th from rear Bare #8 AWG Avg (°F)
0	83	80	80	79
1	83	80	80	80
2	83	80	80	80
3	83	80	80	80
4	83	80	80	80
5	83	80	80	80
6	84	80	80	80
7	85	80	80	80
8	87	80	80	80
9	89	81	80	80
10	92	81	81	80
11	95	82	82	80
12	98	83	83	80
13	102	83	84	81
14	106	84	86	81
15	109	86	88	82
16	113	87	90	82
17	117	88	92	83
18	121	90	94	84
19	125	92	96	85
20	131	94	99	86
21	135	96	101	87
22	139	98	104	89
23	143	100	107	90
24	147	103	109	92
25	151	105	112	93
26	156	108	115	95
27	160	110	118	97
28	161	113	120	99
29	165	116	123	101
30	169	119	126	103
31	172	122	129	105
32	176	125	132	108
33	179	128	135	110
34	182	131	139	113
35	186	134	142	115
36	189	138	146	118

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 4th from rear Surface Max (°F)	4" Conduit 4th from rear Surface Avg (°F)	4" Conduit 4th from rear Bare #8 AWG Max (°F)	4" Conduit 4th from rear Bare #8 AWG Avg (°F)
37	192	141	149	121
38	195	144	153	124
39	197	148	157	127
40	200	151	161	130
41	202	155	164	133
42	207	158	168	136
43	208	162	172	139
44	210	165	176	142
45	211	168	180	145
46	212	172	184	148
47	213	175	188	152
48	214	179	192	155
49	215	182	196	158
50	217	185	199	162
51	218	188	202	165
52	221	192	205	168
53	223	195	207	172
54	225	198	208	175
55	227	200	209	178
56	229	203	210	181
57	231	206	212	184
58	233	208	213	187
59	235	210	215	191
60	237	212	217	194
Max Temp:	237	212	217	194
Max Allowed:	408	330	405	329

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 5th from rear Surface Max (°F)	4" Conduit 5th from rear Surface Avg (°F)	4" Conduit 5th from rear Bare #8 AWG Max (°F)	4" Conduit 5th from rear Bare #8 AWG Avg (°F)
0	83	82	80	79
1	83	82	80	79
2	83	82	80	79
3	83	82	80	79
4	83	82	80	79
5	84	82	80	79
6	86	82	80	79
7	89	83	80	79
8	93	83	80	79
9	97	83	81	80
10	101	84	82	80
11	105	85	83	80
12	109	86	85	80
13	113	87	87	81
14	118	88	88	81
15	123	89	90	82
16	129	91	92	83
17	134	93	95	84
18	139	94	97	85
19	143	96	100	86
20	147	98	102	87
21	151	101	105	88
22	155	103	107	90
23	158	105	109	91
24	160	108	112	93
25	163	110	115	95
26	167	113	117	97
27	170	116	120	99
28	174	119	122	101
29	177	122	125	103
30	179	125	128	105
31	183	128	131	107
32	187	131	134	110
33	187	135	137	112
34	189	138	140	115
35	191	141	143	117
36	194	144	147	120

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 5th from rear Surface Max (°F)	4" Conduit 5th from rear Surface Avg (°F)	4" Conduit 5th from rear Bare #8 AWG Max (°F)	4" Conduit 5th from rear Bare #8 AWG Avg (°F)
37	196	148	150	123
38	198	151	153	126
39	200	154	156	129
40	203	157	159	132
41	205	160	163	135
42	206	164	167	138
43	207	167	171	141
44	208	170	174	144
45	209	173	178	148
46	212	177	182	151
47	214	180	186	154
48	215	184	190	158
49	216	187	194	161
50	218	190	198	164
51	219	193	202	168
52	219	196	205	171
53	220	199	207	174
54	221	202	208	177
55	222	204	210	181
56	223	207	211	184
57	224	209	212	187
58	225	211	214	189
59	226	214	215	192
60	228	216	217	195
Max Temp:	228	216	217	195
Max Allowed:	408	332	405	329

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 6th from rear Surface Max (°F)	4" Conduit 6th from rear Surface Avg (°F)	4" Conduit 6th from rear Bare #8 AWG Max (°F)	4" Conduit 6th from rear Bare #8 AWG Avg (°F)
0	83	82	79	79
1	83	82	79	79
2	83	82	80	79
3	83	82	79	79
4	83	82	79	79
5	84	82	79	79
6	85	82	79	79
7	88	82	79	79
8	91	82	80	79
9	95	83	81	79
10	99	83	82	80
11	103	84	84	80
12	108	85	85	80
13	112	86	87	81
14	116	87	90	81
15	121	89	92	82
16	125	90	94	82
17	131	92	97	83
18	136	94	100	84
19	140	96	102	86
20	144	98	105	87
21	148	100	108	88
22	153	102	111	90
23	156	105	114	91
24	158	107	117	93
25	162	110	120	95
26	166	113	123	97
27	170	115	126	99
28	174	118	129	101
29	178	122	132	103
30	181	125	135	106
31	185	128	138	108
32	189	132	141	111
33	192	135	144	113
34	195	139	147	116
35	199	142	151	119
36	203	145	154	122

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 6th from rear Surface Max (°F)	4" Conduit 6th from rear Surface Avg (°F)	4" Conduit 6th from rear Bare #8 AWG Max (°F)	4" Conduit 6th from rear Bare #8 AWG Avg (°F)
37	206	149	157	125
38	209	152	161	128
39	212	155	164	131
40	214	159	168	134
41	215	162	171	138
42	216	166	175	141
43	218	170	178	144
44	220	173	182	148
45	222	177	185	151
46	225	180	188	155
47	227	184	191	159
48	230	188	193	162
49	232	191	195	166
50	234	194	198	169
51	236	197	200	173
52	239	200	203	176
53	241	203	205	180
54	244	205	207	183
55	246	207	208	186
56	248	209	210	189
57	251	211	211	191
58	253	213	213	194
59	258	215	214	197
60	261	216	216	199
Max Temp:	261	216	216	199
Max Allowed:	408	332	404	329

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 7th from rear Surface Max (°F)	4" Conduit 7th from rear Surface Avg (°F)	4" Conduit 7th from rear Bare #8 AWG Max (°F)	4" Conduit 7th from rear Bare #8 AWG Avg (°F)
0	84	82	80	79
1	84	82	79	79
2	84	82	79	79
3	84	82	79	79
4	84	82	79	79
5	84	82	79	79
6	85	82	80	79
7	88	83	80	79
8	91	84	81	79
9	95	85	81	80
10	99	86	83	80
11	103	88	84	81
12	107	90	86	81
13	112	92	87	82
14	116	94	90	83
15	121	97	92	85
16	126	99	94	86
17	133	102	97	88
18	138	105	100	90
19	143	108	103	92
20	147	111	107	94
21	152	115	110	96
22	157	118	113	99
23	159	122	117	101
24	164	126	121	104
25	169	129	125	107
26	174	132	128	110
27	179	136	132	113
28	183	140	136	116
29	188	143	140	119
30	193	147	144	122
31	197	150	148	125
32	201	153	153	128
33	205	157	157	131
34	207	160	161	134
35	210	163	165	138
36	211	166	170	141

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	4" Conduit 7th from rear Surface Max (°F)	4" Conduit 7th from rear Surface Avg (°F)	4" Conduit 7th from rear Bare #8 AWG Max (°F)	4" Conduit 7th from rear Bare #8 AWG Avg (°F)
37	212	169	174	144
38	212	172	178	147
39	214	175	182	151
40	216	178	186	154
41	219	181	190	157
42	222	184	194	160
43	224	187	197	164
44	228	190	200	167
45	231	193	203	170
46	234	196	206	173
47	237	199	209	176
48	240	202	212	179
49	242	205	216	183
50	245	208	219	186
51	247	211	222	189
52	249	213	226	192
53	251	215	230	195
54	257	217	234	198
55	262	220	239	200
56	267	222	243	203
57	271	224	248	205
58	276	226	253	208
59	281	228	258	211
60	286	230	263	214
Max Temp:	286	230	263	214
Max Allowed:	409	332	405	329

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	80	80	80	80	80	81	80	80	80
1	80	80	80	80	80	81	80	80	80
2	80	80	80	80	80	81	80	80	80
3	80	80	80	80	80	81	80	80	80
4	80	80	80	80	80	81	80	80	80
5	80	80	80	80	80	81	80	80	80
6	80	80	80	80	81	81	80	80	80
7	81	81	81	80	81	81	80	81	80
8	81	82	82	81	82	81	81	82	81
9	82	83	83	82	83	81	83	83	83
10	84	85	84	83	84	82	85	84	84
11	86	87	86	85	86	84	87	87	87
12	88	89	88	87	88	87	91	89	89
13	90	92	91	89	91	90	95	93	92
14	92	95	94	92	94	94	100	96	96
15	95	98	97	95	97	98	106	100	100
16	98	101	100	98	101	102	111	104	103
17	101	105	103	102	105	107	117	109	107
18	104	109	107	105	109	112	126	113	112
19	107	113	111	109	113	118	137	118	116
20	111	117	115	113	118	124	144	124	120
21	114	121	119	118	122	132	150	131	125
22	118	125	123	122	127	138	155	136	131
23	122	131	130	127	134	143	161	141	136
24	126	136	134	133	139	149	168	146	140
25	133	140	138	138	144	155	174	151	145
26	139	145	143	143	149	158	179	156	149
27	144	149	147	147	153	163	183	158	154
28	149	154	152	152	158	168	188	163	158
29	154	158	156	156	161	172	191	167	161
30	159	161	158	159	166	176	194	172	165
31	161	165	162	163	170	180	198	176	170
32	165	169	167	167	175	184	202	180	174
33	169	174	171	172	179	189	205	184	178
34	173	178	175	176	184	194	207	188	182
35	178	182	179	180	189	200	208	192	186
36	181	186	183	185	196	205	209	195	190
37	185	190	187	193	206	208	208	198	193
38	187	194	196	205	208	209	207	201	197
39	194	203	205	207	208	209	208	204	200
40	205	207	207	207	209	209	209	206	203
41	208	208	208	208	209	210	209	209	206

OMEGA POINT LABORATORIES

TVA / TSI Project No. 97260 October 18, 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	209	209	208	208	210	210	209	211	209
43	210	209	209	209	210	210	209	213	212
44	210	210	210	210	210	210	209	213	216
45	211	211	211	211	211	210	210	213	213
46	211	211	211	212	212	211	210	213	213
47	212	212	212	212	213	211	210	213	214
48	211	212	212	212	213	211	211	214	214
49	211	212	212	212	213	211	211	214	214
50	212	212	212	212	213	211	211	214	214
51	212	212	212	212	213	211	211	214	214
52	212	212	212	212	214	211	211	214	214
53	212	213	213	213	213	211	211	214	214
54	213	213	213	213	214	212	212	214	214
55	213	213	213	213	214	212	212	214	215
56	213	213	213	213	213	212	212	215	215
57	213	213	213	213	213	212	212	215	215
58	213	213	213	213	213	212	212	215	215
59	213	213	213	213	213	212	212	215	215
60	213	213	213	213	213	212	212	215	216
Max Temp:	213	213	213	213	214	212	212	215	216
Max Allowed:	405	405	405	405	405	406	405	405	405

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	80	80	80	80	80	80	80
1	80	80	79	80	80	80	80
2	80	80	79	80	80	80	80
3	80	80	79	80	80	80	80
4	80	80	79	80	80	80	80
5	80	80	80	80	80	80	80
6	80	80	80	80	80	80	80
7	80	81	80	81	81	80	80
8	82	82	82	81	83	81	81
9	83	83	83	83	86	83	82
10	85	85	85	84	88	85	84
11	87	87	88	87	91	87	86
12	90	90	91	89	94	90	88
13	93	93	94	92	98	93	91
14	96	97	97	95	102	96	94
15	100	100	101	99	105	99	97
16	104	104	104	103	109	103	101
17	108	108	109	107	113	107	104
18	112	112	113	111	118	111	108
19	116	117	117	116	122	115	118
20	120	121	121	121	129	119	124
21	125	125	126	125	134	124	131
22	131	132	132	132	139	130	136
23	135	136	137	137	144	134	142
24	140	140	142	142	148	139	147
25	144	145	146	146	152	143	152
26	149	149	150	151	157	147	157
27	153	153	155	156	160	151	159
28	157	158	159	158	161	155	163
29	159	160	161	162	165	160	168
30	164	164	165	166	168	162	172
31	168	169	169	170	172	167	177
32	172	173	174	175	176	172	182
33	177	177	178	178	180	178	186
34	181	182	181	182	183	183	190
35	185	186	185	185	187	187	194
36	189	190	189	189	190	192	200
37	193	194	193	192	193	195	206
38	196	198	196	195	196	198	212
39	200	202	200	198	199	200	214
40	203	205	204	201	202	202	215
41	206	209	208	204	204	204	216

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 10 (°F)	TC # 11 (°F)	TC # 12 (°F)	TC # 13 (°F)	TC # 14 (°F)	TC # 15 (°F)	TC # 16 (°F)
42	209	212	210	207	206	206	218
43	214	214	212	210	208	209	220
44	216	215	214	212	211	211	221
45	217	217	216	215	213	212	223
46	214	219	218	216	214	214	224
47	214	213	219	218	216	215	225
48	214	213	220	219	217	216	226
49	214	213	220	221	219	217	226
50	214	213	220	222	220	215	224
51	214	212	219	222	217	214	221
52	214	212	216	219	215	213	220
53	214	212	215	218	215	213	220
54	215	212	214	218	215	214	220
55	215	213	214	218	215	214	220
56	215	213	214	218	215	214	220
57	215	213	215	219	216	214	220
58	215	213	215	219	216	214	220
59	215	213	215	219	216	214	221
60	215	213	214	220	217	214	221
Max Temp:	217	219	220	222	220	217	226
Max Allowed:	405	405	405	405	405	405	405

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 17 (°F)	TC # 18 (°F)	TC # 19 (°F)	TC # 20 (°F)	TC # 21 (°F)	TC # 22 (°F)	TC # 23 (°F)
0	80	80	80	80	79	80	80
1	80	80	80	80	79	80	80
2	80	80	80	80	79	80	80
3	80	80	80	80	79	80	80
4	80	80	80	80	79	80	80
5	80	80	80	80	79	80	80
6	80	80	80	80	79	80	80
7	81	81	81	81	80	80	81
8	82	82	82	82	80	81	81
9	83	83	83	83	81	82	82
10	85	84	84	85	82	84	84
11	87	86	87	87	84	85	85
12	89	89	89	89	86	87	88
13	92	92	92	92	88	90	90
14	95	95	95	95	90	93	93
15	98	98	98	99	93	95	96
16	102	102	102	102	95	98	99
17	106	105	106	106	98	102	102
18	110	109	110	110	101	105	106
19	114	113	114	114	105	108	110
20	118	118	118	118	108	112	114
21	122	122	123	123	111	115	117
22	127	126	127	127	115	119	121
23	134	133	133	133	118	122	125
24	139	137	137	137	122	126	131
25	143	141	142	141	125	132	136
26	147	145	145	145	130	136	140
27	151	149	150	149	134	140	144
28	156	153	154	154	137	144	148
29	159	157	158	158	140	148	153
30	161	159	160	160	144	152	157
31	166	163	164	165	147	156	160
32	170	167	168	169	151	158	165
33	174	171	172	173	155	162	170
34	179	175	177	177	159	166	174
35	183	179	181	181	160	170	179
36	187	183	186	185	164	174	183
37	191	187	190	189	168	178	187
38	195	191	195	192	172	181	191
39	199	195	199	196	175	185	194
40	203	199	203	199	178	188	197
41	206	204	207	202	182	191	200

OMEGA POINT LABORATORIES

Time (min)	TC # 17 (°F)	TC # 18 (°F)	TC # 19 (°F)	TC # 20 (°F)	TC # 21 (°F)	TC # 22 (°F)	TC # 23 (°F)
42	209	208	210	206	185	194	203
43	211	211	212	211	187	196	205
44	214	214	214	214	191	199	208
45	215	216	215	216	197	201	210
46	217	217	217	217	203	204	212
47	218	218	218	218	207	207	215
48	219	219	219	219	210	211	217
49	220	220	219	220	212	213	218
50	214	214	214	214	211	214	219
51	214	214	214	213	212	215	220
52	214	214	214	213	212	215	221
53	214	214	214	214	212	216	221
54	214	214	214	214	212	217	222
55	214	214	214	214	212	217	223
56	214	214	214	214	213	218	224
57	214	214	214	214	213	219	224
58	214	214	214	214	213	219	225
59	214	214	214	214	213	220	226
60	214	214	214	214	213	221	227
Max Temp:	220	220	219	220	213	221	227
Max Allowed:	405	405	405	405	404	405	405

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 24 (°F)	TC # 25 (°F)	TC # 26 (°F)	TC # 27 (°F)	TC # 28 (°F)	TC # 29 (°F)	TC # 30 (°F)
0	80	80	80	80	80	80	80
1	80	80	80	80	80	80	80
2	80	80	80	80	80	80	80
3	80	80	80	80	80	80	80
4	80	80	80	80	80	80	80
5	81	80	80	80	80	80	80
6	81	80	80	80	80	80	80
7	81	81	81	80	80	80	80
8	82	82	82	80	81	81	80
9	83	83	83	80	81	81	81
10	84	85	84	81	82	82	82
11	86	87	86	81	82	84	84
12	88	89	88	82	83	86	86
13	91	92	91	83	84	88	88
14	94	95	94	84	86	90	90
15	97	98	97	86	87	93	93
16	100	102	101	88	89	96	96
17	104	106	104	90	91	99	99
18	108	110	108	92	93	102	105
19	112	113	112	94	95	106	115
20	116	117	116	97	98	110	121
21	120	122	120	99	101	114	124
22	124	126	124	102	104	118	130
23	130	132	130	104	107	122	134
24	134	136	134	107	111	129	138
25	138	140	139	110	116	134	142
26	142	144	143	113	120	139	145
27	146	149	147	116	124	144	149
28	151	157	152	120	131	149	153
29	155	161	156	124	137	153	156
30	159	168	158	129	144	157	159
31	161	173	163	133	151	159	160
32	166	177	167	137	157	163	163
33	170	181	171	142	161	167	167
34	175	185	175	147	171	171	170
35	179	188	178	151	180	175	173
36	183	192	182	155	186	178	176
37	187	195	185	159	190	182	179
38	191	198	189	161	191	185	182
39	194	201	192	164	192	188	185
40	198	203	196	168	193	191	188
41	201	205	199	171	194	194	191

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 24 (°F)	TC # 25 (°F)	TC # 26 (°F)	TC # 27 (°F)	TC # 28 (°F)	TC # 29 (°F)	TC # 30 (°F)
42	204	208	202	174	195	197	194
43	206	210	205	177	197	199	197
44	209	212	208	180	198	202	199
45	212	214	210	183	200	204	201
46	214	215	212	186	201	206	204
47	217	216	214	188	202	209	206
48	219	217	215	191	203	211	208
49	220	218	216	194	205	213	210
50	221	220	217	196	206	215	212
51	223	221	218	198	207	216	214
52	224	223	219	201	208	218	215
53	225	224	220	203	208	218	216
54	226	225	221	205	209	219	217
55	227	227	222	206	210	219	217
56	227	228	223	208	211	220	218
57	228	229	224	209	211	220	219
58	229	230	224	211	212	221	220
59	230	232	225	212	212	221	220
60	231	233	226	212	213	221	221
Max Temp:	231	233	226	212	213	221	221
Max Allowed:	405	405	405	405	405	405	405

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 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	80	80	78	78	78	78	78
1	80	80	78	78	78	78	78
2	80	80	78	78	78	78	78
3	80	80	78	78	78	78	78
4	80	80	78	78	78	78	78
5	80	80	78	78	78	78	78
6	80	80	78	78	78	78	78
7	80	80	78	79	78	78	78
8	81	81	79	79	79	79	79
9	81	82	80	80	79	79	79
10	82	83	81	81	81	80	80
11	84	84	83	83	83	82	81
12	86	86	84	85	85	84	83
13	88	88	87	87	88	87	84
14	90	90	89	90	92	90	87
15	92	93	92	93	97	93	89
16	95	96	95	96	102	98	92
17	98	98	98	100	108	102	95
18	102	102	102	104	113	107	99
19	105	106	106	108	120	111	102
20	109	109	111	113	130	116	106
21	113	114	115	117	137	121	110
22	118	118	120	122	143	126	114
23	122	122	124	126	149	134	118
24	126	127	131	133	154	139	122
25	133	133	135	137	159	144	126
26	137	137	140	141	160	149	133
27	141	141	144	145	163	153	137
28	145	145	147	149	166	158	141
29	149	149	151	153	168	161	146
30	153	153	155	157	171	166	151
31	156	157	159	159	173	171	156
32	158	159	161	163	176	176	160
33	162	162	164	167	179	180	165
34	165	166	168	170	182	184	170
35	169	169	171	174	184	188	175
36	172	173	175	177	187	191	181
37	175	176	178	180	190	195	186
38	179	179	181	184	192	198	191
39	181	182	184	187	194	200	194
40	185	185	187	190	197	202	196
41	187	188	190	192	199	203	197

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 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	190	191	193	195	201	205	199
43	193	194	195	198	203	206	200
44	196	196	198	200	205	207	202
45	198	199	200	203	207	209	204
46	200	201	203	205	209	210	205
47	203	203	205	207	210	211	207
48	205	206	207	209	211	212	208
49	207	208	210	211	212	213	210
50	210	210	212	213	214	214	211
51	212	212	213	214	215	214	212
52	214	214	215	215	215	215	214
53	216	216	216	216	216	216	214
54	218	217	217	217	217	216	215
55	219	218	218	218	218	217	216
56	220	219	218	219	219	217	217
57	220	220	219	219	219	218	217
58	221	220	220	220	220	218	218
59	222	221	220	221	221	219	218
60	222	221	221	221	221	219	219
Max Temp:	222	221	221	221	221	219	219
Max Allowed:	405	405	403	403	403	403	403

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 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	79	78	78	78	78	78	79
1	79	78	78	78	78	78	79
2	78	78	78	78	78	78	79
3	78	78	78	78	78	78	79
4	78	78	78	78	78	78	79
5	79	78	78	78	78	78	79
6	79	78	78	78	78	78	79
7	79	78	78	79	78	79	79
8	79	79	78	79	79	79	80
9	80	79	79	79	79	80	80
10	80	80	79	80	80	81	81
11	82	81	80	81	81	82	83
12	83	82	81	82	82	83	84
13	85	84	82	83	83	85	86
14	87	86	84	85	85	87	87
15	90	88	86	87	87	89	89
16	92	90	88	89	89	90	91
17	95	92	90	92	92	93	93
18	98	95	92	95	94	95	96
19	102	98	95	97	97	97	98
20	105	101	98	100	100	99	100
21	109	104	101	104	103	101	103
22	113	107	104	107	106	104	106
23	116	110	107	110	109	106	108
24	120	114	111	114	113	109	111
25	124	117	115	118	116	111	114
26	130	121	118	121	120	114	116
27	134	125	122	125	123	116	119
28	138	130	125	131	127	119	122
29	142	133	131	134	132	121	125
30	145	137	135	138	135	124	130
31	149	140	138	142	139	126	133
32	153	144	142	146	142	131	135
33	156	147	145	149	145	134	138
34	160	150	149	153	149	136	141
35	161	154	153	156	152	139	144
36	165	158	156	160	155	142	147
37	169	160	159	161	158	145	150
38	173	164	160	164	159	148	153
39	177	169	163	167	162	151	157
40	181	174	166	170	165	155	159
41	185	179	169	173	168	158	162

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 38 (°F)	TC # 39 (°F)	TC # 40 (°F)	TC # 41 (°F)	TC # 42 (°F)	TC # 43 (°F)	TC # 44 (°F)
42	188	184	172	176	171	159	166
43	191	189	175	180	174	163	169
44	194	192	178	183	176	166	173
45	197	194	181	186	179	170	176
46	200	196	184	188	181	173	179
47	202	198	186	191	184	177	183
48	205	199	188	194	186	181	186
49	207	201	191	196	189	184	190
50	209	202	193	198	191	188	193
51	211	203	195	201	193	192	196
52	213	205	197	203	195	199	200
53	215	206	199	205	197	205	204
54	217	208	201	206	199	208	209
55	218	209	203	208	201	208	211
56	219	211	205	209	203	208	212
57	220	212	206	210	205	207	212
58	220	213	208	212	207	206	212
59	221	214	209	213	209	206	212
60	221	215	211	214	210	207	211
Max Temp:	221	215	211	214	210	208	212
Max Allowed:	404	403	403	403	403	403	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 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	78	78	78	79	79	78
1	79	78	78	78	79	79	78
2	79	78	78	78	79	79	78
3	79	78	78	78	79	79	78
4	79	78	78	78	79	79	78
5	79	78	78	78	79	79	78
6	79	78	78	78	79	79	79
7	79	78	78	78	79	79	79
8	79	78	79	78	79	79	80
9	80	78	79	79	79	79	80
10	81	79	79	79	79	79	82
11	82	79	80	80	79	79	83
12	83	79	81	81	79	80	84
13	84	79	82	82	80	80	86
14	85	80	83	83	80	80	88
15	87	80	85	84	81	81	90
16	89	81	87	86	81	82	93
17	90	82	89	88	82	82	95
18	92	83	91	90	83	83	98
19	94	84	93	92	84	84	100
20	96	85	96	94	85	86	103
21	98	86	98	97	86	87	106
22	100	88	101	99	87	88	109
23	103	89	104	101	89	89	113
24	105	91	106	104	90	91	116
25	107	92	109	106	91	93	119
26	110	94	112	109	93	95	122
27	112	96	114	112	95	97	125
28	115	98	117	115	97	98	131
29	117	100	120	118	99	100	134
30	120	102	122	120	101	103	137
31	122	104	125	123	103	105	141
32	125	107	130	126	105	107	144
33	129	109	132	131	107	109	148
34	132	111	135	134	109	112	152
35	134	113	138	137	112	115	155
36	137	116	141	140	115	117	159
37	140	118	144	143	117	119	160
38	143	121	148	146	120	122	164
39	146	124	151	150	123	125	167
40	149	127	155	153	125	130	173
41	153	132	159	157	131	132	177

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 45 (°F)	TC # 46 (°F)	TC # 47 (°F)	TC # 48 (°F)	TC # 49 (°F)	TC # 50 (°F)	TC # 51 (°F)
42	156	135	161	159	133	135	181
43	159	139	164	162	137	138	184
44	161	143	168	165	140	142	189
45	164	147	171	169	144	145	192
46	168	151	174	172	148	148	196
47	171	155	176	175	152	152	200
48	175	160	179	178	155	156	202
49	179	162	182	181	158	159	204
50	183	166	186	184	159	162	205
51	187	171	189	188	163	166	206
52	190	176	192	191	167	170	208
53	194	180	196	194	171	175	209
54	199	185	199	198	176	179	210
55	204	189	201	202	182	184	211
56	207	193	204	205	190	188	212
57	209	197	206	208	196	193	214
58	210	200	208	210	199	197	217
59	210	202	210	213	203	201	221
60	211	205	211	213	206	205	225
Max Temp:	211	205	211	213	206	205	225
Max Allowed:	404	403	403	403	404	404	403

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 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	79
1	78	78	78	78	78	79	79
2	78	78	78	78	78	78	79
3	78	78	78	78	78	78	79
4	78	78	78	78	78	79	79
5	78	78	78	78	78	79	79
6	79	79	79	79	79	80	80
7	79	80	79	79	80	81	80
8	80	81	80	80	81	82	82
9	82	82	82	82	83	84	83
10	83	84	84	84	85	86	85
11	85	86	86	86	88	89	87
12	87	89	88	89	91	92	89
13	90	91	91	92	94	95	92
14	92	94	95	95	99	99	95
15	95	98	98	99	103	103	98
16	99	101	102	103	107	107	102
17	102	105	106	107	112	111	106
18	106	109	109	111	117	115	109
19	109	113	114	116	122	120	113
20	113	117	118	120	127	124	117
21	117	121	122	125	134	131	121
22	121	125	126	131	138	136	124
23	125	131	132	136	143	140	130
24	131	136	137	140	148	145	134
25	135	140	141	145	153	151	138
26	138	144	145	149	158	155	142
27	142	148	149	154	161	160	146
28	146	152	153	158	166	163	150
29	151	156	157	161	171	167	154
30	154	159	159	165	176	172	158
31	158	161	163	169	181	176	161
32	161	165	167	174	185	182	165
33	165	169	171	178	190	187	169
34	169	173	176	182	194	192	173
35	173	177	183	187	199	197	178
36	177	181	188	191	203	202	184
37	181	185	193	196	206	206	195
38	185	192	194	201	208	209	204
39	190	199	198	205	209	210	206
40	193	204	201	208	210	211	208
41	197	206	205	210	210	212	208

TVA / TSI Project No. 97260 October 18, 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	201	208	208	211	211	213	209
43	205	209	210	212	212	214	210
44	208	210	211	213	213	216	210
45	209	211	212	215	214	218	211
46	210	212	213	217	217	221	212
47	210	212	214	219	219	224	213
48	211	214	217	222	223	228	215
49	212	216	219	225	226	232	217
50	213	219	222	228	231	236	220
51	215	221	226	232	235	241	223
52	220	224	229	236	241	245	226
53	225	228	232	241	246	250	230
54	228	231	236	245	251	257	234
55	235	235	241	250	259	262	238
56	234	239	245	257	265	267	243
57	237	244	250	262	270	272	248
58	240	249	257	268	276	277	252
59	244	254	263	273	281	282	260
60	250	261	268	279	286	287	265
Max Temp:	250	261	268	279	286	287	265
Max Allowed:	403	403	403	403	403	403	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 59 (°F)	TC # 60 (°F)	TC # 61 (°F)	TC # 62 (°F)	TC # 63 (°F)	TC # 64 (°F)	TC # 65 (°F)
0	78	79	79	78	78	78	82
1	78	79	79	78	78	78	82
2	78	79	79	78	78	78	82
3	78	79	79	78	78	78	82
4	78	79	79	78	78	78	82
5	78	79	79	78	78	78	82
6	78	79	80	79	78	79	82
7	79	80	81	79	79	79	83
8	79	81	82	80	79	79	84
9	79	82	84	81	80	80	85
10	80	84	86	82	80	81	86
11	80	85	89	84	82	82	87
12	81	87	91	86	83	83	89
13	82	89	94	90	84	85	90
14	84	91	98	94	86	86	92
15	85	93	101	98	88	88	94
16	87	96	105	104	91	91	97
17	88	98	109	110	93	93	99
18	90	101	113	115	96	95	101
19	92	104	117	119	99	98	104
20	95	107	122	124	102	101	106
21	97	110	126	131	106	104	109
22	100	113	132	136	109	106	111
23	102	116	137	141	113	109	114
24	105	120	141	146	116	113	117
25	108	123	145	151	120	116	121
26	111	126	150	156	124	119	125
27	114	132	154	159	130	123	130
28	117	135	159	161	134	126	136
29	120	139	163	165	138	132	139
30	123	142	168	169	141	136	142
31	126	146	172	172	145	140	146
32	132	149	176	175	149	144	150
33	135	153	180	178	153	148	153
34	138	156	185	181	157	152	157
35	142	160	189	184	159	157	160
36	145	162	194	186	164	159	163
37	149	166	199	190	169	163	168
38	153	170	203	193	173	167	172
39	156	174	205	196	177	171	176
40	158	180	207	201	181	176	181
41	162	187	209	204	185	180	185

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 59 (°F)	TC # 60 (°F)	TC # 61 (°F)	TC # 62 (°F)	TC # 63 (°F)	TC # 64 (°F)	TC # 65 (°F)
42	166	194	210	205	188	184	190
43	170	197	210	205	192	188	194
44	174	200	211	206	195	193	198
45	178	202	212	205	198	196	201
46	182	204	214	205	201	199	204
47	186	205	217	205	203	203	206
48	189	206	219	206	205	205	208
49	193	207	222	208	206	208	209
50	196	208	226	210	207	209	211
51	199	209	229	212	208	209	212
52	201	211	232	213	209	210	213
53	203	212	236	215	210	210	213
54	205	213	239	217	210	210	214
55	207	215	242	219	211	210	214
56	208	218	246	222	212	211	214
57	210	221	249	224	212	211	214
58	212	224	253	227	213	211	214
59	213	228	258	229	214	212	214
60	215	231	262	232	215	212	215
Max Temp:	215	231	262	232	215	212	215
Max Allowed:	403	404	404	403	403	403	407

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	82	82	82	82	82	82	82
1	82	82	82	82	82	82	82
2	82	82	82	82	82	82	82
3	82	82	82	82	82	82	82
4	82	82	82	82	82	82	82
5	82	82	82	82	82	82	82
6	82	82	82	82	82	82	82
7	82	82	82	83	83	82	82
8	83	83	82	83	83	82	82
9	83	84	83	84	84	83	82
10	84	85	84	84	85	83	83
11	85	86	85	85	86	84	84
12	86	88	86	86	88	85	84
13	88	89	87	88	89	86	86
14	90	91	89	89	91	88	87
15	91	93	91	91	94	90	88
16	94	96	93	93	97	92	90
17	96	98	96	96	100	94	92
18	99	101	98	98	103	97	94
19	101	105	101	102	106	99	96
20	104	108	104	105	109	102	99
21	108	111	107	108	113	105	102
22	112	115	111	112	116	109	105
23	115	119	114	116	120	112	108
24	118	122	118	119	123	116	111
25	122	126	122	123	127	119	115
26	125	132	126	126	132	123	119
27	131	136	131	132	136	127	122
28	135	139	135	136	139	133	126
29	138	143	138	139	143	136	133
30	142	146	142	143	146	140	136
31	146	151	145	147	149	144	141
32	150	154	149	150	153	148	145
33	154	158	153	154	157	152	149
34	158	160	156	158	159	156	153
35	160	163	158	160	163	159	157
36	164	167	162	163	166	161	159
37	167	170	167	167	170	164	163
38	171	174	171	170	173	168	167
39	175	178	175	174	176	171	171
40	179	181	179	178	180	175	175
41	183	185	183	182	183	179	178

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 66 (°F)	TC # 67 (°F)	TC # 68 (°F)	TC # 69 (°F)	TC # 70 (°F)	TC # 71 (°F)	TC # 72 (°F)
42	187	188	187	186	187	183	183
43	191	191	190	190	190	186	187
44	194	194	193	194	193	190	191
45	197	197	195	197	196	194	195
46	200	200	198	201	199	198	199
47	202	203	201	205	203	203	203
48	205	206	203	208	206	207	207
49	207	209	206	211	208	210	209
50	209	211	209	212	211	212	211
51	211	212	211	213	212	212	213
52	212	213	212	214	213	213	214
53	213	213	213	214	214	214	214
54	214	214	214	214	214	214	214
55	214	214	214	215	215	214	215
56	214	214	214	215	215	214	215
57	215	214	214	215	215	215	215
58	215	214	215	215	216	215	215
59	215	215	215	216	216	215	215
60	215	215	214	214	215	215	215
Max Temp:	215	215	215	216	216	215	215
Max Allowed:	407	407	407	407	407	407	407

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	82	81	82	82	82	82	82
1	82	81	82	82	82	82	82
2	82	81	82	82	82	82	82
3	82	81	82	82	82	82	82
4	82	82	82	82	82	82	82
5	82	83	82	82	83	82	82
6	82	85	82	82	83	82	82
7	82	88	82	82	83	82	82
8	83	91	82	83	83	82	82
9	84	95	83	83	83	82	83
10	86	99	83	84	83	82	83
11	87	104	84	84	84	82	84
12	89	109	85	85	84	83	84
13	92	114	86	86	85	83	85
14	94	119	86	87	85	83	86
15	97	124	88	88	86	84	87
16	101	130	89	89	87	84	89
17	105	135	90	90	88	85	90
18	109	140	91	92	89	86	92
19	115	144	93	93	90	86	93
20	119	149	94	95	91	87	95
21	124	153	96	97	93	88	97
22	131	158	98	98	95	89	99
23	136	160	100	100	96	91	101
24	139	164	101	102	98	92	103
25	143	168	103	104	100	94	106
26	147	173	105	107	102	95	108
27	151	177	107	109	104	97	110
28	155	182	109	111	106	99	113
29	159	188	111	113	108	101	115
30	161	193	114	116	110	103	118
31	165	198	116	118	112	105	120
32	170	202	118	120	115	107	123
33	174	206	120	122	117	109	126
34	179	209	122	124	119	111	131
35	184	212	125	127	122	114	134
36	188	213	129	131	124	116	137
37	192	214	132	134	127	118	140
38	196	215	134	136	131	121	144
39	202	216	137	139	134	124	147
40	207	218	139	142	137	129	151
41	210	221	142	145	140	133	155

TVA / TSI

Project No. 97260

October 18, 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	224	145	148	143	136	159
43	213	228	148	151	147	140	161
44	213	232	151	154	151	144	165
45	213	235	155	158	155	149	170
46	213	239	158	160	159	154	173
47	214	242	160	164	162	159	178
48	214	246	165	168	167	162	181
49	214	249	169	172	171	167	184
50	215	252	174	177	176	172	187
51	216	257	179	181	181	176	190
52	217	260	183	186	185	181	193
53	217	254	189	190	190	186	196
54	219	229	194	195	195	191	199
55	219	220	199	199	198	196	202
56	218	217	203	203	202	199	205
57	216	216	206	206	205	203	207
58	215	217	208	209	207	205	209
59	214	217	209	211	209	207	212
60	214	218	208	213	210	208	214
Max Temp:	219	260	209	213	210	208	214
Max Allowed:	407	406	407	407	407	407	407

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	82	83	83	82	82	82	82
1	82	83	83	82	82	82	82
2	82	83	83	82	82	82	82
3	82	83	83	82	82	82	82
4	82	83	83	82	82	82	82
5	82	83	83	82	82	82	82
6	82	83	83	82	82	83	82
7	82	83	83	82	82	83	83
8	82	83	83	82	83	83	83
9	82	83	83	83	83	83	83
10	83	83	83	83	83	84	84
11	84	83	83	83	84	84	85
12	84	84	83	84	84	85	85
13	85	84	84	84	85	86	86
14	86	84	84	85	85	87	88
15	88	85	84	85	86	88	89
16	89	85	84	86	87	89	91
17	90	86	85	87	89	91	92
18	92	87	85	88	90	92	94
19	94	88	86	89	91	94	96
20	96	88	87	90	93	96	98
21	98	89	87	92	95	98	101
22	100	91	88	93	97	100	103
23	102	92	89	95	99	102	106
24	104	93	90	97	101	105	108
25	107	95	91	98	103	107	111
26	109	96	92	100	105	110	114
27	112	98	94	102	107	113	117
28	115	100	95	104	110	115	120
29	118	102	97	107	113	118	123
30	120	104	98	109	115	121	126
31	123	106	100	111	118	123	131
32	126	108	102	114	120	126	135
33	131	111	104	116	124	132	138
34	134	113	106	119	126	135	141
35	136	116	109	122	131	139	145
36	139	119	111	125	135	143	148
37	142	121	114	131	138	147	152
38	145	124	117	134	142	150	156
39	148	129	120	138	145	154	159
40	152	133	124	141	149	157	163
41	156	136	127	144	152	159	167

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 80 (°F)	TC # 81 (°F)	TC # 82 (°F)	TC # 83 (°F)	TC # 84 (°F)	TC # 85 (°F)	TC # 86 (°F)
42	159	139	132	148	156	163	172
43	163	143	136	152	160	166	176
44	167	146	140	155	161	169	180
45	171	150	144	159	165	173	183
46	175	153	148	161	169	176	187
47	178	157	152	165	172	180	190
48	181	160	156	168	176	183	194
49	184	161	160	172	180	186	197
50	187	165	162	175	183	189	200
51	190	169	166	178	186	192	203
52	193	172	172	182	189	195	206
53	196	176	179	186	192	198	208
54	199	181	185	190	195	201	211
55	202	185	191	194	199	203	212
56	205	190	196	197	202	206	214
57	207	195	199	201	205	208	214
58	210	200	201	204	208	211	215
59	212	204	204	207	211	213	215
60	214	208	208	210	213	214	216
Max Temp:	214	208	208	210	213	214	216
Max Allowed:	407	408	408	407	407	407	407

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 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	82	82	83	83	82	83	83
1	82	82	83	83	82	83	83
2	82	82	83	83	82	83	83
3	82	82	83	83	82	83	83
4	82	82	83	83	82	83	83
5	82	82	83	83	82	83	83
6	82	82	83	83	82	83	83
7	82	82	84	83	82	83	83
8	83	83	84	83	82	83	83
9	83	83	85	84	82	83	84
10	84	84	86	84	82	84	84
11	84	84	87	85	83	84	85
12	85	85	88	86	83	84	86
13	86	86	89	86	83	85	87
14	87	87	91	88	84	86	88
15	89	88	93	89	84	87	89
16	90	90	94	90	85	88	91
17	92	91	96	91	86	89	93
18	94	93	98	93	87	91	95
19	96	95	100	95	88	92	97
20	98	97	103	97	89	94	99
21	100	100	105	99	91	96	102
22	103	102	107	101	92	98	104
23	106	105	110	104	94	100	107
24	108	107	113	106	96	102	109
25	111	110	116	109	98	104	112
26	114	113	118	111	100	107	115
27	117	116	121	114	103	109	118
28	120	119	124	117	105	112	121
29	123	122	129	120	107	115	124
30	126	125	132	123	110	118	129
31	131	130	135	126	113	121	132
32	135	133	139	131	116	124	135
33	138	137	142	134	119	129	138
34	142	140	145	138	122	133	142
35	145	144	149	141	125	136	145
36	149	147	153	145	131	139	148
37	152	151	157	149	134	143	152
38	157	155	160	153	138	146	155
39	159	159	163	156	141	150	158
40	163	162	168	158	145	154	163
41	168	166	172	163	149	157	169

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	172	170	176	167	153	159	173
43	177	174	180	173	158	163	177
44	181	178	183	177	160	168	181
45	184	182	187	181	165	172	185
46	189	186	191	185	169	176	188
47	192	189	194	188	173	180	192
48	196	192	198	192	177	184	196
49	199	196	201	196	181	187	199
50	203	199	204	199	185	191	203
51	205	202	207	201	188	194	207
52	208	205	210	204	192	198	210
53	210	207	212	207	196	202	212
54	212	209	214	210	199	205	213
55	213	211	215	212	202	207	214
56	214	213	216	214	205	209	215
57	215	214	217	214	208	211	215
58	215	215	217	215	211	212	216
59	215	216	218	215	212	213	216
60	216	216	219	216	212	214	216
Max Temp:	216	216	219	216	212	214	216
Max Allowed:	407	407	408	408	407	408	408

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 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	82	82	82	83	84	84	83
1	82	82	82	83	84	84	83
2	82	82	82	83	84	84	83
3	82	82	82	83	84	84	83
4	82	82	82	83	84	84	83
5	82	82	82	83	84	84	84
6	82	82	82	84	84	84	84
7	82	82	82	84	84	84	84
8	83	83	83	84	84	84	84
9	83	83	83	84	85	85	84
10	84	84	84	85	86	85	85
11	85	85	85	86	86	86	86
12	86	86	86	87	87	88	88
13	88	88	88	88	89	89	90
14	90	89	89	89	90	91	92
15	92	91	91	91	92	94	95
16	95	93	93	92	94	97	98
17	97	96	95	94	96	100	101
18	99	98	98	97	99	102	104
19	102	101	100	99	102	105	106
20	105	104	103	103	104	108	109
21	108	107	106	106	107	111	112
22	111	110	109	109	111	114	115
23	114	113	112	112	114	117	117
24	118	116	115	115	117	120	120
25	121	120	118	118	121	123	124
26	125	123	121	121	124	127	127
27	130	129	124	125	130	133	133
28	133	134	129	130	134	136	136
29	137	138	133	133	138	139	140
30	140	141	136	136	142	142	143
31	145	145	141	140	145	146	146
32	149	149	145	144	149	149	149
33	153	152	149	147	153	152	153
34	157	156	154	152	156	155	156
35	160	160	158	156	160	159	159
36	161	161	161	158	161	160	161
37	165	166	166	162	165	163	164
38	168	170	172	166	168	167	167
39	173	174	176	170	172	170	171
40	177	178	180	174	176	174	174
41	181	182	184	178	179	178	177

OMEGA POINT LABORATORIES

Time (min)	TC # 94 (°F)	TC # 95 (°F)	TC # 96 (°F)	TC # 97 (°F)	TC # 98 (°F)	TC # 99 (°F)	TC # 100 (°F)
42	185	186	187	182	183	181	181
43	188	189	191	186	186	185	184
44	192	193	194	190	189	188	188
45	195	196	197	194	193	192	191
46	199	200	200	198	197	195	195
47	202	203	203	201	200	199	198
48	205	206	206	203	203	202	202
49	207	208	208	205	206	205	205
50	209	210	210	208	208	208	209
51	211	211	212	210	211	211	212
52	212	213	213	212	212	213	214
53	213	213	213	213	214	214	214
54	214	214	214	214	214	215	214
55	214	214	214	215	215	215	215
56	215	215	214	215	215	215	216
57	216	215	215	215	215	215	217
58	217	216	215	215	215	216	220
59	218	218	216	216	215	218	222
60	220	221	219	216	215	222	224
Max Temp:	220	221	219	216	215	222	224
Max Allowed:	407	407	407	408	409	409	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 101 (°F)	TC # 102 (°F)	TC # 103 (°F)	TC # 104 (°F)	TC # 105 (°F)	TC # 106 (°F)
0	83	83	83	83	84	83
1	83	83	83	83	84	83
2	83	83	83	83	84	83
3	83	83	83	83	83	83
4	83	83	83	83	84	84
5	83	83	83	83	84	85
6	83	83	83	83	84	86
7	84	83	83	83	84	88
8	84	84	83	83	85	91
9	84	84	84	84	85	94
10	84	84	84	84	87	98
11	85	85	85	85	88	102
12	87	86	87	86	90	106
13	88	87	88	87	92	110
14	90	89	90	89	95	114
15	92	91	92	91	98	119
16	94	93	94	93	101	123
17	96	96	96	95	106	130
18	98	98	99	98	110	134
19	101	101	102	101	114	138
20	104	104	105	104	118	143
21	107	107	108	107	123	147
22	111	111	112	111	127	152
23	114	114	115	115	133	156
24	118	117	119	119	137	158
25	121	121	123	123	141	163
26	125	124	127	127	145	167
27	131	130	133	133	149	171
28	135	134	137	137	152	175
29	139	137	141	141	156	179
30	143	141	145	145	160	183
31	147	145	148	149	161	186
32	151	149	152	153	164	190
33	155	152	156	156	167	194
34	159	156	159	160	170	197
35	160	159	161	161	173	201
36	163	161	164	165	177	205
37	167	164	168	169	180	208
38	170	167	171	172	184	211
39	173	171	174	175	188	213
40	176	174	177	179	194	214
41	179	177	181	182	199	215

OMEGA POINT LABORATORIES

Time (min)	TC # 101 (°F)	TC # 102 (°F)	TC # 103 (°F)	TC # 104 (°F)	TC # 105 (°F)	TC # 106 (°F)
42	182	180	183	185	205	216
43	186	184	186	189	210	217
44	189	187	189	193	213	219
45	192	191	193	197	214	219
46	196	194	197	202	214	221
47	199	198	200	209	215	222
48	203	202	205	212	215	224
49	208	206	209	213	215	226
50	212	210	212	213	215	229
51	213	213	213	213	215	232
52	214	214	213	214	215	234
53	214	214	213	214	216	235
54	214	214	214	214	217	237
55	215	214	214	215	218	236
56	215	215	215	215	220	216
57	215	215	215	215	220	214
58	216	216	216	216	217	213
59	217	218	218	216	215	211
60	220	220	220	217	215	211
Max Temp:	220	220	220	217	220	237
Max Allowed:	408	408	408	408	409	408

OMEGA POINT LABORATORIES

Time (min)	TC # 107 (°F)	TC # 108 (°F)	TC # 109 (°F)	TC # 110 (°F)	TC # 111 (°F)	TC # 112 (°F)
0	83	83	84	83	83	83
1	83	83	84	83	83	83
2	83	83	84	83	83	83
3	83	83	84	83	83	83
4	83	83	84	83	83	83
5	83	83	84	83	83	83
6	83	83	84	83	83	83
7	84	83	84	83	83	83
8	84	84	84	83	83	83
9	84	84	84	84	84	84
10	84	84	84	84	84	84
11	85	84	85	84	84	84
12	85	85	85	84	84	85
13	86	86	86	84	85	85
14	87	87	86	85	86	86
15	88	88	87	85	86	87
16	89	89	88	86	87	88
17	90	90	89	86	88	89
18	91	91	90	87	89	91
19	92	93	91	88	91	92
20	94	94	92	89	92	94
21	95	96	93	90	94	95
22	97	98	95	91	95	97
23	99	99	97	92	97	99
24	101	101	98	93	99	101
25	103	103	100	95	101	104
26	105	105	102	96	103	106
27	107	107	104	98	105	109
28	109	109	106	100	107	111
29	111	111	108	101	110	114
30	113	113	110	103	112	116
31	115	115	112	105	115	119
32	117	117	114	107	117	122
33	120	119	116	109	120	124
34	122	121	119	111	122	129
35	124	124	121	114	125	132
36	127	126	124	116	129	135
37	131	130	126	118	132	138
38	133	132	131	121	136	142
39	136	134	133	124	139	146
40	138	137	136	127	142	149
41	141	139	139	132	146	153

OMEGA POINT LABORATORIES

Time (min)	TC # 107 (°F)	TC # 108 (°F)	TC # 109 (°F)	TC # 110 (°F)	TC # 111 (°F)	TC # 112 (°F)
42	144	142	142	135	150	157
43	147	145	145	138	154	158
44	150	148	148	142	158	162
45	153	151	151	146	160	165
46	157	154	155	150	164	169
47	158	158	159	154	168	173
48	162	160	161	159	174	176
49	166	165	166	161	178	180
50	170	169	170	167	183	184
51	175	175	175	172	187	187
52	179	180	180	177	191	191
53	186	185	185	181	194	194
54	190	190	190	186	198	197
55	195	195	194	191	201	200
56	199	199	198	196	203	203
57	202	202	202	199	205	205
58	205	205	204	202	207	208
59	207	208	207	205	210	211
60	210	210	210	209	212	214
Max Temp:	210	210	210	209	212	214
Max Allowed:	408	408	409	408	408	408

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 113 (°F)	TC # 114 (°F)	TC # 115 (°F)	TC # 116 (°F)	TC # 117 (°F)	TC # 118 (°F)
0	83	83	82	82	83	82
1	83	83	82	82	83	82
2	83	83	82	82	83	82
3	83	83	82	82	83	82
4	83	83	82	82	83	82
5	83	83	82	82	83	82
6	83	83	82	82	83	82
7	83	83	82	83	83	82
8	83	83	82	83	83	83
9	83	83	83	83	83	83
10	83	83	83	83	84	83
11	83	83	83	83	84	84
12	84	84	84	84	85	85
13	84	84	84	84	85	86
14	84	84	84	85	86	86
15	85	84	85	86	87	88
16	86	85	86	87	88	89
17	86	85	87	88	90	90
18	87	86	88	89	91	92
19	88	86	89	91	93	94
20	89	87	90	92	94	95
21	90	88	91	94	96	97
22	92	89	93	95	98	100
23	93	89	94	97	100	102
24	95	91	96	99	102	104
25	97	92	98	101	105	106
26	99	93	99	103	107	109
27	102	94	101	105	109	112
28	104	95	103	107	112	114
29	106	97	105	110	114	117
30	108	98	107	112	117	119
31	110	100	109	114	120	122
32	112	102	111	117	122	125
33	115	104	114	119	125	130
34	117	106	116	122	130	133
35	119	108	119	125	133	136
36	122	110	121	130	136	139
37	124	113	124	132	139	142
38	127	115	126	135	143	146
39	131	118	132	138	146	149
40	134	120	135	142	148	152
41	137	123	138	145	151	156

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 113 (°F)	TC # 114 (°F)	TC # 115 (°F)	TC # 116 (°F)	TC # 117 (°F)	TC # 118 (°F)
42	139	126	140	148	154	159
43	142	131	144	151	156	160
44	145	134	147	154	159	163
45	148	137	151	158	159	165
46	151	141	154	160	162	169
47	155	144	158	163	165	171
48	159	148	159	166	168	174
49	161	152	162	169	170	177
50	164	156	166	172	174	180
51	166	159	170	176	177	183
52	169	163	174	179	180	187
53	172	169	178	183	184	189
54	179	174	184	187	188	193
55	186	180	188	191	192	196
56	194	186	192	196	196	199
57	200	192	197	199	200	203
58	205	199	201	203	204	207
59	208	203	205	207	208	211
60	210	207	209	210	212	214
Max Temp:	210	207	209	210	212	214
Max Allowed:	408	408	407	407	408	407

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 119 (°F)	TC # 120 (°F)	TC # 121 (°F)	TC # 122 (°F)	TC # 123 (°F)	TC # 124 (°F)
0	82	83	83	83	82	83
1	82	83	83	83	82	83
2	82	83	83	83	82	83
3	82	83	83	83	82	83
4	82	83	83	83	82	83
5	82	83	83	83	82	83
6	82	83	83	83	82	83
7	82	83	83	83	82	83
8	83	83	84	83	82	83
9	83	83	84	84	83	83
10	83	84	85	84	83	83
11	84	84	85	84	83	84
12	84	85	86	85	83	84
13	85	86	87	86	83	85
14	86	87	88	86	84	85
15	87	88	89	87	84	86
16	88	89	90	89	85	87
17	90	91	92	90	86	88
18	91	92	94	91	86	89
19	93	94	95	93	87	90
20	95	96	97	95	88	92
21	97	98	99	96	90	93
22	99	100	101	98	91	95
23	101	102	104	100	93	97
24	104	105	106	102	94	98
25	106	107	108	105	96	100
26	109	109	111	107	98	103
27	111	112	113	109	100	105
28	114	115	116	112	102	107
29	117	118	119	114	104	110
30	120	120	121	117	106	112
31	122	123	124	120	109	115
32	125	126	129	122	111	118
33	130	131	132	125	114	120
34	133	135	135	131	117	123
35	136	138	139	134	120	129
36	138	141	142	137	123	132
37	141	144	145	141	126	135
38	144	147	149	145	132	139
39	147	150	153	148	135	142
40	151	153	157	153	139	146
41	154	158	159	156	143	149

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 119 (°F)	TC # 120 (°F)	TC # 121 (°F)	TC # 122 (°F)	TC # 123 (°F)	TC # 124 (°F)
42	157	159	163	159	147	153
43	159	161	167	164	151	157
44	162	164	172	168	155	158
45	165	167	175	172	159	162
46	168	170	178	176	161	166
47	171	173	181	181	164	170
48	174	176	184	184	169	174
49	176	178	187	187	173	178
50	179	181	190	190	177	182
51	182	184	192	193	181	186
52	185	188	195	196	185	190
53	188	191	198	199	189	194
54	192	194	201	202	193	197
55	195	198	205	205	198	201
56	199	201	208	208	202	205
57	203	205	212	212	206	208
58	208	211	214	214	210	211
59	212	213	215	215	212	212
60	214	214	215	215	212	213
Max Temp:	214	214	215	215	212	213
Max Allowed:	407	408	408	408	407	408

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 125 (°F)	TC # 126 (°F)	TC # 127 (°F)	TC # 128 (°F)	TC # 129 (°F)	TC # 130 (°F)
0	83	83	82	83	79	79
1	83	83	82	83	79	79
2	83	83	82	83	79	79
3	83	83	82	83	79	79
4	83	83	82	83	79	79
5	83	83	82	83	79	79
6	83	83	82	83	79	79
7	83	83	82	83	79	79
8	84	83	83	84	80	80
9	84	84	83	84	80	80
10	84	84	84	84	81	81
11	85	85	85	85	82	82
12	85	86	86	86	83	83
13	86	87	87	88	84	84
14	87	88	88	89	85	86
15	88	89	90	90	87	87
16	89	91	92	92	88	89
17	91	93	94	94	90	92
18	92	95	96	97	93	95
19	94	97	98	99	96	97
20	96	99	101	102	98	100
21	98	101	104	104	102	103
22	100	104	107	107	105	106
23	102	106	109	110	110	109
24	105	109	112	113	113	113
25	107	112	115	116	116	116
26	110	116	118	120	120	120
27	113	119	121	123	123	124
28	115	122	125	126	126	129
29	118	126	131	131	131	133
30	121	132	134	135	134	137
31	124	135	137	138	138	140
32	130	139	141	142	141	144
33	133	142	145	145	145	147
34	136	146	148	149	149	151
35	139	149	154	153	152	154
36	142	153	158	157	155	157
37	146	157	160	159	158	159
38	149	159	163	164	160	162
39	152	163	167	169	163	165
40	155	167	171	173	167	169
41	159	171	174	177	171	172

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 125 (°F)	TC # 126 (°F)	TC # 127 (°F)	TC # 128 (°F)	TC # 129 (°F)	TC # 130 (°F)
42	160	174	178	180	174	175
43	163	178	182	185	178	179
44	167	182	186	188	181	182
45	170	186	190	191	184	185
46	174	190	194	195	188	188
47	178	193	197	198	192	192
48	181	197	200	201	195	195
49	185	200	204	205	199	199
50	189	204	207	208	201	202
51	193	208	209	210	204	205
52	197	210	212	212	206	207
53	201	212	213	213	207	209
54	205	213	213	213	208	210
55	208	214	214	214	208	210
56	211	214	214	214	209	210
57	213	214	214	214	209	211
58	214	215	215	215	210	211
59	215	216	216	215	210	212
60	215	216	217	216	210	213
Max Temp:	215	216	217	216	210	213
Max Allowed:	408	408	407	408	404	404

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 131 (°F)	TC # 132 (°F)	TC # 133 (°F)	TC # 134 (°F)	TC # 135 (°F)	TC # 136 (°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	79	79	79	79	79	79
8	79	79	80	79	79	79
9	80	80	80	80	79	80
10	81	80	81	80	80	81
11	82	81	82	81	81	82
12	83	82	84	82	82	83
13	84	84	85	84	83	84
14	86	86	87	85	85	86
15	88	88	89	87	87	88
16	90	90	91	89	89	90
17	93	92	93	91	91	93
18	95	95	96	93	94	95
19	98	98	98	96	96	98
20	102	101	101	99	99	101
21	105	105	104	102	103	105
22	109	109	108	105	106	109
23	112	113	111	108	110	113
24	116	117	115	112	113	116
25	120	120	119	116	117	120
26	123	124	124	120	121	125
27	130	129	130	124	125	131
28	133	133	134	130	132	135
29	137	136	138	135	136	139
30	140	140	142	139	140	143
31	143	143	145	144	144	147
32	146	146	149	147	148	151
33	149	149	153	151	152	154
34	152	152	156	155	155	158
35	155	155	160	159	159	160
36	158	158	161	160	161	163
37	159	158	164	163	164	167
38	162	161	167	167	168	170
39	165	164	170	170	171	174
40	168	168	173	174	175	178
41	172	171	176	177	178	181

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 131 (°F)	TC # 132 (°F)	TC # 133 (°F)	TC # 134 (°F)	TC # 135 (°F)	TC # 136 (°F)
42	175	175	179	181	181	184
43	178	178	182	184	184	188
44	182	182	185	187	188	191
45	185	186	188	190	191	194
46	189	190	192	193	194	198
47	193	194	195	196	197	203
48	197	197	199	200	201	207
49	200	201	203	204	205	209
50	203	205	206	207	207	210
51	206	207	208	208	209	210
52	208	209	210	209	209	211
53	210	209	210	210	210	211
54	210	210	210	210	210	211
55	210	210	211	211	211	211
56	210	210	211	211	212	212
57	210	211	212	212	212	212
58	211	213	212	213	214	213
59	212	217	214	214	215	213
60	215	219	216	215	217	214
Max Temp:	215	219	216	215	217	214
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Time (min)	TC # 137 (°F)	TC # 138 (°F)	TC # 139 (°F)	TC # 140 (°F)	TC # 141 (°F)	TC # 142 (°F)
0	79	78	78	79	79	79
1	79	78	78	79	79	79
2	79	79	78	79	79	79
3	79	79	78	79	79	79
4	79	80	78	79	79	79
5	79	82	78	79	79	79
6	79	85	78	79	79	79
7	80	89	79	79	79	79
8	80	93	79	79	79	79
9	82	98	79	79	79	79
10	83	103	79	80	80	79
11	86	108	79	80	80	79
12	88	113	80	80	80	80
13	91	118	81	81	81	80
14	95	124	81	82	82	80
15	99	131	82	83	82	81
16	104	136	83	84	83	81
17	108	141	84	85	84	82
18	112	146	86	86	85	83
19	117	150	87	88	86	84
20	122	155	88	89	88	85
21	126	160	90	91	89	86
22	132	162	91	92	91	87
23	136	166	93	94	92	88
24	141	170	95	96	94	89
25	145	175	97	98	96	91
26	149	179	98	100	98	93
27	153	183	100	102	100	94
28	156	187	102	104	102	96
29	160	191	104	106	104	98
30	161	195	106	108	106	100
31	164	200	108	110	108	102
32	168	205	110	112	110	104
33	171	207	112	114	113	106
34	174	209	114	116	115	108
35	178	211	116	119	117	111
36	181	212	119	121	120	113
37	185	214	121	124	122	115
38	190	216	124	126	125	118
39	195	219	126	131	129	122
40	199	222	130	133	132	125
41	200	225	133	136	135	130

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 137 (°F)	TC # 138 (°F)	TC # 139 (°F)	TC # 140 (°F)	TC # 141 (°F)	TC # 142 (°F)
42	203	228	136	139	138	134
43	206	231	139	142	141	137
44	208	234	142	145	144	140
45	210	237	145	148	147	144
46	211	240	148	151	150	147
47	212	243	152	154	154	151
48	212	247	156	158	157	154
49	213	250	160	160	159	158
50	214	253	162	164	163	160
51	215	258	167	168	167	164
52	217	239	172	173	172	169
53	218	212	177	177	176	176
54	214	210	182	183	181	183
55	211	209	187	187	187	188
56	210	208	192	193	192	192
57	209	208	196	197	197	196
58	209	207	200	201	201	200
59	209	207	203	204	204	203
60	210	208	205	206	207	206
Max Temp:	218	258	205	206	207	206
Max Allowed:	404	403	403	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 143 (°F)	TC # 144 (°F)	TC # 145 (°F)	TC # 146 (°F)	TC # 147 (°F)	TC # 148 (°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	79	79	79	79	79	79
8	79	79	79	79	79	79
9	79	79	79	79	79	79
10	80	79	80	79	79	79
11	80	80	80	80	80	80
12	80	80	80	80	80	80
13	81	81	80	80	80	80
14	81	82	81	80	81	81
15	82	83	81	81	81	82
16	83	83	82	81	82	83
17	84	84	83	82	83	84
18	85	86	84	82	84	85
19	86	87	85	83	85	86
20	87	89	86	83	86	88
21	89	90	88	84	87	89
22	90	92	89	85	89	91
23	92	94	91	86	90	93
24	93	95	92	87	91	95
25	95	97	94	88	93	97
26	97	99	96	89	95	99
27	99	102	97	91	97	101
28	101	104	98	92	98	103
29	103	106	100	94	100	105
30	105	108	102	95	102	107
31	107	111	104	97	104	109
32	110	113	106	99	106	111
33	112	115	107	100	109	113
34	115	118	109	102	111	116
35	117	121	111	104	113	118
36	120	125	114	106	115	121
37	123	130	117	109	118	124
38	126	134	119	111	120	126
39	132	137	122	114	123	131
40	135	140	129	116	126	134
41	138	144	133	119	131	136

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 143 (°F)	TC # 144 (°F)	TC # 145 (°F)	TC # 146 (°F)	TC # 147 (°F)	TC # 148 (°F)
42	142	147	136	122	134	139
43	145	150	139	125	137	142
44	149	153	142	131	140	145
45	152	156	144	134	144	149
46	156	159	147	137	147	152
47	160	160	151	141	150	155
48	161	162	153	145	154	158
49	165	165	156	149	158	160
50	168	169	160	154	159	164
51	172	173	161	158	163	168
52	177	177	166	162	168	171
53	181	181	171	167	173	175
54	185	185	176	174	178	180
55	190	190	181	179	183	185
56	193	193	186	185	188	189
57	197	197	191	191	193	194
58	201	201	197	197	198	199
59	205	205	202	202	203	203
60	207	208	204	205	206	206
Max Temp:	207	208	204	205	206	206
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 149 (°F)	TC # 150 (°F)	TC # 151 (°F)	TC # 152 (°F)	TC # 153 (°F)	TC # 154 (°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	79	79	79	79	79	79
8	79	79	79	79	79	79
9	79	79	79	79	80	80
10	80	80	80	80	80	80
11	80	80	80	80	80	80
12	80	80	80	81	81	81
13	81	81	81	81	82	81
14	82	82	82	82	82	82
15	83	83	83	83	83	83
16	84	84	84	84	84	84
17	85	86	85	86	86	85
18	86	87	87	87	87	86
19	88	89	88	89	89	88
20	89	91	90	91	90	89
21	91	93	92	93	92	91
22	93	95	95	95	94	93
23	95	97	97	97	97	95
24	98	99	99	99	99	97
25	100	102	102	102	101	99
26	102	104	104	104	104	101
27	104	107	107	107	106	103
28	107	109	110	110	109	106
29	109	112	113	113	111	108
30	111	115	116	116	114	111
31	114	117	118	119	117	114
32	116	120	121	122	120	117
33	118	122	124	129	124	120
34	120	124	126	132	127	123
35	123	127	131	136	132	126
36	125	131	134	139	136	132
37	130	134	136	143	140	135
38	133	136	139	146	144	140
39	135	139	142	148	147	144
40	138	142	145	150	152	148
41	140	144	147	152	156	152

OMEGA POINT LABORATORIES

Time (min)	TC # 149 (°F)	TC # 150 (°F)	TC # 151 (°F)	TC # 152 (°F)	TC # 153 (°F)	TC # 154 (°F)
42	143	147	150	154	159	155
43	146	150	153	156	162	158
44	148	152	155	159	166	162
45	151	155	158	159	168	166
46	154	158	159	162	170	170
47	158	159	162	165	173	174
48	159	162	165	168	175	178
49	162	165	168	170	177	182
50	166	169	171	173	180	184
51	169	173	174	176	183	187
52	173	176	178	179	186	190
53	177	180	181	183	189	193
54	182	185	185	187	192	196
55	187	189	190	192	196	200
56	191	193	194	196	199	204
57	196	197	199	200	204	209
58	200	202	204	208	210	210
59	205	208	210	210	211	211
60	209	210	210	210	211	211
Max Temp:	209	210	210	210	211	211
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI

Project No. 97260

October 18, 1994

Time (min)	TC # 155 (°F)	TC # 156 (°F)	TC # 157 (°F)	TC # 158 (°F)	TC # 159 (°F)	TC # 160 (°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	79	79	79	79	79	79
8	79	79	80	79	79	80
9	79	79	80	79	79	80
10	80	79	80	80	80	80
11	80	79	80	80	80	81
12	80	80	81	81	81	82
13	81	80	82	82	82	83
14	82	80	82	83	83	84
15	82	81	84	84	85	86
16	83	81	85	86	86	87
17	84	82	86	87	88	89
18	86	83	88	89	90	91
19	87	84	89	91	92	93
20	88	85	91	93	95	95
21	90	86	93	95	97	98
22	91	88	95	97	100	100
23	93	89	97	100	102	103
24	95	91	99	103	105	106
25	97	92	102	105	108	109
26	99	94	104	108	111	112
27	102	96	107	111	114	115
28	104	98	109	114	117	118
29	106	100	112	118	120	121
30	109	103	115	121	124	125
31	111	105	118	125	130	132
32	114	108	121	130	134	136
33	117	110	124	134	138	140
34	120	113	129	138	142	144
35	123	116	132	142	146	149
36	126	119	136	146	150	153
37	132	122	140	150	154	157
38	136	125	143	155	159	159
39	140	131	147	159	161	162
40	143	135	151	161	165	165
41	147	138	155	166	169	169

