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PROJECT ALL DISCIPLINE MECHANICAL
CONTRACT TV-92362V UNIT 0
DESCRIPTION FIRE ENDURANCE TESTING
DOCUMENT NO. 11960-97257

QA Record

FIRE ENDURANCE TEST OF THERMO-LAG® 330-1 FIRE PROTECTIVE ENVELOPES (Two Sided Multiple Conduit Enclosures and Cable Tray Support Systems)

Project No. 11960-97257
(Volume 1 of 2)

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

December 2, 1994

Prepared For:

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OMEGA POINT LABORATORIES

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ABSTRACT

A group of eight 4 in. aluminum conduits, a group of two 1 in. steel conduits and two structural steel seismic cable tray support systems, 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.

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Project Manager

12/13/94
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INTRODUCTION

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

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

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

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

OBJECTIVE

The objective of this project was to evaluate a specific assembly for use as a 1-hour fire-protective envelope for redundant electrical systems. The entire program was carried out in accordance with the Tennessee Valley Authority (TVA), TEST PLAN, *One Hour Fire Endurance Tests of 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.

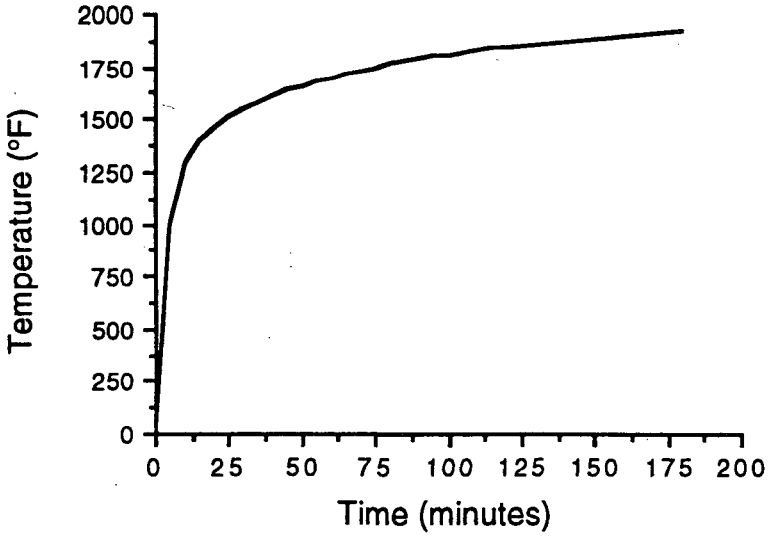
TEST PROCEDURE

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 extensions around the perimeter ledge. 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.

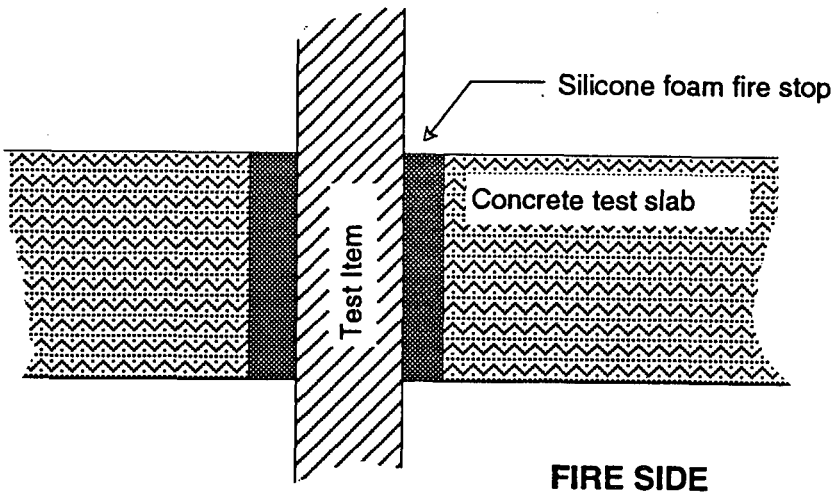
HOSE STREAM TEST

According to the Test Plan, following the fire exposure test, the test specimen is removed from the test furnace, placed in the hose stream testing area 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 test deck is tilted approximately 45° from the horizontal and the technician controlling the hose moves about the deck to allow the stream to play against the bottom and inside vertical surface of the test specimens.

TEST ASSEMBLY

TEST DECK

The test deck consisted of a perimeter of 6 in. structural steel channel, welded together into an 8 ft by 13 ft rectangle, with the flanges inward. Steel rebar (#7) was welded to the interior web of the perimeter channel in a grid pattern spaced 12 in. o.c. The rebars were located 1-1/2 in. up from the bottom of the channel frame. A 10 in. steel I-beam was welded across the top of the steel framework along the long axis to act as additional support. Normal weight concrete was poured into the slab frame and vibrated to remove all air pockets. The assembly was allowed sufficient curing so as not to be severely damaged by the fire exposure. Similar forms were constructed of 6 in. steel channel, 4 in. steel angle and #5 rebars for the deck sides walls (96 in. x 40 in.) and for the deck front and back walls (144 in. x 40 in.). Steel angle was welded in place within the framework for the left and right forms to provide blockouts for conduits and thermocouple leads to pass through the finished concrete deck. Normal weight concrete was poured into the slab frames and vibrated to remove any air pockets. The assembly was allowed sufficient curing so as not to be severely damaged by the fire exposure. After curing, the deck top and sides were assembled and welded together. The test deck was inverted for assembly and righted for testing. After installation of the penetrating items, all holes through the slab were completely filled with silicone foam fire seal.



CROSS-SECTIONAL VIEW OF POINT OF PENETRATION
OF THE SLAB BY A TEST ITEM

This method of sealing around the point where a test item penetrates the test deck has proven very effective at withstanding the 60 minute fire exposure. Since the penetration seal is considered a part of the support system, and is not in itself being evaluated by this test method, the important aspect of the seal is that it be "typical" of a field installation and withstand the fire exposure test. The silicone foam system used in this design does not unduly act as a heat sink, nor does it offer significant physical support to the penetrating item. Its purpose is to seal the gap without affecting the evaluation of the protective envelope system.

TEST ITEMS (GENERAL)

As with conduit and cable tray 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	WEIGHT
4" Aluminum Conduit	3.38 lbs/lin.ft
1" Steel Conduit	1.49 lbs/lin.ft
18" Cable Tray	4 lbs/lin.ft

* 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 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 stainless steel annealed tie wire, stainless steel stress skin (type 304, plain weave and 8x8 square wire cloth, 0.017 in. wire diameter).

TEST ITEM (CONDUITS, UNISTRUT FRAMES AND TRAY SUPPORTS)

A group of eight 4 in. diameter aluminum conduits (two columns of four conduits) was installed near the front of the test deck. Each of the eight conduits passed through a rectangular blockout in the left concrete wall, traversed the entire test deck and exited through a large rectangular blockout in the right concrete wall. The eight conduits had an overall exposed horizontal dimension of 144 in. and were spaced 7 in. apart, both horizontally and vertically. All eight conduits were secured with conduit clamps attached to unistrut supports anchored to the concrete ceiling. The supports were located 30 in. and 90 in. right of the left concrete wall. The support members were positioned in between the two columns of conduits. A unistrut superstructure was constructed around the group of conduits to support the barrier system. The unistrut frame was independent of the conduits and supports and does not contact either. Two sections of unistrut P1001 were welded together at a 90° angle to form an "L" 33 in. high and 31-1/2 in. long. This assembly was then anchored to the front wall and ceiling of the test slab, surrounding the group of eight 4 in. aluminum conduits. The unistrut was positioned such that direct contact was maintained between the side of the unistrut assembly and the fireside of the left deck wall. Two additional unistrut assemblies, having similar dimensions, were anchored to the front deck wall and ceiling at 60 in. and 120 in. from the previously installed member. Sections of unistrut P1000 were then welded between each of the angle assemblies at the 90° corners such that the framework for a two sided box was formed (with the ceiling and front deck wall forming two of the sides). Steel angle, 1-1/2 in. x 1-1/2 in. x 1/4 in. thick was attached to the concrete deck along the top and sides of the two sided enclosure frame to allow attachment of the barrier materials adjacent to the concrete surfaces.

A group of two 1 in. diameter steel conduits (one columns of two conduits) was installed near the rear of the test deck. Each of the conduits passed through a rectangular blockout in the left concrete wall, traversed the entire test deck and exited through a large rectangular blockout in the right concrete wall. The conduits had an overall exposed horizontal dimension of 144 in. and were spaced 6 in. apart. The conduits were secured with conduit clamps attached to unistrut supports anchored to the concrete ceiling. The supports were located 30 in. and 90 in. right of the left concrete wall. The support members were positioned in between the two columns of conduits. A unistrut superstructure was constructed

around the group of conduits to support the barrier system. Two sections of unistrut P1001 were welded together at a 90° angle to form an "L" 12 in. high and 18 in. long. This assembly was then anchored to the rear wall and ceiling of the test slab, surrounding the group of two 1 in. steel conduits. The unistrut was positioned such that direct contact was maintained between the side of the unistrut assembly and the fireside of the left deck wall. Two additional unistrut assemblies, having similar dimensions, were anchored to the rear deck wall and ceiling at 60 in. and 120 in. from the previously installed member. Sections of unistrut P1000 were then welded between each of the angle assemblies at the 90° corners such that the framework for a box was formed (with the ceiling and rear deck wall forming two of the sides).

Two seismic structural cable tray support members were constructed of 6 in. x 6 in. x 1/2 in. wall steel tubing. The supports were formed into trapeze type hangers with three horizontal cross bars. The supports were 56 in. wide and 42 in tall. The cross bars were positioned such that a 12 in. spacing was maintained between the tops of each bar and the top of the uppermost bar was 12 in. below the concrete deck. The supports were fastened to the concrete ceiling with anchor bolts installed through the 12 in. square, 1/2 in. thick steel mounting flanges welded to the top of each vertical leg. Sections of 18 in. steel ladderback cable tray, 8 in. long were fastened to the tops of the support cross bars with 3-1/2 in. x 2-1/2 in. x3/8 in. steel angles and 3/8 in. diameter x 1 in. long bolts. The right support system had one such tray section centered on each horizontal cross bar. The left support system had one such tray centered on the top horizontal cross bar and two trays, equally spaced on the middle and bottom cross bars.

On the right support assembly, thermocouples were installed 12 in. o.c. around the outside surfaces of the assembly. Thermocouples were also affixed to the inside surfaces of the vertical risers on the support, midway between the bottom and middle horizontal cross bars, midway between the middle and top horizontal cross bars, and 8 in. below the slab, above the top cross bar. Thermocouples were also affixed to the top surface of each horizontal cross bar, midway between the cable tray side rails and the vertical support riser. One thermocouple was attached to each end of the center, protected cable tray, 1 in. in from the free ends of the tray section. Positioned as such, these thermocouples are used to plot the heat flow from the top and bottom unprotected cable trays, through the protected steel supports, into the protected middle cable tray.

On the left support assembly, thermocouples were installed 12 in. o.c. around the outside surfaces of the assembly. Thermocouples were also affixed to the inside surfaces of the vertical risers on the support, midway between middle and top horizontal cross bars, and 8 in. below the slab, above the top cross bar. Thermocouples were also affixed to the top surface of the top horizontal cross bar, midway between the cable tray side rails and the vertical support risers, to the

center of the top surface of the bottom cross bar and to the front, center surface of the middle cross bar. One thermocouple was attached to each end of the lower, protected cable trays, 1 in. in from the free ends of the tray sections. Positioned as such, these thermocouples are used to plot the heat flow from the top and middle unprotected cable trays, through the protected steel supports, into the protected lower cable trays.

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 slab using the same blockout as the conduit.

Thermocouples were similarly affixed to the surfaces of the cable tray supports and short cable tray sections. The thermocouples located on the support systems were installed to monitor the heat flow into a protected cable tray from and unprotected cable tray, via a massive steel support network. The exact locations of these thermocouples may be found in Appendix C: Thermocouple Drawings.

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 two-sided conduit enclosures, and to cover the structural support members.

Thermo-Lag® 330-1 Subliming Trowel Grade Material

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

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

This material was used to construct a portion of the conduit protective envelopes.

Application Methods

Two Sided Box Method - For this method of installation, a unistrut frame was built to support the Thermo-Lag® 330-1 (see "Test Item" above). The frame is "L" shaped and fastened to the ceiling and wall to form the two sided box (note the wall and ceiling form the remaining two sides of the box). The unistrut frame has bolts welded 12 in. o.c. to fasten the board material. The boards were cut to fit the frame and the V-ribs were flattened in places were contact was made with the unistrut. Three types of seams were made in the installed panels :

- over the unistrut frame members
- in an open span with a backing board on the inside of the box
- in an open span with a backing board on the outside of the box

Bolts, fender washers and nuts were used to fasten the inside backing board. External stress skin and Thermo-Lag® 330-1 trowel grade material were used to fasten the outside backing board. All boards were pre-buttered at points of contact with the unistrut frame and other boards. Other attributes of the installations are:

- The "Generic TVA Upgrade" (described later in this text) was applied to the completed assembly.
- The 4 in. conduits had a single layer of nominal 5/8 in. pre-shaped conduit section installed. The sections were pre-buttered and secured with stainless steel tie wires 6 in. o.c.
- The 1 in. conduits had two layers of pre-shaped conduit sections installed. The first layer was nominal 5/8 in. and the second layer was nominal 3/8 in. Both layers were pre-buttered and secured with stainless steel tie wire 6 in. o.c.

Cable Tray Supports - For the cable tray supports, the tray(s) of interest were protected first with the separate board method using nominal 5/8 in. Thermo-Lag® 330-1 panels. The "Generic TVA Upgrade" (described later in this text) was then applied to the tray(s) of interest. The remaining cable trays had no protection. The supports were protected with nominal 5/8 in. and 3/8 in. board material. The V-ribs were flattened on all boards and boards were pre-buttered at points of contact with support steel and other boards. Stainless steel tie wires were installed 6 in. o.c. maximum.

"Generic TVA Upgrade" - A skim coat of trowel grade material was applied to the enclosure and external 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. The thickness of the skim coat can be approximated as "just thick enough such that the external stress skin is not readily visible."

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 November 17, 1994, by Herbert W. Stansberry II, Project Manager, with the following persons present:

Jiet Singh	-	USNRC
Kent Brown	-	T.V.A.
Mark Salley	-	T.V.A.
Rick Woody	-	T.V.A.
Brian Gent	-	T.V.A.
Gordon Ankney	-	TSI
Deggary N. Priest	-	Omega Point Laboratories, Inc.
Kerry Hitchcock	-	Omega Point Laboratories, Inc.
Connie Humphrey	-	Omega Point Laboratories, Inc.
Cleda Patton	-	Omega Point Laboratories, Inc.
Richard Beasley	-	Omega Point Laboratories, Inc.
Laudencio Castanon	-	Omega Point Laboratories, Inc.

The furnace was fired at 10:30 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 0:31 (min:sec) the outside surface of the test item was beginning to turn brown, and by 1:32 (min:sec) had ignited fairly uniformly across the exposed surfaces. By 2:17 (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 placed flat on the floor and tilted approximately 45° from horizontal. The hose stream technician applied the hose stream to the deck from the underside, exposing the bottom and inside vertical sections of the test items. The test deck was 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. The temperatures on the conduits are separated into two groups: those inside the box, and those inside separate enclosures. The bare #8 wire however is not separated as no mechanical firestop was installed to isolate the two portions internally. An explanation of the allowable limits is given in the table on the following page.

LOCATION	MAX. TEMP. (°F)	AVG. TEMP. (°F)
GROUP OF 4" CONDUITS		
Lower Rear Conduit in Box	188	142
Lower Rear Conduit, Separate Enclosure	234	222
Lower Rear Conduit Bare #8	195	138
Lower-Mid Rear Conduit in Box	180	135
Lower-Mid Rear Conduit, Separate Enclosure	237	219
Lower-Mid Rear Conduit Bare #8	199	135
Upper-Mid Rear Conduit in Box	178	137
Upper-Mid Rear Conduit, Separate Enclosure	223	212
Upper-Mid Rear Conduit Bare #8	187	135
Upper Rear Conduit in Box	180	142
Upper Rear Conduit, Separate Enclosure	225	214
Upper Rear Conduit Bare #8	204	141
Lower Front Conduit in Box	175	132
Lower Front Conduit, Separate Enclosure	230	215
Lower Front Conduit Bare #8	183	135
Lower-Mid Front Conduit in Box	166	125
Lower-Mid Front Conduit, Separate Enclosure	214	206
Lower-Mid Front Conduit Bare #8	196	129
Upper-Mid Front Conduit in Box	170	125
Upper-Mid Front Conduit, Separate Enclosure	216	206
Upper-Mid Front Conduit Bare #8	199	131
Upper Front Conduit in Box	166	129
Upper Front Conduit, Separate Enclosure	215	202
Upper Front Conduit Bare #8	185	134
Surface of Unistrut Framework	284	223
GROUP OF 1" CONDUITS		
Front Conduit in Box	164	143
Front Conduit, Separate Enclosure	218	205
Front Conduit Bare #8	203	145
Rear Conduit in Box	152	135
Rear Conduit, Separate Enclosure	217	203
Rear Conduit Bare #8	202	140
Surface of Unistrut Framework	218	192

The average initial temperature for all thermocouples at the start of the test was 66°F, yielding an allowable temperature increase of 250°F, or 316°F actual for the average temperatures. (A 325°F increase above the 66°F initial temperature yields a maximum allowable individual temperature of 391°F, in accordance with ASTM E119-88.) All of the thermocouples on within the multiple conduit enclosures met the stated criteria. The thermocouples within the cable tray support systems were for engineering uses only and are not to be considered for evaluation purposes.

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.

4 in. CONDUIT ENCLOSURE

LOCATION	OBSERVATION
Side and end vertical sections.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Between 1/2 in. and 3/4 in. of char depth on ends and in center of enclosure. Approximately 1 in. of char depth on base plates. Several mounds of trowel grade (and the external stress skin covering them) dislodged by hose stream. Approximately 1/2 in. char depth under external stress skin. Material completely intact directly under most of the trowel grade mounds covering nuts and washers. Up to 3/8 in. of uncharred material remaining with up to 1/2 in. of intact material at the corners. Between 1/8 in. and 1/4 in. of uncharred material remaining on the base plates.
Bottom horizontal section.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Between 1/2 in. and 3/4 in. of char depth on ends and in center of enclosure. Approximately 1 in. of char depth on base plates. Several mounds of trowel grade (and the external stress skin covering them) dislodged by hose stream. Approximately 1/2 in. char depth under external stress skin. Material completely intact directly under most of the trowel grade mounds covering nuts and washers. Up to 3/8 in. of uncharred material remaining with up to 1/2 in. of intact material at the corners. Between 1/8 in. and 1/4 in. of uncharred material remaining on the base plates. Approximately 1/4 in. uncharred material in the outside backing board on the right side of the enclosure bottom. Material fully intact under backing board.
Individual conduit sections.	Up to 1 in. char depth on conduits. Between 1/4 in. and 3/8 in. of uncharred material remaining. Material completely intact at interface with end of box enclosure.

1 in. CONDUIT ENCLOSURE

LOCATION	OBSERVATION
Side and end vertical sections.	Between 1/2 in. and 3/4 in. of char depth across panel, still covering external stress skin below. Approximately 1 in. of char depth on base plates. Several mounds of trowel grade (and the external stress skin covering them) dislodged by hose stream. Approximately 1/2 in. char depth under external stress skin. Material completely intact directly under most of the trowel grade mounds covering nuts and washers. Between 3/8 in. and 1/2 in. of uncharred material remaining with material mostly intact at the corners. Between 1/8 in. and 1/4 in. of uncharred material remaining on the base plates.
Bottom horizontal section.	Most of outer char layer dislodged by hose stream test, exposing layer of external stress skin below. Approximately 1 in. of char depth on base plates. Several mounds of trowel grade (and the external stress skin covering them) dislodged by hose stream. Approximately 1/2 in. char depth under external stress skin. Material completely intact directly under most of the trowel grade mounds covering nuts and washers. Between 3/8 in. and 1/2 in. of uncharred material remaining with material mostly intact at the corners. Between 1/8 in. and 1/4 in. of uncharred material remaining on the base plates. Approximately 3/8 in. uncharred material in the outside backing board on the enclosure bottom. Material fully intact under backing board.
Individual conduit sections.	Up to 1 in. char depth on conduits. Approximately 1/8 in. of uncharred material remaining in the outer layer on the conduits. Material completely intact in the inner layer on the conduits and at interface with end of box enclosure (including outer layer).

LEFT CABLE TRAY SUPPORT

LOCATION	OBSERVATION
Vertical sections.	Between 3/4 in. and 1 in. char depth across panels. Between 1 in. and 1-1/2 in. char depth on panels covering mounting plates. Approximately 3/8 in. of uncharred material remaining on front, rear and outside surfaces. Approximately 1/2 in. of uncharred material intact on inside surfaces, between cross bars, with material totally intact at the inside corners.
Top horizontal section (with single, unprotected tray).	Up to 3/4 in. char depth on panels. Approximately 3/8 in. of uncharred material remaining on the front and rear surfaces, with an area having material totally consumed radiating 3 in. away from bare cable tray. Panels on top of the horizontal bar had 3/8 in. uncharred material remaining, with areas having material totally consumed up to approximately 1 in. from the tray side rails. Approximately 1/8 in. uncharred material remaining in panel on bottom of cross bar. Galvanizing compound mostly consumed on surface of bare tray.

LOCATION (cont.)	OBSERVATION
Middle horizontal section (with two protected trays).	Up to 3/4 in. char depth on panels. Approximately 3/8 in. of uncharred material remaining on the front and rear surfaces, with material totally intact at interfaces with cable trays. Panels on top of the horizontal bar had 3/8 in. uncharred material remaining, with material totally intact at interfaces with cable tray and support vertical sections. Approximately 3/8 in. uncharred material remaining in panel on bottom of cross bar. External stress skin exposed on ends and on sides of protected tray. Approximately 1/2 in. char depth under external stress skin. Up to 1/2 in. of uncharred material remaining on ends of trays, with inner layer of board material totally intact. Up to 3/8 in. uncharred material remaining on tray sides and top.
Bottom horizontal section (with two unprotected trays).	Up to 3/4 in. char depth on panels. Stainless steel tie wires exposed along bottom of bar. Approximately 3/8 in. of uncharred material remaining on the front and rear surfaces, with an area having material totally consumed radiating 5 in. away from bare cable tray. Panels on top of the horizontal bar had 3/8 in. uncharred material remaining, with areas having material totally consumed up to approximately 1 in. from the tray side rails. Approximately 1/4 in. to 3/8 in. uncharred material remaining in panel on bottom of cross bar. Galvanizing compound mostly consumed on surface of bare tray.

RIGHT CABLE TRAY SUPPORT

LOCATION	OBSERVATION
Vertical sections.	Approximately 1 in. char depth across panels. Between 1 in. and 1-1/2 in. char depth on panels covering mounting plates. Between 1/4 in. and 3/8 in. of uncharred material remaining on front, rear and outside surfaces. Approximately 3/8 in. of uncharred material intact on inside surfaces, between cross bars, with material totally intact at the inside corners.
Top horizontal section (with single, unprotected tray).	Approximately 1 in. char depth on panels. Approximately 1/4 in. of uncharred material remaining on the front and rear surfaces, with an area having material totally consumed radiating 5 in. away from bare cable tray. Panels on top of the horizontal bar had 3/8 in. uncharred material remaining, with areas having material totally consumed up to approximately 1-1/2 in. from the tray side rails. Approximately 3/8 in. uncharred material remaining in panel on bottom of cross bar. Galvanizing compound mostly consumed on surface of bare tray.

LOCATION (cont.)	OBSERVATION
Middle horizontal section (with single, protected tray).	Approximately 1 in. char depth on panels. Between 1/4 in. and 3/8 in. of uncharred material remaining on the front and rear surfaces, with material totally intact at interfaces with cable tray. Panels on top of the horizontal bar had 3/8 in. uncharred material remaining, with material totally intact at interfaces with cable tray and support vertical sections. Approximately 1/4 in. uncharred material remaining in panel on bottom of cross bar. External stress skin exposed on ends and on sides of protected tray. Approximately 1/2 in. char depth under external stress skin. Up to 1/2 in. of uncharred material remaining on ends of tray, with inner layer of board material totally intact. Up to 3/8 in. uncharred material remaining on tray sides and top.
Bottom horizontal section (with single, unprotected tray).	Approximately 1 in. char depth on panels. Between 1/4 in. and 3/8 in. of uncharred material remaining on the front and rear surfaces, with an area having material totally consumed radiating 3 in. away from bare cable tray. Panels on top of the horizontal bar had 3/8 in. uncharred material remaining, with areas having material totally consumed up to approximately 2 in. from the tray side rails. Approximately 1/8 in. uncharred material remaining in panel on bottom of cross bar. Galvanizing compound mostly consumed on surface of bare tray.

CONCLUSIONS

Each of the two-sided multiple conduit enclosures, 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. The thermocouples located on the outside surfaces of each of the conduits were separated into two groups: those within multiple conduit box enclosures and those within individual conduit enclosures. The bare #8 copper wire passing through each of the conduits was however, considered as a single set due to the inability to separate the influences of the two different enclosures. Due to the larger heat rise experienced in the individual conduit enclosures, the bare #8 thermocouple sets registered higher temperatures than those on the conduit surfaces within multiple conduit enclosures. This phenomenon would ordinarily not be present as experience has shown that the conduit surface temperatures are generally hotter than the conduit interior temperatures for the same conduit. However, all thermocouples within and on the exterior of the conduits, in both multiple and individual conduit box enclosures remained within the maximum temperature limits specified by the Test Plan.

To investigate the effect of heat propagation through structural steel support members, this test deck was fitted with two steel cable tray seismic support systems, each containing a number of 4 in. x 18 in. steel ladderback cable tray sections. The purpose of this portion of the test article was to determine the minimum separation between an unprotected cable tray and a protected cable tray for which the temperature rise within the protected tray would not exceed the maximum specified in the Test Plan. The three tiered, trapeze type cable tray support assemblies were constructed of 1/2 in. thick wall, 6 in. x 6 in. square steel tubing.

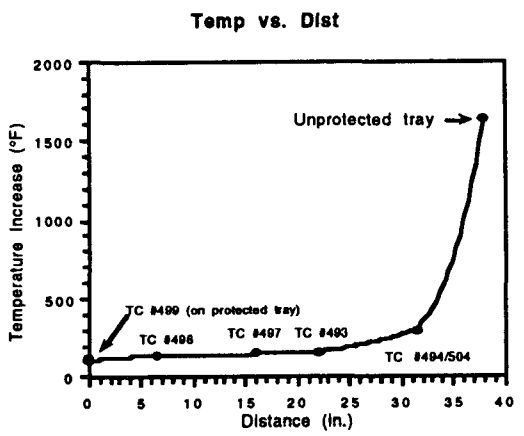
Thermocouples were positioned along the structural steel supports between the protected and unprotected cable trays, and were used to determine the heat rise within and between these two items.

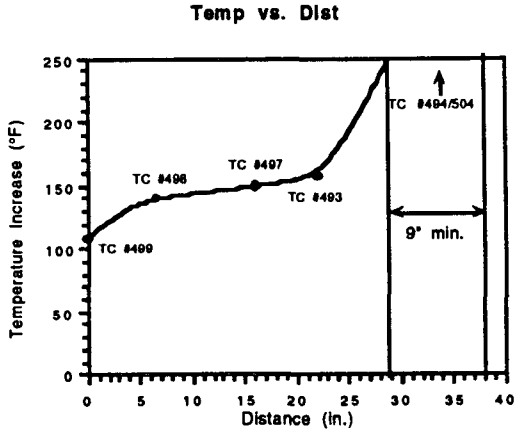
The two paths of heat transfer into the protected elements are:

1) heat entering the unprotected cable trays (including the exposed structural steel beneath it) conducted to the interior of the protective envelope (Thermo-Lag® 330-1) via the structural steel support assembly; and,

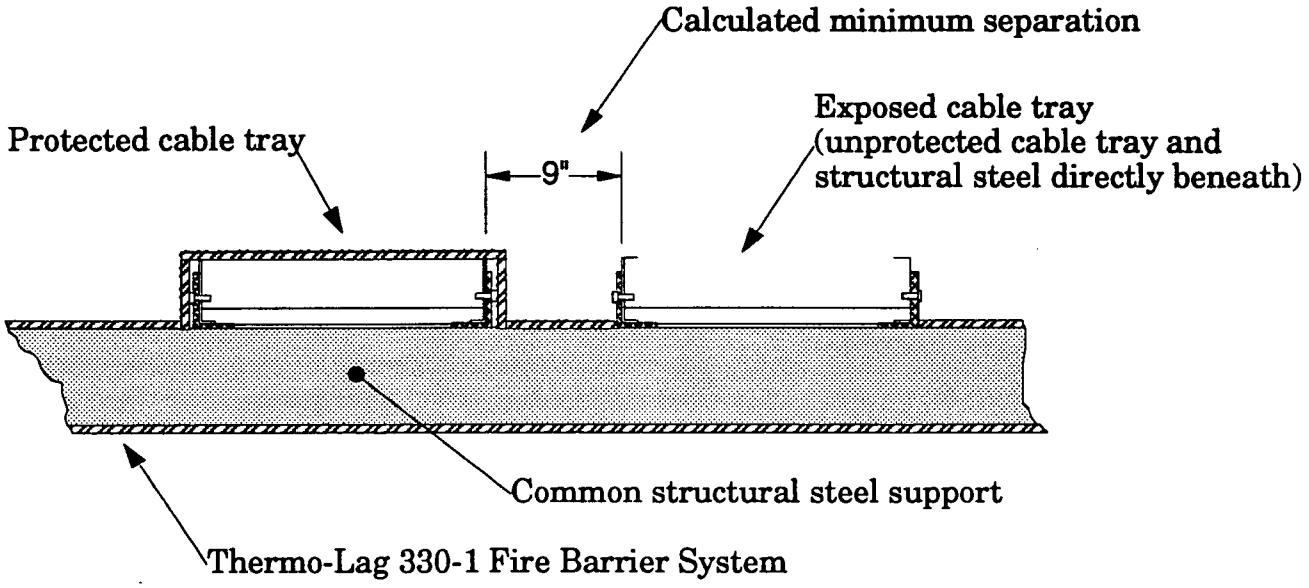
2) heat conducted through the fire protective barrier system (Thermo-Lag® 330-1) directly to the structural steel supports and the protected tray assembly.

Each of these heat transfer paths will have its affect on the heat rise within the protected support and cable tray systems. The graph below presents the results of the system with the highest temperature rise of the two support systems tested. The temperatures plotted indicate increases in temperature above the initial ambient condition at the start of the exposure. The distances represent the linear displacement of the thermocouples from the side rail of the protected cable trays. The 0.0 inch position indicates the location of a thermocouple attached to the vertical centerline of the cable tray side rail. The distances are calculated along the longitudinal centerline of the square tube steel support members, treating heat transfer through bends as 90° angles for simplicity. In light of the very conservative margins of safety determined herein, these results should provide a usable *Rule of Thumb* approach for determining the separation which must be maintained between protected and unprotected cable trays sharing a common structural steel support member of the size utilized in this test assembly.





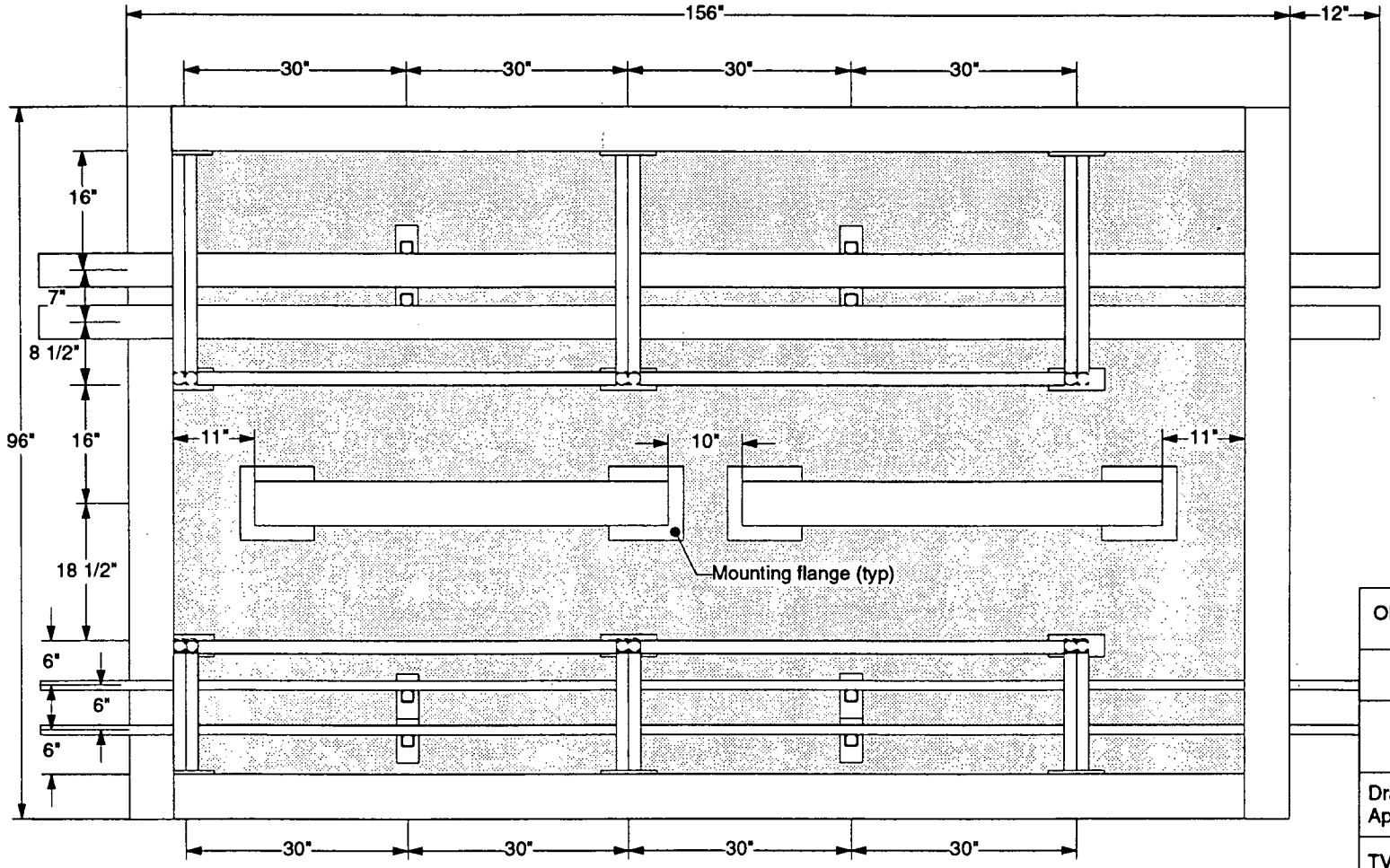
Plotting the distance of each thermocouple from the protected tray versus its temperature at the end of the one hour fire exposure period, smoothing the temperature data and fitting with a continuous curve, reveals that the maximum allowable temperature rise of 250°F is reached on the protected structural steel support at a distance of 9 inches away from the unprotected cable tray. This distance can be considered to be even more conservative, since it is calculated as the location of the maximum allowable temperature rise on the steel support, and does not consider the additional thermal mass of the protected cable tray assembly.



Simplified Diagram of
Protected/Unprotected Tray Relationship

Appendix A

CONSTRUCTION DRAWINGS

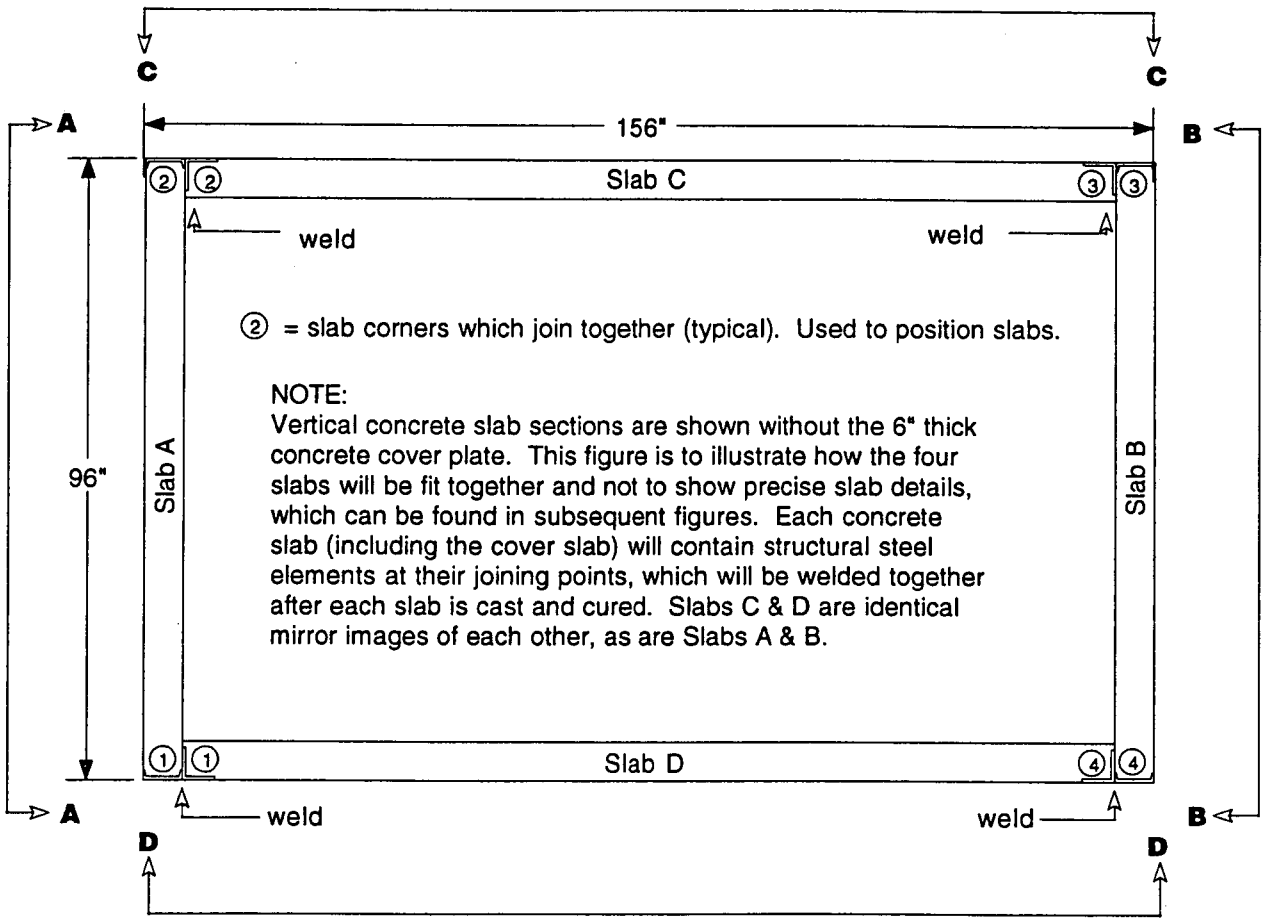


REAR

NOTE:
Deck viewed
from under side

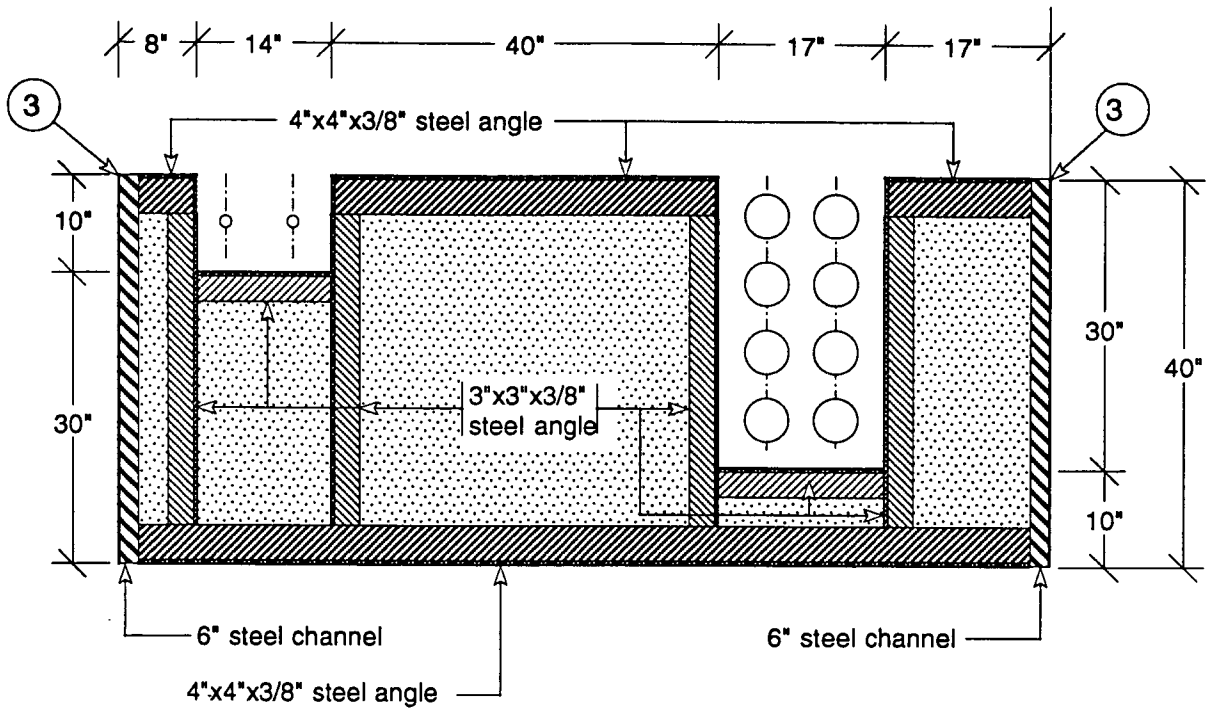
RIGHT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 1 Plan View (Below Deck) - Test Deck #4, Rev. 2
Drawn by: [signature] Date: 8/12/94 Appr'd by: [signature] Date: 8/2/94
TVA Appr'd: [signature] Date: 8/3/94



PLAN VIEW

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 2 Vertical Concrete Slabs PLAN VIEW, Test Deck #4, Rev. 1
Drawn by: Date: 8/2/94 Approved by: Date: 8/2/94
TVA Approval: Date: 8/3/94 Scale: 1/2"=1'

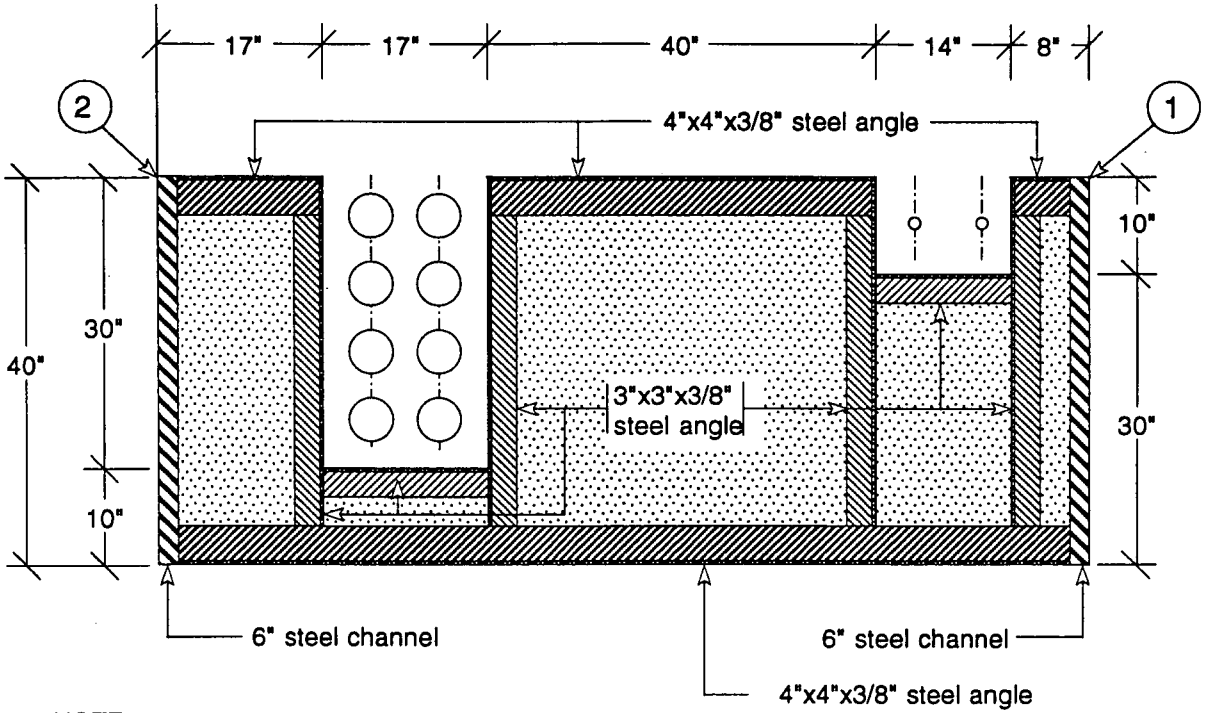


ELEVATION A-A
RIGHT SIDE ELEVATION
(Viewed from fire side)

NOTE:
Darker edges on steel sections denote the placement of the flange.

NOTE:
Once the steel sections are formed, the free areas between them will be reinforced with #5 steel rebars, spaced nominally 8" - 10" o.c. in both directions and welded to the perimeter steel sections (not shown, to reduce the complexity of the drawing). The assembly will then be blocked up with concrete forms where necessary, and filled with normal weight concrete with a minimum compression strength of 2500 psi vibrated into place. The completed slab will then be allowed to set up for one week, followed by an accelerated cure period at nominally 250°F.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 3 Elevation View SLAB A Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 8/2/94 Approved by: C Humphrey Date: 8/2/94
TVA Approval: [illegible] Date: 8/3/94
Scale: 3/4"=1'

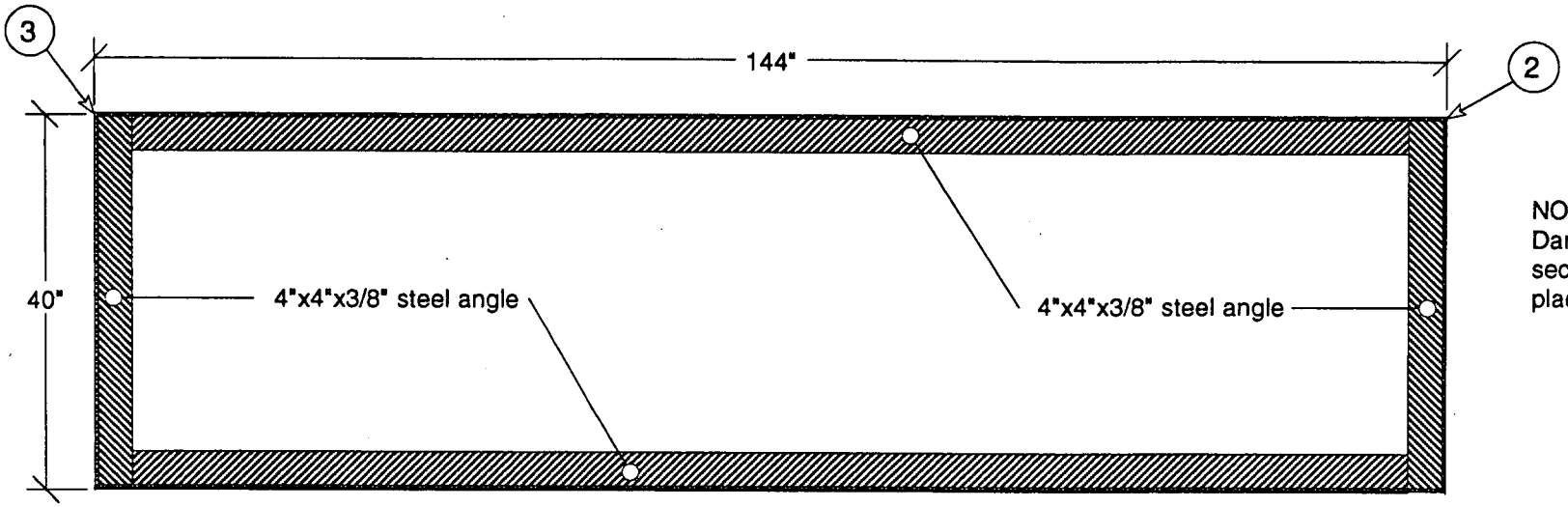


NOTE:
Darker edges on steel sections denote the placement of the flange.

ELEVATION B-B
LEFT SIDE ELEVATION
(Viewed from fire side)

NOTE:
Once the steel sections are formed, the free areas between them will be reinforced with #5 steel rebars, spaced nominally 8" - 10" o.c. in both directions and welded to the perimeter steel sections (not shown, to reduce the complexity of the drawing). The assembly will then be blocked up with concrete forms where necessary, and filled with normal weight concrete with a minimum compression strength of 2500 psi vibrated into place. The completed slab will then be allowed to set up for one week, followed by an accelerated cure period at nominally 250°F.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 4 Elevation View SLAB B Test Deck #4, Rev. 1
Drawn by: H. Stanley II Date: 8/2/94 Approved by: C. Humphrey Date: 8/2/94
TVA Approval: D. Allen Talley Date: 8/3/94 Scale: 3/4"=1'

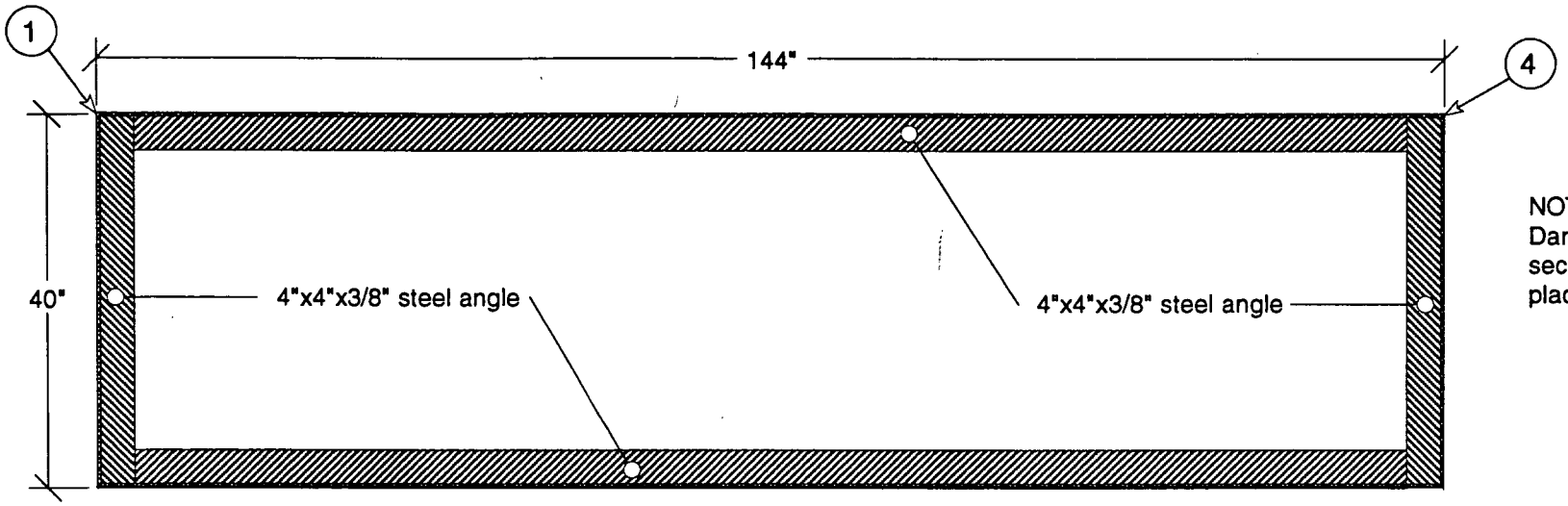


NOTE:
Darker edges on steel sections denote the placement of the flange.

ELEVATION C-C
BACK SIDE ELEVATION
(Viewed from fire side)

NOTE:
Once the steel sections are formed, the free areas between them will be reinforced with #5 steel rebars, spaced nominally 8" - 10" o.c. in both directions and welded to the perimeter steel sections (not shown, to reduce the complexity of the drawing). The assembly will then be blocked up with concrete forms where necessary, and filled with normal weight concrete with a minimum compression strength of 2500 psi vibrated into place. The completed slab will then be allowed to set up for one week, followed by an accelerated cure period at nominally 250°F.

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 5 Elevation View SLAB C Test Deck #4, Rev. 1
Drawn by: [signature] Date: 9/2/94 Approved by: C Humphrey Date: 8/2/94
TVA Approval: [signature] Date: 8/3/94 Scale: 3/4"=1'



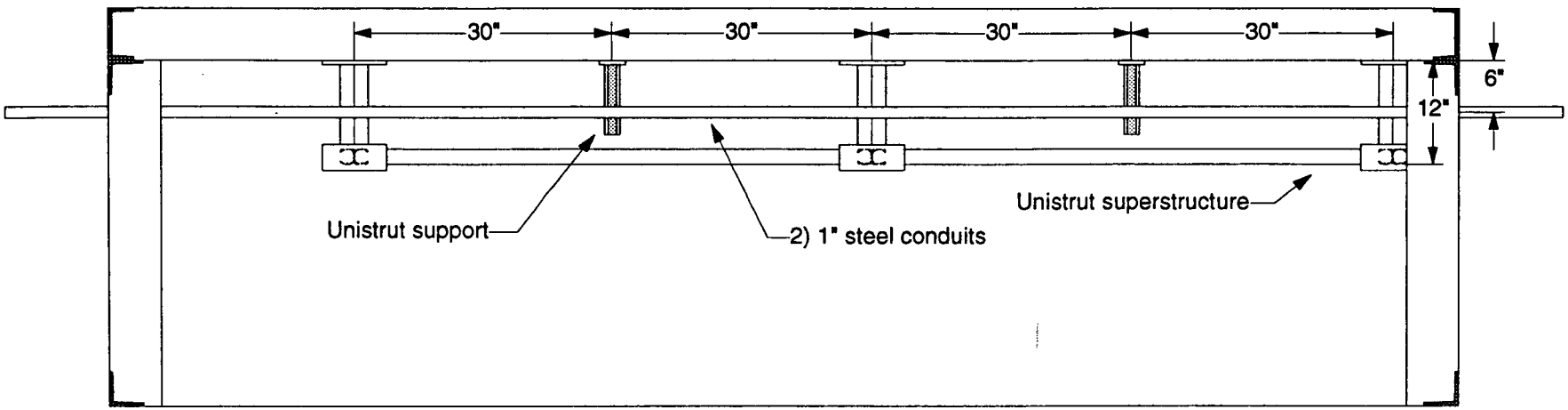
NOTE:
Darker edges on steel sections denote the placement of the flange.

ELEVATION D-D
FRONT SIDE ELEVATION
(Viewed from fire side)

NOTE:
Once the steel sections are formed, the free areas between them will be reinforced with #5 steel rebars, spaced nominally 8" - 10" o.c. in both directions and welded to the perimeter steel sections (not shown, to reduce the complexity of the drawing). The assembly will then be blocked up with concrete forms where necessary, and filled with normal weight concrete with a minimum compression strength of 2500 psi vibrated into place. The completed slab will then be allowed to set up for one week, followed by an accelerated cure period at nominally 250°F.

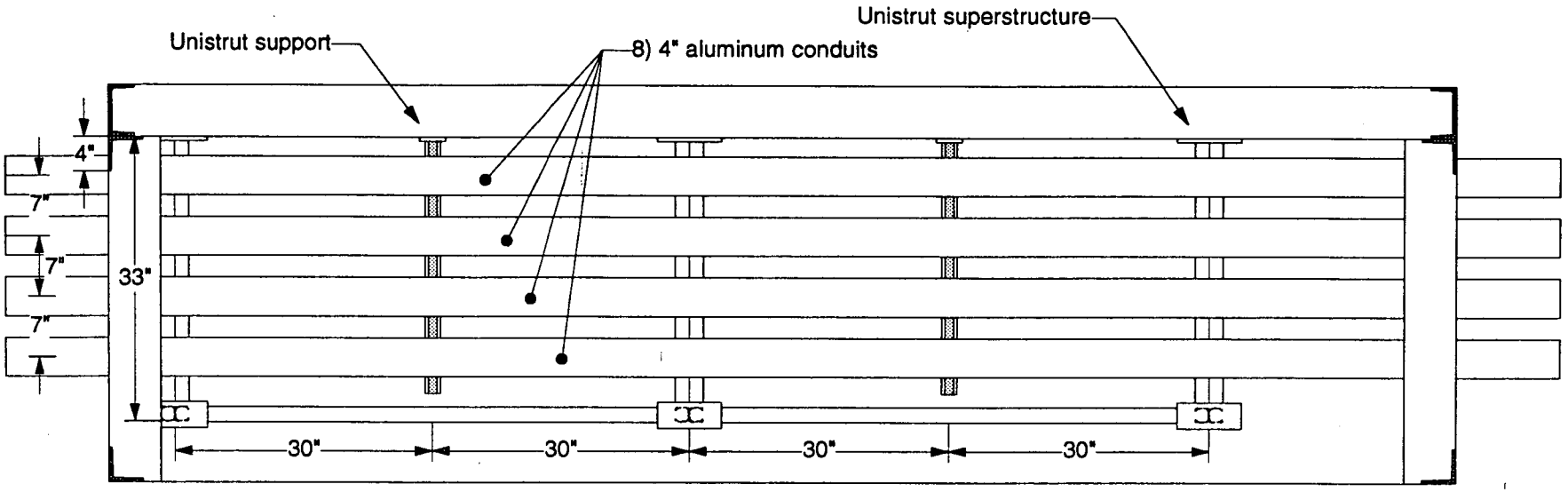
OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 6 Elevation View SLAB D Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 8/2/94 Approved by: C Humphrey Date: 8/2/94
TVA Approval: [signature] Date: 8/3/94

Scale: 3/4"=1'



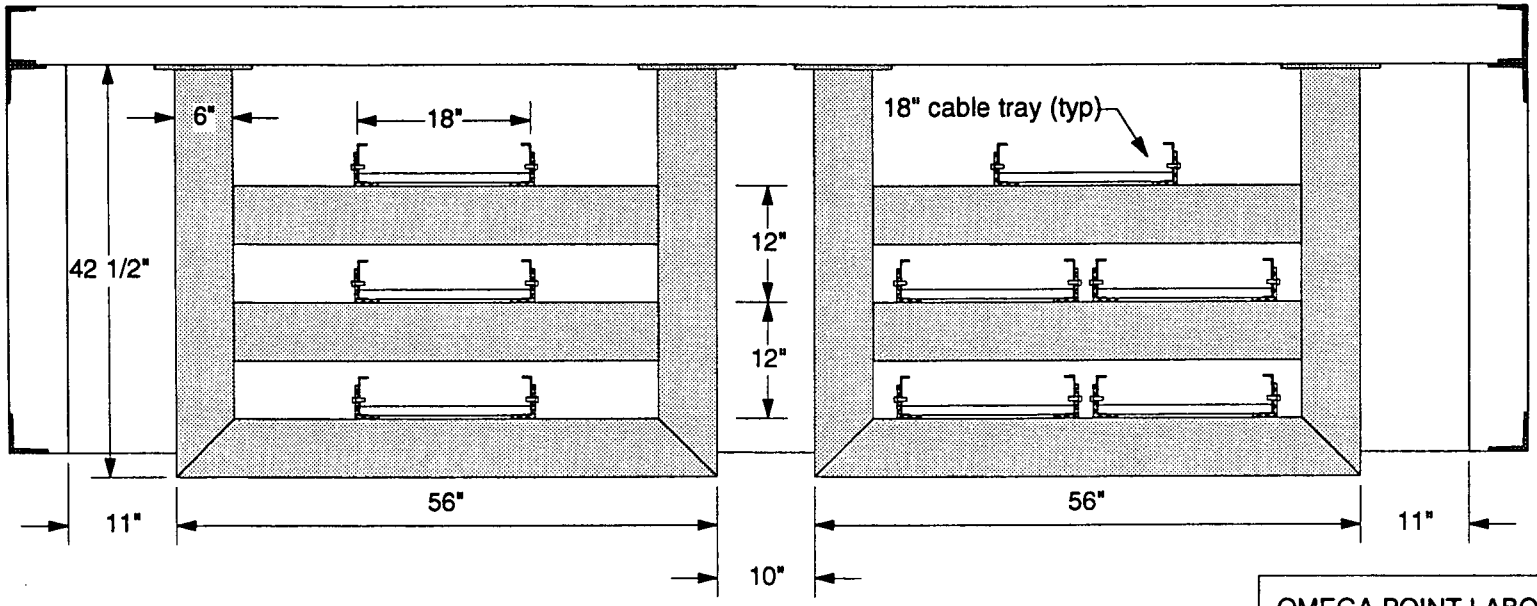
VIEW FROM REAR

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 7 Elevation View of 1" Conduits Test Deck #4, Rev. 2
Drawn by: H. Lambert II Date: 8/2/94 Appr'd by: C. Humphrey Date: 8/2/94
TVA Appr'd: Date: 8/3/94



VIEWED FROM FRONT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 8 Elevation View of 4" Conduits Test Deck #4, Rev. 2
Drawn by: [illegible] Date: 8/2/94 Appr'd by: C Humphrey Date: 8/2/94
TVA Appr'l: [signature] Date: 8/3/94



ELEVATION VIEW
(Viewed From the Rear)

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 9 Elevation View of Tray Supports Test Deck #4, Rev. 1
Drawn by: [signature] Date: 8/2/94 Appr'd by: [signature] Date: 8/2/94
TVA Appr'd: [signature] Date: 8/3/94

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 thermo-couples, 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:

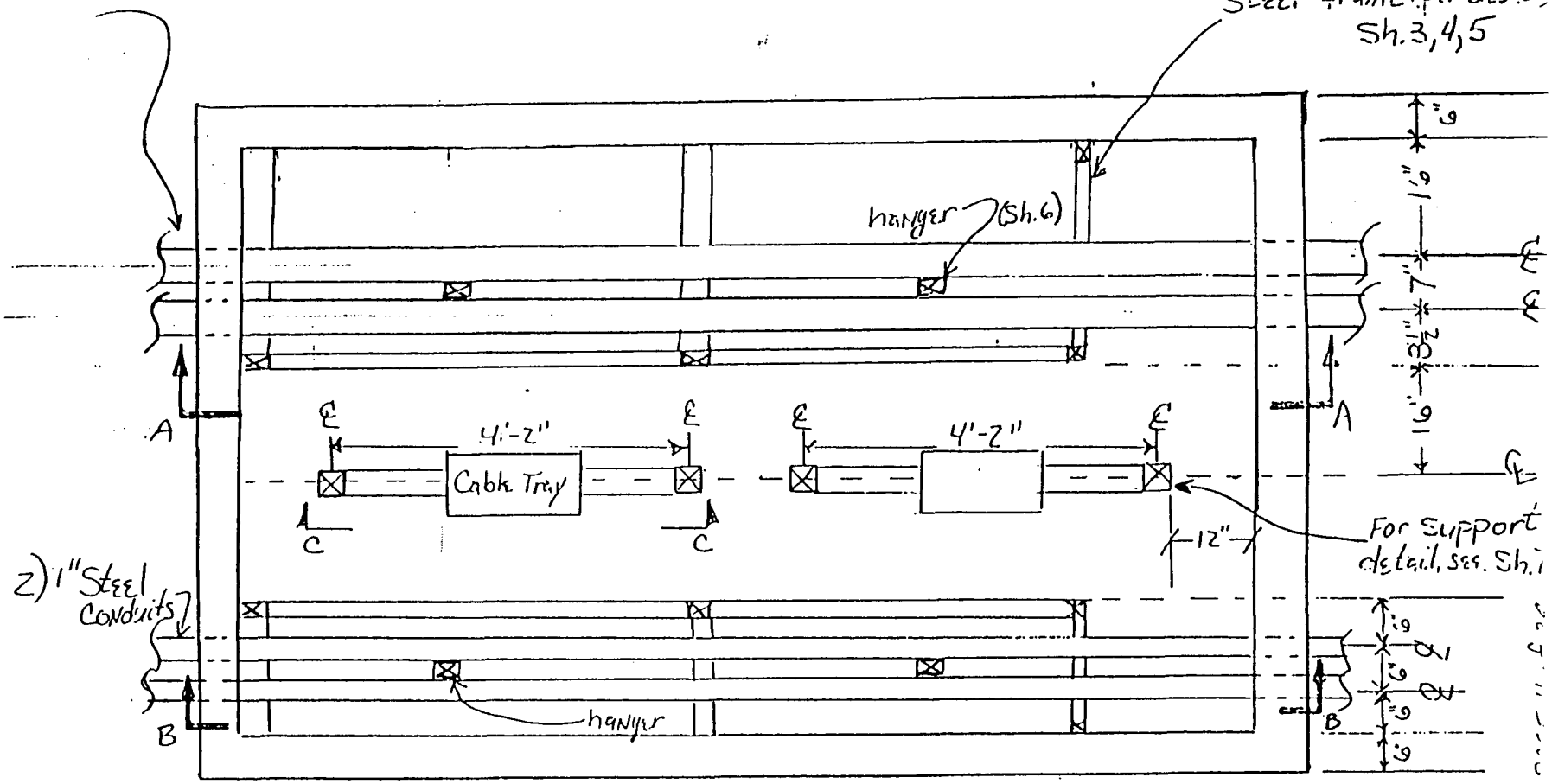
a. Date of the test
b. Location of the test
c. Description of the test furnace and test article
d. Calibration documentation of all thermocouples
e. Qualification and certification for QA personnel
f. Test procedures used
g. Acceptance criteria
h. Provide quality control records for:
   (1) Test article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

2-Sided Box

Test Deck #4

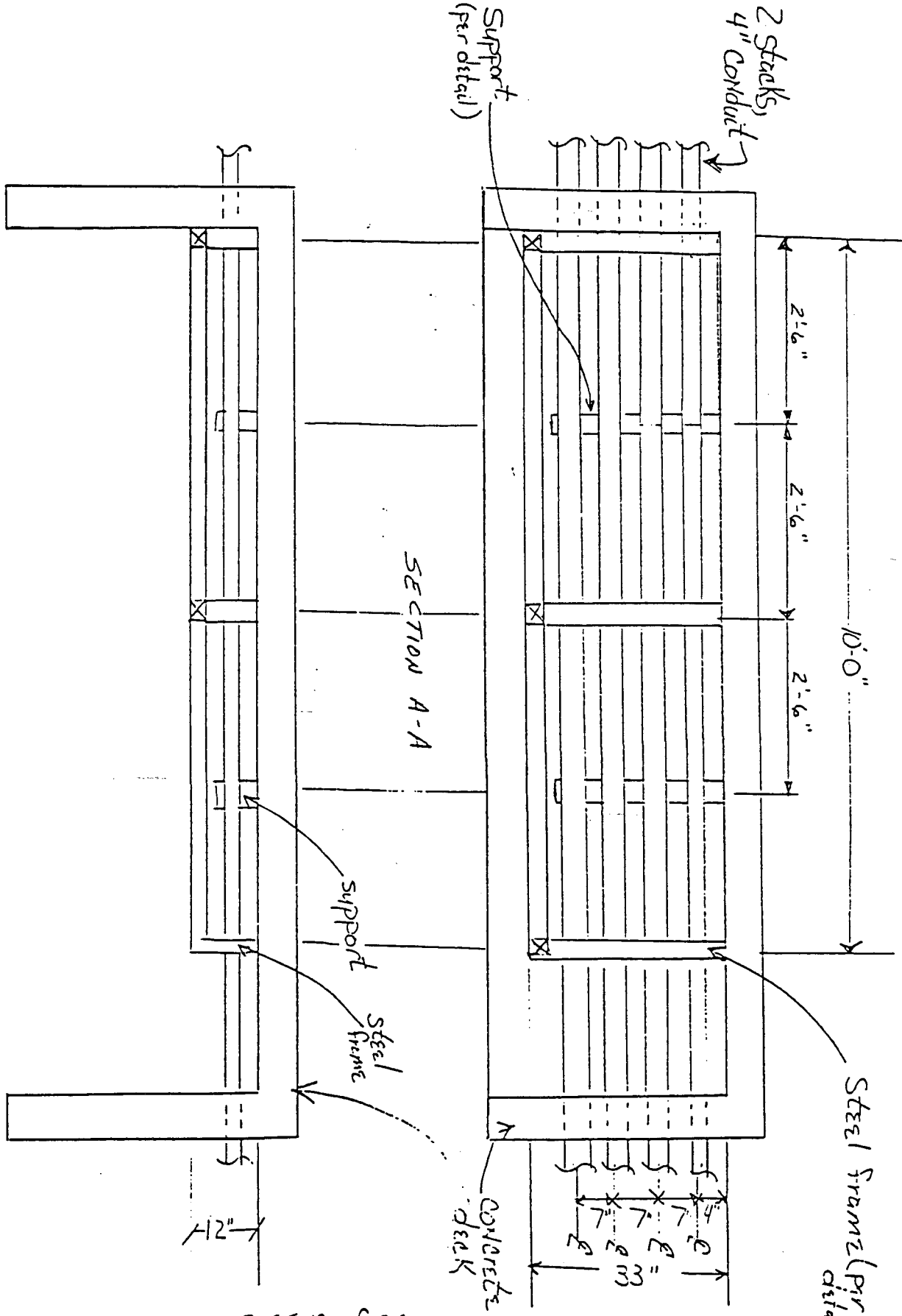
COMPUTED DATE

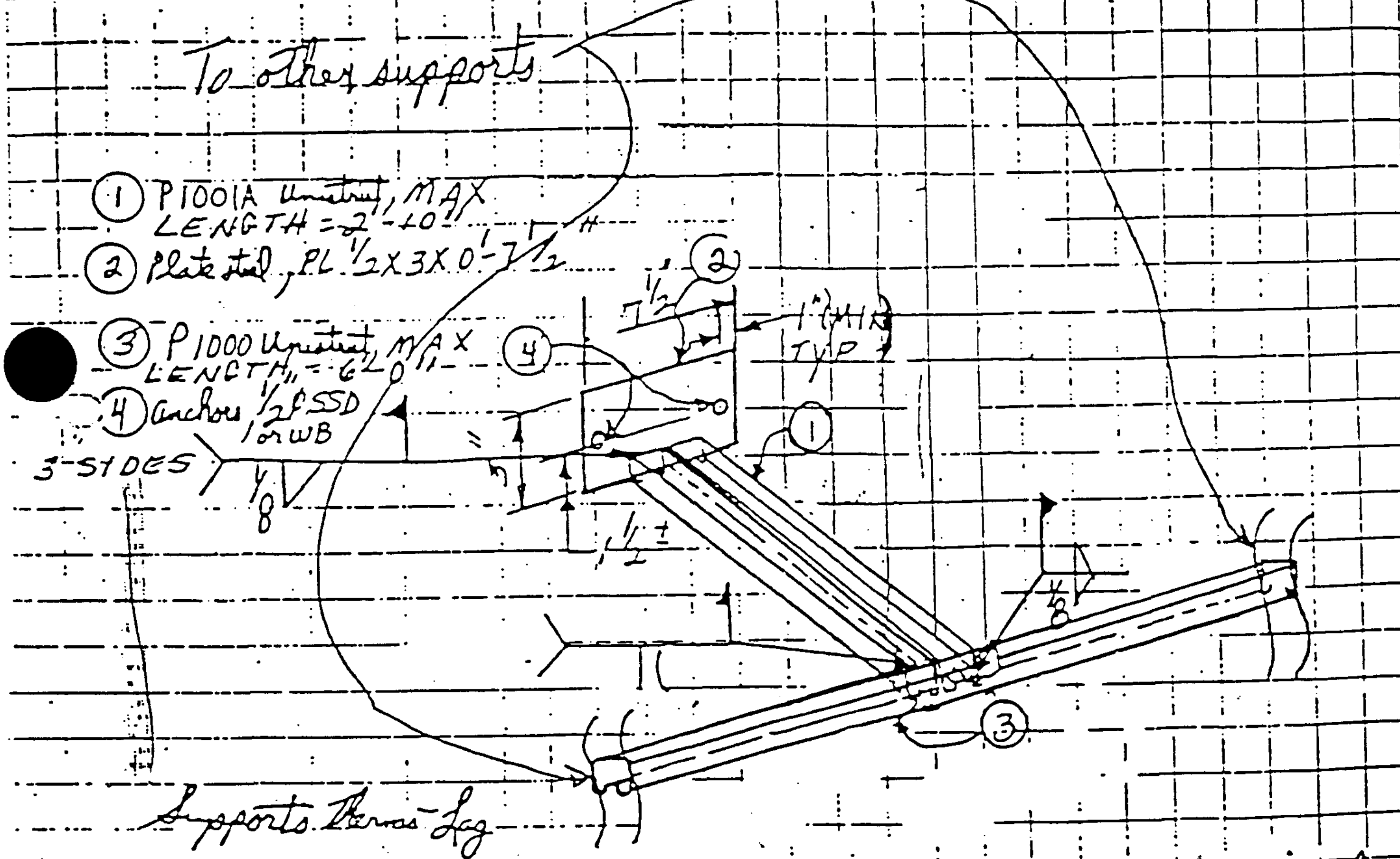
CHECKED DATE

COMPUTED DATE

CHECKED DATE

Test Deck #4





Add the above support to drawing 48N 1314-5 for the following locatio

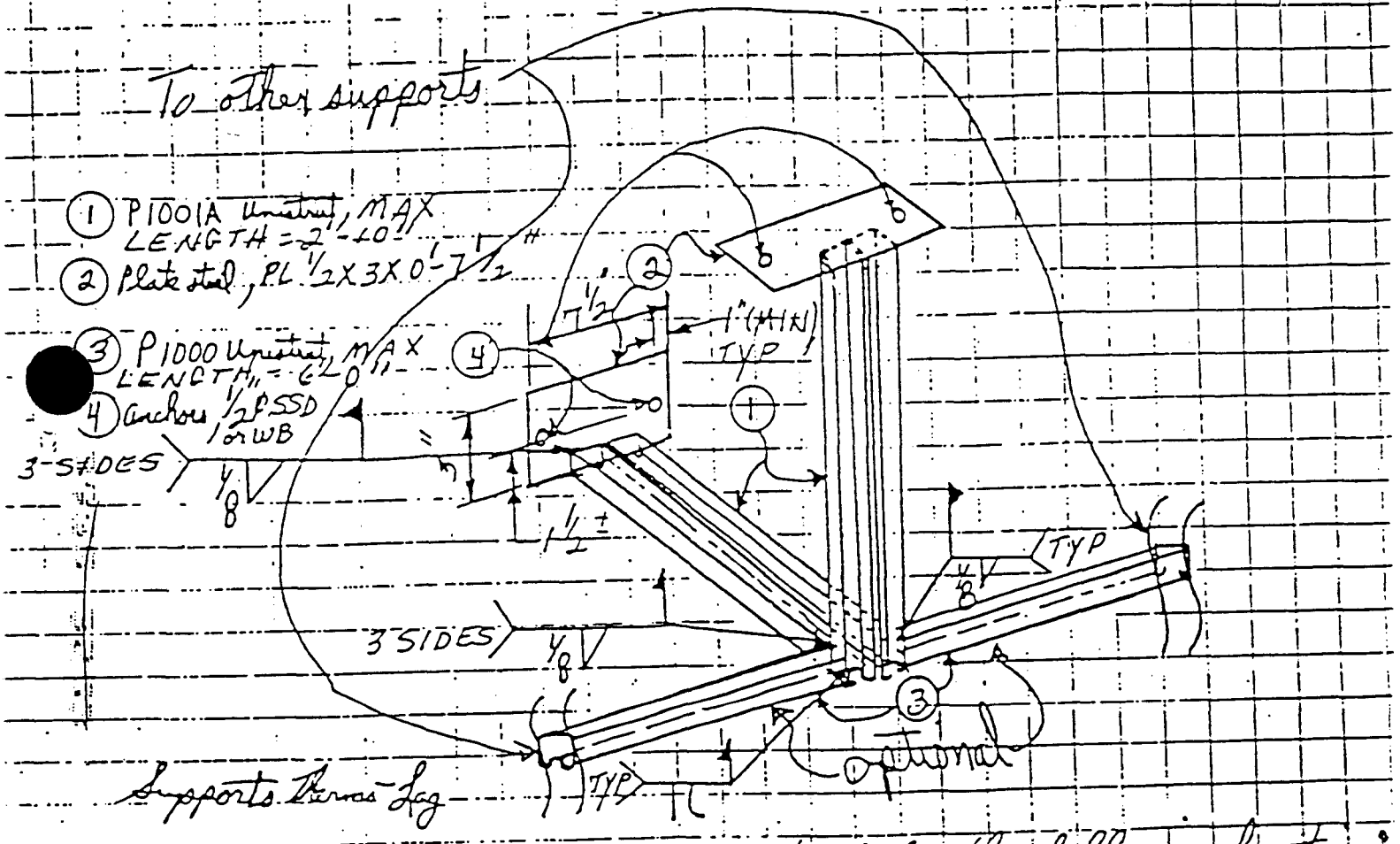
1-37?-113?? ≃10'-2" W of ¢ at A1 Elev ≃ 761' 47A053-90 series can apply

WP 11605

PAGE VI-59 of VI-101

FCR-3451 R1

E4.17



Add the above supports to drawing 48N 1314-5 for the following locations:

(1)	≃ 6' 7½" W of u at A1	Elev ≃ 761'
(2)	≃ 15' 11" W of u at A1	
(3)	≃ 0' 8" W ft 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

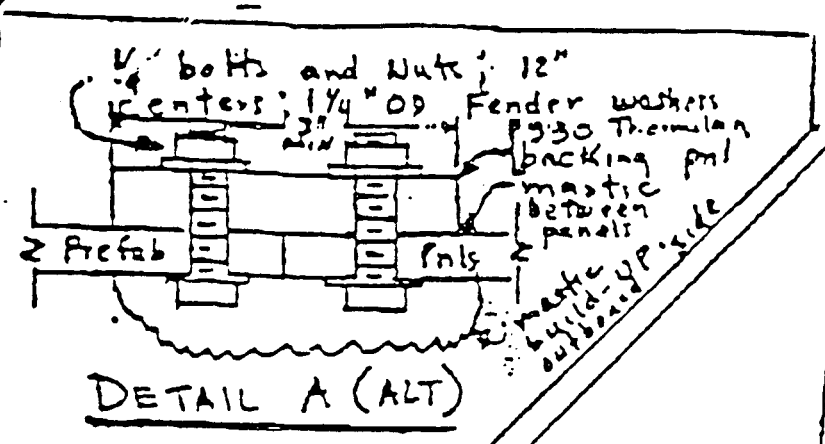
PAGE VI-58 OF VI-10

FCR-3451 R2

SEQUOYAH NUCLEAR PLANT

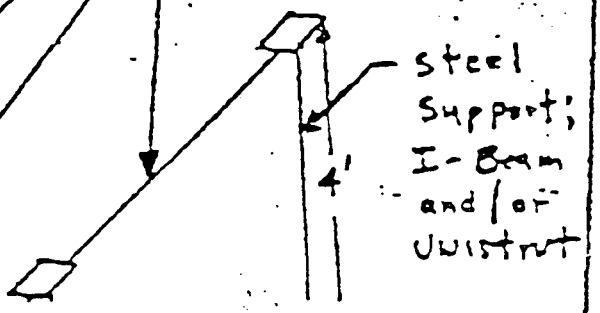
SK-DM 050286

TSI FIRE BARRIER INST - SPECIAL



DETAIL A (ALT)

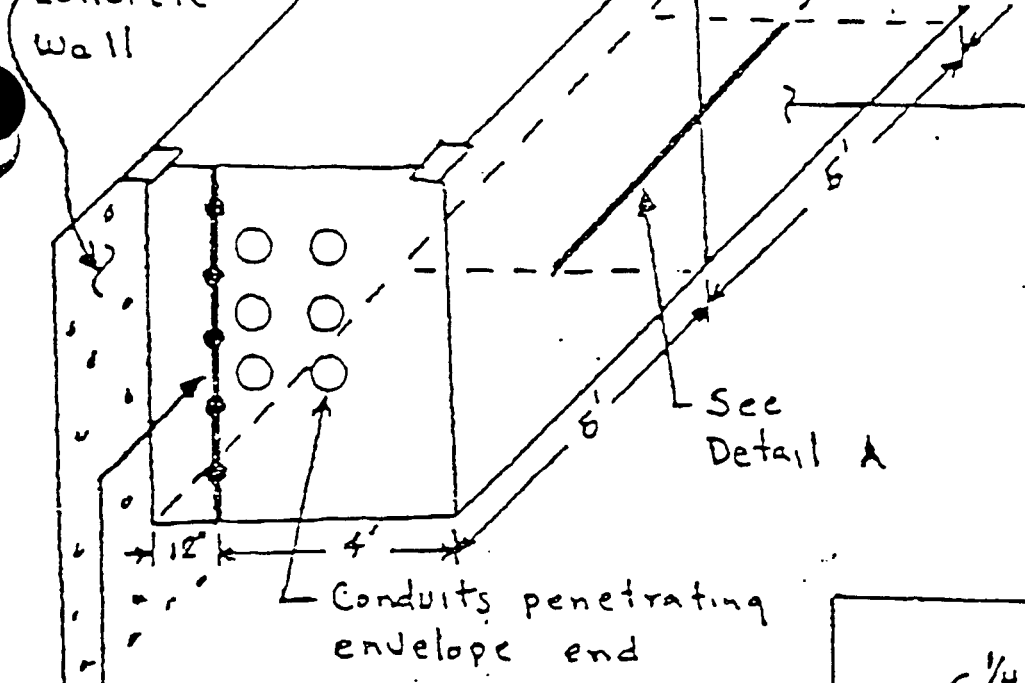
1½" x 1½" angle steel construction; wall and ceiling



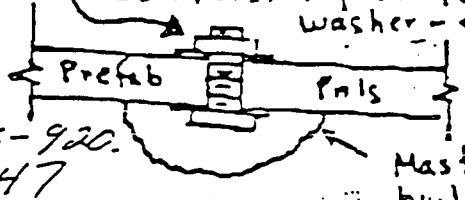
5-6-86

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

L. A. Johnson



Thermo-lag 330, 1 hr. fire barrier material, ½" thick, Prefabricated panel construction, Secured around perimeter using Nelson studs on 12" centers (dimensions approx)

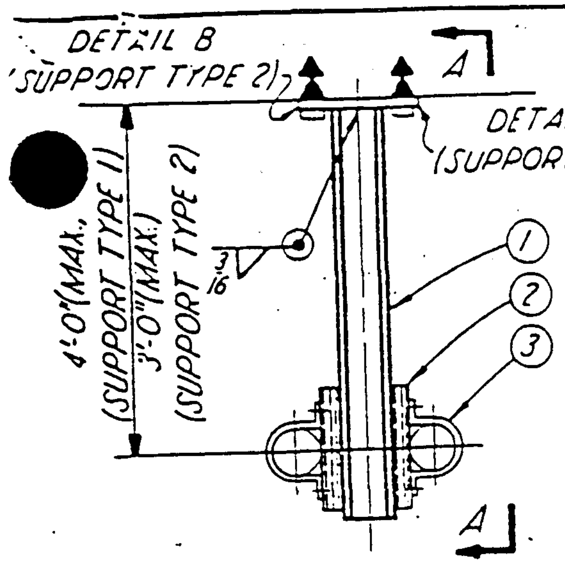


Detail A

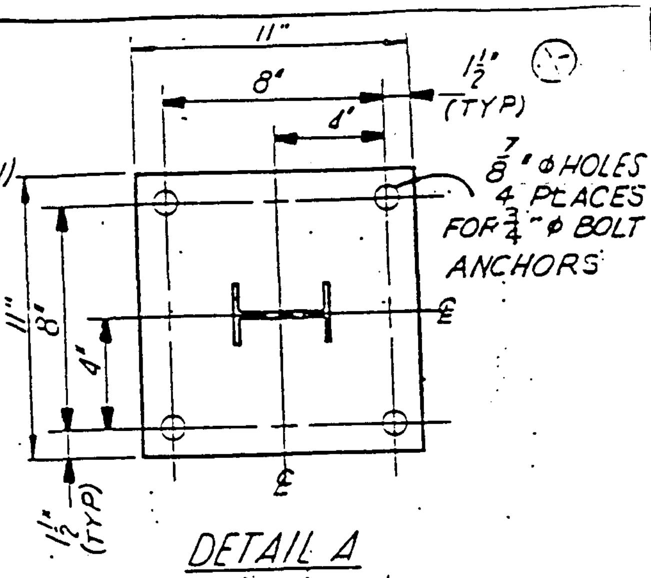
* Pnls joined with mastic

TC-86-920
WP 113-47
PAGE X5-8 OF X5-8

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



ELEVATION VIEW



DETAIL A
(SUPPORT TYPE 1)

TABLE A

SUPPORT TYPE	CONDUIT SIZE									STEEL SIZE "A"
	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	5"	
1	50	50	9	13	11	6	4	3	2	W6X15.5
2	30	30	7	9	9	5	3	3	2	W4X13

NOTES:
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 OE 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

6530 11-22-85
ED NOTE * FR 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

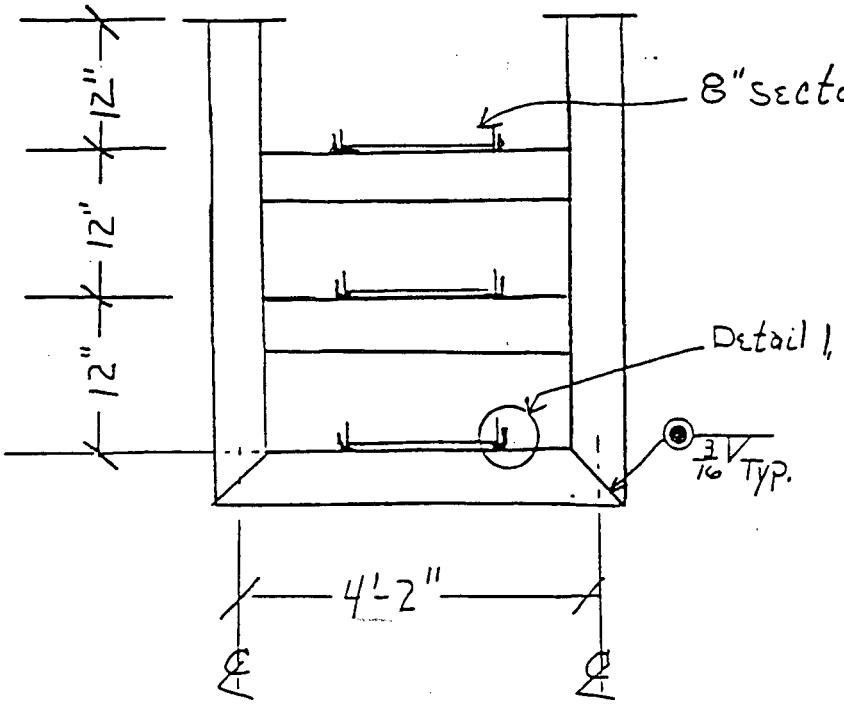
KNOXVILLE 11-23-75 45 M 47A056-53 R1

Test Deck #4

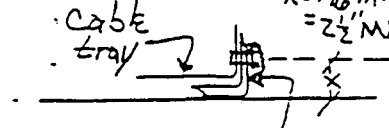
COMPUTED ____ DATE ____

CHECKED ____ DATE ____

Cable Tray Support Details



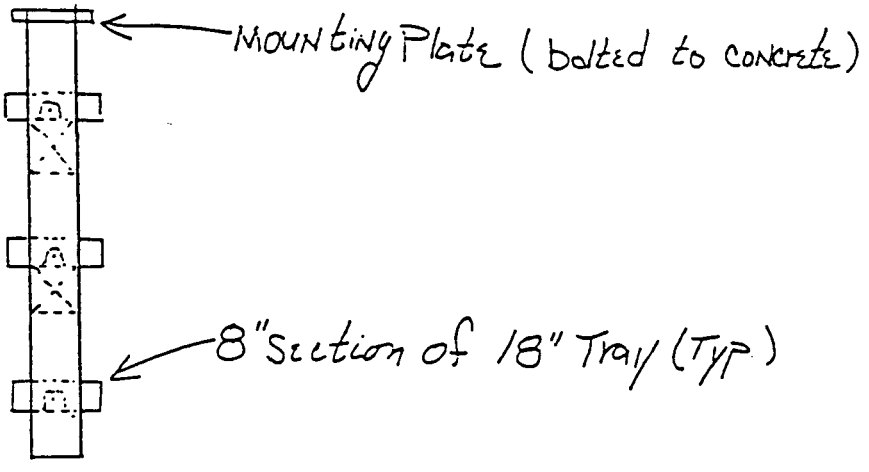
Bolt Hole:
X = 1 9/16" min.
= 2 1/2" max.



4 @ 3 1/2" x 2 1/2" x 3/8" x 0'-4"

Detail 1

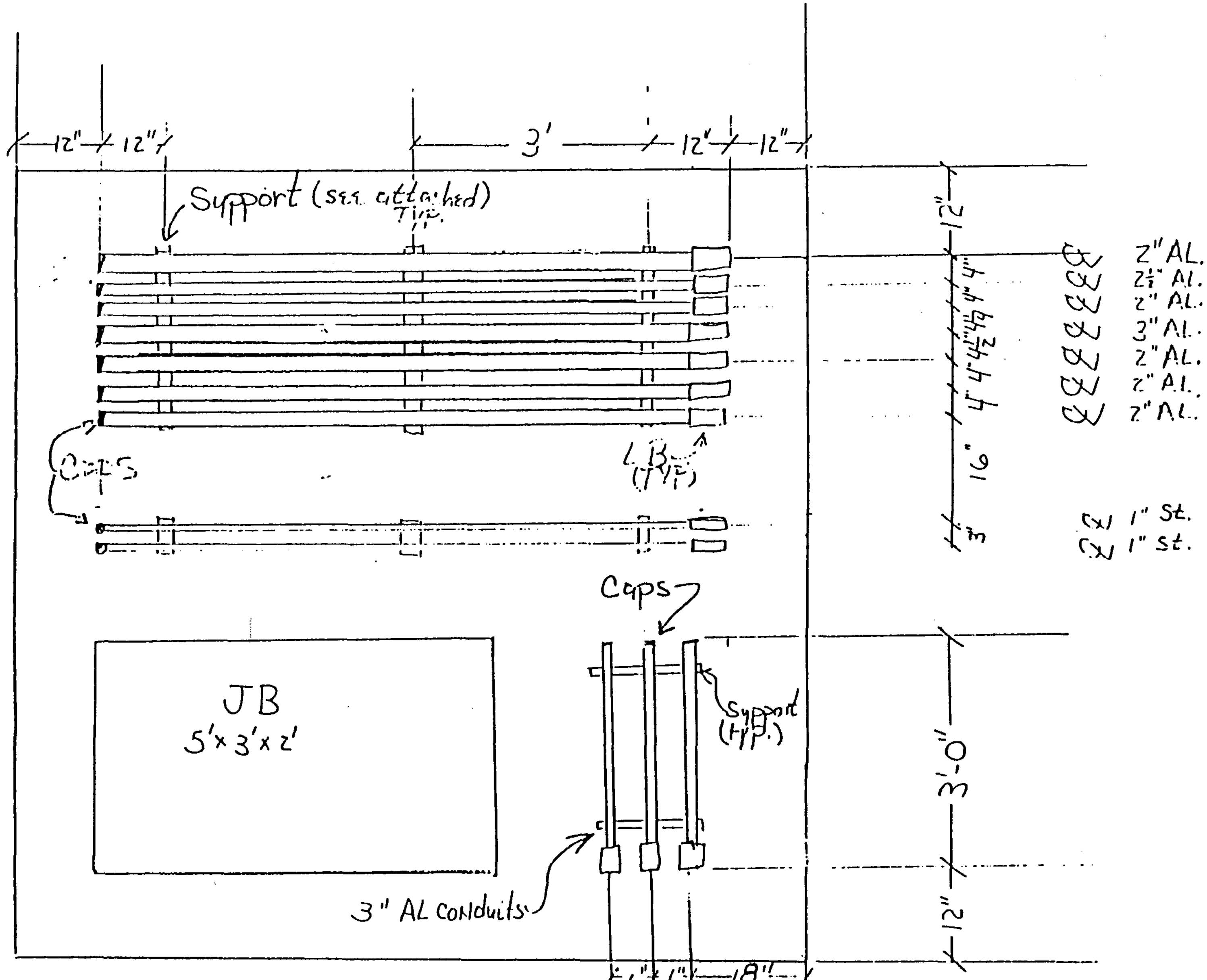
1) Bolt = 3/8" x 1", Hole = 7/16" ϕ
Head installed inside tray.



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)

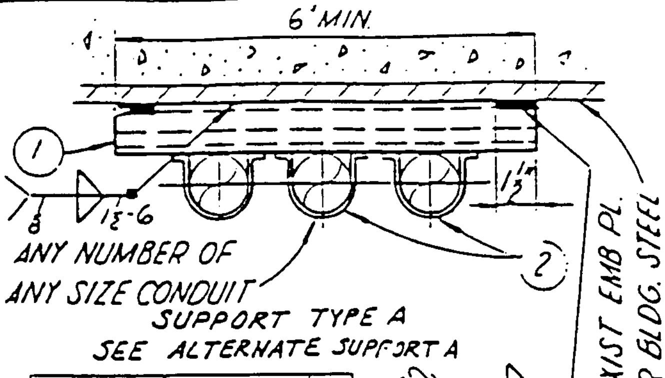
COMPUTED ______ DATE ______
CHECKED ______ DATE ______

- 3 sided - Boxed Conduits
- Large JB
(Wall Config)
Test Deck #5



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.

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



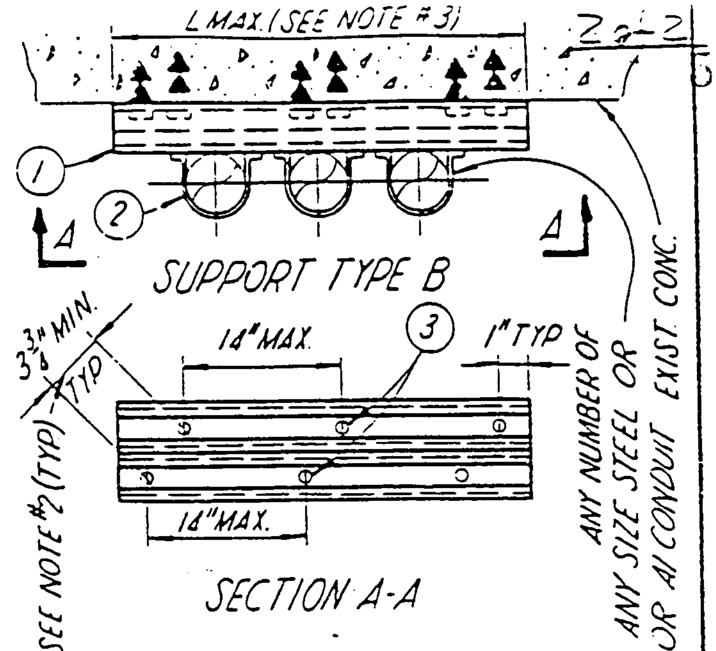


TABLE A

COND. Φ	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" Φ 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	
5	L6530	[illegible]	ADDED NOTE * P... FCR 3770
3	LS1	1-14-85	REV. PER SQ-FCR-1121 FOR ECN L-5198
2	S1	5-27-78	ADDED NOTE 8
1	S1	7-6-[illegible]	ADDED NOTE 7 PER FCR F-646

REVISED PER FCR 2598 R1

SEISMIC CLASS I STRUCTURE
MECHANICAL
SEISMIC SUPPORT
CONDUIT

SEQUOYAH NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

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

KNOXVILLE 45IM 47A056-59 Q

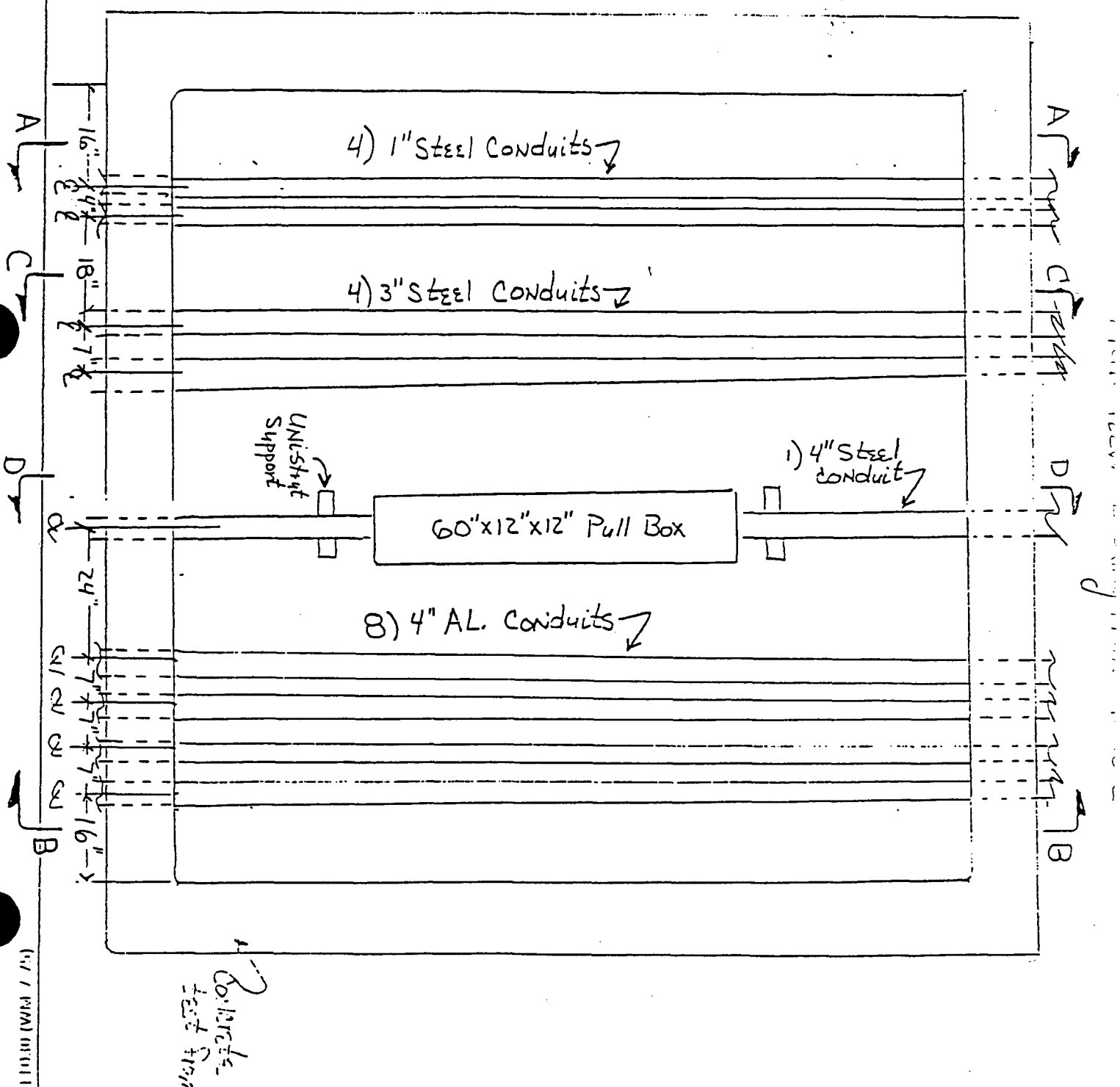
Typical Terminating Conduit Box SHEET 1 OF 3

Test Deck

Concrete Wall

COMPUTED _____ DATE _____

CHECKED _____ DATE _____



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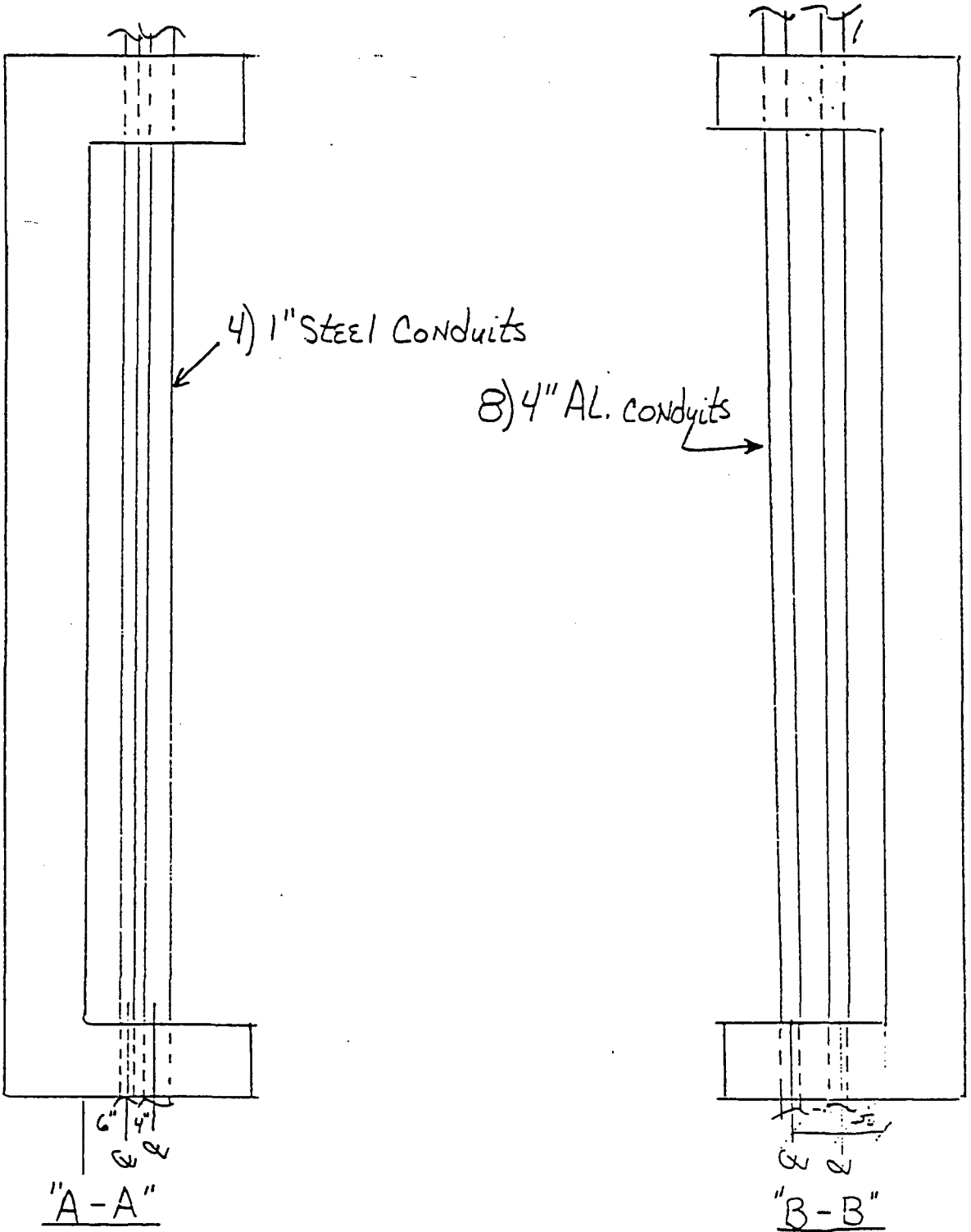
Test Deck #6

Left View

Right View

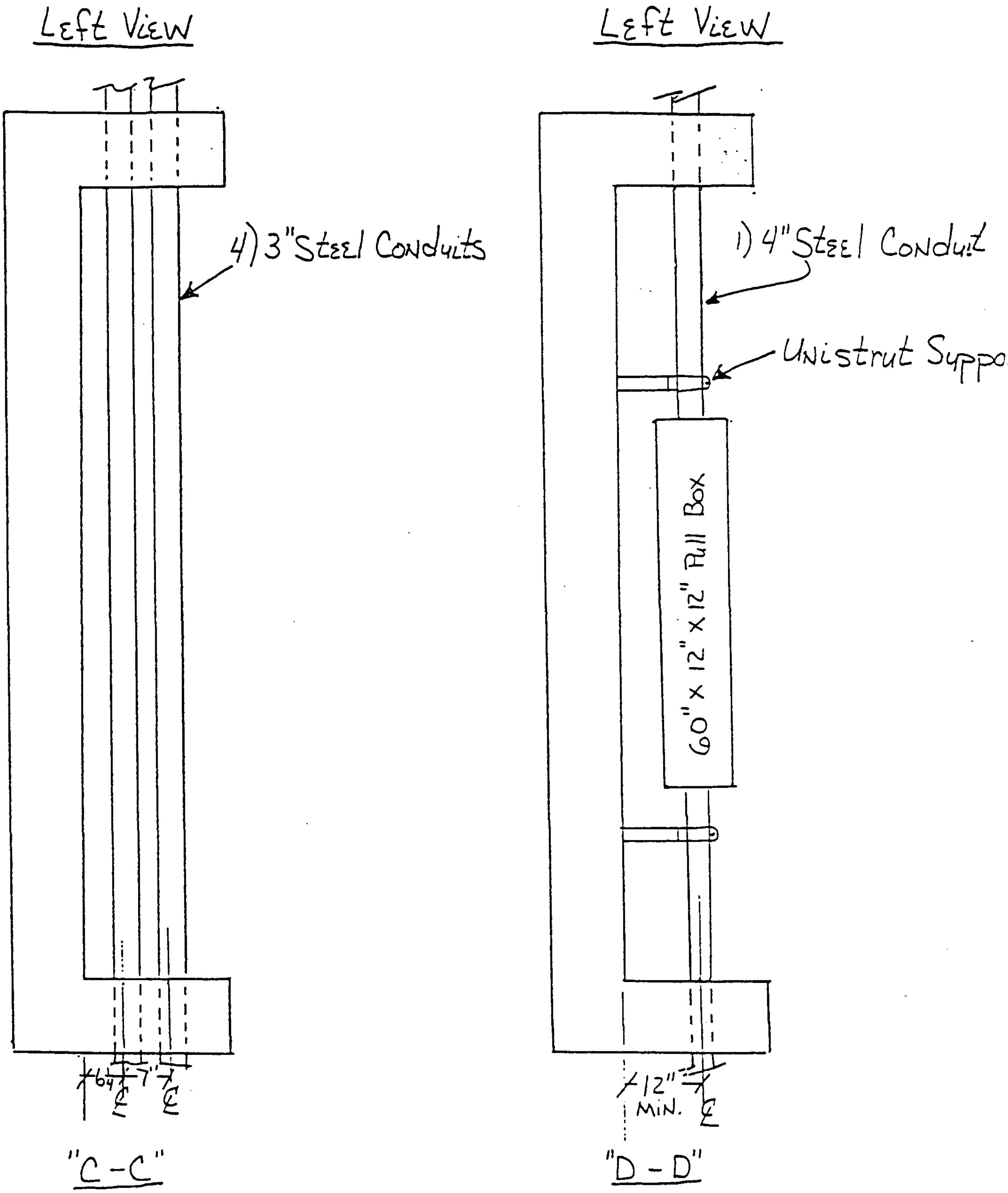


Note: Lab can pour concrete in place around conduits or sleeve and seal or core bore and seal around conduits.

COMPUTED ______ DATE ______

CHECKED ______ DATE ______

Test Deck #6



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

Large Ganged Conduit 01 of 2

Test Deck #7

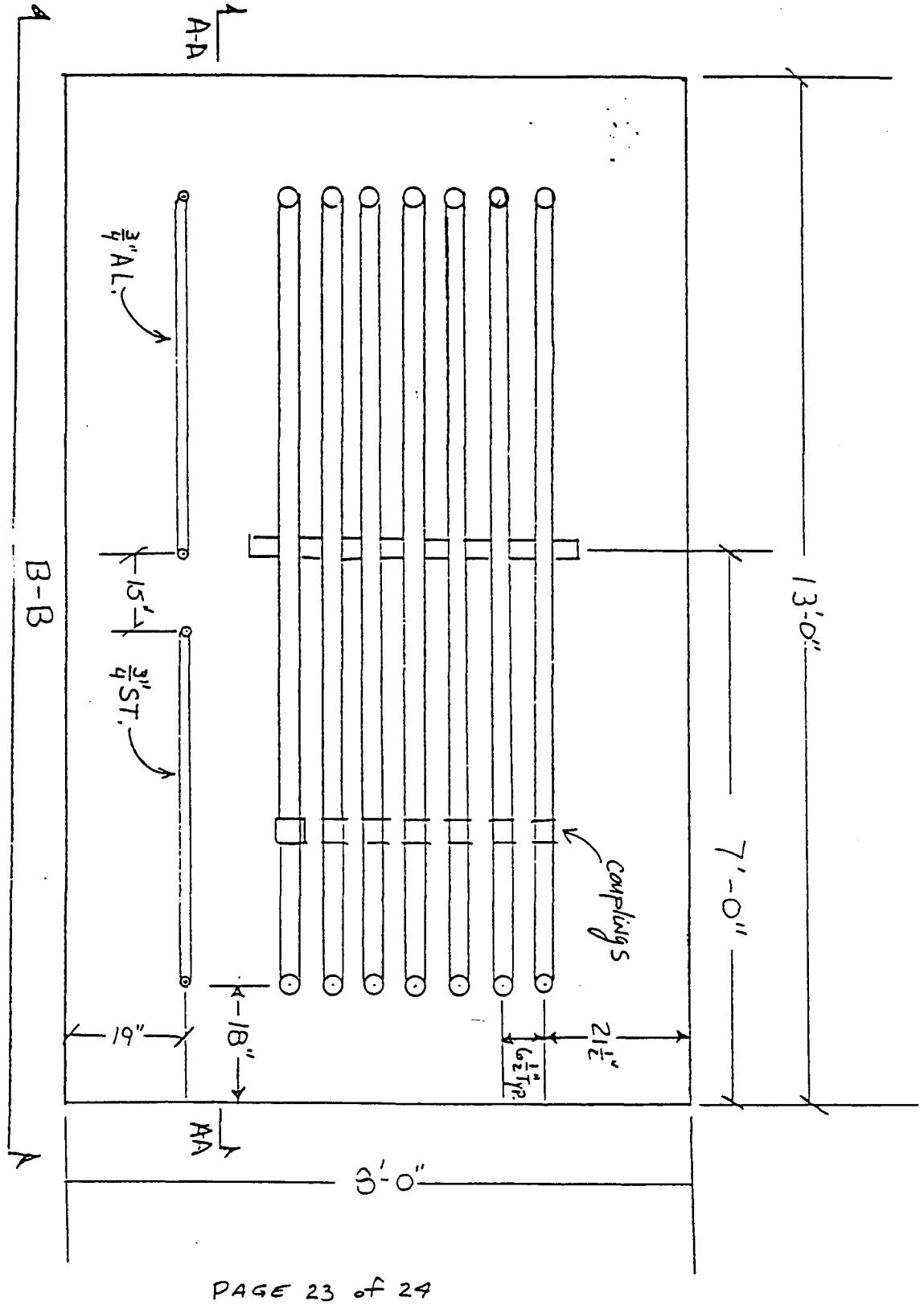
Steel Deck - Horiz -

COMPUTED MHG DATE

CHECKED DATE

7) 4" Steel Conduits. Spaced 6½" on ℄

Plan View



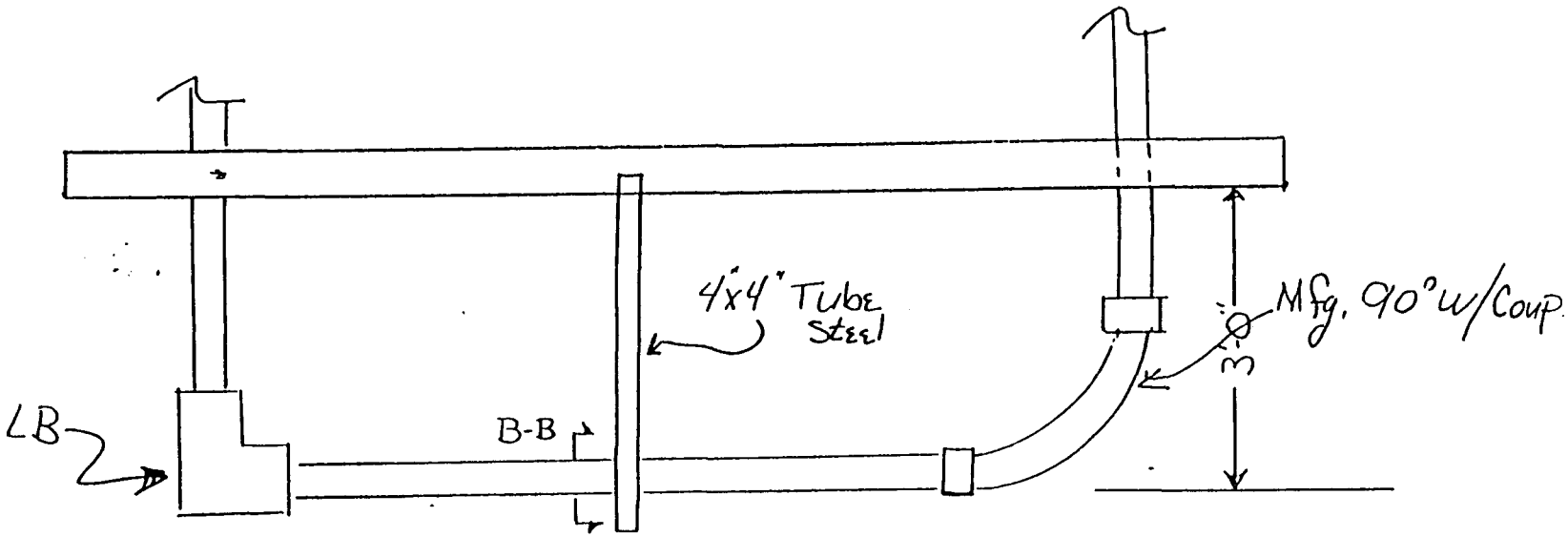
Large Ganged Conduits

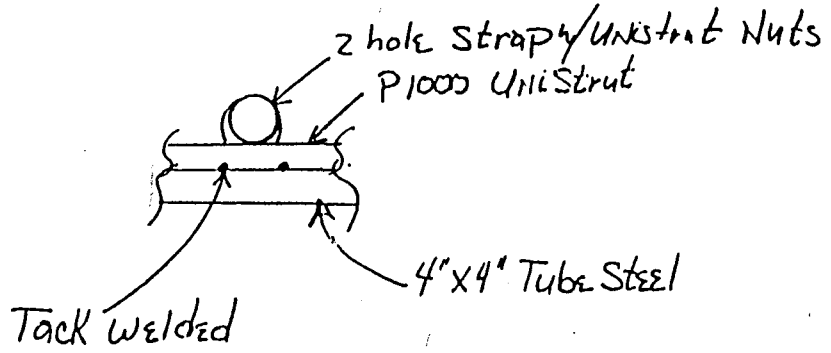
SHEET 02 OF 2 58

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

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

I. BACKGROUND

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

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

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

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

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

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

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

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

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

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

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

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

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

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

III. DEFINITIONS

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

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

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

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

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

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

·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 Materials."

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

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

I. INTRODUCTION

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

II. CABLE CIRCUIT INTEGRITY TESTS

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

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

III. EQUIPMENT QUALIFICATION

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

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

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

IV. CABLE INSULATION TESTS

The two principal materials used as cable insulation and cable jackets by the nuclear industry are thermoplastics and thermosetting polymeric materials. A thermoplastic material can be softened and resoftened by heating and reheating. Conversely, thermosetting cable insulation materials cure by chemical reaction and do not soften when heated. Under excessive heating thermosetting insulation becomes stiff and brittle. Electrical faults may be caused by softening and flowing of thermoplastic insulating materials at temperatures as low as 149 °C [300 °F]. Thermosetting electrical conductor insulation materials usually retain their electrical properties under short-term exposures to temperatures as high as 260 °C [500 °F]. Insulation sistance (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 cessary for proper operation of instruments.

e Megger tests (pre-fire, during the fire [if performed], and immediately ter the fire test conditions) should be done conductor-to-conductor for iti-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 post test visual cable inspection and the Hi-Pot test described above should readily demonstrate the functionality of the cable circuit during and after a fire.

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

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

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

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

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

Functionality should be demonstrated if any of the preceding criteria are exceeded (Note 5). ethods when cables are excluded from test specimen: Comparison of internal temp. profiles to EQ and LOCA test data. Air oven test of cables at rated voltage with Megger and Hi-Pot tests (Note 6) Method when cables are in test specimen include megger and Hi-Pot testing (Note 7) Demonstration of functionality should also consider operating temperature of the cables inside the fire 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.

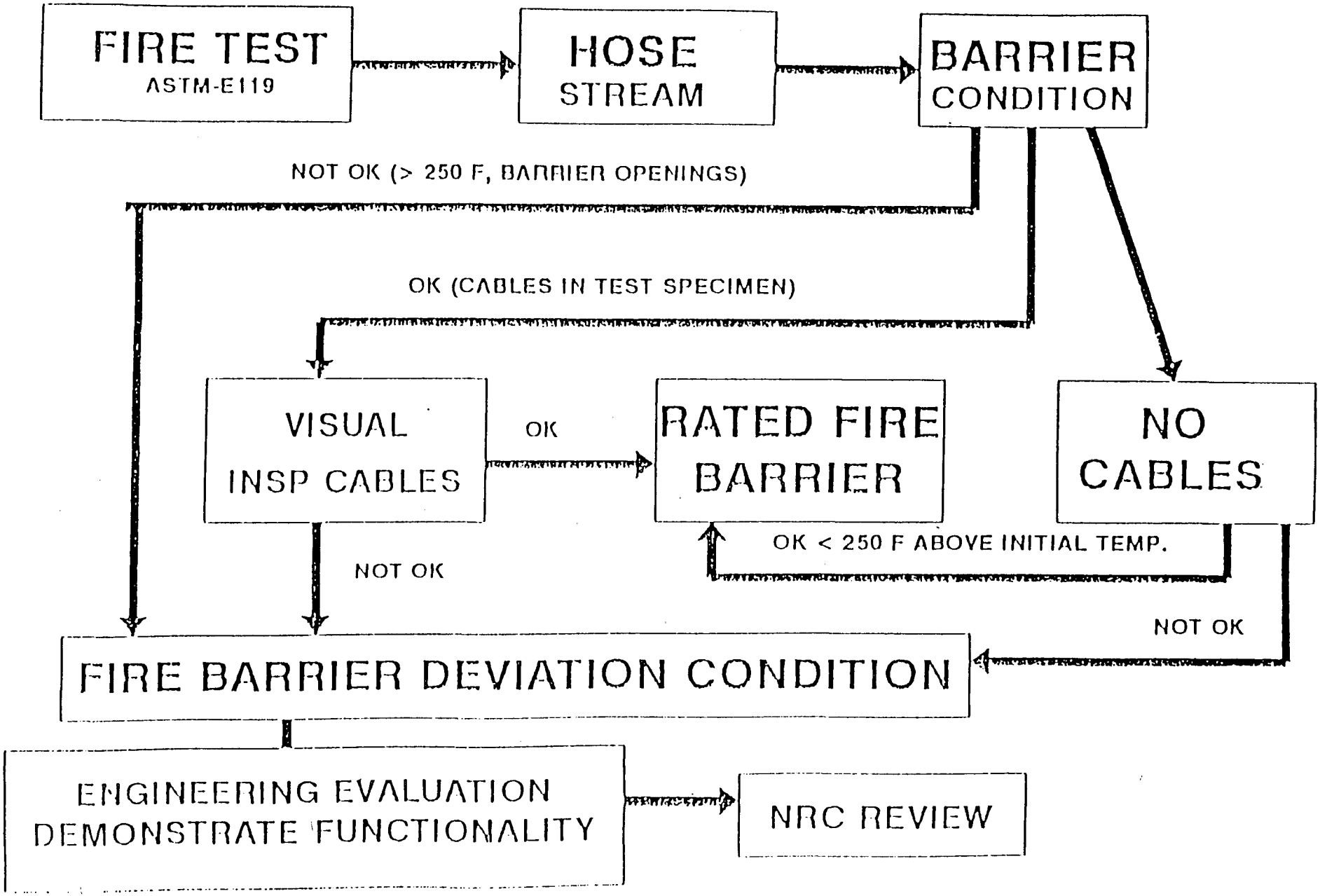
Note 4: This hose stream test method provides assurance that the cable tray or raceway fire barrier system has sufficient structural integrity to resist minor fire related barrier breaches caused by falling objects.

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.

FIRE BARRIER ACCEPTANCE CRITERIA 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.

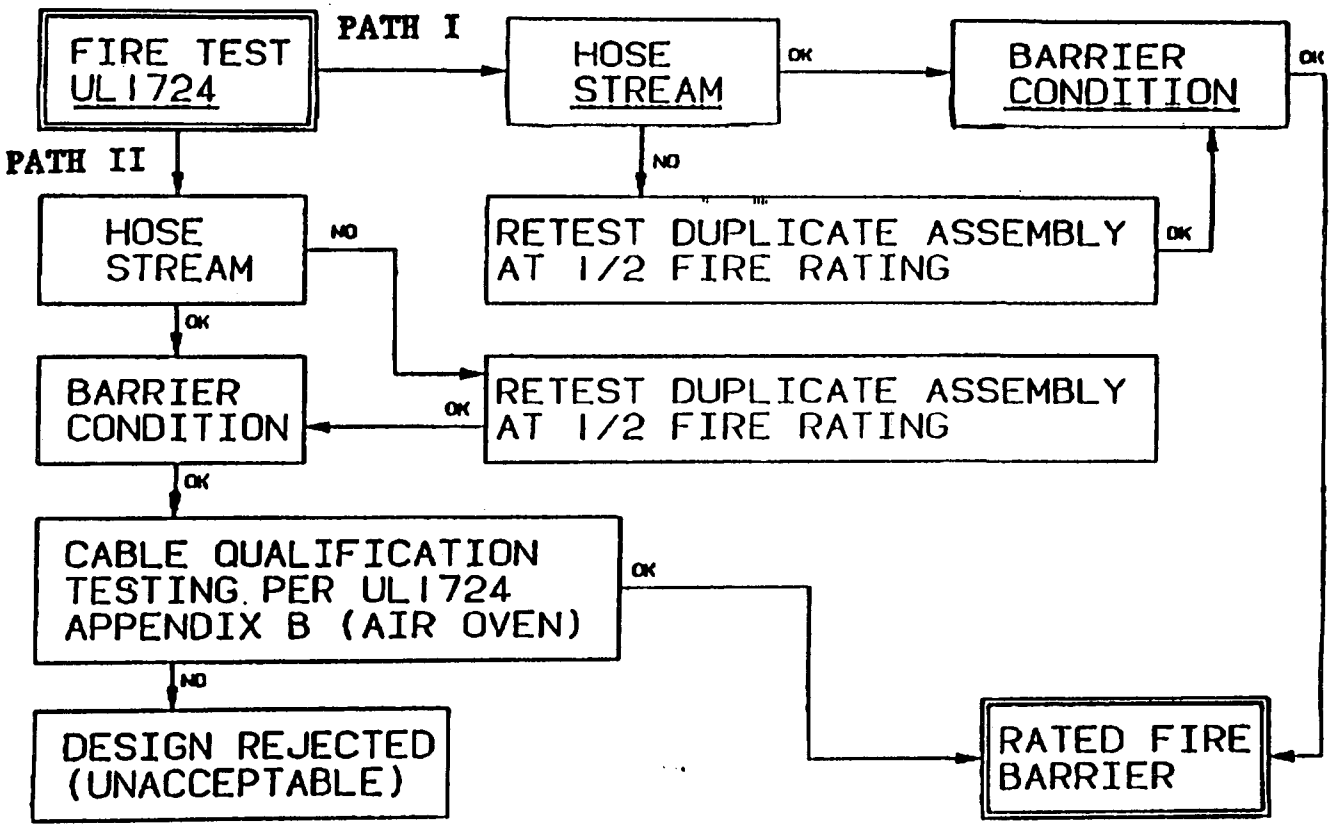
(4) Code of Federal Regulations, Title 10, Part 50, Energy, January 1, 1992.