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 155 (°F)	TC # 156 (°F)	TC # 157 (°F)	TC # 158 (°F)	TC # 159 (°F)	TC # 160 (°F)
42	150	142	160	170	173	172
43	154	146	162	175	177	176
44	158	151	167	179	181	179
45	161	155	173	183	184	183
46	169	160	178	187	188	186
47	175	163	185	191	191	190
48	181	168	190	194	194	193
49	187	173	195	197	198	197
50	192	179	199	201	201	200
51	196	185	203	204	204	203
52	200	191	206	207	207	206
53	203	196	208	209	209	208
54	206	199	209	210	209	209
55	207	202	210	210	210	210
56	208	207	210	210	210	210
57	209	209	210	211	210	210
58	210	210	211	211	210	211
59	210	210	211	212	211	211
60	211	210	212	213	211	211
Max Temp:	211	210	212	213	211	211
Max Allowed:	404	404	404	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 161 (°F)	TC # 162 (°F)	TC # 163 (°F)	TC # 164 (°F)	TC # 165 (°F)	TC # 166 (°F)
0	82	82	82	82	83	83
1	82	82	82	82	83	83
2	82	82	82	82	83	83
3	82	82	82	82	83	83
4	82	82	82	82	83	83
5	82	82	82	82	83	83
6	82	82	82	82	83	83
7	82	83	82	82	83	83
8	82	83	82	82	84	83
9	83	83	83	82	84	84
10	83	84	83	83	85	84
11	84	85	84	84	86	85
12	85	86	85	84	87	86
13	86	87	86	86	88	87
14	87	88	88	87	90	88
15	88	90	89	88	91	90
16	90	91	91	90	93	91
17	91	93	93	91	95	93
18	93	95	95	93	97	95
19	95	97	97	95	99	97
20	97	99	99	98	101	99
21	99	102	102	100	106	102
22	102	104	104	103	109	104
23	104	107	107	106	112	107
24	107	110	109	109	115	110
25	110	113	113	111	118	113
26	113	116	116	115	121	116
27	117	119	119	118	124	119
28	120	122	122	121	129	123
29	124	126	125	124	133	126
30	127	131	130	129	136	132
31	132	135	133	133	140	136
32	136	139	137	136	143	140
33	140	142	140	140	147	144
34	144	145	143	144	150	149
35	148	148	147	147	154	153
36	151	152	150	151	158	157
37	154	155	154	155	160	159
38	158	159	157	159	163	163
39	160	161	159	160	167	167
40	163	164	163	164	171	171
41	167	168	167	168	175	175

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 161 (°F)	TC # 162 (°F)	TC # 163 (°F)	TC # 164 (°F)	TC # 165 (°F)	TC # 166 (°F)
42	171	172	170	172	179	179
43	175	176	174	176	183	183
44	178	180	178	180	187	187
45	182	183	183	185	191	191
46	186	187	187	189	194	195
47	190	191	191	193	198	198
48	193	195	195	197	202	203
49	197	199	199	201	206	207
50	200	202	204	206	210	211
51	204	206	208	210	213	212
52	206	210	212	212	214	213
53	208	212	212	212	215	214
54	210	213	213	212	215	214
55	211	213	213	213	215	215
56	212	213	213	213	215	215
57	212	213	213	213	215	216
58	212	214	214	214	216	217
59	213	214	214	215	216	218
60	213	214	215	217	217	220
Max Temp:	213	214	215	217	217	220
Max Allowed:	407	407	407	407	408	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 167 (°F)	TC # 168 (°F)	TC # 169 (°F)	TC # 170 (°F)	TC # 171 (°F)	TC # 172 (°F)
0	82	82	82	82	81	82
1	82	82	82	82	81	82
2	82	82	82	82	81	82
3	82	82	82	82	81	82
4	82	82	82	82	81	82
5	82	83	82	82	81	82
6	82	83	82	84	81	82
7	83	83	83	85	81	82
8	83	84	83	87	82	82
9	84	84	84	89	82	82
10	84	85	85	92	82	83
11	85	86	87	95	82	83
12	86	87	89	98	83	84
13	87	89	91	102	83	84
14	89	90	93	106	84	85
15	90	92	96	109	85	86
16	92	94	100	113	86	87
17	94	96	103	117	87	88
18	96	98	106	121	88	89
19	98	101	110	125	90	91
20	101	103	114	131	91	92
21	103	106	118	135	93	94
22	106	109	122	139	94	95
23	109	112	125	143	96	97
24	112	116	131	147	98	99
25	115	119	135	151	99	101
26	118	123	139	156	101	103
27	122	127	143	160	103	105
28	125	133	147	161	105	107
29	131	136	151	165	107	109
30	135	140	155	169	109	111
31	139	145	159	172	111	114
32	143	149	161	176	113	116
33	147	153	165	179	115	118
34	152	157	168	182	118	121
35	156	160	172	186	120	123
36	159	164	176	189	122	126
37	163	168	180	192	125	130
38	167	172	183	195	129	133
39	171	176	187	197	131	135
40	175	180	191	200	134	138
41	179	184	195	202	137	141

OMEGA POINT LABORATORIES

Time (min)	TC # 167 (°F)	TC # 168 (°F)	TC # 169 (°F)	TC # 170 (°F)	TC # 171 (°F)	TC # 172 (°F)
42	183	187	200	207	140	144
43	187	190	206	208	143	147
44	190	194	210	210	146	150
45	194	198	211	211	149	153
46	198	203	212	212	153	157
47	202	208	212	213	157	159
48	206	211	213	214	160	163
49	210	213	213	215	164	167
50	212	214	213	217	170	172
51	213	214	214	218	174	176
52	214	215	214	221	179	181
53	214	215	214	223	184	185
54	215	215	215	225	188	190
55	215	215	216	227	194	194
56	216	216	217	229	198	199
57	217	216	218	231	202	202
58	218	217	219	233	205	206
59	219	217	220	235	207	208
60	220	218	222	237	208	210
Max Temp:	220	218	222	237	208	210
Max Allowed:	407	407	407	407	406	407

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 173 (°F)	TC # 174 (°F)	TC # 175 (°F)	TC # 176 (°F)	TC # 177 (°F)	TC # 178 (°F)
0	83	83	83	83	82	82
1	83	83	83	83	82	82
2	83	83	83	83	82	82
3	83	83	83	83	82	82
4	83	83	83	83	82	82
5	83	83	83	83	82	82
6	83	83	83	83	82	82
7	83	83	83	83	82	82
8	83	83	83	83	82	82
9	83	83	83	84	82	82
10	84	83	84	84	82	82
11	84	83	84	84	83	82
12	84	83	84	85	83	83
13	85	84	85	86	84	83
14	85	84	86	87	84	83
15	86	84	87	88	85	84
16	87	85	88	89	86	84
17	88	86	89	91	87	85
18	89	86	91	92	88	86
19	90	87	92	94	89	86
20	91	88	94	96	91	87
21	93	89	96	98	92	88
22	94	90	98	100	94	89
23	96	92	100	102	95	91
24	98	93	102	104	97	92
25	99	95	104	106	99	93
26	101	96	106	109	100	95
27	103	98	109	111	103	96
28	105	100	111	114	104	98
29	107	102	113	116	107	99
30	110	104	116	119	109	101
31	112	106	118	121	111	103
32	114	108	121	124	113	105
33	117	110	124	126	116	108
34	119	113	126	131	119	111
35	122	115	131	134	121	113
36	124	118	134	137	124	115
37	127	120	137	140	129	118
38	131	123	140	143	132	121
39	134	126	143	146	133	124
40	137	131	146	149	135	127
41	140	134	149	152	136	131

OMEGA POINT LABORATORIES

Time (min)	TC # 173 (°F)	TC # 174 (°F)	TC # 175 (°F)	TC # 176 (°F)	TC # 177 (°F)	TC # 178 (°F)
42	143	137	153	155	138	134
43	146	141	156	158	142	138
44	150	145	160	159	144	142
45	153	148	161	161	147	146
46	156	153	164	164	151	150
47	158	157	167	167	154	154
48	163	160	171	171	159	157
49	167	164	174	174	166	159
50	171	169	177	178	170	160
51	176	174	180	181	174	164
52	181	179	184	185	178	168
53	185	184	188	189	181	172
54	190	188	192	193	185	177
55	195	193	196	196	188	182
56	199	198	199	200	191	187
57	203	202	203	204	195	193
58	206	205	206	208	200	199
59	209	208	209	212	205	203
60	211	210	212	217	208	207
Max Temp:	211	210	212	217	208	207
Max Allowed:	408	408	408	408	407	407

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 179 (°F)	TC # 180 (°F)	TC # 181 (°F)	TC # 182 (°F)	TC # 183 (°F)	TC # 184 (°F)
0	81	81	83	82	82	83
1	81	81	83	82	82	83
2	81	81	83	82	82	83
3	81	81	82	82	82	83
4	81	81	83	82	82	83
5	81	81	83	82	82	83
6	81	81	83	82	82	83
7	81	82	83	83	82	83
8	81	82	83	83	83	83
9	82	82	84	83	83	83
10	82	82	84	84	84	84
11	82	83	85	85	84	84
12	83	83	86	86	85	85
13	83	84	87	87	86	86
14	84	85	88	88	87	87
15	85	86	89	90	89	88
16	86	87	91	91	90	89
17	87	89	93	93	92	91
18	88	90	95	95	94	93
19	89	92	97	98	96	95
20	91	93	99	100	98	97
21	92	95	101	102	101	99
22	94	97	103	105	103	102
23	96	99	105	107	106	104
24	97	102	108	110	108	107
25	99	104	110	113	111	110
26	101	106	113	116	114	112
27	103	108	116	119	117	115
28	105	111	118	122	120	118
29	108	113	121	125	124	122
30	110	116	123	130	127	125
31	112	118	126	133	132	130
32	115	121	131	136	135	133
33	117	123	133	140	138	137
34	120	126	136	143	142	140
35	123	131	139	146	145	144
36	126	133	142	149	148	147
37	131	136	144	151	151	151
38	133	139	147	154	153	154
39	136	142	149	156	156	156
40	139	144	152	158	158	159
41	142	147	155	160	159	160

OMEGA POINT LABORATORIES

Time (min)	TC # 179 (°F)	TC # 180 (°F)	TC # 181 (°F)	TC # 182 (°F)	TC # 183 (°F)	TC # 184 (°F)
42	145	150	158	162	161	163
43	148	153	159	164	164	165
44	151	155	162	166	166	168
45	154	158	165	169	169	170
46	157	159	168	175	172	173
47	158	162	171	175	175	176
48	161	165	174	177	178	178
49	164	168	177	181	181	181
50	167	171	180	185	185	185
51	171	174	184	187	188	188
52	175	177	187	192	192	191
53	179	181	190	194	196	195
54	183	185	194	197	199	198
55	187	188	197	201	203	202
56	192	192	200	204	207	206
57	196	197	204	208	210	210
58	200	201	208	212	214	215
59	205	206	211	215	217	217
60	208	209	215	218	221	219
Max Temp:	208	209	215	218	221	219
Max Allowed:	406	406	408	407	407	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 185 (°F)	TC # 186 (°F)	TC # 187 (°F)	TC # 188 (°F)	TC # 189 (°F)	TC # 190 (°F)
0	82	82	81	82	83	82
1	82	82	81	82	83	82
2	82	82	81	82	83	83
3	82	82	81	82	83	82
4	82	82	81	82	83	83
5	82	82	81	82	83	83
6	82	82	81	82	83	83
7	82	82	81	82	83	83
8	82	82	81	82	84	83
9	82	82	81	82	84	84
10	83	83	82	83	85	84
11	83	83	82	84	86	85
12	84	84	82	84	87	86
13	85	84	82	85	88	87
14	86	85	83	86	89	88
15	87	86	83	87	91	90
16	88	87	84	88	92	91
17	90	89	85	90	94	93
18	92	90	86	91	96	96
19	93	92	87	93	98	98
20	95	93	88	94	101	100
21	98	95	90	96	103	103
22	100	97	91	98	106	106
23	102	99	93	100	108	109
24	105	102	95	102	111	112
25	107	104	97	105	113	115
26	110	106	99	107	116	118
27	113	109	101	109	119	122
28	115	112	103	112	122	125
29	118	114	106	115	125	130
30	121	117	108	117	130	134
31	124	120	111	120	133	138
32	129	123	114	124	137	142
33	132	126	116	129	141	145
34	136	131	119	133	145	150
35	139	135	122	137	149	154
36	142	139	126	140	152	158
37	147	142	131	144	156	160
38	151	146	134	148	160	164
39	154	150	138	151	161	168
40	158	153	142	154	165	172
41	160	157	145	158	169	176

OMEGA POINT LABORATORIES

Time (min)	TC # 185 (°F)	TC # 186 (°F)	TC # 187 (°F)	TC # 188 (°F)	TC # 189 (°F)	TC # 190 (°F)
42	163	159	149	159	173	179
43	167	163	153	163	177	183
44	170	167	158	167	181	186
45	174	171	160	171	185	189
46	177	175	164	175	190	192
47	180	179	169	179	194	196
48	183	183	173	183	198	199
49	186	186	178	187	202	202
50	189	189	182	191	205	205
51	192	191	186	196	208	207
52	194	193	190	201	211	210
53	197	196	194	205	213	212
54	200	200	199	208	214	213
55	204	203	202	209	214	214
56	207	207	208	211	214	214
57	211	213	210	212	215	215
58	213	213	211	213	215	216
59	214	213	212	213	216	218
60	214	214	212	214	217	221
Max Temp:	214	214	212	214	217	221
Max Allowed:	407	407	406	407	408	407

OMEGA POINT LABORATORIES

Time (min)	TC # 191 (°F)	TC # 192 (°F)	TC # 193 (°F)	TC # 194 (°F)	TC # 195 (°F)	TC # 196 (°F)
0	82	83	82	82	82	82
1	82	83	82	82	82	82
2	82	83	82	82	82	82
3	82	83	82	82	82	82
4	82	83	82	82	82	82
5	82	83	82	82	82	82
6	82	83	82	82	82	82
7	82	83	82	83	83	82
8	83	83	82	83	83	82
9	83	84	83	84	84	83
10	84	84	84	84	85	84
11	85	85	84	85	86	84
12	86	86	86	86	87	85
13	87	88	87	88	88	87
14	88	89	88	89	90	88
15	90	91	90	91	92	89
16	92	92	91	93	94	91
17	94	94	94	95	96	93
18	96	97	96	97	98	95
19	98	99	98	99	101	98
20	101	101	100	102	103	100
21	104	104	102	104	106	103
22	106	107	105	107	109	106
23	109	109	107	109	111	108
24	112	112	110	113	114	111
25	115	115	113	117	117	114
26	119	118	116	120	119	117
27	122	121	119	123	122	120
28	126	124	123	126	125	123
29	132	130	129	131	130	126
30	136	133	133	135	133	131
31	139	137	137	138	137	134
32	143	141	140	141	140	137
33	147	145	144	145	144	141
34	151	150	148	148	147	144
35	155	154	151	152	150	147
36	159	159	155	155	153	151
37	161	162	159	159	157	154
38	166	166	161	161	158	158
39	170	169	165	164	162	160
40	174	173	168	168	165	163
41	178	176	172	171	169	167

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Time (min)	TC # 191 (°F)	TC # 192 (°F)	TC # 193 (°F)	TC # 194 (°F)	TC # 195 (°F)	TC # 196 (°F)
42	183	180	175	175	173	171
43	186	183	179	178	177	175
44	190	187	182	182	181	178
45	193	190	186	186	184	182
46	196	194	190	189	188	186
47	198	197	193	193	191	190
48	200	199	196	196	195	194
49	203	203	198	200	199	199
50	205	205	201	203	203	203
51	207	207	204	206	207	209
52	210	210	207	209	211	211
53	211	212	209	211	212	212
54	212	212	211	212	213	212
55	212	213	212	212	213	213
56	213	213	212	213	214	213
57	213	214	213	213	214	214
58	214	214	213	214	215	215
59	215	214	213	214	219	219
60	218	215	214	214	222	222
Max Temp:	218	215	214	214	222	222
Max Allowed:	407	408	407	407	407	407

OMEGA POINT LABORATORIES

Time (min)	TC # 197 (°F)	TC # 198 (°F)	TC # 199 (°F)	TC # 200 (°F)	TC # 201 (°F)	TC # 202 (°F)
0	82	82	82	82	82	82
1	82	82	82	82	82	82
2	82	82	82	82	82	82
3	82	82	82	82	82	82
4	82	82	82	82	82	83
5	82	82	82	82	82	84
6	82	82	82	82	82	86
7	82	82	82	82	83	89
8	82	82	82	82	83	93
9	83	82	82	82	84	97
10	83	83	83	83	86	101
11	84	84	84	84	87	105
12	85	84	85	85	89	109
13	86	86	86	86	92	113
14	87	87	88	88	95	118
15	89	88	89	89	97	123
16	90	90	91	91	100	129
17	92	92	93	94	104	134
18	94	94	95	96	107	139
19	97	96	98	99	110	143
20	99	99	100	101	114	147
21	102	101	103	104	117	151
22	104	104	105	107	121	155
23	107	107	108	110	125	158
24	110	110	111	114	130	160
25	113	113	115	117	134	163
26	116	116	118	120	137	167
27	119	119	121	124	141	170
28	122	123	125	130	145	174
29	126	126	130	134	148	177
30	131	131	134	137	152	179
31	134	135	138	142	156	183
32	138	139	142	145	159	187
33	141	142	146	150	161	187
34	145	146	150	154	165	189
35	148	150	154	158	168	191
36	152	154	158	160	172	194
37	155	158	160	164	176	196
38	159	160	164	168	179	198
39	161	164	168	171	183	200
40	164	169	172	175	187	203
41	168	172	176	179	191	205

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 197 (°F)	TC # 198 (°F)	TC # 199 (°F)	TC # 200 (°F)	TC # 201 (°F)	TC # 202 (°F)
42	172	176	179	183	195	206
43	176	180	183	187	199	207
44	180	184	187	191	203	208
45	184	188	191	196	206	209
46	188	193	195	201	209	212
47	193	197	199	207	211	214
48	197	201	204	210	212	215
49	202	207	208	210	212	216
50	207	210	210	211	213	218
51	210	211	211	211	214	219
52	212	211	211	212	215	219
53	212	212	212	212	217	220
54	213	213	213	212	218	221
55	213	213	213	213	219	222
56	214	214	214	214	221	223
57	214	215	216	214	222	224
58	215	216	218	215	224	225
59	217	218	221	217	226	226
60	218	220	223	219	228	228
Max Temp:	218	220	223	219	228	228
Max Allowed:	407	407	407	407	407	407

OMEGA POINT LABORATORIES

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Time (min)	TC # 203 (°F)	TC # 204 (°F)	TC # 205 (°F)	TC # 206 (°F)	TC # 207 (°F)	TC # 208 (°F)
0	82	82	82	82	82	82
1	82	82	82	82	82	82
2	82	82	82	82	82	82
3	82	82	82	82	82	82
4	82	82	82	82	82	82
5	82	82	82	82	82	82
6	82	82	82	82	82	82
7	82	82	82	82	82	82
8	82	82	82	82	82	82
9	82	83	82	82	82	83
10	82	83	83	82	83	83
11	83	83	83	82	83	84
12	83	84	84	82	84	85
13	84	85	84	83	85	86
14	84	85	85	83	86	87
15	85	86	85	84	87	88
16	86	87	86	84	88	90
17	87	88	87	85	89	91
18	89	90	88	85	91	93
19	90	91	89	86	92	95
20	91	93	91	87	94	97
21	93	94	92	88	96	99
22	94	96	94	89	98	101
23	96	98	96	91	100	104
24	98	100	97	92	102	106
25	100	102	100	94	104	108
26	102	104	102	96	107	111
27	104	106	104	97	109	113
28	106	108	106	99	111	116
29	108	111	108	101	114	119
30	110	113	110	103	116	122
31	112	115	113	106	119	125
32	115	118	115	108	122	130
33	117	120	118	110	125	133
34	119	123	121	113	130	136
35	122	126	123	115	133	139
36	125	130	126	118	136	143
37	129	133	131	121	139	147
38	132	136	134	124	142	150
39	135	139	137	129	145	153
40	138	142	140	133	148	155
41	141	145	144	137	151	156

OMEGA POINT LABORATORIES

Time (min)	TC # 203 (°F)	TC # 204 (°F)	TC # 205 (°F)	TC # 206 (°F)	TC # 207 (°F)	TC # 208 (°F)
42	145	149	148	141	155	159
43	149	153	152	145	158	162
44	153	157	156	150	162	164
45	158	159	159	155	166	167
46	160	163	163	160	170	170
47	165	167	168	163	175	174
48	169	171	172	168	179	176
49	174	175	176	173	182	178
50	178	180	180	177	186	181
51	182	184	184	182	189	184
52	187	188	189	187	192	187
53	191	193	194	192	196	190
54	196	197	198	196	199	193
55	200	201	201	200	202	197
56	203	204	205	203	205	201
57	206	207	207	205	208	204
58	207	209	209	208	210	208
59	209	210	211	210	212	212
60	211	212	212	211	214	216
Max Temp:	211	212	212	211	214	216
Max Allowed:	407	407	407	407	407	407

OMEGA POINT LABORATORIES

Time (min)	TC # 209 (°F)	TC # 210 (°F)	TC # 211 (°F)	TC # 212 (°F)	TC # 213 (°F)	TC # 214 (°F)
0	81	81	80	81	82	81
1	81	81	80	81	82	81
2	81	81	80	81	82	81
3	81	81	80	81	82	81
4	81	81	80	81	82	81
5	81	81	80	81	82	81
6	81	81	80	81	82	81
7	81	81	80	81	82	82
8	81	81	81	81	82	82
9	81	81	81	81	82	82
10	82	81	81	82	82	83
11	82	81	82	82	83	84
12	82	81	82	82	84	84
13	83	82	83	83	84	86
14	83	82	84	84	85	87
15	84	82	85	85	86	88
16	85	83	86	86	88	90
17	86	84	87	87	89	92
18	87	84	89	88	91	93
19	88	85	90	90	93	96
20	90	86	92	91	95	98
21	91	87	94	93	97	100
22	93	88	96	95	99	103
23	95	89	98	97	102	105
24	97	90	101	98	104	108
25	98	92	103	101	107	111
26	100	93	106	103	110	114
27	102	95	108	105	112	117
28	104	97	111	107	115	120
29	106	98	113	110	118	123
30	109	101	116	112	121	126
31	111	103	119	115	124	132
32	113	105	121	118	129	135
33	115	108	124	121	132	139
34	118	110	129	125	135	143
35	119	113	132	130	138	147
36	121	116	136	133	142	150
37	124	120	139	136	146	154
38	126	123	142	139	149	157
39	131	126	146	142	153	159
40	133	131	149	146	156	163
41	136	135	153	149	160	166

OMEGA POINT LABORATORIES

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Time (min)	TC # 209 (°F)	TC # 210 (°F)	TC # 211 (°F)	TC # 212 (°F)	TC # 213 (°F)	TC # 214 (°F)
42	140	138	156	152	161	170
43	142	142	159	156	163	173
44	145	145	161	159	166	177
45	149	148	164	160	169	180
46	152	152	167	163	172	184
47	156	157	170	167	175	187
48	160	160	172	170	178	192
49	161	164	175	173	181	195
50	165	167	178	176	183	197
51	170	171	181	179	186	200
52	171	174	184	183	189	203
53	175	179	187	186	192	205
54	180	183	190	189	195	207
55	183	187	193	193	198	209
56	188	193	197	197	201	211
57	192	196	200	200	204	212
58	197	200	204	204	207	213
59	201	205	208	207	210	214
60	205	208	211	210	213	216
Max Temp:	205	208	211	210	213	216
Max Allowed:	406	406	405	406	407	406

OMEGA POINT LABORATORIES

TVA / TSI

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October 18, 1994

Time (min)	TC # 215 (°F)	TC # 216 (°F)	TC # 217 (°F)	TC # 218 (°F)	TC # 219 (°F)	TC # 220 (°F)
0	81	82	81	81	81	81
1	81	82	81	81	80	81
2	81	82	81	81	81	81
3	81	82	81	81	81	81
4	81	82	81	81	80	81
5	81	82	81	81	80	81
6	81	82	81	81	80	81
7	81	82	81	81	81	81
8	82	82	81	81	81	81
9	82	82	82	82	81	82
10	82	83	82	82	81	82
11	83	83	83	82	81	83
12	84	84	84	83	81	83
13	85	85	84	84	81	84
14	86	86	86	84	82	85
15	87	88	87	85	82	86
16	89	89	88	86	83	87
17	90	91	90	88	84	88
18	92	93	92	89	85	90
19	94	95	93	91	86	91
20	97	97	96	93	87	93
21	99	99	98	95	89	95
22	101	102	100	97	90	97
23	104	104	103	99	92	99
24	107	107	105	102	94	101
25	109	110	108	104	96	104
26	112	113	111	107	98	106
27	115	115	113	109	100	109
28	118	118	116	112	103	111
29	122	122	119	115	105	115
30	125	125	122	118	108	118
31	131	130	125	122	111	121
32	134	134	131	125	114	124
33	138	137	134	131	117	129
34	142	142	137	135	120	133
35	145	146	141	138	124	136
36	149	150	144	142	129	141
37	153	154	149	147	133	144
38	157	158	152	151	136	148
39	160	160	156	154	140	151
40	164	163	159	158	144	155
41	167	167	161	160	148	158

OMEGA POINT LABORATORIES

Time (min)	TC # 215 (°F)	TC # 216 (°F)	TC # 217 (°F)	TC # 218 (°F)	TC # 219 (°F)	TC # 220 (°F)
42	171	171	165	164	152	160
43	174	175	170	168	156	163
44	177	178	174	172	160	167
45	180	181	177	175	162	171
46	183	183	182	179	166	175
47	186	186	185	183	170	179
48	188	188	189	187	175	183
49	191	190	192	191	179	187
50	194	192	196	194	183	191
51	196	194	199	197	187	195
52	199	196	203	200	191	199
53	201	199	206	203	195	202
54	203	202	209	206	199	205
55	206	205	211	209	203	207
56	208	208	212	211	206	209
57	211	210	213	212	209	211
58	213	214	214	213	210	212
59	214	215	214	213	211	212
60	215	216	215	214	211	213
Max Temp:	215	216	215	214	211	213
Max Allowed:	406	407	406	406	406	406

OMEGA POINT LABORATORIES

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Time (min)	TC # 221 (°F)	TC # 222 (°F)	TC # 223 (°F)	TC # 224 (°F)	TC # 225 (°F)	TC # 226 (°F)
0	82	81	81	82	82	82
1	82	81	81	82	82	82
2	82	81	81	82	82	83
3	82	81	81	82	82	82
4	82	81	81	82	82	83
5	82	81	81	82	83	83
6	82	82	81	82	83	83
7	82	82	81	82	83	83
8	83	82	82	82	83	83
9	83	82	82	83	84	84
10	84	83	83	83	84	84
11	85	84	84	84	85	85
12	86	84	85	85	86	86
13	87	85	86	86	87	87
14	88	87	87	87	88	89
15	89	88	89	88	89	90
16	91	90	90	90	91	92
17	93	91	92	91	92	94
18	95	94	94	93	94	96
19	97	96	96	95	96	98
20	99	99	98	97	98	100
21	102	102	101	100	100	103
22	104	104	104	102	102	105
23	107	107	106	105	105	108
24	110	111	109	107	107	111
25	113	114	112	110	110	115
26	115	117	115	113	113	118
27	118	121	119	116	116	121
28	122	125	122	119	119	124
29	125	130	126	123	125	129
30	130	133	133	129	130	133
31	133	137	136	133	134	136
32	136	140	140	136	138	139
33	139	144	144	140	141	142
34	143	147	149	144	145	146
35	146	151	153	148	148	149
36	150	155	156	151	152	152
37	153	159	158	156	156	156
38	157	160	162	159	160	159
39	158	165	166	161	161	160
40	162	168	169	166	165	164
41	166	172	173	170	169	168

OMEGA POINT LABORATORIES

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Time (min)	TC # 221 (°F)	TC # 222 (°F)	TC # 223 (°F)	TC # 224 (°F)	TC # 225 (°F)	TC # 226 (°F)
42	171	176	176	174	173	171
43	175	179	180	178	177	175
44	178	183	184	182	180	179
45	183	186	188	186	184	183
46	188	190	191	190	188	187
47	192	194	195	194	192	190
48	197	197	198	197	195	194
49	201	201	202	201	199	198
50	204	204	205	204	202	201
51	208	207	207	208	205	205
52	210	209	210	211	210	209
53	212	211	212	212	212	212
54	214	212	212	213	213	213
55	214	212	213	213	214	213
56	214	213	213	213	214	214
57	215	214	213	213	214	214
58	215	214	213	213	214	214
59	215	215	214	214	215	214
60	217	216	214	214	215	215
Max Temp:	217	216	214	214	215	215
Max Allowed:	407	406	406	407	407	407

OMEGA POINT LABORATORIES

Time (min)	TC # 227 (°F)	TC # 228 (°F)	TC # 229 (°F)	TC # 230 (°F)	TC # 231 (°F)	TC # 232 (°F)
0	82	82	83	83	82	83
1	82	82	83	83	82	83
2	82	82	83	83	82	83
3	82	82	83	83	82	83
4	82	82	83	83	82	83
5	82	82	83	83	82	83
6	82	82	83	83	82	83
7	83	82	83	83	83	83
8	83	83	83	83	83	83
9	84	83	84	84	83	84
10	84	83	84	84	84	84
11	85	84	85	85	85	85
12	86	85	86	86	86	87
13	88	86	87	87	87	88
14	89	87	88	88	89	89
15	91	89	89	89	90	91
16	93	91	91	91	92	93
17	96	93	93	93	94	96
18	98	95	95	95	96	98
19	100	97	97	97	99	101
20	103	100	100	99	101	104
21	105	102	102	102	104	107
22	108	105	105	105	107	109
23	111	108	108	107	110	113
24	113	111	111	110	113	116
25	116	114	114	113	116	119
26	119	116	117	116	119	123
27	122	120	120	120	122	126
28	125	123	123	123	125	132
29	130	126	126	127	131	135
30	133	131	132	132	135	139
31	136	134	135	136	138	142
32	139	137	138	139	142	146
33	142	140	142	143	145	150
34	145	144	145	147	149	154
35	149	147	148	150	153	158
36	152	150	152	154	157	160
37	155	153	156	158	159	163
38	159	157	159	160	163	167
39	160	158	161	163	167	171
40	163	162	165	167	171	176
41	167	166	168	172	175	180

OMEGA POINT LABORATORIES

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Time (min)	TC # 227 (°F)	TC # 228 (°F)	TC # 229 (°F)	TC # 230 (°F)	TC # 231 (°F)	TC # 232 (°F)
42	170	169	172	176	179	184
43	174	174	176	180	183	189
44	178	178	180	184	187	195
45	182	182	184	188	191	201
46	187	186	188	192	195	208
47	190	190	193	197	201	211
48	195	195	198	202	207	212
49	200	199	202	208	211	212
50	203	203	208	213	212	212
51	206	210	212	213	212	212
52	211	212	213	213	212	213
53	212	212	213	213	213	213
54	213	213	214	214	214	214
55	214	213	214	214	215	215
56	214	213	214	215	215	215
57	214	214	214	216	216	216
58	215	214	215	217	218	217
59	215	215	216	219	221	219
60	216	218	217	221	223	222
Max Temp:	216	218	217	221	223	222
Max Allowed:	407	407	408	408	407	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 233 (°F)	TC # 234 (°F)	TC # 235 (°F)	TC # 236 (°F)	TC # 237 (°F)	TC # 238 (°F)
0	82	82	82	82	83	83
1	82	82	82	82	83	83
2	82	82	82	82	83	83
3	82	82	82	82	83	83
4	82	82	82	82	83	83
5	82	84	82	83	83	83
6	82	85	82	83	83	83
7	83	88	82	83	84	83
8	84	91	83	83	84	83
9	85	95	84	84	85	83
10	87	99	84	85	86	84
11	90	103	86	87	87	84
12	93	108	87	88	88	84
13	98	112	89	90	90	85
14	101	116	91	92	91	86
15	105	121	93	94	93	87
16	107	125	95	97	95	88
17	111	131	97	99	98	89
18	114	136	100	102	100	90
19	117	140	102	105	103	91
20	122	144	105	107	105	93
21	125	148	107	110	108	95
22	130	153	110	113	110	96
23	134	156	113	116	113	98
24	138	158	115	119	116	100
25	142	162	118	122	118	102
26	146	166	121	125	121	104
27	149	170	124	130	124	106
28	152	174	126	133	126	109
29	156	178	131	136	131	111
30	159	181	134	139	134	113
31	161	185	136	142	137	116
32	164	189	139	145	139	118
33	168	192	142	148	142	121
34	172	195	145	151	145	124
35	176	199	148	154	147	127
36	179	203	151	157	150	132
37	183	206	154	160	154	135
38	187	209	157	161	156	138
39	190	212	158	164	159	141
40	194	214	161	167	160	144
41	198	215	165	170	164	147

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Time (min)	TC # 233 (°F)	TC # 234 (°F)	TC # 235 (°F)	TC # 236 (°F)	TC # 237 (°F)	TC # 238 (°F)
42	202	216	168	173	167	151
43	206	218	171	176	170	155
44	209	220	174	179	174	158
45	210	222	178	183	178	160
46	212	225	182	186	181	164
47	213	227	185	189	185	168
48	214	230	188	192	188	171
49	214	232	192	196	192	175
50	215	234	195	199	196	179
51	216	236	198	202	199	183
52	217	239	201	205	202	187
53	219	241	204	208	206	192
54	221	244	207	212	209	196
55	223	246	210	213	213	199
56	225	248	212	214	215	203
57	228	251	213	214	215	206
58	230	253	212	215	215	208
59	232	258	212	214	216	211
60	235	261	213	214	216	212
Max Temp:	235	261	213	215	216	212
Max Allowed:	407	407	407	407	408	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 239 (°F)	TC # 240 (°F)	TC # 241 (°F)	TC # 242 (°F)	TC # 243 (°F)	TC # 244 (°F)
0	83	83	83	82	82	82
1	83	83	83	82	82	82
2	83	83	82	82	82	82
3	83	83	82	82	82	82
4	83	83	82	82	82	82
5	83	83	82	82	82	82
6	83	83	82	82	83	83
7	83	83	83	82	84	84
8	83	84	83	83	85	85
9	84	84	83	83	87	87
10	84	85	83	83	90	90
11	85	86	84	83	94	94
12	86	87	84	84	98	98
13	87	88	85	84	100	102
14	89	89	85	85	103	105
15	90	91	86	86	106	109
16	92	93	87	86	109	112
17	94	95	88	87	113	116
18	97	98	89	89	117	120
19	99	100	91	90	121	123
20	102	103	92	91	124	127
21	104	105	93	93	130	132
22	107	108	95	94	133	135
23	110	111	97	96	137	139
24	113	115	99	98	140	143
25	116	118	101	100	144	146
26	119	121	103	102	147	150
27	122	124	105	104	149	154
28	125	127	107	106	152	157
29	130	132	110	108	155	159
30	133	134	112	110	159	163
31	136	137	115	113	160	166
32	139	142	117	115	163	170
33	142	146	120	118	167	174
34	146	150	122	120	170	179
35	149	154	125	123	173	183
36	153	157	131	126	176	187
37	156	158	134	131	179	192
38	160	161	137	134	183	196
39	161	164	140	137	186	200
40	164	167	143	141	190	204
41	168	170	146	144	193	207

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 239 (°F)	TC # 240 (°F)	TC # 241 (°F)	TC # 242 (°F)	TC # 243 (°F)	TC # 244 (°F)
42	171	173	149	148	196	211
43	175	177	153	151	199	212
44	179	181	157	155	203	213
45	182	183	159	158	205	214
46	185	185	162	160	208	215
47	186	186	174	164	210	216
48	188	188	179	168	211	218
49	190	191	180	171	212	220
50	193	195	184	175	213	223
51	196	198	187	179	214	226
52	199	201	190	182	215	230
53	201	204	192	186	216	233
54	204	208	195	189	217	237
55	207	212	197	192	220	242
56	209	216	200	196	224	247
57	211	220	203	199	228	252
58	214	224	206	203	233	259
59	217	228	209	206	237	264
60	220	232	212	209	243	270
Max Temp:	220	232	212	209	243	270
Max Allowed:	408	408	408	407	407	407

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 245 (°F)	TC # 246 (°F)	TC # 247 (°F)	TC # 248 (°F)	TC # 249 (°F)	TC # 250 (°F)
0	83	83	83	83	83	83
1	83	83	83	83	83	83
2	83	83	83	83	83	83
3	83	83	83	83	83	83
4	83	83	83	83	83	83
5	84	83	83	84	83	83
6	84	84	84	84	84	84
7	86	85	85	85	85	84
8	87	86	86	87	87	86
9	89	88	88	89	89	87
10	91	90	90	91	91	89
11	94	93	93	93	94	90
12	97	95	95	96	97	93
13	100	98	98	99	100	95
14	104	102	102	103	103	97
15	107	105	105	106	107	100
16	111	109	109	110	111	103
17	115	113	112	114	114	106
18	119	116	116	118	118	109
19	123	120	120	122	122	112
20	127	124	124	126	126	115
21	133	131	130	132	132	119
22	137	135	134	136	136	122
23	142	139	138	140	140	125
24	146	143	143	145	145	131
25	151	147	147	149	149	135
26	155	152	151	153	153	138
27	160	156	155	157	157	141
28	162	158	160	160	159	145
29	167	163	162	164	163	148
30	172	167	166	169	167	152
31	177	172	170	174	172	156
32	182	176	175	178	176	159
33	187	181	179	181	180	161
34	193	185	183	185	184	164
35	197	190	188	189	188	168
36	199	196	192	193	192	171
37	203	202	196	197	196	175
38	206	209	201	201	200	179
39	210	212	206	205	204	183
40	214	214	211	210	209	187
41	215	215	213	212	212	192

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 245 (°F)	TC # 246 (°F)	TC # 247 (°F)	TC # 248 (°F)	TC # 249 (°F)	TC # 250 (°F)
42	216	215	215	213	214	198
43	217	217	216	214	215	204
44	218	218	217	215	216	209
45	219	220	219	217	218	211
46	220	223	222	219	220	212
47	223	226	226	221	223	213
48	226	230	229	224	226	214
49	230	234	233	228	229	215
50	233	238	237	232	233	216
51	237	242	241	236	236	217
52	241	246	245	241	240	219
53	245	251	249	245	244	222
54	250	257	253	250	248	225
55	255	262	260	257	253	228
56	262	267	264	262	259	232
57	267	271	269	267	264	235
58	272	276	274	272	269	239
59	277	281	279	277	274	243
60	282	286	284	282	279	248
Max Temp:	282	286	284	282	279	248
Max Allowed:	408	408	408	408	408	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 251 (°F)	TC # 252 (°F)	TC # 253 (°F)	TC # 254 (°F)	TC # 255 (°F)	TC # 256 (°F)
0	82	83	84	83	83	83
1	82	83	84	83	82	83
2	82	83	84	82	82	83
3	82	83	84	82	83	83
4	82	83	84	82	83	83
5	82	83	84	82	83	83
6	82	83	84	83	83	84
7	82	84	85	84	83	84
8	82	85	86	84	84	84
9	83	86	87	85	85	85
10	83	87	89	86	86	86
11	84	88	90	88	87	87
12	85	90	92	90	88	88
13	86	91	95	93	90	90
14	87	93	97	96	92	91
15	88	95	100	99	94	93
16	89	97	103	103	97	95
17	91	100	106	106	99	98
18	93	102	109	110	102	100
19	95	104	112	113	105	103
20	97	107	116	117	108	106
21	98	110	119	121	111	108
22	101	113	123	124	114	111
23	103	115	126	129	117	114
24	106	118	132	132	120	117
25	108	121	136	135	124	120
26	111	124	139	138	127	124
27	113	129	143	141	132	127
28	116	133	147	144	135	132
29	119	136	150	147	139	136
30	122	139	154	148	142	139
31	125	142	158	151	146	143
32	129	145	159	151	149	146
33	133	149	163	152	153	150
34	135	152	167	151	156	153
35	138	155	170	152	158	157
36	141	158	174	151	162	158
37	144	160	177	151	166	162
38	148	163	181	151	169	165
39	151	166	185	149	173	169
40	154	169	189	145	177	173
41	157	172	192	141	180	177

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 251 (°F)	TC # 252 (°F)	TC # 253 (°F)	TC # 254 (°F)	TC # 255 (°F)	TC # 256 (°F)
42	159	176	196	135	184	181
43	162	180	200	129	187	185
44	165	183	203	124	191	188
45	169	187	207	132	194	192
46	173	191	211	138	197	196
47	177	195	213	146	201	200
48	181	198	214	154	203	205
49	185	202	215	161	206	211
50	188	205	216	166	209	214
51	192	208	216	174	211	214
52	195	211	218	180	213	215
53	199	212	220	186	214	215
54	202	213	222	191	215	215
55	205	214	225	197	215	215
56	208	215	228	202	216	216
57	211	215	231	206	216	216
58	213	216	234	212	217	216
59	215	217	237	218	217	216
60	216	219	241	224	218	217
Max Temp:	216	219	241	224	218	217
Max Allowed:	407	408	409	408	408	408

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 257 (°F)	TC # 258 (°F)	TC # 259 (°F)	TC # 260 (°F)	TC # 261 (°F)	TC # 262 (°F)
0	80	81	80	80	80	80
1	80	81	80	80	80	80
2	80	81	80	80	80	80
3	80	81	80	80	80	80
4	80	81	80	80	80	80
5	80	81	80	80	80	80
6	81	81	81	80	80	80
7	81	81	81	80	80	80
8	82	81	81	80	81	81
9	82	82	82	81	81	82
10	83	83	83	82	82	82
11	84	84	84	84	83	84
12	85	85	86	87	84	85
13	87	86	87	91	86	87
14	88	88	89	95	88	90
15	90	89	92	99	90	94
16	92	91	94	102	93	99
17	94	94	97	105	96	104
18	96	96	100	108	100	108
19	99	100	103	111	104	113
20	101	103	106	115	107	117
21	104	106	109	118	111	122
22	107	109	112	121	116	126
23	110	113	115	124	120	133
24	115	116	118	130	124	137
25	119	120	122	133	131	141
26	123	123	125	137	135	144
27	125	127	131	140	139	148
28	131	132	134	144	143	151
29	135	136	137	146	147	155
30	138	140	140	149	150	159
31	142	143	144	151	154	160
32	145	146	147	153	157	163
33	149	149	151	155	160	166
34	153	153	154	157	160	167
35	156	156	157	160	163	169
36	160	159	158	160	166	171
37	161	160	161	163	168	173
38	166	163	165	165	171	175
39	170	166	168	167	174	177
40	174	170	172	170	176	179
41	179	174	176	173	179	181

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 257 (°F)	TC # 258 (°F)	TC # 259 (°F)	TC # 260 (°F)	TC # 261 (°F)	TC # 262 (°F)
42	184	178	180	176	182	183
43	188	181	184	179	185	185
44	192	185	188	182	188	188
45	196	189	192	186	191	191
46	199	194	195	189	194	194
47	202	197	199	192	197	197
48	206	199	201	196	200	200
49	208	202	204	199	203	205
50	210	205	206	204	206	208
51	211	208	208	208	208	209
52	212	210	210	210	210	210
53	212	211	211	211	210	211
54	213	212	211	212	211	212
55	213	212	212	212	212	212
56	213	212	212	212	212	212
57	213	213	212	212	212	213
58	213	213	212	212	212	213
59	213	213	213	212	213	214
60	213	213	213	213	213	215
Max Temp:	213	213	213	213	213	215
Max Allowed:	405	406	405	405	405	405

OMEGA POINT LABORATORIES

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Time (min)	TC # 263 (°F)	TC # 264 (°F)	TC # 265 (°F)	TC # 266 (°F)	TC # 267 (°F)	TC # 268 (°F)
0	80	80	80	80	80	80
1	80	80	80	80	80	80
2	80	80	80	80	80	80
3	80	80	80	80	80	80
4	80	80	80	81	80	80
5	80	80	80	83	80	80
6	80	80	81	85	80	80
7	80	80	81	88	80	80
8	80	80	82	91	80	80
9	81	81	84	95	80	80
10	82	82	86	99	80	81
11	83	83	88	103	81	81
12	84	84	90	107	81	82
13	85	86	93	112	82	83
14	87	87	97	116	82	84
15	89	89	102	121	84	85
16	91	91	106	126	85	87
17	93	93	111	133	86	88
18	96	96	116	138	87	90
19	98	98	121	143	89	93
20	102	101	126	147	91	95
21	105	105	133	152	93	98
22	108	108	137	157	96	102
23	112	112	142	159	98	105
24	116	116	146	164	102	110
25	119	120	151	169	107	118
26	123	124	155	174	116	127
27	127	130	160	179	121	133
28	133	134	162	183	124	137
29	137	138	166	188	129	142
30	140	143	170	193	134	149
31	144	147	174	197	139	155
32	148	152	177	201	146	160
33	152	156	181	205	154	165
34	156	158	184	207	158	170
35	159	163	187	210	164	174
36	160	167	190	211	169	179
37	164	171	193	212	176	185
38	167	176	196	212	182	194
39	171	180	198	214	192	205
40	174	185	201	216	205	208
41	178	188	205	219	208	208

OMEGA POINT LABORATORIES

Time (min)	TC # 263 (°F)	TC # 264 (°F)	TC # 265 (°F)	TC # 266 (°F)	TC # 267 (°F)	TC # 268 (°F)
42	180	192	208	222	208	208
43	184	197	210	224	209	209
44	187	201	211	228	209	209
45	191	205	212	231	210	210
46	195	207	212	234	210	210
47	200	209	213	237	210	210
48	206	210	213	240	210	210
49	208	210	214	242	210	210
50	209	211	215	245	210	210
51	210	211	217	247	210	210
52	211	212	218	249	211	210
53	211	212	220	243	211	211
54	211	212	221	229	211	211
55	212	213	223	216	211	211
56	212	213	222	213	211	211
57	213	214	219	212	211	211
58	213	214	217	211	211	210
59	214	215	215	210	210	210
60	215	215	213	209	211	211
Max Temp:	215	215	223	249	211	211
Max Allowed:	405	405	405	405	405	405

OMEGA POINT LABORATORIES

Time (min)	TC # 269 (°F)	TC # 270 (°F)	TC # 271 (°F)	TC # 272 (°F)	TC # 273 (°F)	TC # 274 (°F)
0	80	80	79	79	80	80
1	80	80	79	80	80	80
2	80	80	79	80	80	80
3	80	80	79	80	79	80
4	80	80	79	80	80	80
5	80	80	79	80	80	80
6	80	80	79	80	79	80
7	80	80	79	80	80	80
8	80	80	79	80	80	80
9	80	80	80	80	80	80
10	81	80	80	80	80	80
11	81	81	81	81	81	81
12	82	82	81	82	82	82
13	83	83	82	83	84	84
14	84	84	84	85	86	86
15	85	85	85	88	88	88
16	87	87	87	90	92	91
17	89	89	90	94	96	94
18	91	91	93	98	100	97
19	93	94	96	102	106	101
20	96	97	100	108	112	106
21	99	101	105	114	119	111
22	103	105	111	122	130	116
23	107	111	119	134	140	121
24	113	119	131	145	150	129
25	122	131	141	153	157	135
26	132	136	148	158	161	141
27	136	142	154	164	166	146
28	140	149	158	168	170	150
29	147	155	163	172	174	154
30	154	159	167	176	177	158
31	160	163	170	180	180	160
32	163	167	174	183	184	164
33	168	172	178	187	188	168
34	172	176	182	191	193	171
35	176	180	186	197	200	176
36	181	185	192	203	204	180
37	186	192	205	206	206	184
38	196	206	206	206	206	187
39	205	207	207	207	206	190
40	207	207	207	207	207	193
41	207	207	207	207	207	195

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Time (min)	TC # 269 (°F)	TC # 270 (°F)	TC # 271 (°F)	TC # 272 (°F)	TC # 273 (°F)	TC # 274 (°F)
42	207	208	208	207	207	198
43	208	208	208	208	207	202
44	208	208	208	208	208	208
45	209	209	209	209	209	210
46	210	209	209	209	210	211
47	210	210	209	209	210	211
48	210	209	208	209	210	211
49	210	209	208	208	208	210
50	210	209	209	209	209	210
51	210	209	209	209	209	210
52	210	210	209	209	209	210
53	211	210	210	210	210	210
54	211	210	210	210	210	211
55	211	210	210	210	210	211
56	211	210	210	210	210	211
57	211	210	209	209	209	211
58	210	210	209	209	209	211
59	210	210	209	209	210	211
60	210	210	209	209	210	212
Max Temp:	211	210	210	210	210	212
Max Allowed:	405	405	404	404	405	405

Time (min)	TC # 275 (°F)	TC # 276 (°F)	TC # 277 (°F)	TC # 278 (°F)	TC # 279 (°F)	TC # 280 (°F)
0	79	79	80	80	80	80
1	79	79	80	80	80	80
2	79	79	80	80	80	80
3	79	79	80	80	80	80
4	79	79	80	80	80	80
5	79	79	80	80	80	80
6	79	79	80	80	80	80
7	79	79	80	80	80	80
8	79	79	80	80	80	81
9	79	80	81	81	80	82
10	80	80	81	81	81	83
11	80	81	82	82	82	84
12	81	82	83	83	83	86
13	82	83	84	85	85	88
14	84	84	86	86	87	90
15	86	86	88	88	89	92
16	88	88	90	91	92	95
17	90	91	92	93	95	98
18	93	93	95	96	98	102
19	96	96	98	99	101	105
20	100	99	101	103	105	109
21	104	103	105	106	109	113
22	107	106	108	110	113	118
23	112	110	112	114	117	122
24	116	114	116	118	121	126
25	121	118	120	123	126	133
26	125	122	124	127	132	137
27	132	127	131	133	137	142
28	136	133	135	138	141	146
29	141	137	139	142	145	150
30	145	142	143	146	150	154
31	150	146	147	151	154	158
32	154	151	152	155	158	160
33	158	155	156	159	161	165
34	161	159	159	162	165	169
35	165	162	163	166	169	173
36	169	166	168	170	173	177
37	173	170	172	174	177	181
38	177	175	178	178	181	185
39	181	179	184	183	185	188
40	185	183	191	187	188	192
41	189	188	199	192	192	195

OMEGA POINT LABORATORIES

Time (min)	TC # 275 (°F)	TC # 276 (°F)	TC # 277 (°F)	TC # 278 (°F)	TC # 279 (°F)	TC # 280 (°F)
42	192	194	206	197	195	198
43	197	204	210	201	199	201
44	208	210	211	204	202	203
45	210	210	212	207	205	206
46	211	211	212	209	208	208
47	211	211	212	211	210	211
48	211	212	213	213	213	213
49	210	211	212	212	213	215
50	209	210	212	211	211	215
51	209	210	212	211	211	212
52	209	210	212	211	211	212
53	210	210	212	212	211	212
54	210	210	212	212	211	212
55	210	210	212	212	212	212
56	210	210	212	212	212	212
57	211	210	212	212	212	212
58	211	211	212	212	212	213
59	211	212	213	212	212	213
60	211	212	213	212	212	213
Max Temp:	211	212	213	213	213	215
Max Allowed:	404	404	405	405	405	405

OMEGA POINT LABORATORIES

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Time (min)	TC # 281 (°F)	TC # 282 (°F)	TC # 283 (°F)	TC # 284 (°F)	TC # 285 (°F)	TC # 286 (°F)
0	80	80	79	80	80	80
1	80	80	79	80	80	80
2	80	80	79	80	80	80
3	80	80	79	79	80	80
4	80	80	79	79	80	80
5	80	80	79	80	80	80
6	80	80	79	80	80	80
7	80	80	79	80	80	80
8	80	80	79	80	81	80
9	81	80	80	80	81	80
10	82	81	80	81	82	81
11	83	82	81	82	83	82
12	85	84	83	83	84	83
13	87	86	84	84	85	84
14	89	88	86	86	87	86
15	92	90	88	88	89	88
16	95	93	91	91	92	90
17	98	96	94	93	94	93
18	101	99	97	97	97	96
19	105	103	100	100	101	99
20	109	107	104	104	104	102
21	113	110	108	107	108	105
22	117	115	112	111	111	109
23	122	119	116	115	115	112
24	126	123	120	119	119	116
25	132	129	125	124	123	119
26	137	134	131	130	129	123
27	141	138	135	134	133	127
28	145	143	140	138	137	133
29	149	147	144	142	142	136
30	154	151	148	146	145	140
31	158	156	152	151	150	144
32	161	158	157	155	154	148
33	166	163	159	159	158	152
34	170	168	163	161	160	156
35	175	173	168	165	164	160
36	180	178	172	169	168	161
37	184	182	177	174	172	165
38	188	187	181	178	177	169
39	192	191	185	182	181	173
40	195	195	189	186	185	176
41	198	198	193	190	189	180

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 281 (°F)	TC # 282 (°F)	TC # 283 (°F)	TC # 284 (°F)	TC # 285 (°F)	TC # 286 (°F)
42	200	201	197	195	193	184
43	203	203	201	199	197	187
44	205	206	204	202	200	191
45	208	208	206	206	203	194
46	209	210	209	208	206	198
47	211	212	211	211	209	201
48	213	213	213	212	211	203
49	215	216	215	215	214	212
50	215	216	215	215	213	212
51	215	215	214	212	212	212
52	214	214	212	211	212	212
53	212	213	211	211	212	212
54	212	212	211	211	212	212
55	212	212	211	211	212	212
56	212	212	211	211	212	212
57	211	212	211	211	212	212
58	212	212	211	212	213	212
59	212	212	212	212	213	212
60	212	212	212	212	213	213
Max Temp:	215	216	215	215	214	213
Max Allowed:	405	405	404	405	405	405

OMEGA POINT LABORATORIES

Time (min)	TC # 287 (°F)	TC # 288 (°F)	TC # 289 (°F)	TC # 290 (°F)	TC # 291 (°F)	TC # 292 (°F)
0	76	80	78	79	78	78
1	74	80	78	79	78	78
2	75	80	78	79	78	78
3	76	79	78	79	78	78
4	74	80	78	79	78	78
5	74	80	78	79	78	78
6	76	80	78	79	78	78
7	74	80	78	79	78	78
8	75	80	78	79	78	78
9	76	80	79	79	79	79
10	75	80	79	80	79	79
11	76	80	79	80	80	80
12	77	80	80	81	81	81
13	77	81	81	82	82	83
14	80	82	83	84	83	84
15	80	82	84	86	85	86
16	81	83	86	88	87	89
17	84	84	88	90	89	91
18	84	85	90	92	92	94
19	84	87	92	95	95	97
20	88	88	95	98	98	100
21	88	90	98	101	101	103
22	91	91	100	104	104	107
23	94	93	103	108	108	110
24	95	95	107	111	111	114
25	96	97	110	115	115	118
26	100	99	113	118	119	122
27	103	101	116	122	123	126
28	105	103	120	126	129	132
29	106	106	124	132	133	136
30	108	108	129	136	138	141
31	110	111	133	140	142	145
32	113	113	137	145	147	150
33	116	116	141	149	151	155
34	119	118	145	154	156	159
35	122	121	149	158	159	162
36	127	124	153	161	163	166
37	132	127	157	165	167	171
38	136	132	159	170	171	175
39	139	135	163	174	176	179
40	142	137	167	178	179	182
41	142	140	170	181	183	186

OMEGA POINT LABORATORIES

Time (min)	TC # 287 (°F)	TC # 288 (°F)	TC # 289 (°F)	TC # 290 (°F)	TC # 291 (°F)	TC # 292 (°F)
42	144	143	174	185	187	189
43	145	145	177	188	190	192
44	149	148	180	191	193	196
45	152	150	183	194	196	198
46	153	153	185	197	199	201
47	156	155	188	200	202	203
48	158	157	190	202	204	206
49	174	159	193	205	207	208
50	177	160	195	207	209	210
51	175	161	197	209	211	211
52	171	163	199	211	213	213
53	168	165	200	212	214	214
54	169	167	202	214	216	216
55	170	168	203	215	217	217
56	168	170	204	216	219	218
57	169	171	205	217	220	219
58	170	172	206	219	221	220
59	169	173	207	219	222	221
60	177	174	208	221	223	223
Max Temp:	177	174	208	221	223	223
Max Allowed:	401	405	403	404	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	79	79	78	78	79	78
1	79	79	78	78	78	78
2	79	79	78	78	78	78
3	79	79	78	78	78	78
4	79	79	78	78	78	78
5	79	79	78	78	78	78
6	79	79	78	78	78	78
7	79	79	78	78	79	78
8	79	79	78	78	79	79
9	79	79	78	78	79	79
10	79	79	79	79	79	79
11	80	79	79	79	79	79
12	81	80	80	80	80	80
13	82	81	81	80	81	81
14	83	82	83	81	82	82
15	85	83	84	83	83	83
16	87	84	86	84	84	85
17	89	86	88	86	86	87
18	91	88	90	88	88	89
19	94	90	93	91	91	91
20	96	92	96	94	93	94
21	99	95	99	97	97	97
22	102	97	102	100	100	100
23	105	100	106	104	103	104
24	108	103	109	108	107	107
25	112	106	113	112	111	111
26	115	110	117	116	115	116
27	119	113	122	120	119	120
28	122	117	126	124	123	124
29	126	121	133	130	129	130
30	133	126	137	134	133	134
31	137	133	142	138	137	138
32	141	138	146	142	142	142
33	145	143	151	146	145	146
34	150	148	155	150	149	150
35	154	154	160	154	153	154
36	159	160	162	158	157	158
37	161	163	166	160	159	160
38	166	167	170	164	163	163
39	169	170	174	167	166	167
40	173	174	178	171	170	170
41	177	177	181	174	173	174

OMEGA POINT LABORATORIES

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Time (min)	TC # 293 (°F)	TC # 294 (°F)	TC # 295 (°F)	TC # 296 (°F)	TC # 297 (°F)	TC # 298 (°F)
42	180	180	184	178	176	177
43	183	183	187	181	180	180
44	186	186	190	184	183	183
45	189	188	192	187	186	186
46	192	191	195	190	189	189
47	195	193	197	193	191	192
48	197	195	200	195	194	194
49	200	197	202	198	197	197
50	202	200	204	200	199	199
51	204	201	206	202	201	202
52	206	203	208	205	204	204
53	208	205	209	206	206	206
54	209	206	210	208	208	208
55	210	208	212	210	210	210
56	212	209	212	211	212	212
57	213	210	213	213	213	214
58	214	211	214	214	214	215
59	215	212	215	215	216	216
60	215	212	216	216	217	217
Max Temp:	215	212	216	216	217	217
Max Allowed:	404	404	403	403	404	403

OMEGA POINT LABORATORIES

Time (min)	TC # 299 (°F)	TC # 300 (°F)	TC # 301 (°F)	TC # 302 (°F)	TC # 303 (°F)	TC # 304 (°F)
0	78	78	78	78	77	78
1	78	78	78	78	77	78
2	78	78	78	78	77	78
3	78	78	78	78	77	78
4	78	78	78	78	77	78
5	78	78	78	78	77	78
6	78	78	78	78	77	78
7	78	78	78	78	77	78
8	78	78	78	78	78	78
9	78	78	79	78	78	78
10	78	79	79	79	78	79
11	79	79	80	80	79	79
12	80	80	81	81	80	80
13	81	81	82	82	82	81
14	82	83	84	85	83	83
15	83	84	86	87	85	84
16	85	87	89	90	88	86
17	87	89	93	94	91	89
18	90	92	97	98	93	91
19	92	95	101	102	97	94
20	95	98	105	106	100	97
21	99	102	110	111	104	100
22	103	107	115	116	108	103
23	106	111	120	121	112	107
24	111	115	125	126	116	111
25	115	120	132	133	120	114
26	119	124	137	138	125	118
27	123	131	142	143	131	122
28	129	135	146	147	136	126
29	134	139	150	151	140	132
30	138	144	153	156	144	136
31	142	148	157	160	149	140
32	146	152	159	162	153	144
33	150	156	162	166	158	147
34	154	159	166	170	160	151
35	158	161	169	173	165	155
36	160	165	172	177	169	160
37	163	169	176	181	174	162
38	167	172	179	185	178	166
39	170	175	182	188	182	170
40	174	179	185	191	186	175
41	177	182	188	194	189	179

OMEGA POINT LABORATORIES

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Time (min)	TC # 299 (°F)	TC # 300 (°F)	TC # 301 (°F)	TC # 302 (°F)	TC # 303 (°F)	TC # 304 (°F)
42	180	185	191	196	192	182
43	183	188	194	198	194	186
44	187	191	196	200	197	189
45	189	194	198	202	199	192
46	192	196	201	204	201	194
47	195	199	203	205	203	197
48	197	201	205	207	204	199
49	200	204	207	208	206	201
50	202	206	208	210	208	203
51	205	208	210	211	209	205
52	207	210	211	212	211	207
53	209	212	213	213	212	209
54	211	213	214	214	213	210
55	212	214	215	215	214	212
56	214	215	216	216	215	214
57	215	216	217	217	216	215
58	216	217	218	218	217	216
59	217	218	219	218	218	217
60	218	219	220	219	219	218
Max Temp:	218	219	220	219	219	218
Max Allowed:	403	403	403	403	402	403

OMEGA POINT LABORATORIES

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Time (min)	TC # 305 (°F)	TC # 306 (°F)	TC # 307 (°F)	TC # 308 (°F)	TC # 309 (°F)	TC # 310 (°F)
0	78	78	77	77	77	77
1	78	78	77	77	77	77
2	78	78	77	77	77	77
3	78	78	77	77	77	77
4	78	78	77	77	77	77
5	78	78	77	77	77	77
6	78	78	77	77	77	77
7	78	78	77	77	77	77
8	78	78	77	77	77	77
9	78	78	77	77	77	77
10	78	78	77	77	77	77
11	79	79	78	78	77	77
12	79	79	78	78	77	77
13	80	80	79	79	77	78
14	81	80	80	80	77	78
15	82	82	81	81	77	78
16	84	83	82	82	78	79
17	86	84	84	84	78	79
18	88	86	86	85	78	79
19	90	88	88	87	78	80
20	92	91	90	89	79	80
21	95	93	93	91	79	81
22	98	95	95	94	79	82
23	101	98	98	96	80	83
24	104	101	101	98	80	84
25	107	104	104	101	81	84
26	111	108	107	104	81	86
27	114	111	110	107	82	86
28	118	115	114	109	83	88
29	121	118	117	112	83	89
30	125	122	120	115	84	90
31	131	125	124	118	84	91
32	134	131	129	121	85	92
33	138	135	133	124	86	93
34	142	138	136	127	87	95
35	145	142	140	132	88	96
36	149	145	143	135	88	97
37	153	149	147	138	89	99
38	158	153	150	140	90	100
39	160	156	153	143	91	102
40	164	160	156	146	92	104
41	169	161	160	149	93	105

OMEGA POINT LABORATORIES

Time (min)	TC # 305 (°F)	TC # 306 (°F)	TC # 307 (°F)	TC # 308 (°F)	TC # 309 (°F)	TC # 310 (°F)
42	173	165	161	151	94	107
43	177	168	164	154	96	109
44	180	171	167	157	97	111
45	183	175	170	159	98	113
46	186	178	173	160	99	115
47	189	181	176	162	101	117
48	191	183	179	165	103	120
49	193	186	182	167	105	122
50	195	189	185	169	107	125
51	197	191	187	172	111	131
52	199	193	189	174	115	135
53	201	195	191	176	121	140
54	203	197	193	178	129	148
55	204	199	195	180	138	158
56	206	201	197	182	148	167
57	208	203	198	183	158	175
58	209	204	200	184	165	183
59	210	206	201	186	174	190
60	212	207	203	188	184	197
Max Temp:	212	207	203	188	184	197
Max Allowed:	403	403	402	402	402	402

OMEGA POINT LABORATORIES

Time (min)	TC # 311 (°F)	TC # 312 (°F)	TC # 313 (°F)	TC # 314 (°F)	TC # 315 (°F)	TC # 316 (°F)
0	77	78	79	79	78	79
1	77	78	79	79	78	79
2	77	78	79	79	78	79
3	77	78	79	79	78	79
4	77	78	79	79	78	79
5	77	78	79	79	78	79
6	77	78	79	79	78	79
7	77	78	79	79	78	79
8	77	78	79	79	78	79
9	77	78	79	79	78	79
10	77	78	79	79	78	79
11	78	79	79	79	78	79
12	78	79	79	79	79	79
13	78	79	79	79	79	79
14	79	80	80	79	79	80
15	79	80	80	80	79	80
16	80	81	81	80	80	81
17	80	82	81	81	80	82
18	81	82	82	81	81	82
19	82	83	83	82	81	83
20	83	84	84	83	82	84
21	84	86	85	84	83	86
22	85	87	86	85	84	87
23	86	88	87	86	86	88
24	87	90	89	87	87	90
25	89	91	90	89	88	91
26	90	93	91	90	90	93
27	91	95	93	92	91	95
28	93	96	95	93	93	97
29	95	98	97	95	95	99
30	97	100	98	97	97	101
31	98	102	100	99	99	103
32	100	104	102	101	101	106
33	102	106	104	103	103	108
34	104	108	107	105	105	110
35	106	111	109	107	107	113
36	107	113	111	109	109	115
37	110	115	113	112	112	118
38	112	118	116	114	114	121
39	114	120	118	117	117	123
40	116	123	121	119	120	126
41	118	125	124	122	122	131

OMEGA POINT LABORATORIES

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Time (min)	TC # 311 (°F)	TC # 312 (°F)	TC # 313 (°F)	TC # 314 (°F)	TC # 315 (°F)	TC # 316 (°F)
42	121	130	126	124	125	134
43	123	133	131	129	130	137
44	126	135	134	132	133	140
45	130	138	137	135	136	143
46	133	141	140	139	139	146
47	136	144	143	142	143	150
48	139	148	147	145	146	153
49	142	151	150	149	150	157
50	145	154	154	153	154	159
51	148	158	157	157	158	163
52	152	159	159	160	162	168
53	156	163	164	166	169	173
54	159	167	169	172	176	179
55	165	173	174	178	180	183
56	172	177	179	183	184	186
57	180	183	185	187	188	190
58	186	190	190	192	194	194
59	196	199	199	200	201	200
60	200	205	206	206	206	205
Max Temp:	200	205	206	206	206	205
Max Allowed:	402	403	404	404	403	404

OMEGA POINT LABORATORIES

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Time (min)	TC # 317 (°F)	TC # 318 (°F)	TC # 319 (°F)	TC # 320 (°F)	TC # 321 (°F)	TC # 322 (°F)
0	79	79	78	78	80	80
1	79	79	78	78	80	80
2	79	79	78	78	80	80
3	79	79	78	78	80	80
4	79	79	78	78	80	80
5	79	79	78	78	80	80
6	79	79	78	78	80	80
7	79	79	78	78	80	80
8	79	79	78	79	80	80
9	79	79	78	79	80	81
10	79	79	79	79	81	81
11	80	79	79	80	82	82
12	80	80	80	81	83	83
13	80	81	81	82	84	84
14	81	81	82	83	85	86
15	82	82	83	84	87	88
16	83	83	84	86	89	90
17	84	85	86	88	91	92
18	85	86	88	90	93	94
19	86	88	89	92	96	97
20	88	89	92	95	98	100
21	89	91	94	97	101	103
22	91	93	96	100	104	107
23	93	95	99	103	107	110
24	95	97	102	106	111	114
25	97	100	104	109	114	118
26	99	102	107	112	118	122
27	101	105	110	115	122	126
28	103	107	114	119	125	132
29	106	110	117	122	131	136
30	108	113	120	126	135	140
31	111	116	124	132	139	144
32	114	119	127	136	143	149
33	116	122	132	139	147	153
34	119	125	136	143	151	157
35	122	130	140	147	155	160
36	125	133	143	151	159	164
37	129	136	147	155	161	168
38	133	140	150	159	165	173
39	136	143	154	161	169	177
40	139	146	158	165	174	181
41	142	150	160	169	178	185

Time (min)	TC # 317 (°F)	TC # 318 (°F)	TC # 319 (°F)	TC # 320 (°F)	TC # 321 (°F)	TC # 322 (°F)
42	145	153	163	173	182	189
43	148	157	167	177	186	193
44	152	159	171	181	190	196
45	155	162	175	184	193	199
46	158	166	179	188	196	202
47	160	170	182	191	199	205
48	163	173	186	194	202	208
49	167	177	189	197	205	211
50	171	180	192	200	208	214
51	174	183	195	203	211	217
52	178	186	197	206	214	220
53	182	190	200	208	217	223
54	186	193	203	212	220	227
55	190	196	206	215	223	230
56	193	199	209	218	227	234
57	196	202	212	221	230	238
58	199	205	215	224	234	242
59	202	208	219	228	239	247
60	207	212	223	233	244	252
Max Temp:	207	212	223	233	244	252
Max Allowed:	404	404	403	403	405	405

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Time (min)	TC # 323 (°F)	TC # 324 (°F)	TC # 325 (°F)	TC # 326 (°F)	TC # 327 (°F)	TC # 328 (°F)
0	80	80	80	80	79	80
1	80	80	80	80	79	80
2	80	80	80	80	79	80
3	80	80	80	80	79	80
4	80	80	80	80	79	80
5	80	80	80	80	79	80
6	80	80	80	80	79	80
7	80	80	80	80	79	80
8	80	80	80	80	80	80
9	80	80	80	80	80	80
10	81	81	81	81	80	81
11	82	82	82	81	81	82
12	83	83	82	82	82	83
13	84	84	83	82	82	84
14	86	85	84	83	84	86
15	87	87	86	84	85	87
16	89	89	88	86	86	89
17	92	91	89	87	88	92
18	95	94	91	89	90	95
19	98	97	94	91	92	98
20	101	100	96	93	95	101
21	104	103	99	95	97	104
22	108	106	102	98	100	107
23	111	110	105	100	103	111
24	115	113	108	103	106	115
25	119	117	112	106	109	118
26	123	121	115	109	113	122
27	129	125	118	113	116	126
28	134	131	122	116	120	132
29	138	135	126	119	123	136
30	142	140	131	122	127	140
31	147	144	135	126	132	144
32	151	148	139	131	136	148
33	156	153	143	135	140	152
34	158	157	147	139	144	156
35	163	159	151	142	147	160
36	167	164	155	146	151	162
37	172	169	160	150	155	166
38	176	173	162	154	159	170
39	180	178	167	158	161	173
40	184	182	172	160	165	177
41	188	186	176	164	169	181

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 323 (°F)	TC # 324 (°F)	TC # 325 (°F)	TC # 326 (°F)	TC # 327 (°F)	TC # 328 (°F)
42	192	190	180	168	174	184
43	195	193	184	172	177	188
44	199	197	187	176	181	191
45	202	200	191	180	185	194
46	205	203	194	183	188	197
47	207	206	197	187	191	199
48	210	209	200	190	194	202
49	213	212	203	194	197	204
50	216	215	206	197	199	207
51	219	218	209	200	202	209
52	223	221	212	203	205	212
53	226	225	215	206	208	214
54	230	228	218	208	210	217
55	234	232	221	211	213	219
56	238	236	224	214	216	222
57	242	240	228	216	218	224
58	247	244	231	219	221	226
59	252	249	235	222	223	229
60	259	253	238	224	226	232
Max Temp:	259	253	238	224	226	232
Max Allowed:	405	405	405	405	404	405

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 329 (°F)	TC # 330 (°F)	TC # 331 (°F)	TC # 332 (°F)	TC # 333 (°F)	TC # 334 (°F)
0	80	80	79	80	79	79
1	80	80	79	80	79	79
2	80	80	79	80	79	79
3	80	80	79	80	79	79
4	80	80	79	80	79	79
5	80	80	79	80	79	79
6	80	80	79	80	79	79
7	80	80	79	80	79	79
8	80	80	79	80	80	79
9	80	80	80	80	80	79
10	81	80	80	80	80	80
11	82	81	80	80	80	80
12	83	82	81	81	81	81
13	84	82	81	81	81	81
14	86	83	82	82	82	82
15	88	84	83	83	83	84
16	90	86	84	84	85	85
17	93	88	86	86	86	87
18	96	90	88	87	88	89
19	99	92	89	89	90	91
20	103	94	91	91	92	93
21	106	97	94	93	94	95
22	110	100	96	95	97	98
23	114	103	99	98	99	101
24	118	106	102	101	102	104
25	122	109	104	104	105	107
26	125	112	107	107	108	110
27	131	116	111	110	111	113
28	135	119	114	113	115	117
29	139	123	117	116	118	120
30	143	127	121	120	122	124
31	147	132	124	123	125	129
32	151	136	130	127	131	133
33	155	140	134	133	135	136
34	158	144	138	136	138	140
35	160	148	142	140	142	144
36	164	152	146	144	146	148
37	168	156	150	149	150	151
38	172	158	154	153	154	155
39	176	163	159	157	158	159
40	180	167	161	159	160	161
41	183	171	165	163	163	164

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 329 (°F)	TC # 330 (°F)	TC # 331 (°F)	TC # 332 (°F)	TC # 333 (°F)	TC # 334 (°F)
42	187	175	169	167	167	168
43	190	179	173	171	171	172
44	193	183	178	175	175	176
45	196	187	182	179	179	179
46	198	190	186	183	182	183
47	200	193	189	187	186	186
48	202	196	193	191	190	190
49	204	199	196	194	193	193
50	206	201	199	197	196	196
51	208	204	201	199	198	199
52	210	206	203	202	201	201
53	211	207	205	204	203	204
54	213	209	207	206	205	206
55	215	210	208	207	207	207
56	217	212	209	209	208	208
57	219	213	210	210	210	210
58	220	214	211	211	210	210
59	222	215	212	212	211	210
60	224	217	213	212	212	209
Max Temp:	224	217	213	212	212	210
Max Allowed:	405	405	404	405	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 335 (°F)	TC # 336 (°F)	TC # 337 (°F)	TC # 338 (°F)	TC # 339 (°F)	TC # 340 (°F)
0	79	79	79	79	78	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	78	78
5	79	79	79	79	79	78
6	79	79	79	79	79	79
7	79	79	79	79	79	79
8	79	79	79	79	79	80
9	79	79	79	79	80	81
10	79	79	79	80	80	82
11	80	80	80	80	82	84
12	80	80	80	81	83	86
13	81	81	81	82	84	88
14	82	82	82	83	86	90
15	83	83	83	84	88	92
16	84	85	84	85	90	95
17	86	86	86	87	93	97
18	88	88	88	89	95	100
19	90	90	90	91	98	103
20	92	93	92	93	100	106
21	95	96	95	96	103	109
22	97	98	98	99	106	111
23	100	102	101	102	109	115
24	103	105	104	105	113	118
25	106	108	107	108	116	121
26	109	111	111	112	119	124
27	113	115	115	115	122	129
28	116	118	118	119	126	132
29	120	122	122	122	131	135
30	123	125	125	126	135	138
31	127	131	131	132	138	141
32	132	134	135	135	142	144
33	136	138	138	139	146	148
34	139	142	142	143	149	151
35	143	145	145	147	153	154
36	147	149	149	151	156	158
37	150	152	153	155	158	159
38	154	156	156	158	162	162
39	157	159	160	160	165	165
40	159	161	162	164	169	167
41	163	165	165	167	172	170

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 335 (°F)	TC # 336 (°F)	TC # 337 (°F)	TC # 338 (°F)	TC # 339 (°F)	TC # 340 (°F)
42	167	169	169	171	175	173
43	171	173	173	175	179	176
44	174	177	177	179	182	179
45	178	181	181	183	186	181
46	182	185	186	187	189	184
47	186	189	190	192	192	186
48	190	193	195	195	195	189
49	193	197	198	199	198	192
50	196	200	201	201	201	195
51	199	202	204	204	203	196
52	202	205	205	205	204	197
53	204	206	206	206	204	197
54	206	207	208	207	205	200
55	207	208	208	207	205	201
56	208	208	206	205	204	202
57	208	207	206	205	204	202
58	207	207	206	206	205	203
59	207	207	206	206	206	203
60	207	207	207	207	207	206
Max Temp:	208	208	208	207	207	206
Max Allowed:	404	404	404	404	403	403

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 341 (°F)	TC # 342 (°F)	TC # 343 (°F)	TC # 344 (°F)	TC # 345 (°F)	TC # 346 (°F)
0	78	79	79	80	80	80
1	78	79	79	80	80	80
2	78	79	79	80	80	80
3	78	79	79	80	80	80
4	78	79	79	80	80	80
5	78	79	79	80	80	80
6	78	79	79	80	80	80
7	78	79	79	80	80	80
8	78	79	79	80	80	80
9	78	79	79	80	80	80
10	78	79	79	80	80	80
11	78	79	79	80	80	80
12	78	79	79	80	80	80
13	79	79	79	80	80	80
14	79	79	79	80	80	80
15	79	79	79	80	80	80
16	79	79	80	81	80	80
17	79	79	80	81	81	81
18	79	80	80	81	81	81
19	79	80	81	82	82	81
20	79	80	81	82	82	82
21	80	80	82	83	83	82
22	80	81	82	84	83	83
23	80	82	83	84	84	84
24	80	82	84	85	85	84
25	81	83	85	86	86	85
26	81	83	86	87	87	86
27	82	84	87	88	88	87
28	82	85	88	89	89	88
29	83	86	89	91	91	90
30	83	87	90	92	92	91
31	84	88	91	94	93	92
32	85	88	93	95	95	94
33	85	89	94	97	97	96
34	86	91	96	98	98	97
35	87	92	97	100	100	99
36	87	93	99	102	102	101
37	88	94	100	104	104	103
38	89	95	102	106	106	105
39	90	97	104	108	108	107
40	91	98	106	110	111	110
41	92	100	107	112	113	113

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 341 (°F)	TC # 342 (°F)	TC # 343 (°F)	TC # 344 (°F)	TC # 345 (°F)	TC # 346 (°F)
42	93	101	109	114	116	115
43	95	103	112	117	118	118
44	96	105	114	120	122	121
45	97	107	116	122	125	125
46	99	109	119	125	130	131
47	102	111	122	131	134	135
48	104	114	125	134	138	139
49	107	117	131	138	142	143
50	110	120	134	142	146	148
51	113	124	138	145	151	152
52	116	129	142	150	155	157
53	121	133	146	154	159	159
54	123	137	150	158	162	163
55	129	141	154	161	166	168
56	131	145	159	165	170	172
57	140	151	161	169	175	176
58	146	156	167	174	179	180
59	156	161	172	178	183	184
60	161	169	178	182	186	188
Max Temp:	161	169	178	182	186	188
Max Allowed:	403	404	404	405	405	405

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 347 (°F)	TC # 348 (°F)	TC # 349 (°F)	TC # 350 (°F)	TC # 351 (°F)	TC # 352 (°F)
0	80	80	81	80	80	80
1	80	80	81	80	80	80
2	80	80	81	80	80	80
3	80	80	81	80	80	80
4	80	80	81	80	80	80
5	80	80	81	80	80	80
6	80	80	81	80	80	80
7	80	80	81	80	80	80
8	80	80	81	80	80	80
9	80	80	81	80	80	80
10	80	80	81	81	80	80
11	80	80	81	81	80	81
12	80	80	81	81	80	81
13	80	80	81	81	80	81
14	80	80	81	82	81	82
15	80	80	81	82	81	82
16	80	80	82	83	82	82
17	80	81	82	83	82	83
18	81	81	82	84	83	84
19	81	81	83	85	84	85
20	81	82	84	86	85	86
21	82	82	84	87	86	87
22	82	83	85	88	87	88
23	83	83	86	89	88	90
24	84	84	87	91	90	91
25	84	85	88	93	91	93
26	85	86	89	94	93	95
27	86	87	91	96	95	97
28	87	88	92	98	97	99
29	88	89	93	100	99	101
30	90	91	95	102	101	103
31	91	92	97	104	103	106
32	93	94	99	107	106	108
33	94	95	101	109	108	110
34	96	97	103	112	111	113
35	97	99	105	114	113	116
36	99	101	107	117	116	119
37	101	103	110	120	119	122
38	104	106	112	123	122	125
39	106	108	115	126	125	130
40	108	111	118	132	130	133
41	111	114	121	135	134	136

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 347 (°F)	TC # 348 (°F)	TC # 349 (°F)	TC # 350 (°F)	TC # 351 (°F)	TC # 352 (°F)
42	114	116	124	139	137	140
43	117	120	130	143	141	144
44	120	123	133	146	144	147
45	124	126	137	150	148	151
46	129	132	141	154	152	155
47	133	136	144	158	156	159
48	137	140	148	160	160	161
49	142	144	152	163	161	165
50	146	147	155	167	165	169
51	150	151	159	170	169	172
52	154	155	160	174	173	176
53	158	159	164	177	176	180
54	160	161	167	180	179	183
55	164	165	171	183	183	187
56	169	168	173	187	186	190
57	172	171	173	188	189	194
58	177	175	175	185	192	197
59	181	179	178	184	193	199
60	185	183	182	185	191	201
Max Temp:	185	183	182	188	193	201
Max Allowed:	405	405	406	405	405	405

OMEGA POINT LABORATORIES

Time (min)	TC # 353 (°F)	TC # 354 (°F)	TC # 355 (°F)	TC # 356 (°F)	TC # 357 (°F)	TC # 358 (°F)
0	77	78	77	77	78	78
1	77	78	77	77	78	78
2	77	78	77	77	78	78
3	77	78	77	77	78	78
4	77	78	77	77	78	78
5	77	78	77	77	78	78
6	77	78	77	77	78	78
7	77	78	77	77	78	78
8	77	78	77	77	78	78
9	77	78	77	77	78	78
10	77	78	78	77	78	78
11	78	78	78	78	78	79
12	78	78	78	78	78	79
13	78	79	78	78	79	79
14	78	79	79	79	79	79
15	79	79	79	79	80	79
16	80	80	80	80	80	80
17	80	81	81	81	81	80
18	81	82	82	81	82	81
19	82	82	83	82	82	82
20	83	84	84	84	83	83
21	84	85	85	85	84	84
22	86	86	87	86	86	85
23	87	88	88	88	87	87
24	89	89	90	90	89	88
25	91	91	92	92	91	90
26	92	93	94	94	93	92
27	95	95	96	96	95	94
28	97	98	98	98	97	96
29	99	100	101	100	99	98
30	101	102	104	103	102	101
31	104	105	106	106	104	103
32	106	108	109	108	107	106
33	109	110	112	111	110	108
34	111	113	115	114	113	111
35	115	116	118	117	115	114
36	117	119	121	120	118	117
37	120	122	124	123	122	120
38	124	125	129	129	125	124
39	127	131	133	132	131	129
40	132	134	136	136	134	133
41	136	138	140	140	138	137

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 353 (°F)	TC # 354 (°F)	TC # 355 (°F)	TC # 356 (°F)	TC # 357 (°F)	TC # 358 (°F)
42	139	142	144	144	142	141
43	143	145	148	148	146	145
44	147	149	152	153	150	149
45	151	153	156	157	155	153
46	155	157	158	159	159	158
47	159	159	162	163	161	160
48	161	163	166	167	165	164
49	165	167	170	171	169	169
50	169	171	174	175	173	173
51	173	175	178	179	177	177
52	177	179	181	182	181	181
53	180	183	185	186	185	185
54	184	186	188	189	188	188
55	187	189	192	192	192	192
56	191	193	195	196	195	195
57	194	196	198	198	198	198
58	197	198	200	201	200	201
59	199	201	203	203	203	203
60	202	203	205	205	205	205
Max Temp:	202	203	205	205	205	205
Max Allowed:	402	403	402	402	403	403

OMEGA POINT LABORATORIES

Time (min)	TC # 359 (°F)	TC # 360 (°F)	TC # 361 (°F)	TC # 362 (°F)	TC # 363 (°F)	TC # 364 (°F)
0	77	78	77	78	77	77
1	77	78	77	78	77	77
2	77	78	77	78	77	77
3	77	78	77	78	77	77
4	77	78	77	78	77	77
5	77	78	77	78	77	77
6	77	78	77	78	77	77
7	78	78	77	78	77	77
8	78	78	78	78	77	77
9	78	78	78	78	77	77
10	78	78	78	78	78	78
11	78	78	78	79	78	78
12	78	79	79	79	79	78
13	78	79	79	80	79	79
14	79	80	80	81	80	80
15	79	80	81	82	81	80
16	80	81	82	83	83	82
17	80	82	83	85	84	83
18	81	83	84	86	86	84
19	82	85	86	88	88	86
20	83	86	88	90	90	88
21	85	88	90	92	92	90
22	86	89	92	95	94	92
23	88	91	94	97	97	95
24	89	94	96	100	99	97
25	91	96	98	102	102	100
26	93	98	101	105	105	103
27	95	101	104	109	108	106
28	98	103	107	112	111	109
29	100	106	110	115	115	112
30	103	109	113	118	118	115
31	105	112	116	122	121	119
32	108	115	119	125	125	122
33	111	118	123	131	130	126
34	114	121	126	135	135	131
35	117	124	132	138	138	135
36	120	130	136	142	142	139
37	123	133	139	146	147	143
38	126	136	143	151	152	147
39	132	140	147	155	156	151
40	136	144	151	159	158	155
41	139	148	155	161	162	159

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 359 (°F)	TC # 360 (°F)	TC # 361 (°F)	TC # 362 (°F)	TC # 363 (°F)	TC # 364 (°F)
42	143	152	159	165	166	161
43	147	156	161	169	170	165
44	151	158	165	173	174	169
45	155	162	169	177	178	173
46	160	166	172	181	182	177
47	162	170	177	184	185	180
48	166	174	180	188	188	184
49	170	178	184	191	192	187
50	174	182	187	194	195	190
51	178	186	191	197	197	194
52	182	189	194	199	200	196
53	186	193	197	202	202	199
54	190	196	200	204	204	201
55	193	199	202	205	205	203
56	196	201	204	207	206	205
57	199	203	206	208	208	207
58	201	205	207	210	209	208
59	203	207	209	211	210	209
60	205	208	211	213	212	211
Max Temp:	205	208	211	213	212	211
Max Allowed:	402	403	402	403	402	402

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 365 (°F)	TC # 366 (°F)	TC # 367 (°F)	TC # 368 (°F)	TC # 369 (°F)	TC # 370 (°F)
0	78	77	77	77	75	76
1	78	77	77	77	75	76
2	78	77	77	77	75	76
3	78	77	77	77	75	76
4	78	77	77	77	75	76
5	78	77	77	77	75	76
6	78	77	77	77	76	76
7	78	78	77	77	75	76
8	78	78	78	78	76	77
9	78	78	78	78	76	77
10	78	78	79	79	77	77
11	79	79	80	80	77	78
12	79	80	81	81	78	79
13	80	80	82	82	79	80
14	81	82	84	84	81	81
15	82	83	86	86	82	82
16	83	85	88	88	84	84
17	85	87	90	90	86	86
18	86	89	93	93	89	89
19	88	91	95	95	92	91
20	90	93	98	98	95	94
21	92	96	101	101	98	97
22	95	98	104	104	101	99
23	97	101	107	108	104	102
24	100	104	110	111	107	106
25	103	107	113	114	111	110
26	106	110	116	118	115	113
27	109	114	120	121	117	116
28	112	117	123	124	121	120
29	115	120	126	130	125	123
30	119	124	132	133	130	127
31	122	127	135	137	134	132
32	126	132	138	141	137	136
33	131	136	142	144	141	140
34	135	139	145	147	144	143
35	138	142	148	151	148	146
36	142	145	151	154	151	150
37	146	149	154	157	154	153
38	149	152	158	158	158	156
39	153	156	159	162	159	160
40	157	159	162	165	162	161
41	158	161	165	168	165	164

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 365 (°F)	TC # 366 (°F)	TC # 367 (°F)	TC # 368 (°F)	TC # 369 (°F)	TC # 370 (°F)
42	162	164	169	171	169	168
43	166	167	172	174	172	171
44	169	171	175	177	175	174
45	173	174	178	180	178	178
46	177	178	181	184	181	181
47	180	181	185	187	185	184
48	184	185	188	190	188	188
49	187	188	191	194	192	191
50	191	192	194	197	195	194
51	194	195	197	200	198	196
52	197	198	200	203	200	199
53	200	200	203	205	202	201
54	202	203	205	207	204	202
55	204	205	207	208	205	203
56	206	207	209	210	206	203
57	208	208	210	211	207	202
58	210	210	210	208	204	199
59	211	211	209	208	204	196
60	212	212	208	207	203	194
Max Temp:	212	212	210	211	207	203
Max Allowed:	403	402	402	402	400	401

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 371 (°F)	TC # 372 (°F)
0	76	75
1	76	75
2	76	75
3	76	75
4	76	75
5	76	76
6	76	76
7	76	76
8	77	77
9	77	78
10	78	79
11	79	80
12	80	82
13	82	84
14	84	86
15	85	88
16	87	90
17	89	92
18	92	95
19	95	98
20	97	100
21	101	103
22	104	106
23	107	109
24	110	112
25	113	115
26	116	118
27	120	121
28	123	124
29	126	127
30	131	131
31	135	134
32	138	137
33	141	140
34	144	143
35	147	145
36	151	148
37	154	151
38	157	154
39	158	157
40	161	159
41	164	160

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 371 (°F)	TC # 372 (°F)
42	168	163
43	171	166
44	174	168
45	177	170
46	180	173
47	183	176
48	186	179
49	189	181
50	191	184
51	194	187
52	196	189
53	198	190
54	198	190
55	198	193
56	201	197
57	199	197
58	196	197
59	192	194
60	191	193
Max Temp:	201	197
Max Allowed:	401	400

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 373 (°F)	TC # 374 (°F)	TC # 375 (°F)	TC # 376 (°F)	TC # 377 (°F)	TC # 378 (°F)	TC # 379 (°F)	TC # 380 (°F)	TC # 381 (°F)	TC # 382 (°F)	TC # 383 (°F)	TC # 384 (°F)
0	77	78	79	78	79	79	80	80	80	80	79	79
1	77	78	79	78	79	79	80	80	80	80	80	79
2	77	78	79	78	79	79	80	80	80	80	80	79
3	77	78	79	78	79	79	80	80	80	80	80	79
4	77	78	79	78	79	79	80	80	80	80	80	79
5	77	78	79	78	79	79	80	80	80	80	80	79
6	77	78	79	78	79	79	80	80	80	80	79	79
7	77	78	79	78	79	79	80	80	80	80	79	79
8	77	78	79	78	79	79	80	80	80	80	80	79
9	77	78	79	78	79	79	80	80	79	80	80	79
10	77	78	79	78	79	79	80	80	80	80	80	80
11	77	78	79	79	79	79	80	80	80	80	80	80
12	77	78	79	79	79	80	80	80	80	80	80	80
13	77	78	79	79	80	80	80	80	80	80	80	80
14	77	78	80	79	80	80	80	80	80	80	80	80
15	78	78	80	79	80	80	80	80	80	80	80	81
16	78	78	80	80	80	80	80	80	80	81	81	81
17	78	79	81	80	80	80	80	80	81	81	81	82
18	78	79	81	81	81	81	81	81	81	81	82	82
19	78	79	82	81	81	81	81	81	81	82	83	83
20	78	80	82	82	82	82	81	81	82	82	83	84
21	78	80	83	82	83	82	82	82	83	83	84	85
22	79	80	84	83	83	83	82	82	84	84	85	86
23	79	81	85	84	84	84	83	83	84	85	86	87
24	79	81	86	85	85	84	84	84	85	86	87	88
25	79	82	87	86	86	85	85	85	86	87	89	90
26	80	83	88	87	87	86	85	85	87	88	90	91
27	80	83	89	88	88	87	86	86	89	89	91	93
28	81	84	90	89	89	88	87	87	90	91	93	95
29	81	85	92	90	90	90	89	89	91	92	95	97
30	82	86	93	91	92	91	90	90	93	94	96	99
31	82	86	94	93	93	92	91	91	94	95	98	101
32	83	87	96	94	95	94	92	93	96	97	100	103
33	83	88	98	95	96	95	94	94	98	99	102	105
34	84	89	99	97	98	97	96	96	99	101	104	107
35	84	90	101	98	100	99	97	97	101	103	106	110
36	85	91	103	100	101	100	99	99	103	105	109	112
37	86	93	105	102	103	102	101	101	105	107	111	115

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 373 (°F)	TC # 374 (°F)	TC # 375 (°F)	TC # 376 (°F)	TC # 377 (°F)	TC # 378 (°F)	TC # 379 (°F)	TC # 380 (°F)	TC # 381 (°F)	TC # 382 (°F)	TC # 383 (°F)	TC # 384 (°F)
38	86	94	107	103	105	104	103	103	108	109	113	117
39	87	95	108	105	107	106	105	105	110	111	116	120
40	88	96	111	107	109	108	107	107	112	114	119	123
41	89	97	113	109	111	111	109	110	115	116	121	126
42	90	99	115	111	114	113	112	112	117	119	124	128
43	91	100	117	113	116	116	115	115	120	122	127	131
44	92	102	119	115	119	118	117	117	123	125	130	134
45	93	103	122	117	121	121	120	120	126	128	133	137
46	94	105	124	119	124	124	123	123	129	131	136	140
47	95	107	127	121	127	127	127	126	132	134	139	143
48	96	108	130	124	130	130	130	130	135	137	142	146
49	98	110	133	126	133	134	133	133	138	140	145	149
50	99	112	136	129	137	137	137	137	141	144	149	153
51	101	115	139	132	140	141	140	140	145	147	152	156
52	102	117	143	135	144	145	144	144	148	151	155	159
53	104	119	146	138	148	149	148	148	152	154	159	163
54	107	122	150	141	152	153	153	152	156	158	163	166
55	110	125	154	145	156	158	157	157	160	162	166	170
56	116	130	158	149	161	163	165	163	164	166	170	173
57	124	136	163	154	166	170	172	170	168	170	174	177
58	130	147	170	163	174	176	178	175	172	174	178	181
59	142	160	177	171	180	183	186	181	177	178	182	185
60	155	169	186	184	189	192	193	188	181	182	186	189
Max Temp:	155	169	186	184	189	192	193	188	181	182	186	189
Max Allowed:	402	403	404	403	404	404	405	405	405	405	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 385 (°F)	TC # 386 (°F)	TC # 387 (°F)	TC # 388 (°F)	TC # 389 (°F)	TC # 390 (°F)	TC # 391 (°F)	TC # 392 (°F)	TC # 393 (°F)	TC # 394 (°F)	TC # 395 (°F)	TC # 396 (°F)
0	79	79	79	79	79	79	79	79	79	79	79	79
1	79	79	79	80	79	79	79	79	79	79	79	79
2	79	79	79	79	79	79	79	79	79	79	79	79
3	79	79	79	80	79	79	79	79	79	79	79	79
4	79	79	79	80	79	79	79	79	79	79	79	79
5	79	79	79	80	79	79	79	79	79	79	79	79
6	79	79	79	80	79	79	79	79	79	79	79	79
7	79	79	79	80	79	79	79	79	80	80	79	79
8	79	79	79	80	79	79	79	79	80	80	79	80
9	79	79	79	80	79	79	79	79	80	80	80	80
10	80	79	80	80	79	79	79	79	80	80	80	80
11	80	80	80	80	80	79	79	79	80	81	80	80
12	80	80	80	80	80	79	80	80	81	81	81	80
13	80	80	80	81	80	80	80	80	81	82	81	81
14	80	80	81	81	80	80	80	80	82	83	82	82
15	81	81	81	82	80	80	80	81	83	84	83	82
16	81	81	82	82	81	80	81	81	83	85	84	83
17	82	82	83	83	81	81	81	82	85	87	85	84
18	83	83	84	84	82	81	82	83	86	89	86	86
19	83	83	85	85	83	82	83	84	87	90	88	87
20	84	84	86	86	84	83	83	85	89	92	90	89
21	85	85	87	87	85	84	84	86	91	95	92	91
22	87	87	89	89	86	85	86	88	93	97	94	93
23	88	88	90	90	87	86	87	89	95	99	96	96
24	89	90	92	92	88	87	88	91	97	102	99	98
25	91	91	94	94	90	88	90	93	99	105	101	101
26	92	93	96	95	91	90	91	95	102	107	104	104
27	94	95	98	97	93	91	93	97	104	110	107	107
28	96	97	100	99	95	93	95	99	107	113	110	110
29	98	99	102	102	97	95	97	102	110	116	113	113
30	100	101	104	104	99	97	99	104	113	119	116	117
31	102	103	107	106	101	99	101	107	116	123	119	120
32	105	106	109	109	103	101	104	109	119	126	123	123
33	107	108	112	111	106	104	106	112	122	129	126	127
34	109	111	115	114	108	106	109	115	125	133	130	130
35	112	113	118	117	111	109	111	118	129	137	133	134
36	114	116	120	120	113	111	114	121	132	141	137	137
37	117	119	123	123	116	114	117	124	136	145	141	141

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 385 (°F)	TC # 386 (°F)	TC # 387 (°F)	TC # 388 (°F)	TC # 389 (°F)	TC # 390 (°F)	TC # 391 (°F)	TC # 392 (°F)	TC # 393 (°F)	TC # 394 (°F)	TC # 395 (°F)	TC # 396 (°F)
38	120	121	126	126	119	117	120	127	139	149	145	145
39	123	124	130	129	122	120	123	131	143	152	149	148
40	126	127	133	133	126	123	126	134	147	157	153	152
41	129	130	136	136	129	127	129	137	151	161	156	155
42	132	133	140	140	133	130	133	141	155	165	160	159
43	135	136	143	143	136	133	136	145	158	169	164	163
44	138	140	146	147	140	137	140	148	162	173	168	166
45	141	143	149	150	143	141	143	152	166	177	172	170
46	144	146	153	154	147	145	147	156	170	181	176	174
47	147	149	156	157	151	148	151	159	174	184	180	177
48	150	152	159	161	155	152	155	163	178	188	183	181
49	153	155	162	164	158	156	159	167	181	192	187	185
50	156	158	165	167	162	160	163	171	185	195	191	188
51	159	162	168	171	166	164	167	175	189	199	194	192
52	163	165	172	174	169	168	171	179	193	202	197	195
53	166	168	175	177	173	172	175	182	196	204	200	198
54	169	171	178	181	177	176	179	186	199	206	203	201
55	173	174	181	184	180	180	182	190	201	207	205	203
56	176	178	185	187	184	184	186	193	203	208	206	205
57	180	181	188	191	188	188	190	196	205	209	208	207
58	183	185	192	194	191	191	193	199	206	210	209	208
59	187	189	196	198	195	195	197	202	208	211	210	209
60	191	192	199	200	198	198	199	204	210	213	210	209
Max Temp:	191	192	199	200	198	198	199	204	210	213	210	209
Max Allowed:	404	404	404	404	404	404	404	404	404	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 397 (°F)	TC # 398 (°F)	TC # 399 (°F)	TC # 400 (°F)	TC # 401 (°F)	TC # 402 (°F)	TC # 403 (°F)	TC # 404 (°F)	TC # 405 (°F)	TC # 406 (°F)	TC # 407 (°F)	TC # 408 (°F)
0	79	79	79	79	79	79	79	78	77	78	79	79
1	79	79	79	79	79	79	79	78	77	78	79	79
2	79	79	79	79	79	79	79	78	78	78	79	79
3	79	79	79	79	79	79	79	78	78	78	79	79
4	79	79	79	79	79	79	79	79	78	78	79	79
5	79	79	79	79	79	79	79	79	78	78	79	79
6	79	79	79	79	79	79	79	79	78	78	79	79
7	79	79	80	80	79	79	80	80	78	78	79	79
8	80	79	80	80	79	79	80	81	78	78	79	79
9	80	80	80	80	80	80	81	82	78	78	79	79
10	80	80	80	80	80	80	82	84	78	78	79	79
11	80	80	81	81	80	81	83	86	78	78	79	79
12	81	81	82	81	81	81	85	88	78	78	79	80
13	81	82	83	82	81	82	87	90	78	78	79	80
14	82	83	84	83	82	84	89	93	78	78	79	80
15	83	84	86	84	83	85	91	96	78	78	80	81
16	84	85	87	86	85	87	94	99	78	79	80	81
17	85	87	89	88	86	89	96	101	78	79	81	82
18	87	89	92	90	88	91	99	104	78	79	81	82
19	89	92	96	92	91	93	102	108	78	79	82	83
20	91	95	101	95	93	96	105	111	78	80	82	84
21	93	98	106	99	96	99	108	114	79	80	83	85
22	96	102	111	103	99	102	111	117	79	80	84	85
23	98	105	116	107	102	105	115	120	79	81	84	86
24	101	109	120	111	106	108	118	124	79	81	85	88
25	105	113	124	115	109	112	122	127	80	82	86	89
26	108	116	128	119	113	116	125	130	80	83	87	90
27	111	120	132	123	117	119	129	133	80	83	88	91
28	114	124	136	127	121	123	132	137	81	84	90	93
29	118	127	140	131	125	127	136	140	81	85	91	94
30	122	131	143	135	129	131	139	143	82	86	92	96
31	125	135	147	139	133	135	143	146	82	87	93	97
32	129	138	150	142	137	139	146	149	83	87	95	99
33	132	141	153	146	141	142	150	152	83	88	96	101
34	135	144	155	149	144	146	153	156	84	89	98	102
35	139	147	156	152	148	150	157	159	85	91	99	104
36	142	150	158	155	151	153	160	162	85	92	101	106
37	145	152	160	158	155	157	163	164	86	93	103	108

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Time (min)	TC # 397 (°F)	TC # 398 (°F)	TC # 399 (°F)	TC # 400 (°F)	TC # 401 (°F)	TC # 402 (°F)	TC # 403 (°F)	TC # 404 (°F)	TC # 405 (°F)	TC # 406 (°F)	TC # 407 (°F)	TC # 408 (°F)
38	149	155	162	160	158	160	167	167	87	94	104	110
39	152	158	164	163	161	163	170	170	88	95	106	112
40	155	160	166	166	164	167	173	172	89	97	108	114
41	158	163	169	169	167	170	176	175	89	98	110	117
42	162	166	171	171	170	173	179	177	90	99	112	119
43	165	169	174	174	173	176	182	180	91	101	114	121
44	168	172	177	177	177	179	184	182	92	102	116	123
45	172	175	180	181	180	182	187	185	93	104	118	126
46	175	178	183	184	183	185	190	187	94	105	120	128
47	179	181	186	187	186	189	193	190	95	107	123	131
48	182	185	189	190	190	193	196	193	97	109	125	134
49	186	188	193	193	193	196	200	197	98	111	127	136
50	189	191	196	197	197	199	203	199	100	113	130	139
51	193	195	199	200	200	202	205	199	101	115	132	142
52	196	198	202	203	202	205	206	201	103	117	135	145
53	199	201	205	205	206	207	208	203	105	119	138	149
54	202	203	207	207	207	208	205	203	107	122	142	152
55	204	205	208	205	205	206	205	203	110	125	145	156
56	205	205	206	201	196	201	202	203	113	128	149	160
57	206	203	202	197	192	193	199	202	116	132	153	163
58	206	201	201	195	189	190	198	200	120	136	157	168
59	206	201	199	195	188	190	198	199	128	141	161	172
60	208	202	199	194	187	189	199	199	136	150	167	176
Max Temp:	208	205	208	207	207	208	208	203	136	150	167	176
Max Allowed:	404	404	404	404	404	404	404	403	402	403	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 409 (°F)	TC # 410 (°F)	TC # 411 (°F)	TC # 412 (°F)	TC # 413 (°F)	TC # 414 (°F)	TC # 415 (°F)	TC # 416 (°F)	TC # 417 (°F)	TC # 418 (°F)	TC # 419 (°F)	TC # 420 (°F)
0	79	79	80	80	80	80	80	80	80	80	80	80
1	79	79	80	80	80	80	80	80	80	80	80	80
2	79	80	80	80	80	80	80	80	80	80	80	80
3	79	80	80	80	80	80	80	80	80	80	80	80
4	79	79	80	80	80	80	80	80	80	80	80	80
5	79	79	80	80	80	80	80	80	80	80	80	80
6	79	79	80	80	80	80	80	80	80	80	80	80
7	79	80	80	80	80	80	80	80	80	80	80	80
8	79	80	80	80	80	80	80	80	80	80	80	80
9	79	80	80	80	80	80	80	80	80	80	80	80
10	80	80	80	80	80	80	80	80	80	80	80	80
11	80	80	80	80	80	80	80	80	80	80	80	80
12	80	80	80	80	80	80	80	80	80	80	80	80
13	80	80	80	80	80	80	80	80	80	80	80	80
14	80	80	80	80	81	81	81	81	81	81	81	81
15	81	80	80	80	81	81	81	81	81	81	81	81
16	81	81	80	80	81	81	81	81	81	81	81	81
17	82	81	80	80	81	81	82	82	82	82	82	82
18	82	81	81	80	81	82	82	82	82	82	82	82
19	83	82	81	81	82	82	83	83	83	83	83	83
20	83	82	81	81	82	83	83	84	84	84	84	84
21	84	83	82	81	83	83	84	85	85	85	85	85
22	85	83	82	82	83	84	85	86	86	86	86	86
23	86	84	83	82	84	85	86	87	87	87	87	87
24	87	85	83	83	85	85	87	88	88	89	89	89
25	88	86	84	84	85	86	88	89	90	90	90	90
26	89	87	85	84	86	87	89	91	92	92	92	92
27	91	88	86	85	87	89	91	92	93	94	94	94
28	92	89	87	86	88	90	92	94	95	96	96	96
29	93	90	88	87	90	91	94	96	97	98	98	98
30	95	92	89	88	91	92	95	98	99	100	100	100
31	96	93	90	89	92	94	97	100	101	102	102	102
32	98	94	92	91	94	96	99	102	103	105	104	104
33	100	96	93	92	95	97	101	104	106	107	107	107
34	102	98	95	94	97	99	103	106	108	110	110	110
35	103	99	96	95	98	101	105	108	110	112	112	112
36	105	101	98	97	100	103	107	110	113	115	115	115
37	107	103	100	99	102	105	109	113	115	117	118	118

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Time (min)	TC # 409 (°F)	TC # 410 (°F)	TC # 411 (°F)	TC # 412 (°F)	TC # 413 (°F)	TC # 414 (°F)	TC # 415 (°F)	TC # 416 (°F)	TC # 417 (°F)	TC # 418 (°F)	TC # 419 (°F)	TC # 420 (°F)
38	110	105	102	101	104	107	111	115	118	120	121	121
39	112	107	104	102	106	109	114	118	120	123	124	124
40	114	109	106	105	108	111	116	120	123	125	127	128
41	116	112	108	107	111	114	118	123	126	128	130	131
42	119	114	111	109	113	116	121	125	128	131	133	134
43	121	117	113	111	116	119	124	128	131	134	136	138
44	124	119	116	114	118	121	126	131	134	137	139	141
45	126	122	118	117	121	124	129	134	137	140	142	145
46	129	125	121	120	124	127	132	137	140	143	145	148
47	132	128	124	122	127	130	135	140	143	146	149	152
48	135	131	127	126	130	133	138	143	146	149	152	155
49	137	134	131	129	133	136	142	146	149	153	155	159
50	141	137	134	132	136	140	145	149	152	156	158	162
51	144	141	138	136	140	143	148	153	156	159	162	166
52	147	144	141	140	144	147	152	156	159	163	165	170
53	151	148	145	144	148	151	156	160	163	167	169	173
54	154	152	149	148	152	155	160	164	167	170	173	177
55	158	156	154	152	156	159	164	168	171	174	177	181
56	162	160	158	157	160	164	169	172	175	178	180	184
57	166	165	163	161	165	168	173	177	179	182	184	188
58	171	169	167	166	169	173	177	181	183	186	188	192
59	175	174	172	171	174	177	181	185	187	190	192	196
60	180	180	179	176	178	182	186	189	191	194	196	199
Max Temp:	180	180	179	176	178	182	186	189	191	194	196	199
Max Allowed:	404	404	405	405	405	405	405	405	405	405	405	405

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Time (min)	TC # 421 (°F)	TC # 422 (°F)	TC # 423 (°F)	TC # 424 (°F)	TC # 425 (°F)	TC # 426 (°F)	TC # 427 (°F)	TC # 428 (°F)	TC # 429 (°F)	TC # 430 (°F)	TC # 431 (°F)	TC # 432 (°F)
0	80	80	80	80	80	80	80	80	80	80	80	80
1	80	80	80	80	80	80	80	80	80	80	80	80
2	80	80	80	80	80	80	80	80	80	80	80	80
3	80	80	80	80	80	80	80	80	80	80	80	80
4	80	80	80	80	80	80	80	80	80	80	80	80
5	80	80	80	80	80	80	80	80	80	80	80	80
6	80	80	80	80	80	80	80	80	80	80	80	80
7	80	80	80	80	80	80	80	80	80	80	80	80
8	80	80	80	80	80	80	80	80	80	80	80	80
9	80	80	80	80	80	80	80	80	80	80	80	80
10	80	80	80	80	80	80	80	80	80	81	80	80
11	80	80	80	80	80	80	80	81	81	81	81	81
12	80	80	80	80	80	81	81	81	81	82	81	81
13	81	80	80	81	81	81	81	81	82	83	82	82
14	81	81	81	81	81	81	82	82	83	84	83	83
15	81	81	81	81	82	82	82	83	84	85	84	83
16	82	81	81	82	82	83	83	84	85	86	85	85
17	83	82	82	82	83	84	84	85	86	88	86	86
18	83	82	83	83	84	85	85	86	87	89	88	88
19	84	83	83	84	85	86	86	87	89	91	90	89
20	85	84	84	85	86	87	88	89	91	93	92	91
21	86	85	85	86	88	89	89	90	92	95	94	93
22	87	86	86	87	89	91	91	92	94	97	96	96
23	89	87	87	89	91	92	93	94	96	100	98	98
24	90	88	89	90	93	94	95	96	99	102	101	101
25	92	89	90	92	95	97	97	99	101	105	103	104
26	94	91	92	94	97	99	100	101	104	107	106	107
27	96	93	94	96	99	101	102	104	106	110	109	110
28	98	94	96	98	101	104	105	107	109	113	112	113
29	100	96	98	100	104	106	108	109	112	116	115	116
30	102	98	100	102	107	109	110	112	115	119	118	120
31	104	101	102	105	109	112	113	115	118	122	121	123
32	107	103	104	107	112	115	117	119	122	126	125	127
33	109	105	107	110	115	118	120	122	125	129	128	131
34	112	108	109	113	118	122	124	126	128	132	132	134
35	115	110	112	116	122	125	127	129	132	136	136	138
36	118	113	115	119	125	129	131	133	136	139	139	142
37	121	116	118	122	129	133	135	137	139	143	143	146

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Time (min)	TC # 421 (°F)	TC # 422 (°F)	TC # 423 (°F)	TC # 424 (°F)	TC # 425 (°F)	TC # 426 (°F)	TC # 427 (°F)	TC # 428 (°F)	TC # 429 (°F)	TC # 430 (°F)	TC # 431 (°F)	TC # 432 (°F)
38	124	119	121	125	132	137	139	140	143	147	147	150
39	127	122	124	128	136	141	143	144	147	150	151	154
40	131	125	127	132	140	145	147	148	150	154	155	158
41	134	129	130	136	144	149	151	152	154	158	159	162
42	138	132	134	139	148	153	155	156	158	162	163	166
43	142	136	138	143	152	157	159	160	162	166	167	170
44	145	140	141	147	156	161	163	164	166	170	171	174
45	149	143	145	151	160	164	167	168	170	174	175	178
46	153	147	149	155	164	168	170	172	174	178	179	182
47	157	152	154	159	168	172	174	175	177	182	183	186
48	162	156	158	164	172	176	178	179	181	186	187	190
49	166	161	163	168	176	180	181	183	185	189	191	195
50	170	166	168	172	180	183	185	186	189	193	195	199
51	174	171	173	177	184	187	188	190	192	197	199	202
52	178	175	177	181	188	191	192	193	196	201	203	205
53	182	180	182	185	191	194	195	196	199	204	205	207
54	186	185	186	189	195	197	198	199	202	206	207	208
55	190	189	190	193	198	200	200	202	204	208	209	209
56	194	193	194	196	200	202	203	204	206	210	210	210
57	198	197	197	199	203	204	205	206	208	212	212	211
58	201	200	200	202	205	206	207	208	210	213	213	212
59	203	203	203	204	207	208	208	210	212	215	215	213
60	205	205	205	206	209	210	210	212	214	217	216	214
Max Temp:	205	205	205	206	209	210	210	212	214	217	216	214
Max Allowed:	405	405	405	405	405	405	405	405	405	405	405	405

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Time (min)	TC # 433 (°F)	TC # 434 (°F)	TC # 435 (°F)	TC # 436 (°F)	TC # 437 (°F)	TC # 438 (°F)	TC # 439 (°F)	TC # 440 (°F)	TC # 441 (°F)	TC # 442 (°F)	TC # 443 (°F)	TC # 444 (°F)
0	79	79	79	78	77	78	78	79	79	79	79	79
1	79	79	79	78	77	78	78	79	79	79	79	79
2	79	79	79	78	77	78	78	79	79	79	79	79
3	79	79	79	78	77	78	78	79	79	79	79	79
4	79	79	79	78	77	78	78	79	79	79	79	79
5	79	79	79	78	77	78	78	79	79	79	79	79
6	79	79	79	78	77	78	78	79	79	79	79	79
7	79	79	79	79	77	78	78	79	79	79	79	79
8	79	79	79	79	77	78	78	79	79	79	79	79
9	79	79	79	80	77	78	78	79	79	79	79	79
10	80	79	80	81	77	78	78	79	79	79	79	79
11	80	80	81	82	77	78	78	79	79	79	79	79
12	80	80	82	83	77	78	79	79	79	79	80	79
13	81	81	83	84	77	78	79	79	79	79	80	80
14	82	82	84	86	77	78	79	79	80	80	80	80
15	83	83	86	88	77	78	79	80	80	80	80	80
16	84	84	87	90	77	78	79	80	80	80	80	80
17	85	86	89	92	78	79	80	80	80	80	80	80
18	87	87	91	94	78	79	80	81	81	80	80	80
19	89	89	94	96	78	79	81	81	81	81	81	81
20	91	91	96	99	78	79	81	82	82	81	81	81
21	93	94	98	101	78	80	82	83	83	82	81	81
22	95	96	101	104	78	80	83	83	83	82	82	82
23	98	99	104	107	79	81	83	84	84	83	83	83
24	101	102	107	109	79	81	84	85	85	84	83	83
25	104	105	110	112	79	82	85	86	86	85	84	84
26	107	108	113	115	79	82	86	88	87	86	85	85
27	110	111	116	118	80	83	87	89	88	87	86	86
28	113	114	119	120	80	84	88	90	90	88	87	87
29	117	118	122	123	81	85	89	91	91	89	88	88
30	121	121	125	126	81	85	91	93	93	91	89	89
31	125	125	129	129	81	86	92	95	94	92	91	91
32	128	129	132	132	82	87	93	96	96	94	92	92
33	132	132	135	135	83	88	95	98	97	95	94	94
34	137	136	139	137	83	89	97	100	99	97	96	95
35	141	140	142	140	84	90	98	102	101	99	97	97
36	145	144	146	143	84	91	100	103	103	101	99	99
37	149	148	149	146	85	93	101	106	105	103	101	101

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Time (min)	TC # 433 (°F)	TC # 434 (°F)	TC # 435 (°F)	TC # 436 (°F)	TC # 437 (°F)	TC # 438 (°F)	TC # 439 (°F)	TC # 440 (°F)	TC # 441 (°F)	TC # 442 (°F)	TC # 443 (°F)	TC # 444 (°F)
38	153	152	153	149	86	94	103	108	107	105	103	103
39	157	156	156	152	87	95	105	110	110	107	105	105
40	161	159	159	155	88	97	107	112	112	109	108	107
41	164	163	163	159	88	98	109	114	115	112	110	110
42	168	167	167	162	89	100	111	117	117	114	113	112
43	172	171	170	165	90	101	114	119	120	117	115	115
44	176	174	174	167	91	103	116	122	123	120	118	118
45	180	178	177	170	93	105	119	125	126	123	121	120
46	184	182	180	172	94	107	121	128	129	126	124	123
47	188	186	183	175	95	109	124	131	132	130	128	127
48	192	189	186	177	97	111	127	134	135	133	131	130
49	196	193	188	179	98	114	130	138	139	137	135	134
50	199	196	191	181	100	116	133	141	143	142	139	138
51	202	198	192	183	102	119	137	145	147	145	143	141
52	204	200	194	185	104	122	140	149	151	149	146	144
53	205	202	196	186	106	125	144	153	155	152	150	147
54	207	203	198	188	108	128	148	157	159	157	154	151
55	208	204	199	190	111	132	152	161	163	161	158	155
56	209	206	201	192	114	135	156	165	168	165	162	159
57	210	207	202	194	117	139	160	169	172	169	167	164
58	211	208	203	195	119	144	164	173	176	173	171	168
59	212	209	205	197	123	148	168	177	180	177	175	173
60	213	211	207	198	128	153	172	181	183	181	179	177
Max Temp:	213	211	207	198	128	153	172	181	183	181	179	177
Max Allowed:	404	404	404	403	402	403	403	404	404	404	404	404

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Time (min)	TC # 445 (°F)	TC # 446 (°F)	TC # 447 (°F)	TC # 448 (°F)	TC # 449 (°F)	TC # 450 (°F)	TC # 451 (°F)	TC # 452 (°F)	TC # 453 (°F)	TC # 454 (°F)	TC # 455 (°F)	TC # 456 (°F)
0	79	79	79	79	79	79	79	79	80	80	80	80
1	79	79	79	79	79	79	79	79	80	80	80	80
2	79	79	79	79	79	79	79	79	80	80	80	80
3	79	79	79	79	79	79	79	79	80	80	80	80
4	79	79	79	79	79	79	79	79	80	80	80	80
5	79	79	79	79	79	79	79	79	80	80	80	80
6	79	79	79	79	79	79	79	79	80	80	80	80
7	79	79	79	79	79	79	79	79	80	80	80	80
8	79	79	79	79	79	79	79	79	80	80	80	80
9	79	79	79	79	79	79	79	79	80	80	80	80
10	79	79	79	79	79	79	79	79	80	80	80	80
11	80	79	80	80	79	79	79	80	80	80	80	80
12	80	80	80	80	80	80	80	80	80	80	80	80
13	80	80	80	80	80	80	80	80	80	80	81	81
14	80	80	80	80	80	80	80	81	81	81	81	81
15	80	80	81	81	81	81	81	81	81	81	81	82
16	80	81	81	81	81	81	81	82	82	81	82	83
17	81	81	82	82	82	82	82	83	82	82	83	83
18	81	81	82	83	83	82	83	84	83	83	83	84
19	81	82	83	84	83	83	84	85	84	83	84	86
20	82	83	84	85	85	84	85	86	85	84	85	87
21	83	83	85	86	86	86	86	88	86	85	87	88
22	83	84	86	87	87	87	88	89	87	86	88	90
23	84	85	87	89	89	88	89	91	88	88	89	92
24	85	86	89	90	90	90	91	93	90	89	91	94
25	86	87	90	92	92	92	93	95	92	91	93	96
26	87	89	92	94	94	94	95	97	93	92	94	98
27	88	90	93	96	96	96	97	99	95	94	96	100
28	89	91	95	98	98	98	99	101	97	96	99	102
29	91	93	97	100	100	100	101	104	99	98	101	105
30	92	94	99	102	102	103	104	106	102	100	103	108
31	94	96	101	104	105	105	106	109	104	103	106	110
32	95	98	103	107	107	108	109	111	107	105	108	113
33	97	100	105	109	110	111	112	114	109	108	111	116
34	99	102	107	112	112	114	115	117	112	110	114	119
35	101	104	110	114	115	116	118	120	115	113	117	122
36	103	106	112	117	118	119	121	123	118	116	120	126
37	105	108	115	119	121	122	124	126	121	119	123	129

Time (min)	TC # 445 (°F)	TC # 446 (°F)	TC # 447 (°F)	TC # 448 (°F)	TC # 449 (°F)	TC # 450 (°F)	TC # 451 (°F)	TC # 452 (°F)	TC # 453 (°F)	TC # 454 (°F)	TC # 455 (°F)	TC # 456 (°F)
38	107	111	117	122	123	125	127	130	124	122	126	133
39	110	113	120	125	126	128	131	133	127	125	129	136
40	112	116	122	128	129	132	134	137	131	129	133	140
41	114	119	125	131	132	135	137	140	134	132	136	144
42	117	121	128	133	135	138	141	144	138	136	140	147
43	120	124	131	136	138	141	144	148	141	139	144	151
44	123	127	134	139	142	144	147	151	145	143	147	155
45	125	130	137	142	145	147	151	155	149	147	151	159
46	128	133	139	145	147	150	154	158	153	151	155	163
47	131	136	142	148	151	153	157	162	157	155	159	167
48	135	139	146	152	154	157	160	165	161	159	163	171
49	138	142	149	155	157	160	163	169	164	163	167	174
50	141	145	152	158	160	163	167	172	168	168	171	178
51	145	149	155	161	163	166	170	175	172	172	176	182
52	148	152	158	164	167	169	173	179	176	176	180	186
53	151	156	162	168	170	173	177	182	180	180	184	190
54	155	159	165	171	174	176	180	185	183	184	188	193
55	159	163	169	175	177	180	183	189	187	188	192	196
56	163	167	173	178	181	183	187	192	191	192	195	199
57	167	171	176	182	184	187	190	196	194	196	198	202
58	171	175	180	185	187	190	194	199	198	199	201	204
59	175	179	184	189	191	194	197	202	201	202	203	206
60	180	183	188	193	194	197	200	204	203	204	205	208
Max Temp:	180	183	188	193	194	197	200	204	203	204	205	208
Max Allowed:	404	404	404	404	404	404	404	404	405	405	405	405

Time (min)	TC # 457 (°F)	TC # 458 (°F)	TC # 459 (°F)	TC # 460 (°F)	TC # 461 (°F)	TC # 462 (°F)	TC # 463 (°F)	TC # 464 (°F)	TC # 465 (°F)	TC # 466 (°F)	TC # 467 (°F)	TC # 468 (°F)
0	80	80	80	80	80	80	80	80	80	79	79	79
1	80	80	80	80	80	80	80	80	80	79	79	79
2	80	80	80	80	80	80	80	80	80	79	79	79
3	80	80	80	80	80	80	80	80	80	79	79	79
4	80	80	80	80	80	80	80	80	80	79	79	79
5	80	80	80	80	80	80	80	80	80	79	79	79
6	80	80	80	80	80	80	80	80	80	79	79	79
7	80	80	80	80	80	80	80	80	80	80	80	80
8	80	80	80	80	80	80	80	80	80	80	80	80
9	80	80	80	80	80	80	81	81	80	80	81	81
10	80	80	80	80	80	80	81	81	81	80	81	82
11	80	80	80	80	81	81	82	82	81	81	82	83
12	80	81	81	81	81	81	83	83	82	82	84	85
13	81	81	81	81	82	82	84	84	83	83	85	87
14	81	82	82	82	82	83	85	85	84	84	86	88
15	82	82	82	83	83	84	86	86	85	85	88	90
16	83	83	83	83	84	86	88	88	87	87	90	92
17	84	84	84	85	86	87	90	90	88	88	92	95
18	85	86	86	86	87	89	92	92	90	90	95	97
19	86	87	87	87	89	90	94	94	93	93	97	100
20	88	88	89	89	90	92	96	96	95	95	100	102
21	89	90	90	91	92	94	99	99	97	98	102	105
22	91	92	92	92	94	97	101	101	100	100	105	107
23	93	94	94	95	97	99	104	104	103	103	108	109
24	95	96	97	97	99	102	106	107	106	106	110	112
25	97	99	99	99	101	104	109	110	108	109	113	115
26	99	101	101	102	104	107	112	113	111	112	116	117
27	102	104	104	104	107	110	115	116	114	115	119	120
28	104	107	107	107	109	112	118	119	117	118	122	122
29	107	109	110	110	112	115	121	122	121	121	125	125
30	110	112	113	113	115	118	123	125	124	124	128	127
31	113	116	116	116	118	121	127	128	127	127	131	130
32	116	119	119	119	121	124	130	131	131	131	134	133
33	119	122	122	122	125	127	133	134	134	134	137	135
34	123	126	126	126	128	131	136	138	138	138	140	138
35	126	129	129	129	131	134	139	141	141	141	143	141
36	130	133	133	133	135	137	142	145	145	144	147	143
37	133	137	137	136	138	141	146	148	148	148	150	146

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Time (min)	TC # 457 (°F)	TC # 458 (°F)	TC # 459 (°F)	TC # 460 (°F)	TC # 461 (°F)	TC # 462 (°F)	TC # 463 (°F)	TC # 464 (°F)	TC # 465 (°F)	TC # 466 (°F)	TC # 467 (°F)	TC # 468 (°F)
38	137	140	141	140	142	144	149	152	152	152	153	148
39	141	144	145	144	146	148	153	155	156	155	156	151
40	145	148	149	148	149	151	156	159	159	159	159	154
41	148	152	153	152	153	155	160	163	163	162	163	156
42	152	156	157	155	157	159	164	166	167	166	166	159
43	156	160	160	159	160	162	167	170	171	169	169	161
44	160	164	164	163	164	166	171	174	174	173	172	164
45	164	168	168	167	168	170	175	178	178	177	176	166
46	168	172	172	171	172	173	178	182	182	180	179	169
47	172	175	175	174	175	177	182	186	186	184	182	172
48	175	179	179	178	179	181	186	190	190	188	185	174
49	179	183	183	182	183	184	190	194	194	192	188	176
50	183	186	186	185	186	188	194	198	198	194	190	178
51	186	189	189	189	190	192	198	202	201	197	192	180
52	190	193	193	192	193	196	202	205	203	199	194	182
53	193	196	196	195	197	199	204	207	205	201	196	184
54	196	199	199	198	200	202	207	208	207	203	198	186
55	199	201	201	201	203	205	209	210	208	204	199	188
56	202	203	203	203	205	207	210	211	209	206	201	190
57	204	205	205	205	207	209	212	212	210	207	202	191
58	206	207	207	207	209	211	214	213	212	208	204	193
59	208	209	209	209	211	213	215	215	213	210	206	194
60	210	211	210	211	213	215	217	216	214	211	207	196
Max Temp:	210	211	210	211	213	215	217	216	214	211	207	196
Max Allowed:	405	405	405	405	405	405	405	405	405	404	404	404

OMEGA POINT LABORATORIES

Time (min)	TC # 469 (°F)	TC # 470 (°F)	TC # 471 (°F)	TC # 472 (°F)	TC # 473 (°F)	TC # 474 (°F)	TC # 475 (°F)	TC # 476 (°F)	TC # 477 (°F)	TC # 478 (°F)	TC # 479 (°F)	TC # 480 (°F)
0	78	78	79	79	79	79	79	79	79	79	79	79
1	78	78	79	79	79	79	79	79	79	79	79	79
2	78	78	79	79	79	79	80	79	79	79	79	79
3	78	78	79	79	79	79	79	79	79	79	79	79
4	78	78	79	79	79	79	79	79	79	79	79	79
5	78	78	79	79	79	79	79	79	79	79	79	79
6	78	78	79	79	79	79	79	79	79	79	79	79
7	78	78	79	79	79	79	79	79	79	79	79	79
8	78	78	79	79	79	79	79	79	79	79	79	79
9	78	78	79	79	79	80	79	79	79	79	79	79
10	78	78	79	79	79	79	79	79	79	80	79	79
11	78	78	79	79	79	79	79	79	80	80	79	79
12	78	79	79	79	79	79	79	79	80	80	80	80
13	78	79	79	80	79	80	79	80	80	80	80	80
14	78	79	79	80	79	80	80	80	80	80	80	80
15	78	79	80	80	80	80	80	80	80	81	81	81
16	78	79	80	80	80	80	80	80	81	81	81	81
17	78	79	80	81	80	80	80	80	81	82	82	82
18	78	79	80	81	80	80	80	80	82	82	82	83
19	79	80	81	81	81	81	81	81	83	83	83	84
20	79	80	81	82	82	81	81	81	83	84	84	85
21	79	80	82	83	82	82	81	82	84	85	85	86
22	79	81	83	83	83	82	82	83	85	86	86	87
23	80	81	83	84	83	83	83	83	87	87	88	89
24	80	82	84	85	84	84	83	84	88	89	89	90
25	80	82	85	86	85	85	84	85	89	90	91	92
26	81	83	86	87	86	86	85	86	91	92	93	94
27	81	84	87	88	88	87	86	87	93	94	94	96
28	82	85	88	90	89	88	87	89	94	96	96	98
29	82	86	90	91	90	89	88	90	96	97	98	100
30	83	87	91	93	92	91	90	91	98	100	101	103
31	84	88	92	94	93	92	91	93	100	102	103	105
32	84	89	94	96	95	94	93	95	102	104	105	108
33	85	90	96	98	97	95	94	96	105	106	108	110
34	86	91	97	99	98	97	96	98	107	109	110	113
35	87	92	99	101	100	99	98	100	109	111	113	116
36	87	94	101	103	102	101	100	102	112	114	116	119
37	88	95	103	106	105	103	102	105	115	117	119	122

OMEGA POINT LABORATORIES

Time (min)	TC # 469 (°F)	TC # 470 (°F)	TC # 471 (°F)	TC # 472 (°F)	TC # 473 (°F)	TC # 474 (°F)	TC # 475 (°F)	TC # 476 (°F)	TC # 477 (°F)	TC # 478 (°F)	TC # 479 (°F)	TC # 480 (°F)
38	89	96	105	108	107	105	104	107	117	120	122	125
39	91	98	107	110	109	108	107	110	120	123	125	128
40	92	100	109	112	112	110	110	112	123	126	128	132
41	93	102	111	115	114	113	113	115	126	129	131	135
42	95	104	114	118	117	116	116	118	129	132	134	139
43	96	106	116	120	120	119	119	122	133	136	138	142
44	98	108	119	123	123	123	123	125	136	139	142	146
45	100	110	122	127	127	127	126	128	140	142	145	150
46	102	113	125	130	130	130	130	132	143	146	149	153
47	103	116	128	133	134	133	132	135	146	149	152	157
48	105	118	131	137	137	136	134	138	150	153	156	161
49	107	121	135	140	141	140	138	141	153	156	160	164
50	109	124	138	144	145	144	143	145	156	159	163	168
51	111	127	142	148	149	148	147	149	159	163	167	172
52	113	130	145	152	153	153	151	153	163	166	170	175
53	116	133	149	156	157	157	156	157	166	169	173	178
54	118	136	153	160	162	161	160	161	169	173	177	182
55	122	140	157	164	166	165	165	165	173	176	180	185
56	125	143	161	168	170	170	169	169	176	179	183	188
57	129	147	164	172	174	174	173	173	180	182	186	191
58	130	150	168	176	178	178	177	177	183	185	190	194
59	133	154	172	179	182	182	181	181	186	189	193	197
60	138	157	175	183	185	185	185	185	190	192	196	200
Max Temp:	138	157	175	183	185	185	185	185	190	192	196	200
Max Allowed:	403	403	404	404	404	404	404	404	404	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 481 (°F)	TC # 482 (°F)	TC # 483 (°F)	TC # 484 (°F)	TC # 485 (°F)	TC # 486 (°F)	TC # 487 (°F)	TC # 488 (°F)	TC # 489 (°F)	TC # 490 (°F)	TC # 491 (°F)	TC # 492 (°F)
0	79	79	79	79	79	79	79	79	79	79	79	79
1	79	79	79	79	79	79	79	79	79	79	79	79
2	79	79	79	79	79	79	79	79	79	79	79	79
3	79	79	79	79	79	79	79	79	79	79	79	79
4	79	79	79	79	79	79	79	79	79	79	79	79
5	79	79	79	79	79	79	79	79	79	79	79	79
6	79	79	79	79	79	79	79	79	79	79	79	79
7	79	79	79	79	79	79	79	79	79	79	79	79
8	79	79	79	79	79	79	79	79	79	79	79	79
9	79	79	79	79	79	79	79	79	79	79	79	79
10	79	79	79	79	79	79	79	79	79	79	79	80
11	79	80	80	80	79	79	80	80	80	80	80	80
12	80	80	80	80	80	80	80	80	80	80	80	80
13	80	80	80	80	80	80	80	80	80	80	80	81
14	80	80	80	80	80	80	80	81	81	81	81	81
15	81	81	81	81	81	80	81	81	82	82	81	82
16	81	81	81	81	81	81	81	82	82	82	82	82
17	82	82	82	82	82	82	82	83	83	83	83	84
18	83	83	83	83	82	82	83	84	84	84	84	85
19	84	84	84	84	83	83	84	85	86	86	85	86
20	85	85	85	85	84	84	85	87	87	87	87	88
21	86	86	86	86	85	85	86	88	89	89	89	89
22	88	88	88	87	87	87	88	90	90	91	90	91
23	89	89	89	89	88	88	89	92	92	93	92	93
24	91	91	91	91	90	90	91	94	95	95	94	95
25	93	93	93	92	91	92	93	96	97	97	97	98
26	95	95	95	94	93	94	95	98	99	99	99	100
27	97	97	97	96	95	96	97	101	102	102	101	103
28	99	100	99	99	98	98	100	103	104	105	104	105
29	101	102	102	101	100	100	102	106	107	107	107	108
30	104	104	104	104	102	103	105	109	110	110	110	111
31	106	107	107	106	105	105	107	112	113	114	113	114
32	109	110	110	109	108	108	110	115	116	117	116	117
33	112	113	113	112	111	111	113	118	120	120	119	121
34	115	116	116	115	113	114	116	121	123	124	123	124
35	118	119	119	118	117	117	119	124	127	127	126	127
36	121	122	122	121	120	120	122	128	130	131	130	131
37	124	125	125	124	123	123	126	131	134	135	134	134