(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

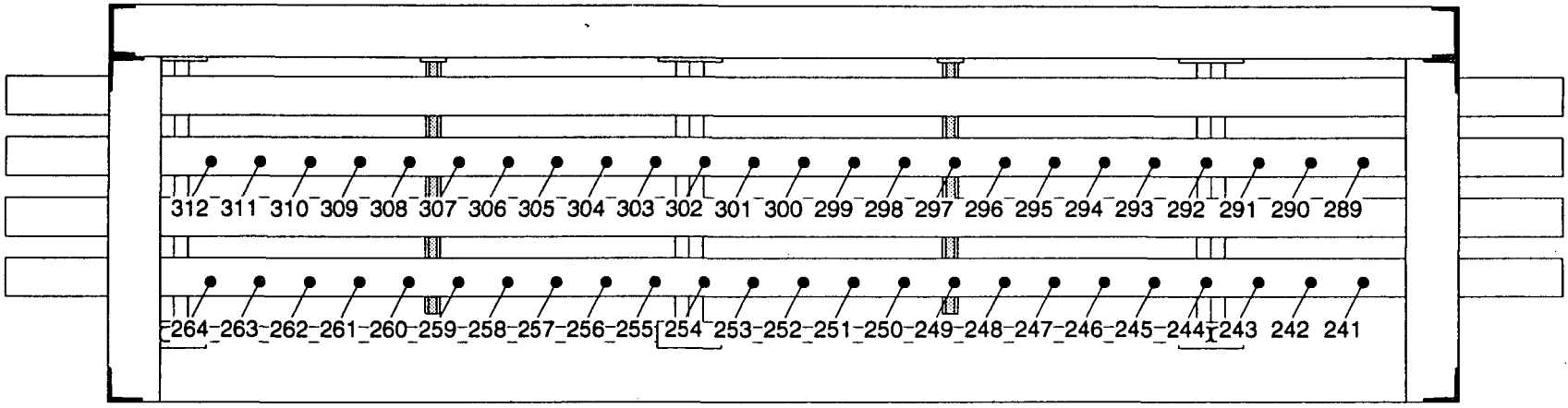


PATH I - RACEWAY $\Delta T_{avg.} \leq$ 250°F AND $\Delta T_{max.} \leq$ 325°F

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

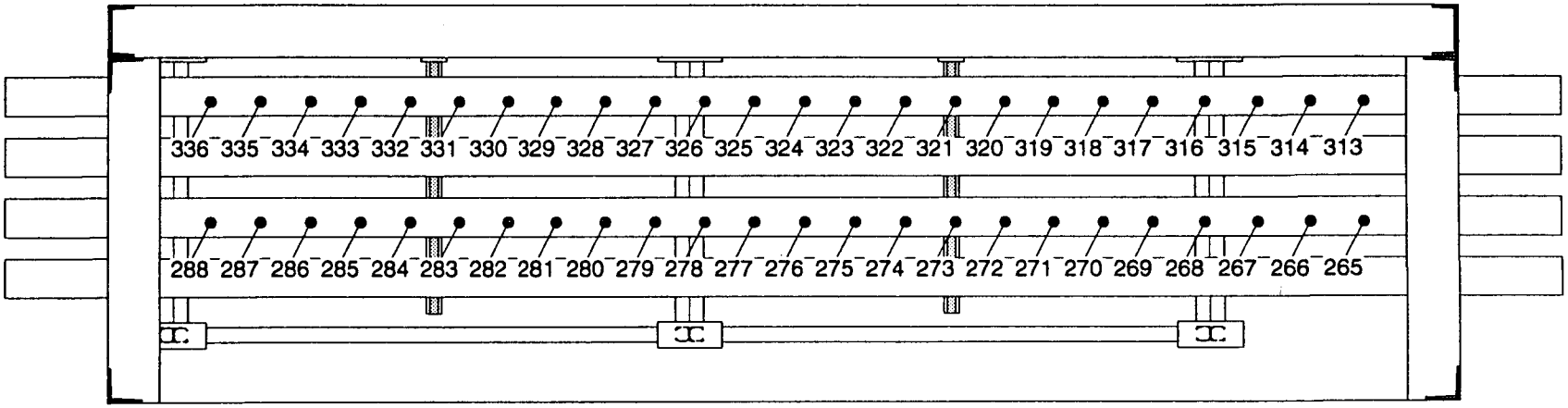
Appendix C

THERMOCOUPLE LOCATIONS



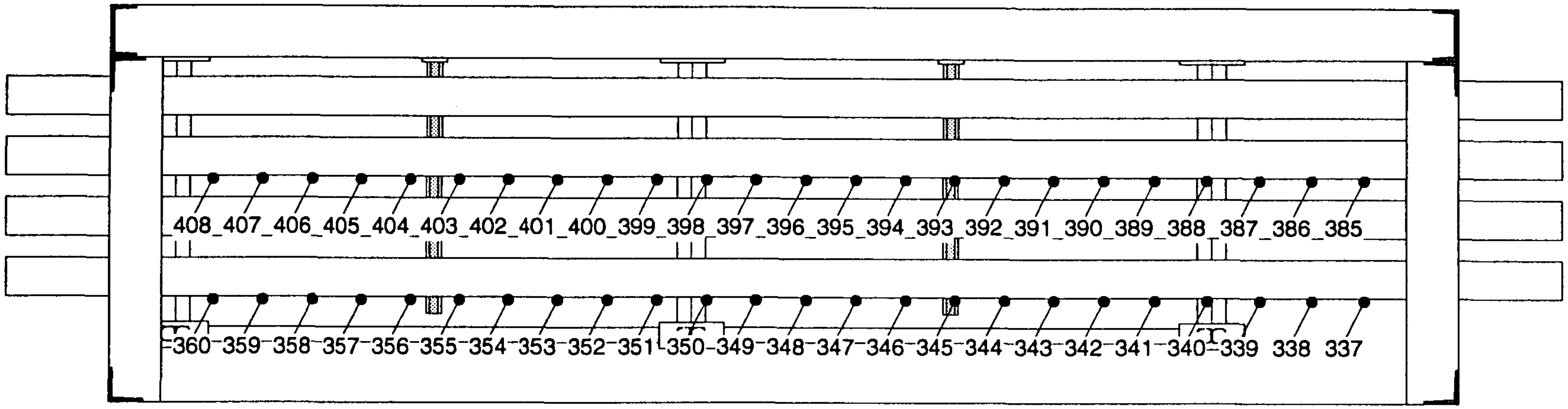
VIEWED FROM FRONT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 10 Thermocouple Locations - Rear 4" Conduits, Test Deck #4, Rev. 1
Drawn by: H. Shelton Date: 9/22/94 Appr'd by: C. Humphrey Date: 9/22/94



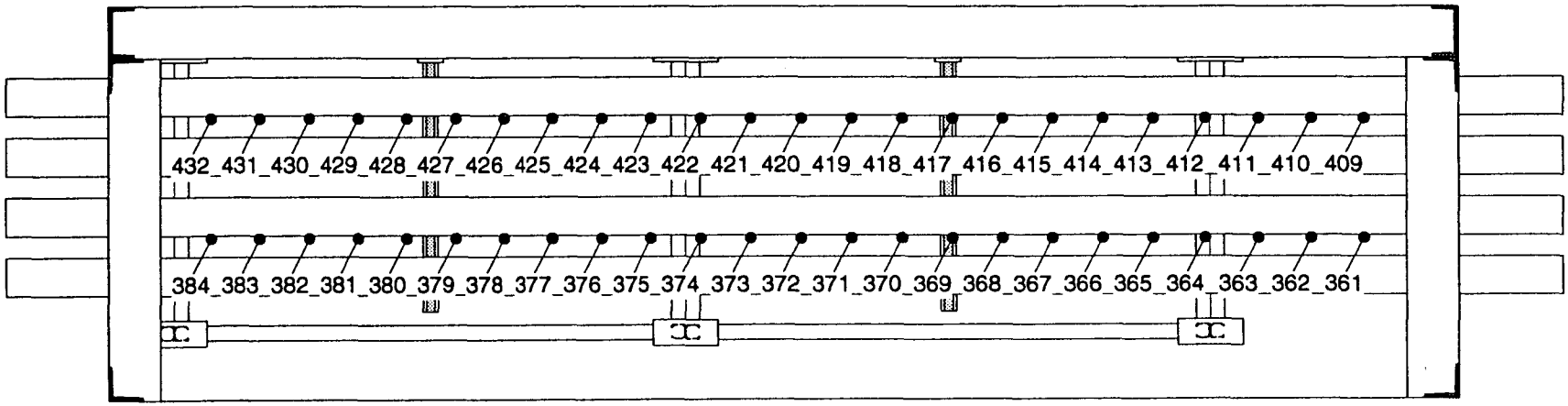
VIEWED FROM FRONT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 11 Thermocouple Locations - Rear 4" Conduits, Test Deck #4, Rev. 1
Drawn by: [signature] Date: 9/22/94 Appr'd by: [signature] Date: 9/22/94



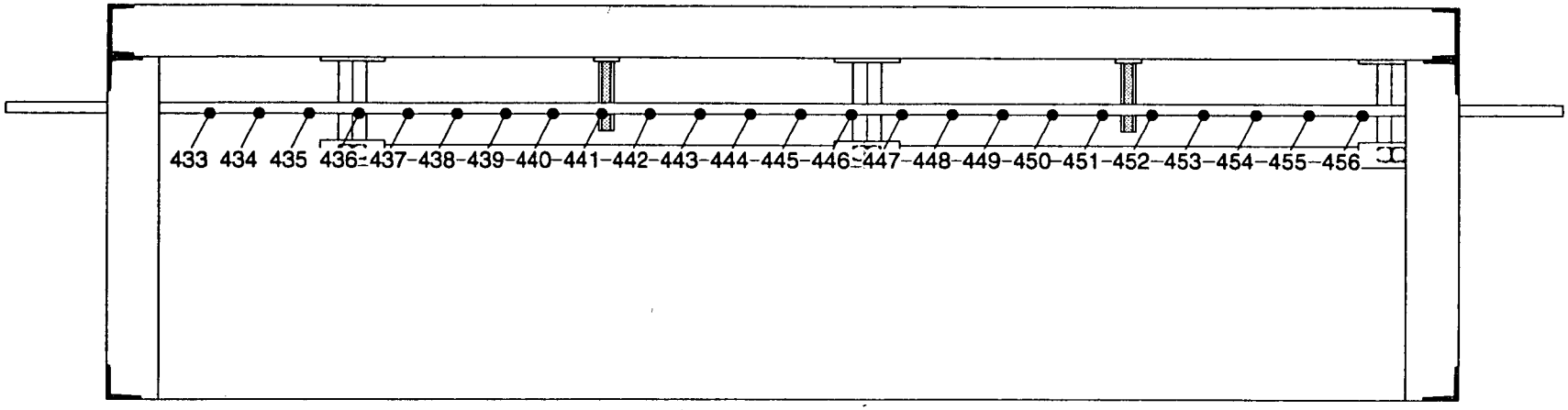
VIEWED FROM FRONT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 12 Thermocouple Locations - Front 4" Conduits, Test Deck #4, Rev. 1
Drawn by: [signature] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94



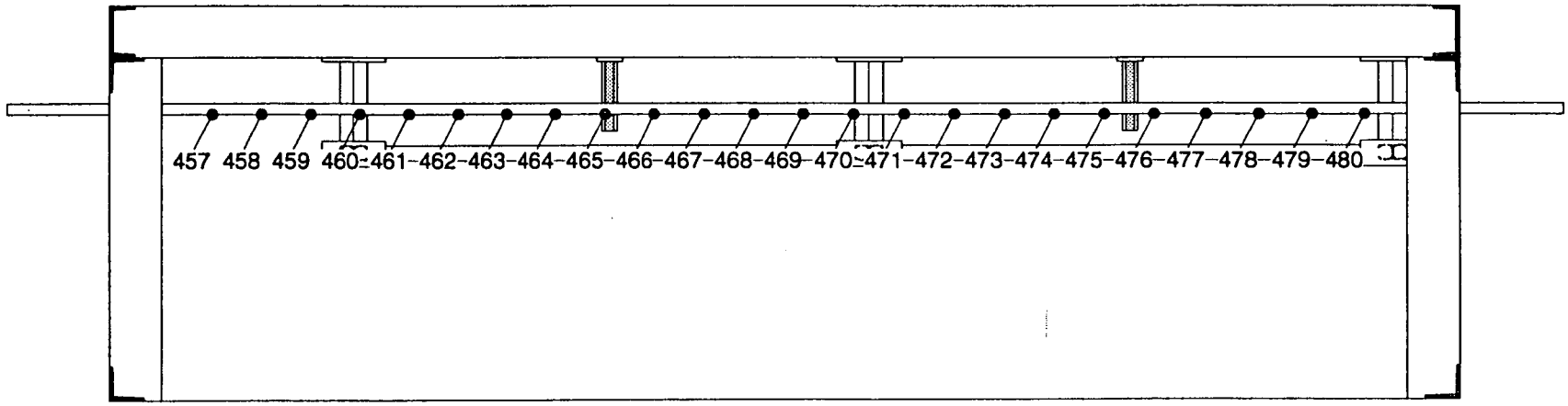
VIEWED FROM FRONT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 13 Thermocouple Locations - Front 4" Conduits, Test Deck #4, Rev. 1
Drawn by: H. [illegible] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94



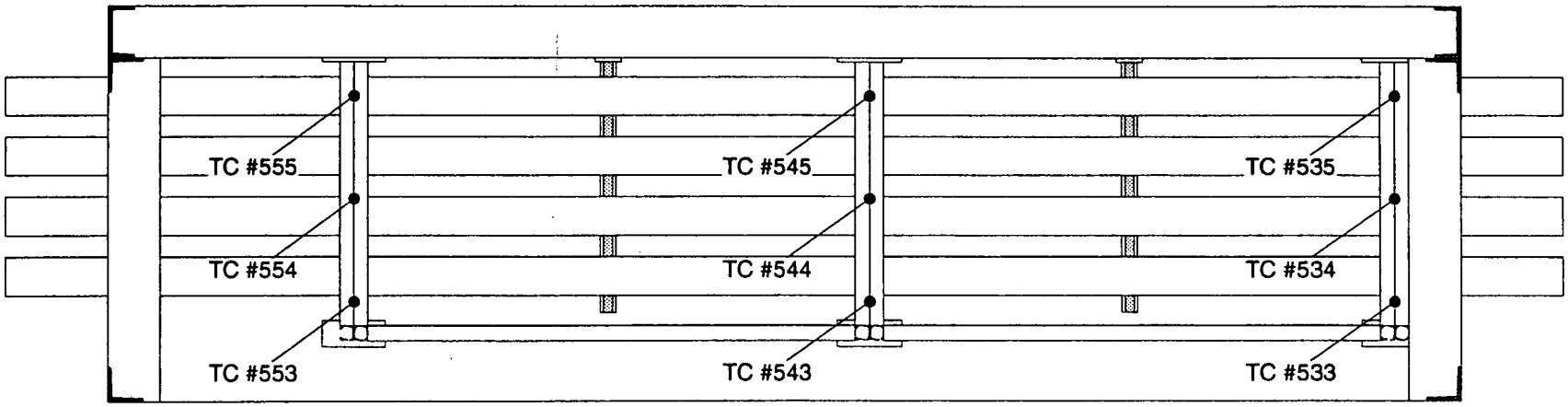
VIEW FROM REAR

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 14 Thermocouple Locations - Front 1" Conduit, Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94



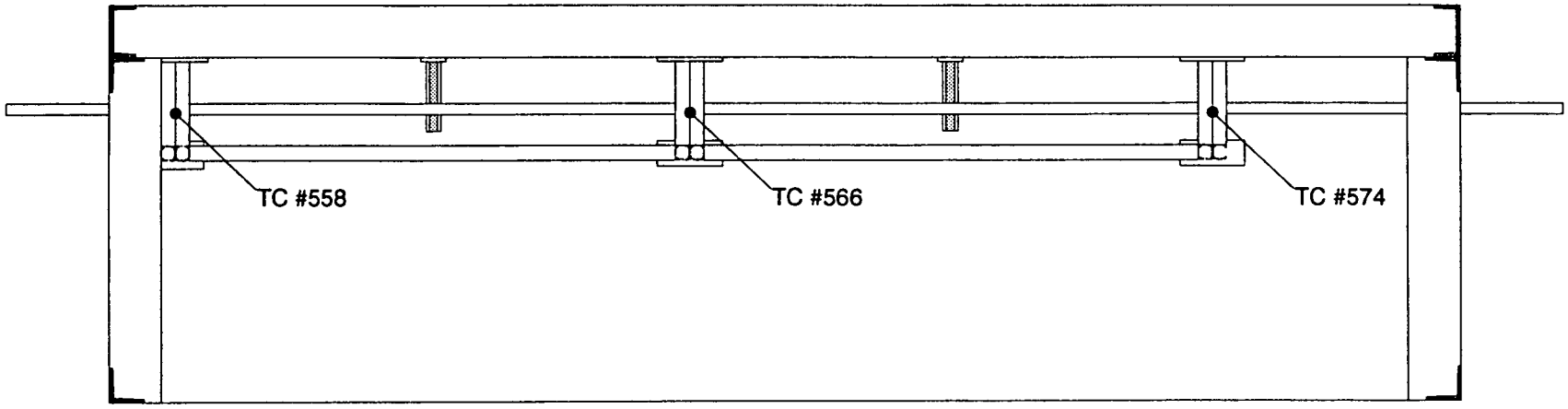
VIEW FROM REAR

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 15 Thermocouple Locations - Rear 1" Conduit, Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94



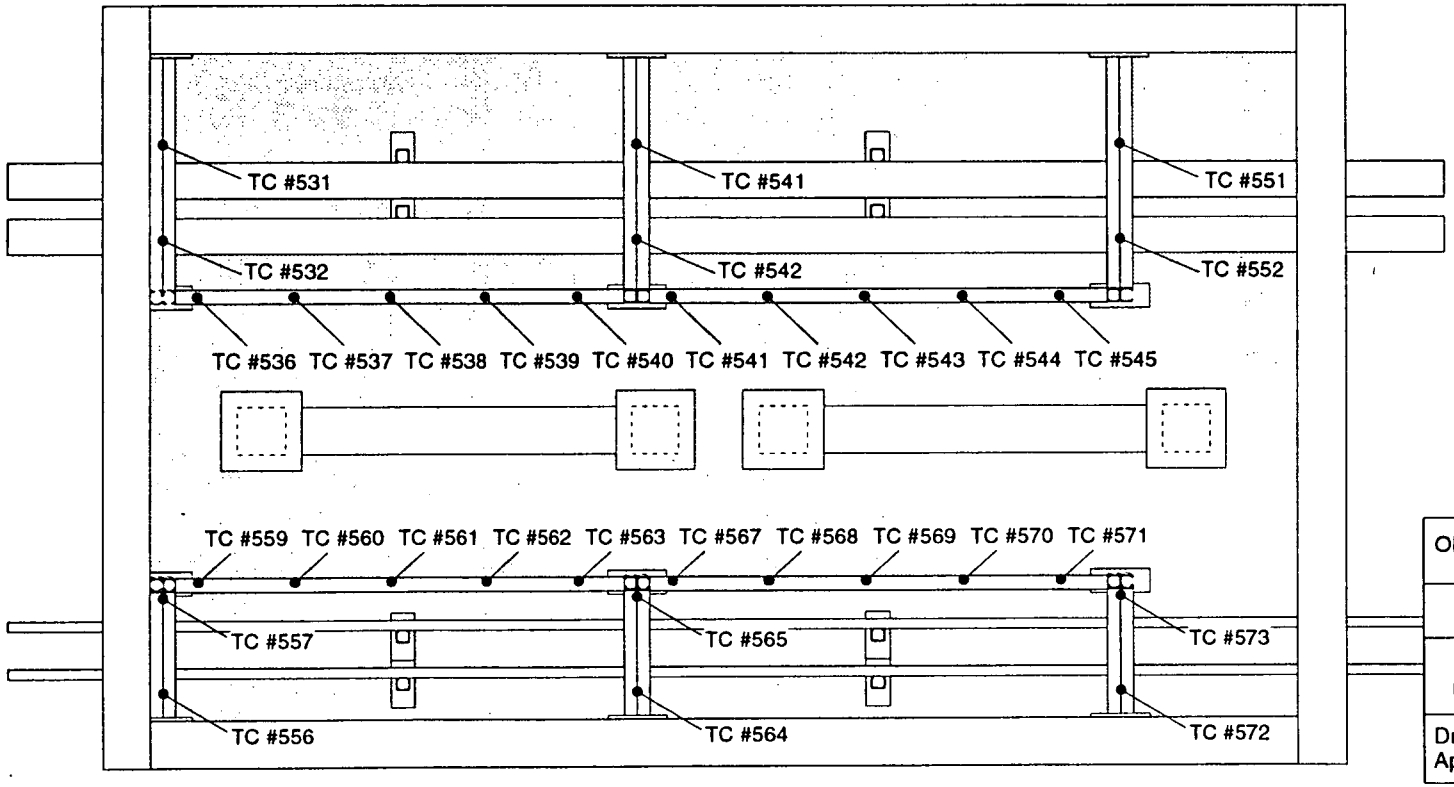
VIEWED FROM REAR

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 16 Thermocouple Locations - Large Unistrut Box, Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94

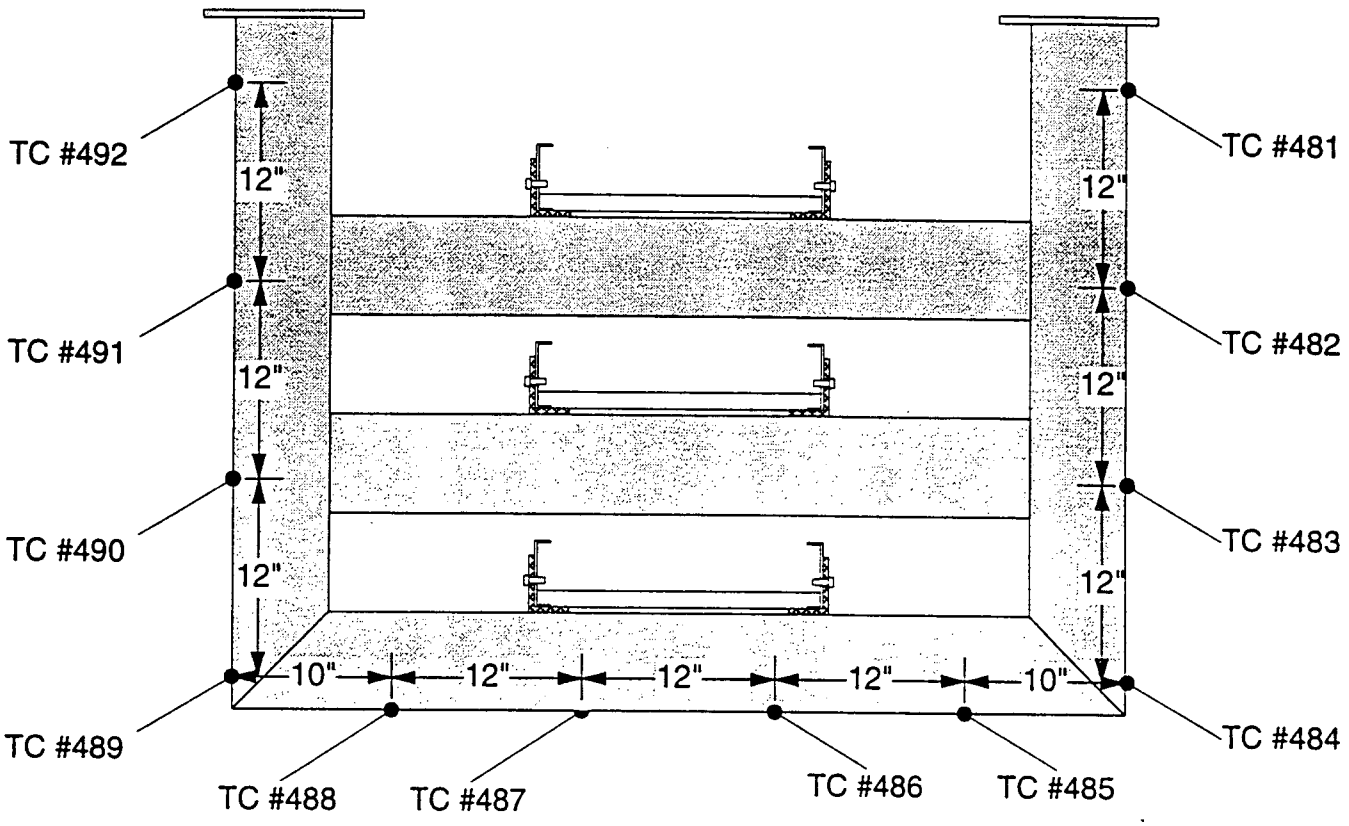


VIEW FROM FRONT

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 17 Thermocouple Locations - Small Unistrut Frame, Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94



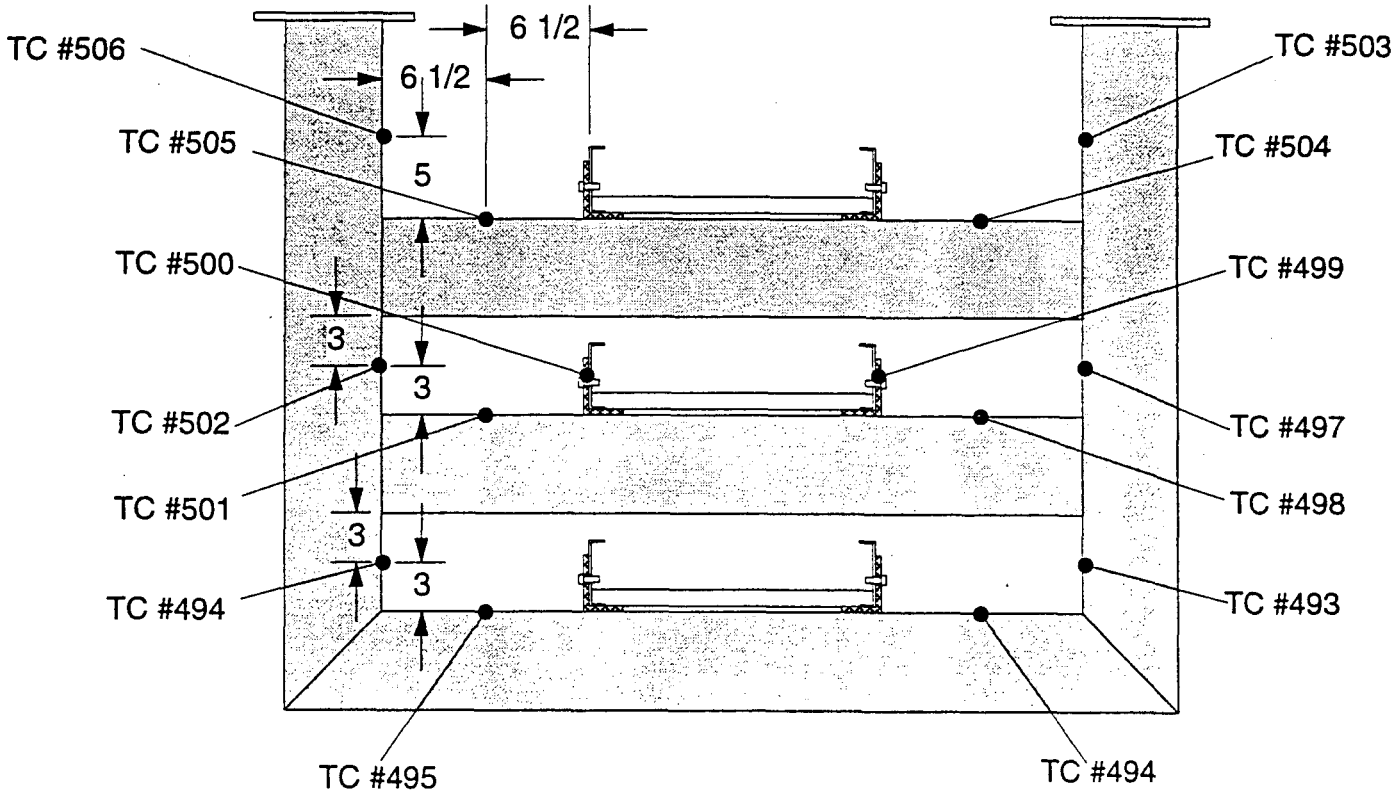
OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 18 Thermocouple Locations - Unistrut Boxes, Test Deck #4, Rev. 1
Drawn by: [illegible] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94



ELEVATION VIEW
(Viewed From the Rear)

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 19 Thermocouple Locations - Right Tray Support, Test Deck #4, Rev. 1
Drawn by: [signature] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94

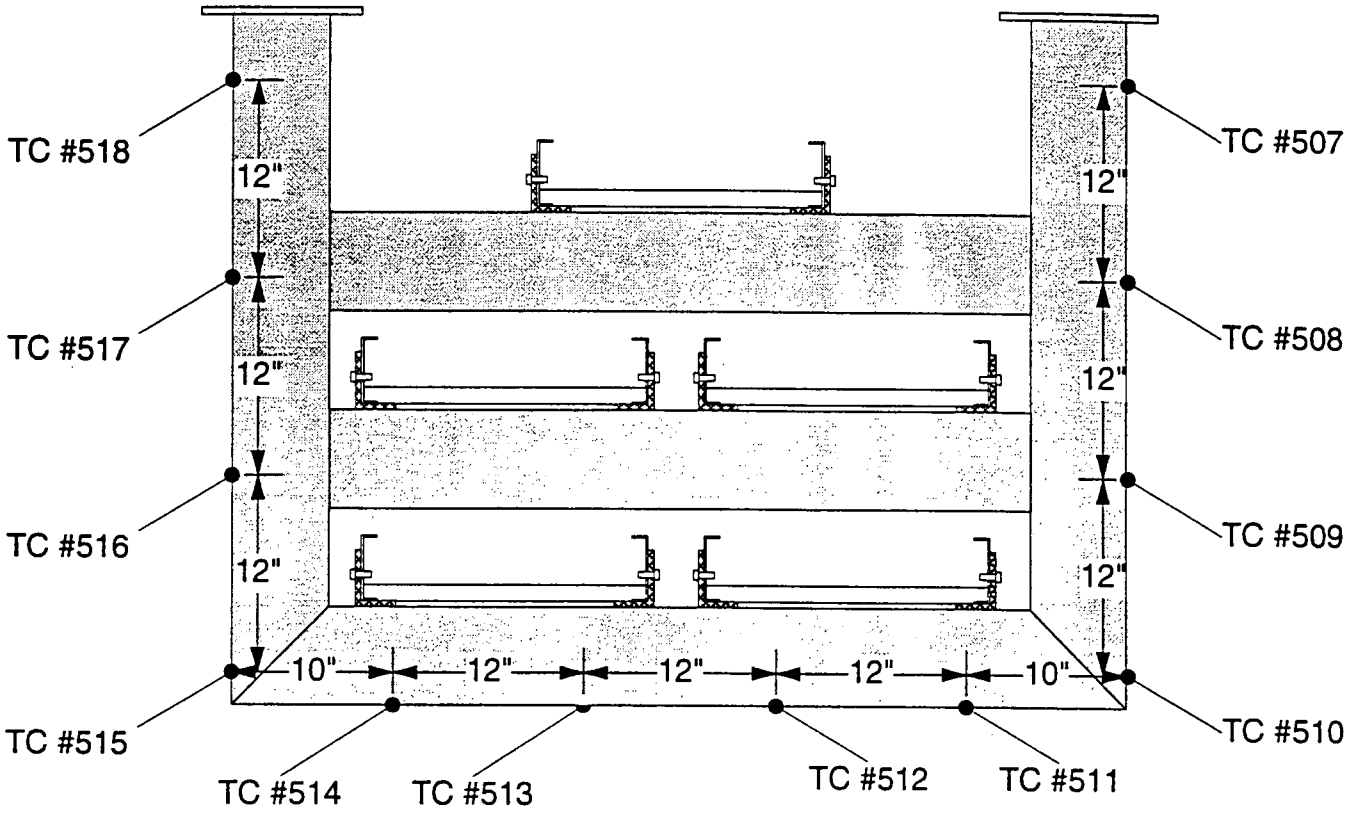
OMEGA POINT LABORATORIES



ELEVATION VIEW
(Viewed From the Rear)

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 20 Thermocouple Locations - Right Tray Support, Test Deck #4, Rev. 1
Drawn by: [signature] Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94

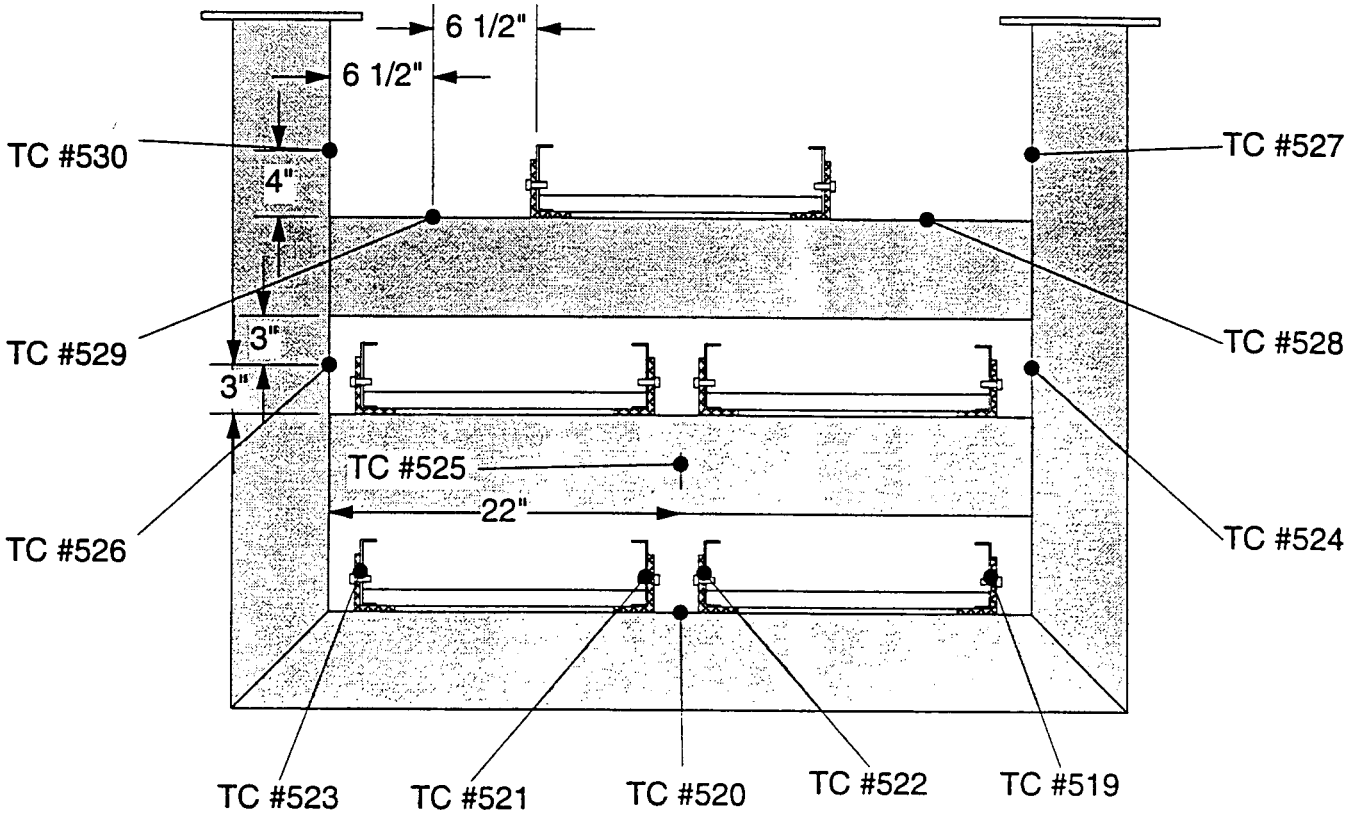
OMEGA POINT LABORATORIES



ELEVATION VIEW
(Viewed From the Rear)

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 21 Thermocouple Locations - Left Tray Support, Test Deck #4, Rev. 1
Drawn by: H Shelley II Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94

OMEGA POINT LABORATORIES



ELEVATION VIEW
(Viewed From the Rear)

OMEGA POINT LABORATORIES, INC. Project No. 11960-97257
TVA / TSI
Fig. 22 Thermocouple Locations - Left Tray Support, Test Deck #4, Rev. 1
Drawn by: H. Shah Date: 9/22/94 Appr'd by: C Humphrey Date: 9/22/94

OMEGA POINT LABORATORIES

THERMOCOUPLE PLACEMENT LOG - PROJECT NO. 97257

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Bottom Rear Conduit in Array

TC Number	Description of exact physical location
C1	On bare #8 wire in conduit, 6" left of right side of slab.
C2	On bare #8 wire in conduit, 6" left of previous thermocouple.
C3	On bare #8 wire in conduit, 6" left of previous thermocouple.
C4	On bare #8 wire in conduit, 6" left of previous thermocouple.
C5	On bare #8 wire in conduit, 6" left of previous thermocouple.
C6	On bare #8 wire in conduit, 6" left of previous thermocouple.
C7	On bare #8 wire in conduit, 6" left of previous thermocouple.
C8	On bare #8 wire in conduit, 6" left of previous thermocouple.
C9	On bare #8 wire in conduit, 6" left of previous thermocouple.
C10	On bare #8 wire in conduit, 6" left of previous thermocouple.
C11	On bare #8 wire in conduit, 6" left of previous thermocouple.
C12	On bare #8 wire in conduit, 6" left of previous thermocouple.
C13	On bare #8 wire in conduit, 6" left of previous thermocouple.
C14	On bare #8 wire in conduit, 6" left of previous thermocouple.
C15	On bare #8 wire in conduit, 6" left of previous thermocouple.
C16	On bare #8 wire in conduit, 6" left of previous thermocouple.
C17	On bare #8 wire in conduit, 6" left of previous thermocouple.
C18	On bare #8 wire in conduit, 6" left of previous thermocouple.
C19	On bare #8 wire in conduit, 6" left of previous thermocouple.
C20	On bare #8 wire in conduit, 6" left of previous thermocouple.
C21	On bare #8 wire in conduit, 6" left of previous thermocouple.
C22	On bare #8 wire in conduit, 6" left of previous thermocouple.
C23	On bare #8 wire in conduit 6" left of previous thermocouple.
C24	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Bottom-Middle Rear Conduit in Array

TC Number	Description of exact physical location
C25	On bare #8 wire in conduit, 6" left of right side of slab.
C26	On bare #8 wire in conduit, 6" left of previous thermocouple.
C27	On bare #8 wire in conduit, 6" left of previous thermocouple.
C28	On bare #8 wire in conduit, 6" left of previous thermocouple.
C29	On bare #8 wire in conduit, 6" left of previous thermocouple.
C30	On bare #8 wire in conduit, 6" left of previous thermocouple.
C31	On bare #8 wire in conduit, 6" left of previous thermocouple.
C32	On bare #8 wire in conduit, 6" left of previous thermocouple.
C33	On bare #8 wire in conduit, 6" left of previous thermocouple.
C34	On bare #8 wire in conduit, 6" left of previous thermocouple.
C35	On bare #8 wire in conduit, 6" left of previous thermocouple.
C36	On bare #8 wire in conduit, 6" left of previous thermocouple.
C37	On bare #8 wire in conduit, 6" left of previous thermocouple.
C38	On bare #8 wire in conduit, 6" left of previous thermocouple.
C39	On bare #8 wire in conduit, 6" left of previous thermocouple.
C40	On bare #8 wire in conduit, 6" left of previous thermocouple.
C41	On bare #8 wire in conduit, 6" left of previous thermocouple.
C42	On bare #8 wire in conduit, 6" left of previous thermocouple.
C43	On bare #8 wire in conduit, 6" left of previous thermocouple.
C44	On bare #8 wire in conduit, 6" left of previous thermocouple.
C45	On bare #8 wire in conduit, 6" left of previous thermocouple.
C46	On bare #8 wire in conduit, 6" left of previous thermocouple.
C47	On bare #8 wire in conduit, 6" left of previous thermocouple.
C48	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Upper-Middle Rear Conduit in Array

TC Number	Description of exact physical location
C49	On bare #8 wire in conduit, 6" left of right side of slab.
C50	On bare #8 wire in conduit, 6" left of previous thermocouple.
C51	On bare #8 wire in conduit, 6" left of previous thermocouple.
C52	On bare #8 wire in conduit, 6" left of previous thermocouple.
C53	On bare #8 wire in conduit, 6" left of previous thermocouple.
C54	On bare #8 wire in conduit, 6" left of previous thermocouple.
C55	On bare #8 wire in conduit, 6" left of previous thermocouple.
C56	On bare #8 wire in conduit, 6" left of previous thermocouple.
C57	On bare #8 wire in conduit, 6" left of previous thermocouple.
C58	On bare #8 wire in conduit, 6" left of previous thermocouple.
C59	On bare #8 wire in conduit, 6" left of previous thermocouple.
C60	On bare #8 wire in conduit, 6" left of previous thermocouple.
C61	On bare #8 wire in conduit, 6" left of previous thermocouple.
C62	On bare #8 wire in conduit, 6" left of previous thermocouple.
C63	On bare #8 wire in conduit, 6" left of previous thermocouple.
C64	On bare #8 wire in conduit, 6" left of previous thermocouple.
C65	On bare #8 wire in conduit, 6" left of previous thermocouple.
C66	On bare #8 wire in conduit, 6" left of previous thermocouple.
C67	On bare #8 wire in conduit, 6" left of previous thermocouple.
C68	On bare #8 wire in conduit, 6" left of previous thermocouple.
C69	On bare #8 wire in conduit, 6" left of previous thermocouple.
C70	On bare #8 wire in conduit, 6" left of previous thermocouple.
C71	On bare #8 wire in conduit, 6" left of previous thermocouple.
C72	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Upper Rear Conduit in Array

TC Number	Description of exact physical location
C73	On bare #8 wire in conduit, 6" left of right side of slab.
C74	On bare #8 wire in conduit, 6" left of previous thermocouple.
C75	On bare #8 wire in conduit, 6" left of previous thermocouple.
C76	On bare #8 wire in conduit, 6" left of previous thermocouple.
C77	On bare #8 wire in conduit, 6" left of previous thermocouple.
C78	On bare #8 wire in conduit, 6" left of previous thermocouple.
C79	On bare #8 wire in conduit, 6" left of previous thermocouple.
C80	On bare #8 wire in conduit, 6" left of previous thermocouple.
C81	On bare #8 wire in conduit, 6" left of previous thermocouple.
C82	On bare #8 wire in conduit, 6" left of previous thermocouple.
C83	On bare #8 wire in conduit, 6" left of previous thermocouple.
C84	On bare #8 wire in conduit, 6" left of previous thermocouple.
C85	On bare #8 wire in conduit, 6" left of previous thermocouple.
C86	On bare #8 wire in conduit, 6" left of previous thermocouple.
C87	On bare #8 wire in conduit, 6" left of previous thermocouple.
C88	On bare #8 wire in conduit, 6" left of previous thermocouple.
C89	On bare #8 wire in conduit, 6" left of previous thermocouple.
C90	On bare #8 wire in conduit, 6" left of previous thermocouple.
C91	On bare #8 wire in conduit, 6" left of previous thermocouple.
C92	On bare #8 wire in conduit, 6" left of previous thermocouple.
C93	On bare #8 wire in conduit, 6" left of previous thermocouple.
C94	On bare #8 wire in conduit, 6" left of previous thermocouple.
C95	On bare #8 wire in conduit, 6" left of previous thermocouple.
C96	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Bottom Front Conduit in Array

TC Number	Description of exact physical location
C97	On bare #8 wire in conduit, 6" left of right side of slab.
C98	On bare #8 wire in conduit, 6" left of previous thermocouple.
C99	On bare #8 wire in conduit, 6" left of previous thermocouple.
C100	On bare #8 wire in conduit, 6" left of previous thermocouple.
C101	On bare #8 wire in conduit, 6" left of previous thermocouple.
C102	On bare #8 wire in conduit, 6" left of previous thermocouple.
C103	On bare #8 wire in conduit, 6" left of previous thermocouple.
C104	On bare #8 wire in conduit, 6" left of previous thermocouple.
C105	On bare #8 wire in conduit, 6" left of previous thermocouple.
C106	On bare #8 wire in conduit, 6" left of previous thermocouple.
C107	On bare #8 wire in conduit, 6" left of previous thermocouple.
C108	On bare #8 wire in conduit, 6" left of previous thermocouple.
C109	On bare #8 wire in conduit, 6" left of previous thermocouple.
C110	On bare #8 wire in conduit, 6" left of previous thermocouple.
C111	On bare #8 wire in conduit, 6" left of previous thermocouple.
C112	On bare #8 wire in conduit, 6" left of previous thermocouple.
C113	On bare #8 wire in conduit, 6" left of previous thermocouple.
C114	On bare #8 wire in conduit, 6" left of previous thermocouple.
C115	On bare #8 wire in conduit, 6" left of previous thermocouple.
C116	On bare #8 wire in conduit, 6" left of previous thermocouple.
C117	On bare #8 wire in conduit, 6" left of previous thermocouple.
C118	On bare #8 wire in conduit, 6" left of previous thermocouple.
C119	On bare #8 wire in conduit, 6" left of previous thermocouple.
C120	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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

Project #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Lower-Middle Front Conduit in Array

TC Number	Description of exact physical location
C121	On bare #8 wire in conduit, 6" left of right side of slab.
C122	On bare #8 wire in conduit, 6" left of previous thermocouple.
C123	On bare #8 wire in conduit, 6" left of previous thermocouple.
C124	On bare #8 wire in conduit, 6" left of previous thermocouple.
C125	On bare #8 wire in conduit, 6" left of previous thermocouple.
C126	On bare #8 wire in conduit, 6" left of previous thermocouple.
C127	On bare #8 wire in conduit, 6" left of previous thermocouple.
C128	On bare #8 wire in conduit, 6" left of previous thermocouple.
C129	On bare #8 wire in conduit, 6" left of previous thermocouple.
C130	On bare #8 wire in conduit, 6" left of previous thermocouple.
C131	On bare #8 wire in conduit, 6" left of previous thermocouple.
C132	On bare #8 wire in conduit, 6" left of previous thermocouple.
C133	On bare #8 wire in conduit, 6" left of previous thermocouple.
C134	On bare #8 wire in conduit, 6" left of previous thermocouple.
C135	On bare #8 wire in conduit, 6" left of previous thermocouple.
C136	On bare #8 wire in conduit, 6" left of previous thermocouple.
C137	On bare #8 wire in conduit, 6" left of previous thermocouple.
C138	On bare #8 wire in conduit, 6" left of previous thermocouple.
C139	On bare #8 wire in conduit, 6" left of previous thermocouple.
C140	On bare #8 wire in conduit, 6" left of previous thermocouple.
C141	On bare #8 wire in conduit, 6" left of previous thermocouple.
C142	On bare #8 wire in conduit, 6" left of previous thermocouple.
C143	On bare #8 wire in conduit, 6" left of previous thermocouple.
C144	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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Project #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Upper-Middle Front Conduit in Array

TC Number	Description of exact physical location
C145	On bare #8 wire in conduit, 6" left of right side of slab.
C146	On bare #8 wire in conduit, 6" left of previous thermocouple.
C147	On bare #8 wire in conduit, 6" left of previous thermocouple.
C148	On bare #8 wire in conduit, 6" left of previous thermocouple.
C149	On bare #8 wire in conduit, 6" left of previous thermocouple.
C150	On bare #8 wire in conduit, 6" left of previous thermocouple.
C151	On bare #8 wire in conduit, 6" left of previous thermocouple.
C152	On bare #8 wire in conduit, 6" left of previous thermocouple.
C153	On bare #8 wire in conduit, 6" left of previous thermocouple.
C154	On bare #8 wire in conduit, 6" left of previous thermocouple.
C155	On bare #8 wire in conduit, 6" left of previous thermocouple.
C156	On bare #8 wire in conduit, 6" left of previous thermocouple.
C157	On bare #8 wire in conduit, 6" left of previous thermocouple.
C158	On bare #8 wire in conduit, 6" left of previous thermocouple.
C159	On bare #8 wire in conduit, 6" left of previous thermocouple.
C160	On bare #8 wire in conduit, 6" left of previous thermocouple.
C161	On bare #8 wire in conduit, 6" left of previous thermocouple.
C162	On bare #8 wire in conduit, 6" left of previous thermocouple.
C163	On bare #8 wire in conduit, 6" left of previous thermocouple.
C164	On bare #8 wire in conduit, 6" left of previous thermocouple.
C165	On bare #8 wire in conduit, 6" left of previous thermocouple.
C166	On bare #8 wire in conduit, 6" left of previous thermocouple.
C167	On bare #8 wire in conduit, 6" left of previous thermocouple.
C168	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 4" Aluminum Conduit

Upper Front Conduit in Array

TC Number	Description of exact physical location
C169	On bare #8 wire in conduit, 6" left of right side of slab.
C170	On bare #8 wire in conduit, 6" left of previous thermocouple.
C171	On bare #8 wire in conduit, 6" left of previous thermocouple.
C172	On bare #8 wire in conduit, 6" left of previous thermocouple.
C173	On bare #8 wire in conduit, 6" left of previous thermocouple.
C174	On bare #8 wire in conduit, 6" left of previous thermocouple.
C175	On bare #8 wire in conduit, 6" left of previous thermocouple.
C176	On bare #8 wire in conduit, 6" left of previous thermocouple.
C177	On bare #8 wire in conduit, 6" left of previous thermocouple.
C178	On bare #8 wire in conduit, 6" left of previous thermocouple.
C179	On bare #8 wire in conduit, 6" left of previous thermocouple.
C180	On bare #8 wire in conduit, 6" left of previous thermocouple.
C181	On bare #8 wire in conduit, 6" left of previous thermocouple.
C182	On bare #8 wire in conduit, 6" left of previous thermocouple.
C183	On bare #8 wire in conduit, 6" left of previous thermocouple.
C184	On bare #8 wire in conduit, 6" left of previous thermocouple.
C185	On bare #8 wire in conduit, 6" left of previous thermocouple.
C186	On bare #8 wire in conduit, 6" left of previous thermocouple.
C187	On bare #8 wire in conduit, 6" left of previous thermocouple.
C188	On bare #8 wire in conduit, 6" left of previous thermocouple.
C189	On bare #8 wire in conduit, 6" left of previous thermocouple.
C190	On bare #8 wire in conduit, 6" left of previous thermocouple.
C191	On bare #8 wire in conduit, 6" left of previous thermocouple.
C192	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: Bare #8 in 1" Steel Conduit

Front Conduit in Array

TC Number	Description of exact physical location
C193	On bare #8 wire in conduit, 6" left of right side of slab.
C194	On bare #8 wire in conduit, 6" left of previous thermocouple.
C195	On bare #8 wire in conduit, 6" left of previous thermocouple.
C196	On bare #8 wire in conduit, 6" left of previous thermocouple.
C197	On bare #8 wire in conduit, 6" left of previous thermocouple.
C198	On bare #8 wire in conduit, 6" left of previous thermocouple.
C199	On bare #8 wire in conduit, 6" left of previous thermocouple.
C200	On bare #8 wire in conduit, 6" left of previous thermocouple.
C201	On bare #8 wire in conduit, 6" left of previous thermocouple.
C202	On bare #8 wire in conduit, 6" left of previous thermocouple.
C203	On bare #8 wire in conduit, 6" left of previous thermocouple.
C204	On bare #8 wire in conduit, 6" left of previous thermocouple.
C205	On bare #8 wire in conduit, 6" left of previous thermocouple.
C206	On bare #8 wire in conduit, 6" left of previous thermocouple.
C207	On bare #8 wire in conduit, 6" left of previous thermocouple.
C208	On bare #8 wire in conduit, 6" left of previous thermocouple.
C209	On bare #8 wire in conduit, 6" left of previous thermocouple.
C210	On bare #8 wire in conduit, 6" left of previous thermocouple.
C211	On bare #8 wire in conduit, 6" left of previous thermocouple.
C212	On bare #8 wire in conduit, 6" left of previous thermocouple.
C213	On bare #8 wire in conduit, 6" left of previous thermocouple.
C214	On bare #8 wire in conduit, 6" left of previous thermocouple.
C215	On bare #8 wire in conduit, 6" left of previous thermocouple.
C216	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

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Project #: 97257

Test Deck #: 4

Item: Bare #8 in 1" Steel Conduit

Rear Conduit in Array

TC Number	Description of exact physical location
C217	On bare #8 wire in conduit, 6" left of right side of slab.
C218	On bare #8 wire in conduit, 6" left of previous thermocouple.
C219	On bare #8 wire in conduit, 6" left of previous thermocouple.
C220	On bare #8 wire in conduit, 6" left of previous thermocouple.
C221	On bare #8 wire in conduit, 6" left of previous thermocouple.
C222	On bare #8 wire in conduit, 6" left of previous thermocouple.
C223	On bare #8 wire in conduit, 6" left of previous thermocouple.
C224	On bare #8 wire in conduit, 6" left of previous thermocouple.
C225	On bare #8 wire in conduit, 6" left of previous thermocouple.
C226	On bare #8 wire in conduit, 6" left of previous thermocouple.
C227	On bare #8 wire in conduit, 6" left of previous thermocouple.
C228	On bare #8 wire in conduit, 6" left of previous thermocouple.
C229	On bare #8 wire in conduit, 6" left of previous thermocouple.
C230	On bare #8 wire in conduit, 6" left of previous thermocouple.
C231	On bare #8 wire in conduit, 6" left of previous thermocouple.
C232	On bare #8 wire in conduit, 6" left of previous thermocouple.
C233	On bare #8 wire in conduit, 6" left of previous thermocouple.
C234	On bare #8 wire in conduit, 6" left of previous thermocouple.
C235	On bare #8 wire in conduit, 6" left of previous thermocouple.
C236	On bare #8 wire in conduit, 6" left of previous thermocouple.
C237	On bare #8 wire in conduit, 6" left of previous thermocouple.
C238	On bare #8 wire in conduit, 6" left of previous thermocouple.
C239	On bare #8 wire in conduit, 6" left of previous thermocouple.
C240	On bare #8 wire in conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Lower Rear Conduit in Array

TC Number	Description of exact physical location
E241	On rear surface of the conduit, 6" left of right side of slab.
E242	On rear surface of the conduit, 6" left of previous thermocouple.
E243	On rear surface of the conduit, 6" left of previous thermocouple.
E244	On rear surface of the conduit, 6" left of previous thermocouple.
E245	On rear surface of the conduit, 6" left of previous thermocouple.
E246	On rear surface of the conduit, 6" left of previous thermocouple.
E247	On rear surface of the conduit, 6" left of previous thermocouple.
E248	On rear surface of the conduit, 6" left of previous thermocouple.
E249	On rear surface of the conduit, 6" left of previous thermocouple.
E250	On rear surface of the conduit, 6" left of previous thermocouple.
E251	On rear surface of the conduit, 6" left of previous thermocouple.
E252	On rear surface of the conduit, 6" left of previous thermocouple.
E253	On rear surface of the conduit, 6" left of previous thermocouple.
E254	On rear surface of the conduit, 6" left of previous thermocouple.
E255	On rear surface of the conduit, 6" left of previous thermocouple.
E256	On rear surface of the conduit, 6" left of previous thermocouple.
E257	On rear surface of the conduit, 6" left of previous thermocouple.
E258	On rear surface of the conduit, 6" left of previous thermocouple.
E259	On rear surface of the conduit, 6" left of previous thermocouple.
E260	On rear surface of the conduit, 6" left of previous thermocouple.
E261	On rear surface of the conduit, 6" left of previous thermocouple.
E262	On rear surface of the conduit, 6" left of previous thermocouple.
E263	On rear surface of the conduit, 6" left of previous thermocouple.
E264	On rear surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Lower-Middle Rear Conduit in Array

TC Number	Description of exact physical location
E265	On rear surface of the conduit, 6" left of right side of slab.
E266	On rear surface of the conduit, 6" left of previous thermocouple.
E267	On rear surface of the conduit, 6" left of previous thermocouple.
E268	On rear surface of the conduit, 6" left of previous thermocouple.
E269	On rear surface of the conduit, 6" left of previous thermocouple.
E270	On rear surface of the conduit, 6" left of previous thermocouple.
E271	On rear surface of the conduit, 6" left of previous thermocouple.
E272	On rear surface of the conduit, 6" left of previous thermocouple.
E273	On rear surface of the conduit, 6" left of previous thermocouple.
E274	On rear surface of the conduit, 6" left of previous thermocouple.
E275	On rear surface of the conduit, 6" left of previous thermocouple.
E276	On rear surface of the conduit, 6" left of previous thermocouple.
E277	On rear surface of the conduit, 6" left of previous thermocouple.
E278	On rear surface of the conduit, 6" left of previous thermocouple.
E279	On rear surface of the conduit, 6" left of previous thermocouple.
E280	On rear surface of the conduit, 6" left of previous thermocouple.
E281	On rear surface of the conduit, 6" left of previous thermocouple.
E282	On rear surface of the conduit, 6" left of previous thermocouple.
E283	On rear surface of the conduit, 6" left of previous thermocouple.
E284	On rear surface of the conduit, 6" left of previous thermocouple.
E285	On rear surface of the conduit, 6" left of previous thermocouple.
E286	On rear surface of the conduit, 6" left of previous thermocouple.
E287	On rear surface of the conduit, 6" left of previous thermocouple.
E288	On rear surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Upper-Middle Rear Conduit in Array

TC Number	Description of exact physical location
E289	On rear surface of the conduit, 6" left of right side of slab.
E290	On rear surface of the conduit, 6" left of previous thermocouple.
E291	On rear surface of the conduit, 6" left of previous thermocouple.
E292	On rear surface of the conduit, 6" left of previous thermocouple.
E293	On rear surface of the conduit, 6" left of previous thermocouple.
E294	On rear surface of the conduit, 6" left of previous thermocouple.
E295	On rear surface of the conduit, 6" left of previous thermocouple.
E296	On rear surface of the conduit, 6" left of previous thermocouple.
E297	On rear surface of the conduit, 6" left of previous thermocouple.
E298	On rear surface of the conduit, 6" left of previous thermocouple.
E299	On rear surface of the conduit, 6" left of previous thermocouple.
E300	On rear surface of the conduit, 6" left of previous thermocouple.
E301	On rear surface of the conduit, 6" left of previous thermocouple.
E302	On rear surface of the conduit, 6" left of previous thermocouple.
E303	On rear surface of the conduit, 6" left of previous thermocouple.
E304	On rear surface of the conduit, 6" left of previous thermocouple.
E305	On rear surface of the conduit, 6" left of previous thermocouple.
E306	On rear surface of the conduit, 6" left of previous thermocouple.
E307	On rear surface of the conduit, 6" left of previous thermocouple.
E308	On rear surface of the conduit, 6" left of previous thermocouple.
E309	On rear surface of the conduit, 6" left of previous thermocouple.
E310	On rear surface of the conduit, 6" left of previous thermocouple.
E311	On rear surface of the conduit, 6" left of previous thermocouple.
E312	On rear surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Upper Rear Conduit in Array

TC Number	Description of exact physical location
E313	On rear surface of the conduit, 6" left of right side of slab.
E314	On rear surface of the conduit, 6" left of previous thermocouple.
E315	On rear surface of the conduit, 6" left of previous thermocouple.
E316	On rear surface of the conduit, 6" left of previous thermocouple.
E317	On rear surface of the conduit, 6" left of previous thermocouple.
E318	On rear surface of the conduit, 6" left of previous thermocouple.
E319	On rear surface of the conduit, 6" left of previous thermocouple.
E320	On rear surface of the conduit, 6" left of previous thermocouple.
E321	On rear surface of the conduit, 6" left of previous thermocouple.
E322	On rear surface of the conduit, 6" left of previous thermocouple.
E323	On rear surface of the conduit, 6" left of previous thermocouple.
E324	On rear surface of the conduit, 6" left of previous thermocouple.
E325	On rear surface of the conduit, 6" left of previous thermocouple.
E326	On rear surface of the conduit, 6" left of previous thermocouple.
E327	On rear surface of the conduit, 6" left of previous thermocouple.
E328	On rear surface of the conduit, 6" left of previous thermocouple.
E329	On rear surface of the conduit, 6" left of previous thermocouple.
E330	On rear surface of the conduit, 6" left of previous thermocouple.
E331	On rear surface of the conduit, 6" left of previous thermocouple.
E332	On rear surface of the conduit, 6" left of previous thermocouple.
E333	On rear surface of the conduit, 6" left of previous thermocouple.
E334	On rear surface of the conduit, 6" left of previous thermocouple.
E335	On rear surface of the conduit, 6" left of previous thermocouple.
E336	On rear surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Bottom Front Conduit in Array

TC Number	Description of exact physical location
E337	On bottom surface of the conduit, 6" left of right side of slab.
E338	On bottom surface of the conduit, 6" left of previous thermocouple.
E339	On bottom surface of the conduit, 6" left of previous thermocouple.
E340	On bottom surface of the conduit, 6" left of previous thermocouple.
E341	On bottom surface of the conduit, 6" left of previous thermocouple.
E342	On bottom surface of the conduit, 6" left of previous thermocouple.
E343	On bottom surface of the conduit, 6" left of previous thermocouple.
E344	On bottom surface of the conduit, 6" left of previous thermocouple.
E345	On bottom surface of the conduit, 6" left of previous thermocouple.
E346	On bottom surface of the conduit, 6" left of previous thermocouple.
E347	On bottom surface of the conduit, 6" left of previous thermocouple.
E348	On bottom surface of the conduit, 6" left of previous thermocouple.
E349	On bottom surface of the conduit, 6" left of previous thermocouple.
E350	On bottom surface of the conduit, 6" left of previous thermocouple.
E351	On bottom surface of the conduit, 6" left of previous thermocouple.
E352	On bottom surface of the conduit, 6" left of previous thermocouple.
E353	On bottom surface of the conduit, 6" left of previous thermocouple.
E354	On bottom surface of the conduit, 6" left of previous thermocouple.
E355	On bottom surface of the conduit, 6" left of previous thermocouple.
E356	On bottom surface of the conduit, 6" left of previous thermocouple.
E357	On bottom surface of the conduit, 6" left of previous thermocouple.
E358	On bottom surface of the conduit, 6" left of previous thermocouple.
E359	On bottom surface of the conduit, 6" left of previous thermocouple.
E360	On bottom surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Lower-Middle Front Conduit in Array

TC Number	Description of exact physical location
E361	On bottom surface of the conduit, 6" left of right side of slab.
E362	On bottom surface of the conduit, 6" left of previous thermocouple.
E363	On bottom surface of the conduit, 6" left of previous thermocouple.
E364	On bottom surface of the conduit, 6" left of previous thermocouple.
E365	On bottom surface of the conduit, 6" left of previous thermocouple.
E366	On bottom surface of the conduit, 6" left of previous thermocouple.
E367	On bottom surface of the conduit, 6" left of previous thermocouple.
E368	On bottom surface of the conduit, 6" left of previous thermocouple.
E369	On bottom surface of the conduit, 6" left of previous thermocouple.
E370	On bottom surface of the conduit, 6" left of previous thermocouple.
E371	On bottom surface of the conduit, 6" left of previous thermocouple.
E372	On bottom surface of the conduit, 6" left of previous thermocouple.
E373	On bottom surface of the conduit, 6" left of previous thermocouple.
E374	On bottom surface of the conduit, 6" left of previous thermocouple.
E375	On bottom surface of the conduit, 6" left of previous thermocouple.
E376	On bottom surface of the conduit, 6" left of previous thermocouple.
E377	On bottom surface of the conduit, 6" left of previous thermocouple.
E378	On bottom surface of the conduit, 6" left of previous thermocouple.
E379	On bottom surface of the conduit, 6" left of previous thermocouple.
E380	On bottom surface of the conduit, 6" left of previous thermocouple.
E381	On bottom surface of the conduit, 6" left of previous thermocouple.
E382	On bottom surface of the conduit, 6" left of previous thermocouple.
E383	On bottom surface of the conduit, 6" left of previous thermocouple.
E384	On bottom surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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 #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface

Upper-Middle Front Conduit in Array

TC Number	Description of exact physical location
E385	On bottom surface of the conduit, 6" left of right side of slab.
E386	On bottom surface of the conduit, 6" left of previous thermocouple.
E387	On bottom surface of the conduit, 6" left of previous thermocouple.
E388	On bottom surface of the conduit, 6" left of previous thermocouple.
E389	On bottom surface of the conduit, 6" left of previous thermocouple.
E390	On bottom surface of the conduit, 6" left of previous thermocouple.
E391	On bottom surface of the conduit, 6" left of previous thermocouple.
E392	On bottom surface of the conduit, 6" left of previous thermocouple.
E393	On bottom surface of the conduit, 6" left of previous thermocouple.
E394	On bottom surface of the conduit, 6" left of previous thermocouple.
E395	On bottom surface of the conduit, 6" left of previous thermocouple.
E396	On bottom surface of the conduit, 6" left of previous thermocouple.
E397	On bottom surface of the conduit, 6" left of previous thermocouple.
E398	On bottom surface of the conduit, 6" left of previous thermocouple.
E399	On bottom surface of the conduit, 6" left of previous thermocouple.
E400	On bottom surface of the conduit, 6" left of previous thermocouple.
E401	On bottom surface of the conduit, 6" left of previous thermocouple.
E402	On bottom surface of the conduit, 6" left of previous thermocouple.
E403	On bottom surface of the conduit, 6" left of previous thermocouple.
E404	On bottom surface of the conduit, 6" left of previous thermocouple.
E405	On bottom surface of the conduit, 6" left of previous thermocouple.
E406	On bottom surface of the conduit, 6" left of previous thermocouple.
E407	On bottom surface of the conduit, 6" left of previous thermocouple.
E408	On bottom surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

NOTE:
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Project #: 97257

Test Deck #: 4

Item: 4" Aluminum Conduit Surface
Upper Front Conduit in Array

TC Number	Description of exact physical location
E409	On bottom surface of the conduit, 6" left of right side of slab.
E410	On bottom surface of the conduit, 6" left of previous thermocouple.
E411	On bottom surface of the conduit, 6" left of previous thermocouple.
E412	On bottom surface of the conduit, 6" left of previous thermocouple.
E413	On bottom surface of the conduit, 6" left of previous thermocouple.
E414	On bottom surface of the conduit, 6" left of previous thermocouple.
E415	On bottom surface of the conduit, 6" left of previous thermocouple.
E416	On bottom surface of the conduit, 6" left of previous thermocouple.
E417	On bottom surface of the conduit, 6" left of previous thermocouple.
E418	On bottom surface of the conduit, 6" left of previous thermocouple.
E419	On bottom surface of the conduit, 6" left of previous thermocouple.
E420	On bottom surface of the conduit, 6" left of previous thermocouple.
E421	On bottom surface of the conduit, 6" left of previous thermocouple.
E422	On bottom surface of the conduit, 6" left of previous thermocouple.
E423	On bottom surface of the conduit, 6" left of previous thermocouple.
E424	On bottom surface of the conduit, 6" left of previous thermocouple.
E425	On bottom surface of the conduit, 6" left of previous thermocouple.
E426	On bottom surface of the conduit, 6" left of previous thermocouple.
E427	On bottom surface of the conduit, 6" left of previous thermocouple.
E428	On bottom surface of the conduit, 6" left of previous thermocouple.
E429	On bottom surface of the conduit, 6" left of previous thermocouple.
E430	On bottom surface of the conduit, 6" left of previous thermocouple.
E431	On bottom surface of the conduit, 6" left of previous thermocouple.
E432	On bottom surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

NOTE:
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Project #: 97257

Test Deck #: 4

Item: 1" Steel Conduit Surface

Front Conduit in Array

TC Number	Description of exact physical location
E433	On bottom surface of the conduit, 6" left of right side of slab.
E434	On bottom surface of the conduit, 6" left of previous thermocouple.
E435	On bottom surface of the conduit, 6" left of previous thermocouple.
E436	On bottom surface of the conduit, 6" left of previous thermocouple.
E437	On bottom surface of the conduit, 6" left of previous thermocouple.
E438	On bottom surface of the conduit, 6" left of previous thermocouple.
E439	On bottom surface of the conduit, 6" left of previous thermocouple.
E440	On bottom surface of the conduit, 6" left of previous thermocouple.
E441	On bottom surface of the conduit, 6" left of previous thermocouple.
E442	On bottom surface of the conduit, 6" left of previous thermocouple.
E443	On bottom surface of the conduit, 6" left of previous thermocouple.
E444	On bottom surface of the conduit, 6" left of previous thermocouple.
E445	On bottom surface of the conduit, 6" left of previous thermocouple.
E446	On bottom surface of the conduit, 6" left of previous thermocouple.
E447	On bottom surface of the conduit, 6" left of previous thermocouple.
E448	On bottom surface of the conduit, 6" left of previous thermocouple.
E449	On bottom surface of the conduit, 6" left of previous thermocouple.
E450	On bottom surface of the conduit, 6" left of previous thermocouple.
E451	On bottom surface of the conduit, 6" left of previous thermocouple.
E452	On bottom surface of the conduit, 6" left of previous thermocouple.
E453	On bottom surface of the conduit, 6" left of previous thermocouple.
E454	On bottom surface of the conduit, 6" left of previous thermocouple.
E455	On bottom surface of the conduit, 6" left of previous thermocouple.
E456	On bottom surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

NOTE:
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Project #: 97257

Test Deck #: 4

Item: 1" Steel Conduit Surface

Rear Conduit in Array

TC Number	Description of exact physical location
E457	On bottom surface of the conduit, 6" left of right side of slab.
E458	On bottom surface of the conduit, 6" left of previous thermocouple.
E459	On bottom surface of the conduit, 6" left of previous thermocouple.
E460	On bottom surface of the conduit, 6" left of previous thermocouple.
E461	On bottom surface of the conduit, 6" left of previous thermocouple.
E462	On bottom surface of the conduit, 6" left of previous thermocouple.
E463	On bottom surface of the conduit, 6" left of previous thermocouple.
E464	On bottom surface of the conduit, 6" left of previous thermocouple.
E465	On bottom surface of the conduit, 6" left of previous thermocouple.
E466	On bottom surface of the conduit, 6" left of previous thermocouple.
E467	On bottom surface of the conduit, 6" left of previous thermocouple.
E468	On bottom surface of the conduit, 6" left of previous thermocouple.
E469	On bottom surface of the conduit, 6" left of previous thermocouple.
E470	On bottom surface of the conduit, 6" left of previous thermocouple.
E471	On bottom surface of the conduit, 6" left of previous thermocouple.
E472	On bottom surface of the conduit, 6" left of previous thermocouple.
E473	On bottom surface of the conduit, 6" left of previous thermocouple.
E474	On bottom surface of the conduit, 6" left of previous thermocouple.
E475	On bottom surface of the conduit, 6" left of previous thermocouple.
E476	On bottom surface of the conduit, 6" left of previous thermocouple.
E477	On bottom surface of the conduit, 6" left of previous thermocouple.
E478	On bottom surface of the conduit, 6" left of previous thermocouple.
E479	On bottom surface of the conduit, 6" left of previous thermocouple.
E480	On bottom surface of the conduit, 6" left of previous thermocouple, 6" right of left side of slab.

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. 97257

NOTE:
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Project #: 97257

Test Deck #: 4

Item: Tray Support System with Three Cable Tray Sections

Right side of test deck

TC Number	Description of exact physical location
E481	On left outside surface of support, 4" below slab.
E482	On left outside surface of support, 12" below previous thermocouple.
E483	On left outside surface of support, 12" below previous thermocouple.
E484	On left outside surface of support, 12" below previous thermocouple.
E485	On bottom surface of support, 12" from previous thermocouple.
E486	On bottom surface of support, 12" from previous thermocouple.
E487	On bottom surface of support, 12" from previous thermocouple.
E488	On bottom surface of support, 12" from previous thermocouple.
E489	On right outside surface of support, 12" from previous thermocouple.
E490	On right outside surface of support, 12" above previous thermocouple.
E491	On right outside surface of support, 12" above previous thermocouple.
E492	On right outside surface of support, 12" above previous thermocouple.
E493	On left inside surface of support, midway between bottom and middle cross bars.
E494	On top surface of bottom cross bar, midway between tray and left vertical.
E495	On top surface of bottom cross bar, midway between tray and right vertical.
E496	On right inside surface of support, midway between bottom and middle cross bars.
E497	On left inside surface of support, midway between middle and top cross bars.
E498	On top surface of middle cross bar, midway between tray and left vertical.
E499	On middle cable tray left side rail, 1" in from end of tray section.
E500	On middle cable tray right side rail, 1" in from end of tray section.
E501	On top surface of middle cross bar, midway between tray and right vertical.
E502	On right inside surface of support, midway between middle and top cross bars.
E503	On left inside surface of support, midway between top cross bar and slab.
E504	On top surface of top cross bar, midway between tray and left vertical.
E505	On top surface of top cross bar, midway between tray and right vertical.
E506	On right inside surface of support, midway between top cross bar and slab.

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. 97257

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 #: 97257

Test Deck #: 4

Item: Tray Support System with Five Cable Tray Sections

Left side of test deck

TC Number	Description of exact physical location
E507	On left outside surface of support, 4" below slab.
E508	On left outside surface of support, 12" below previous thermocouple.
E509	On left outside surface of support, 12" below previous thermocouple.
E510	On left outside surface of support, 12" below previous thermocouple.
E511	On bottom surface of support, 12" from previous thermocouple.
E512	On bottom surface of support, 12" from previous thermocouple.
E513	On bottom surface of support, 12" from previous thermocouple.
E514	On bottom surface of support, 12" from previous thermocouple.
E515	On right outside surface of support, 12" from previous thermocouple.
E516	On right outside surface of support, 12" above previous thermocouple.
E517	On right outside surface of support, 12" above previous thermocouple.
E518	On right outside surface of support, 12" above previous thermocouple.
E519	On bottom left cable tray left side rail, 1" in from end of tray section.
E520	On top surface of bottom cross bar, midway between vertical supports.
E521	On bottom right cable tray left side rail, 1" in from end of tray section.
E522	On bottom left cable tray right side rail, 1" in from end of tray section.
E523	On bottom right cable tray right side rail, 1" in from end of tray section.
E524	On left inside surface of support, midway between top and middle cross bars.
E525	On front surface of middle cross bar, midway between vertical supports.
E526	On right inside surface of support, midway between top and middle cross bars.
E527	On left inside surface of support, midway between top cross bar and slab.
E528	On top surface of top cross bar, midway between tray and left vertical.
E529	On top surface of top cross bar, midway between tray and right vertical.
E530	On right inside surface of support, midway between top cross bar and slab.

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. 97257

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Project #: 97257

Test Deck #: 4

Item: Unistrut Framework Surrounding Array of 8) 4" Aluminum Conduits Rear of test deck

TC Number	Description of exact physical location
E531	On bottom surface of right bottom support, 6" from rear wall.
E532	On bottom surface of right bottom support, 12" from previous thermocouple.
E533	On outside surface of right vertical support, 12" from previous thermocouple.
E534	On outside surface of right vertical support, 12" above previous thermocouple.
E535	On outside surface of right vertical support, 12" above previous thermocouple.
E536	On bottom surface of corner support, 6" from right slab wall.
E537	On bottom surface of corner support, 12" left of previous thermocouple.
E538	On bottom surface of corner support, 12" left of previous thermocouple.
E539	On bottom surface of corner support, 12" left of previous thermocouple.
E540	On bottom surface of corner support, 12" left of previous thermocouple.
E541	On bottom surface of center bottom support, 6" from rear wall.
E542	On bottom surface of center bottom support, 12" from previous thermocouple.
E543	On outside surface of center vertical support, 12" from previous thermocouple.
E544	On outside surface of center vertical support, 12" above previous thermocouple.
E545	On outside surface of center vertical support, 12" above previous thermocouple.
E546	On bottom surface of corner support, 12" left of thermocouple E540.
E547	On bottom surface of corner support, 12" left of previous thermocouple.
E548	On bottom surface of corner support, 12" left of previous thermocouple.
E549	On bottom surface of corner support, 12" left of previous thermocouple.
E550	On bottom surface of corner support, 12" left of previous thermocouple.
E551	On bottom surface of left bottom support, 6" from rear wall.
E552	On bottom surface of left bottom support, 12" from previous thermocouple.
E553	On outside surface of left vertical support, 12" from previous thermocouple.
E554	On outside surface of left vertical support, 12" above previous thermocouple.
E555	On outside surface of left vertical support, 12" above 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. 97257

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Project #: 97257

Test Deck #: 4

Item: Unistrut Framework Surrounding Array of 2) 1" Steel Conduits Front of test deck

TC Number	Description of exact physical location
E556	On bottom surface of right bottom support, 6" from front wall.
E557	On bottom surface of right bottom support, 12" from previous thermocouple.
E558	On outside surface of right vertical support, 12" from previous thermocouple.
E559	On bottom surface of corner support, 6" from right slab wall.
E560	On bottom surface of corner support, 12" left of previous thermocouple.
E561	On bottom surface of corner support, 12" left of previous thermocouple.
E562	On bottom surface of corner support, 12" left of previous thermocouple.
E563	On bottom surface of corner support, 12" left of previous thermocouple.
E564	On bottom surface of center bottom support, 6" from front wall.
E565	On bottom surface of center bottom support, 12" from previous thermocouple.
E566	On outside surface of center vertical support, 12" from previous thermocouple.
E567	On bottom surface of corner support, 12" left of thermocouple E563.
E568	On outside surface of right vertical support, 12" from previous thermocouple.
E569	On outside surface of right vertical support, 12" above previous thermocouple.
E570	On outside surface of right vertical support, 12" above previous thermocouple.
E571	On outside surface of right vertical support, 12" above previous thermocouple.
E572	On bottom surface of left bottom support, 6" from front wall.
E573	On bottom surface of left bottom support, 12" from previous thermocouple.
E574	On outside surface of left vertical support, 12" from previous thermocouple.

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

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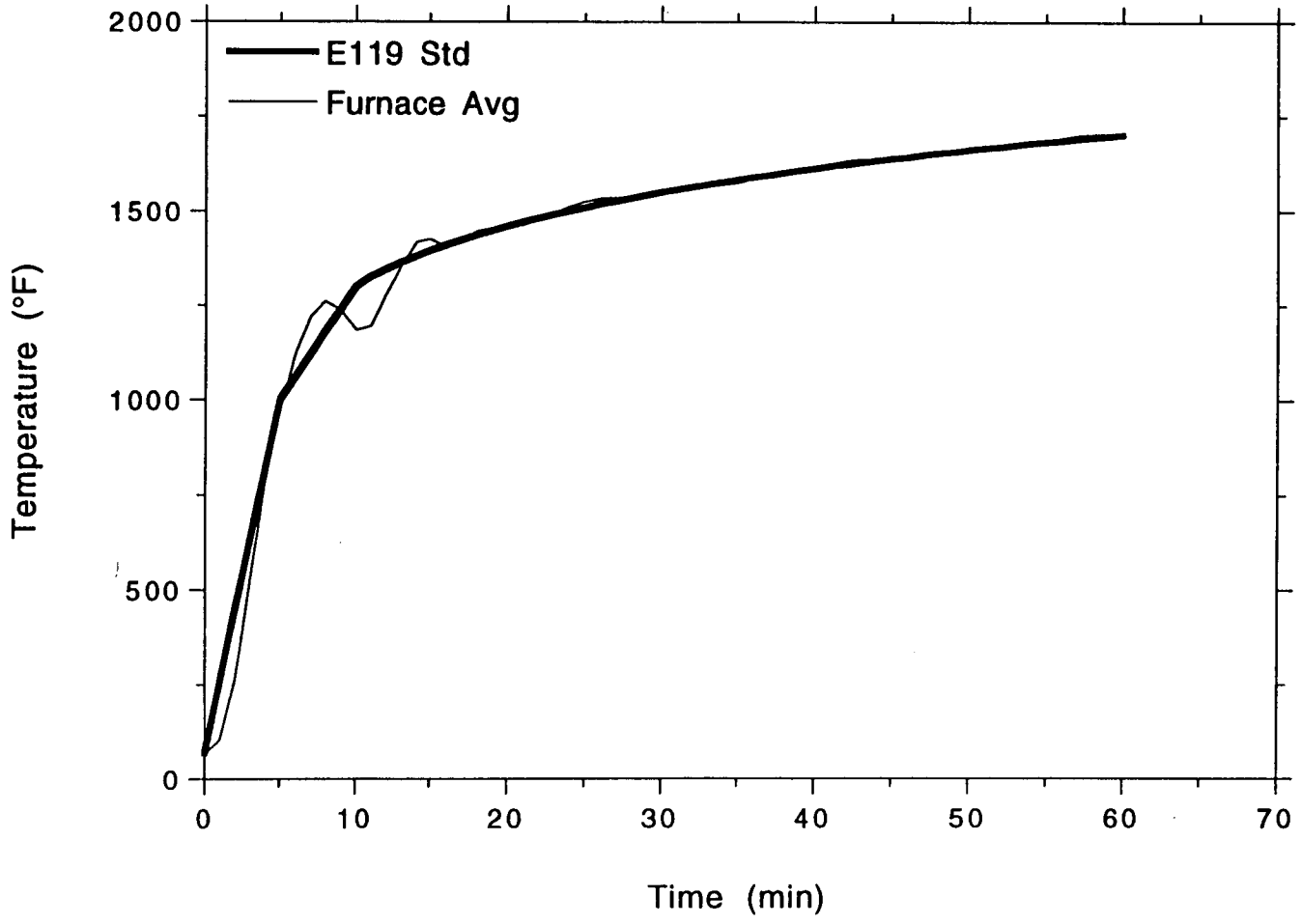
Appendix D

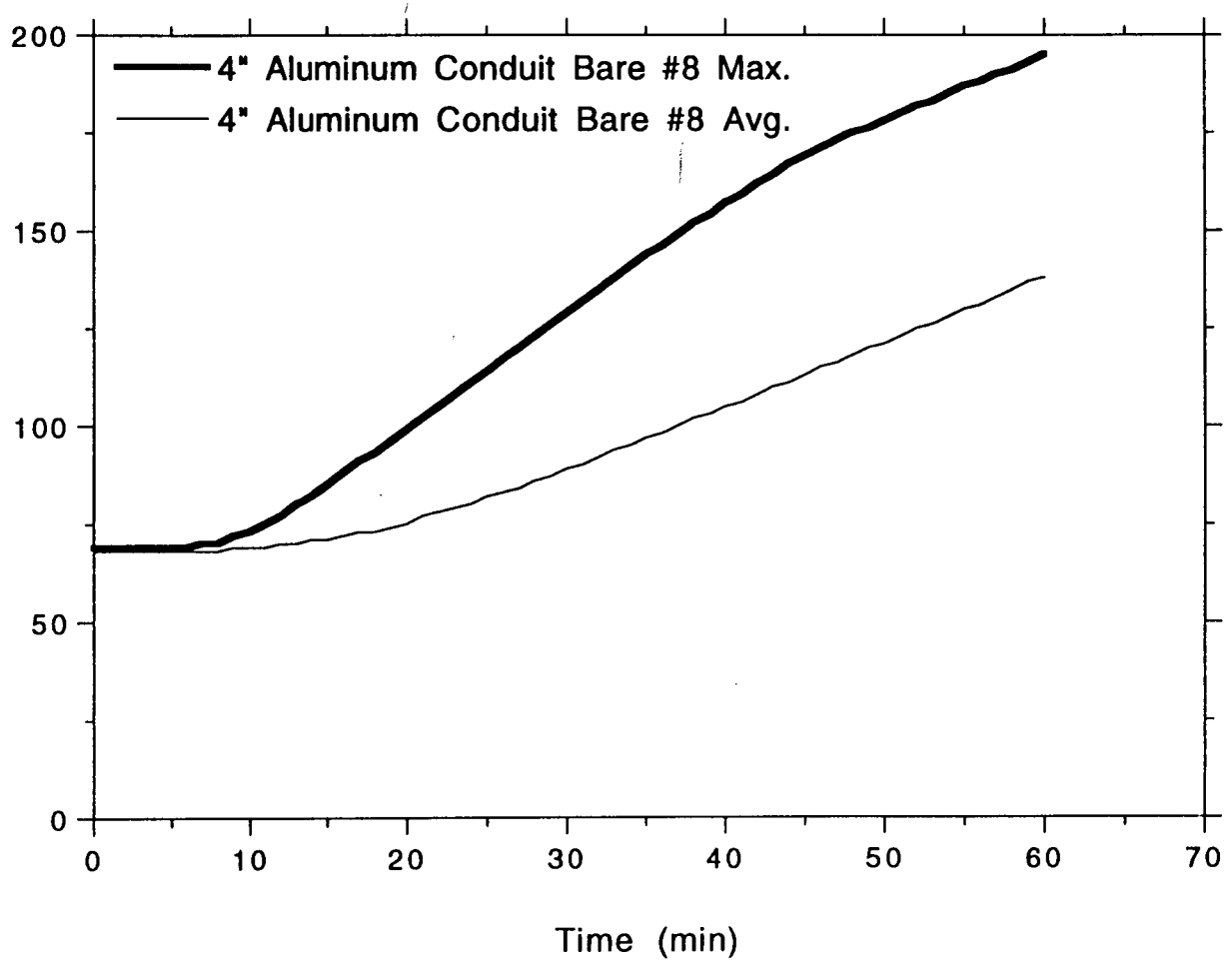
TEST DATA

TSI/TVA
Project No. 11960-97257
Furnace Temperature



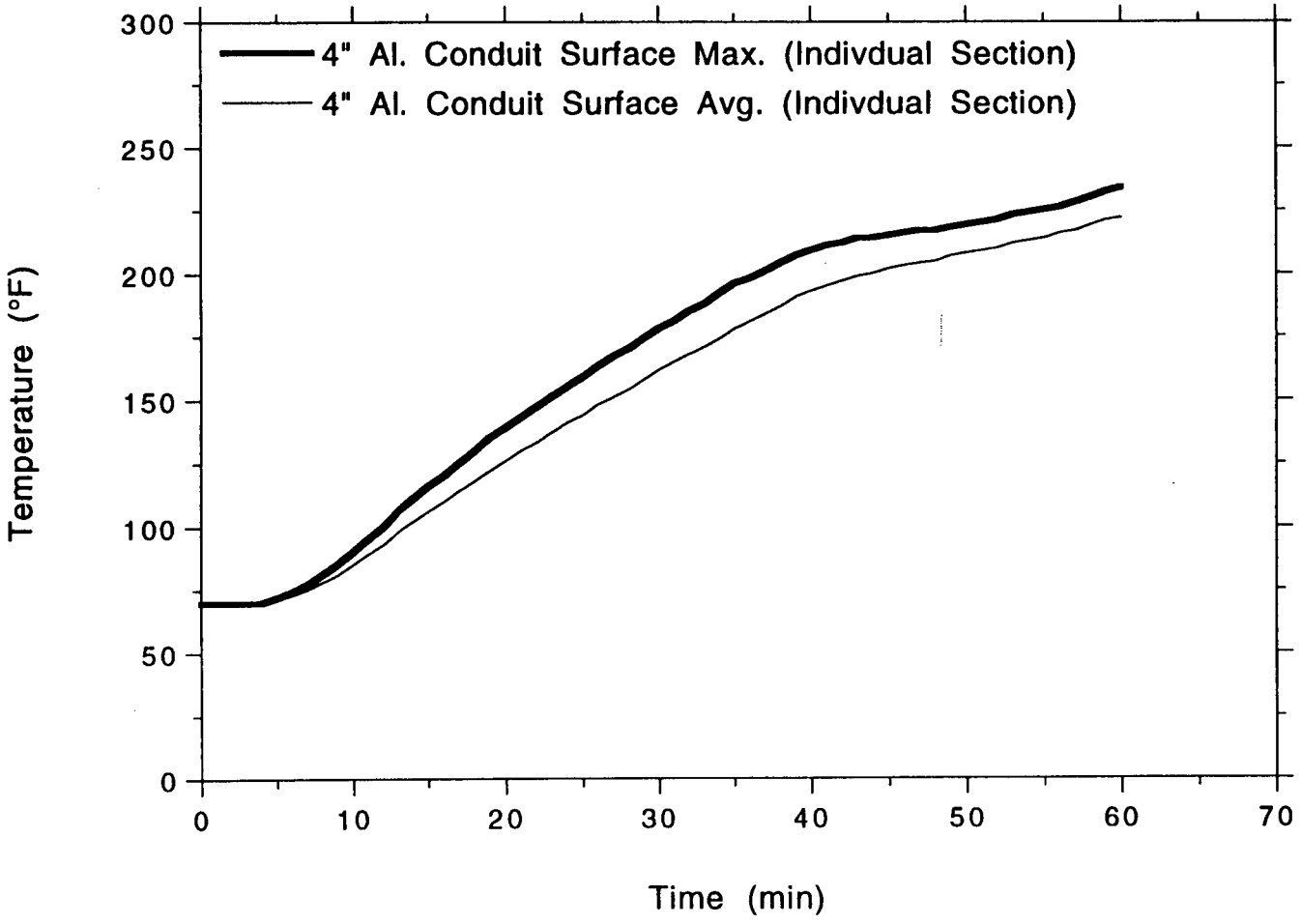
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



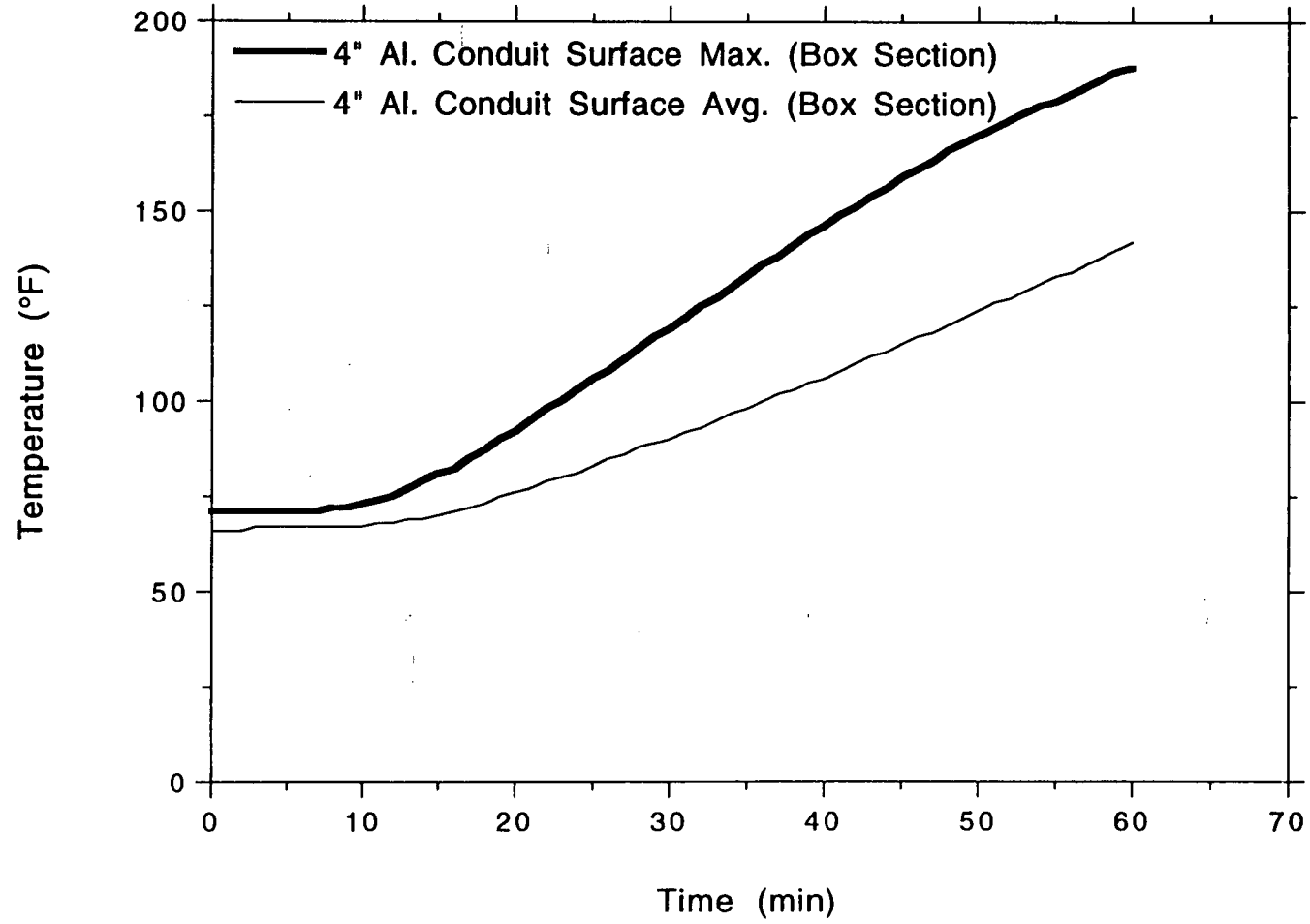
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



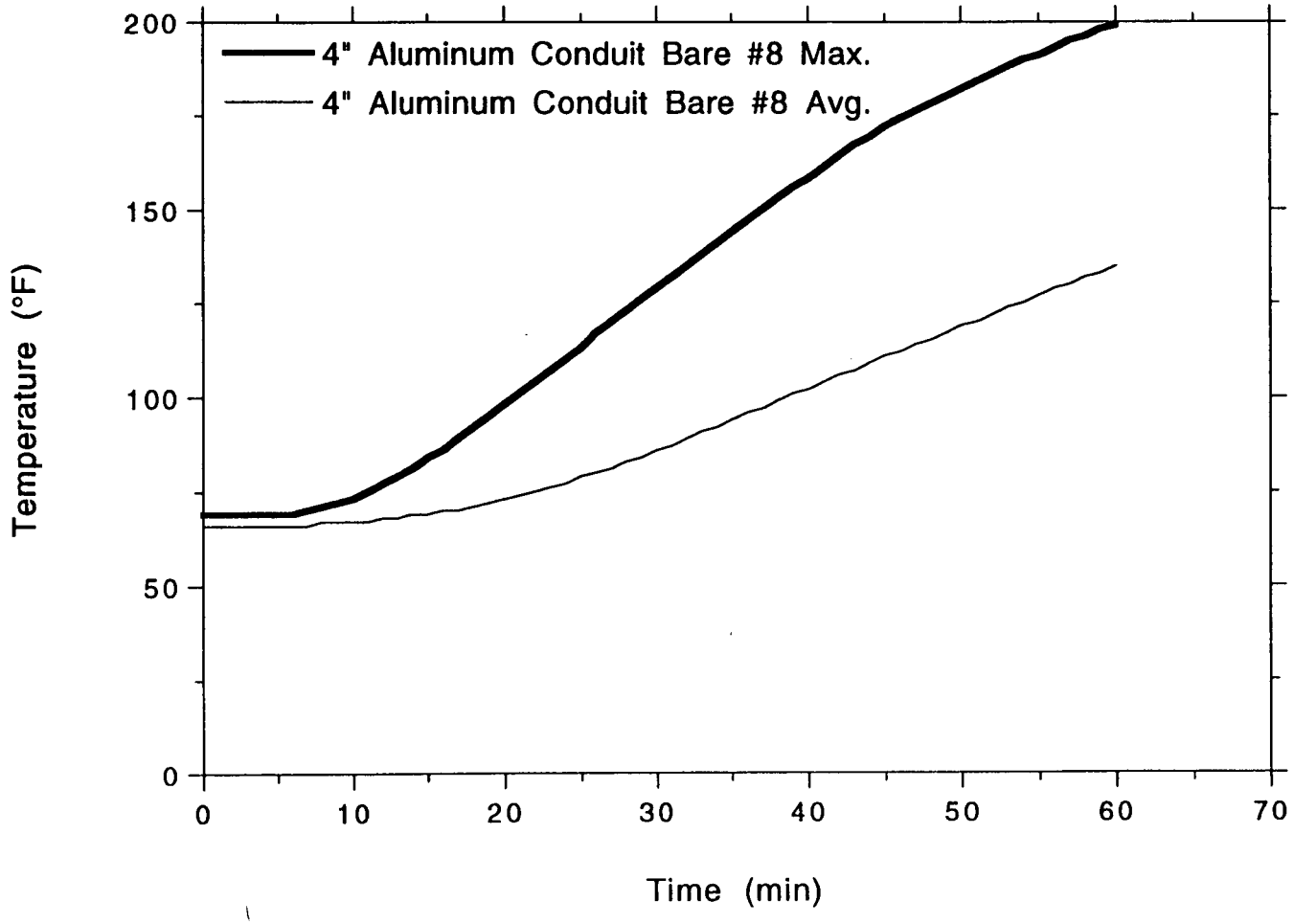
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



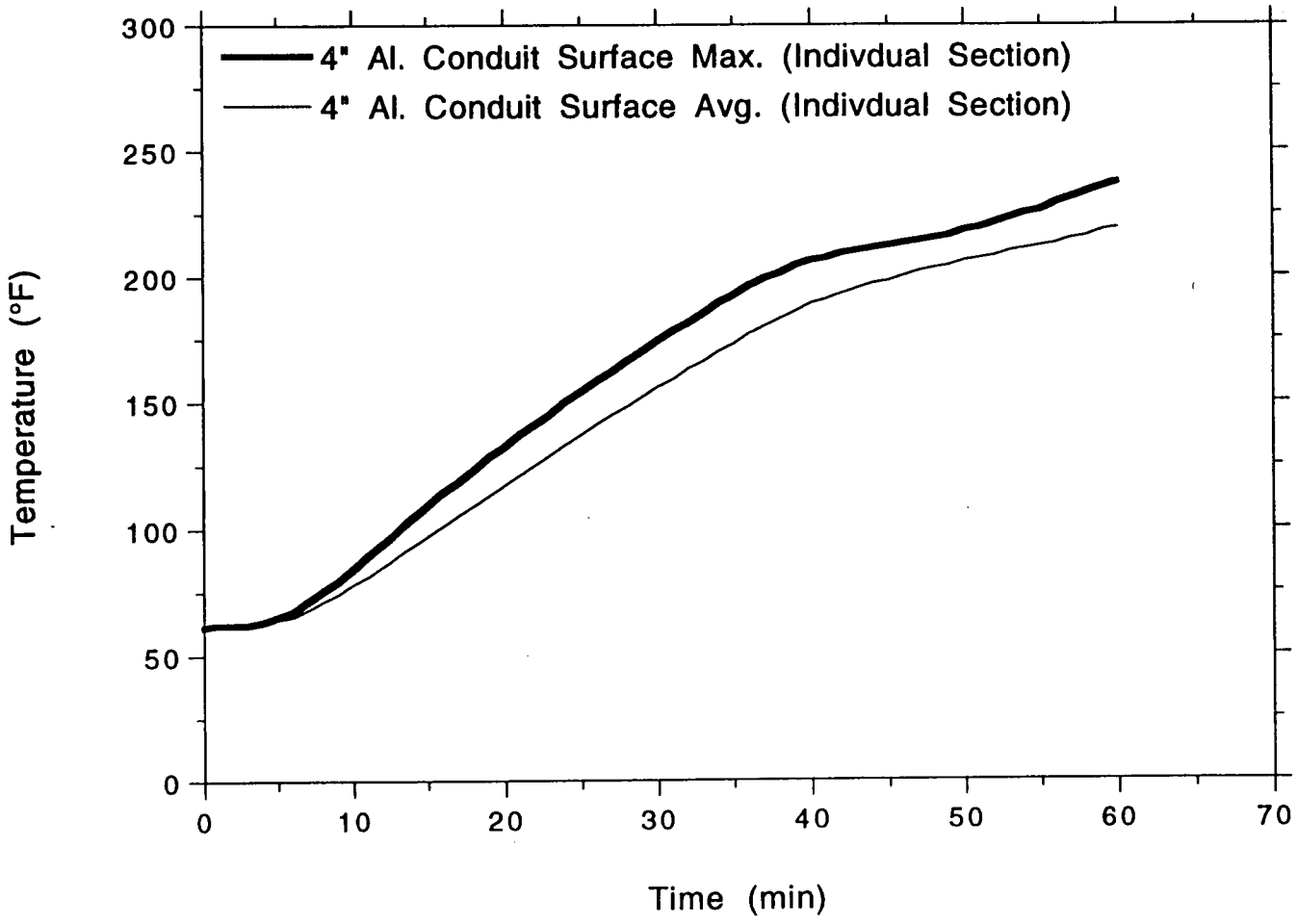
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



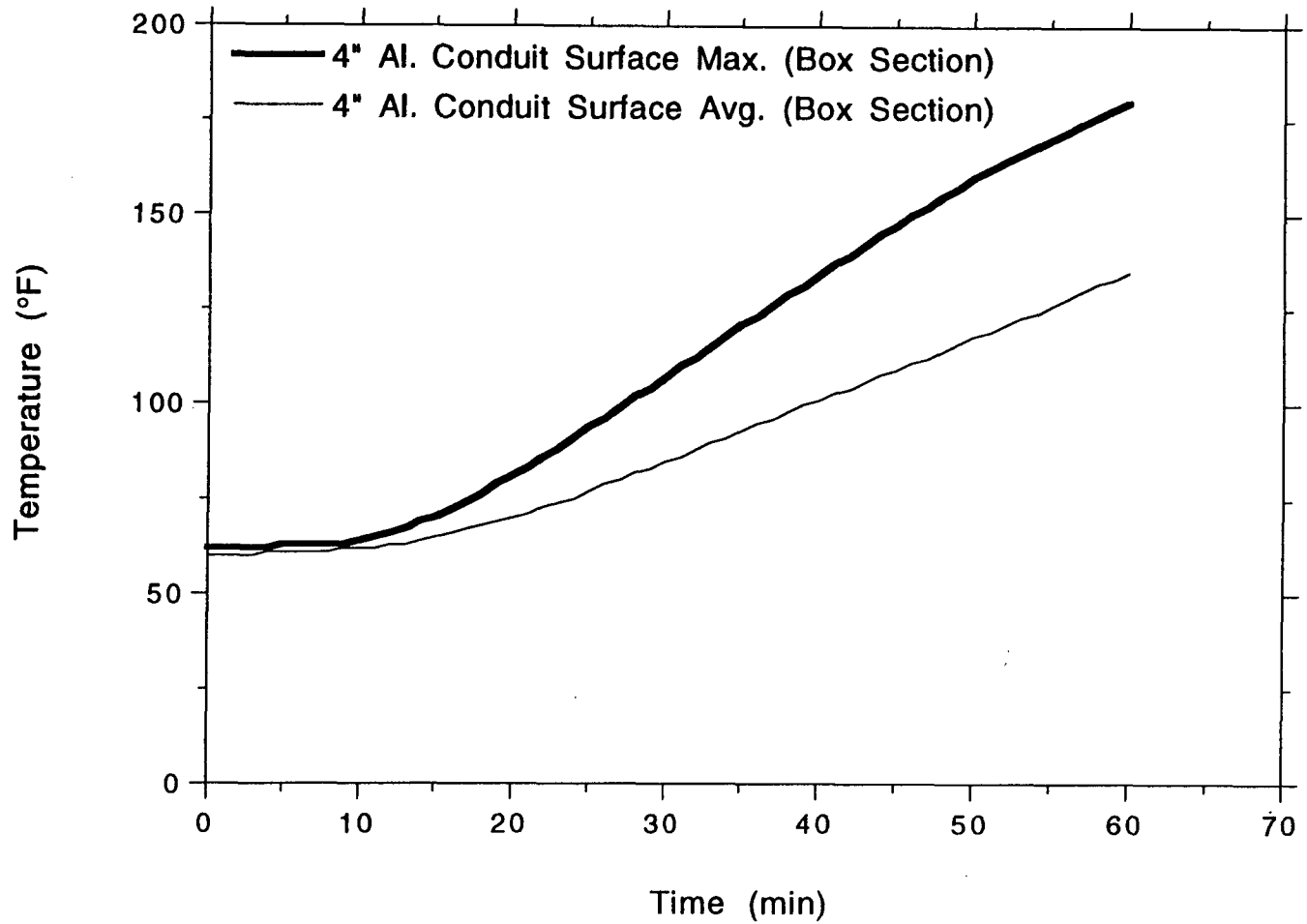
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



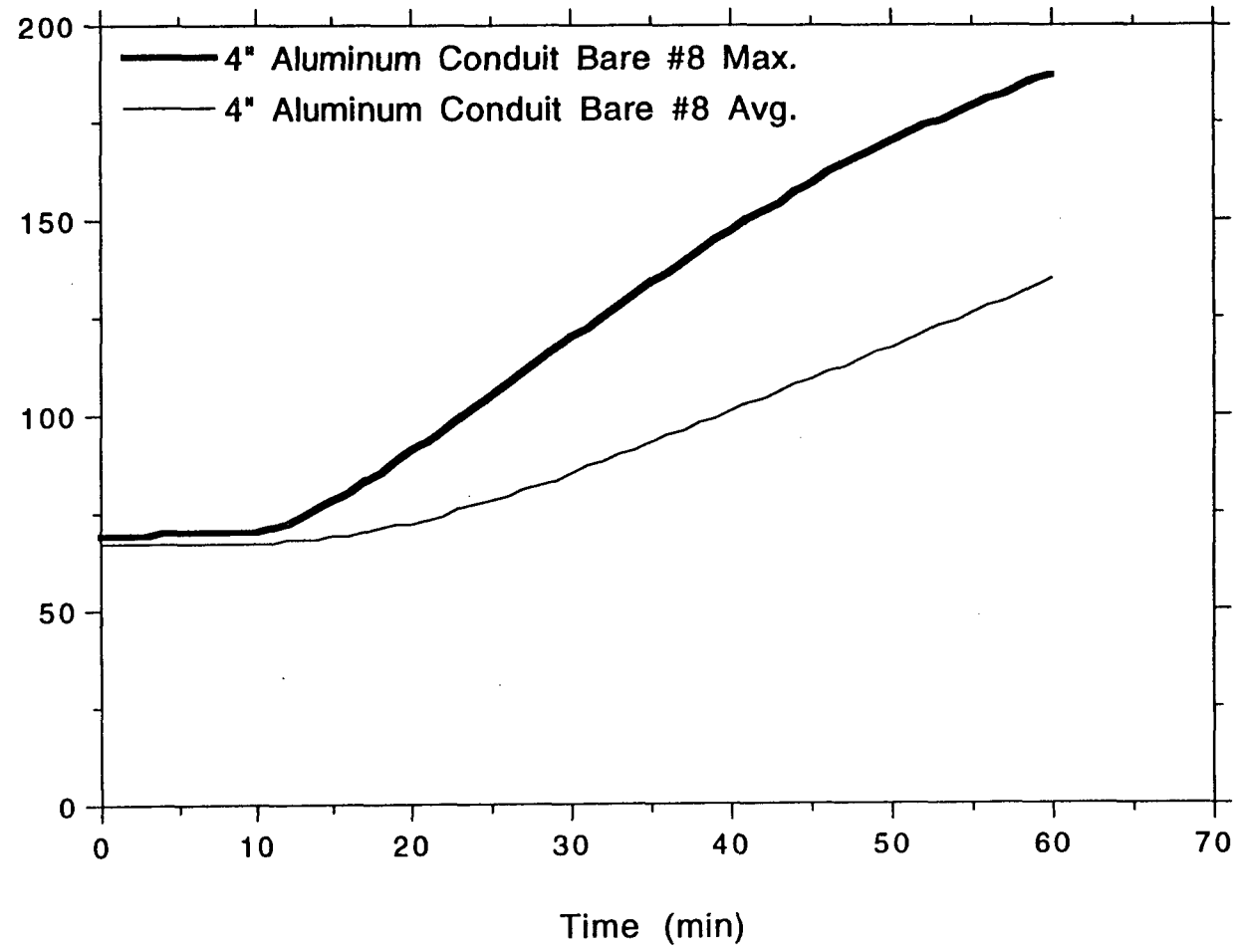
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



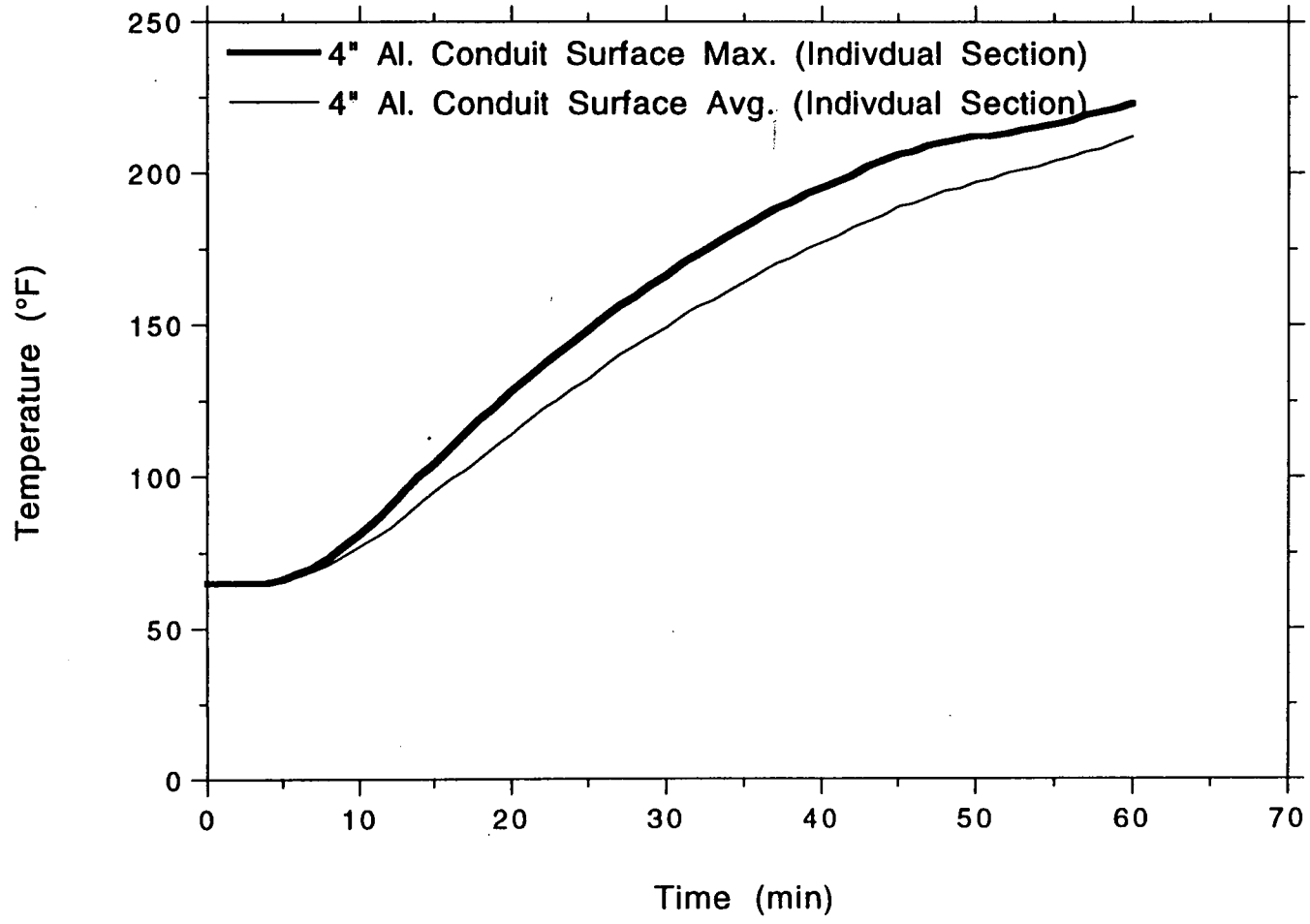
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Rear Al. Conduit



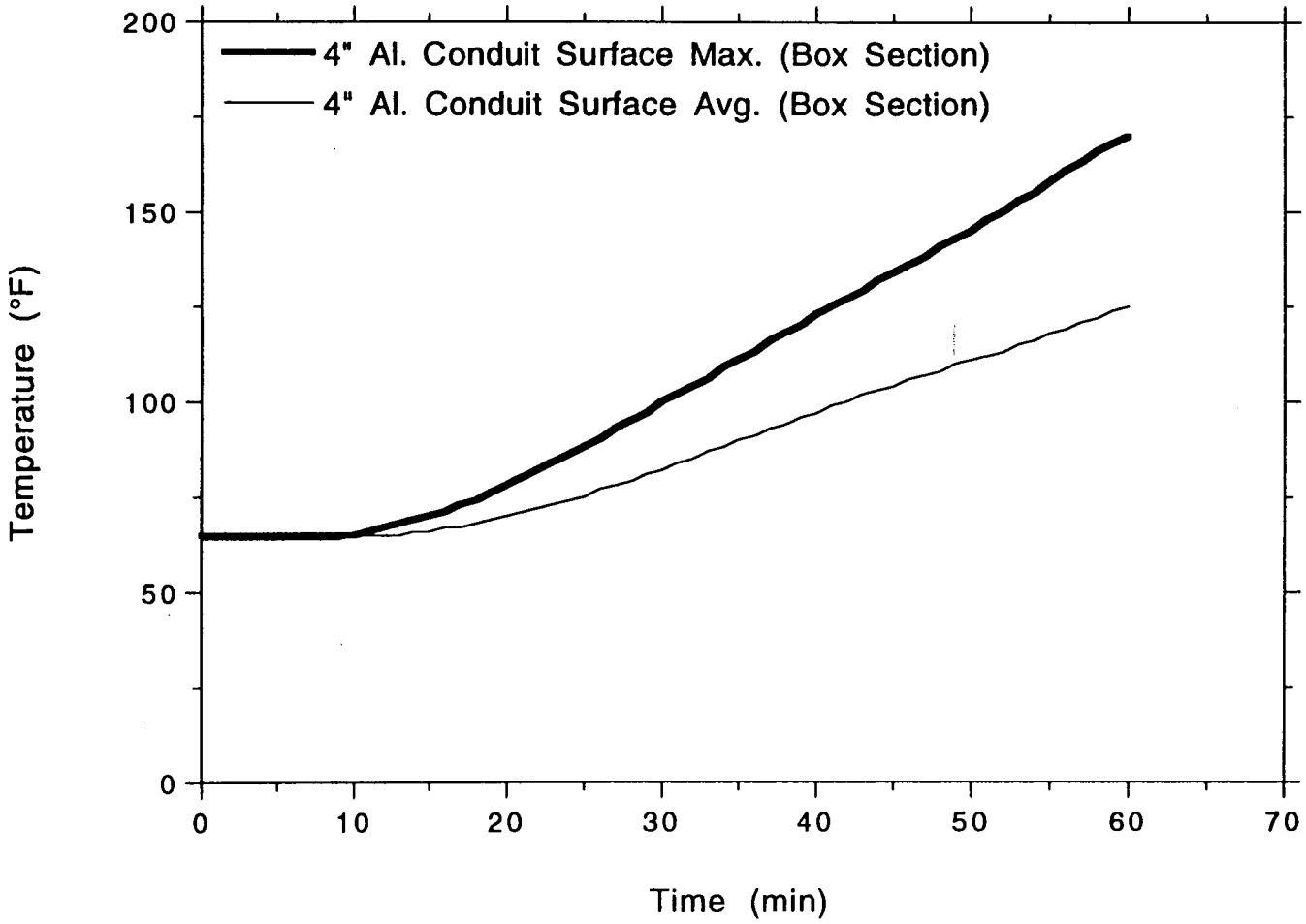
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Rear Al. Conduit



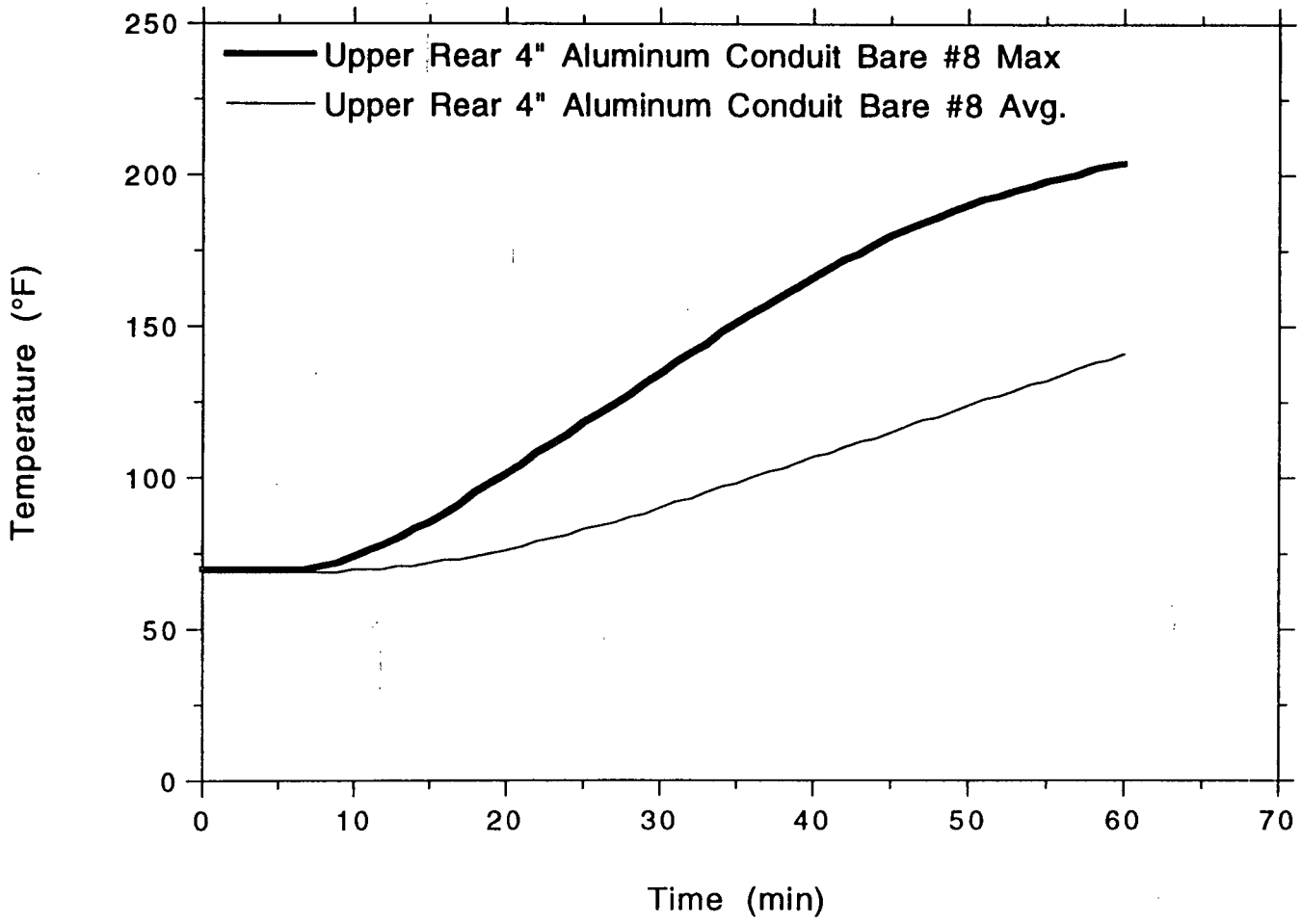
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



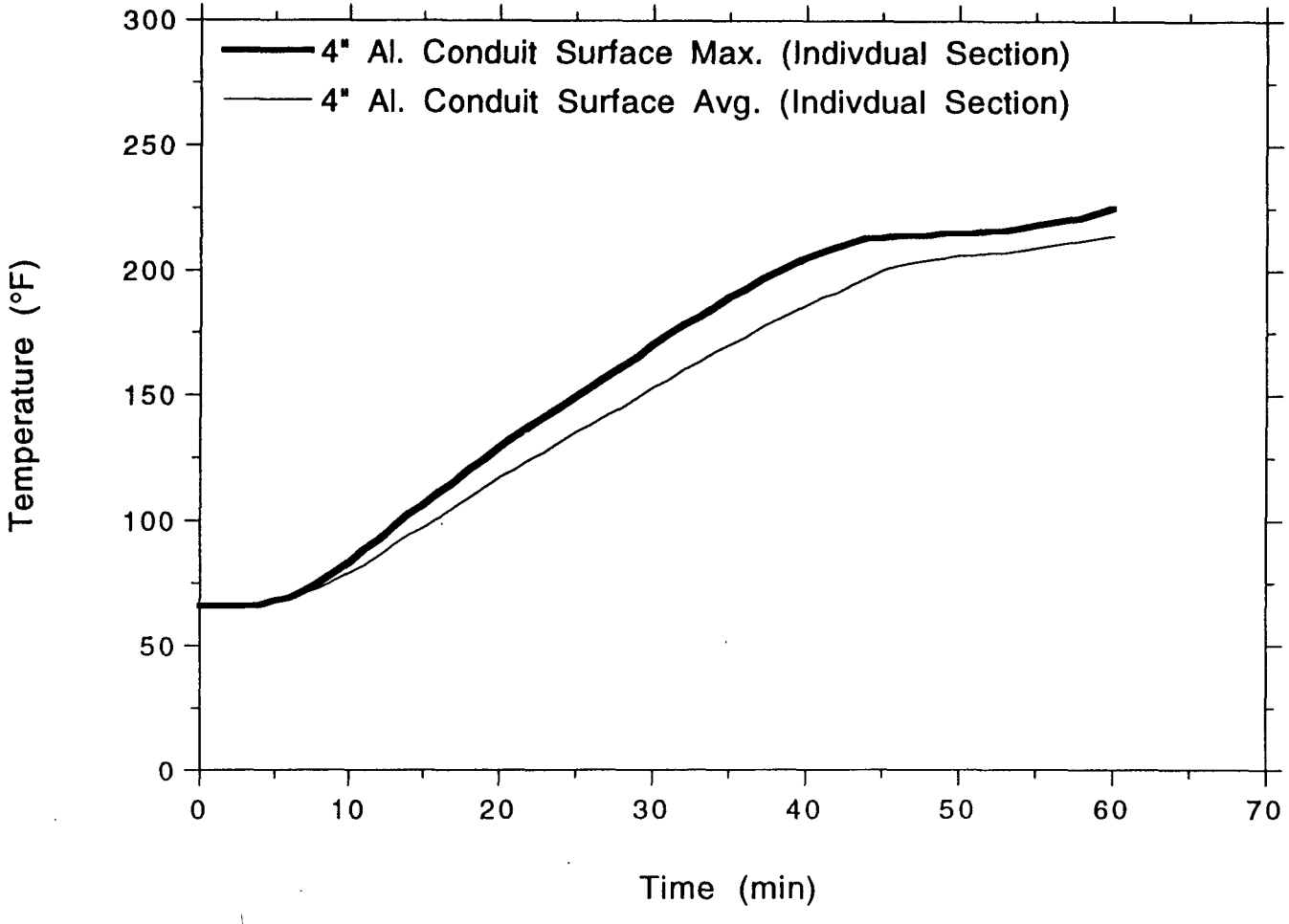
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



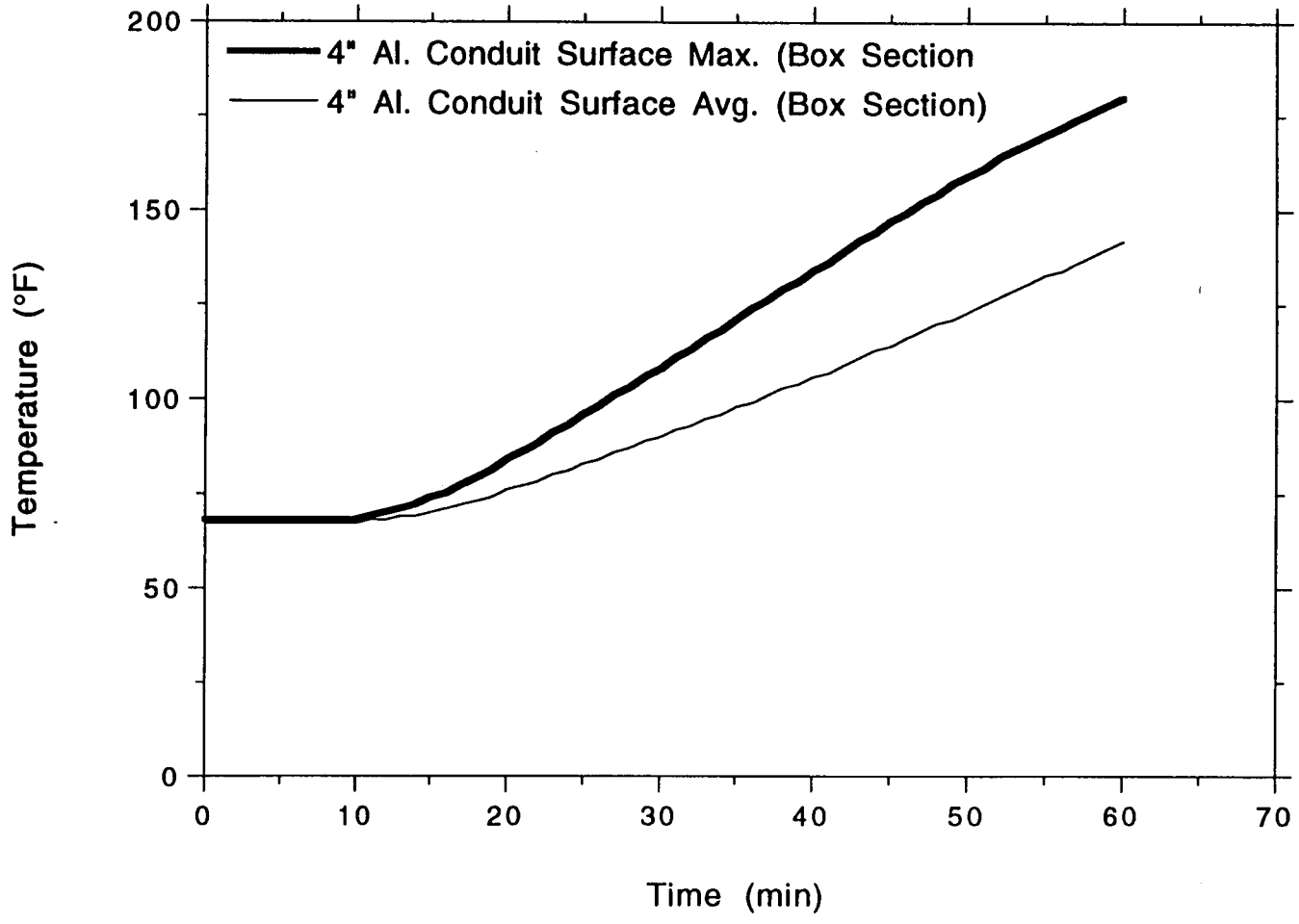
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



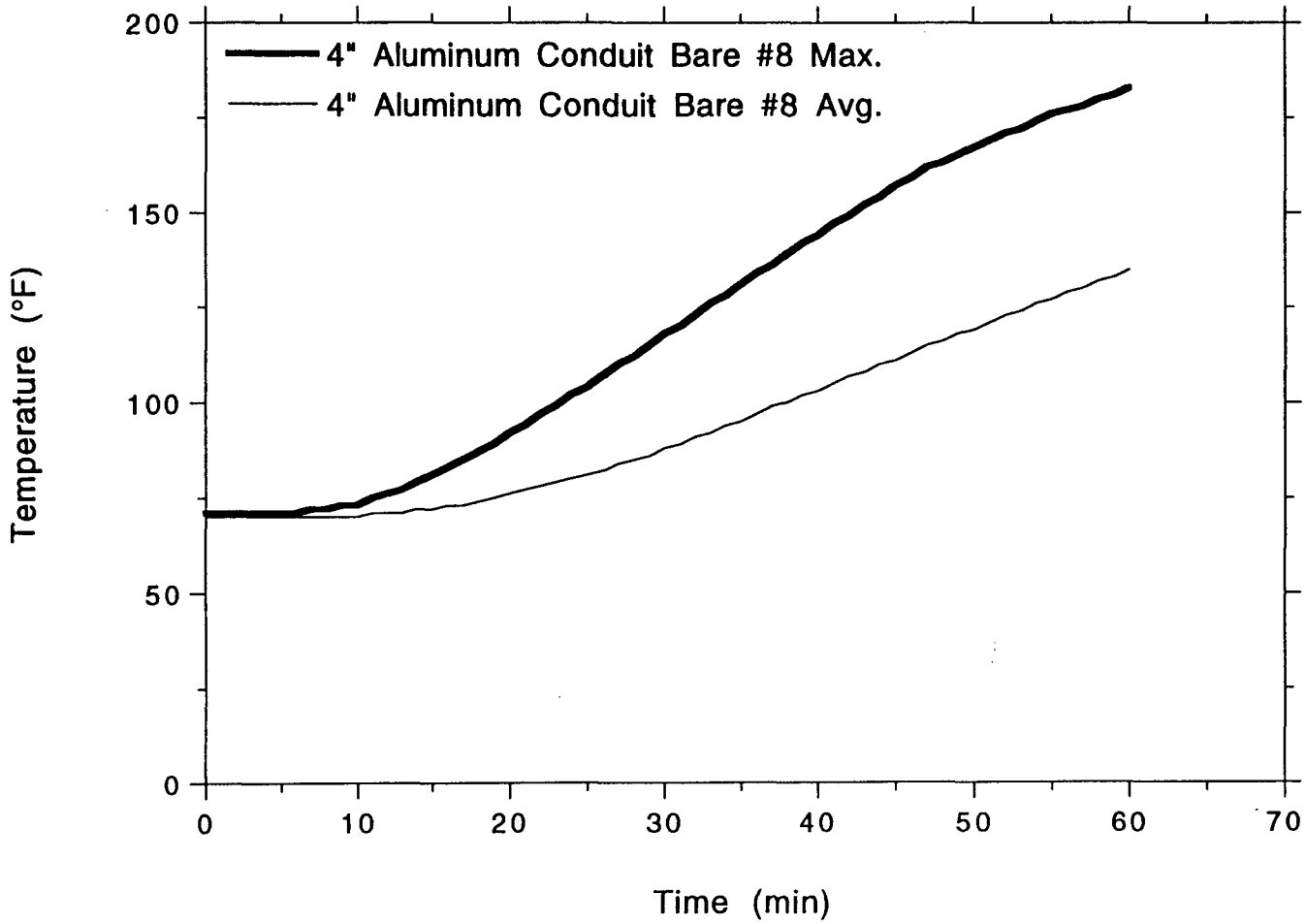
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



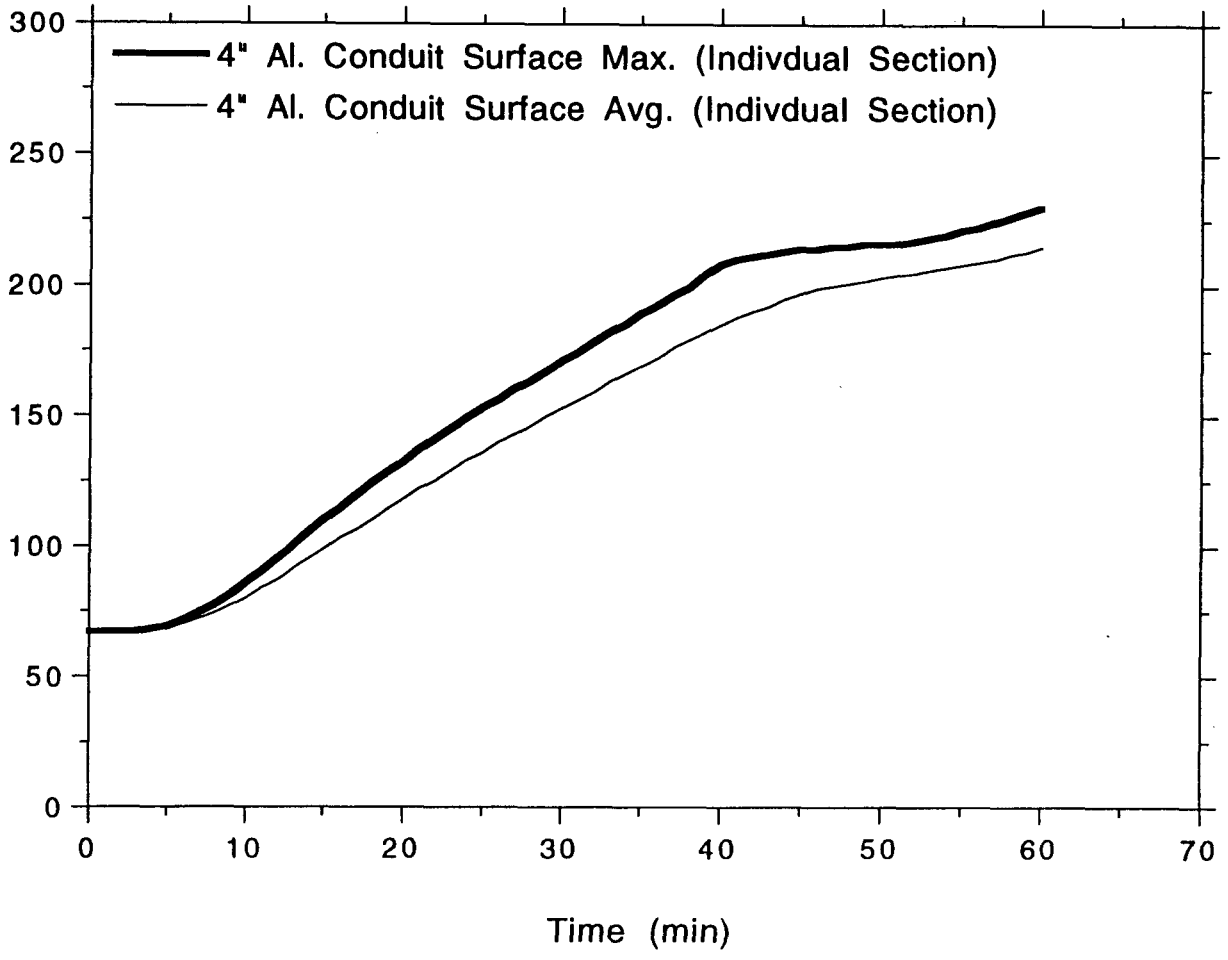
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



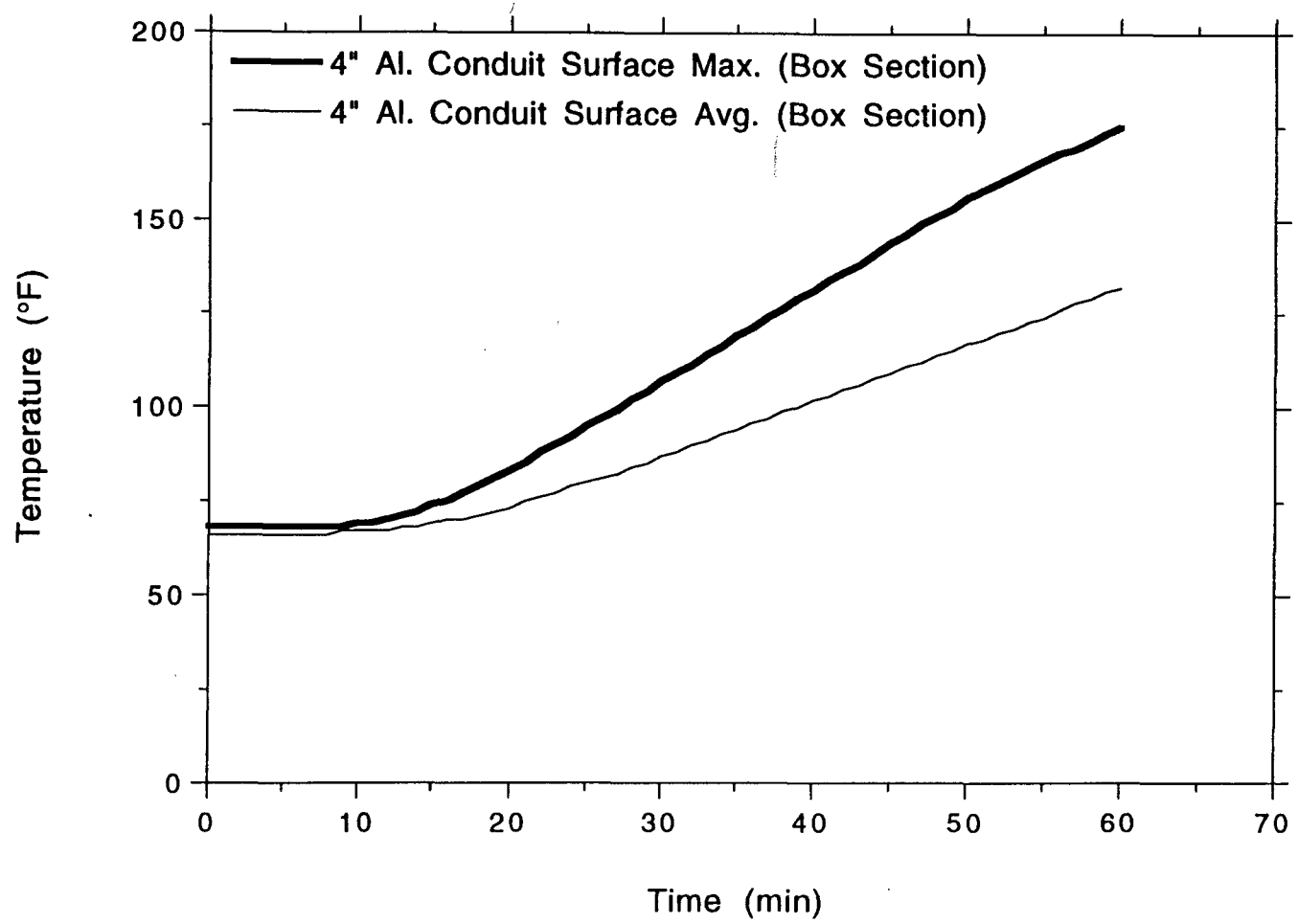
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



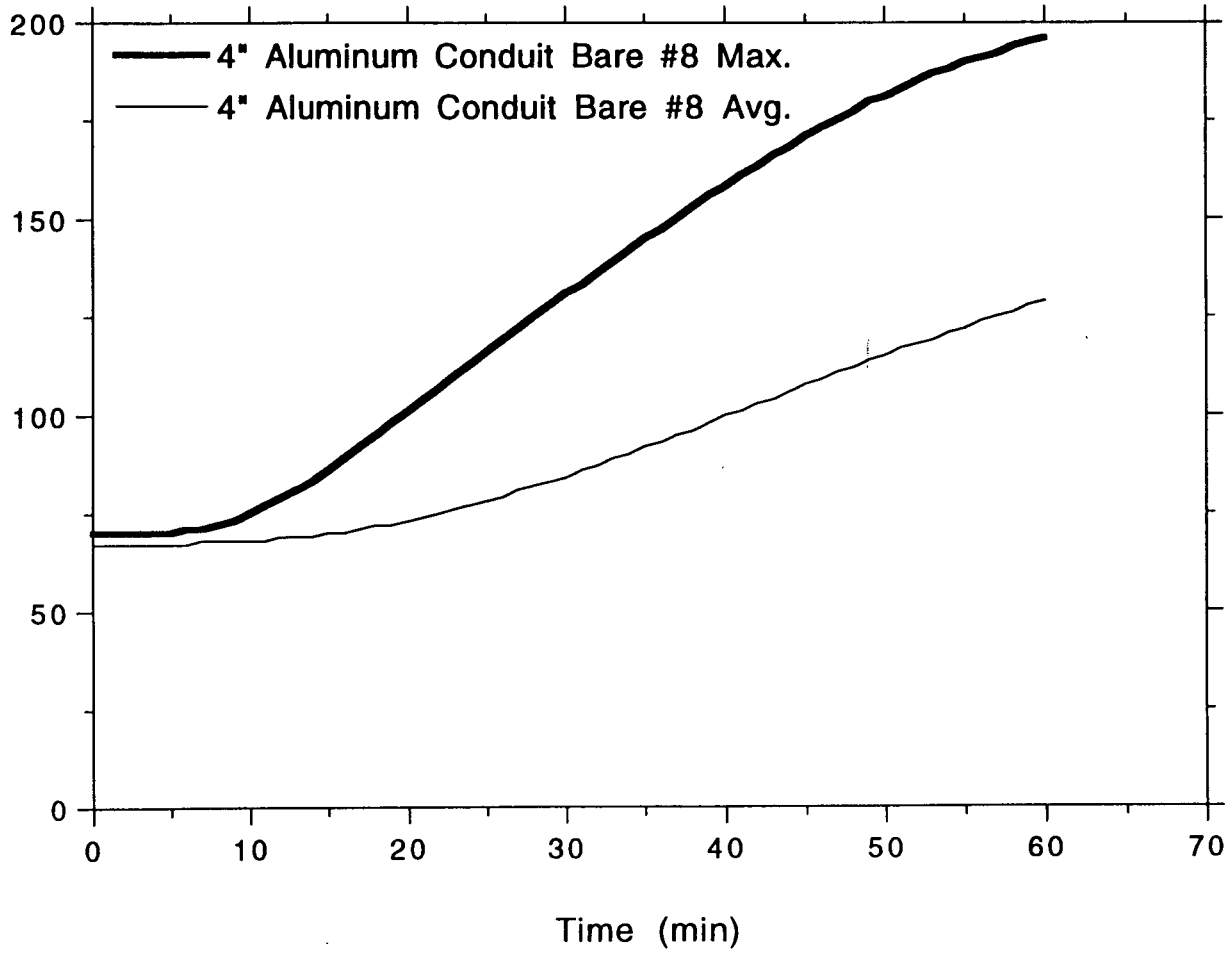
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



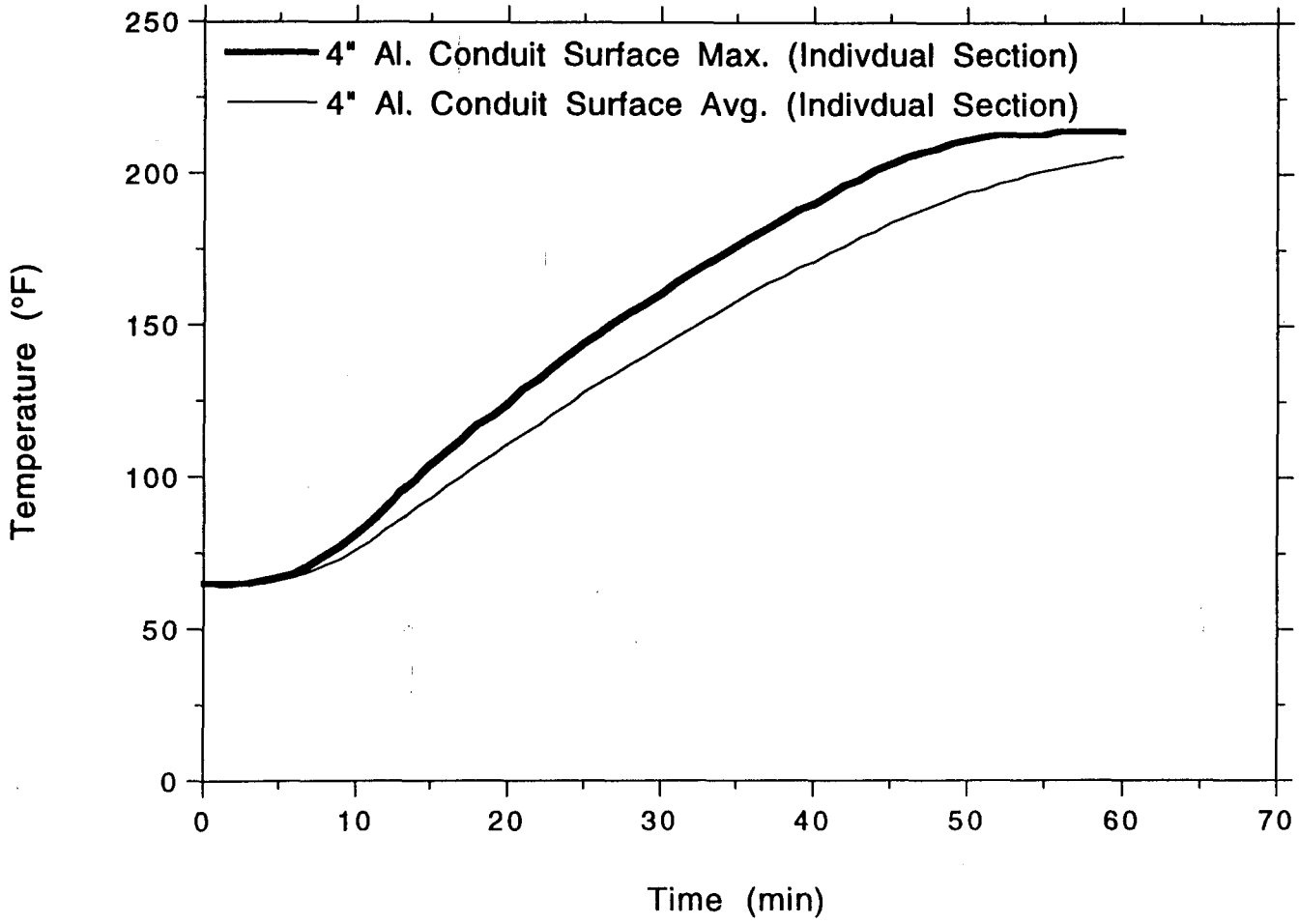
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



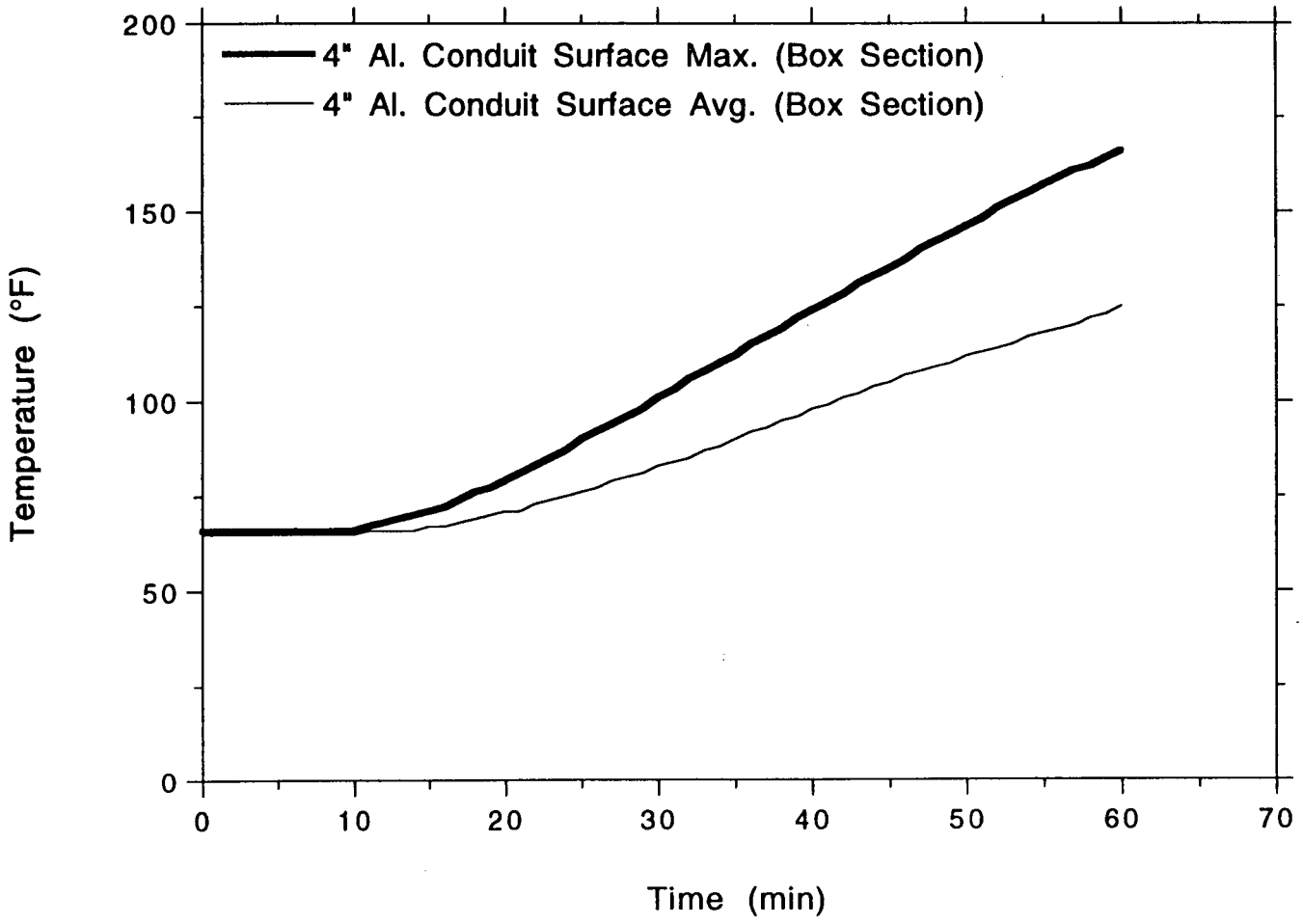
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



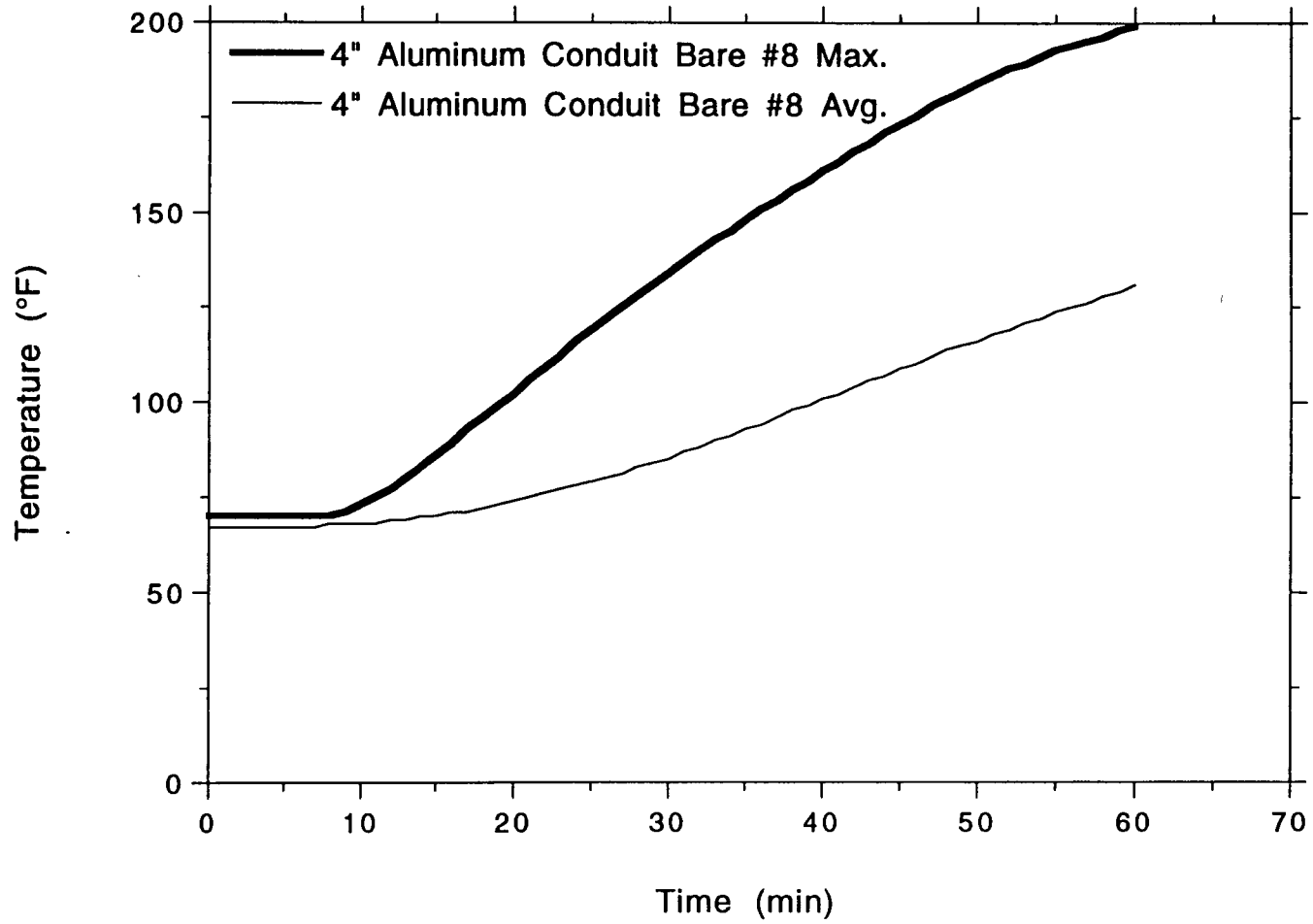
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