Time (min)	TC # 481 (°F)	TC # 482 (°F)	TC # 483 (°F)	TC # 484 (°F)	TC # 485 (°F)	TC # 486 (°F)	TC # 487 (°F)	TC # 488 (°F)	TC # 489 (°F)	TC # 490 (°F)	TC # 491 (°F)	TC # 492 (°F)
38	127	129	129	128	126	127	129	135	137	138	137	138
39	131	132	132	131	130	130	132	138	141	142	141	142
40	134	136	136	135	134	134	136	142	145	146	145	145
41	138	140	140	139	137	138	140	146	149	150	149	149
42	141	143	143	142	141	142	143	149	153	154	153	153
43	145	147	147	146	145	145	147	153	156	158	157	157
44	149	151	151	150	149	149	151	157	160	162	161	161
45	152	154	155	154	153	153	155	161	164	166	165	165
46	156	158	159	158	157	157	159	165	168	170	169	169
47	160	162	163	162	161	162	163	169	172	174	173	172
48	163	165	166	166	165	166	167	173	176	178	177	176
49	167	169	170	170	169	170	171	177	180	182	181	180
50	171	172	174	174	173	174	175	181	184	186	185	184
51	174	176	177	178	177	178	180	185	188	189	188	188
52	178	179	181	181	181	182	184	189	191	193	192	192
53	181	183	184	185	185	186	188	193	195	196	196	195
54	184	186	188	189	189	190	191	196	198	199	199	198
55	187	189	191	193	193	193	195	199	201	202	201	201
56	191	192	194	196	196	197	198	202	203	204	203	203
57	194	195	197	199	199	199	200	204	205	206	205	206
58	197	198	200	201	202	202	203	206	207	207	207	207
59	199	201	203	204	204	204	205	208	209	209	209	209
60	202	203	205	206	206	206	207	209	210	210	210	211
Max Temp:	202	203	205	206	206	206	207	209	210	210	210	211
Max Allowed:	404	404	404	404	404	404	404	404	404	404	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 493 (°F)	TC # 494 (°F)	TC # 495 (°F)	TC # 496 (°F)	TC # 497 (°F)	TC # 498 (°F)	TC # 499 (°F)	TC # 500 (°F)	TC # 501 (°F)	TC # 502 (°F)	TC # 503 (°F)	TC # 504 (°F)
0	79	79	79	79	79	79	79	78	77	78	79	79
1	79	79	79	79	79	79	79	78	77	78	79	79
2	79	79	79	79	79	79	79	78	77	78	79	79
3	79	79	79	79	79	79	79	78	77	78	79	79
4	79	79	79	79	79	79	79	78	77	78	79	79
5	79	79	79	79	79	79	79	78	78	78	79	79
6	79	79	79	79	79	79	79	79	78	78	79	79
7	79	79	79	79	79	79	79	79	78	78	79	79
8	79	80	80	79	79	79	80	80	78	78	79	79
9	80	80	80	80	79	80	80	81	78	78	79	80
10	80	80	81	80	80	80	81	82	78	78	79	80
11	80	80	81	80	80	81	83	84	78	79	79	80
12	80	81	82	81	81	81	84	85	78	79	80	81
13	81	82	83	82	81	83	86	87	78	79	80	82
14	82	82	84	83	82	84	88	90	78	80	81	82
15	82	83	85	84	84	85	90	92	79	81	82	83
16	84	85	87	86	85	87	92	94	79	81	83	84
17	85	86	89	87	86	89	95	97	79	82	84	86
18	86	88	90	89	88	91	97	100	80	83	85	87
19	88	89	93	91	90	93	100	102	80	84	86	88
20	89	91	95	93	92	96	103	105	81	85	87	90
21	91	94	97	96	95	99	106	108	82	86	89	91
22	93	96	100	98	97	101	109	111	82	87	90	93
23	95	98	102	101	100	104	112	114	83	88	92	95
24	98	101	105	104	103	107	115	117	83	89	93	97
25	100	103	108	107	106	110	118	120	84	90	95	99
26	103	106	111	110	109	113	122	123	85	92	97	101
27	105	109	114	113	112	116	125	126	86	93	99	103
28	108	112	117	116	115	120	128	129	87	94	101	105
29	111	115	120	119	118	123	131	132	88	96	103	108
30	114	117	123	122	121	126	134	135	88	97	105	110
31	117	121	126	125	125	130	138	138	89	99	107	112
32	120	124	129	129	128	133	141	140	90	100	109	115
33	123	127	132	132	132	137	144	143	91	102	111	117
34	126	130	136	135	135	140	147	146	92	103	113	120
35	130	133	139	139	139	143	151	149	93	105	115	122
36	133	136	142	142	142	147	154	152	94	106	117	125
37	137	140	146	146	146	151	157	155	95	108	119	127

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 8, 1994

Time (min)	TC # 493 (°F)	TC # 494 (°F)	TC # 495 (°F)	TC # 496 (°F)	TC # 497 (°F)	TC # 498 (°F)	TC # 499 (°F)	TC # 500 (°F)	TC # 501 (°F)	TC # 502 (°F)	TC # 503 (°F)	TC # 504 (°F)
38	140	143	149	149	149	154	161	158	97	110	122	130
39	144	147	153	153	153	158	164	161	98	112	124	132
40	147	150	156	157	157	161	168	164	99	114	126	135
41	151	154	160	160	161	165	171	168	100	115	129	138
42	155	157	163	164	165	169	175	171	101	117	131	141
43	158	161	167	168	169	173	178	174	103	119	134	144
44	162	165	171	172	173	177	182	178	104	121	136	146
45	166	168	174	176	176	181	185	180	106	123	139	149
46	170	172	178	180	180	184	188	183	107	124	141	152
47	174	176	182	184	184	188	191	185	109	126	144	155
48	177	180	186	188	188	192	193	187	111	129	147	158
49	181	184	190	192	192	195	195	190	113	131	149	161
50	185	188	194	197	196	197	198	192	115	134	152	165
51	189	192	198	200	199	199	200	193	119	137	155	168
52	193	196	202	203	201	201	201	195	123	140	159	171
53	197	199	205	205	203	203	203	197	127	145	162	174
54	200	202	207	207	205	205	205	199	133	150	166	178
55	202	205	208	208	207	206	207	200	140	154	169	181
56	205	207	210	210	208	208	208	202	150	164	174	184
57	207	209	211	211	210	209	210	204	158	168	179	187
58	209	211	213	212	211	211	212	206	170	181	187	192
59	211	213	214	213	213	213	214	208	175	188	196	199
60	213	214	215	215	214	214	216	210	187	197	202	205
Max Temp:	213	214	215	215	214	214	216	210	187	197	202	205
Max Allowed:	404	404	404	404	404	404	404	403	402	403	404	404

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	TC # 505 (°F)	TC # 506 (°F)	TC # 507 (°F)	TC # 508 (°F)	TC # 509 (°F)	TC # 510 (°F)	TC # 511 (°F)	TC # 512 (°F)	TC # 513 (°F)	TC # 514 (°F)	TC # 515 (°F)	TC # 516 (°F)
0	79	79	79	80	79	79	79	79	79	79	79	79
1	79	79	79	79	79	79	79	79	79	79	79	79
2	79	79	79	79	79	79	79	79	79	79	79	79
3	79	79	79	79	79	79	79	79	79	79	79	79
4	79	79	79	79	79	79	79	79	79	79	79	79
5	79	79	79	79	79	79	79	79	79	79	79	79
6	79	79	79	79	79	79	80	80	79	79	79	79
7	79	79	79	79	79	80	80	80	80	79	79	79
8	79	79	79	79	80	80	81	81	80	80	80	80
9	80	79	80	80	80	80	81	81	80	80	80	80
10	80	80	80	80	80	81	82	83	81	81	81	80
11	80	80	80	80	80	81	84	84	82	82	82	81
12	80	80	80	80	81	82	85	86	83	83	83	82
13	81	80	80	80	81	83	87	87	85	84	84	83
14	82	81	80	81	82	84	89	90	87	86	85	84
15	82	81	81	81	83	86	91	92	89	88	87	86
16	83	82	81	82	83	87	93	94	91	90	89	88
17	84	83	82	82	84	89	96	97	93	92	91	89
18	85	84	83	83	86	91	99	100	96	95	94	92
19	87	85	84	84	87	93	101	103	99	97	96	94
20	88	86	85	85	89	95	104	107	102	100	99	96
21	90	87	86	86	90	97	107	110	105	103	102	99
22	91	88	87	88	92	100	111	113	108	107	105	102
23	93	90	88	89	94	102	114	117	112	110	108	104
24	95	91	90	90	96	105	117	121	115	113	111	108
25	96	93	91	92	98	107	121	125	119	117	115	111
26	98	95	93	94	100	110	124	128	123	121	118	114
27	100	97	94	96	102	113	128	132	127	124	122	117
28	103	99	96	98	105	116	131	136	131	128	126	121
29	105	101	98	100	107	119	135	140	135	132	129	124
30	107	103	100	102	109	122	138	144	139	136	133	127
31	109	105	102	104	112	125	142	148	143	140	137	131
32	112	107	104	106	115	128	146	153	147	144	141	135
33	114	109	107	109	117	131	150	157	151	148	145	138
34	117	112	109	111	120	134	153	161	155	152	149	142
35	119	114	111	113	123	137	157	165	160	156	153	146
36	122	117	114	116	126	141	161	170	164	161	157	150
37	124	119	116	119	129	144	165	174	168	165	161	153

Time (min)	TC # 505 (°F)	TC # 506 (°F)	TC # 507 (°F)	TC # 508 (°F)	TC # 509 (°F)	TC # 510 (°F)	TC # 511 (°F)	TC # 512 (°F)	TC # 513 (°F)	TC # 514 (°F)	TC # 515 (°F)	TC # 516 (°F)
38	127	122	119	121	132	148	169	178	172	169	165	157
39	130	125	121	124	135	151	173	182	177	173	169	161
40	132	127	124	127	138	155	177	186	181	178	173	165
41	135	130	127	130	141	158	181	190	185	182	177	169
42	138	133	130	133	145	162	184	194	189	186	181	173
43	141	136	133	136	148	165	187	197	193	190	185	177
44	144	139	136	139	151	169	191	200	197	194	189	181
45	147	143	139	143	155	172	194	203	200	197	192	184
46	150	146	143	146	158	175	197	206	203	200	196	188
47	154	149	146	150	161	179	200	209	207	204	199	191
48	157	153	149	153	165	182	203	212	210	207	202	195
49	160	156	153	157	168	185	206	216	213	210	205	198
50	164	160	157	160	172	188	209	219	216	213	209	201
51	167	163	160	164	175	191	213	222	220	216	212	205
52	171	167	164	168	178	195	216	226	224	220	215	208
53	175	171	168	171	182	198	220	230	227	224	219	211
54	178	175	172	175	185	202	224	234	232	227	222	214
55	182	179	176	179	188	205	228	239	236	231	226	218
56	185	183	181	183	191	210	233	243	240	235	230	221
57	189	188	187	187	195	214	238	248	245	240	234	225
58	193	194	194	193	198	218	242	253	249	244	238	229
59	200	200	200	198	202	223	247	258	254	249	242	232
60	205	206	205	203	206	228	252	263	259	254	246	236
Max Temp:	205	206	205	203	206	228	252	263	259	254	246	236
Max Allowed:	404	404	404	405	404	404	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Time (min)	TC # 517 (°F)	TC # 518 (°F)	TC # 519 (°F)	TC # 520 (°F)	TC # 521 (°F)	TC # 522 (°F)	TC # 523 (°F)	TC # 524 (°F)	TC # 525 (°F)	TC # 526 (°F)	TC # 527 (°F)	TC # 528 (°F)
0	79	79	79	79	79	79	79	79	79	79	79	79
1	79	79	79	79	79	79	79	79	79	79	79	79
2	79	79	79	79	79	79	79	79	79	79	79	79
3	79	79	79	79	79	79	79	79	79	79	79	79
4	79	79	79	79	79	79	79	79	79	79	79	79
5	79	79	79	79	79	79	79	79	79	79	79	79
6	79	79	79	79	79	79	79	79	79	79	79	79
7	79	79	79	79	79	79	79	79	79	79	79	79
8	79	79	79	79	79	79	79	79	79	80	80	79
9	80	80	80	80	79	79	80	80	80	80	80	80
10	80	80	80	80	80	80	80	80	80	80	80	80
11	81	80	81	80	80	80	80	80	80	81	81	80
12	81	81	81	81	81	80	80	80	81	82	82	81
13	82	81	82	82	82	81	81	81	82	83	83	82
14	83	82	83	83	83	82	82	82	83	84	84	83
15	84	83	84	84	84	83	83	83	84	85	86	85
16	86	84	85	86	85	84	84	84	85	87	88	87
17	87	86	87	88	87	86	85	85	87	90	90	89
18	89	87	89	89	89	87	87	87	89	92	93	92
19	91	89	91	91	91	89	89	88	91	95	96	95
20	93	91	93	94	93	91	90	90	93	97	99	98
21	95	93	95	96	95	93	92	92	96	101	103	102
22	98	95	97	99	98	96	95	95	98	104	106	106
23	100	97	100	102	101	98	97	97	101	107	110	109
24	103	100	103	105	104	101	100	100	104	110	113	113
25	106	102	105	108	107	104	103	103	107	113	117	117
26	108	105	108	111	110	107	106	106	110	117	120	121
27	111	108	111	114	113	110	109	109	114	120	124	125
28	114	110	114	118	116	113	112	112	117	123	128	129
29	118	113	118	121	120	117	115	115	120	127	131	132
30	121	116	121	124	123	120	118	119	123	130	135	136
31	124	120	124	128	127	123	122	122	127	133	138	140
32	127	123	128	132	130	127	126	126	130	137	141	143
33	131	126	131	135	134	130	129	129	134	140	144	147
34	134	129	134	139	138	134	133	133	137	143	148	150
35	138	132	138	142	141	138	136	136	140	146	151	154
36	141	136	141	146	145	141	140	140	143	149	154	156
37	145	139	145	150	149	145	143	143	147	152	157	159

OMEGA POINT LABORATORIES

Time (min)	TC # 517 (°F)	TC # 518 (°F)	TC # 519 (°F)	TC # 520 (°F)	TC # 521 (°F)	TC # 522 (°F)	TC # 523 (°F)	TC # 524 (°F)	TC # 525 (°F)	TC # 526 (°F)	TC # 527 (°F)	TC # 528 (°F)
38	148	142	148	153	152	149	147	147	150	155	160	162
39	152	146	152	157	156	153	151	151	154	158	162	165
40	155	149	155	160	160	156	155	154	157	161	165	168
41	159	153	159	164	164	160	158	158	161	164	168	171
42	163	156	162	168	167	164	162	161	164	167	171	174
43	166	160	166	171	171	168	166	165	167	171	173	177
44	170	163	170	175	174	172	170	169	171	174	176	180
45	174	167	173	178	178	175	174	173	175	177	179	183
46	178	170	177	182	182	179	177	177	178	180	182	186
47	182	174	181	185	185	183	181	181	182	184	186	189
48	185	178	184	189	188	186	185	184	185	187	189	192
49	189	182	188	192	192	190	189	188	189	190	192	196
50	192	185	191	195	195	193	193	192	192	194	195	199
51	195	189	194	198	198	197	196	195	195	197	199	202
52	199	192	198	201	201	200	199	198	198	200	202	204
53	202	196	200	203	203	202	201	200	201	203	204	206
54	205	199	203	206	205	204	203	203	203	205	206	207
55	208	203	206	208	207	206	205	205	205	207	208	208
56	211	205	208	210	209	208	207	207	207	208	209	209
57	214	208	211	212	211	209	208	208	208	210	210	205
58	218	211	213	214	212	210	210	209	210	211	208	199
59	221	214	216	217	214	212	211	210	211	211	205	196
60	224	216	218	219	215	213	212	211	212	211	200	194
Max Temp:	224	216	218	219	215	213	212	211	212	211	210	209
Max Allowed:	404	404	404	404	404	404	404	404	404	404	404	404

OMEGA POINT LABORATORIES

Time (min)	TC # 529 (°F)	TC # 530 (°F)	TC # 531 (°F)	TC # 532 (°F)
0	79	79	79	78
1	79	79	79	78
2	79	79	79	79
3	79	79	79	78
4	79	79	79	78
5	79	79	79	79
6	79	79	79	79
7	79	79	79	79
8	79	79	79	79
9	80	80	80	80
10	80	80	81	81
11	80	81	82	82
12	81	81	83	83
13	81	82	84	85
14	82	83	86	87
15	84	85	88	89
16	85	87	90	91
17	87	89	93	94
18	89	91	95	96
19	92	94	98	99
20	95	96	101	102
21	98	99	104	105
22	102	103	108	108
23	105	106	111	111
24	109	110	114	114
25	113	114	118	117
26	116	118	122	120
27	120	122	126	124
28	124	126	129	127
29	128	129	133	130
30	132	133	137	133
31	136	138	141	137
32	140	142	144	140
33	143	146	148	143
34	147	150	152	146
35	151	154	155	149
36	154	157	159	152
37	157	161	163	155

OMEGA POINT LABORATORIES

Time (min)	TC # 529 (°F)	TC # 530 (°F)	TC # 531 (°F)	TC # 532 (°F)
38	161	165	166	158
39	164	169	170	161
40	168	173	173	164
41	171	177	176	166
42	174	180	179	169
43	178	184	182	171
44	181	188	185	173
45	185	191	187	175
46	189	195	189	176
47	192	197	192	178
48	195	200	194	180
49	198	202	195	182
50	201	203	197	184
51	203	204	199	185
52	205	206	199	187
53	206	206	199	190
54	207	207	200	194
55	208	206	198	197
56	203	201	197	195
57	196	195	195	195
58	190	191	194	195
59	187	188	192	196
60	185	187	191	195
Max Temp:	208	207	200	197
Max Allowed:	404	404	404	403

OMEGA POINT LABORATORIES

TVA / TSI | Project No. 97260 | October 18, 1994

Time (min)	E119 Std Furnace (°F)	Avg Ambient (°F)	Furnace # 1 (°F)	Furnace # 2 (°F)	Furnace # 3 (°F)
0	68	78	77	78	79	78
1	254	158	77	205	128	154
2	440	400	77	570	314	349
3	627	756	77	1042	633	650
4	813	935	77	1135	915	923
5	1000	941	77	1056	987	971
6	1060	969	77	1052	988	974
7	1120	1108	77	1189	1073	1070
8	1180	1227	77	1299	1206	1201
9	1240	1248	77	1278	1272	1257
10	1300	1203	77	1200	1259	1235
11	1327	1233	77	1230	1270	1254
12	1346	1318	77	1345	1323	1318
13	1364	1404	78	1474	1376	1378
14	1380	1419	78	1491	1396	1397
15	1395	1380	78	1431	1362	1364
16	1410	1363	78	1405	1332	1338
17	1423	1398	78	1443	1349	1355
18	1436	1449	78	1519	1383	1398
19	1448	1474	78	1546	1417	1439
20	1459	1440	78	1509	1398	1409
21	1470	1429	78	1496	1376	1392
22	1480	1457	79	1532	1386	1403
23	1490	1507	79	1590	1428	1458
24	1499	1510	79	1584	1451	1478
25	1508	1474	79	1554	1418	1438
26	1517	1462	79	1542	1398	1423
27	1525	1521	79	1619	1435	1475
28	1533	1532	79	1618	1466	1495
29	1541	1529	79	1623	1453	1475
30	1548	1565	79	1662	1487	1522
31	1555	1582	79	1670	1516	1555
32	1562	1583	79	1660	1525	1565
33	1569	1581	79	1650	1528	1566
34	1576	1577	79	1644	1524	1556
35	1582	1559	79	1637	1499	1521
36	1588	1551	79	1638	1478	1495
37	1594	1552	79	1648	1469	1483
38	1600	1583	79	1682	1488	1505

OMEGA POINT LABORATORIES

Time (min)	E119 Std (°F)	Furnace Avg (°F)	Ambient (°F)	Furnace # 1 (°F)	Furnace # 2 (°F)	Furnace # 3 (°F)
39	1606	1614	79	1707	1527	1559
40	1612	1628	79	1715	1558	1600
41	1617	1629	79	1713	1563	1593
42	1622	1610	79	1700	1535	1552
43	1627	1598	80	1700	1516	1525
44	1633	1604	80	1713	1513	1519
45	1638	1620	80	1729	1519	1526
46	1642	1649	80	1749	1555	1578
47	1647	1664	80	1753	1588	1629
48	1652	1663	80	1751	1593	1626
49	1656	1640	80	1733	1565	1579
50	1661	1634	80	1731	1557	1558
51	1665	1644	80	1744	1561	1557
52	1669	1669	80	1773	1575	1587
53	1674	1696	81	1794	1617	1660
54	1678	1716	80	1810	1650	1714
55	1682	1718	81	1802	1659	1723
56	1686	1703	80	1782	1644	1698
57	1690	1675	81	1754	1605	1636
58	1693	1657	81	1748	1580	1589
59	1697	1672	81	1771	1585	1586
60	1701	1703	81	1811	1606	1628

OMEGA POINT LABORATORIES

Time (min)	Furnace # 4 (°F)	Furnace # 5 (°F)	Furnace # 6 (°F)	Furnace # 7 (°F)	Furnace # 8 (°F)
0	79	79	79	78	78
1	127	132	137	130	209
2	271	294	276	268	541
3	524	540	483	472	1013
4	785	765	707	686	1078
5	866	825	789	767	979
6	909	867	838	822	1075
7	1032	1014	984	963	1313
8	1178	1158	1128	1102	1362
9	1237	1202	1190	1177	1282
10	1217	1166	1163	1165	1200
11	1242	1197	1189	1190	1274
12	1307	1273	1254	1252	1411
13	1361	1333	1311	1308	1552
14	1378	1367	1332	1332	1525
15	1349	1351	1318	1324	1444
16	1335	1351	1319	1330	1419
17	1362	1386	1343	1349	1510
18	1390	1429	1369	1368	1583
19	1416	1457	1395	1386	1595
20	1394	1418	1376	1377	1516
21	1383	1409	1370	1375	1513
22	1399	1432	1387	1388	1593
23	1436	1490	1420	1409	1649
24	1452	1488	1433	1423	1618
25	1420	1445	1407	1409	1558
26	1407	1440	1397	1398	1556
27	1444	1497	1429	1416	1655
28	1467	1504	1448	1437	1657
29	1459	1491	1442	1441	1669
30	1489	1535	1472	1459	1705
31	1511	1558	1493	1475	1710
32	1520	1558	1502	1484	1699
33	1523	1552	1503	1490	1692
34	1524	1550	1504	1494	1693
35	1503	1516	1484	1490	1666
36	1488	1511	1474	1484	1673
37	1486	1515	1477	1489	1677
38	1511	1549	1502	1504	1739

Time (min)	Furnace # 4 (°F)	Furnace # 5 (°F)	Furnace # 6 (°F)	Furnace # 7 (°F)	Furnace # 8 (°F)
39	1540	1586	1529	1518	1762
40	1556	1588	1536	1526	1764
41	1561	1585	1537	1535	1775
42	1546	1567	1530	1540	1739
43	1534	1553	1523	1542	1713
44	1532	1563	1521	1538	1746
45	1543	1583	1532	1543	1787
46	1574	1620	1558	1554	1811
47	1593	1626	1568	1562	1809
48	1595	1619	1568	1570	1814
49	1577	1594	1560	1578	1768
50	1572	1589	1561	1585	1756
51	1577	1606	1562	1582	1785
52	1596	1644	1578	1581	1831
53	1623	1662	1592	1584	1843
54	1641	1666	1598	1590	1857
55	1646	1665	1602	1599	1854
56	1636	1655	1595	1598	1842
57	1610	1628	1581	1596	1825
58	1594	1609	1579	1605	1790
59	1604	1637	1589	1612	1824
60	1629	1673	1605	1613	1865

Time (min)	Furnace # 9 (°F)	Furnace # 10 (°F)
0	78	78
1	179	179
2	540	573
3	1070	1129
4	1175	1180
5	1093	1079
6	1100	1066
7	1252	1191
8	1340	1292
9	1318	1266
10	1240	1188
11	1260	1222
12	1365	1335
13	1494	1453
14	1508	1467
15	1446	1410
16	1416	1386
17	1459	1425
18	1547	1500
19	1571	1522
20	1524	1480
21	1506	1467
22	1543	1506
23	1619	1569
24	1611	1557
25	1572	1524
26	1548	1511
27	1647	1593
28	1641	1591
29	1643	1593
30	1690	1630
31	1699	1636
32	1690	1628
33	1679	1624
34	1671	1615
35	1656	1615
36	1655	1615
37	1658	1622
38	1696	1652

TVA / TSI Project No. 97260 October 18, 1994

Time (min)	Furnace # 9 (°F)	Furnace # 10 (°F)
39	1736	1676
40	1745	1689
41	1739	1686
42	1721	1674
43	1708	1667
44	1717	1680
45	1737	1698
46	1770	1718
47	1784	1726
48	1771	1724
49	1742	1703
50	1734	1699
51	1749	1714
52	1783	1738
53	1820	1765
54	1846	1786
55	1838	1788
56	1811	1770
57	1777	1739
58	1754	1724
59	1774	1742
60	1824	1773

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 #7: PROJECT NO. 97260

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 — 7/29/94
Omega Point Laboratories, Inc. — Date

J. Pierce — 8/1/94
TVA / TSI — Date

II. ELECTRICAL CABLE INSTALLATION

N/A

Omega Point Laboratories, Inc. — Date

TVA / TSI — Date

III. THERMOCOUPLE INSTALLATION

C Humphrey — 8/1/94
Omega Point Laboratories, Inc. — Date

J. Pierce — 8/1/94
TVA / TSI — 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 — 9/17/94
Omega Point Laboratories, Inc. — Date

J A Pierce — 10/17/94
TVA / TSI — Date

V. FINAL PRE-BURN INSPECTION

C Humphrey — 10/18/94
Omega Point Laboratories, Inc. — Date

J A Pierce — 10/18/94
TVA / TSI — Date

OMEGA POINT LABORATORIES

Event Log

EVENT LOG

TSI / TVA

Client # 11960

PROJECT NUMBERS:

97257
97258
97259
97260

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 brief description of each of the test assemblies are:

97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Purchase order received from TSI to begin construction on these four test decks.	7/18/94	CH
Construction of Test Deck #7 begins by OPL welders.	7/20/94	CH
Conduit sections are cut and installation begins on Test Deck #7 by OPL technicians.	7/26	CH
Conduit sections are all installed on Test Deck #7.	7/28	CH
Thermocouple installation begins on Test Deck #7.	7/28	CH
Thermocouple installation is completed by OPL technicians.	7/29	CH
Test Deck #7 assembly is verified by OPL QA/QC.	7/29	CH
All thermocouples are verified on Test Deck #7 by OPL QA/QC and the assembly is accepted by TVA proj. mgr.	8/1/94	CH
The conduit covers for the 3/4" conduits were not	8/1/94	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 brief description of each of the test assemblies are:

97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Shipped by TVA, Omega Point technicians have fabricated a cover from steel plate for the 3/4" steel conduit. The 3/4" aluminum conduit cover was found from another distributor and is held with two stainless steel tie wires.	8/1/94	CH
OPI technicians begin construction on the test frame for Test Decks #5 and #6.	8/1/94	CH
Rich Johnson, TSI is on site to witness construction procedures.	8/1	CH
Pat Madden USNRC arrives at Omega Point.	8/1	CH
TVA insulators arrive at Omega Point and begin the application of Thermo-Lag to Test Deck #7. The insulators are: Ben Loveless, Bernard McQueen	8/2/94	CH
Test frames for Test	8/3	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 brief description of each of the test assemblies are:

97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (8) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Decks #5 and #6 are completed and verified by OPL QA.	8/2/94	CH
4" Conduits on the outside of group are each fitted with one piece (1/2) of pipe covered) on Test Deck #7.	8/2	CH
Eight pieces of flat stock Thermo-Lag are cut to fit between conduit sections at transition from the individually wrapped to boxed conduits on Deck #7.	8/2	CH
Curved radius of the seven 4" conduits is insulated with V-ribbed Thermo-Lag panels which have been scored and bent to fit the curve on Test Deck #7 and held with stainless steel tie wire.	8/3	94
Concrete slab was poured for Test Decks #5 and #6 by OPL technicians.	8/3/94	CH
Side and top panels of Test Deck #6 details are	8/3 & 8/4	CH

EVENT LOG

TVA/TSI

Client #11960

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97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
verified by OPL QA.	8/4/94	CH
Vertical section of deck #7 on LB end is bolted in with the V-rib panel Thermo-Lag and held with stainless steel tie wire. This bolted in section has threaded bolts with washers and nuts penetrating the box between conduits.	8/4	CH
measured cut and fit 3/4" conduit sections with the Thermo-Lag preformed conduit & Gravel grade material to complete this Test Deck #7 will be shipped at a later date. Ampacity testing priority will delays the completion of this test deck #7 by TVA installers.	8/5	CH
	8/5/94	CH
Side panels of Test Deck #4 is verified by OPL.	8/5	
Concrete is poured into Test Deck #4 and remaining sections of Test Deck #6.	8/5	CH

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ITEM	DATE	INITIALS
Front slab panels for Test Deck #5 and #6 and the side slab panel for Test Deck #6 are put into the large furnace at a low temperature to accellerate the curing proces of the concrete. These panels are removed from the furnace on 8/16/94.	8/12/94	CH
Side slab panels for Test Deck #4 are put in the large furnace for curing. The front panel of this test deck uses a slab stripped of JB's & conduits done for TVA previously, but not tested.	8/16/94	CH
The sides panels for Test Deck #6 are welded together by CPI technicians.	8/18/94	CH
The side panels are removed from the furnace for Test Deck #4.	8/19/94	CH
Construction of the conduits	8/19/94	CH

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ITEM	DATE	INITIALS
and thermocouple placement started 8/18 continues for Test #6.	8/19/94	CH
Thermocouple placement verification is done by OPI QA/QC for Test #6.	8/22	CH
OPI technicians start welding side panels on Test #4.	8/22	CH
Mark Talley TVA arrives at Omega Point to manage Therm-Tag installers.	8/22	CH
TVA insulators arrive at OPI to complete Test #7 and start ampacity test insulation. The following installers are on site: Arnold Wright ~~Tony Cole~~ CH Bernard McQueen John H. Stewart, Jr. Ben Loveless	8/23	CH
Daniele Oudinot, USNRC arrived at OPI to witness insulation procedures on 8/22/94.		

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ITEM	DATE	INITIALS
Fabricated pull box for Test Deck #6 is received by OPL QA/QC.	8/23/94	CH
Twelve buckets of NEI Thermo-Lag 330-1 trowel grade material have been transferred to the TVA stock by an authorization letter from Biff Bradley. This material comes from TSI batch no. 93-10049 and the expiration date has been extended six months by TSI to January 1995.	8/23	CH
The completion of Test Deck #7 has been resumed by the TVA installers.	8/23	CH
Thermo-Lag trowel grade material in putty form is added to the inside corners of the Therm-Lag panels and conduit sections on Test Deck #7.	8/24	CH
Upgrade is started on	8/25	CH

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ITEM	DATE	INITIALS
tray using stress skin panels. The nuts and washers are removed from the bolts and replaced over the stress skin layer. The overlapped stress skin is stitched with stain steel tie wire and fastened with staples.	8/25/94	CH
All of the conduit sections and the pull box have been installed on test deck #6 by OPL technicians and verified by OPL QA/QC. The placement of the thermocouples is completed and verified.	8/25	CH
Shipment of Therm-Lag 330-1 conduit sections, panels and trowel grade material is received by OPL from TSI.	8/25	CH
Construction continues on test #4 with cutting the tray section supports.	8/25	CH
application of the stain-	8/26	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
steel stress skin is completed on deck #7 and the covering of trowel grade material is started.	8/26/94	CH
The bolt heads are covered with trowel grade material in putty form and held with segments of stress skin and fastened with staples.	8/26	CH
The assembly of conduits for test deck #5 is started by OPI technicians.	8/26	CH
Test deck #6 is stood up in the vertical position and leg supports are welded in place.	8/26	CH
OPI technicians install the penetration seals in test deck #6.	8/26	CH
Test deck #6 is completed by OPI and is turned over to TVA installers.	8/27	CH
TVA insulators continue to apply the trowel grade Therm-Lag over	8/27	CH

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ITEM	DATE	INITIALS
the stress skin on test deck #7.	8/27/94	CH
The sections of two CH bare supports on test #7 are now wrapped to tally with Thermo-Lag panel material. This consists of about 16" in length of the 4" diameter tube steel which supports the middle section of the assembly. These were previously left un-insulated.	8/27	CH
Welding continues on tray supports for test deck #4.	8/27	CH
Boxed conduit section of test deck #7 is polished smooth.	8/27	CH
Test deck #6 is started by TVA installers. The group of eight 4" conduits are boxed as one and held together by threaded bolts and tie wire.	8/29/94	CH
	8/29/94	CH

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ITEM	DATE	INITIALS
OPL technicians begin thermo-couple layout for Deck #5.	8/29/94	CH
Thermo-Lag wrap of the group of (8) 4" conduits on test deck #6 is completed.	8/30	CH
The first layer of Thermo-Lag preformed conduit sections are installed on both 3/4" conduits on test deck #7.	8/30	CH
Applied the second layer of Thermo-Lag conduit sections to both of the 3/4" conduits on Test Deck #7.	8/31/94	CH
Thermocouple installation on the conduit surfaces begin for Test Deck #5.	8/31	CH
Twenty-four additional thermocouples are added to test deck #7. These are placed on the outside edges at 18" intervals, on the two rear conduits of the grouping of (4) 3" steel conduits and the group of (4) 1" steel conduits. This was done to satisfy the requirement	9/8/94	CH
	9/8/94	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
that the thermocouples be placed at the inside surface of the Therm-Tec material. The existing thermocouples on the two rear conduits of each group are facing the inside or center of the box. These additional 24 thermocouples		
are verified by OPI QA/QC!	9/8/94	CH
Type B brad plates are installed on Test Deck #6 enclosure of the four 3" conduits. Type skive and fold method is used with a backing piece at the butt joint. a 1/4" threaded rod encloses this group of conduits at this joint.	9/9/94	CH
OPI welders continue construction of Test Deck #4	9/9	CH
TVA installers continue insulation of Test Deck #6 with the wraps of the four 1" conduits using Type A Vbase plates and staggered butt joints. Started the junction	9/10 9/10 9/10	CH CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
box enclosure using the score and fold method and the Type A baseplates.	9/10/94	CH
Installed upper baseplate and support insulation on Test Deck #6. Wrapped Thermo-Lag preformed conduit around the JB conduits.	9/12/94	CH
Added skim coat and stress skin to the eight conduit enclosure and stitched with tie wire at overlap.	9/12/94	CH
Installed stress skin on conduits and JB enclosures.	9/13	CH
Stainless steel tie wire used for stitching the stress skin on Test Deck #6.	9/13	CH
QC technicians begin thermocouple layout for Test Deck #4.	9/14	CH
Thermocouples are applied to conduits on Test Deck #4.	9/14 CH	CH
Continued to install stress skin on ~~Assembly~~ Test Deck #6. Skim coat is applied over the stress skin.	9/14/94	

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Finish coat of the trowel grade material is applied over the 1" and 4" conduit enclosures on Test Deck #6. Attached anchor bolts to the large junction box on Test Deck #5. These bolts penetrate the Thermo-Lag panels and hold it to the junction box. The Thermo-Lag panels have two inches of the panel stress skin left bare to attach to the concrete deck surface. The stainless steel stress skin layer is applied and bolted leaving a 2" overlap on the deck.	9/15/94	CH
The 3" and 2" conduit enclosures are covered with the Thermo-Lag panel using the score and fold method. The wires were attached to the conduit straps and pulled thru holes drilled in the panels	9/15 9/16 9/16 CH	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
To attach boxes to deck. Started 7 conduit enclosure using an individual piece method. Support pieces of Therm-Lag panel were installed between conduits and some scrap pieces on top of LB's to provide an even top surface before the Therm-Lag panels were applied. Tie wires to conduit straps thru panels keeps the boxes held tightly.	9/16/94	CH
Installed sidesteps on the 7 conduit enclosure on deck #5. Added stress skim and the trowel grade skim coat to the junction box.	9/16 9/17 9/17	CH CH CH
Completed skim coat on junction box and applied stress skin and skim coat of trowel grade material on the 7 conduit enclosure on deck #5.	9/19/94 9/19	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
The final tie wires are attached to the conduit and pull box enclosures on deck #6. This test article is complete.	9/19/94	CH
TVA/TSI Test Plan Clarification number 001 is issued to address the change of the Unistrut design on Test Deck #4.	9/20/94	CH
Polished junction box on deck #5 and applied skim coat to the 7 conduit enclosure.	9/20	CH
	9/20	
The edge frames were added to the enclosures. Four different frame types were used. These are bolted to the concrete deck and skim coated with trowel grade Thermo-Lag on test deck #5.	9/21	CH
	9/21	CH
Bolts are cut flush and covered with the trowel grade material on deck #5.	9/22	CH
Trowel grade "putty" is	9/22	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
added on all frames edges to complete surface for a beveled finish on deck #5.	9/22	CH
all TVA personnel depart from Omega Point.	9/22	CH
Omega Point Technicians continue fabrication of supports on test deck #4.	9/23	CH
Omega Point technicians apply thermocouples on test deck #4.	9/24	CH
Test deck #4 is completed by OPI technicians and QA/QC verification is done.	9/26	CH
Mark Salley TVA on site. Shipment of T-L received.	9/26	CH
Test deck #4 is turned over to TVA installers Arnold Wright and ~~Wayne~~ CH Derrick Starnes.	9/27	CH
Installation of the Therm Lag panel begins on the Darex board assembly.	9/27	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
of 8 conduits on test deck #4. Sections of the Therm-Tag panel are cut to fit around the conduit with the seams butting at the vertical centerline. Small pieces of Therm-Tag panel 3" wide are used as a backing board held with trowel grade material at inside seams. Stress skin cut in 3" widths covers the outside surface of these seams and is held with trowel grade material and staples.	9/27/94	CH
Large conduit box on test deck #4 is assembled.	9/28	CH
There are two treatments of the butt joints done. One uses a string of backing board on the inside with stress skin and bolts tying it together with trowel grade material.	9/28	CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
The second butt joint treatment consists of bolts at a 12" spacing in the seam with fender washers and a strip of panel over the bolt heads with stress skins and trowel grade material. Staple attach the stress skins to the panels.	9/28/94	CH
Began Thermo-Lag cover of cable trays and the structural steel supports of deck #4.	9/28 9/29	CH CH
Continued application of Thermo-Lag on cable trays on deck #4. On the (5) cable tray ~~sect~~ assembly, the two bottom trays are protected with Thermo-Lag.	9/30	CH
Application of Thermo-Lag continues on the cable tray support assembly in test #4. Baseplates are placed and held with anchor	10/1 10/1	CH CH

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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
bolts using 1¼" washers under the nuts. Trowel grade Thermo-Lag is applied over the spaced tie wires on the 5 tray assembly.	10/1/94	CH
Completed the (5) cabel tray assembly on test #4 and began insulating the (3) tray assembly. On this (3) tray assembly only the middle tray is protected with the Thermo-Lag 330-1 panel. The top and bottom cable tray sections are bare. A piece of 3/8" Thermo-Lag had to be used on the support where the cladded middle tray restricted the clearance. Stress skin covers this middle tray and is fastened with staples.	10/3	CH
Completed Thermo-Lag coverage on the (3) cable tray assembly of deck #4.	10/4	CH
	10/4	CH

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ITEM	DATE	INITIALS
Applied the trowel grade material to the (3) Cable tray assembly on deck #4 and completed the base-plates. These were constructed in the same manner as the baseplates on the (5) tray assembly.	10/4/94	CH
A skim coat of the Thermo-Lag trowel grade material has been applied to the preformed conduit sections for the 4" conduits before their installation due to the limited space available.	10/4	CH
Polished Thermo-Lag surface on cable tray supports of deck #4.	10/5	CH
Cut and applied panels on the (2) 1" steel conduit box on deck #4. Used the two joint details. The side panel uses the back plate method and the top joint uses the 1/4" washers on the bolts at the seam.	10/5	CH

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97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

Page 22 of ___

ITEM	DATE	INITIALS
Completed butt joint seam on test deck #4 1" conduit box with 3" stress skin overlap, stapled and skimmed with trowel pad material. Installed two layers of the preformed conduit sections over the exposed 1" metal conduits. These layers are prebuttered and the seams are staggered 90° and fastened with stainless steel tie wire 6" o.c.	10/6	CH
Continued with the stressskin application to the 1" conduit box on test deck #4. The seams are overlapped 3 inches and stitched together every 6".	10/6 10/7	CH CH
Started putting stress skin on the large box enclosure of the 4" conduits.	10/7	CH
Wrapped all exposed 4" conduit ends in thermo-Lag preformed conduit sections on deck #4. All	10/8 10/8/94	CH 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 brief description of each of the test assemblies are:

97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
pieces prebuttered and held with tie wire.	10/8/94	CH
Pierce TVA on site.	10/8	CH
"Picture frame" pieces bolted to concrete sides and floor of test article over the stress skin on test deck #4. Trowel grade material bevels panel edges to concrete.	10/10	CH
Conduit frames installed where the conduits enter the boxed enclosure.	10/10	
Picture frame border pieces are completed and skim coat started on large box enclosure of test deck #4. The trowel grade material "putty balls" are installed over bolt ends and covered with squares of stress skin stapled down.	10/11	CH
Continued with the "putty balls" over the bolt ends and skim coat on deck #4.	10/12	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
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97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
More spins coat of trowel is applied to deck #4.	10/13/94	CH
Continued touch-up of deck #4	10/14	CH
Test deck #7 is placed on the test furnace after the final inspection by OPL Technicians.	10/17	CH
Herb Stansberry does the final pre-burn inspection checklist as 32 thermocouples are attached to the OPL data acquisition equipment. The temperature at the start of test for deck #7 is 82° and the relative humidity is 72%.	10/18	CH
On site to witness the test of deck #7 are:		
Dee Priest, Omega Point Labs	10/18	CH
Kerry Hitchcock " " "		
Herb Stansberry " " "		
Connie Humphrey " " "		
Cleda Patton " " "		
Laudencio Castanon " " "		
Richard Beasley " " "		
JB Pierce TVA	10/18	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 brief description of each of the test assemblies are:

97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Mark Sallee TVA	10/18/94	CH
Rick Woody "		
Brian Lent "		
Rick Johnson TSI		
Tim Hill "		
Jet Singh USNRC		
Jess Bittel Hughes Assoc.		
The test of Deck #7 begins at 9:43 and is completed in one hour. The hose stream test follows using OPL pressure gage #92LE003, calibration due 1/20/95. The pressure at the fog nozzle is 75psi using a 30° spray pattern from a distance of five feet for five minutes. Following the hose stream test the test article was torn down to inspect the condition of the thermo-lag material.	10/18	CH
Final layer of the trowel grade skim coat is applied to Test Deck #4. The 30 day cure time begins.	10/19	

EVENT LOG

TVA/TSI

Client #11960

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97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Test deck #6 is placed in front of the furnace after final inspection by OPL technician.	10/18	SP
Herb Stansberry does the final pre-burn inspection checklist as 683 thermocouples are attached to the OPL data acquisition equipment. The temperature at the start of the test for deck #6 is 82° and the relative humidity is 80%.	10/19	SP
On site to witness the test of deck # 6 are:		
Des Priest Omega Point Labs	10/19	SP
Kerry Hitchcock " " "		
Herb Stansberry " " "		
Cleda Patton " " "		
Dingyi Huang " " "		
Laudencio Castanon " " "		
Richard Beasley " " "		
JJ Pierce TVA		
Mark Salley "		
Rick Woodly "		
Brian Gent "		
Rich Lohman TSI		
Jim Hill "		
Jit Singh USNRC		

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 brief description of each of the test assemblies are:

97257	#4	Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258	#5	Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259	#6	Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260	#7	Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
The test of Deck #6 begins at 12:18 pm and is completed in one hour. Hose stream test follows using OPL pressure gage #921ED03. calibration due 1/30/95. Pressure at the fog nozzle is 75 psi using a 30° spray pattern from a distance of five feet for five minutes. Due to considerable heat from the test deck, tear down will be conducted on 10/20/94.	10/19	SP
Test Deck #6 was torn down to inspect the condition of the Thermo-Lag material.	10/20	SP
Test Deck #5 is prepared for the fire test on 10/27. Steel Studs material has been placed around test deck perimeter to extend the gasketing surface of the furnace. Steel Studs are covered on the inside with 2 layers of 5/8" gypsum wall board, type X and covered in turn with 1" Ceramic fiber blanket. Test Deck #5 is placed in front	10/24 10/25 10/26	SP SP SP

EVENT LOG

TVA/TSI

Client #11960

NOTE:
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97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
of the furnace after final inspection by OPL technicians.	10/26	SS
Herb Stansberry does the final pre-burn inspection checklist as 434 thermocouples are attached to the OPL data acquisition equipment. The temperature at the start of the test for deck #5 is 60° and the relative humidity is 76%. On site to witness the test of deck #5 are:	10/27	SS
Des Priest Omega Point Labs		
Kerry Hitchcock " " "		
Cled Patton " " "		
Herb Stansberry " " "		
Laudencio Castanon " " "		
Richard Beasley " " "		
Mark Salley TVA		
Rick Woodly "		
Brian Gent "		
Rashid Abbas "		
Ben Evans TSI		
Tim Hill "		
Ed Connelle USNRC		
Bob McDaniel Florida Power & Light		

EVENT LOG

TVA/TSI

Client #11960

NOTE:
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97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
The test of deck #5 begins at 9:01 am and is completed in one hour. Hose stream test follows using OPL pressure gage #92LE003, calibration due 11/20/95. Pressure at the fog nozzle is 75 psi using a 30° spray pattern from a distance of five feet for five minutes. Following the hose stream test the test article was allowed to cool and tear down was conducted in the afternoon to inspect the condition of the thermo-lag.	10/27	SH
Penetration seals started by OPL technicians on Test Deck #4. It was noticed that some trowel grade material was missing on the preformed sections of conduit where they entered the boxed section. TVA installers added trowel grade material at this time to repair. See TVA data sheet, dated 11/9/94 on Test Deck #4.	10/27 11/9 11/9 11/9/94	SH CH CH

EVENT LOG

TVA/TSI

Client #11960

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97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
The penetration seals are completed by OPL technicians on Test Deck #4. This test article is inspected by OPL Quality assurance and accepted as ready to test by TVA. Test Deck #4 is placed on the test furnace.	11/16/94	CH
	11/16	CH
Pretest checklist is performed by Herb Stansbury and 574 thermocouples are attached to the Omega Point data acquisition system. The ambient temperature at time of test start is 64° with the relative humidity at 82%.	11/17	CH
The fire test of deck #4 began at 10:30 am. On site to witness this test are:	11/17	CH
Lee Priest Omega Point Labs		
Connie Humphrey " " "		
Cleda Patton " " "		
Kerry Hitchcock " " "		
Richard Beasley " " "		
Herb Stansbury " " "	11/17	CH

EVENT LOG

TVA/TSI

Client #11960

NOTE:
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97257 #4 Concrete slab with (2) 1" steel conduits, (8) 4" alum. conduits & (6) cable trays.
97258 #5 Concrete wall with 5'x3'x2' J-Box, (2) steel conduits & (10) alum. conduits.
97259 #6 Concrete wall with (4) 1" steel conduit, (8) 4" alum., (4) 3" steel & (1) 4" steel conduit with a 60"x12"x12" pull box.
97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Laudencio Catanon Omaja Point	11/17/94	CH
Mark Talley TVA		
Kent Brown "		
Rick Woody "		
Brian Hunt "		
Gordon Embrey TSI		
Jet Singh USNRC		
This test of deck #4 is completed at 11:30 and is followed by a five minute hose stream test using the 30° spray fog nozzle with 75 psi from a distance of five feet. The tear down and inspection of this test article will be done tomorrow due to the heat maintained in the concrete.	11/17	CH
	11/17/94	CH

Installation Details

ATTACHMENT 1

DATA SHEET

RACEWAY ID Parallel Conduits WP/WR NO. 97260 TEST DECK 7

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN J.P. Pierce DATE 8/2/94

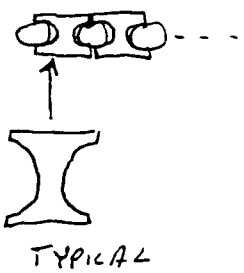
QC INSPECTOR C Humphrey DATE 8/2/94

TYPICAL DRAWING NO. 47W343

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	6" max (tie wire)	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: 4" Conduit Section Lot # 92-11018, 94-03018
Panel Lot # 94-03047
For end piece where boxed conduits transition to individual wrapped, see sketch.



ATTACHMENT 1

DATA SHEET

RACEWAY ID Parallel Ganged Conduits WP/WR NO. 97260 - Test Deck 7

LOT/CONTRACT NO. Trowel 94-05093 EXPIRATION DATE Dec 94

CRAFTSMAN [signature] DATE 8/3/94

QC INSPECTOR C Humphrey DATE 8/3/94

TYPICAL DRAWING NO. 47W243

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	ok	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Conduit Section Lot # 92-11018, 94-11018 (min 1/2", max 3/4")
Panel Lot # 94-03047 (min 1/2", max 3/4")
Used Conduit sections for box sides to 13" past support.
Used flat panel for sides to top of 90° sweep connection.
Used individual conduit wrap rest of way. Fill in sides
with trowel when flat panel used for sides.
Conduit Lot # 94-03018

ATTACHMENT 1

DATA SHEET

RACEWAY ID Parallel Conduits WP/WR NO. 97260 TEST DECK 7

LOT/CONTRACT NO. Icowel 94-05093 EXPIRATION DATE DEC 94

CRAFTSMAN JJ Pierce DATE 8/4/94

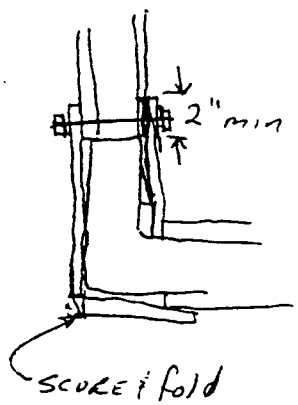
QC INSPECTOR C Humphrey DATE 8/4/94

TYPICAL DRAWING NO. 47W243

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	ok	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Box in vertical part of deck at the LB end.
Conduit Lot 94-03018 (max 3/4", min 1/2")
Panel Lot 94-02053, 94-03047, 94-03018
Put filler piece in on front of LBs (~4" wide).
3/4" Conduit Lot (5/8" thick) 94-02053



ATTACHMENT 1

DATA SHEET

RACEWAY ID Parallel Conduits WP/WR NO. 97260-Test Deck 7

LOT/CONTRACT NO. See below (Remarks) EXPIRATION DATE N/A

CRAFTSMAN J J 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	
JOINTS OFFSET	NA	
18" RULE		
CIRCUMFERENCE		
SURFACE APPEARANCE		
MESH OVERLAPS		

REMARKS: Measured, cut, and fit pieces for 3/4" Conduits. Lot # 94-02053
3/8" thick Conduit Lot # 94-04005, 94-02012, 94-02005

1 5|32

Sheet 3 of 3

8/23/94 CF

ATTACHMENT 1

DATA SHEET

RACEWAY ID Test Deck #7: 97260 WP/WR NO. _____

LOT/CONTRACT NO. Trowel Grade B-11049 EXPIRATION DATE Jan 95

CRAFTSMAN [signature] DATE 8/23/94

QC INSPECTOR C Humphrey DATE 8/23/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	_____	_____
SEAMS OFFSET	NA	_____
JOINTS OFFSET	NA	_____
18" RULE	YES	_____
CIRCUMFERENCE	N/A	_____
SURFACE APPEARANCE	Not yet	_____
MESH OVERLAPS	Not yet	_____

REMARKS: Resume Work on Test Deck #7. Thermo-Lag that was pre cut from the Last Trip was pre buttered and assembled.

Sheet 1 of 1

ATTACHMENT 1

DATA SHEET

RACEWAY ID 97260 #7 WP/WR NO. _____

LOT/CONTRACT NO. Trowel 93-11049 EXPIRATION DATE Jan 95

CRAFTSMAN [signature] DATE 8/24/94

QC INSPECTOR [signature] DATE 8/24/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	Final Terwire Not yet	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	YES	
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE	In process	
MESH OVERLAPS	Not yet	

REMARKS: Work continued on Finishing the Exterior of the 7 ganged conduits.

ATTACHMENT 1

DATA SHEET

Sheet 1 of 2

RACEWAY ID #7:97260 WP/WR NO. _____

LOT/CONTRACT NO. Trays/Grade 92-11049 EXPIRATION DATE JAN 95

CRAFTSMAN [signature] DATE 8/25/94

QC INSPECTOR C Humphrey DATE 8/25/94

TYPICAL DRAWING NO. 47W243 Sh 17

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	IN process	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	YES	NA
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	IN process	
MESH OVERLAPS		

REMARKS: Started INstallation of external stress skin. Require: 1" overlap minimum. 6" tieson longitudinal ties - See Next sheet

-34-

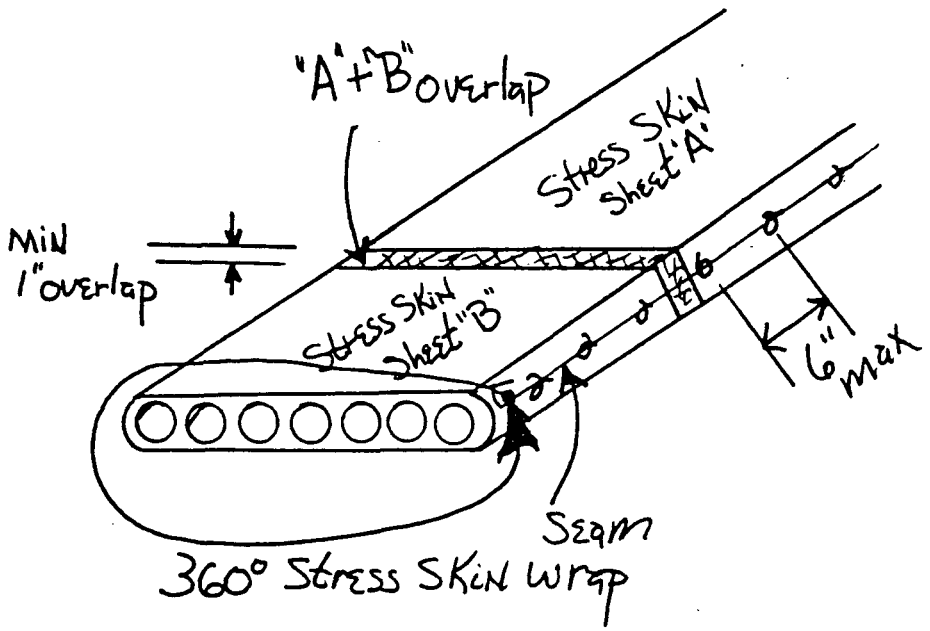
WBEP - 7197A

535

SUBJECT Deck #7 97260 PROJECT Thermo-Lag Test

COMPUTED BY [signature] DATE 8/25/94 CHECKED BY C Humphrey DATE 8/25/94

External Stress Skin Detail



ATTACHMENT 1

DATA SHEET

Sheet 1 of 1

RACEWAY ID #7: 97260 WP/WR NO. _____

LOT/CONTRACT NO. Trowel Grade 93-11049 EXPIRATION DATE JAN 95

CRAFTSMAN _____ DATE 8/26/94 ~~8/27/94~~

QC INSPECTOR C Humphrey DATE 8/26/94

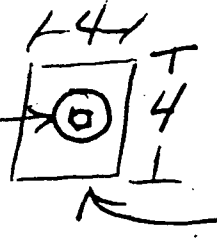
TYPICAL DRAWING NO. 47W243 Sh 17

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	IN process	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	YES	
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE	IN process	
MESH OVERLAPS	Complete	

N/A

REMARKS: 1) The assembly was completly covered in S.S. Stress skin.
2) All bolts, Nut, finder washers were covered.
3) Final application of skim coat was started.
4) Increase Bolt cover from 2"x2" minimum to 4"x4" minimum.



WBEP - 7197A

ATTACHMENT 1

DATA SHEET

Sheet 1 of 1

RACEWAY ID #7: 97260 WP/WR NO. _____

LOT/CONTRACT NO. Trowel 93-41049 EXPIRATION DATE JAN 95

CRAFTSMAN [signature] DATE 8/27/94

QC INSPECTOR C Humphrey DATE 8/27/94

TYPICAL DRAWING NO. 47W243 Sh 17

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	Final (Not Yet)	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	See Remarks	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	YES - Completed	
MESH OVERLAPS	YES	

REMARKS: It was determined to protect the primary support the full length w/ single layer Nom. 5/8" Thermo Lag per G-98, DSM 17.2.2 & Dwg requirements. Thermo-Lag surface is being finished on the ganged 7 conducts.

Sheet 1 of 1

ATTACHMENT 1

DATA SHEET

RACEWAY ID 9760 WP/WR NO. Test deck #7

LOT/CONTRACT NO. Trowel 93-11049 EXPIRATION DATE Jan 95

CRAFTSMAN [signature] DATE 8/29/94

QC INSPECTOR C Humphrey DATE 8/29/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	YES-Complete	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA-Full support	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	Complete	
MESH OVERLAPS	YES-complete	

REMARKS: The Seven gang conduit is complete

ATTACHMENT 1

DATA SHEET

RACEWAY ID 97260 WP/WR NO. Deck 7 Sheet 1 of 1

Trowel 93-11049

LOT/CONTRACT NO. Preform 3/4" EXPIRATION DATE Jan 95

CRAFTSMAN [signature] DATE 8/30/94

QC INSPECTOR [signature] DATE 8-30-94

TYPICAL DRAWING NO.

Preformed 3/4" T-Lag F94-03047, F94-02053

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	OK	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	Not Yet	
MESH OVERLAPS	YES ON "LB"	

REMARKS: Started first layer on both 3/4" conduits.

ATTACHMENT 1

DATA SHEET

Sheet 1 of 1

RACEWAY ID 97260 WP/WR NO. Test Deck #7

LOT/CONTRACT NO. Trowel 93-11049 EXPIRATION DATE Jan 95

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		
SEAMS OFFSET	NA	YES
JOINTS OFFSET	NA	YES
18" RULE	NA	NA
CIRCUMFERENCE	COMP	*
SURFACE APPEARANCE		
MESH OVERLAPS		ON radius 90° OK

REMARKS: Applied Second Layer to 3/4" Steel & AL. conduits

* The wet circumference exceeded the max of 12" as required by G-98 Rev 0, SRN-98-01. This is due to the exterior thermocouple leads on the outside of the conduit.

Certifications of Calibration and Conformance

OMEGA POINT LABORATORIES

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: 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	
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

542

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:	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
8/15/94	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 AMMACITY

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:

2250

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.

Shayne Anderson 8/15/94
Quality Assurance Inspector

Manny Moreno
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	11230	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

Total	
Shipping	
Tax	
Invoice Total	

Recvd 8/22/94 12,550ft
8/23/94 6,175ft.
Recvd 9/8/94 5,000ft
9/20/94 13,856

OMEGA POINT LABORATORIES
MATERIAL PURCHASING SPECIFICATIONS

SPECIFICATION NUMBER: MS--1123Q-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

550

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

551

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.

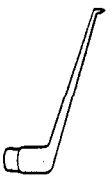
Like TFE, suggested upper continuous temperature is 500°F (260°C), however, it does not have TFE's solder iron resistance.

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.



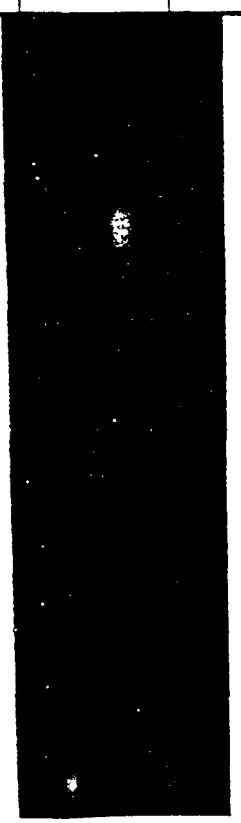
Calibrated conductors for high system accuracy

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

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.

SHIPMENTS & 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.

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 RD
ELMENDORF, TX 78112

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
11330			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. MS11230-97105 SCHED. SHIP 8.5/94	18,705'
2	20000.00	KK-TG/TG-24 REF. MS11230-97168 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

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, INC
16015 SHADY FALLS ROA[illegible]
ELMENDORF, TX 781[illegible]

19239

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG001	60	60	00	13794

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP
11170		

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, T4-24 REF. MC11230-27135 SCHED. SHIP 3/31/94	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] ON 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	✓		✓		

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, IN
16015 SHADY FALLS RD.
ELMENDORF, TX 781

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG001	30	50	MO	10774

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP	CODE
11031			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 10

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QUANTITY SHIPPED
	15000.00	KK-TA TP-24 REF. MS11830-97185	13856
3	1.00	CALIBRATION AT 200, 400, 600, 800 AND 1000°F W/D 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.

L 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. DATE 8/31/94

16015 SHADY FALLS ROAD CUSTOMER PO# 11230

ELMENDORF, TX 78112 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. Coffey
Quality Assurance Manager

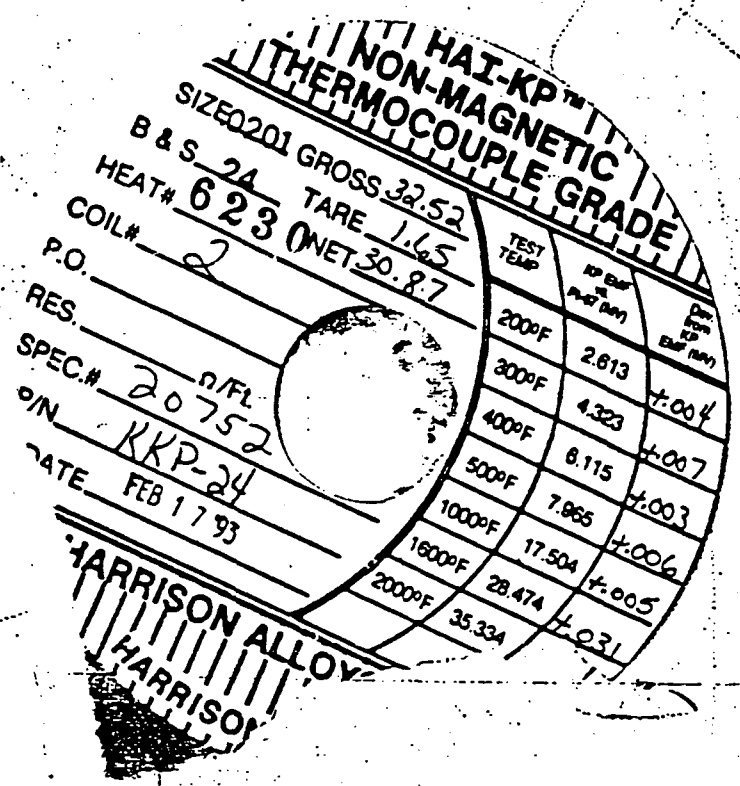
57 HARVEY ROAD
LONDONDERRY, NH
03053
(603) 432-WIRE
FAX (603) 432-0435

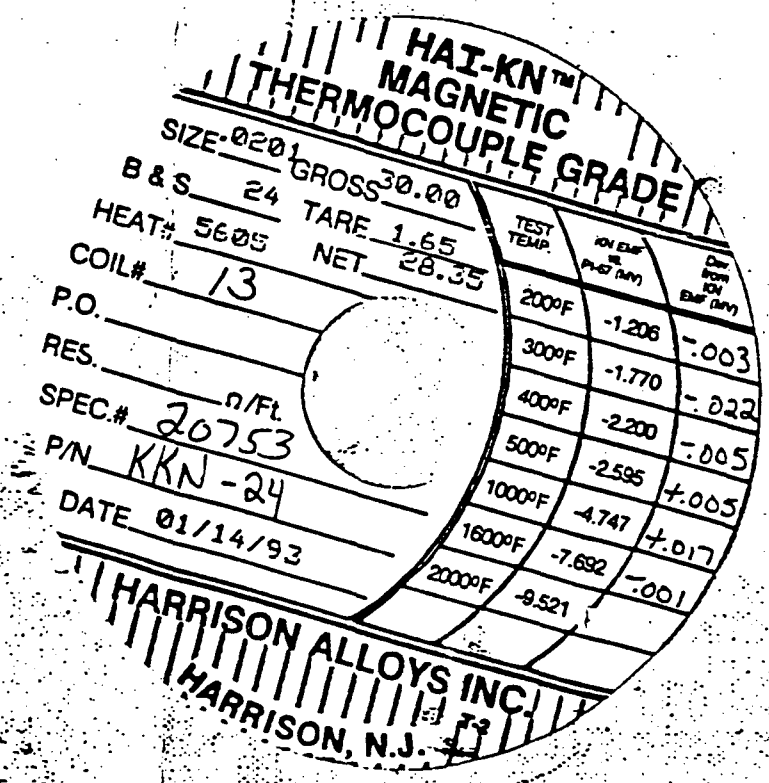
Good KK material to Special Limitson

Run # 6518

1-13-94

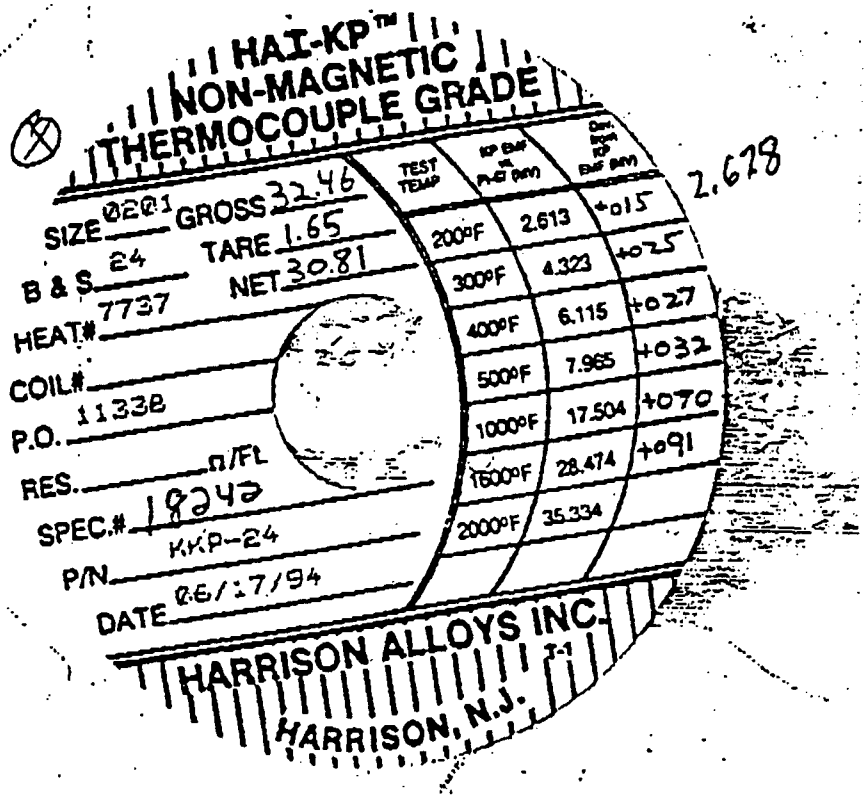
Wire used for Spool 105-946.





Bare Wire Reel # 18242 used on Spool #s

105-967, 105-968, 105-969, 105-970, 105-971 & 105-972



Bare Wire Reel # 17623 Used
04 Spool #'s 105-967, 105-968, 105-969
105-970, 105-971 + 105-972

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE 0201 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.	KN EMF vs Pt-67 (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	-7.682	-.008
2000°F	-9.521	

HARRISON ALLOYS INC.
HARRISON, N.J.

These Two Rolls 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 RFPL
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 1435.11960
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	
Te Wire	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

PMC CORPORATION
57 HARVEY ROAD, LONDONDERRY, N.H. 03053 • (603) 432-WIRE

SPECIALIZING IN WIRE, CABLES & TEMPERATURE

SOLD TO	SHIP TO
OMEGA POINT LABS, INC. 16015 SHADY FALLS ROAD ELMENDORF, TX 78112 78238	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	OME3001	80	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 [illegible]

CODE	
1. MFT	5. METERS
2. CFT	6. FEET
3. POUNDS	7. LOT
4. EACH NET	8. OTHER

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QUANTITY SHIPPED
1	12000.00	KK-18-TA-24 REF. MS11390-11960	12285
2	1.00	CALIBRATION AT [illegible], 400, [illegible], 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	✓			✓	

PACKING SLIP

CERTIFICATE OF CONFORMANCE

TO OMEGA POINT LABORATORIES INC. DATE 8/31/94

16015 SHADY FALLS ROAD CUSTOMER PO# 1139-O

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 Reels were used to Manufacture Job No 18959
T.C.

9000 KK
Special Limits
8-16-94

HAI-KP™
NON-MAGNETIC
THERMOCOUPLE GRADE

SIZE .0201 GROSS 31.78
B & S 24 TARE 1.65
NET 30.13
HEAT# 2981
COIL#
P.O. 11338
RES. 18578 Ω/Ft
SPEC.# KKP -24
P/N
DATE 08/09/94

TEST TEMP	KP EMF vs Pt67 (mV)	Dev from KP EMF (mV)
200°F	2.613	+002
300°F	4.323	+007
400°F	6.115	-002
500°F	7.985	-004
1000°F	17.50	-004
1600°F	28.474	+033
2000°F	35.334	

HARRISON ALLOYS INC. T-1
HARRISON, N.J.

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE .0201 GROSS 32.04
B & S 24 TARE 1.65
NET 30.39
HEAT# 2879
COIL# 1
P.O. 11338
RES. 18579 Ω/Ft
SPEC.#
P/N KKN-24
DATE 08/09/94

TEST TEMP.	KN EMF vs Pt67 (mV)	Dev from KN EMF (mV)
200°F	-1.206	-003
300°F	-1.770	-017
400°F	-2.200	-006
500°F	-2.595	-001
1000°F	-4.747	-016
1600°F	-7.692	-065
2000°F	-9.521	-141

HARRISON ALLOYS INC. T-2
HARRISON, N.J.

OMEGA POINT LABORATORIES
COMMERCIAL GRADE DEDICATION

PURCHASING SPEC. NO: MS- 11392-11960

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-1139Q-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.

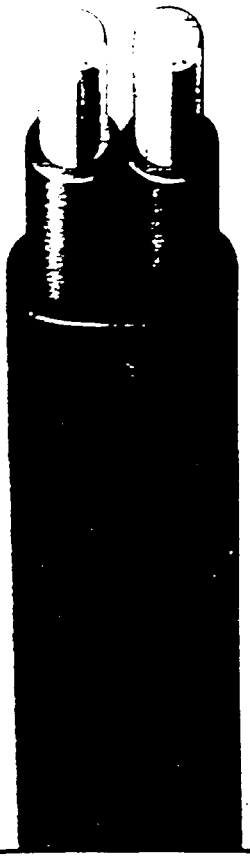
Typical applications include aircraft and automotive engine testing, rapid transit cables, and down hole cable in the oil industry.

*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

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.

CLAIMS & 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.

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

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.	COND 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

5 of 5

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:	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
7/19/94	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

583

Rothe Development, Inc.
Metrology Services Division
[redacted] Sinclair Rd.
San Antonio, 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]ed 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

584

CHARGE # 107 CONTROL # 556 - 8477

WORK ORDER # 44184

CUSTOMER

RECEIVED FROM Omega Point Laboratories DATE 07/20/94

ADDRESS 16015 Shady Falls Road
Elmendorf, TX 78112-9784 PHONE# 635-8100

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 Holder

- [ ] 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

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

TR #'s 2030, 208, 150

COMMENTS CAL DATA PROVIDED

WORK PERFORMED:

Cal'd

E [redacted] °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:

DI 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. RECD 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

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): Bothe 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. 591
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
8414 Sinclair Rd.
San 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

Received 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

593

CHARGE # 107 CONTROL # 556 - 8477

WORK ORDER # 42180

CUSTOMER

RECEIVED FROM Omega Point Laboratories DATE 02/14/94

ADDRESS 16015 Shady Falls Road PHONE# 635-8100
Elmendorf, TX 78112-9784

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

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

PR #'s 20, 30, 150, 243

COMMENTS CAL DATA PROVIDED

WORK PERFORMED: Optimized mV + mA functions.

Cal'd

TEMP 72 °F

R.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 Joe A Mendoza
COMMENTS:

RDI 1001

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 ✓ PECEIVED 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: 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	
0-100 PSI GAGE	1103Q	1	1	–	SN. 92LE003	Y	Y	good	None	X			Calibration Services only
0-60 PSI GAGE	1103Q	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:	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	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**

OMEGA POINT LABORATORIES

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

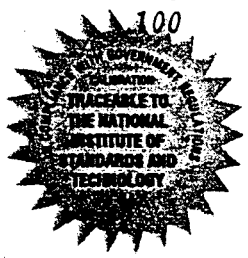
Certificate of Calibration

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. 42531 601

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

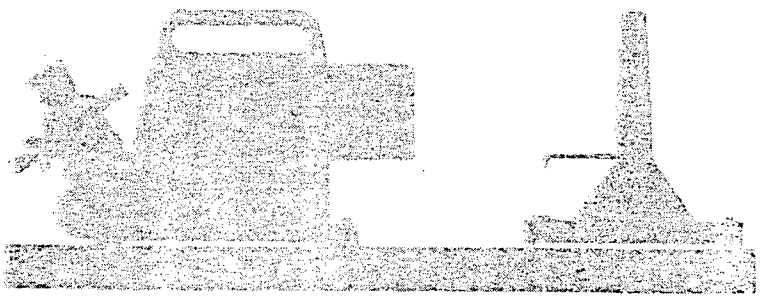
SOLD TO
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

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
kb
p

Masters at Repairs and Calibration of Precision Measuring Instruments

Please Pay ▲

PACKING SLIP

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	
No Shelf Life On Conduit	(In 2 Cartons)	

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

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. 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

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. 438300 THERMO-LAG Preshaped Conduit	3 Pieces	F92-10009
Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	5 Pieces	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
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

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. 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
Manager Quality Control

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. 1584X6 - THERMO-	1	F93-11048
LAG RIBBED PANEL, NOMINAL 5/8"	9	F94-02012
4' X 6½'	6	F94-02053
	9	F94-03018
	7	F94-03028
ITEM 07	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

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 E 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

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

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. 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

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: 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. 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

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 TS1/TUA
CLIENT/PROJECT NUMBER 11960-97185.8687
RECEIVED FROM TS1
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1393 - 11960
DATE RECEIVED 7-8-94
DATE INSPECTED 7-8-94
INSPECTED BY: CBatten

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
Temp. Recorder	NA	0	1	0	Recorder # 0301 chart tape # 27	Y	N	Good	None	X			Receiving Verification Only. Temperature Recorder has been returned to TS1. CBatten
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 F94-02013	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

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. Expiration on trowel 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	100lbs	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			
ThermoLag 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
	10 Pieces	F94-03018
Item 02		
	28 Pieces	
No Shelf Life On Conduit	(In 2 Cartons)	

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

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. 238100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 1"	16 Pieces	F94-04005

Item 03

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

620

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. 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

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. 438300 THERMO-LAG Preshaped Conduit	3 Pieces	F92-10009
Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	5 Pieces	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
Manager Quality Control

DATE OF SHIPMENT: 30 June 1994
BILL OF LADING: 21334
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

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. 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
David O'Bryant
Manager Quality Control

623

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. 1584X6 - THERMO-	1	F93-11048 ✓
LAG RIBBED PANEL, NOMINAL 5/8"	9	F94-02012 ✓
4' X 6½'	6	F94-02053 ✓
	9	F94-03018 ✓
	7	F94-03028 ✓
ITEM 07	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

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: David O'Bryant DATE: 30 JUNE 1994 PAGE NO. 1

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.	F062494
	(IN 1 CARTON)	

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

027

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

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

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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. 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

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. 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)	

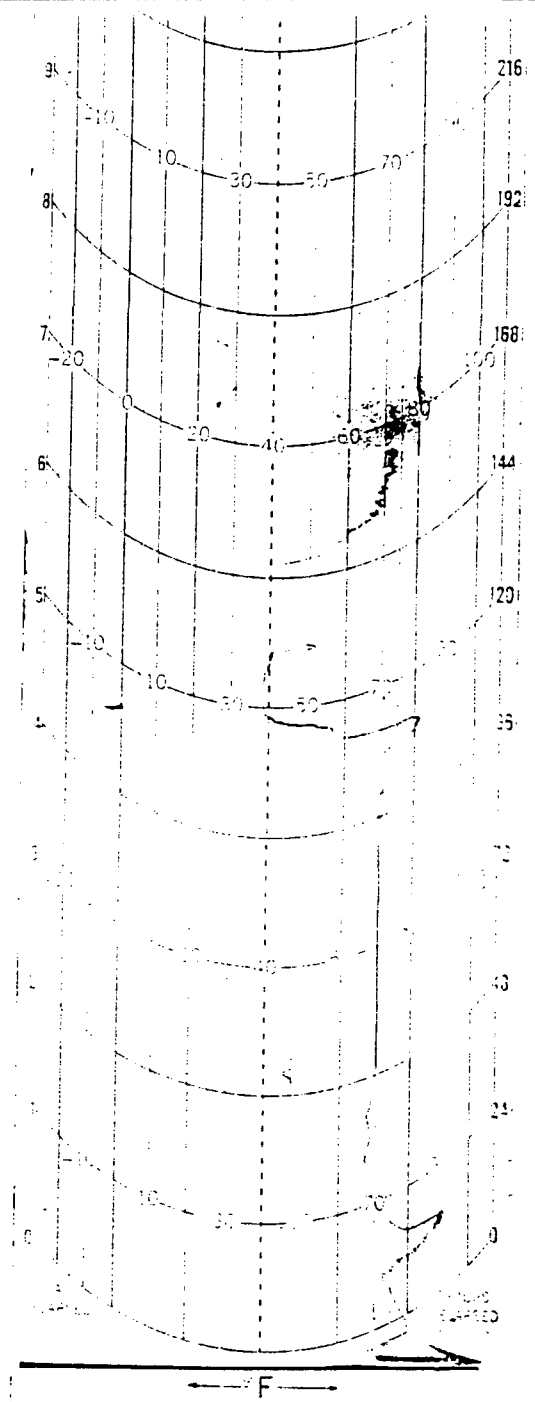
No Shelf Life On Conduit

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 Point
CAR CONT:
PER:
CITY: St. Louis
SHIPPER: T6I
DATE: 6-30-94 TIME: 1:30pm
INSTR. No.

CHART 27

LOAD CARTRIDGE - ADVANCE CHART

32 DAY (–30° + 110° F)

PART NO. 840-95

PARTLOW THERMA-GARD

NEW HARTFORD, N.Y. 13413

START

JUL 5 '04 TUE 15:00 THERMAL SCIENCE INC. FAX NO. 3143481207 P.01 632

SHORT FORM — ORIGINAL — NOT NEGOTIABLE

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 TV 92362V

Carrier DYNAMIC TRUCK PREPAID PROTECTIVE SERVICE 6/0 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 (Sub. to Correction)	Class or Rate	Check Column
1		CARTON TVA PART #158100 16 PCS 1" ITEM 01	100 lb		
2		CARTONS TVA PART NO. 158400 28 PCS. 4" ITEM 02	300		
1		CARTON TVA PART NO. 238100 16 PCS. 1" ITEM 03	150		
1		CARTON TVA PART NO. 338300 8 PCS. 3 INCH (UPGRADE) ITEM 04	90		
1		CARTON TVA PART NO. 438300 8 PCS. 3" (UPGRADE) ITEM 05	90		
		PALLET TVA PART NO. 1384X6 7 EA. THERMO LAG 330 RIBBED PANEL 3/8" THICKNESS 4'x6½' NOM. ITEM 06	700		
4		PALLETS TVA PART NO. 1584X6 46 PANELS THERMO LAG 330 RIBBED PANEL 5/8" THICKNESS NOM. 4'x6½' ITEM 7	5200 lb		
2		PALLETS CONTAINING: 40 x 50 LB. PAILS [redacted] THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE ITEM 08 TVA PART TG-330	2400		
1		1 x 5 gal. pail containing temp. recorder STORE ABOVE 32 F AND BELOW 100F AT ALL TIMES			
		CARTON CONTAINING STRESS SKIN ASTM E437 TYPE 304 SS Wire/plain weave 8x8 square mesh wire cloth 0.017" DIA. Wire ITEM 09	120 lb		
		CARTON CONTAINING 3 Rolls SS Banding ITEM [redacted] 11 3 Rolls (100 Lb.) SS TIE WIRE TYPE 304 ITEM 10 1 BOX OF 1000 [redacted] SS CLIPS ITEM 11	140 Lb		
		CARTON TVA PART NO. 158340 3/4" [redacted] 10 PCS. ITEM 12	50		
		CARTON TVA PART NO. 238340 SIZE 3/4 INCH UPGRADE ITEM 13 (10 PCS.)	100		

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."

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

...ckages 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 ...fication.

...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."

...print 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: Preserved ... through June 30, 1978 ..."

Per ______ Shipper.

...MAL SCIENCE, INC. Shipper, Per [signature] Agent, Per ______

...ost office address of shipper **2200 Cassens Dr., St. Louis, MO 63026**

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TUA
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 633

SOLD TO
3500
Thermal Science
2200 Cassens Drive
St. Louis, MO

63026

SHIP TO
[redacted]
Omega Point Laboratories
16015 Shady Falls Road
Elmendorff, Texas

78112

CUSTOMER ORDER NO.	DATE SHIPPED
1247[illegible]	8-7-96
DATE ORDER RECEIVED	**SHIPPED VIA**
8/ 2/96	UPS Next Day
OUR ORDER NO.	
12492	
RESALE NO./STATUS	
Interstate 0	
FREIGHT TERMS	

ING	INIT.	CONTACT
UPS-NEXT DAY AIR	Ken	Denise

QUANTITY ORDERED*	DESCRIPTION						QUANTITY SHIPPED*
	[redacted]	MESH SIZE	WIRE DIA.	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 11960-97257-60+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.	COND 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	16 ga annealed Type 304	Y	Y	Good	None	X			

FORM
1/29/93

PACKING LIST

SOLD TO
6573
Thermal Science
2200 Cassens Drive
St. Louis, MO

63026

SHIP TO
[redacted] Science
Omega Point Laboratories
C/O TVA, Attn: Mark Sallee
16015 Shady Falls Road
Elmendorff, Texas
78112

CUSTOMER ORDER NO	DATE SHIPPED
125[illegible]	8/25
DATE ORDER RECEIVED	SHIPPED VIA
8/24/94	UPS Next Day Air
OUR ORDER NO.	
12569	
RESALE NO./STATUS	
Interstate O	
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

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-Q 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-Q 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 +

Item #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 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: 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	
EXTREME	4	PROTECTION	B

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.

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 :

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 97220 9733 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	158AX6 F94-02012	Y	X	Good	None	X			
" "	NA	0	1	0	158AX6 F94-03028	X	Y	Good	None	X			
" "	NA	0	4	0	158AX6 F94-03047	Y	Y	Good	None	X			
" "	NA	0	7	0	158AX6 F94-04005	Y	Y	Good	None	X			
" "	NA	0	16	0	158AX6 F94-07014	Y	Y	Good	None	X			
" "	NA	0	1	0	158AX6 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

64-57

THIS SHIPPING ORDER

must be legibly filled in, in ink, in indelible pencil, or by typewriter or other impression, and retained by the Agent.

646

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.

rc **THERMAL SCIENCE, INC.** TVA CONTRACT NO. TV92363T

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.)

onsigned to TENNESSEE VALLEY AUTHORITY c/o OMEGA POINT LABORATORIES

estination 16015 SHADY FALLS ROAD State of County of

oute ELMENDORFF, TX 78112

elivering 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	2250 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: STEEL 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

HI MENT 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

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

21398

TSI

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: Flavia O'Bryant DATE: 18 AUGUST 1994 PAGE NO. 1

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
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

651

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. 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

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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. 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

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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. 158340	4 PIECES	F94-02053
THERMO LAG PRESHAPED	6 PIECES	F94-03047
CONDUIT SECTIONS		
THICKNESS: 0.625" ± 0.125" NOMINAL	10 PIECES	
SIZE: 3/4"	(IN 1 CARTON)	

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. 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

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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. 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

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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
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

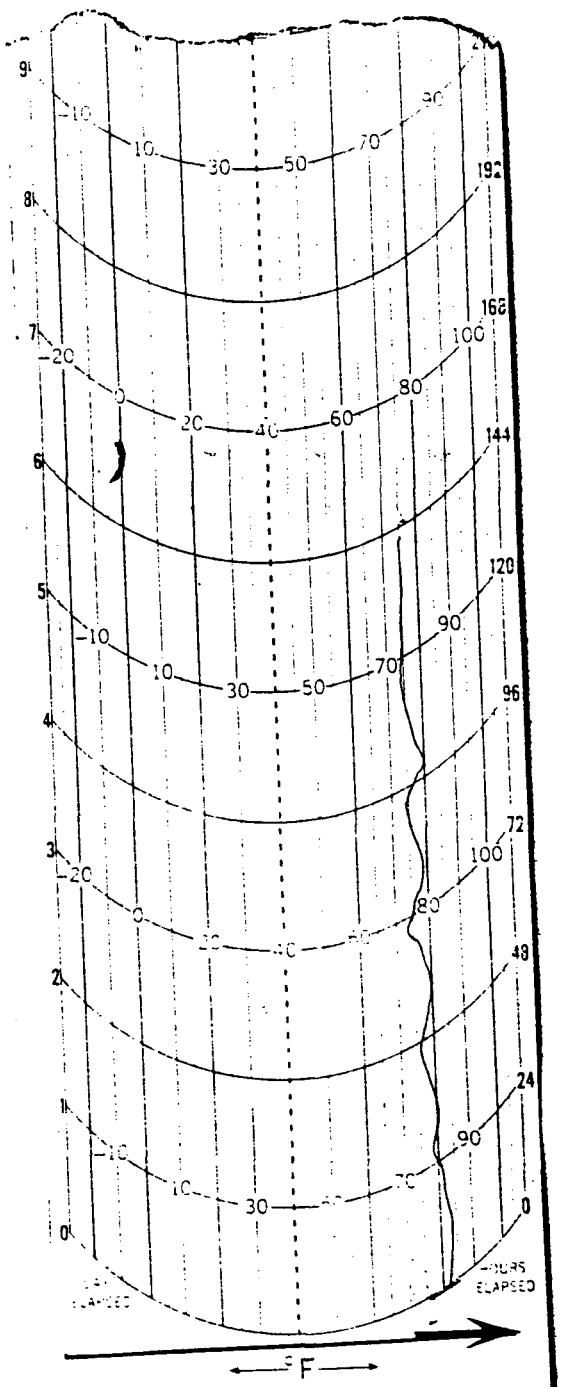
This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

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 Omaha Point
CAR CONT.:
PER:
CITY: St. Louis
SHIPPER: TST
DATE: 8/18/94 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: 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	
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 5/8"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-ASTME437. 8X8 sq. mesh 0.017dia	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

OMEGA POINT LABORATORIES

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: 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
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

663

STRAIGHT BILL OF LADING — SHORT FORM — ORIGINAL — NOT NEGOTIABLE

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.**
At **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 or 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

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

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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

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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

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
✓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

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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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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

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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 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

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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 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	1000 LBS. (20 x 50 Lb. Pails)	94-09009

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
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

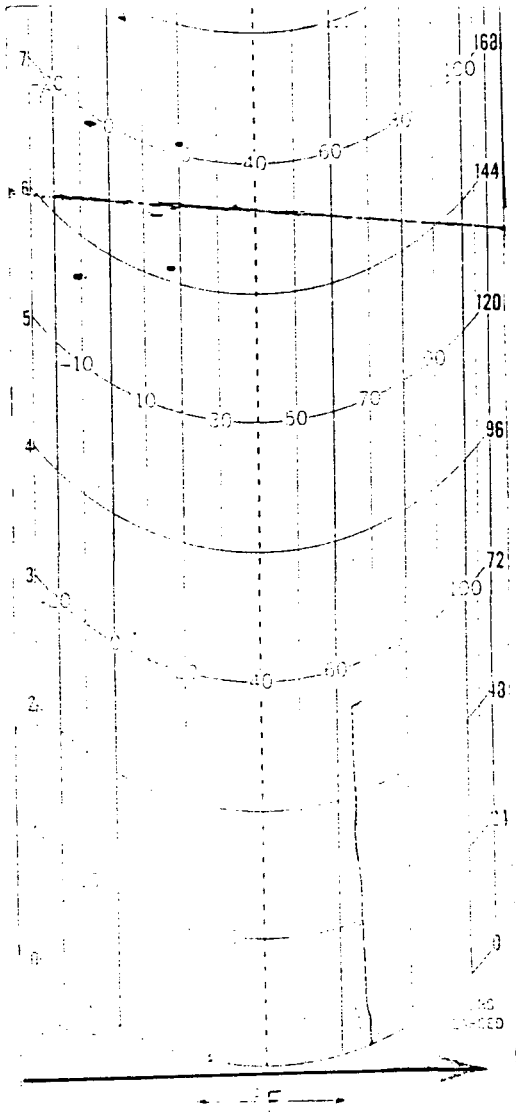
LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-09009	1000 LBS. (20 x 50 Lb. Pails)	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 ÷

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 LOCATION
PER
CITY St. Louis
SHIPPER TSL
DATE 9-23-94 TIME 10:15 am
INSTR. NO.

CHART 71

ADVANCE CHART

30 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

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: 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 :

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 :

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 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 EH	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 1½"	N/A	0	1	0	1½" 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.	2" 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

STRAIGHT BILL OF LADING — SHORT FORM — ORIGINAL — NOT NEGOTIABLE

686

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.	1	

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:
$ ____

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 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 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 Pozanek
HEAD OF SHIPPING

THERMAL SCIENCE INC.

PAGE 2 OF 2

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" ITEM 1	7 PANELS 1 8 PANELS (ON 1 PALLET)	F94-08021 F94-08022

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	500 LB. (10 x 50 LB. PAILS)	94-08008

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

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 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

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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

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	F94-08021
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

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

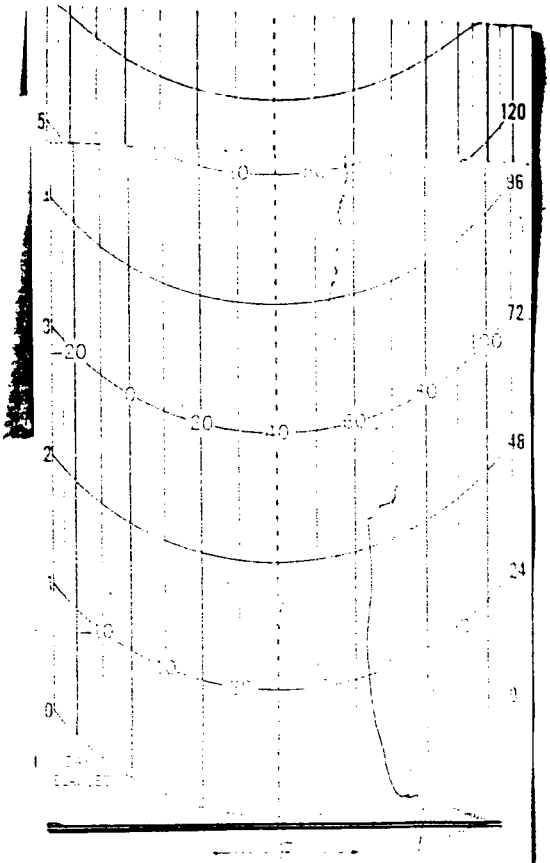
This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point 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 - Omega-Bank
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 - AT

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	
EXTREME	4	PROTECTION	B

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.

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 :

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

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: 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 :

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.	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 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

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.

(Mail or street address of consignee—For purposes of notification only.)

Consigned to TENNESSEE VALLEY AUTHORITY % OMEGA POINT LAB

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.

C[illegible]T 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, 1979, 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

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

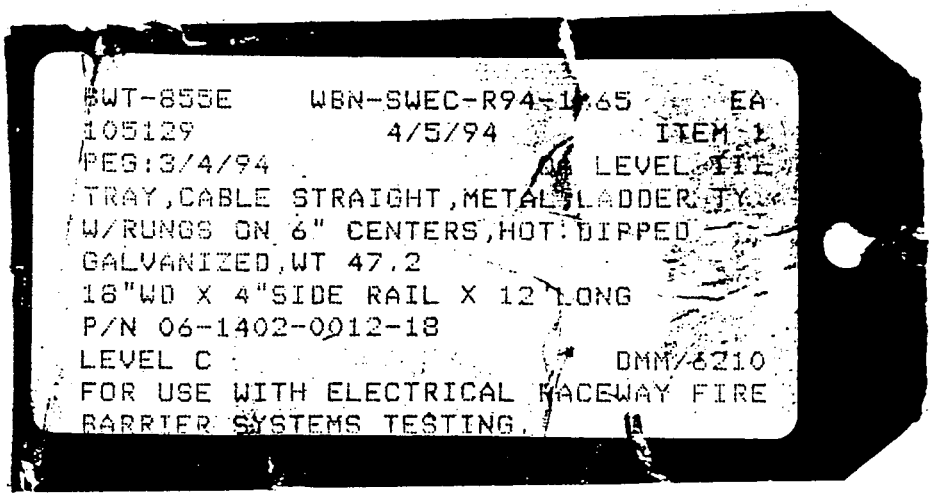
Q/A RECEIVING REPORT

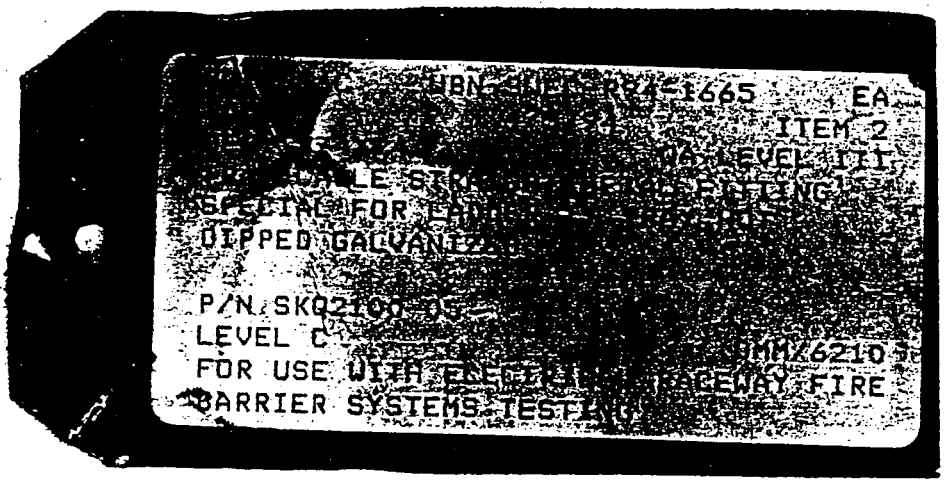
CLIENT/PROJECT NAME TVA/TS1
CLIENT/PROJECT NUMBER 11210/TBD
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

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.	CONtD 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
PES: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.


WBN-SWEC-R94-1665 EA
ITEM 2
QA LEVEL III
SPECIAL FOR
DIPPED GALVANIZ
P/N SKQ2100 05
LEVEL C
DMM/6210
FOR USE WITH
BARRIER SYSTEMS TESTI

SHADDY FALLS RD 8100 ... 03/06 OVNT ... TENNESSEE VALLEY AUTHORITY ... 608
ELMENDORF TX 78112 WATTS BAR NUCLEAR PLANT 703
05916702 SPRING CITY TN 37381
00994265

PO# ~~NONE~~

20

OVERNITE PHONE NUMBER (210) 662-0766

Peggy

FREIGHT BILL NUMBER 345 608 583

CITY RTE/BYD SCAC 2M | DEST SNT

PICK UP DATE 05/16/94 | ORIG KNX

ADV CAR ~~NONE~~

BL#

AD

OV 61.75

BD

OVERNITE TRANSPORTATION COMPANY

345 608 583

COLLECT THIS AMOUNT $6

OTC

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

2 pcs Bent & Damage / 11 loose upon Del

2 ◄ TTL PCS

DELIVERY EXCEPTIONS

TTL WT ► 300

SIGNATURE

FIRM

RECEIVED THE ABOVE PROPERTY IN GOOD CONDITION EXCEPT AS NOTED

ODOM	ARRIVE	DEPART
009	9:16	9:45

DATE	PCS	INITIALS
5-23-94	11 PC	ROW

TOTAL CHARGES 61.75 C

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 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	Y	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	Y	N	good	None	X			
Junction Box	NA	0	2	0	A3L60#3612LP	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	ALU34ELL	Y	N	good	None	X			
1" Cap	NA	0	2	0	PLG100R	Y	N	good	None	X			
2" Cap	NA	0	5	0	PLG200A	Y	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	Y	N	good	None	X			

FORM
1/29/93

TVA 144 (FD-5-70)

SHIPPING TICKET

No. 53694-00073705

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-N&PS-BFNP

SHIP TO
OMEGA POINT LAB
16015 SHADY FALLS ROAD
ELMENDORF, 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-0

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 DIR
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

0115008526

TRACKING NUMBER 0115008526

705

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.
** Minimum charge: 100 lbs. Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 [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
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	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

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 1960-97185-87
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 Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
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 w/½" 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	–	1reel	–	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 / TSI
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" Allum Conduit	NA	-	5	-	AVK-543K	Y	N	"	"	X			NON-SAFETY RELATED MATERIAL.
2.5" Alum Conduit	NA	-	1	-	BBN-621X	Y	N	"	"	X			C/A
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

9407

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TS1
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. CM
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	–	BTY-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

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.	~~10~~ 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-260M	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-557N	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 W. BURT
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

712

CONSIGNEE

CUSTOMER COPY (BLUE)

OMEGA POINT LAB

16015 SHADY FALES RD

MENDORF TX 78112

6358100

INBOUND TRAILER

288858 OVNT

FREIGHT BILL NUMBER

391 634 025

CITY RTE/BYD SCAC | DEST

2M | SNT

SHIPPER

391 634 025

TVA

NUCLEAR PLANT

BROWNS FERRY RD

ATHENS AL 35611

02521271 (205)729-2000

ADV CAR

P/O# NONE

OVERNITE PHONE NUMBER

(210)662-0966

PICK UP DATE

05/25/94

ORIG

DCT

BL# 5569400740

AD | OV | BD

31

DELIVERY RECEIPT COPY: 1

COLLECT THIS AMOUNT

$.0

$.0

OVERNITE TRANSPORTATION COMPANY

391 634 025

# 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

2"x10" HD Conduit Insert

Roger Young 6-2-94

4 TTL PCS

TTL WT 2567

DELIVERY EXCEPTIONS

SIGNATURE

Veda Patton

FIRM

RECEIVED THE ABOVE PROPERTY IN GOOD CONDITION EXCEPT AS NOTED

ODOM	ARRIVE	DEPART	TOTAL CHARGES
DATE	PCS	INITIALS	P

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

TVA 144 (FD-5-70)

SHIPPING TICKET

NO. [illegible] 714

SHIPPER: MARK WILLIAMS

POINT OF ORIGIN: SPRING CITY,TN 37381 4-28-94 19

SHIPPING STOREROOM: NUCLEAR STORES WBNP

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					
xxxxxx		xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxx	xxx	xxxxxxx	xxxxxxxxxxxx
1	2	CONDUIT 3 in,galv. 720092260	AWD-019L	2	pc		
2	1	ELBOW 90 deg,3 in 1008122	BLB-258A	1	ea		
3	3	STRAP RETAINING 3 in PIPE 42981B	BJN-409R	3	ea		
		ALL ITEMS QA 3					

5/2/94

SHIPPING WEIGHT

THIS MATERIAL CONTAINS NO RADIOACTIVITY

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED: 4-28-94 19 G. B. L. No. TV

METHOD OF SHIPMENT: MOTOR

6 — 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.	COMD MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
3/4" Strap 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

718

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR ATHENS, AL. 35611 07/15 19 94

SHIPPING STOREROOM 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

000512L

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

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 JUDY 19

NAME OF CARRIER

MATERIAL CHECKED IN BY

STORES LEDGER POSTED BY

717

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 0115008530

4159 0115008530

1 Date 7-15-94

RECIPIENT'S COPY

From (Your Name) Please Print	Your Phone Number (Very Important)	To (Recipient's Name) Please Print	Recipient's Phone Number (Very Important)
	(205) 729-4641	2	( )
Company	**Department/Floor No.**	**Company**	**Department/Floor No.**
TVA/BROWNS FERRY NUCLEAR PLT		Omegh Point Lab	
Street Address		**Exact Street Address** (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)	
BROWNS FERRY ROAD		1615 Shady Hill Rd	
City	**State** / **ZIP Required**	**City**	**State** / **ZIP Required**
ATHENS	AL 35611	Elsewhere	TX 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†)	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 ☐ GOVT. LETTER
	41 ☐ GOVT. PACKAGE

*Economy Letter Rate not available. Minimum charge. One pound Economy rate.

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
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 2 ☑ 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
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 3.94
PART #[illegible]
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. RECD 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 11960-97257-60+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			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
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 728

SHIPPER J.M. WILLIAMS

POINT OF ORIGIN NEAR SPRING,CITY, TN 37381 8-26, 94

SHIPPING STOREROOM WATTS BAR NUCLEAR PLANT

AUTHORITY R.D. HALL PROJ MGR N.E.

SHIP 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	EMB329W	5	EA		
2		4 IN GASKET	EMB330P	5	EA		
3		1 IN LG COVER	BPP177P	2	EA		
4		2-1/2 - 3 IN LB COVER	EBT792M	5	EA		
5		2-1/2 -3 IN LB GASKET	BGP836C	5	EA		
6		1 IN GASKET BPQ043N		2	EA		
7		2IN GASKET	BGK730W	5	EA		
8		2 IN LB COVER AQP157H		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)

TENNESSEE VALLEY AUTHORITY

SHIPPING TICKET

No. 35694-01057 722

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR, ATHENS, AL. 35611 8-24- 1994

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., H&PS

SHIP TO
OMEGA POINT LAB
16015 SHAVY FALLS ROAD
KLEINDORF, 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
NAME OF CARRIER
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

O. W. BURT

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

R.P. Hyde
Lead Procurement Engineer
Browns Ferry Nuclear Plant

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 [redacted] Date

From (Your Name) Please Print | Your Phone Number (Very Important) ( )

Company | Department/Floor No.

[redacted]

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

[redacted]

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 [redacted]

4 SERVICES (Check only one box)

Priority Overnight	Standard Overnight
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
☐ 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 | 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 4 ☐ B.S.C. 2 ☒ On-Call Stop 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
Other 1
Other 2
Total Charges

REVISION DATE 3/94
PART #137204 FXEM 4/94
FORMAT #158
158

Q/A RECEIVING REPORT

OMEGA POINT LABORATORIES

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			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" 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 8-2 19 94

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., M&PS

SHIP TO MR OMEGA POINT LABS
10613 SHADY FALLS ROAD
ELLENDORF, TX 78112

ACCT NO. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT 0005151 RECORD ONLY

BILL TO

CREDIT 0002W65

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.	AHD-015W	70	FT		
		SENT FOR FIRE TESTING PROGRAM					
		QA III					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

E SHIPPED 8-6 19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT FEDEX (2ND 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

Copy
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER C W BURT
MATERIAL CHECKED IN BY
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

4159M 0115008850

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 3 5 6

2 To (Recipient's Name) Please Print
Company
Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)
1601 Sandy 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

1 125

Total Total 125 Total

OTHER
OTHER
FEDEX LETTER
52 FEDEX PAK
13 FEDEX BOX
53 FEDEX BOX
14 FEDEX TUBE
54 FEDEX TUBE

DELIVER WEEKDAY
Saturday
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)

Economy Two-Day
30 ECONOMY*
* Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only)
46 GOV'T LETTER
41 GOV'T PACKAGE

Special Handling
4 DANGEROUS GOODS (Extra charge)
DRY ICE
Dangerous Goods Shipper's Declaration not required

Freight Service (for packages over 150 lbs.)
70 OVERNIGHT FREIGHT**
80 TWO-DAY FREIGHT
** Confirmed reservation required
† Delivery commitment may be later in some areas.

12 HOLIDAY DELIVERY (Extra charge)

DIM SHIPMENT (Chargeable Weight)
L x W x H

Received At
Regular 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
City State

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	Good	None	X			Receiving Verification Only. NOTE: cut
1'X1'X5'													

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY

SHIPPING TICKET

No. G 578597

SHIPPER TVA - HORACE CROWDEN

POINT OF ORIGIN MUSCLE SHOALS, Al. 8-24- 19 94

SHIPPING STOREROOM POWER SERVICE SHOPS

AUTHORITY BPN-N-94-0071

TO

OMEGA POINT LAB
16015 Shady Falls Road
Elmendorf, Texas 78112
ATTN: M. 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

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960/97553-55
RECEIVED FROM TVA
PROJECT LOCATION OPL

REPORT NUMBER 1442.11960
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 Inspection 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)

SHIPPING TICKET

No. S3694-00010

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR, ATHENS, AL. 35611 10-4- 1994

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., M&PS

TO
OMEGA POINT LAB
16015 SHADY FALLS ROAD
ELMENDORF, 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- 19 94 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

C019333775

PACKAGE TRACKING NUMBER 28193337

RECIPIENT'S COPY

[redacted]

1 From (Your Name) Please Print: C.J. Burt

Date: 10-4-94

Company: TVA/BROWNS FERRY NUCLEAR PLT

Your Phone Number (Very Important): (205)729-6641

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 I...: ( )

Company: Omega Point Lab

Department/Flr

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]

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**
80 ☒ TWO-DAY FREIGHT**

(Confirmed reservation required)

† 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 / 1200	Total

DIM SHIPMENT (Chargeable Weight) 256 lbs.

120 x 048 x 042

Received At
1 ☐ Regular Stop
2 ☒ On-Call Stop
3 ☐ Drop Box
4 ☐ B.S.C.
5 ☐ Station

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address
City
State
ZIP Required

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 4/94
PART #145412 FXEM 9/94
FORMAT #160

160

7 Release Signature:

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 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 QA
2" " "	"	0	3	0	N2558-20EG	Y	N	"	"	X			
1" " "	"	0	6	0	N2558-10EG	Y	N	"	"	X			

FORM
1/29/93

TVA 144 (FD-5-70)

SHIPPING TICKET

NO. 850-15485 735

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		
3	6	1" two hole conduit straps P|N N2558-10EG lot C0149 RD 331168 Item 5 4-6-93	AWN-628T	6	Ea		

Shipped per WBN Peg package T69941008800
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

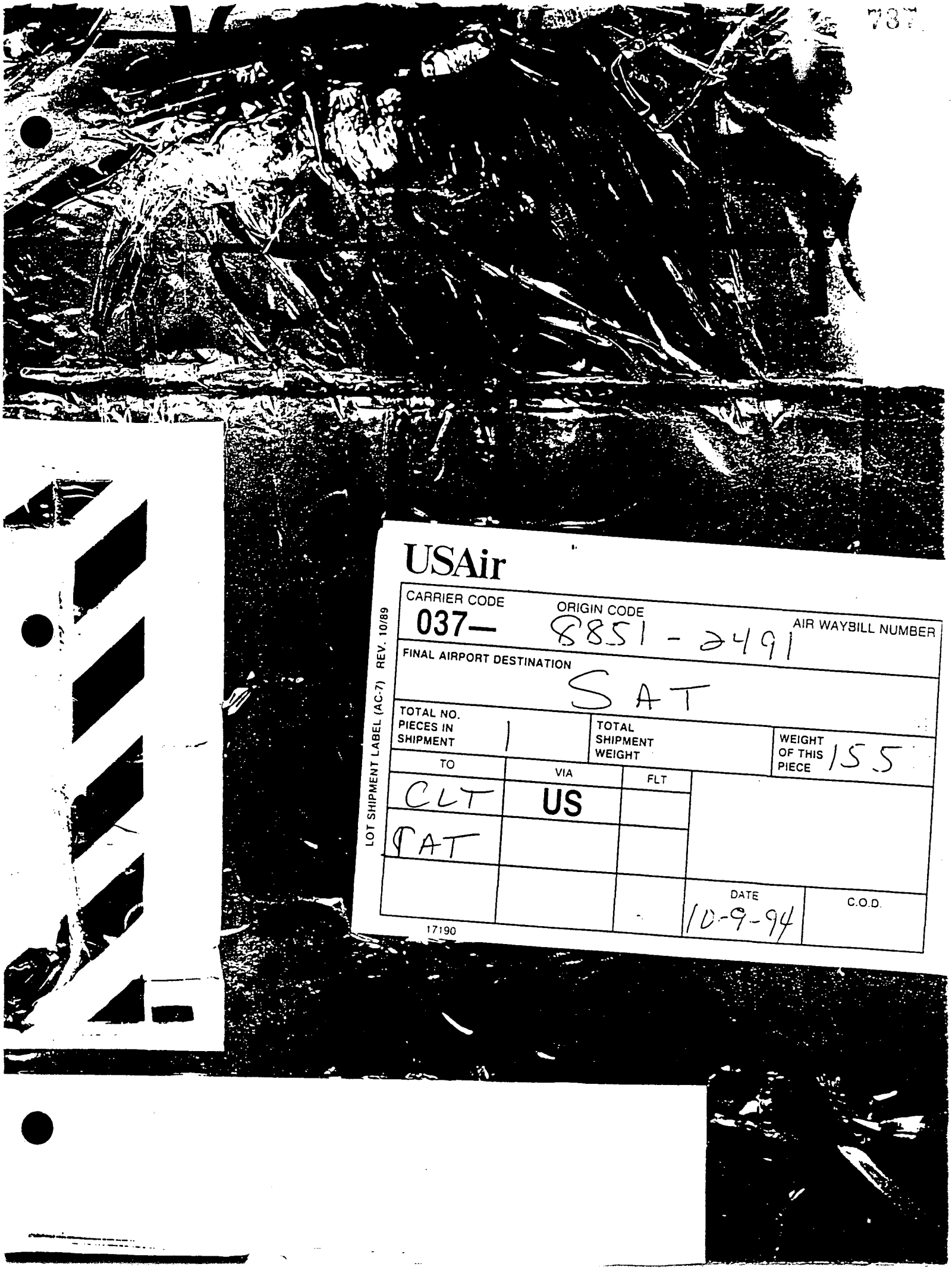
Q/A RECEIVING REPORT

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			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" 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

☐ PREPAID
☐ COLLECT

---- DELIVERY SERVICE, INC.
P.O. BOX 460289
SAN ANTONIO, TEXAS 78246-0289
PHONE (210) 826-8110
RRC NO. 4756

738

№ 1272

CARRIER Sonic

SHIPPER

DATE

ADDRESS

AIRBILL NO. TEH 31453

CITY

CONSIGNEE Omega Paint Lines

ADDRESS 16015 Shady Falls Rd

CITY Elmendorf TX 78112

NO PIECES 1

DESCRIPTION Ltn Paint Powder

REFERENCE NO. US 8851-4491

WEIGHT 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 →

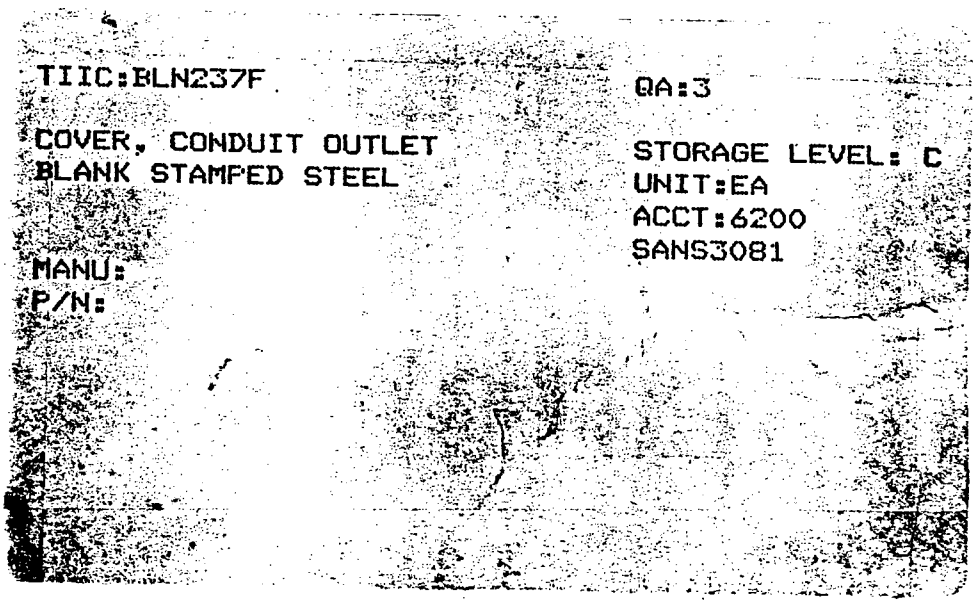
TIME

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



Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185, 86+87
RECEIVED FROM Soltec
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.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Channel	11250	10	10	—	CAN3X4.1#X20	Y	Y	Good	None	X			
3"X4.10 Channel X20													
ANGLE IRON 4"X4"X½X20	11250	1	1	—	ANG 4X C07	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: 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**

* * * * * * * * * * * * * * * * *
* SALES ORDER 29564 *
* * * * * * * * * * * * * * * * *

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
SHIP VIA:
COMMENTS:

TELEPHONE #: (512) 635-8100

ORDER DATE: 7/05/94
SALESMAN: CASEY HARMS

REQUEST DATE: 7/05/94

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	[redacted]	10	CHN 3X4.1#X20	3" X 4.1# CHANNEL X 20	820	28.75	235.75
02	1	1	ANG 4XC07	4 X 4 X 1/2 X 20	256	25.80	66.05

T[redacted]EIGHT: 1076 LBS

RECEIVED BY: Richard Beasley

NET BEFORE TAX	301.80
TAX.....	23.39
GRAND TOTAL...	325.19

RUCTURAL METALS, INC.
X 911, SEGUIN, TEXAS 78156-0911
512-372-8200

CERTIF[illegible] TEST REPORT

The following tests conform to the requirements of the specifications listed.

WE HEREBY CERTIFY THAT THE FO[illegible]OWING DATA IS A TRUE COPY FROM TESTS P[illegible]MED IN OUR LABORATORY.

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/FT
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	6.2
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		

EMARKS: 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-[redacted]200

CERTIFIED TEST REPORT

The following tests conform to the requirements of the specifications listed.

IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

DAN SCHACHT
QUALITY CONTROL MANAGER

4/29/94

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 SEGUIN TX
T
O

\ S115812
NO B9418932

NO V183809
DATE 04/28/94

	SECTION		SPECIFICATION	T #	YIELD PSI	TENSILE PSI	ELONG %	IN	R.A. %	BEND TEST DIAM	RSL	DATE ROLLED	LB/FT
81	C 3X4.1	20	ASTM A36-91	1	52500	75600	31.0	8				110293	4.100
45	F 3X3/8	20	ASTM A36-91	1	51800	75000	27.0	8				122093	3.720
89	L 3X3X3/16	20	ASTM A36-91	1	54200	75300	31.0	8				010394	3.670
33	L 4X4X1/4	20	ASTM A36-91	1	54200	77000	31.0	8				021894	6.600
94	\4 REBAR	20	ASTM A615-93 GRADE 60 AASHTO M31	1	66000	103000	13.0	8		1.750	OK	042394	0.640
95	\4 REBAR	20	ASTM A615-93 GRADE 60 AASHTO M31	1	65500	102000	12.6	8		1.750	OK	042394	0.640
72	L 4X3X3/8	20	ASTM A36-93a	1	52100	76300	32.5	8				040994	8.500
51	L 4X3X1/4	20	ASTM A36-93a	1	53100	73900	30.0	8				041094	5.750

	C	MN	P	S	SI	CU	CR	NI	MO	CB	V	AL	CE		BHN	
81	.17	0.74	.012	.034	.21	.39	0.17	0.18	.052	.000	.0010	.002	.00			517
45	.16	0.71	.011	.035	.23	.45	0.13	0.16	.051	.000	.0010	.002	.00			517
89	.17	0.77	.011	.031	.24	.39	0.09	0.16	.064	.001	.0030	.003	.00			517
33	.17	0.70	.007	.020	.20	.39	0.12	0.18	.061	.000	.0010	.001	.00			517
94	.35	0.96	.012	.036	.25	.38	0.12	0.16	.046	.001	.0020	.002	.00			517
95	.37	0.96	.014	.040	.24	.46	0.10	0.15	.038	.001	.0030	.002	.00			517
72	.15	0.86	.009	.022	.22	.44	0.17	0.21	.044	.000	.0020	.000	.00			517
51	.15	0.77	.012	.027	.23	.43	0.25	0.20	.056	.002	.0030	.001	.00			517

S: 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 97285 97332 97187, 97260, 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: Q 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	
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 0
PLACED BY: KERRY
TELEPHONE #: (512) 635-8100
SHIP VIA:
COMMENTS:

ORDER DATE: 8/23/94
REQUEST DATE: 8/23/94
SALESMAN: CASEY HARMS

LINE	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	1	1	TUB 6X6X.500X40	6 X 6 X .500 X 40	1410	1999.00	799.60
02	0	0		MUST HAVE MTR **	0	.00	.00
05	2	2	ANG 3X3X.25ALUM	3 X 3 X 1/4 X 25 ALUMINUM	56	255.00	141.53

TOTAL WEIGHT: 1466 LBS

NET BEFORE TAX 941.13
TAX..... 72.94
GRAND TOTAL... 1014.07

RECEIVED BY:

NAME AND ADDRESS OF PRODUCER'S PLANT — USINE PRODUCTRICE
FIRMA U CHRIFT DES HERSTELLERWERKS

VALE
USINE DE

57480 RETTEL FRANCE

PAGE-SHEET-S 1

CERTIFICAT DE RECEPTION
INSPECTION CERTIFICATE - ABNAHMEPRUFZEUGNIS
MODELE 3.1.B (A49.001) DIN 50049

TOTAL P.01
PAGE.001

ACHETEUR - PURCHASER - BESTELLER	NO.COMMANDE ACHETEUR PURCHASER'S ORDER N° BESTELLUNG NR	NO COMMANDE USINE PLANT ORDER NUMBER WERKSBESTELL NUMMER	AVIS D'EXPEDITION N° DISPATCH NOTE N° VERSANDANZEIGE NR
FRANCOSTEEL CORPORATION SALES HOUSTON UNITED STATES	FNY 553 - 8180 Q	3-M -20227	8 -130487

POSTE ITEM POST	DIMENSIONS EN POUCES DIMENSIONS ABMESSUNGEN	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

QUANTITE TOTALE-TOTAL QUANTITY-GESAMTMENGE

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)

666 8402

ANALYSE SUR TUBES EN % - PIPES ANALYSIS - ROHRENANALYSE

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

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	75562	28,5	
11	61348	71791	32,9	
12	63669	75997	32,2	

Toi Kerry
Item: B.76
6X6X500
Sq. Tube

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
PRODUCTEUR: PRODUCER HERSTELLER

M. SZKOLNIK

XT 77444

DATE DATUM 29/11/93

AUG 25 '94 11:02

87

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSA/TVA
CLIENT/PROJECT NUMBER 11960-97185-87 + 97332-38 + 97257-60
RECEIVED FROM Deltec
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 3½" x 2½" x 3/8" x 20'	11460	1	1	0	ANG-3½x2½x20	Y	Y	Good	None	X			

FORM
1/29/93

E-25

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

* * * * * * * * * * * * * * * * * * *
SALES ORDER 29259
* * * * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC. **DELIVER PICKING TICKET**
5390 DIETRICH
SAN ANTONIO, TX 78219

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:
TELEPHONE #: (210) 635-8100
SHIP VIA:
COMMENTS:

ORDER DATE: 8/25/94
REQUEST DATE: 8/25/94
SALESMAN: CASEY HARMS

NE	ORDER QTY	SHIP QTY	COD	PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
1	1	1		ANG 3-1/2X2-1/2XC05	3-1/2 X 2-1/2 X 3/8 X 20	144	30.95	44.57

TOTAL WEIGHT: 144 LBS

RECEIVED BY: Kerry Stekter

NET BEFORE TAX 44.57
TAX............ 3.45
GRAND TOTAL.... 48.02

752

CO·STEEL LASCO

Hopkins St. South, Whitby, Ontario, Canada L1N 5T1
TEL: WHITBY 905-668-8811 • TORONTO 416-364-6138
FAX: 905-668-8469 DUNS 20-183-2094
A Division of Co-Steel Inc.

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

3736.4

O'NEAL STEEL
108 BOGGSTOWN RD.
SHELBYVILLE, INDIANA
U.S.A.
46176

ATTENTION:

CUST. ORDER NUMBER / 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 / ESSAI DE FUAGE | 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.	CONTD MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Plate ½"x12"x20'	11320	1	1	0	FLT ½X12	Y		Good	None	X			
Sq tubing 4x4x¼x20	11320	1	1	0	TUB4XC06X20	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:

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
7/20/94	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 7-20-94

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
TELEPHONE #: (512) 633-8100
SHIP VIA:
COMMENTS:

ORDER DATE: 7/20/94
REQUEST DATE: 7/20/94
SALESMAN: CASEY HARMS

LINE	ORDER QTY	SHIP QTY	COD	PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	1	1		FLT 1/2X12	1/2 X 12 X 20	408	30.95	125.40
02	1	1		TUB 4XC06X20	4 X 4 X 250 X 20	244	516.10	103.22

T WEIGHT: 652 LBS

RECEIVED BY: Gene 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 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
/2 X 12	345-0467	#534	73600	50000	27	.17	.74	.26	.03	.02	.000	.000	.48	.09	.11	.033
ASTM A36-93/ASME SA36-89																
/4 X 12	334-2690	#534	73700	49100	23	.13	.72	.21	.03	.01	.000	.000	.26	.14	.10	.031
ASTM A36-93/ASME SA36-89																
/2 X 10	343-0813	#534	81800	56400	21	.23	.90	.26	.04	.02	.000	.000	.40	.16	.12	.040
ASTM A529-92 GD 50																
/8 X 8	343-0790	#534	65500	47700	25	.16	.75	.22	.04	.02	.000	.000	.38	.10	.12	.038
ASTM A36-93/ASME SA36-89																
X 1 X 1/8	332-2362	#534	80000	59500	28	.15	.82	.24	.04	.02	.000	.000	.37	.20	.16	.049
ASTM A36-93/ASME SA36-89																
X 2 X 1/4	341-1165	#534	70500	50400	30	.15	.75	.22	.04	.02	.000	.000	.48	.17	.17	.057
ASTM A36-93/ASME SA36-89																
X 3 X 3/8	342-0736	#534	63700	43800	27	.13	.71	.16	.03	.02	.000	.000	.33	.10	.10	.024
ASTM A36-93/ASME SA36-89																
X 4.1	341-1085	#534	70500	49800	25	.12	.82	.25	.03	.01	.000	.000	.60	.13	.11	.034
ASTM A36-93/ASME SA36-89																
X 8.2	343-0661	#534	72300	54400	24	.20	.85	.25	.04	.02	.000	.000	.55	.15	.13	.057
ASTM A36-93/ASME SA36-89																

CHIEF METALLURGIST

MELTED AND MANUFACTURED IN U.S.A.

HANNA

Certification 391000 5/12/94 2

Shipped From:
Hanna Steel Corporation
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

Sold To:
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				
CONTINUED							
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

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	ANG1-½XC01	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 24559 *
* * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.   **DELIVER PICKING TICKET**
5390 DIETRICH
SAN ANTONIO, TX 78219

BILL TO: 000477   SHIP TO:
OMEGA POINT LABORATORIES   OMEGA POINT LABORATORIES
16015 SHADY FALLS   16015 SHADY FALLS
ELMENDORF, TEXAS   78112   ELMENDORF, TEXAS   781120000

PURCHASE ORDER: 1154 A
PLACED BY: TERRY   TELEPHONE #: (210) [illegible]35-910[illegible]
SHIP VIA:
COMMENTS:

ORDER DATE: [illegible]   REQUEST DATE: 7.2[illegible]94
SALESMAN: CASEY HARDE

INV	ORDER QTY	SHIP QTY	PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	4	4	ANG 1-1 2XC01	1-1/2 X 1-1/2 X 1/8 X 20	78	26.[illegible]5	26.03
02				****MILL CERTS REQUIRED	0	.00	.00

WEIGHT: 78 LBS   NET BEFORE TAX   26.03
                                   TAX..........   2.02
RECEIVED BY: GRAND TOTAL..... 28.05

SMI

BO , SEGUIN, TEXAS 78156-0911
512-372-8200

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

S O L D T O	170000 TOLTEC STEEL PRODUCTS, INC. P O BOX / SAN ANTONIO, TX 78219 HOUSTON TX 77241	S H I P T O	8001 TOLTEC STEEL PRODUCTS, INC. P/U @ THE MILL SAN ANTONIO, TX 78219 SEGUIN TX

IH SB2439
NO B9379472

AT O	SECTION	SPECIFICATION	T #	YIELD PSI	TENSILE PSI	ELONG %	ELONG IN	R.A. %	BEND TEST DIAM	BEND TEST RSL	DATE ROLLED	LB/FT
360	L 2.5X2.5X3/16	ASTM A36-89	1	53300	75000	31.5	8				081692	2.9
396	L 1.5X1.5X1/8	ASTM A36-89	1	55700	75200	23.0	8				101992	1.2
032	L 2X2X1/4	ASTM A36-89	1	52200	74600	27.5	8				113092	3.0
385	L 3X2X3/16	ASTM A36-91	1	55400	77800	29.0	8				011393	3.0
			2	55400	77200	29.0						
193	L 3X3X1/2	ASTM A36-91	1	60000	79900	25.0	8				012793	9.40
496	L 3.5X3.5X1/4	ASTM A36-89	1	55600	77000	35.0	8				040792	5.74

AT O	C	MN	P	S	SI	CU	CR	NI	MO	CB	V	AL	CE		BHN	
360	.16	0.81	.009	.031	.21	.52	0.10	0.18	.048	.000	.0020	.003	.00			1145
396	.19	0.65	.007	.031	.20	.34	0.11	0.11	.034	.000	.0010	.001	.00			1145
032	.19	0.61	.011	.035	.17	.43	0.09	0.16	.046	.000	.0010	.002	.00			1145
385	.20	0.63	.006	.028	.21	.41	0.10	0.16	.041	.000	.0010	.002	.00			1145
193	.20	0.76	.007	.021	.21	.28	0.13	0.17	.069	.000	.0170	.003	.00			1145
496	.18	0.72	.010	.030	.20	.48	0.11	0.14	.032	.000	.0020	.000	.00			1145

RKS:

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, 9725-60
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. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
7 Strand Bare #8 Copper Wire	1121Q	1K	1K	0	BASTR7SD8	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: 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**

768

SUMMERS ELECTRIC COMPANY

ORIGINAL

PACKING SLIP

T... NUMBER	PAGE
480330601	1

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

06-JUL-1994, 11:26

SOLD TO: 09543800
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 SMALL

TCI-8:30

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
1121-Q		KERRY	DEL

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLSMN	TAX
28-JUN-1994	03-JUL-1994	Our Truck	PC	243	000

10th, Net 20th

LINE	W/O/BO	ORDERED	QTY SHIP	PART NUMBER / DESCRIPTION	BIN LOCATION	UNIT PRICE	EXTENSION
002		1000	0 1000	CUP BARE-B STR SOFT DRAWN BARE C	33500	140.00 M Y	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: VM CHECKED BY: DM DATE: 7/6/94 CUSTOMER SIGNATURE: Diane Lloyde

MASTER FORM # 2350

765

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

#74 TX 779-675

66287011695

MFG DATE

BASTR7SD8
8 AWG 7STR
BARE CU STRAND SD

GROSS | TARE | NET | FEET 1000

CUTTING
DRAWING
STRANDING
CABLING
ARMOR
JACKET
INSULATION
TESTING

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

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			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	
galv Cond Strap	11340	7	7	0	KINC105-4	Y	Y	Good	None	X			

FORM
1/29/93

E23

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:

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
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

769

CONTROL

PACKING SLIP

NUMBER	PAGE
080764101	1

22-JUL-1994, 08:53

TYA.

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
2400 BROCKTON
SAN ANTONIO, TX 78217

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
1340			WC

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
2-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
01	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 [illegible] CHECKED BY [ ] DATE [ ] CUSTOMER SIGNATURE [signature]

770

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 # 11340 on our Bill of Lading (shipping document) # 0807641O1, 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 Davis
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TUA
CLIENT/PROJECT NUMBER 11960-97185-8709257-6D
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			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	
Junction box	11410	1	1	0	MS? 12x12x6D	Y	Y	GOOD	None	X			
12ga. flat cover Welded Ends													

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 C Patton
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 773

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
410		KERRY	DEL

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
-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 2-23 PLEASE CALL CODE

PICKED BY | CHECKED BY | DATE | CUSTOMER SIGNATURE Richard Beasley 1.00

MASTER FORM #225C

774

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) # 08125180 1, 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 +97332-97269-97260 97338
RECEIVED FROM Simmons 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. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
4" steel locknut	11450	4	4	0	KPT 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	RPP 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:

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
8/24/94	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 777

NUMBER	PAGE
178378001	1

24-AUG-1994, 12:15

FROM: 318 W. JOSEPHINE
SAN ANTONIO, TX 78212

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
001	4	0	4	BPT 110 4-IN STEEL LOCKNUT	11-B-3 00110		165.00	C	6.60
002	25	0	25	KIN C105-4 GALV COND STRAP	17-A-1 75951		235.63	C	58.91
003	15	0	15	KIN C105-3 GALV COND STRAP	17-A-1 75945		171.22	C	25.68
004	5	0	5	KIN C105-2-1/2 GALV COND STRAP	17-A-1 75942		158.45	C	7.92
005	20	0	20	KIN C105-2 GALV COND STRAP	17-A-1 75939		131.00	C	26.20
006	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: 231 CHECKED BY: 231 DATE: 24 AU RECEIVED BY: Kerry [signature]

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

CUSTOMER

PACKING SLIP 778

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 #225C

PICKED BY [ ] CHECKED BY [ ] DATE 8/24/94 CUSTOMER SIGNATURE [ ]

779

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 # 11459 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

789

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	11570	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:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	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

SHIPPING ORDER

15:56:40

S

B-LINE® SYSTEMS, INC.
509 West Monroe Street
Highland, Illinois 62249-0326
Phone: 618-654-2184

SHIPPING ORDER NO.: 8942-9261

RS1 SYM

786

DATE: 9/29/94

0026073

SOLD TO:

OMEGA POINT LABORATORY
16015 SHADDY FALLS RD

ELMENDORF TX 78112

Bernie 9-30 AP

SHIP TO:

OMEGA POINT LABORATORY
16015 SHADDY FALLS RD

ELMENDORF TX 78112

1-CTN=6 #

PAGE NO. 1 OF 1 TERMS - NET 30 DAYS

8942926 1

CUST. ORDER NO.	DATE RECEIVED	LAST SHIPPED	SHIPPING DATE	VIA	COL	PPD	CHG	ALLC
11570	9/29/94		10/03/94	AP		X	X	

DIV.	SALESMAN	SHIP FROM	F.O.B.	DATE SHIPPED	B/L	WEIGHT
7	8800 E	TROY	TROY	10-3-94	35f077	79#

TOM FENOGLIO

1 of 2 - 73

ORDERED	DUE	SHIPPED	BACK ORDER	UNIT	*	PART NUMBER	DESCRIPTION
2	2	2	—	PC		248P09-12-144	STR SECTION ITM 1
							____ BUNDLE(S) OF _____ PC(S) EA.
			S/O 1128-34200				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.

ORM 102 A

[redacted]

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.

Rick 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

AMERICAN Freightways®

800-826-3875

P. O. Box 840, Harrison, Arkansas 72602-0840 (ARFW)

PAGE 01 OF 01

FREIGHT BILL NUMBER
Refer To This Number

014 6371503 RO

CONSIGNEE COPY

CONSIGNEE	SHIPPER	DATE
02215441 OMEGA POINT LABORATORY 16015 SHADDY FALLS RD ELMENDORF TX 78112	00950456 P3067 B LINE SYSTEMS EXIT ARFW DOCK SAINT LOUIS MO 63147	10/03/94 ORIGIN: STL DEST.: SAT BL#: 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

(2)

RECEIVED IN GOOD CONDITION EXCEPT AS NOTED
FIRM:

BY: June Elizalde

DELIVERED BY: R Knigm

DATE: 10-5-94

783

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME T21/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: 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	
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:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	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

U. S. SALES COMPANY, INC.

CONTRACTORS SPECIALTIES
"SINCE 1948"
318 W. MELROSE PLACE
SAN ANTONIO, TEXAS 78212

PHONE 829-7044

Sold To: Omegh Point Lake

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-255S-40 4 " " "				
	Date Ordered 10 P-255S-40				

TAX

TOTAL

Received By C Humphries

☐ 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-2559-43 4 Hole Dead Ends				

TAX

TOTAL

Received By Jane Elizabeth

☐ 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 8-25
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	
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**

736

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 10 E G. ([illegible])				
40	P-1001 " " " (05-200273)				

TAX

TOTAL

Received By: Richard D. 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
REPORT NUMBER 1431 . 11960
CLIENT/PROJECT NUMBER 11960-97185-87. 97267-60 97332-38
DATE RECEIVED 8-30-94
RECEIVED FROM Hilti, Inc
DATE INSPECTED 8-30-94
PROJECT LOCATION Omega Point Labs
INSPECTED BY: @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	00045360S	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:

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
8/29/94	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**

800

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

RDER DATE	ORDER #	SLS #	SLS NAME	SHIP LOC.	X-REF# = Y
8/29/94	459353-01	1750	RICHARD CARPENTER	51	08/29/94-16:16:33

CCT. #	ACCT. NAME AND CUSTOMER PURCHASE ORDER NO.	DDAATT
8989177	OMEGA POINT LABORATORIES 1148Q	58-07-01

HANK YOU FOR CALLING HILTI CUSTOMER SERVICE 1-800-879-8000
ICK DAVITO EXT 5109

IE	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 ☐ 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

CEIVED BY

DATE RECEIVED

PACKED BY

LE

2-6 (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
8/29/94	459353-01	1750	RICHARD CARPENTER	51	08/29/94-16:16:23

CCT. #	ACCT. NAME AND CUSTOMER PURCHASE ORDER NO.	DDAATT
8989177	OMEGA POINT LABORATORIES 1148Q	58-07-01

HANK YOU FOR CALLING HILTI CUSTOMER SERVICE 1-800-879-8000
ICK DAVITO EXT 6109

NE	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 ☐ WAL IN

CARRIER

BILL OF LADING #

FREIGHT COST

CHARGE TO CUST
☐ YES ☐

NO. OF PACK

WEIGHT
_____LBS.

DATE SHI

PICKED

CHEC

S

PACI

2

RECEIVED BY

DATE RECEIVED

TITLE

202-6 (1-92) 000964502

COPY

SUBJECT TO TERMS AND CONDITIONS ON REVE

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 11960-97258 #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:	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
8/31/94	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 Patton
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. 805

☐-NEW ACC'T. ☐ ADDRESS/NAME CHANGE

ACCOUNT NUMBER 5918111717

CUSTOMER PHONE NUMBER ( ) —

PURCHASE ORDER NUMBER 115/Q

BILL TO
NAME Omega Flu...
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

IF TAX EXEMPT FORWARD CERTIFICATE TO TULSA

PROMO

COMPLETE ONLY IF APPLICABLE
① Ship to T/S For Delivery ② Confirms Prior Whse. Shipmt.
APPROVAL #
CUSTOMER SITE
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
			KB3/6334	2		2				
			KB 1/2 7	1		1				
			Tec/76	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 KNH

Salesmen are not authorized to make warranties regarding specific applications —

CUSTOMER'S SIGNATURE X [signature]

DATE 8-30-94 TITLE Tech

SUBJECT TO TERMS AND CONDITIONS ON REVERSE SIDE.

TOTAL ORDER $

TAX

FREIGHT

NET ORDER $

SHIP C.O.D. $

APPROVED BY

DATE ENTERED TIME

S.E. OPERATOR

TOOLS WARRANTED TO ORIGINAL PURCHASER ONLY

808

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+ 97257
RECEIVED FROM Hilti
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1441 . 11960
DATE RECEIVED 9/30/94
DATE INSPECTED 9/30/94
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	
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:	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
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"x4½" 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**

HILTI®

CUSTOMER COPY

300

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 8981771

CUSTOMER PHONE NUMBER ( ) -

PURCHASE ORDER NUMBER 11590

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			KB 1/4-3 1/4	2		2				
2			KB 1/4-4 1/2	1		1				

NOTES/SHIPPING INSTRUCTIONS

TOTAL ORDER
$

DELIVERY; ☐ COMPLETE ☐ PARTIAL AS SHOWN BALANCE TO BE SHIPPED.
CASH ☐ CHECK #
AMT. REC'D. $
DRIVER'S LICENSE # STATE EXP. DATE
PHONED IN ORDER ☐ NAME

TAX
FREIGHT
NET ORDER $

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

SHIP C.O.D. $
APPROVED BY
DATE ENTERED | TIME
S.E. OPERATOR

Salesmen are not authorized to make warranties regarding specific applications —

CUSTOMER'S SIGNATURE X Kerry Hutchens
DATE 9/30 | TITLE

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 stl Cover	NA	0	1	0	2000-0012-24	Y	N						
Adj. Riser Conn. Pair	NA	0	2	0	06-1079-130702	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

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: A Dalton

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	
Tie Wire .062"	NA	0	100#	0	30455.062"	Y	N	Good	None	X			Receiving Verification Only.