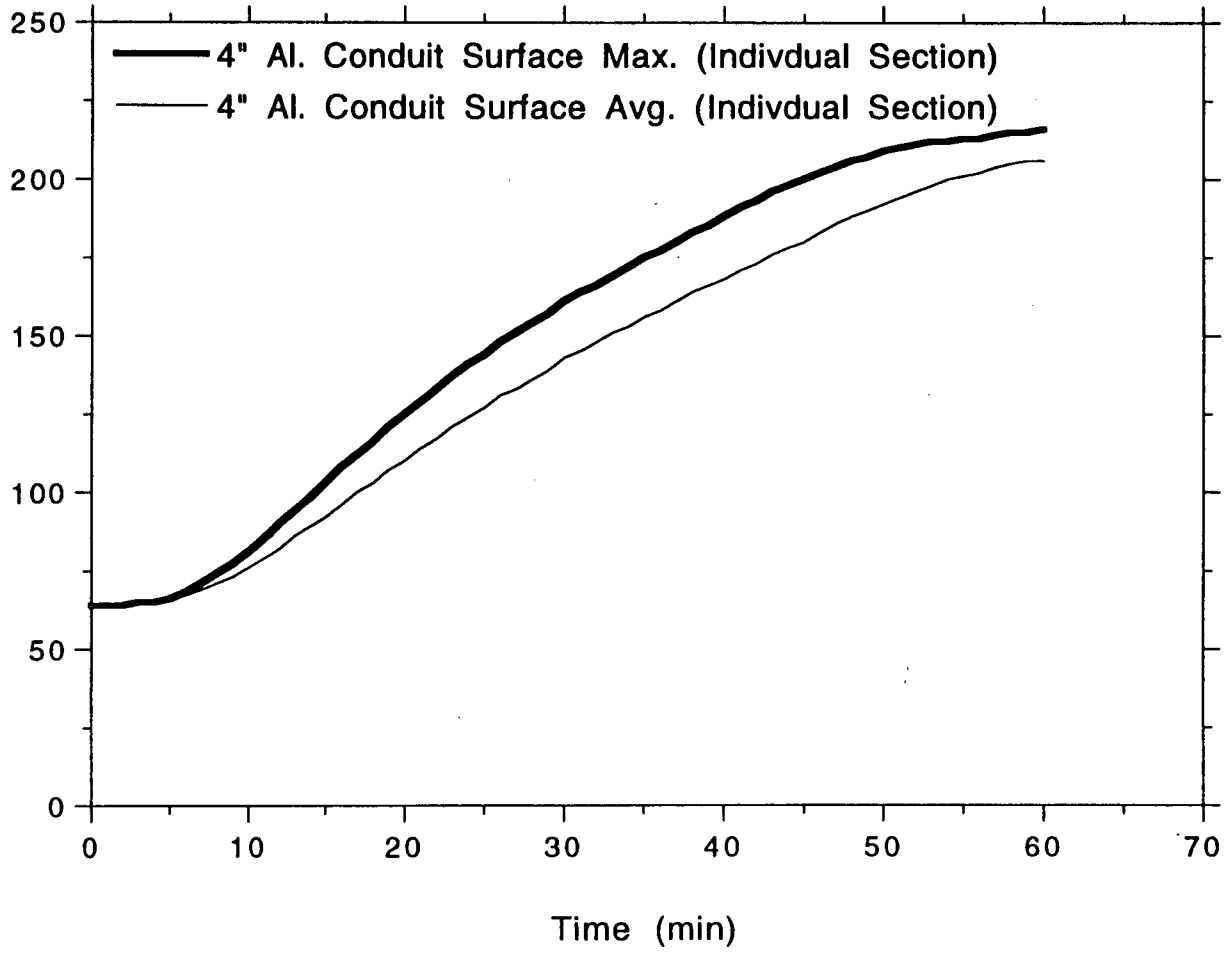
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



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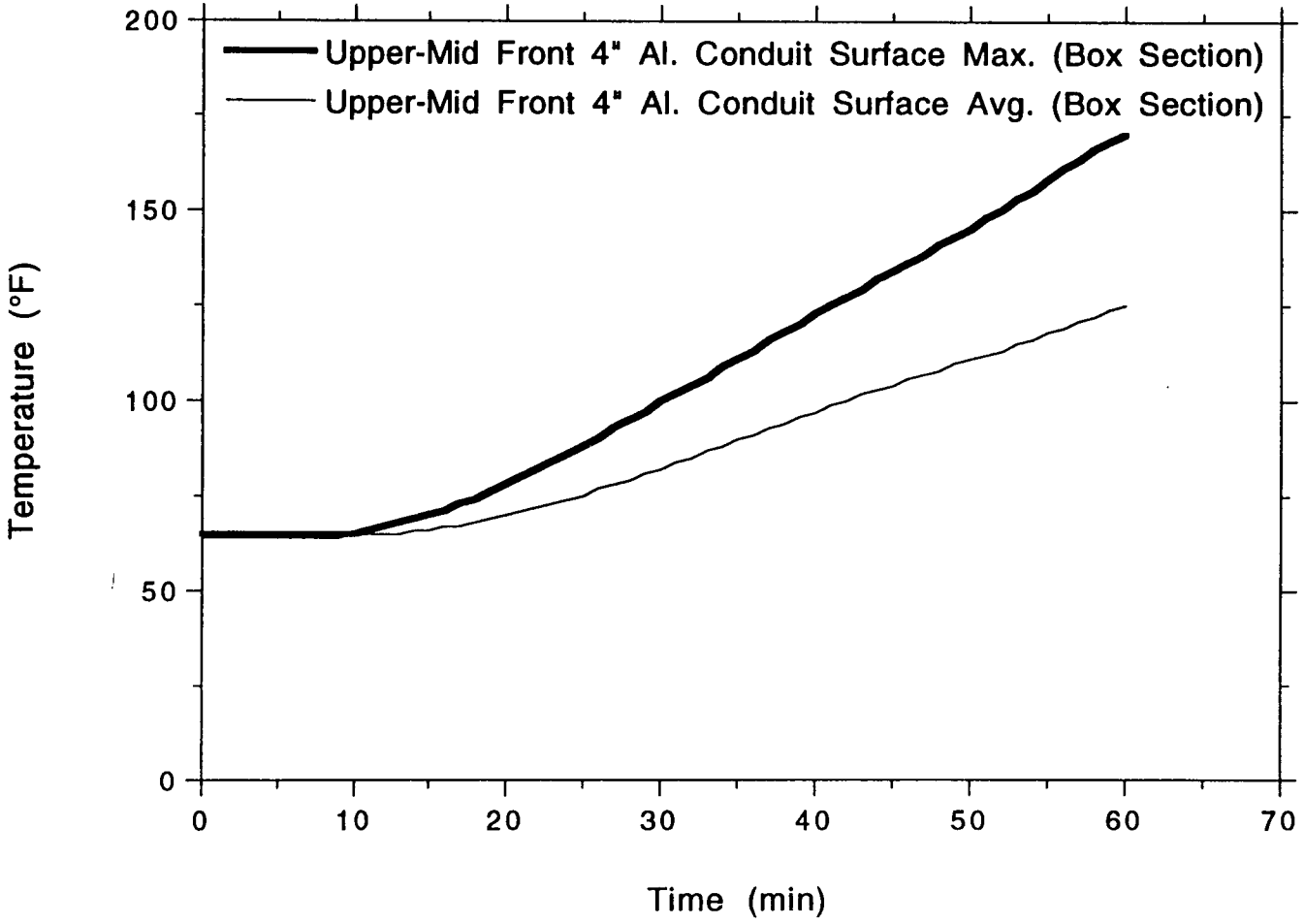
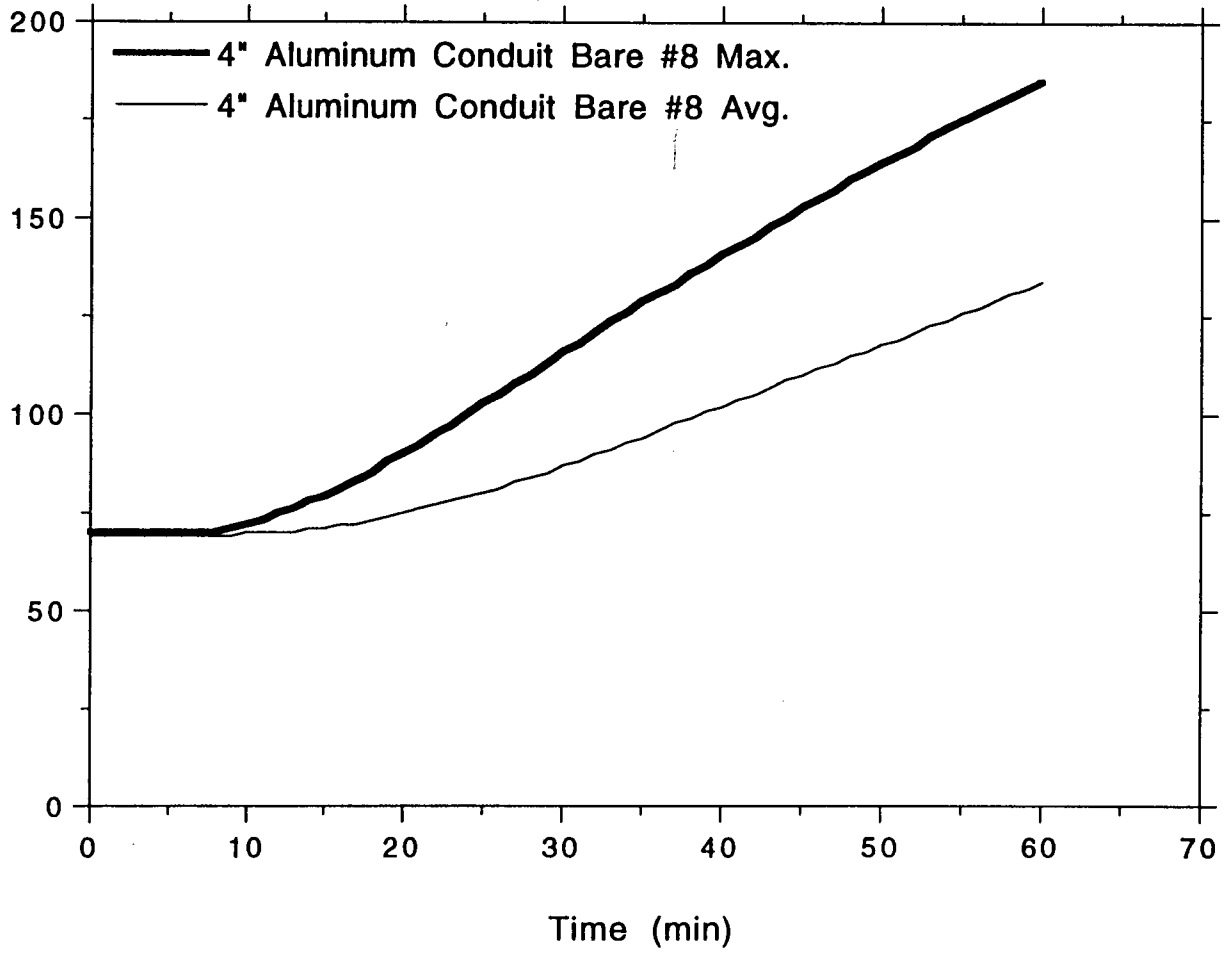
Project No. 11960-97257
Upper-Mid Front Al. Conduit



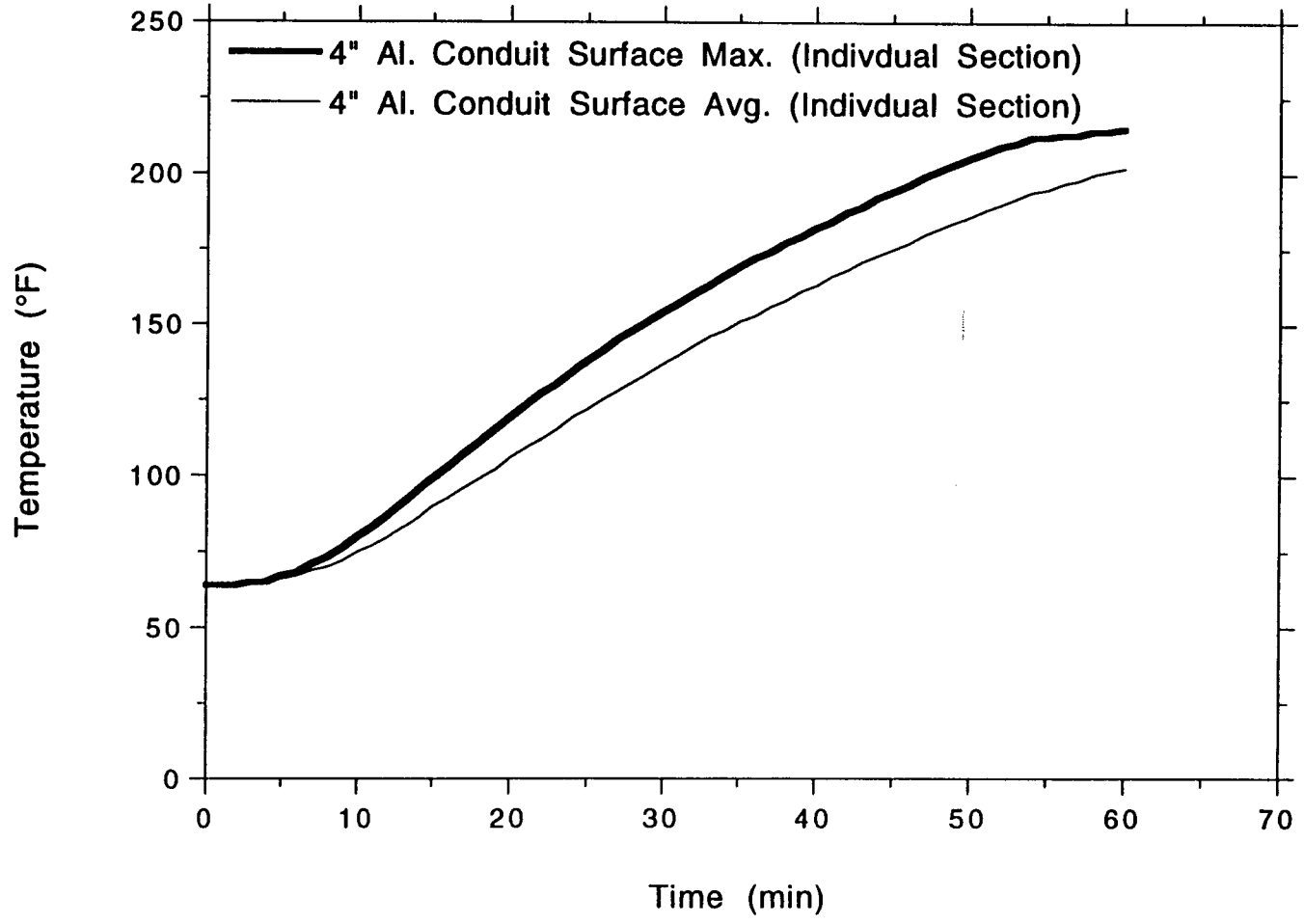
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



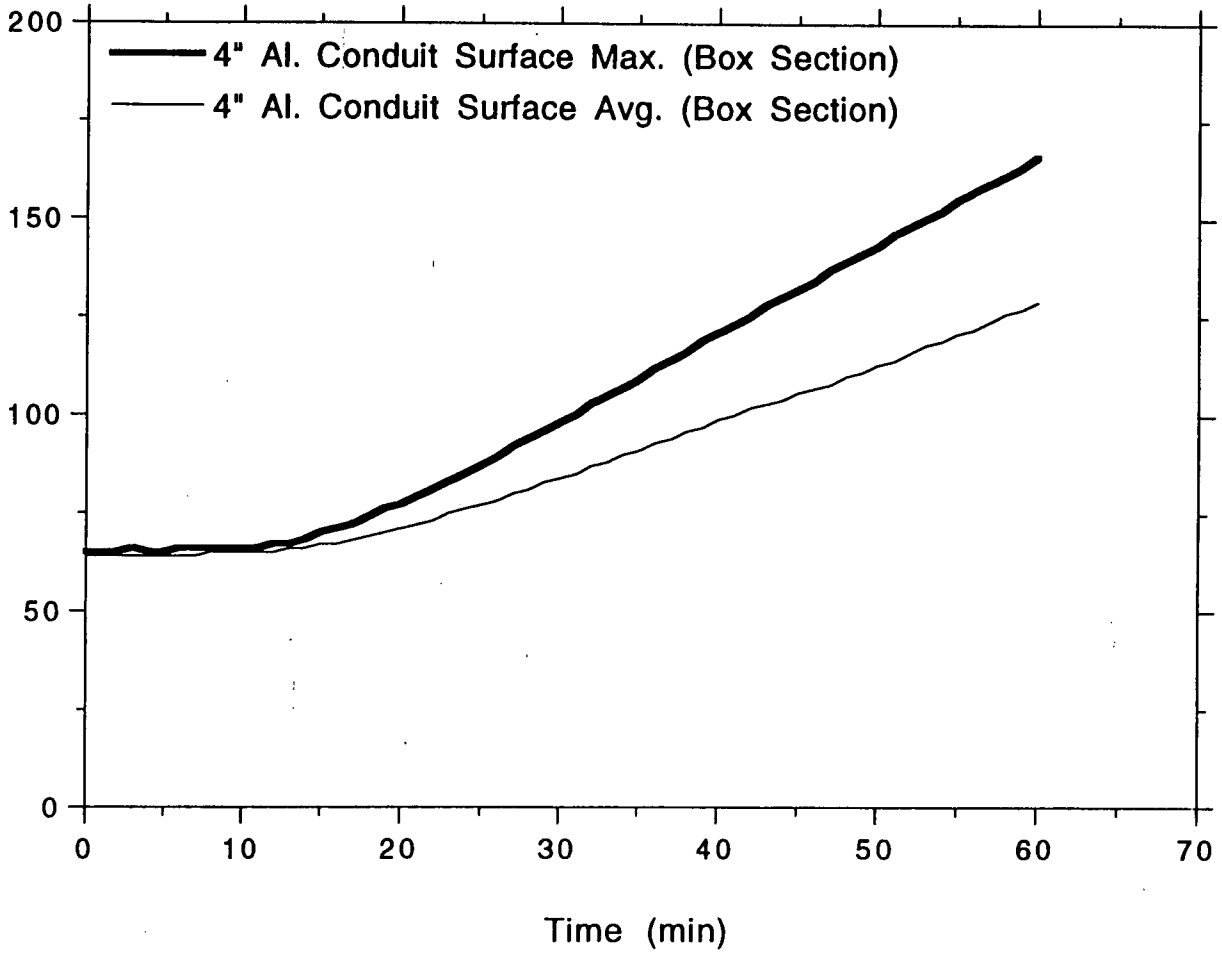
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



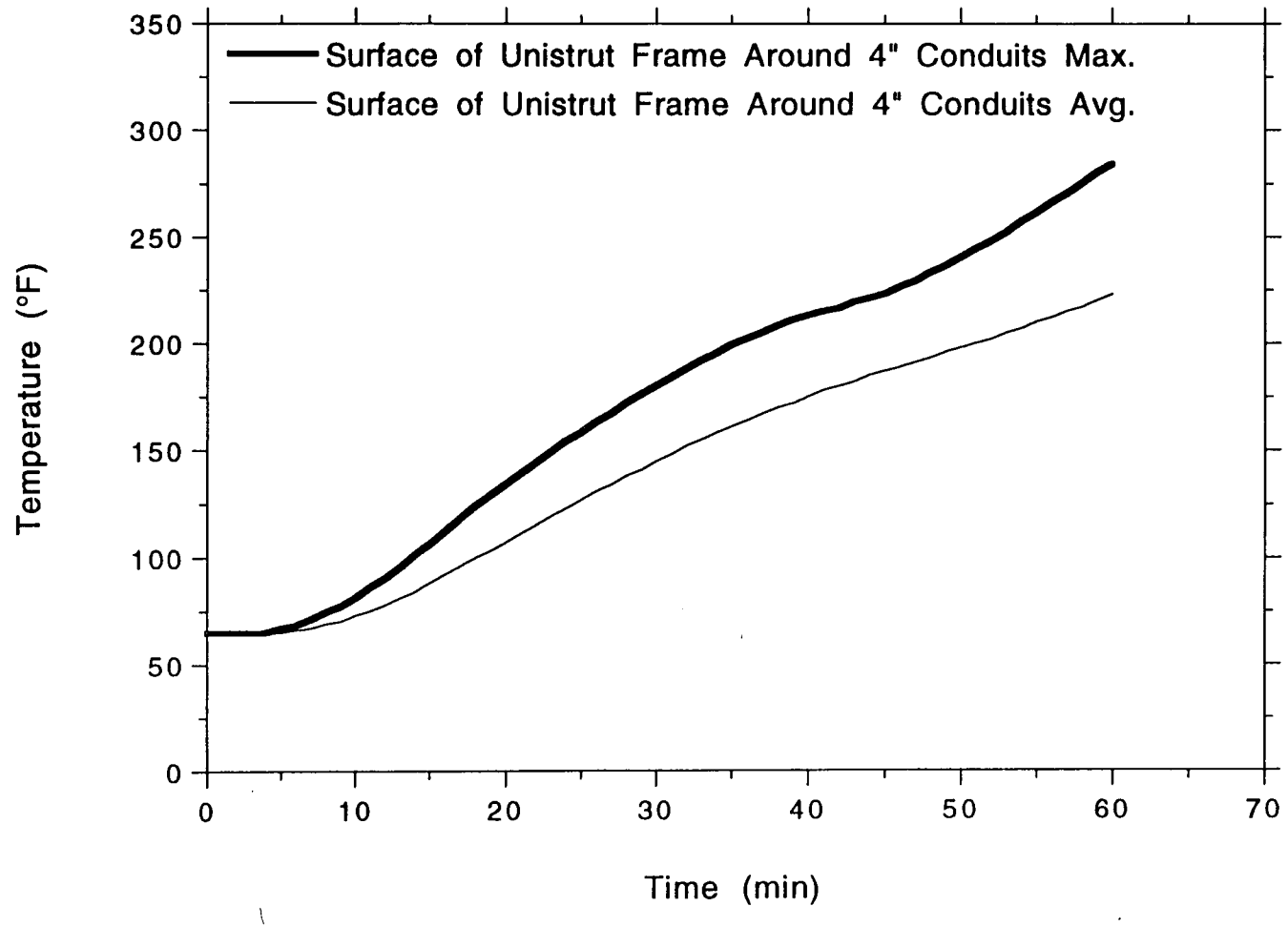
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



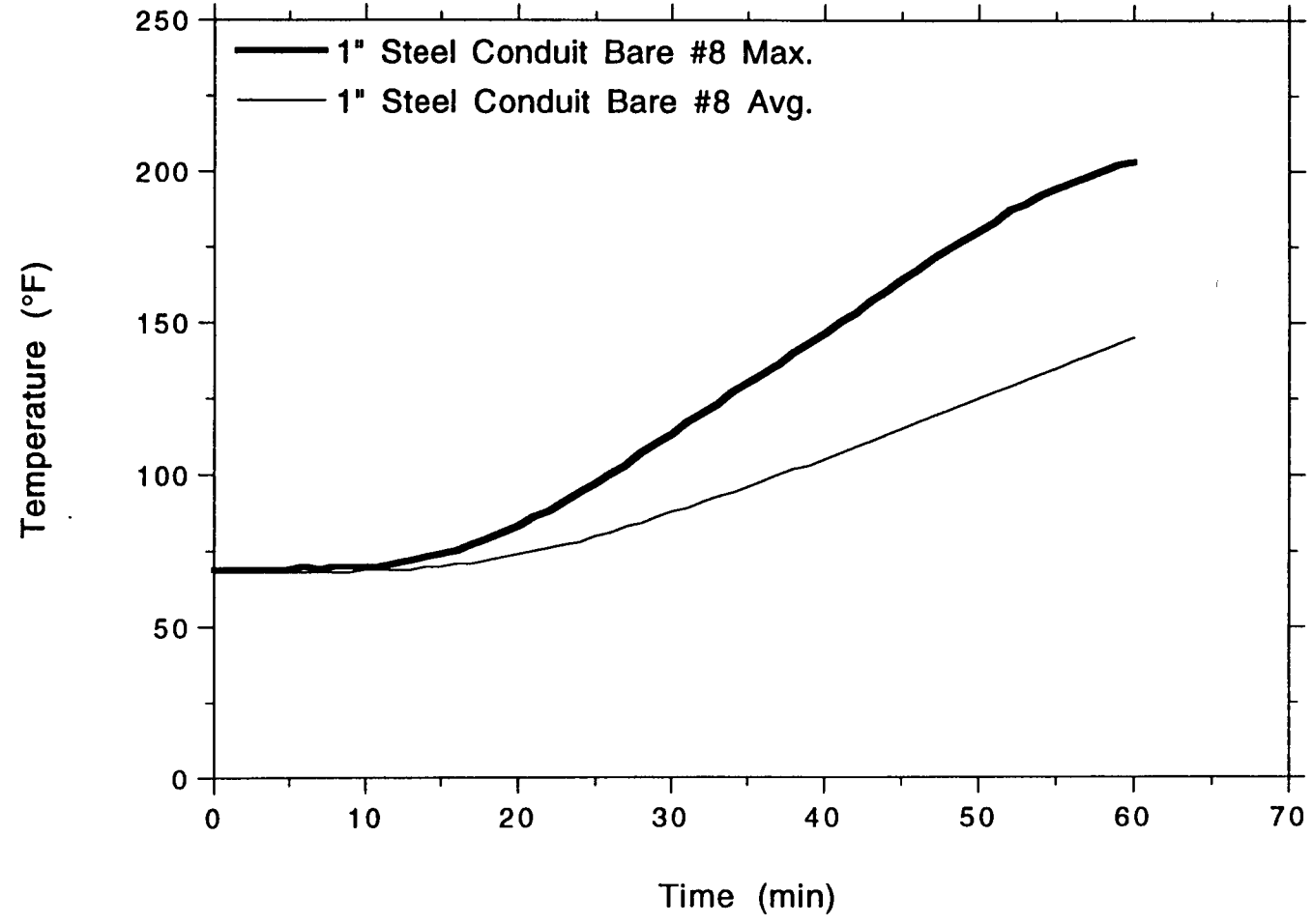
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Al. Conduit Group Unistrut Frame



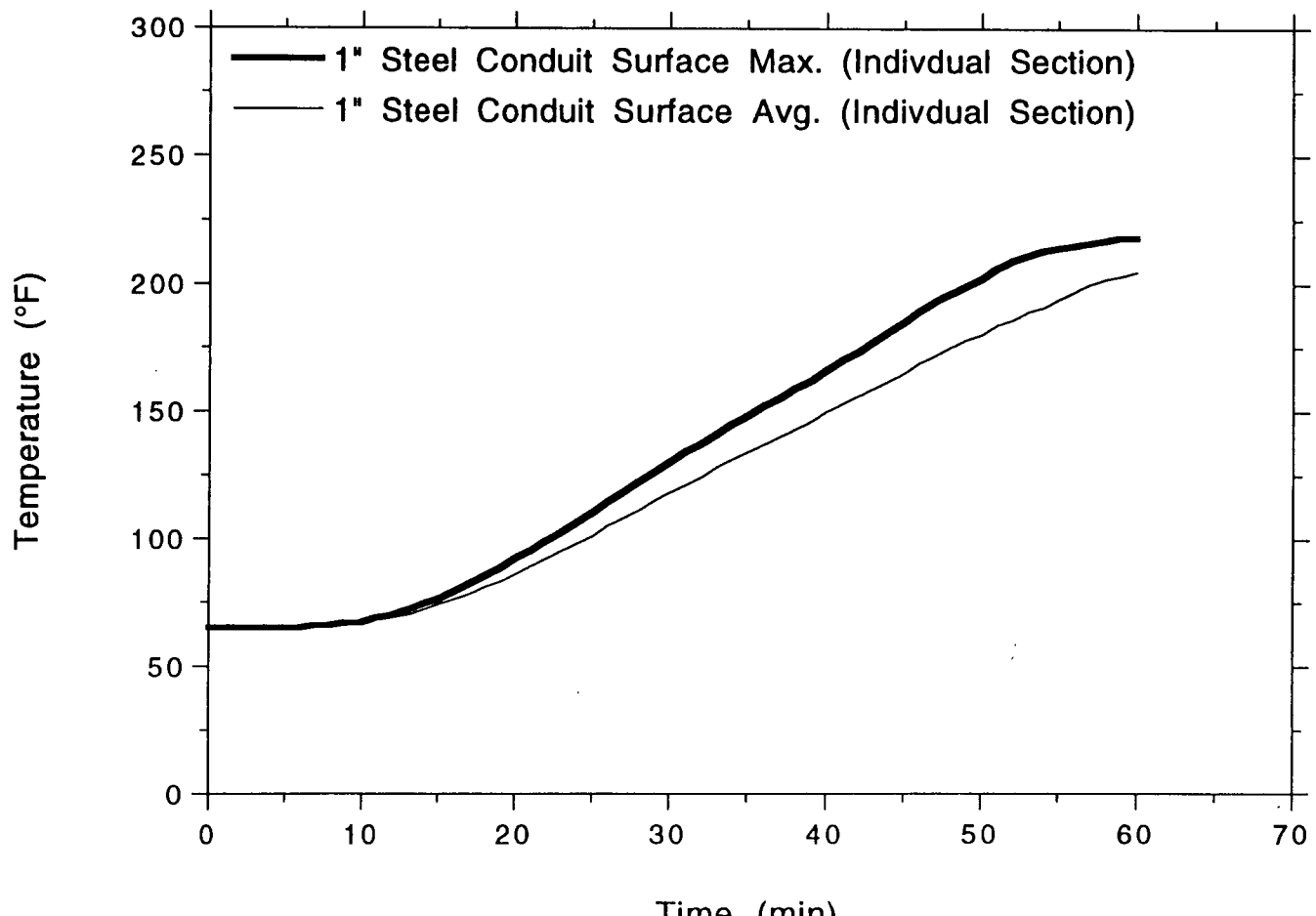
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



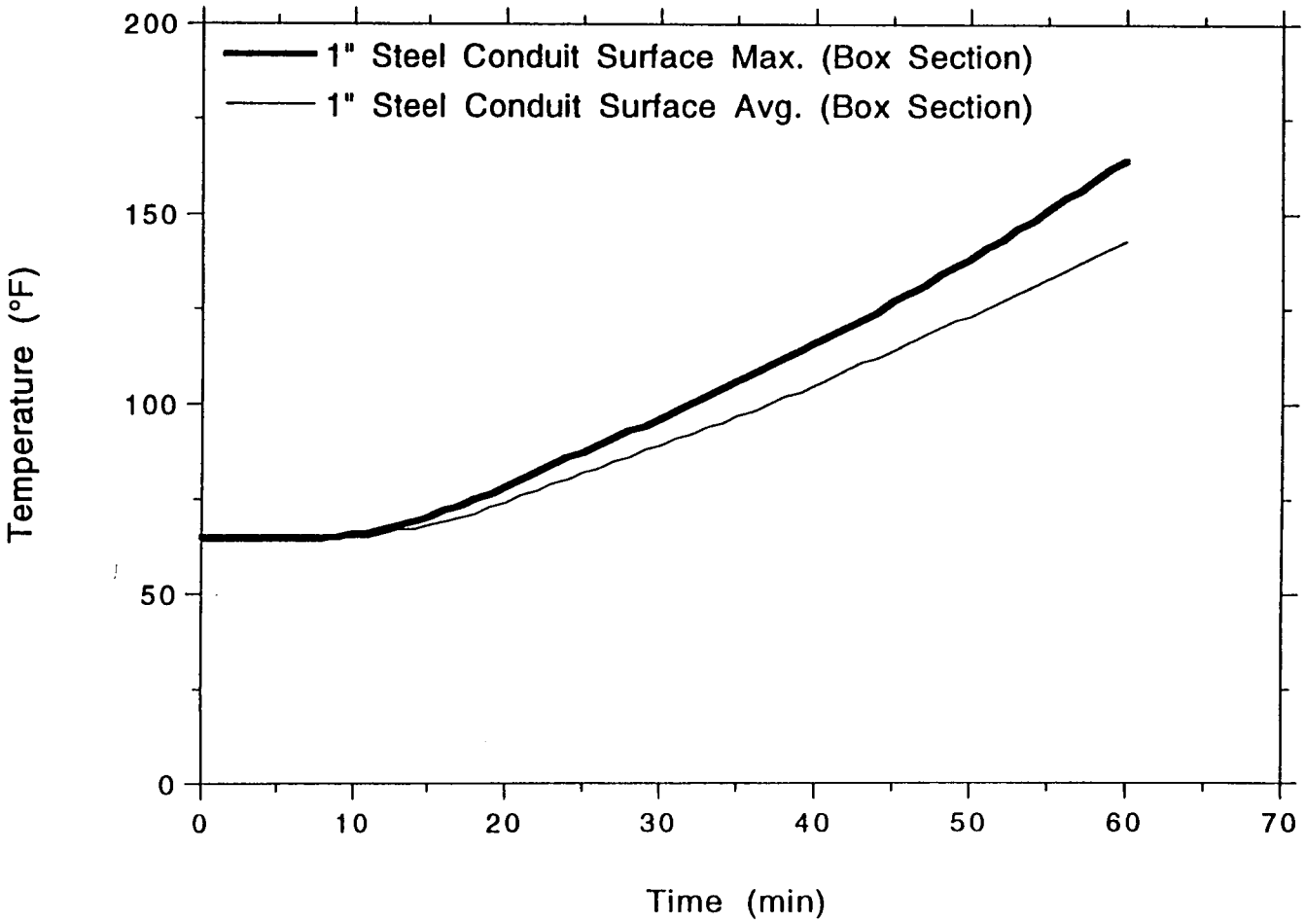
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



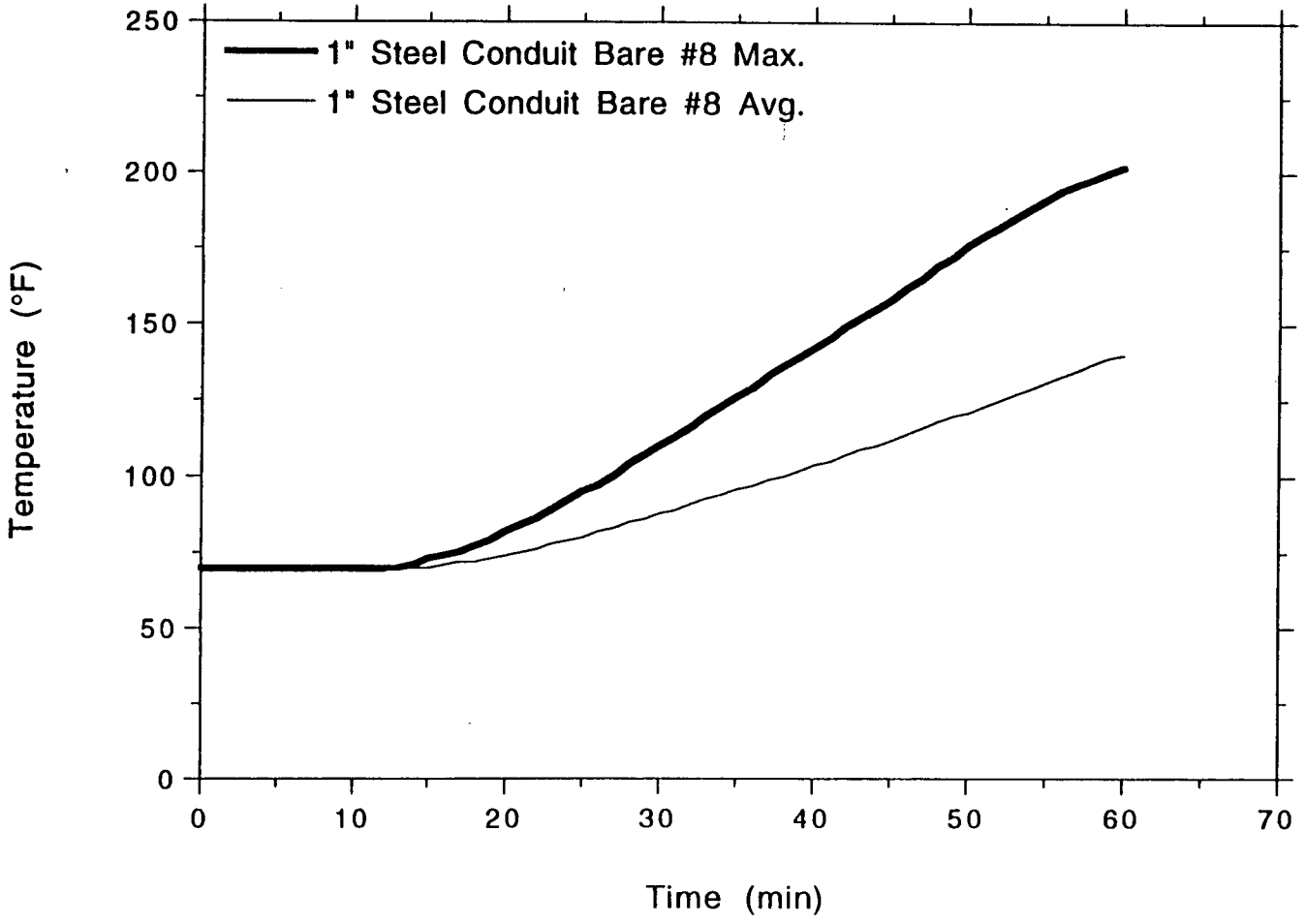
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



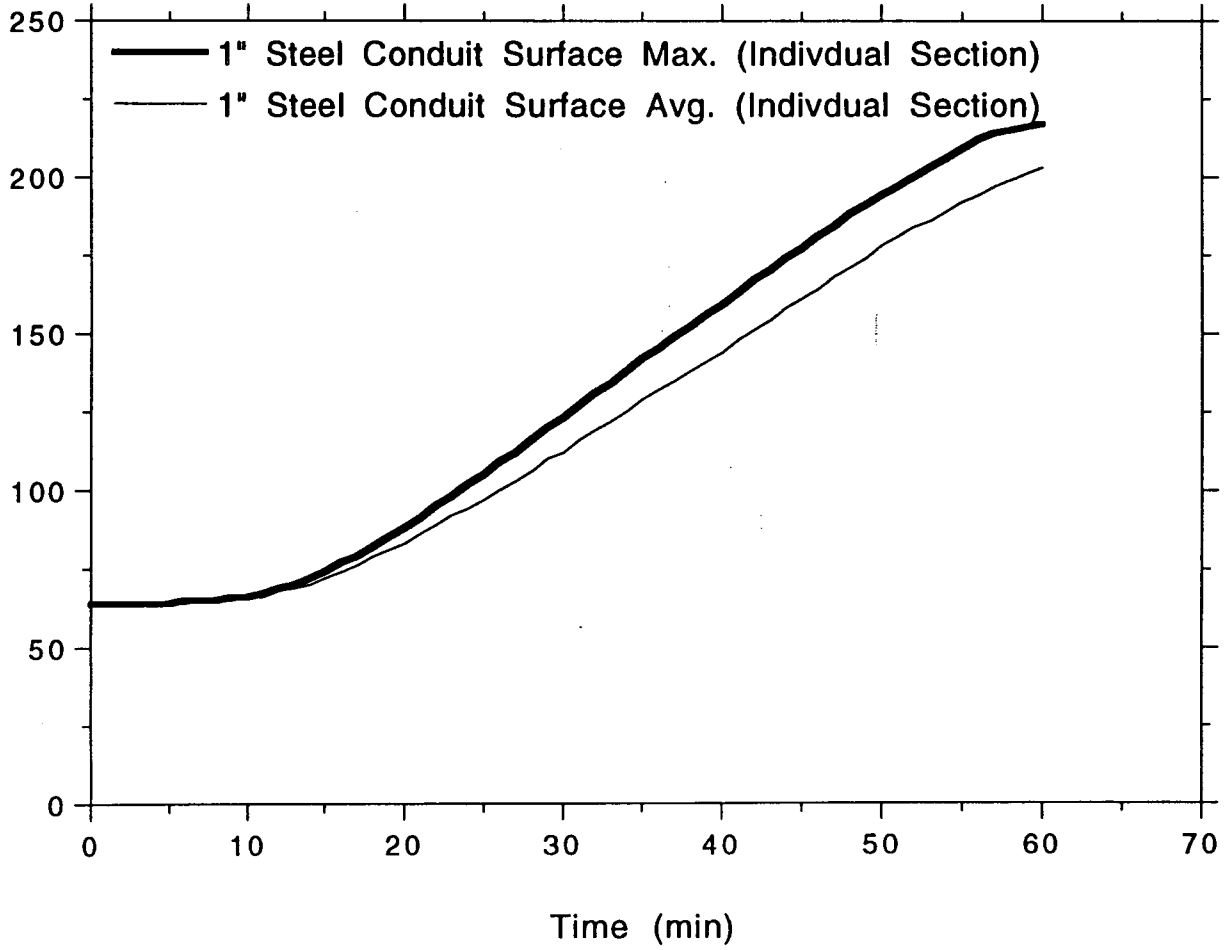
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



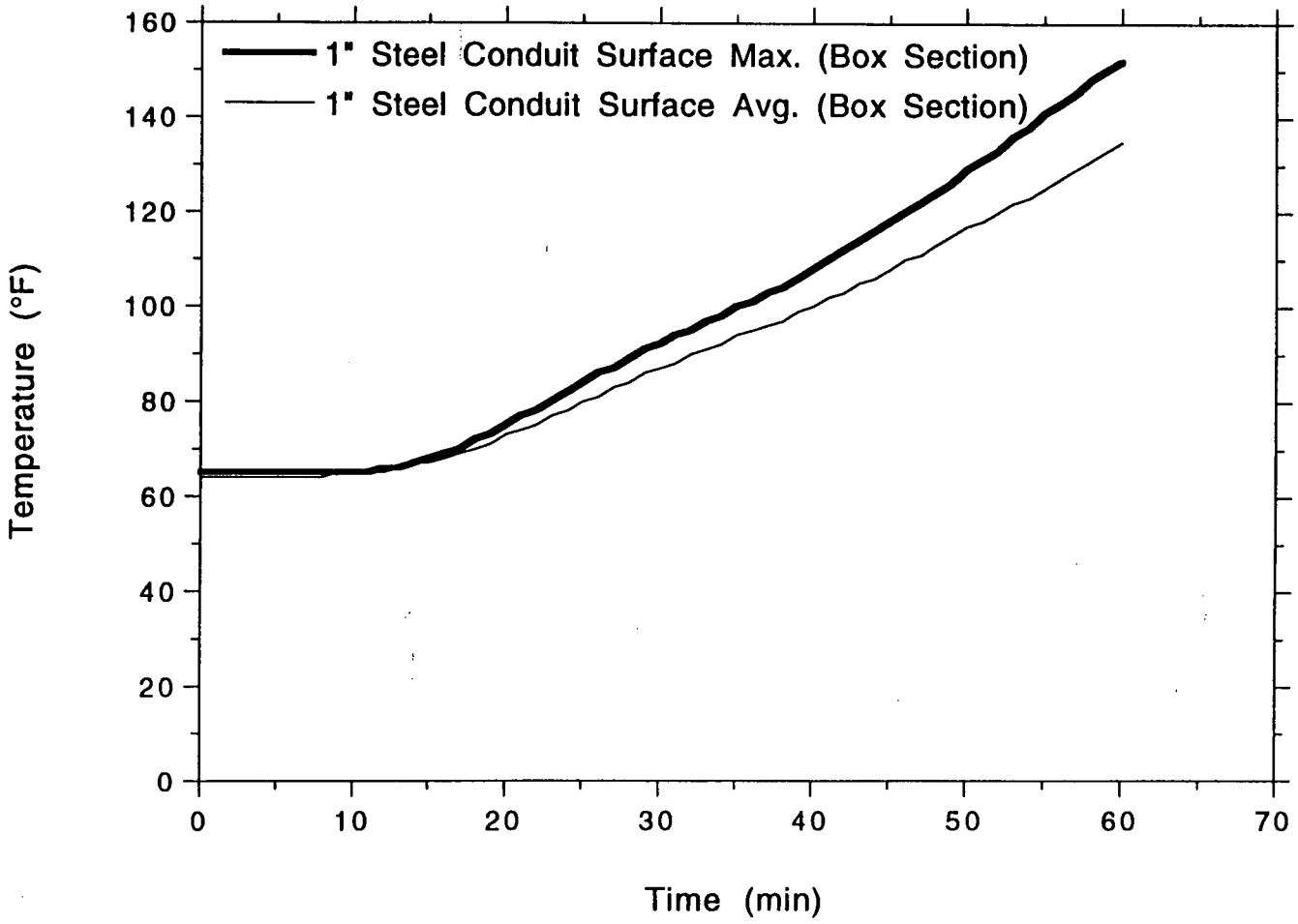
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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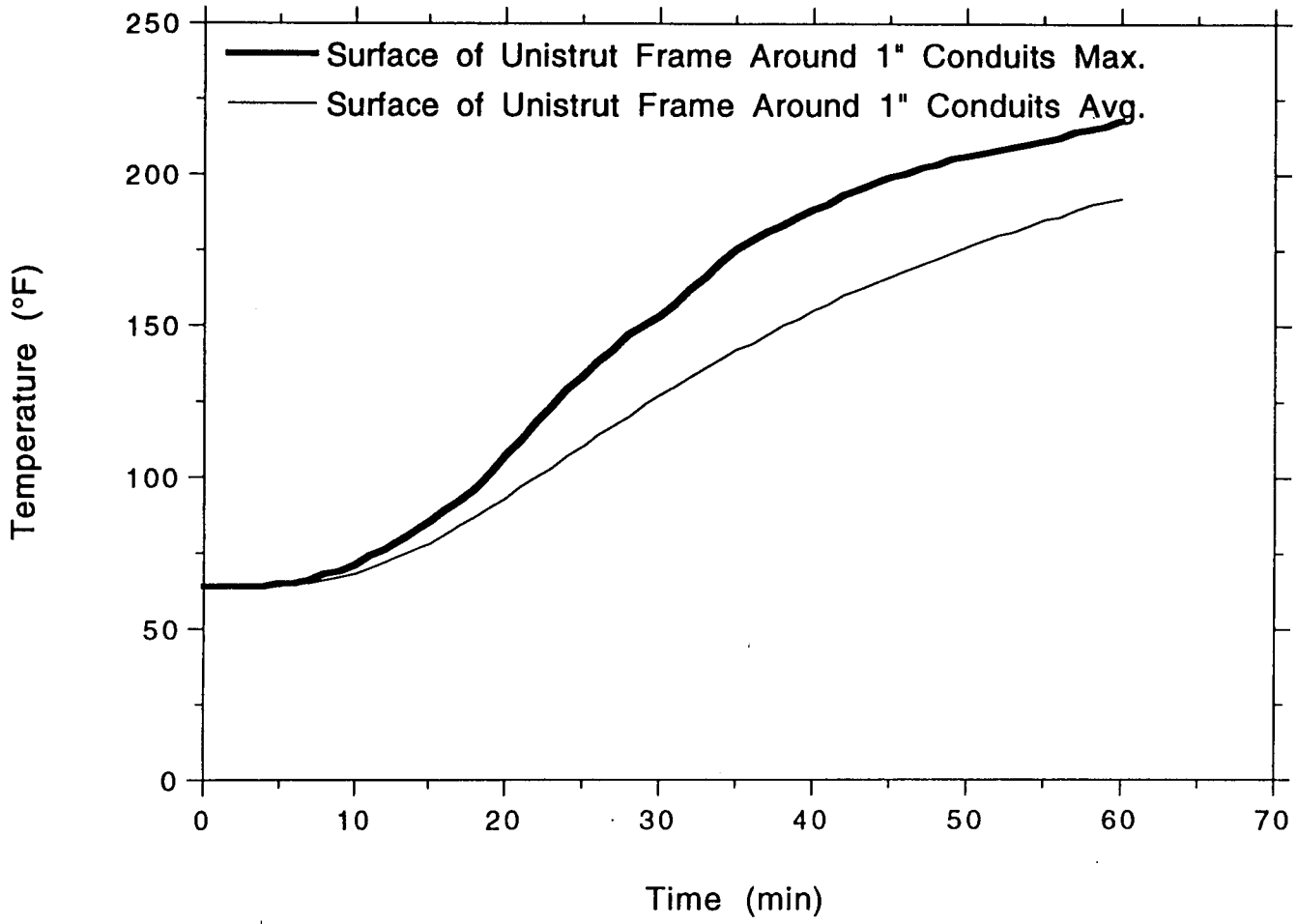
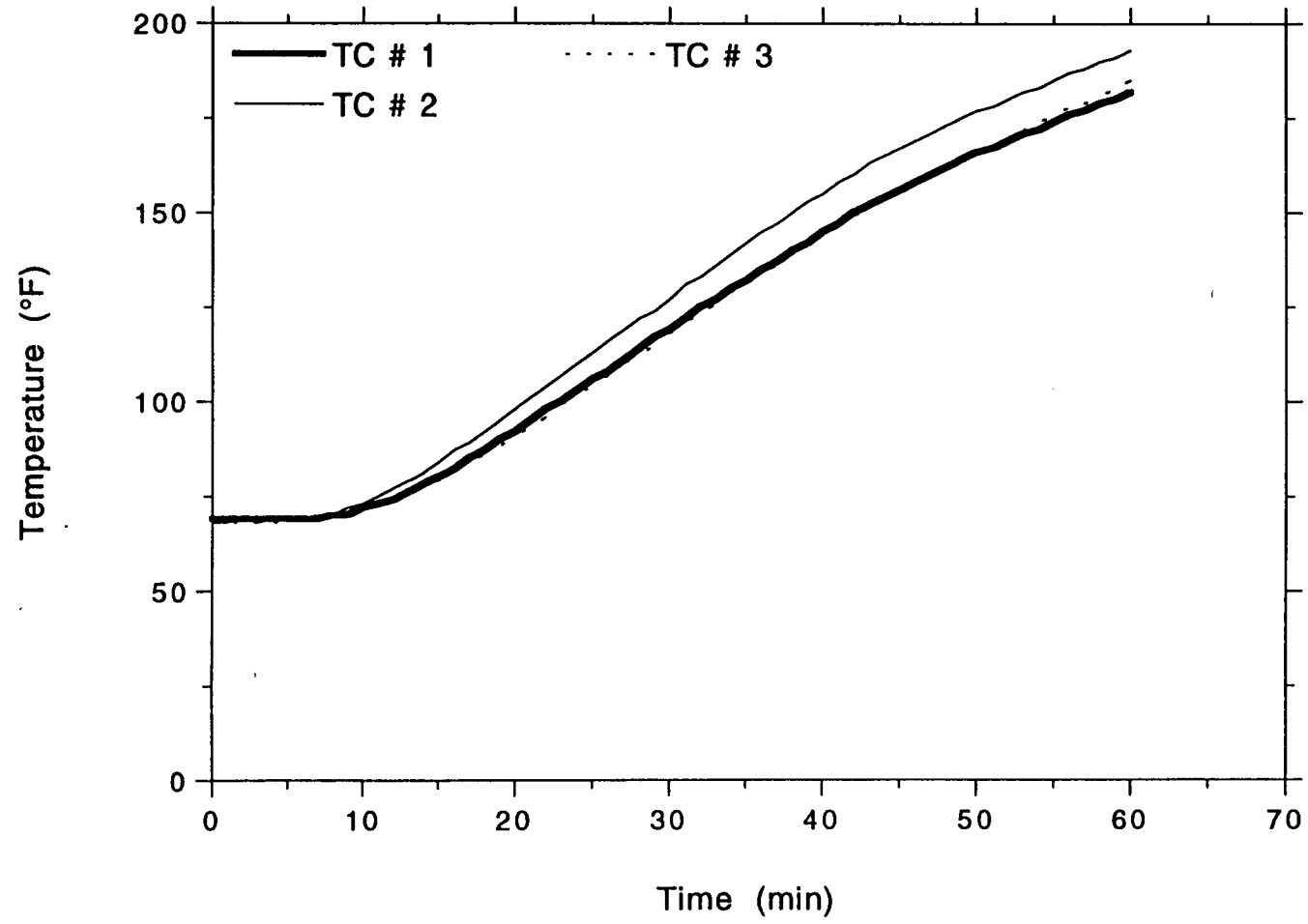
Steel Conduit Group Unistrut Frame



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
#8 in Lower Rear Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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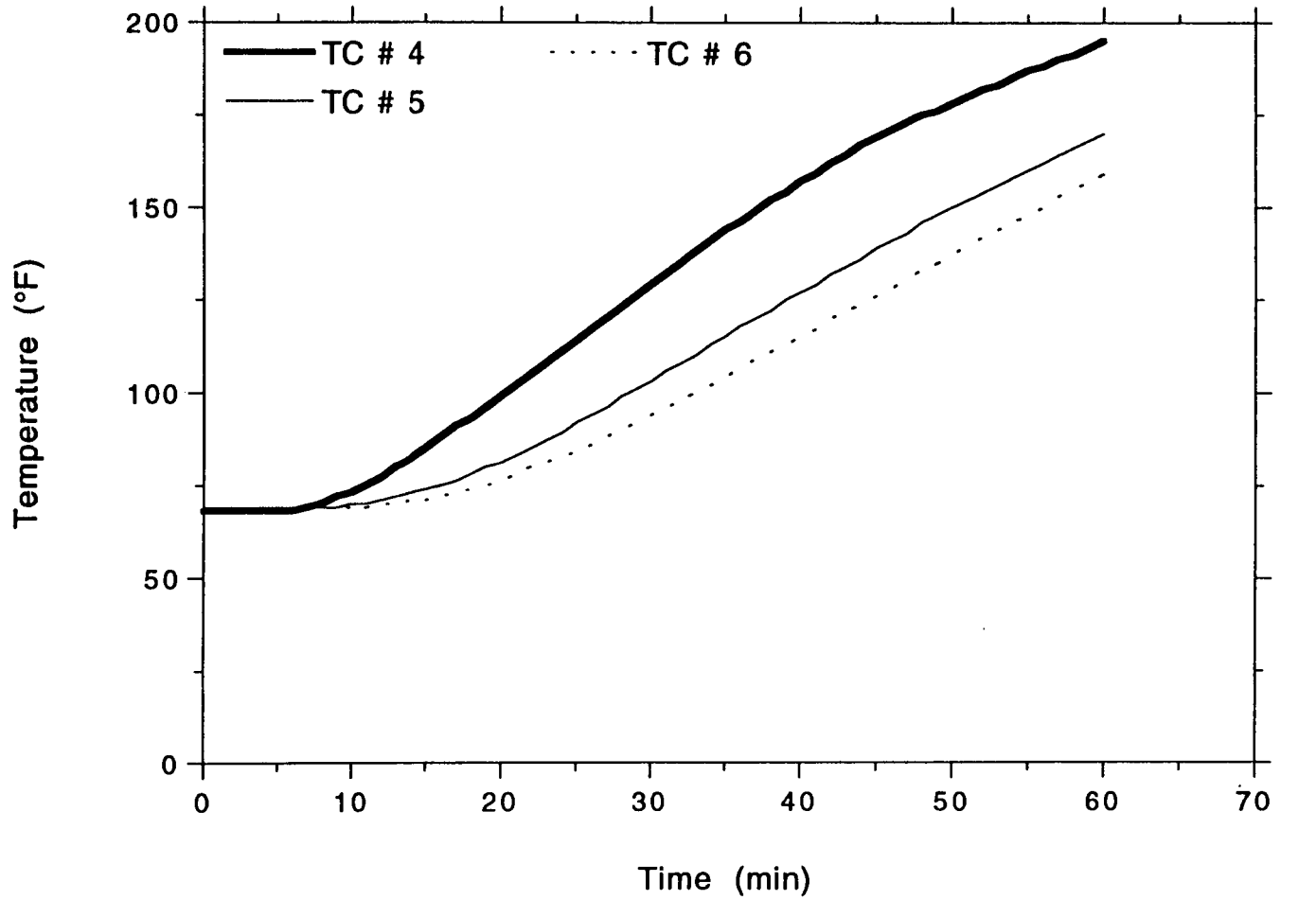

OMEGA POINT LABORATORIES

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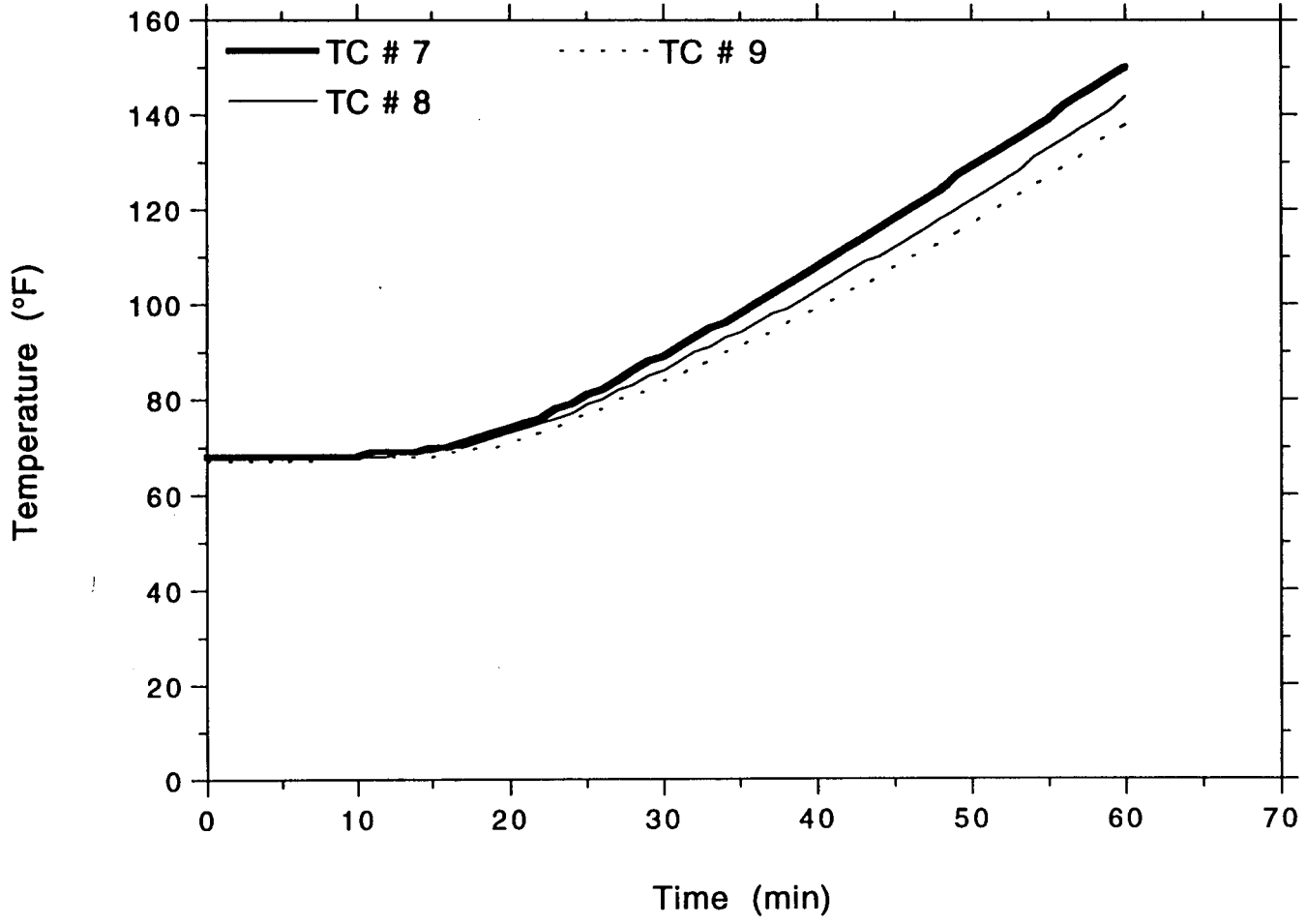

OMEGA POINT LABORATORIES

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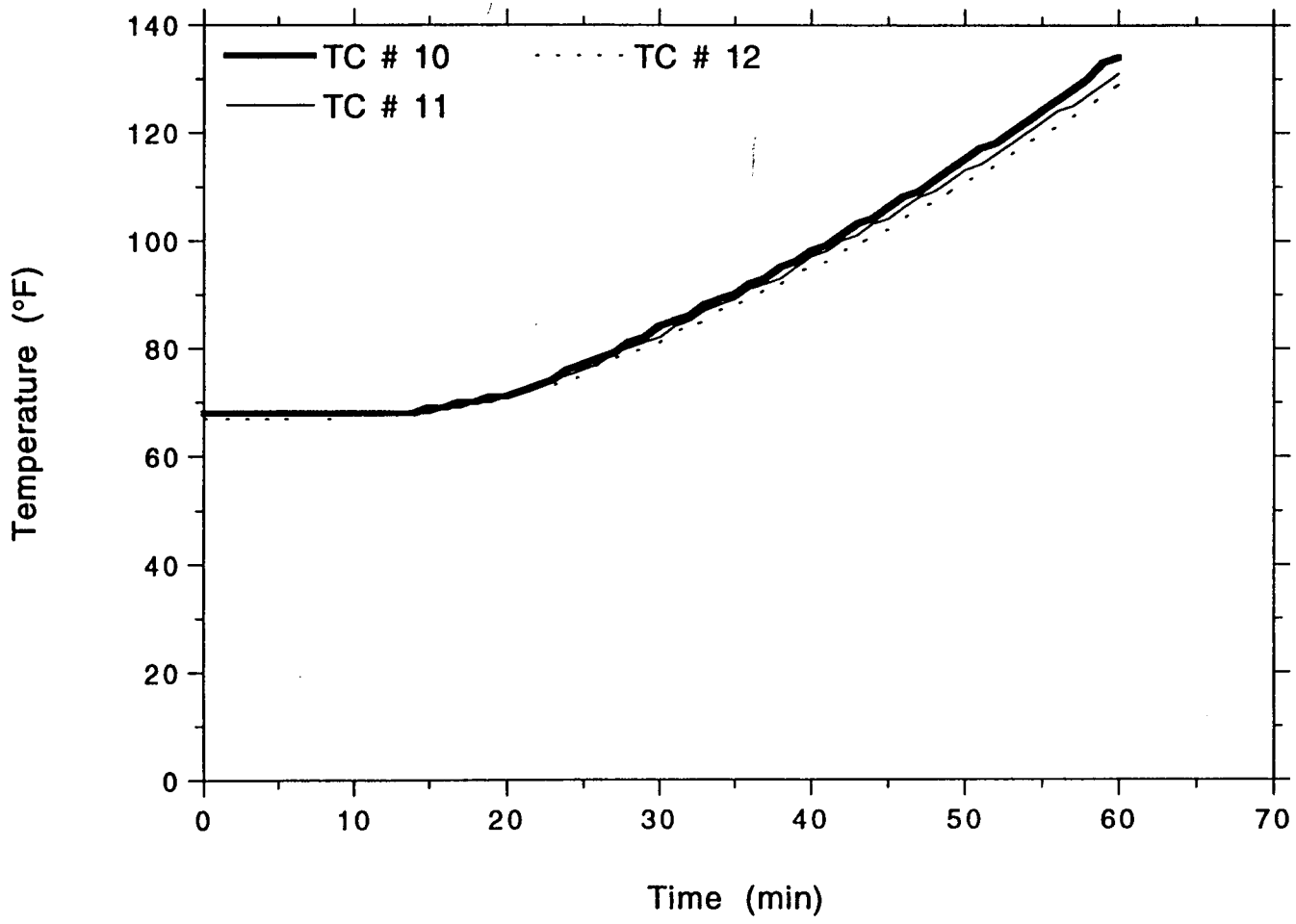

OMEGA POINT LABORATORIES

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Project No. 11960-97257
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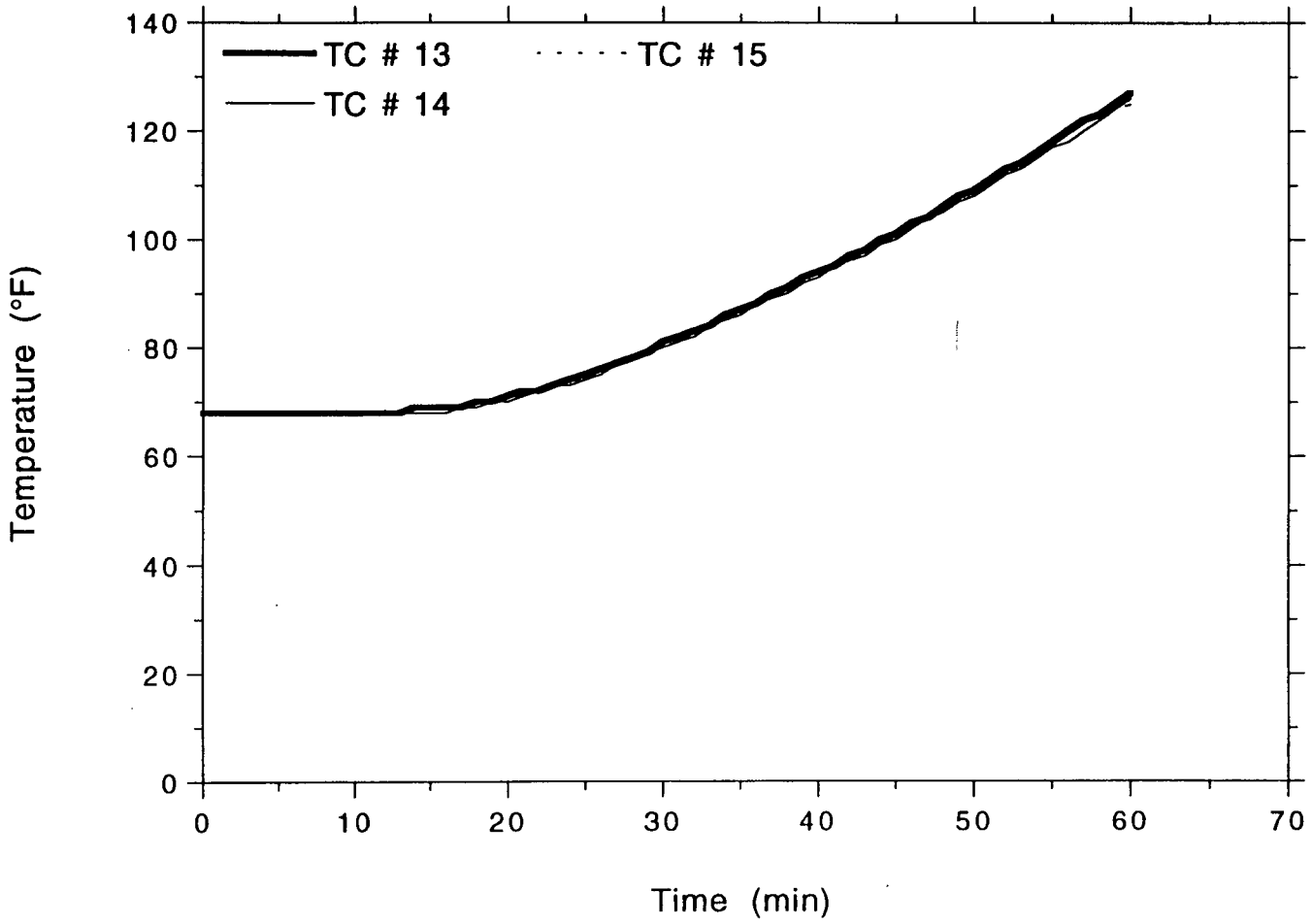

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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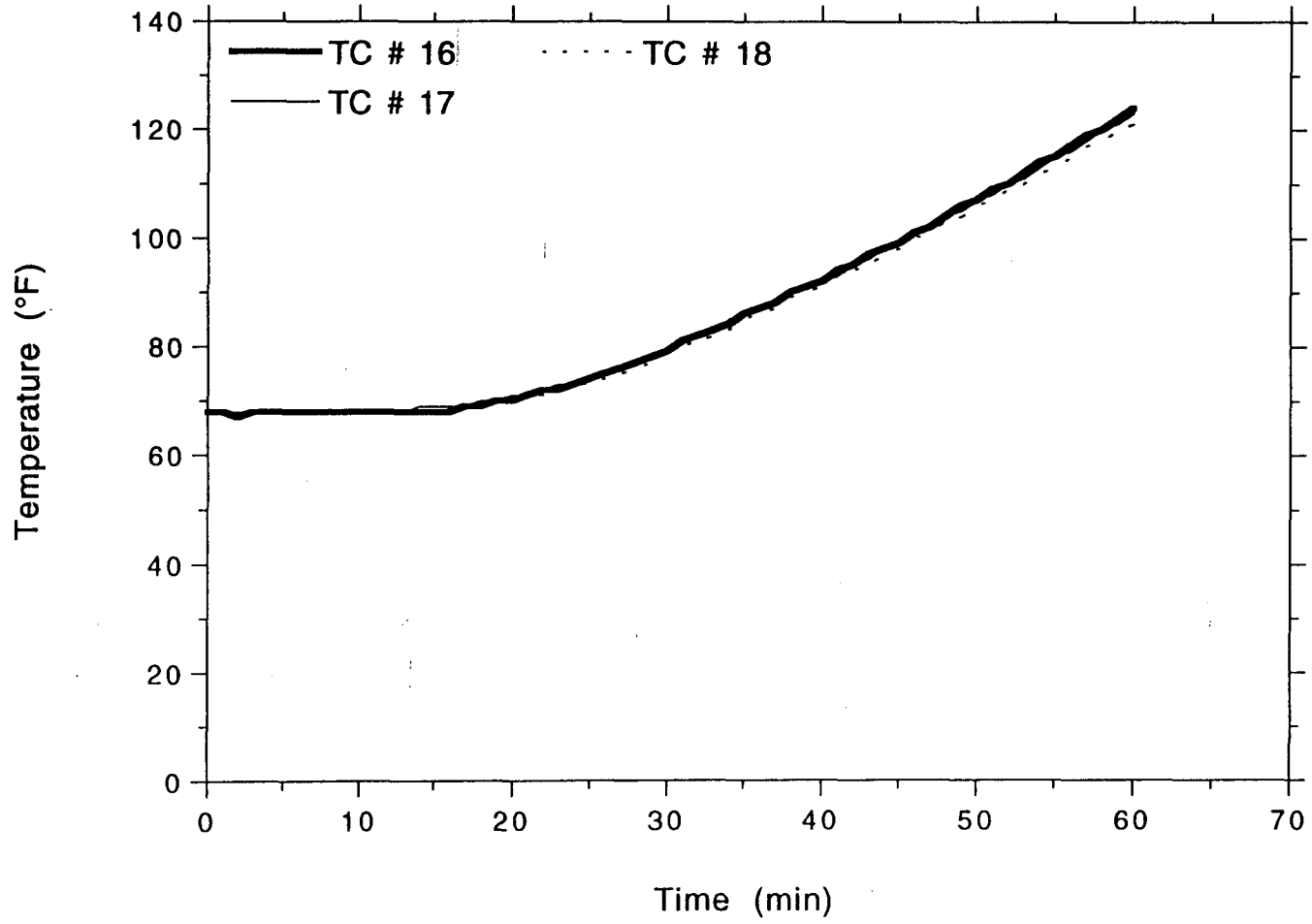

OMEGA POINT LABORATORIES

TSI/TVA
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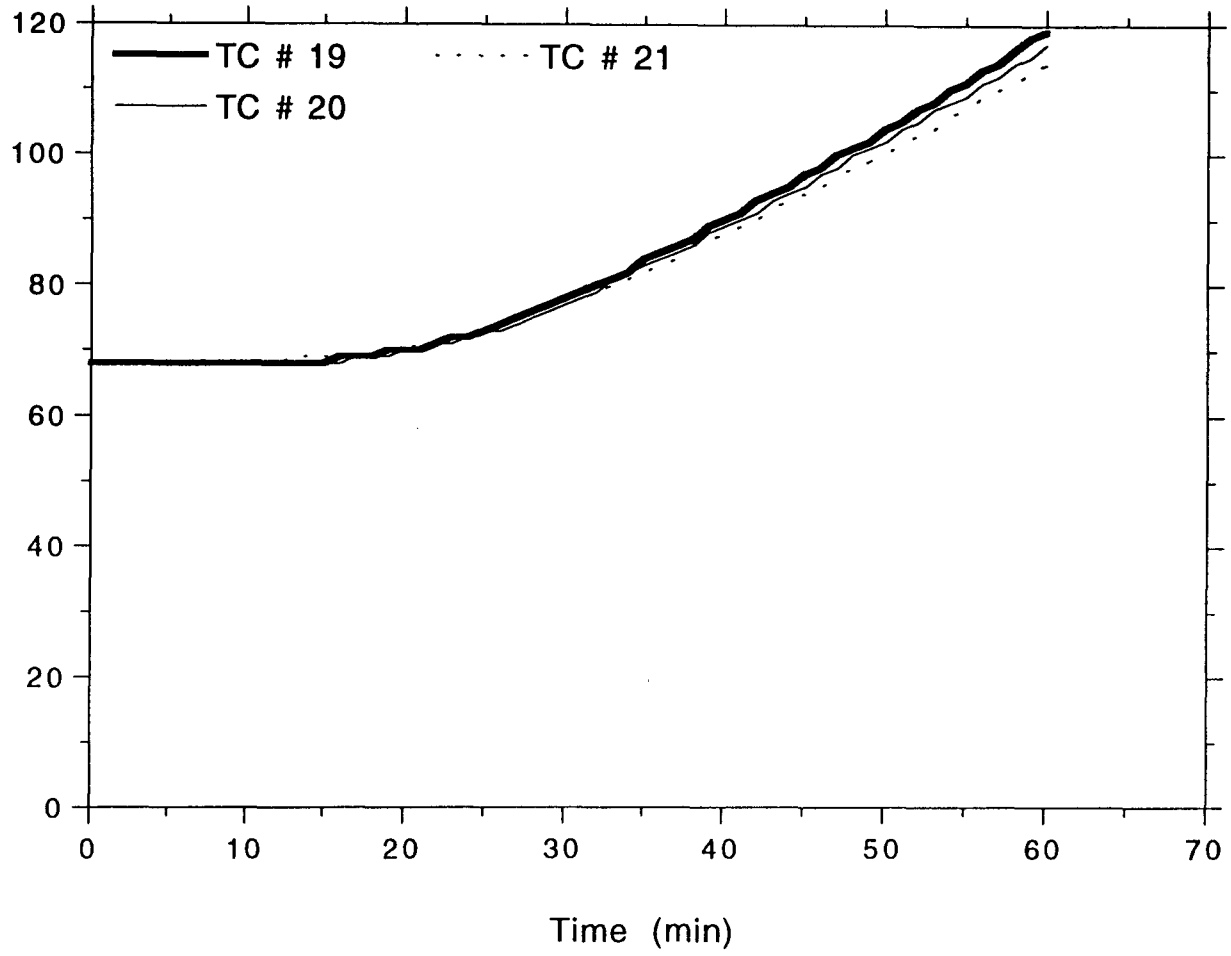

OMEGA POINT LABORATORIES

TSI/TVA
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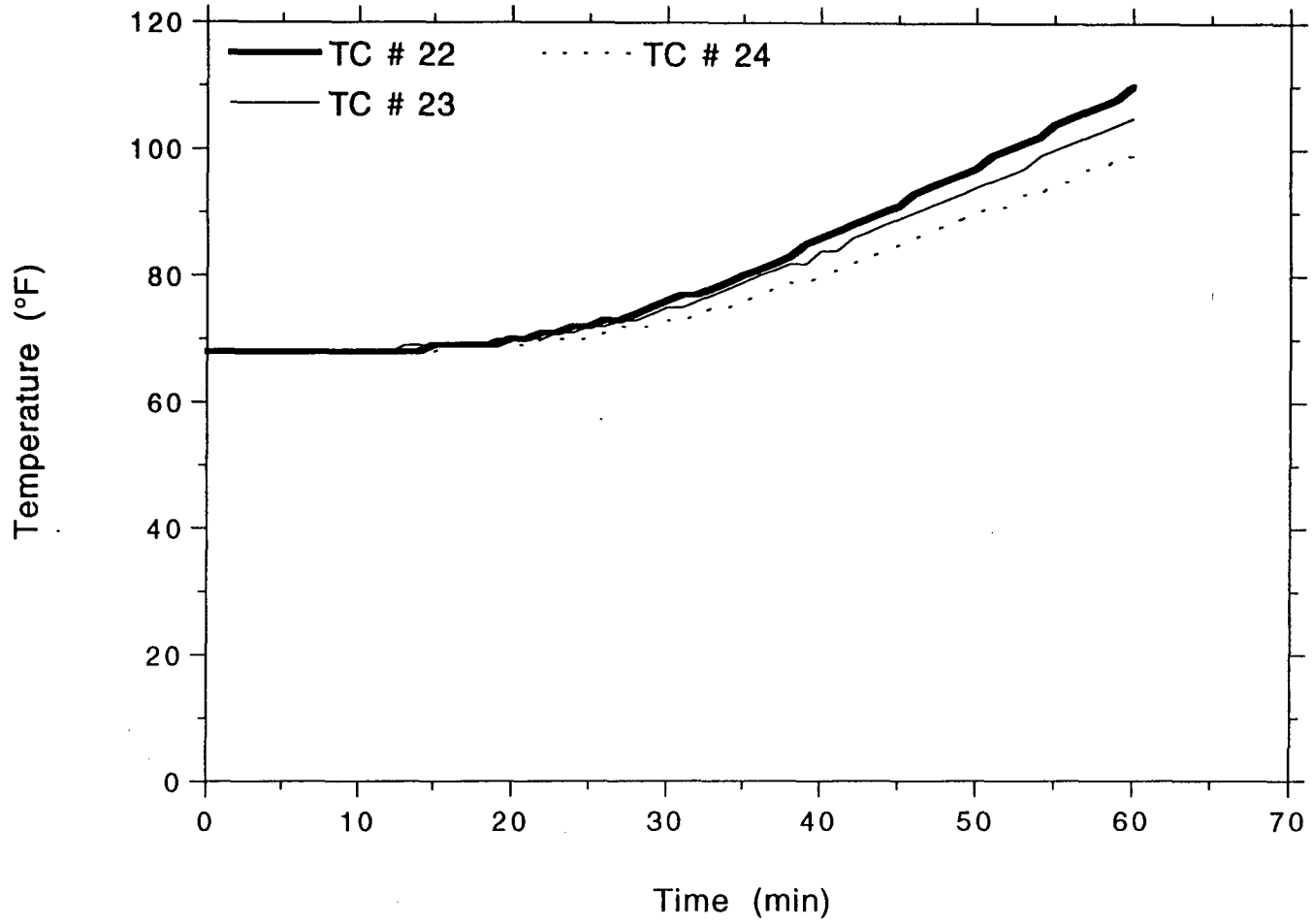

OMEGA POINT LABORATORIES

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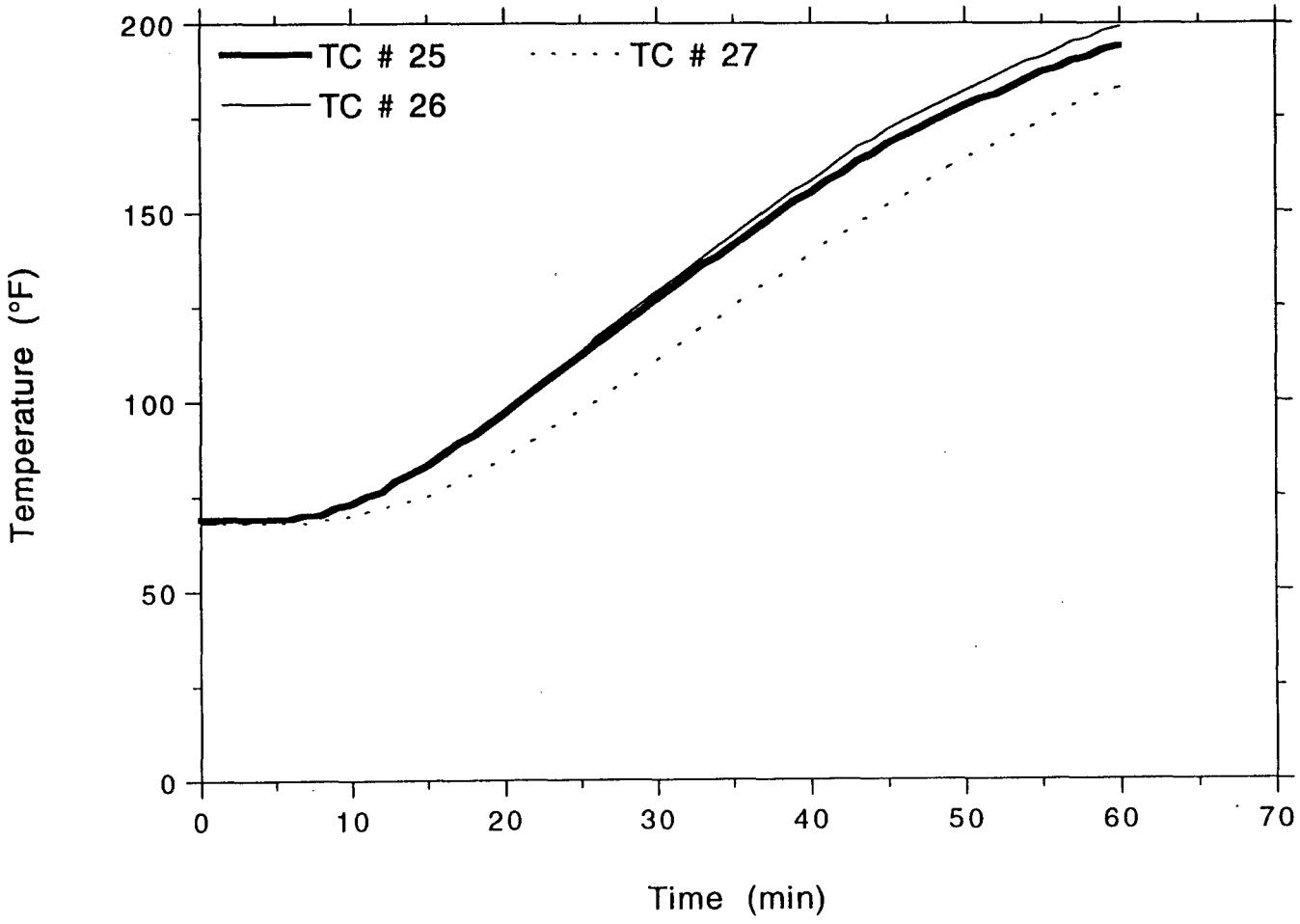

OMEGA POINT LABORATORIES

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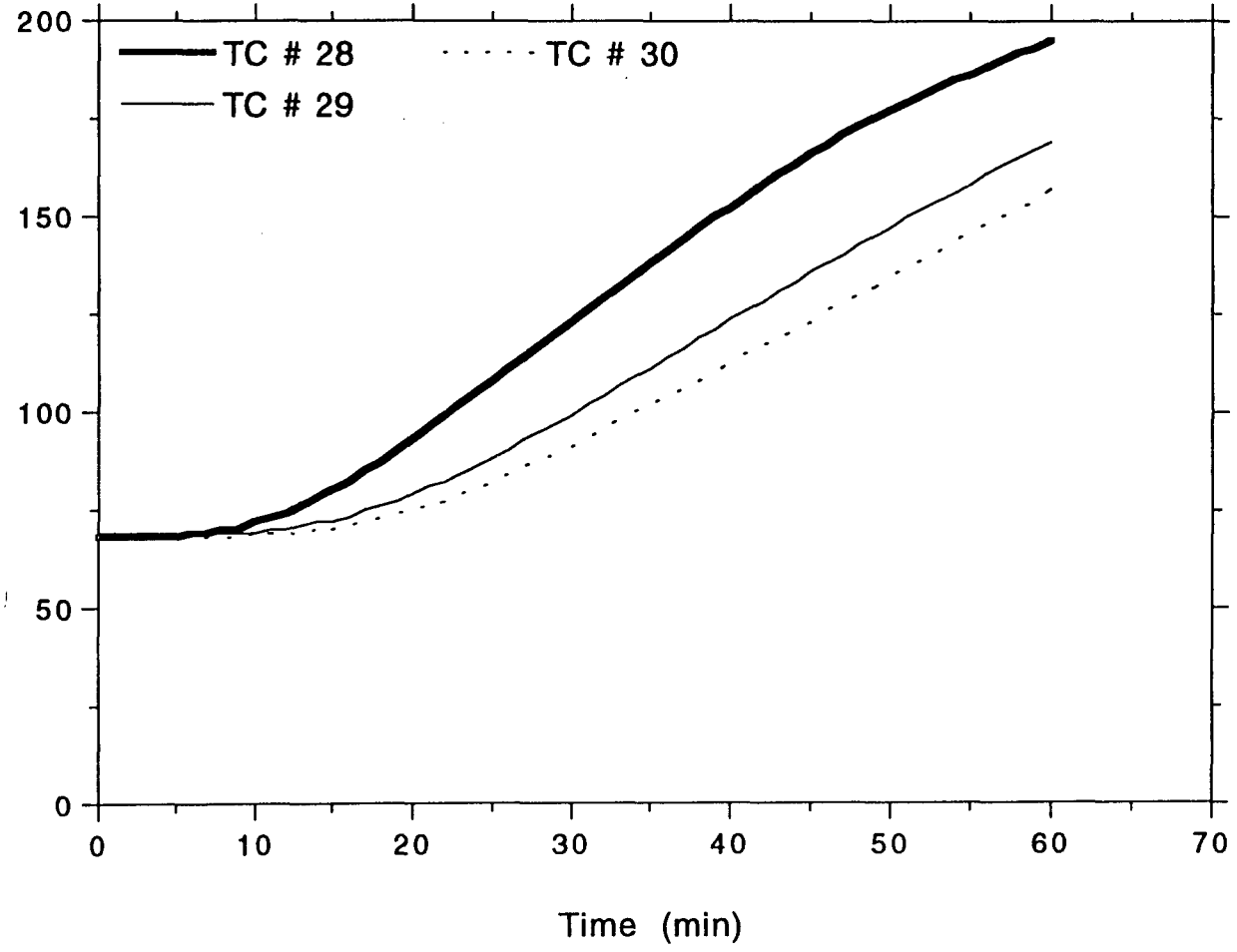

OMEGA POINT LABORATORIES

TSI/TVA
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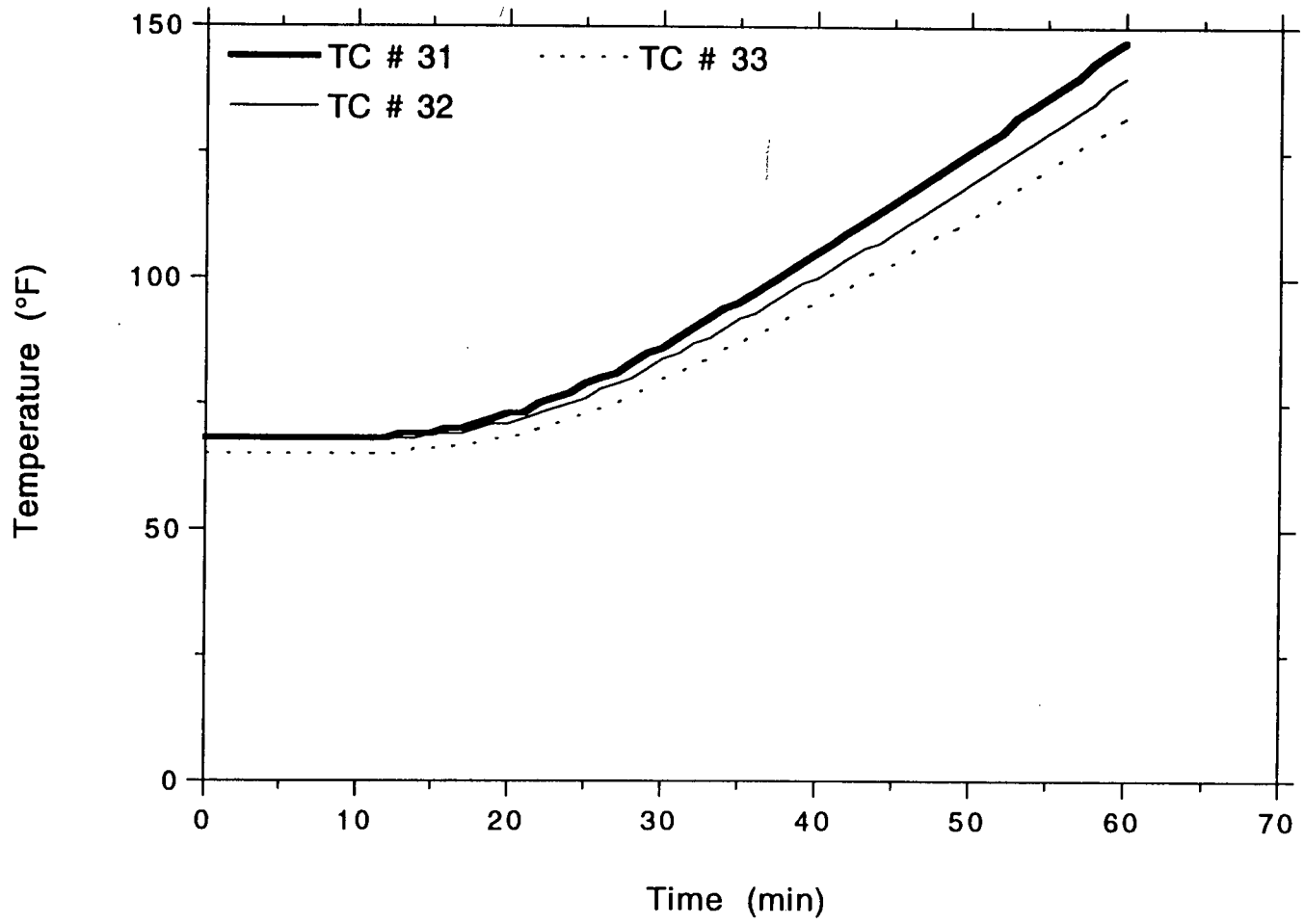

OMEGA POINT LABORATORIES

TSI/TVA
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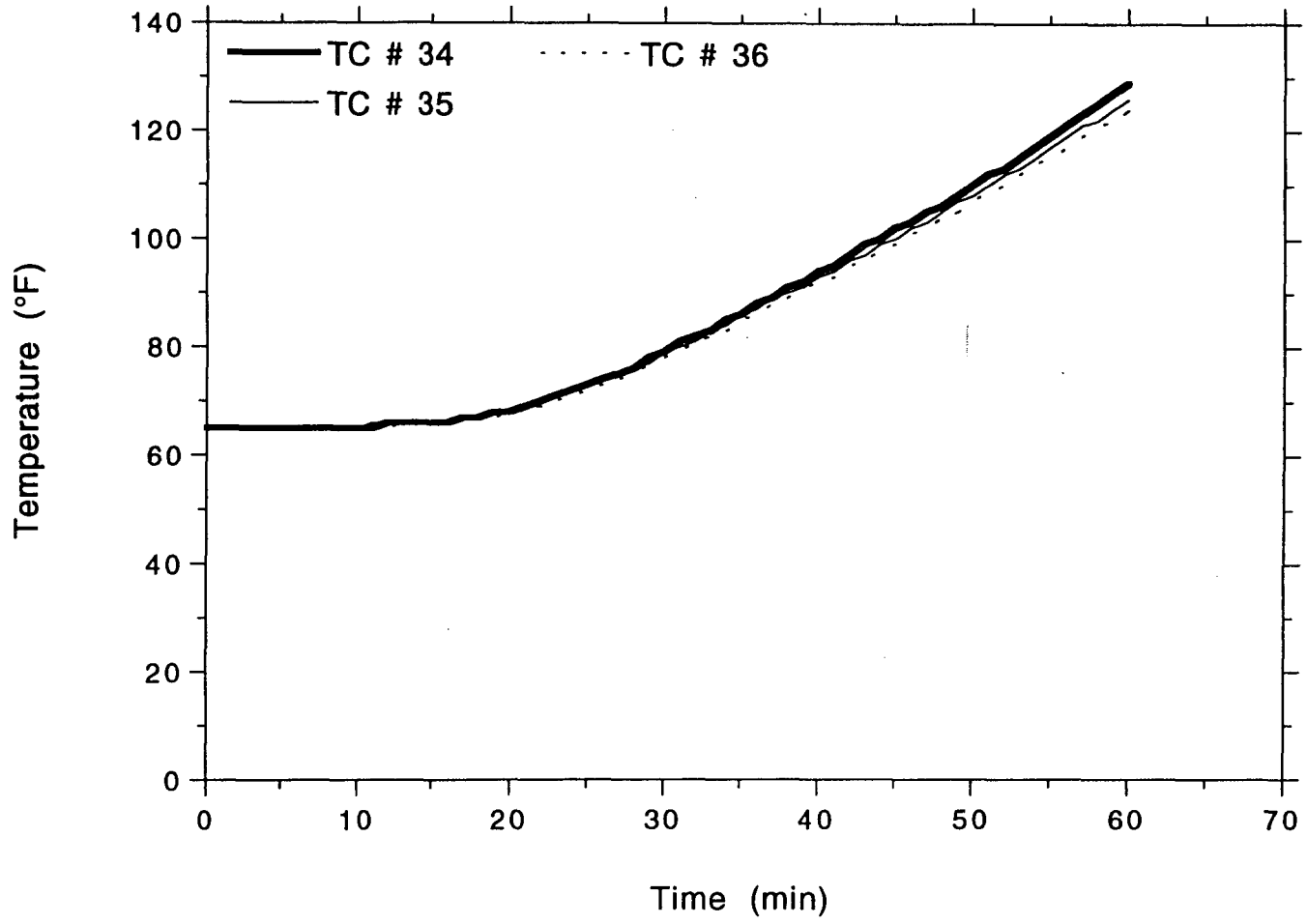

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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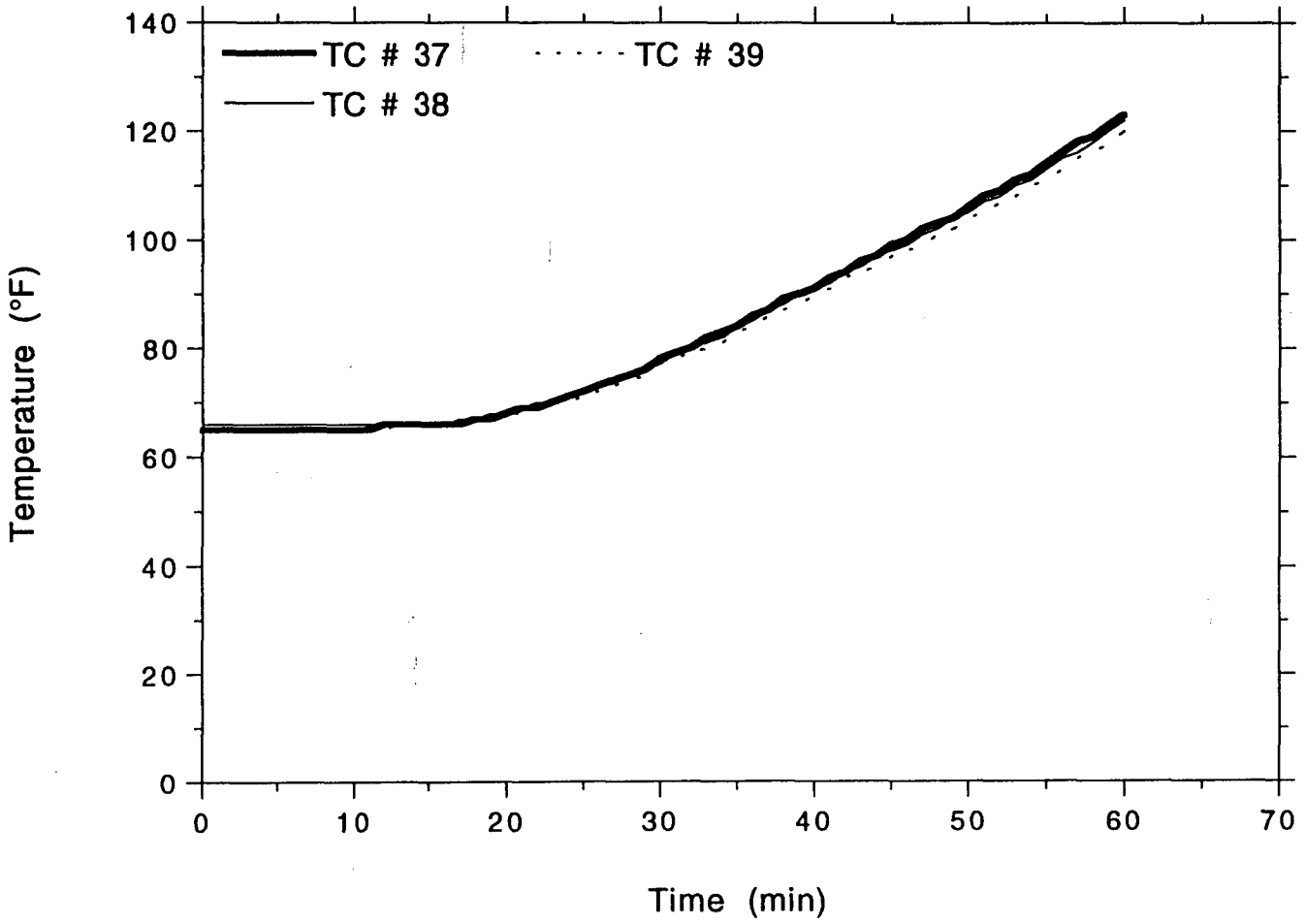

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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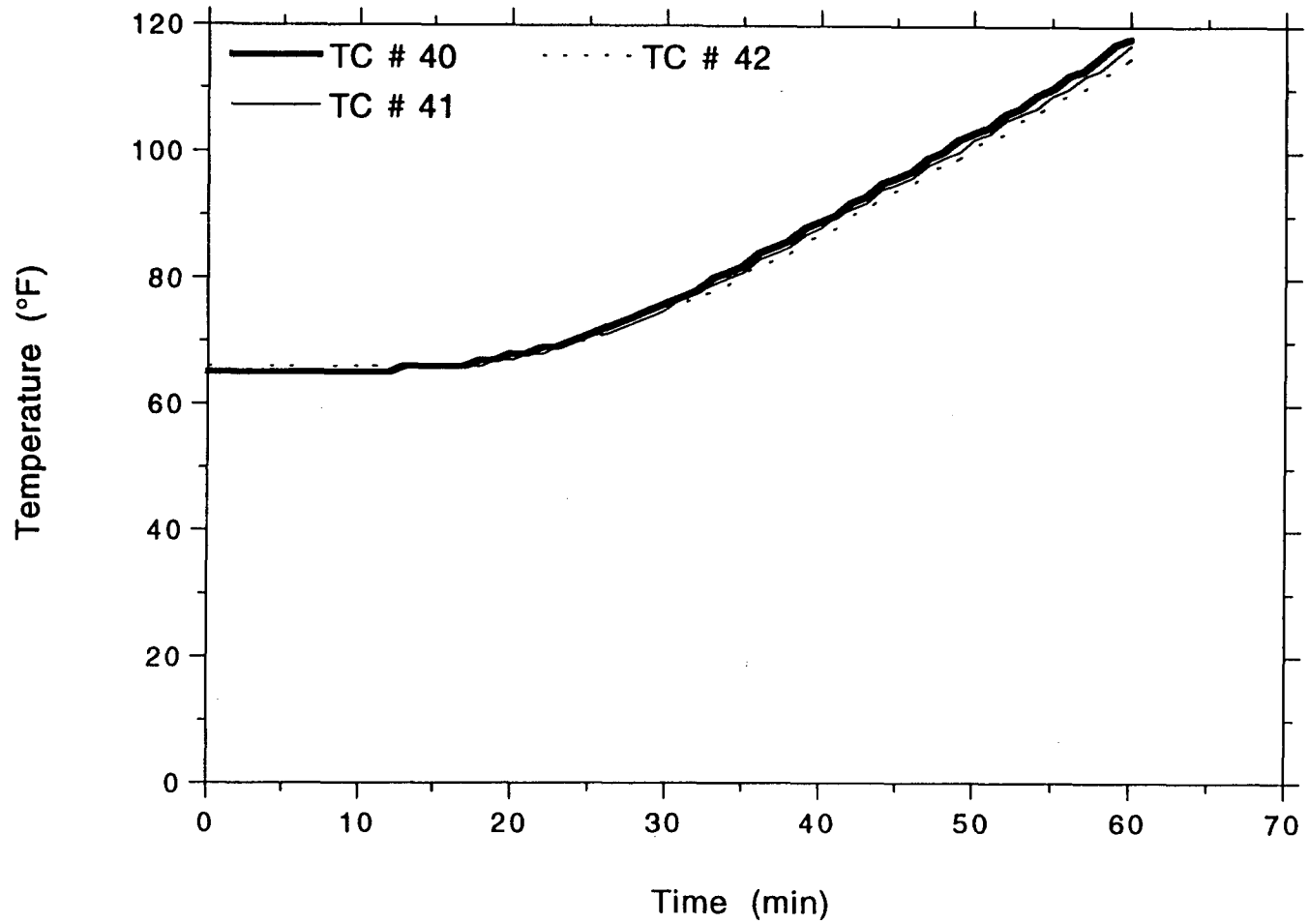

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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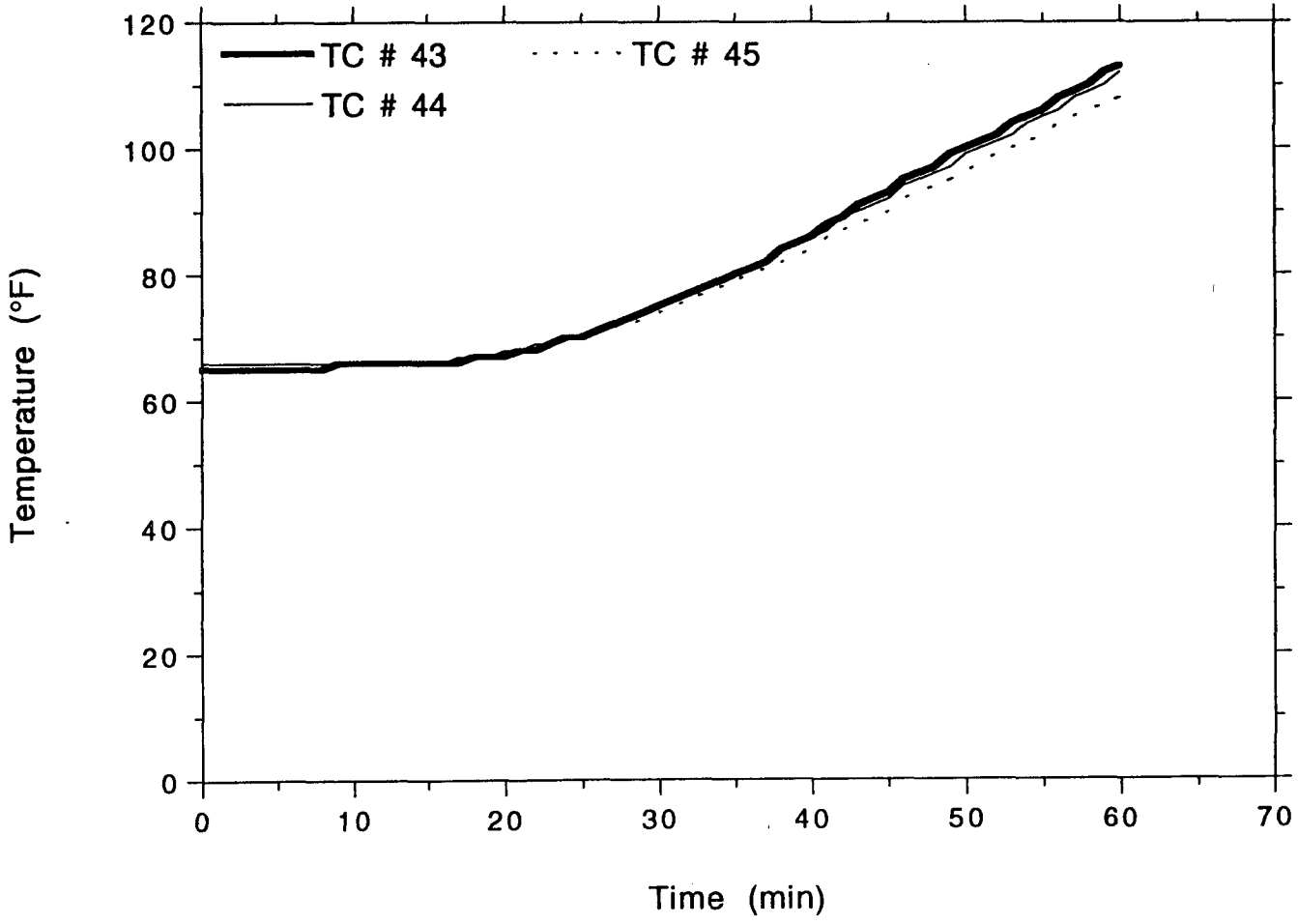

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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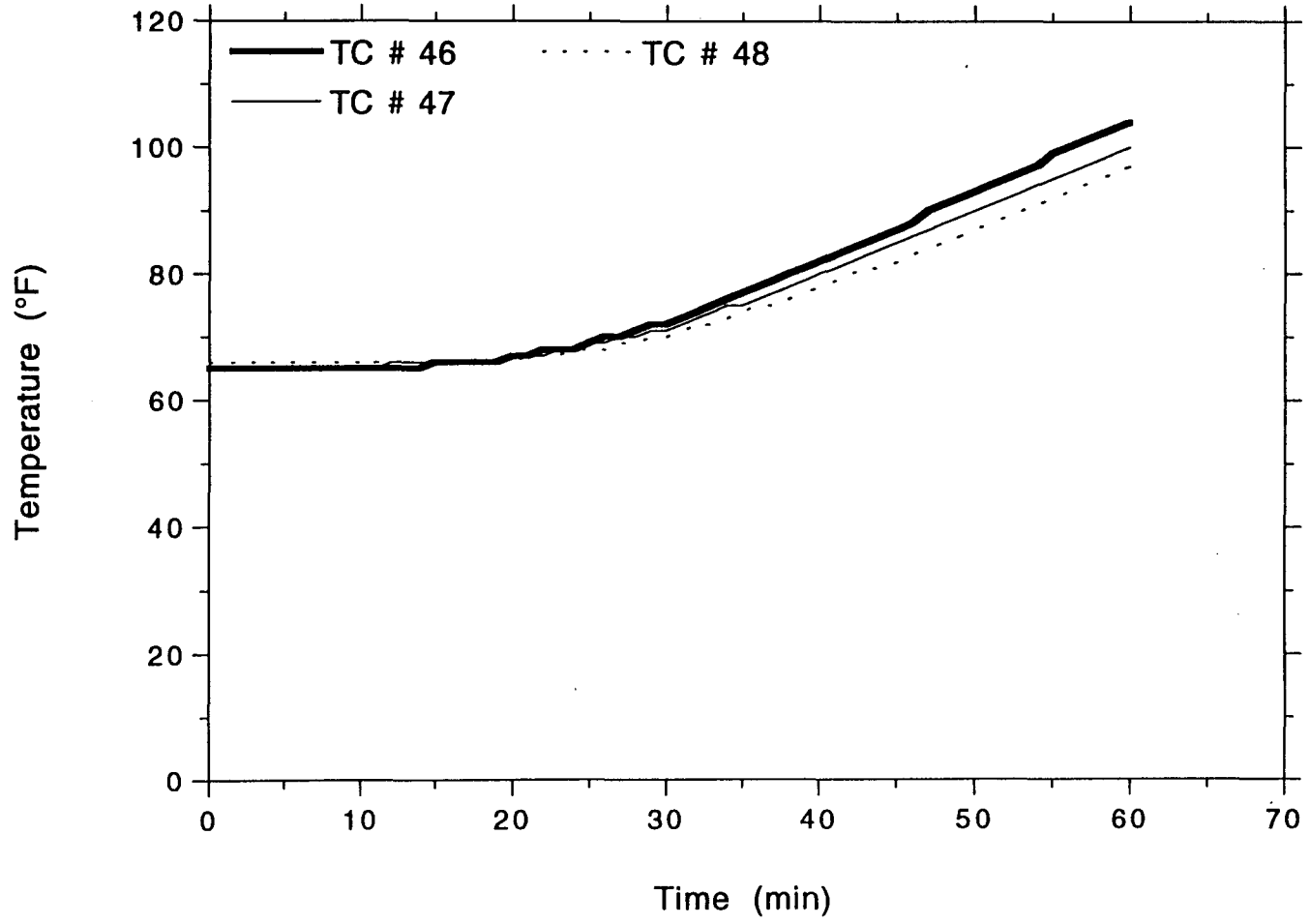

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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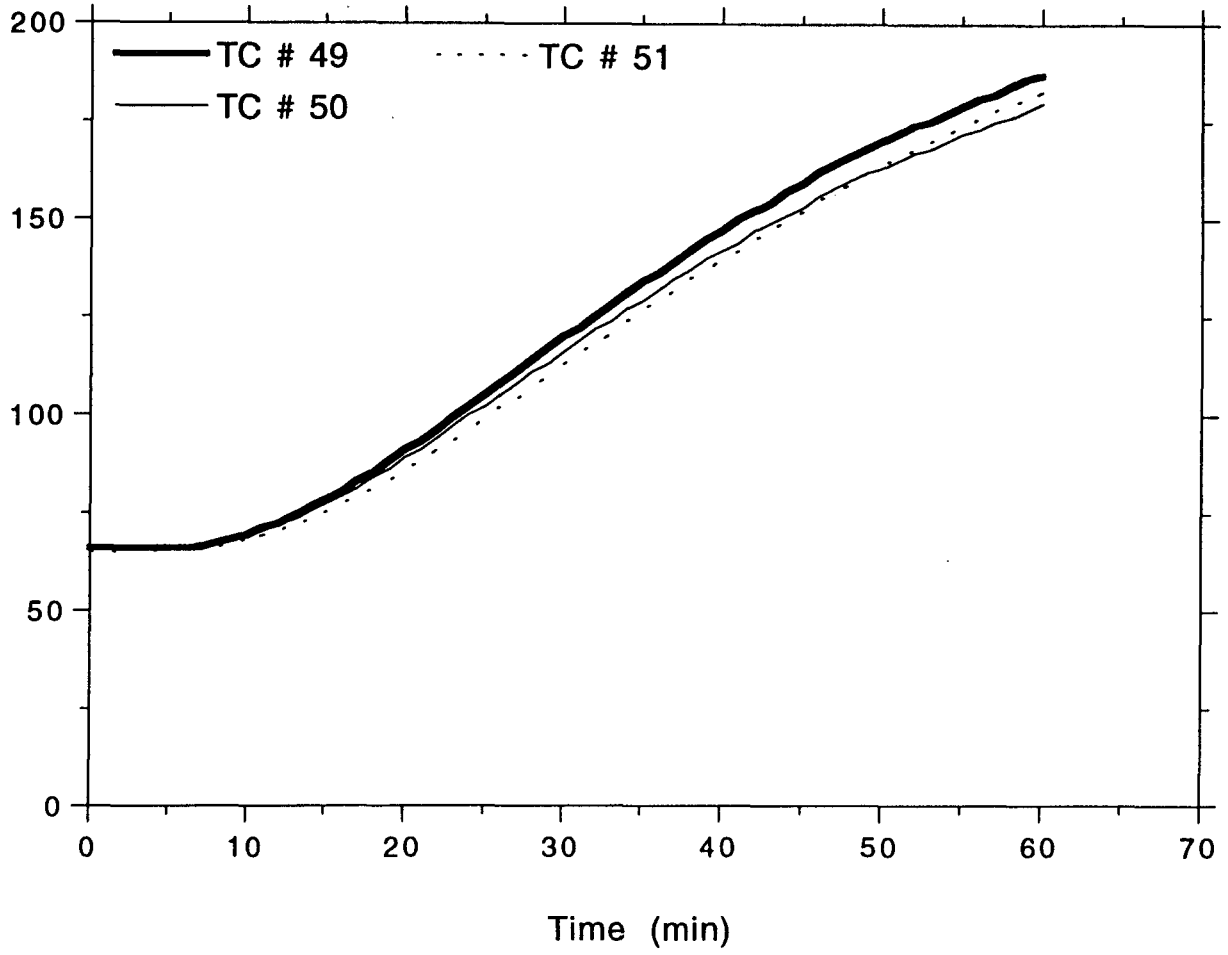

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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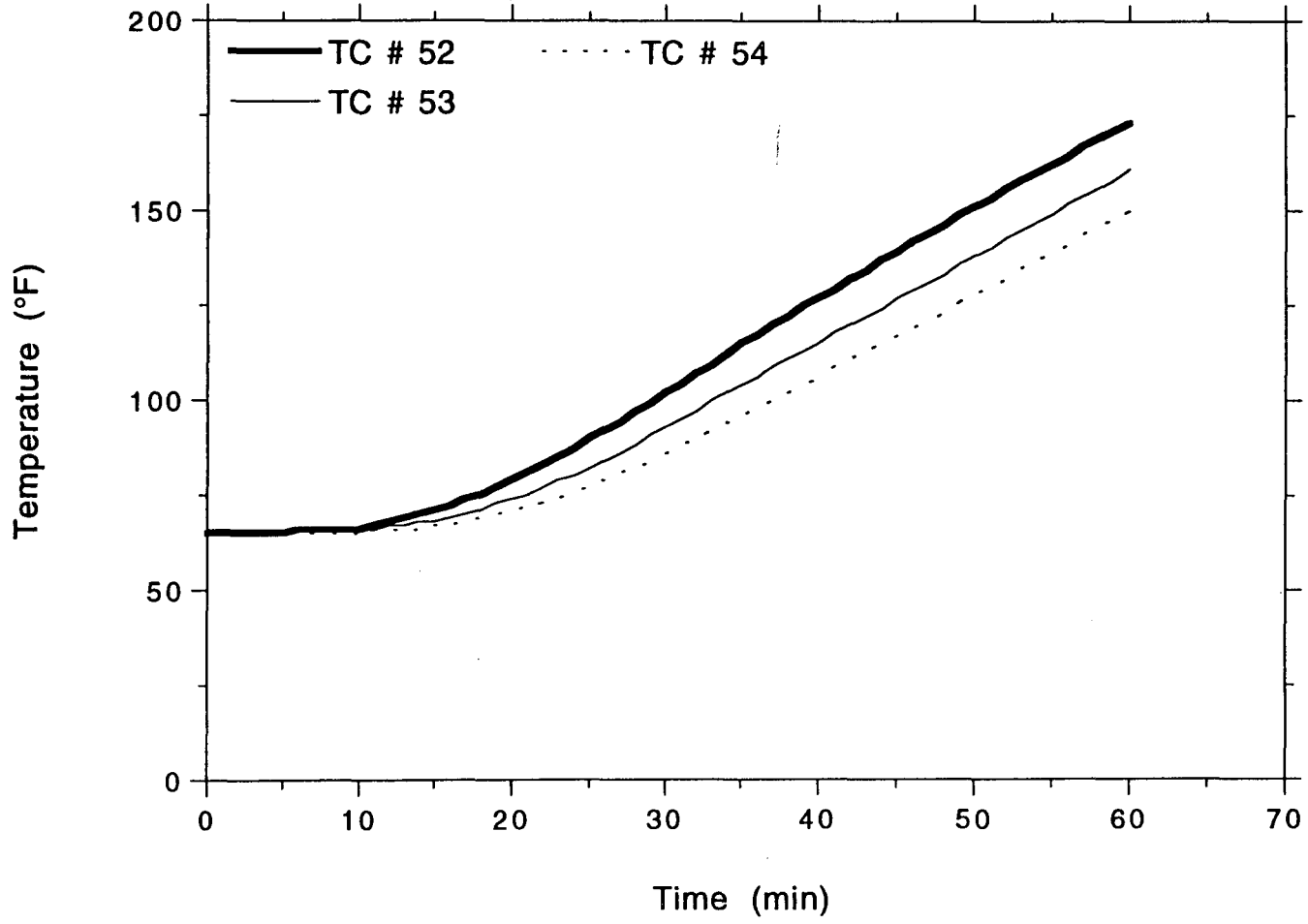

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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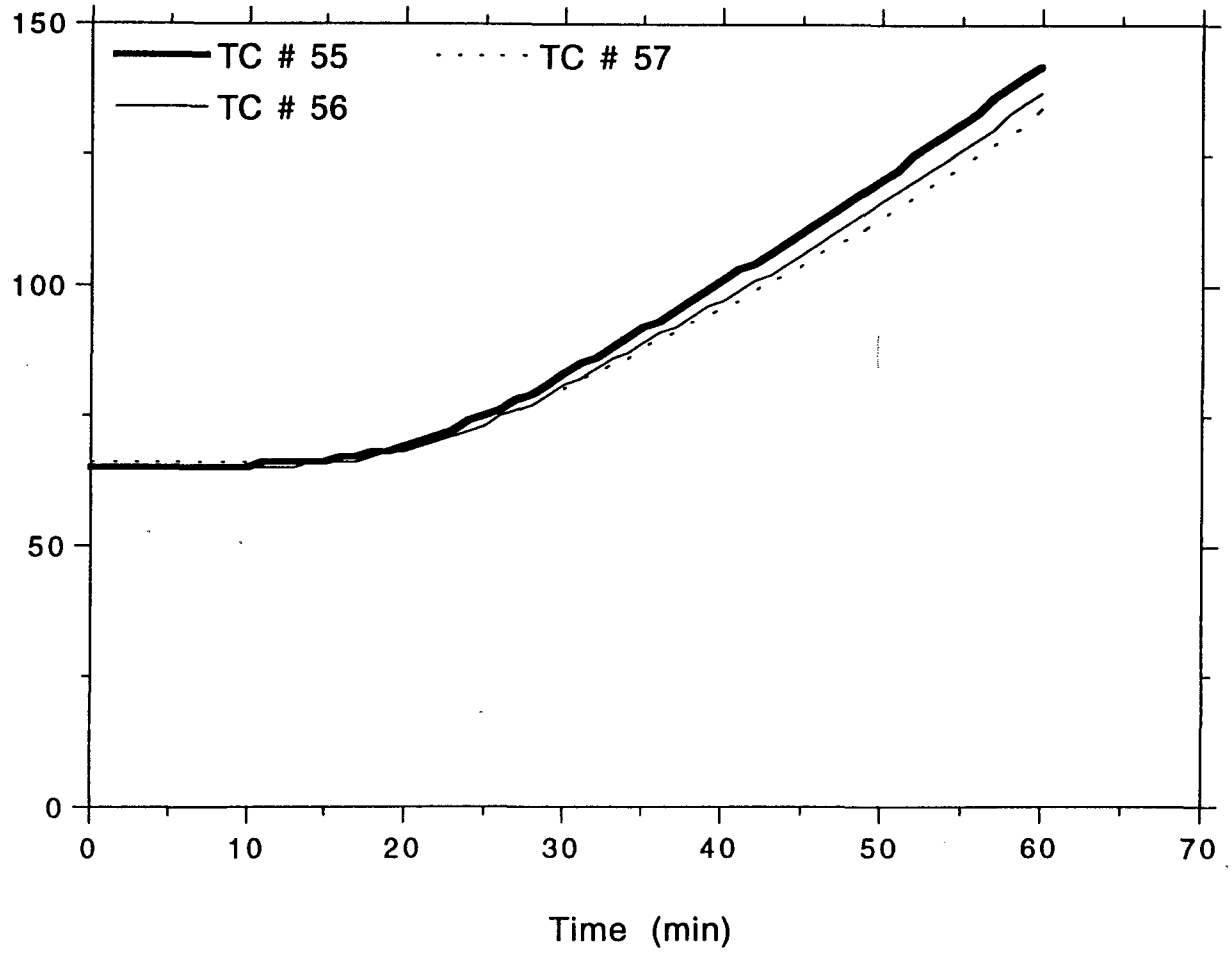

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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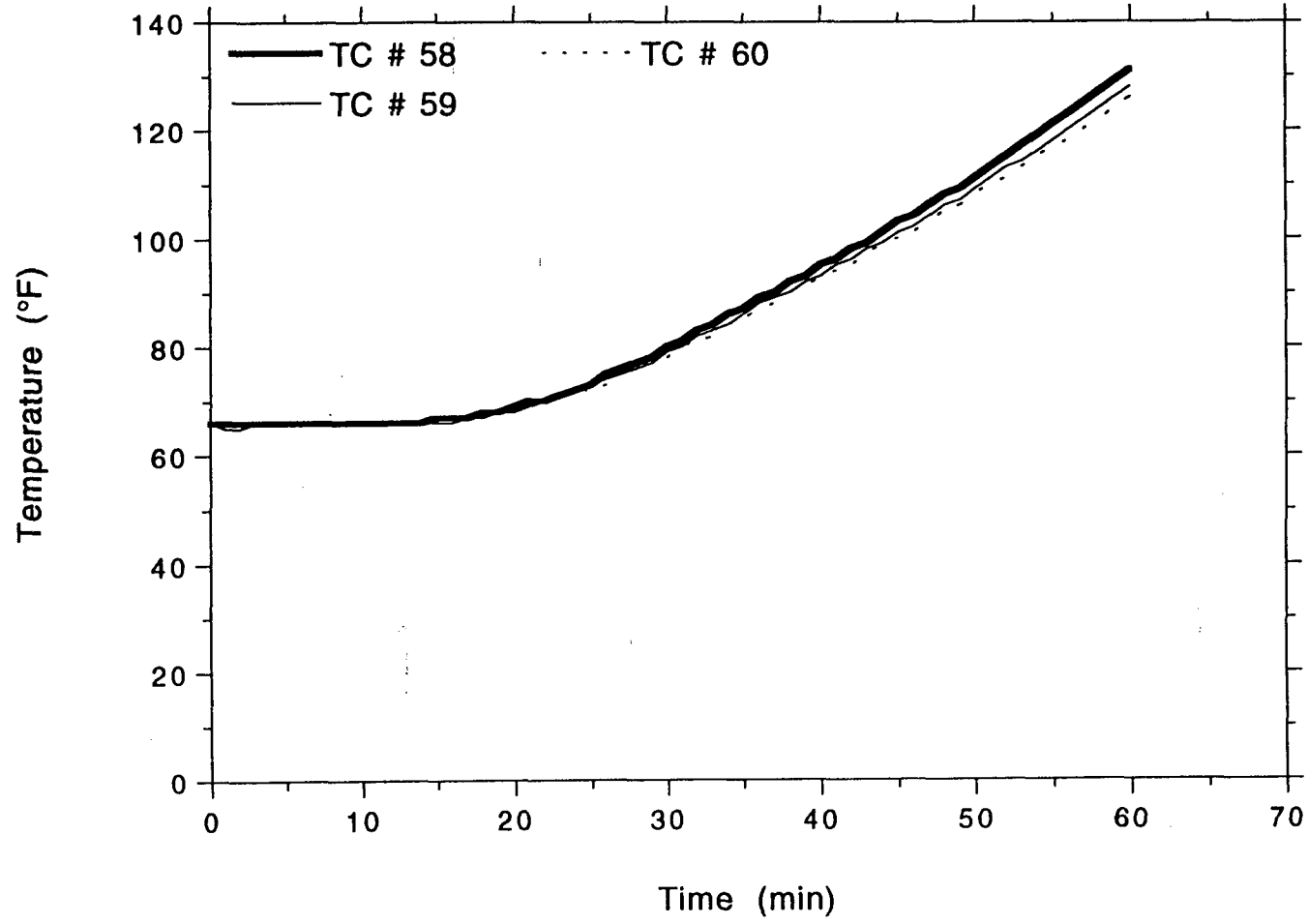

OMEGA POINT LABORATORIES

TSI/TVA
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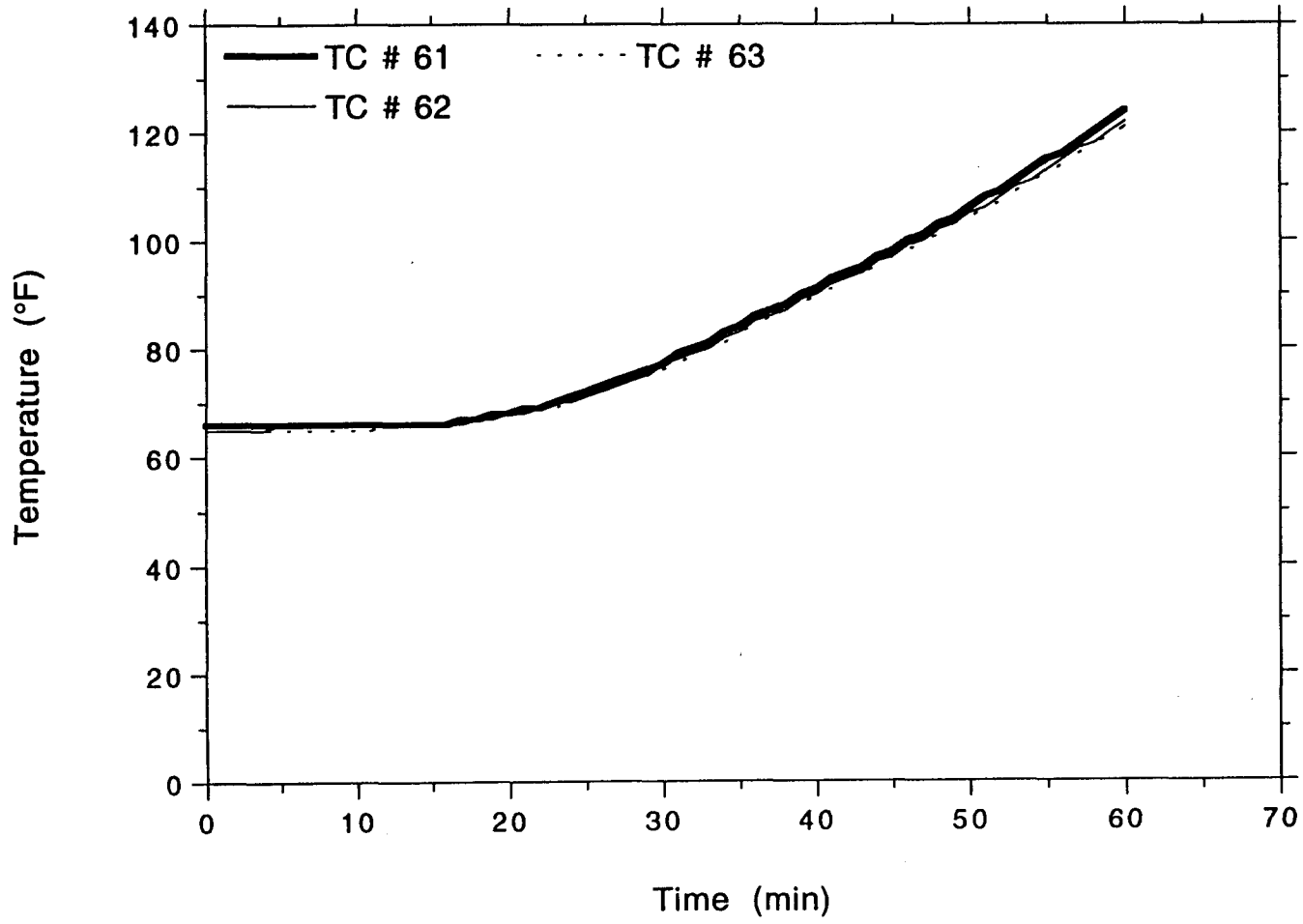

OMEGA POINT LABORATORIES

TSI/TVA
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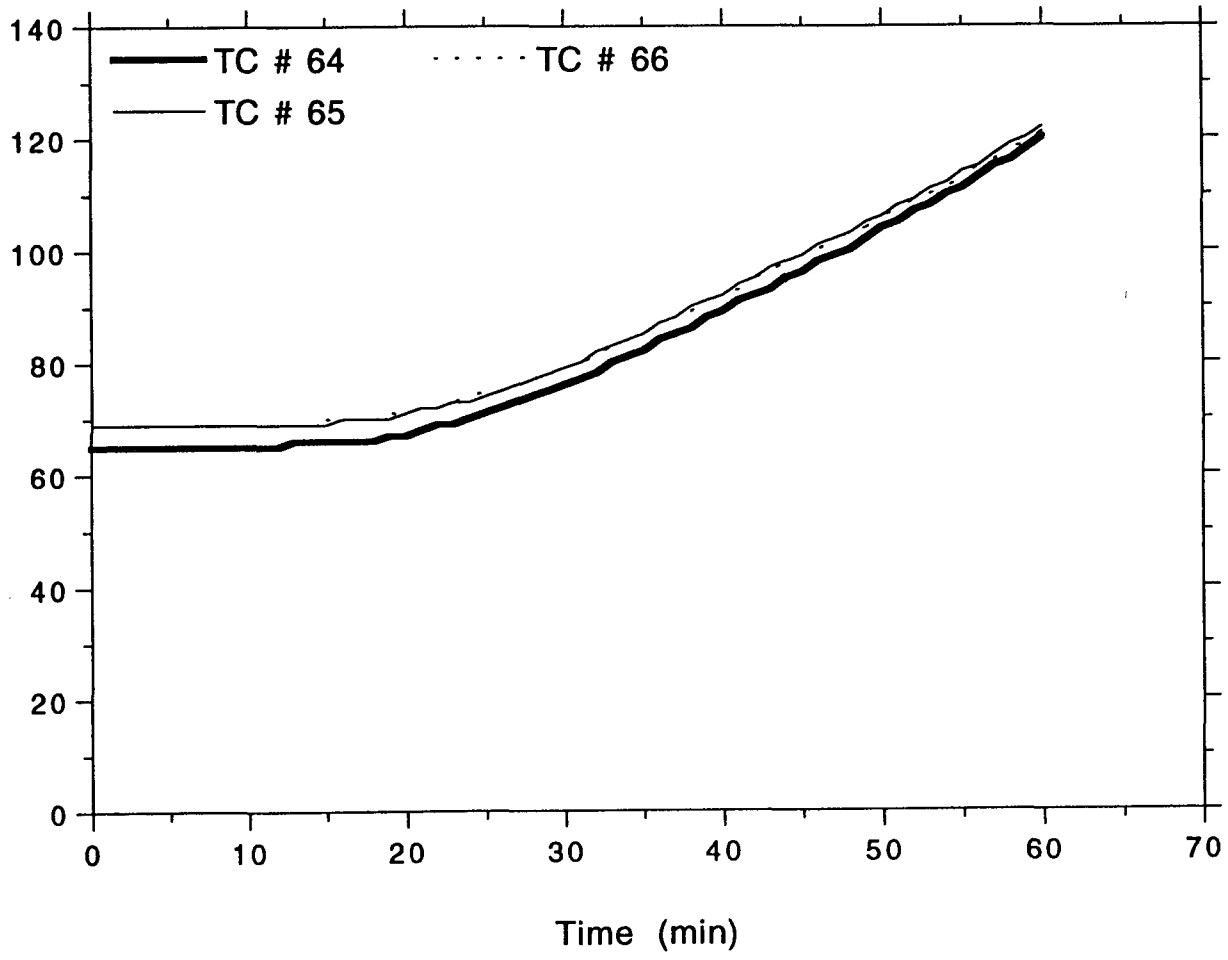

OMEGA POINT LABORATORIES

TSI/TVA
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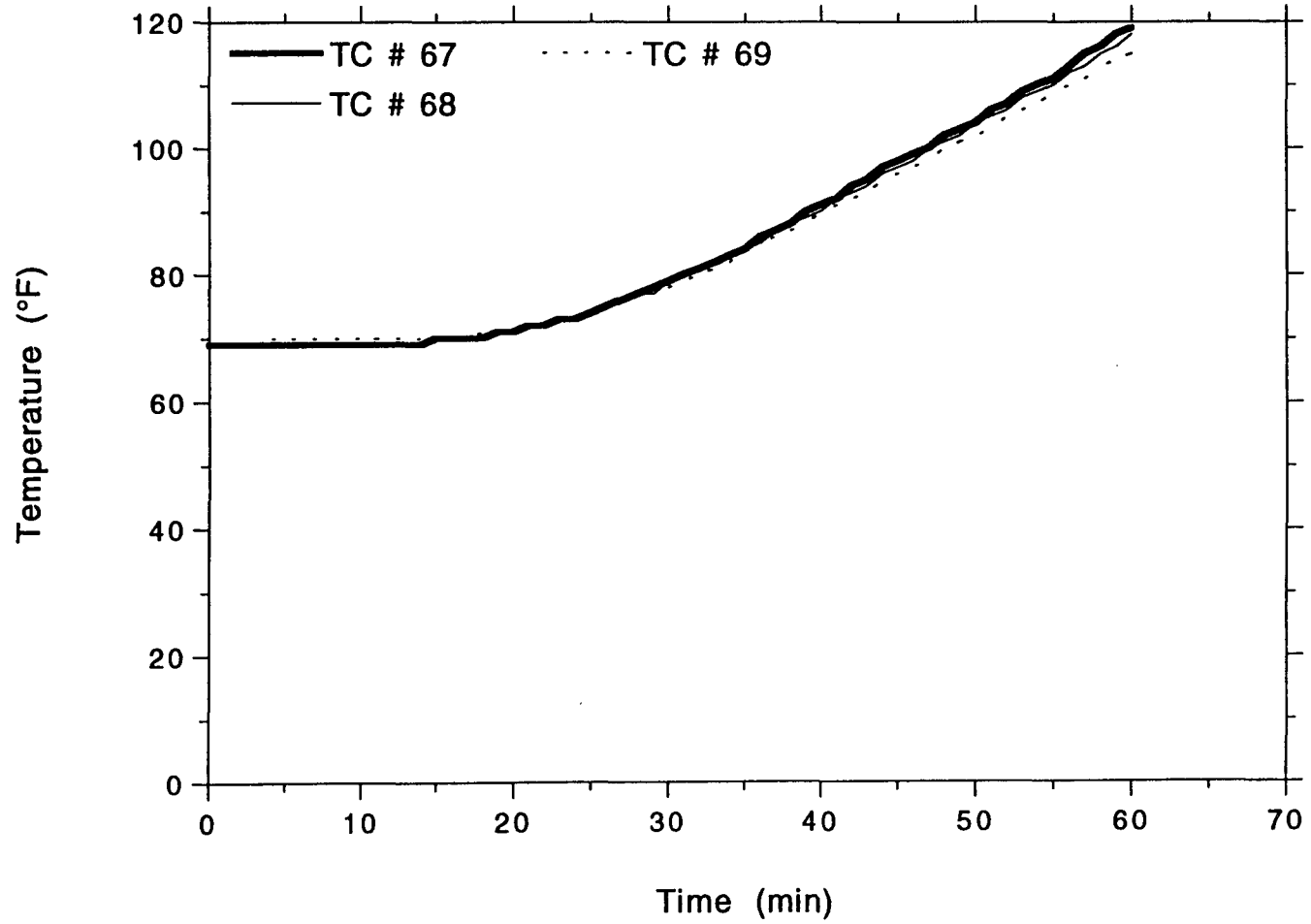

OMEGA POINT LABORATORIES

TSI/TVA
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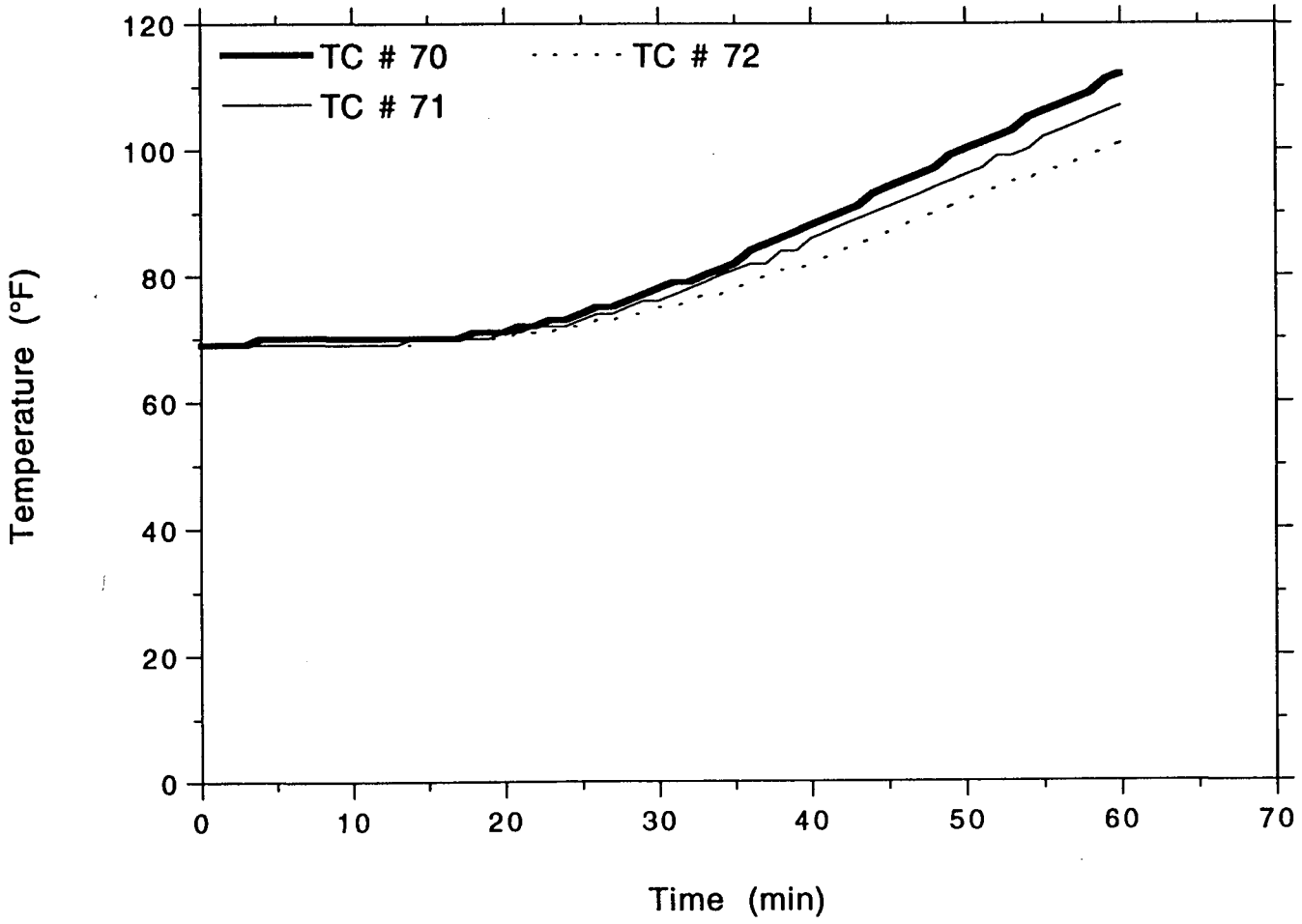