FORM
1/29/93

815

ORDER NO:
PAGE:
DATE:
REQ. SHIP DATE:

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

SOLD TO

SHIP TO

F.

CUSTOMER P.O.	ORDER DATE	SLSP	TERMS	SHIPPED FROM	SHIPPED VIA	FREIGHT
					~~COMPANY~~ COAST	

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.

SMC #5183
ICC-MC 190566

58098[illegible]

CTI W/B NO.
CTI CONTROL NO.
DATE 7-20-94

SHIPPERS B/L NO.
S RS ORDER NO.
CONSIGNEES ORDER NO.
RELEASE NO.

Cannonball Trucking, Inc.

P.O. Box 262523, Houston, Texas 77207-2523 • 644-7300
Fax # (713) 644-9431

INTRASTATE ☐ ICC ☐ LOCAL ☐

FROM: SHIPPER	TO: CONSIGNEE
Southwestern Wire Cloth	Omega Paint Laboratory
STREET ADDRESS 1631 W Belt North	STREET ADDRESS 16013 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					

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#		
	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 [illegible signature]	RECEIVER'S NAME	
	RECEIVED ABOVE ARTICLES IN GOOD ORDER	CONSIGNEE
BY / DATE	BY [signature]	DATE 7-20-94

nt 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.
ere the rate is dependent on value, shippers are required to state in writing the agreed
d value of property hereby specifically stated by the shipper to be not exceeding: $ per
"It is understood 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 subsuquent thereto."

CARRIER
CANNONBALL TRUCKING, INC.
P.O.BOX 262523
Houston, Texas 77207-2523

I hereby certify that the dates and time shown is correct.
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 Adams 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. RECD 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" Finished 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

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	QVD	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	4.35
TOTAL	67.35

820

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

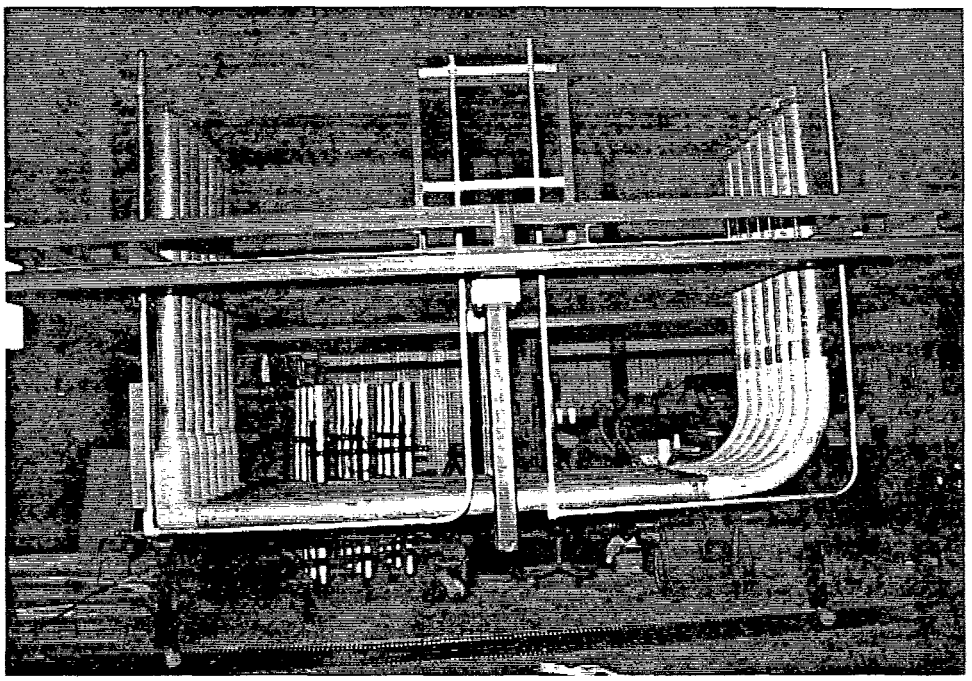
To Whom It May concern:

I hereby certify that on 7/11/94 we, Alamo Bolt & Screw provided the material called for on your Purchase Order # 1126-Q 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.

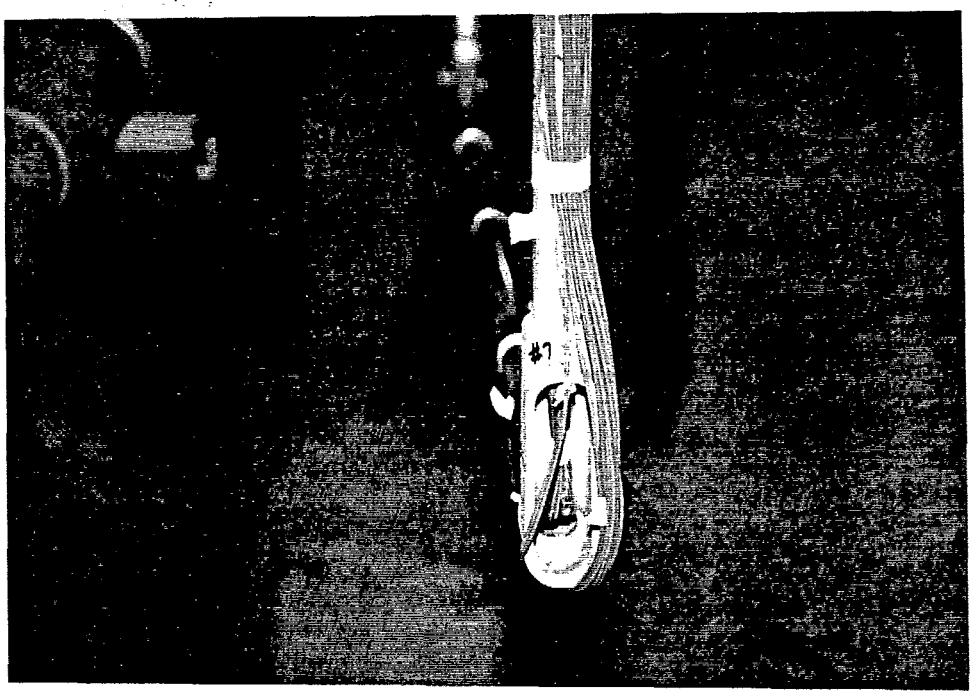
Date: 7/25/94
Signature: Teresa A. Deboard
Title: Office Manager

Appendix F

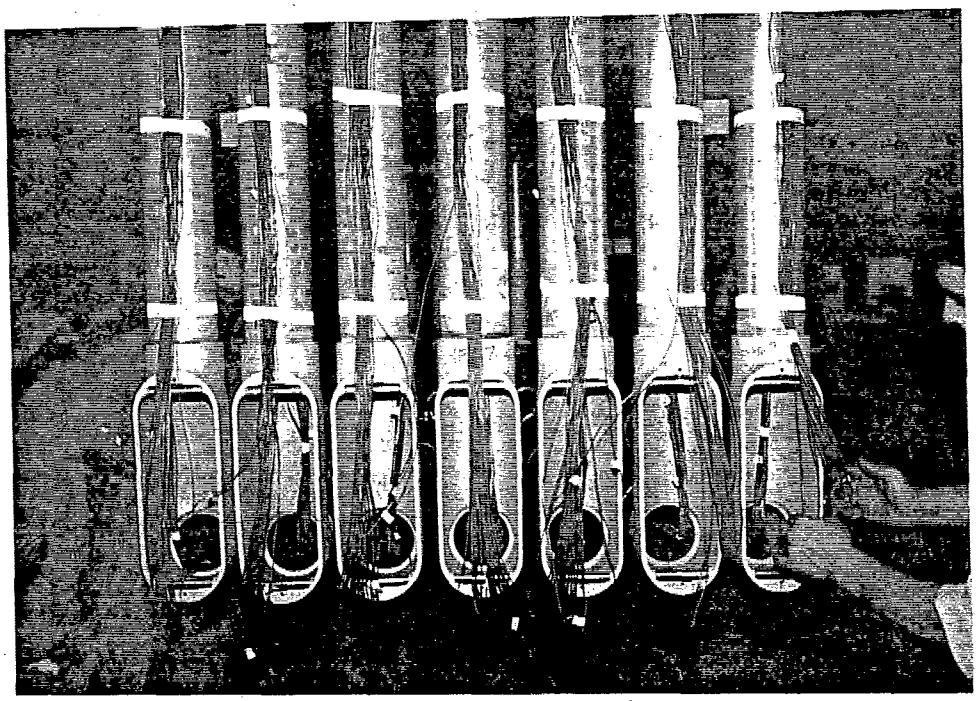
PHOTOGRAPHS



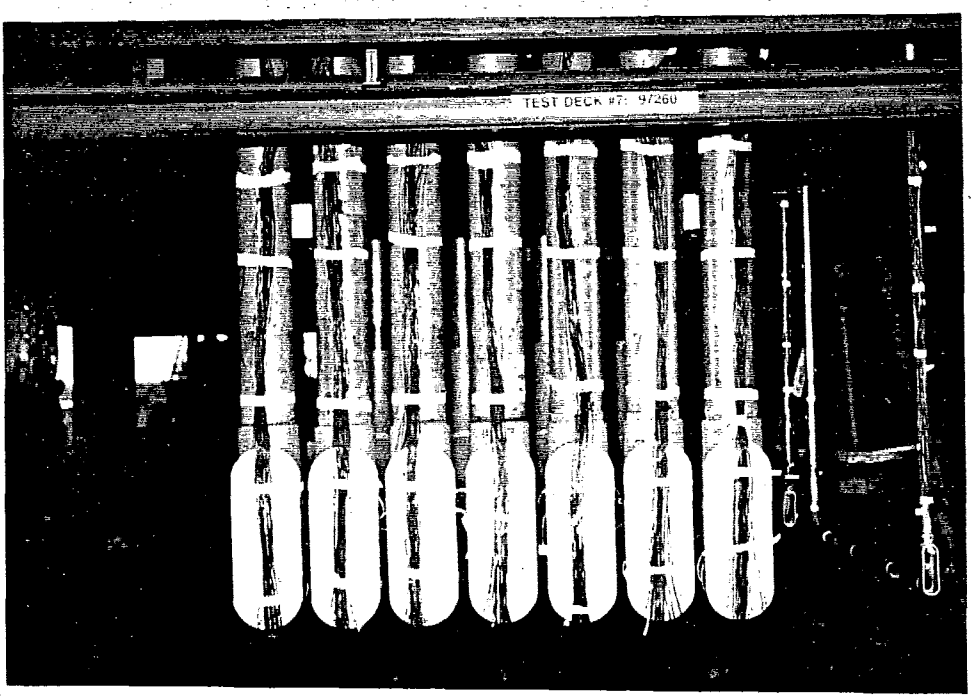
Front view of conduit assemblies.



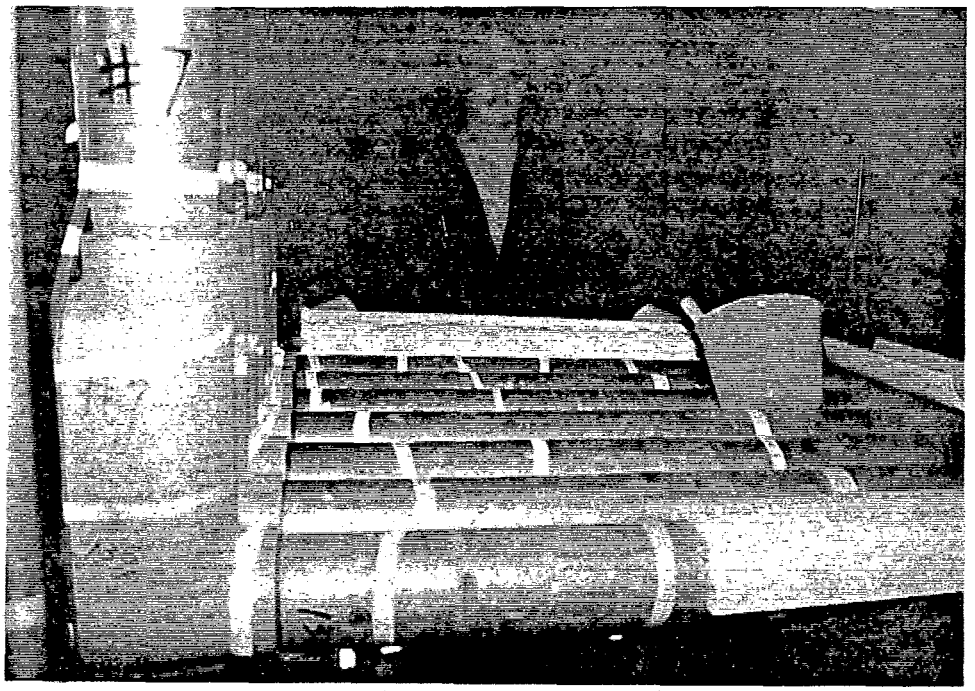
Close view of 3/4 in. condulet elbow.



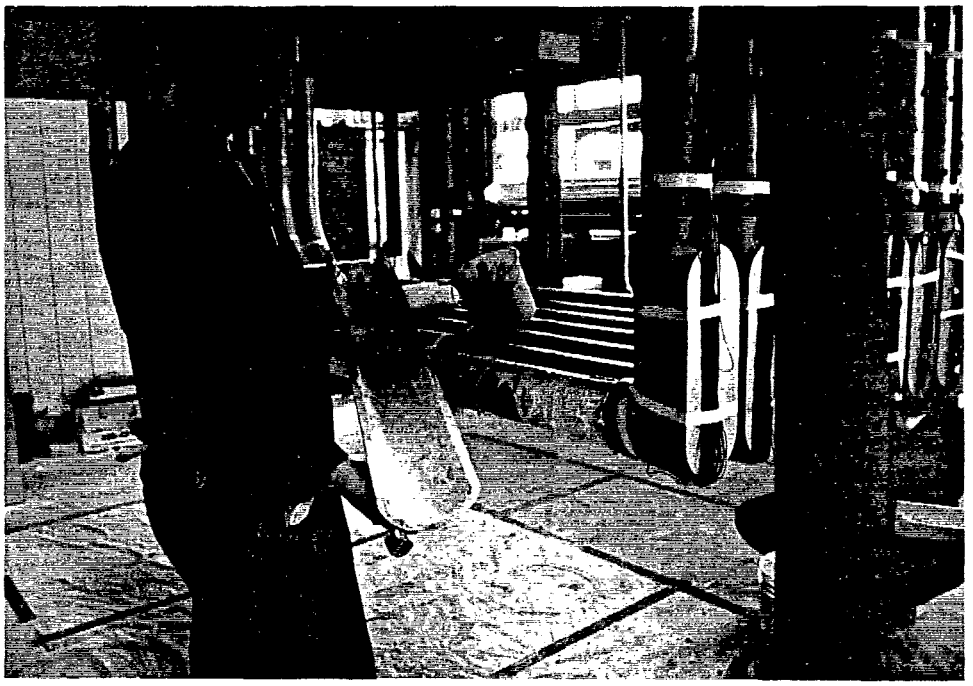
View of 4 in. condulet elbows.



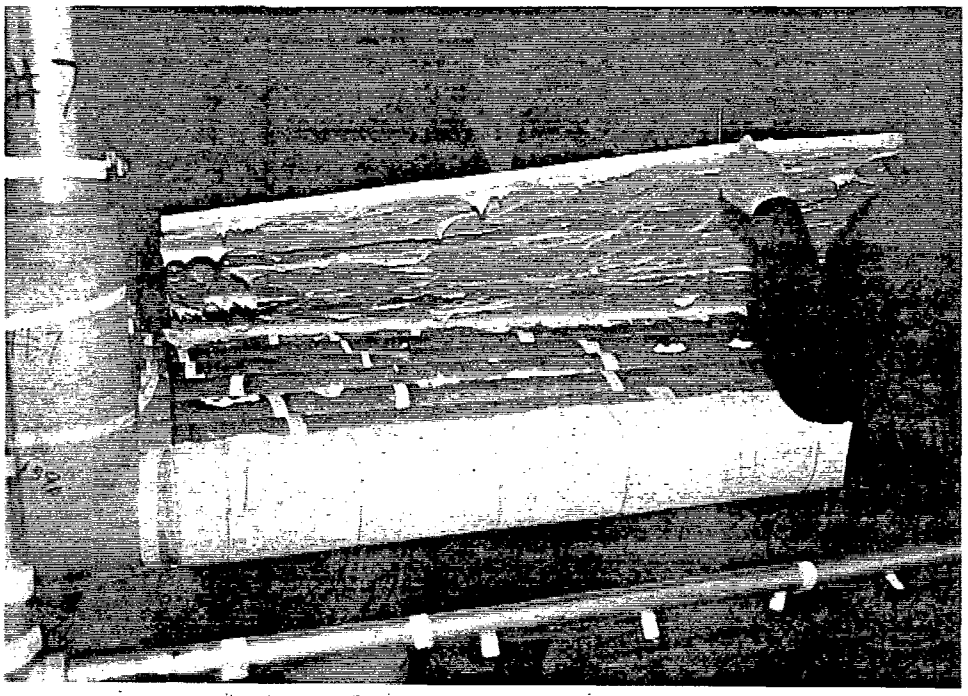
View of 4 in. condulet elbows with covers installed.



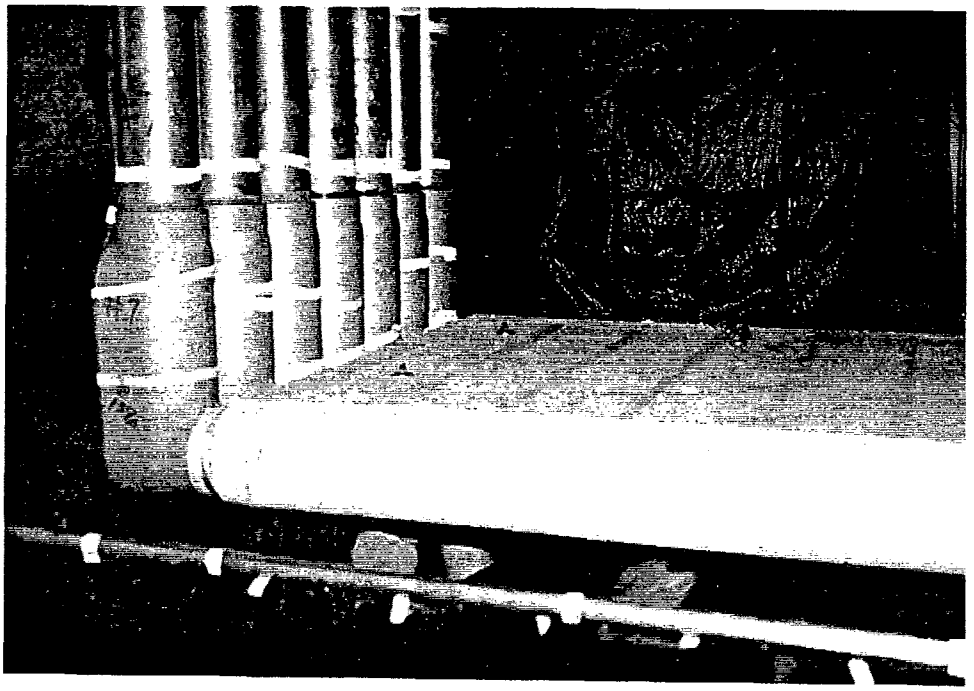
Pre-shaped conduit section installed on outside conduits.



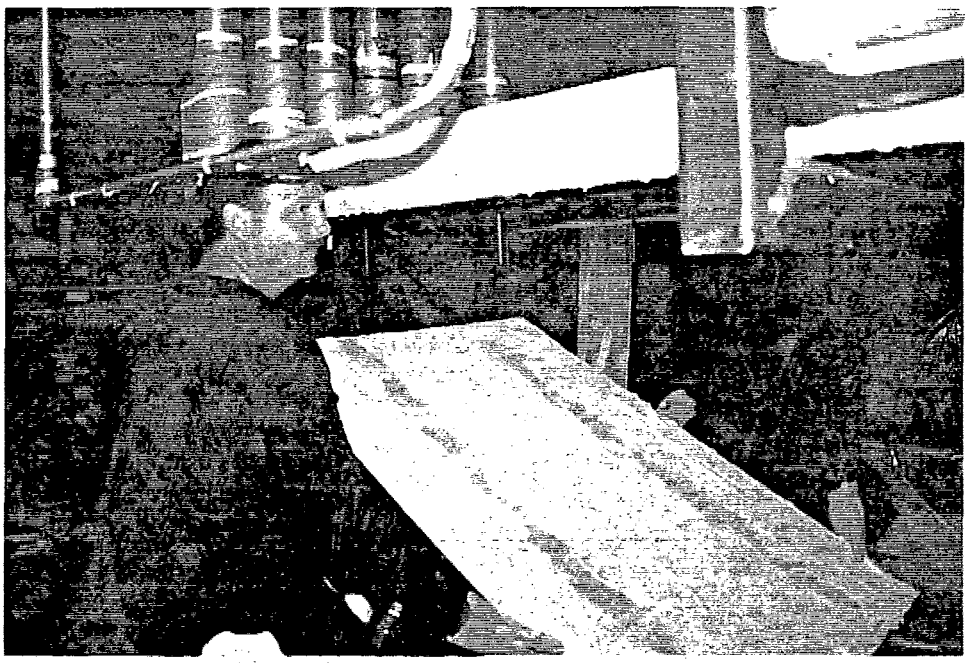
Pre-buttered, pre-shaped conduit section installed on outside conduits.



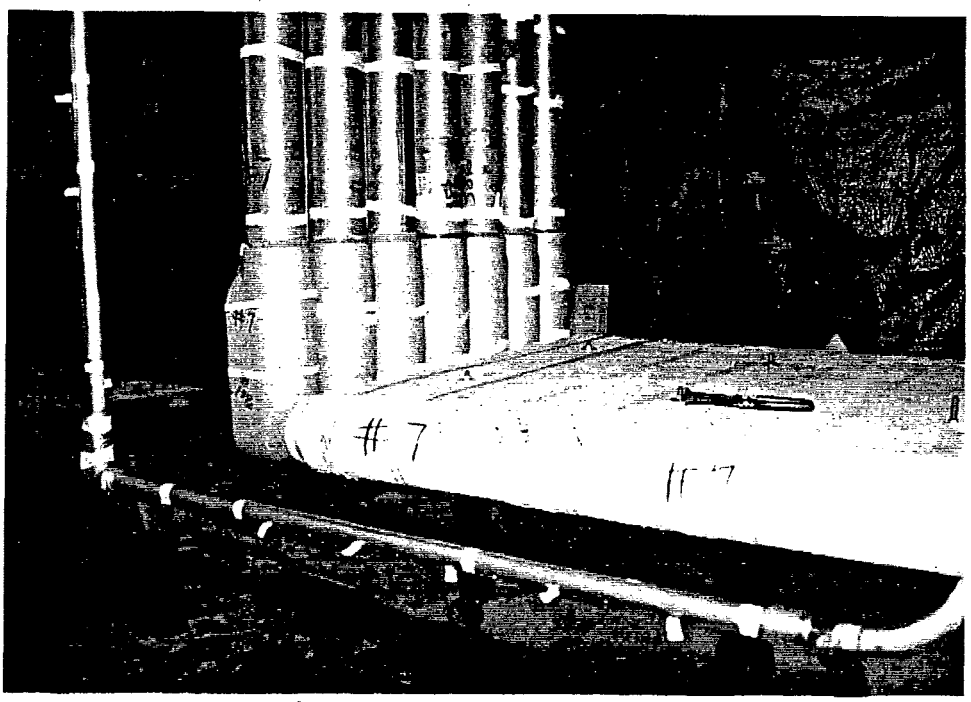
Pre-buttered panel installed on top of conduits.



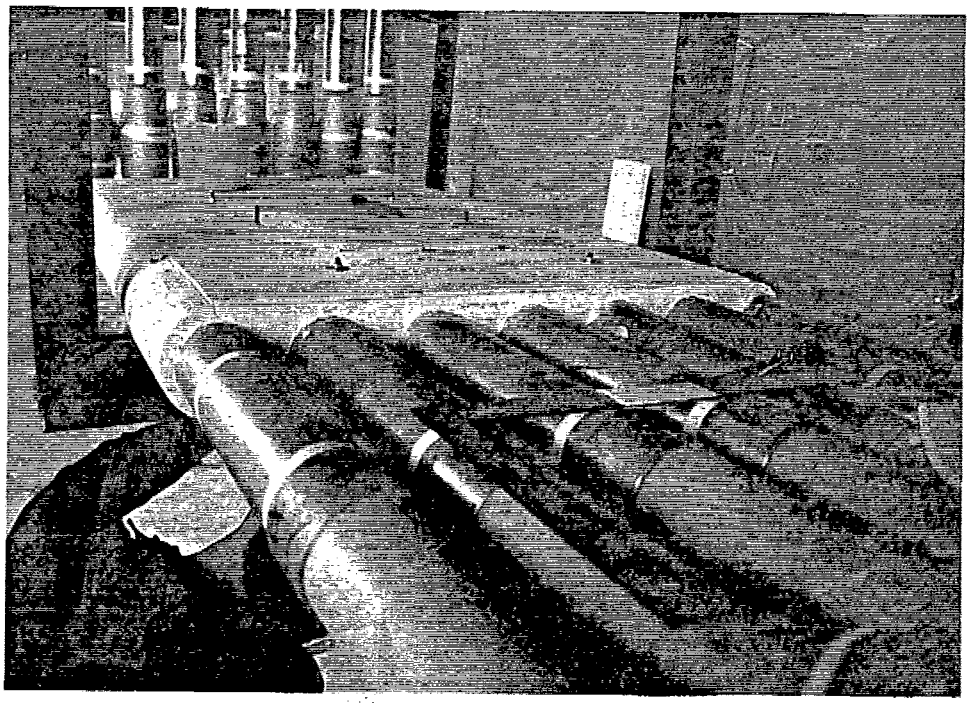
Panel held in place with threaded rod, washers and nuts.



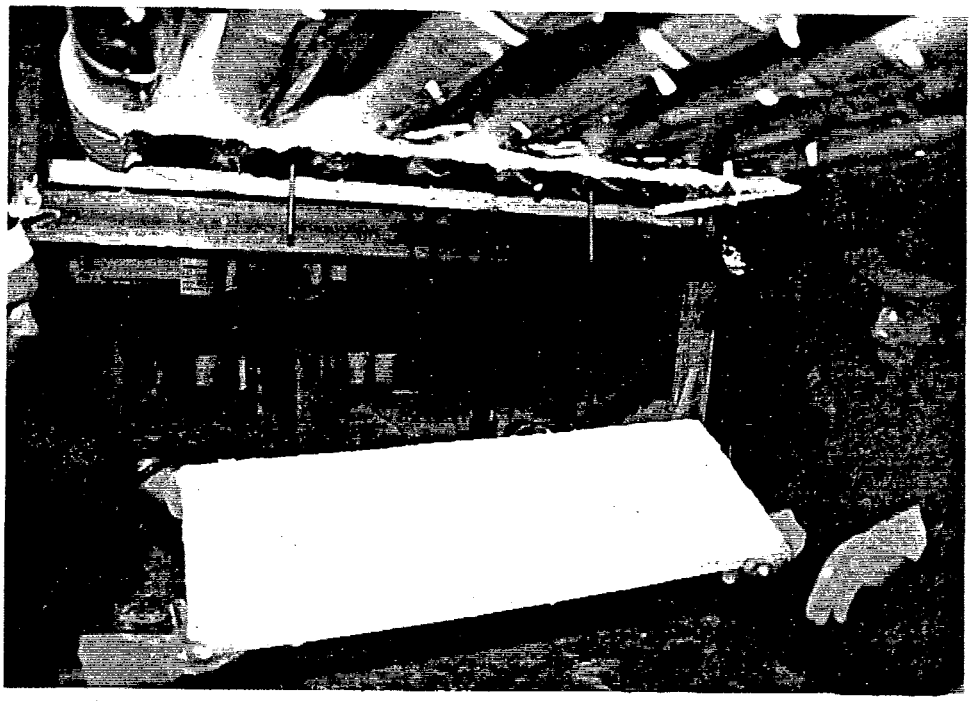
Pre-buttered panel installed on bottom of conduits.



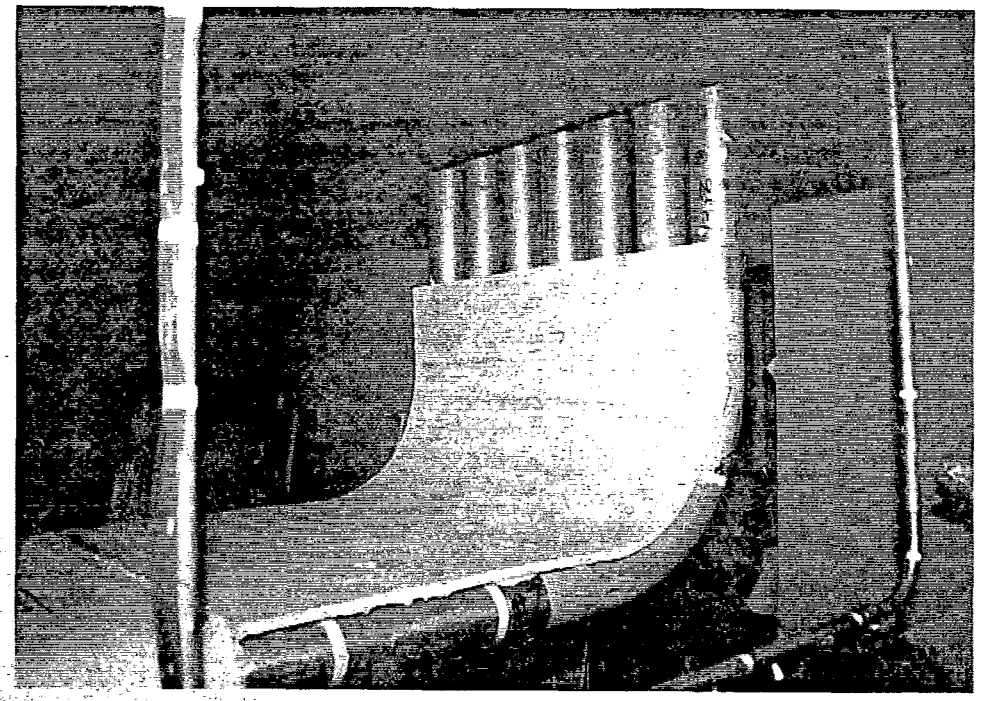
Panels secured with stainless steel tie wire.



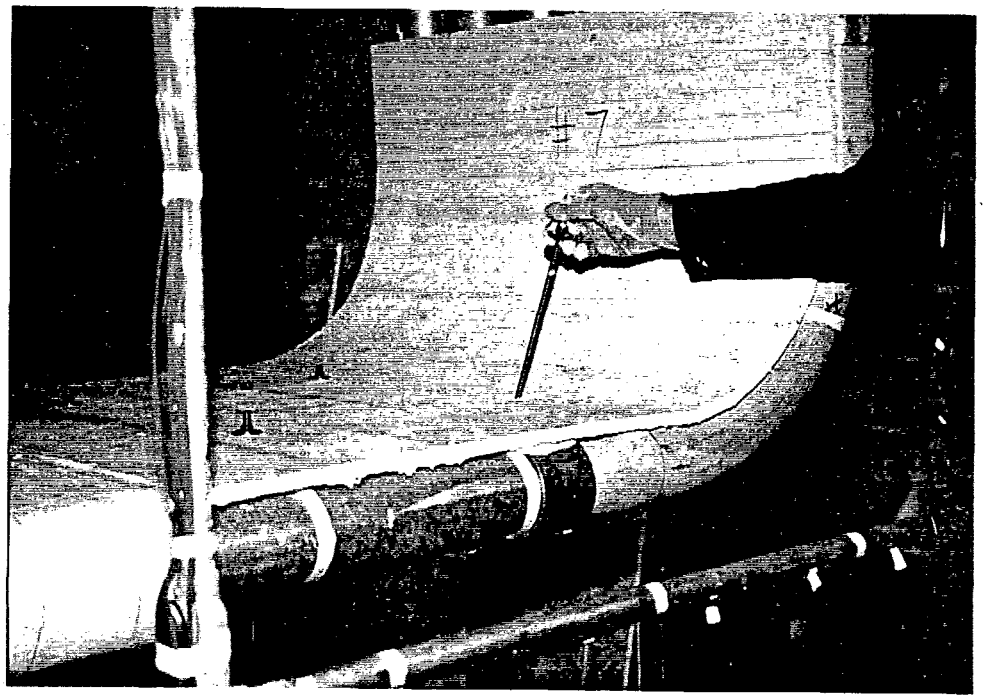
Panels installed between conduits near support location.



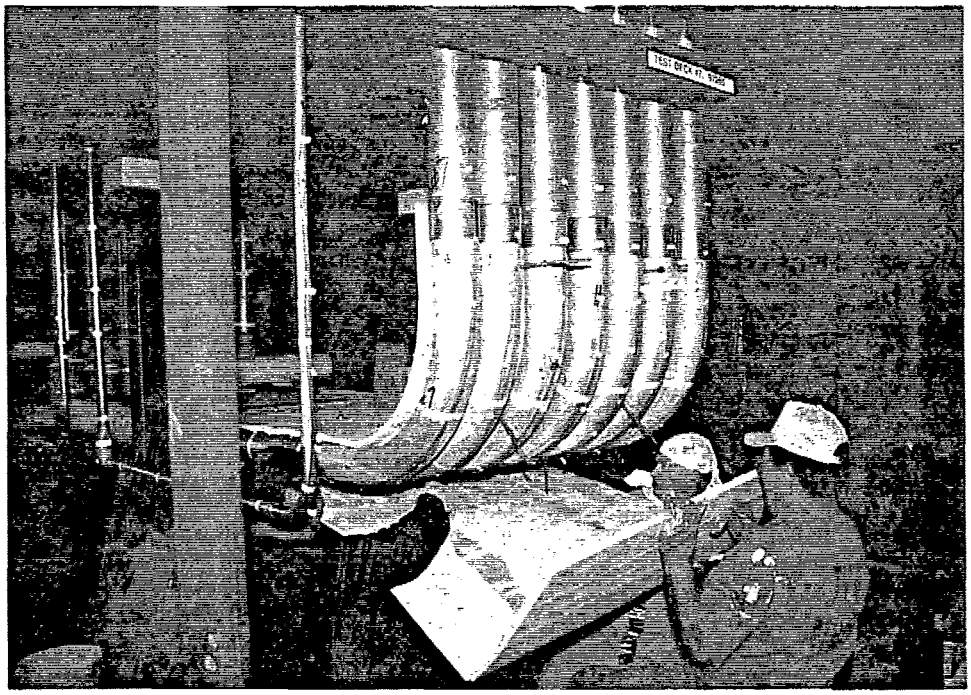
Pre-buttered panel installed on bottom of conduits.



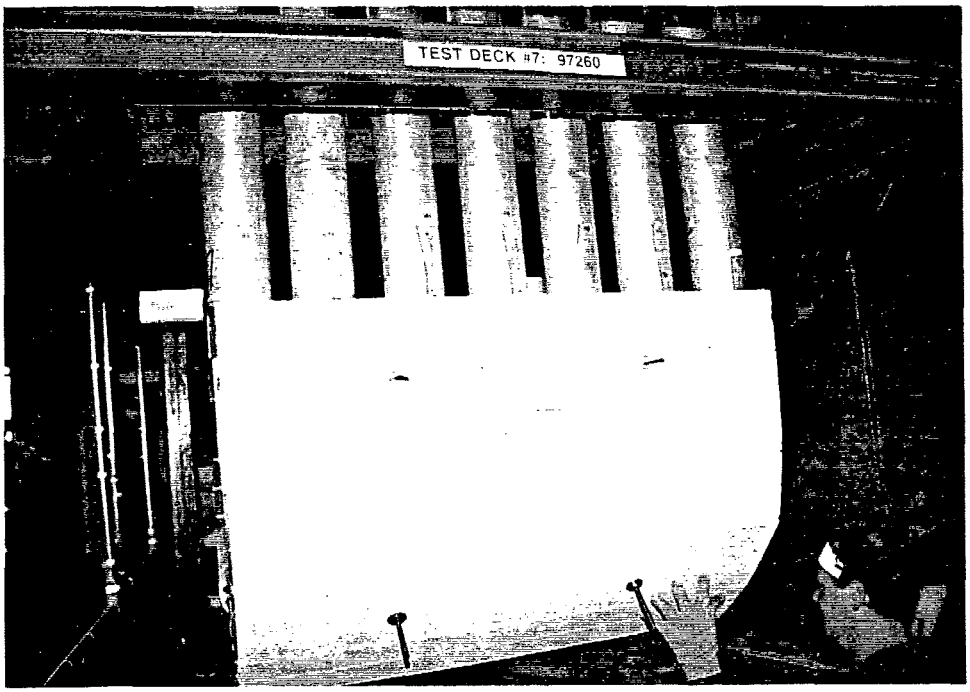
Scored and folded panel installed on top of conduits and radial bends.



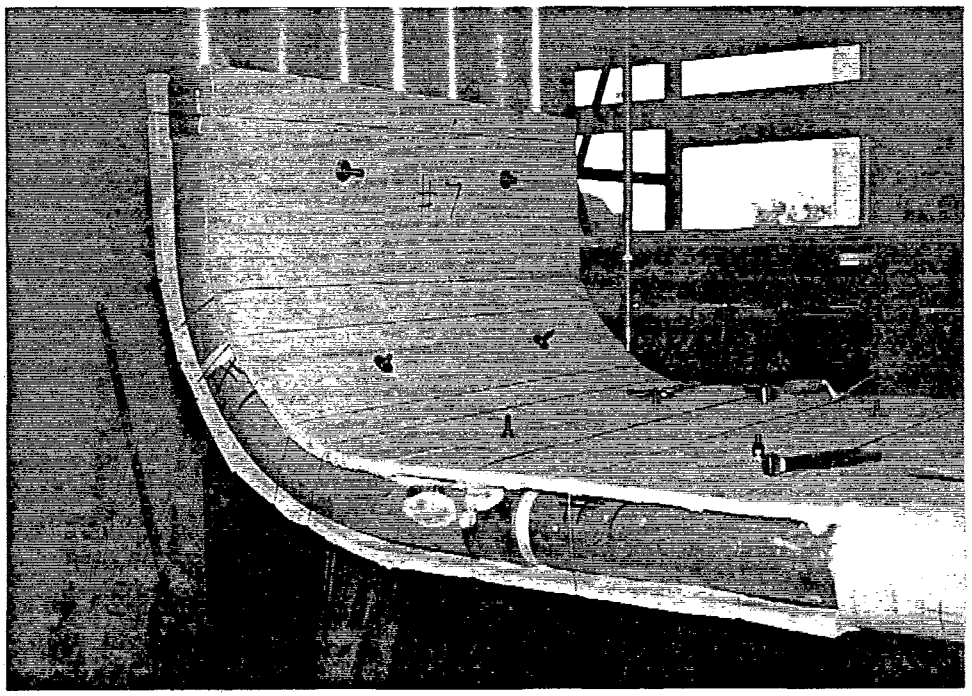
Panel secured with threaded rod, washers and nuts.



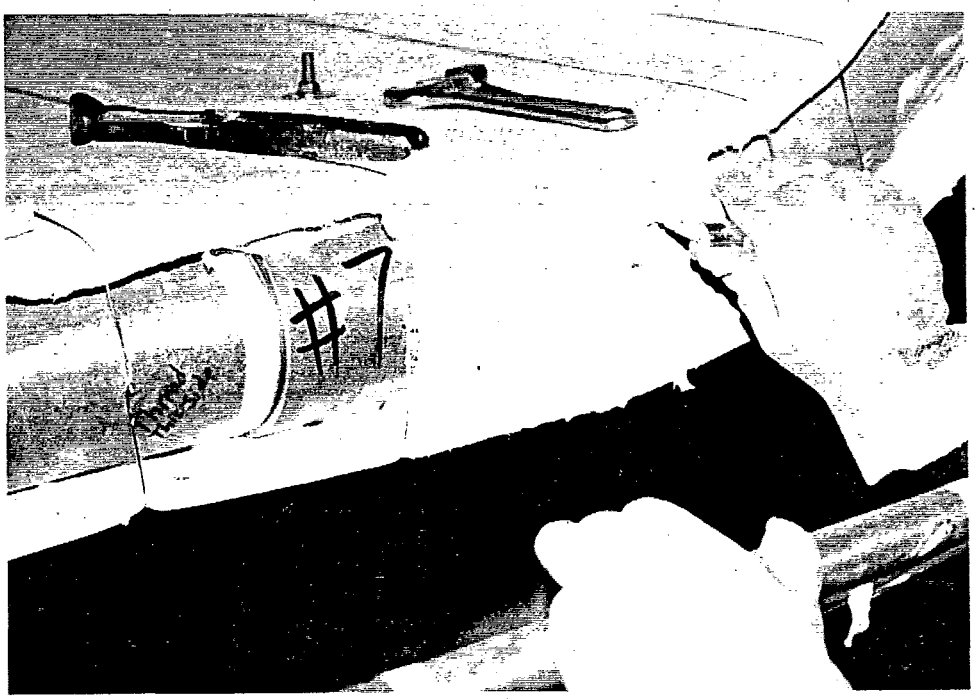
Scored and folded panel installed on bottom of conduits and radial bends.



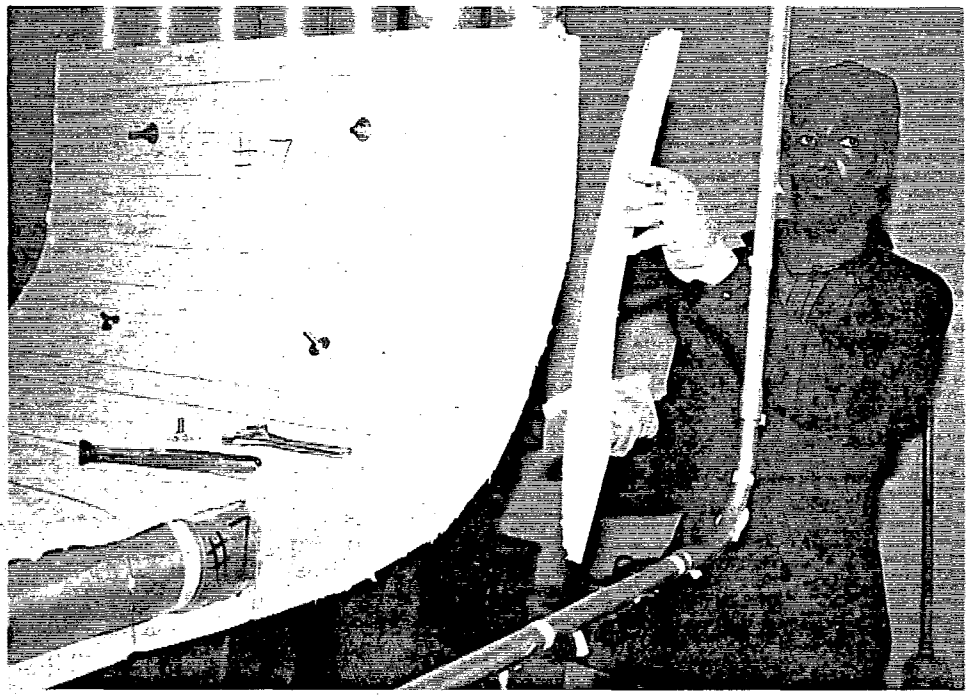
Panel secured with threaded rod, washers and nuts.



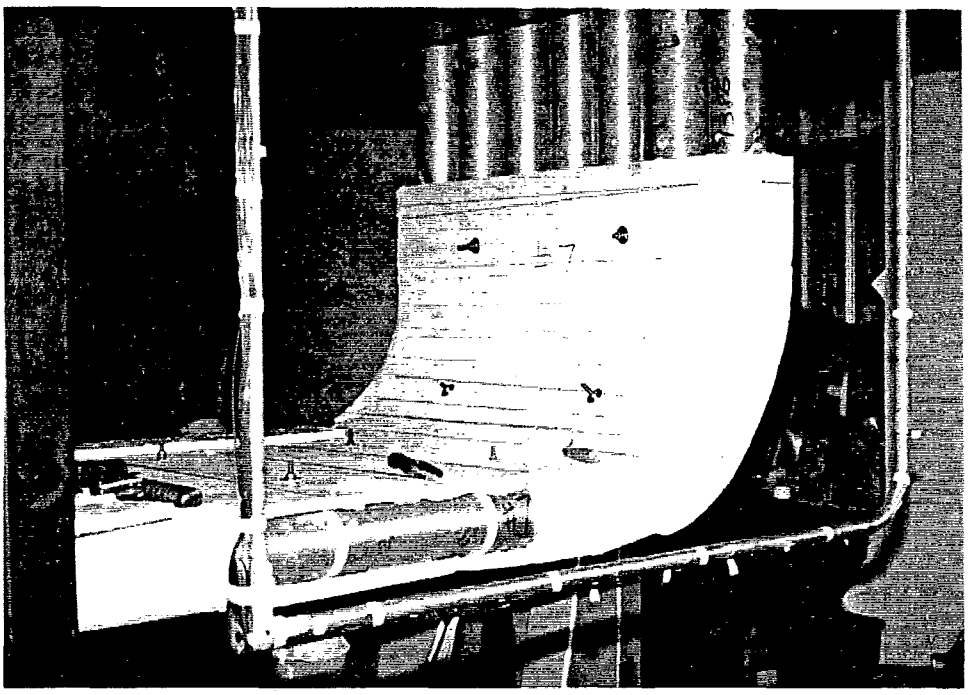
Panels installed on top and bottom of radial bends.



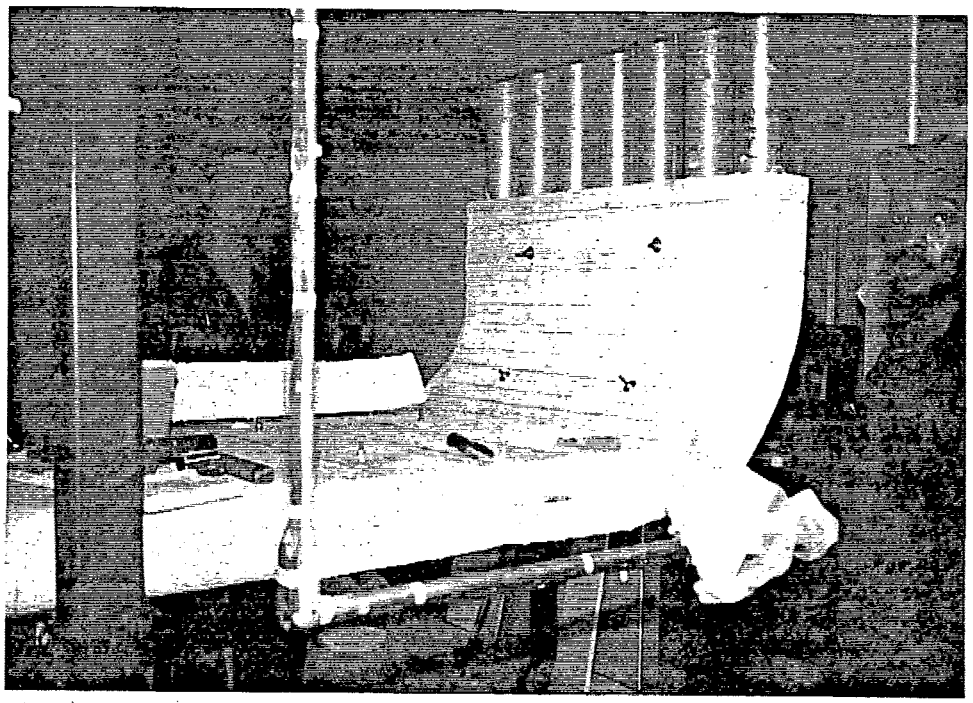
Sides of conduits and radial bends pre-buttered prior to panel installation.



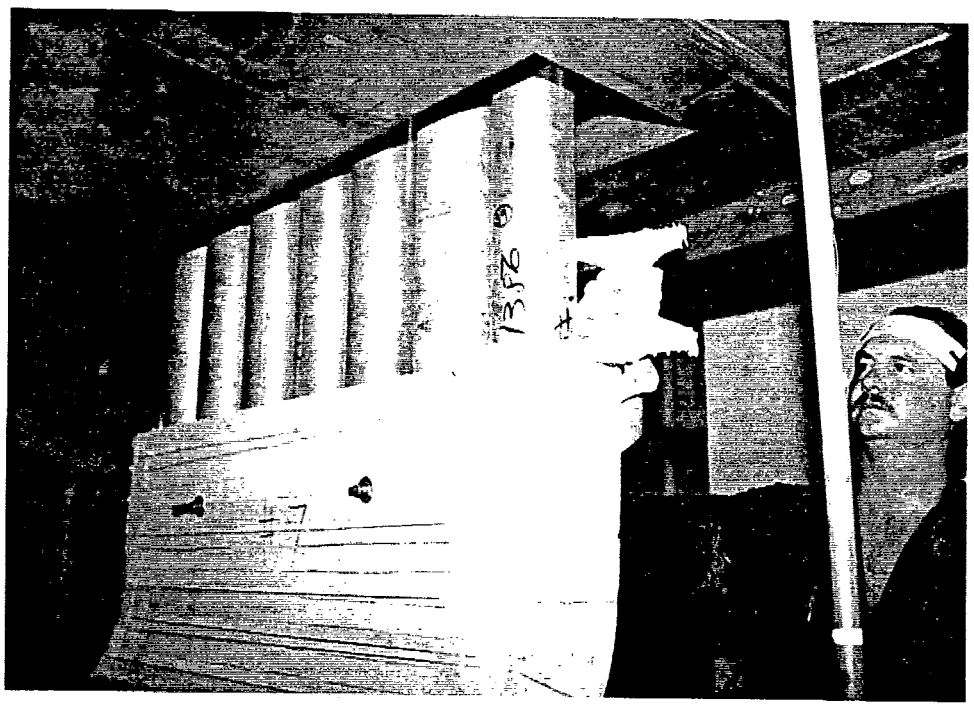
Pre-buttered panel installed on side of radial bend.



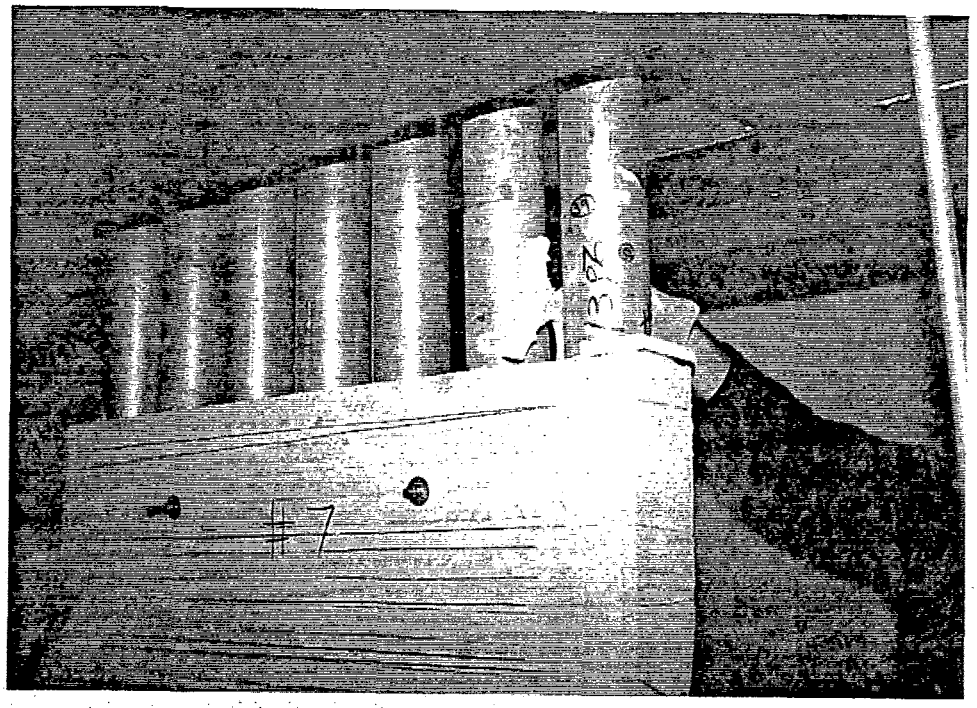
Panel secured with stainless steel tie wire.



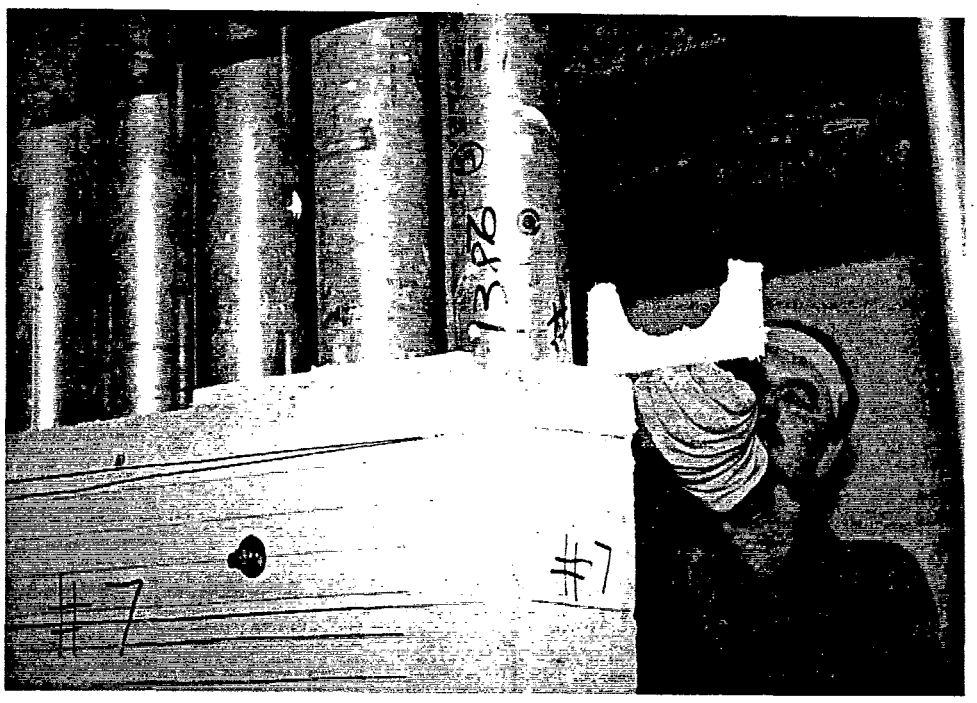
Pre-buttered panel installed side of conduits.



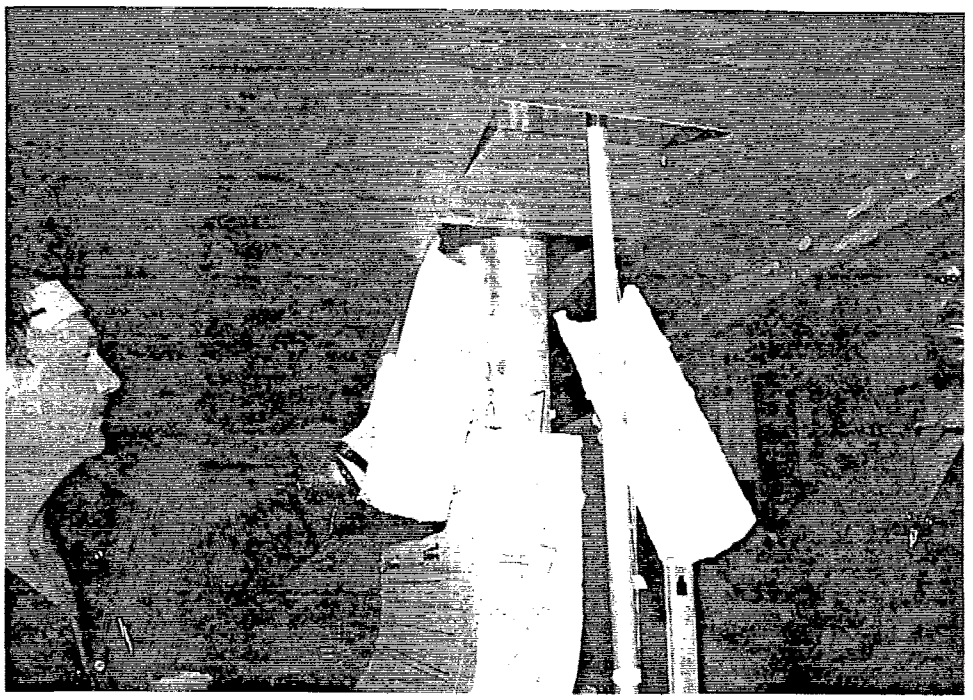
Pre-buttered panels installed between conduits at top of radial bends.



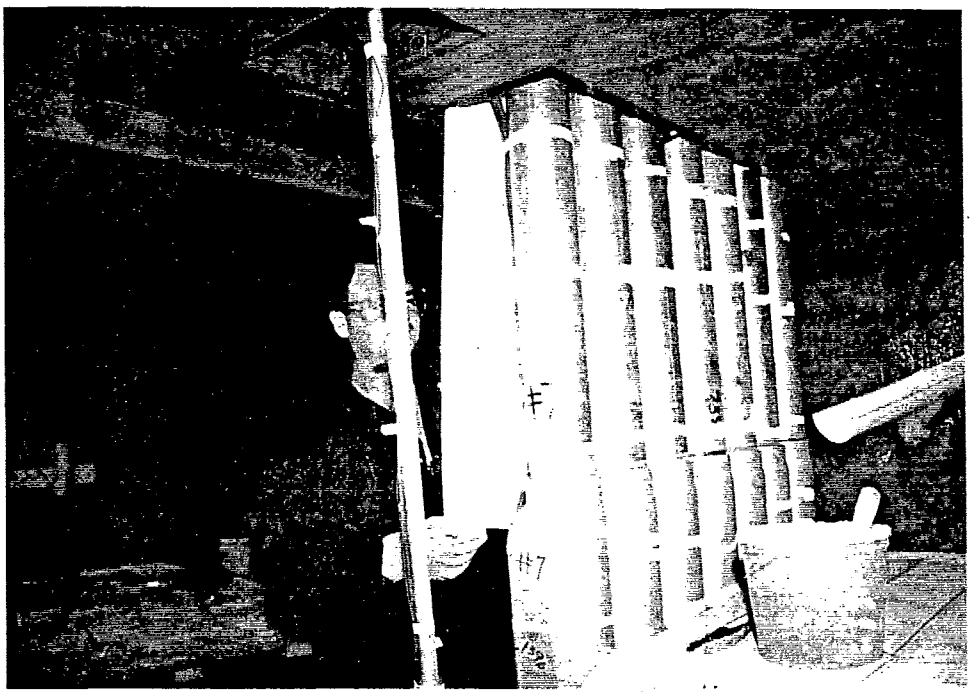
Pre-buttered panels installed between conduits at top of radial bends.



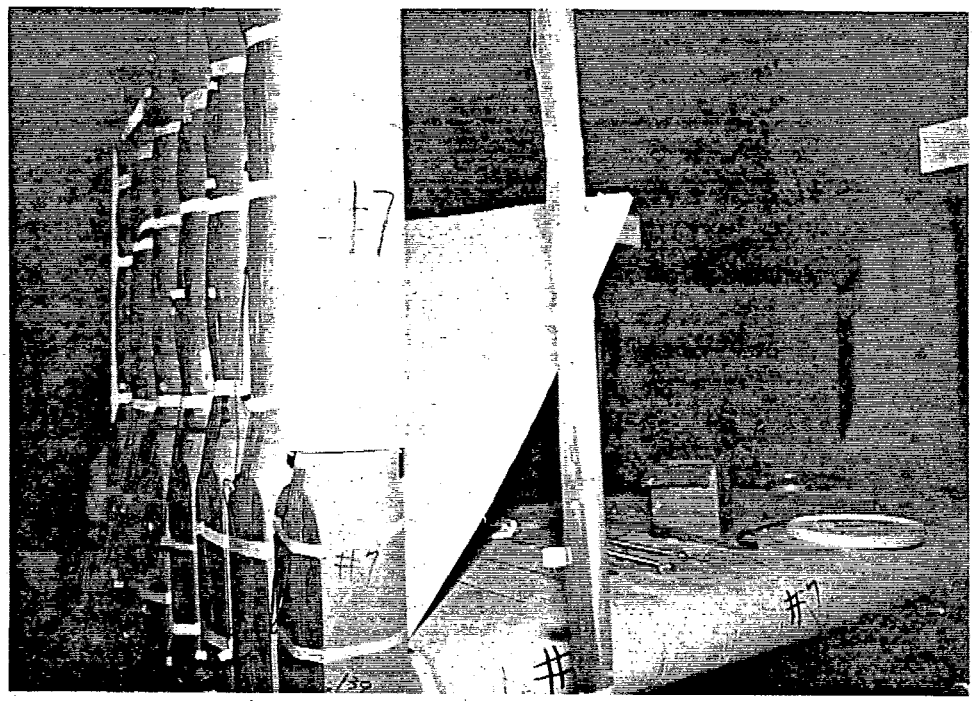
Pre-buttered panels installed between conduits at top of radial bends.



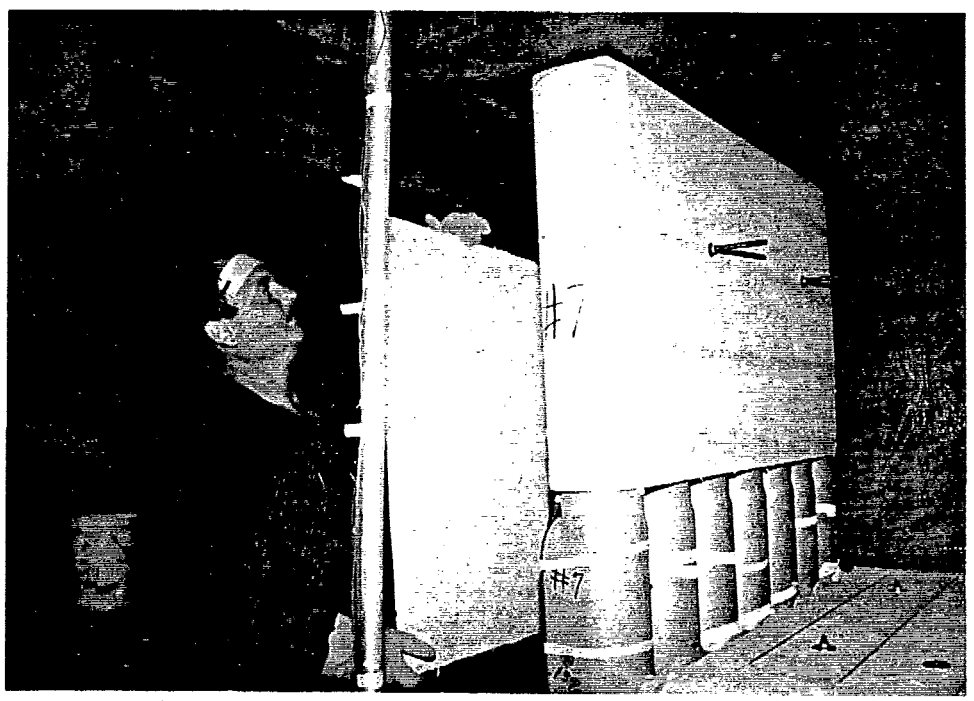
Pre-buttered, pre-shaped conduits sections installed on straight conduit above radial bends.



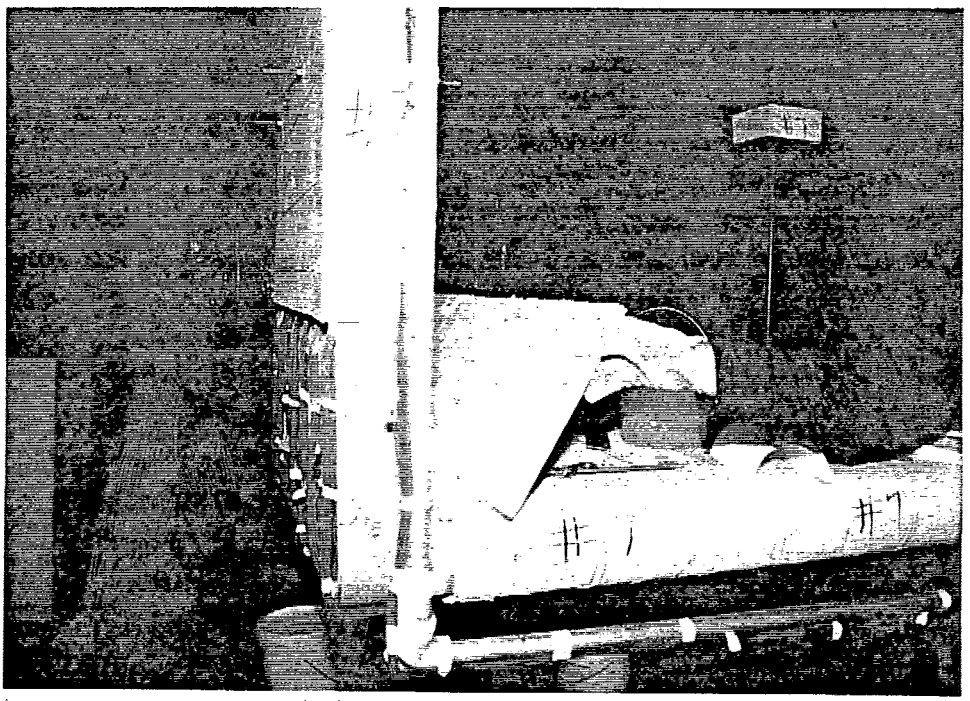
Panel installed on outside of conduits over LBs.



Pre-shaped conduit section installed on conduit over LB.

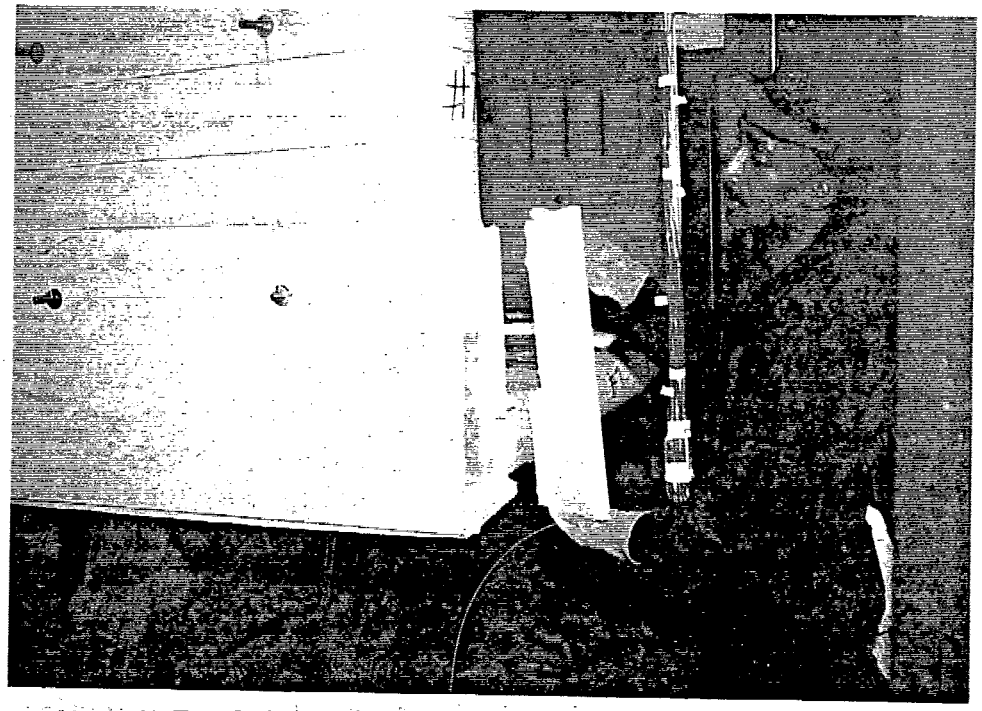


Panels secured with threaded rod, washers and nuts.