OMEGA POINT LABORATORIES

TSI/TVA
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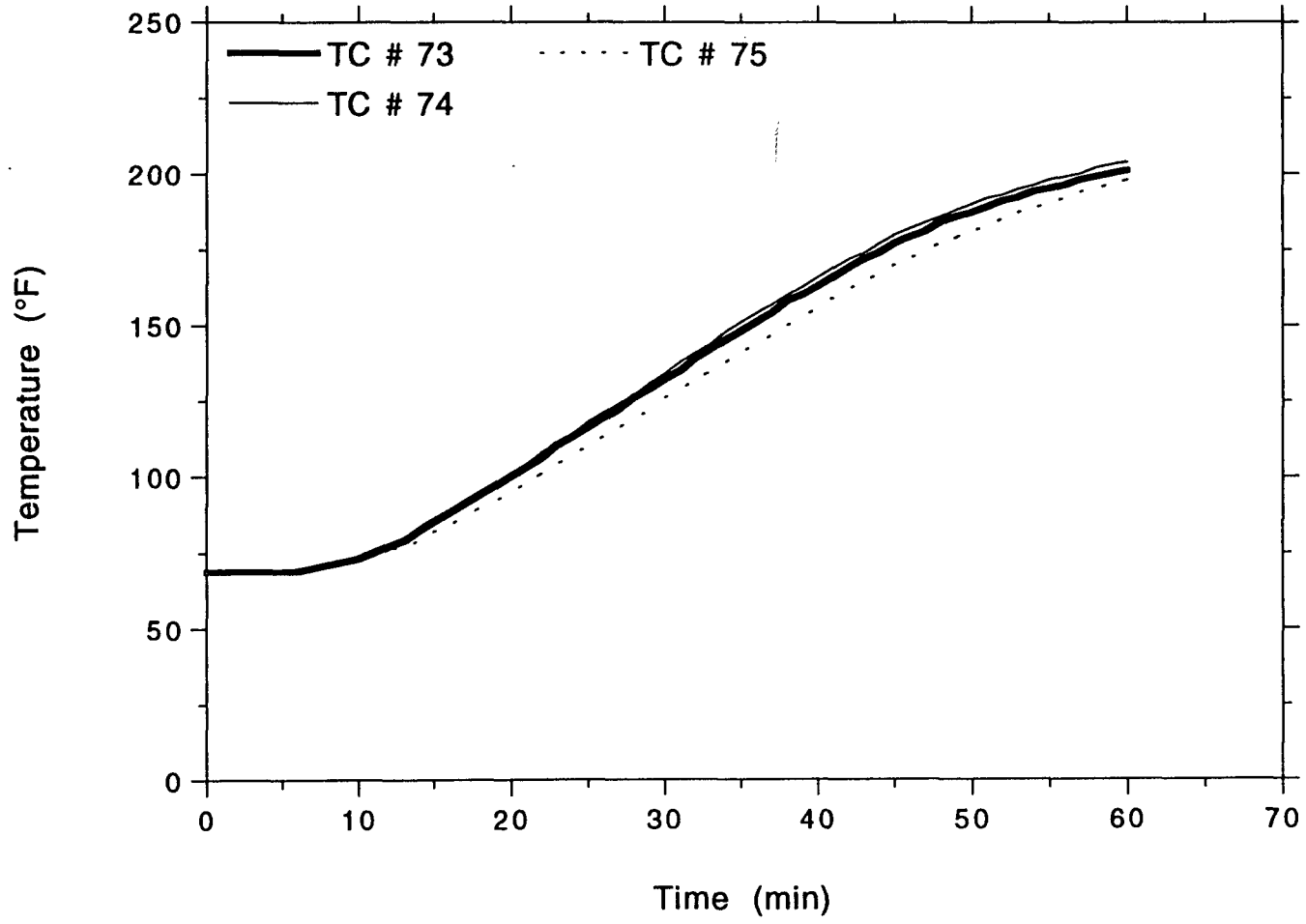

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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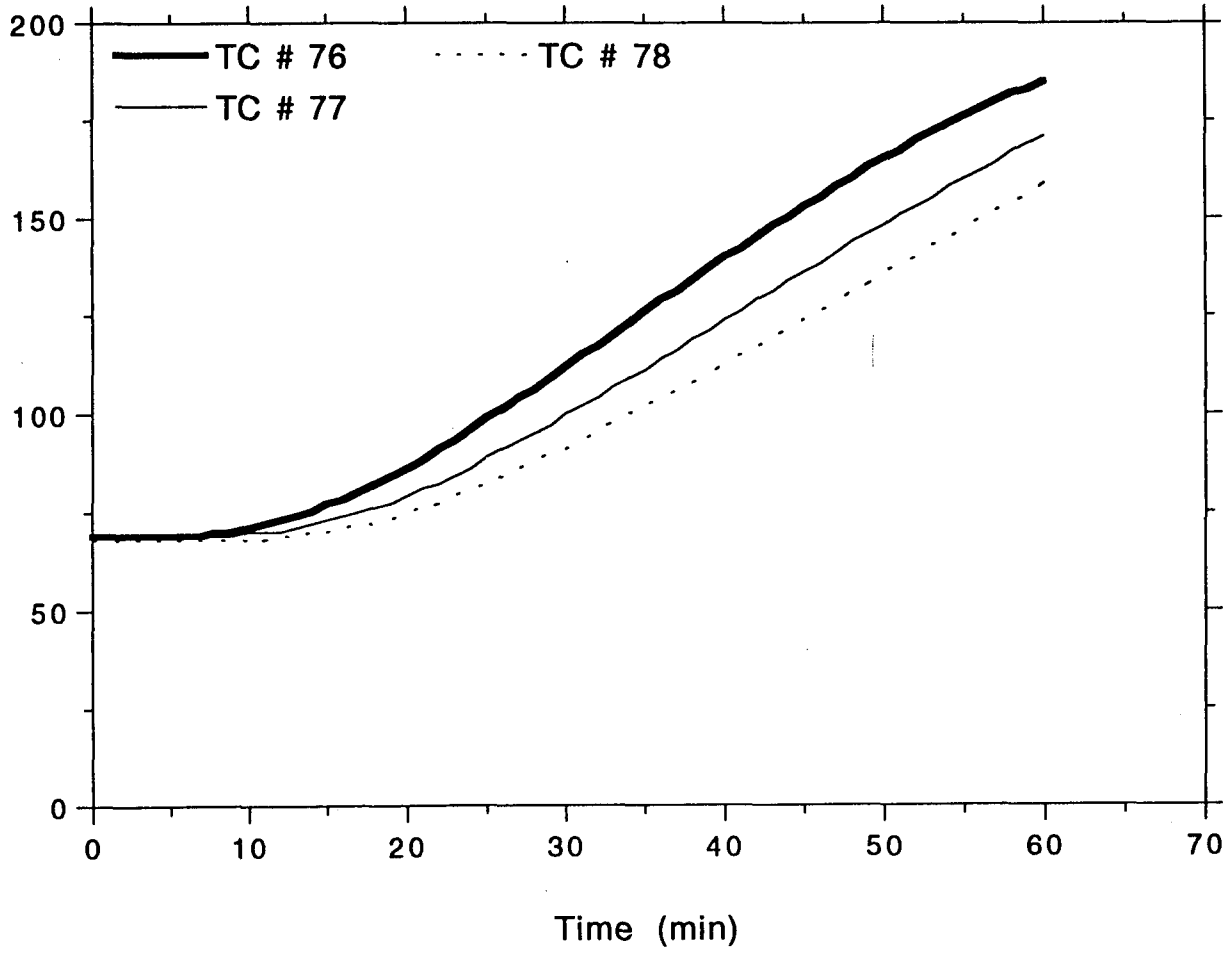

OMEGA POINT LABORATORIES

TSI/TVA
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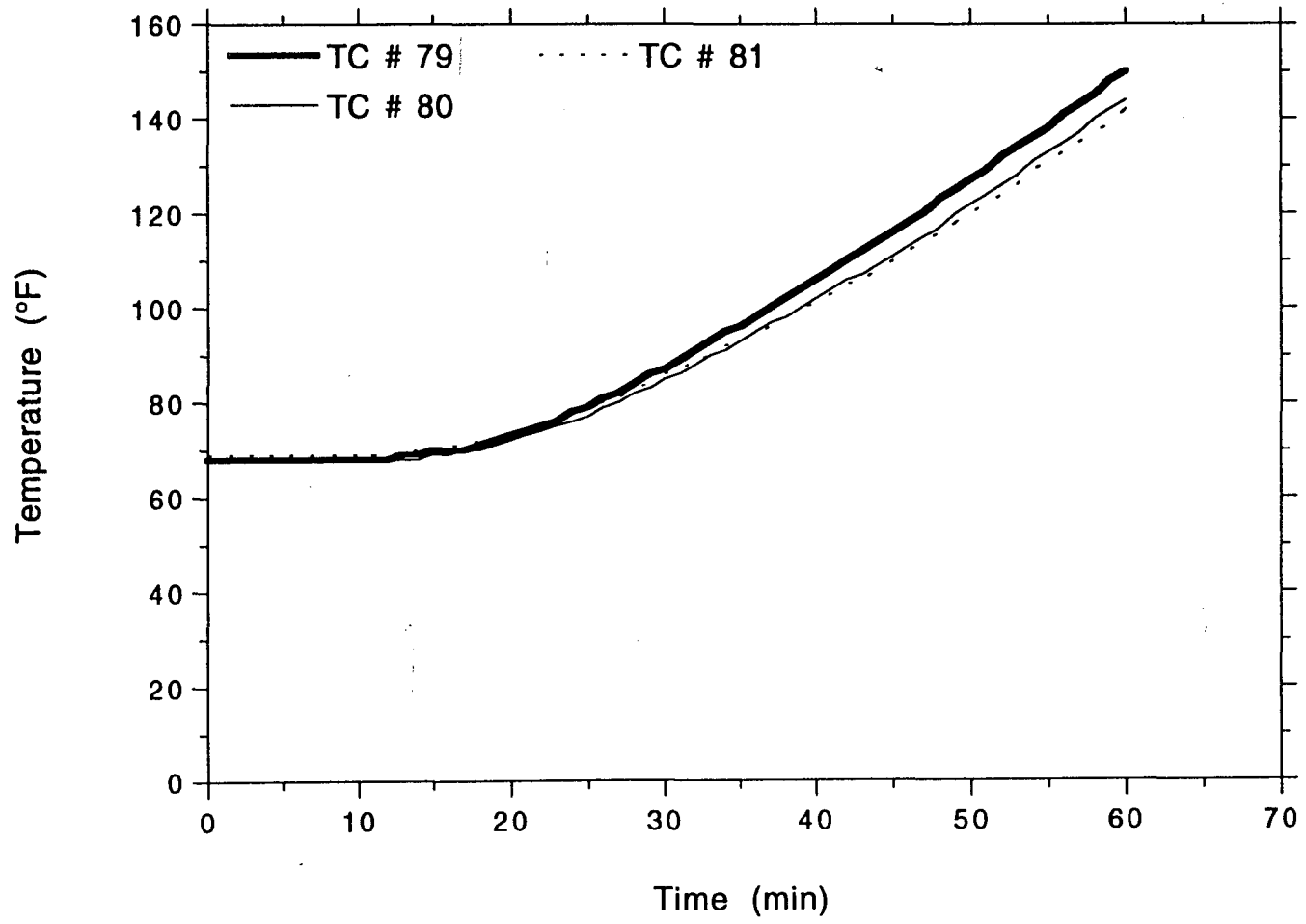

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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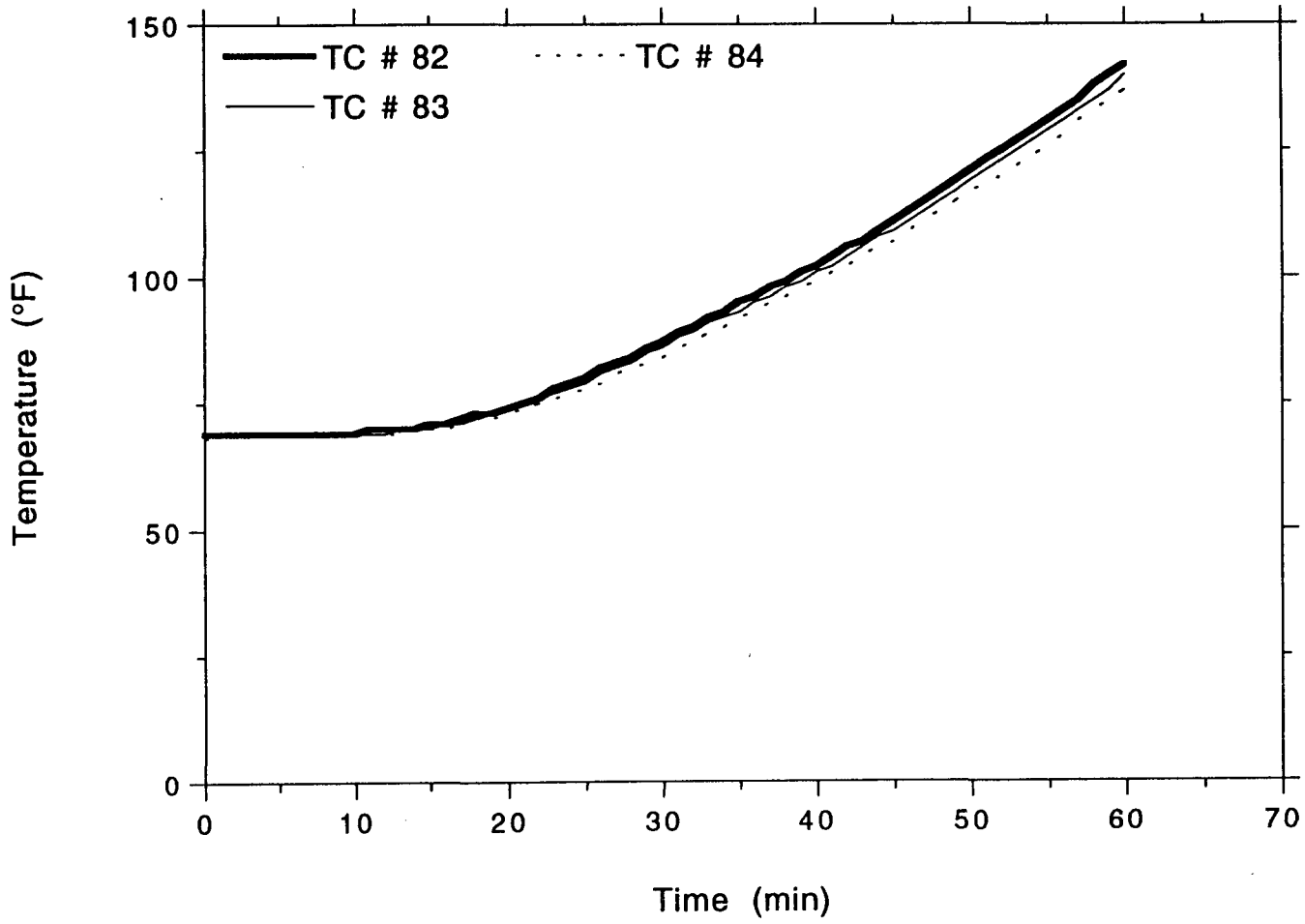

OMEGA POINT LABORATORIES

TSI/TVA
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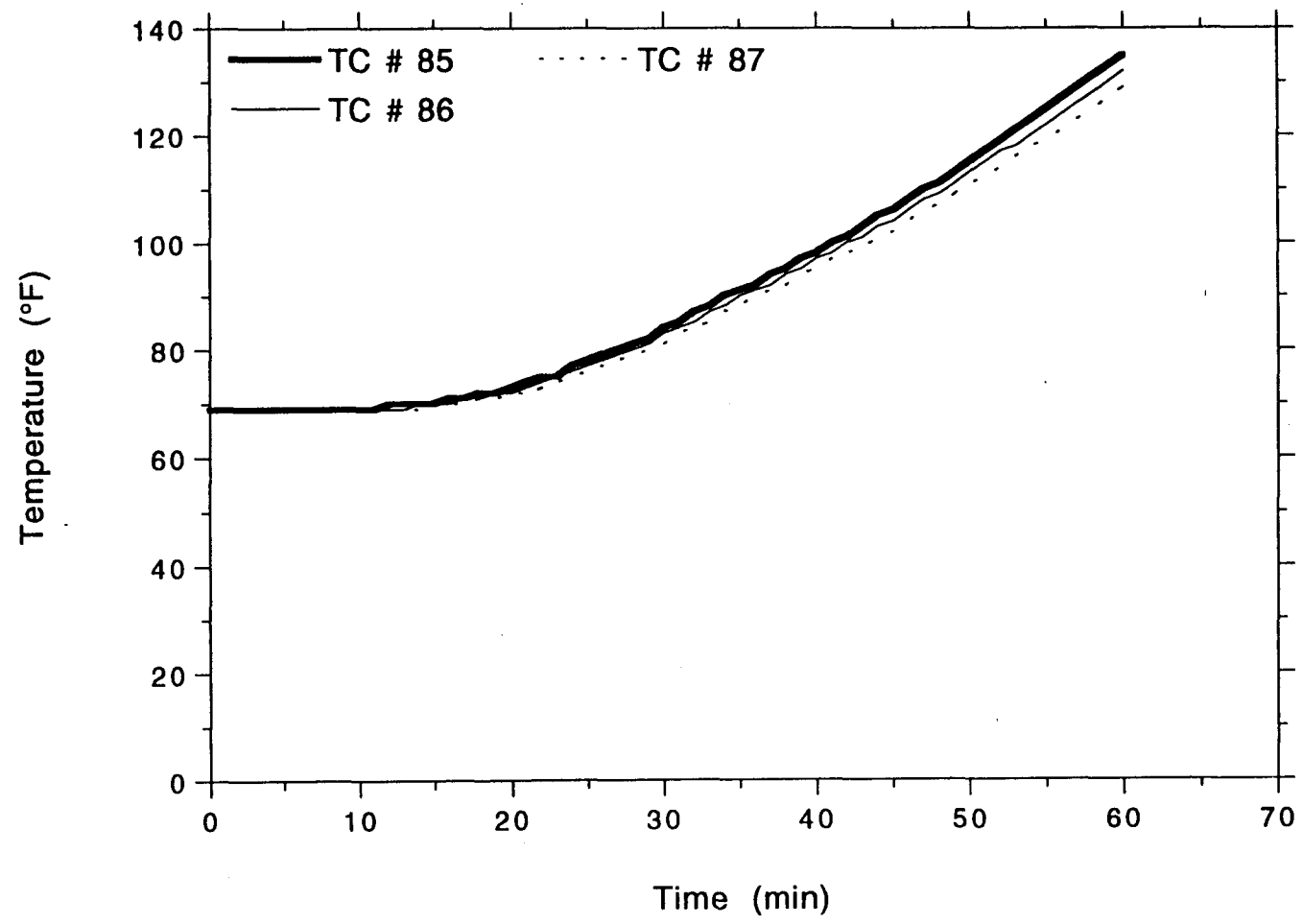

OMEGA POINT LABORATORIES

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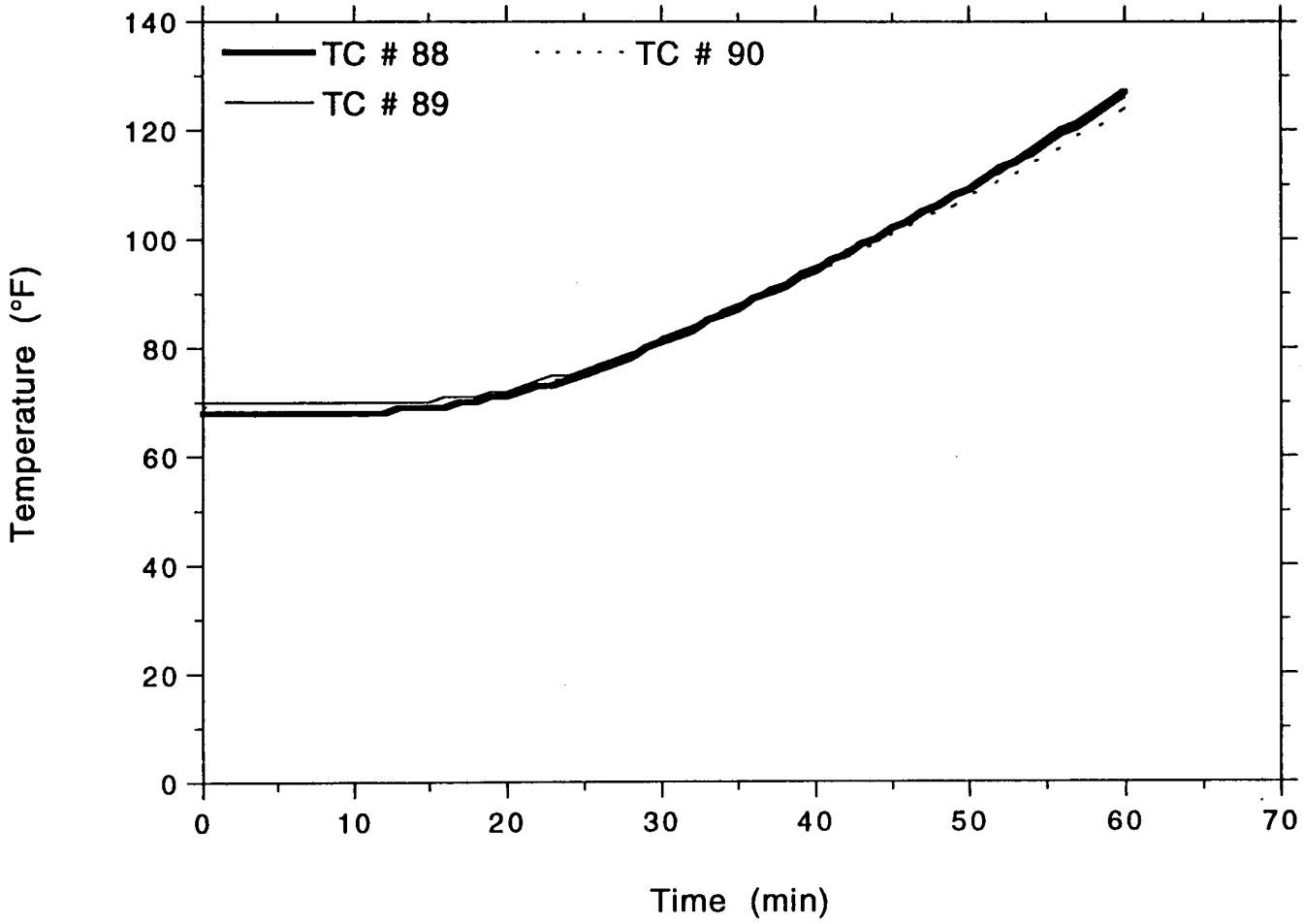

OMEGA POINT LABORATORIES

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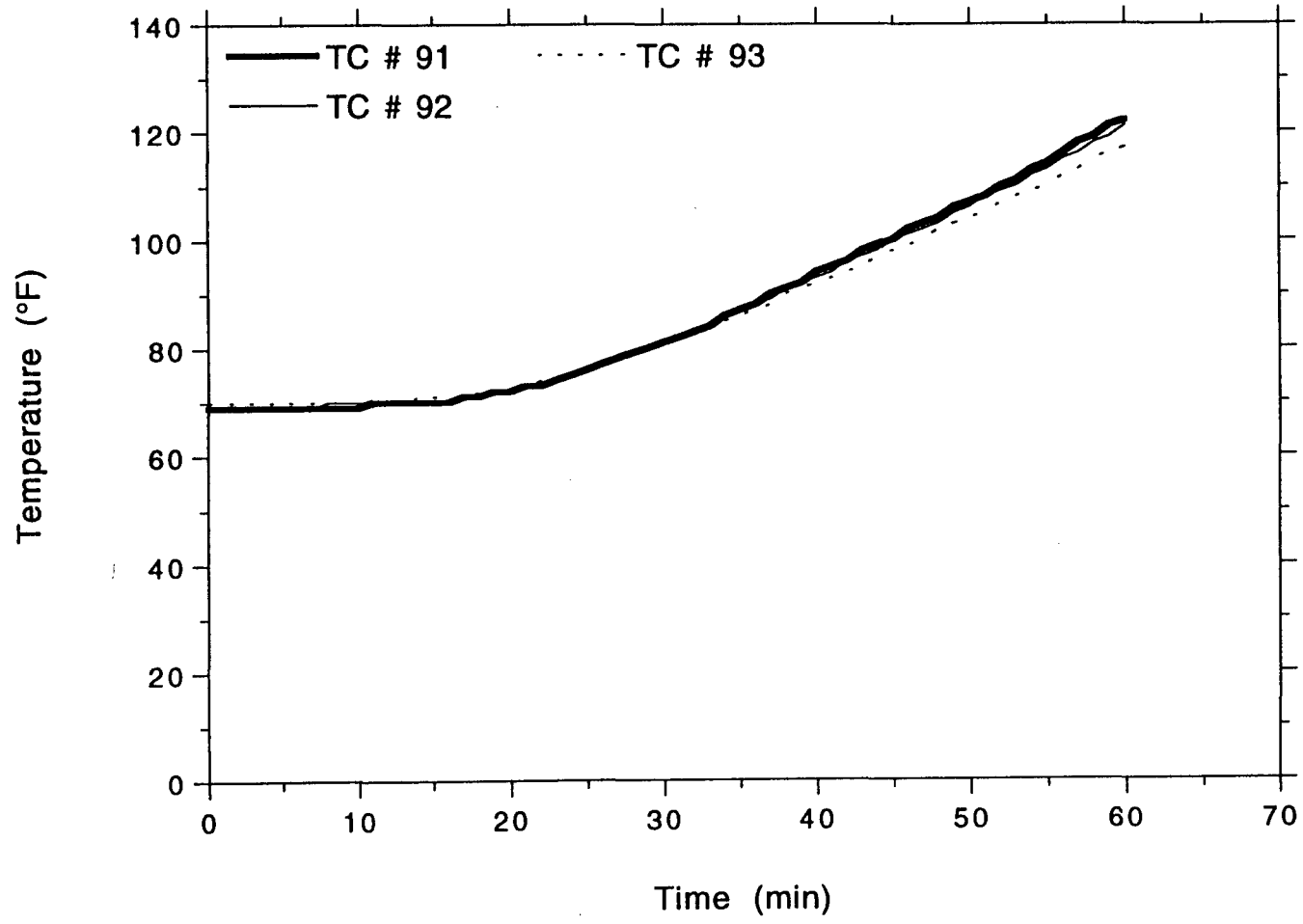

OMEGA POINT LABORATORIES

TSI/TVA
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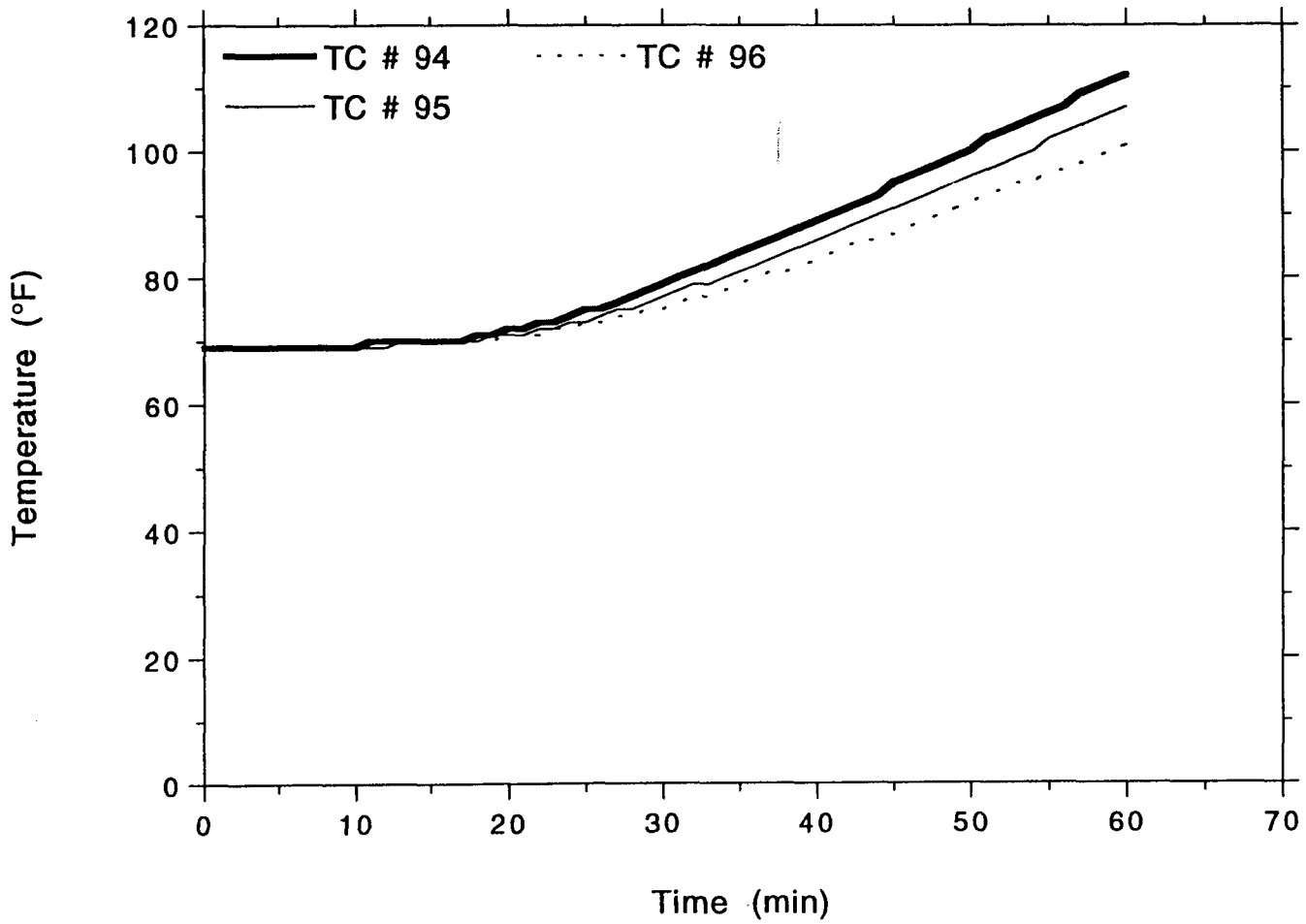
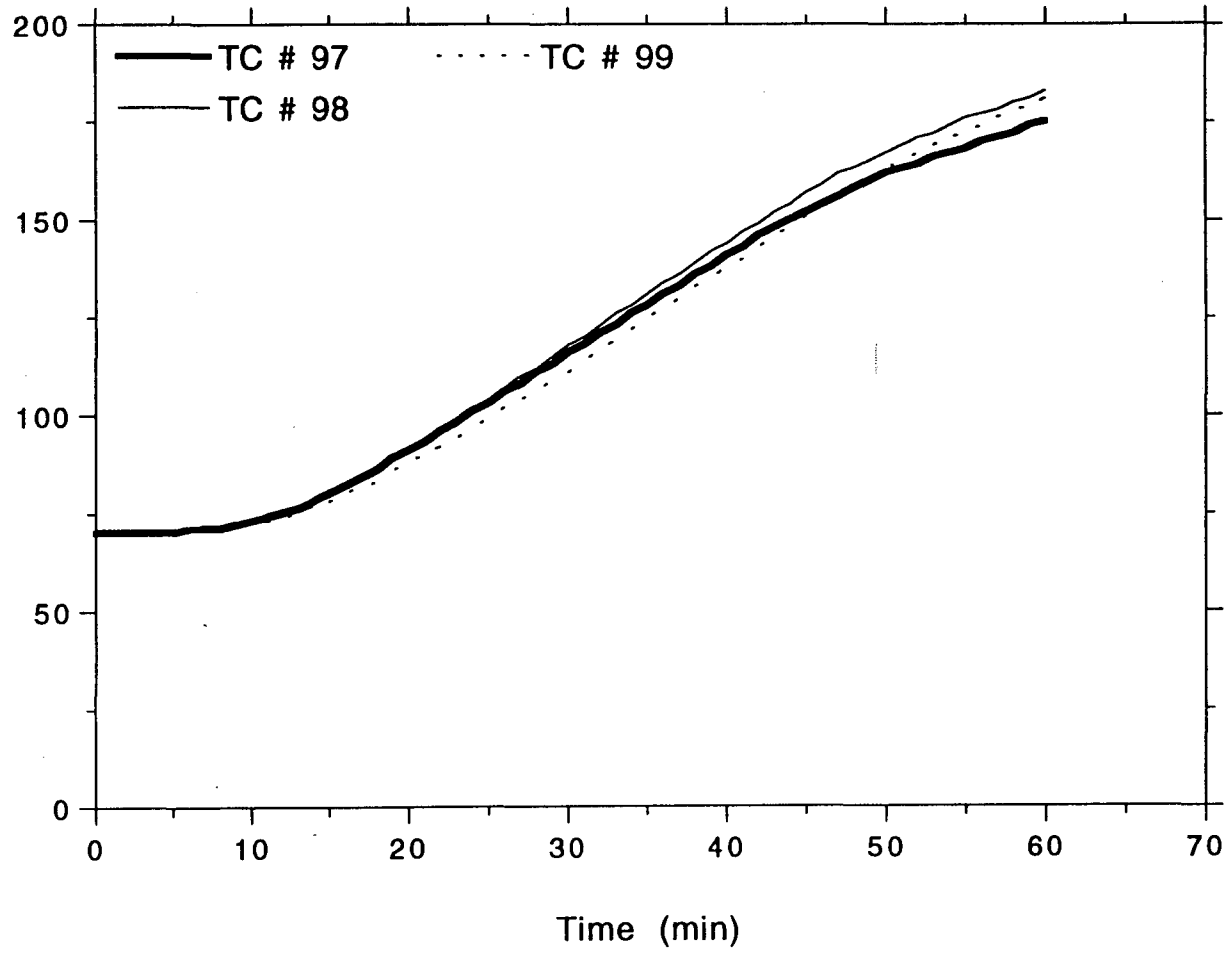


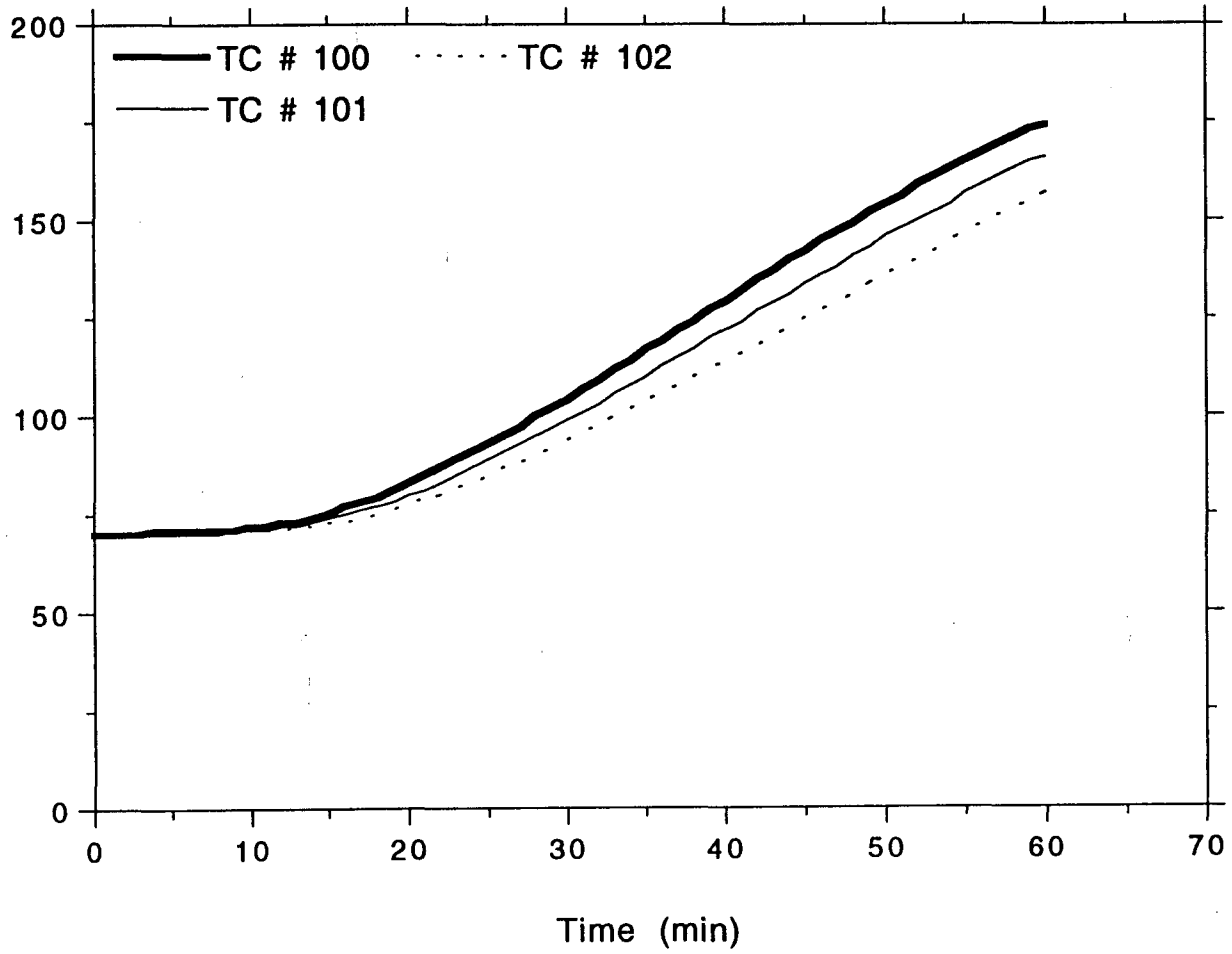
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
#8 in Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
#8 in Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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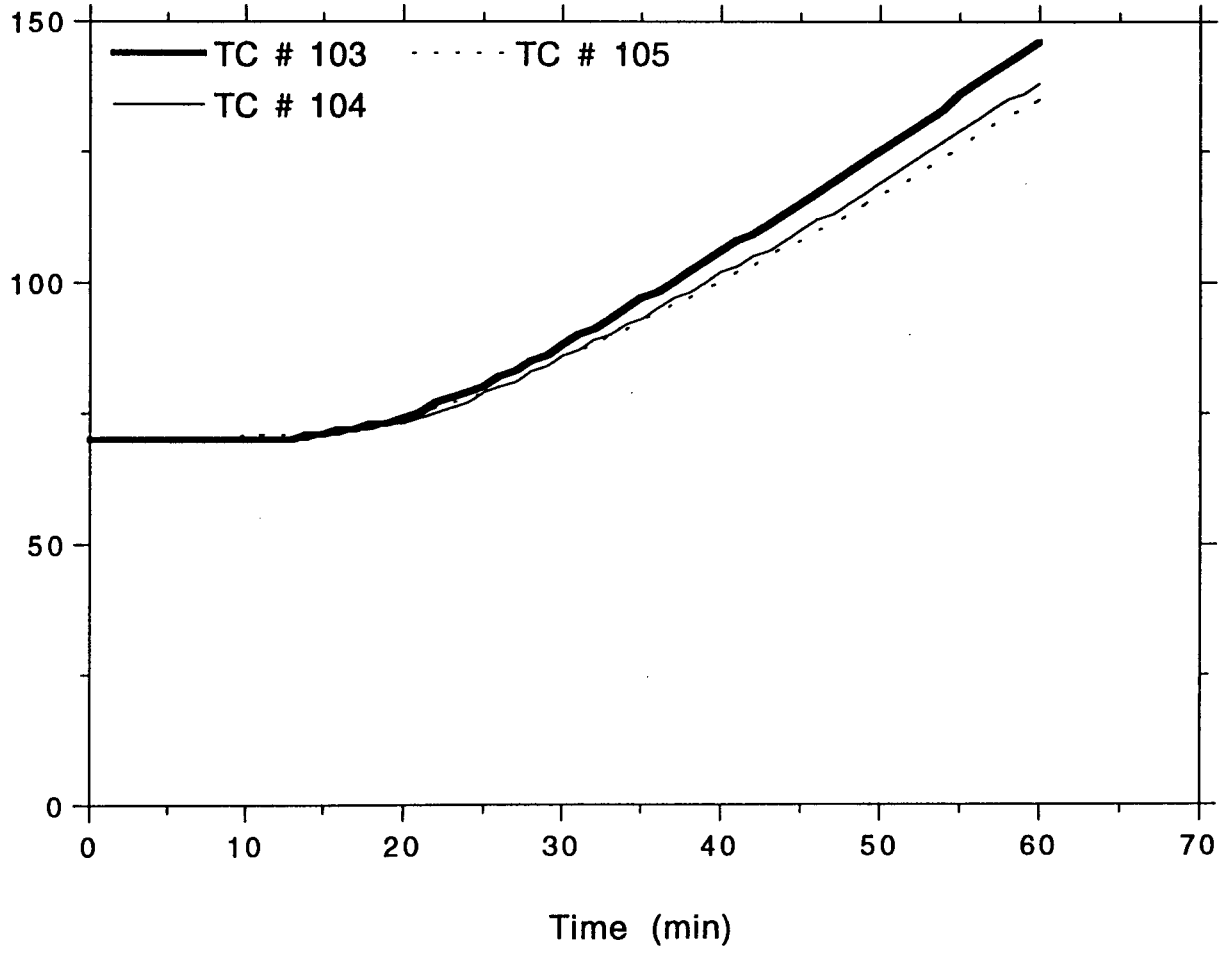
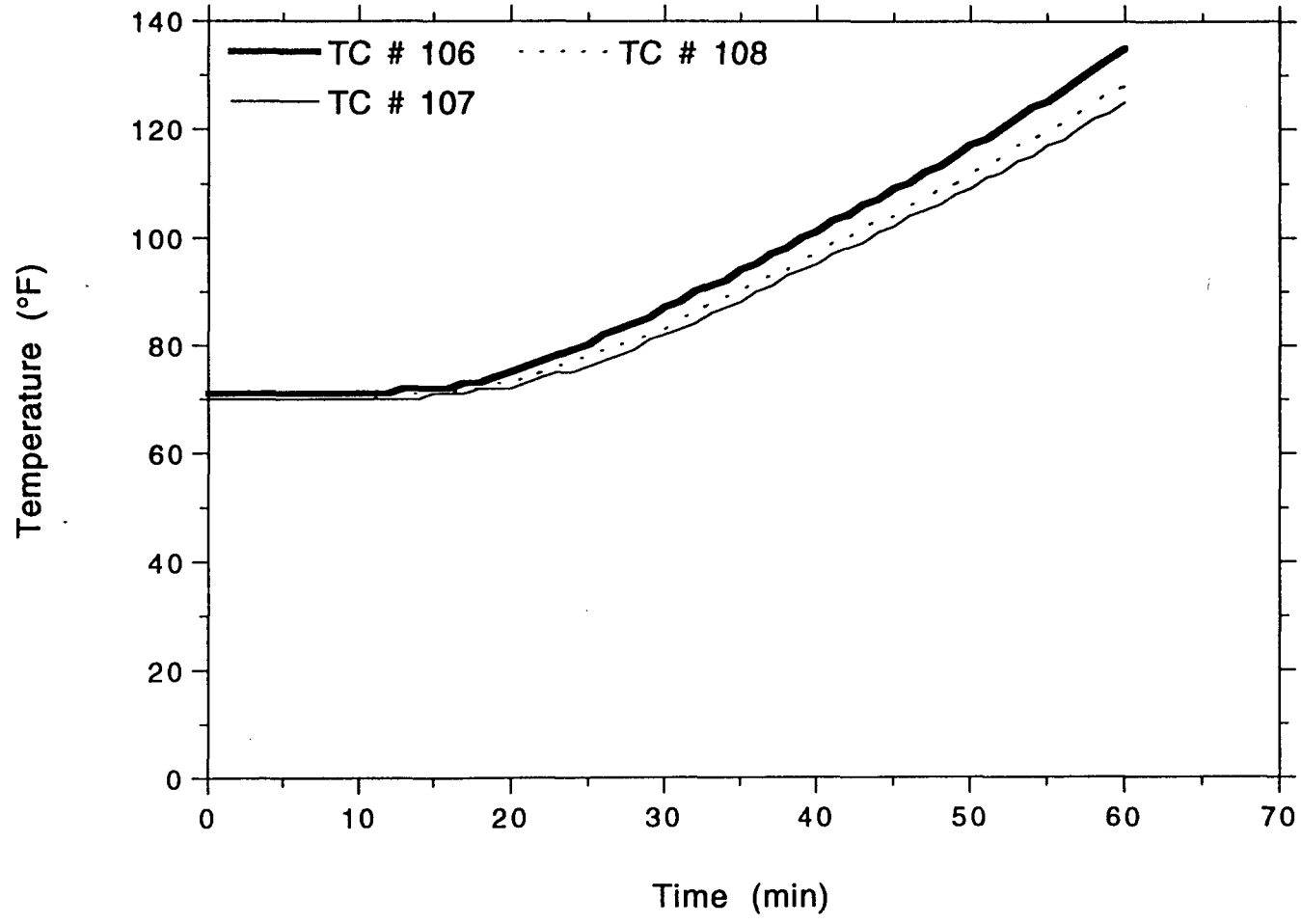
#8 in Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
#8 in Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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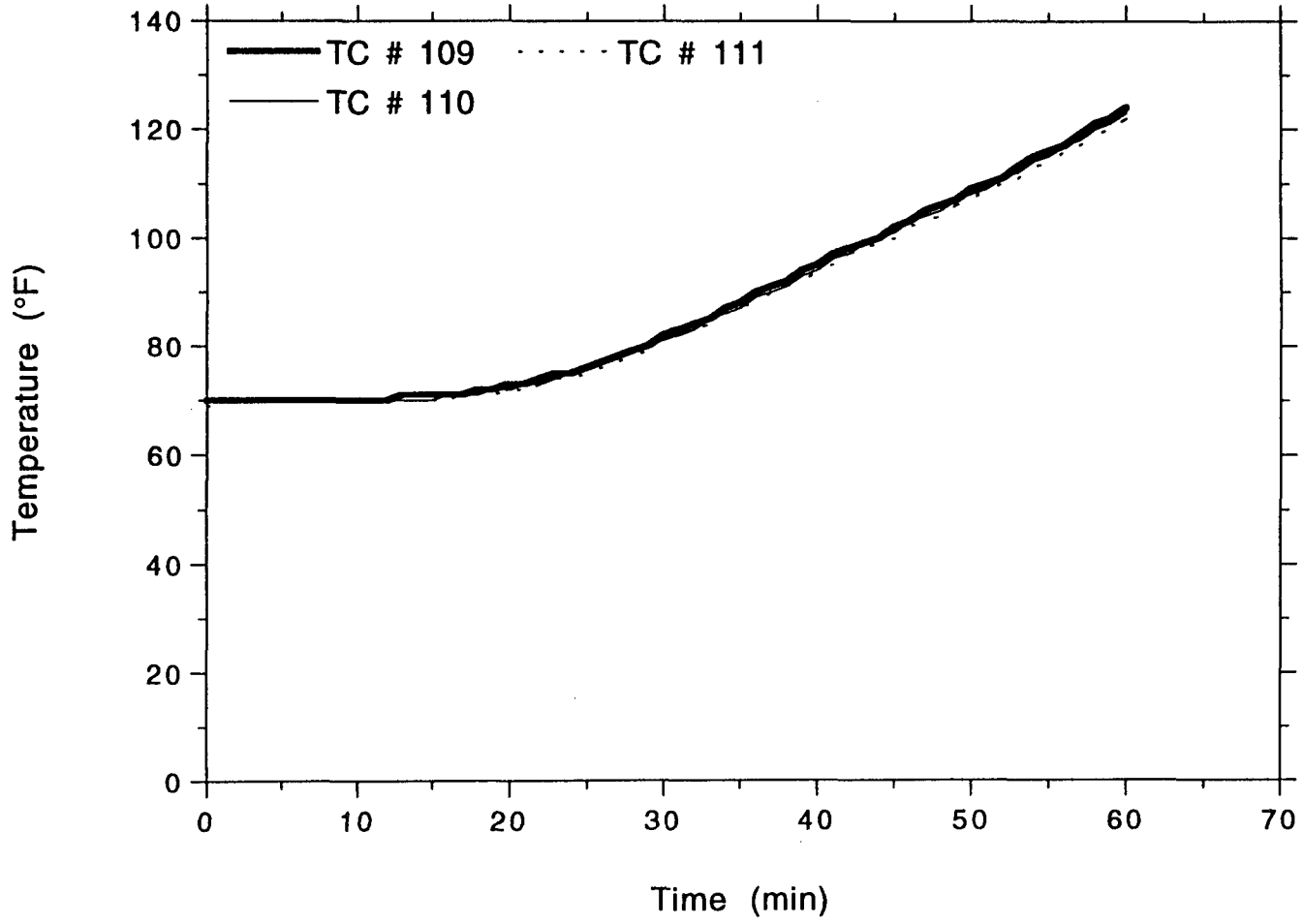

OMEGA POINT LABORATORIES

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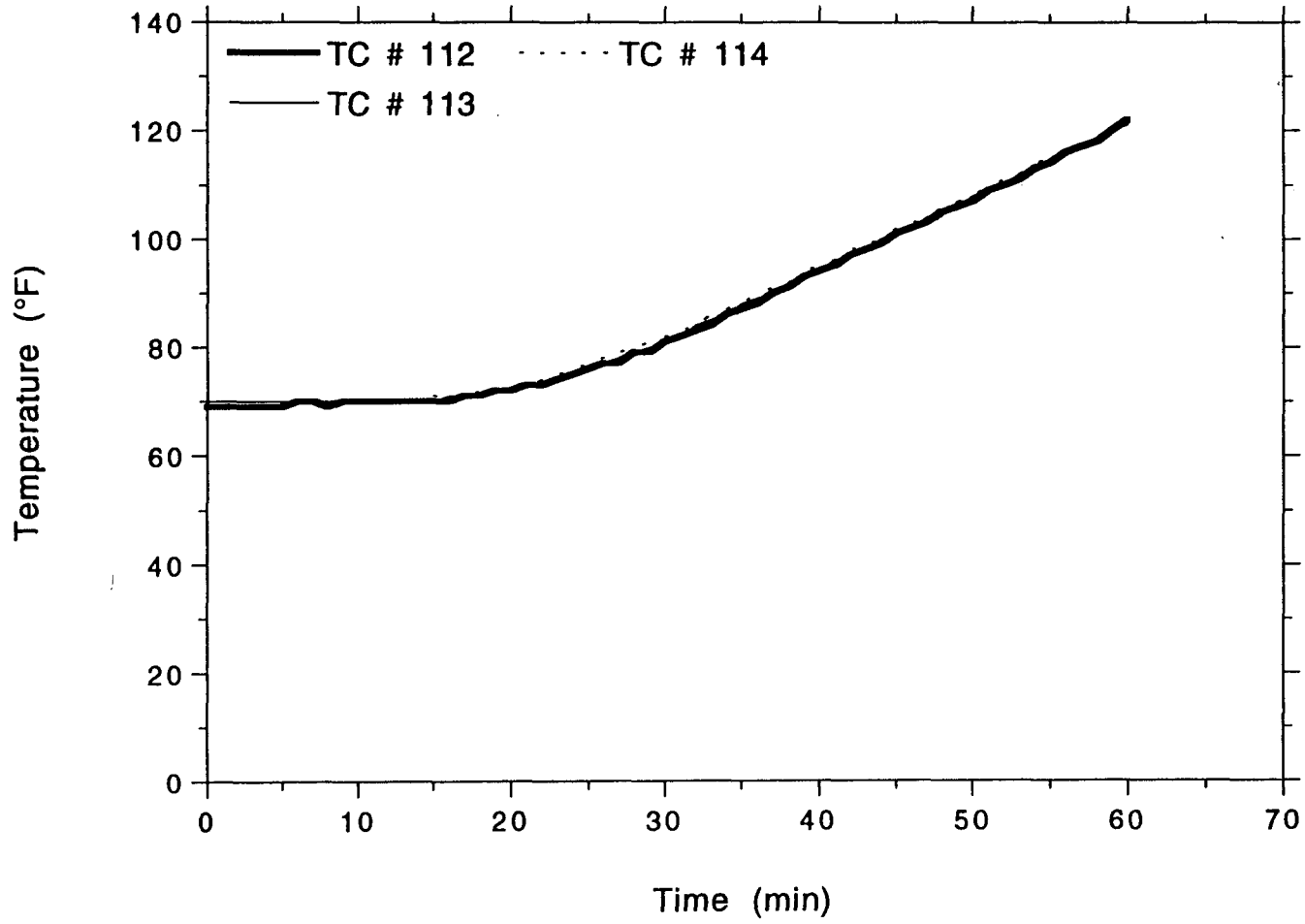

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Project No. 11960-97257
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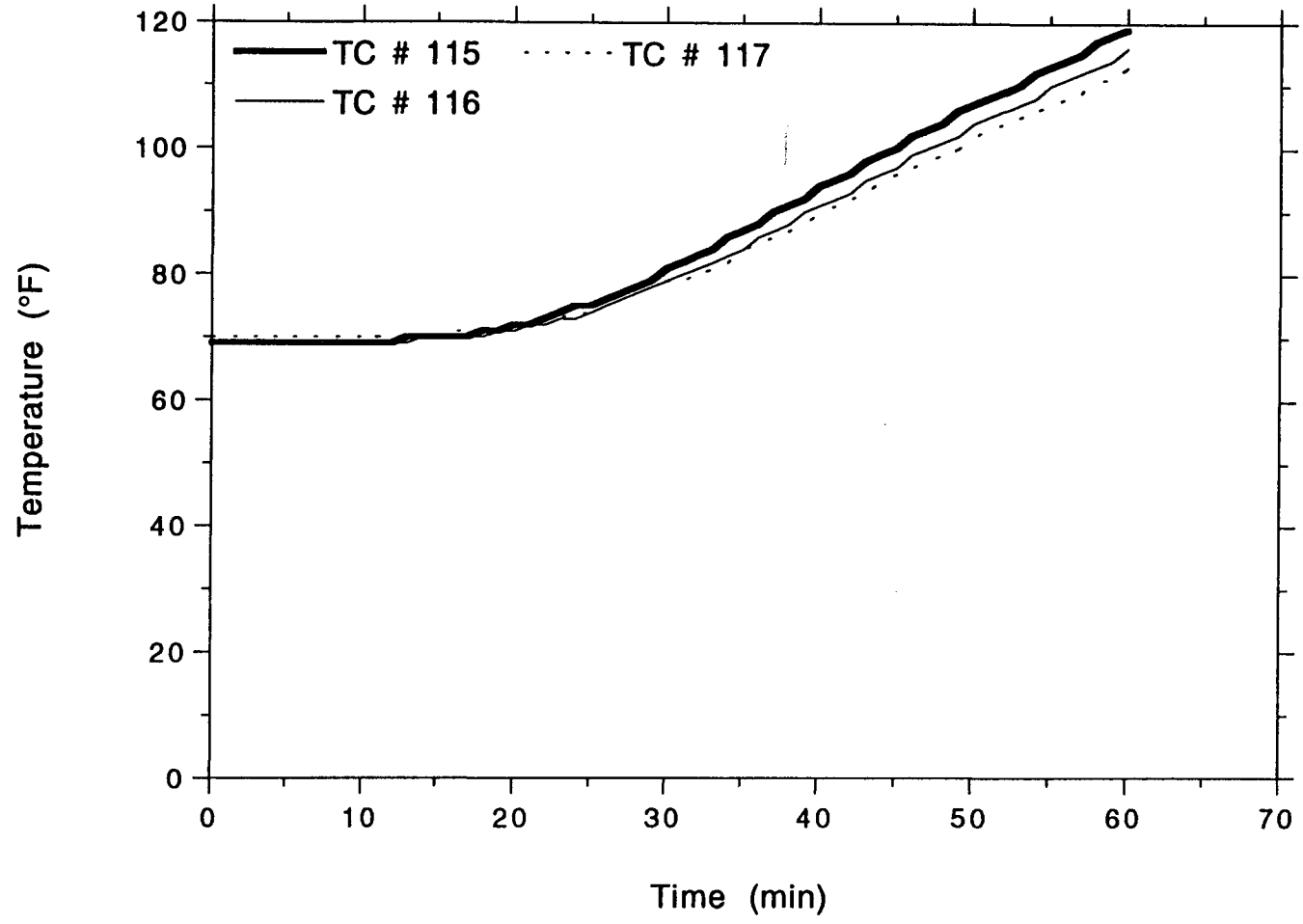

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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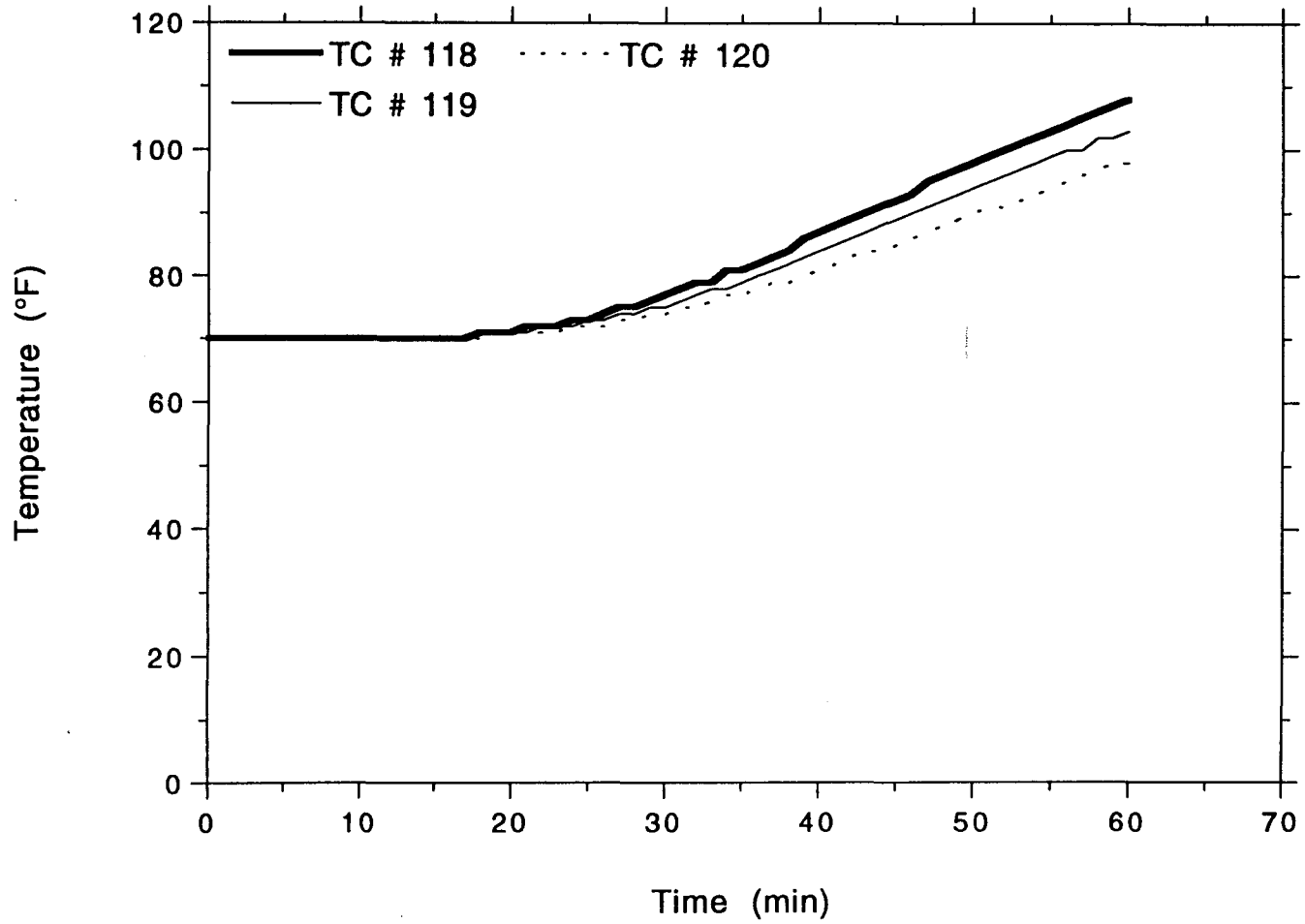

OMEGA POINT LABORATORIES

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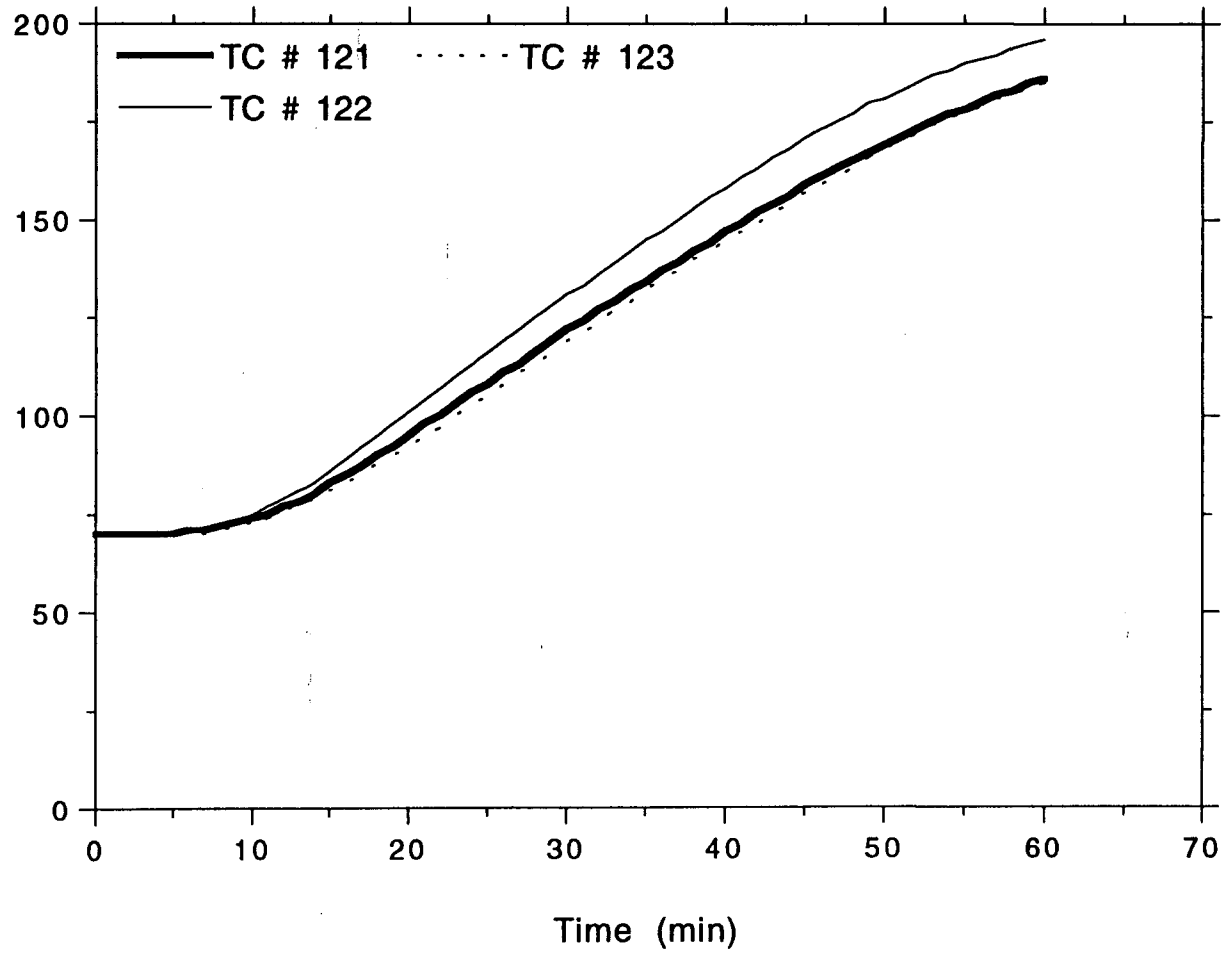

OMEGA POINT LABORATORIES

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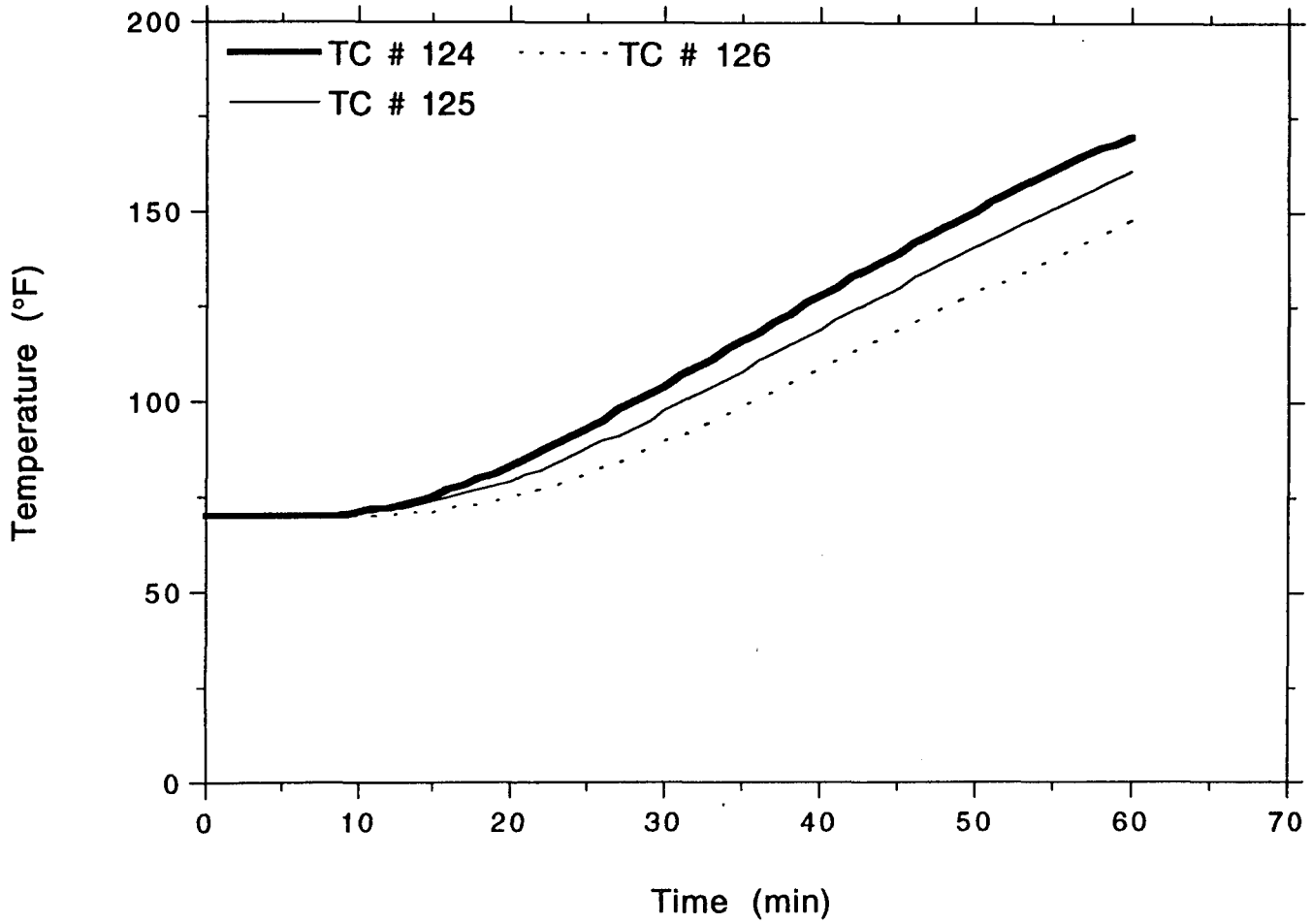

OMEGA POINT LABORATORIES

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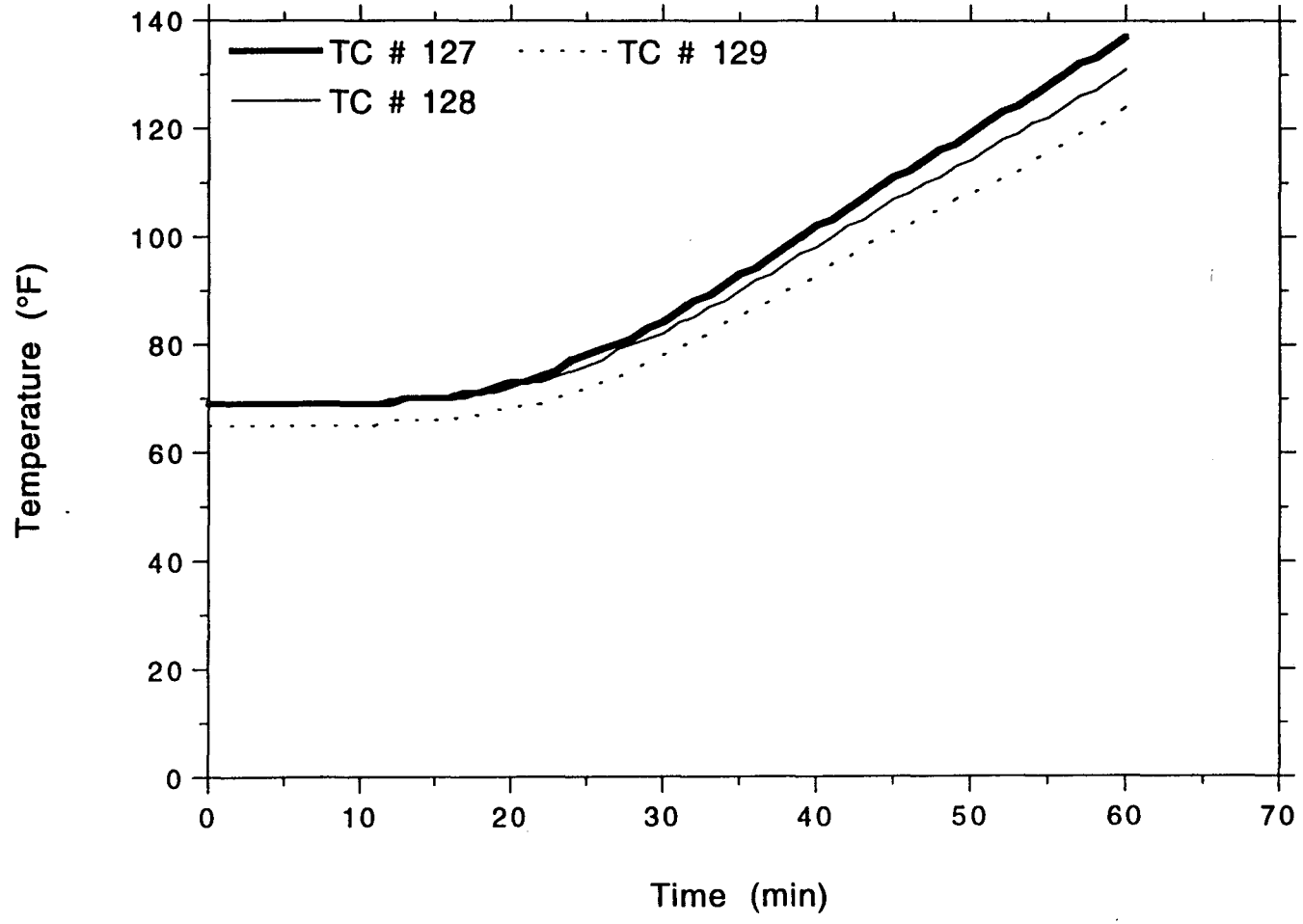

OMEGA POINT LABORATORIES

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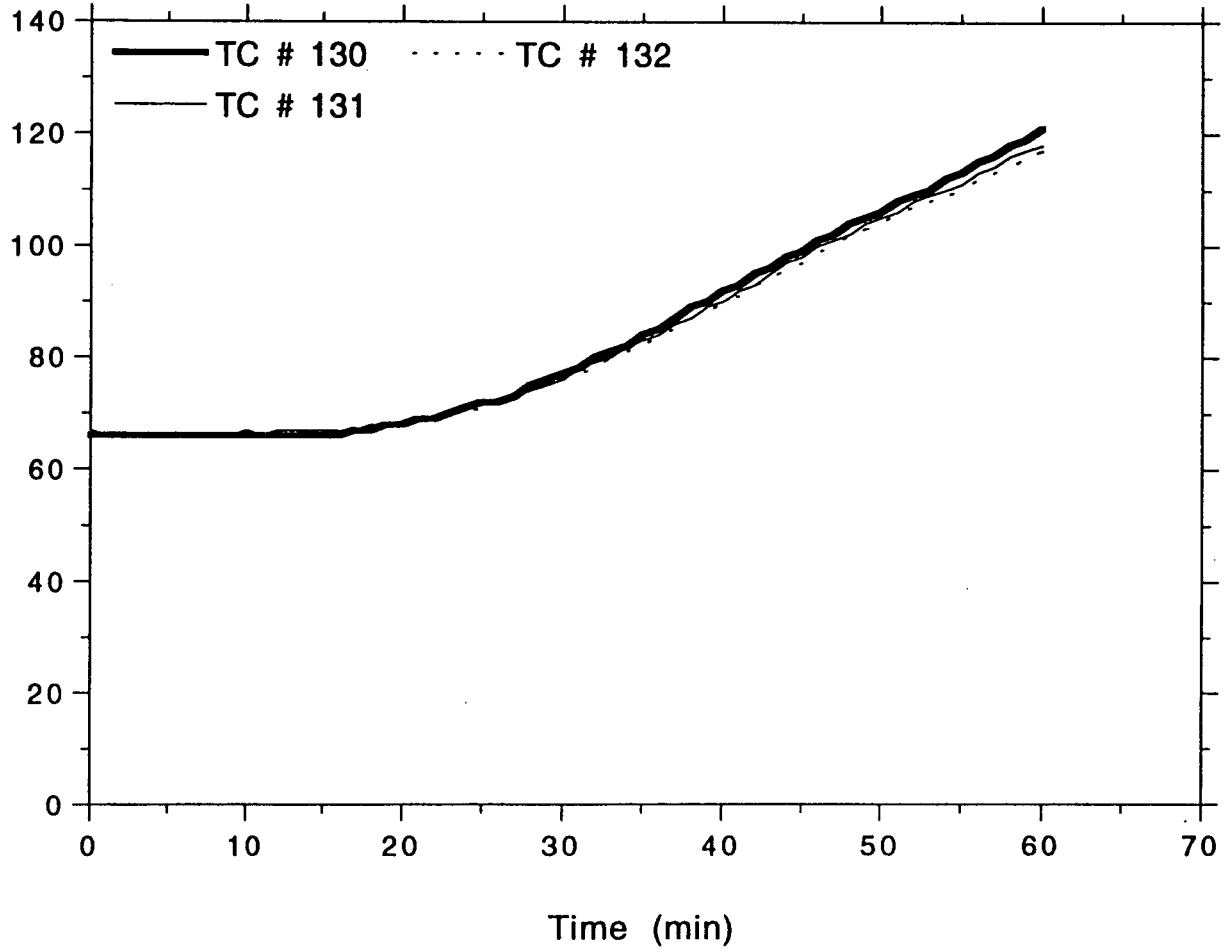

OMEGA POINT LABORATORIES

TSI/TVA
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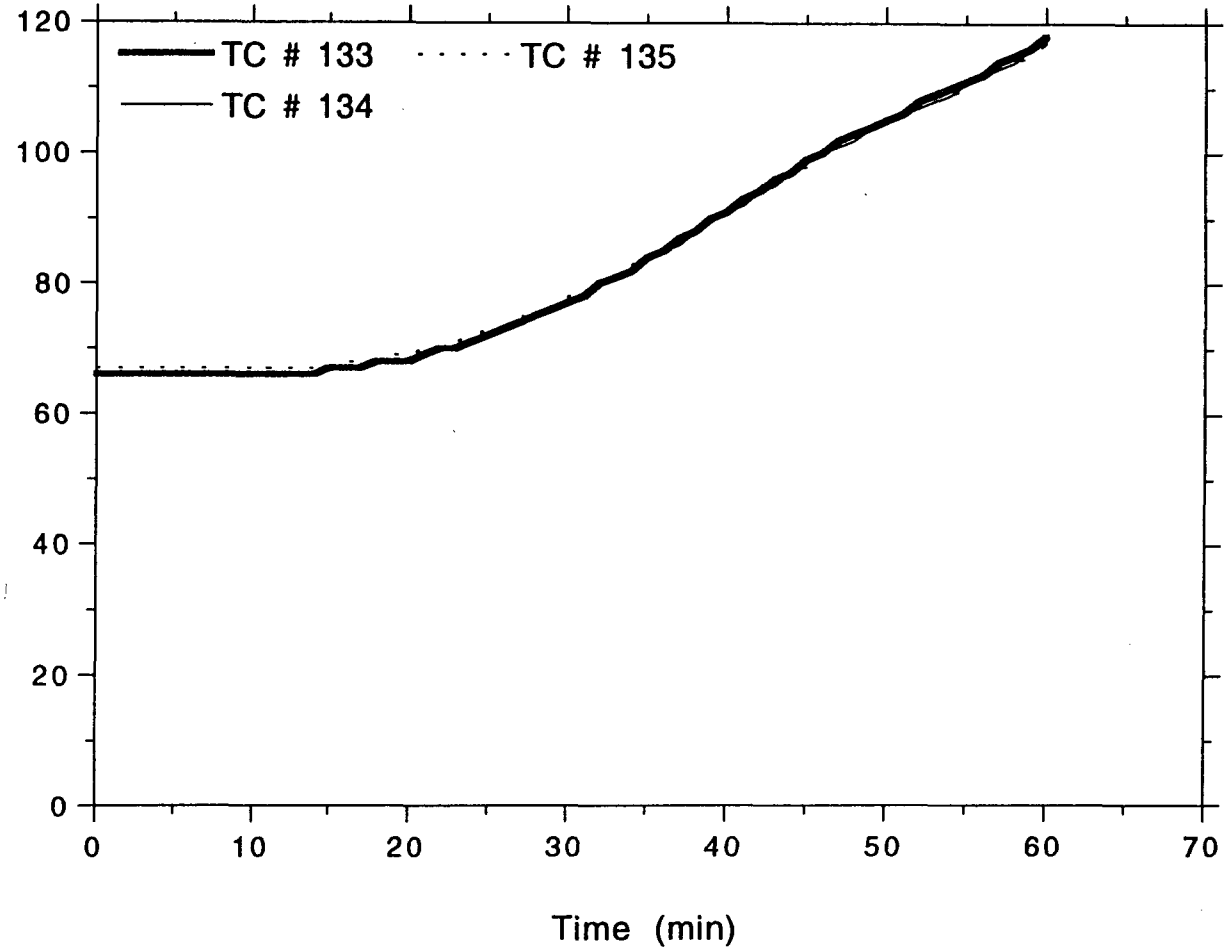

OMEGA POINT LABORATORIES

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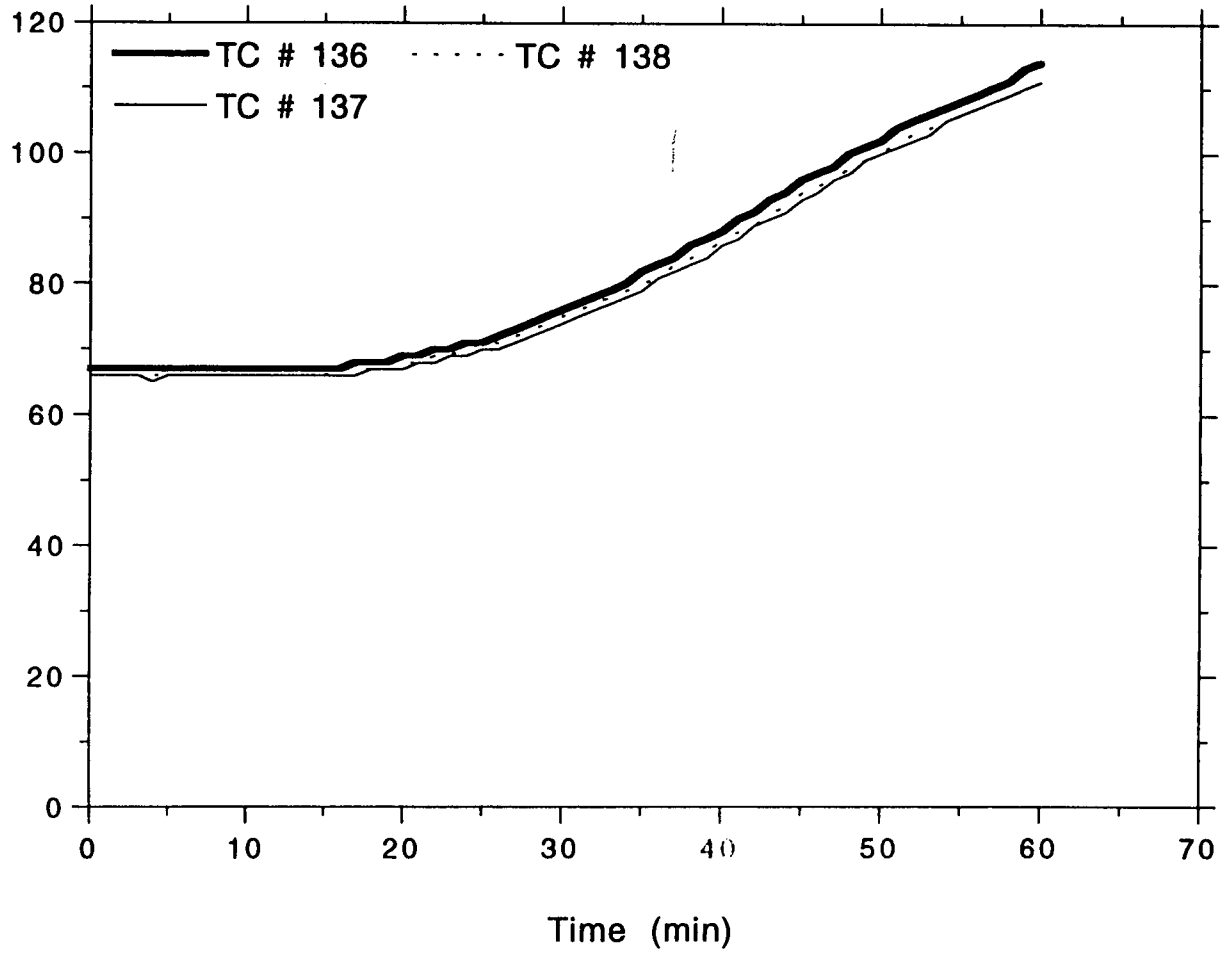

OMEGA POINT LABORATORIES

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Project No. 11960-97257
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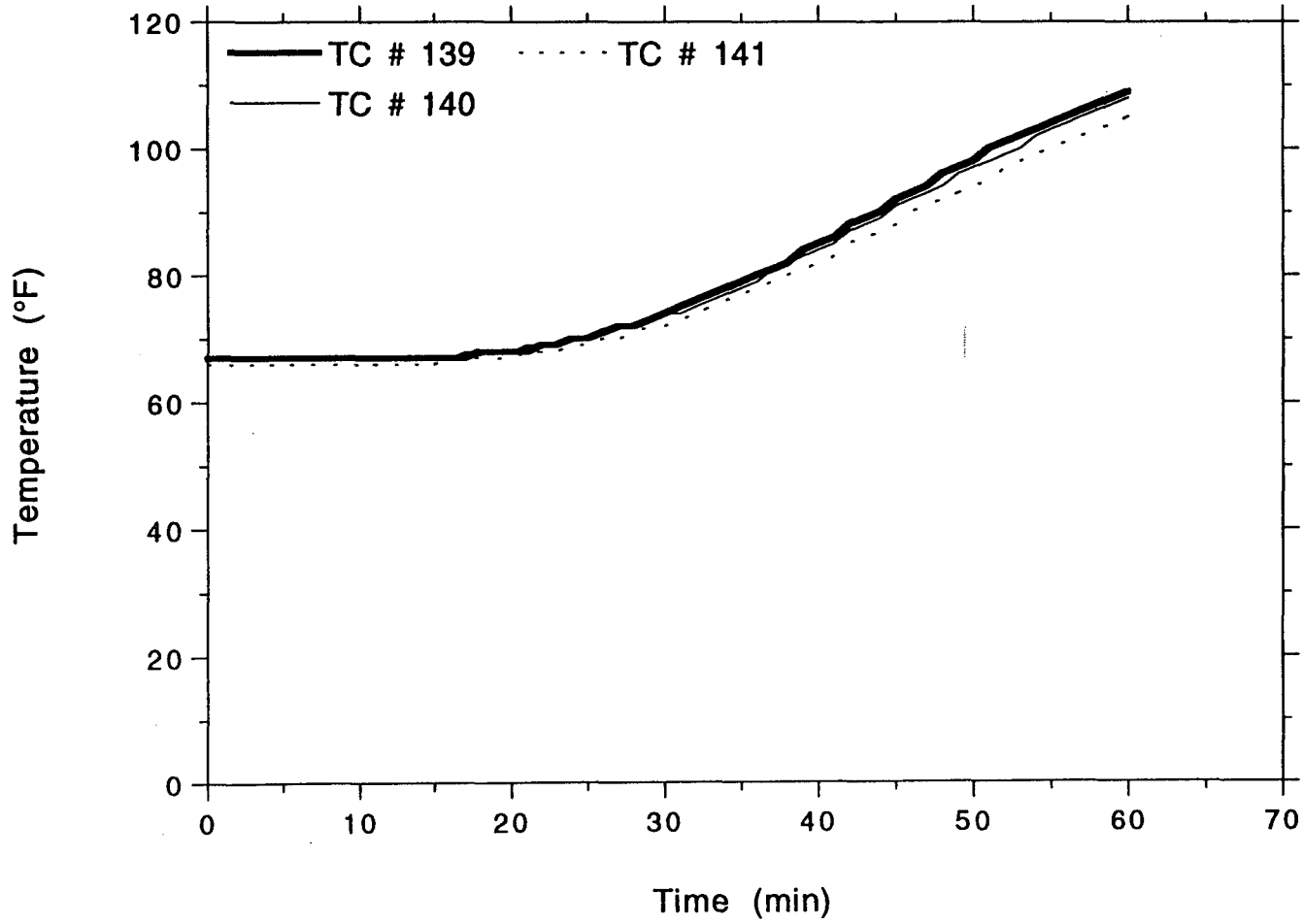

OMEGA POINT LABORATORIES

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Project No. 11960-97257
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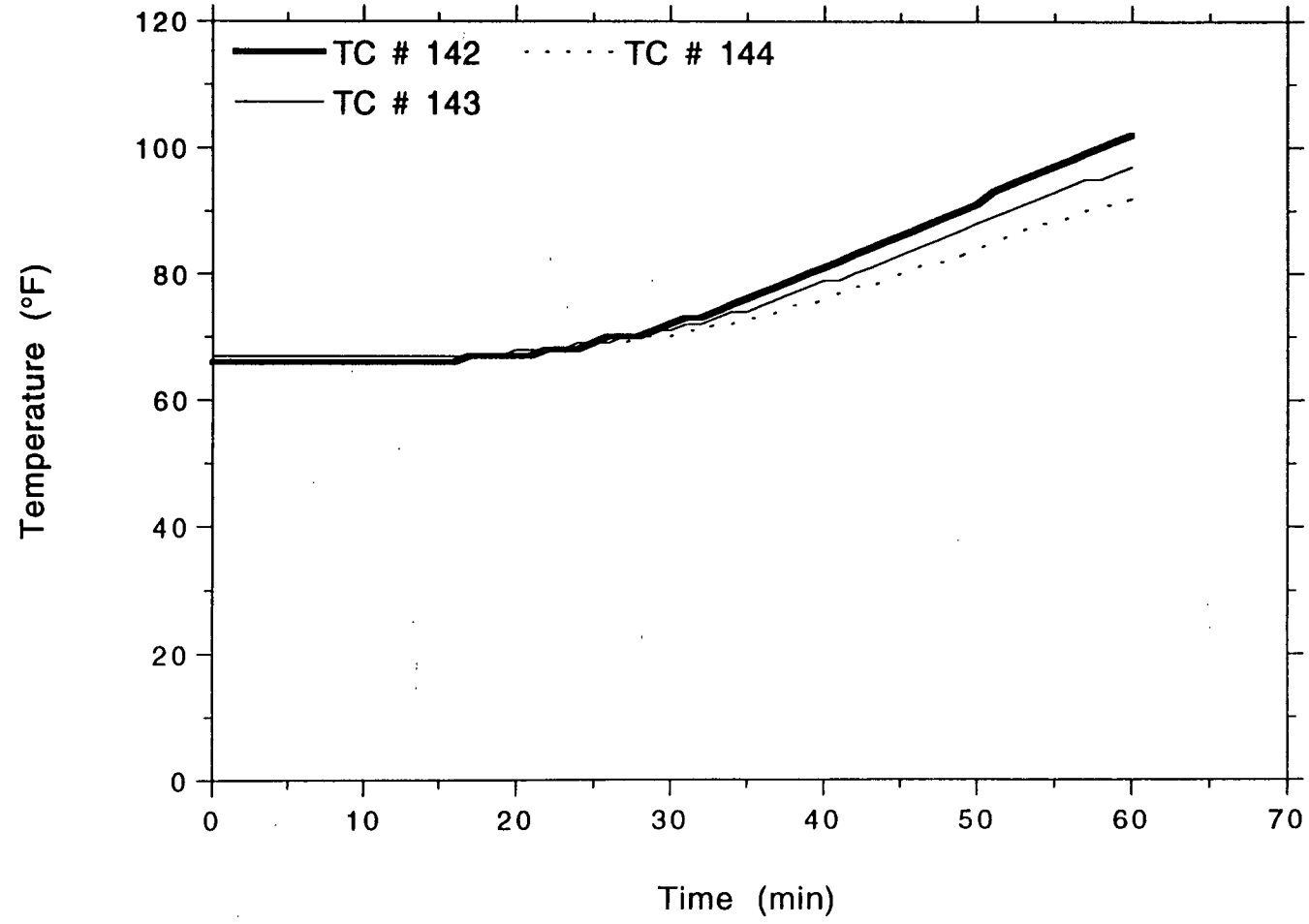

OMEGA POINT LABORATORIES

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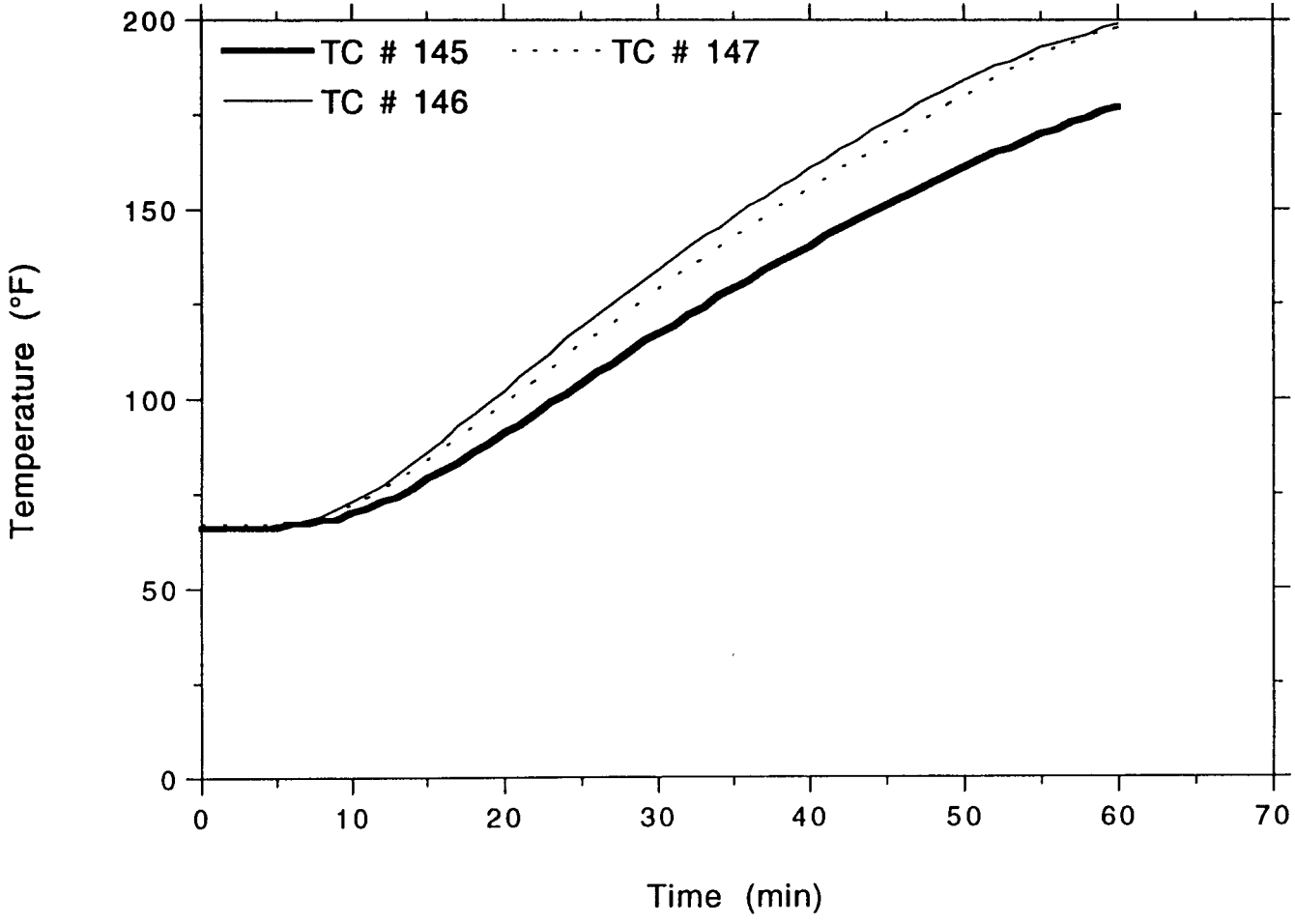

OMEGA POINT LABORATORIES

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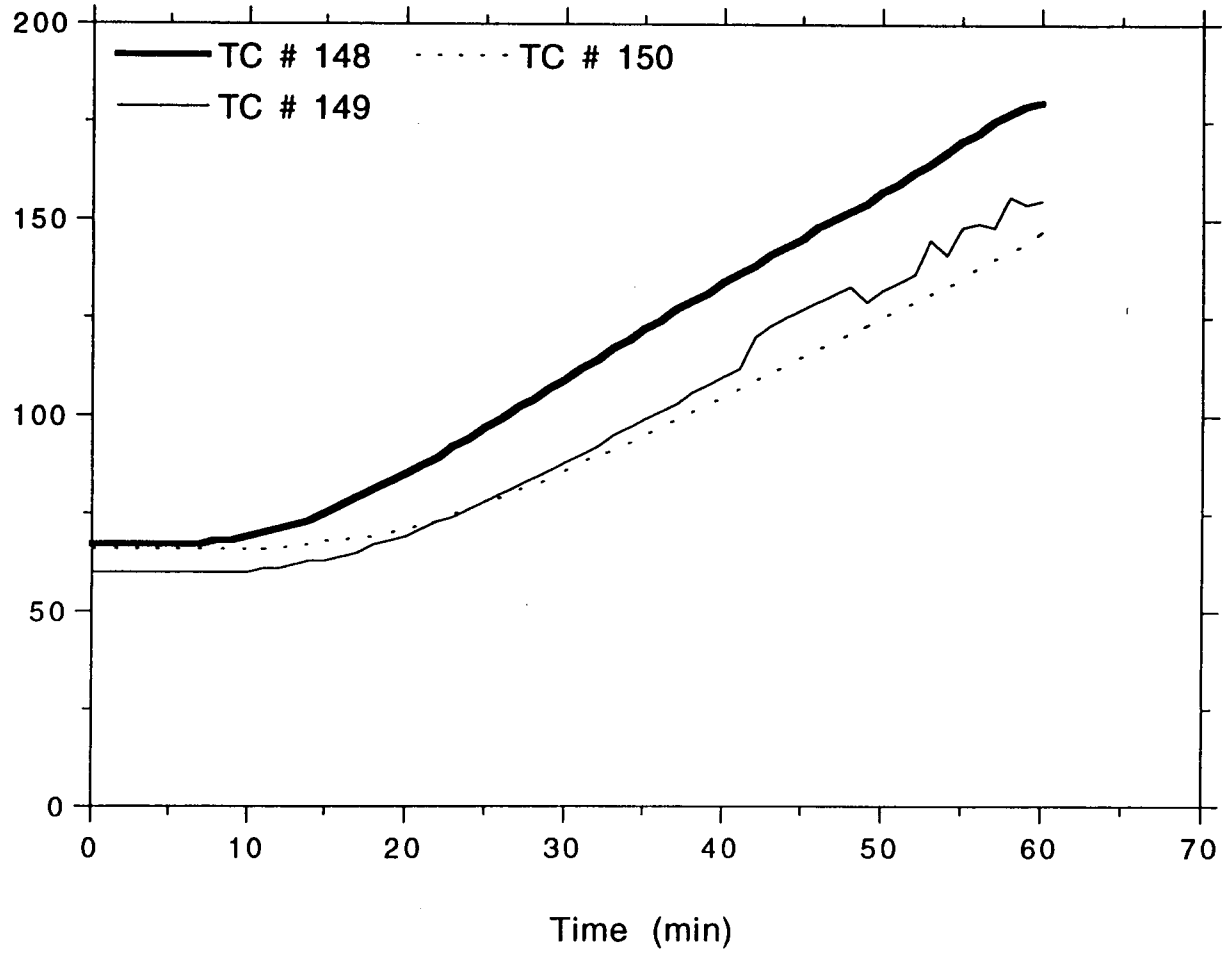

OMEGA POINT LABORATORIES

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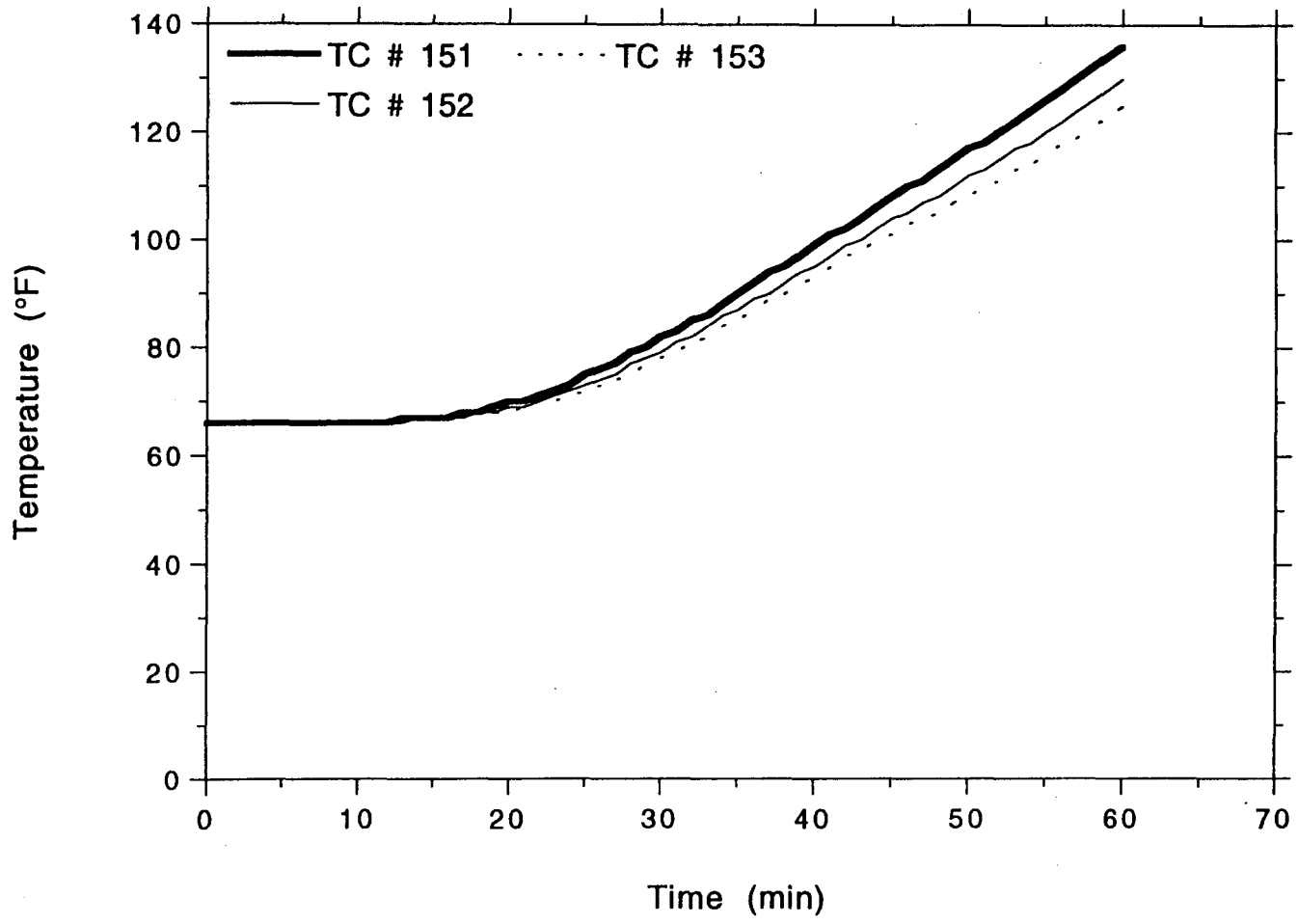

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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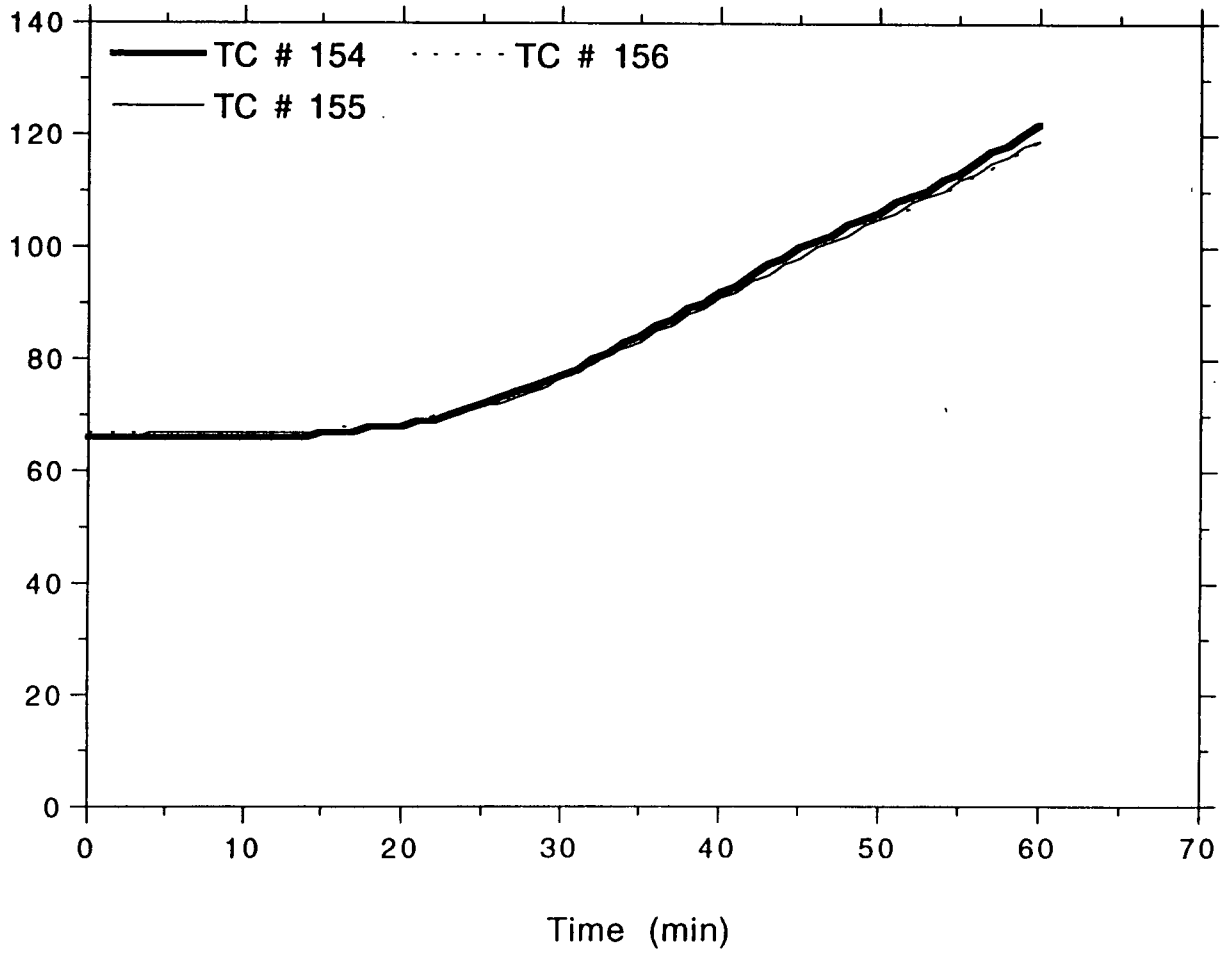

OMEGA POINT LABORATORIES

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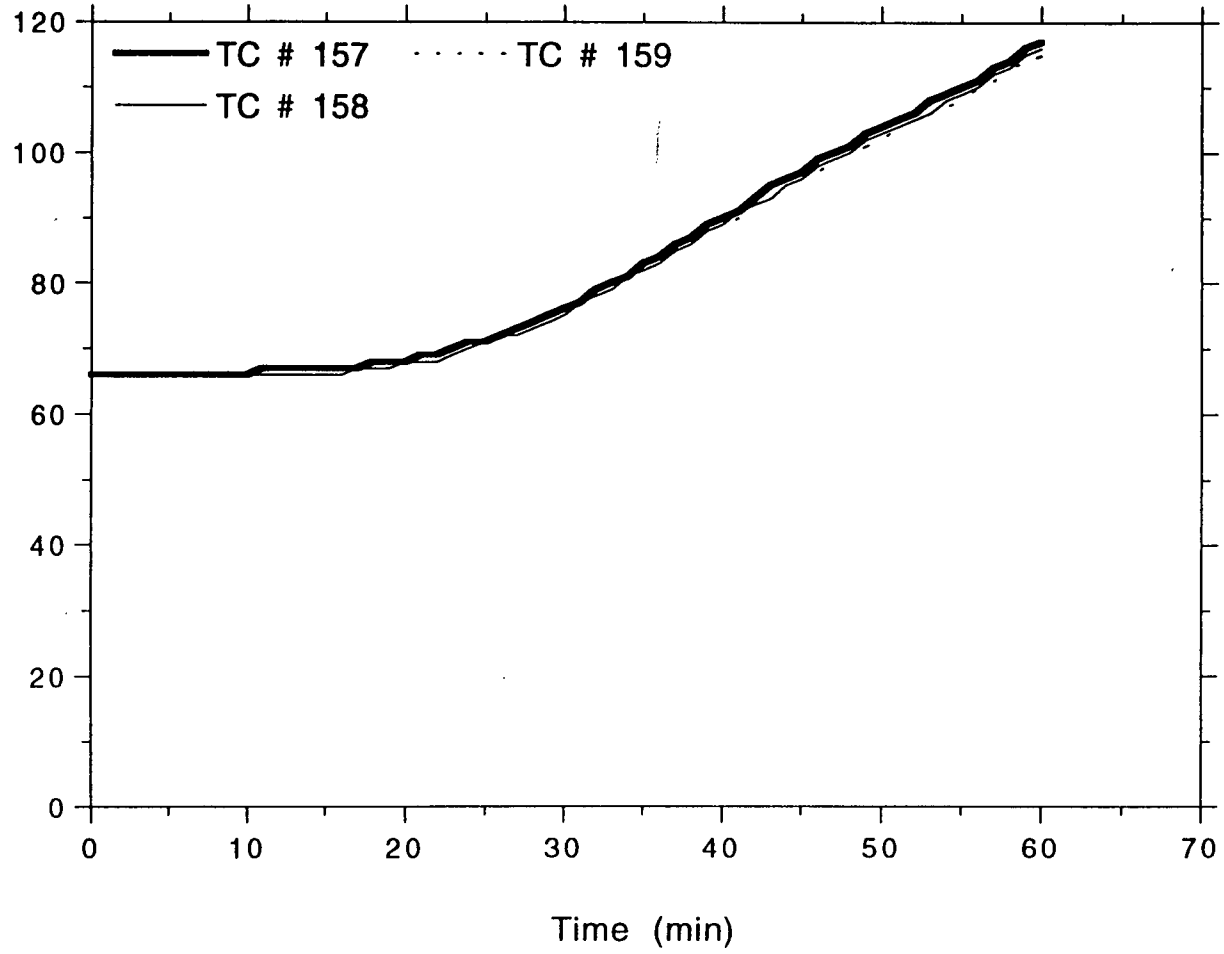

OMEGA POINT LABORATORIES

TSI/TVA
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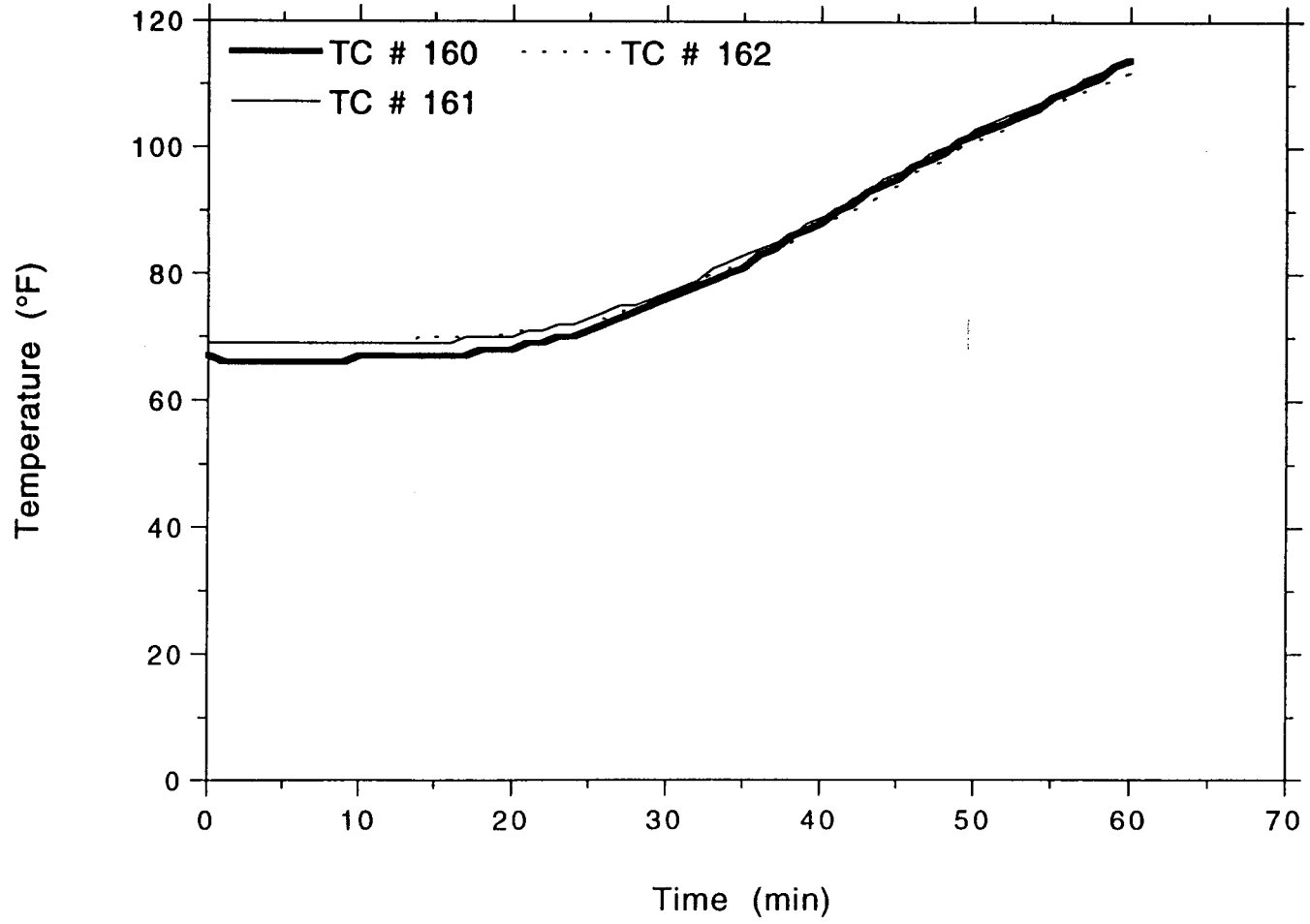

OMEGA POINT LABORATORIES

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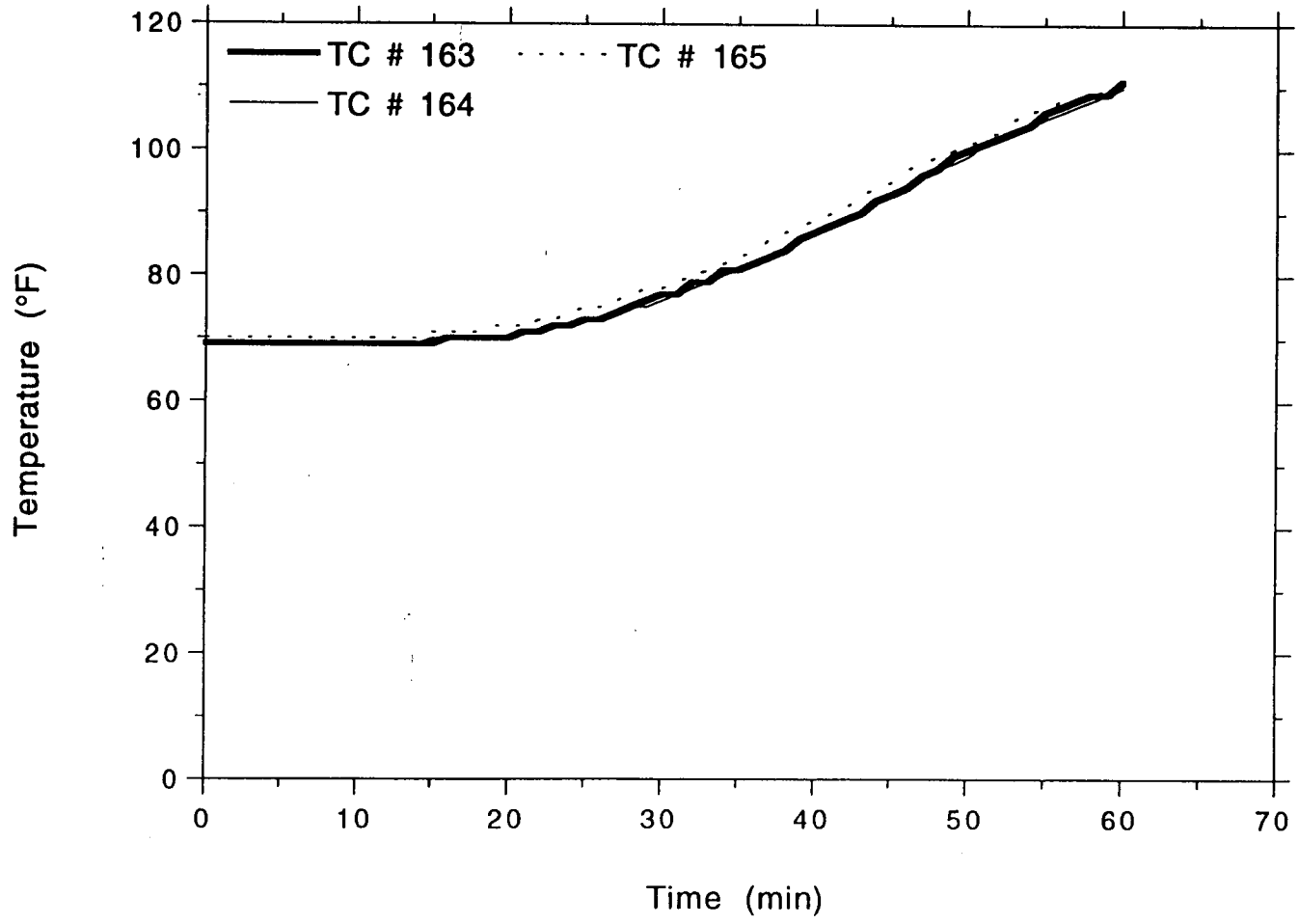

OMEGA POINT LABORATORIES

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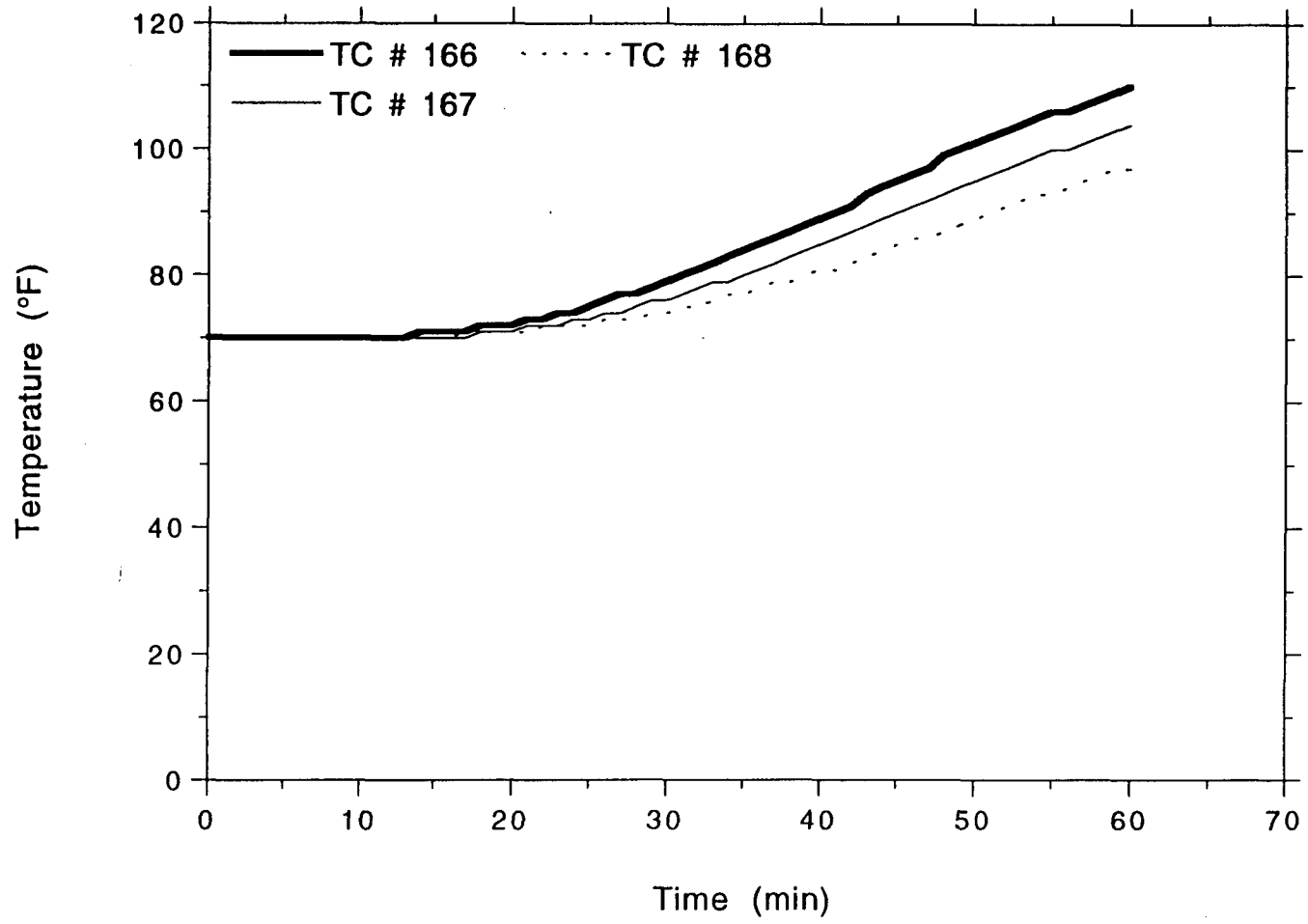

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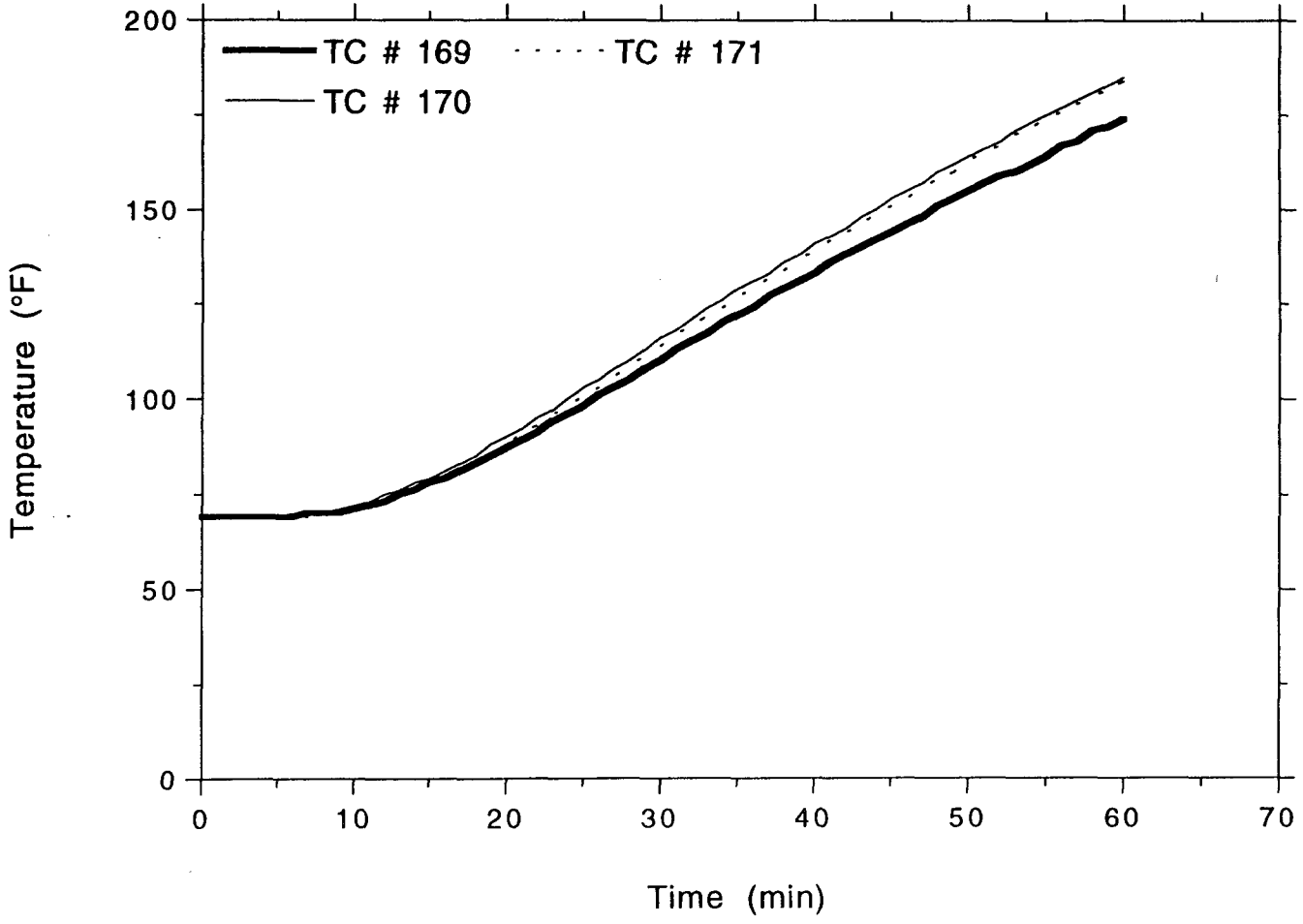

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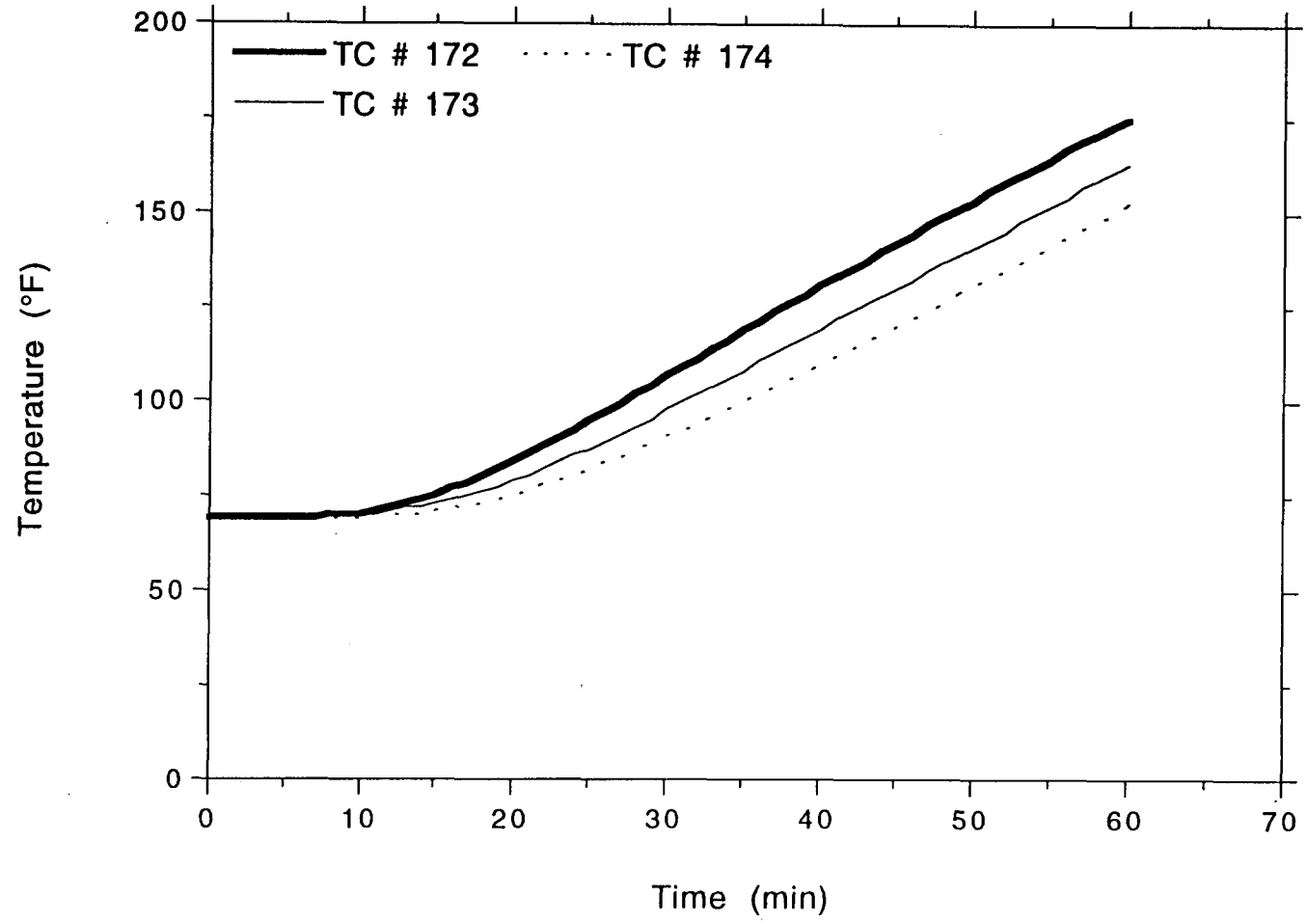

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TSI/TVA
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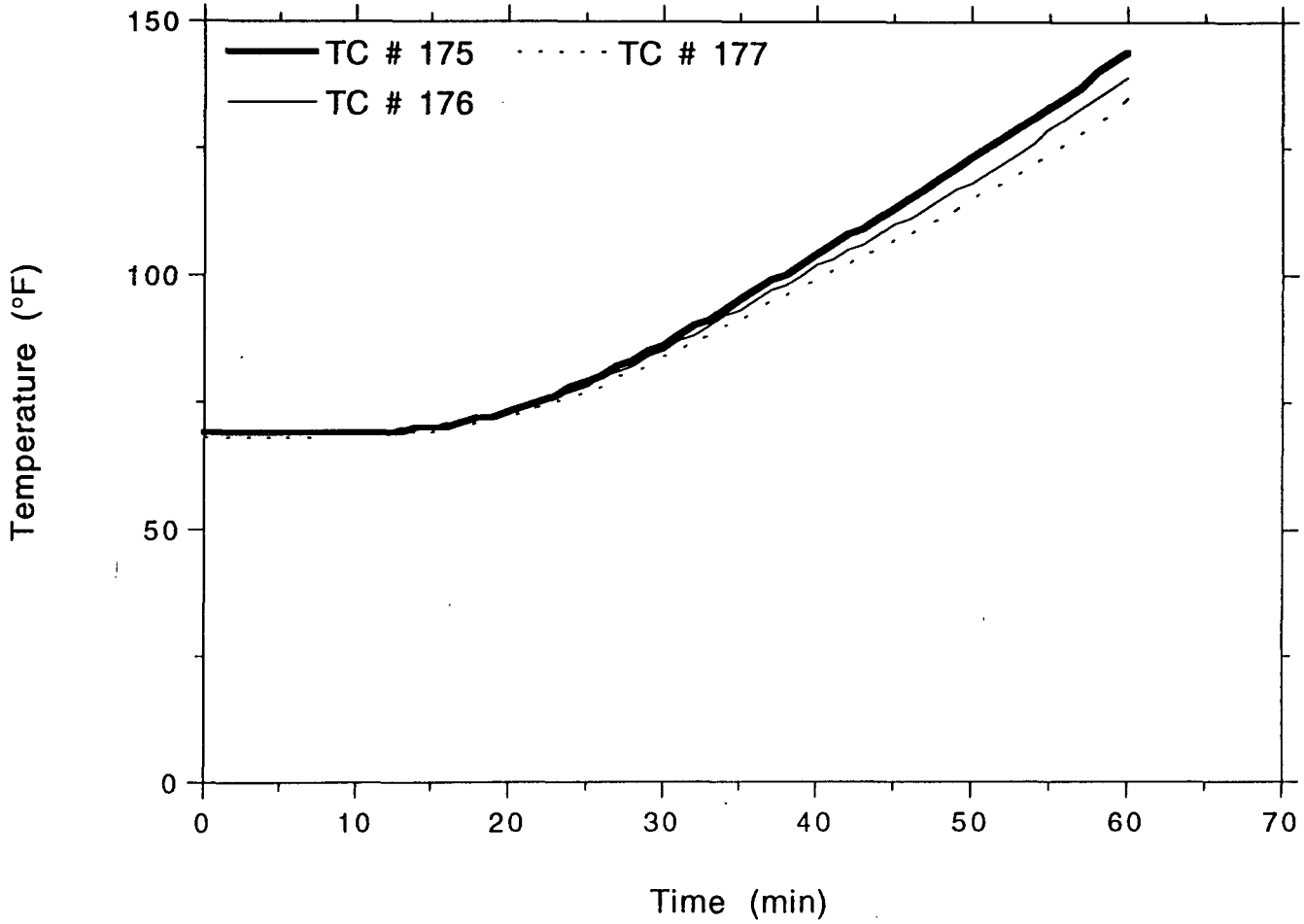

OMEGA POINT LABORATORIES

922

TSI/TVA
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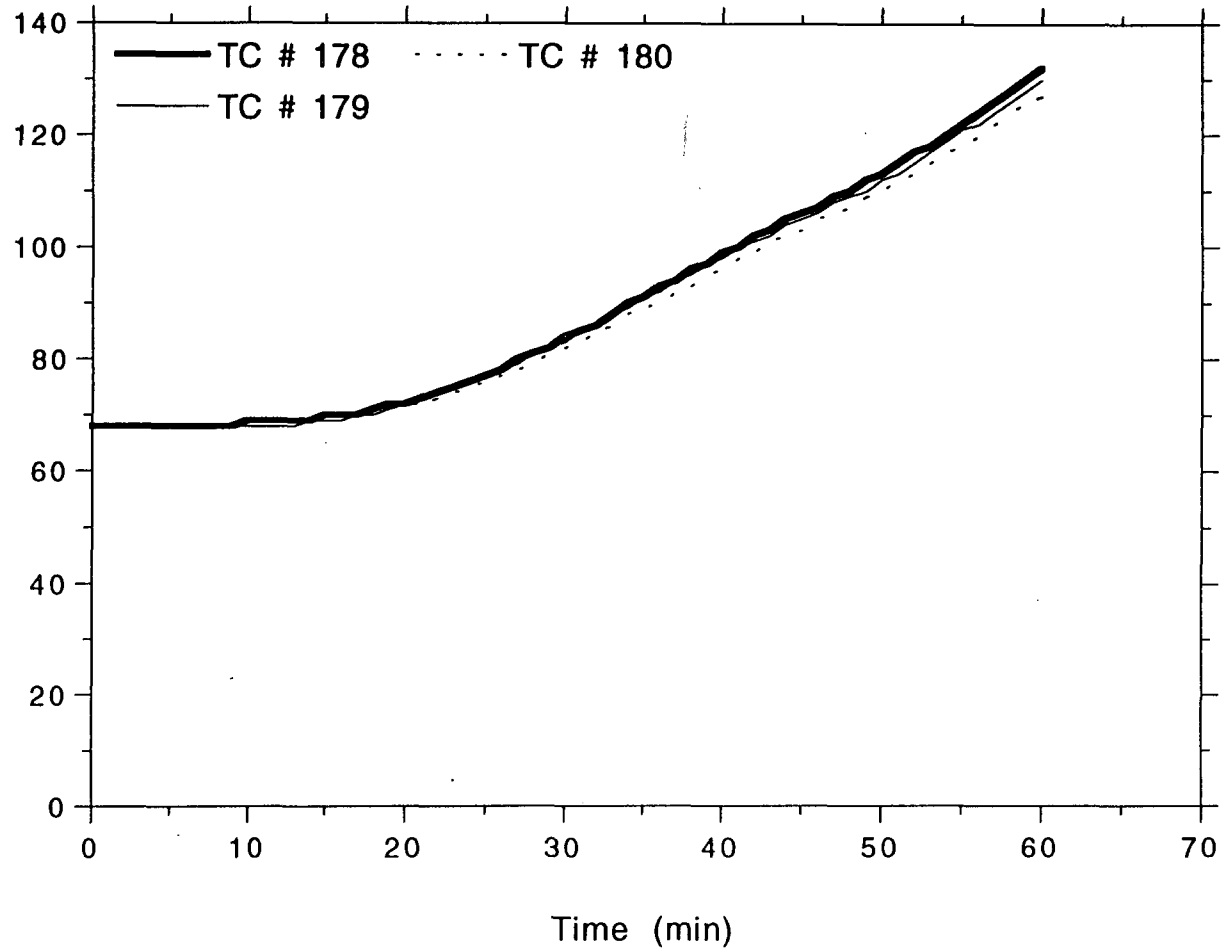

OMEGA POINT LABORATORIES

TSI/TVA
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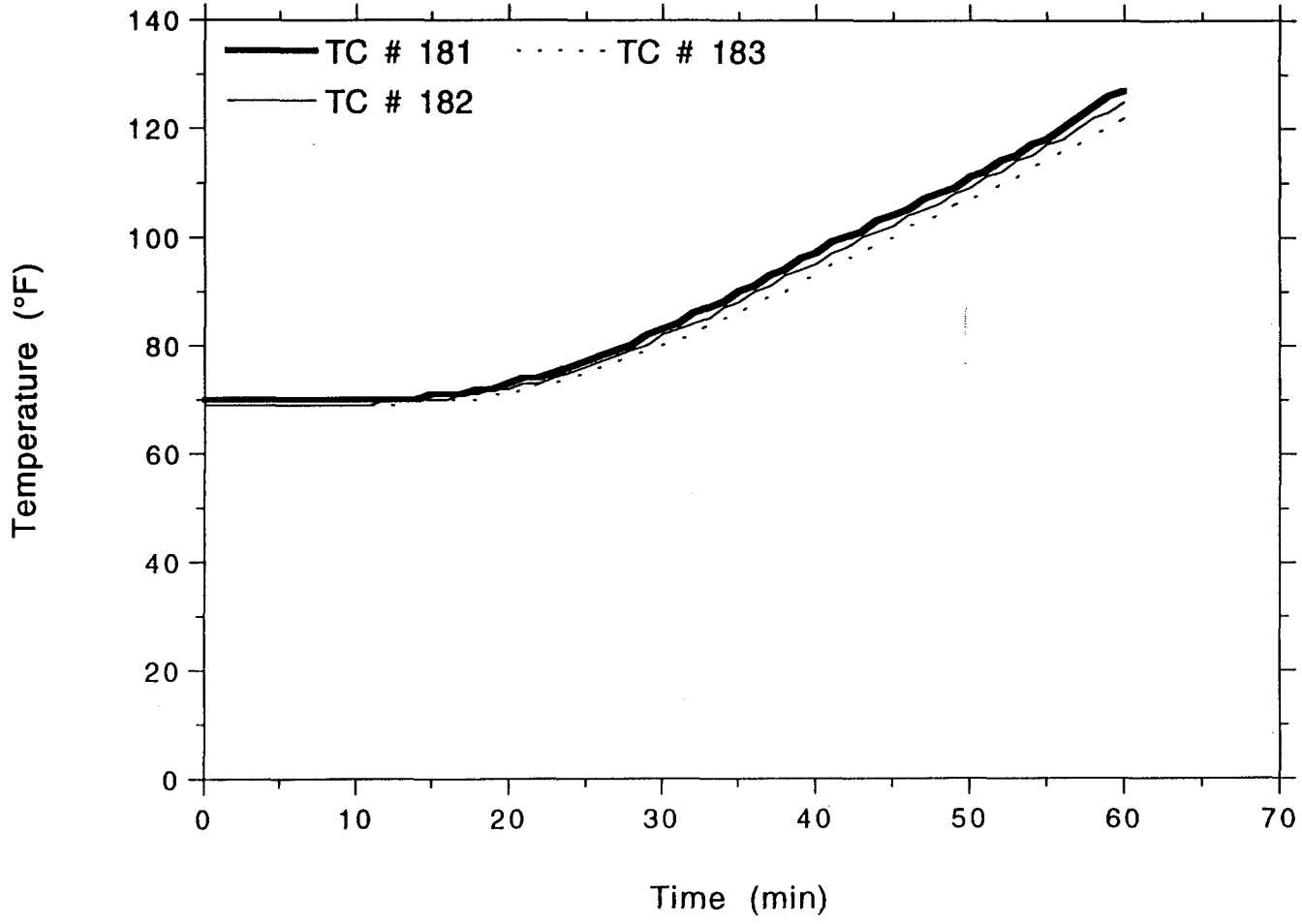

OMEGA POINT LABORATORIES

TSI/TVA
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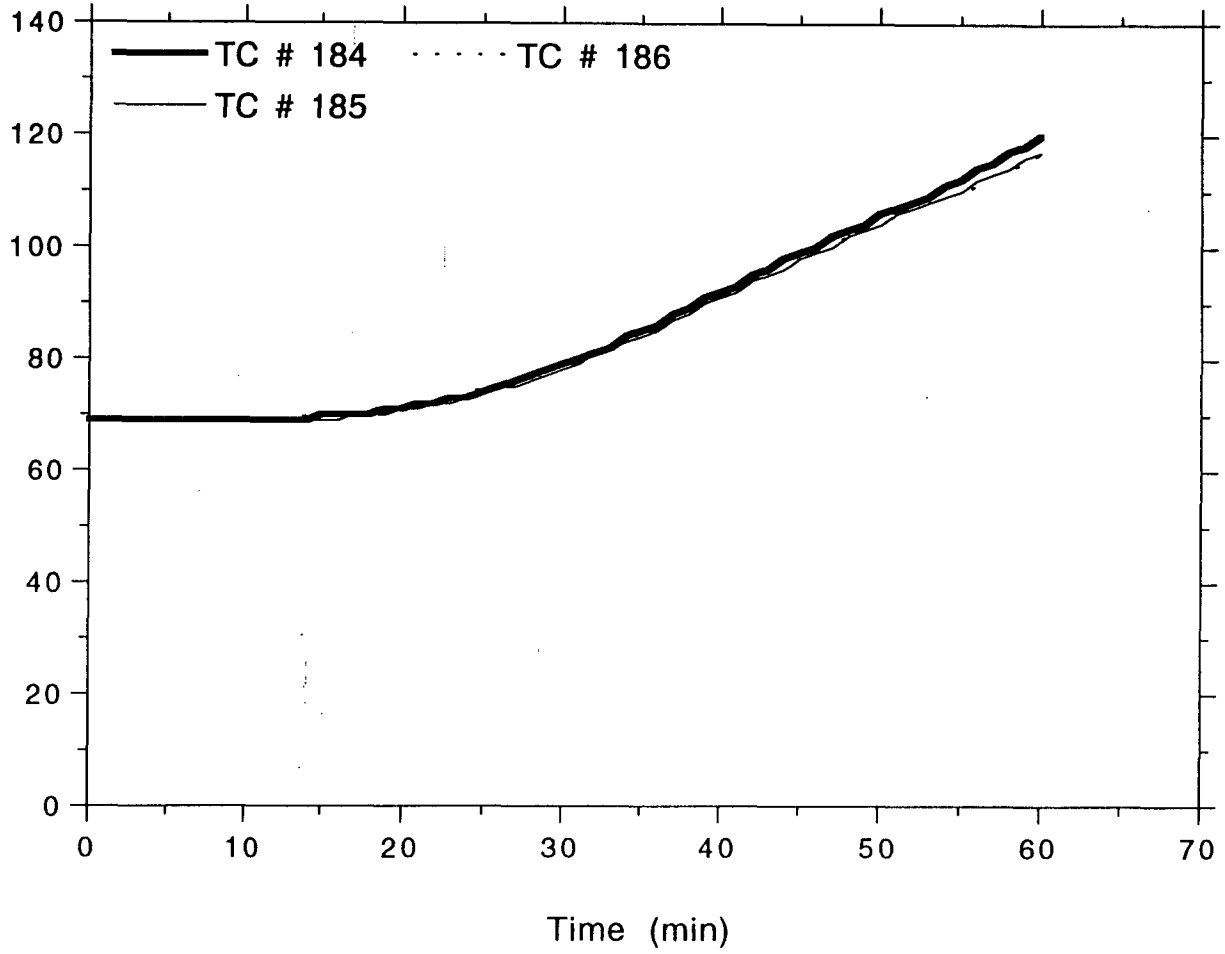