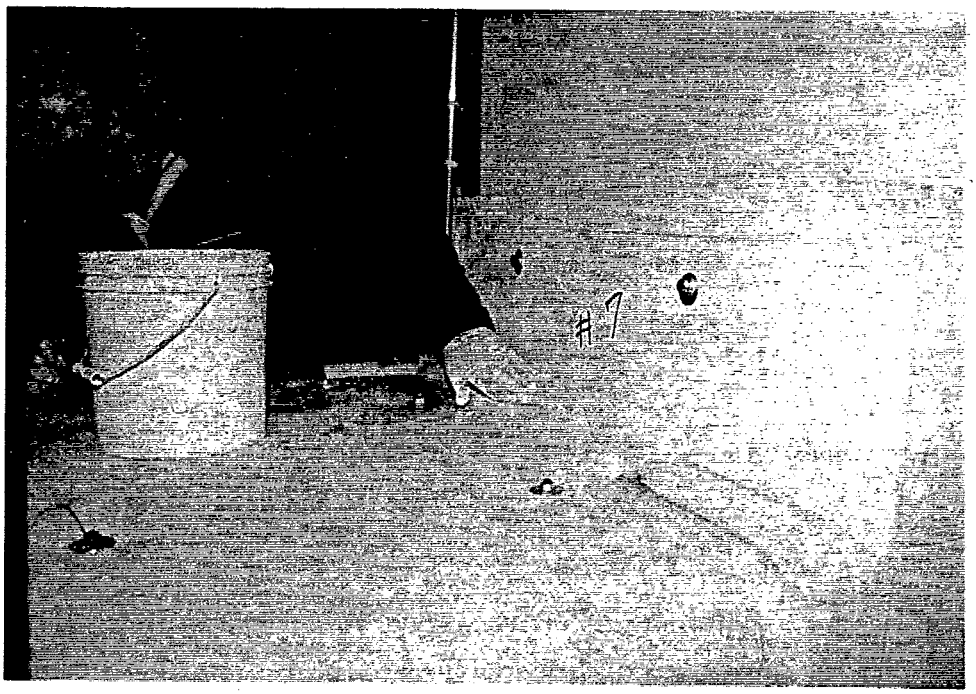


Pre-buttered panel installed over LBs

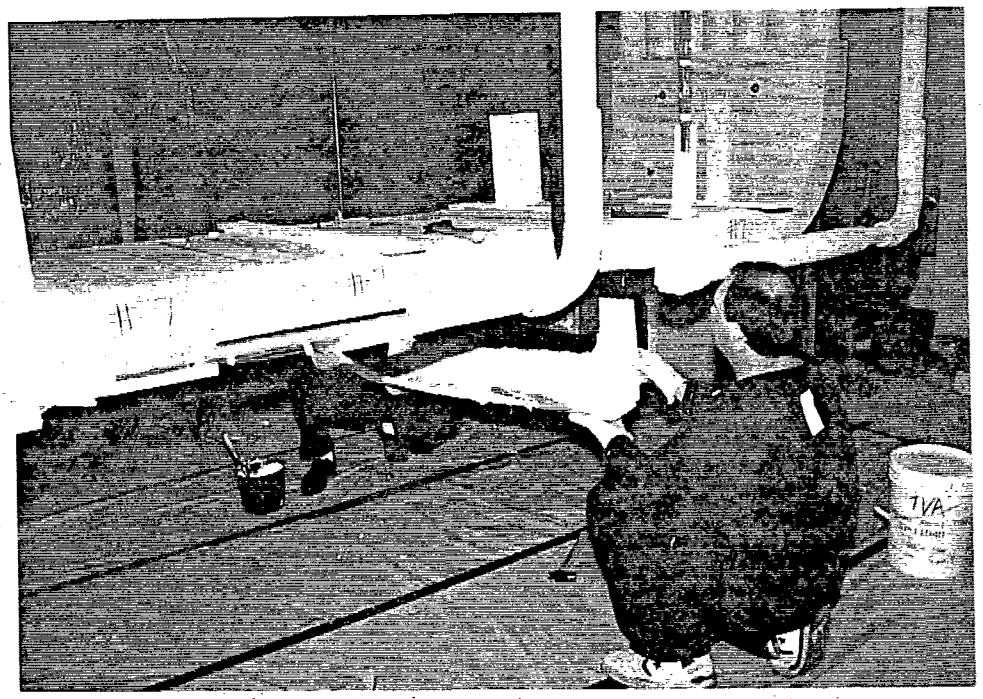
Scored and folded panel installed on bottom and outside of LBs.



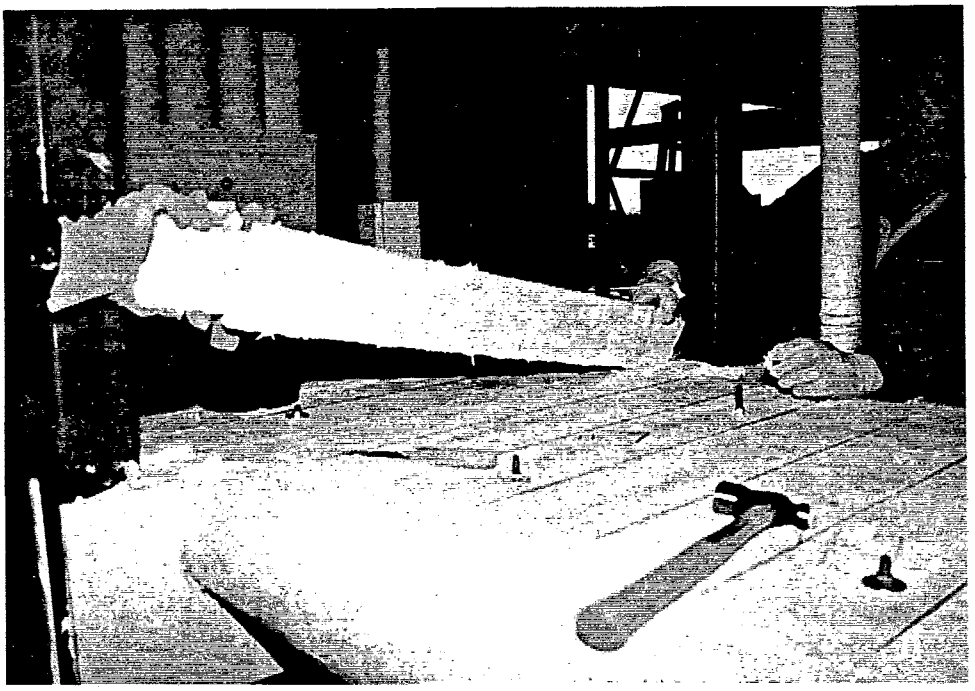
Pre-buttered panel installed on side of LB.



Trowel grade material applied to joints between panels on LBs.



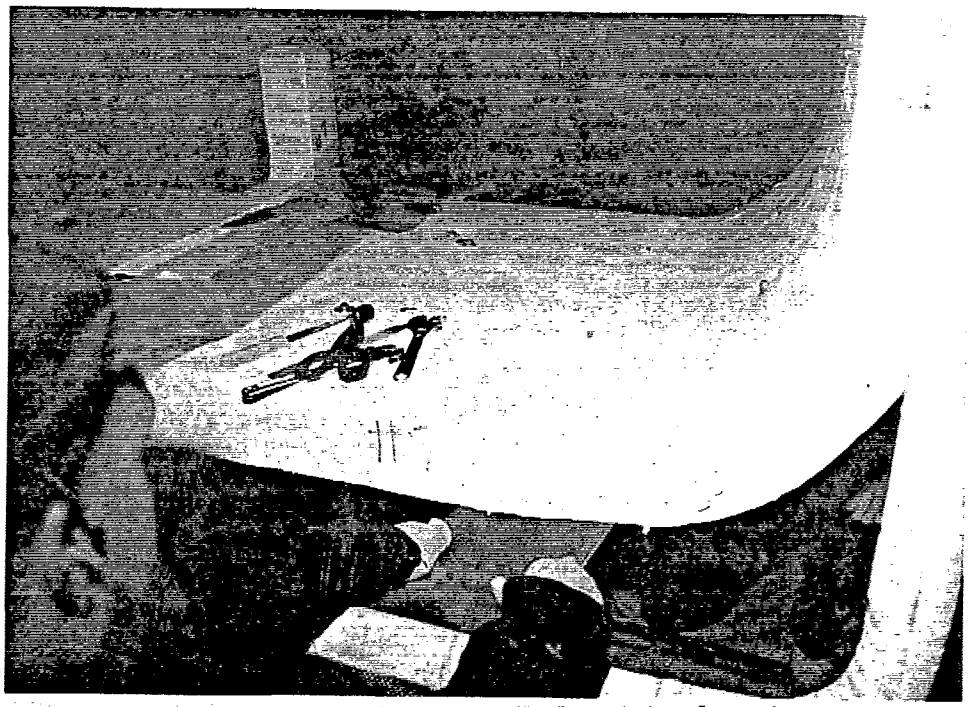
Pre-buttered panel installed on support member under conduits.



Pre-buttered strip installed over joint at support location.

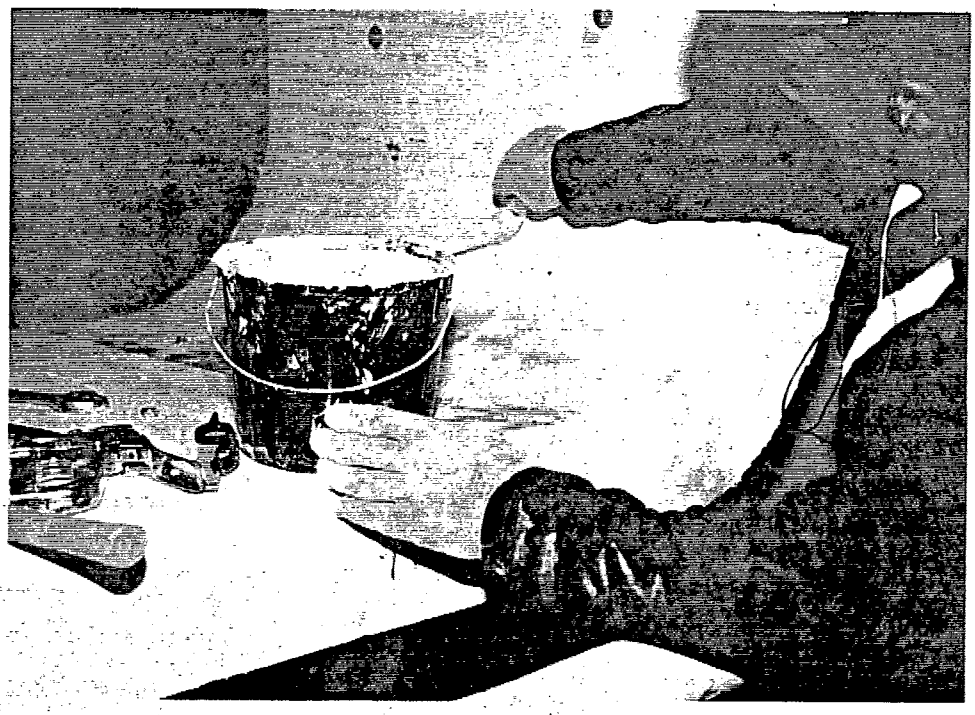
Pre-buttered, scored and folded panels installed on support member.

Skim coat of trowel grade material applied to enclosure.

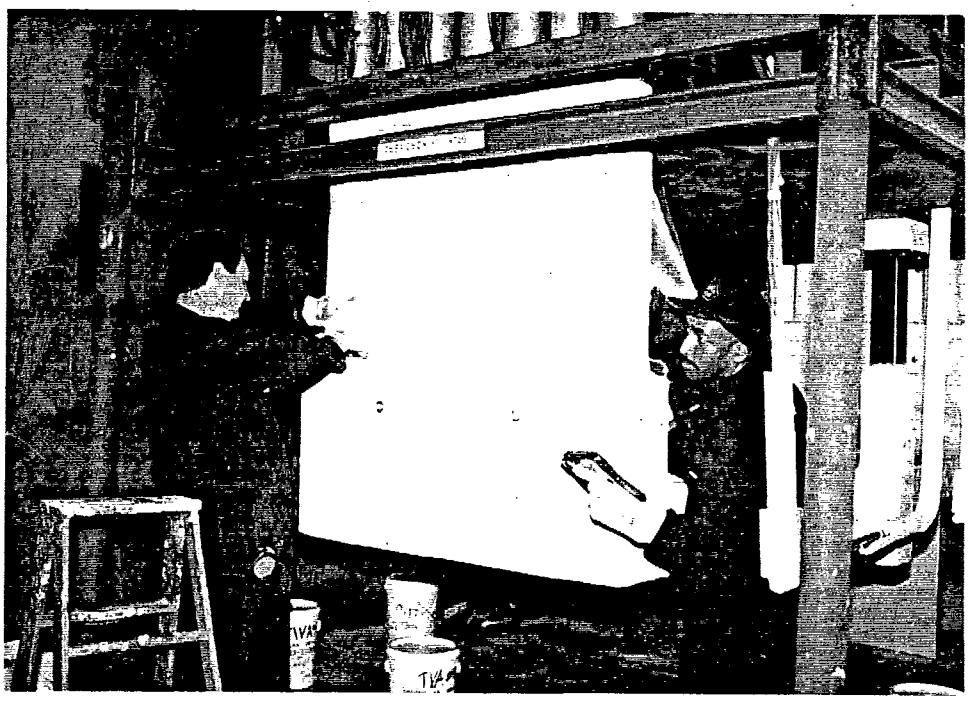


External stress skin installed at joint loactions.

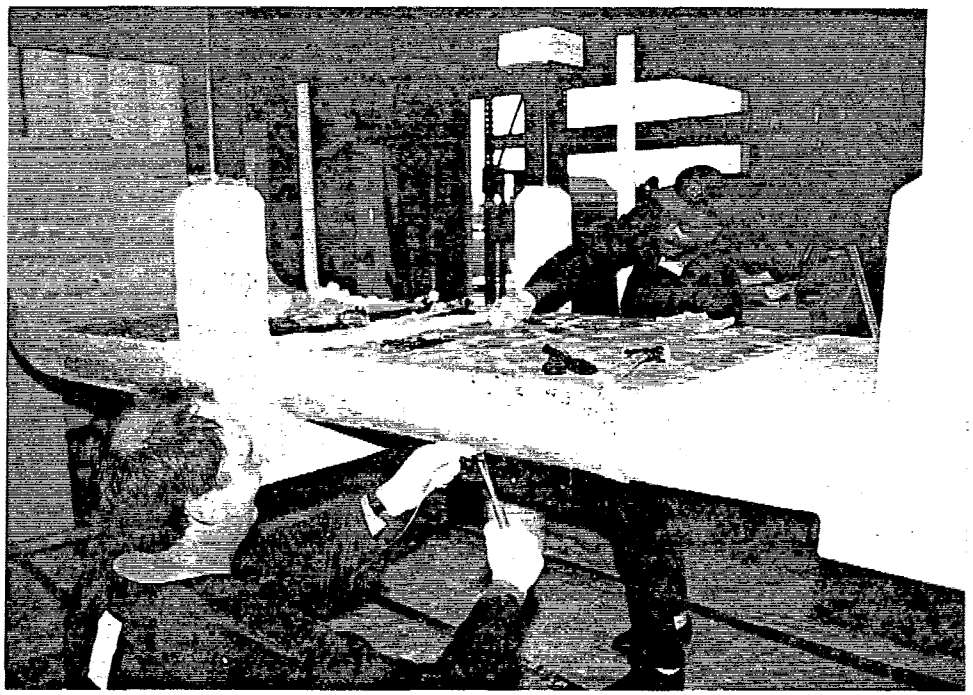
External stress skin stapled in place.



Skim coat of trowel grade material applied over external stress skin.

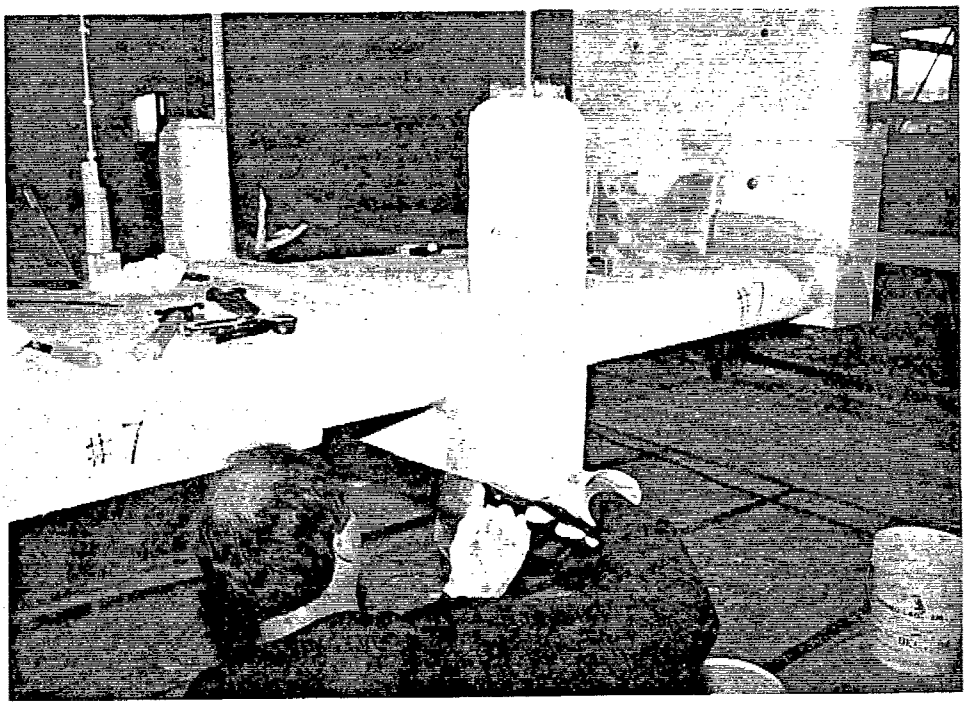


External stress skin installed over material installed over LBs.

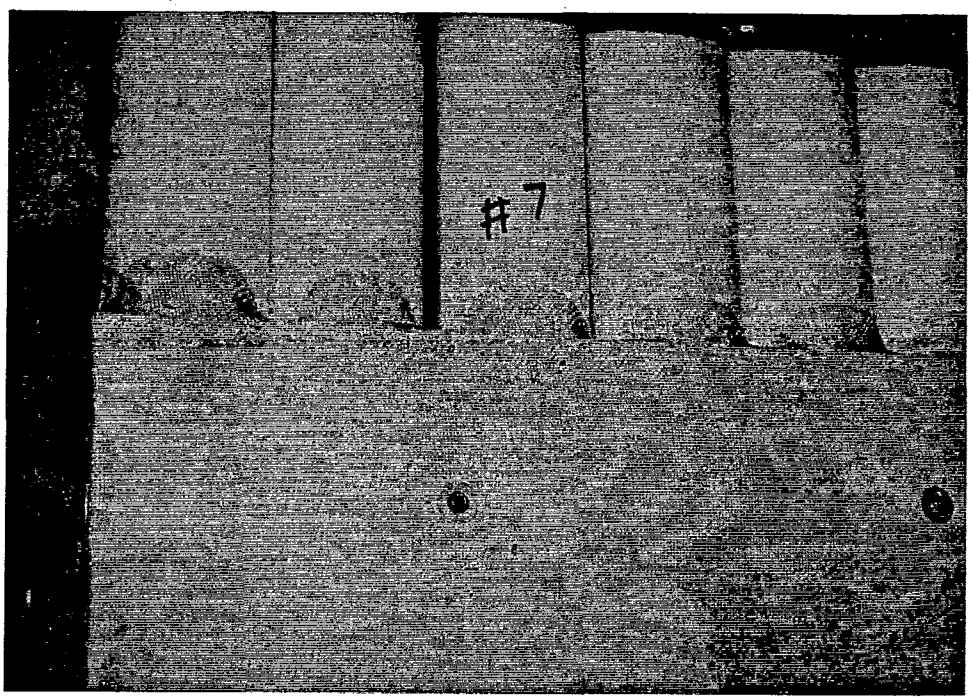


External stress skin secured with washers, nuts and stinless steel tie wires.

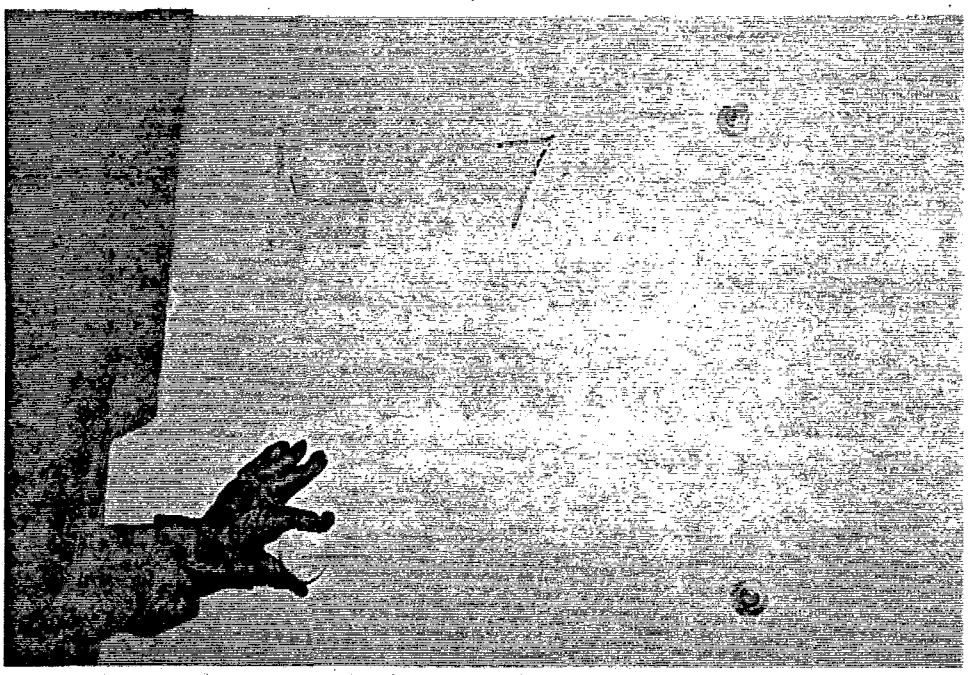
External stress skin installed over strip at support location.



External stress skin installed over support members.



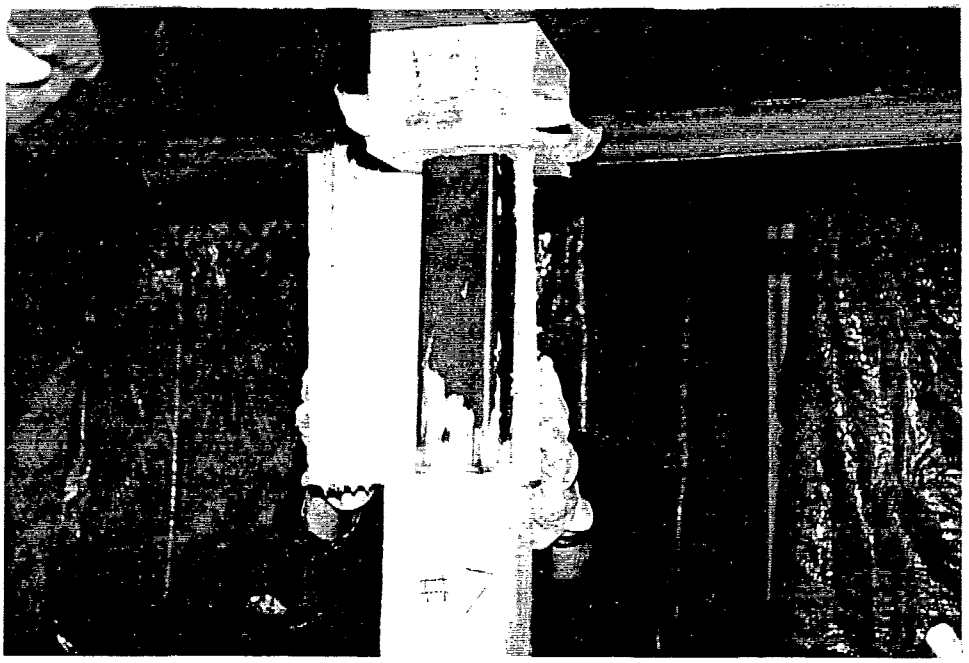
Details of external stress skin installation over radial bends at preformed conduit interface.



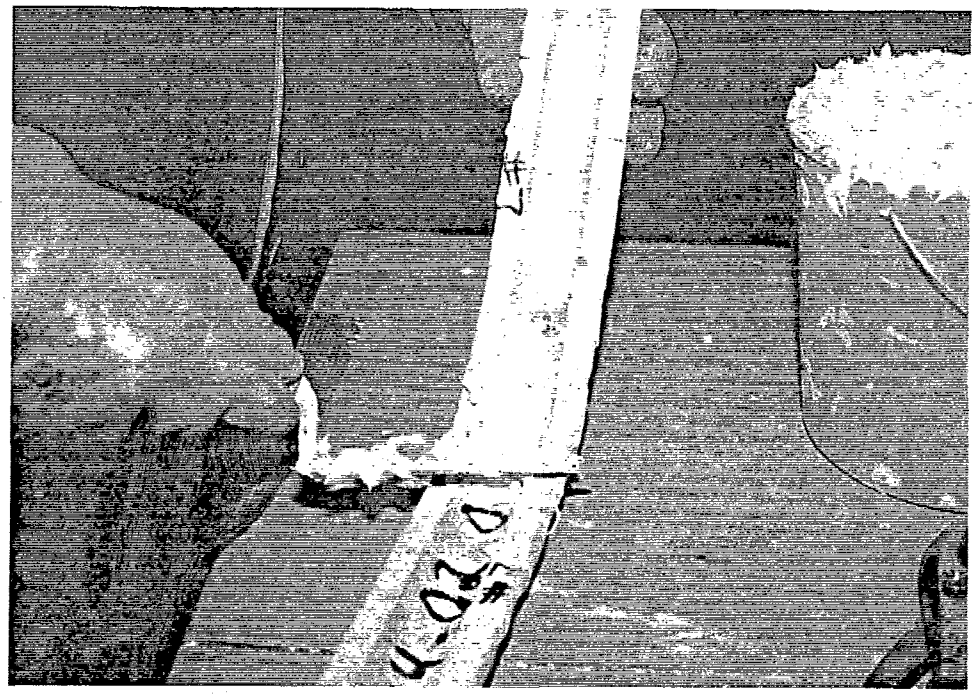
Mounds of trowel grade material installed over washers and nuts.

External stress skin stapled over mounds of trowel grade material.

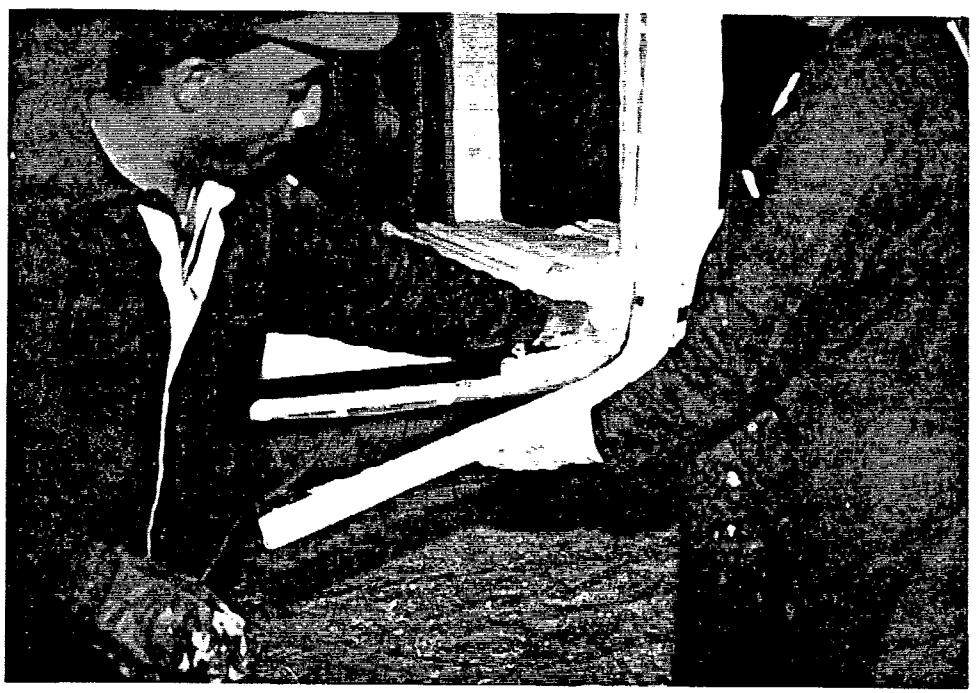
View of external stress skin and mounds on nuts in the radial bend area.



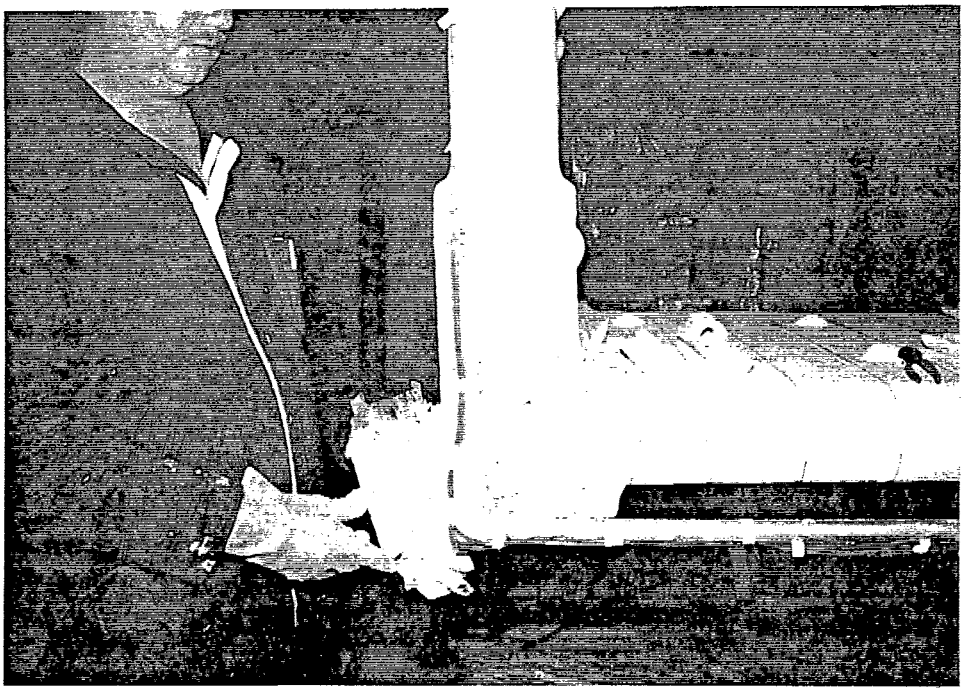
Pre-buttered, scored and folded panels installed on vertical portions of supports.



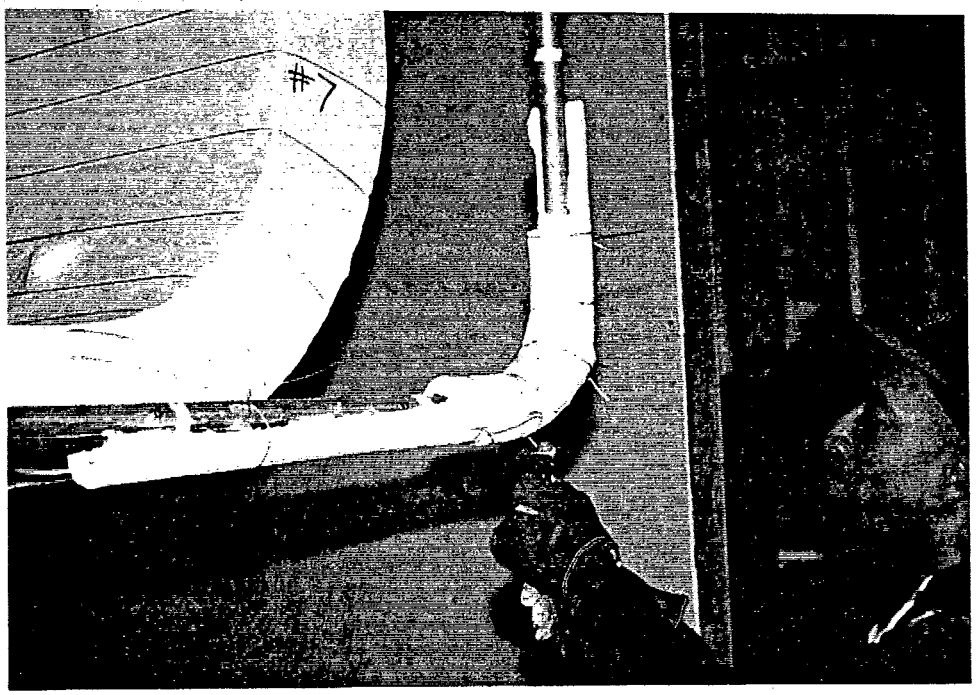
Bent pre-shaped conduit section pre-buttered prior to installation.



Pre-buttered pre-shaped conduit sections installed on radial bend.

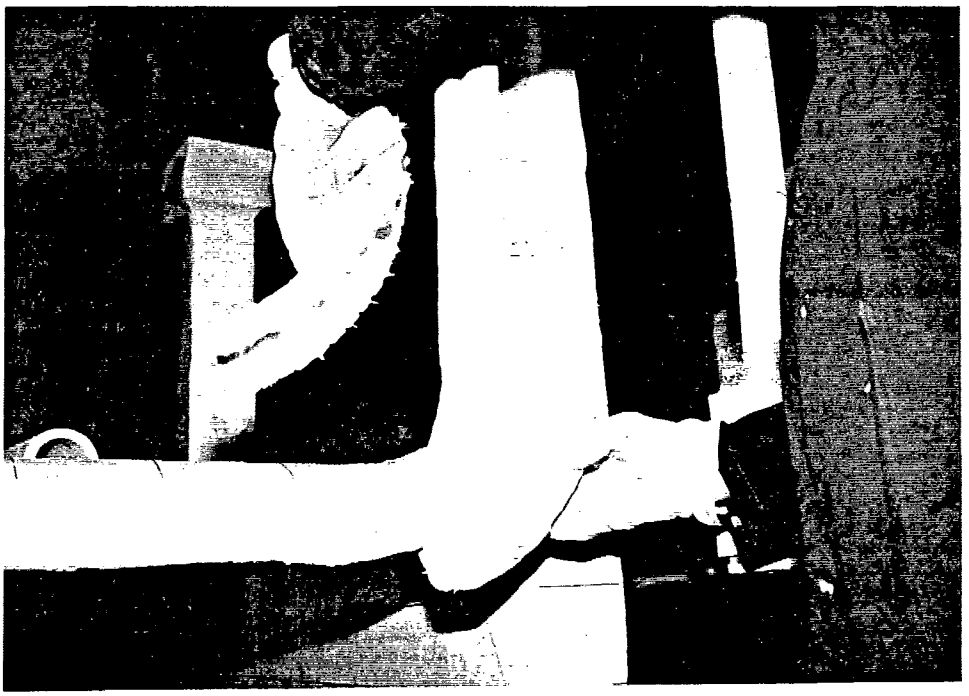


Pre-buttered panel folded and installed on 3/4 in. LB.

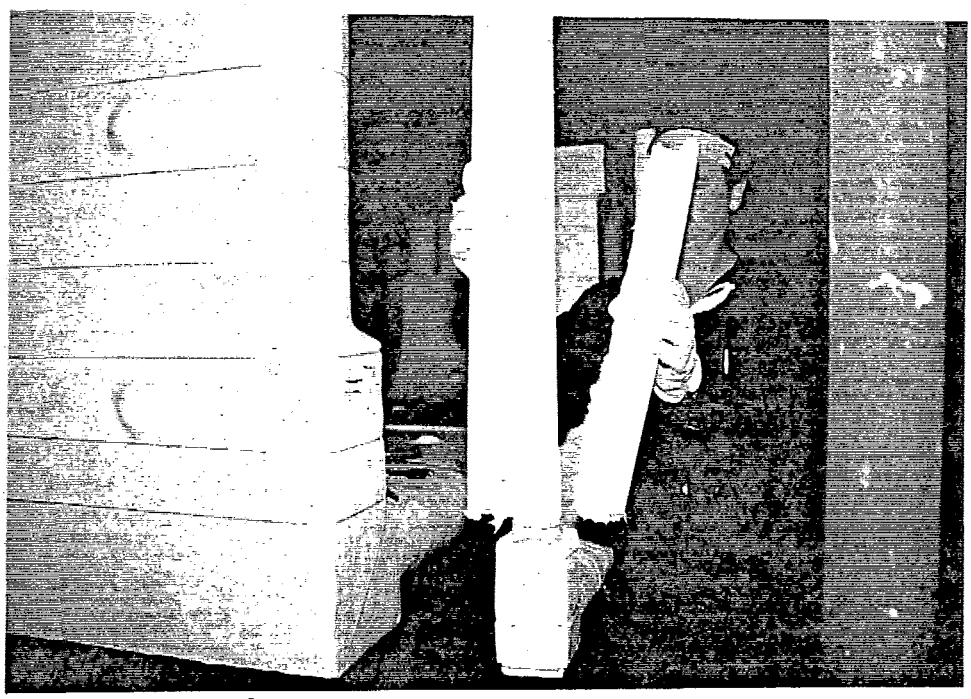


Pre-shaped conduit sections secured with stainless steel tie wires.

Pre-shaped conduit sections installed on vertical sections of conduit over LBs.

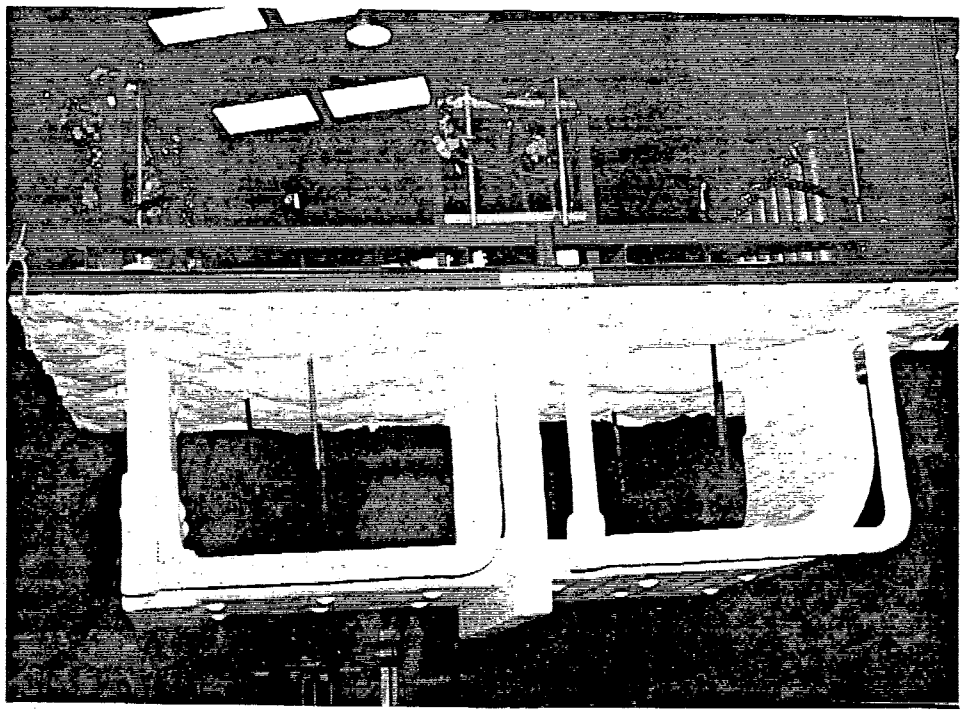


Second layer of pre-shaped conduit sections installed on 3/4 in. conduits.

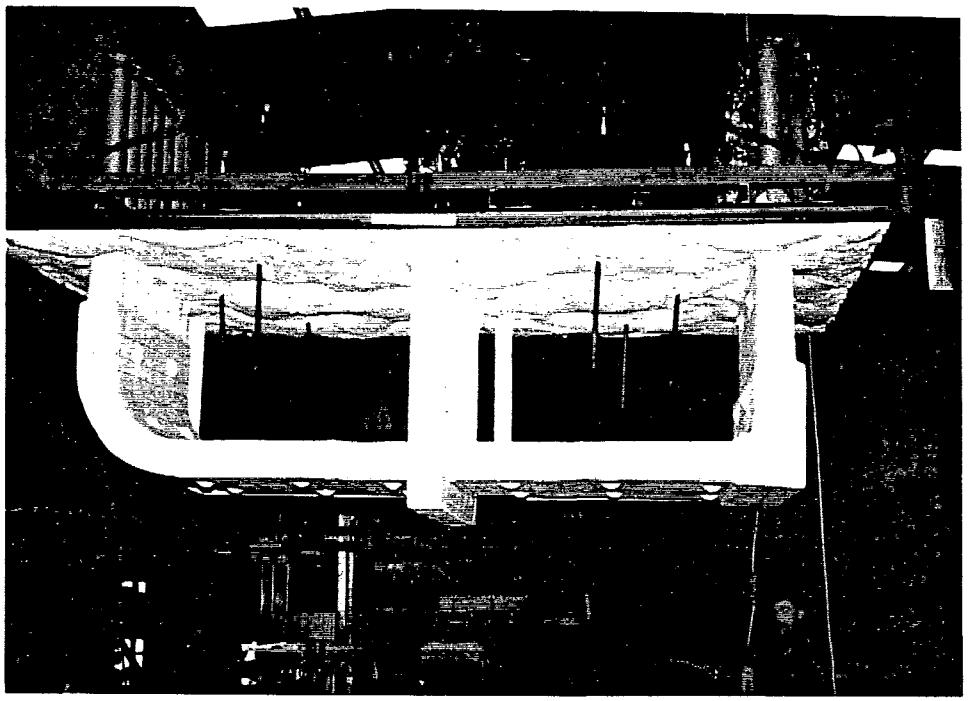


Second layer of pre-shaped conduit sections installed on 3/4 in. conduits.

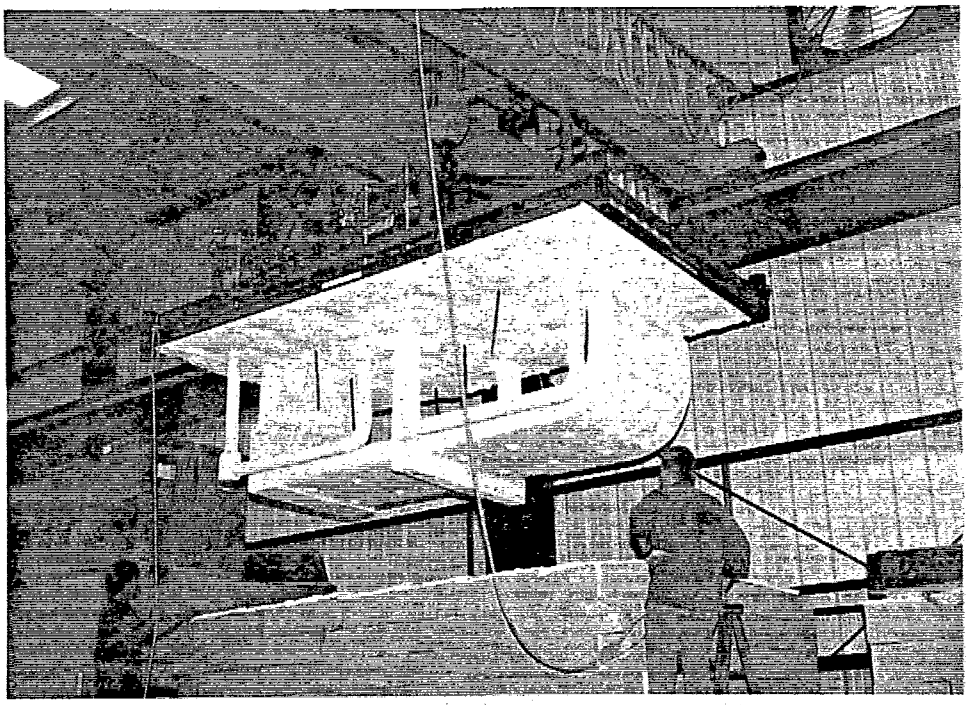
External stress skin installed on 3/4 in. conduit radial bends.



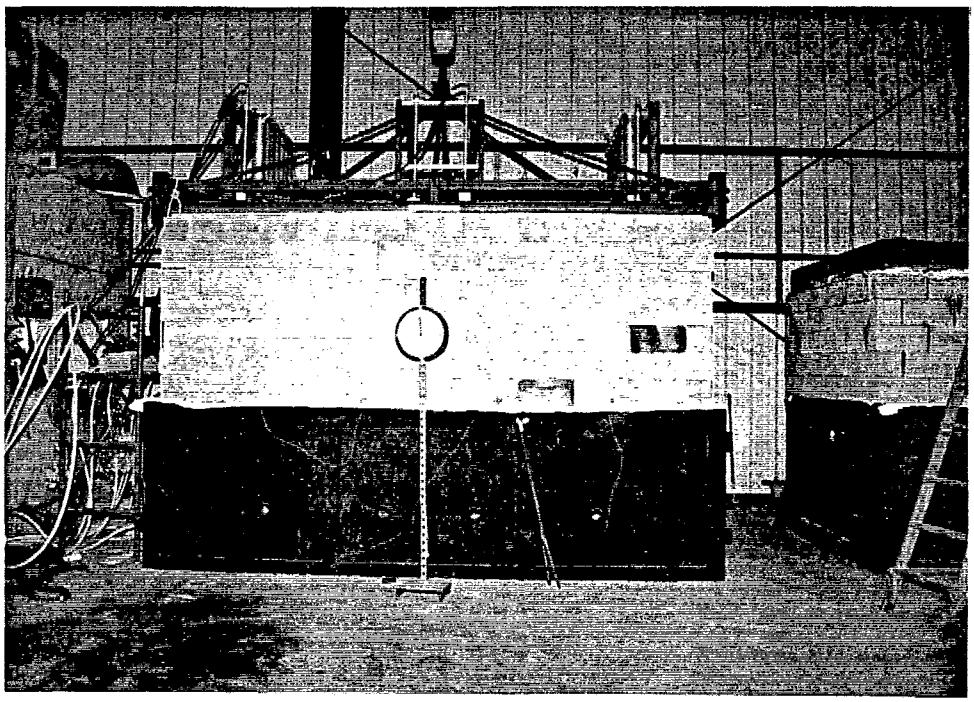
Front view of completed test assembly.



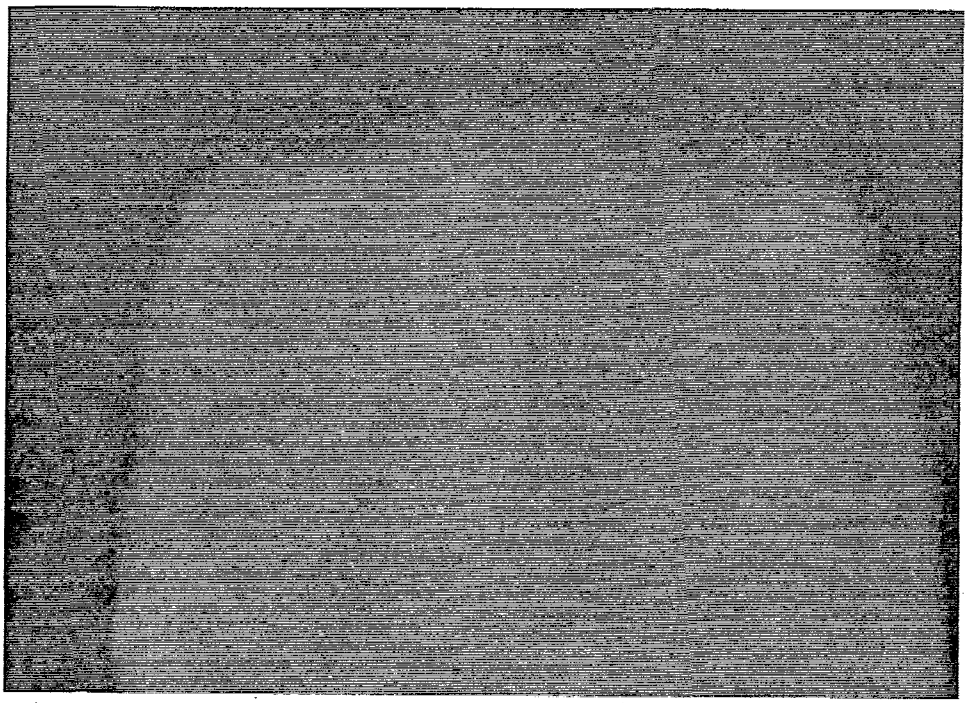
Rear view of completed test assembly.



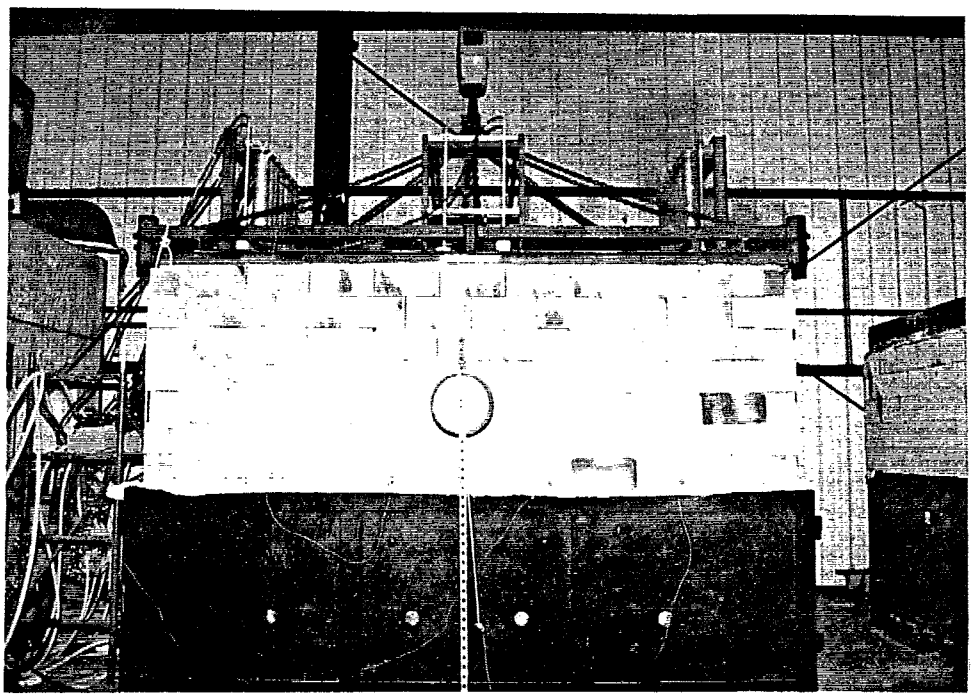
Test deck installed onto furnace.



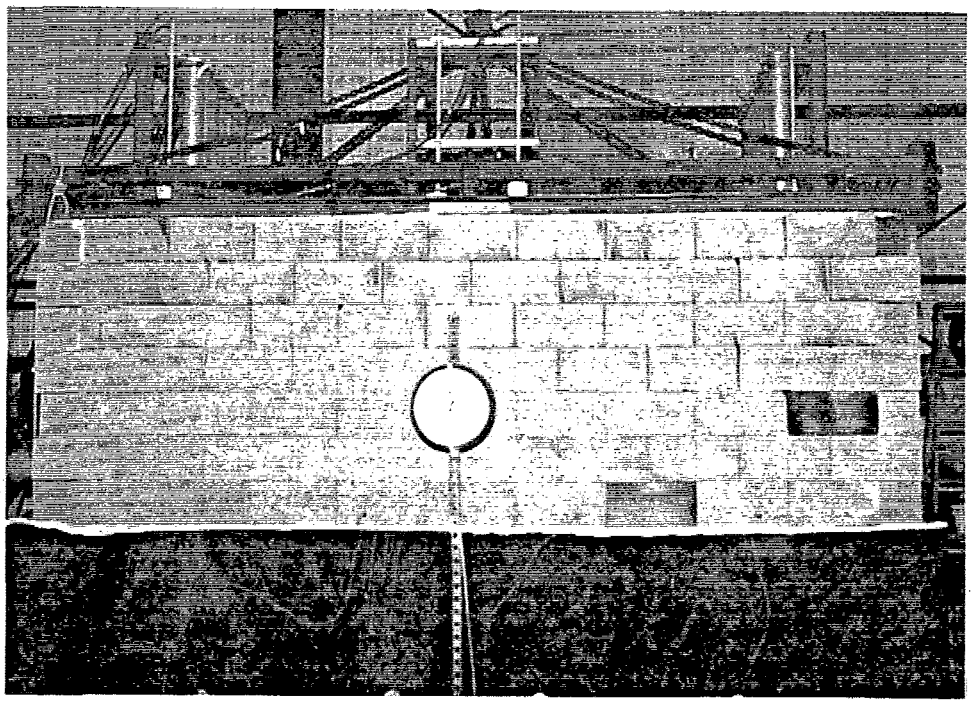
Test furnace prior to start of fire exposure.



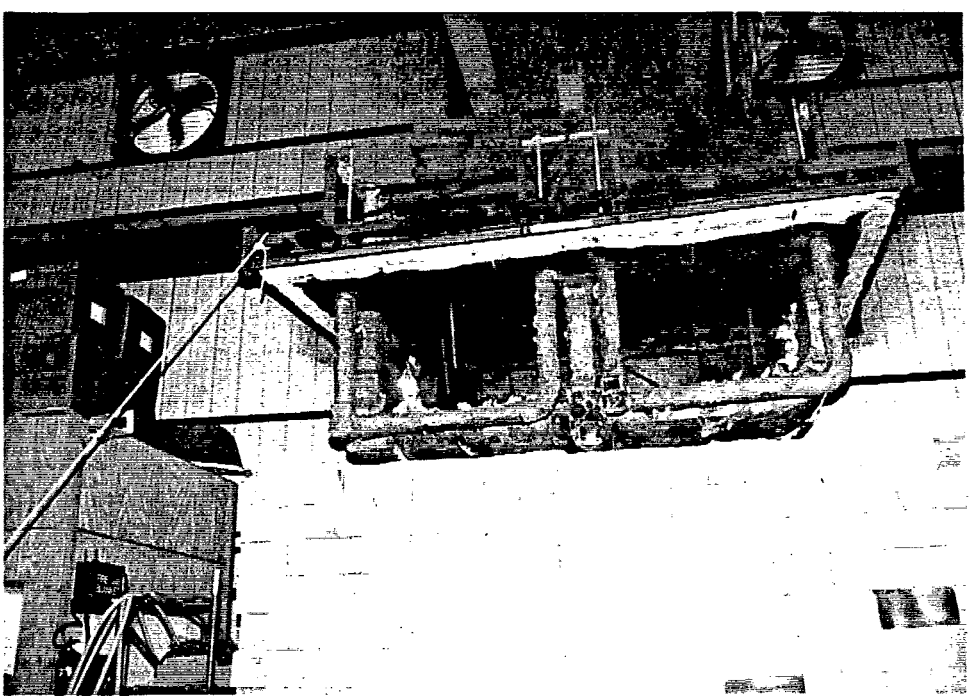
Furnace interior during fire exposure.



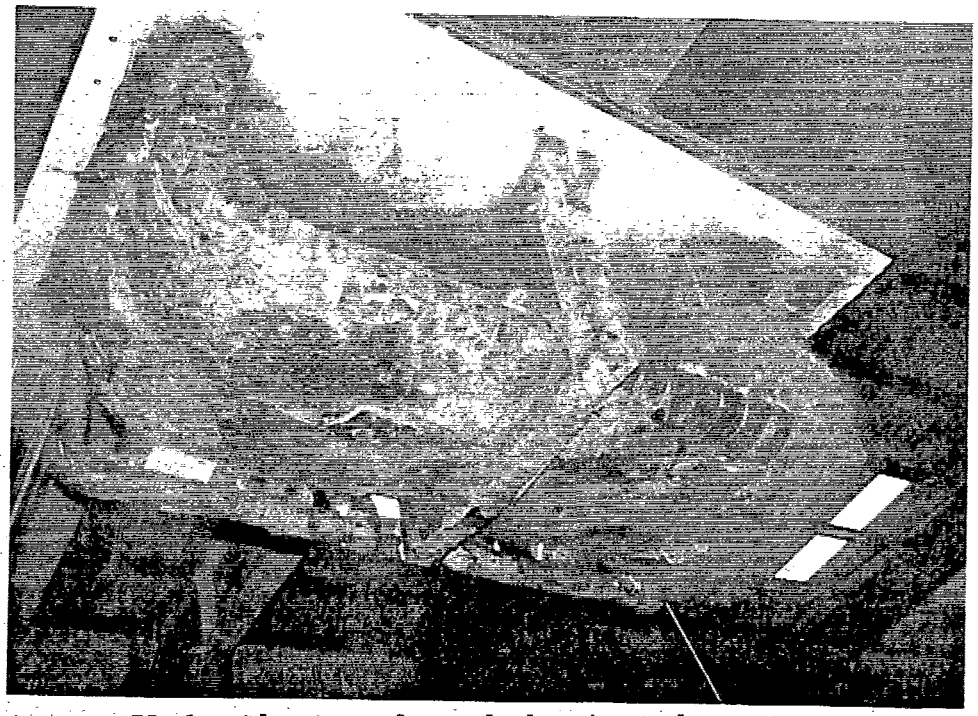
Test furnace at approximately thirty minutes.



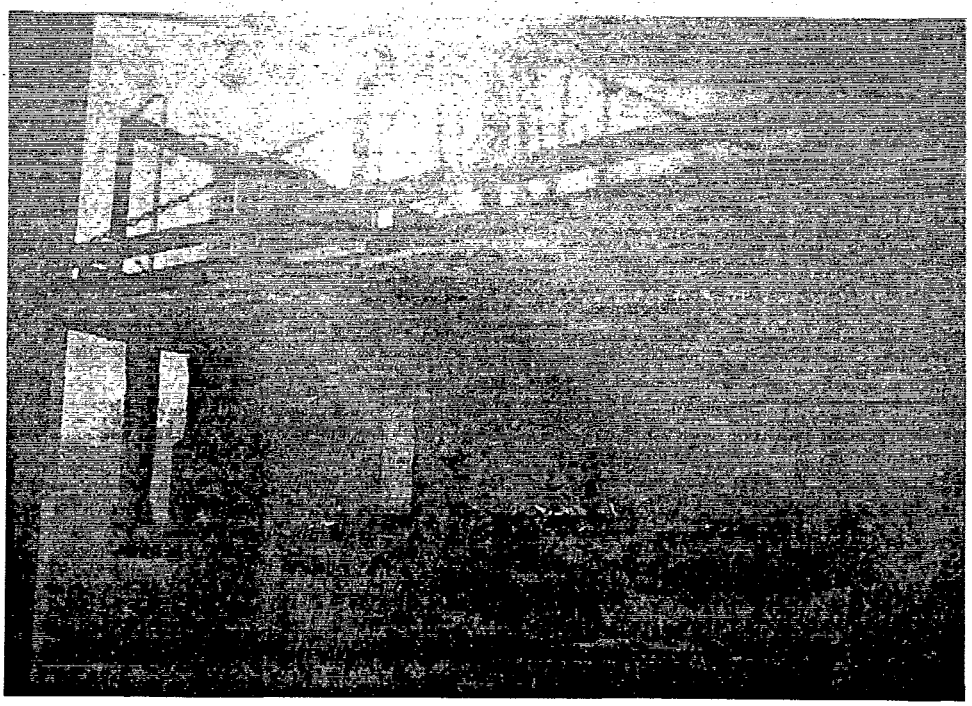
Test furnace at end of exposure (one hour).



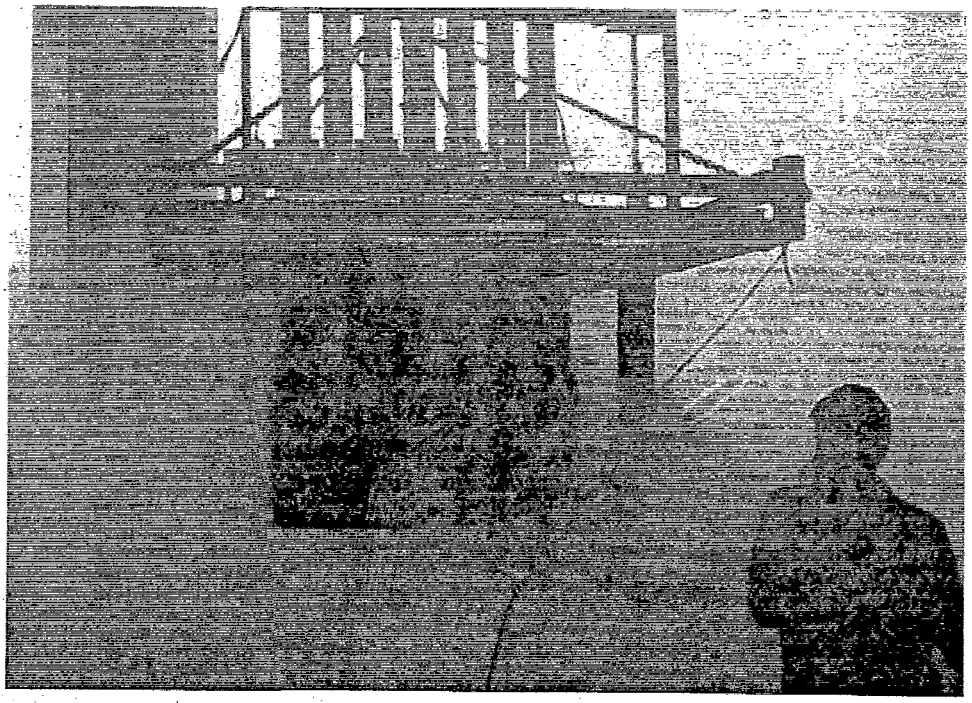
Test deck lifted from furnace.



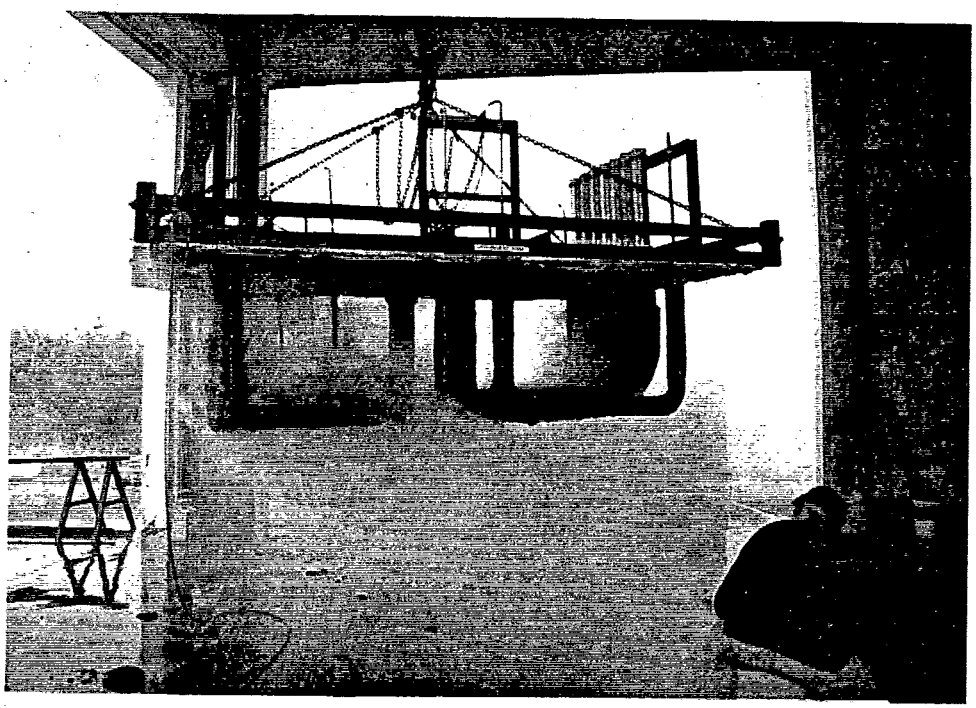
Underside view of test deck prior to hose stream.



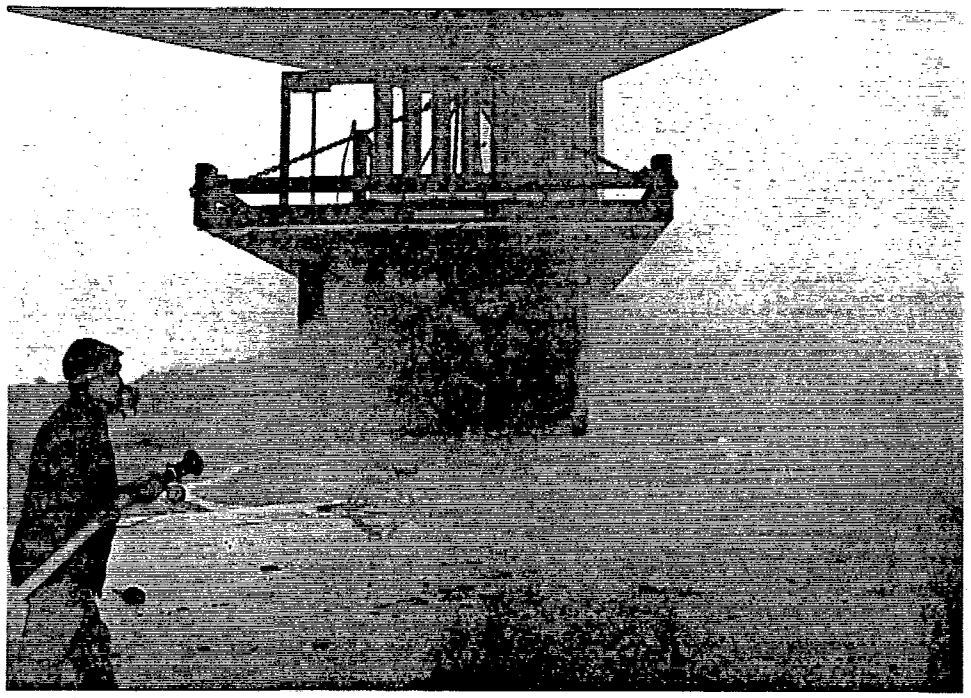
Front view of test deck prior to hose stream.



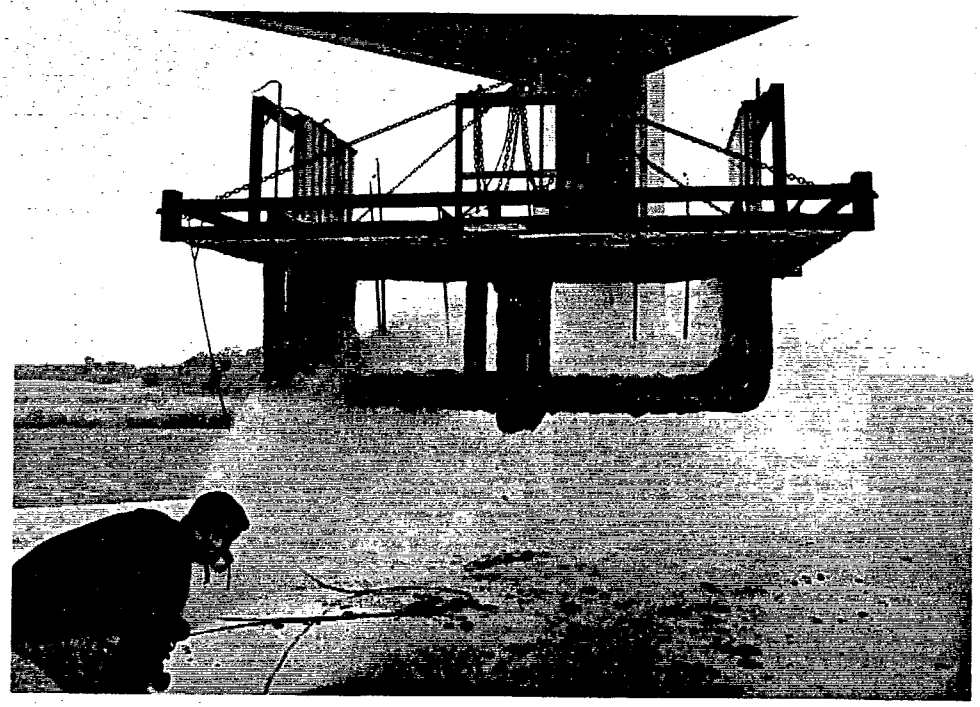
Water hose stream test.



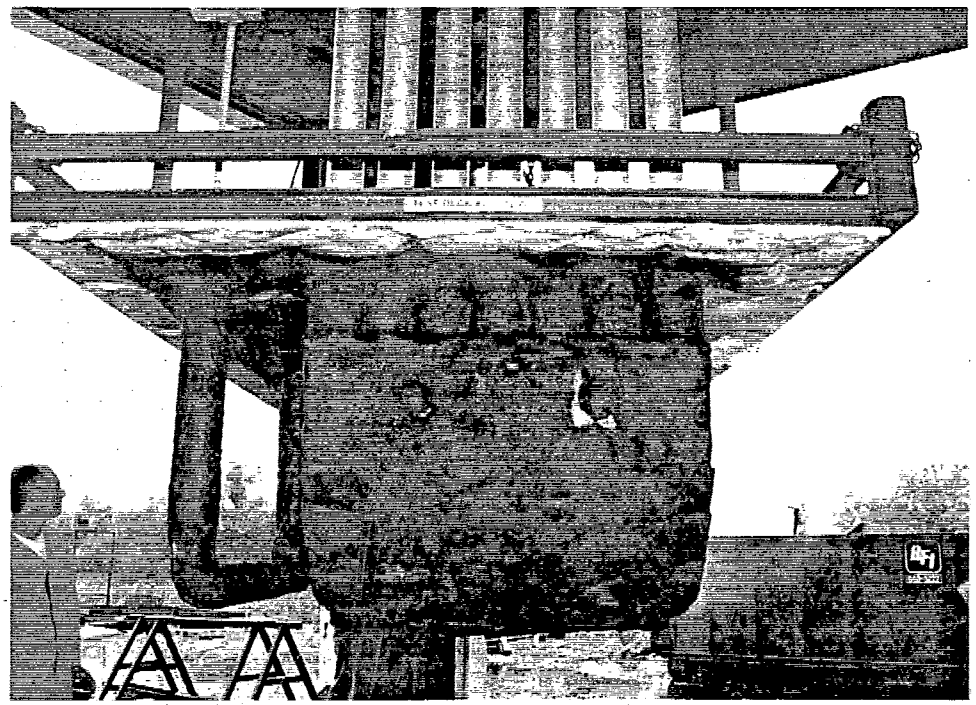
Water hose stream test.



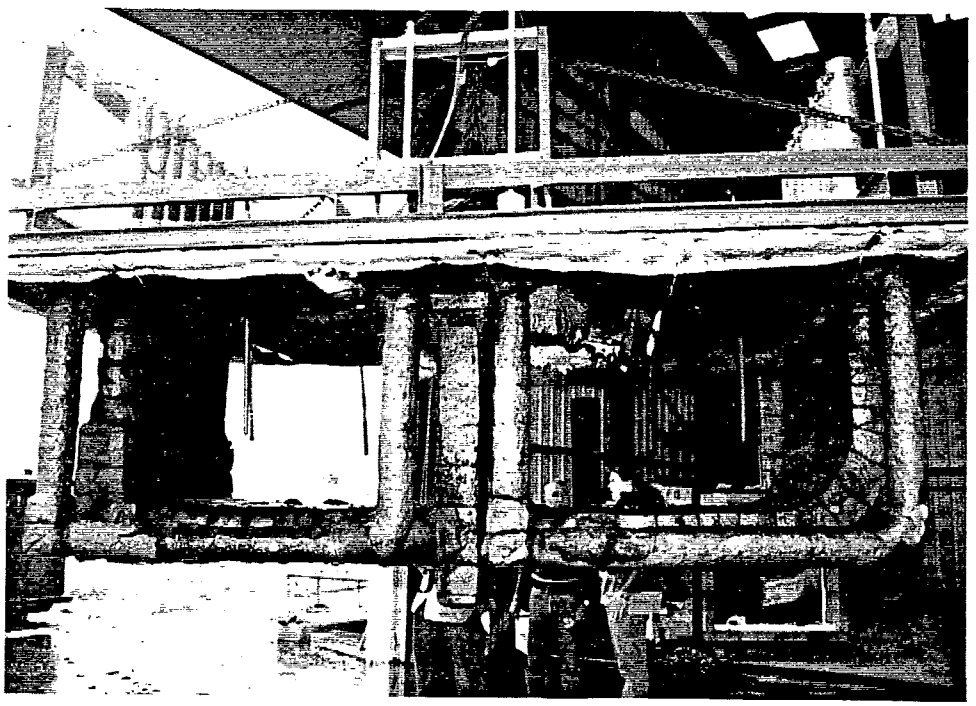
Water hose stream test.



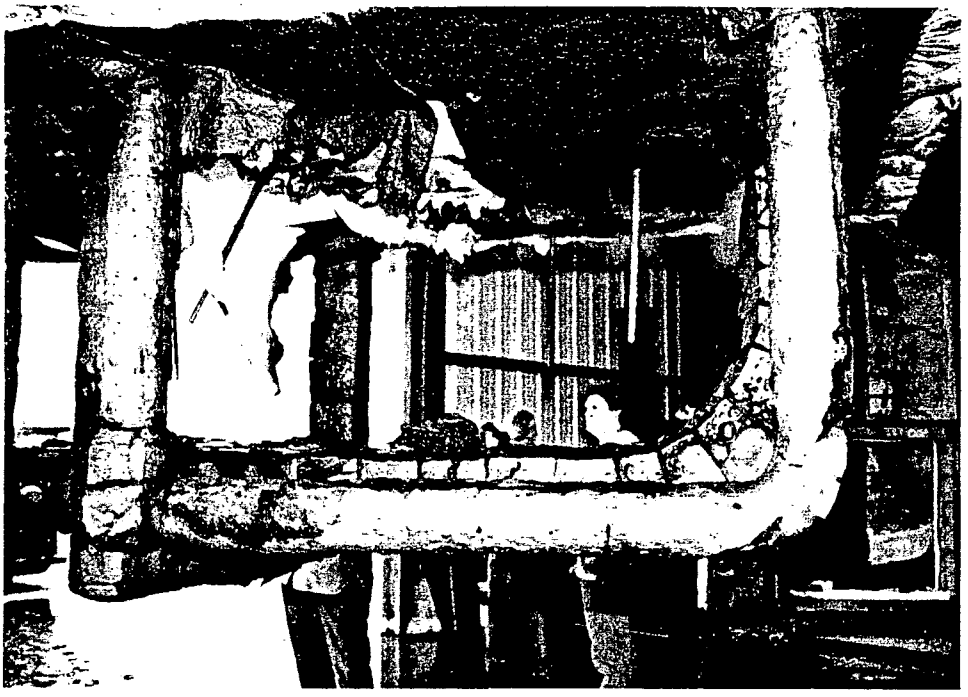
Water hose stream test.



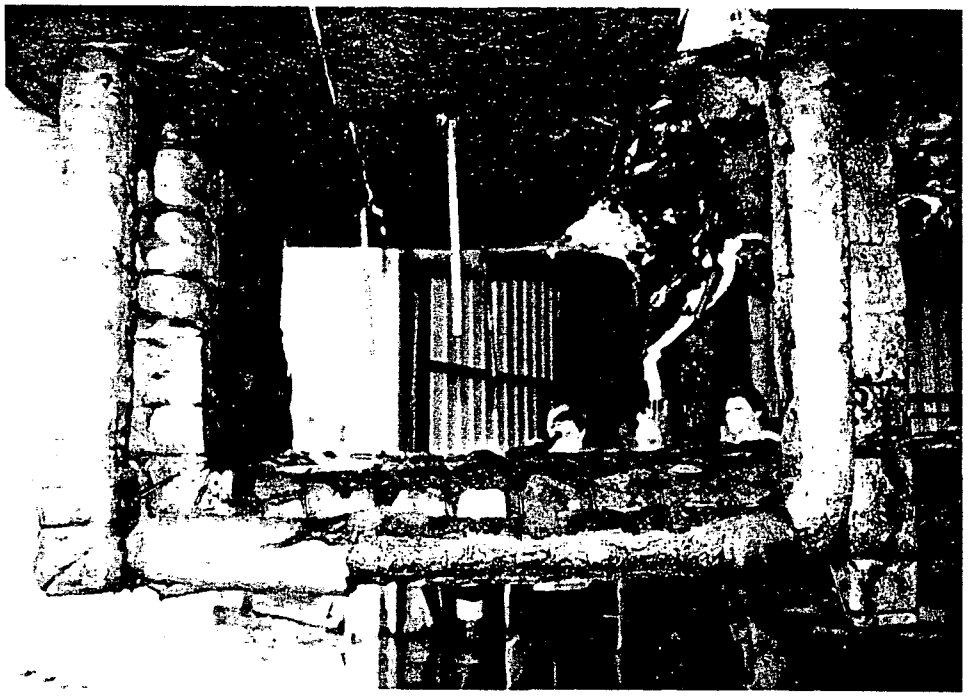
Right end view after hose stream.



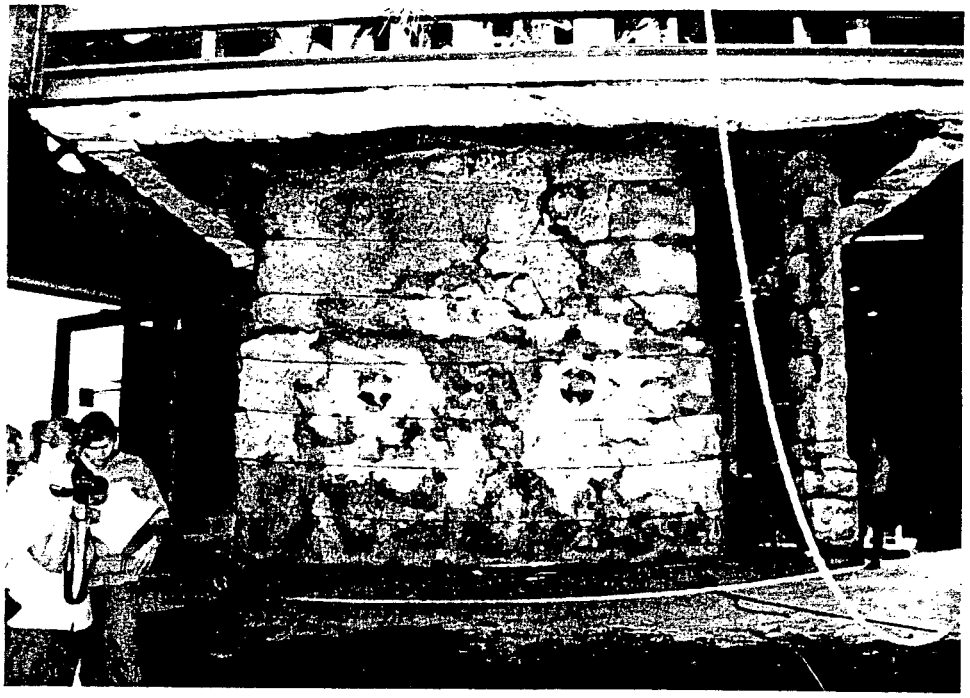
Front view after hose stream.



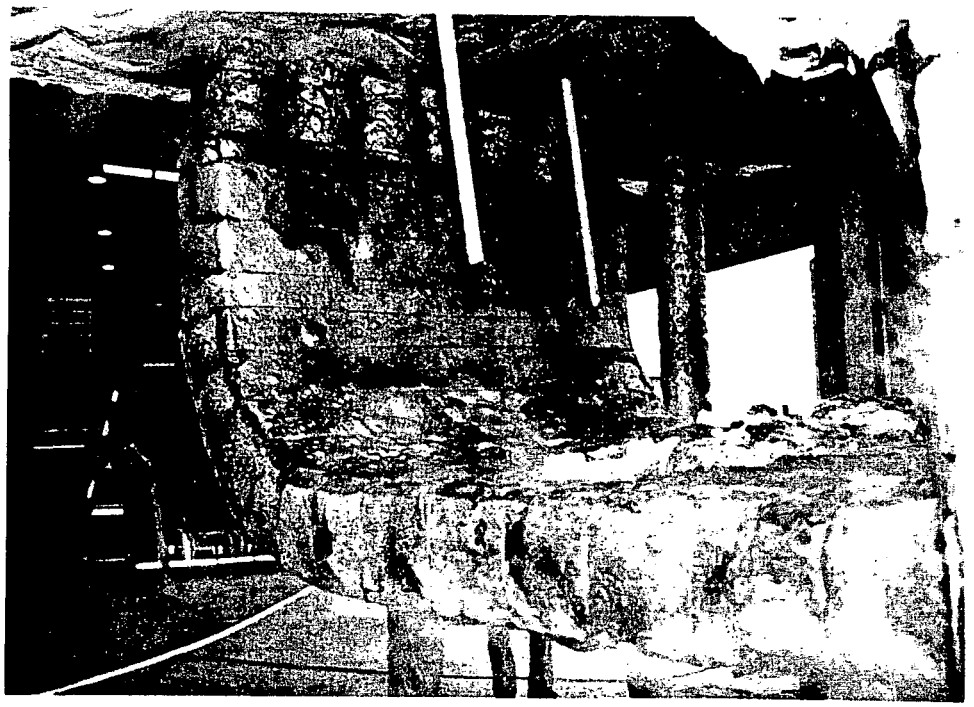
Right 3/4 in. conduit after hose stream.



Left 3/4 in. conduit after hose stream.



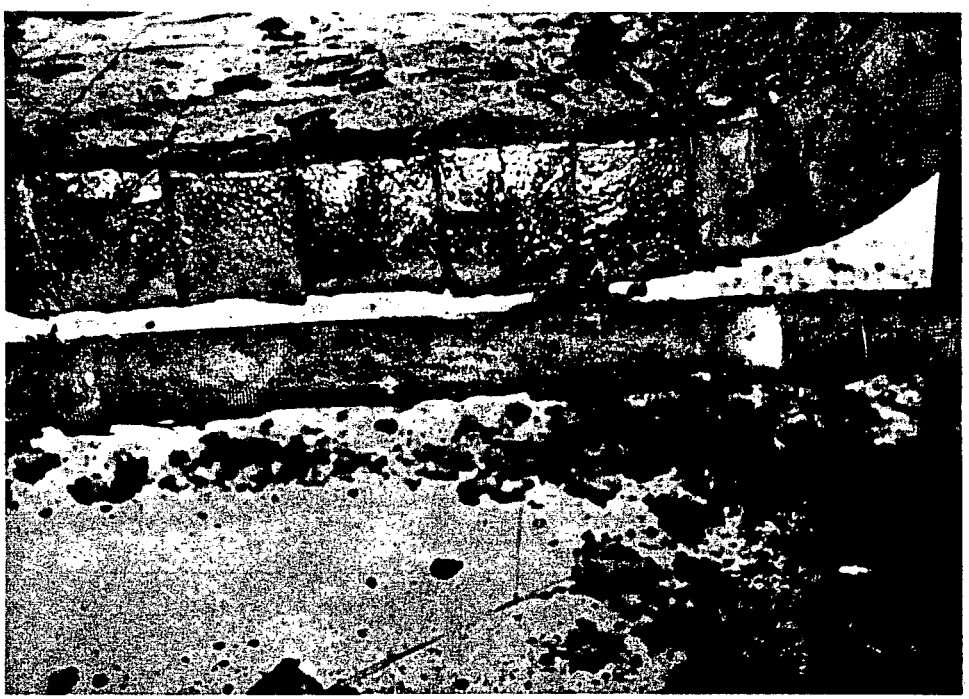
Left end view after hose stream.



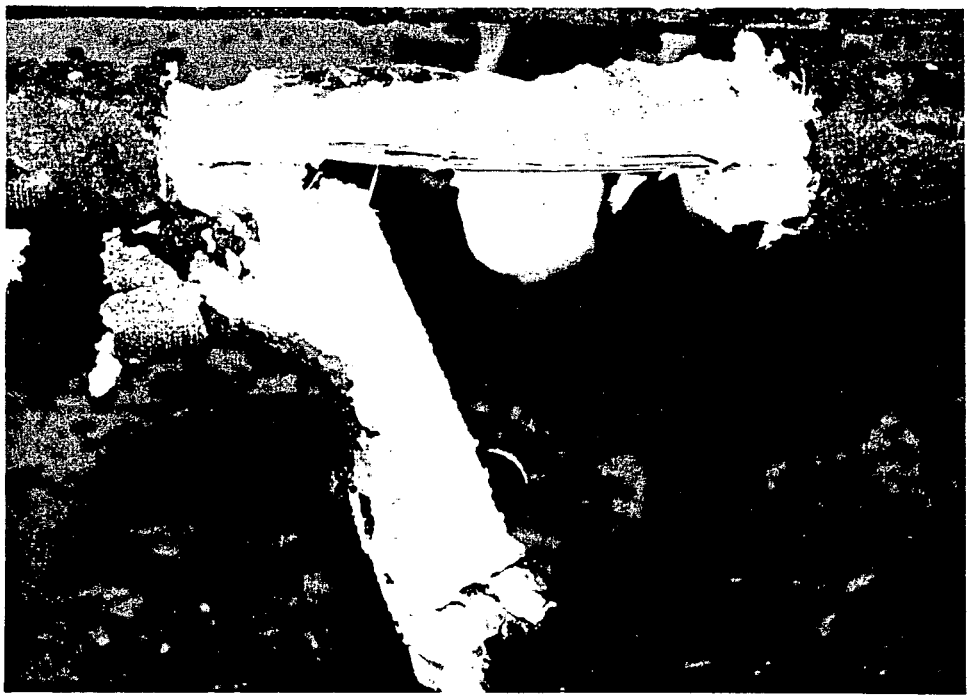
Interior view after hose stream.

Interior view after hose stream.

Outer layer of material removed from left 3/4 in. conduit above LB.



Outer layer of material removed from left 3/4 in. conduit horizontal run.



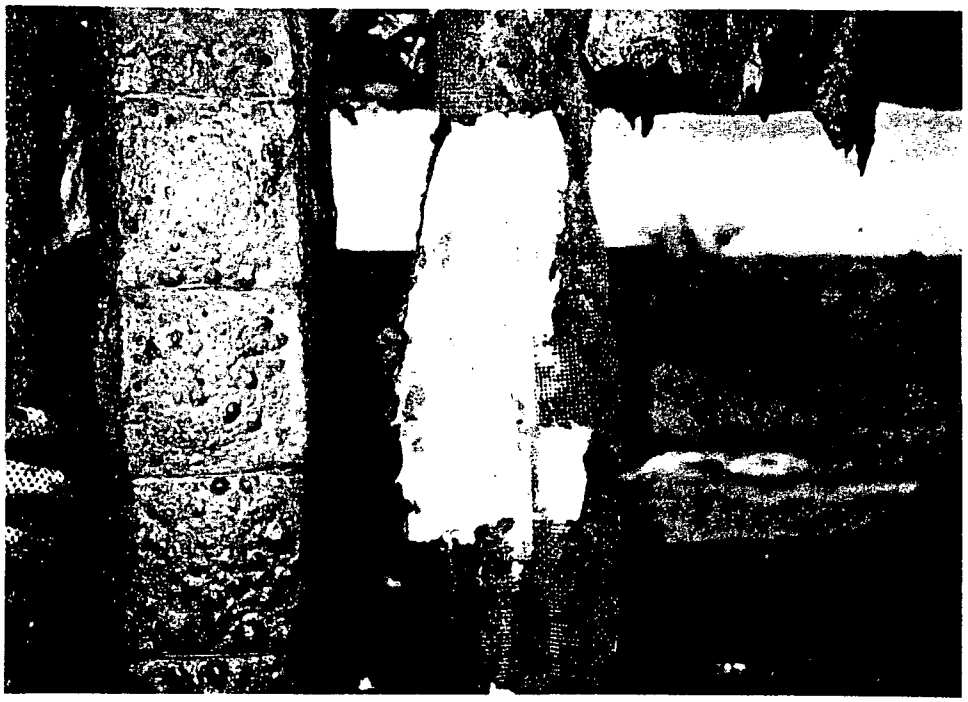
Inner layer of material removed from left 3/4 in. conduit horizontal run.

Material removed from left 3/4 in. radial bend.

Outer layer of material removed from left 3/4 in. conduit above radial bend.

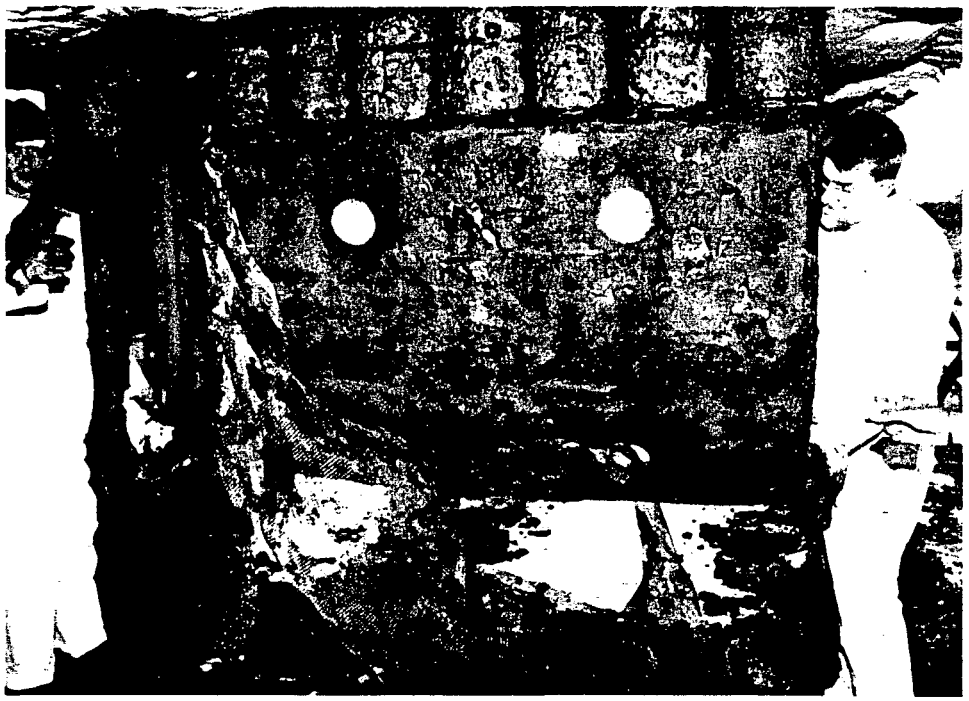
Inner layer of material removed from left 3/4 in. conduit above radial bend.

Outer layer of material removed from left 3/4 in. conduit LB.

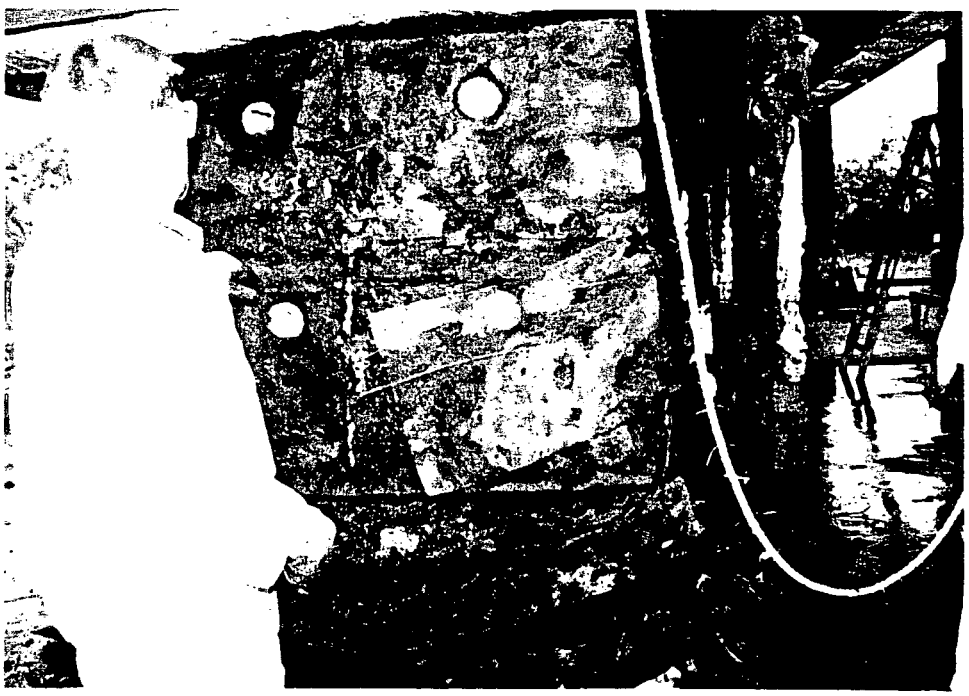


Material removed from right 3/4 in. conduit above LB.

Trowel grade mound removed from panel.

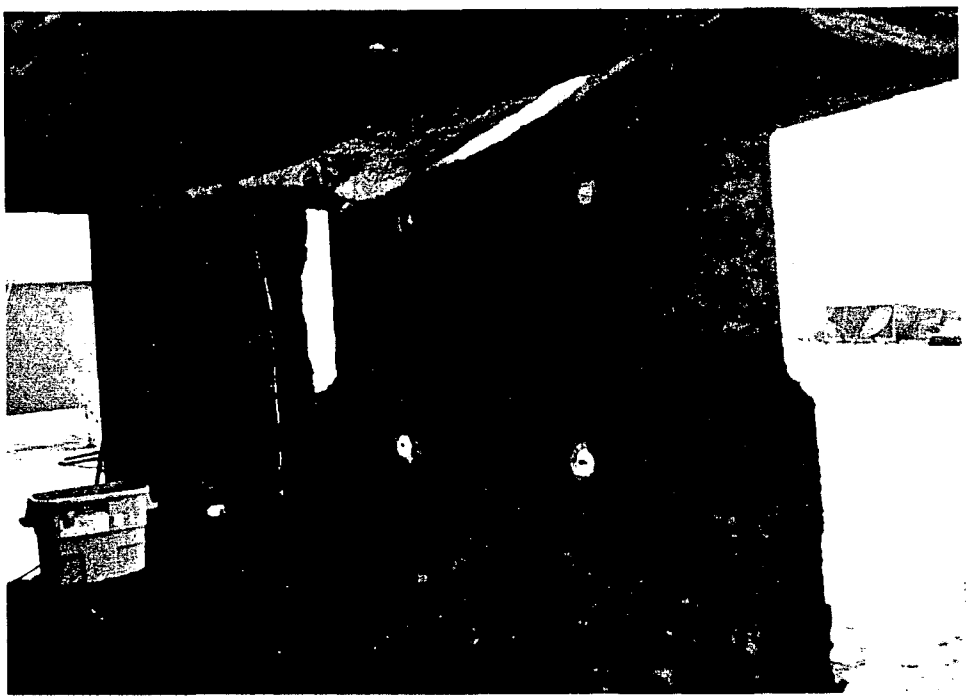


External stress skin removed from radial bends.

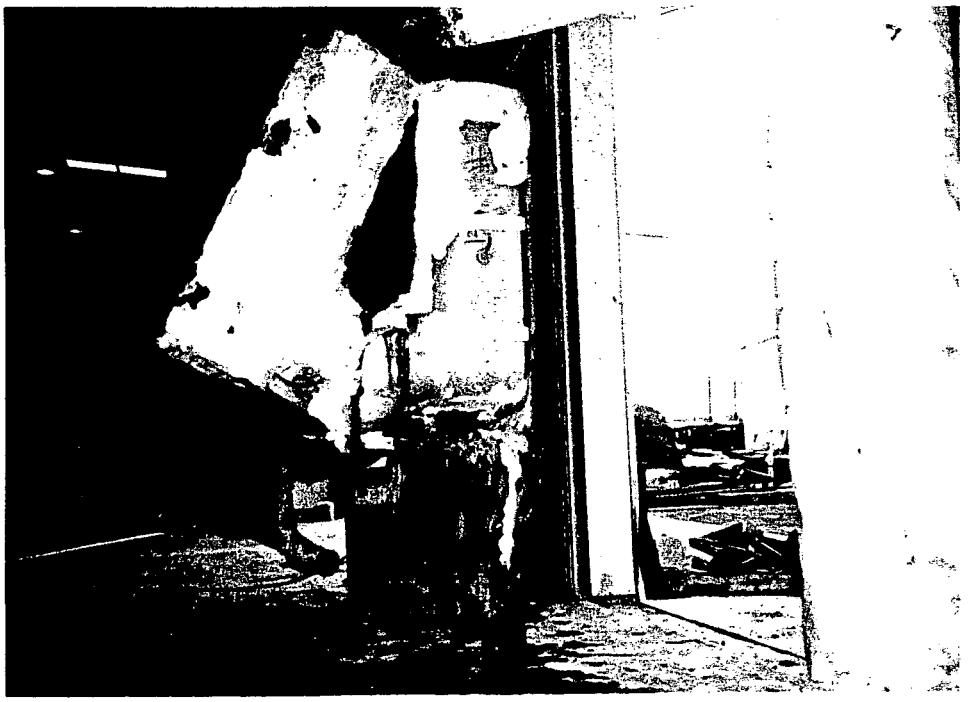


External stress skin removed from conduit LBs.

Trowel grade mounds removed from panel.

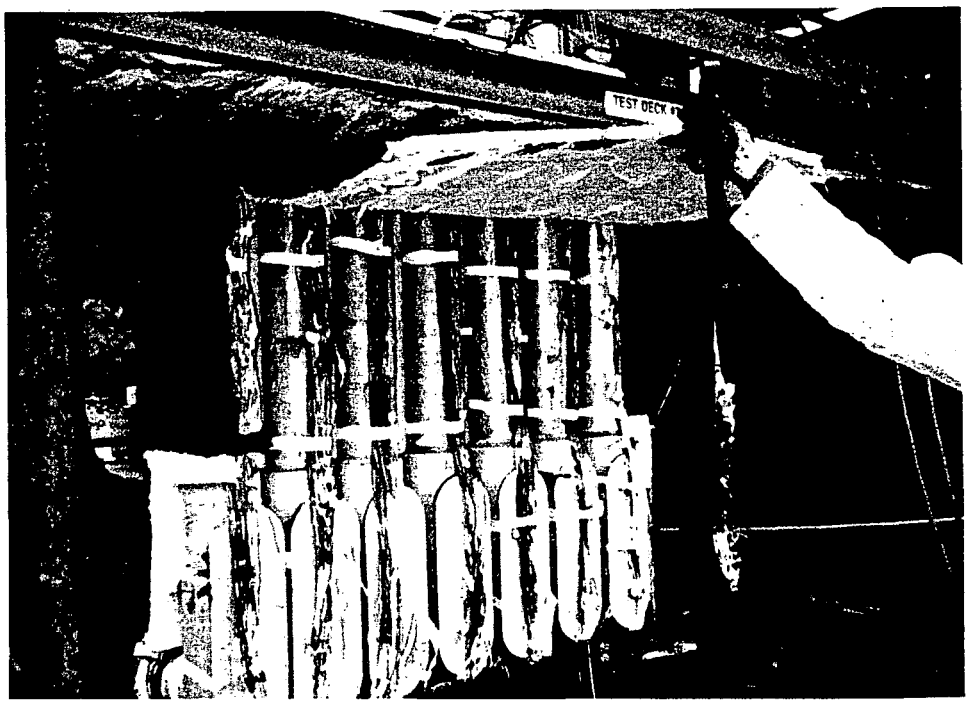


Trowel grade mounds removed from panel.



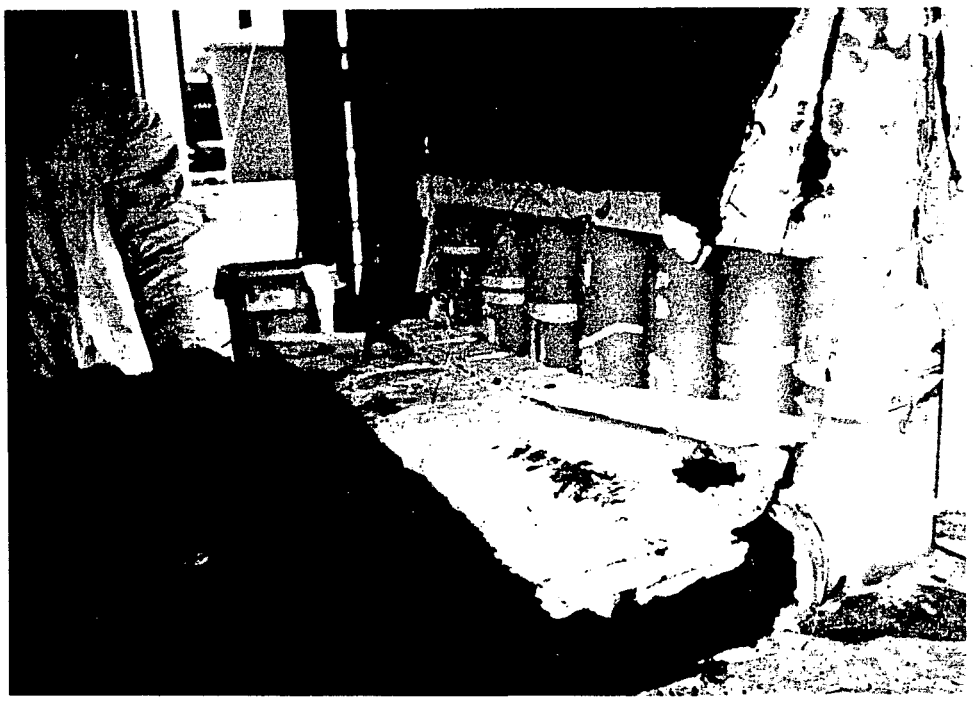
Material removed from rear conduit LB.

Material removed from conduit LBs.

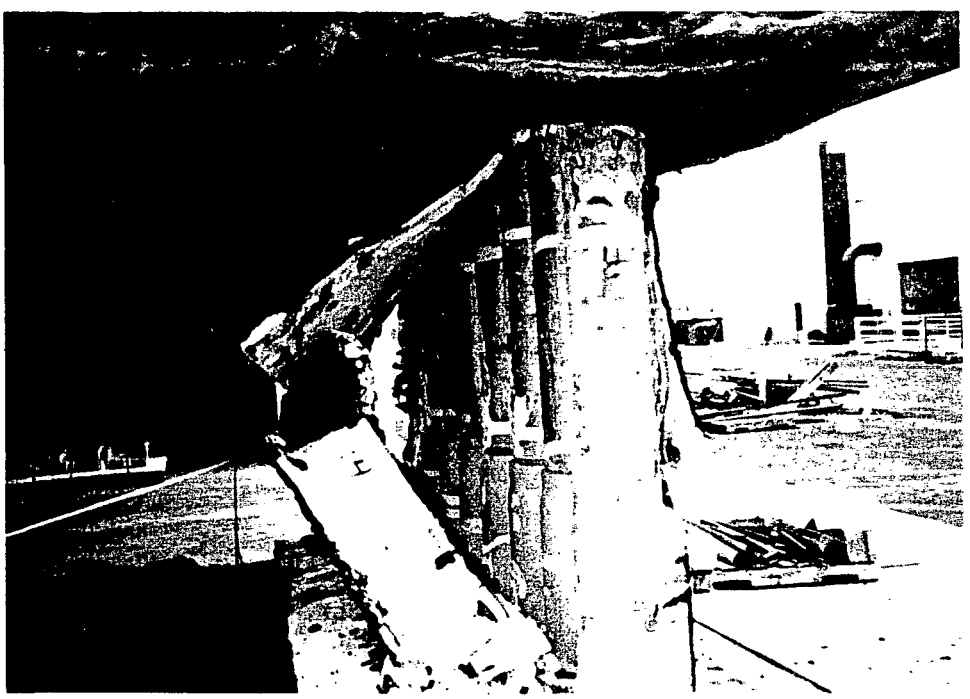


Material removed from conduits above conduit LBs.

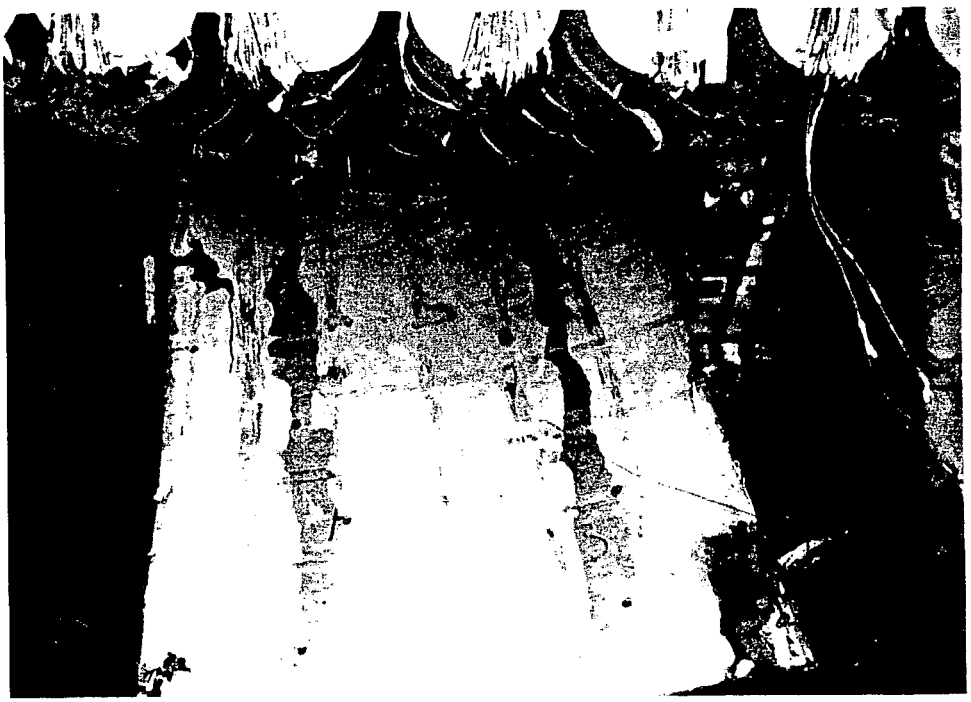
Material removed from side of rear conduit.



Material removed from conduit LBs.



Material removed from conduit above LBs.



Material removed from bottom of conduits.

Material removed from conduits.

Material removed from support members.

Material removed from support members.

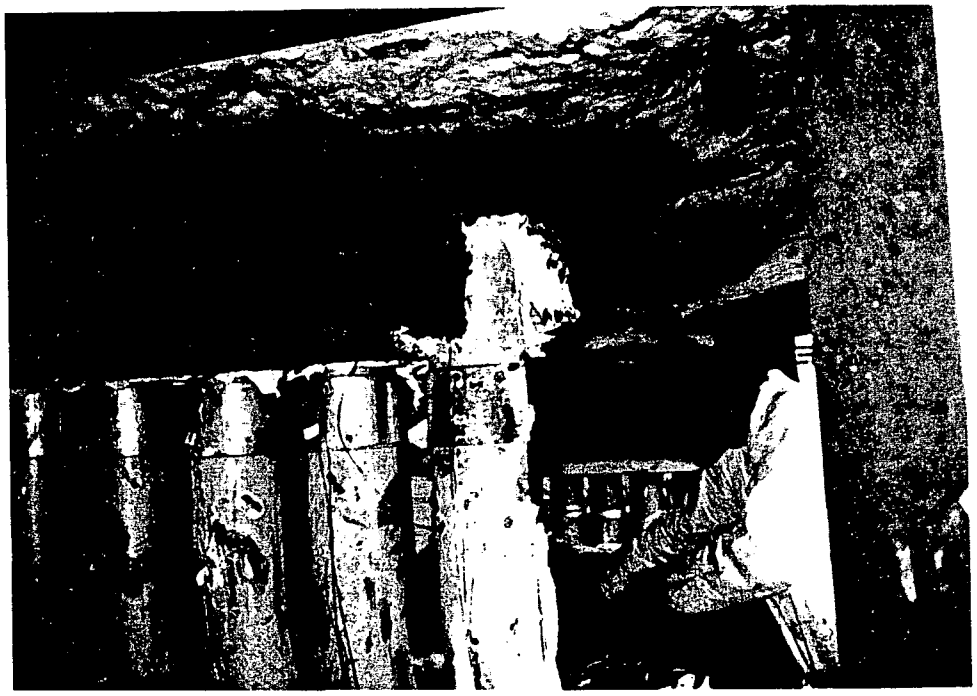
Material removed from conduits at location of support members.

Material removed from bottom of radial bends.

Material removed from bottom of radial bends.

Material removed from radial bends.

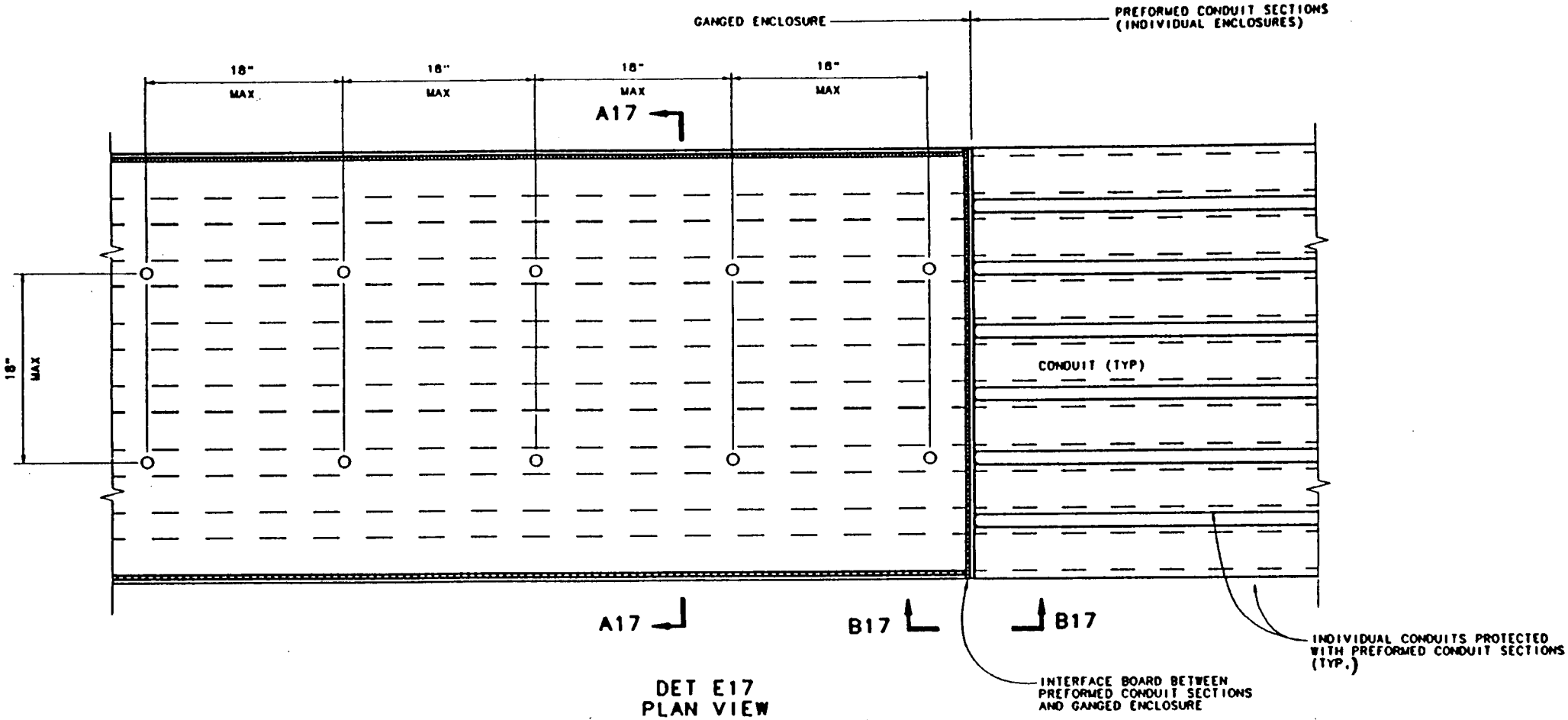
Material removed from top of conduits.



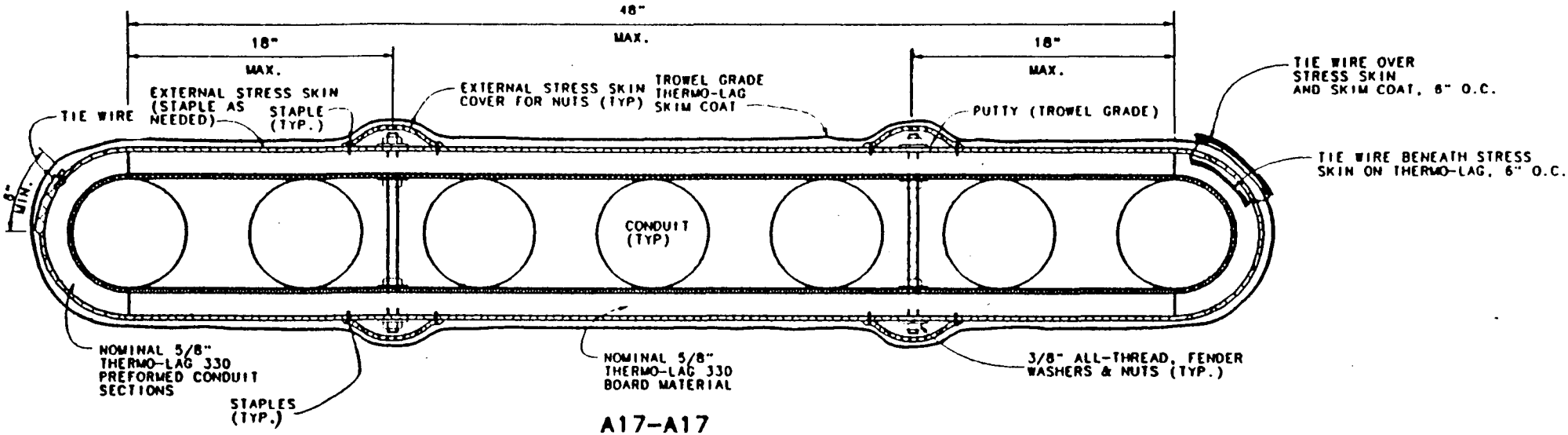
Material removed from conduits above radial bends.

Appendix G

THERMO-LAG® INSTALLATION DETAILS

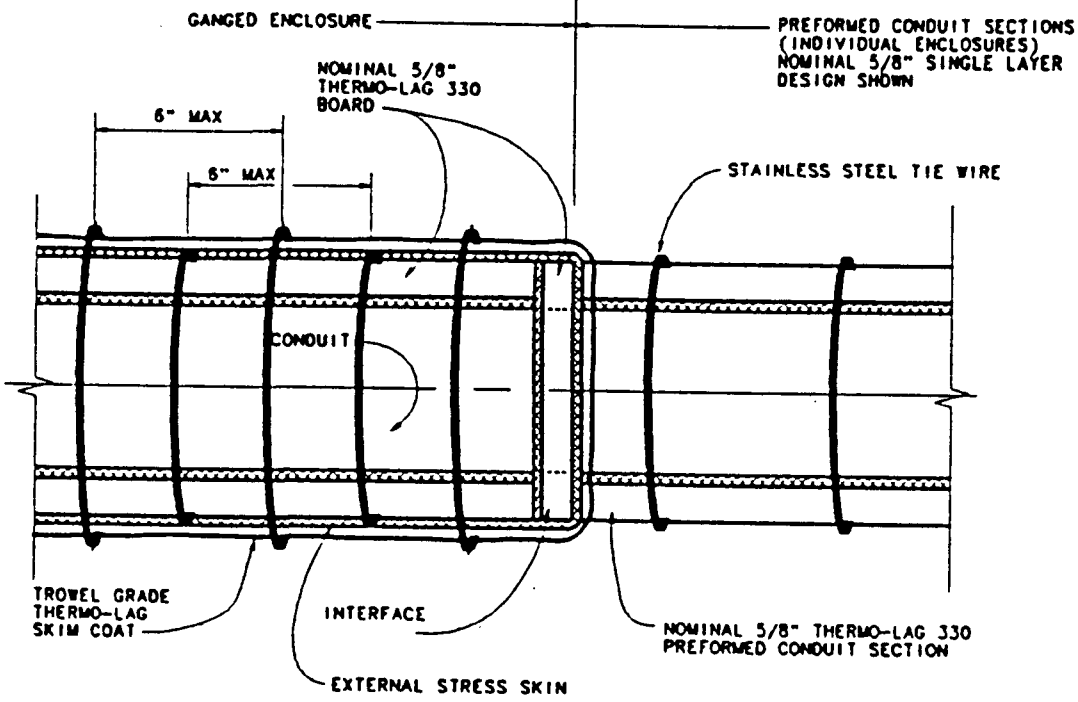


DET E17
PLAN VIEW
GANGED CONDUIT ENCLOSURE
N.T.S.

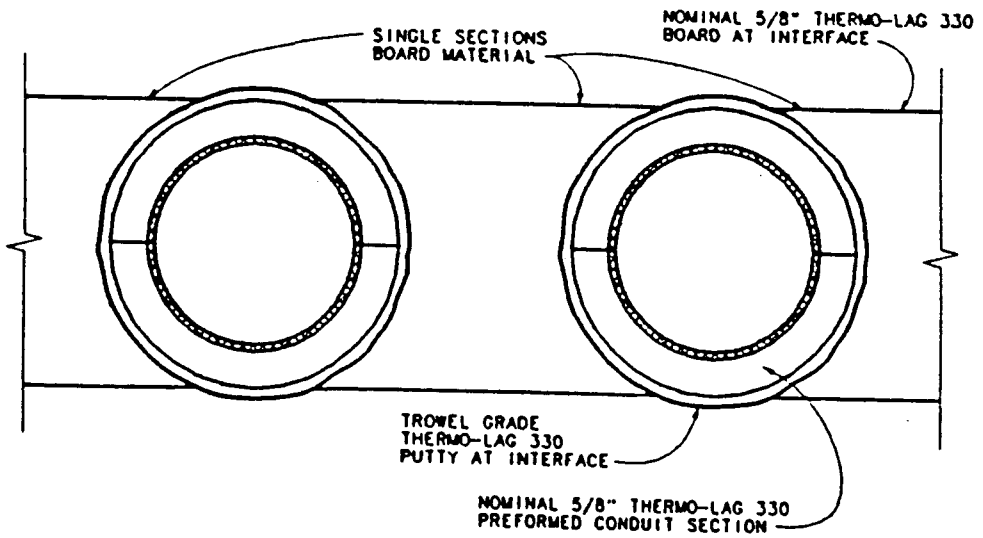


A17-A17
END VIEW
GANGED CONDUITS
FOUR SIDED ENCLOSURE

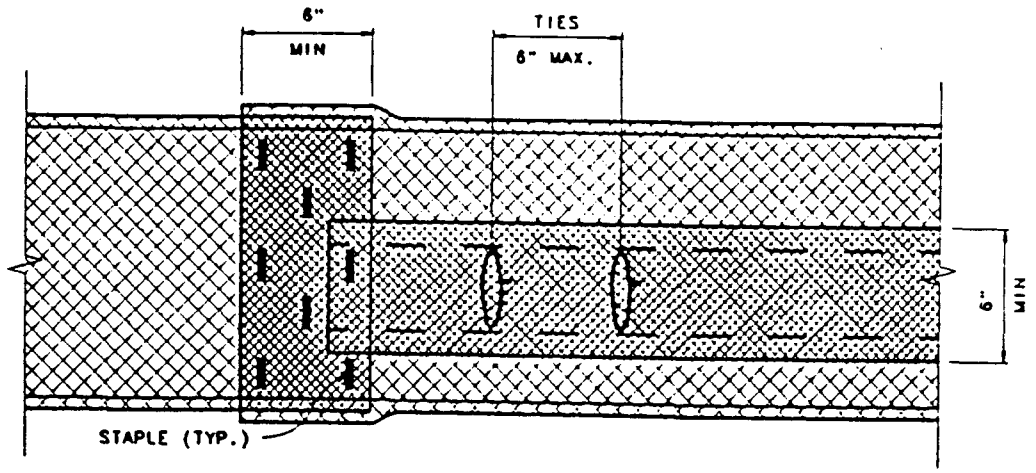
N.T.S.



B17-B17
INTERFACE SECTION - ELEVATION VIEW
N.T.S.

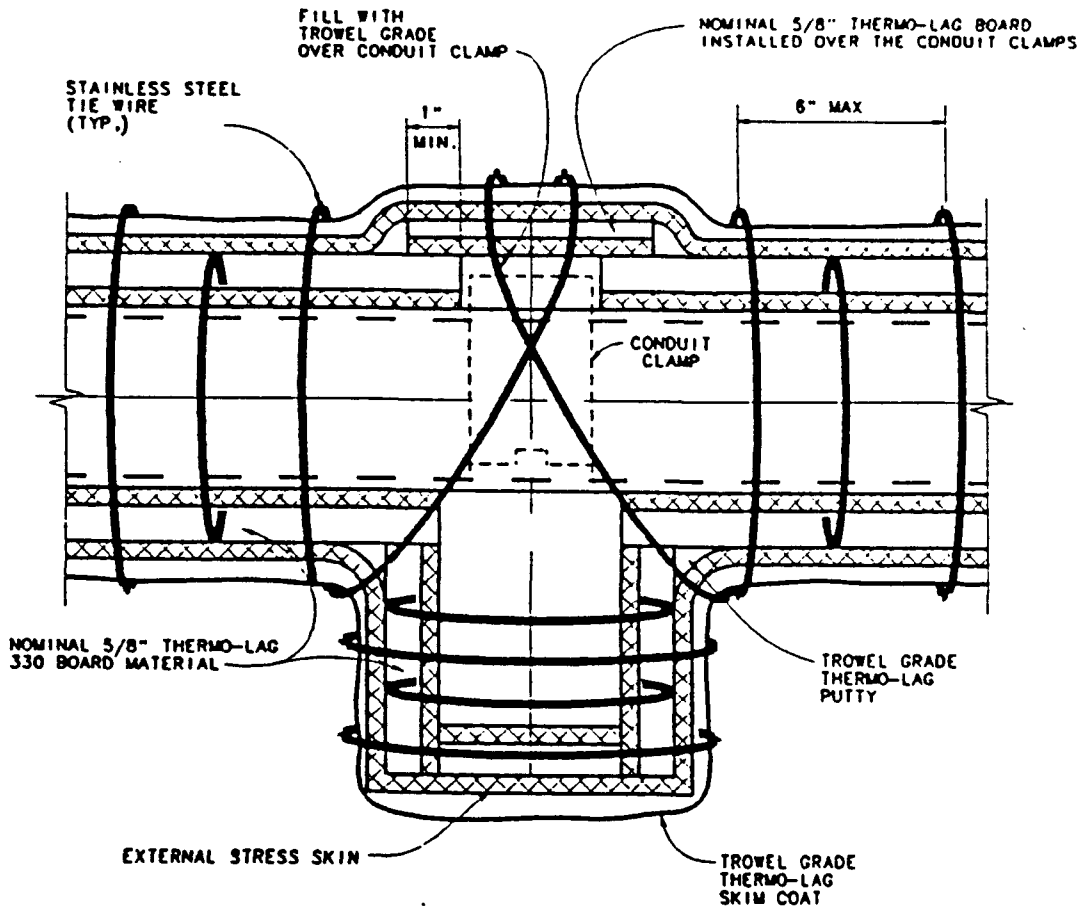


DET D17
INTERFACE DETAIL
N.T.S.



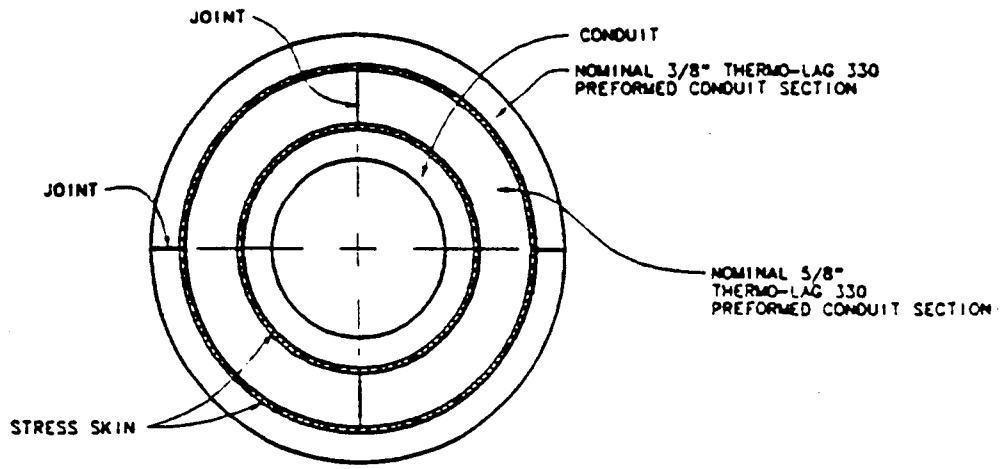
DET C17
EXTERNAL STRESS SKIN

N.T.S.



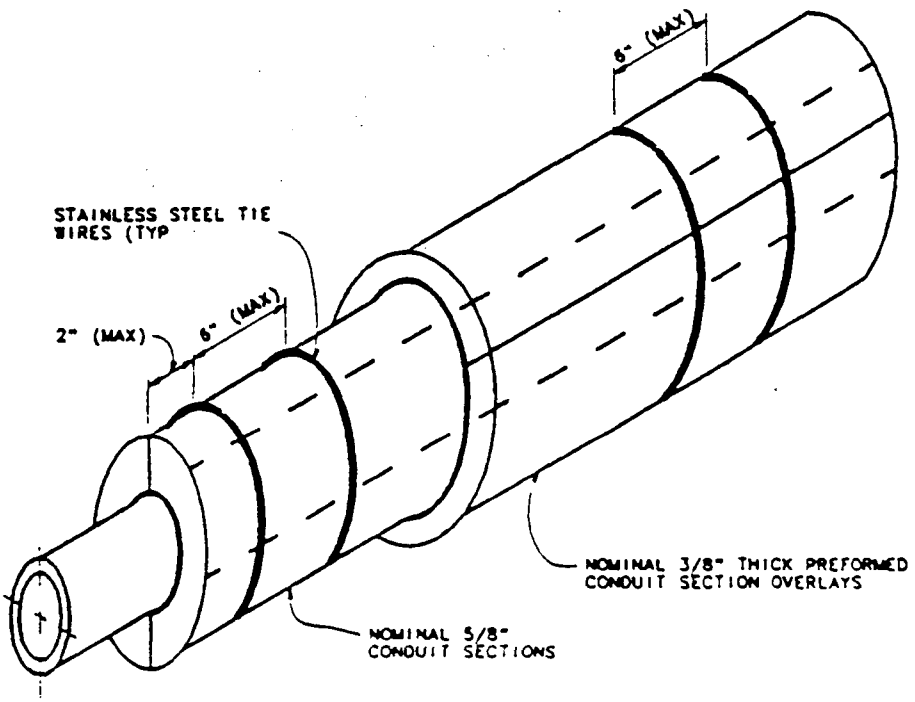
DET F17
SUPPORTS PROTECTION DETAIL

N.T.S.



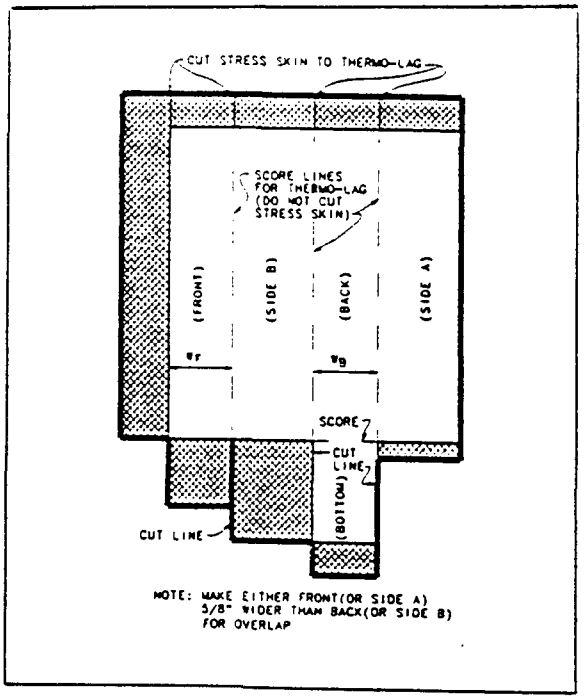
DETAIL E-1
CONDUIT SECTION
5/8" & 3/8" SHOWN

3/4" Conduit



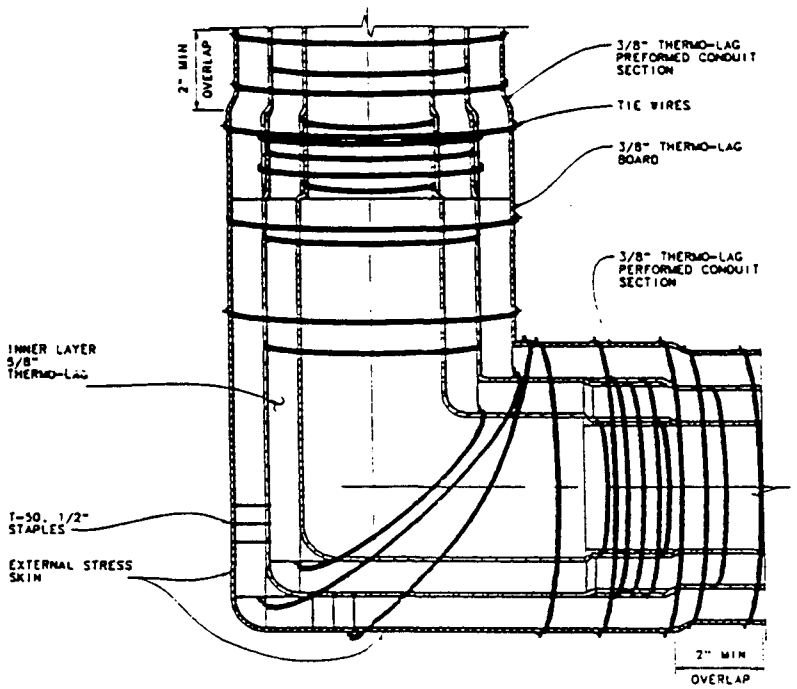
DETAIL F-2
CONDUIT ISOMETRIC

3/4" Conduit



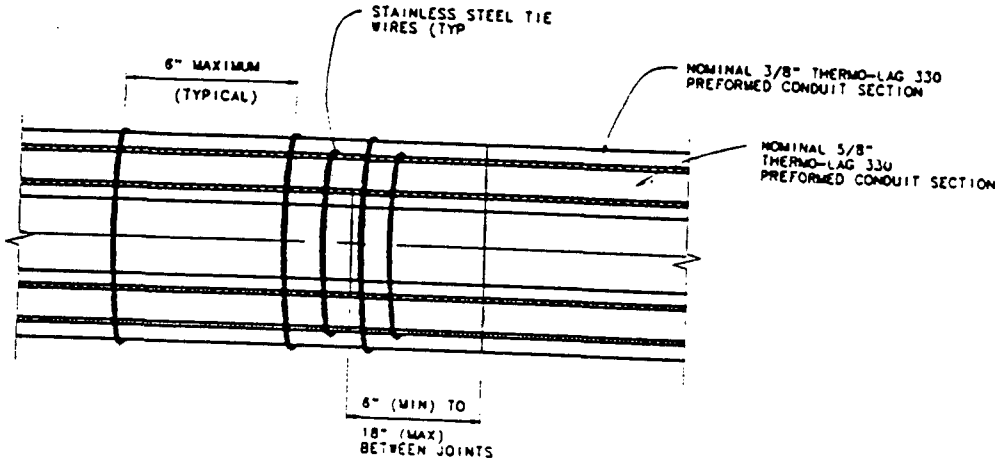
DETAIL G-2
SMALL LB OR LS
(SMALLER THAN 4" CONDUITS)

3/4" Conduit



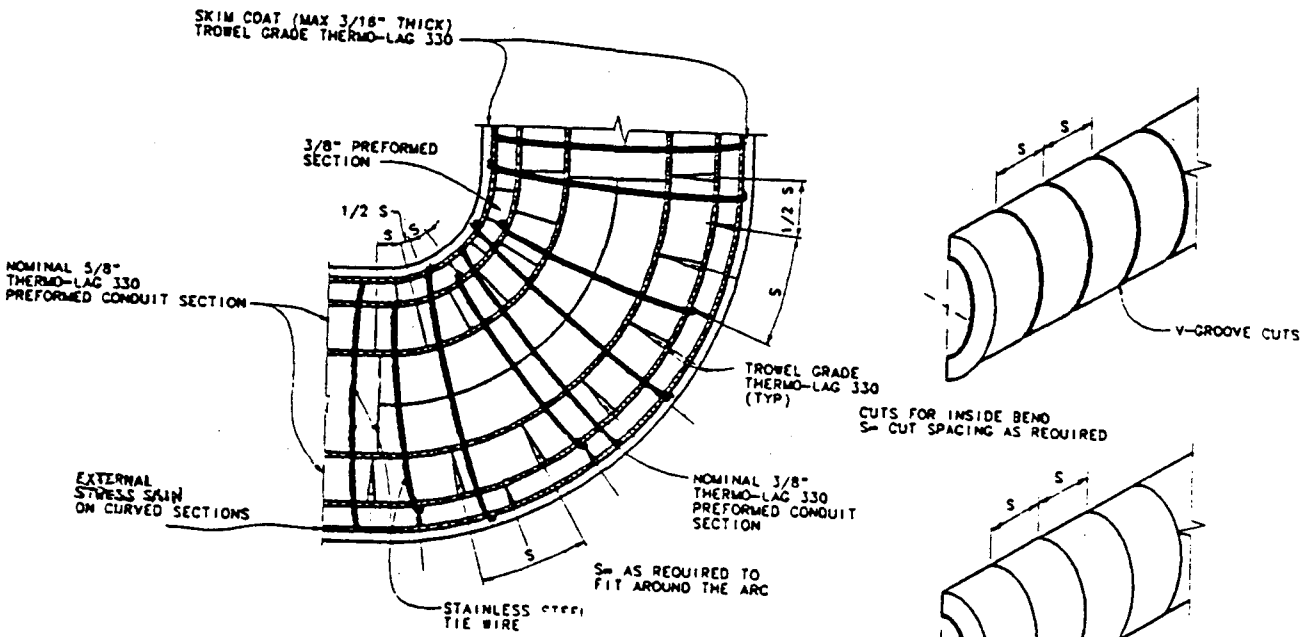
DETAIL A-2
LB DETAIL
NOMINAL 5/8" PLUS 3/8" SHOWN

3/4" Conduit



DETAIL 8-2
STRAIGHT JOINT
NOMINAL 5/8" PLUS 3/8" SHOWN

3/4" Conduit



3/4" Conduit

TEST REPORT TRANSMITTAL FORM

To: Rubin Feldman
Thermal Science, Inc.
2200 Cassens Drive
St. Louis, MO 63026
(314) 349-1233

Re: Project No. 11960-97260

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
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