OMEGA POINT LABORATORIES

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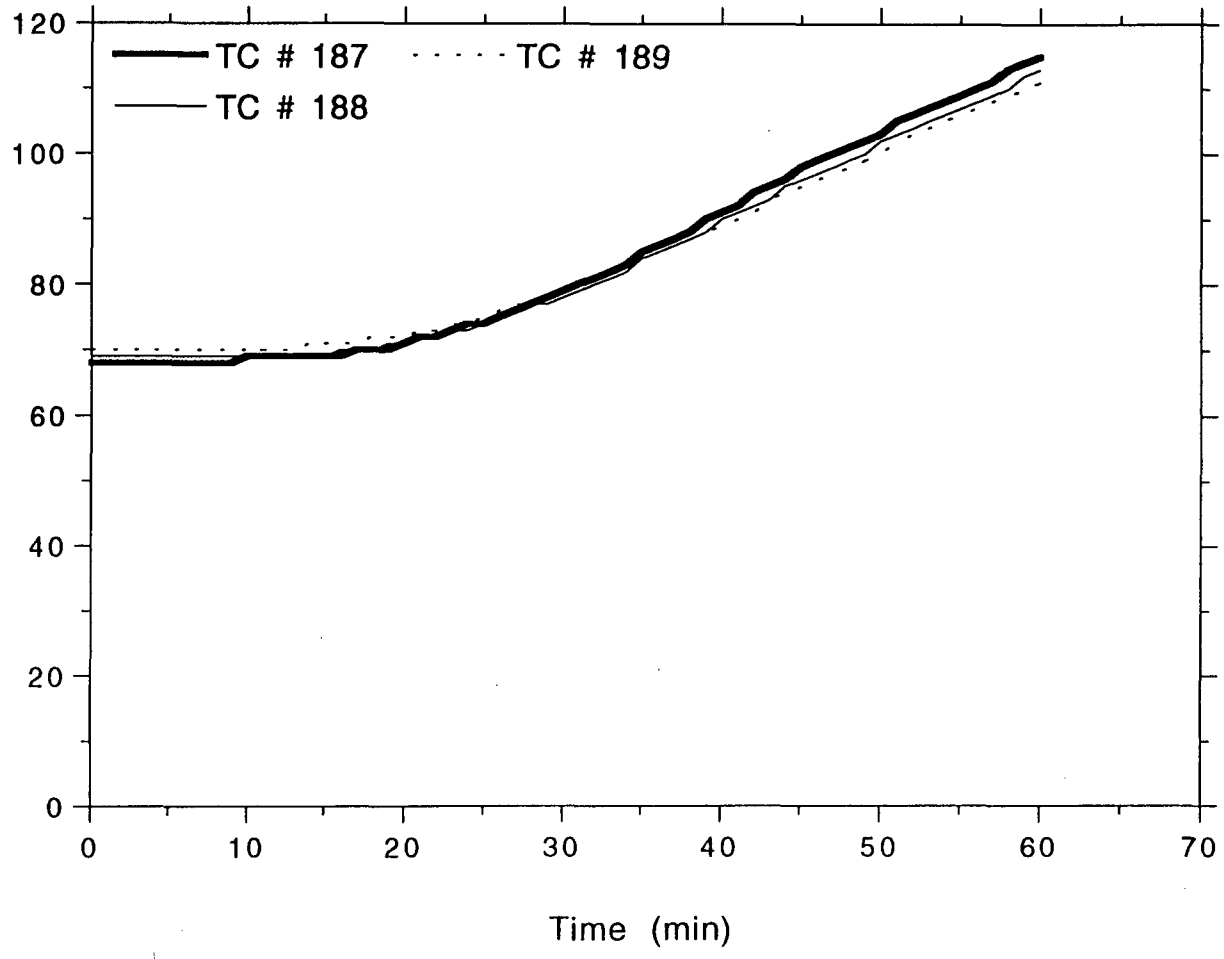

OMEGA POINT LABORATORIES

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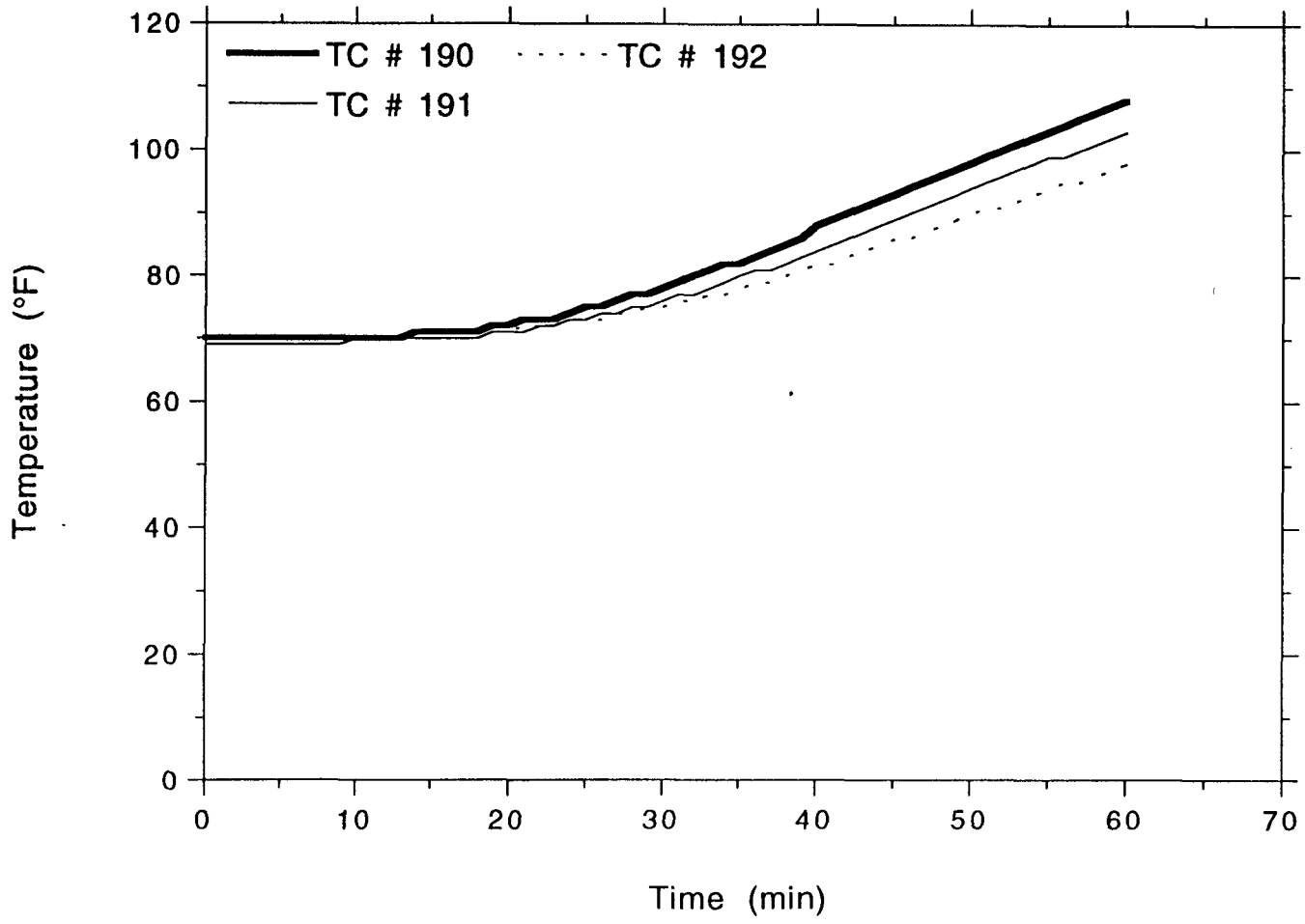

OMEGA POINT LABORATORIES

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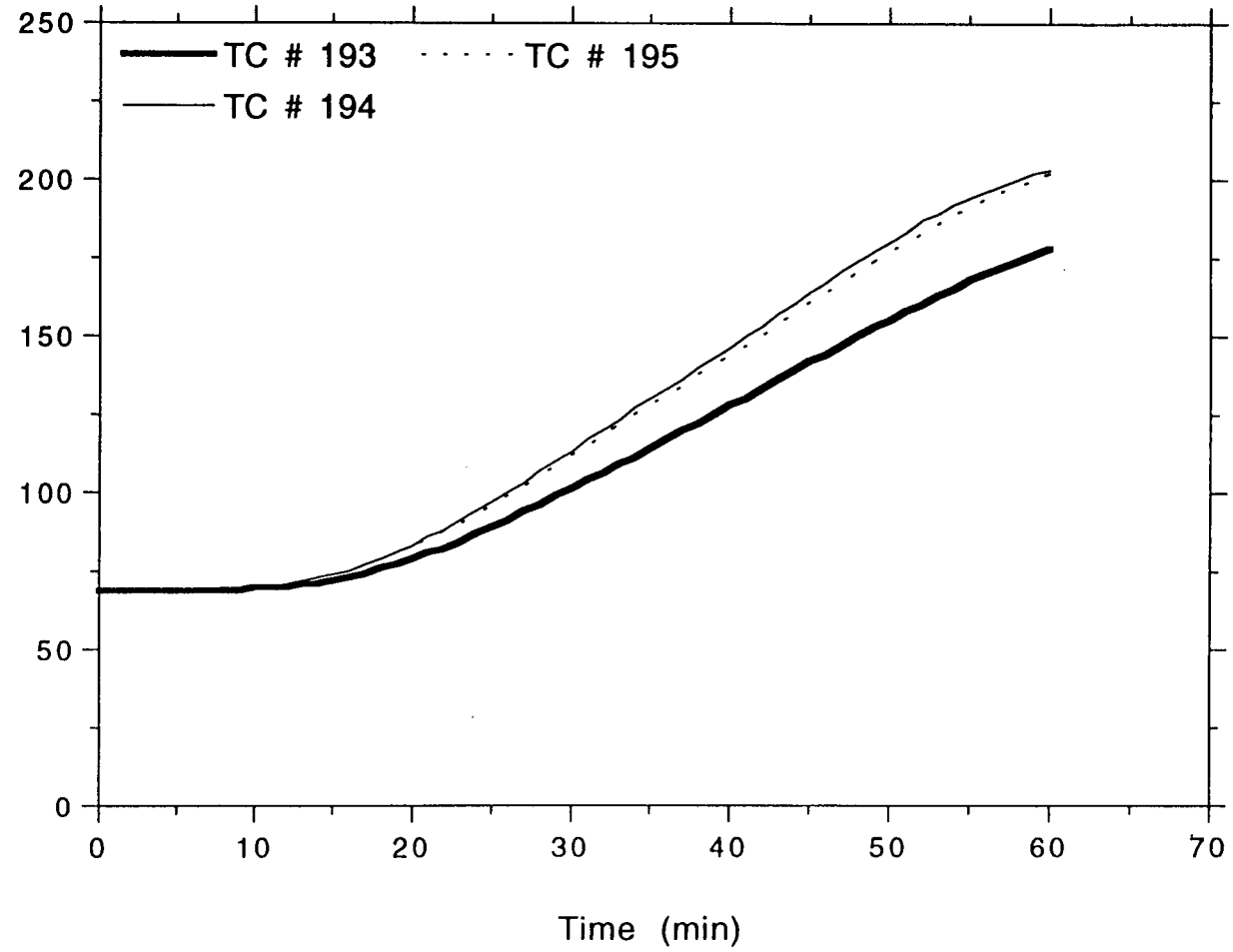

OMEGA POINT LABORATORIES

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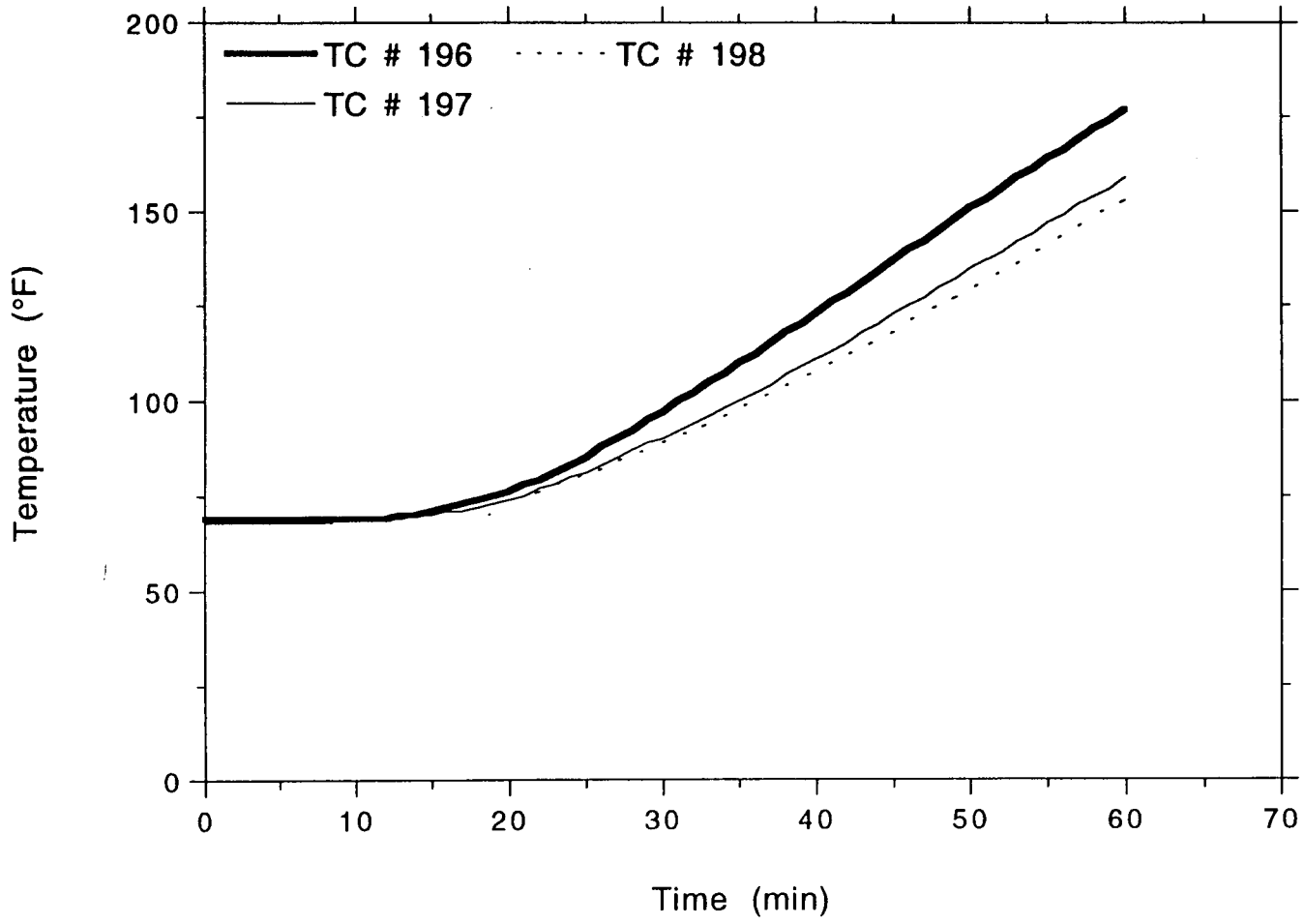

OMEGA POINT LABORATORIES

TSI/TVA
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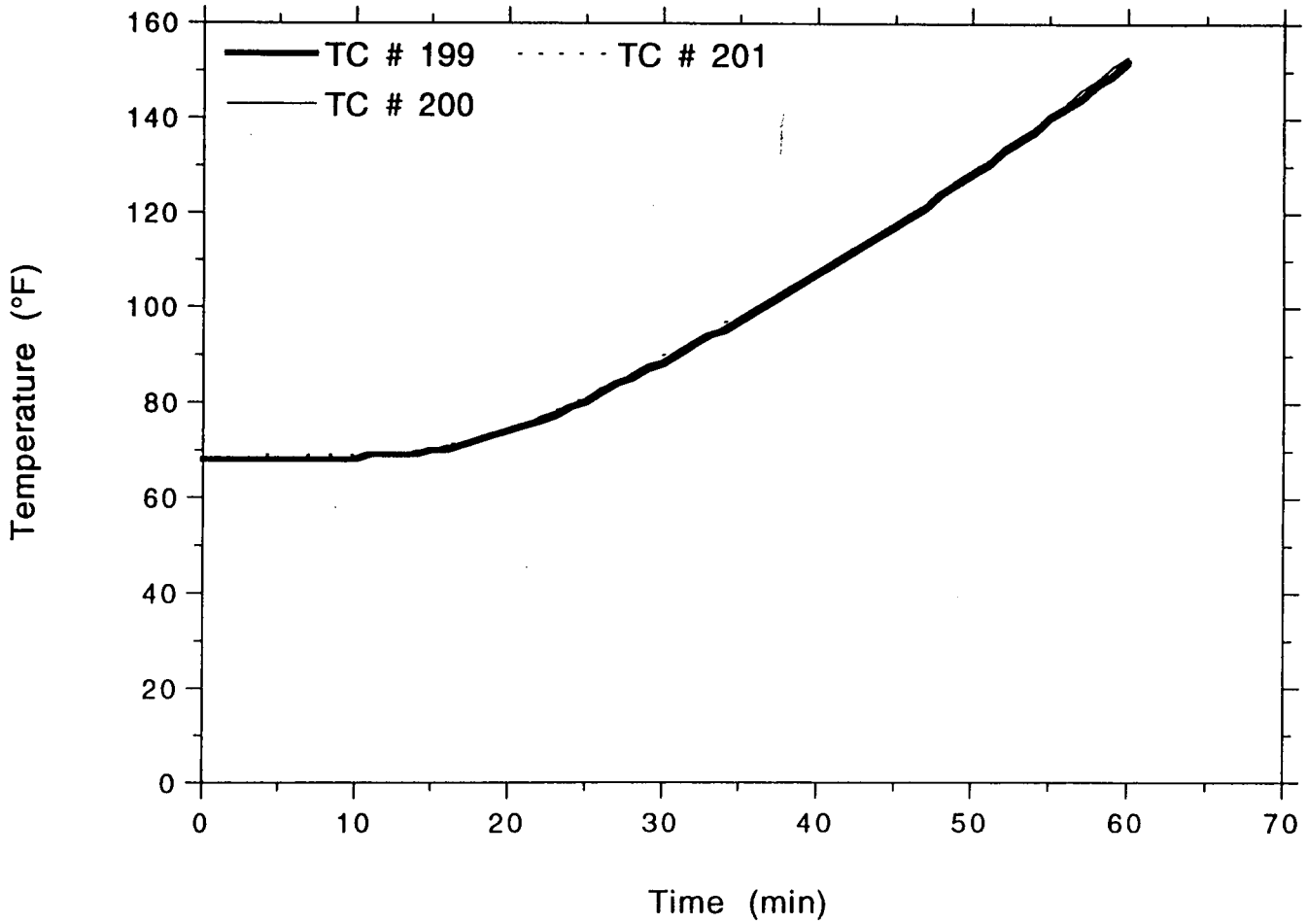

OMEGA POINT LABORATORIES

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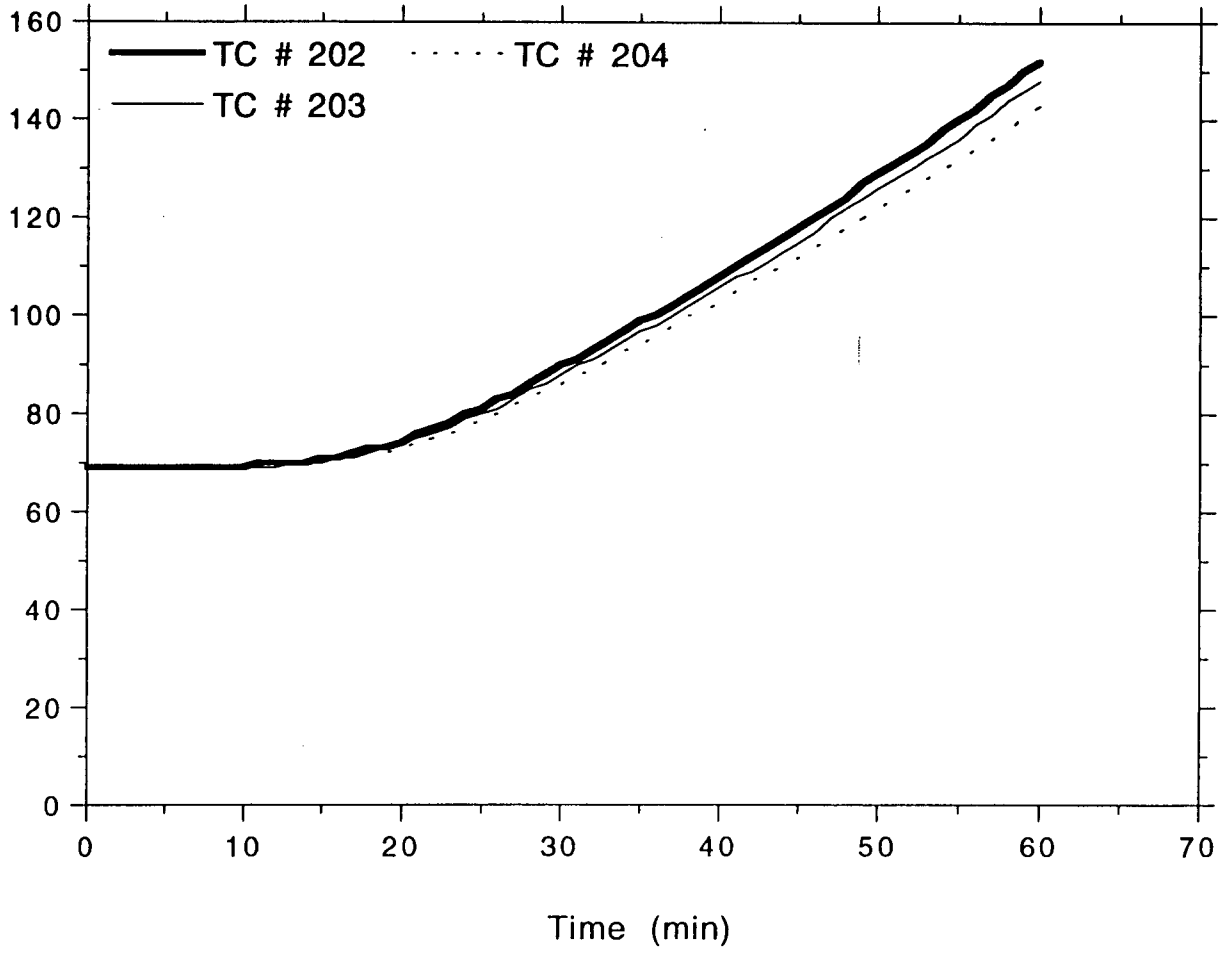

OMEGA POINT LABORATORIES

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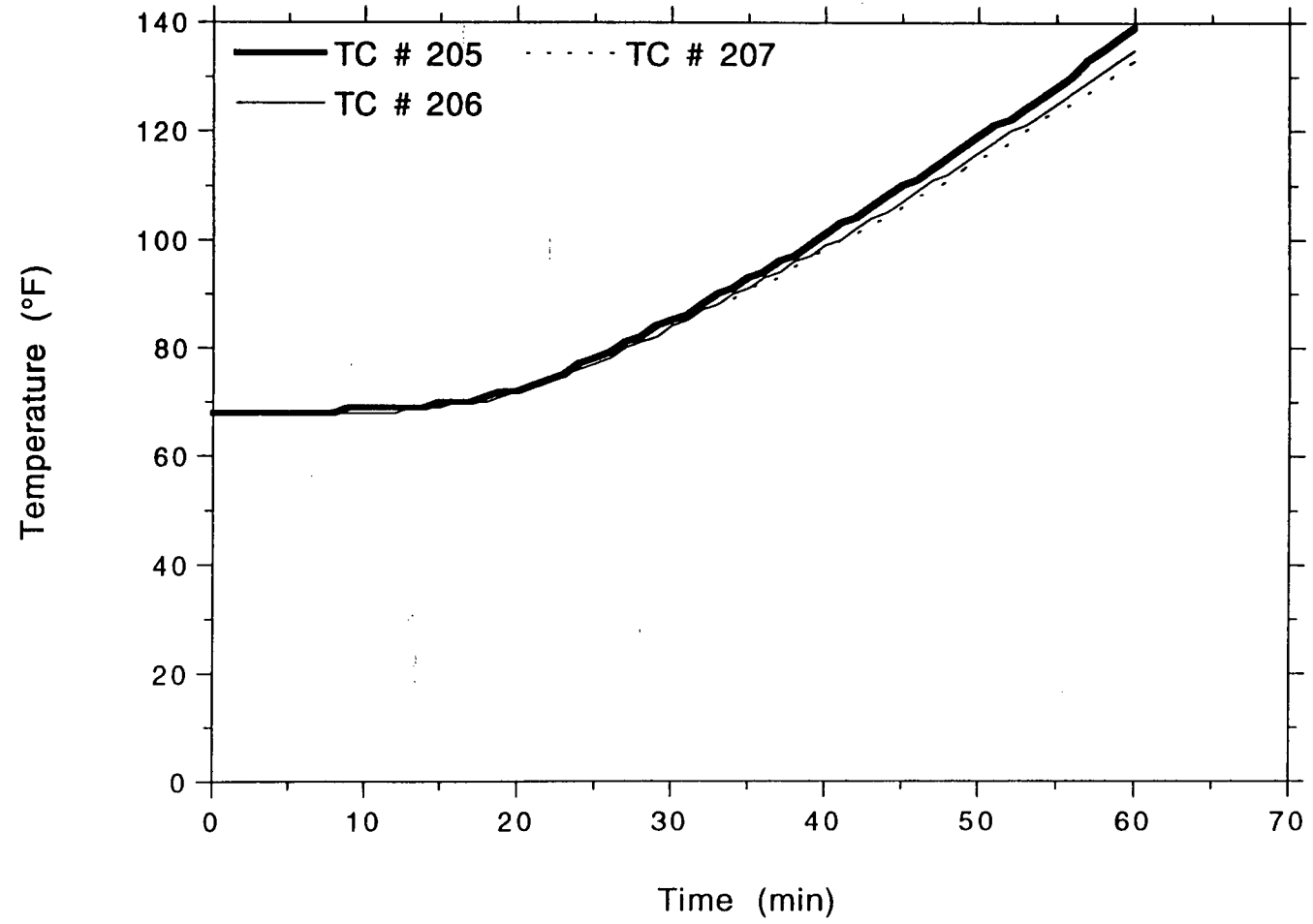

OMEGA POINT LABORATORIES

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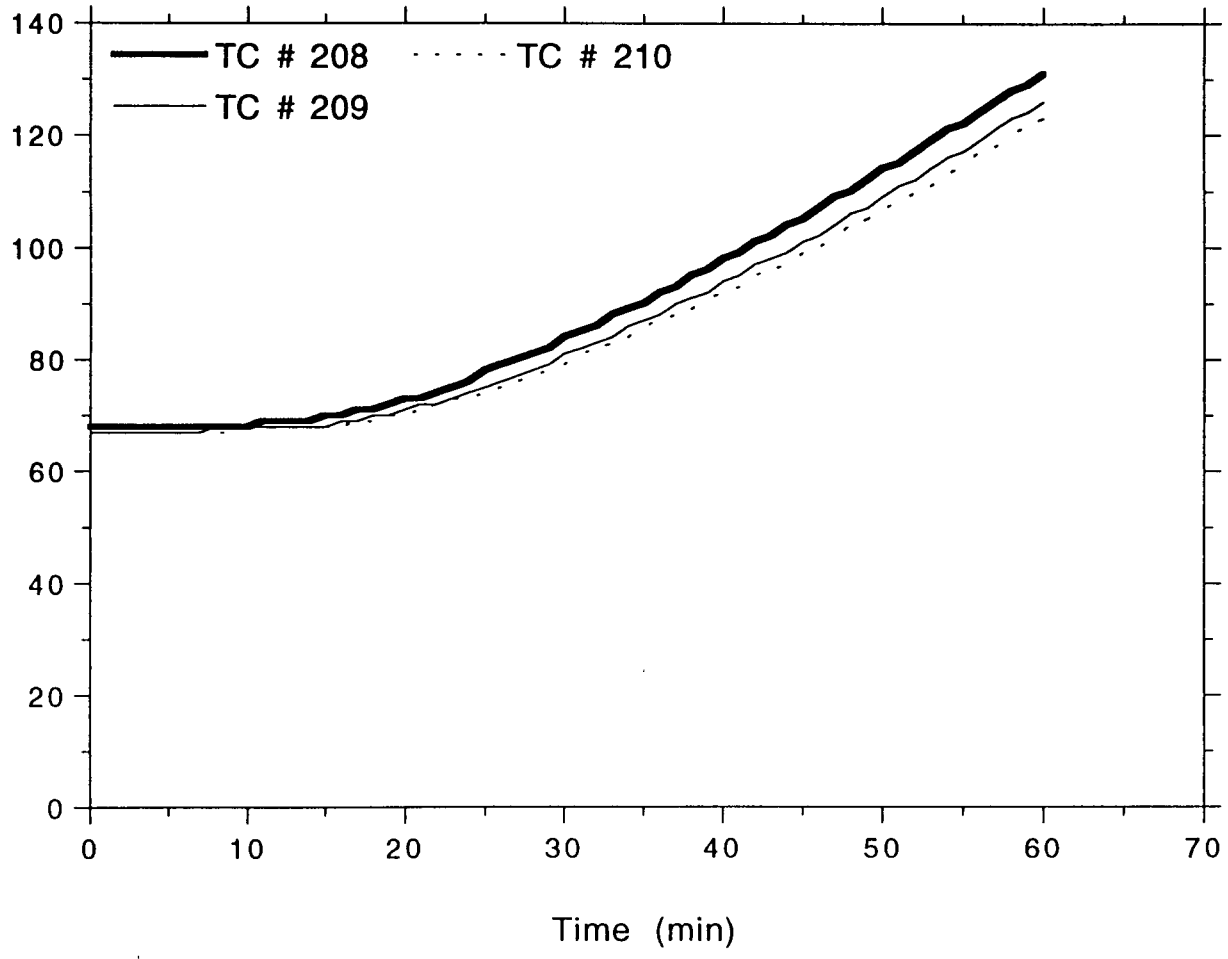

OMEGA POINT LABORATORIES

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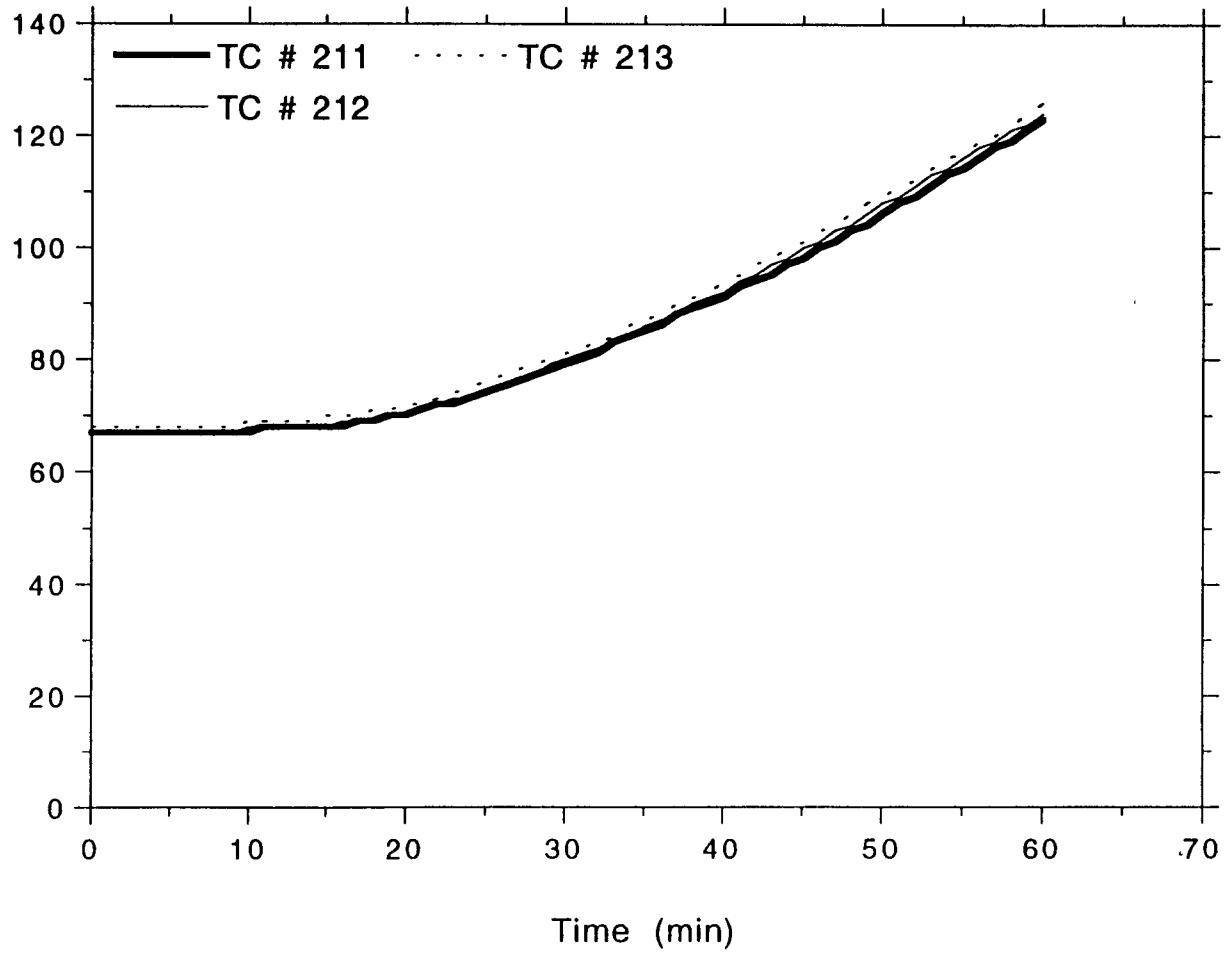

OMEGA POINT LABORATORIES

TSI/TVA
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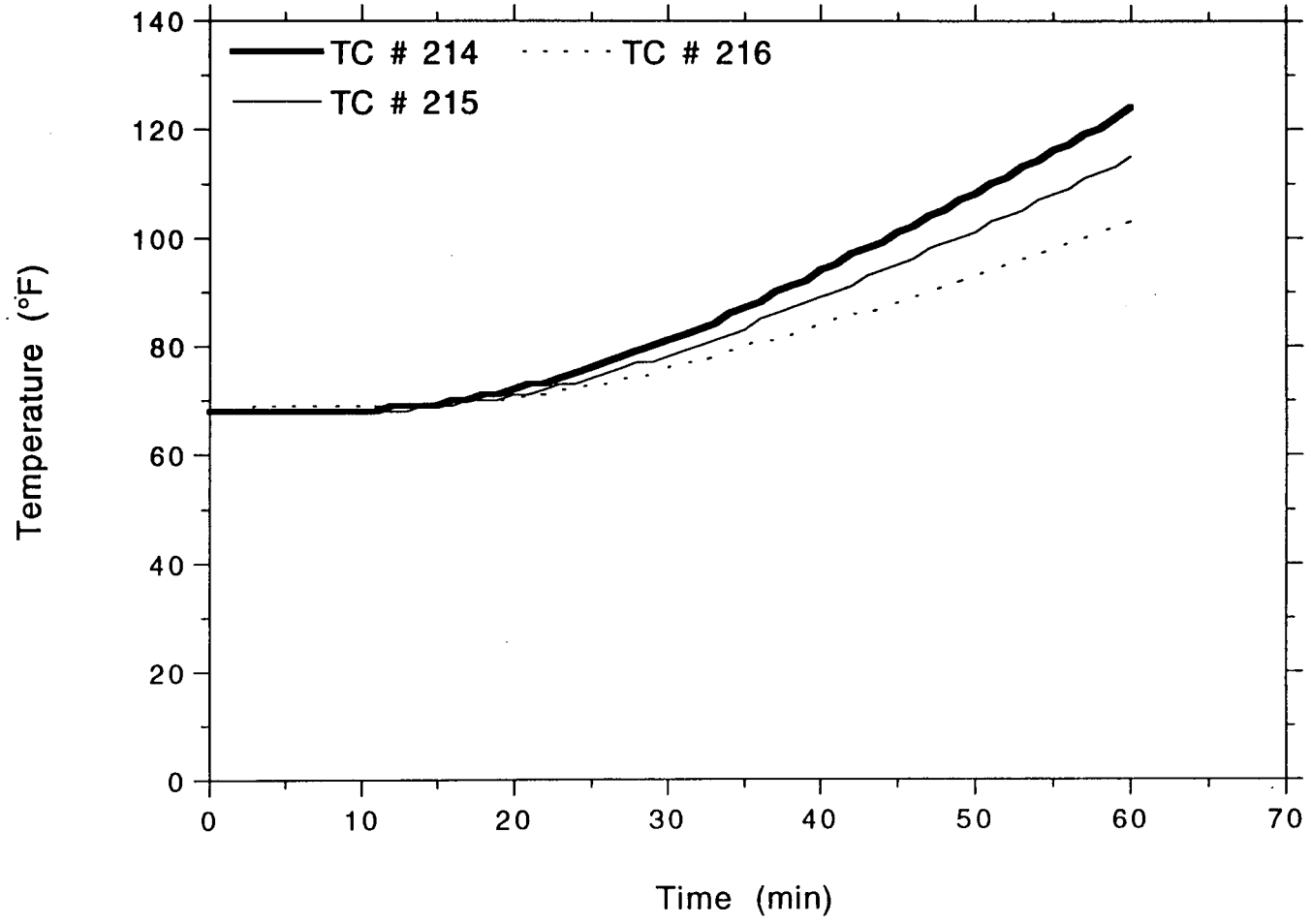
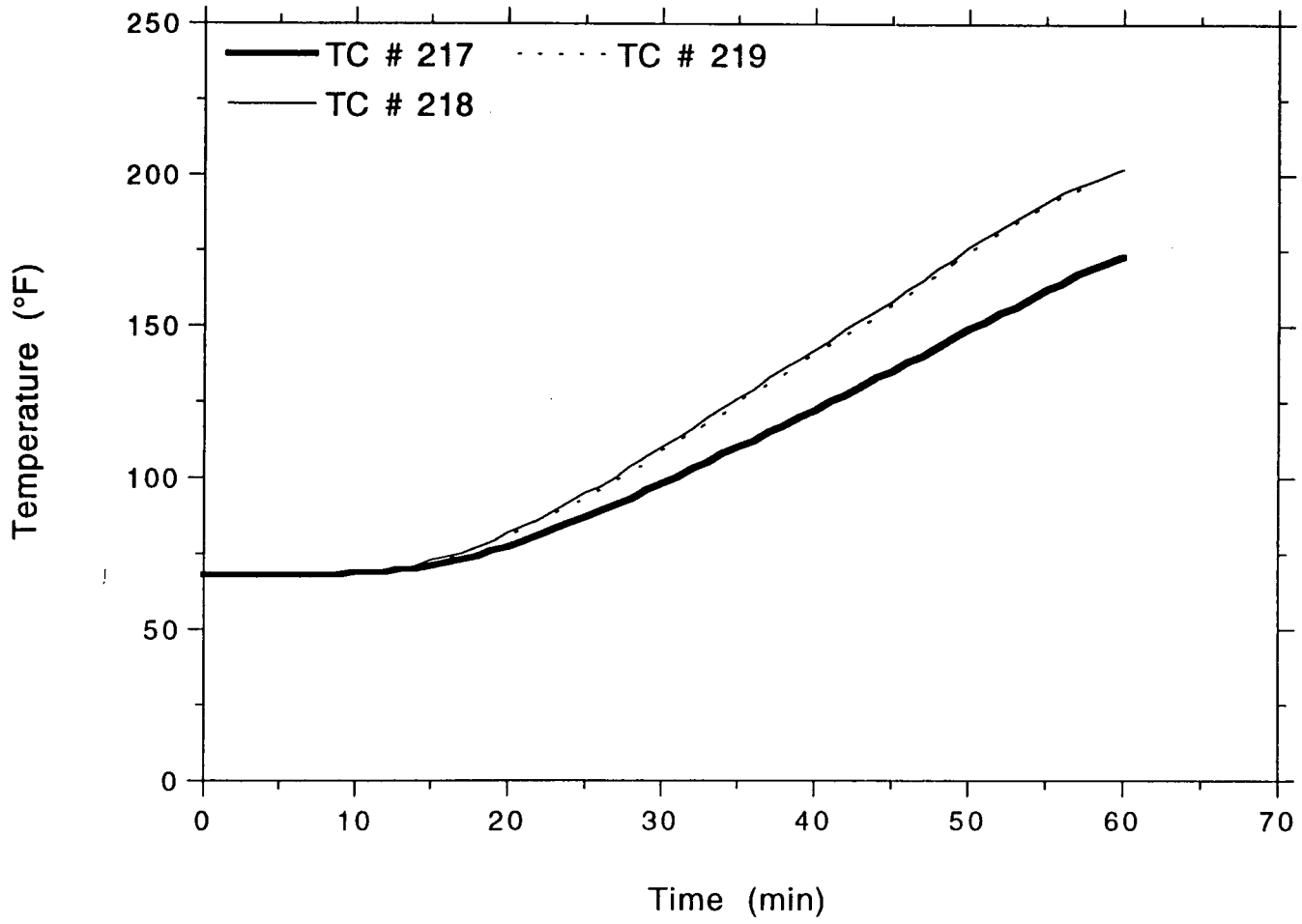


OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
#8 in Rear Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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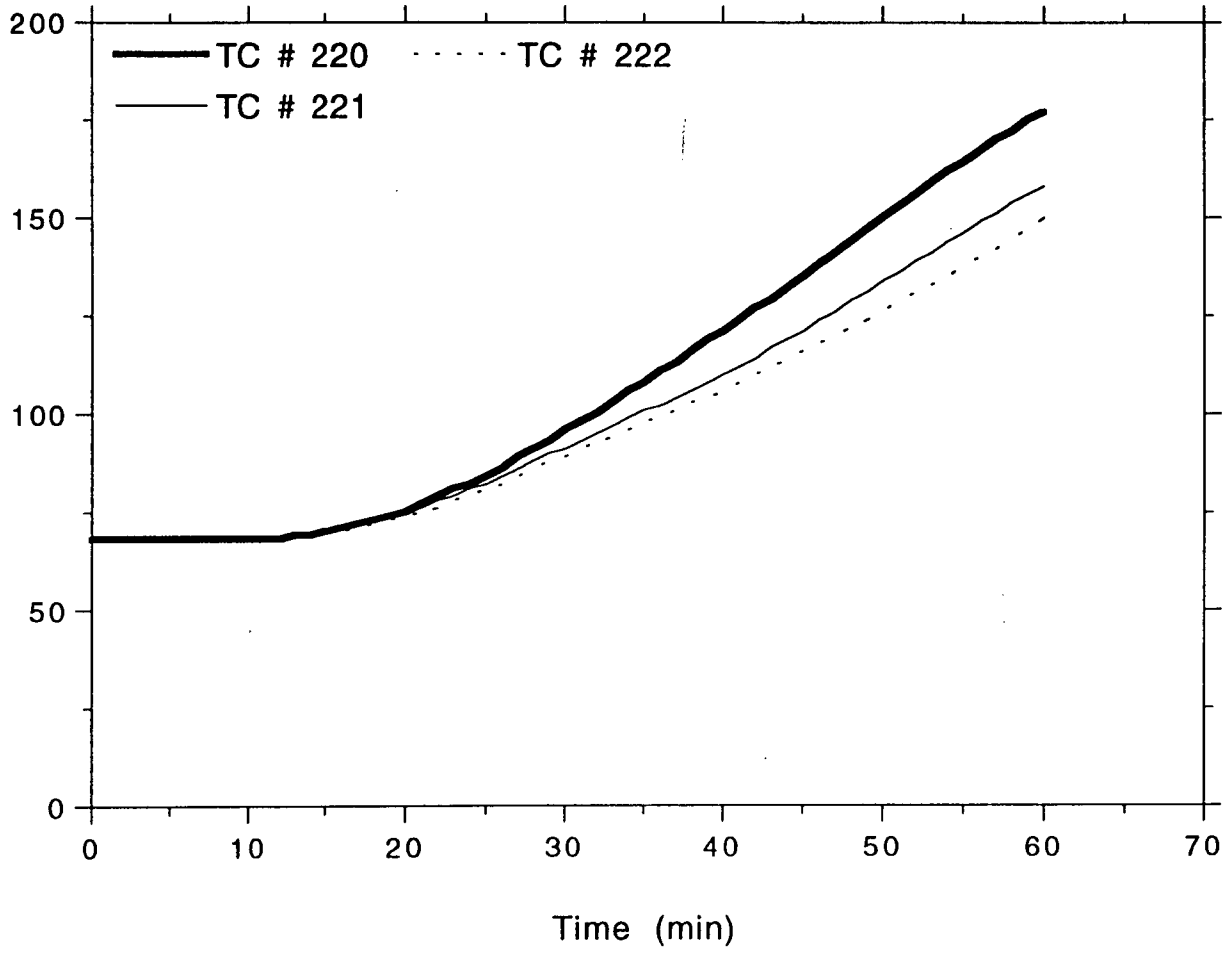

OMEGA POINT LABORATORIES

TSI/TVA
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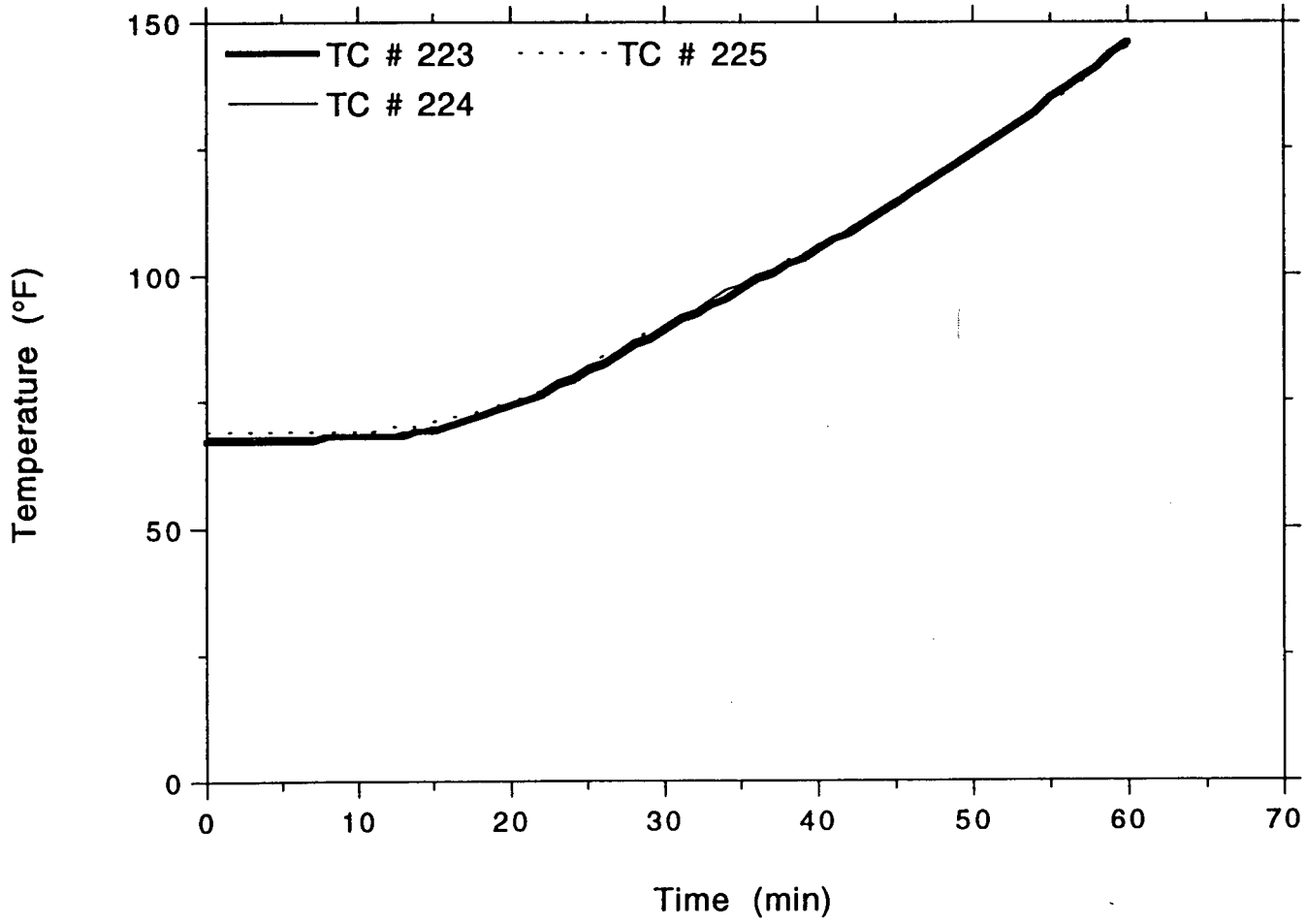

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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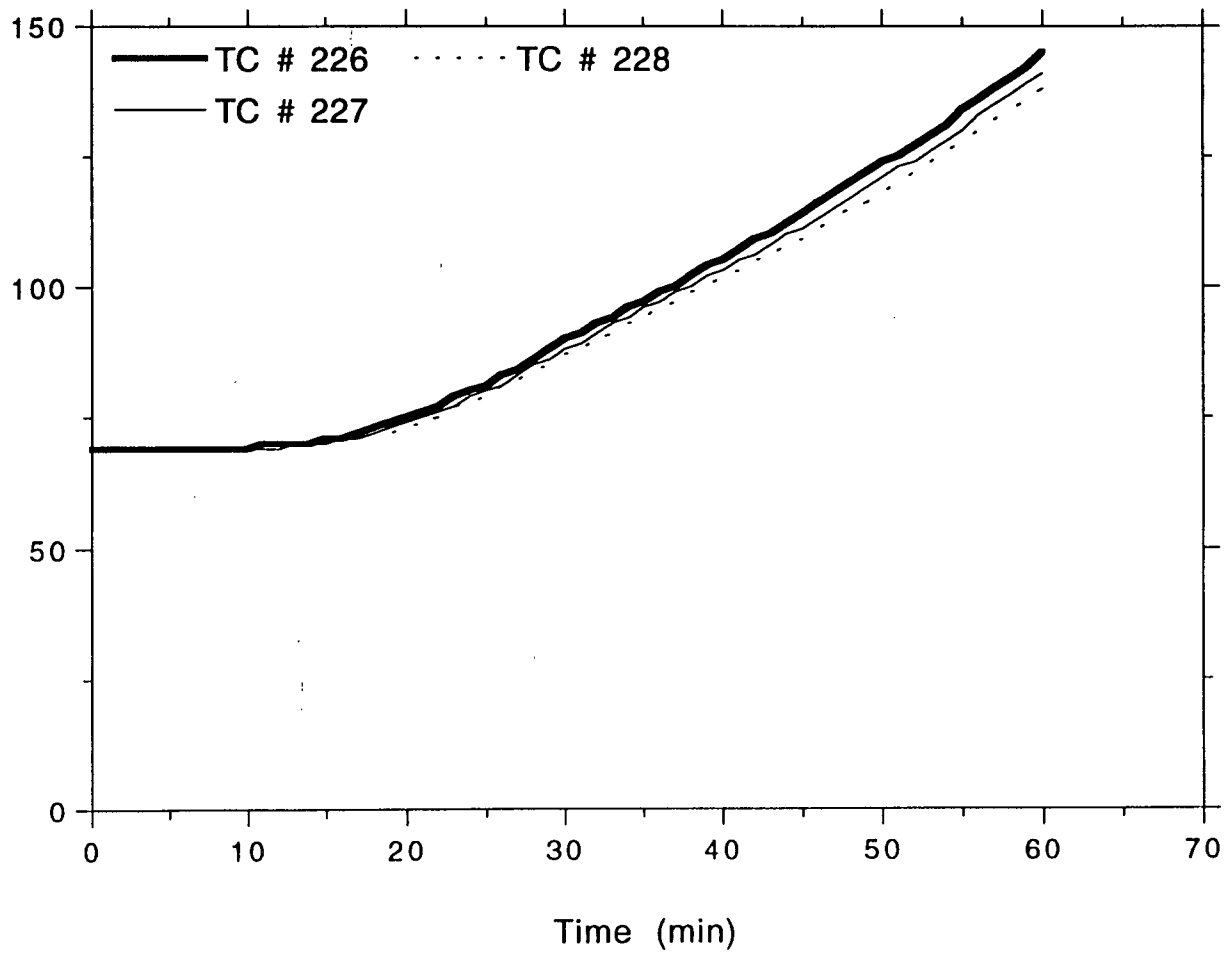

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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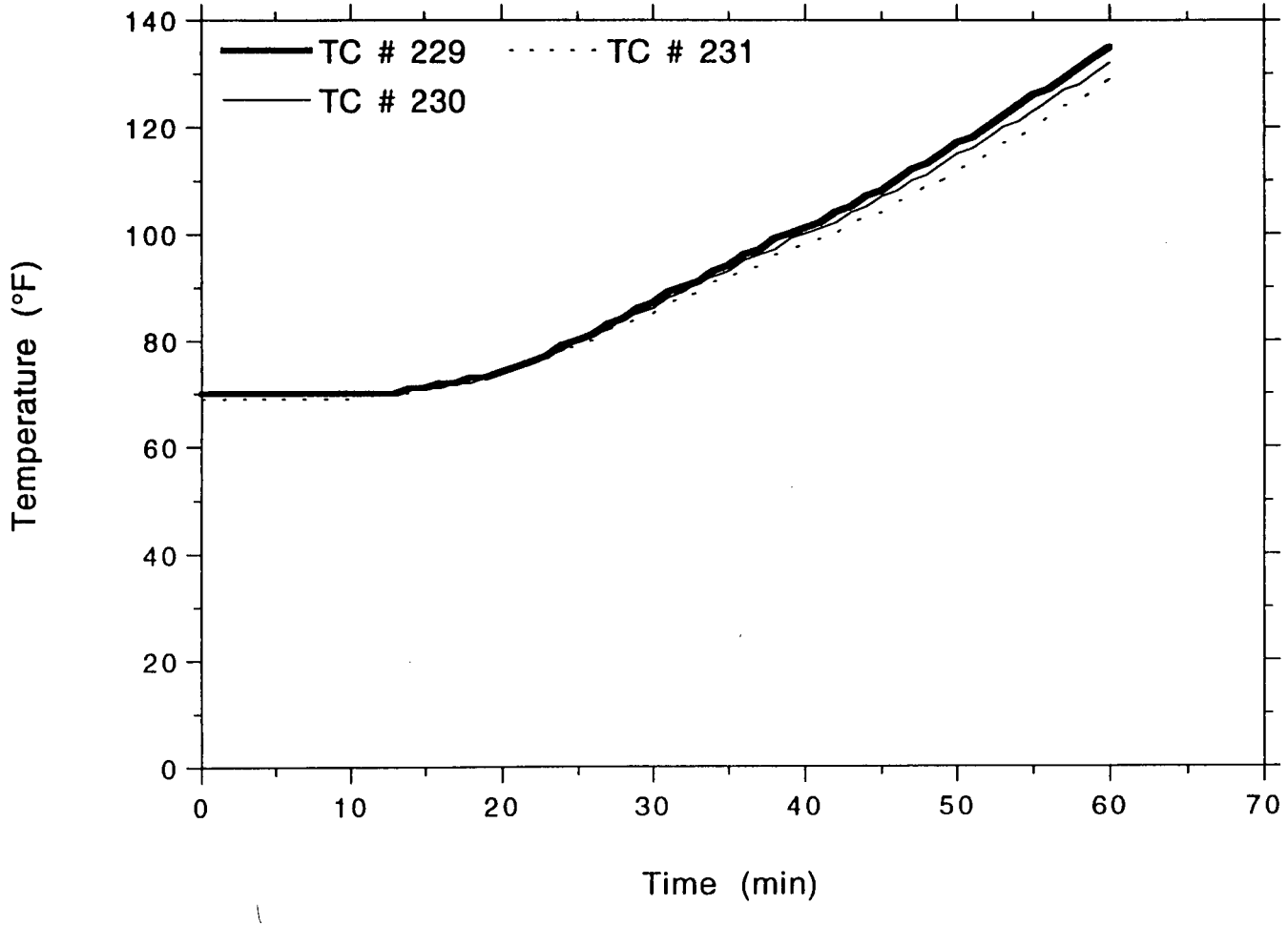

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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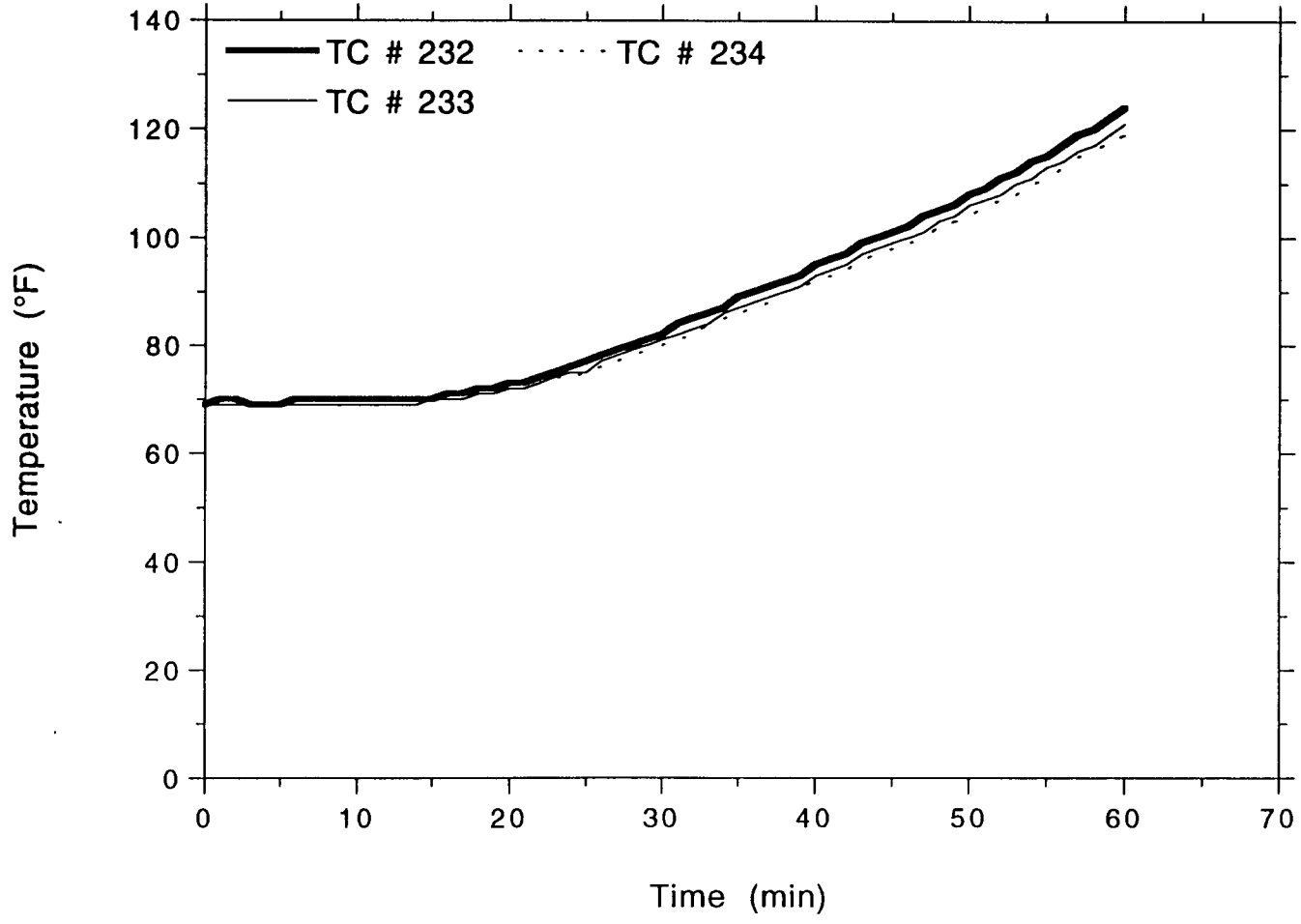

OMEGA POINT LABORATORIES

TSI/TVA
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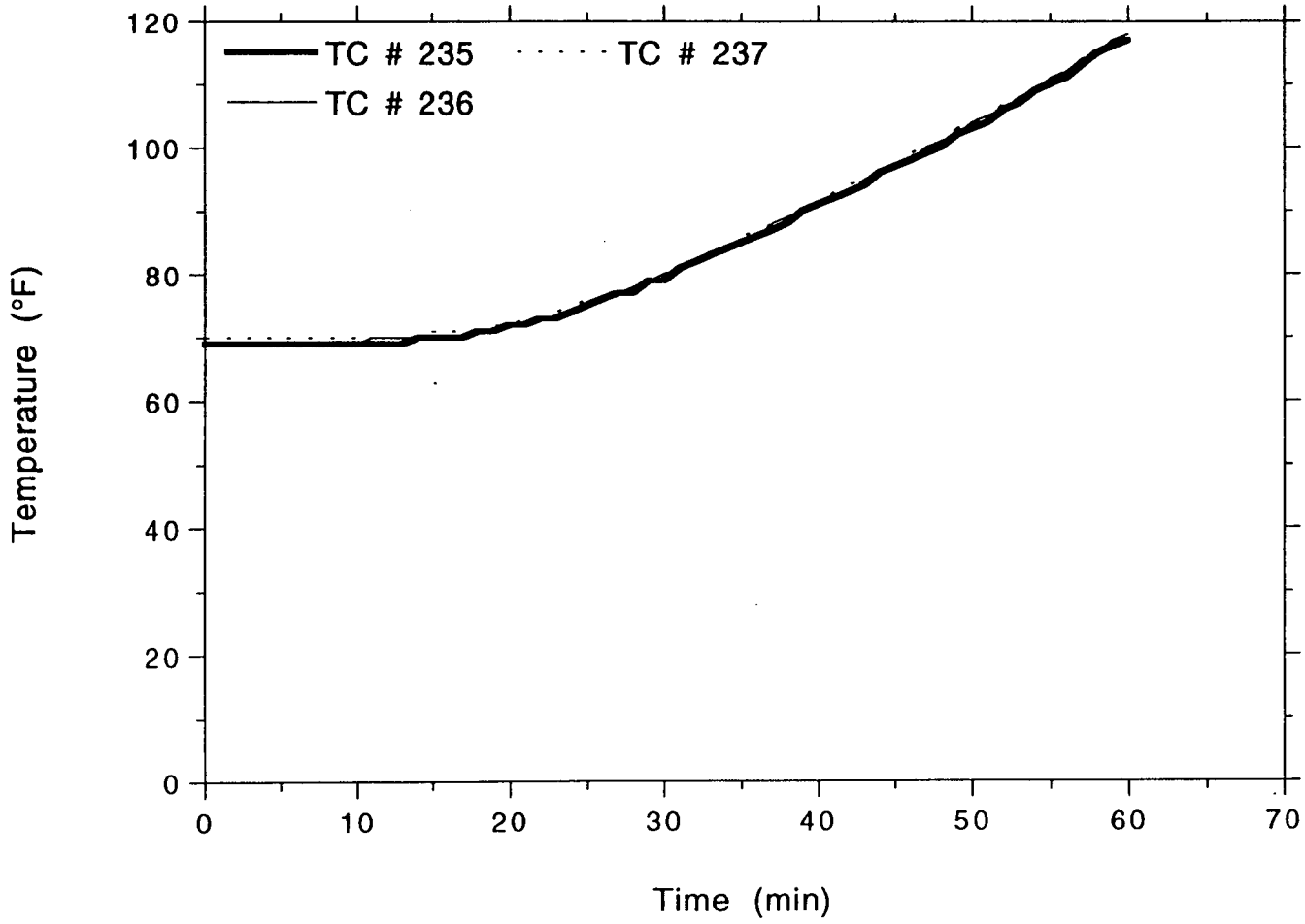

OMEGA POINT LABORATORIES

TSI/TVA
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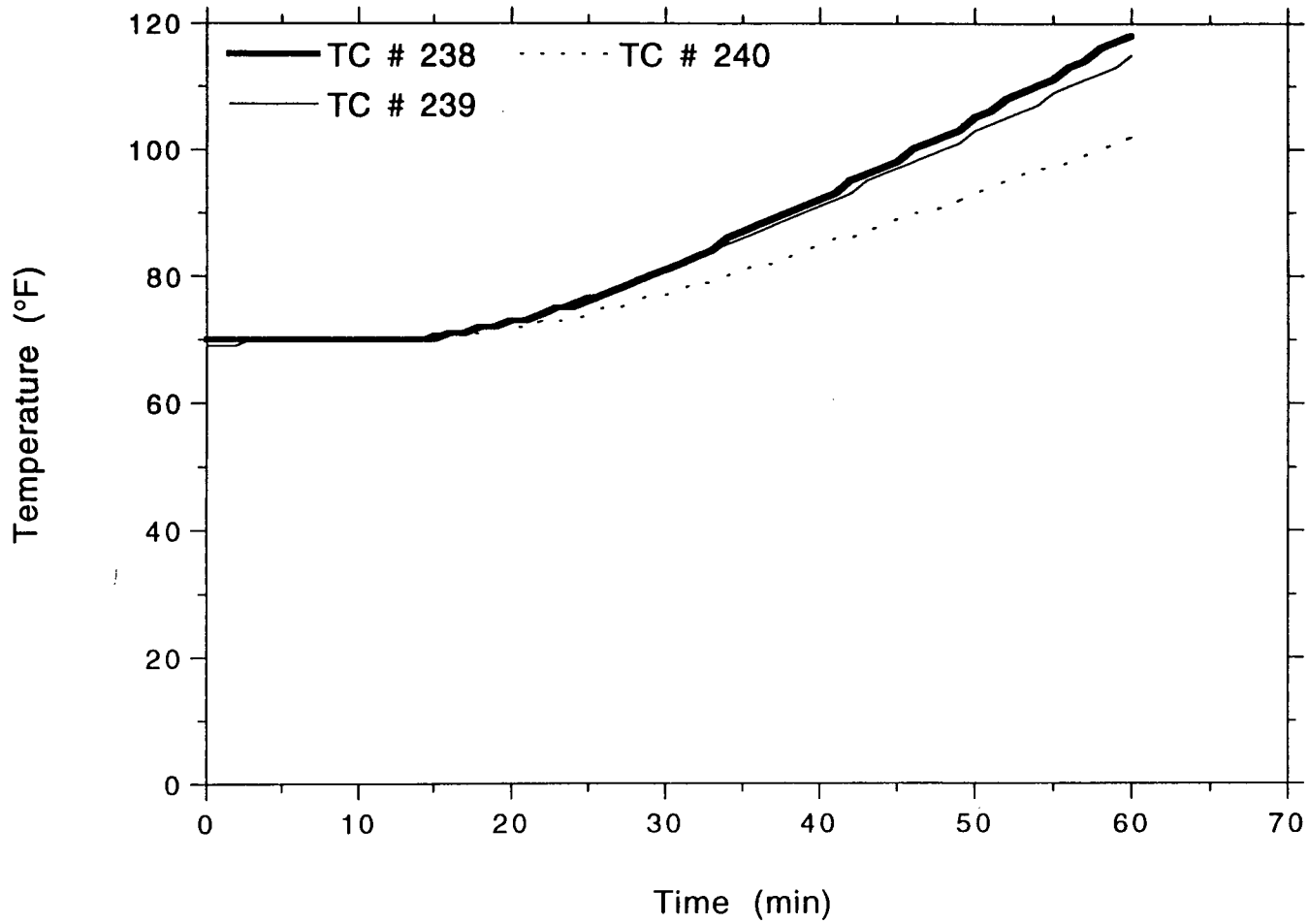
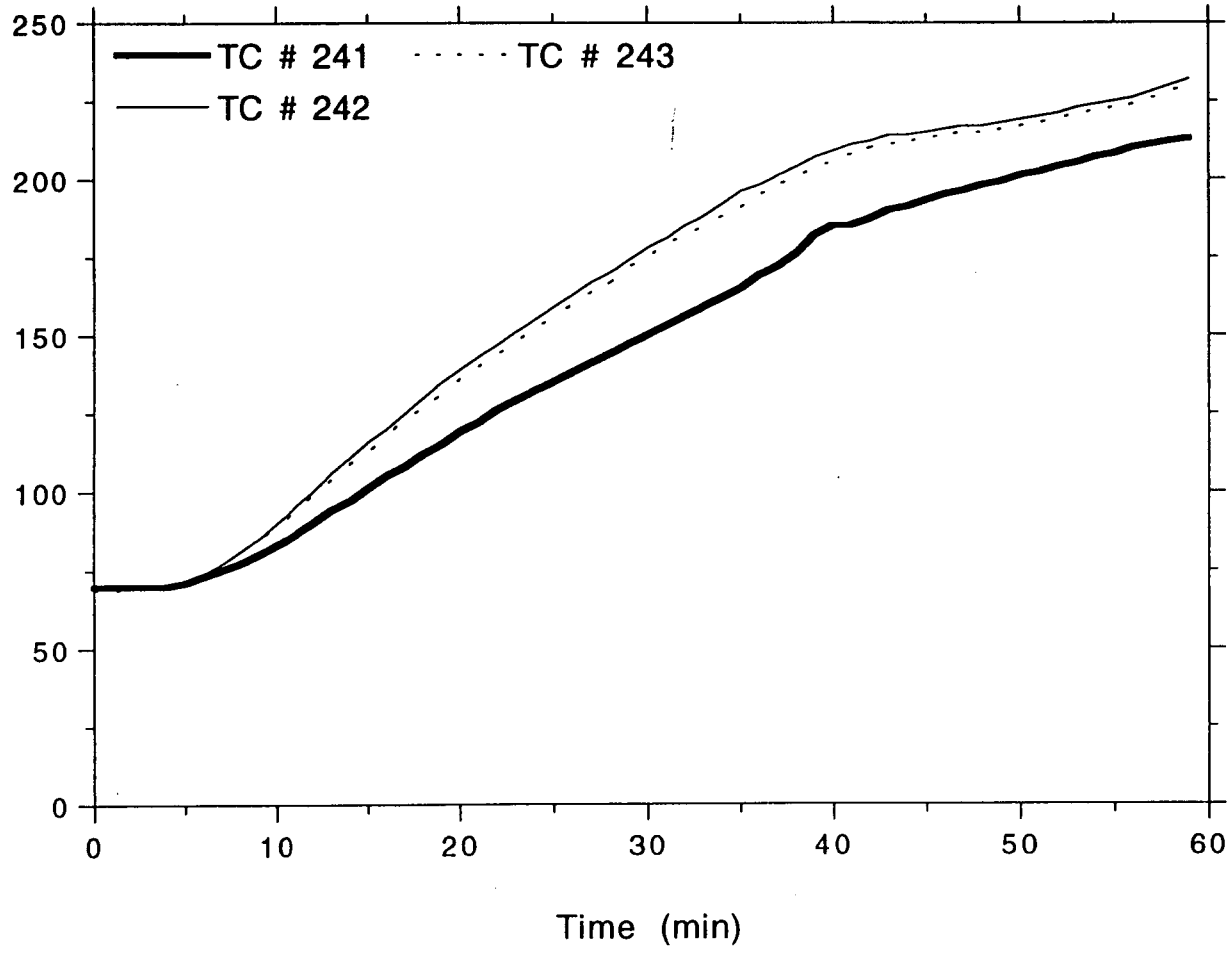


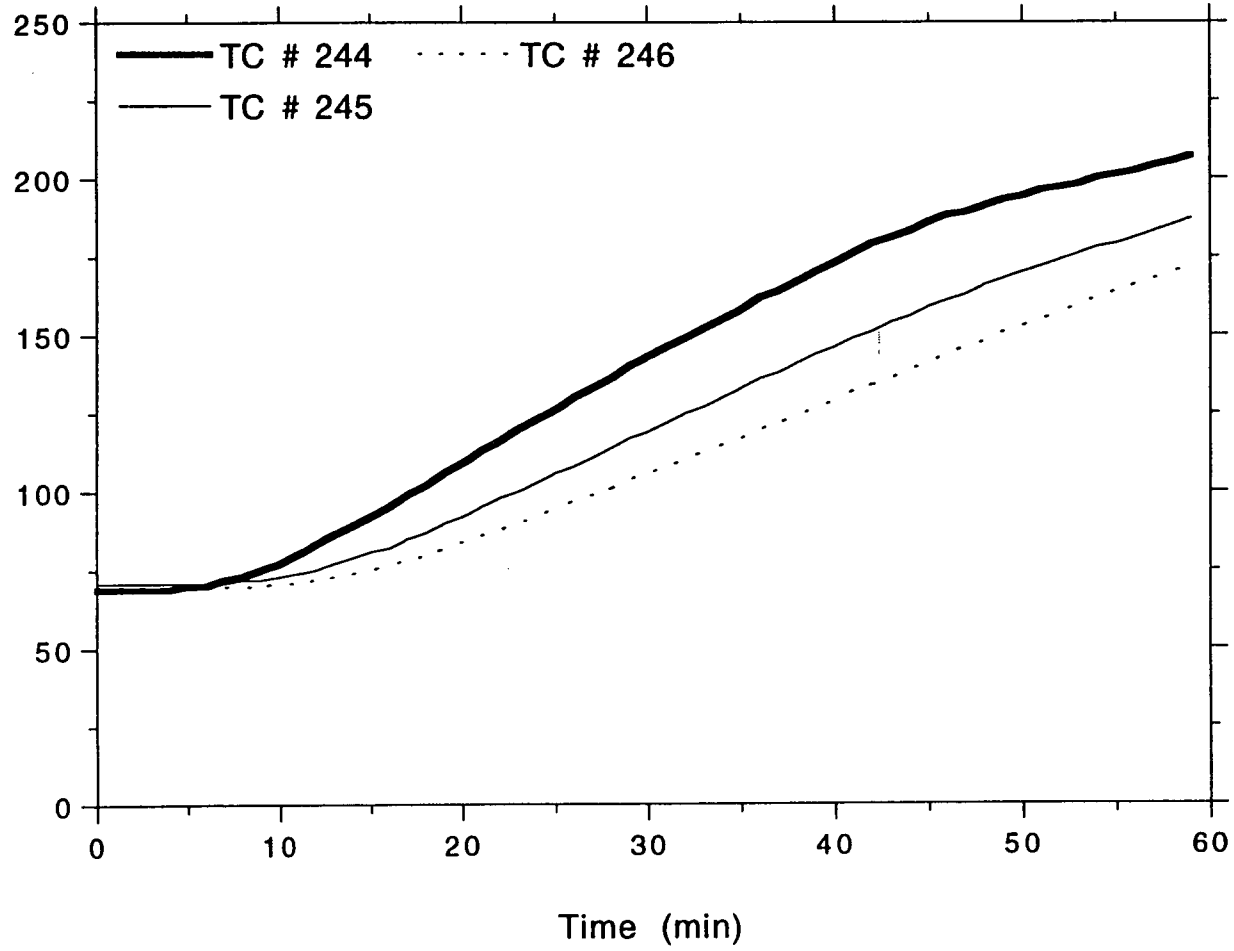
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



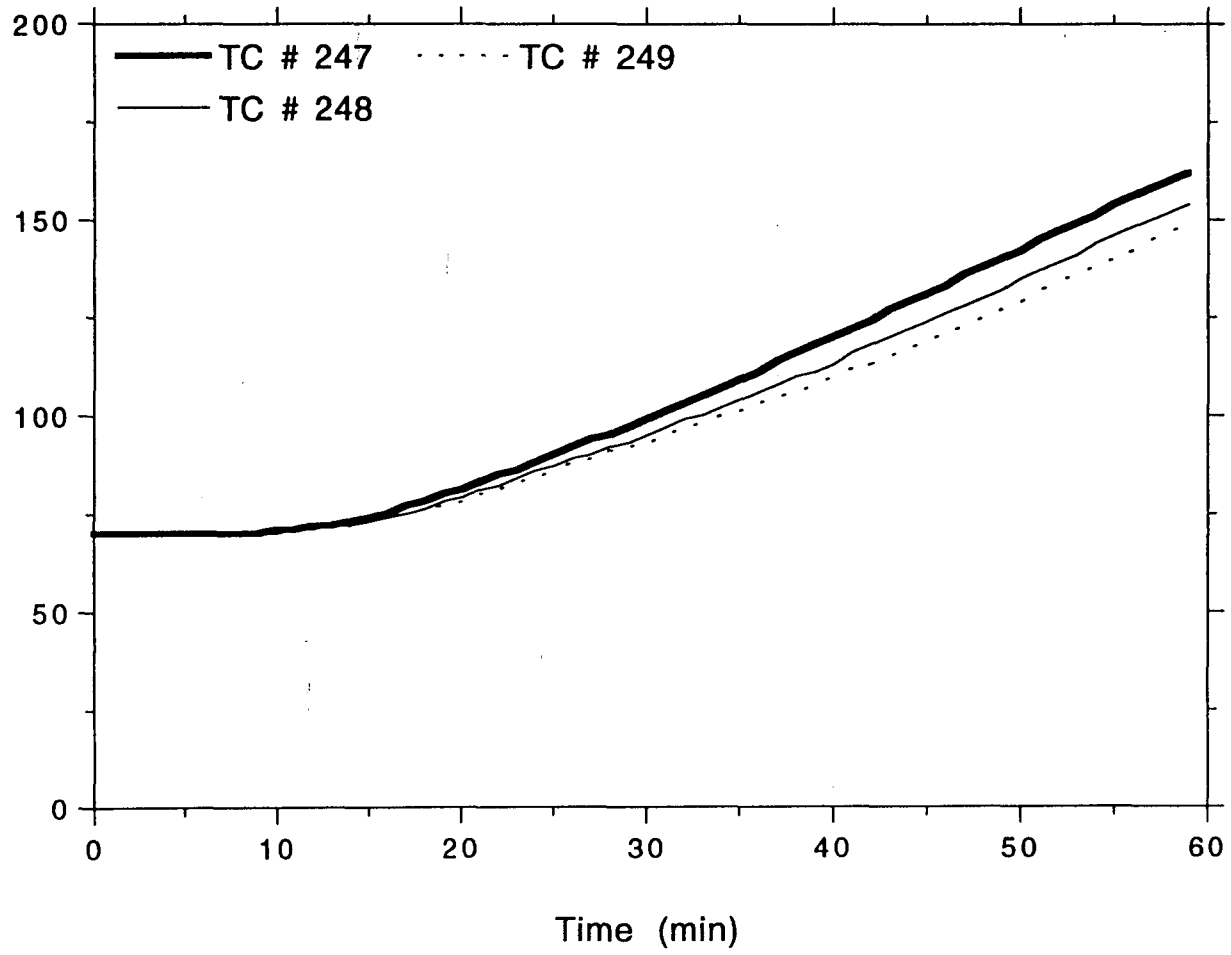
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



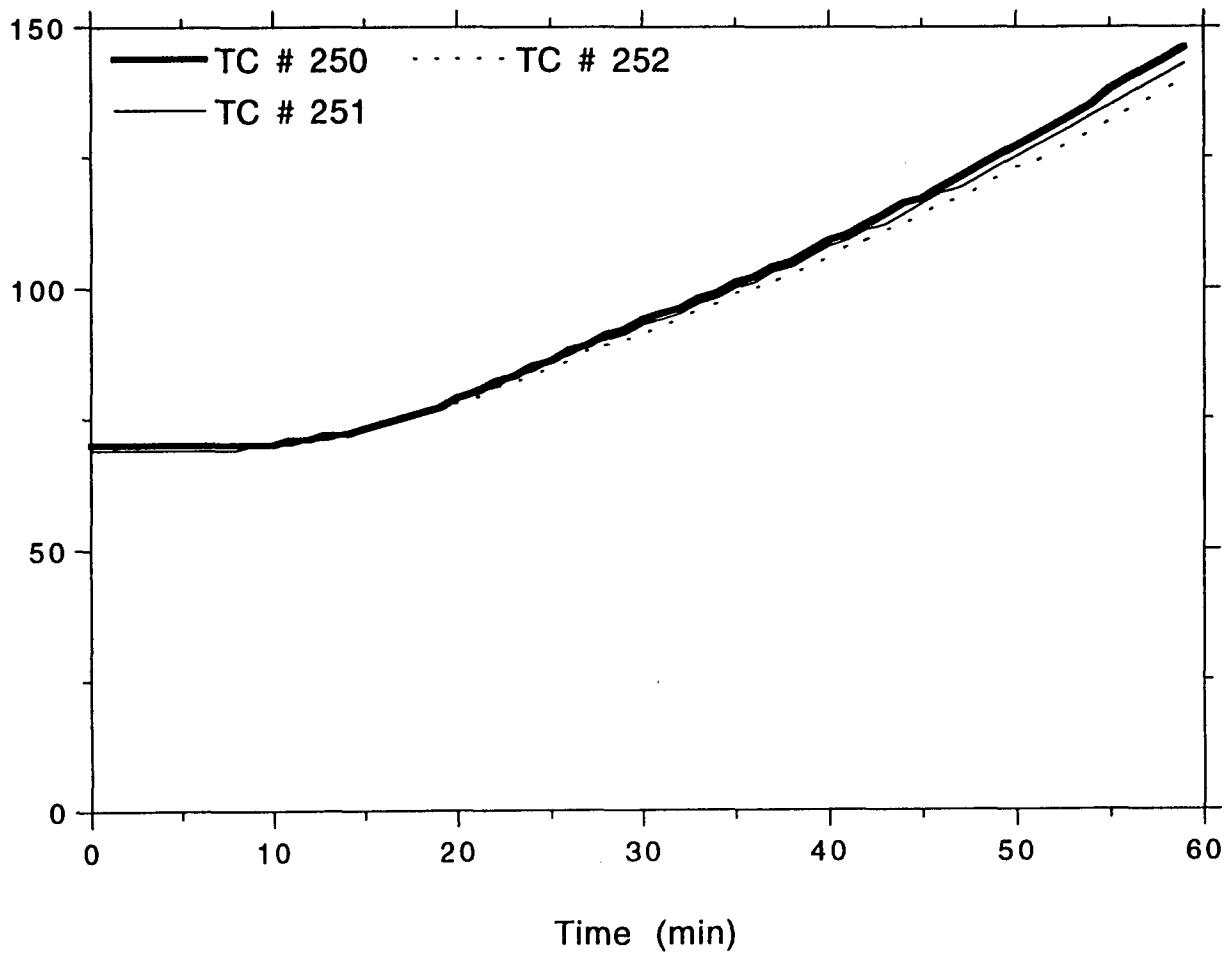
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



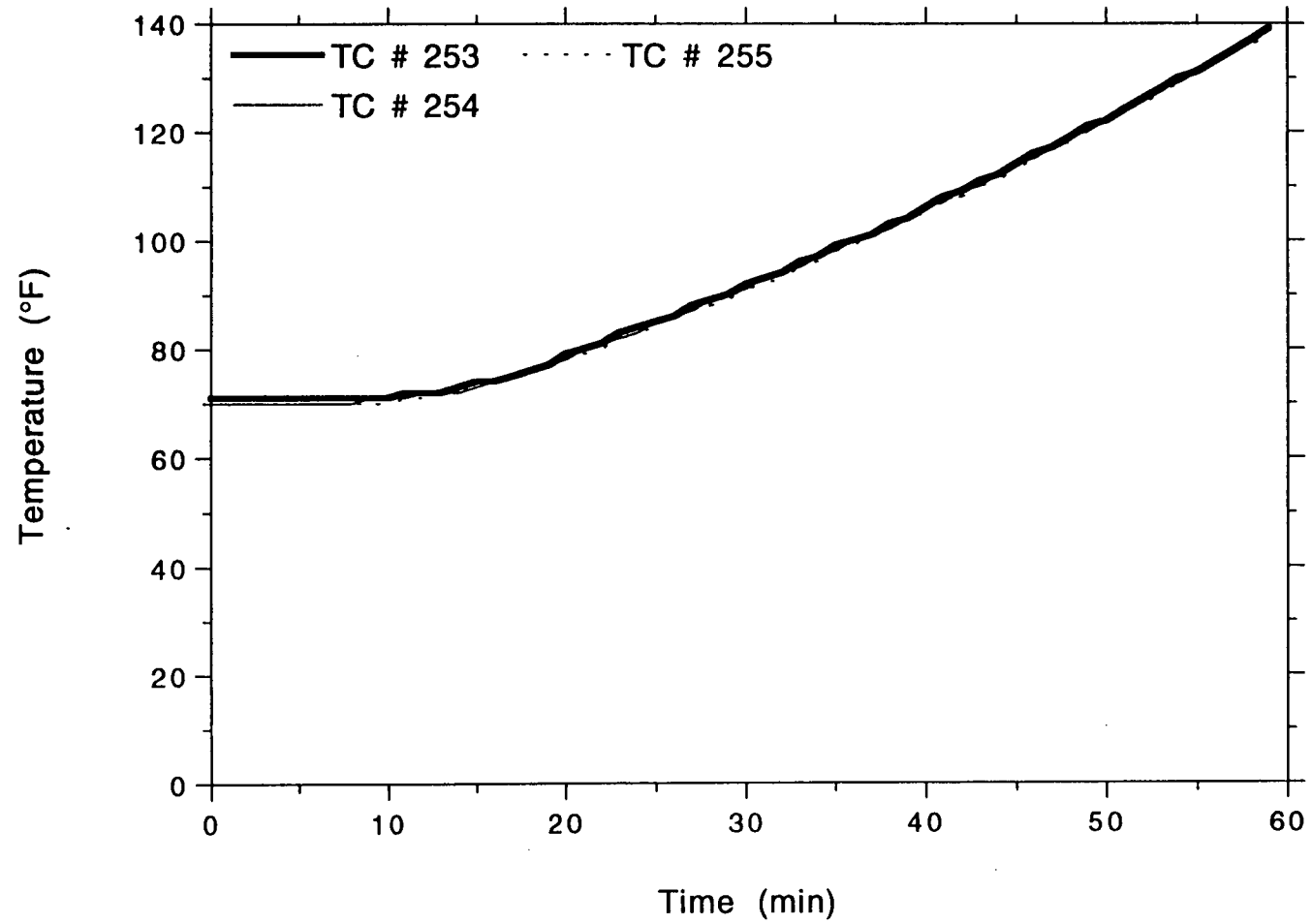
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



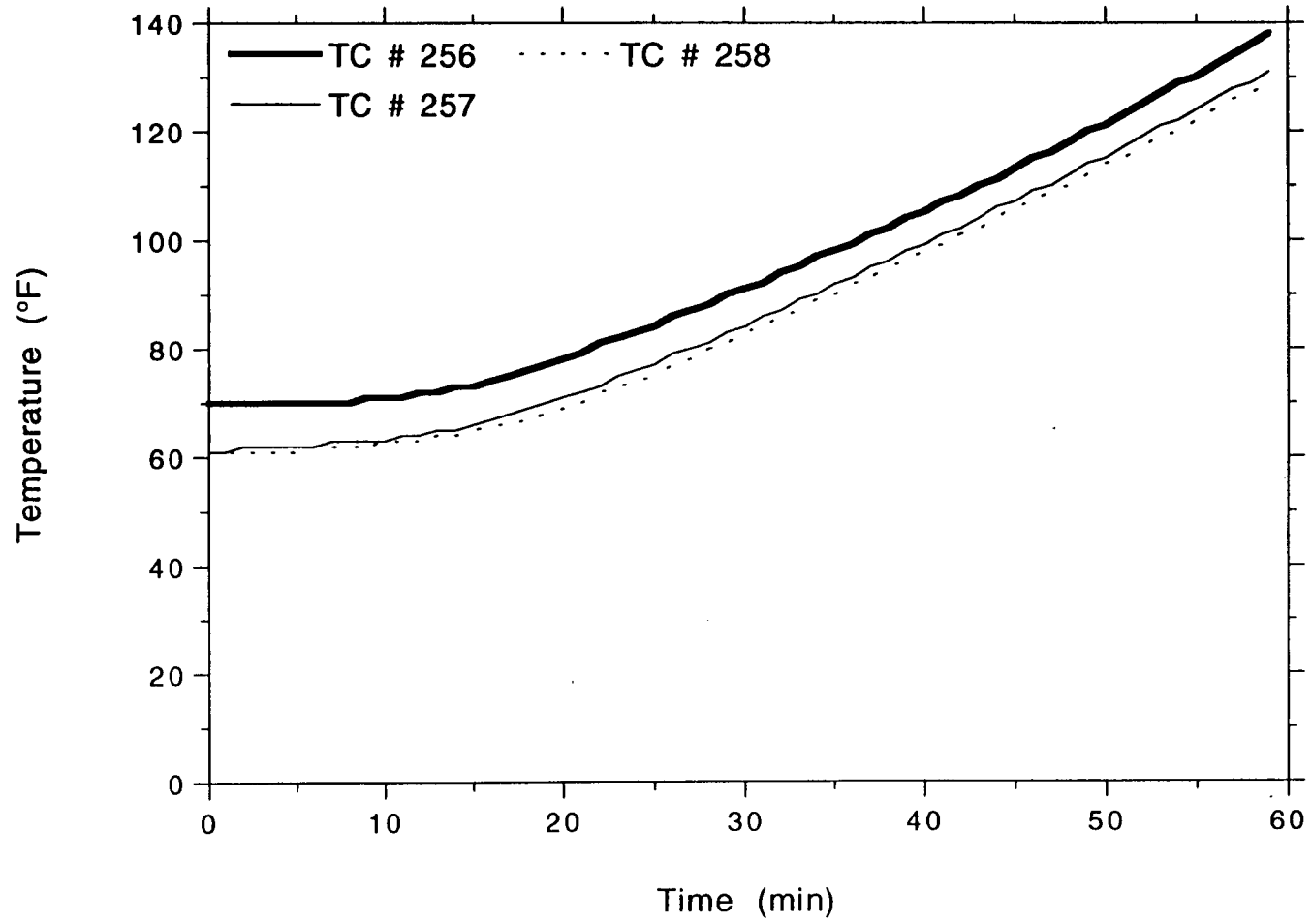
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



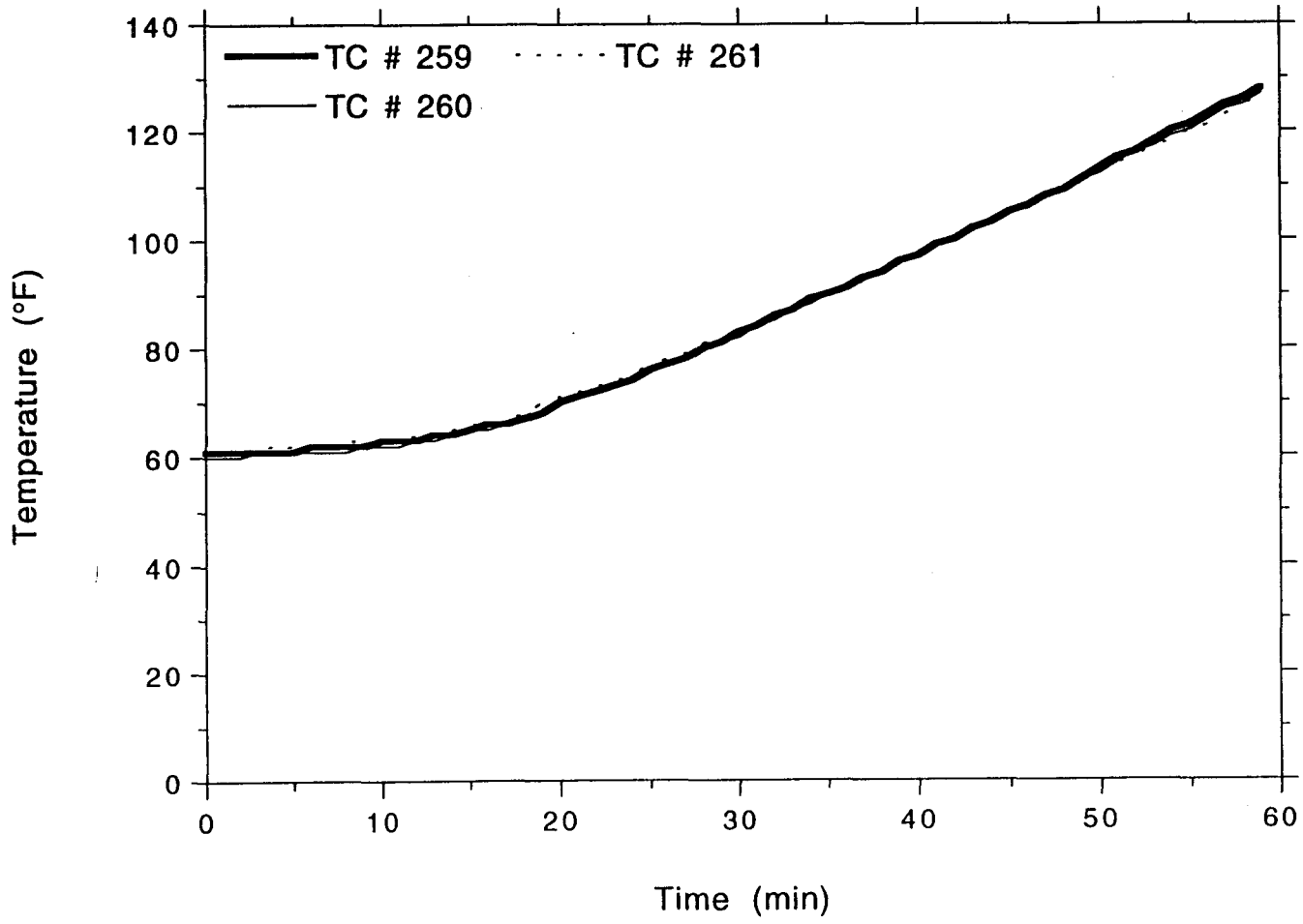
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



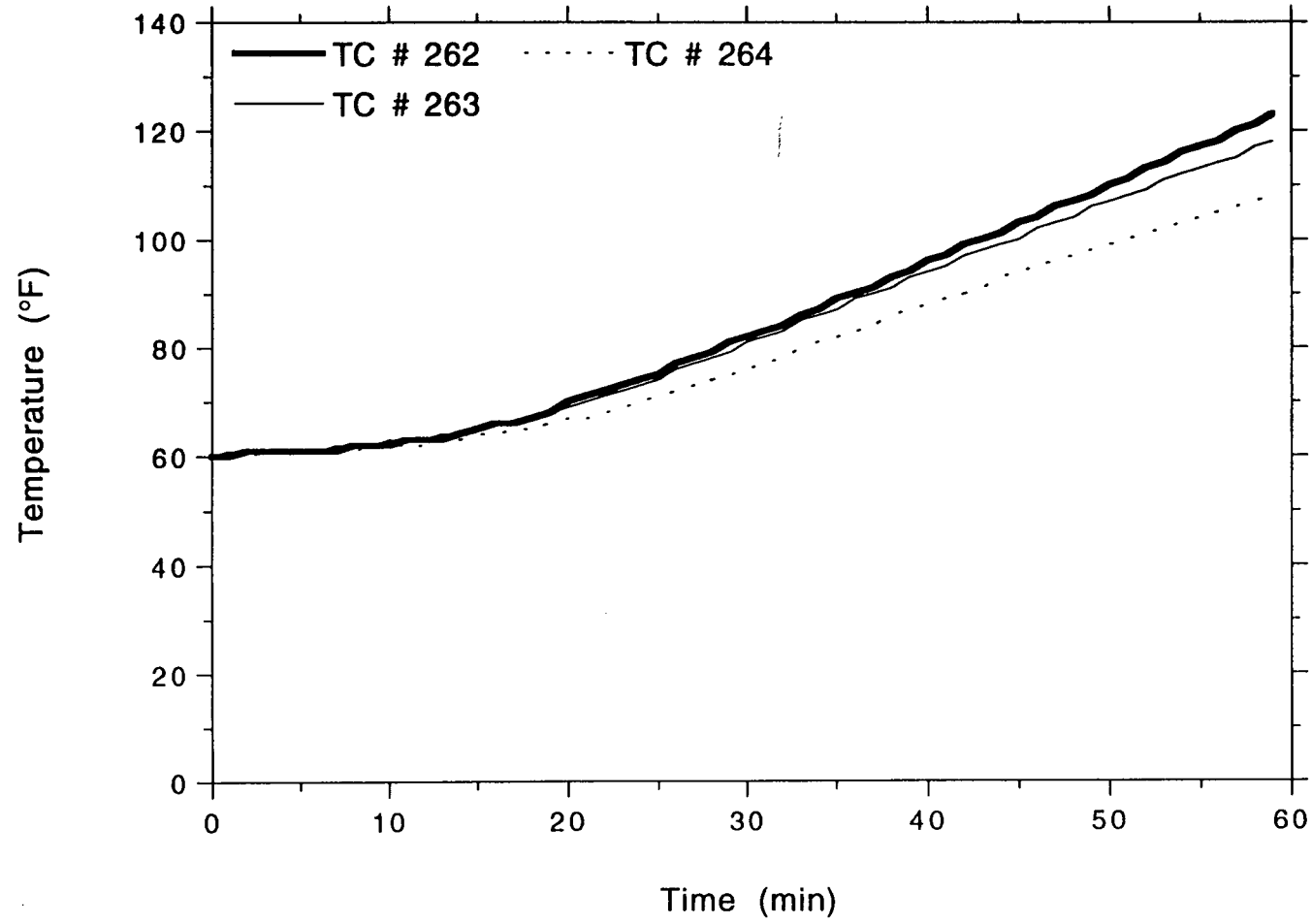
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



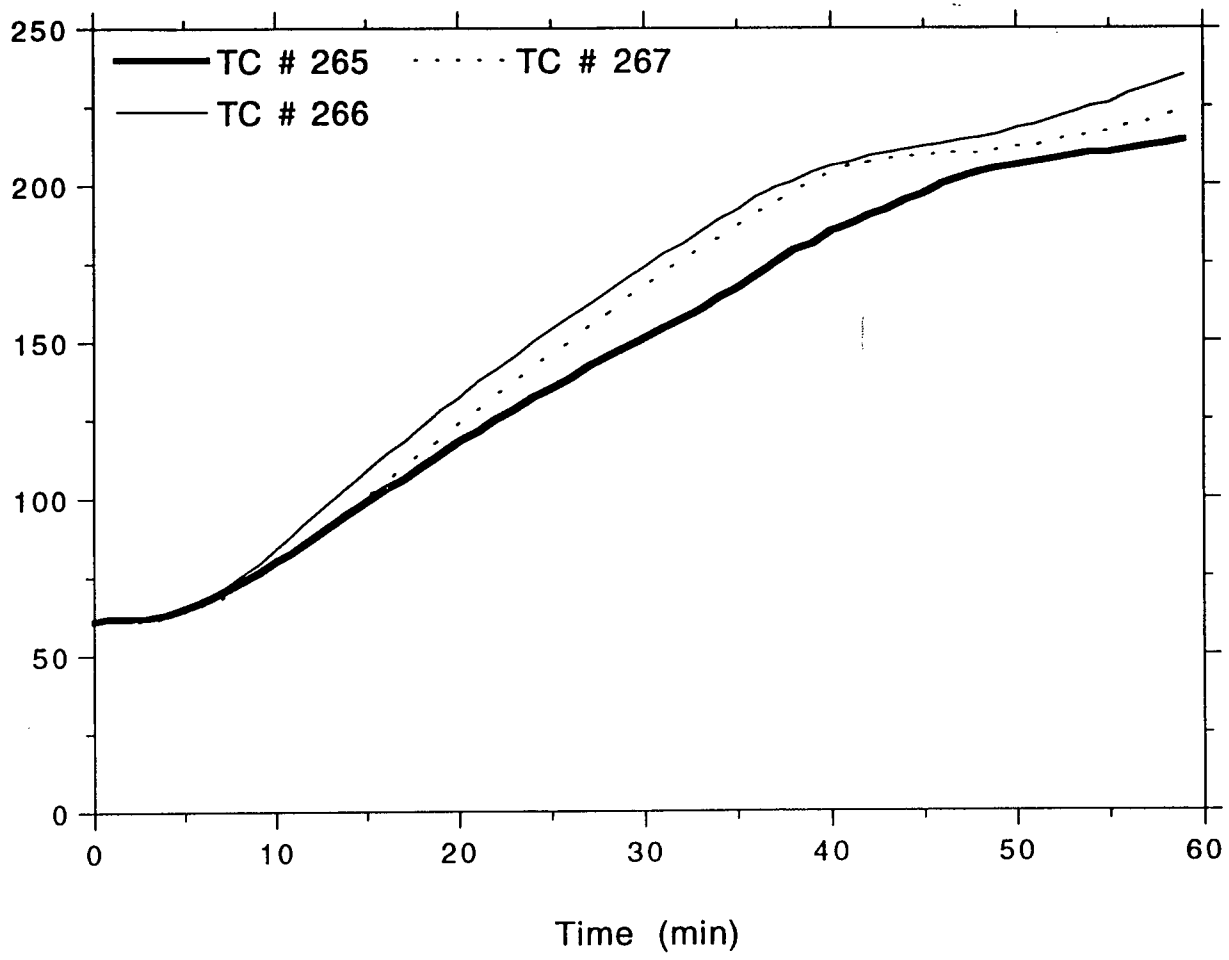
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Rear Al. Conduit



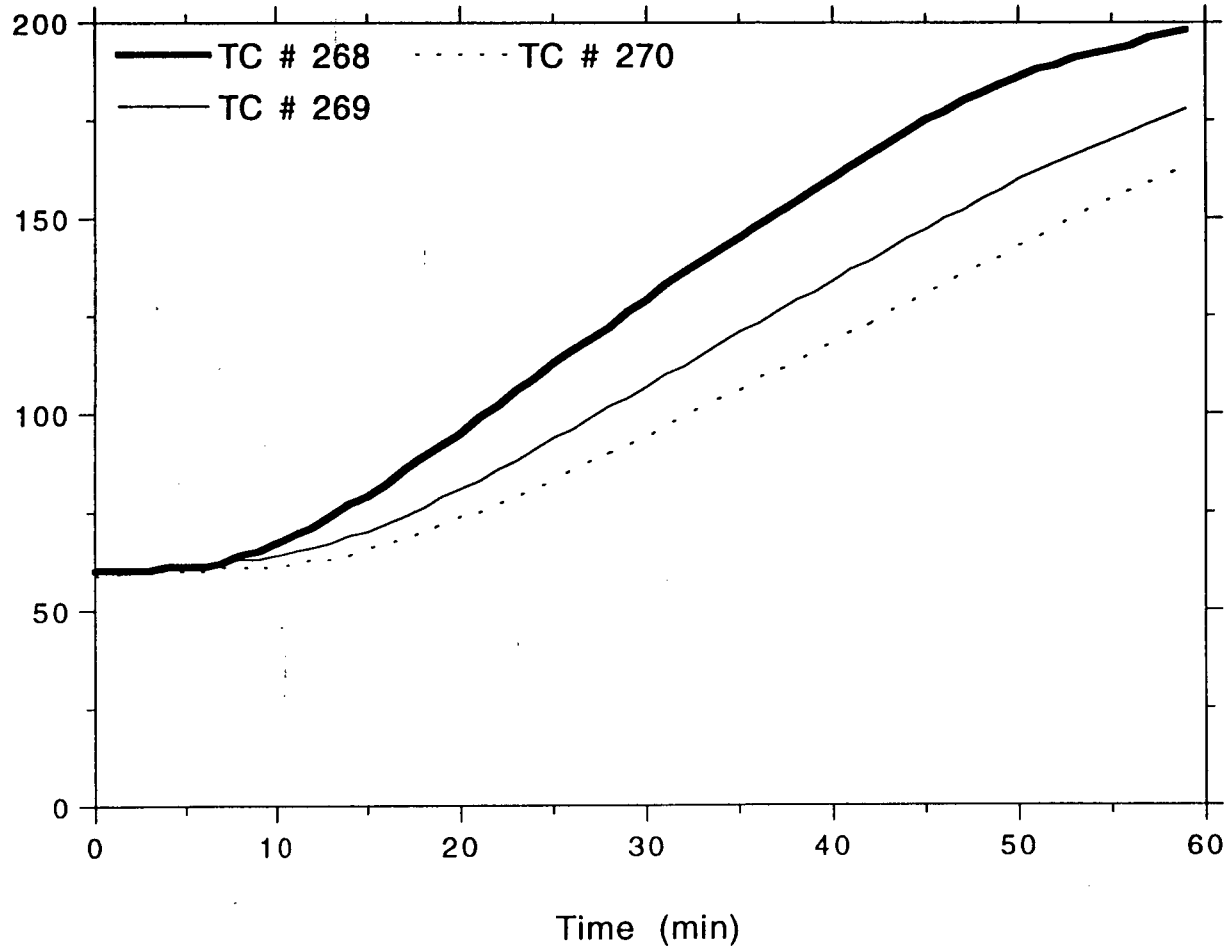
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



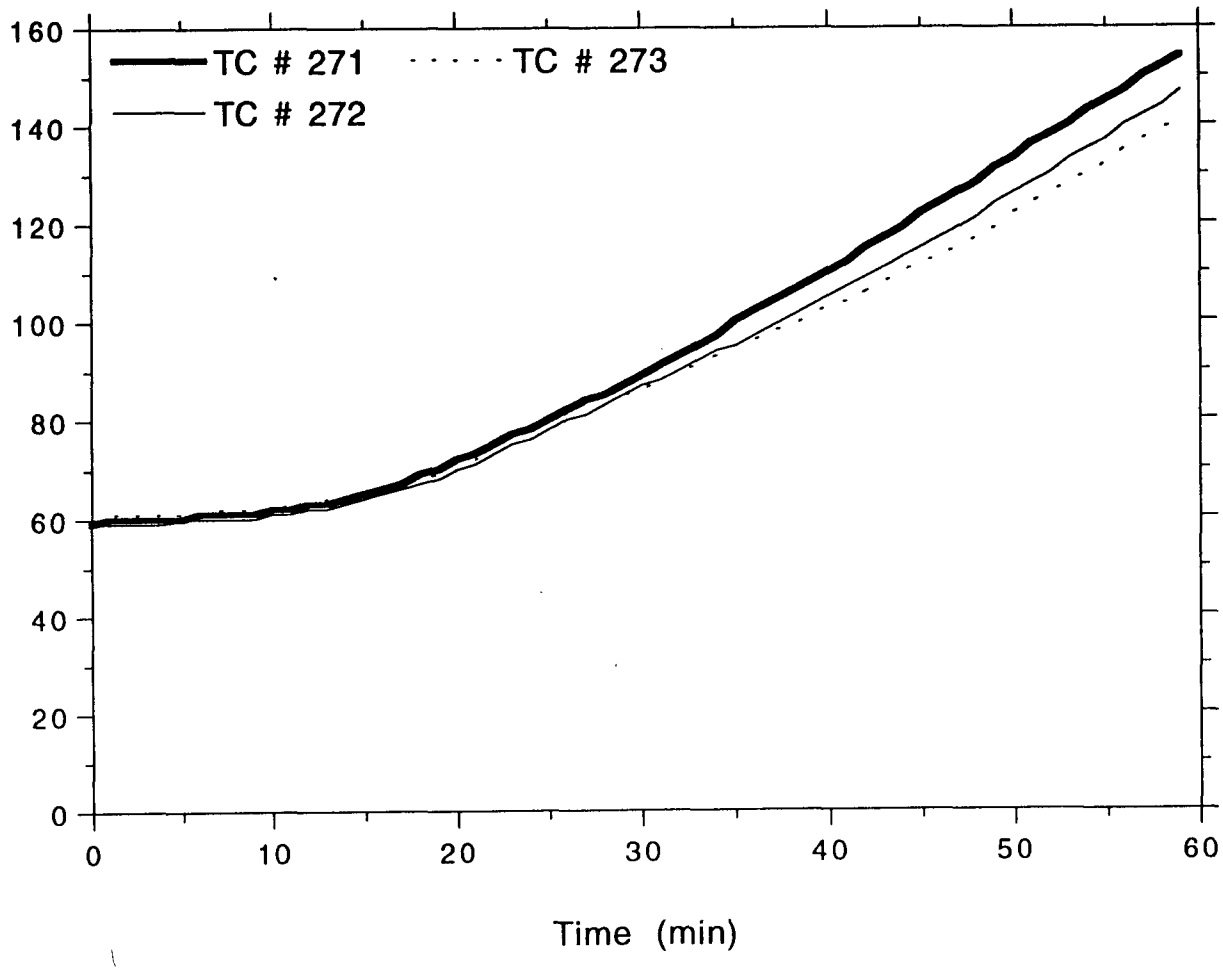
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



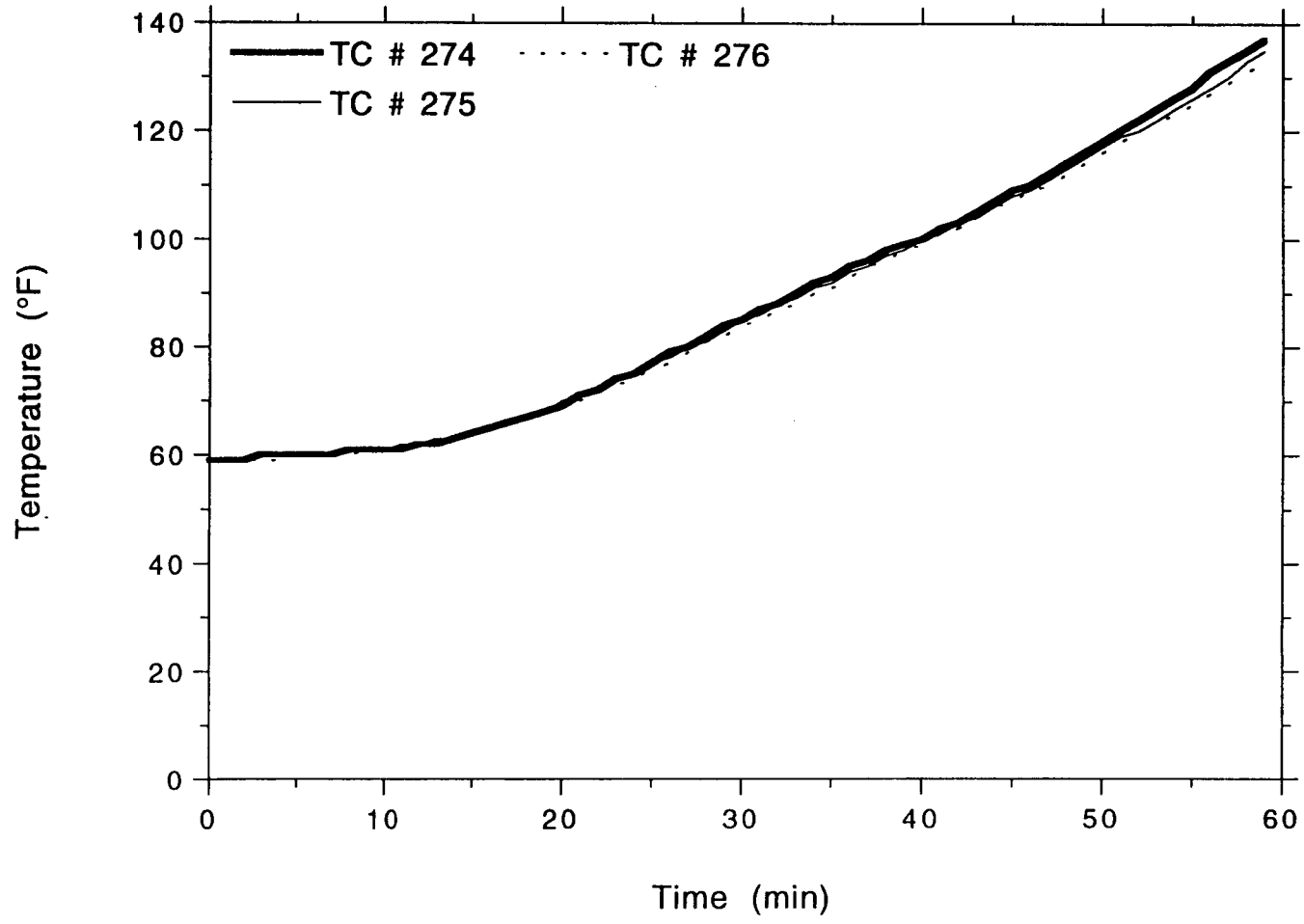
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



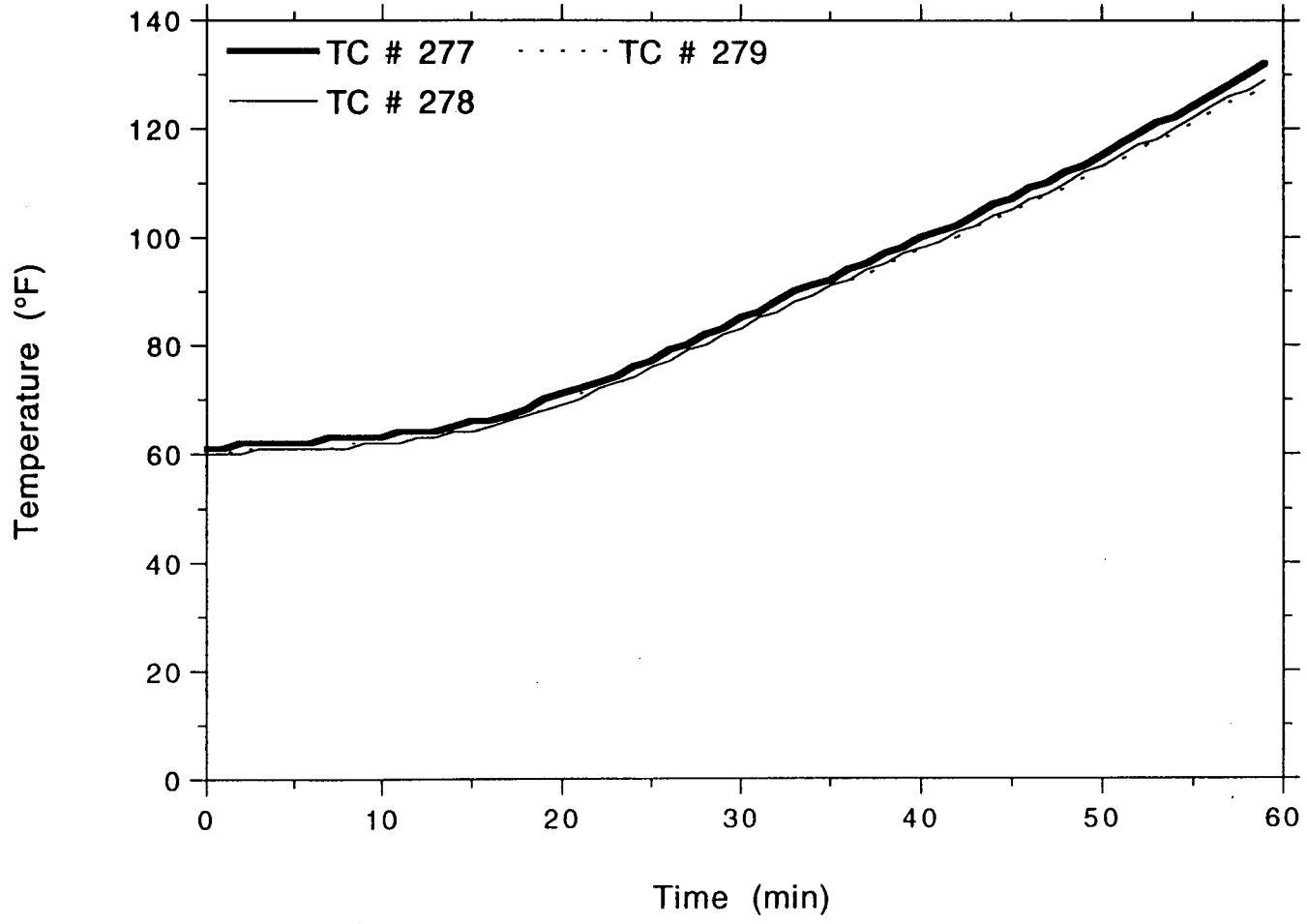
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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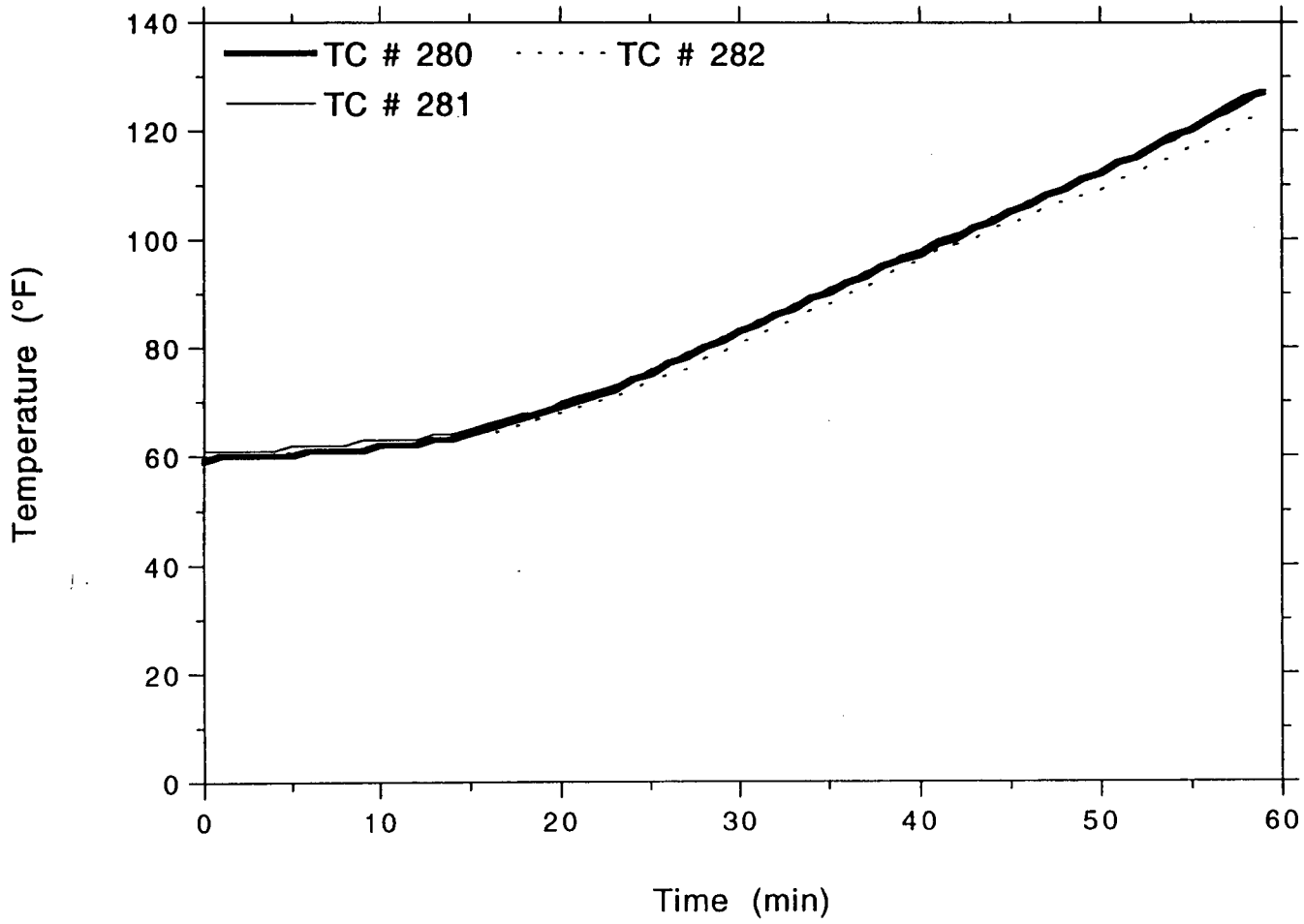
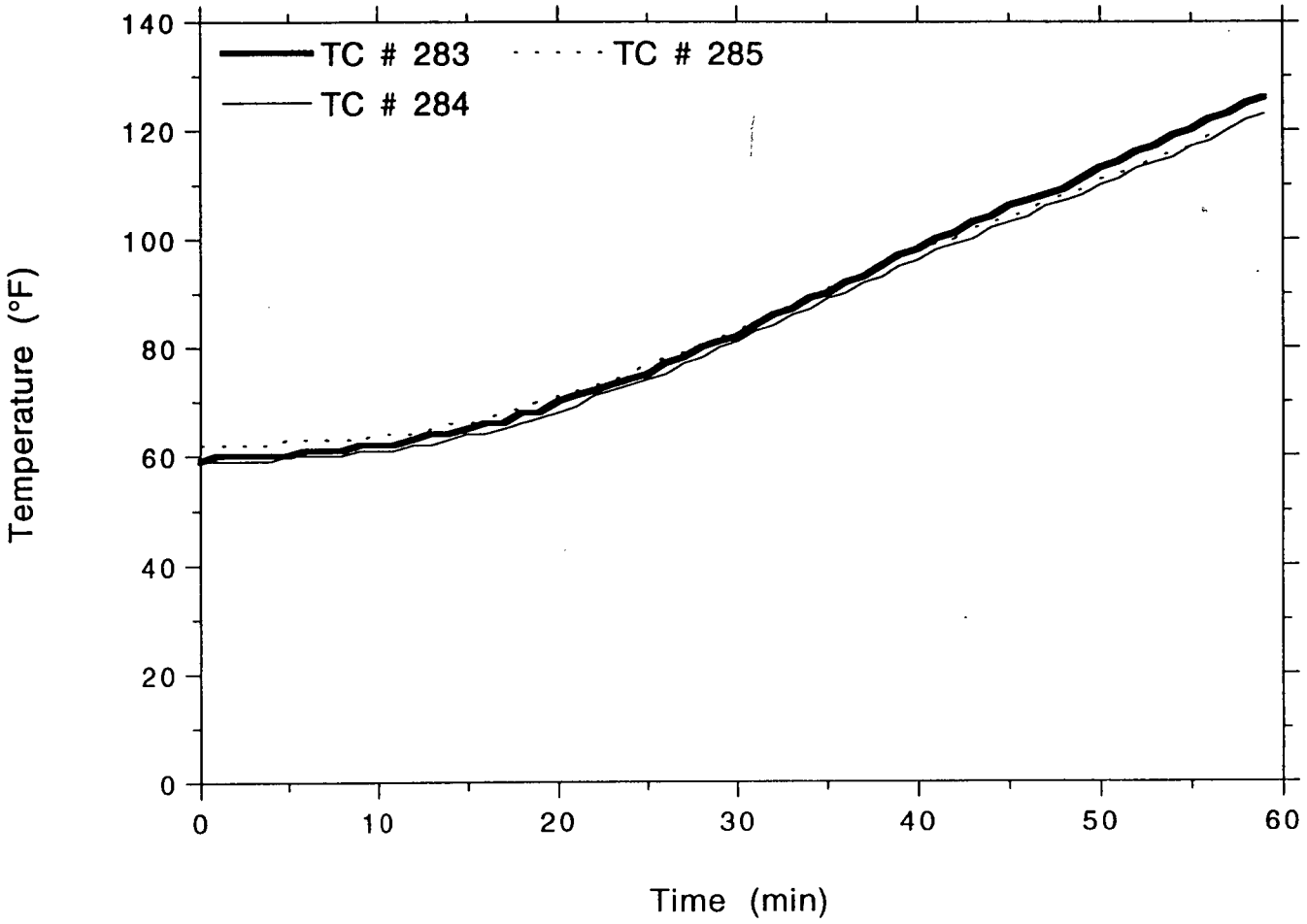


OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Rear Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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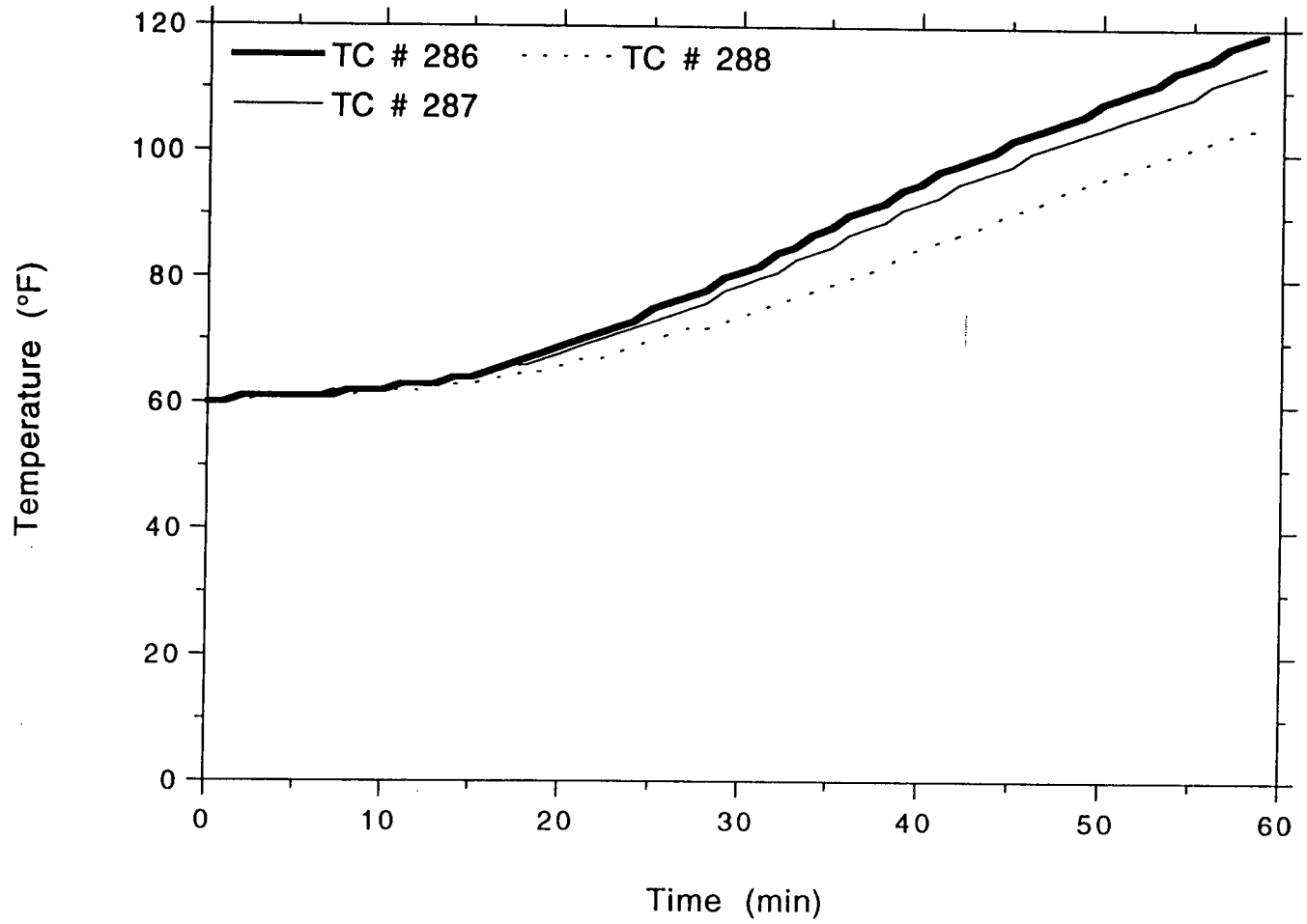

OMEGA POINT LABORATORIES

TSI/TVA
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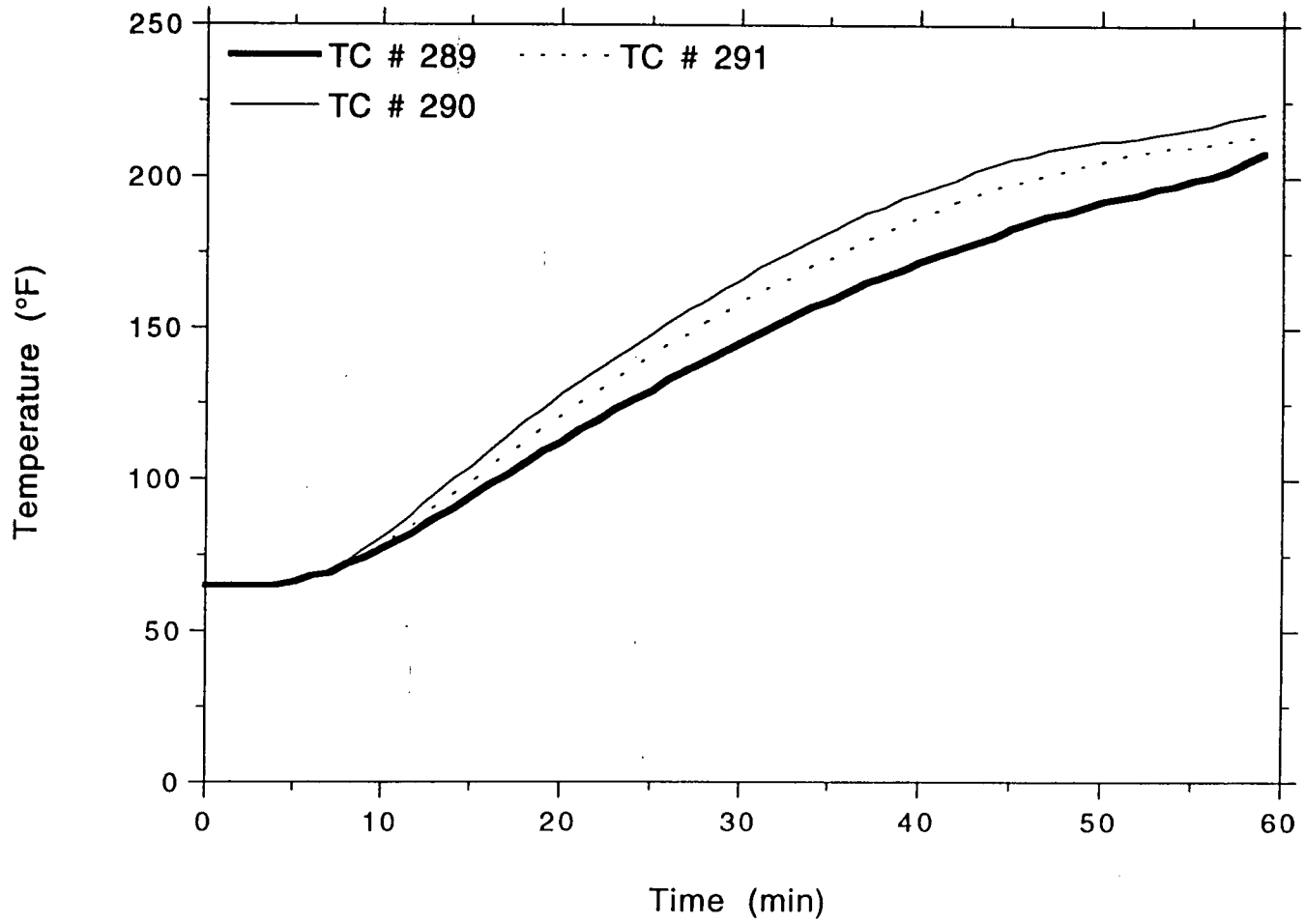

OMEGA POINT LABORATORIES

TSI/TVA
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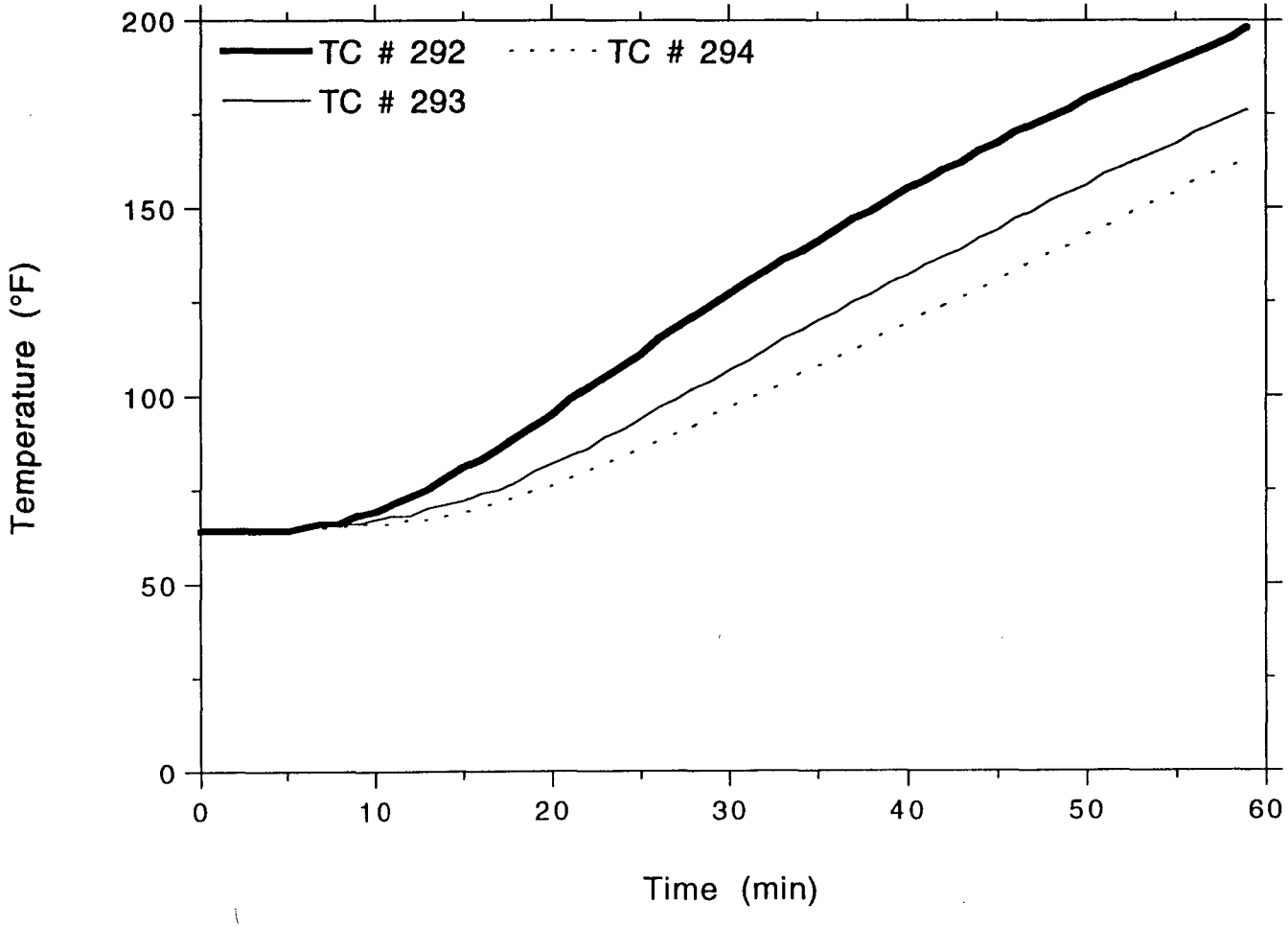

OMEGA POINT LABORATORIES

TSI/TVA
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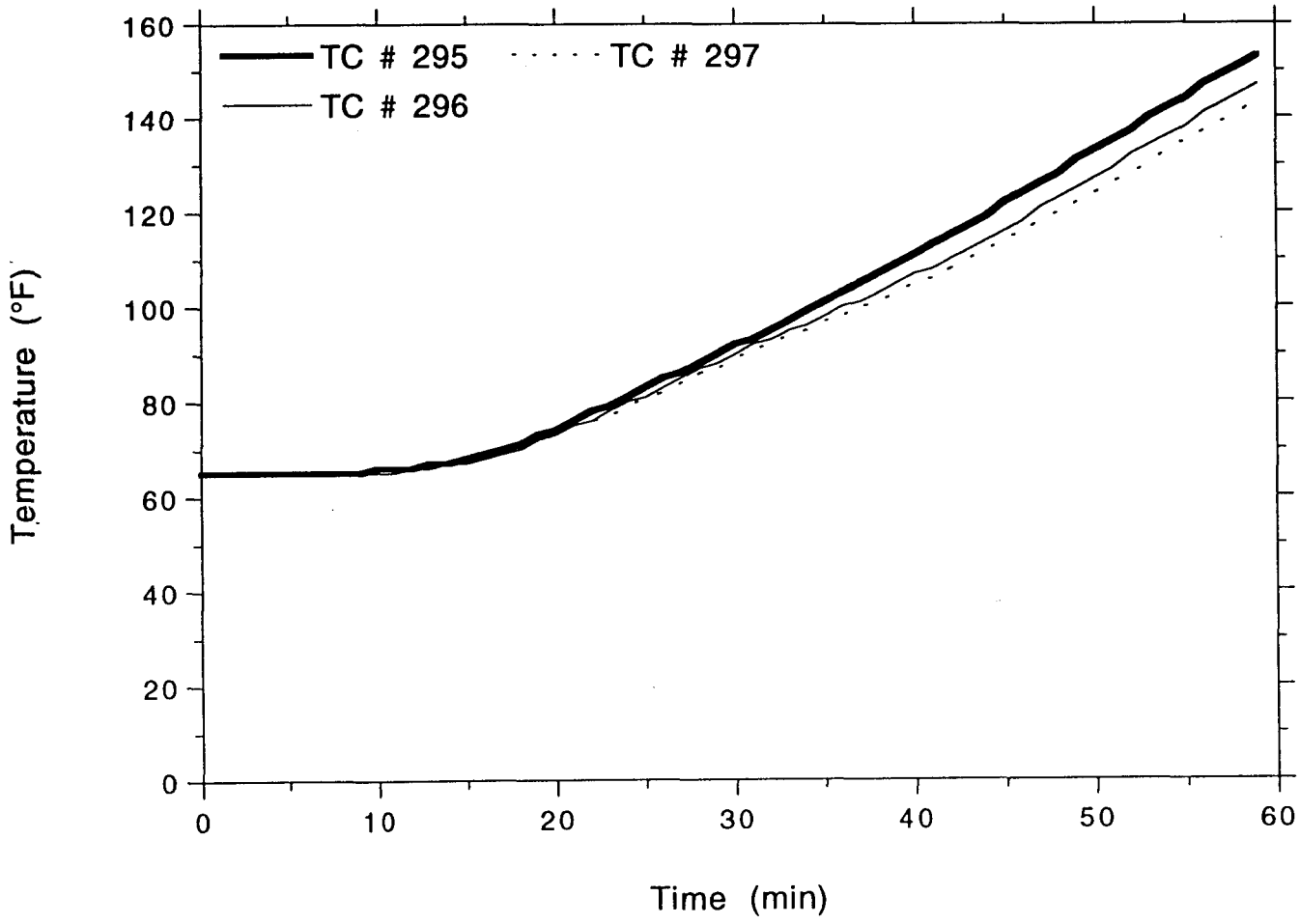

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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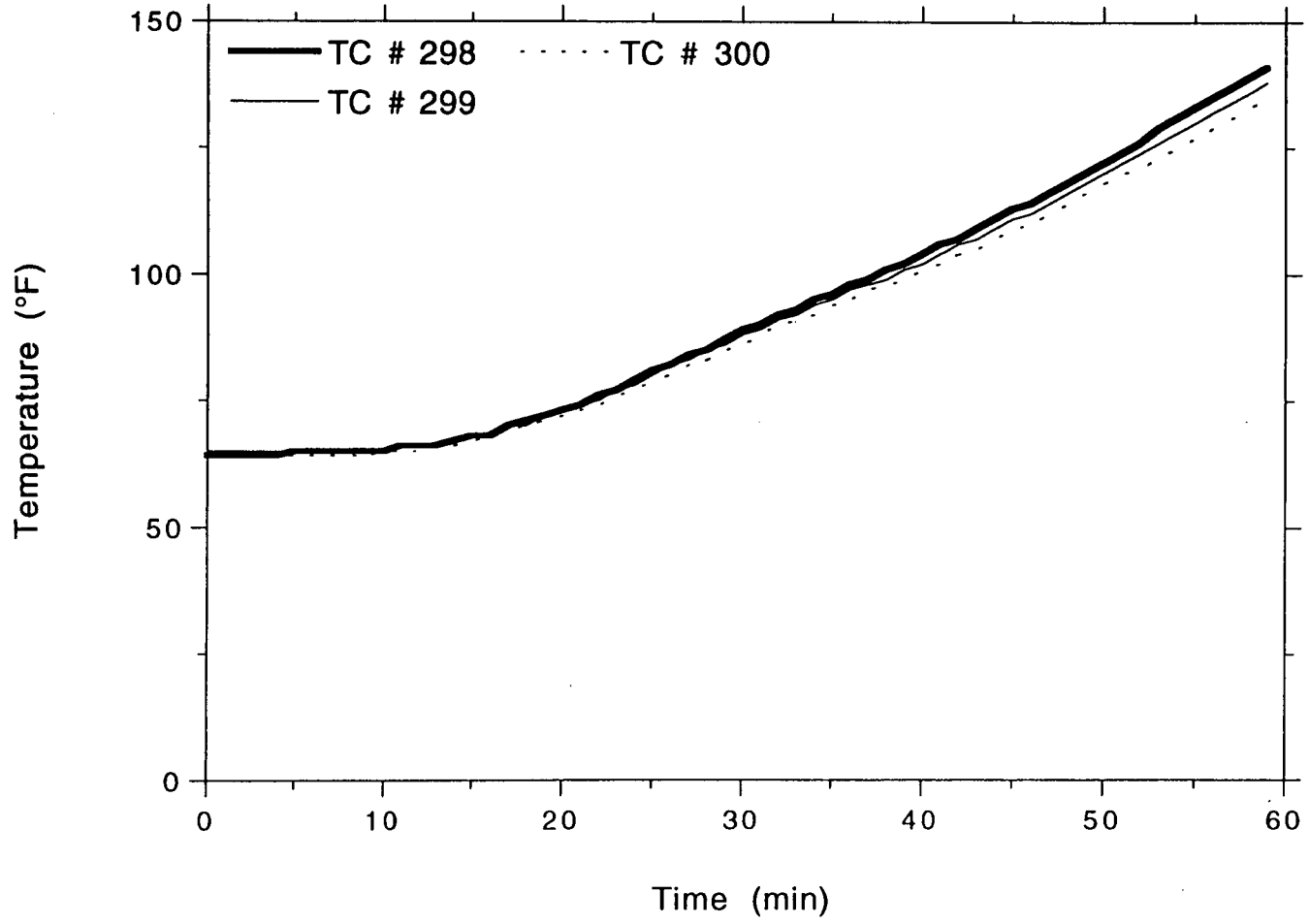

OMEGA POINT LABORATORIES

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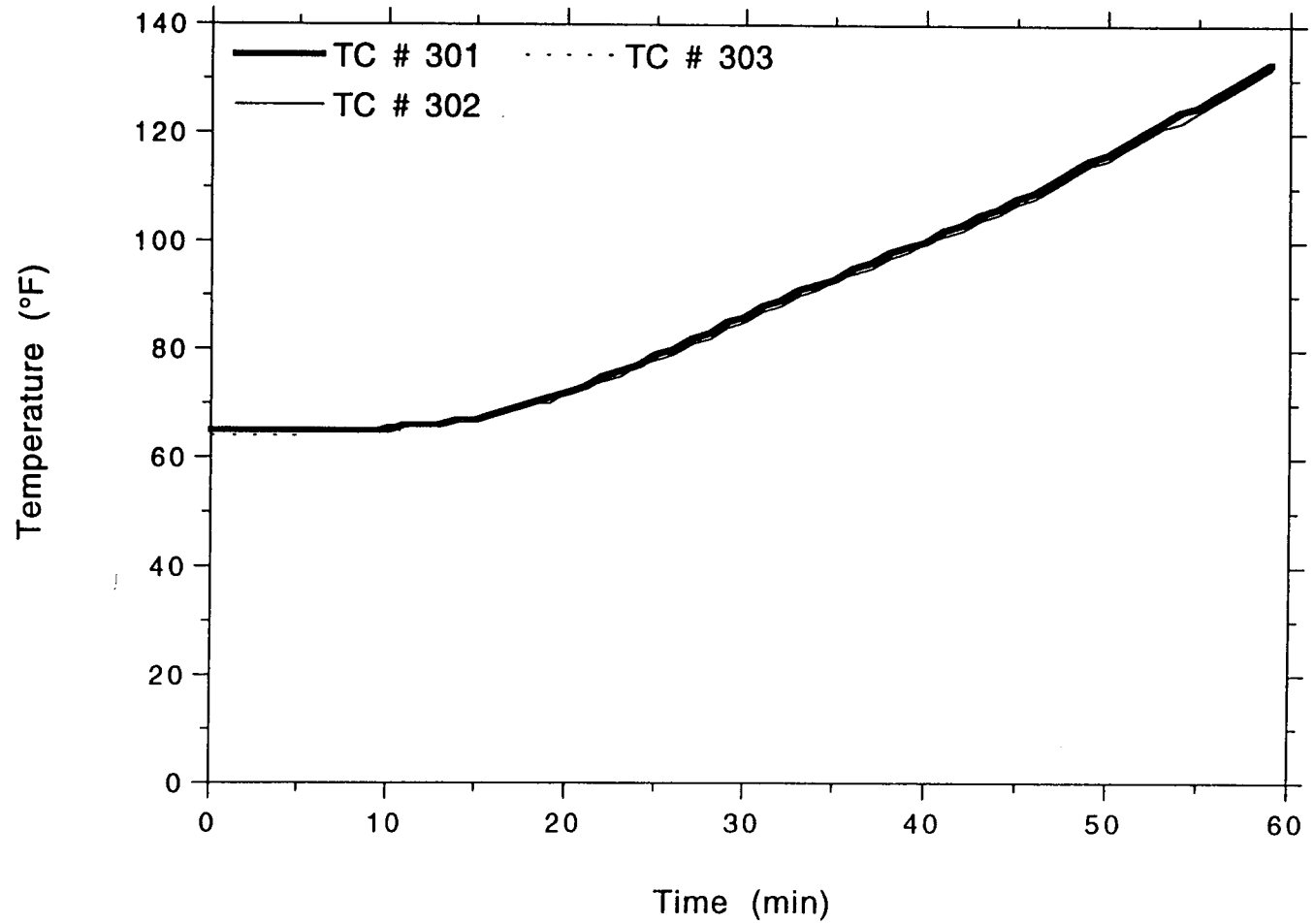

OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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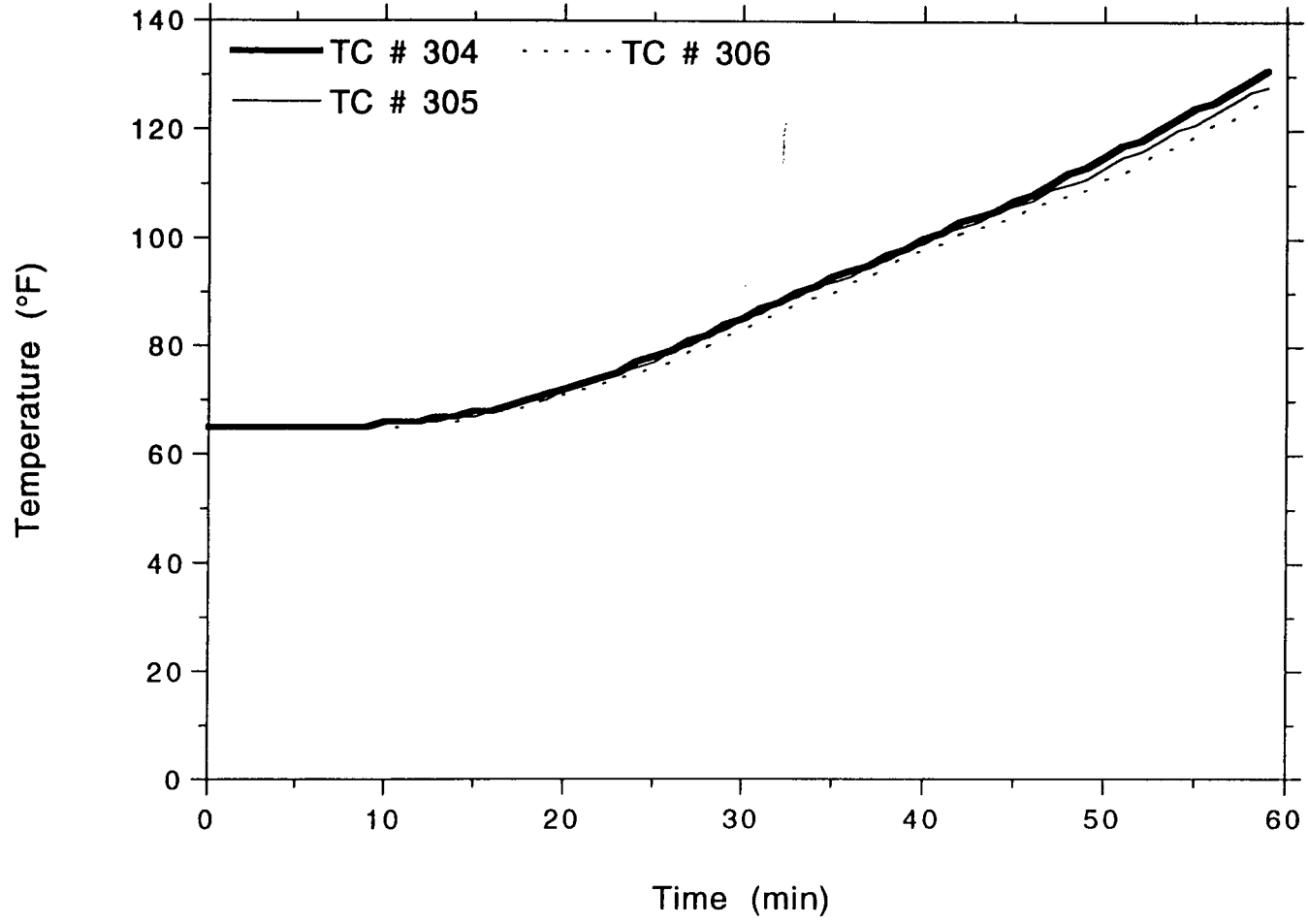

OMEGA POINT LABORATORIES

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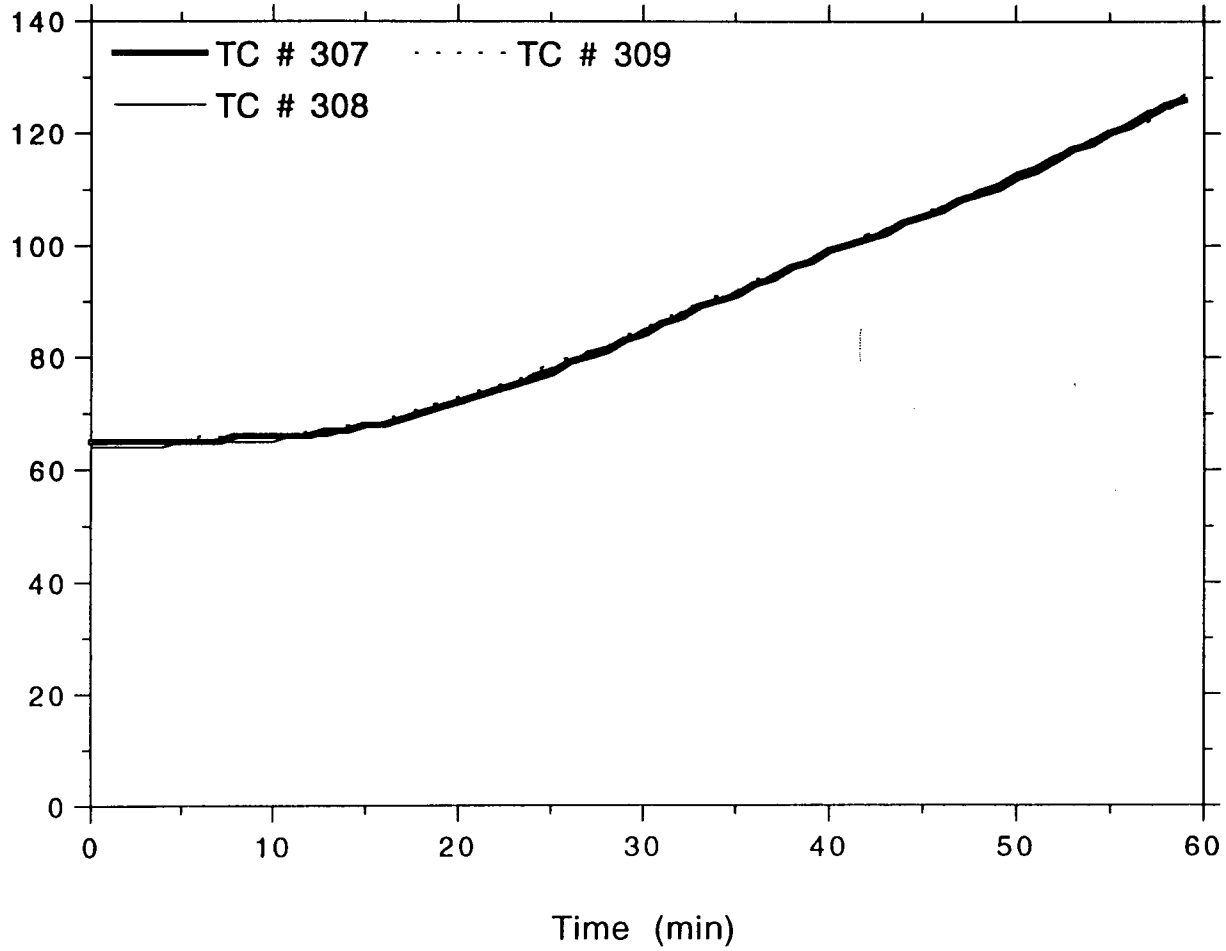

OMEGA POINT LABORATORIES

TSI/TVA
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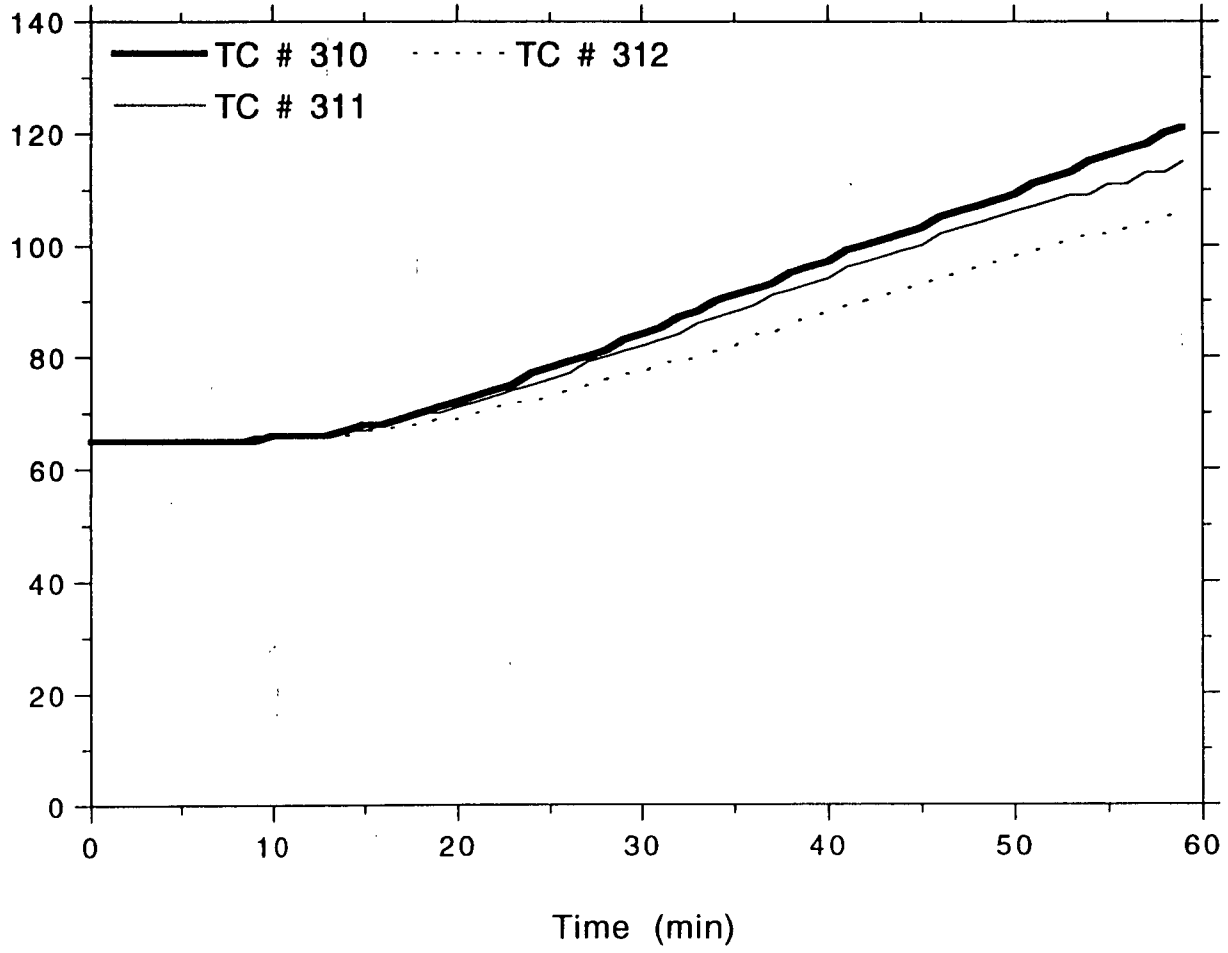
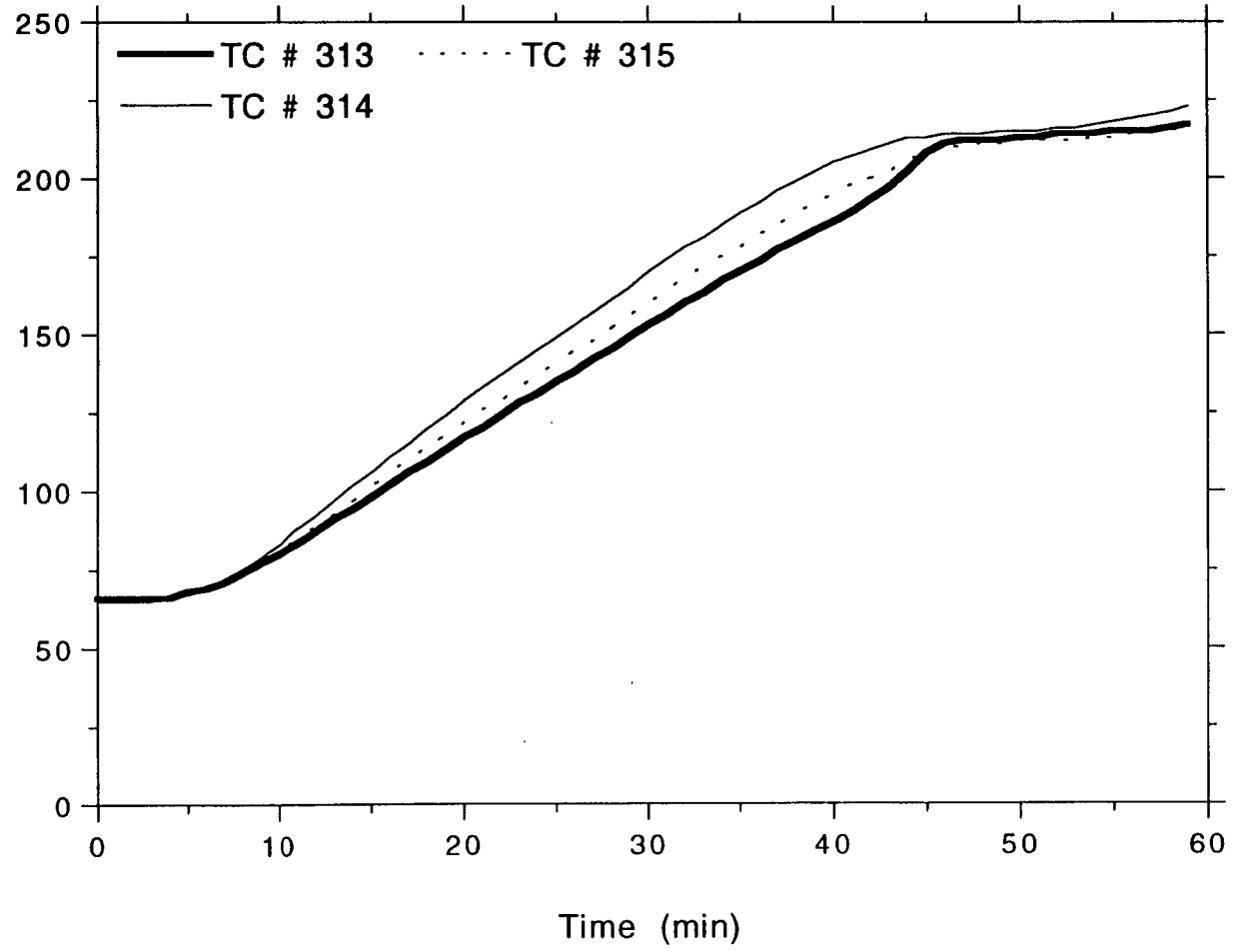
Upper-Mid Rear Al. Conduit



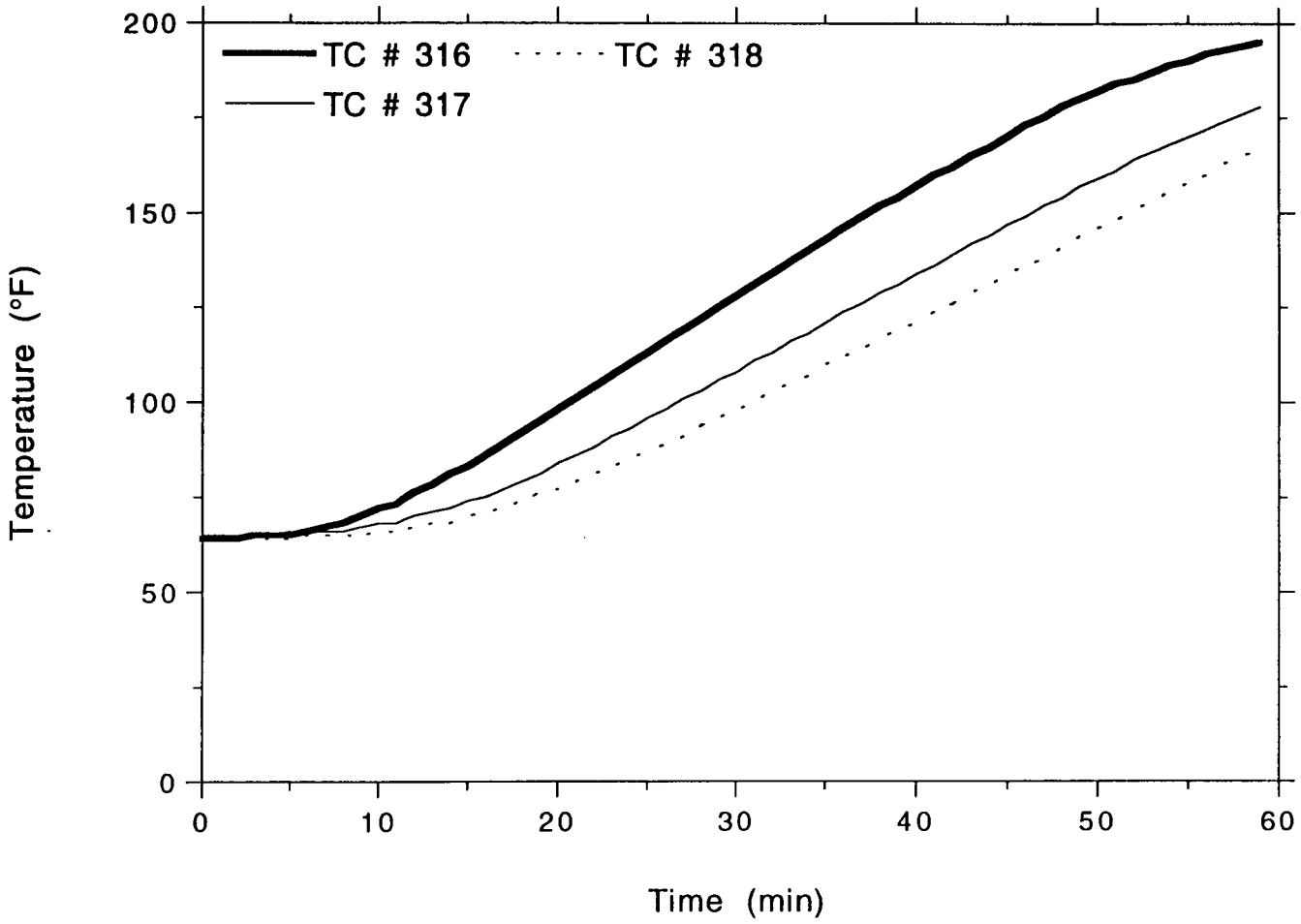
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



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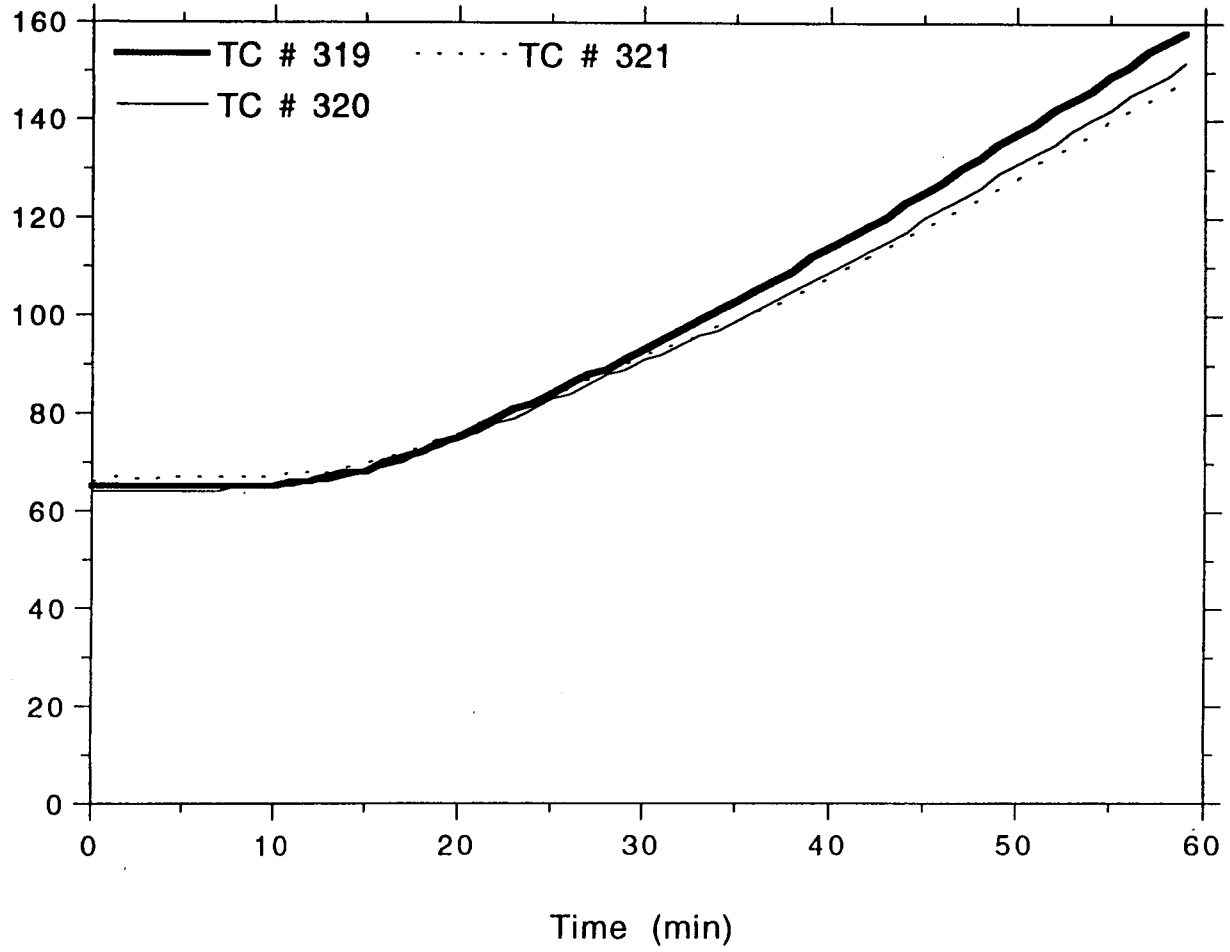

OMEGA POINT LABORATORIES

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Project No. 11960-97257
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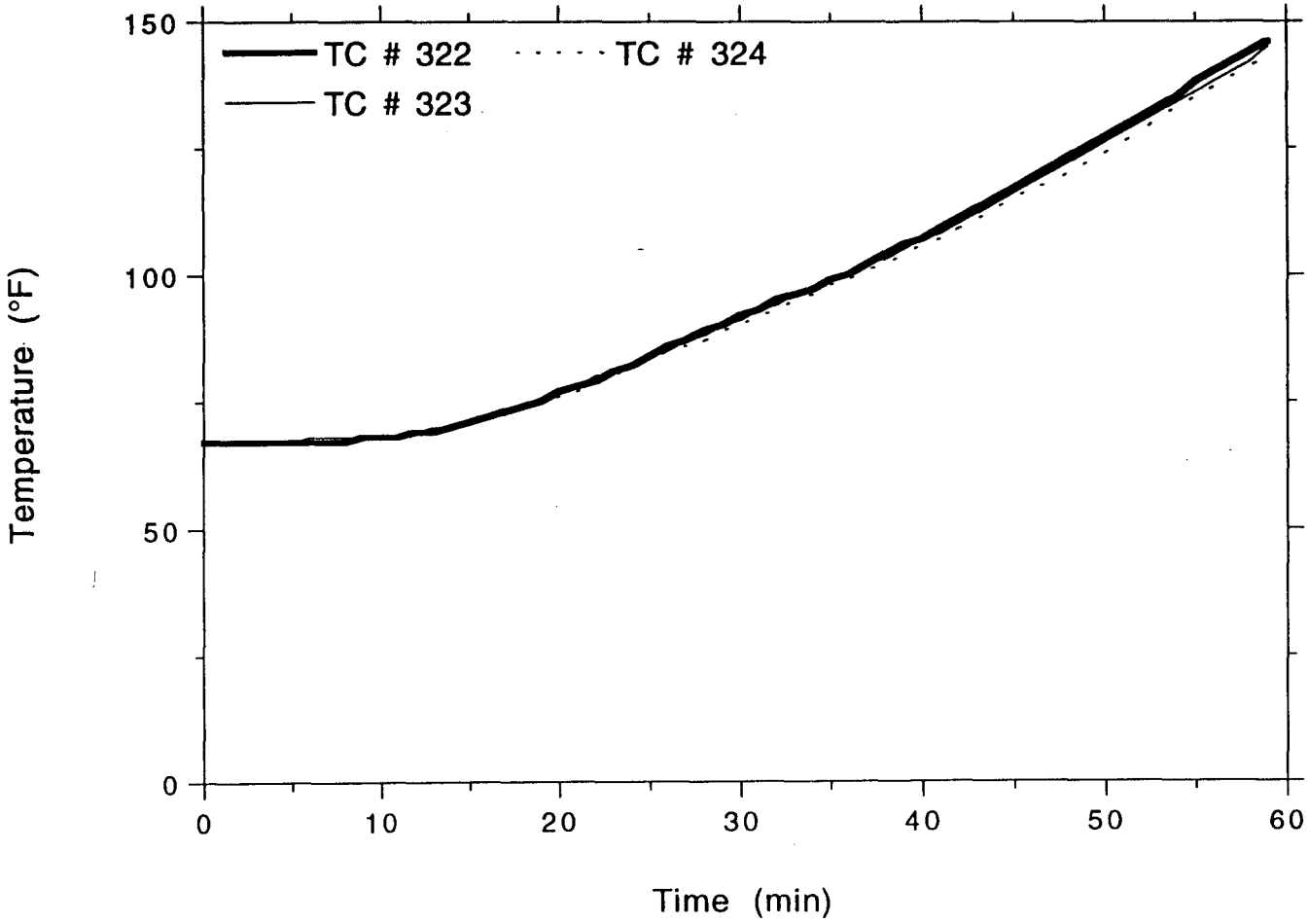
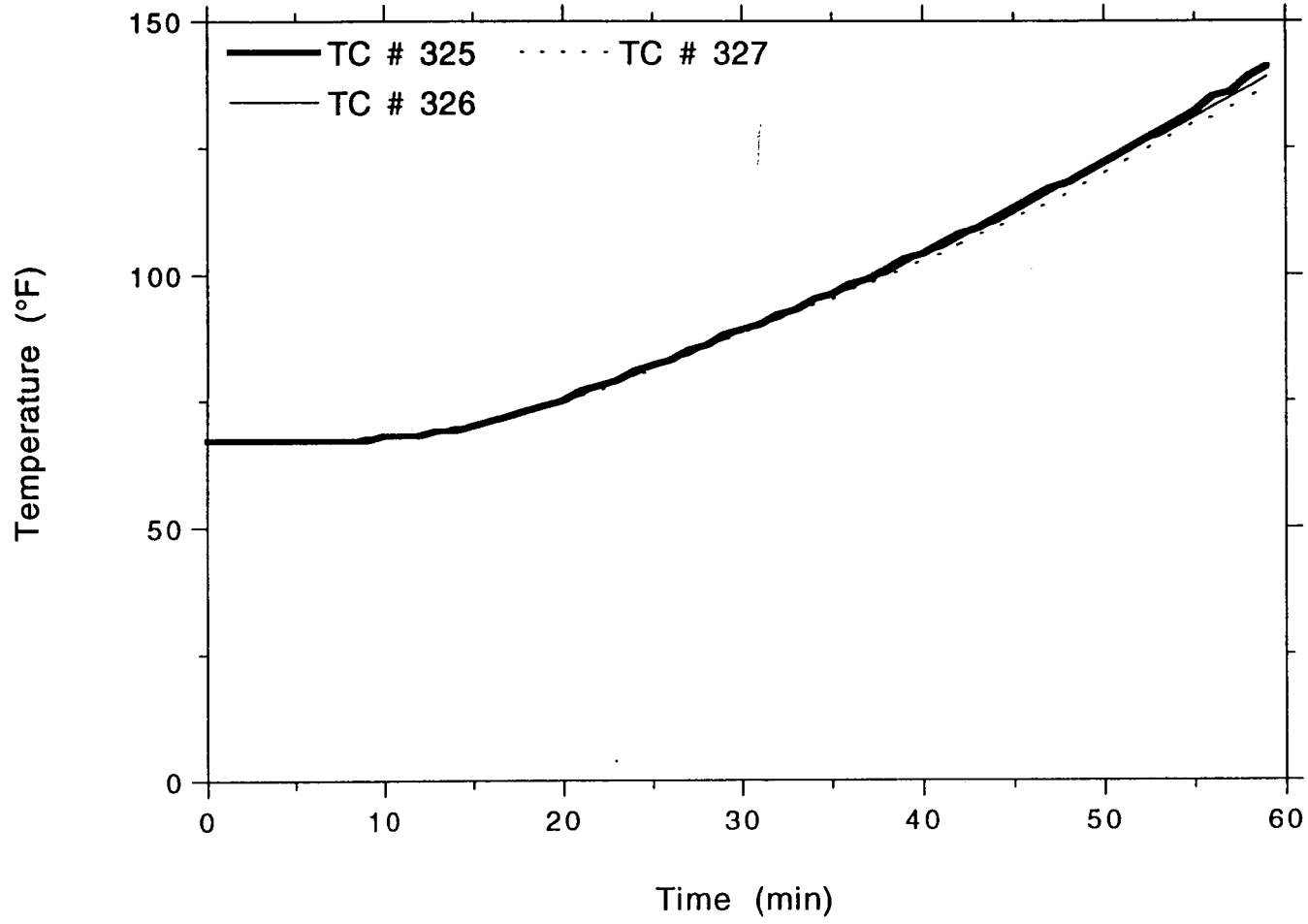


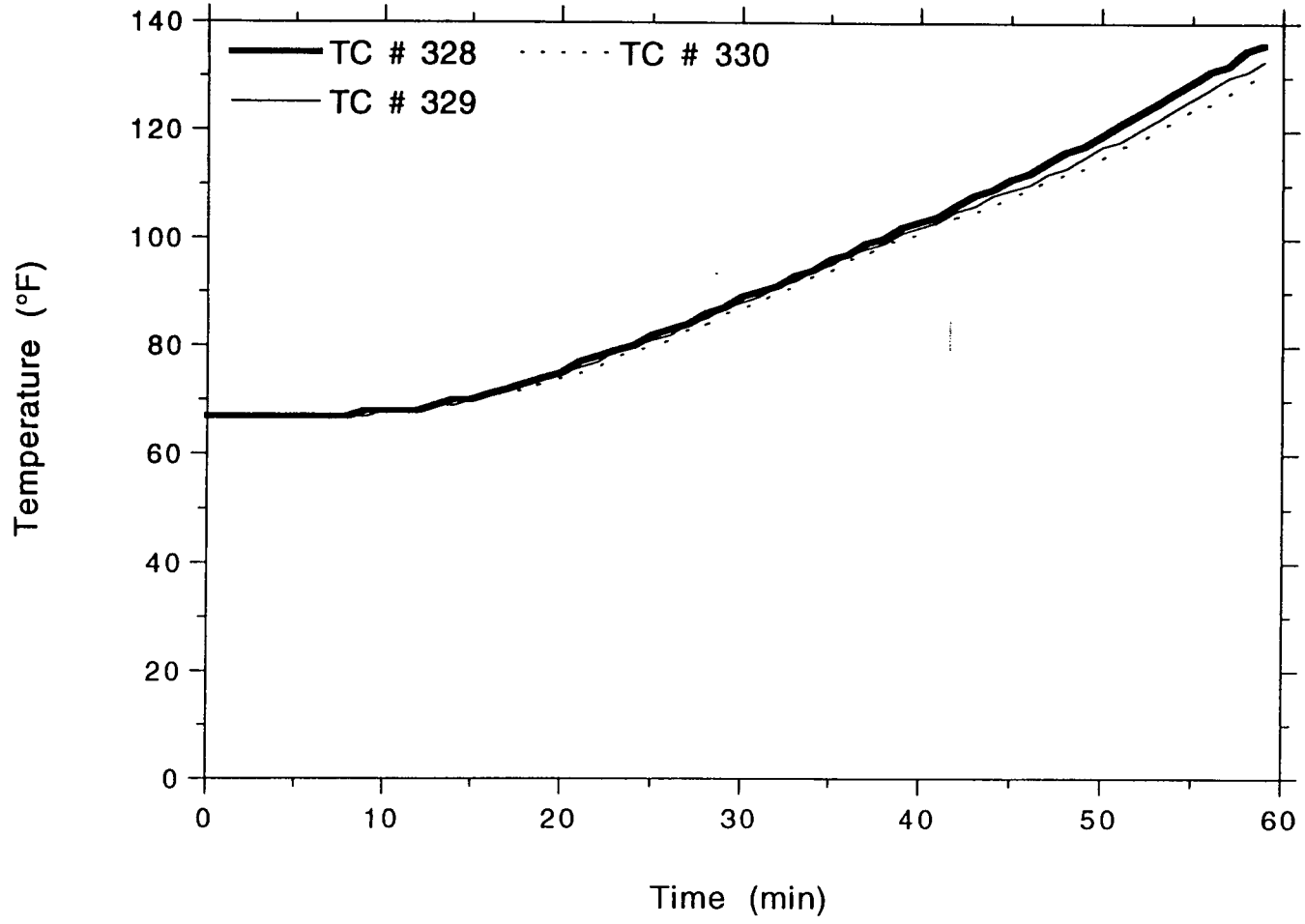
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



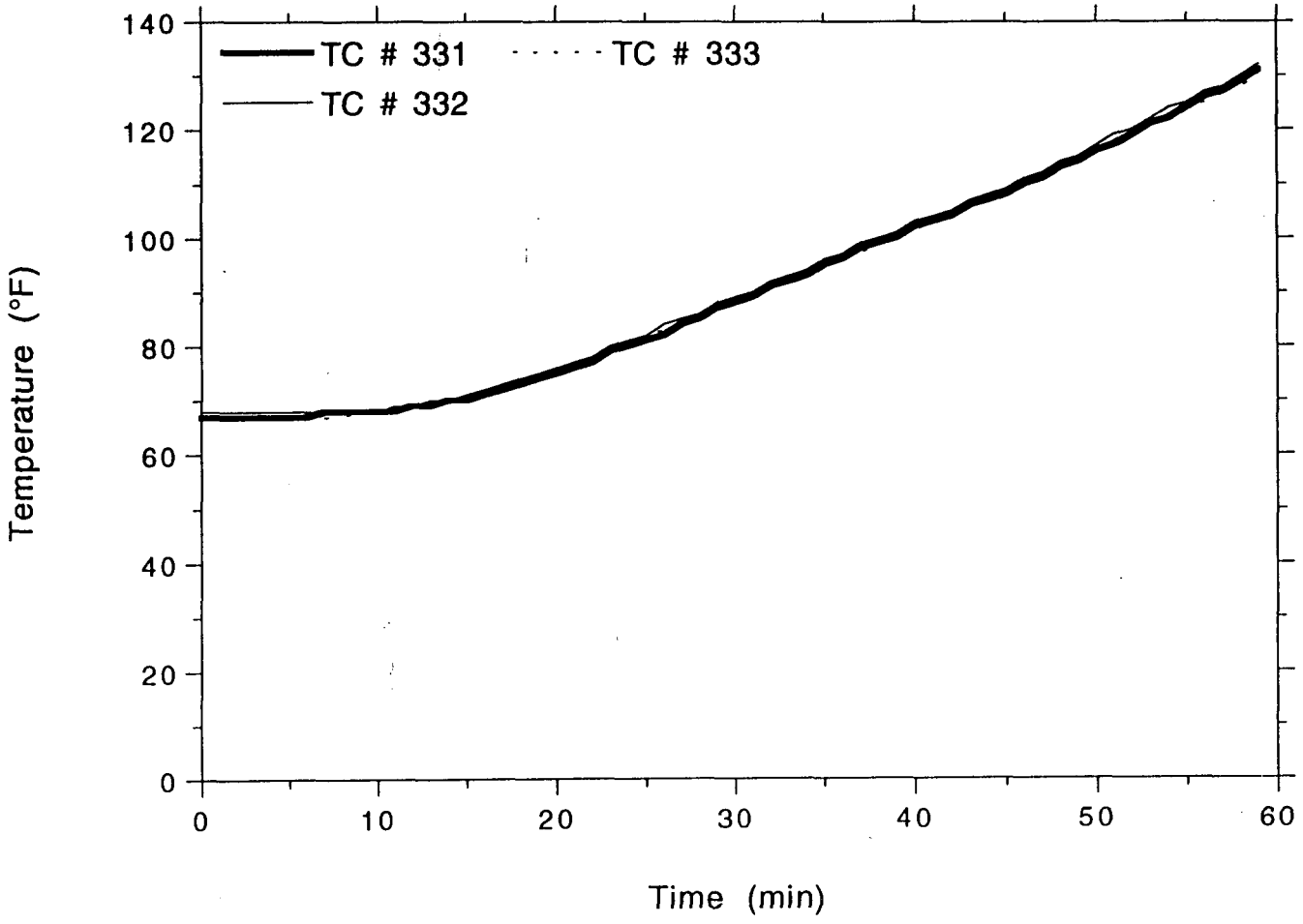
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



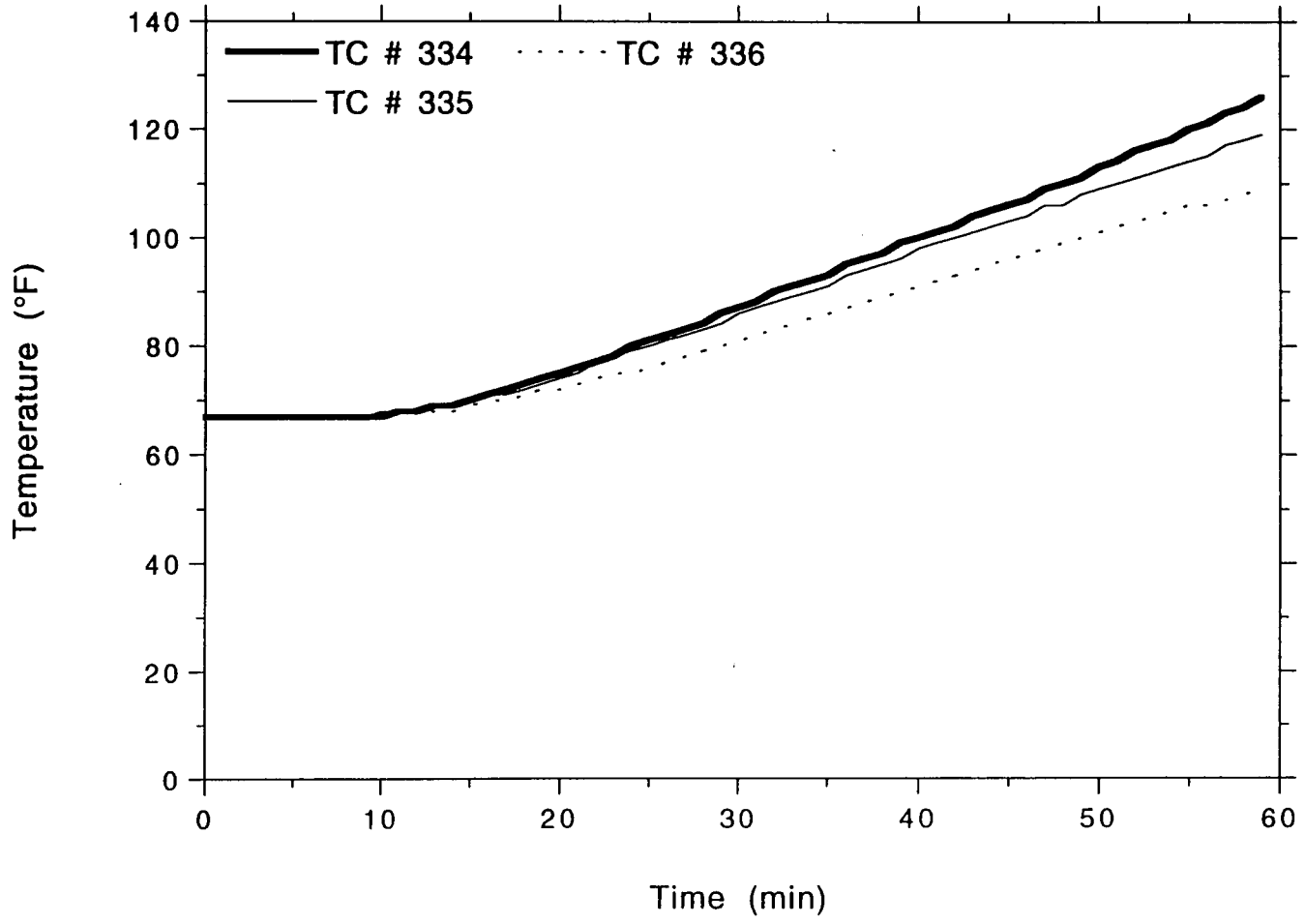
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



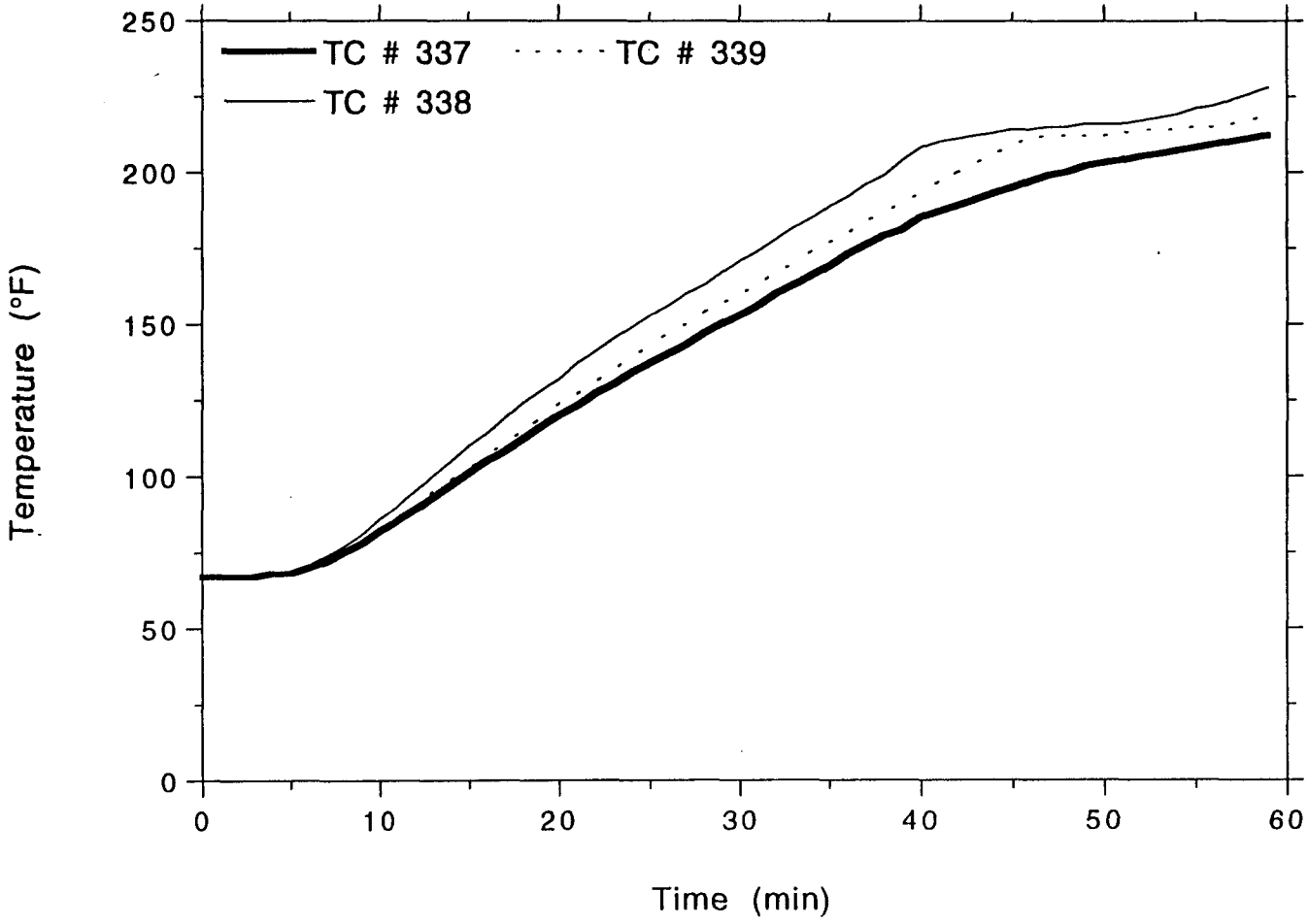
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Rear Al. Conduit



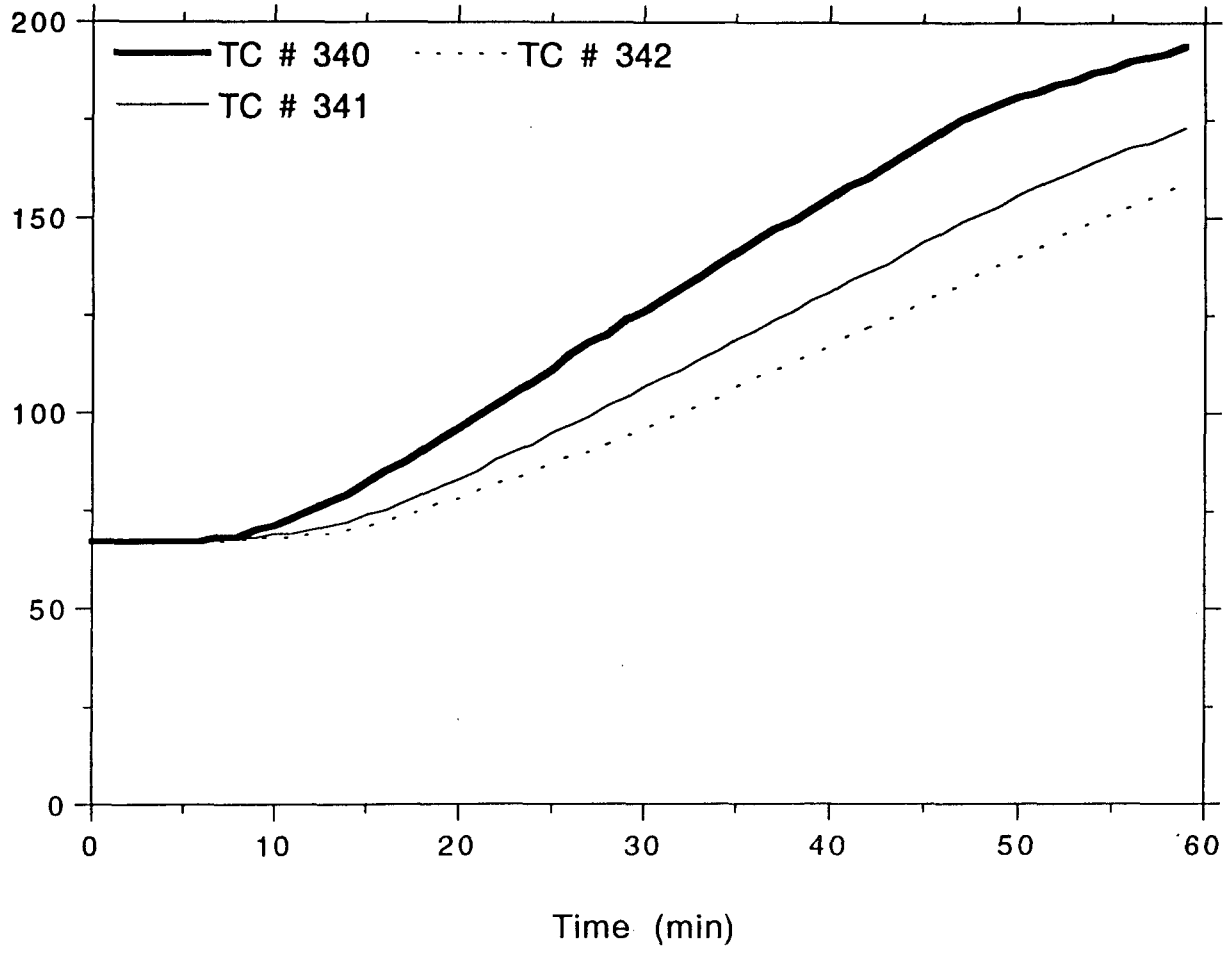
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



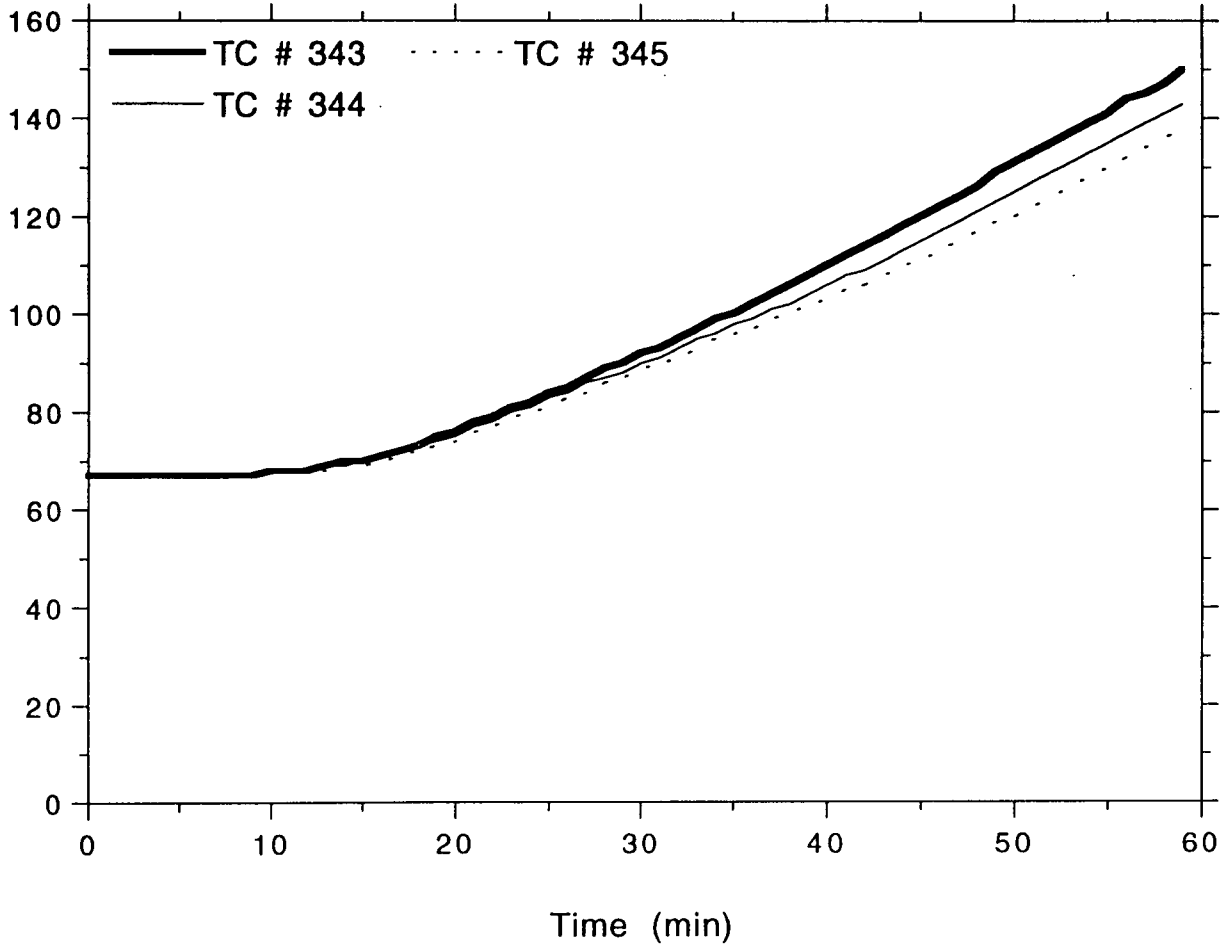
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



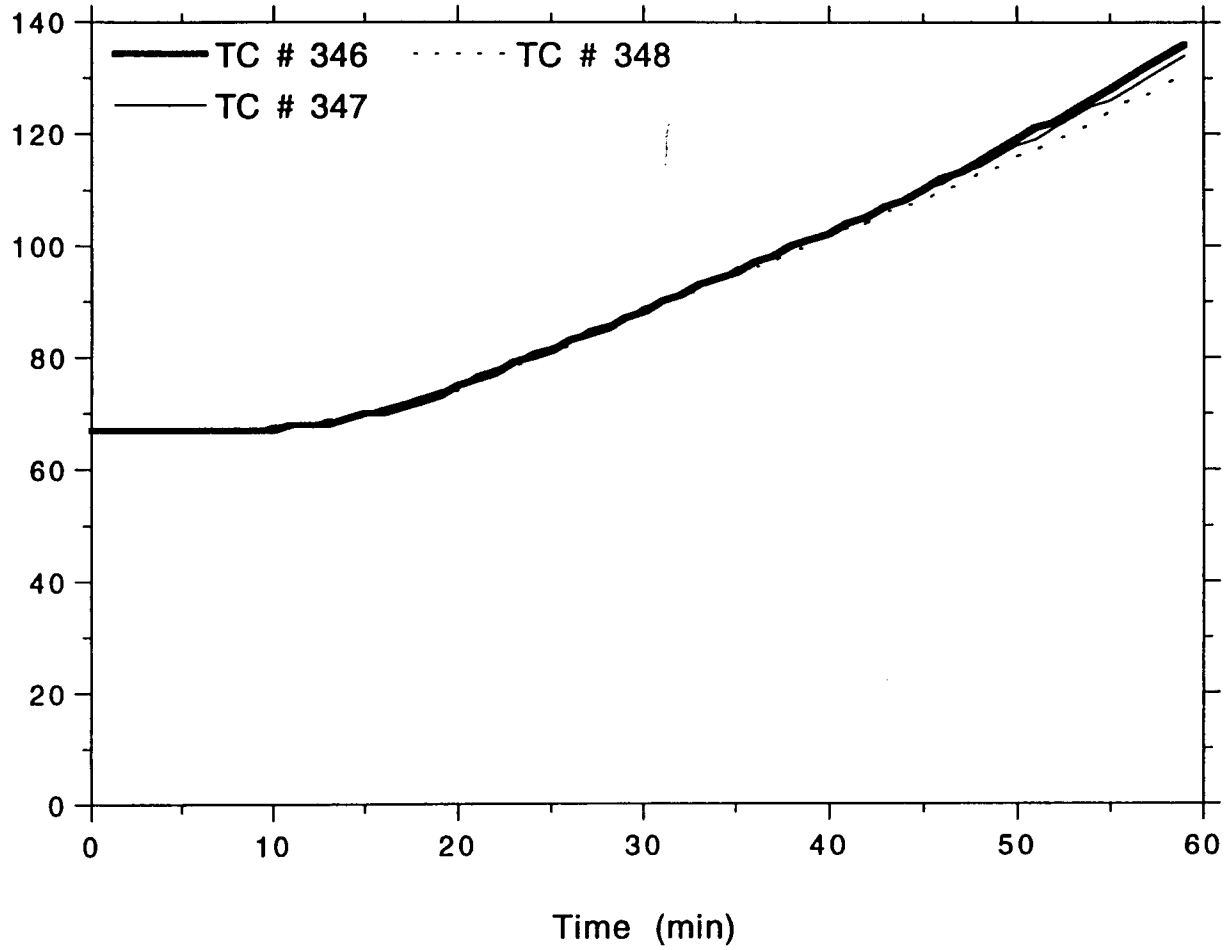
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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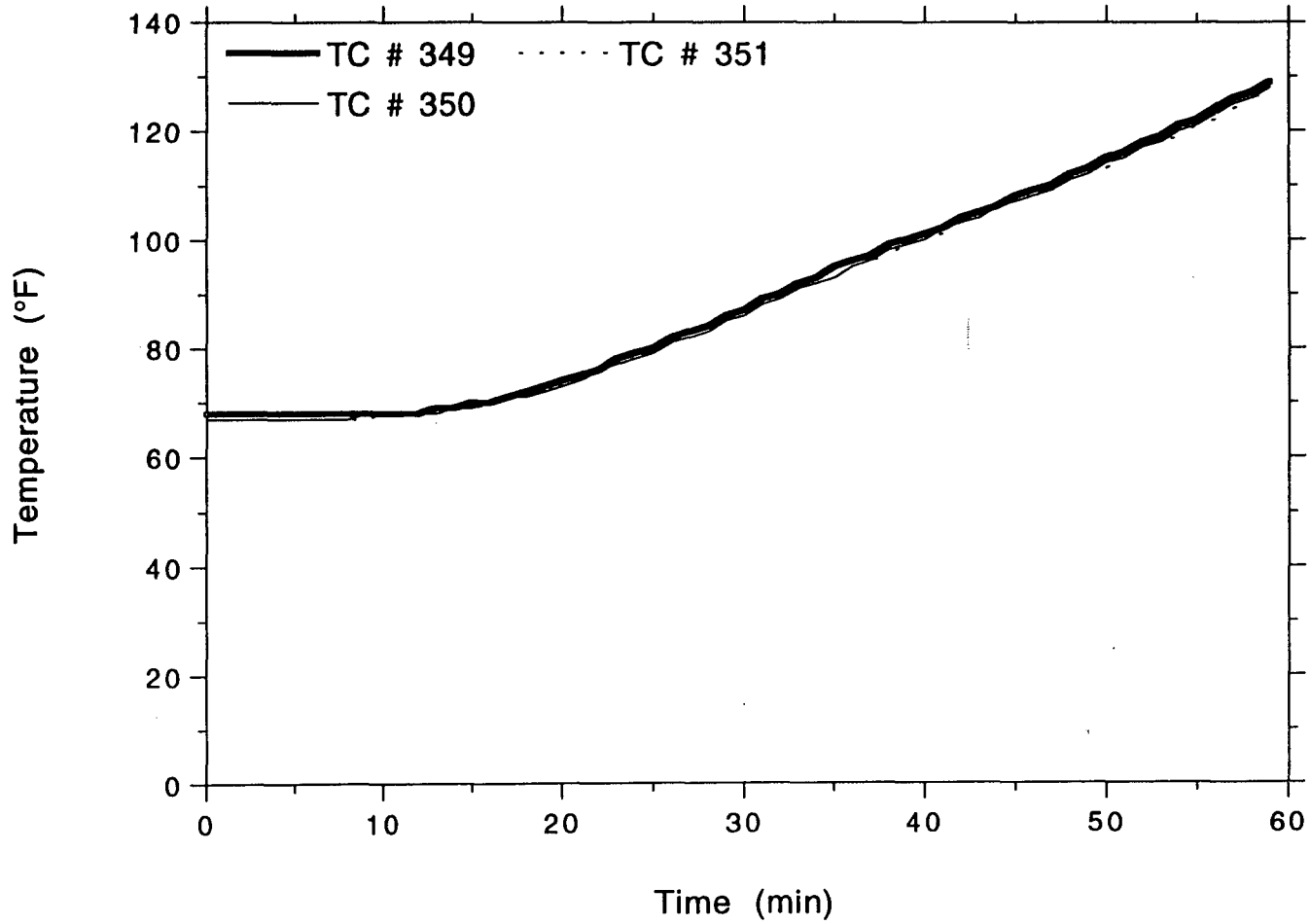
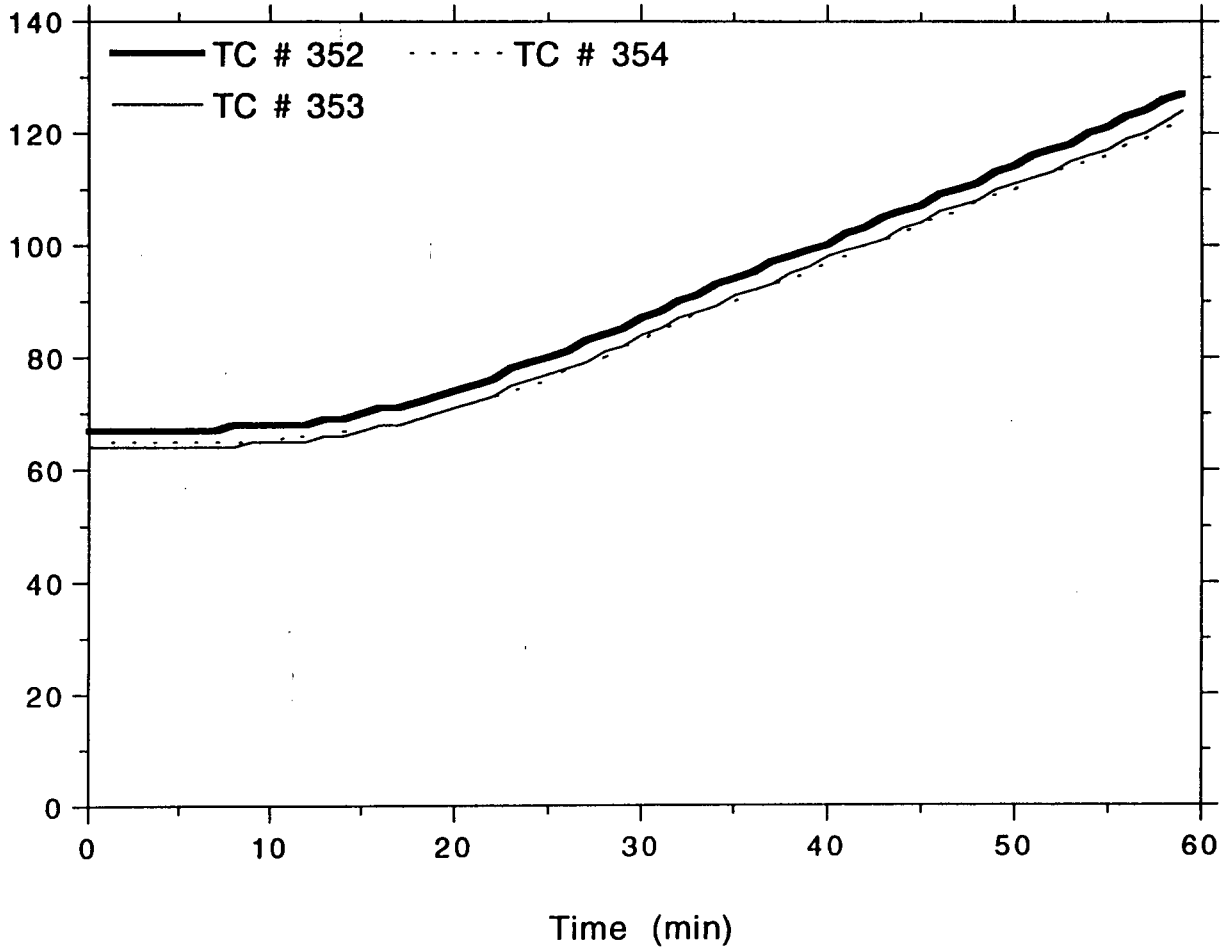
Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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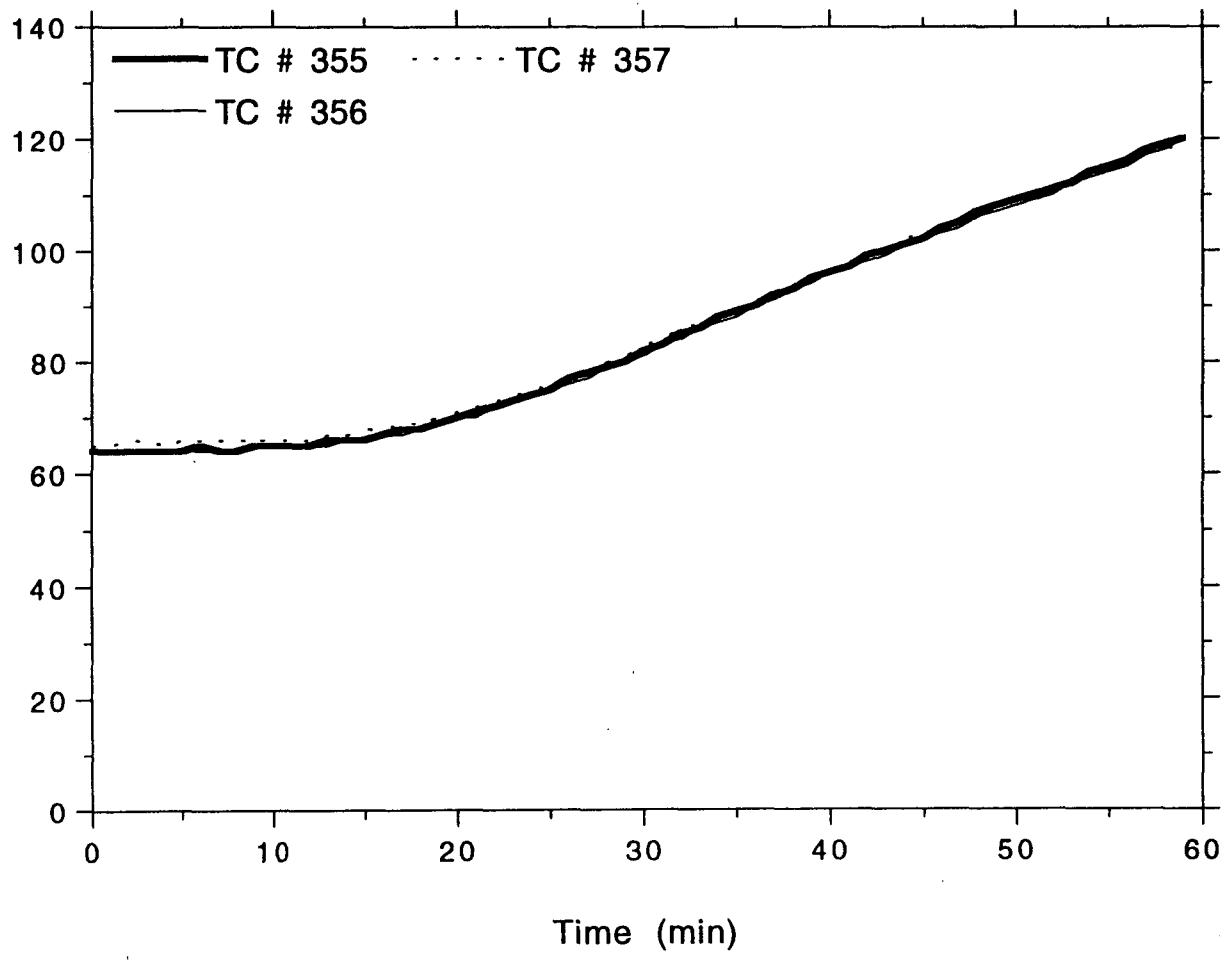
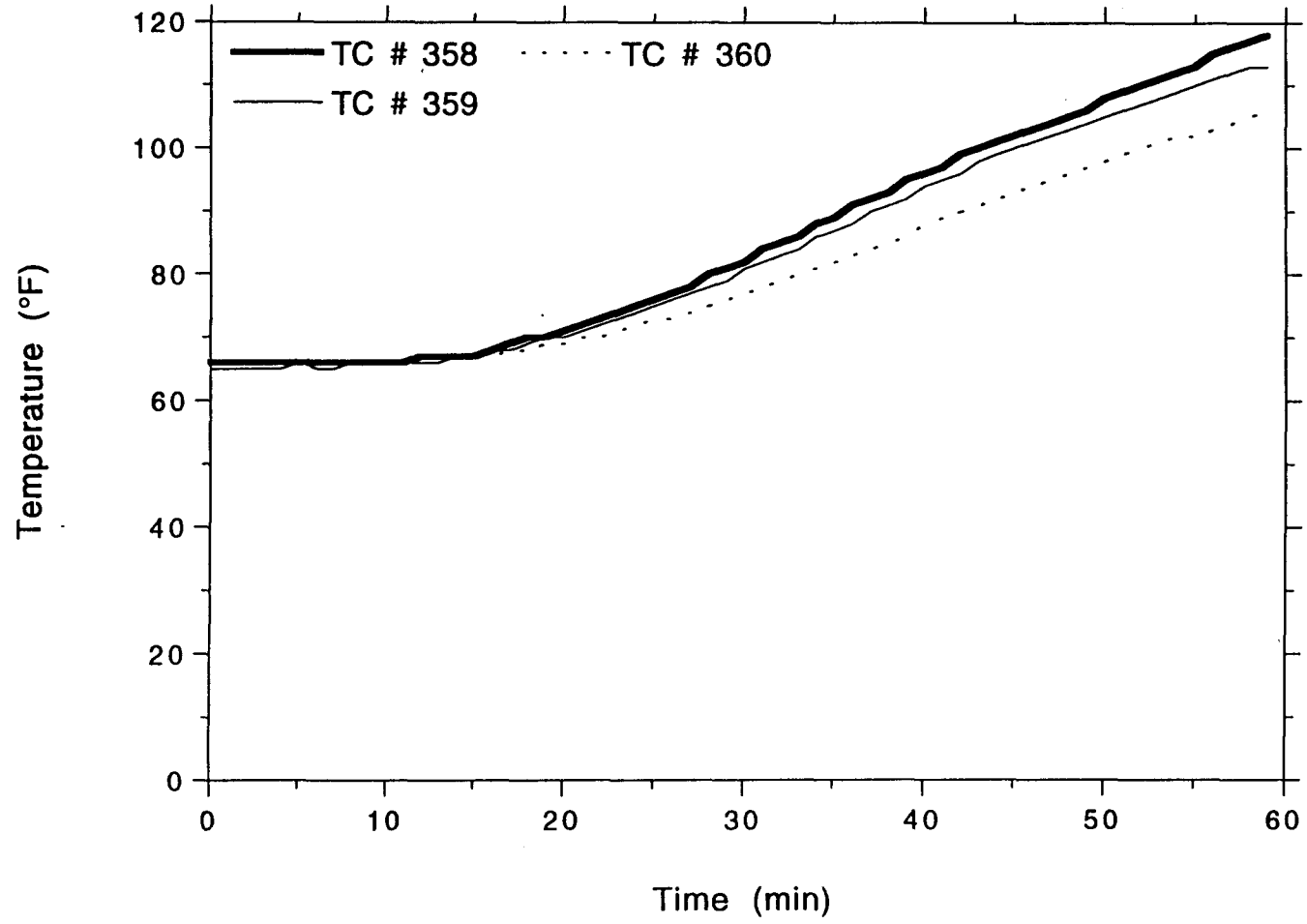
Lower Front Al. Conduit



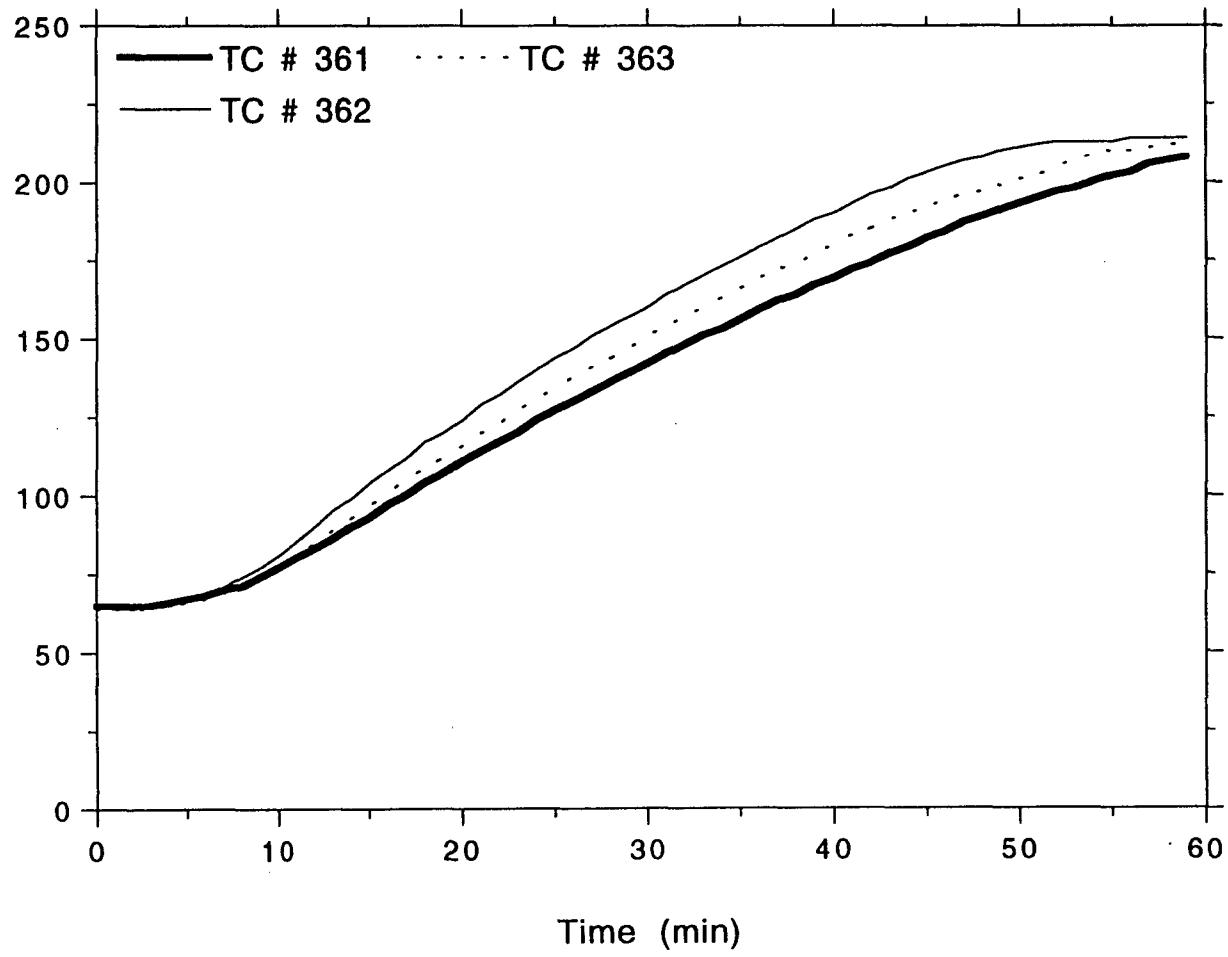
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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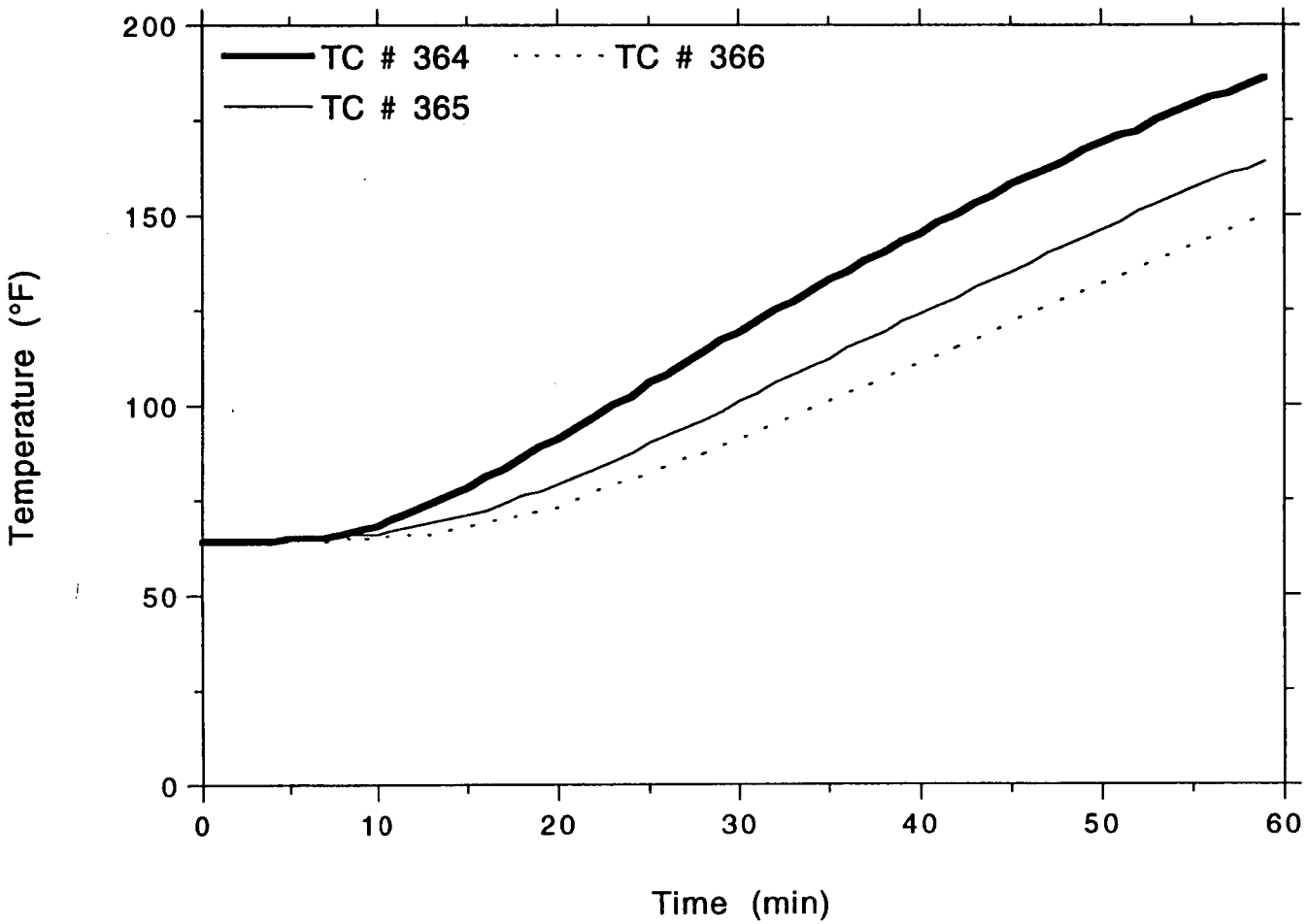
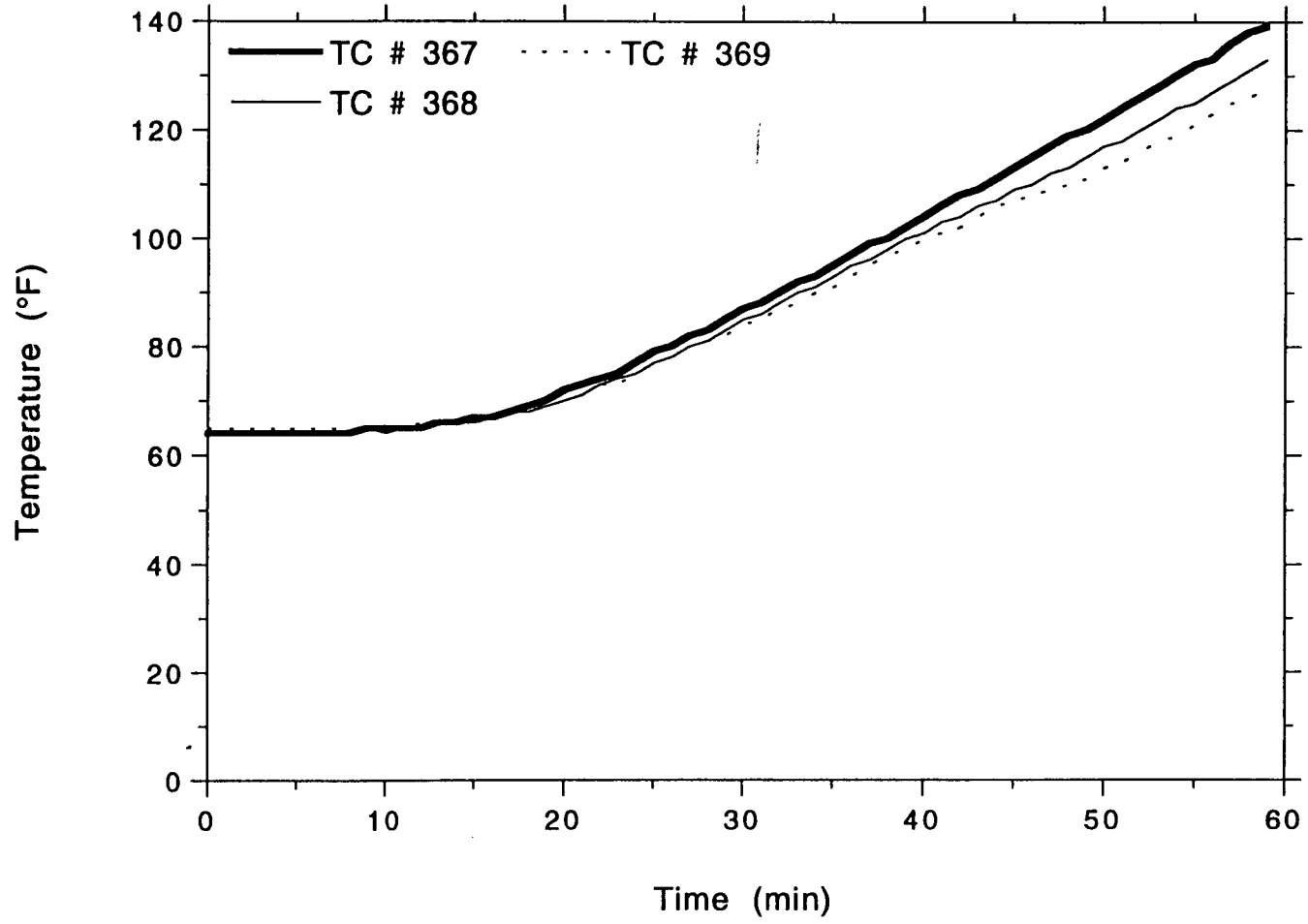
Lower-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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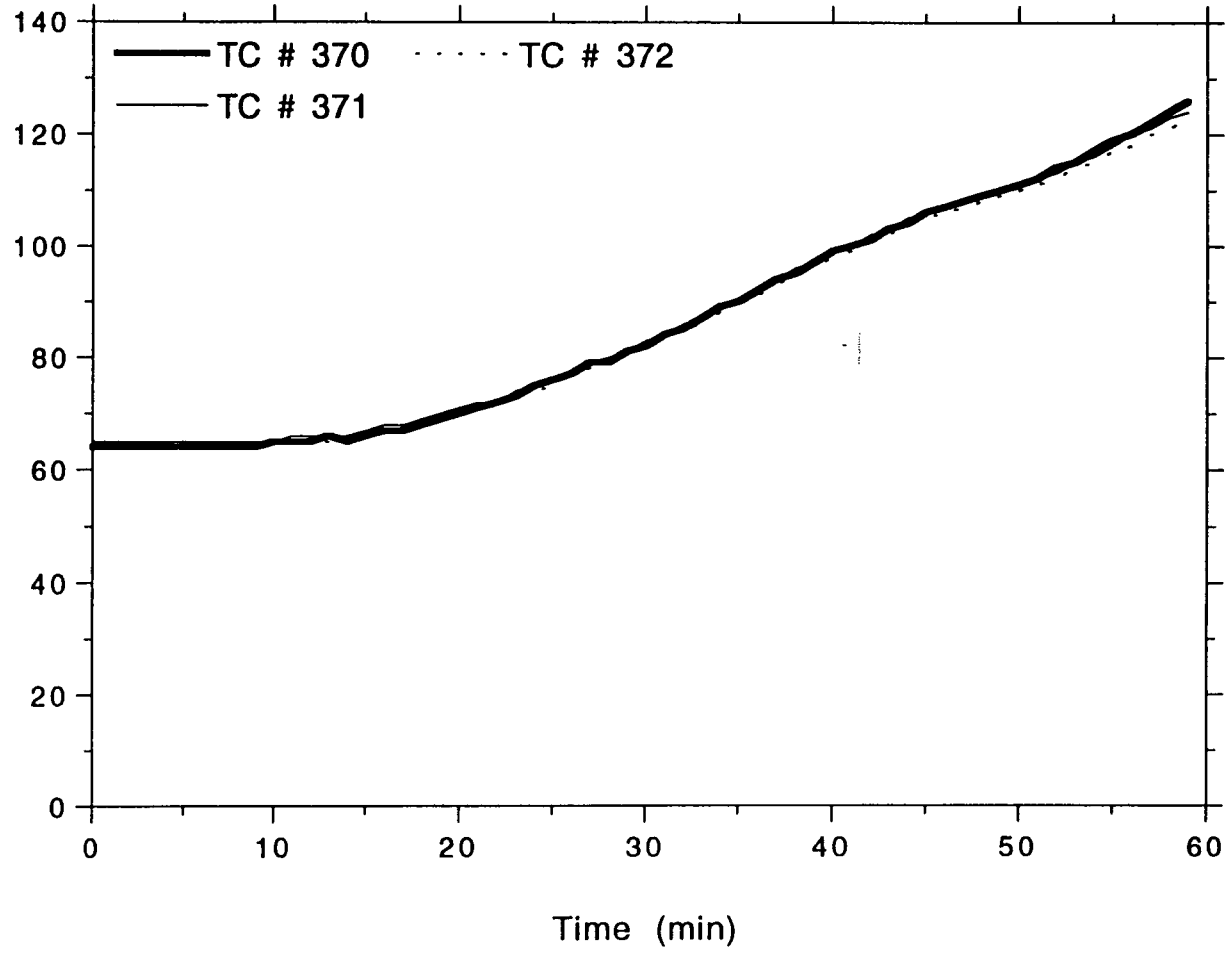
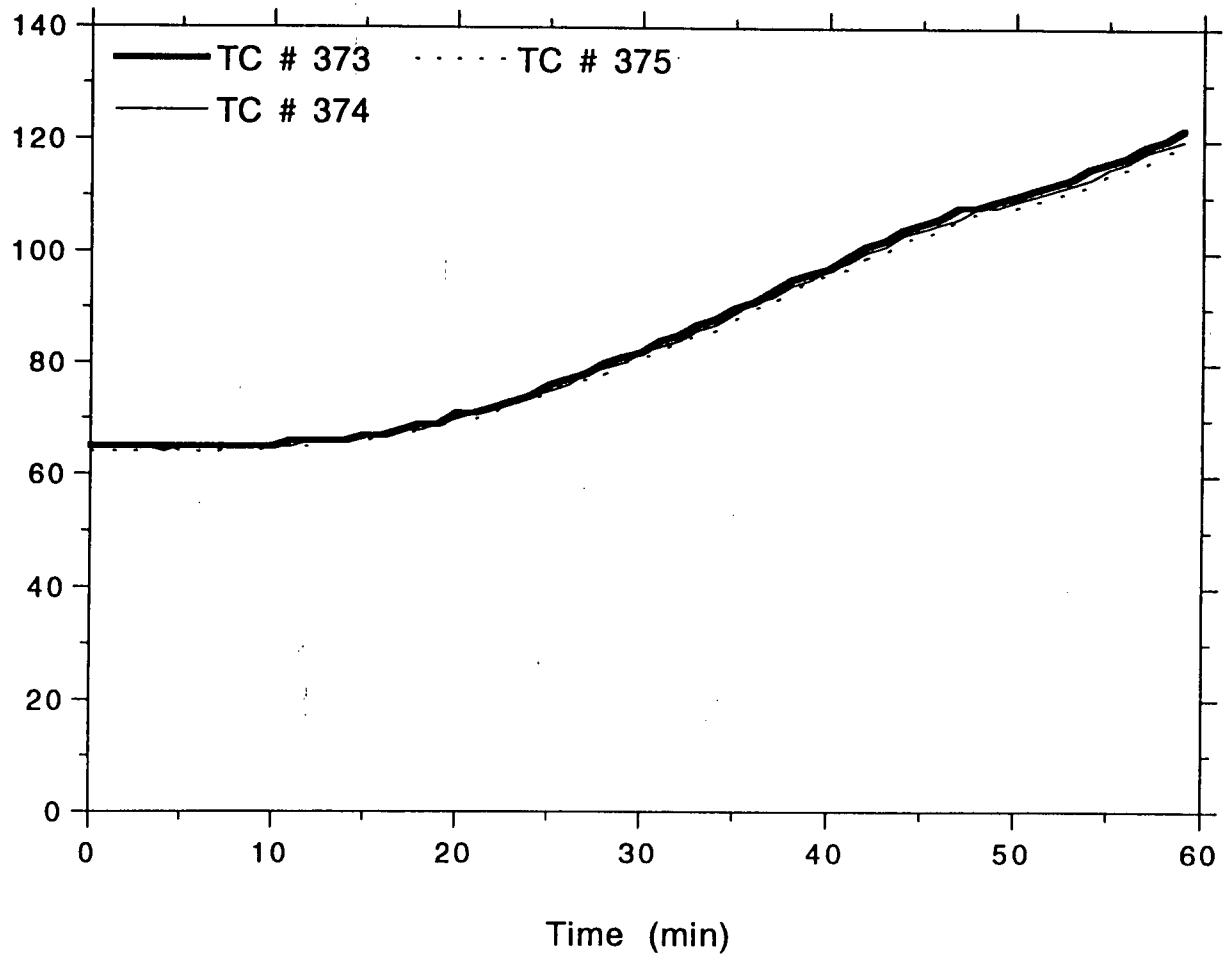
Lower-Mid Front Al. Conduit



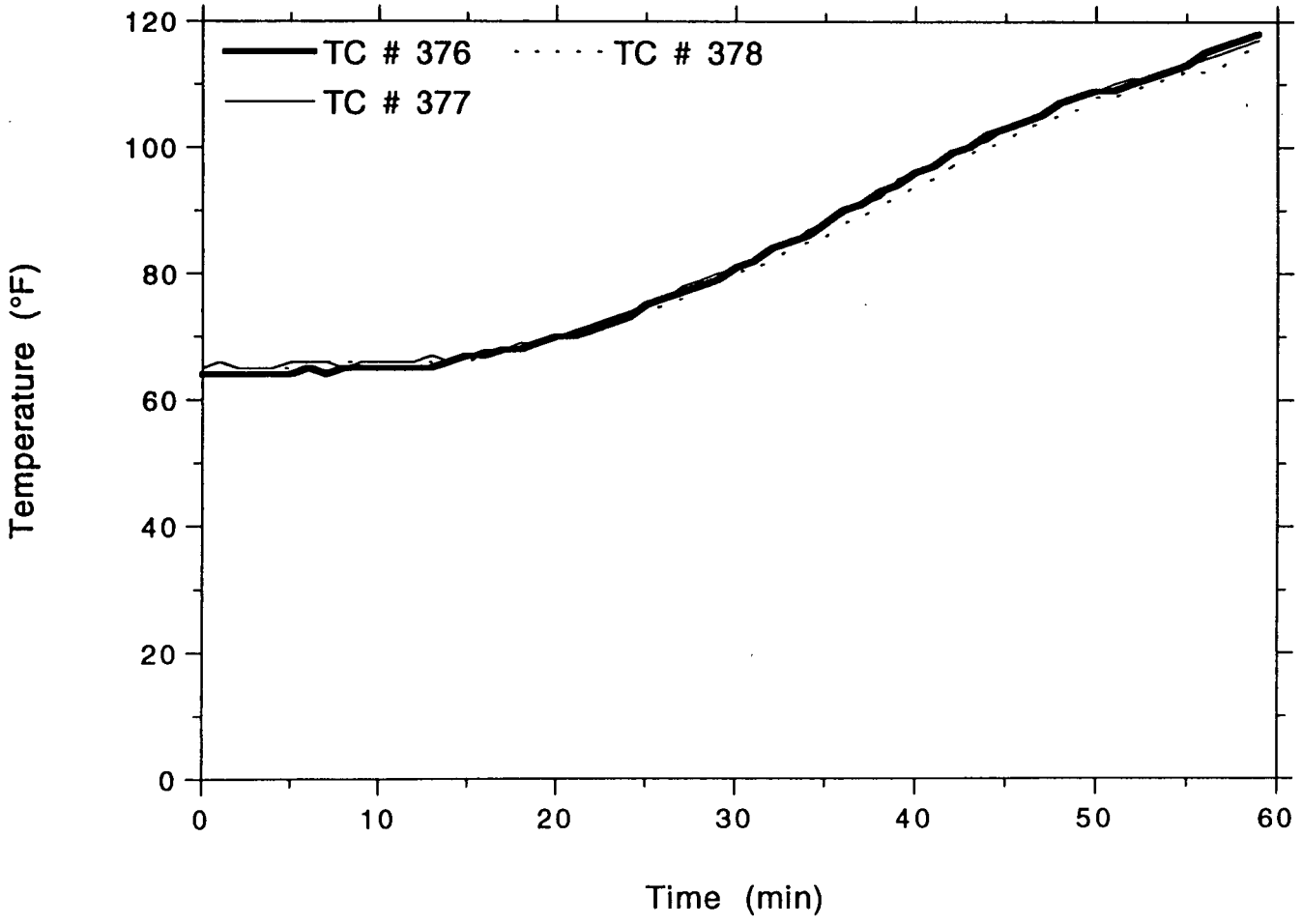
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Lower-Mid Front Al. Conduit



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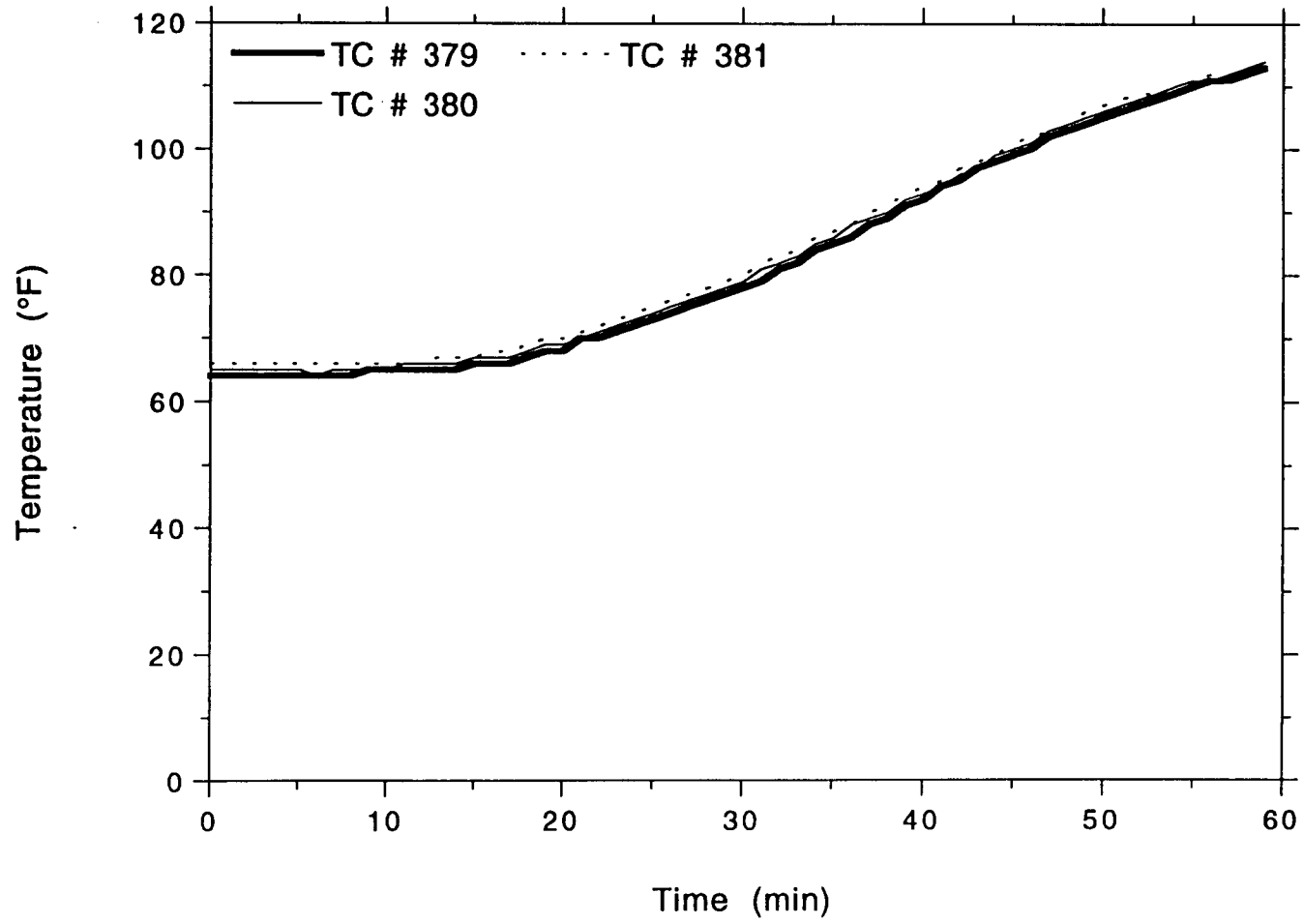
Lower-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

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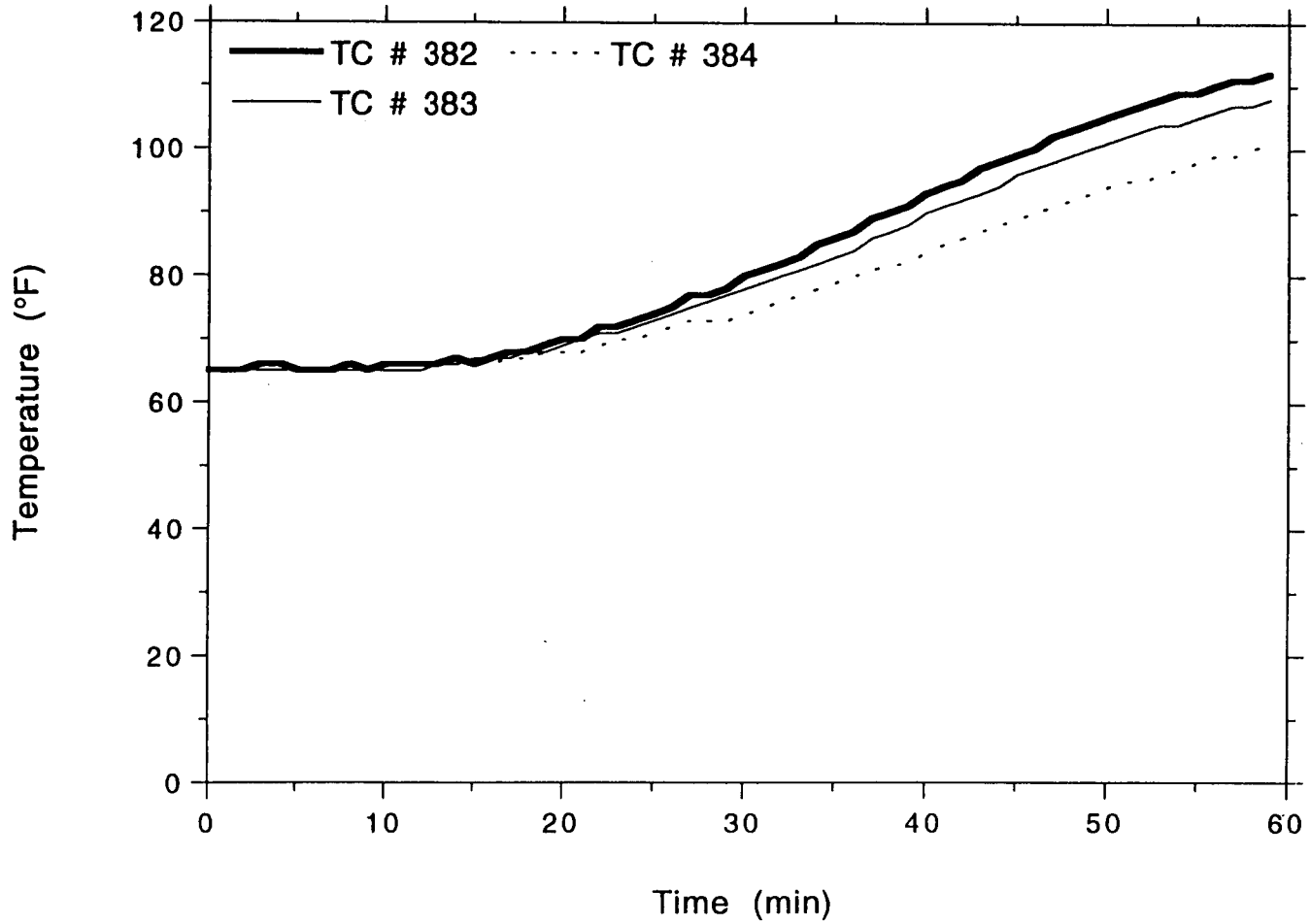
Lower-Mid Front Al. Conduit



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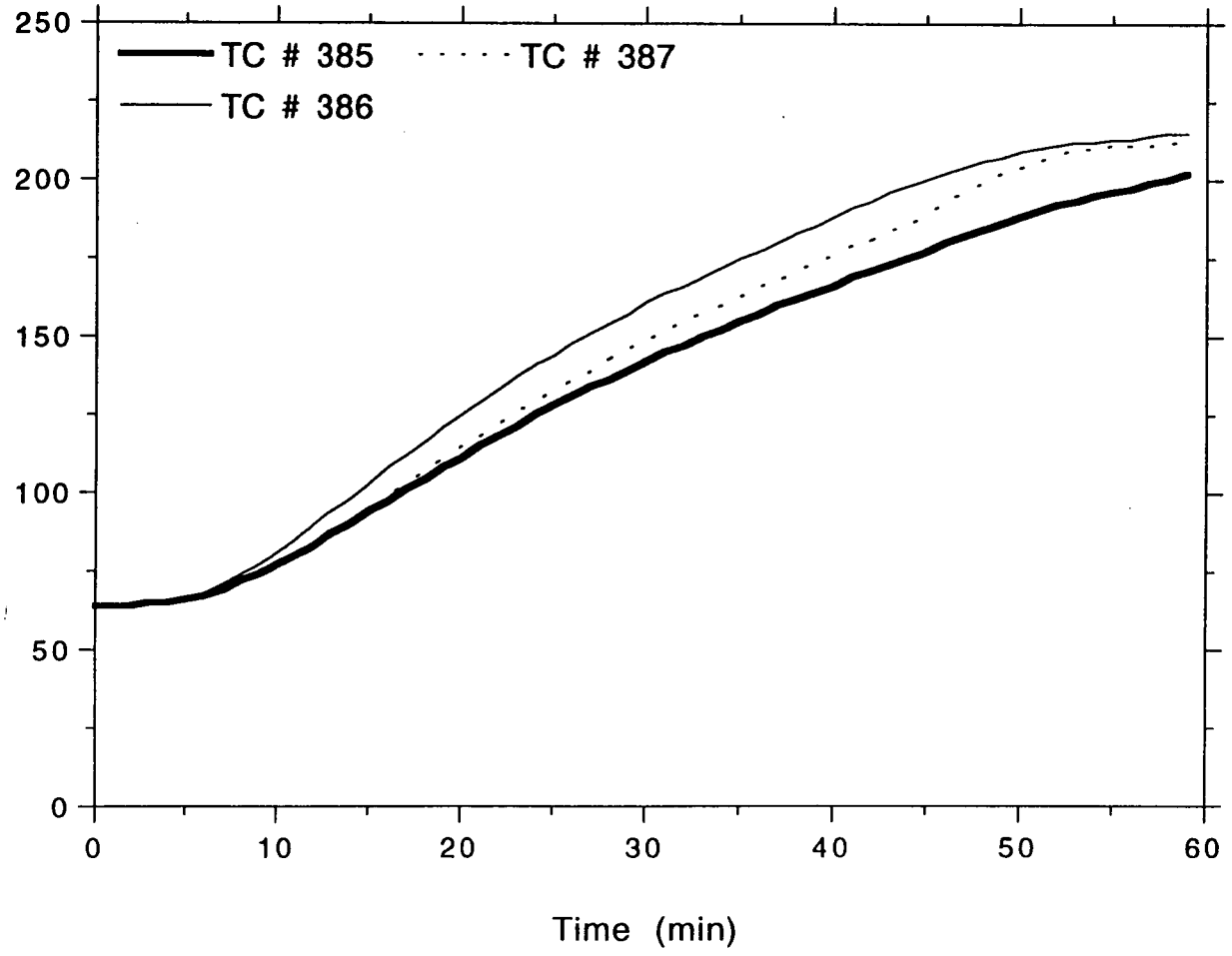
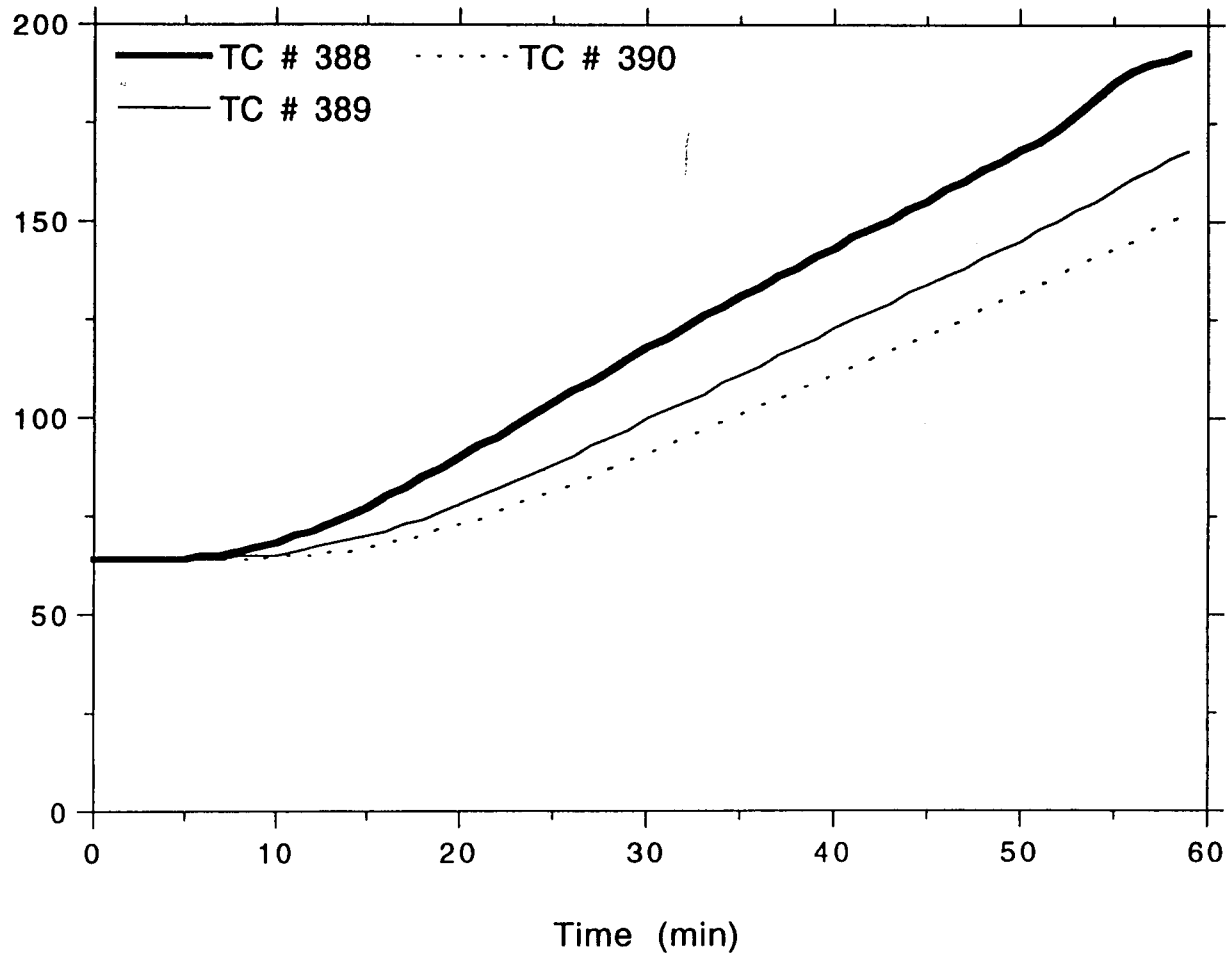
TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



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TSI/TVA
Project No. 11960-97257
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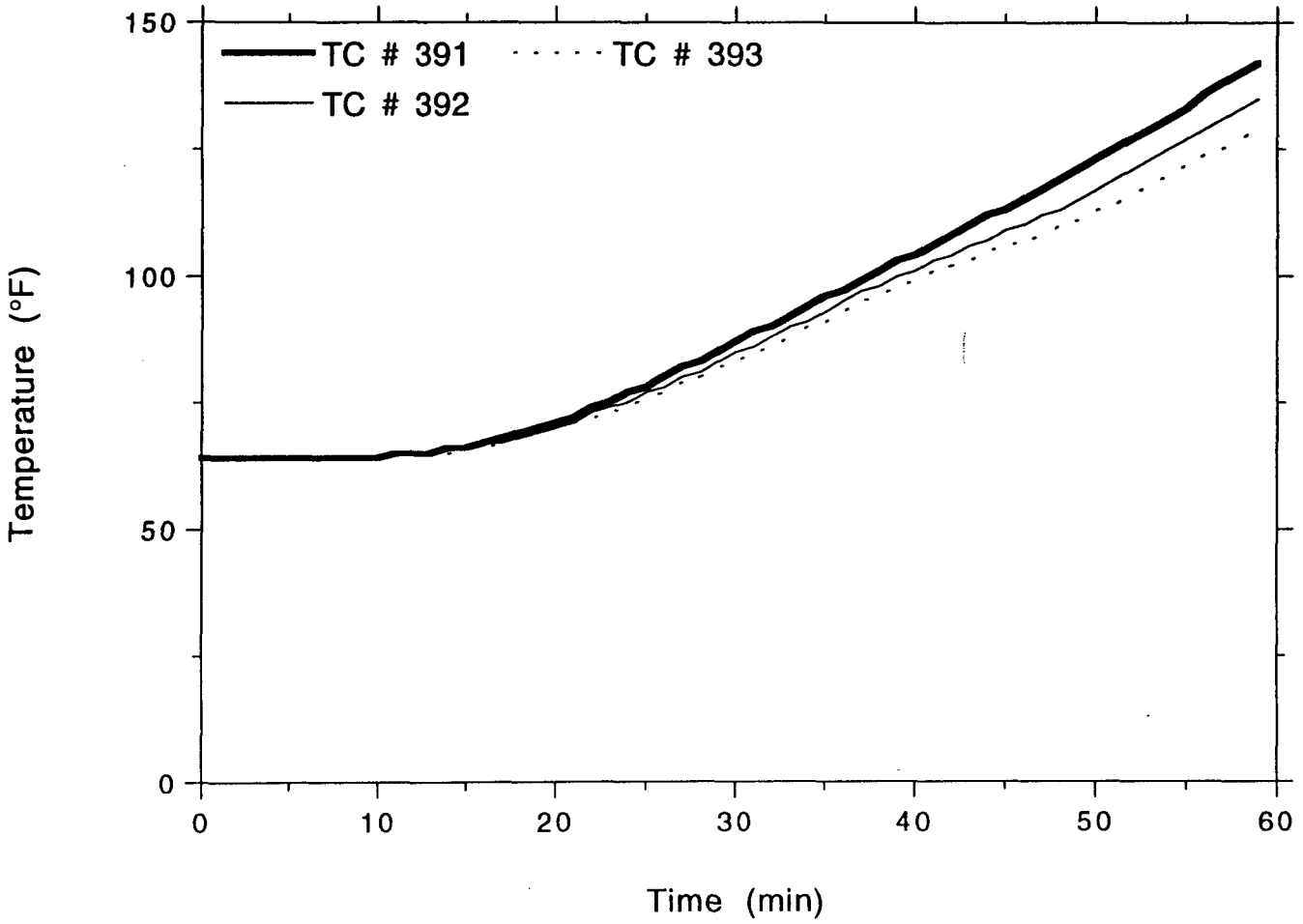
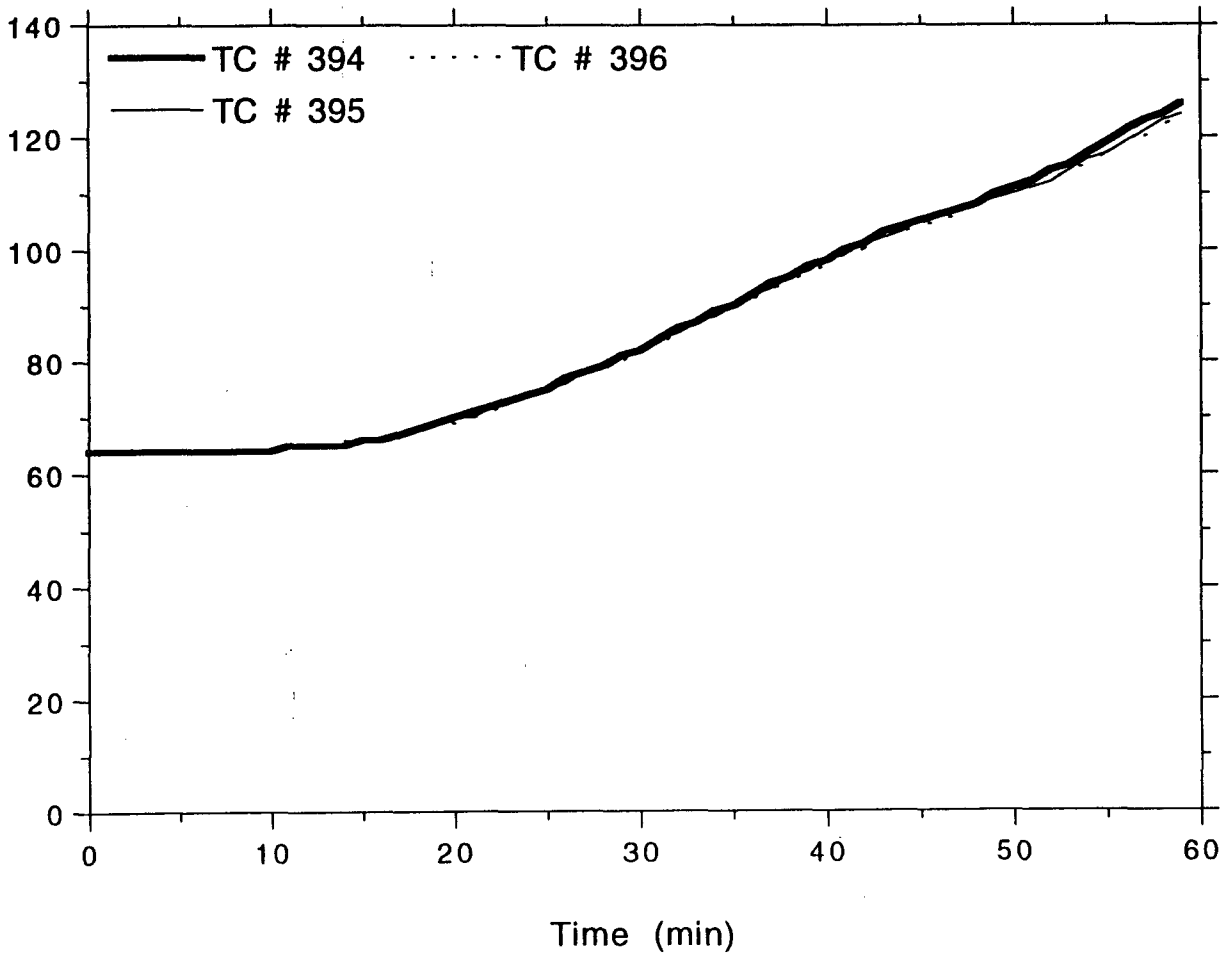


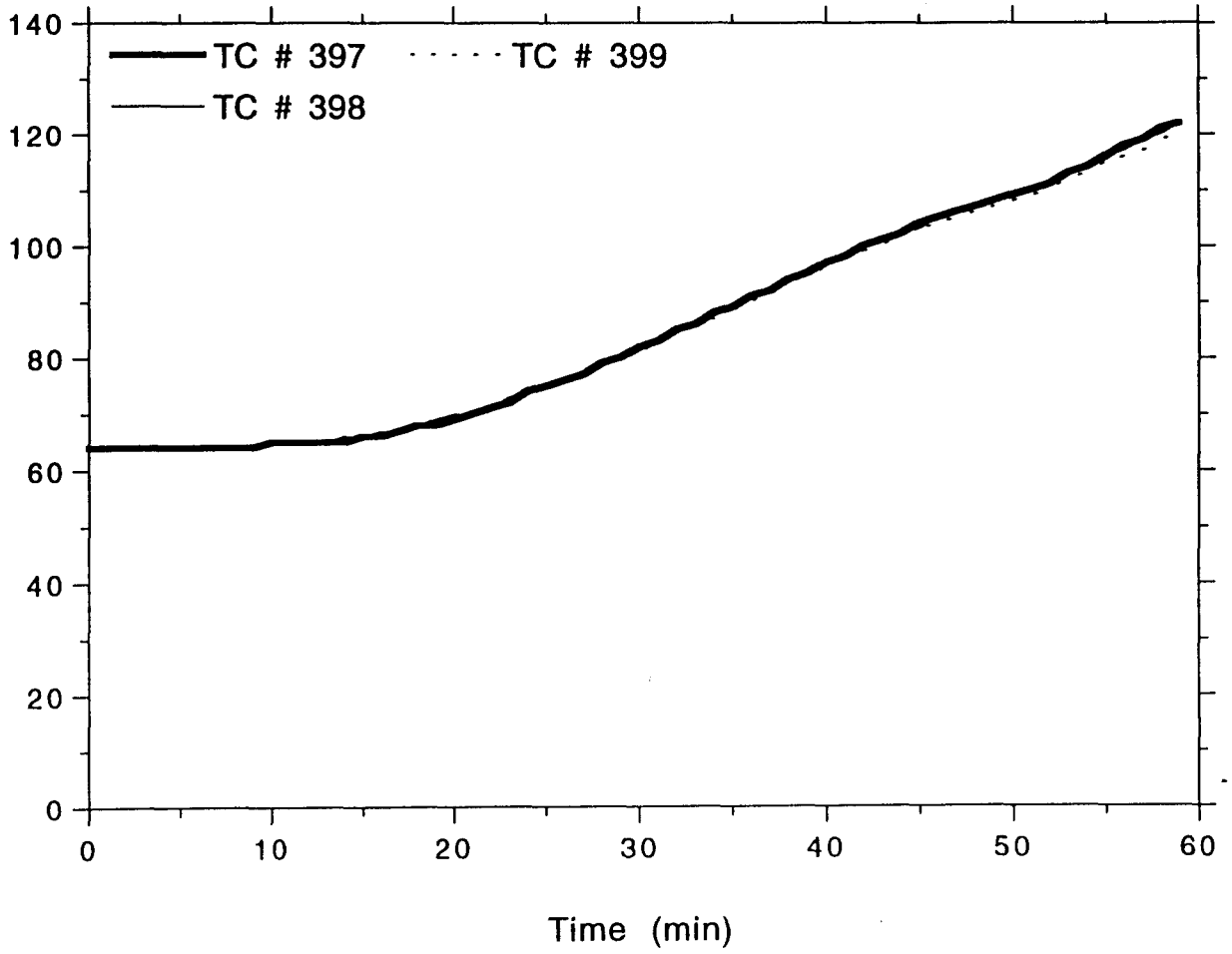
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



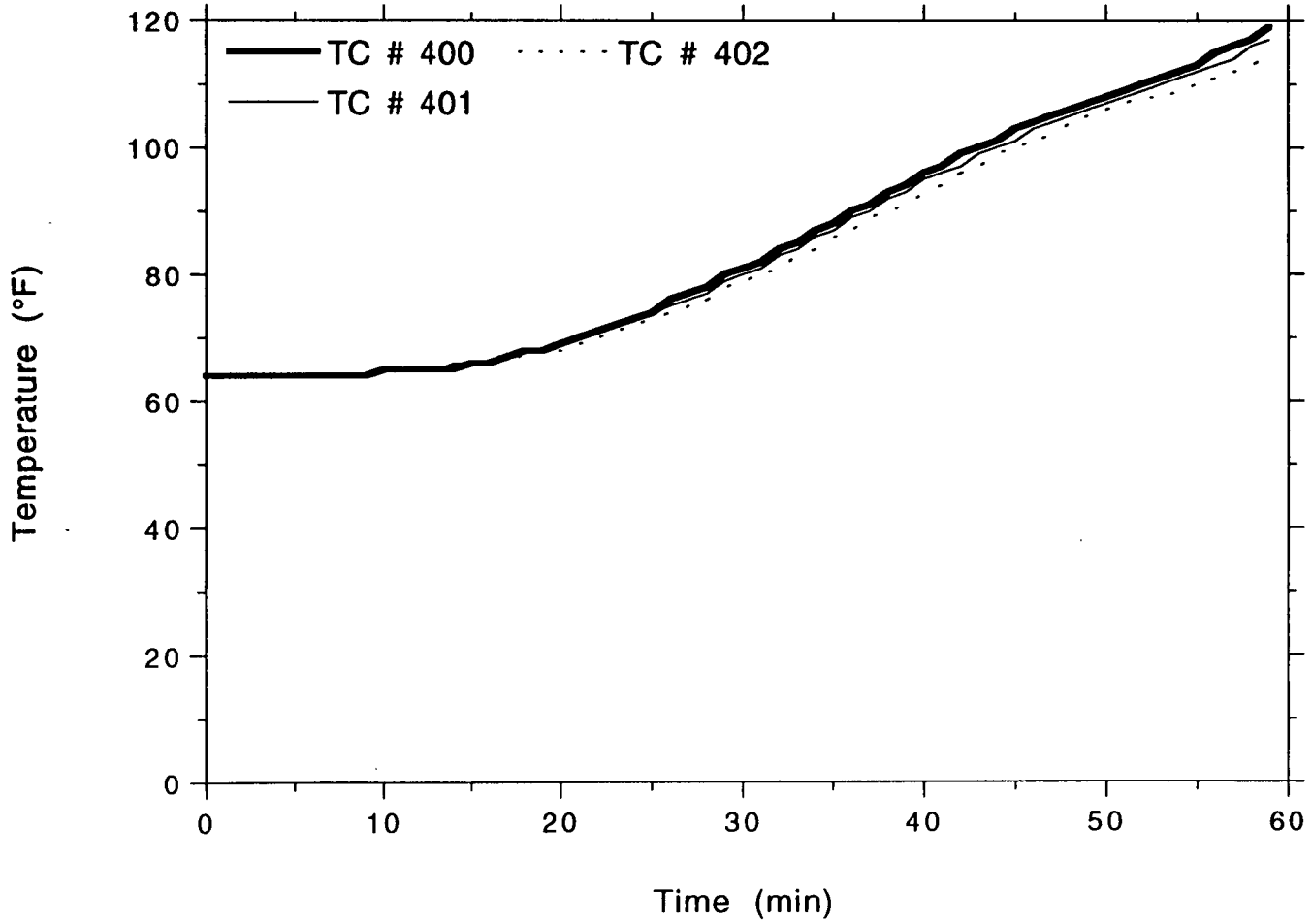
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



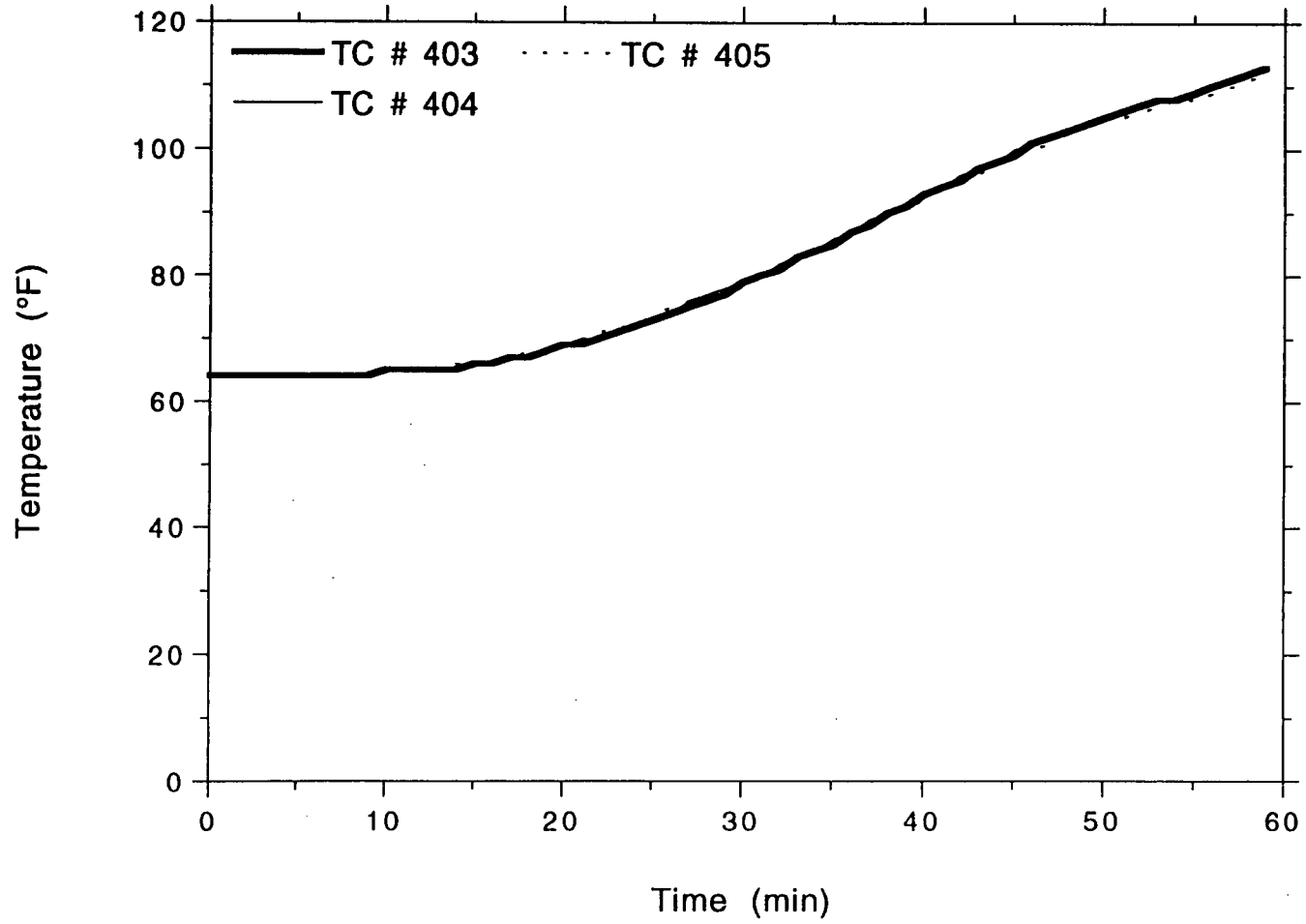
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



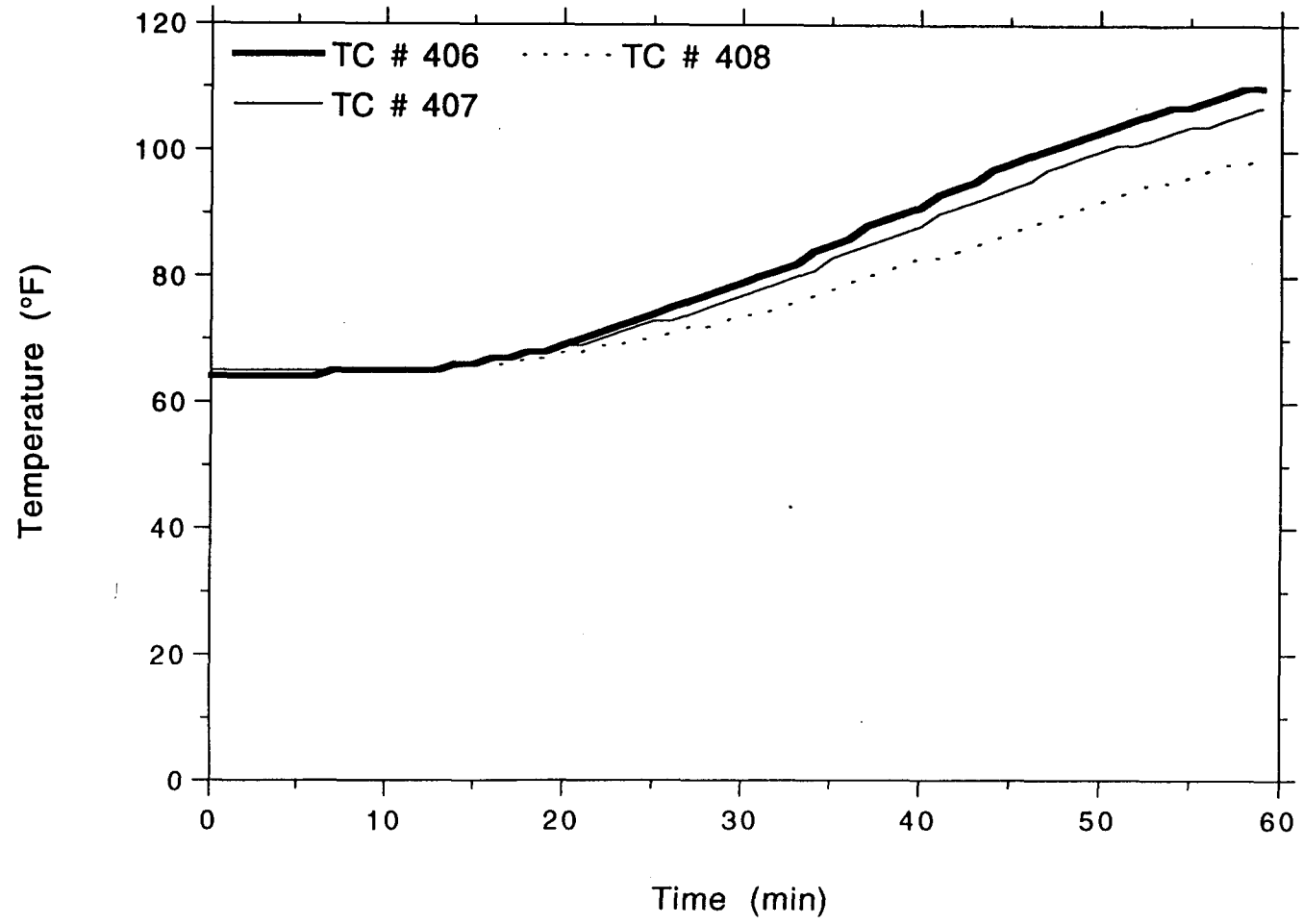
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



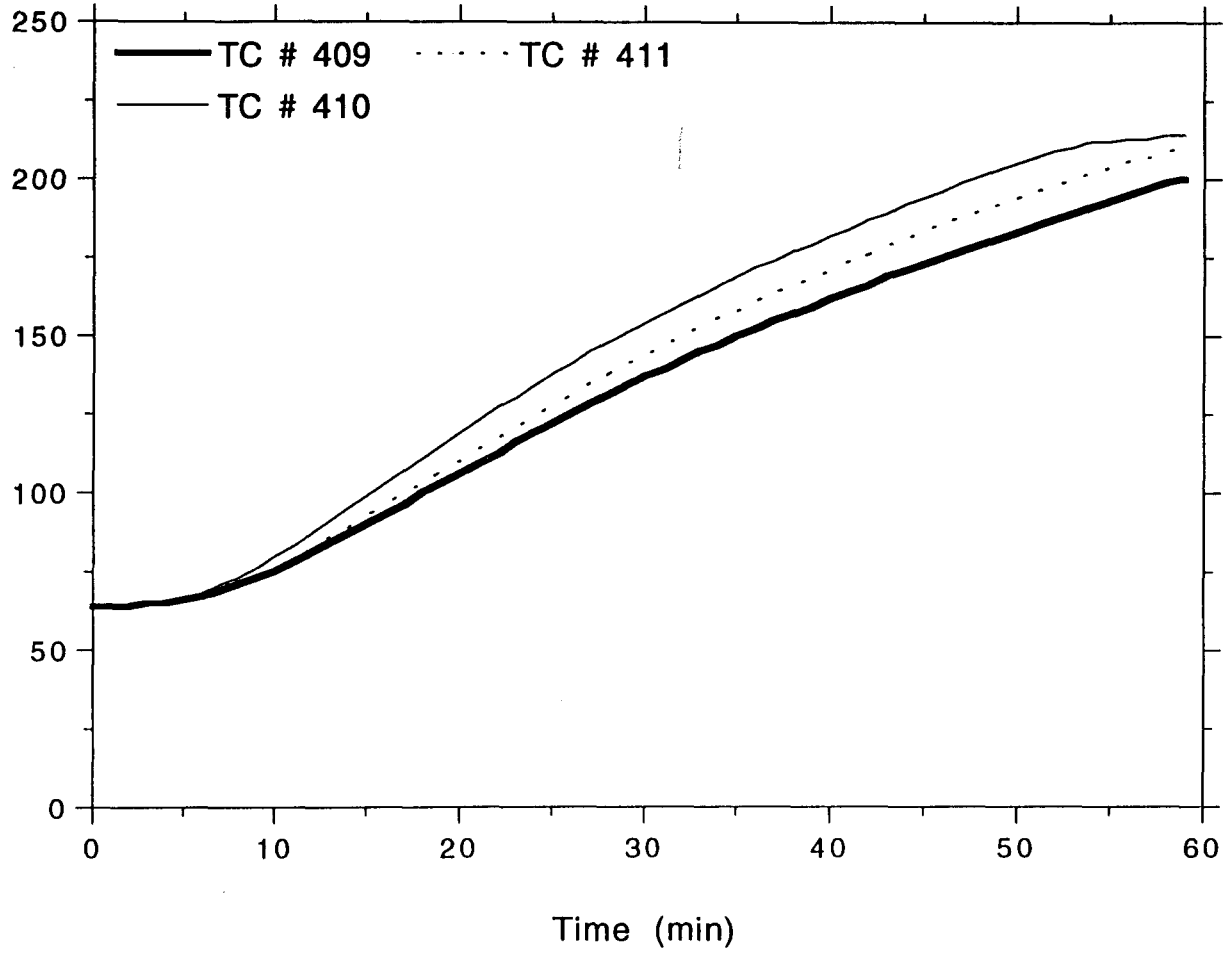
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper-Mid Front Al. Conduit



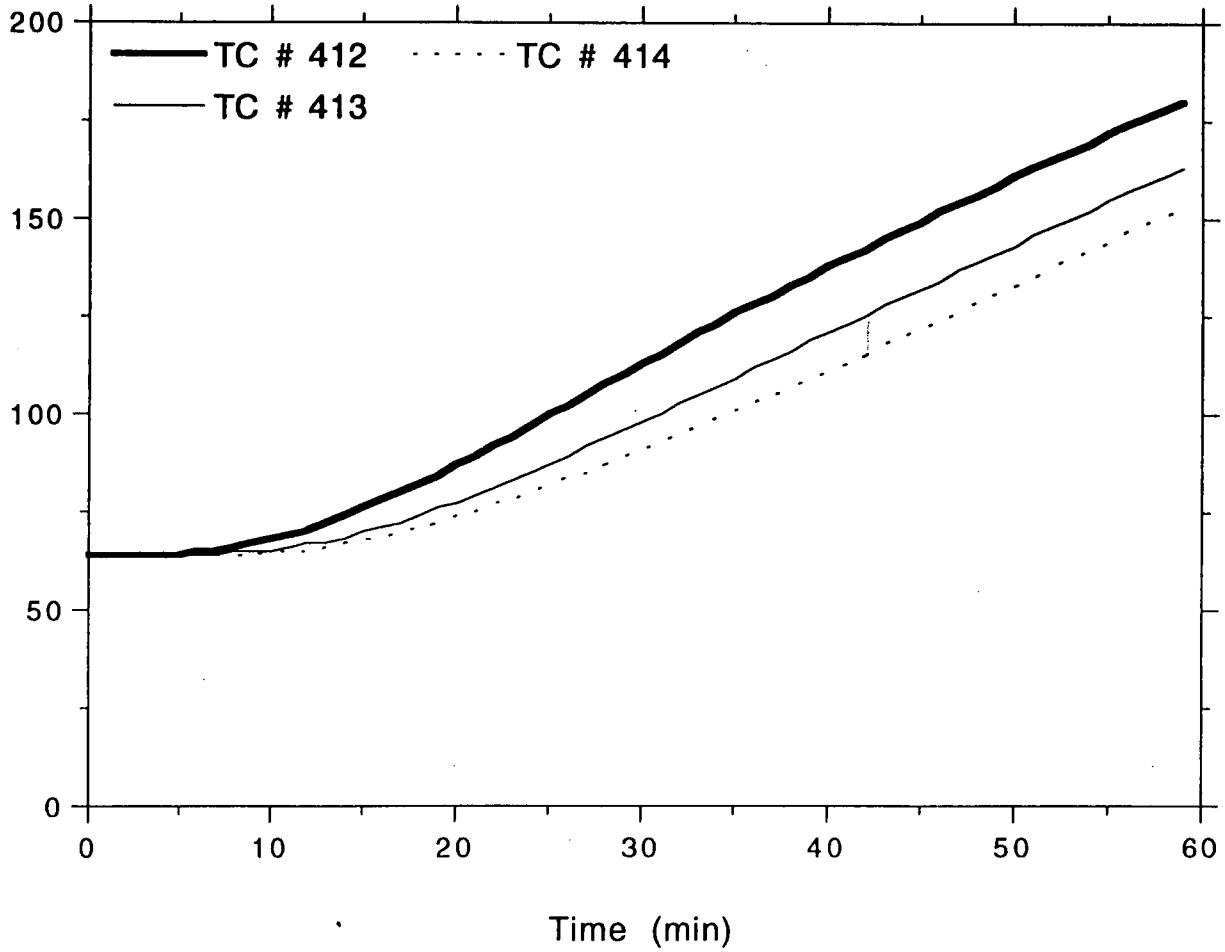
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



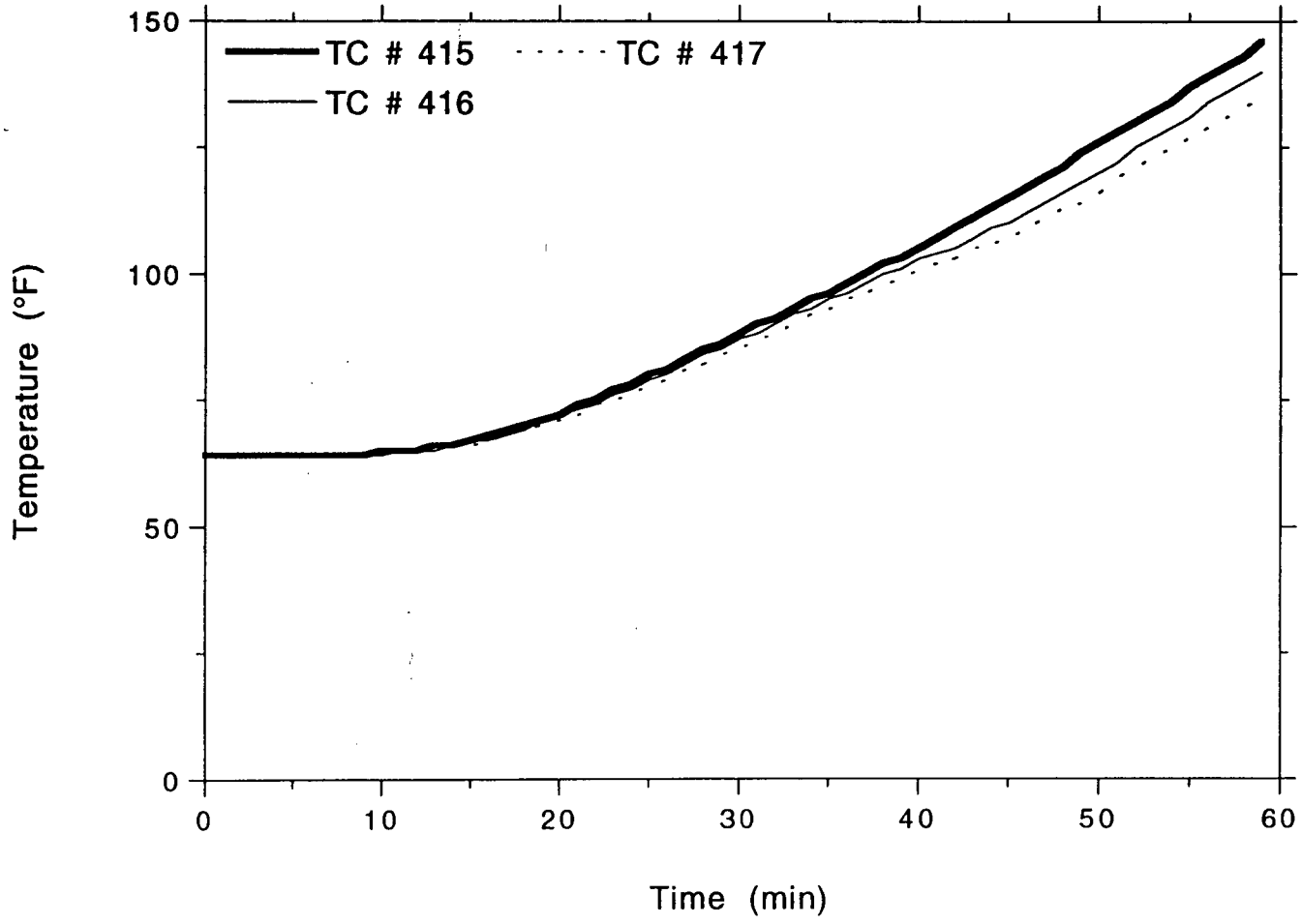
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



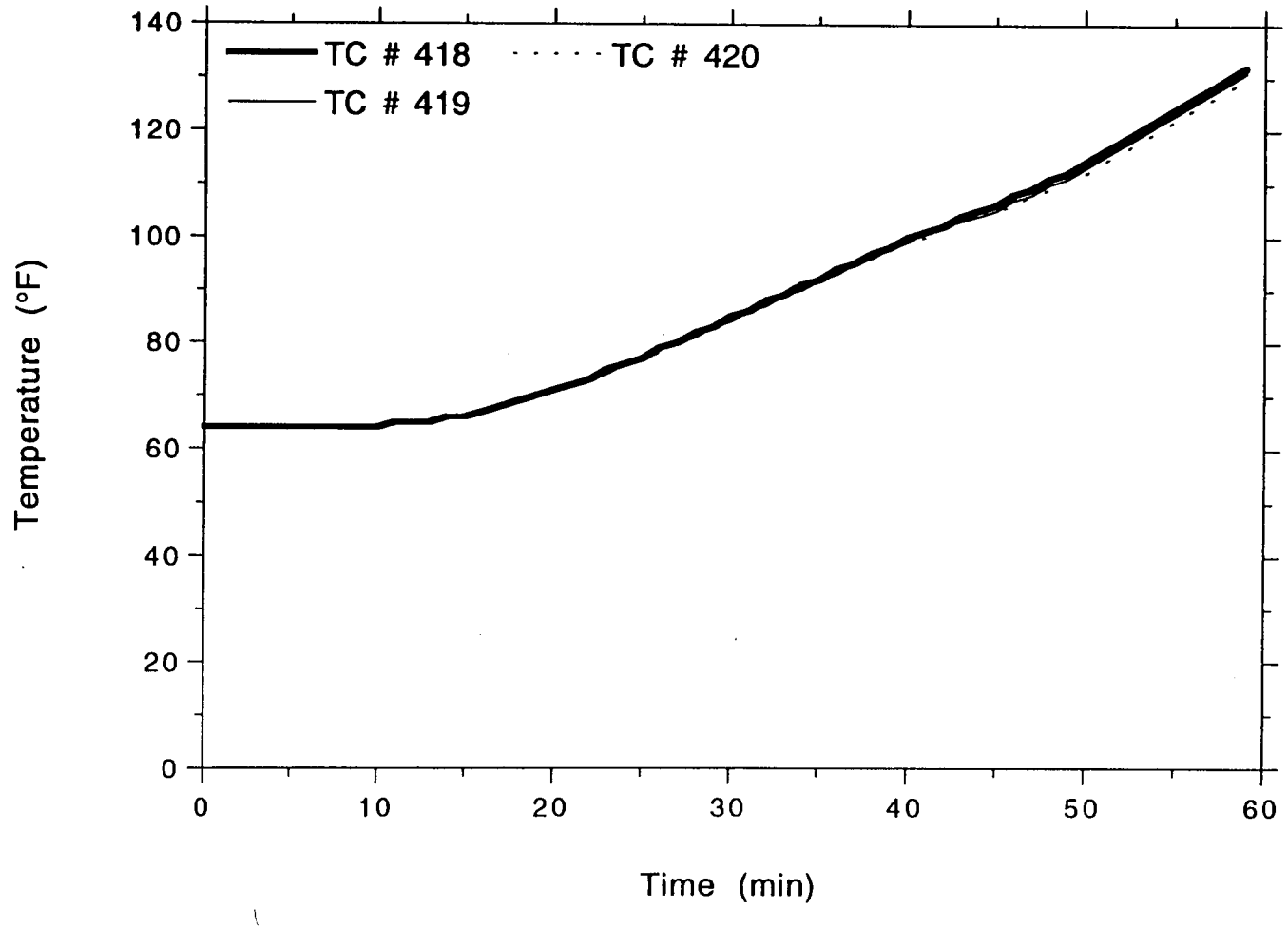
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



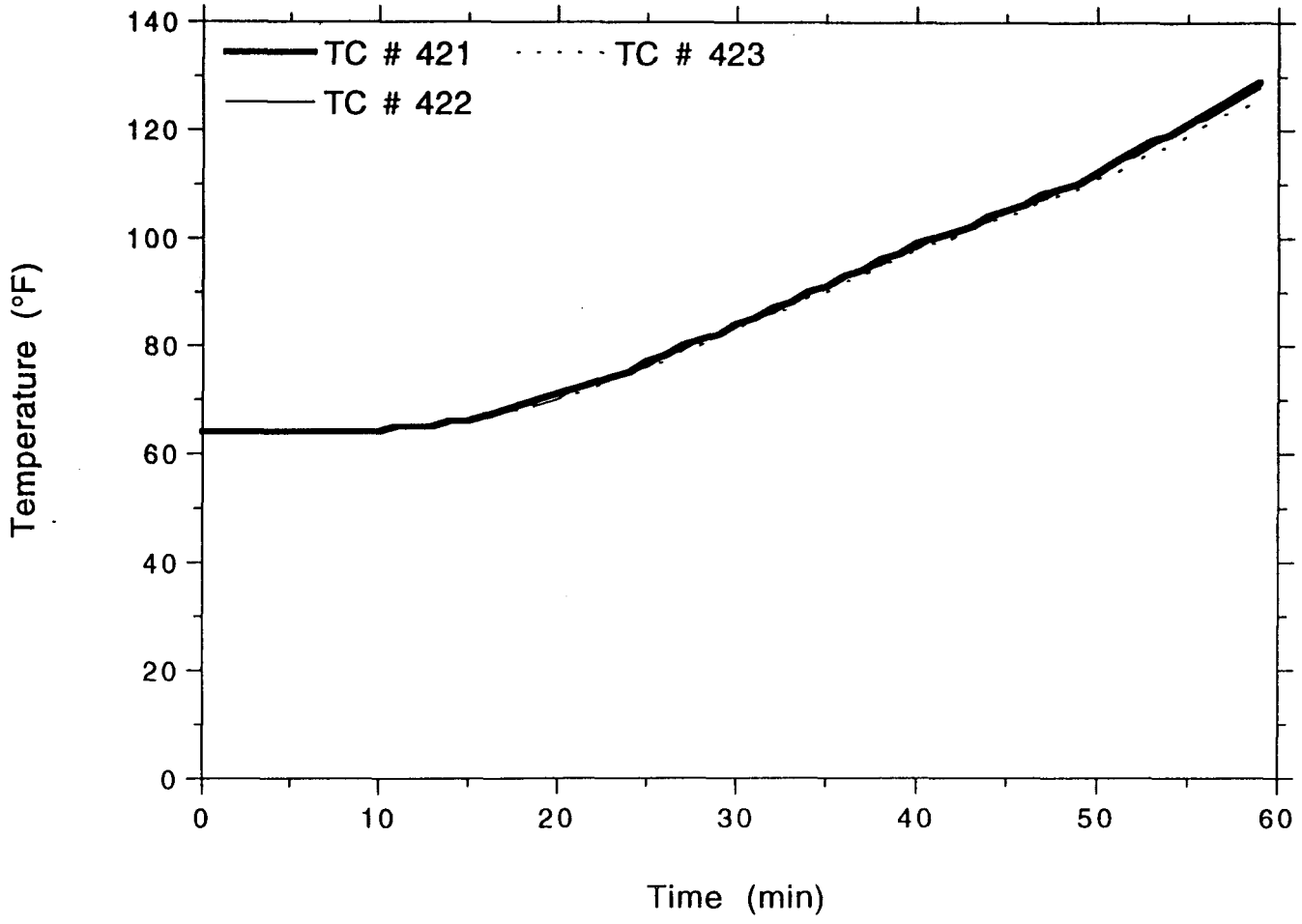
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



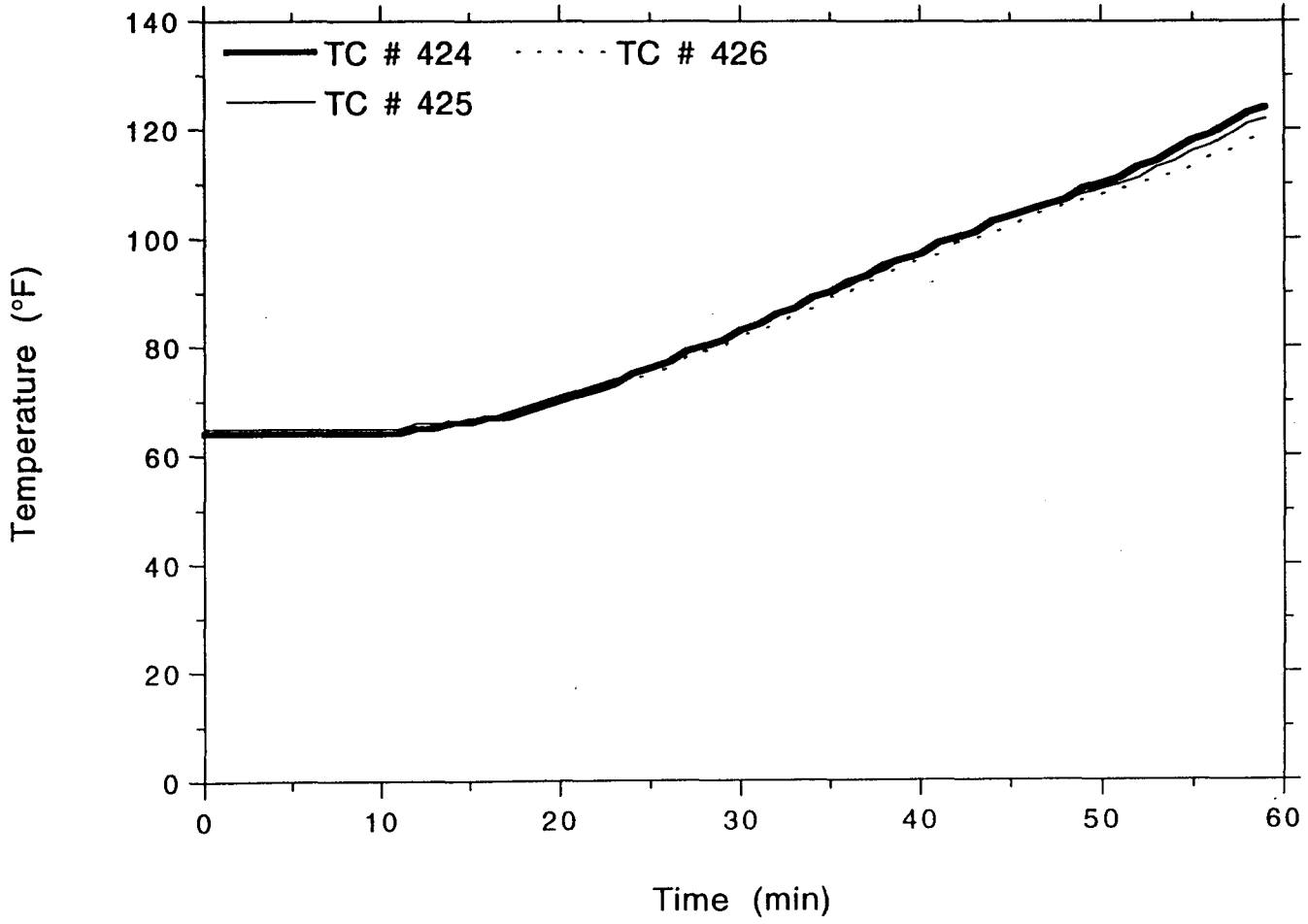
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



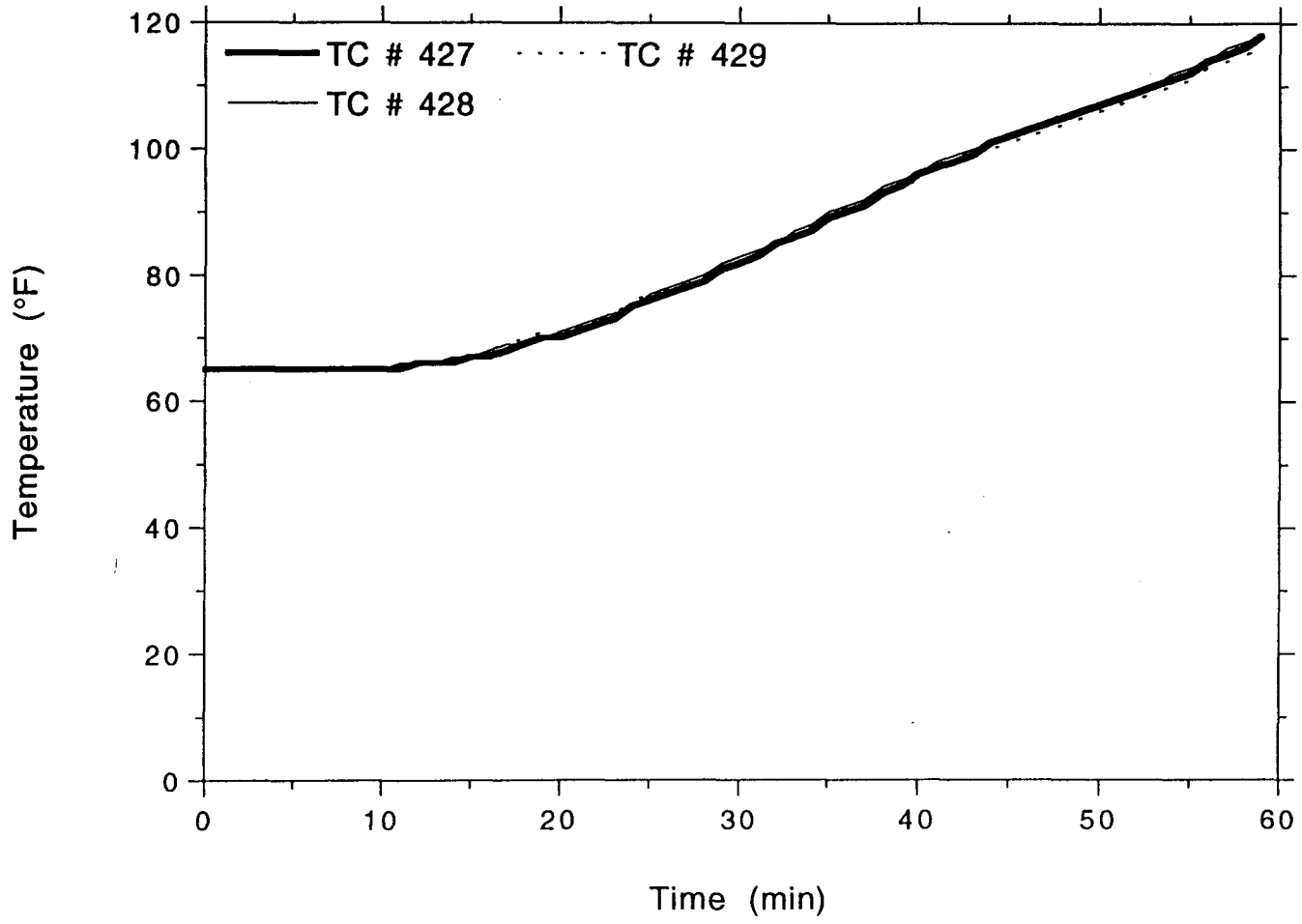
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



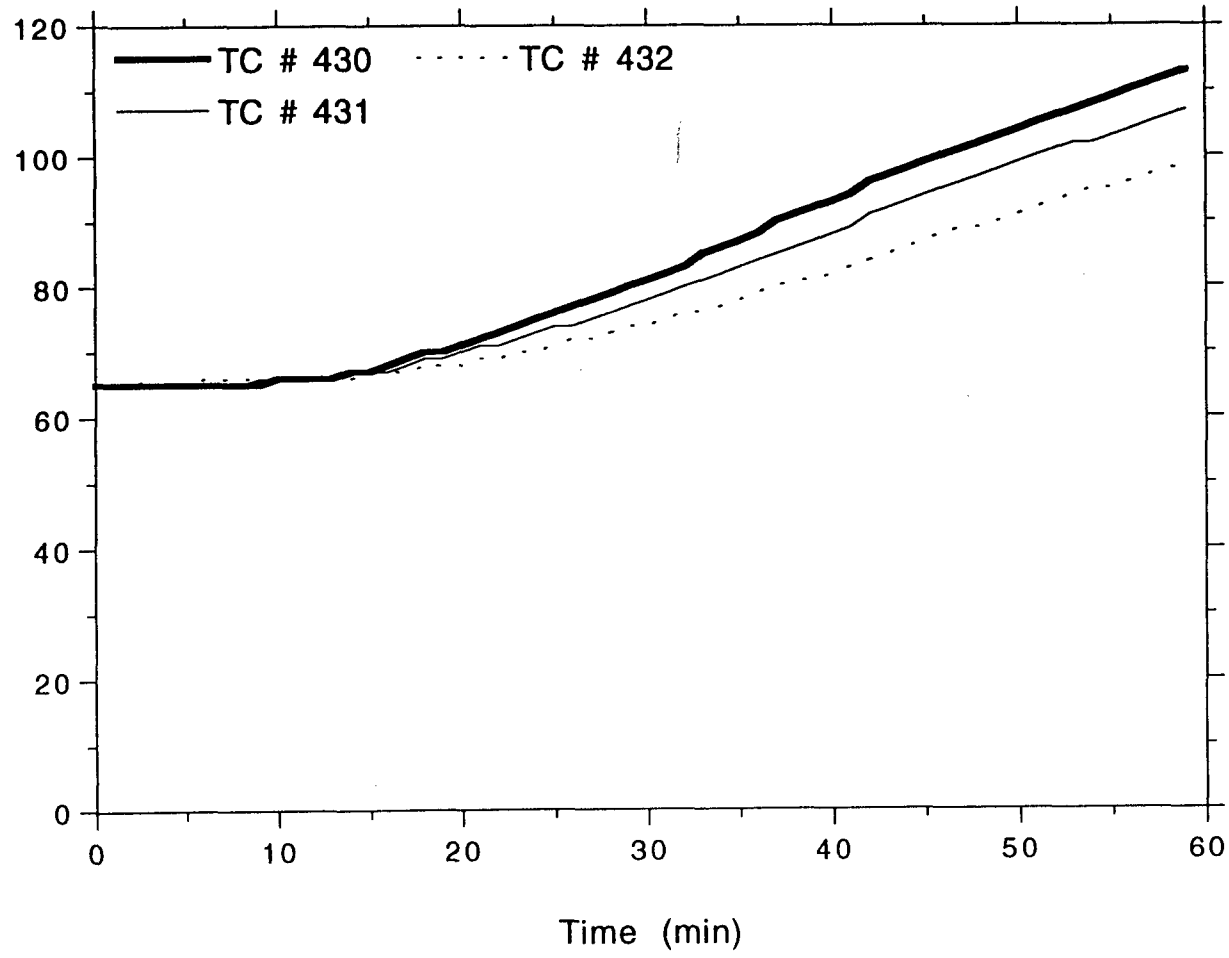
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



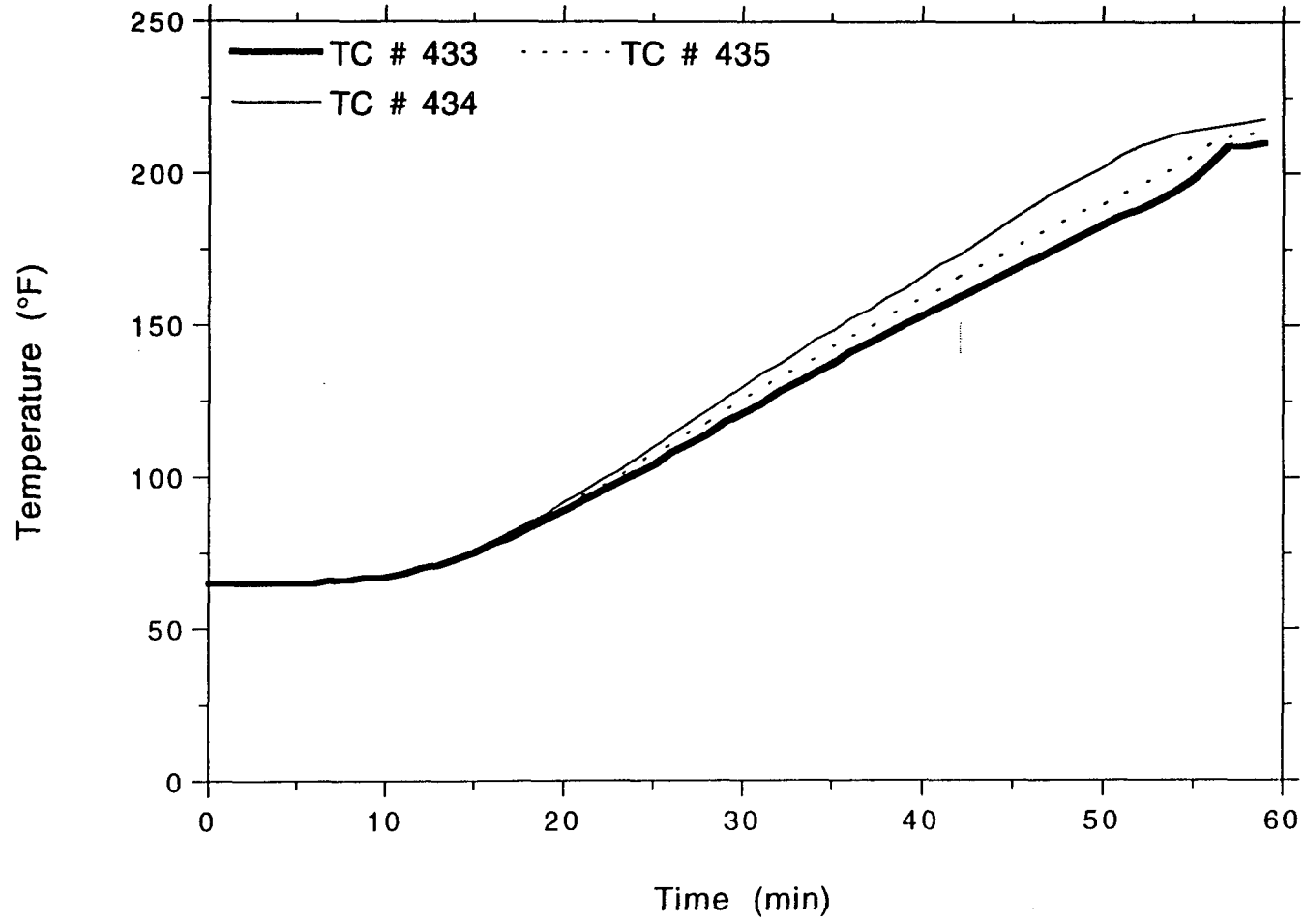
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Upper Front Al. Conduit



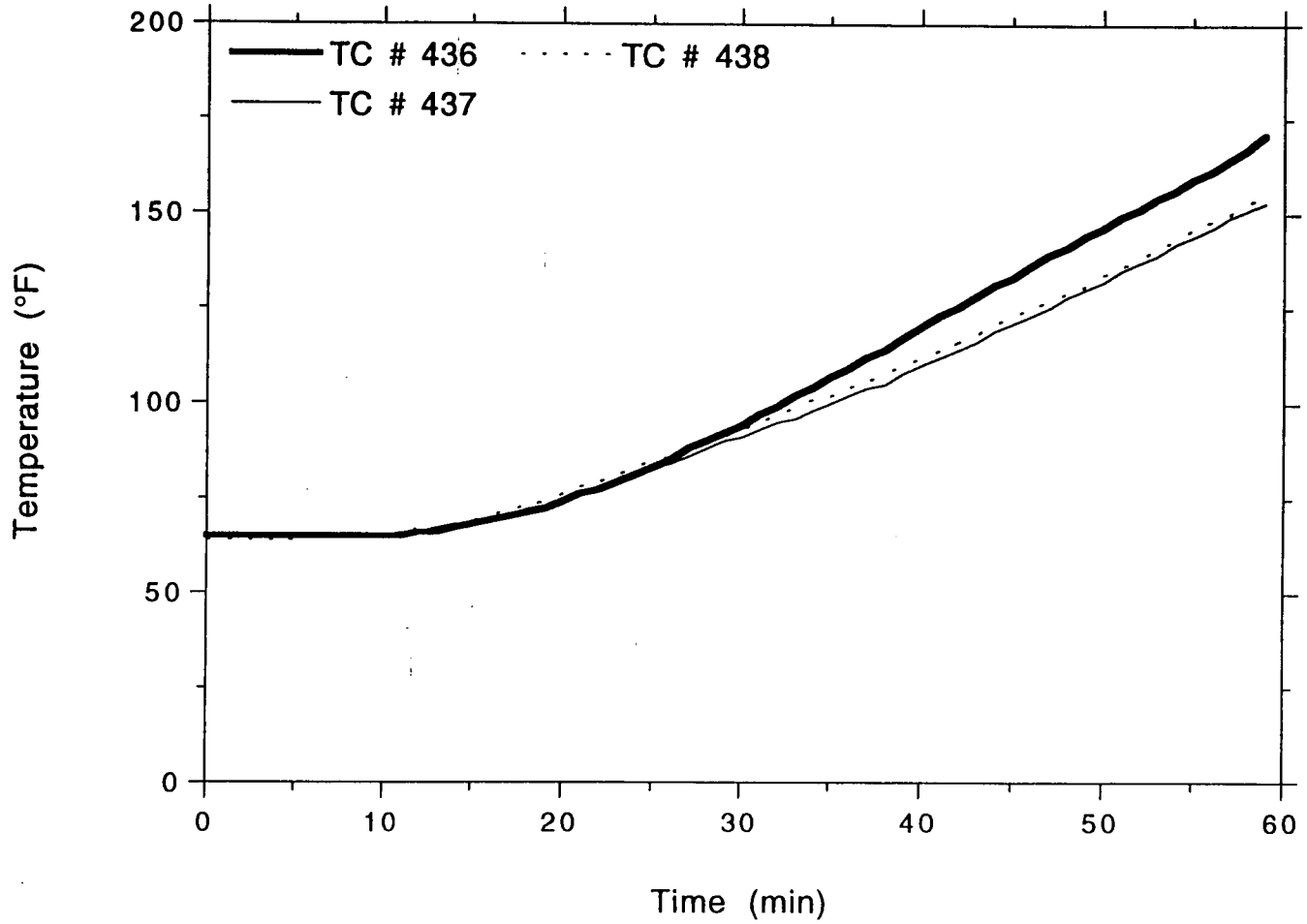
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



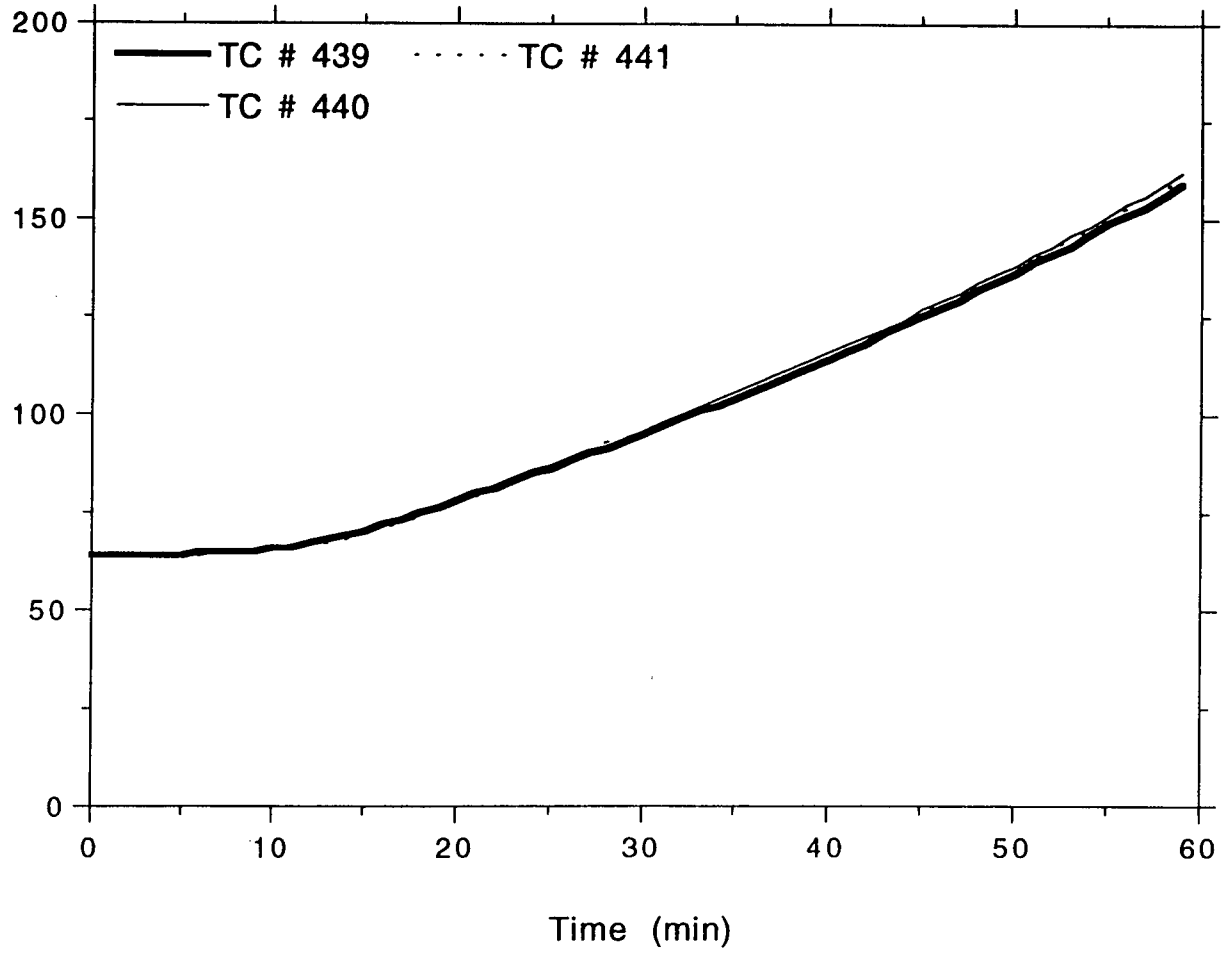
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



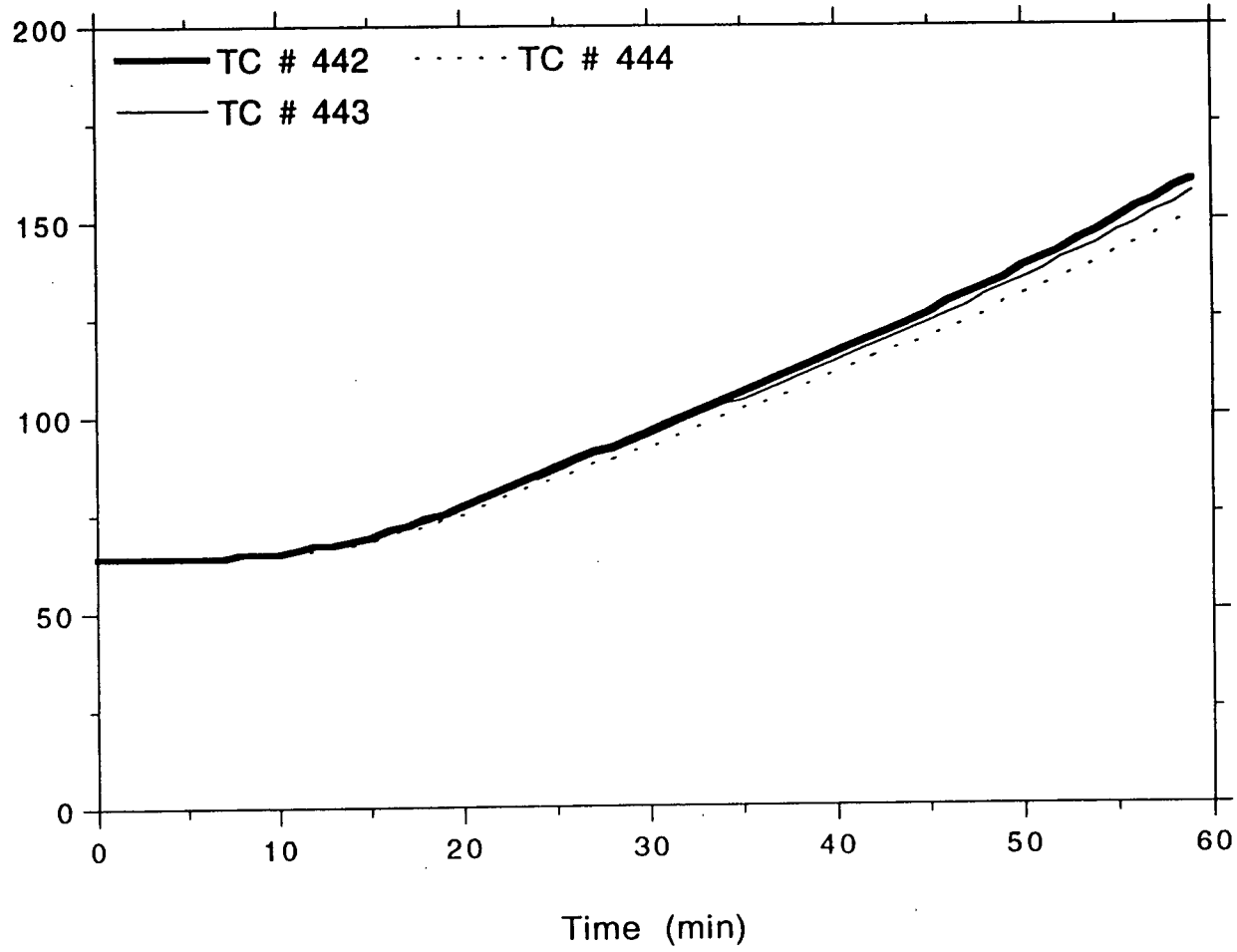
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



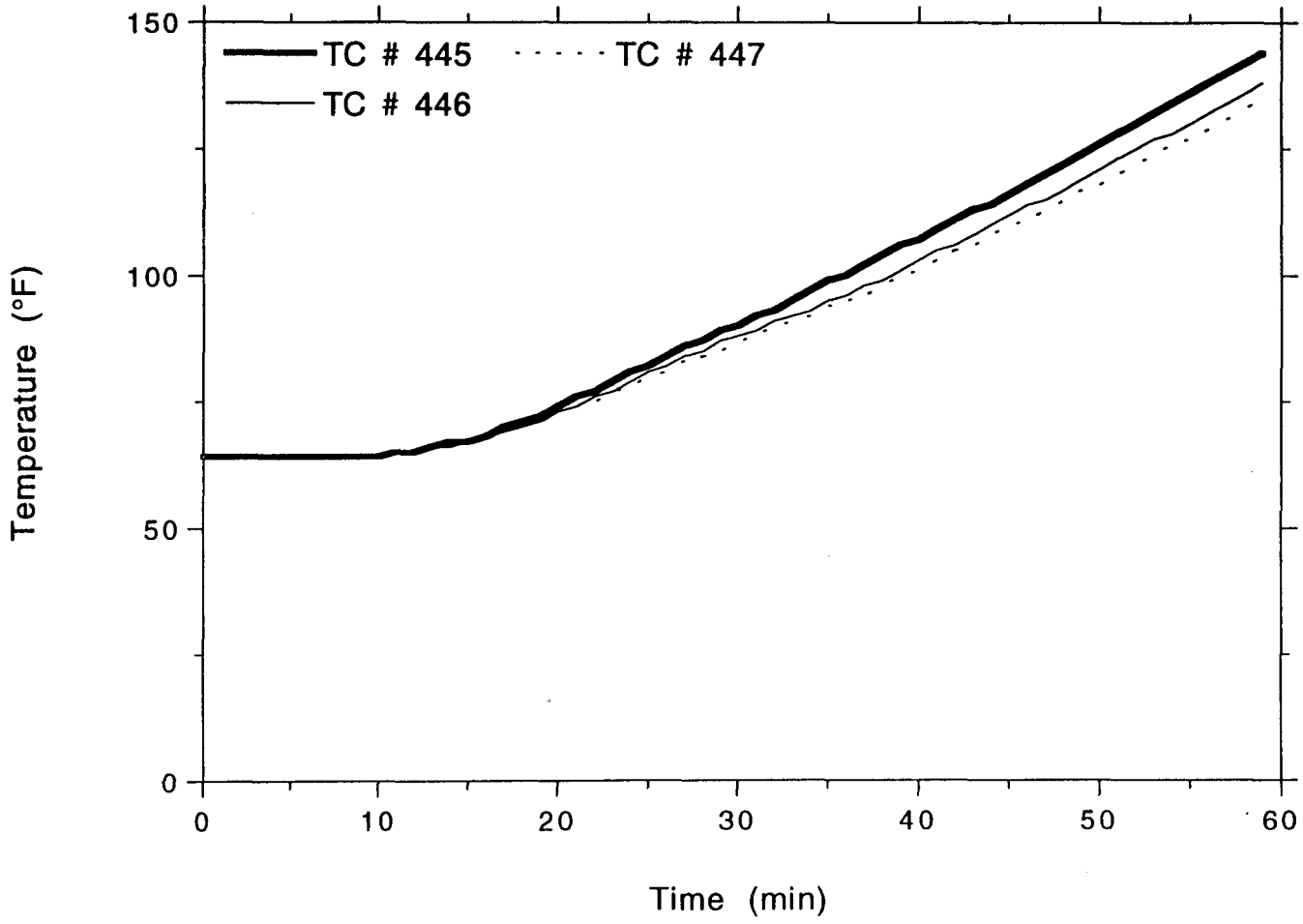
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



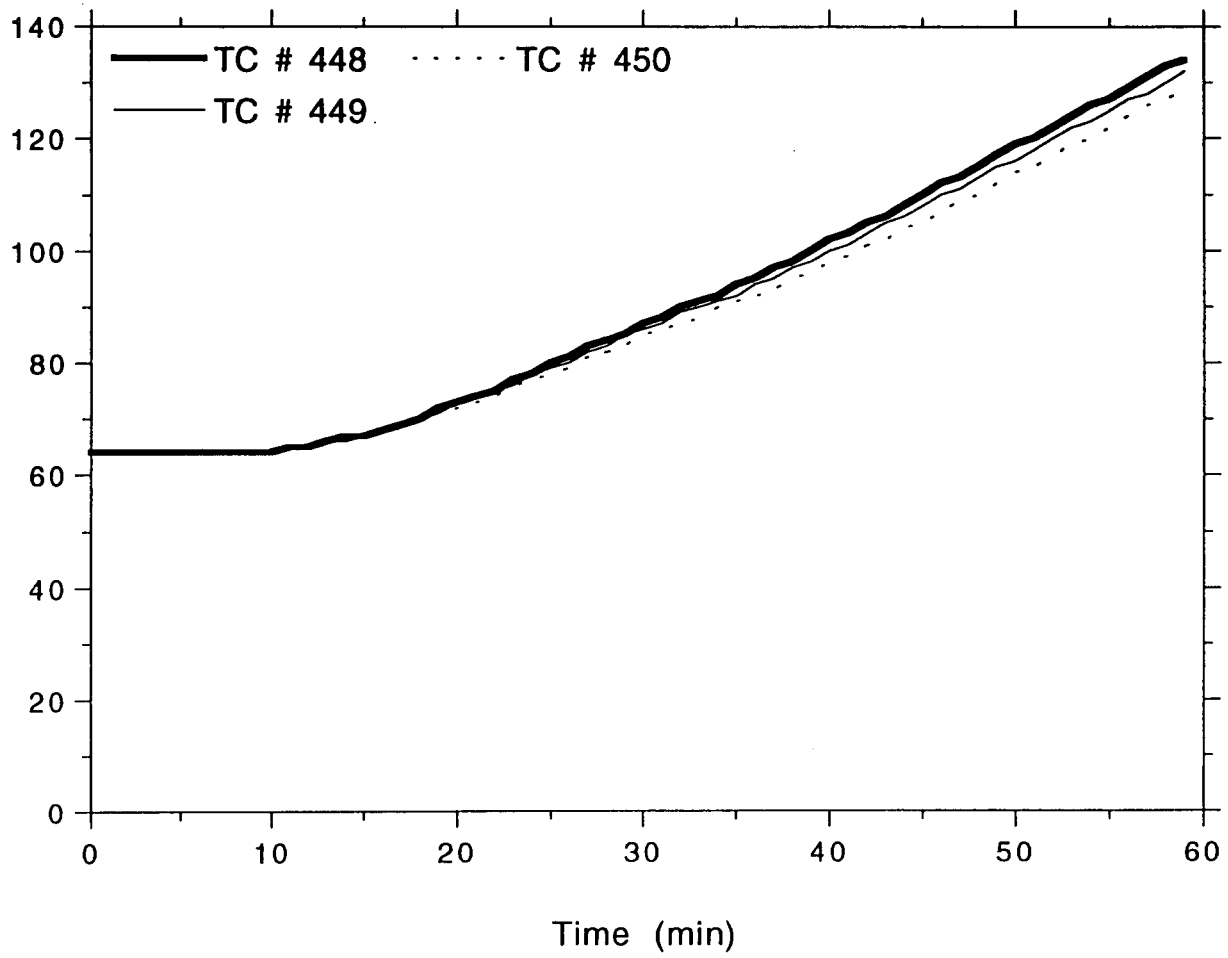
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



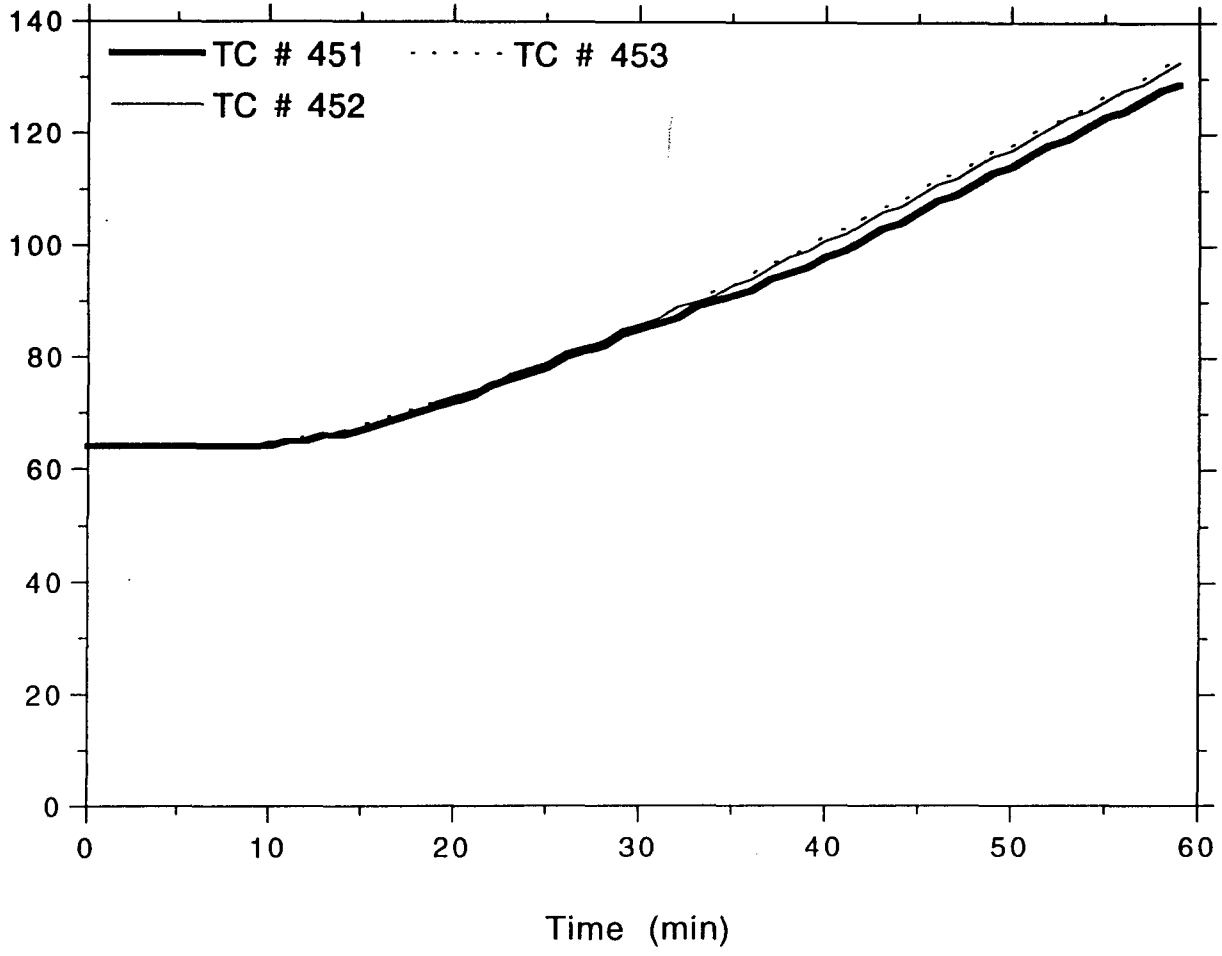
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Front Steel Conduit



OMEGA POINT LABORATORIES

TSI/TVA
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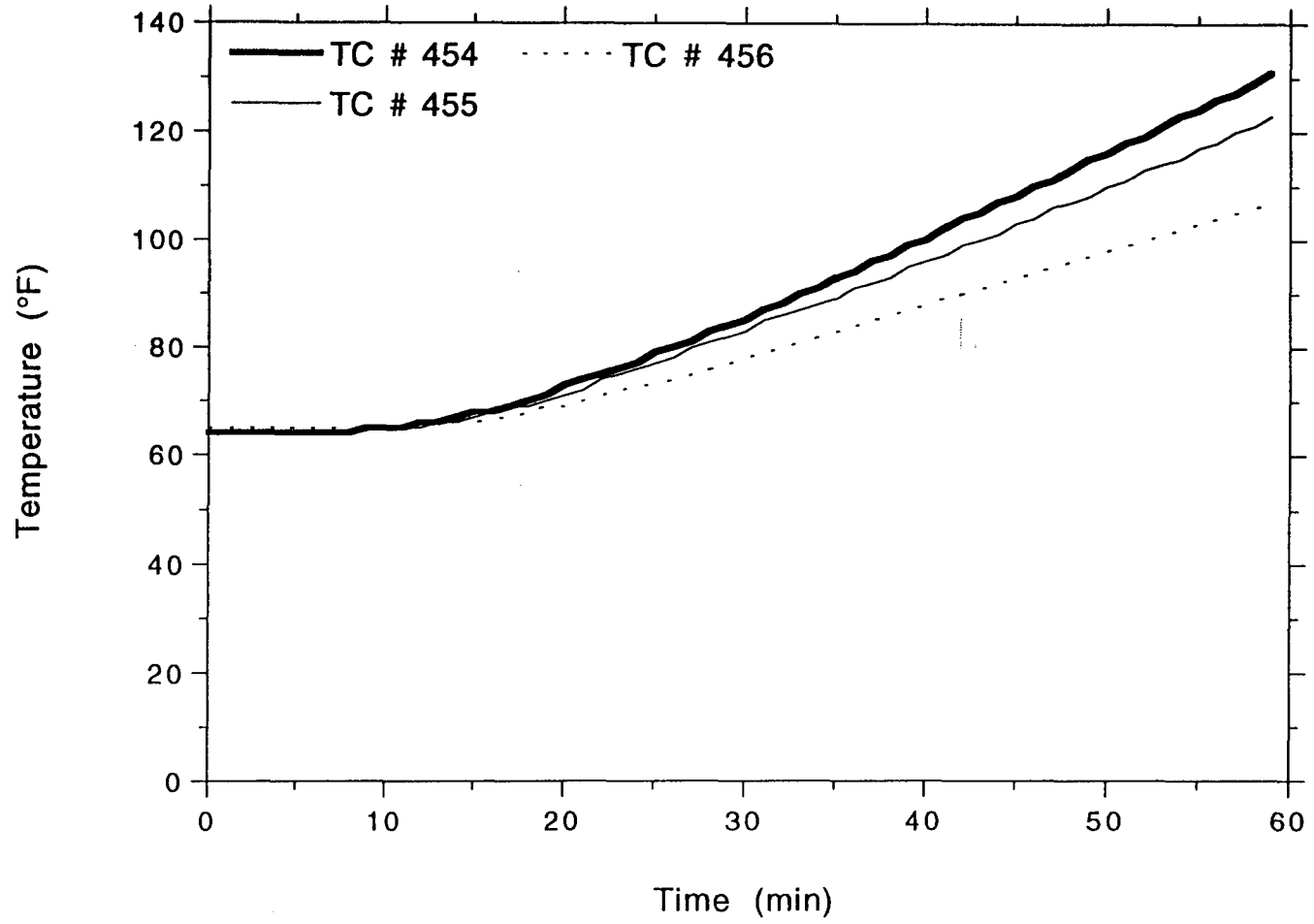
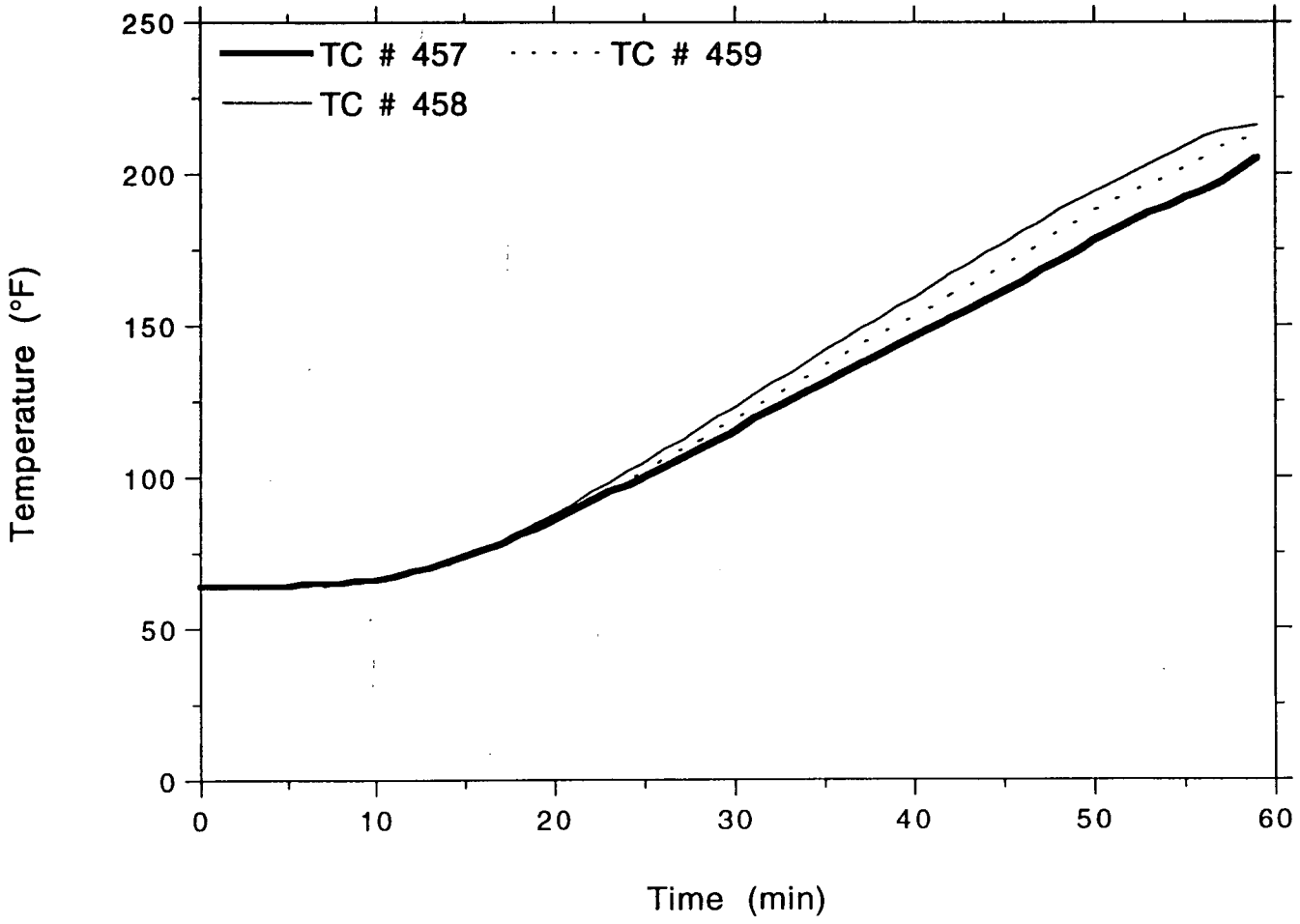


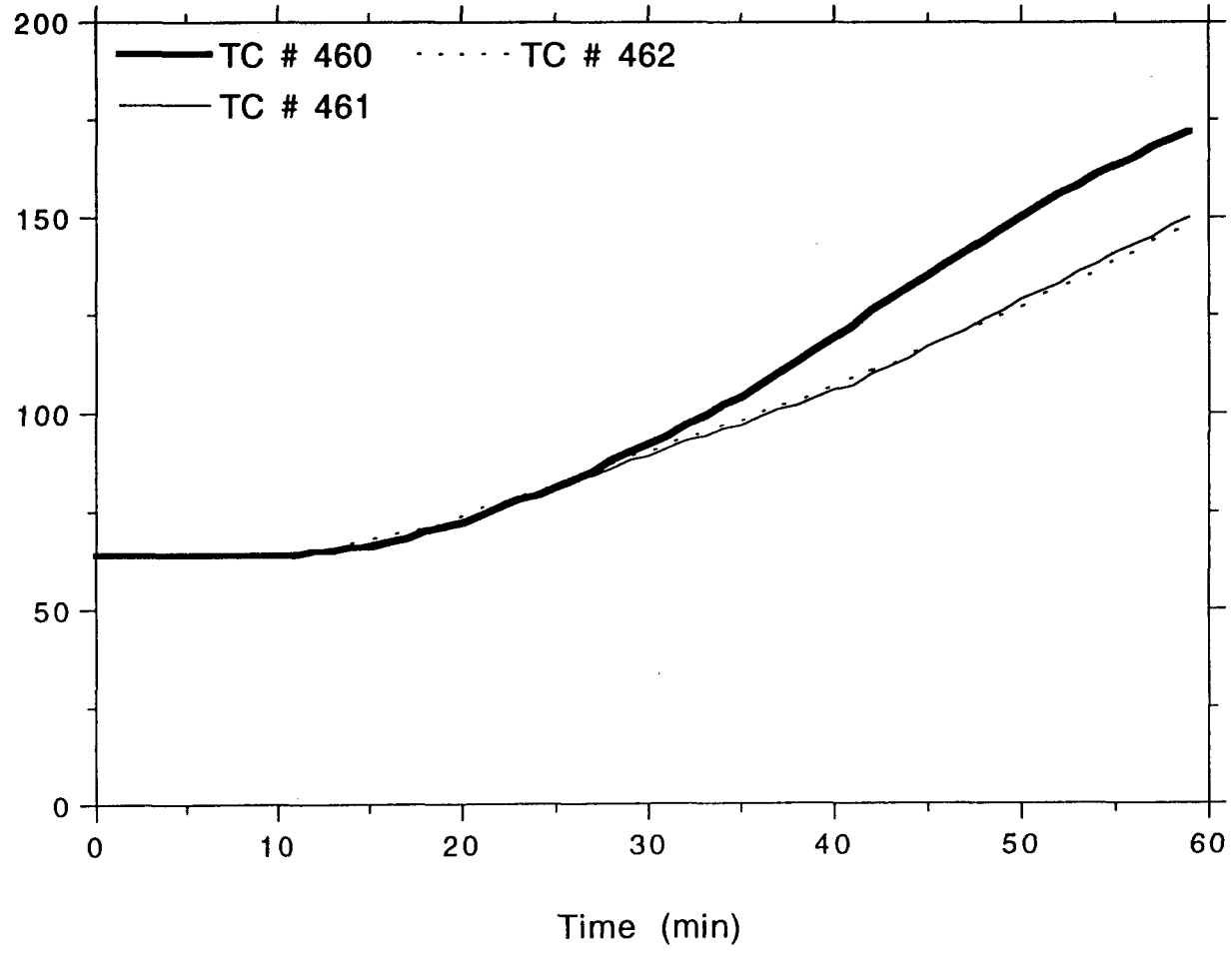
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



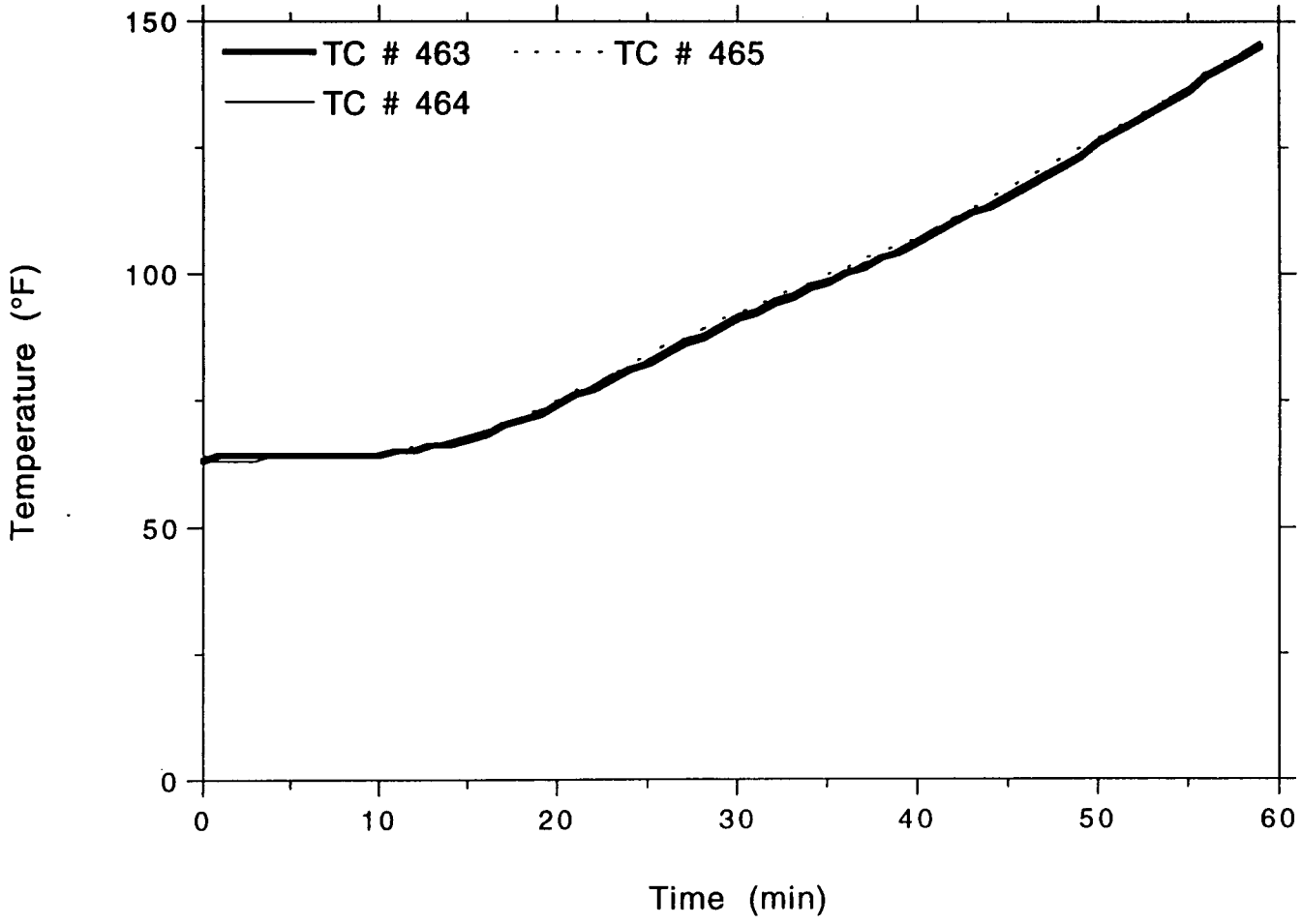
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



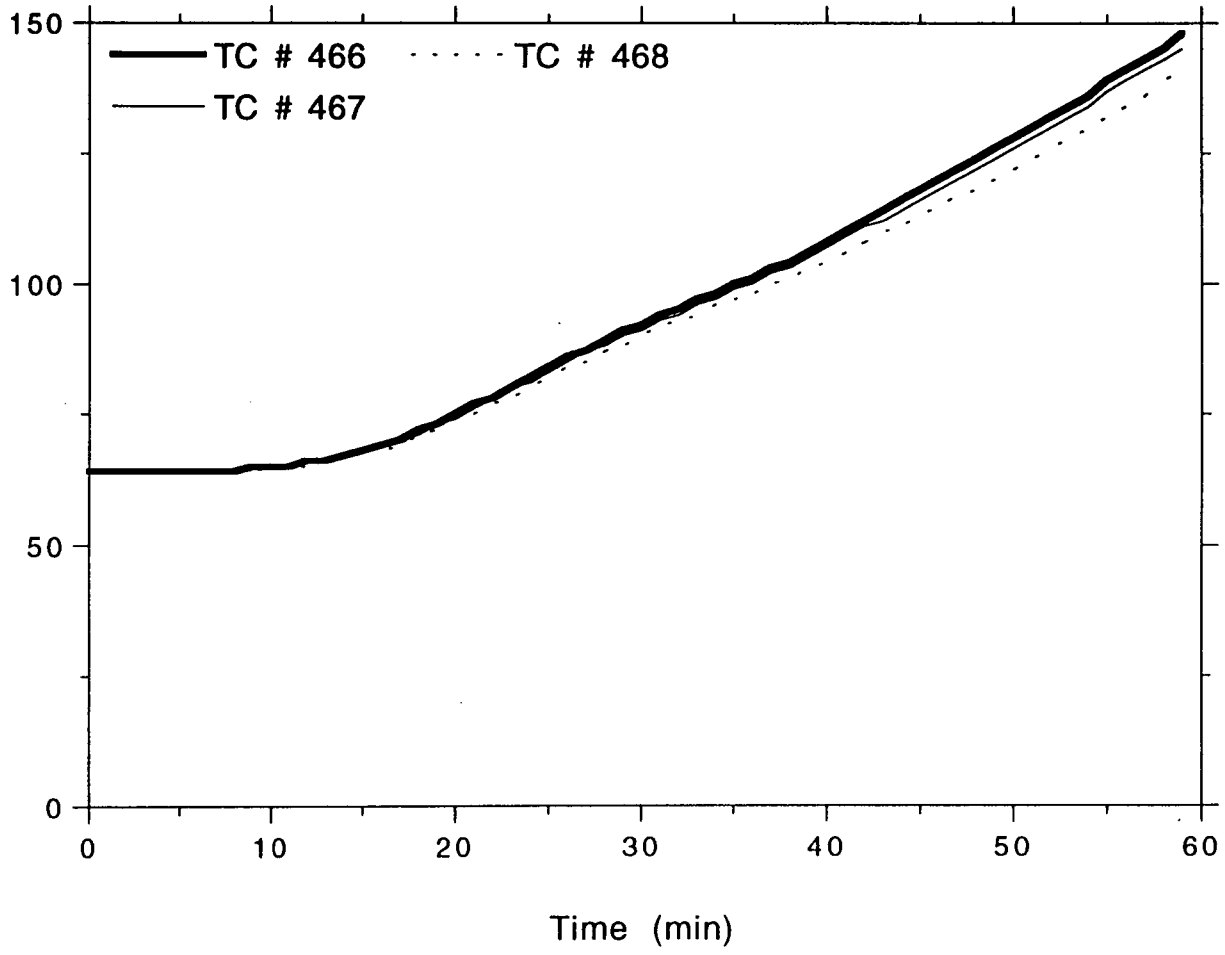
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



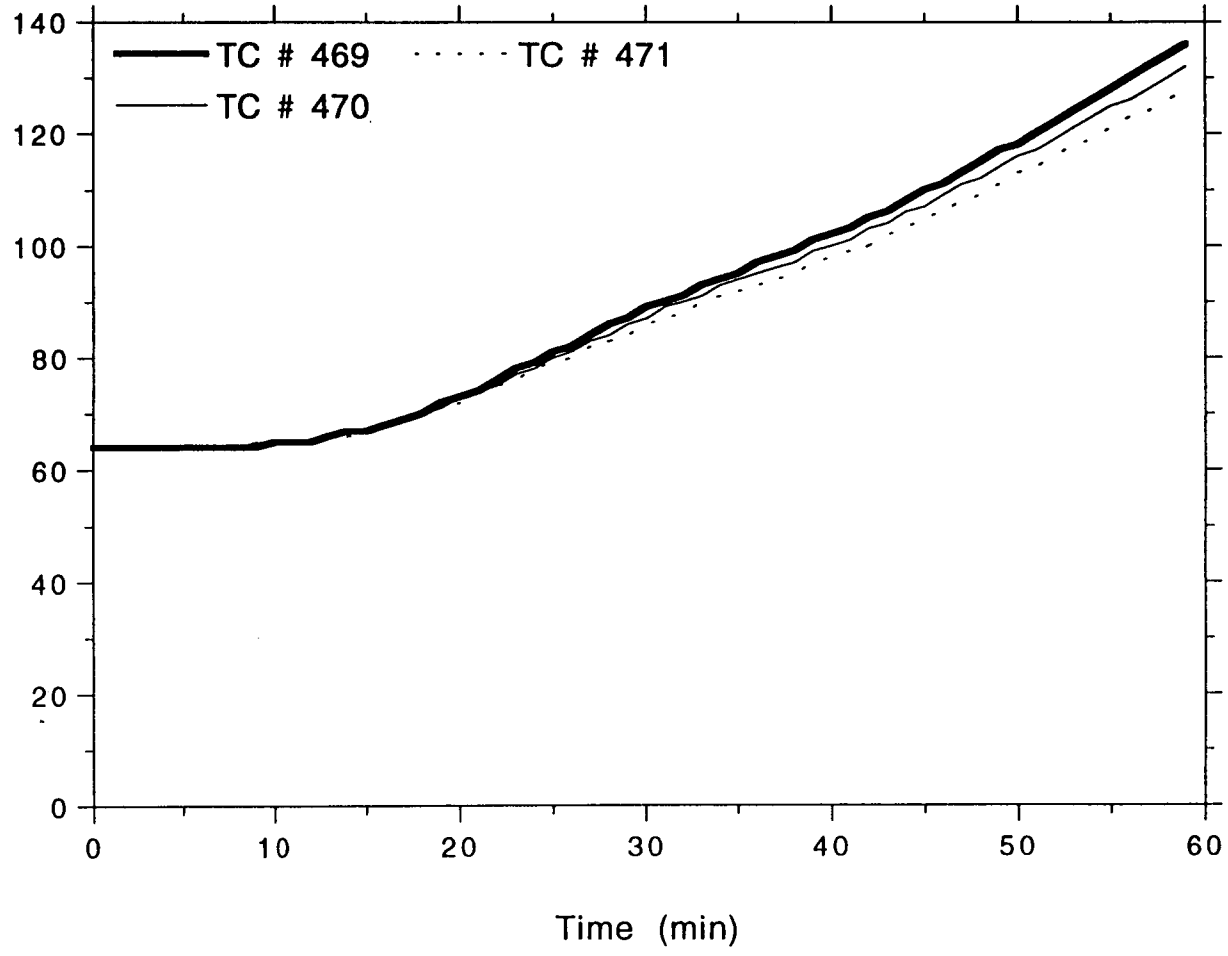
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



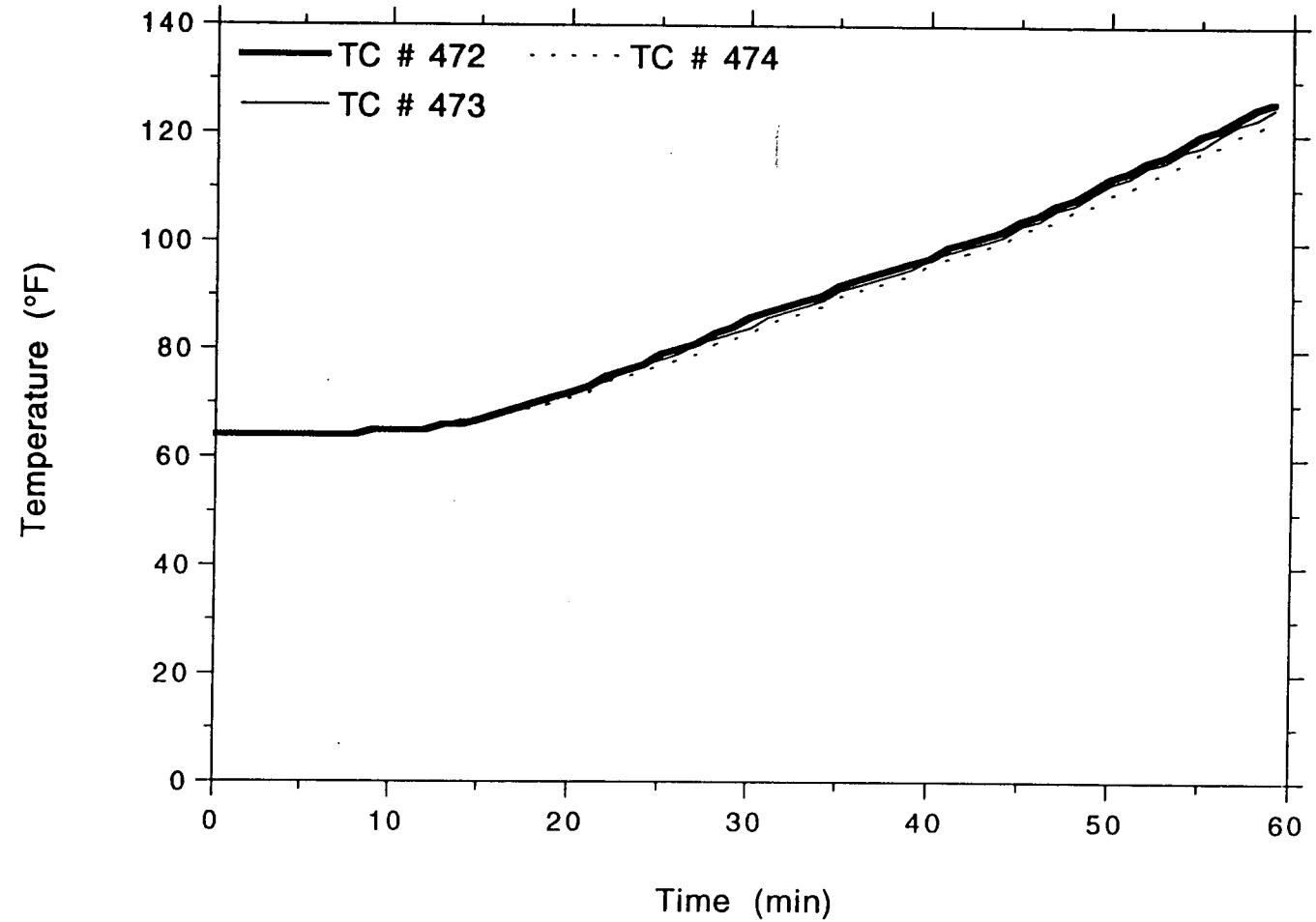
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



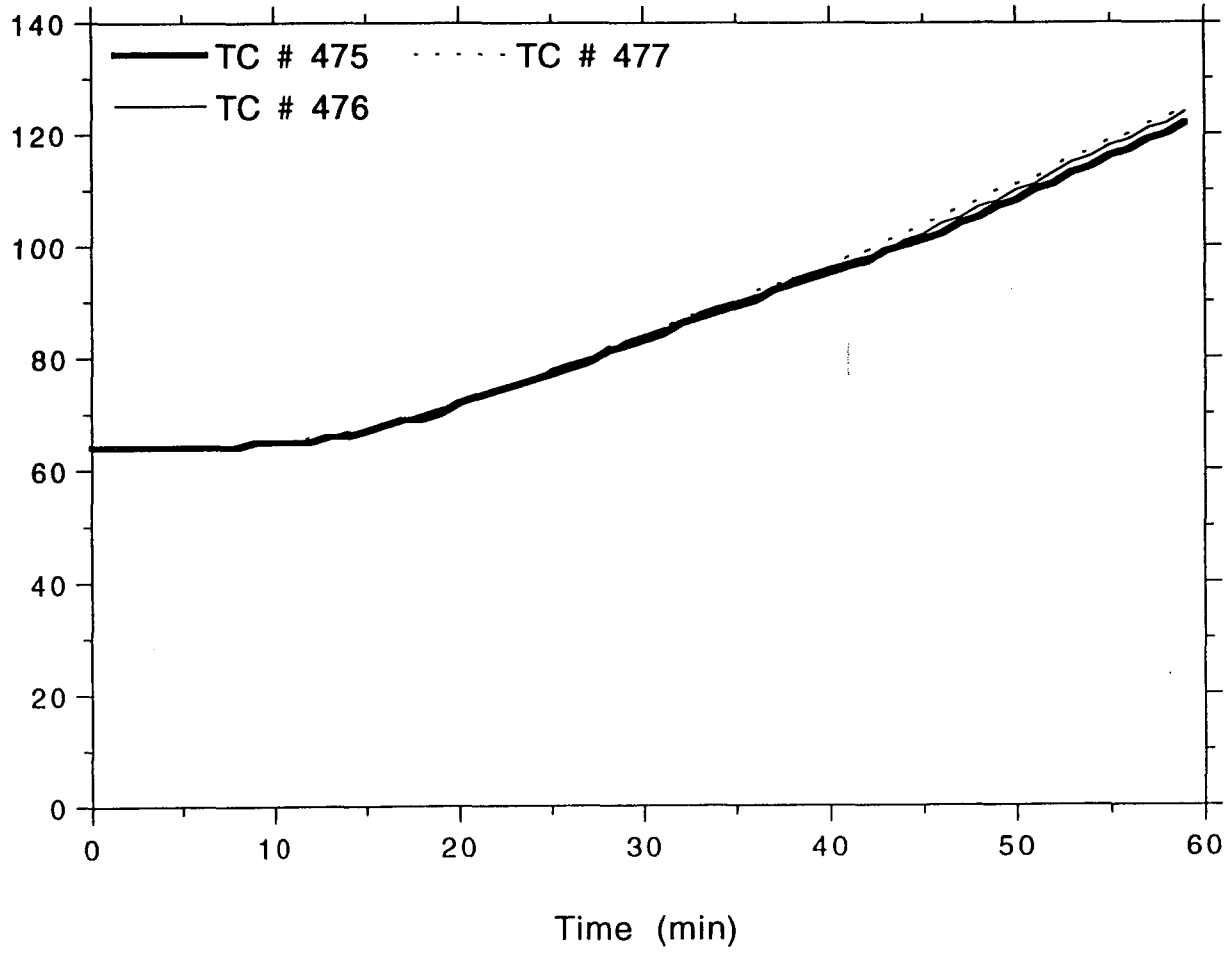
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



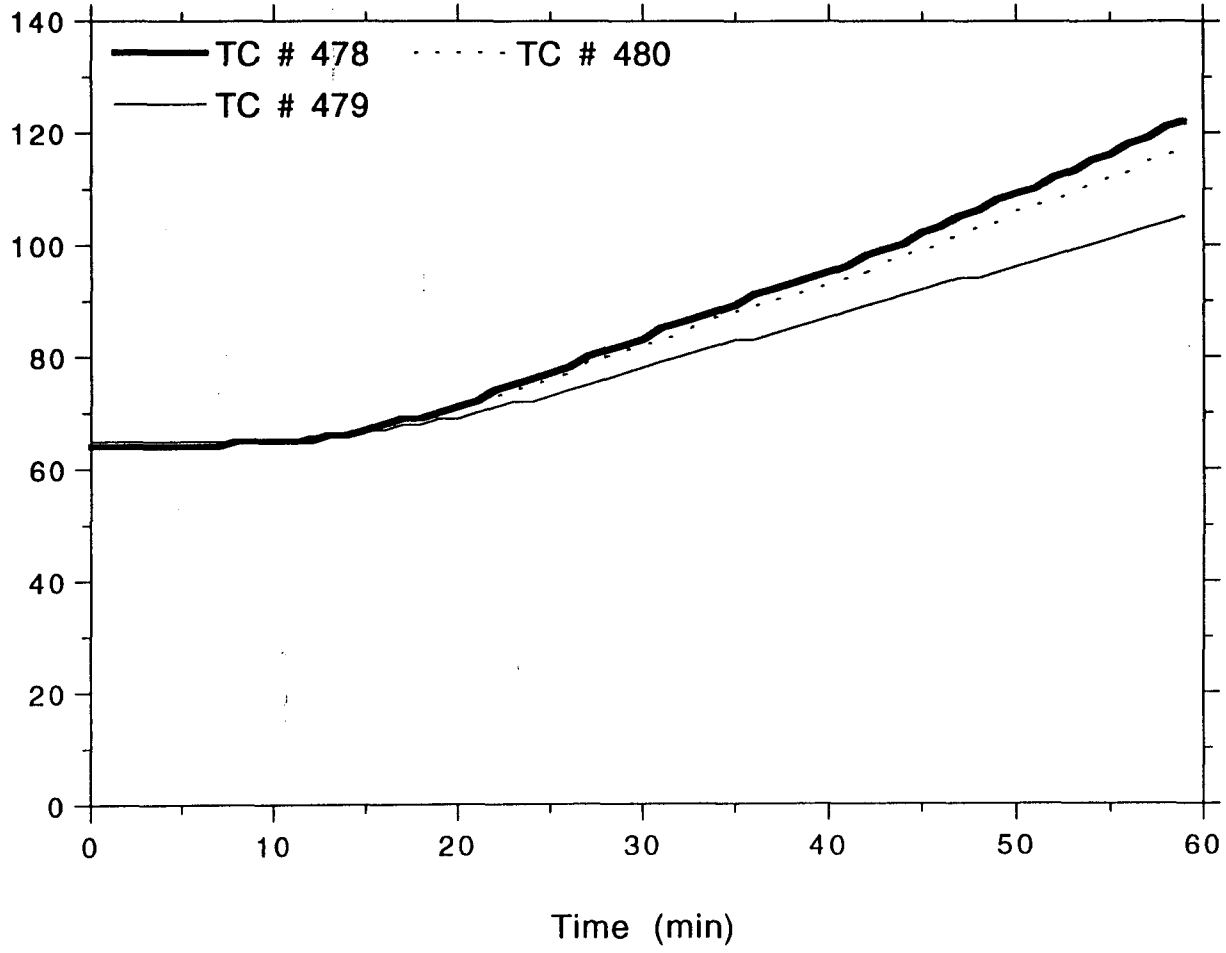
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



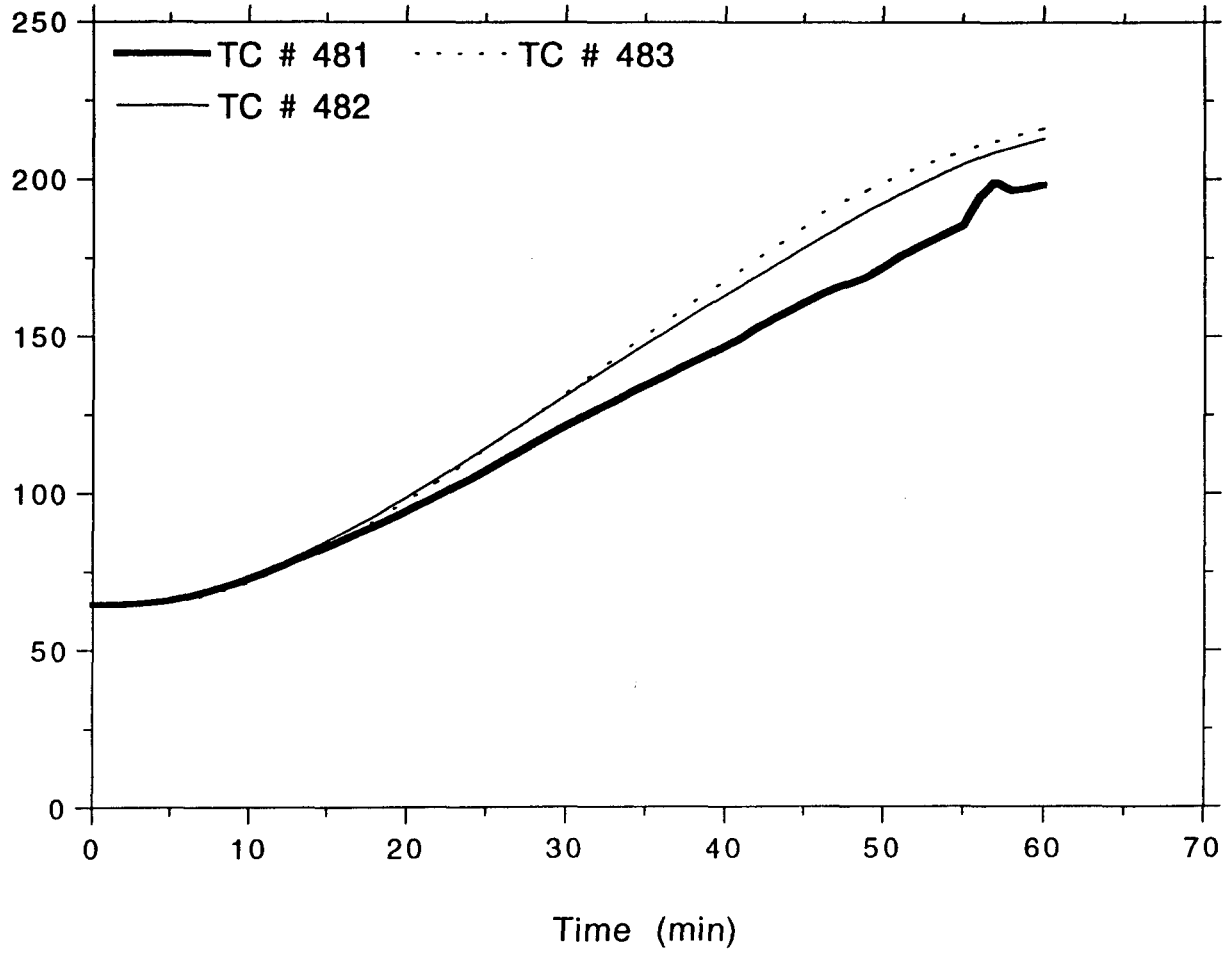
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Rear Steel Conduit



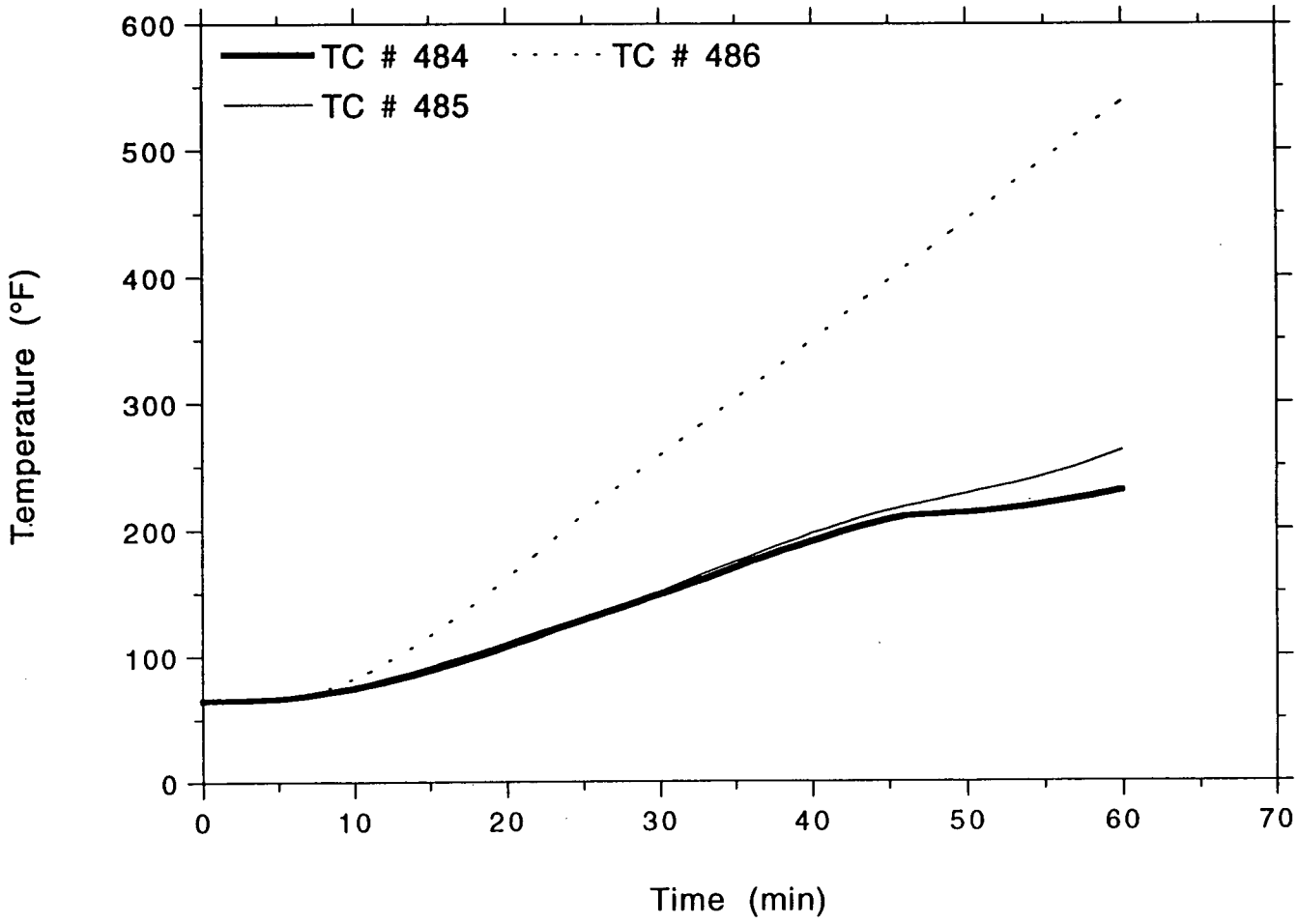
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



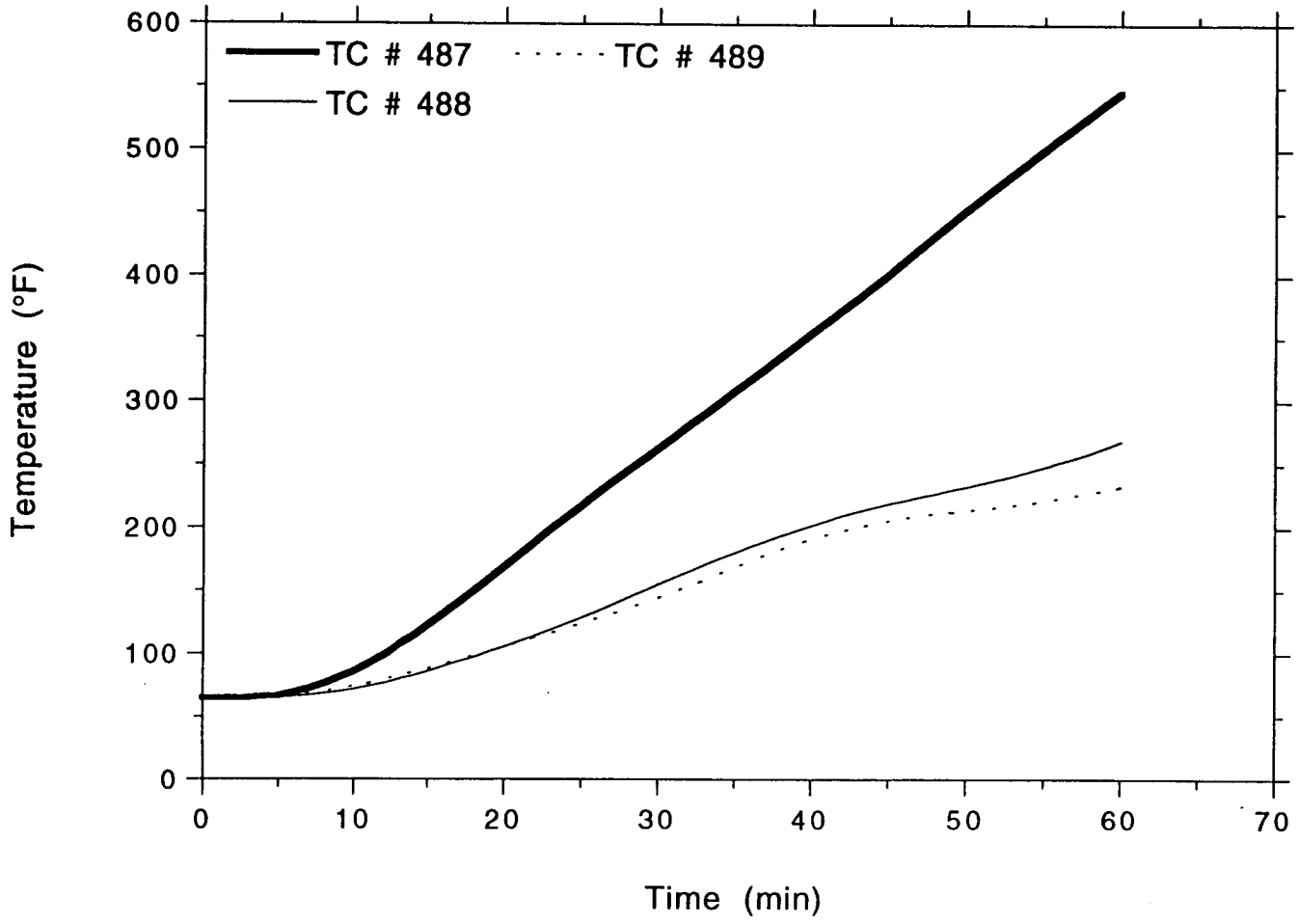
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



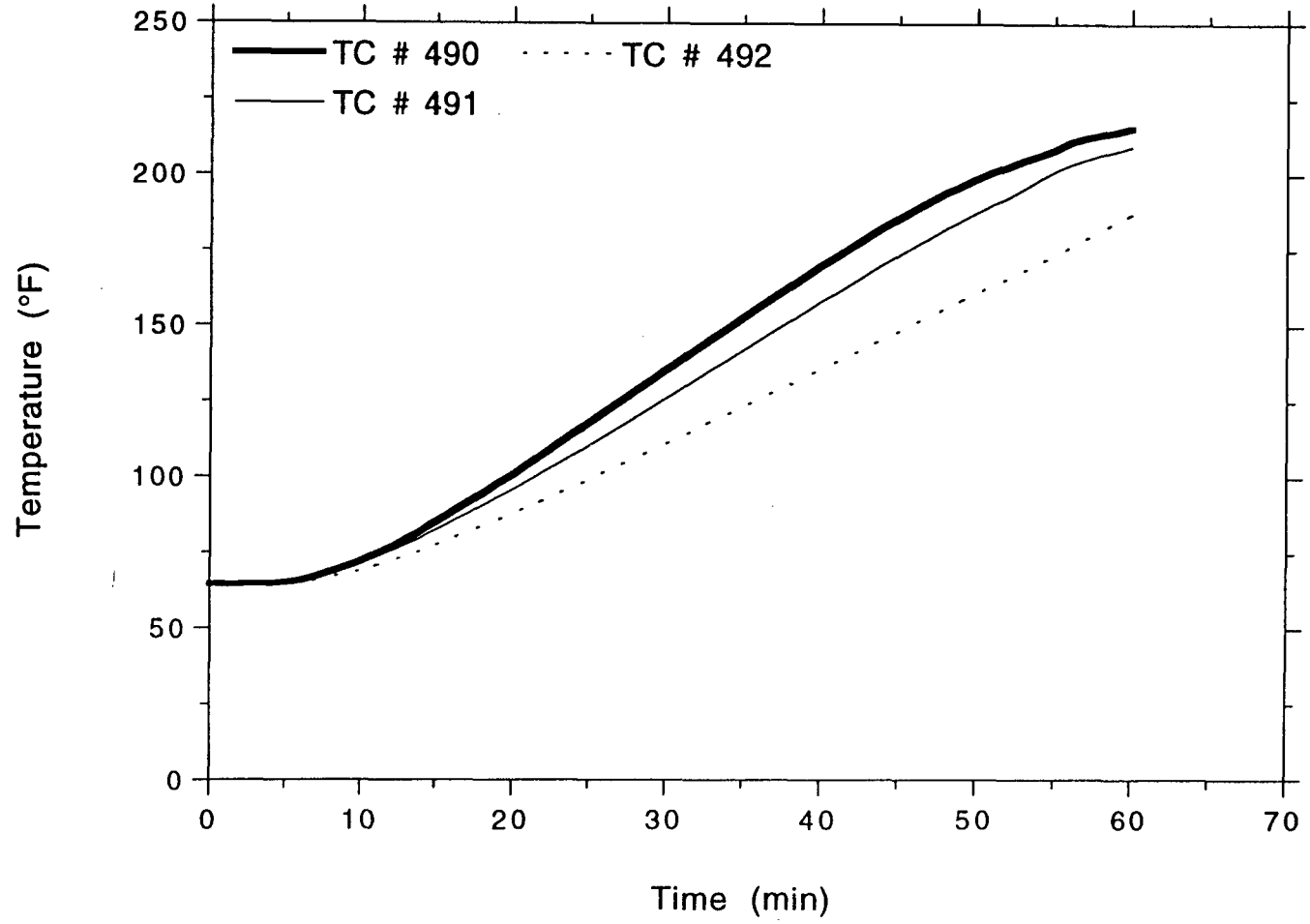
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



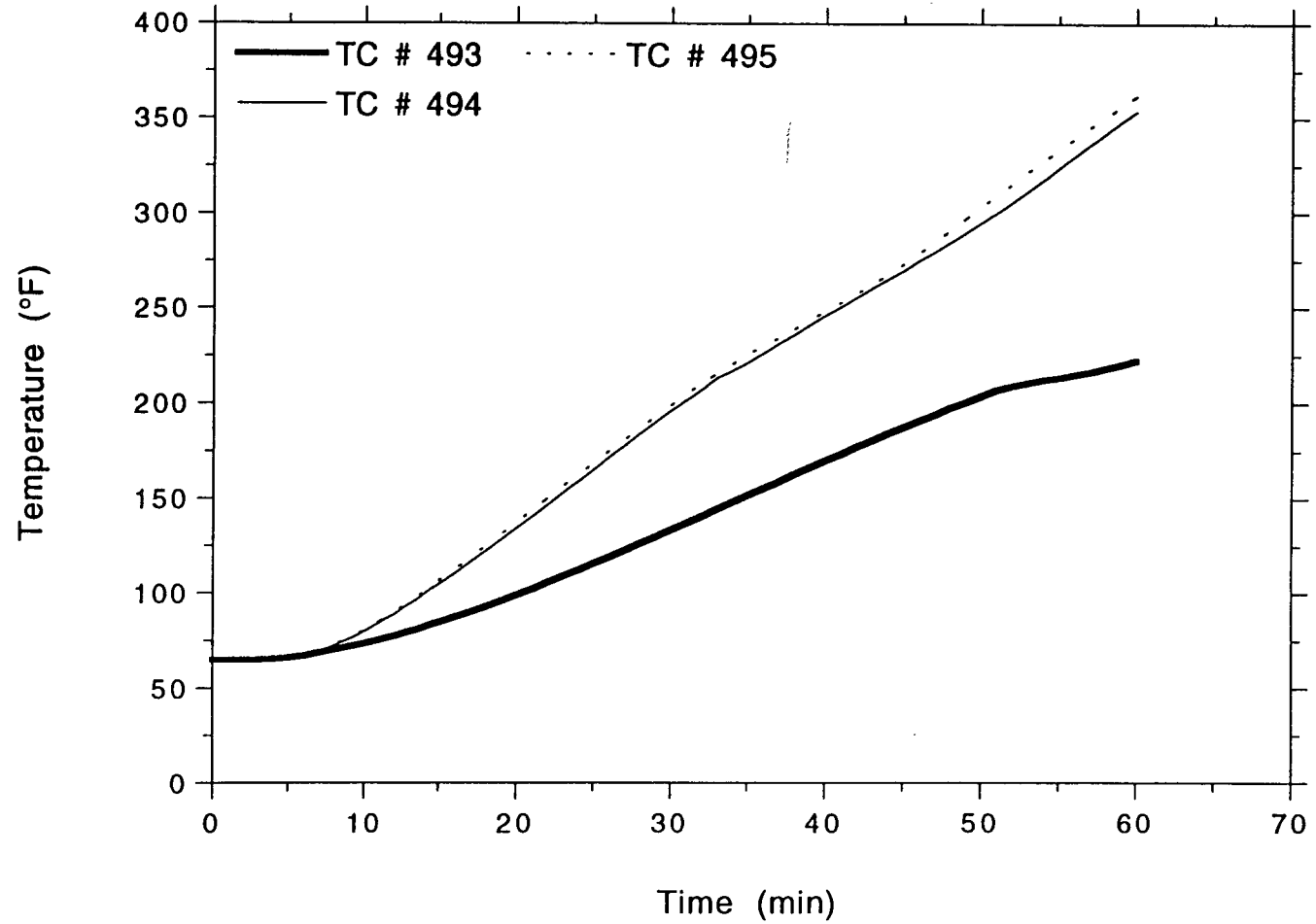
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



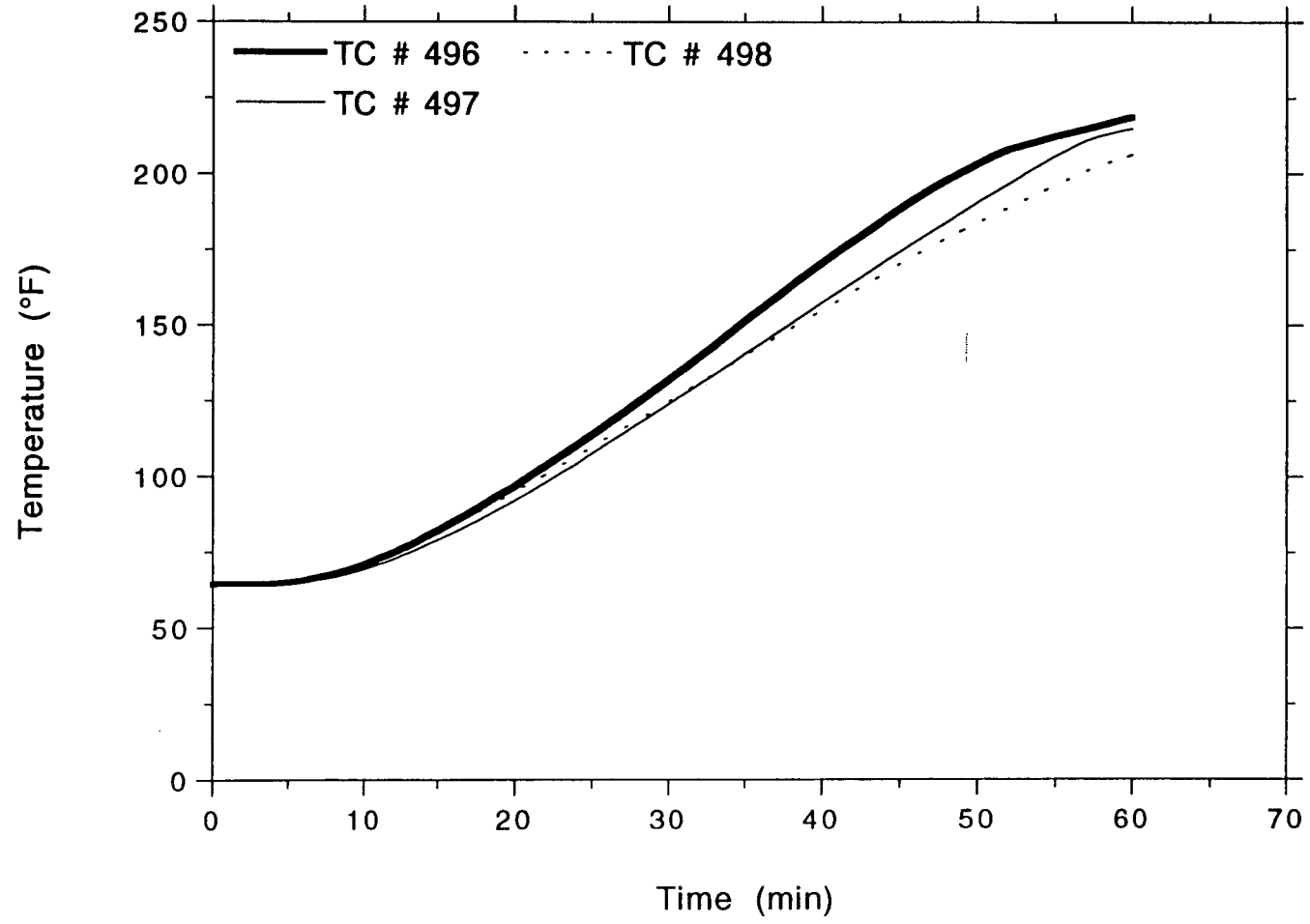
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
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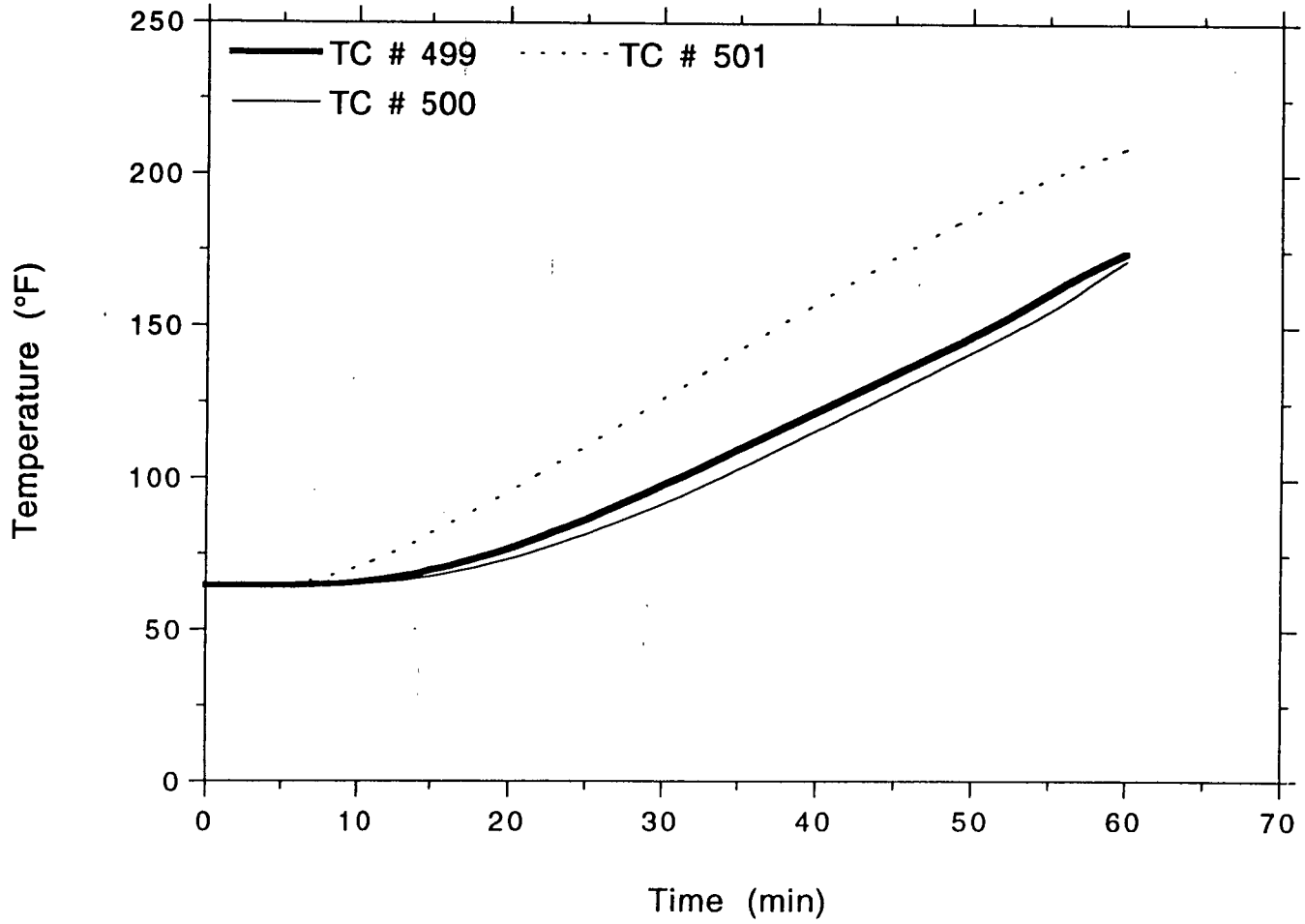
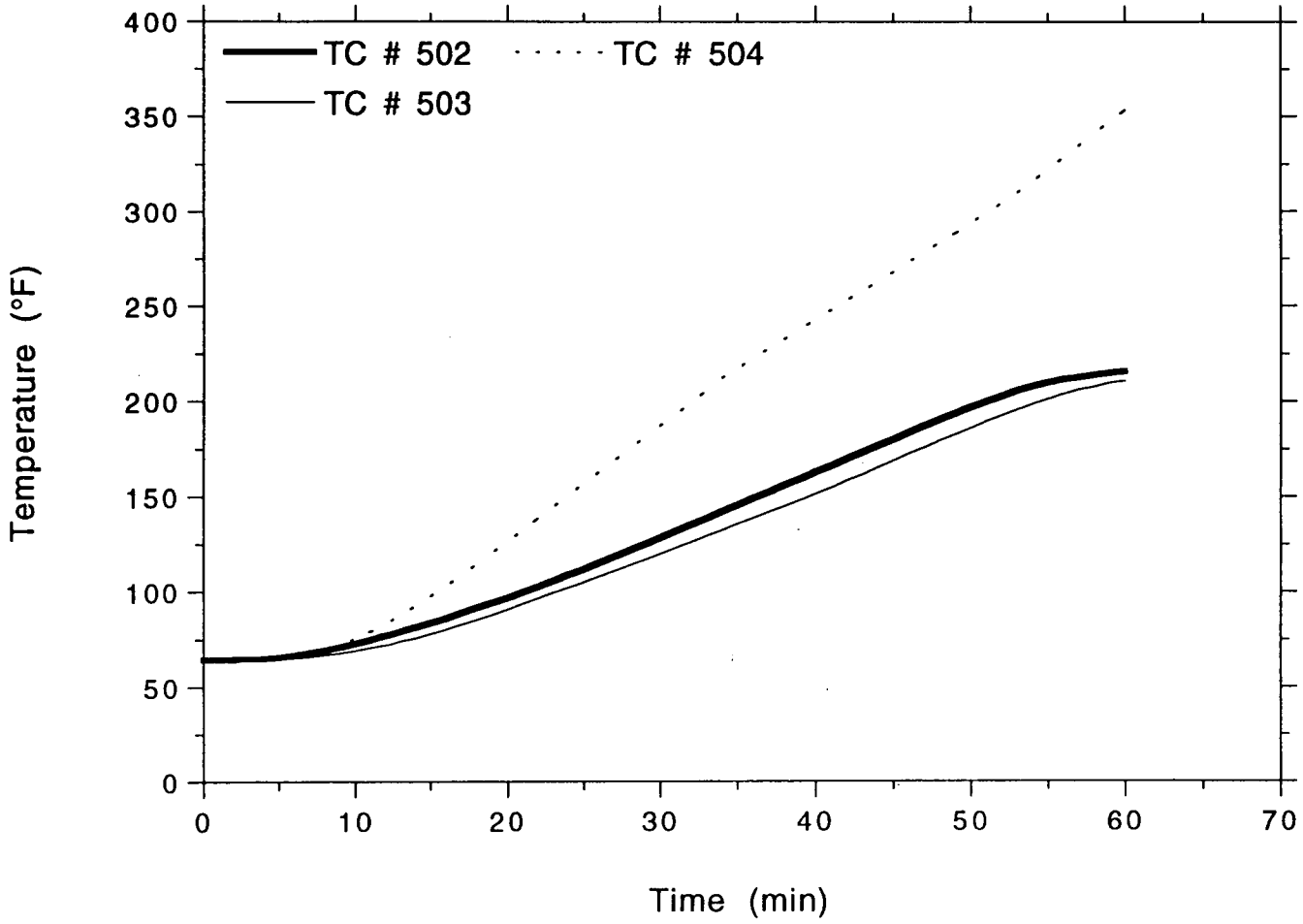


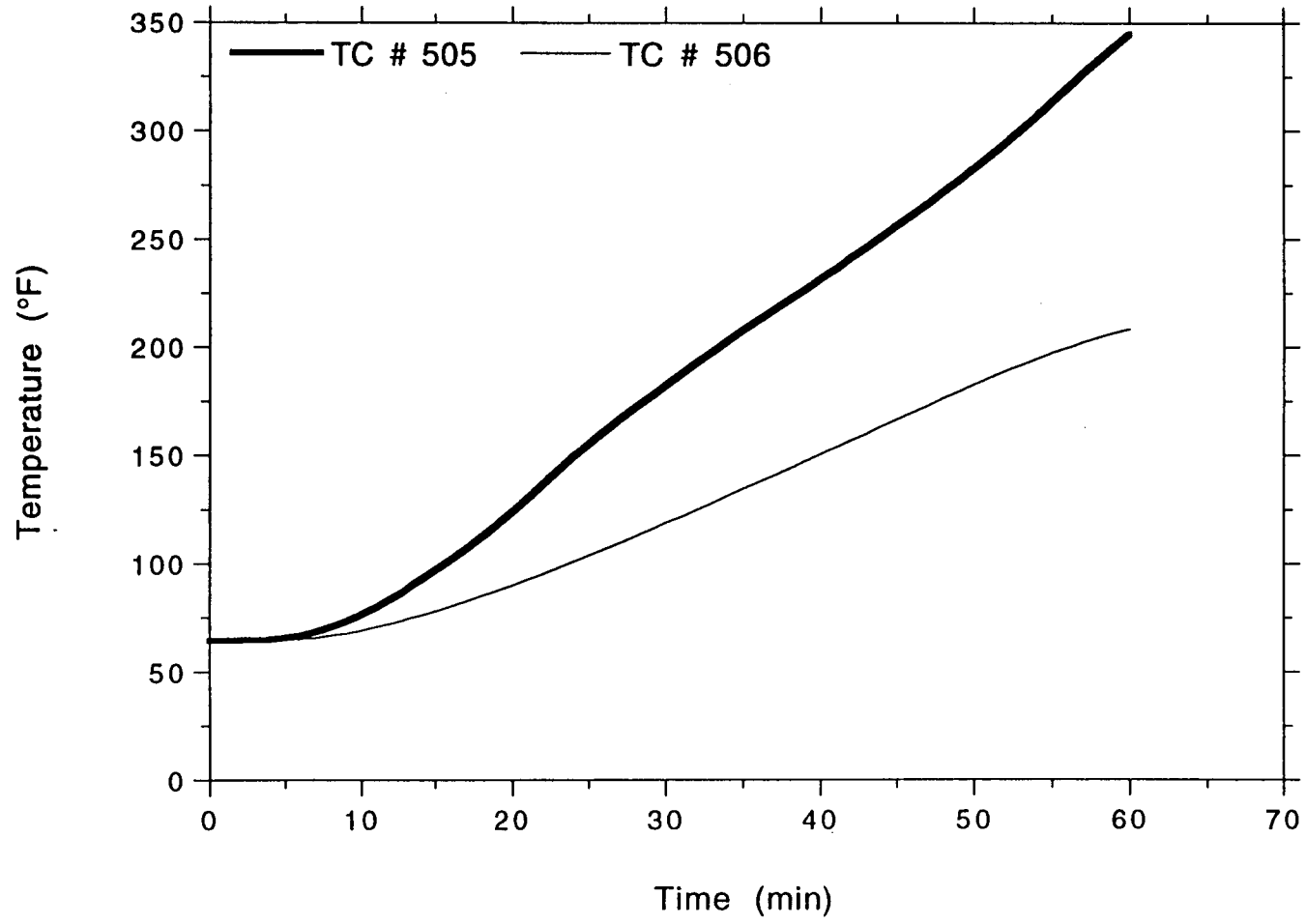
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



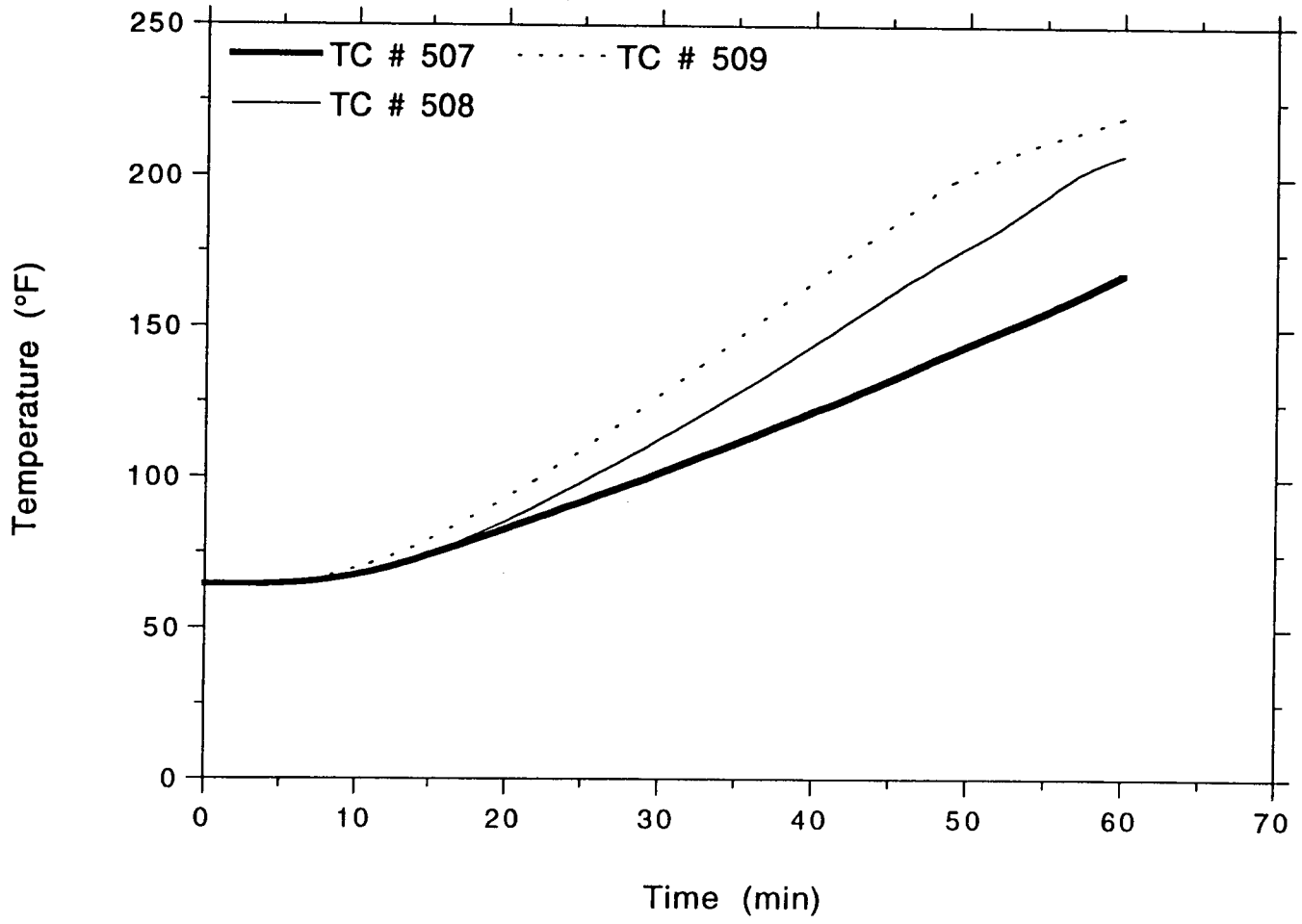
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Right Cable Tray Support System



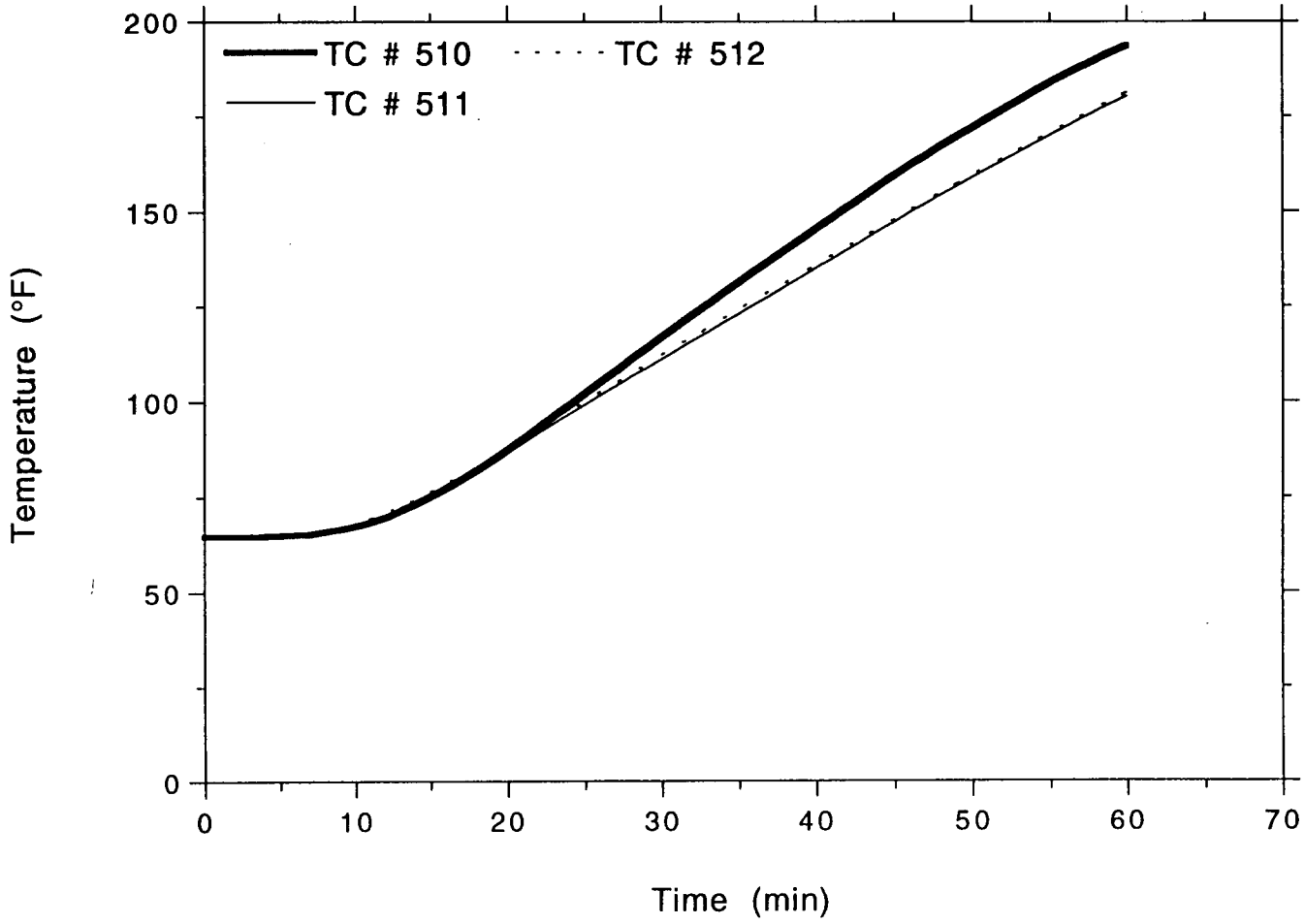
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



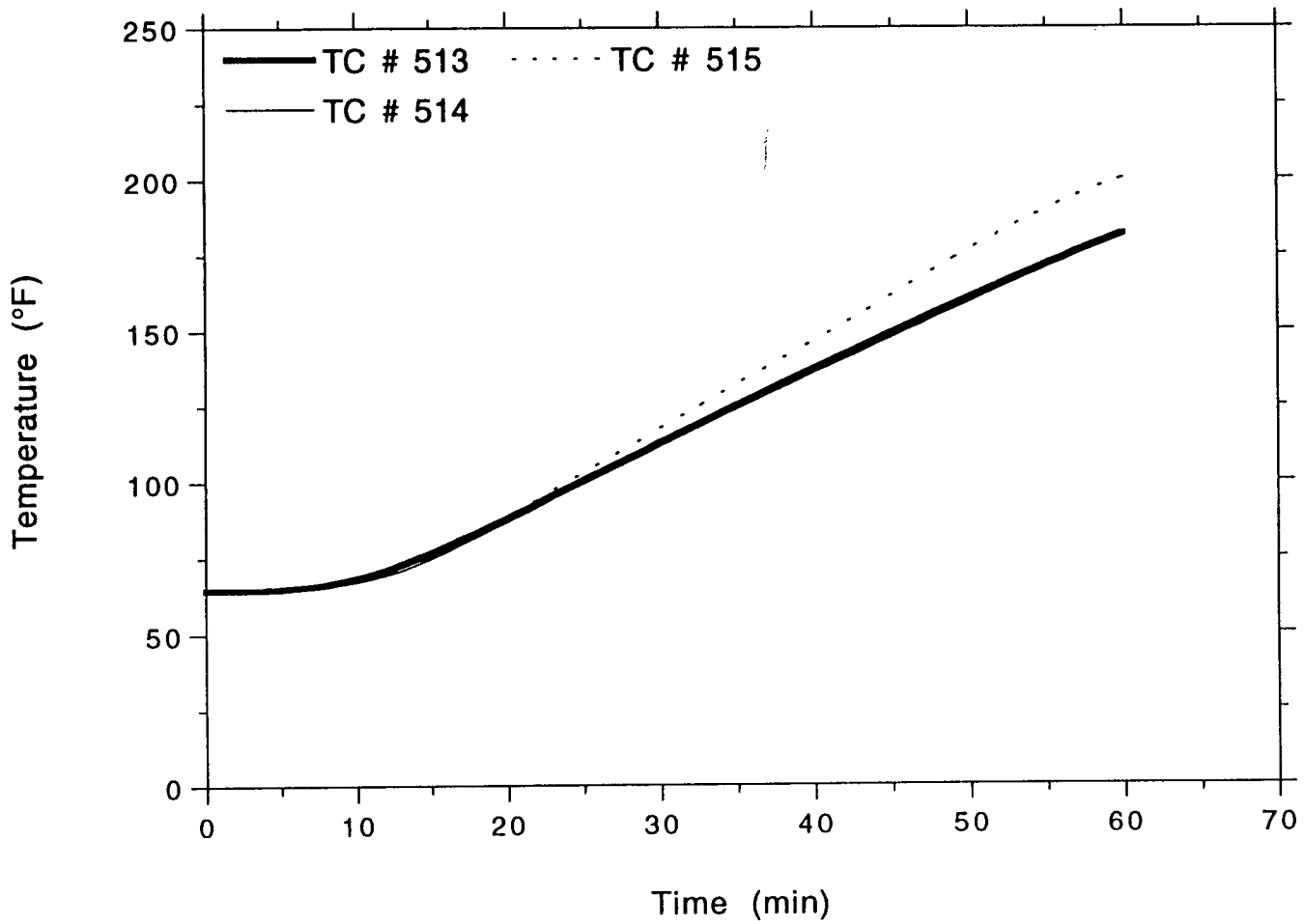
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



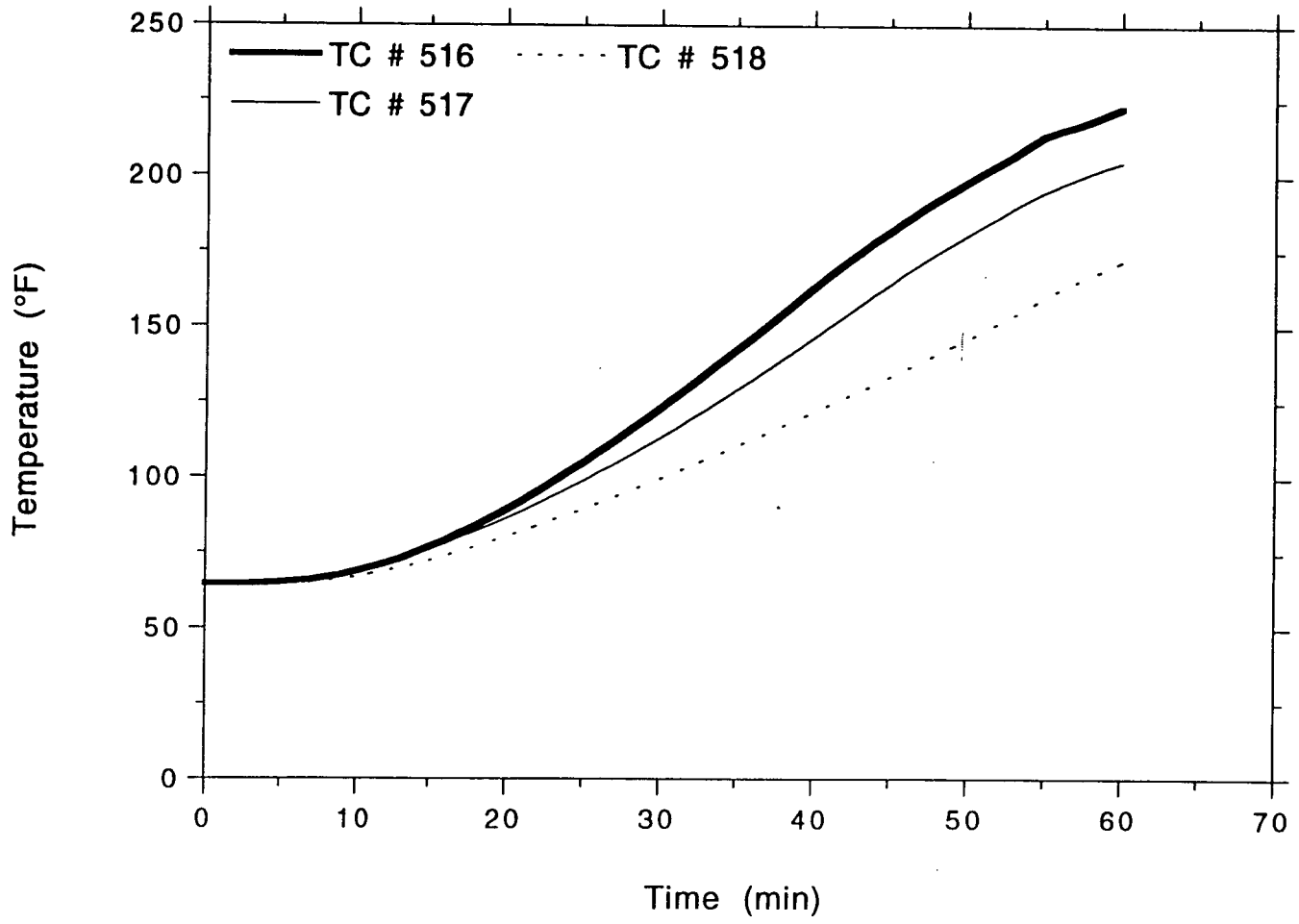
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



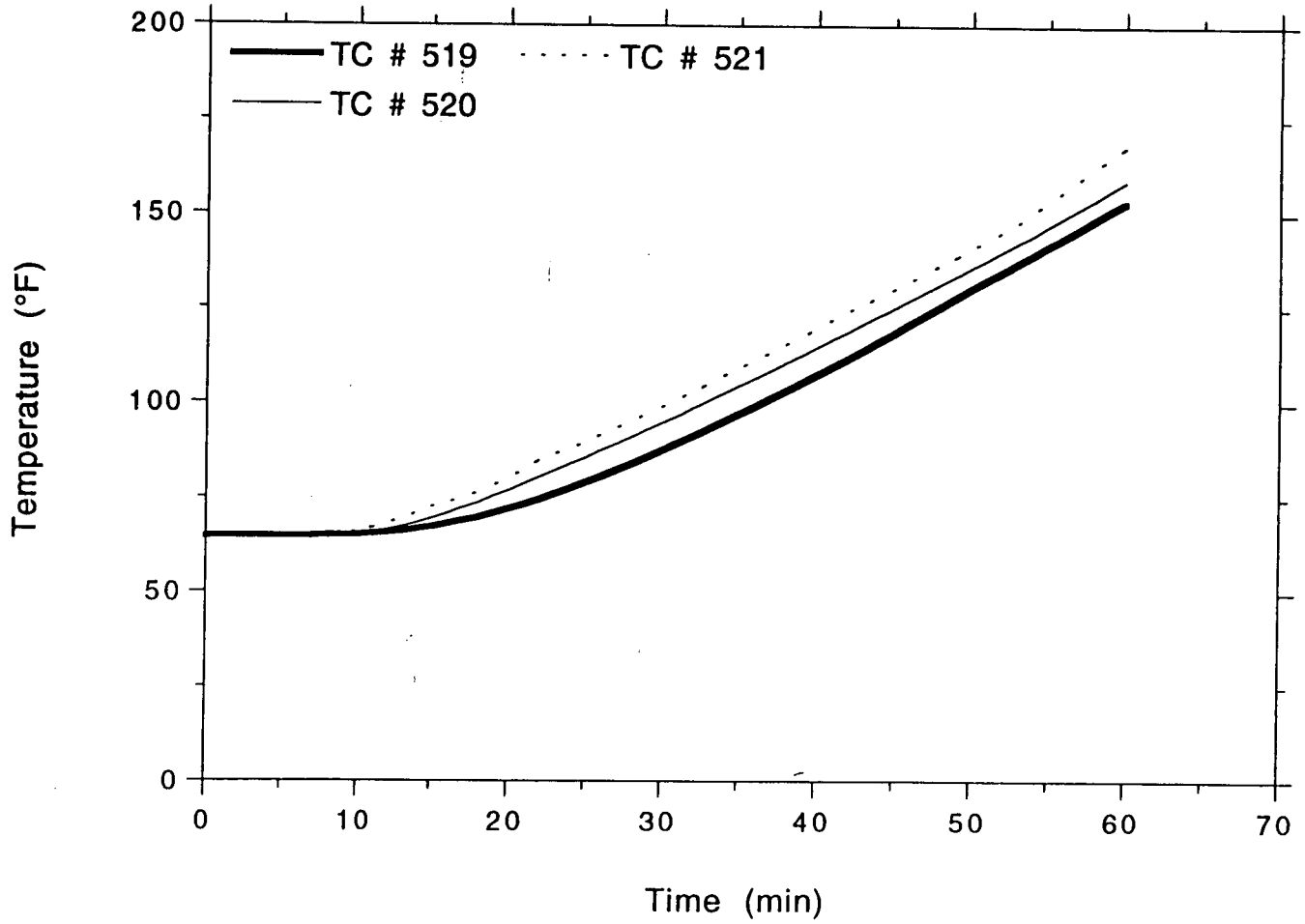
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



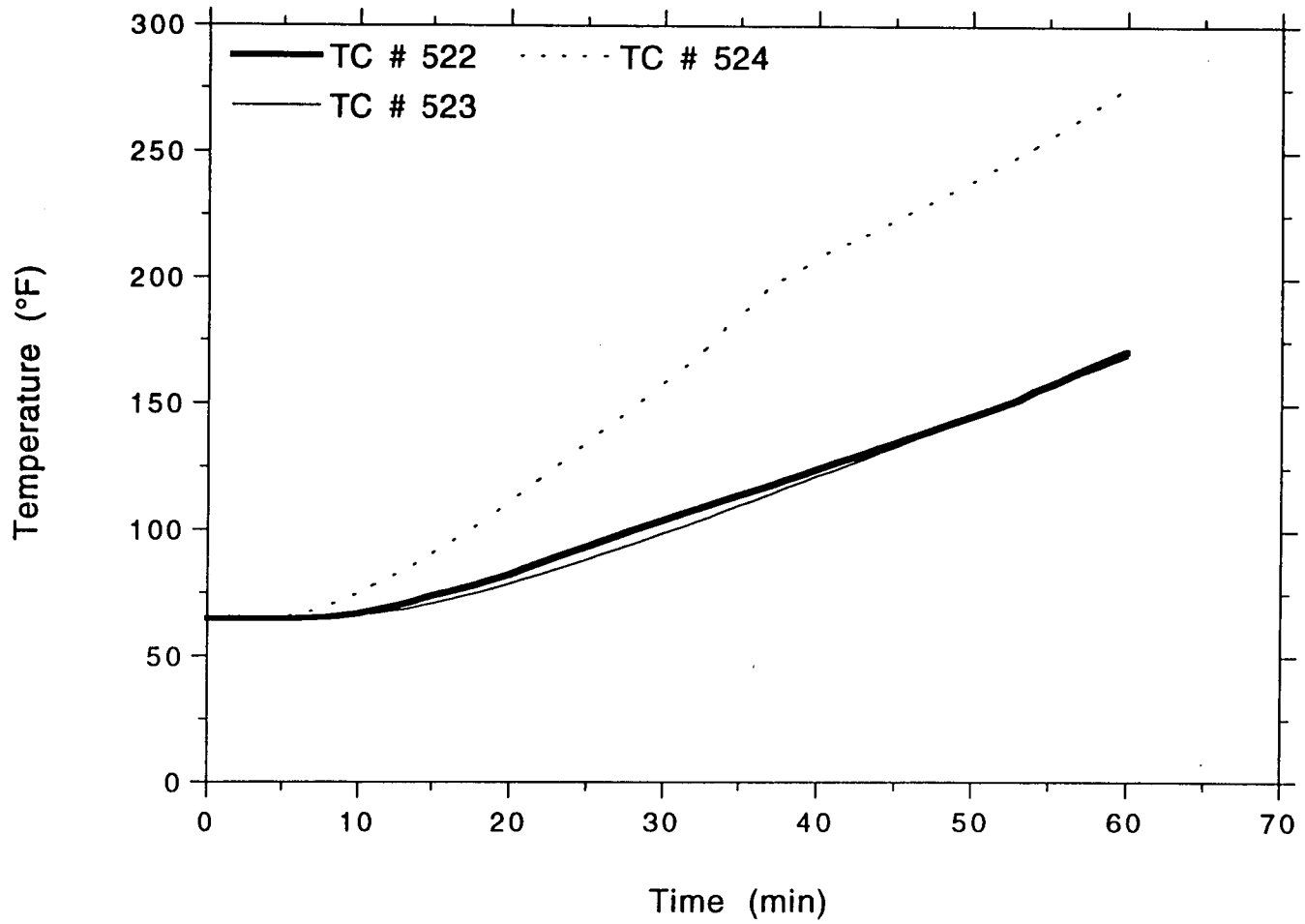
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



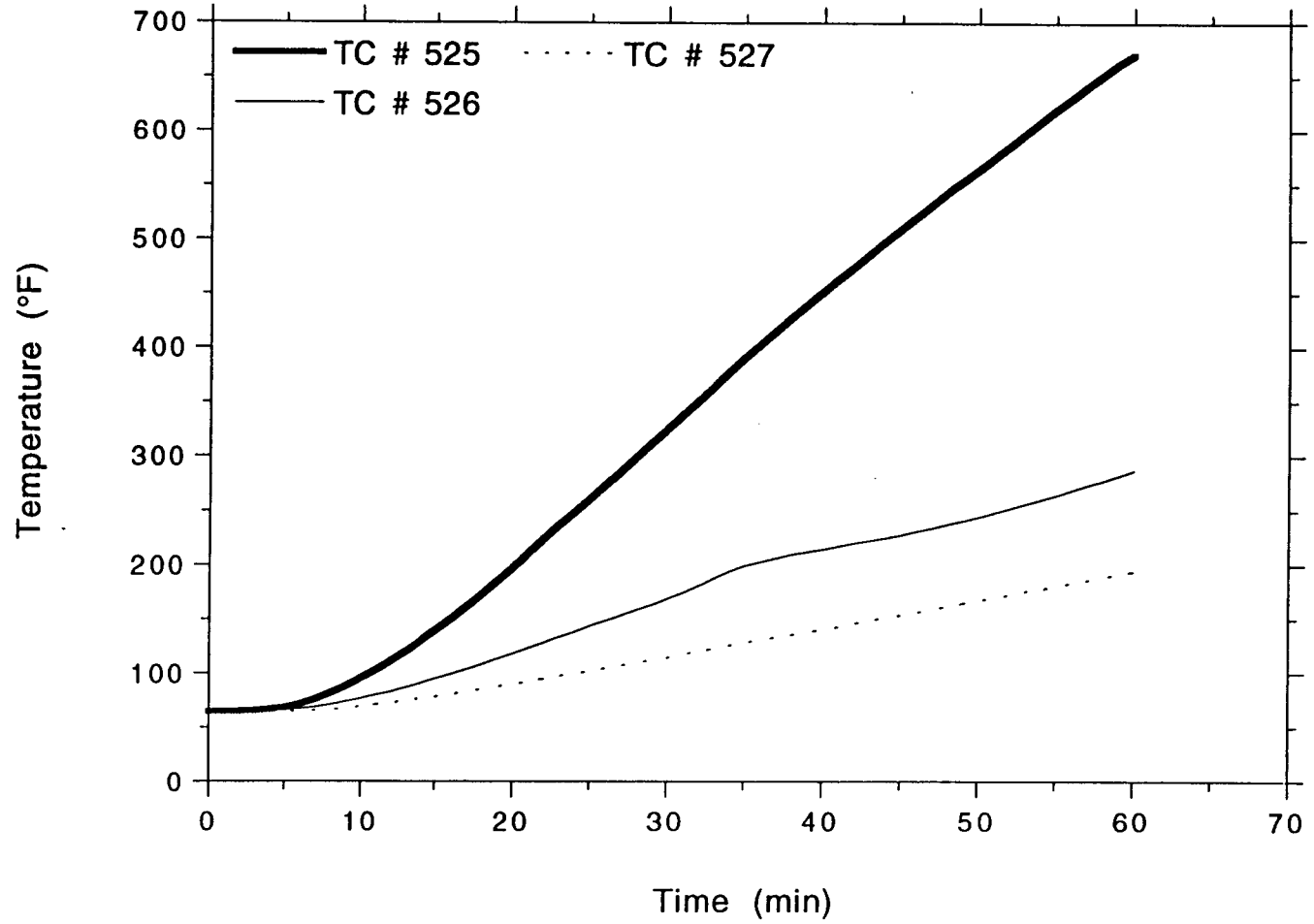
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



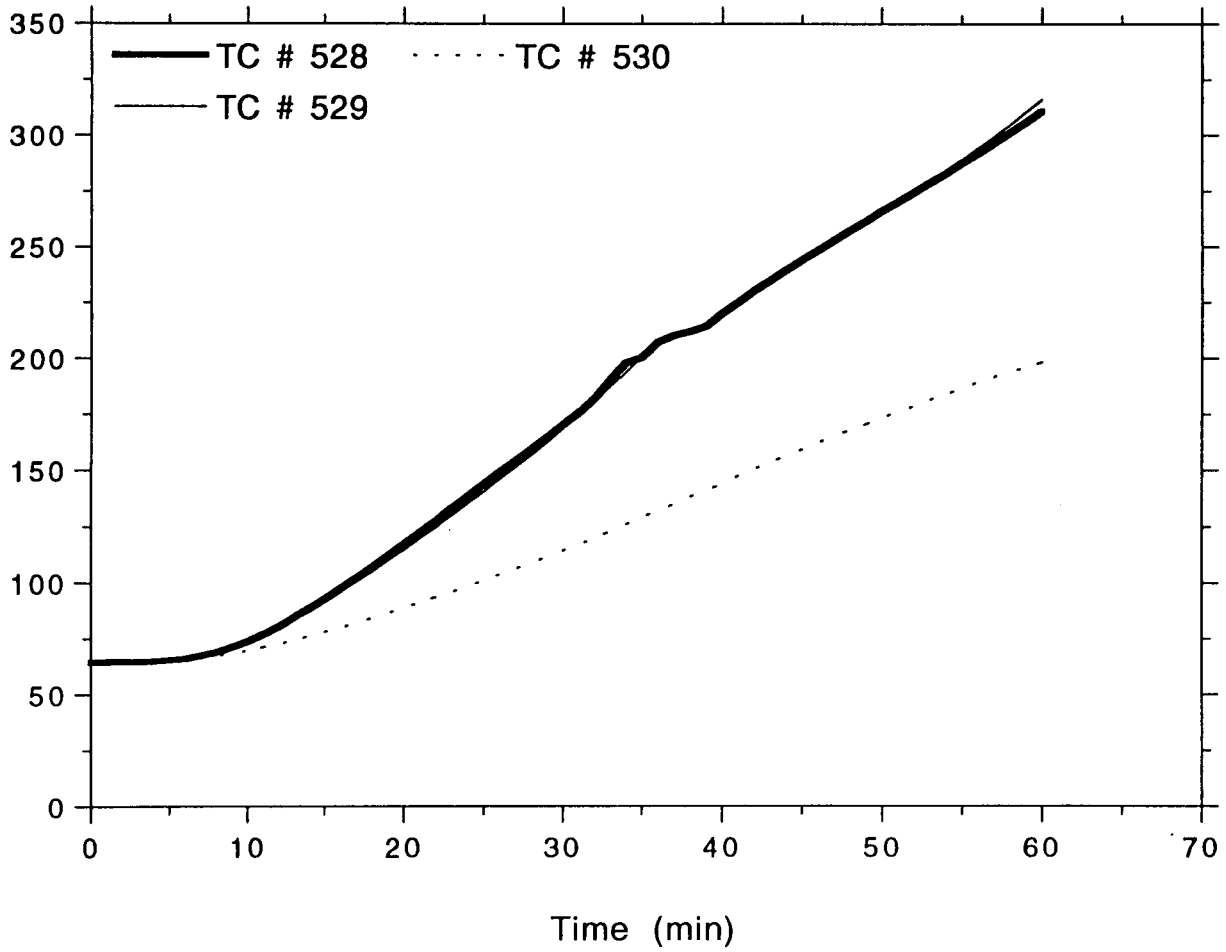
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



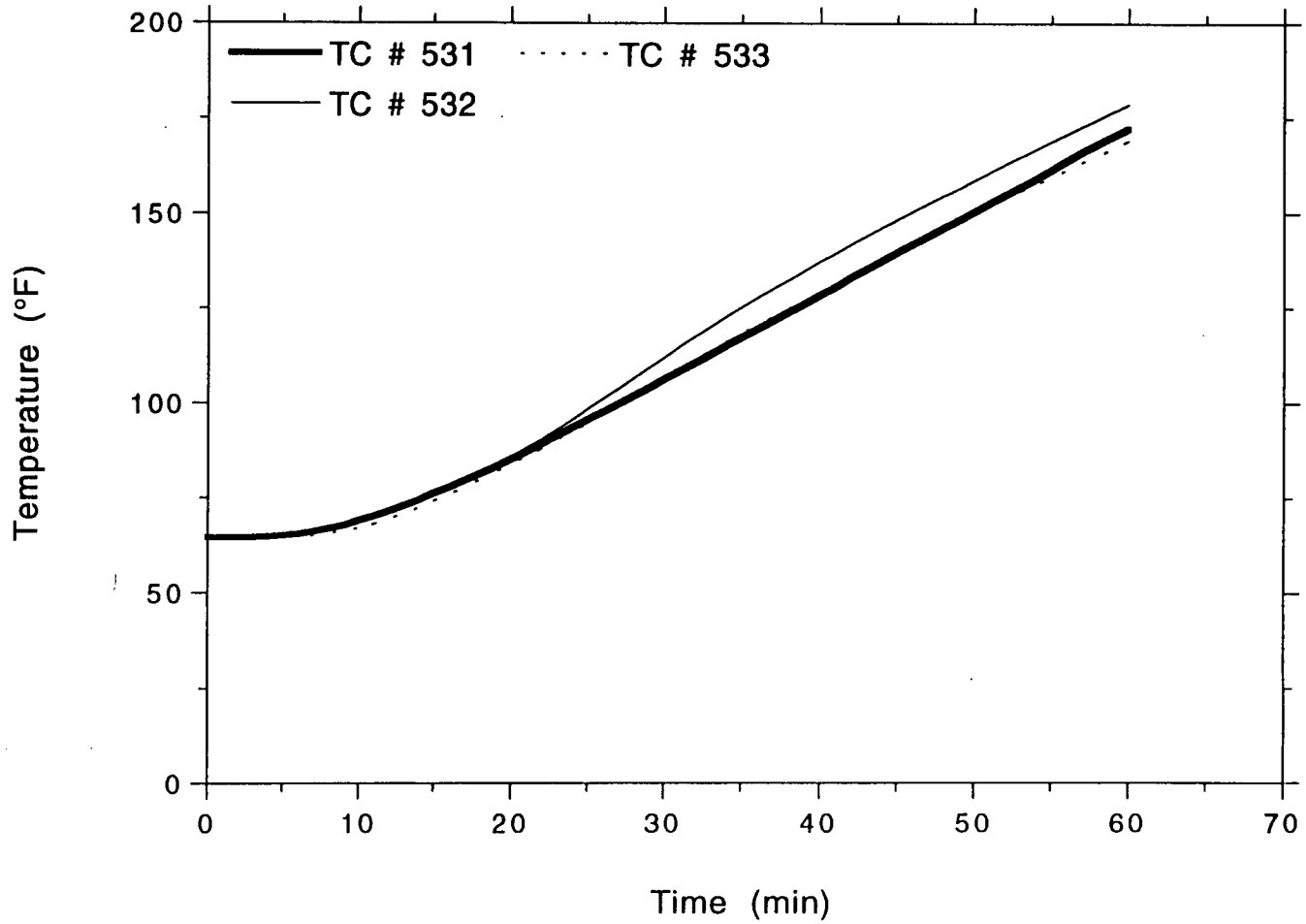
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Left Cable Tray Support System



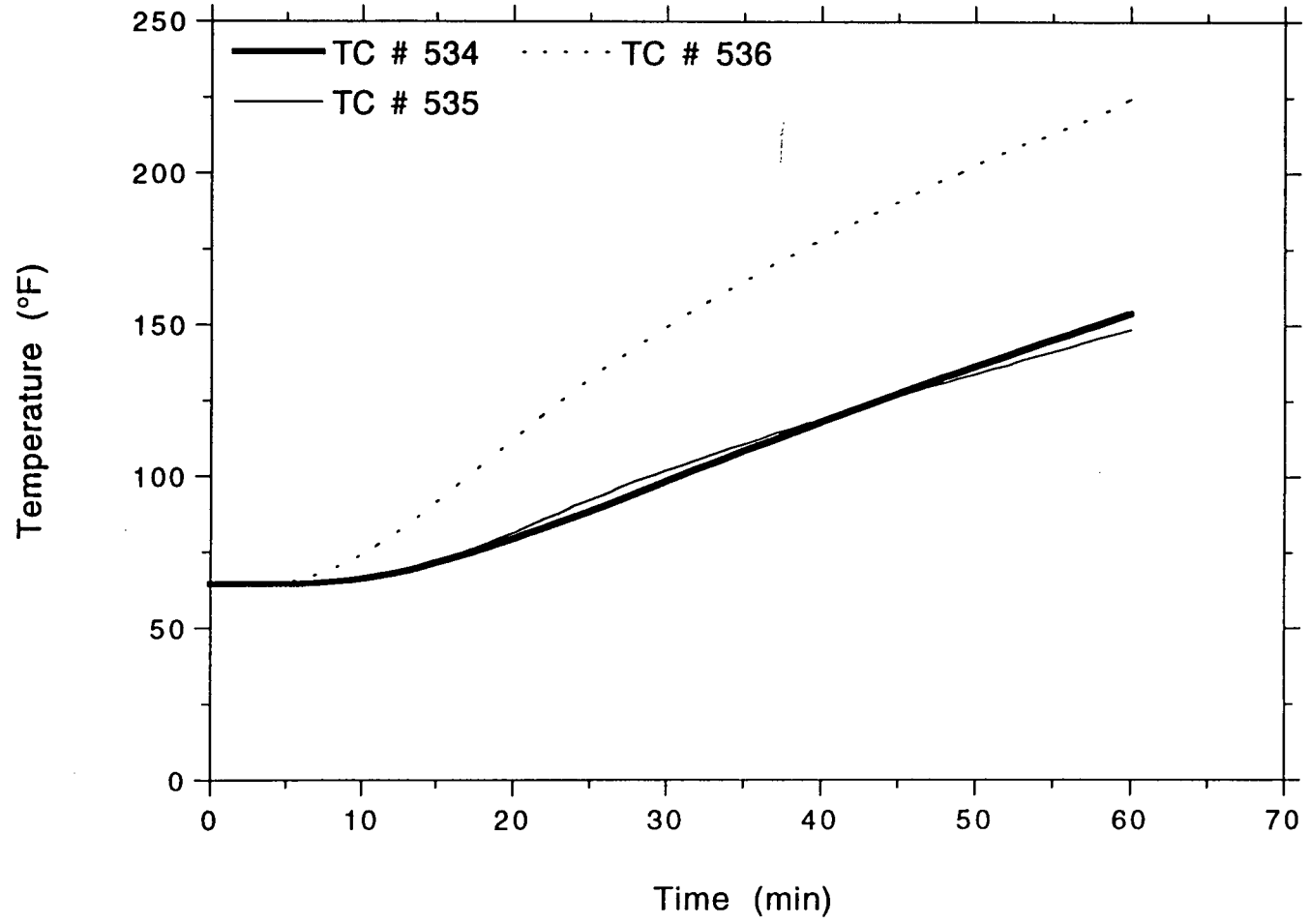
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Large Unistrut Support System



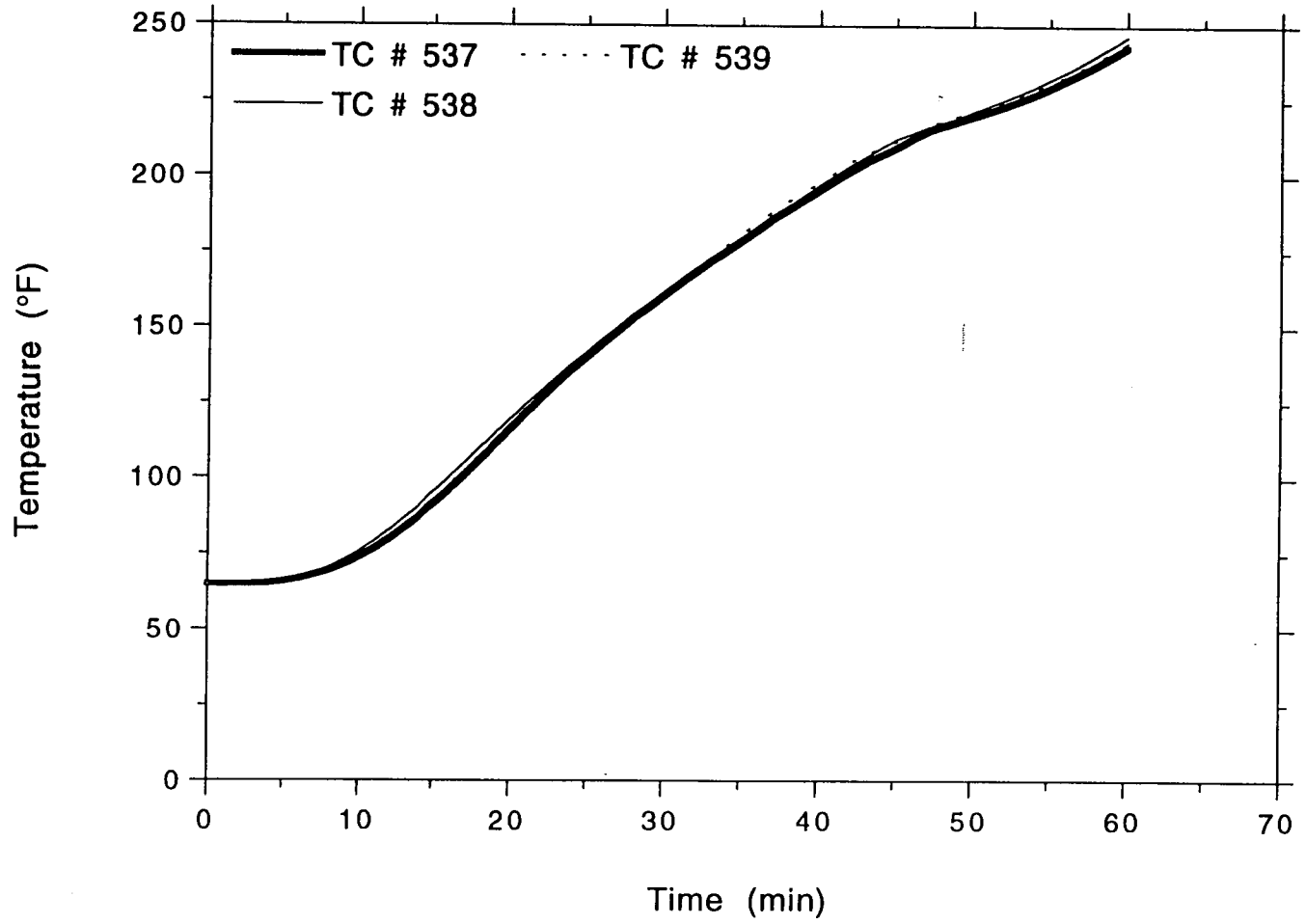
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Large Unistrut Support System



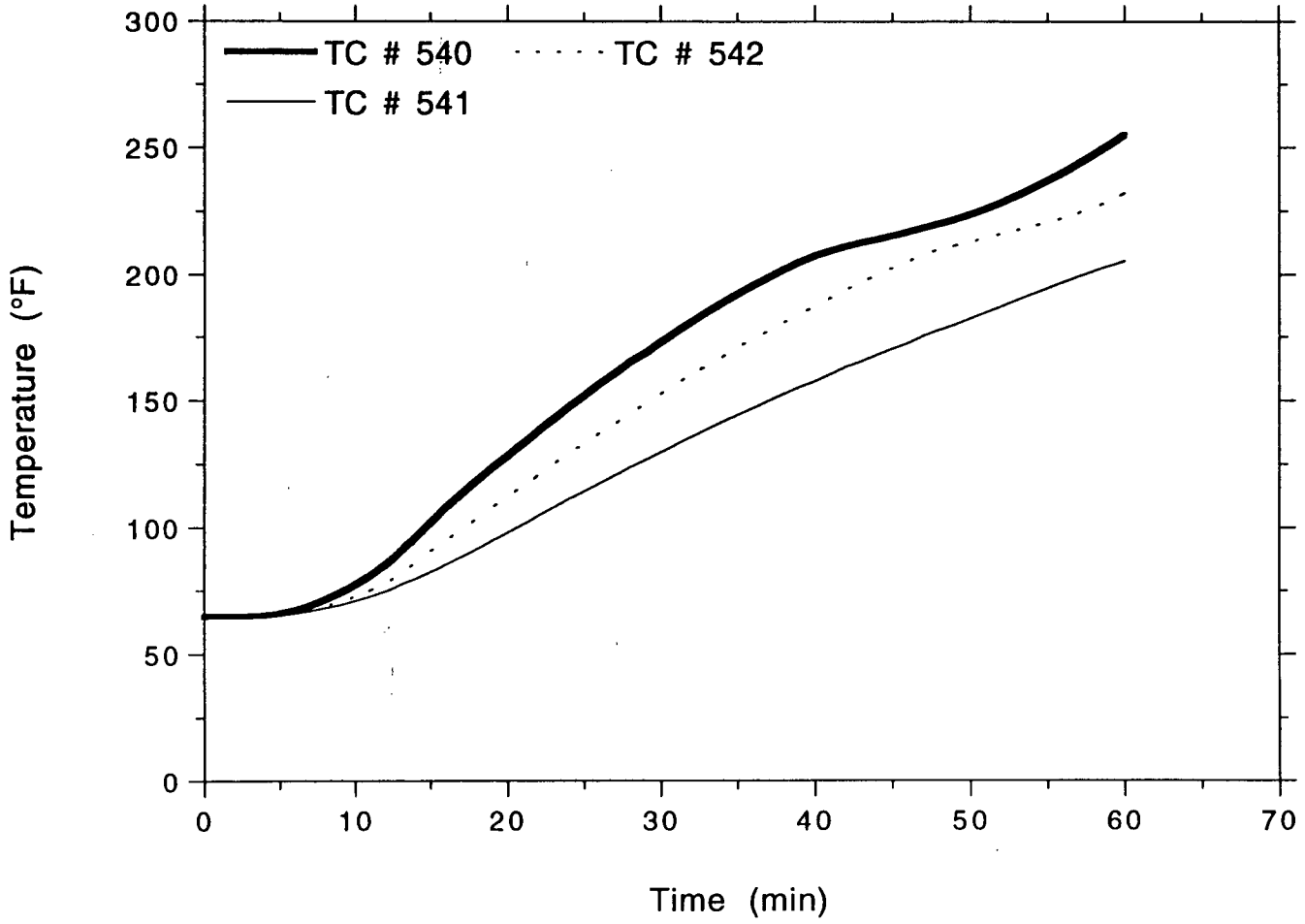
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Large Unistrut Support System



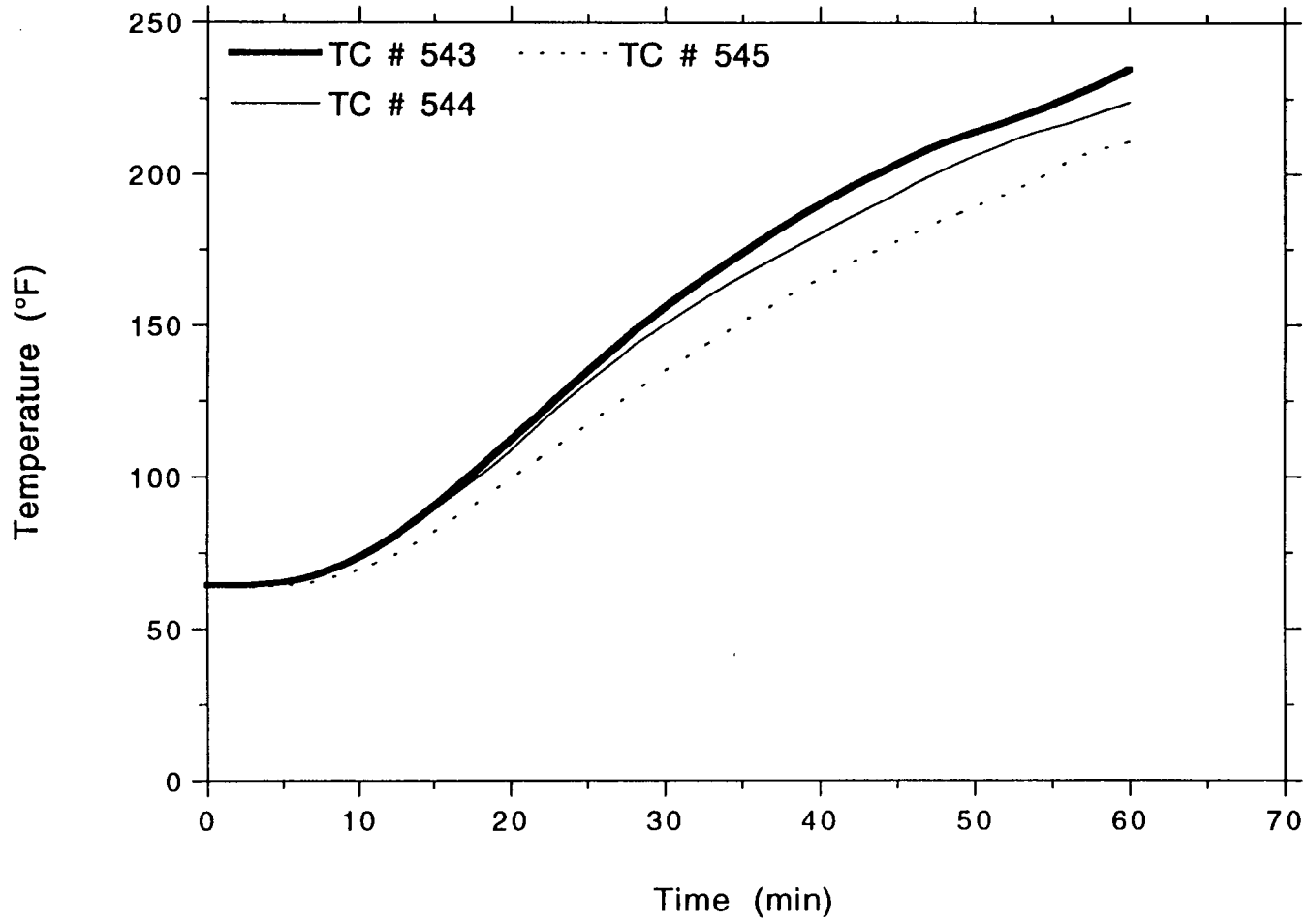
OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Large Unistrut Support System



OMEGA POINT LABORATORIES

TSI/TVA
Project No. 11960-97257
Large Unistrut Support System



OMEGA POINT LABORATORIES

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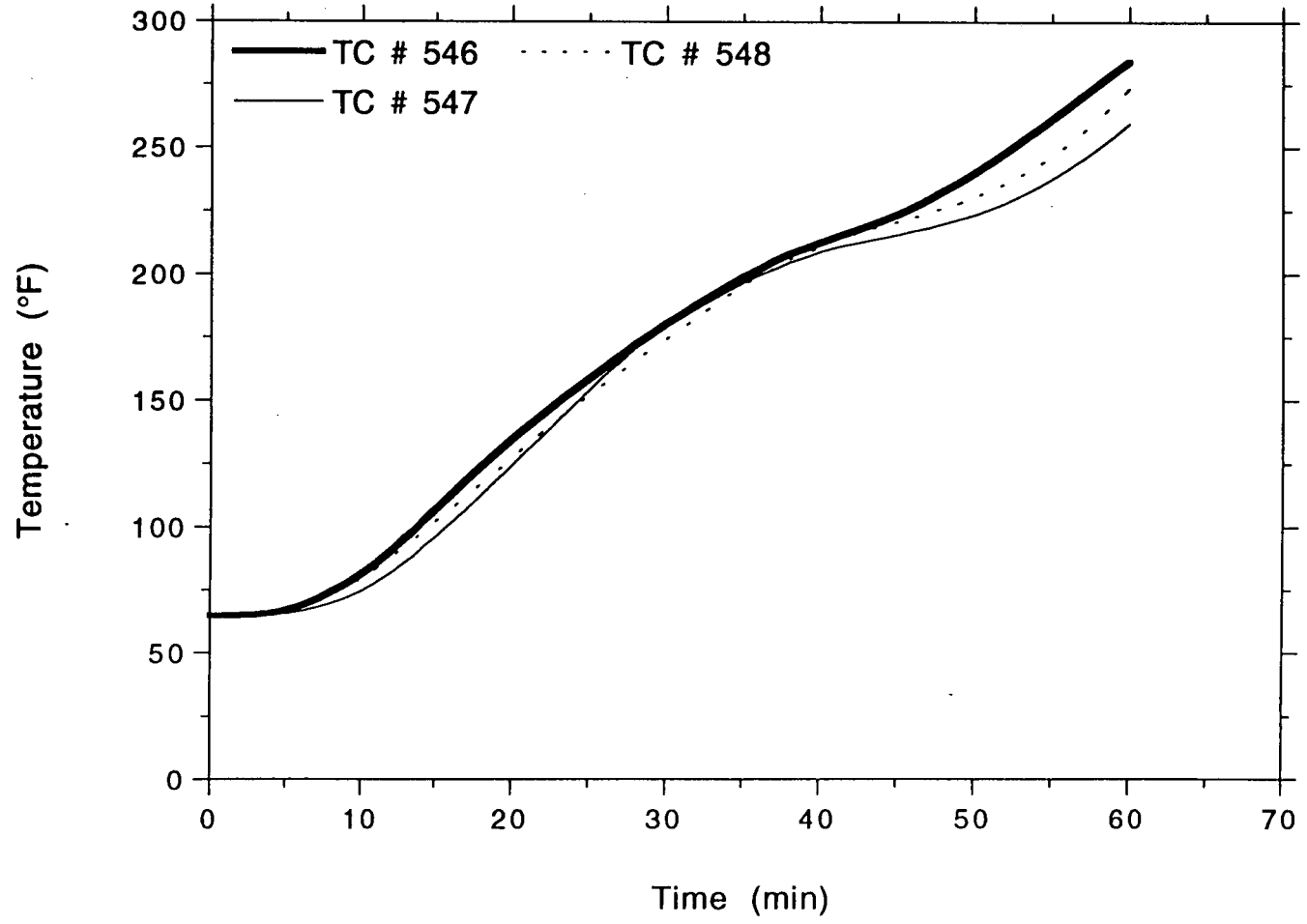

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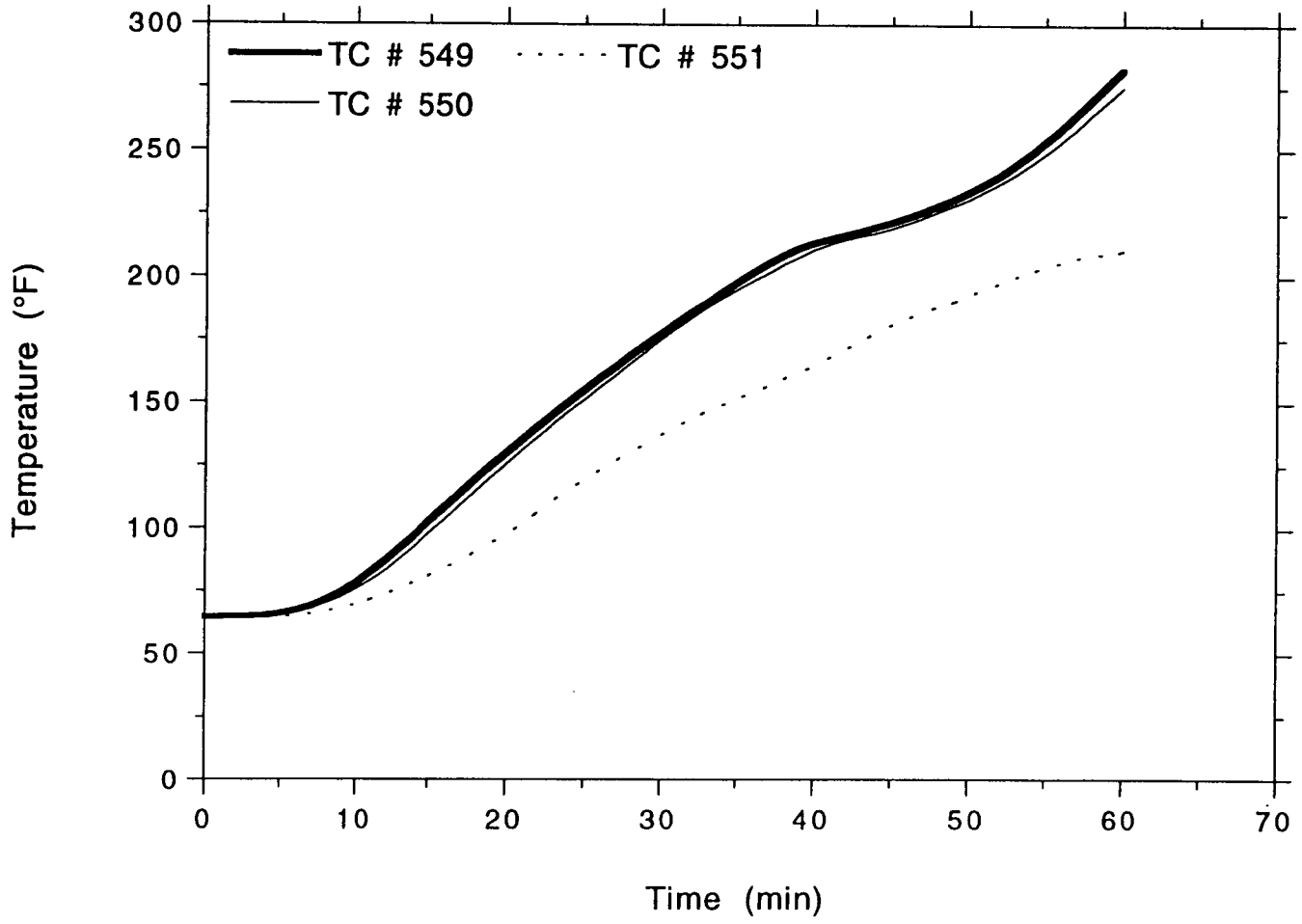
Large Unistrut Support System



OMEGA POINT LABORATORIES

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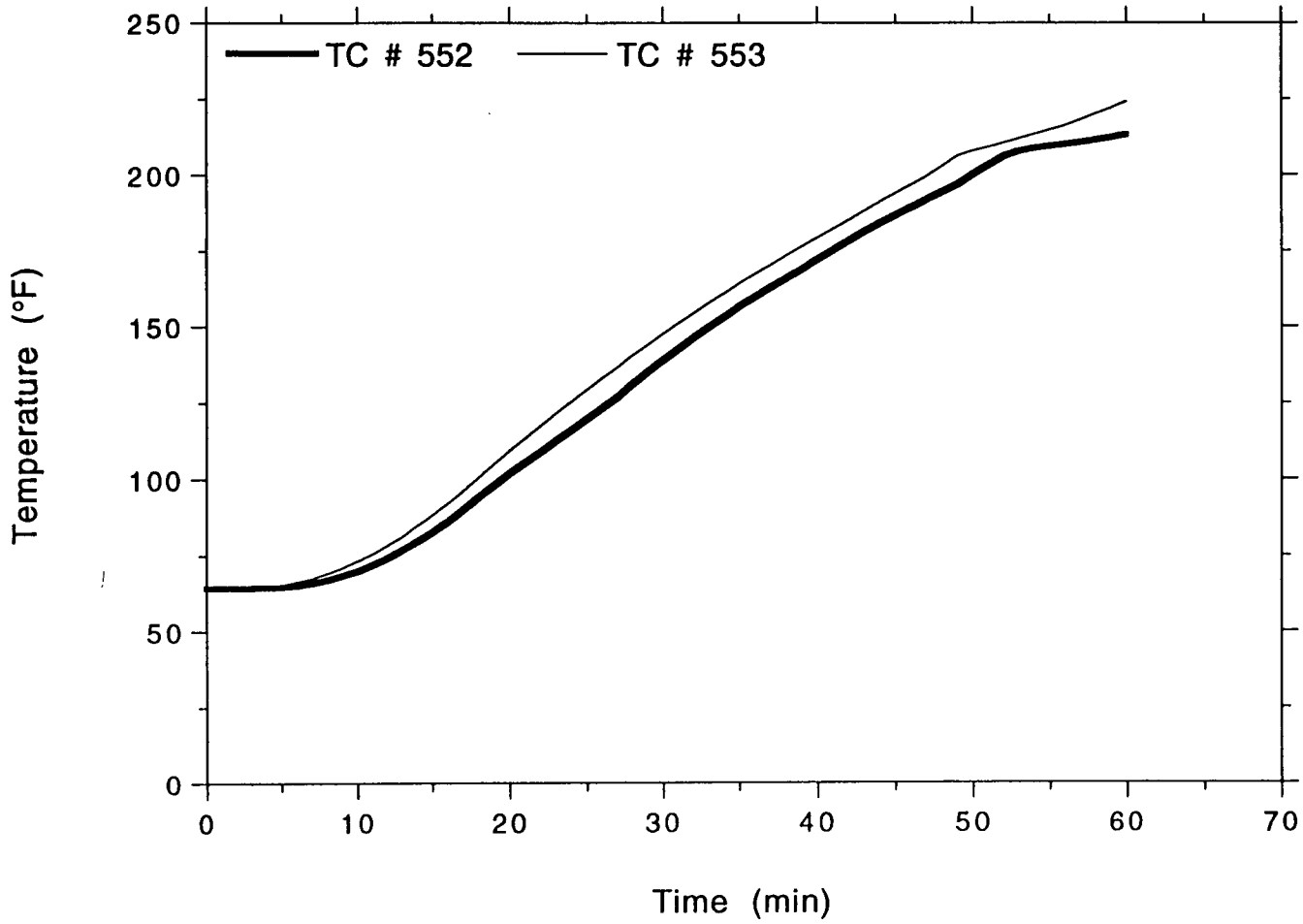
Large Unistrut Support System



OMEGA POINT LABORATORIES

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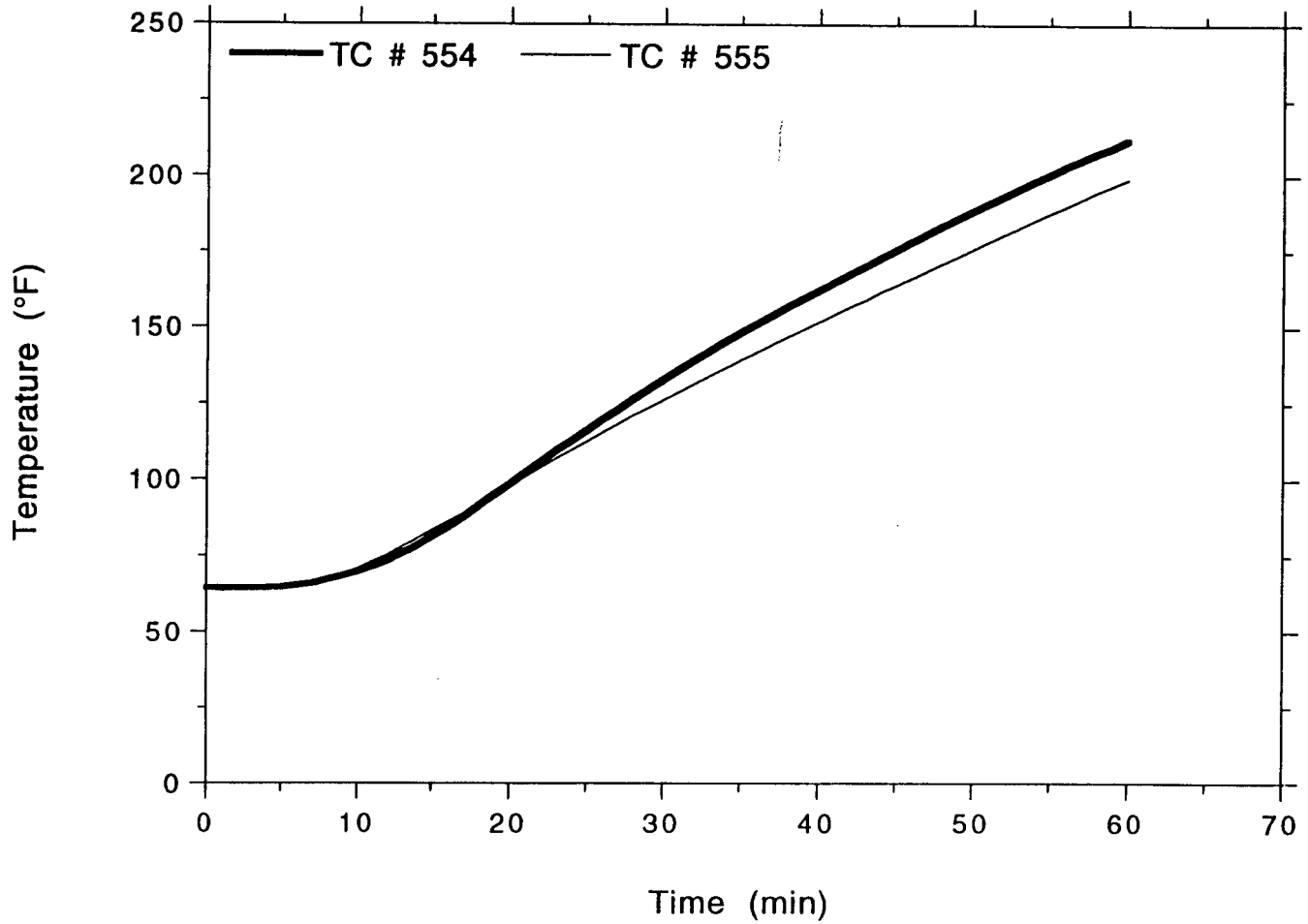
Large Unistrut Support System



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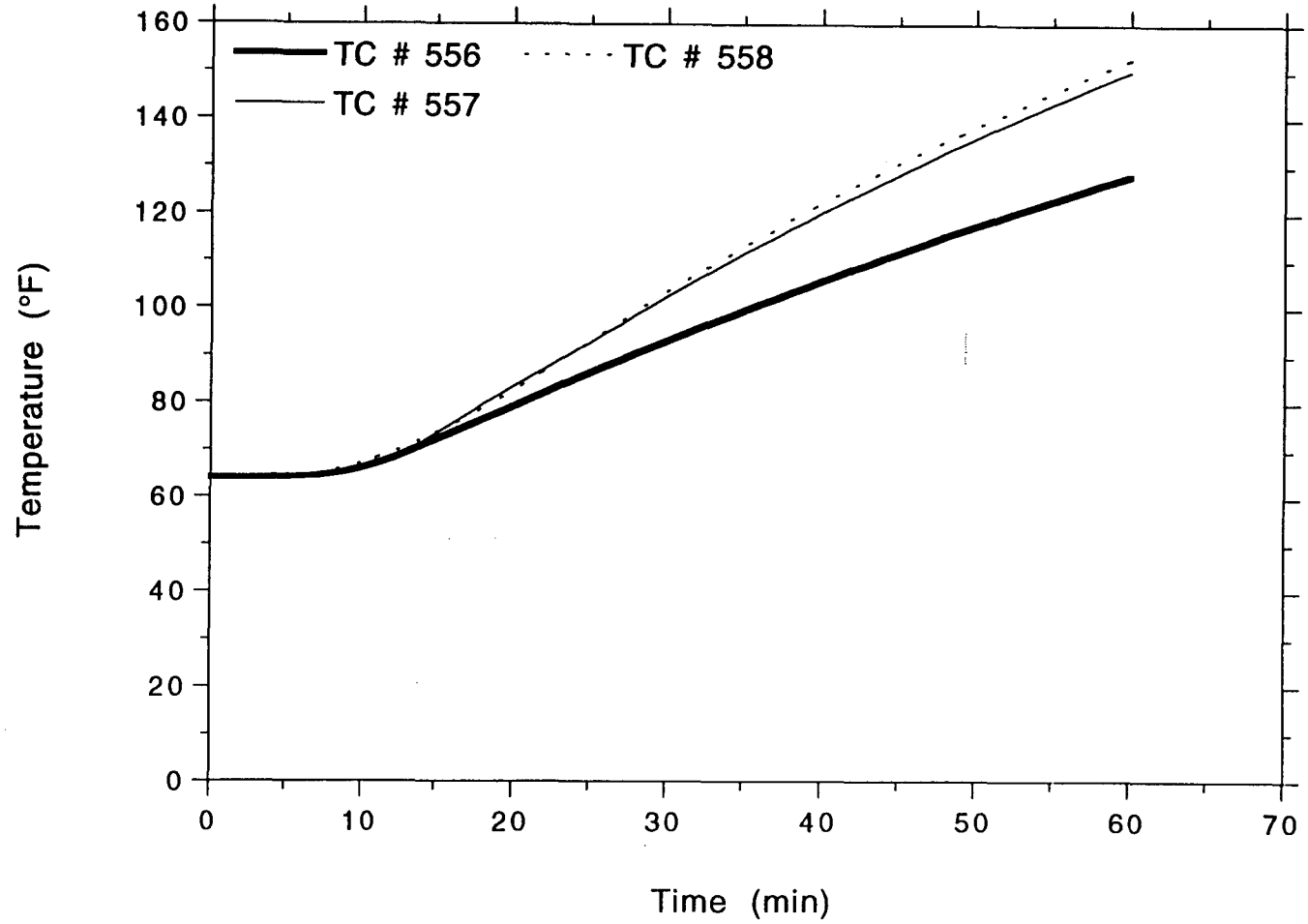
Small Unistrut Support System



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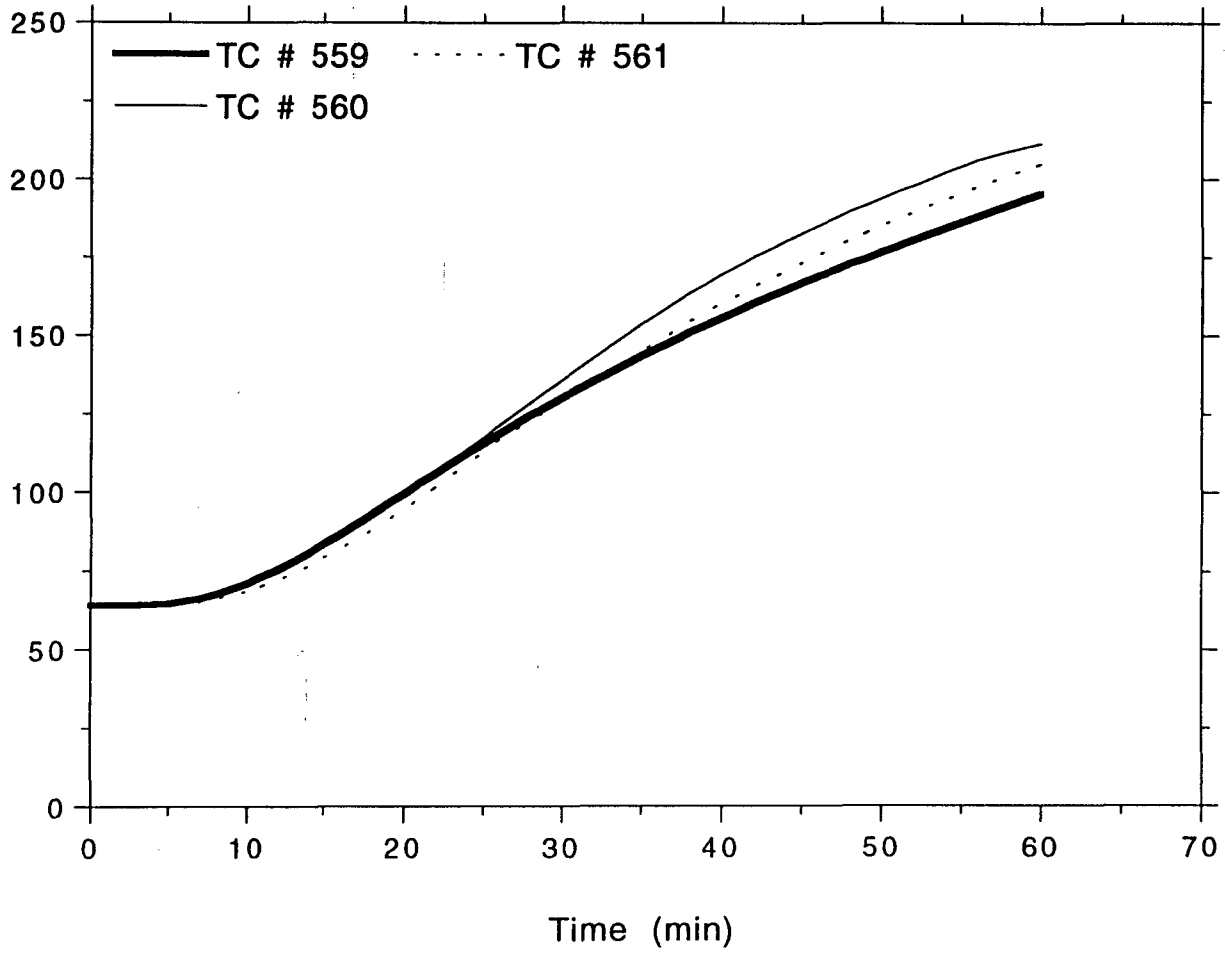
Small Unistrut Support System



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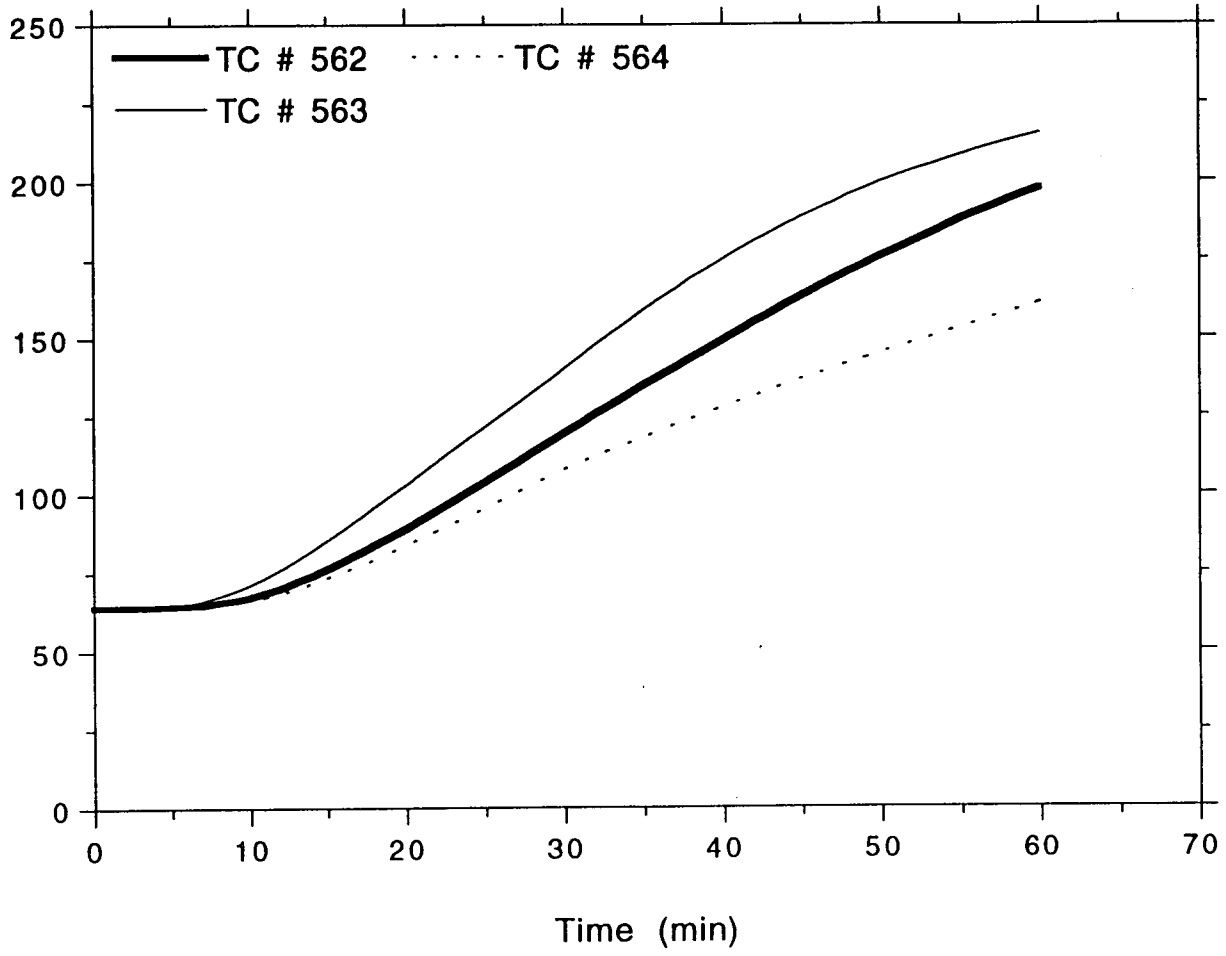
Small Unistrut Support System



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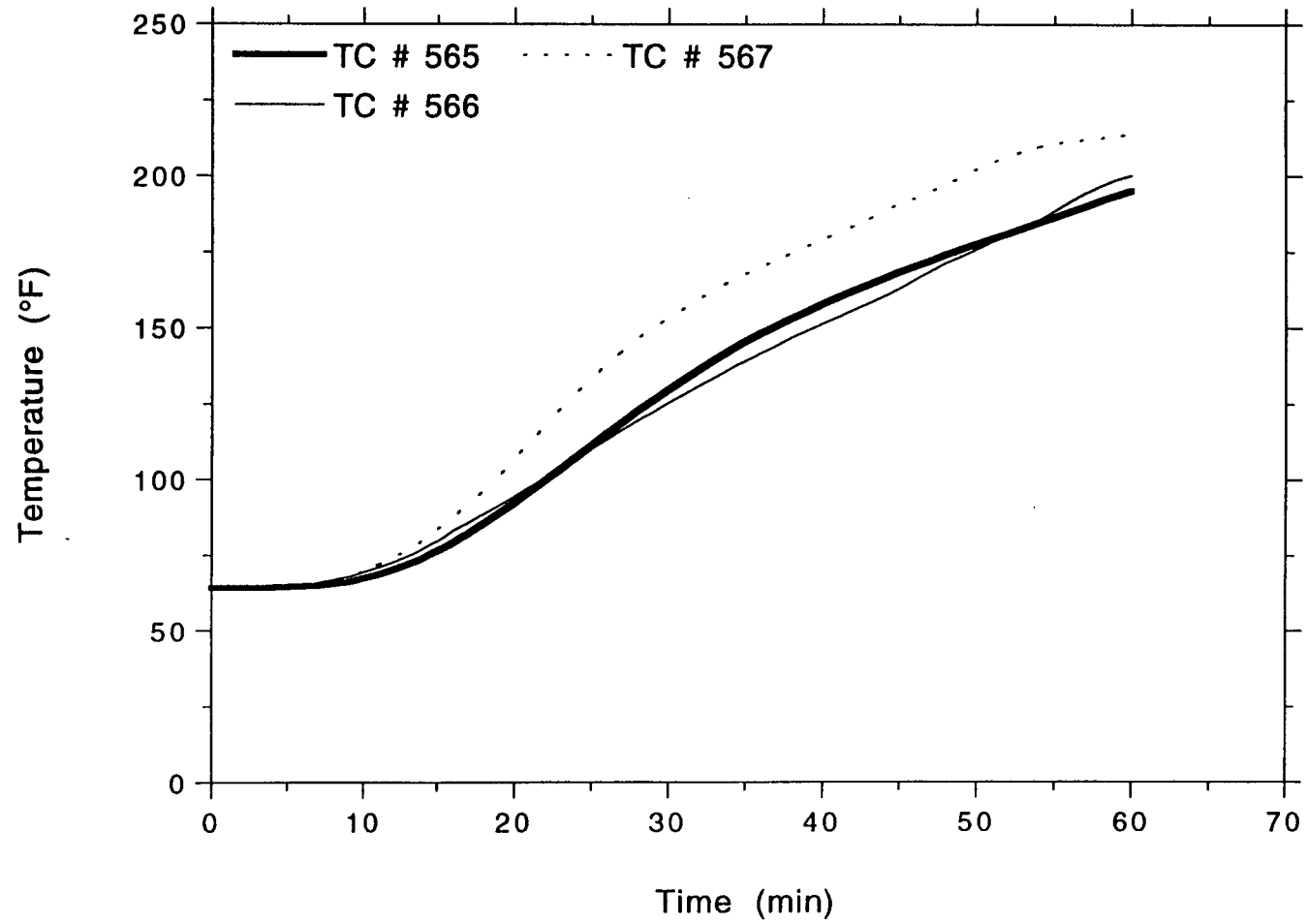

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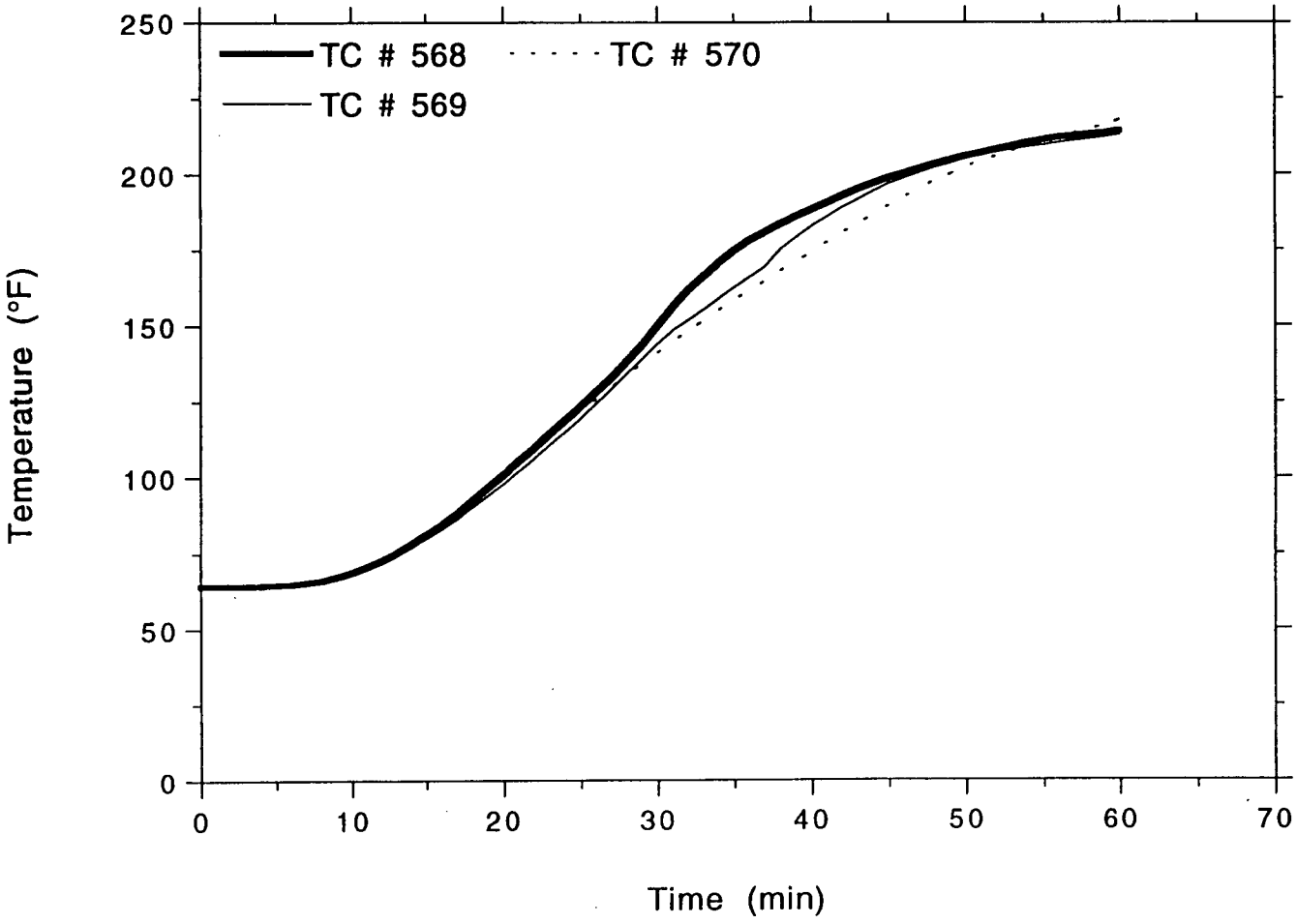
Small Unistrut Support System



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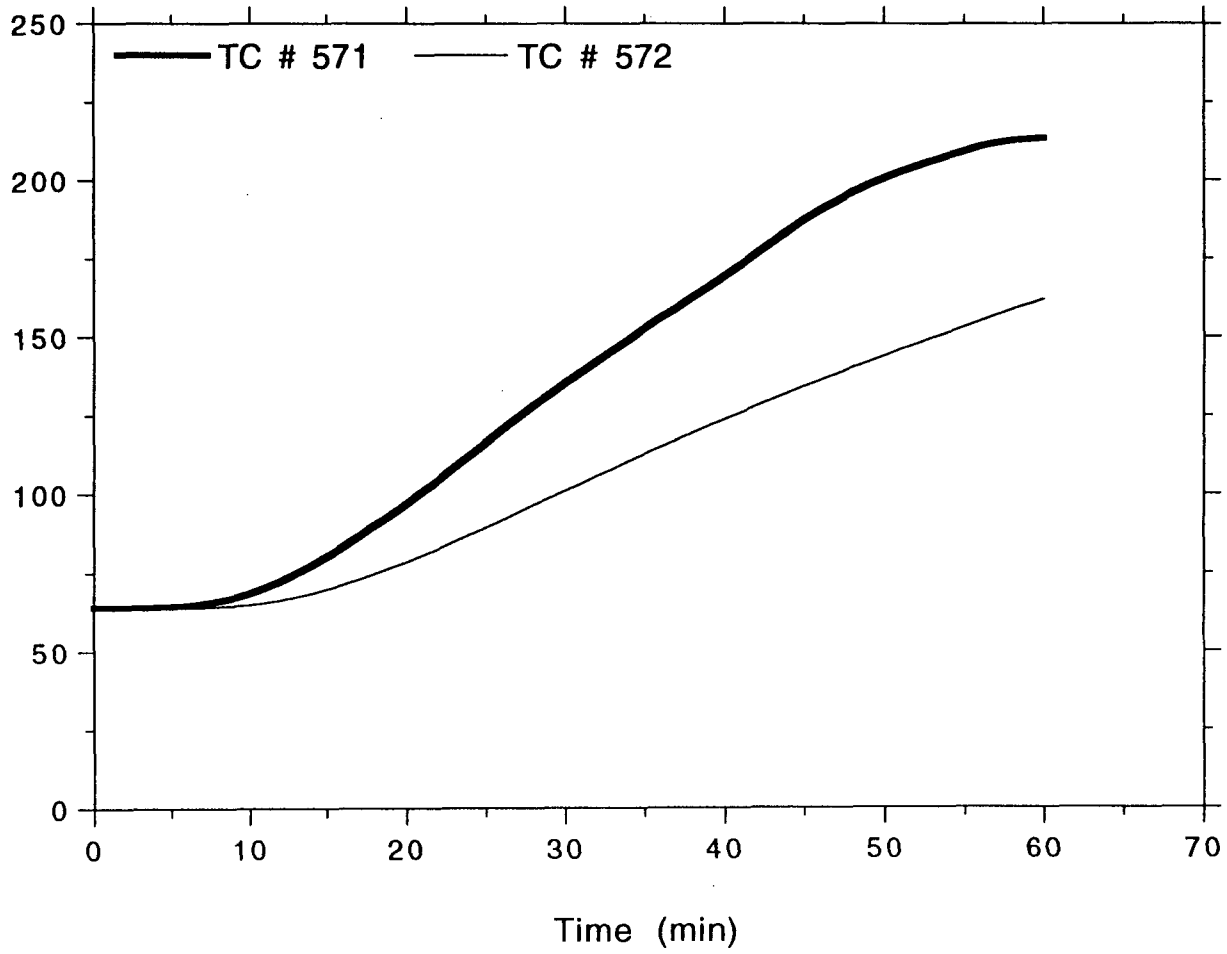

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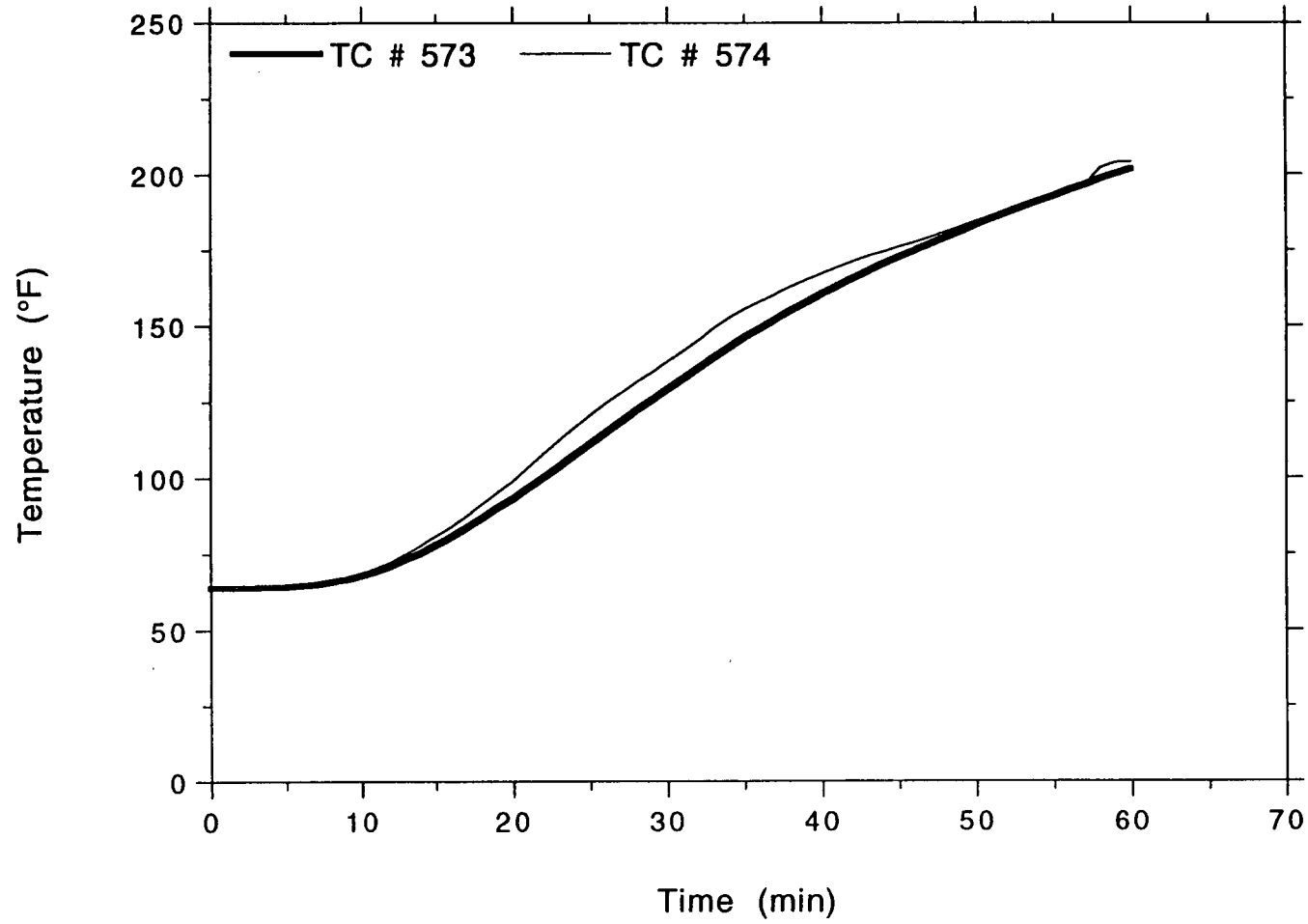

OMEGA POINT LABORATORIES

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 12/23/94 (2)

9501120202

FIRE ENDURANCE TEST OF THERMO-LAG® 330-1 FIRE PROTECTIVE ENVELOPES (Two Sided Multiple Conduit Enclosures and Cable Tray Support Systems)

Project No. 11960-97257
(Volume 2 of 2)

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

December 2, 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

Report No. 11960-97257
TVA / Thermal Science, Inc.

December 2, 1994
Volume 2 of 2

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(VOLUME 2 OF 2)

Appendix D

TEST DATA (continued)

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	Lower Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Lower Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
0	69	68	70
1	69	68	70
2	69	68	70
3	69	68	70
4	69	68	70
5	69	68	72
6	69	68	74
7	70	68	77
8	70	68	81
9	72	69	85
10	73	69	90
11	75	69	95
12	77	70	100
13	80	70	106
14	82	71	111
15	85	71	116
16	88	72	120
17	91	73	125
18	93	73	130
19	96	74	135
20	99	75	139
21	102	77	143
22	105	78	147
23	108	79	151
24	111	80	155
25	114	82	159
26	117	83	163
27	120	84	167
28	123	86	170
29	126	87	174
30	129	89	178
31	132	90	181
32	135	92	185
33	138	94	188
34	141	95	192
35	144	97	196
36	146	98	198
37	149	100	201
38	152	102	204

Time (min)	Lower Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Lower Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
39	154	103	207
40	157	105	209
41	159	106	211
42	162	108	212
43	164	110	214
44	167	111	214
45	169	113	215
46	171	115	216
47	173	116	217
48	175	118	217
49	176	120	218
50	178	121	219
51	180	123	220
52	182	125	221
53	183	126	223
54	185	128	224
55	187	130	225
56	188	131	226
57	190	133	228
58	191	135	230
59	193	137	232
60	195	138	234
Max Temp:	195	138	234
Max Allowed:	395	318	396

Time (min)	Lower Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Lower Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
0	70	71	66
1	70	71	66
2	70	71	66
3	70	71	67
4	70	71	67
5	71	71	67
6	73	71	67
7	75	71	67
8	78	72	67
9	81	72	67
10	85	73	67
11	89	74	68
12	93	75	68
13	98	77	69
14	102	79	69
15	106	81	70
16	110	82	71
17	114	85	72
18	118	87	73
19	122	90	75
20	126	92	76
21	130	95	77
22	133	98	79
23	137	100	80
24	141	103	81
25	144	106	83
26	148	108	85
27	151	111	86
28	154	114	88
29	158	117	89
30	162	119	90
31	165	122	92
32	168	125	93
33	171	127	95
34	174	130	97
35	178	133	98
36	181	136	100
37	184	138	102
38	187	141	103

Time (min)	Lower Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Lower Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
39	191	144	105
40	193	146	106
41	195	149	108
42	197	151	110
43	199	154	112
44	200	156	113
45	202	159	115
46	203	161	117
47	204	163	118
48	205	166	120
49	207	168	122
50	208	170	124
51	209	172	126
52	210	174	127
53	212	176	129
54	213	178	131
55	214	179	133
56	216	181	134
57	217	183	136
58	219	185	138
59	221	187	140
60	222	188	142
Max Temp:	222	188	142
Max Allowed:	320	397	316

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Time (min)	Lower-Mid Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Lower-Mid Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower-Mid Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
0	69	66	61
1	69	66	62
2	69	66	62
3	69	66	62
4	69	66	63
5	69	66	65
6	69	66	67
7	70	66	71
8	71	67	75
9	72	67	79
10	73	67	84
11	75	67	89
12	77	68	94
13	79	68	99
14	81	69	104
15	84	69	109
16	86	70	114
17	89	70	118
18	92	71	123
19	95	72	128
20	98	73	132
21	101	74	137
22	104	75	141
23	107	76	145
24	110	77	150
25	113	79	154
26	117	80	158
27	120	81	162
28	123	83	166
29	126	84	170
30	129	86	174
31	132	87	178
32	135	89	181
33	138	91	185
34	141	92	189
35	144	94	192
36	147	96	196
37	150	97	199
38	153	99	201

OMEGA POINT LABORATORIES

Time (min)	Lower-Mid Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Lower-Mid Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower-Mid Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
39	156	101	204
40	158	102	206
41	161	104	207
42	164	106	209
43	167	107	210
44	169	109	211
45	172	111	212
46	174	112	213
47	176	114	214
48	178	115	215
49	180	117	216
50	182	119	218
51	184	120	219
52	186	122	221
53	188	124	223
54	190	125	225
55	191	127	226
56	193	129	229
57	195	130	231
58	196	132	233
59	198	133	235
60	199	135	237
Max Temp:	199	135	237
Max Allowed:	395	316	387

Time (min)	Lower-Mid Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower-Mid Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Lower-Mid Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
0	61	62	60
1	61	62	60
2	61	62	60
3	61	62	60
4	62	62	61
5	64	63	61
6	65	63	61
7	68	63	61
8	71	63	61
9	74	63	62
10	78	64	62
11	81	65	62
12	85	66	63
13	89	67	63
14	93	69	64
15	97	70	65
16	101	72	66
17	105	74	67
18	109	76	68
19	113	79	69
20	117	81	70
21	121	83	71
22	125	86	73
23	129	88	74
24	133	91	75
25	137	94	77
26	141	96	79
27	145	99	80
28	148	102	82
29	152	104	83
30	156	107	85
31	159	110	86
32	163	112	88
33	166	115	90
34	170	118	91
35	173	121	93
36	177	123	95
37	180	126	96
38	183	129	98

Time (min)	Lower-Mid Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower-Mid Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Lower-Mid Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
39	186	131	100
40	189	134	101
41	191	137	103
42	193	139	104
43	195	142	106
44	197	145	108
45	198	147	109
46	200	150	111
47	202	152	112
48	203	155	114
49	204	157	116
50	206	160	118
51	207	162	119
52	208	164	121
53	210	166	123
54	211	168	124
55	212	170	126
56	213	172	128
57	215	174	130
58	216	176	132
59	218	178	133
60	219	180	135
Max Temp:	219	180	135
Max Allowed:	311	388	310

Time (min)	Upper-Mid Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Upper-Mid Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Upper-Mid Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
0	69	67	65
1	69	67	65
2	69	67	65
3	69	67	65
4	70	67	65
5	70	67	66
6	70	67	68
7	70	67	70
8	70	67	73
9	70	67	77
10	70	67	81
11	71	67	85
12	72	68	90
13	74	68	95
14	76	68	100
15	78	69	104
16	80	69	109
17	83	70	114
18	85	71	119
19	88	72	123
20	91	72	128
21	93	73	132
22	96	74	136
23	99	76	140
24	102	77	144
25	105	78	148
26	108	79	152
27	111	81	156
28	114	82	159
29	117	83	163
30	120	85	166
31	122	87	170
32	125	88	173
33	128	90	176
34	131	91	179
35	134	93	182
36	136	95	185
37	139	96	188
38	142	98	190

Time (min)	Upper-Mid Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Upper-Mid Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Upper-Mid Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
39	145	99	193
40	147	101	195
41	150	103	197
42	152	104	199
43	154	106	202
44	157	108	204
45	159	109	206
46	162	111	207
47	164	112	209
48	166	114	210
49	168	116	211
50	170	117	212
51	172	119	212
52	174	121	213
53	175	123	214
54	177	124	215
55	179	126	216
56	181	128	217
57	182	129	219
58	184	131	220
59	186	133	221
60	187	135	223
Max Temp:	187	135	223
Max Allowed:	395	317	391

Time (min)	Upper-Mid Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Upper-Mid Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper-Mid Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
0	65	65	65
1	65	65	65
2	65	65	65
3	65	65	65
4	65	65	65
5	66	65	65
6	67	66	65
7	69	66	65
8	71	66	65
9	74	66	65
10	77	67	66
11	80	68	66
12	83	68	66
13	87	70	66
14	91	71	67
15	95	72	68
16	99	74	69
17	102	75	70
18	106	77	71
19	110	80	72
20	114	82	73
21	118	84	74
22	122	86	75
23	125	89	77
24	129	91	78
25	132	94	80
26	136	97	81
27	140	99	83
28	143	102	84
29	146	104	86
30	149	107	87
31	153	109	89
32	156	112	90
33	158	115	92
34	161	117	93
35	164	120	95
36	167	122	97
37	170	125	98
38	172	127	100

Time (min)	Upper-Mid Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Upper-Mid Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper-Mid Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
39	175	130	101
40	177	132	103
41	179	135	104
42	182	137	106
43	184	139	107
44	186	142	109
45	189	144	111
46	190	147	112
47	192	149	114
48	194	152	116
49	195	154	117
50	197	156	119
51	198	159	121
52	200	161	122
53	201	163	124
54	202	165	126
55	204	167	128
56	205	170	130
57	207	172	131
58	208	174	133
59	210	176	135
60	212	178	137
Max Temp:	212	178	137
Max Allowed:	315	391	315

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	Upper Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Upper Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Upper Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
0	70	69	66
1	70	69	66
2	70	69	66
3	70	69	66
4	70	69	66
5	70	69	68
6	70	69	69
7	70	69	72
8	71	69	75
9	72	69	79
10	74	70	83
11	76	70	88
12	78	70	92
13	80	71	97
14	83	71	102
15	85	72	106
16	88	73	111
17	91	73	115
18	95	74	120
19	98	75	124
20	101	76	129
21	104	77	133
22	108	79	137
23	111	80	141
24	114	81	145
25	118	83	149
26	121	84	153
27	124	85	157
28	127	87	161
29	131	88	165
30	134	90	170
31	138	92	174
32	141	93	178
33	144	95	181
34	148	97	185
35	151	98	189
36	154	100	192
37	157	102	196
38	160	103	199

Time (min)	Upper Rear 4" Aluminum Conduit Bare #8 Max. (°F)	Upper Rear 4" Aluminum Conduit Bare #8 Avg. (°F)	Upper Rear 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
39	163	105	202
40	166	107	205
41	169	108	207
42	172	110	209
43	174	112	211
44	177	113	213
45	180	115	213
46	182	117	214
47	184	119	214
48	186	120	214
49	188	122	215
50	190	124	215
51	192	126	215
52	193	127	216
53	195	129	216
54	196	131	217
55	198	132	218
56	199	134	219
57	200	136	220
58	202	138	221
59	203	139	223
60	204	141	225
Max Temp:	204	141	225
Max Allowed:	396	319	392

Time (min)	Upper Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Upper Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
0	65	68	67
1	65	68	67
2	65	68	67
3	65	68	67
4	66	68	67
5	67	68	67
6	68	68	67
7	71	68	67
8	73	68	67
9	76	68	67
10	79	68	67
11	82	69	68
12	86	70	68
13	90	71	69
14	94	72	69
15	97	74	70
16	101	75	71
17	105	77	72
18	109	79	73
19	113	81	74
20	117	84	76
21	120	86	77
22	124	88	78
23	127	91	80
24	131	93	81
25	135	96	83
26	138	98	84
27	142	101	86
28	145	103	87
29	149	106	89
30	153	108	90
31	156	111	92
32	160	113	93
33	163	116	95
34	167	118	96
35	170	121	98
36	173	124	99
37	177	126	101
38	180	129	103

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Time (min)	Upper Rear 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Upper Rear 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper Rear 4" Al. Conduit Surface Avg. (Box Section) (°F)
39	183	131	104
40	186	134	106
41	189	136	107
42	191	139	109
43	194	142	111
44	197	144	113
45	200	147	114
46	202	149	116
47	203	152	118
48	204	154	120
49	205	157	121
50	206	159	123
51	206	161	125
52	207	164	127
53	207	166	129
54	208	168	131
55	209	170	133
56	210	172	134
57	211	174	136
58	212	176	138
59	213	178	140
60	214	180	142
Max Temp:	214	180	142
Max Allowed:	315	394	317

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Time (min)	Lower Front 4" Aluminum Conduit Bare #8 Max. (°F)	Lower Front 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
0	71	70	67
1	71	70	67
2	71	70	67
3	71	70	67
4	71	70	68
5	71	70	69
6	71	70	71
7	72	70	74
8	72	70	77
9	73	70	81
10	73	70	86
11	75	71	90
12	76	71	95
13	77	71	100
14	79	72	105
15	81	72	110
16	83	73	114
17	85	73	119
18	87	74	124
19	89	75	128
20	92	76	132
21	94	77	137
22	97	78	141
23	99	79	145
24	102	80	149
25	104	81	153
26	107	82	156
27	110	84	160
28	112	85	163
29	115	86	167
30	118	88	171
31	120	89	174
32	123	91	178
33	126	92	182
34	128	94	185
35	131	95	189
36	134	97	192
37	136	99	196
38	139	100	199

Time (min)	Lower Front 4" Aluminum Conduit Bare #8 Max. (°F)	Lower Front 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
39	142	102	204
40	144	103	208
41	147	105	210
42	149	107	211
43	152	108	212
44	154	110	213
45	157	111	214
46	159	113	214
47	162	115	215
48	163	116	215
49	165	118	216
50	167	119	216
51	169	121	216
52	171	123	217
53	172	124	218
54	174	126	219
55	176	127	221
56	177	129	222
57	178	130	224
58	180	132	226
59	181	133	228
60	183	135	230
Max Temp:	183	135	230
Max Allowed:	397	320	393

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Time (min)	Lower Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower Front 4" Al. Conduit Surface Max. (Box Section) (°F)	Lower Front 4" Al. Conduit Surface Avg. (Box Section) (°F)
0	67	68	66
1	67	68	66
2	67	68	66
3	67	68	66
4	68	68	66
5	68	68	66
6	70	68	66
7	72	68	66
8	74	68	66
9	77	68	67
10	80	69	67
11	84	69	67
12	87	70	67
13	91	71	68
14	95	72	68
15	99	74	69
16	103	75	70
17	106	77	70
18	110	79	71
19	114	81	72
20	118	83	73
21	122	85	75
22	125	88	76
23	129	90	77
24	133	92	79
25	136	95	80
26	140	97	81
27	143	99	82
28	146	102	84
29	150	104	85
30	153	107	87
31	156	109	88
32	159	111	90
33	163	114	91
34	166	116	93
35	169	119	94
36	172	121	96
37	176	124	97
38	179	126	99

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Time (min)	Lower Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower Front 4" Al. Conduit Surface Max. (Box Section) (°F)	Lower Front 4" Al. Conduit Surface Avg. (Box Section) (°F)
39	182	129	100
40	185	131	102
41	188	134	103
42	190	136	105
43	192	138	106
44	195	141	108
45	197	144	109
46	199	146	111
47	200	149	112
48	201	151	114
49	202	153	115
50	203	156	117
51	204	158	118
52	205	160	120
53	206	162	121
54	207	164	123
55	208	166	124
56	209	168	126
57	210	169	128
58	212	171	129
59	213	173	131
60	215	175	132
Max Temp:	215	175	132
Max Allowed:	317	394	316

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Time (min)	Lower-Mid Front 4" Aluminum Conduit Bare #8 Max. (°F)	Lower-Mid Front 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower-Mid Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
0	70	67	65
1	70	67	65
2	70	67	65
3	70	67	65
4	70	67	66
5	70	67	67
6	71	67	68
7	71	68	71
8	72	68	74
9	73	68	77
10	75	68	81
11	77	68	85
12	79	69	90
13	81	69	95
14	83	69	99
15	86	70	104
16	89	70	108
17	92	71	112
18	95	72	117
19	98	72	120
20	101	73	124
21	104	74	129
22	107	75	132
23	110	76	136
24	113	77	140
25	116	78	144
26	119	79	147
27	122	81	151
28	125	82	154
29	128	83	157
30	131	84	160
31	133	86	164
32	136	87	167
33	139	89	170
34	142	90	173
35	145	92	176
36	147	93	179
37	150	95	182
38	153	96	185

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Time (min)	Lower-Mid Front 4" Aluminum Conduit Bare #8 Max. (°F)	Lower-Mid Front 4" Aluminum Conduit Bare #8 Avg. (°F)	Lower-Mid Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)
39	156	98	188
40	158	100	190
41	161	101	193
42	163	103	196
43	166	104	198
44	168	106	201
45	171	108	203
46	173	109	205
47	175	111	207
48	177	112	208
49	180	114	210
50	181	115	211
51	183	117	212
52	185	118	213
53	187	119	213
54	188	121	213
55	190	122	213
56	191	124	214
57	192	125	214
58	194	126	214
59	195	128	214
60	196	129	214
Max Temp:	196	129	214
Max Allowed:	396	317	391

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Time (min)	Lower-Mid Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower-Mid Front 4" Al. Conduit Surface Max. (Box Section) (°F)
0	65	66
1	64	66
2	64	66
3	65	66
4	65	66
5	66	66
6	67	66
7	69	66
8	71	66
9	73	66
10	76	66
11	79	67
12	83	68
13	86	69
14	90	70
15	93	71
16	97	72
17	100	74
18	104	76
19	107	77
20	111	79
21	114	81
22	117	83
23	121	85
24	124	87
25	128	90
26	131	92
27	134	94
28	137	96
29	140	98
30	143	101
31	146	103
32	149	106
33	152	108
34	155	110
35	158	112
36	161	115
37	164	117
38	166	119

Time (min)	Lower-Mid Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)	Lower-Mid Front 4" Al. Conduit Surface Max. (Box Section) (°F)
39	169	122
40	171	124
41	174	126
42	176	128
43	179	131
44	181	133
45	184	135
46	186	137
47	188	140
48	190	142
49	192	144
50	194	146
51	195	148
52	197	151
53	198	153
54	200	155
55	201	157
56	202	159
57	203	161
58	204	162
59	205	164
60	206	166
Max Temp:	206	166
Max Allowed:	315	392

Time (min)	Lower-Mid Front 4" Al. Conduit Surface Avg. (Box Section) (°F)	Upper-Mid Front 4" Aluminum Conduit Bare #8 Max. (°F)	Upper-Mid Front 4" Aluminum Conduit Bare #8 Avg. (°F)
0	65	70	67
1	65	70	67
2	65	70	67
3	65	70	67
4	65	70	67
5	65	70	67
6	65	70	67
7	65	70	67
8	65	70	68
9	65	71	68
10	65	73	68
11	66	75	68
12	66	77	69
13	66	80	69
14	66	83	70
15	67	86	70
16	67	89	71
17	68	93	71
18	69	96	72
19	70	99	73
20	71	102	74
21	71	106	75
22	73	109	76
23	74	112	77
24	75	116	78
25	76	119	79
26	77	122	80
27	79	125	81
28	80	128	83
29	81	131	84
30	83	134	85
31	84	137	87
32	85	140	88
33	87	143	90
34	88	145	91
35	90	148	93
36	92	151	94
37	93	153	96
38	95	156	98

Time (min)	Lower-Mid Front 4" Al. Conduit Surface Avg. (Box Section) (°F)	Upper-Mid Front 4" Aluminum Conduit Bare #8 Max. (°F)	Upper-Mid Front 4" Aluminum Conduit Bare #8 Avg. (°F)
39	96	158	99
40	98	161	101
41	99	163	102
42	101	166	104
43	102	168	106
44	104	171	107
45	105	173	109
46	107	175	110
47	108	178	112
48	109	180	114
49	110	182	115
50	112	184	116
51	113	186	118
52	114	188	119
53	115	189	121
54	117	191	122
55	118	193	124
56	119	194	125
57	120	195	126
58	122	196	128
59	123	198	129
60	125	199	131
Max Temp:	125	199	131
Max Allowed:	315	396	317

Time (min)	Upper-Mid Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)	Upper-Mid Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)
0	64	64
1	64	64
2	64	64
3	65	65
4	65	65
5	66	66
6	68	67
7	71	69
8	74	71
9	77	73
10	81	76
11	85	79
12	90	82
13	94	86
14	98	89
15	103	92
16	108	96
17	112	100
18	116	103
19	121	107
20	125	110
21	129	114
22	133	117
23	137	121
24	141	124
25	144	127
26	148	131
27	151	133
28	154	136
29	157	139
30	161	143
31	164	145
32	166	148
33	169	151
34	172	153
35	175	156
36	177	158
37	180	161
38	183	164

Time (min)	Upper-Mid Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)	Upper-Mid Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)
39	185	166
40	188	168
41	191	171
42	193	173
43	196	176
44	198	178
45	200	180
46	202	183
47	204	186
48	206	188
49	207	190
50	209	192
51	210	194
52	211	196
53	212	198
54	212	200
55	213	201
56	213	202
57	214	204
58	215	205
59	215	206
60	216	206
Max Temp:	216	206
Max Allowed:	390	314

Time (min)	Upper-Mid Front 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper-Mid Front 4" Al. Conduit Surface Avg. (Box Section) (°F)	Upper Front 4" Aluminum Conduit Bare #8 Max. (°F)
0	65	64	70
1	65	64	70
2	65	64	70
3	65	64	70
4	65	64	70
5	65	64	70
6	65	64	70
7	65	64	70
8	65	64	70
9	65	64	71
10	65	65	72
11	66	65	73
12	67	65	75
13	68	65	76
14	69	66	78
15	70	66	79
16	71	67	81
17	73	67	83
18	74	68	85
19	76	69	88
20	78	70	90
21	80	71	92
22	82	72	95
23	84	73	97
24	86	74	100
25	88	75	103
26	90	77	105
27	93	78	108
28	95	79	110
29	97	81	113
30	100	82	116
31	102	84	118
32	104	85	121
33	106	87	124
34	109	88	126
35	111	90	129
36	113	91	131
37	116	93	133
38	118	94	136

Time (min)	Upper-Mid Front 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper-Mid Front 4" Al. Conduit Surface Avg. (Box Section) (°F)	Upper Front 4" Aluminum Conduit Bare #8 Max. (°F)
39	120	96	138
40	123	97	141
41	125	99	143
42	127	100	145
43	129	102	148
44	132	103	150
45	134	104	153
46	136	106	155
47	138	107	157
48	141	108	160
49	143	110	162
50	145	111	164
51	148	112	166
52	150	113	168
53	153	115	171
54	155	116	173
55	158	118	175
56	161	119	177
57	163	121	179
58	166	122	181
59	168	124	183
60	170	125	185
Max Temp:	170	125	185
Max Allowed:	391	314	396

OMEGA POINT LABORATORIES

Time (min)	Upper Front 4" Aluminum Conduit Bare #8 Avg. (°F)	Upper Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)	Upper Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)
0	69	64	64
1	69	64	64
2	69	64	64
3	69	65	65
4	69	65	65
5	69	67	66
6	69	68	67
7	69	71	69
8	69	73	70
9	69	76	72
10	70	80	75
11	70	83	77
12	70	87	80
13	70	91	83
14	71	95	86
15	71	99	90
16	72	103	93
17	72	107	96
18	73	111	99
19	74	115	102
20	75	119	106
21	76	123	109
22	77	127	112
23	78	130	115
24	79	134	119
25	80	138	122
26	81	141	125
27	83	145	128
28	84	148	131
29	85	151	134
30	87	154	137
31	88	157	140
32	90	160	143
33	91	163	146
34	93	166	148
35	94	169	151
36	96	172	153
37	98	174	156
38	99	177	158

Time (min)	Upper Front 4" Aluminum Conduit Bare #8 Avg. (°F)	Upper Front 4" Al. Conduit Surface Max. (Indivdual Section) (°F)	Upper Front 4" Al. Conduit Surface Avg. (Indivdual Section) (°F)
39	101	179	161
40	102	182	163
41	104	184	166
42	105	187	168
43	107	189	171
44	109	192	173
45	110	194	175
46	112	196	177
47	113	199	180
48	115	201	182
49	116	203	184
50	118	205	186
51	119	207	188
52	121	209	190
53	123	210	192
54	124	212	194
55	126	212	195
56	127	213	197
57	129	213	198
58	131	214	200
59	132	214	201
60	134	215	202
Max Temp:	134	215	202
Max Allowed:	319	390	314

Time (min)	Upper Front 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper Front 4" Al. Conduit Surface Avg. (Box Section) (°F)	Surface of Unistrit Frame Around 4" Conduits Max. (°F)
0	65	64	65
1	65	64	65
2	65	64	65
3	66	64	65
4	65	64	65
5	65	64	67
6	66	64	68
7	66	64	71
8	66	65	74
9	66	65	77
10	66	65	81
11	66	65	86
12	67	65	90
13	67	66	95
14	68	66	101
15	70	67	106
16	71	67	112
17	72	68	118
18	74	69	124
19	76	70	129
20	77	71	134
21	79	72	139
22	81	73	144
23	83	75	149
24	85	76	154
25	87	77	158
26	89	78	163
27	92	80	167
28	94	81	172
29	96	83	176
30	98	84	180
31	100	85	184
32	103	87	188
33	105	88	192
34	107	90	195
35	109	91	199
36	112	93	202
37	114	94	205
38	116	96	208

Time (min)	Upper Front 4" Al. Conduit Surface Max. (Box Section) (°F)	Upper Front 4" Al. Conduit Surface Avg. (Box Section) (°F)	Surface of Unistrit Frame Around 4" Conduits Max. (°F)
39	119	97	211
40	121	99	213
41	123	100	215
42	125	102	216
43	128	103	219
44	130	104	221
45	132	106	223
46	134	107	226
47	137	108	229
48	139	110	233
49	141	111	236
50	143	113	240
51	146	114	244
52	148	116	248
53	150	118	252
54	152	119	257
55	155	121	261
56	157	122	266
57	159	124	270
58	161	126	275
59	163	127	280
60	166	129	284
Max Temp:	166	129	284
Max Allowed:	391	314	391

Time (min)	Surface of Unistrit Frame Around 4" Conduits Avg. (°F)	Front 1" Steel Conduit Bare #8 Max. (°F)	Front 1" Steel Conduit Bare #8 Avg. (°F)
0	65	69	68
1	65	69	68
2	65	69	68
3	65	69	68
4	65	69	68
5	65	69	68
6	66	70	68
7	67	69	68
8	69	70	68
9	70	70	68
10	73	70	69
11	75	70	69
12	78	71	69
13	81	72	69
14	84	73	70
15	88	74	70
16	92	75	71
17	96	77	71
18	100	79	72
19	103	81	73
20	107	83	74
21	111	86	75
22	115	88	76
23	119	91	77
24	123	94	78
25	127	97	80
26	131	100	81
27	134	103	83
28	138	107	84
29	141	110	86
30	145	113	88
31	148	117	89
32	152	120	91
33	155	123	93
34	158	127	94
35	161	130	96
36	164	133	98
37	167	136	100
38	170	140	102

Time (min)	Surface of Unistrit Frame Around 4" Conduits Avg. (°F)	Front 1" Steel Conduit Bare #8 Max. (°F)	Front 1" Steel Conduit Bare #8 Avg. (°F)
39	172	143	103
40	175	146	105
41	178	150	107
42	180	153	109
43	182	157	111
44	185	160	113
45	187	164	115
46	189	167	117
47	191	171	119
48	193	174	121
49	196	177	123
50	198	180	125
51	200	183	127
52	202	187	129
53	205	189	131
54	207	192	133
55	210	194	135
56	212	196	137
57	215	198	139
58	217	200	141
59	220	202	143
60	223	203	145
Max Temp:	223	203	145
Max Allowed:	315	395	318

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Time (min)	Front 1" Steel. Conduit Surface Max. (Indivdual Section) (°F)	Front 1" Steel. Conduit Surface Avg. (Indivdual Section) (°F)	Front 1" Steel. Conduit Surface Max. (Box Section) (°F)
0	65	65	65
1	65	65	65
2	65	65	65
3	65	65	65
4	65	65	65
5	65	65	65
6	65	65	65
7	66	66	65
8	66	66	65
9	67	66	65
10	67	67	66
11	69	68	66
12	70	69	67
13	72	70	68
14	74	72	69
15	76	74	70
16	79	76	72
17	82	78	73
18	85	81	75
19	88	83	76
20	92	86	78
21	95	89	80
22	99	92	82
23	102	95	84
24	106	98	86
25	110	101	87
26	114	105	89
27	118	108	91
28	122	111	93
29	126	115	94
30	130	118	96
31	134	121	98
32	137	124	100
33	141	128	102
34	145	131	104
35	148	134	106
36	152	137	108
37	155	140	110
38	159	143	112

OMEGA POINT LABORATORIES

Time (min)	Front 1" Steel. Conduit Surface Max. (Indivdual Section) (°F)	Front 1" Steel. Conduit Surface Avg. (Indivdual Section) (°F)	Front 1" Steel. Conduit Surface Max. (Box Section) (°F)
39	162	146	114
40	166	150	116
41	170	153	118
42	173	156	120
43	177	159	122
44	181	162	124
45	185	165	127
46	189	169	129
47	193	172	131
48	196	175	134
49	199	178	136
50	202	180	138
51	206	184	141
52	209	186	143
53	211	189	146
54	213	191	148
55	214	194	151
56	215	197	154
57	216	200	156
58	217	202	159
59	218	203	162
60	218	205	164
Max Temp:	218	205	164
Max Allowed:	391	315	391

Time (min)	Front 1" Steel. Conduit Surface Avg. (Box Section) (°F)	Rear 1" Steel Conduit Bare #8 Max. (°F)	Rear 1" Steel Conduit Bare #8 Avg. (°F)
0	64	70	69
1	64	70	69
2	64	70	69
3	64	70	69
4	64	70	69
5	64	70	69
6	64	70	69
7	64	70	69
8	64	70	69
9	65	70	69
10	65	70	69
11	65	70	69
12	66	70	69
13	67	70	70
14	67	71	70
15	68	73	70
16	69	74	71
17	70	75	72
18	71	77	72
19	73	79	73
20	74	82	74
21	76	84	75
22	77	86	76
23	79	89	78
24	80	92	79
25	82	95	80
26	83	97	82
27	85	100	83
28	86	104	85
29	88	107	86
30	89	110	88
31	91	113	89
32	92	116	91
33	94	120	93
34	95	123	94
35	97	126	96
36	98	129	97
37	100	133	99
38	102	136	100

Time (min)	Front 1" Steel. Conduit Surface Avg. (Box Section) (°F)	Rear 1" Steel Conduit Bare #8 Max. (°F)	Rear 1" Steel Conduit Bare #8 Avg. (°F)
39	103	139	102
40	105	142	104
41	107	145	105
42	109	149	107
43	111	152	109
44	112	155	110
45	114	158	112
46	116	162	114
47	118	165	116
48	120	169	118
49	122	172	120
50	123	176	121
51	125	179	123
52	127	182	125
53	129	185	127
54	131	188	129
55	133	191	131
56	135	194	133
57	137	196	135
58	139	198	137
59	141	200	139
60	143	202	140
Max Temp:	143	202	140
Max Allowed:	314	396	319

Time (min)	Rear 1" Steel. Conduit Surface Max. (Indivdual Section) (°F)	Rear 1" Steel. Conduit Surface Avg. (Indivdual Section) (°F)	Rear 1" Steel. Conduit Surface Max. (Box Section) (°F)
0	64	64	65
1	64	64	65
2	64	64	65
3	64	64	65
4	64	64	65
5	64	64	65
6	65	64	65
7	65	65	65
8	65	65	65
9	66	65	65
10	66	66	65
11	67	66	65
12	69	68	66
13	70	69	66
14	72	70	67
15	74	72	68
16	77	74	69
17	79	76	70
18	82	79	72
19	85	81	73
20	88	83	75
21	91	86	77
22	95	89	78
23	98	92	80
24	102	94	82
25	105	97	84
26	109	100	86
27	112	103	87
28	116	106	89
29	120	110	91
30	123	112	92
31	127	116	94
32	131	119	95
33	134	122	97
34	138	125	98
35	142	129	100
36	145	132	101
37	149	135	103
38	152	138	104

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Time (min)	Rear 1" Steel. Conduit Surface Max. (Indivdual Section) (°F)	Rear 1" Steel. Conduit Surface Avg. (Indivdual Section) (°F)	Rear 1" Steel. Conduit Surface Max. (Box Section) (°F)
39	156	141	106
40	159	144	108
41	163	148	110
42	167	151	112
43	170	154	114
44	174	158	116
45	177	161	118
46	181	164	120
47	184	168	122
48	188	171	124
49	191	174	126
50	194	178	129
51	197	181	131
52	200	184	133
53	203	186	136
54	206	189	138
55	209	192	141
56	212	194	143
57	214	197	145
58	215	199	148
59	216	201	150
60	217	203	152
Max Temp:	217	203	152
Max Allowed:	390	314	391

OMEGA POINT LABORATORIES

Time (min)	Rear 1" Steel. Conduit Surface Avg. (Box Section) (°F)	Surface of Unistrit Frame Around 1" Conduits Max. (°F)	Surface of Unistrit Frame Around 1" Conduits Avg. (°F)
0	64	64	64
1	64	64	64
2	64	64	64
3	64	64	64
4	64	64	64
5	64	65	64
6	64	65	65
7	64	66	65
8	64	68	66
9	65	69	67
10	65	71	68
11	65	74	70
12	65	76	72
13	66	79	74
14	67	82	76
15	67	85	78
16	68	89	81
17	69	92	84
18	70	96	87
19	71	101	90
20	73	107	93
21	74	112	97
22	75	118	100
23	77	123	103
24	78	129	107
25	80	133	110
26	81	138	114
27	83	142	117
28	84	147	120
29	86	150	124
30	87	153	127
31	88	157	130
32	90	162	133
33	91	166	136
34	92	171	139
35	94	175	142
36	95	178	144
37	96	181	147
38	97	183	150

Time (min)	Rear 1" Steel. Conduit Surface Avg. (Box Section) (°F)	Surface of Unistrit Frame Around 1" Conduits Max. (°F)	Surface of Unistrit Frame Around 1" Conduits Avg. (°F)
39	99	186	152
40	100	188	155
41	102	190	157
42	103	193	160
43	105	195	162
44	106	197	164
45	108	199	166
46	110	200	168
47	111	202	170
48	113	203	172
49	115	205	174
50	117	206	176
51	118	207	178
52	120	208	180
53	122	209	181
54	123	210	183
55	125	211	185
56	127	212	186
57	129	214	188
58	131	215	190
59	133	216	191
60	135	218	192
Max Temp:	135	218	192
Max Allowed:	314	390	314

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)
0	69	68	68	68	69	69	68	68
1	69	68	68	68	69	69	68	68
2	69	69	68	68	69	69	68	68
3	69	68	68	68	69	69	68	68
4	69	69	68	68	69	69	68	68
5	69	69	68	68	69	69	68	68
6	69	69	69	68	69	69	68	68
7	69	70	69	69	69	69	68	68
8	70	70	70	70	69	69	68	68
9	70	72	70	72	69	69	68	68
10	72	73	71	73	70	69	68	68
11	73	75	73	75	70	69	69	68
12	74	77	74	77	71	70	69	68
13	76	79	76	80	72	70	69	69
14	78	81	77	82	73	71	69	69
15	80	84	79	85	74	71	70	69
16	82	87	82	88	75	72	70	70
17	85	89	84	91	76	73	71	70
18	87	92	86	93	78	74	72	71
19	90	95	88	96	80	75	73	72
20	92	98	91	99	81	76	74	73
21	95	101	93	102	83	78	75	74
22	98	104	96	105	85	80	76	75
23	100	107	99	108	87	81	78	76
24	103	110	102	111	89	83	79	77
25	106	113	104	114	92	84	81	79
26	108	116	107	117	94	86	82	80
27	111	119	110	120	96	88	84	82
28	114	122	112	123	99	90	86	83
29	117	124	115	126	101	92	88	85
30	119	127	118	129	103	94	89	86
31	122	131	121	132	106	96	91	88
32	125	133	123	135	108	98	93	90
33	127	136	126	138	110	100	95	91
34	130	139	129	141	113	102	96	93
35	132	142	131	144	115	104	98	94
36	135	145	134	146	118	107	100	96
37	137	147	136	149	120	109	102	98
38	140	150	139	152	122	111	104	99
39	142	153	142	154	125	113	106	101
40	145	155	144	157	127	115	108	103

OMEGA POINT LABORATORIES

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)
41	147	158	147	159	129	117	110	105
42	150	160	149	162	132	120	112	107
43	152	163	151	164	134	122	114	109
44	154	165	154	167	136	124	116	110
45	156	167	156	169	139	126	118	112
46	158	169	158	171	141	128	120	114
47	160	171	160	173	143	131	122	116
48	162	173	162	175	146	133	124	118
49	164	175	164	176	148	135	127	120
50	166	177	166	178	150	137	129	122
51	167	178	168	180	152	140	131	124
52	169	180	170	182	154	142	133	126
53	171	182	172	183	156	144	135	128
54	172	183	174	185	158	146	137	131
55	174	185	176	187	160	148	139	133
56	176	187	178	188	162	150	142	135
57	177	188	179	190	164	153	144	137
58	179	190	181	191	166	155	146	139
59	180	191	183	193	168	157	148	141
60	182	193	185	195	170	159	150	144
Max Temp:	182	193	185	195	170	159	150	144
Max Allowed:	394	393	393	393	394	394	393	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 9 (°F)	TC # 10 (°F)	TC # 11 (°F)	TC # 12 (°F)	TC # 13 (°F)	TC # 14 (°F)	TC # 15 (°F)
0	67	68	68	67	68	68	68
1	67	68	68	67	68	68	68
2	67	68	68	67	68	68	68
3	67	68	68	67	68	68	68
4	67	68	68	67	68	68	68
5	67	68	68	67	68	68	68
6	67	68	68	67	68	68	68
7	67	68	68	68	68	68	68
8	68	68	68	67	68	68	68
9	68	68	68	67	68	68	68
10	68	68	68	68	68	68	68
11	68	68	68	68	68	68	68
12	68	68	68	68	68	68	68
13	68	68	68	68	68	68	68
14	68	68	68	68	69	68	68
15	68	69	68	68	69	68	69
16	69	69	69	69	69	68	69
17	69	70	69	69	69	69	69
18	70	70	70	70	70	69	70
19	70	71	70	70	70	70	70
20	71	71	71	71	71	70	71
21	72	72	72	72	72	71	71
22	73	73	73	73	72	72	72
23	74	74	74	73	73	73	73
24	76	76	75	74	74	73	74
25	77	77	76	75	75	74	75
26	78	78	77	77	76	75	76
27	80	79	79	78	77	77	77
28	81	81	80	79	78	78	78
29	82	82	81	80	79	79	79
30	84	84	82	81	81	80	80
31	85	85	84	83	82	81	81
32	87	86	85	84	83	82	83
33	88	88	87	85	84	84	84
34	90	89	88	87	86	85	85
35	91	90	89	88	87	86	86
36	93	92	91	89	88	88	88
37	94	93	92	91	90	89	89
38	96	95	93	92	91	90	90
39	98	96	95	94	93	92	92
40	99	98	97	95	94	93	93

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 9 (°F)	TC # 10 (°F)	TC # 11 (°F)	TC # 12 (°F)	TC # 13 (°F)	TC # 14 (°F)	TC # 15 (°F)
41	101	99	98	96	95	95	95
42	103	101	100	98	97	96	96
43	104	103	101	99	98	97	97
44	106	104	103	101	100	99	99
45	108	106	104	102	101	100	100
46	110	108	106	104	103	102	102
47	111	109	108	106	104	104	104
48	113	111	109	107	106	105	105
49	115	113	111	109	108	107	107
50	117	115	113	111	109	108	108
51	119	117	114	112	111	110	110
52	121	118	116	114	113	112	112
53	123	120	118	116	114	113	113
54	125	122	120	118	116	115	115
55	127	124	122	120	118	117	117
56	129	126	124	121	120	118	118
57	131	128	125	123	122	120	120
58	134	130	127	125	123	122	122
59	136	133	129	127	125	124	124
60	138	134	131	129	127	126	125
Max Temp:	138	134	131	129	127	126	125
Max Allowed:	392	393	393	392	393	393	393

OMEGA POINT LABORATORIES

Time (min)	TC # 16 (°F)	TC # 17 (°F)	TC # 18 (°F)	TC # 19 (°F)	TC # 20 (°F)	TC # 21 (°F)
0	68	68	68	68	68	68
1	68	68	68	68	68	68
2	67	68	68	68	68	68
3	68	68	68	68	68	68
4	68	68	68	68	68	68
5	68	68	68	68	68	68
6	68	68	68	68	68	68
7	68	68	68	68	68	68
8	68	68	68	68	68	68
9	68	68	68	68	68	68
10	68	68	68	68	68	68
11	68	68	68	68	68	68
12	68	68	68	68	68	68
13	68	68	68	68	68	69
14	68	69	68	68	68	69
15	68	69	69	68	68	69
16	68	69	69	69	68	69
17	69	69	69	69	69	69
18	69	70	69	69	69	69
19	70	70	70	70	69	70
20	70	71	70	70	70	70
21	71	71	71	70	70	71
22	72	72	71	71	71	71
23	72	73	72	72	71	72
24	73	73	73	72	72	72
25	74	74	73	73	73	73
26	75	75	74	74	73	73
27	76	76	75	75	74	74
28	77	77	76	76	75	75
29	78	78	77	77	76	76
30	79	79	79	78	77	77
31	81	81	80	79	78	78
32	82	82	81	80	79	79
33	83	83	82	81	81	80
34	84	84	83	82	82	81
35	86	86	85	84	83	82
36	87	87	86	85	84	83
37	88	88	87	86	85	84
38	90	90	89	87	86	86
39	91	91	90	89	88	87
40	92	92	91	90	89	88

Time (min)	TC # 16 (°F)	TC # 17 (°F)	TC # 18 (°F)	TC # 19 (°F)	TC # 20 (°F)	TC # 21 (°F)
41	94	93	93	91	90	89
42	95	95	94	93	91	90
43	97	96	95	94	93	92
44	98	98	97	95	94	93
45	99	99	98	97	95	94
46	101	101	100	98	97	95
47	102	102	101	100	98	97
48	104	104	103	101	100	98
49	106	105	104	102	101	99
50	107	107	106	104	102	100
51	109	108	107	105	104	102
52	110	110	109	107	105	103
53	112	111	110	108	107	104
54	114	113	112	110	108	106
55	115	115	113	111	109	107
56	117	116	115	113	111	109
57	119	118	117	114	112	110
58	120	120	118	116	114	111
59	122	121	120	118	115	113
60	124	123	121	119	117	114
Max Temp:	124	123	121	119	117	114
Max Allowed:	393	393	393	393	393	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 22 (°F)	TC # 23 (°F)	TC # 24 (°F)	TC # 25 (°F)	TC # 26 (°F)	TC # 27 (°F)
0	68	68	68	69	68	68
1	68	68	68	69	68	68
2	68	68	68	69	69	68
3	68	68	68	69	68	68
4	68	68	68	69	69	68
5	68	68	68	69	69	68
6	68	68	68	69	69	68
7	68	68	68	70	70	68
8	68	68	68	70	71	69
9	68	68	68	72	72	69
10	68	68	68	73	73	70
11	68	68	68	75	75	71
12	68	68	68	76	77	72
13	68	69	68	79	79	73
14	68	69	68	81	81	74
15	69	69	68	83	84	75
16	69	69	69	86	86	77
17	69	69	69	89	89	79
18	69	69	69	91	92	81
19	69	70	69	94	95	83
20	70	70	69	97	98	85
21	70	70	69	100	101	88
22	71	70	70	103	104	90
23	71	71	70	106	107	93
24	72	71	70	109	110	95
25	72	72	70	112	113	98
26	73	72	71	115	117	100
27	73	73	72	118	120	103
28	74	73	72	121	123	106
29	75	74	72	124	126	108
30	76	75	73	127	129	111
31	77	75	73	130	132	114
32	77	76	74	133	135	117
33	78	77	75	136	138	120
34	79	78	75	138	141	122
35	80	79	76	141	144	125
36	81	80	77	144	147	128
37	82	81	78	147	150	131
38	83	82	79	150	153	133
39	85	82	79	153	156	136
40	86	84	80	155	158	139

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 22 (°F)	TC # 23 (°F)	TC # 24 (°F)	TC # 25 (°F)	TC # 26 (°F)	TC # 27 (°F)
41	87	84	81	158	161	142
42	88	86	82	160	164	144
43	89	87	83	163	167	147
44	90	88	84	165	169	149
45	91	89	85	168	172	152
46	93	90	86	170	174	154
47	94	91	87	172	176	157
48	95	92	88	174	178	159
49	96	93	89	176	180	162
50	97	94	90	178	182	164
51	99	95	91	180	184	166
52	100	96	91	181	186	168
53	101	97	93	183	188	170
54	102	99	93	185	190	172
55	104	100	95	187	191	174
56	105	101	95	188	193	176
57	106	102	97	190	195	178
58	107	103	97	191	196	180
59	108	104	99	193	198	182
60	110	105	99	194	199	183
Max Temp:	110	105	99	194	199	183
Max Allowed:	393	393	393	394	393	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 28 (°F)	TC # 29 (°F)	TC # 30 (°F)	TC # 31 (°F)	TC # 32 (°F)	TC # 33 (°F)
0	68	69	68	68	68	65
1	68	69	68	68	68	65
2	68	69	68	68	68	65
3	68	69	68	68	68	65
4	68	69	68	68	68	65
5	68	69	68	68	68	65
6	69	69	68	68	68	65
7	69	69	68	68	68	65
8	70	69	68	68	68	65
9	70	69	68	68	68	65
10	72	69	69	68	68	65
11	73	70	69	68	68	65
12	74	70	69	68	68	65
13	76	71	69	69	68	65
14	78	72	70	69	68	66
15	80	72	70	69	69	66
16	82	73	71	70	69	66
17	85	75	72	70	69	67
18	87	76	73	71	70	67
19	90	77	74	72	71	68
20	93	79	75	73	71	68
21	96	81	76	73	72	69
22	99	82	77	75	73	70
23	102	84	79	76	74	71
24	105	86	80	77	75	72
25	108	88	82	79	76	73
26	111	90	84	80	78	74
27	114	93	86	81	79	75
28	117	95	88	83	80	77
29	120	97	89	85	82	78
30	123	99	91	86	84	80
31	126	102	93	88	85	81
32	129	104	96	90	87	83
33	132	107	98	92	88	84
34	135	109	100	94	90	86
35	138	111	102	95	92	87
36	141	114	104	97	93	89
37	144	116	106	99	95	90
38	147	119	108	101	97	92
39	150	121	110	103	99	94
40	152	124	113	105	100	95

OMEGA POINT LABORATORIES

Time (min)	TC # 28 (°F)	TC # 29 (°F)	TC # 30 (°F)	TC # 31 (°F)	TC # 32 (°F)	TC # 33 (°F)
41	155	126	115	107	102	97
42	158	128	117	109	104	98
43	161	131	119	111	106	100
44	163	133	121	113	107	102
45	166	136	123	115	109	103
46	168	138	126	117	111	105
47	171	140	128	119	113	107
48	173	143	130	121	115	109
49	175	145	132	123	117	110
50	177	147	135	125	119	112
51	179	150	137	127	121	114
52	181	152	139	129	123	116
53	183	154	141	132	125	118
54	185	156	144	134	127	120
55	186	158	146	136	129	122
56	188	161	148	138	131	124
57	190	163	150	140	133	126
58	192	165	152	143	135	128
59	193	167	154	145	138	130
60	195	169	157	147	140	132
Max Temp:	195	169	157	147	140	132
Max Allowed:	393	394	393	393	393	390

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 34 (°F)	TC # 35 (°F)	TC # 36 (°F)	TC # 37 (°F)	TC # 38 (°F)	TC # 39 (°F)
0	65	65	65	65	66	65
1	65	65	65	65	66	65
2	65	65	65	65	66	65
3	65	65	65	65	66	65
4	65	65	65	65	66	65
5	65	65	65	65	66	65
6	65	65	65	65	66	65
7	65	65	65	65	66	65
8	65	65	65	65	66	65
9	65	65	65	65	66	65
10	65	65	65	65	66	65
11	65	66	65	65	66	65
12	66	66	65	66	66	65
13	66	66	66	66	66	66
14	66	66	66	66	66	66
15	66	66	66	66	66	66
16	66	66	66	66	66	66
17	67	67	66	66	67	66
18	67	67	67	67	67	67
19	68	68	67	67	68	67
20	68	68	68	68	68	68
21	69	69	69	69	69	68
22	70	70	69	69	70	69
23	71	71	70	70	70	70
24	72	72	71	71	71	70
25	73	73	72	72	72	71
26	74	74	73	73	73	72
27	75	75	74	74	74	73
28	76	76	75	75	75	74
29	78	77	77	76	76	75
30	79	79	78	78	77	77
31	81	80	79	79	79	78
32	82	81	81	80	80	79
33	83	83	82	82	81	80
34	85	84	83	83	82	81
35	86	86	85	84	84	83
36	88	87	86	86	85	84
37	89	89	88	87	87	86
38	91	90	89	89	88	87
39	92	91	91	90	90	88
40	94	93	92	91	91	90

Time (min)	TC # 34 (°F)	TC # 35 (°F)	TC # 36 (°F)	TC # 37 (°F)	TC # 38 (°F)	TC # 39 (°F)
41	95	94	93	93	92	91
42	97	96	95	94	94	93
43	99	97	96	96	95	94
44	100	99	98	97	97	95
45	102	100	99	99	98	97
46	103	102	101	100	99	98
47	105	103	102	102	101	99
48	106	105	104	103	102	101
49	108	107	105	104	104	102
50	110	108	107	106	105	104
51	112	110	109	108	107	105
52	113	112	110	109	108	107
53	115	113	112	111	110	108
54	117	115	114	112	111	110
55	119	117	115	114	113	111
56	121	119	117	116	115	113
57	123	121	119	118	116	115
58	125	122	121	119	118	116
59	127	124	122	121	120	118
60	129	126	124	123	122	120
Max Temp:	129	126	124	123	122	120
Max Allowed:	390	390	390	390	391	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 40 (°F)	TC # 41 (°F)	TC # 42 (°F)	TC # 43 (°F)	TC # 44 (°F)	TC # 45 (°F)
0	65	65	66	65	66	66
1	65	65	66	65	66	66
2	65	65	65	65	66	66
3	65	65	65	65	66	66
4	65	65	66	65	66	66
5	65	65	66	65	66	66
6	65	65	66	65	66	66
7	65	65	65	65	66	66
8	65	65	66	65	66	66
9	65	65	66	66	66	66
10	65	65	66	66	66	66
11	65	65	66	66	66	66
12	65	65	66	66	66	66
13	66	66	66	66	66	66
14	66	66	66	66	66	66
15	66	66	66	66	66	66
16	66	66	66	66	66	66
17	66	66	66	66	67	66
18	67	66	67	67	67	67
19	67	67	67	67	67	67
20	68	67	67	67	68	67
21	68	68	68	68	68	68
22	69	68	68	68	69	68
23	69	69	69	69	69	69
24	70	70	70	70	70	70
25	71	71	70	70	70	70
26	72	71	71	71	71	71
27	73	72	72	72	72	72
28	74	73	73	73	73	72
29	75	74	74	74	74	73
30	76	75	75	75	75	74
31	77	77	76	76	76	75
32	78	78	77	77	77	76
33	80	79	78	78	78	77
34	81	80	79	79	79	78
35	82	81	81	80	80	79
36	84	83	82	81	81	80
37	85	84	83	82	82	81
38	86	85	84	84	84	82
39	88	87	86	85	85	83
40	89	88	87	86	86	84

OMEGA POINT LABORATORIES

Time (min)	TC # 40 (°F)	TC # 41 (°F)	TC # 42 (°F)	TC # 43 (°F)	TC # 44 (°F)	TC # 45 (°F)
41	90	90	88	88	87	86
42	92	91	90	89	89	87
43	93	92	91	91	90	88
44	95	94	93	92	91	89
45	96	95	94	93	92	90
46	97	96	95	95	94	92
47	99	98	97	96	95	93
48	100	99	98	97	96	94
49	102	100	99	99	97	95
50	103	102	101	100	99	96
51	104	103	102	101	100	98
52	106	105	103	102	101	99
53	107	106	105	104	102	100
54	109	107	106	105	104	101
55	110	109	108	106	105	102
56	112	110	109	108	106	104
57	113	112	110	109	108	105
58	115	113	112	110	109	106
59	117	115	113	112	110	107
60	118	117	115	113	112	108
Max Temp:	118	117	115	113	112	108
Max Allowed:	390	390	391	390	391	391

OMEGA POINT LABORATORIES

Time (min)	TC # 46 (°F)	TC # 47 (°F)	TC # 48 (°F)	TC # 49 (°F)	TC # 50 (°F)	TC # 51 (°F)
0	65	65	66	66	66	65
1	65	65	66	66	66	65
2	65	65	66	66	66	65
3	65	65	66	66	66	66
4	65	65	66	66	66	65
5	65	65	66	66	66	66
6	65	65	66	66	66	66
7	65	65	66	66	67	66
8	65	65	66	67	67	66
9	65	65	66	68	68	67
10	65	65	66	69	69	68
11	65	65	66	71	70	69
12	65	66	66	72	72	70
13	65	66	66	74	73	72
14	65	66	66	76	75	73
15	66	66	66	78	77	75
16	66	66	66	80	79	77
17	66	66	66	83	81	79
18	66	66	66	85	84	81
19	66	66	66	88	86	83
20	67	67	66	91	89	86
21	67	67	67	93	91	88
22	68	67	67	96	94	91
23	68	68	67	99	97	93
24	68	68	68	102	100	96
25	69	69	68	105	102	99
26	70	69	68	108	105	102
27	70	70	69	111	108	104
28	71	70	69	114	111	107
29	72	71	70	117	113	110
30	72	71	70	120	116	113
31	73	72	71	122	119	116
32	74	73	72	125	122	118
33	75	74	72	128	124	121
34	76	75	73	131	127	124
35	77	75	74	134	129	127
36	78	76	75	136	132	129
37	79	77	75	139	135	132
38	80	78	76	142	137	135
39	81	79	77	145	140	137
40	82	80	78	147	142	140

Time (min)	TC # 46 (°F)	TC # 47 (°F)	TC # 48 (°F)	TC # 49 (°F)	TC # 50 (°F)	TC # 51 (°F)
41	83	81	79	150	144	142
42	84	82	80	152	147	145
43	85	83	81	154	149	147
44	86	84	81	157	151	150
45	87	85	82	159	153	152
46	88	86	83	162	156	155
47	90	87	84	164	158	157
48	91	88	85	166	160	159
49	92	89	86	168	162	162
50	93	90	87	170	163	164
51	94	91	88	172	165	166
52	95	92	89	174	167	168
53	96	93	90	175	168	170
54	97	94	91	177	170	172
55	99	95	92	179	172	174
56	100	96	93	181	173	176
57	101	97	94	182	175	178
58	102	98	95	184	176	180
59	103	99	96	186	178	181
60	104	100	97	187	180	183
Max Temp:	104	100	97	187	180	183
Max Allowed:	390	390	391	391	391	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 52 (°F)	TC # 53 (°F)	TC # 54 (°F)	TC # 55 (°F)	TC # 56 (°F)	TC # 57 (°F)
0	65	66	65	65	65	66
1	65	66	65	65	65	66
2	65	66	65	65	65	66
3	65	66	65	65	65	66
4	65	66	65	65	65	66
5	65	66	65	65	65	66
6	66	66	65	65	65	66
7	66	66	65	65	65	66
8	66	66	65	65	65	66
9	66	66	65	65	65	66
10	66	66	65	65	65	66
11	67	66	66	66	65	66
12	68	67	66	66	65	66
13	69	67	66	66	65	66
14	70	68	66	66	66	66
15	71	68	67	66	66	66
16	72	69	67	67	66	67
17	74	70	68	67	66	67
18	75	71	69	68	67	68
19	77	73	70	68	68	68
20	79	74	71	69	68	69
21	81	75	72	70	69	70
22	83	77	73	71	70	70
23	85	79	74	72	71	71
24	87	80	76	74	72	72
25	90	82	77	75	73	73
26	92	84	79	76	75	75
27	94	86	81	78	76	76
28	97	88	82	79	77	77
29	99	91	84	81	79	79
30	102	93	86	83	81	80
31	104	95	88	85	82	82
32	107	97	90	86	84	83
33	109	100	92	88	86	85
34	112	102	94	90	87	86
35	115	104	96	92	89	88
36	117	106	98	93	91	90
37	120	109	100	95	92	91
38	122	111	102	97	94	93
39	125	113	104	99	96	94
40	127	115	106	101	97	96

OMEGA POINT LABORATORIES

Time (min)	TC # 52 (°F)	TC # 53 (°F)	TC # 54 (°F)	TC # 55 (°F)	TC # 56 (°F)	TC # 57 (°F)
41	129	118	109	103	99	97
42	132	120	111	104	101	99
43	134	122	113	106	102	101
44	137	124	115	108	104	102
45	139	127	117	110	106	104
46	142	129	119	112	108	106
47	144	131	121	114	110	108
48	146	133	123	116	112	109
49	149	136	126	118	114	111
50	151	138	128	120	116	113
51	153	140	130	122	118	115
52	156	143	132	125	120	117
53	158	145	135	127	122	119
54	160	147	137	129	124	121
55	162	149	139	131	126	123
56	164	152	141	133	128	125
57	167	154	144	136	130	127
58	169	156	146	138	133	129
59	171	158	148	140	135	131
60	173	161	150	142	137	134
Max Temp:	173	161	150	142	137	134
Max Allowed:	390	391	390	390	390	391

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 58 (°F)	TC # 59 (°F)	TC # 60 (°F)	TC # 61 (°F)	TC # 62 (°F)	TC # 63 (°F)
0	66	66	66	66	65	65
1	66	65	66	66	65	65
2	66	65	66	66	65	65
3	66	66	66	66	65	65
4	66	66	66	66	65	65
5	66	66	66	66	66	65
6	66	66	66	66	66	65
7	66	66	66	66	66	65
8	66	66	66	66	66	65
9	66	66	66	66	66	65
10	66	66	66	66	66	65
11	66	66	66	66	66	65
12	66	66	66	66	66	66
13	66	66	66	66	66	66
14	66	66	66	66	66	66
15	67	66	66	66	66	66
16	67	66	66	66	66	66
17	67	67	67	67	66	66
18	68	67	67	67	67	67
19	68	68	68	68	67	67
20	69	68	68	68	68	68
21	70	69	69	69	68	68
22	70	70	70	69	69	69
23	71	71	71	70	70	69
24	72	72	72	71	70	70
25	73	73	72	72	71	71
26	75	74	73	73	72	72
27	76	75	75	74	73	73
28	77	76	76	75	74	74
29	78	77	77	76	75	75
30	80	79	78	77	77	76
31	81	80	80	79	78	77
32	83	82	81	80	79	79
33	84	83	82	81	80	80
34	86	84	84	83	82	81
35	87	86	85	84	83	83
36	89	88	87	86	85	84
37	90	89	88	87	86	86
38	92	90	90	88	87	87
39	93	92	91	90	89	88
40	95	93	93	91	90	90

OMEGA POINT LABORATORIES

Time (min)	TC # 58 (°F)	TC # 59 (°F)	TC # 60 (°F)	TC # 61 (°F)	TC # 62 (°F)	TC # 63 (°F)
41	96	95	94	93	92	91
42	98	96	95	94	93	93
43	99	98	97	95	94	94
44	101	99	99	97	96	95
45	103	101	100	98	97	97
46	104	102	101	100	99	98
47	106	104	103	101	100	100
48	108	106	105	103	102	101
49	109	107	106	104	103	103
50	111	109	108	106	105	104
51	113	111	110	108	106	106
52	115	113	111	109	108	107
53	117	114	113	111	110	109
54	119	116	115	113	111	111
55	121	118	117	115	113	112
56	123	120	118	116	115	114
57	125	122	120	118	117	116
58	127	124	122	120	118	118
59	129	126	124	122	120	119
60	131	128	126	124	122	121
Max Temp:	131	128	126	124	122	121
Max Allowed:	391	391	391	391	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 64 (°F)	TC # 65 (°F)	TC # 66 (°F)	TC # 67 (°F)	TC # 68 (°F)	TC # 69 (°F)
0	65	69	69	69	69	69
1	65	69	69	69	69	69
2	65	69	69	69	69	69
3	65	69	69	69	69	69
4	65	69	69	69	69	70
5	65	69	69	69	69	70
6	65	69	69	69	69	70
7	65	69	69	69	69	70
8	65	69	69	69	69	70
9	65	69	69	69	69	70
10	65	69	69	69	69	70
11	65	69	69	69	69	70
12	65	69	69	69	69	70
13	66	69	69	69	69	70
14	66	69	69	69	69	70
15	66	69	70	70	70	70
16	66	70	70	70	70	70
17	66	70	70	70	70	70
18	66	70	70	70	70	71
19	67	70	71	71	71	71
20	67	71	71	71	71	71
21	68	72	72	72	72	72
22	69	72	72	72	72	72
23	69	73	73	73	73	73
24	70	73	74	73	73	73
25	71	74	75	74	74	74
26	72	75	75	75	75	75
27	73	76	76	76	76	76
28	74	77	77	77	77	77
29	75	78	78	78	77	77
30	76	79	79	79	79	78
31	77	80	80	80	80	79
32	78	82	81	81	81	80
33	80	83	83	82	82	81
34	81	84	84	83	83	82
35	82	85	85	84	84	84
36	84	87	87	86	85	85
37	85	88	88	87	87	86
38	86	90	89	88	88	87
39	88	91	91	90	89	88
40	89	92	92	91	90	90

OMEGA POINT LABORATORIES

Time (min)	TC # 64 (°F)	TC # 65 (°F)	TC # 66 (°F)	TC # 67 (°F)	TC # 68 (°F)	TC # 69 (°F)
41	91	94	93	92	92	91
42	92	95	95	94	93	92
43	93	97	96	95	94	93
44	95	98	98	97	96	95
45	96	99	99	98	97	96
46	98	101	100	99	98	97
47	99	102	102	100	100	98
48	100	103	103	102	101	100
49	102	105	104	103	102	101
50	104	106	106	104	104	102
51	105	108	107	106	105	103
52	107	109	109	107	106	105
53	108	111	110	109	108	106
54	110	112	111	110	109	107
55	111	114	113	111	110	109
56	113	115	115	113	112	110
57	115	117	116	115	113	111
58	116	119	118	116	115	113
59	118	120	119	118	116	114
60	120	122	121	119	118	115
Max Temp:	120	122	121	119	118	115
Max Allowed:	390	394	394	394	394	394

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 70 (°F)	TC # 71 (°F)	TC # 72 (°F)	TC # 73 (°F)	TC # 74 (°F)	TC # 75 (°F)
0	69	69	69	69	69	69
1	69	69	69	69	69	69
2	69	69	69	69	69	69
3	69	69	69	69	69	69
4	70	69	69	69	69	69
5	70	69	69	69	69	69
6	70	69	69	69	70	70
7	70	69	69	70	70	70
8	70	69	69	71	71	71
9	70	69	69	72	72	72
10	70	69	69	73	74	73
11	70	69	69	75	76	74
12	70	69	69	77	78	76
13	70	69	69	79	80	77
14	70	70	69	82	83	79
15	70	70	70	85	85	82
16	70	70	70	88	88	84
17	70	70	70	91	91	87
18	71	70	70	94	95	90
19	71	70	70	97	98	92
20	71	71	70	100	101	95
21	72	71	71	103	104	98
22	72	72	71	106	108	101
23	73	72	71	110	111	104
24	73	72	72	113	114	107
25	74	73	72	116	118	110
26	75	74	73	119	121	113
27	75	74	73	122	124	116
28	76	75	74	126	127	119
29	77	76	74	129	131	122
30	78	76	75	132	134	126
31	79	77	75	135	138	129
32	79	78	76	139	141	132
33	80	79	77	142	144	135
34	81	80	77	145	148	138
35	82	81	78	148	151	141
36	84	82	79	151	154	144
37	85	82	80	154	157	147
38	86	84	81	158	160	150
39	87	84	81	160	163	153
40	88	86	82	163	166	156

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 70 (°F)	TC # 71 (°F)	TC # 72 (°F)	TC # 73 (°F)	TC # 74 (°F)	TC # 75 (°F)
41	89	87	83	166	169	159
42	90	88	84	169	172	162
43	91	89	85	172	174	165
44	93	90	86	174	177	167
45	94	91	87	177	180	170
46	95	92	88	179	182	172
47	96	93	89	181	184	175
48	97	94	90	184	186	177
49	99	95	91	186	188	179
50	100	96	92	187	190	181
51	101	97	93	189	192	183
52	102	99	94	191	193	185
53	103	99	95	192	195	187
54	105	100	95	194	196	189
55	106	102	97	195	198	190
56	107	103	97	196	199	192
57	108	104	98	198	200	194
58	109	105	99	199	202	195
59	111	106	100	200	203	197
60	112	107	101	201	204	198
Max Temp:	112	107	101	201	204	198
Max Allowed:	394	394	394	394	394	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 76 (°F)	TC # 77 (°F)	TC # 78 (°F)	TC # 79 (°F)	TC # 80 (°F)	TC # 81 (°F)
0	69	69	68	68	68	69
1	69	69	68	68	68	69
2	69	69	68	68	68	69
3	69	69	68	68	68	69
4	69	69	68	68	68	69
5	69	69	68	68	68	69
6	69	69	68	68	68	69
7	69	69	68	68	68	69
8	70	69	68	68	68	69
9	70	69	68	68	68	69
10	71	70	68	68	68	69
11	72	70	68	68	68	69
12	73	70	69	68	68	69
13	74	71	69	69	68	70
14	75	72	70	69	68	70
15	77	73	70	70	69	70
16	78	74	71	70	69	71
17	80	75	72	70	70	71
18	82	76	72	71	70	72
19	84	77	73	72	71	72
20	86	79	75	73	72	73
21	88	81	76	74	73	74
22	91	82	77	75	74	75
23	93	84	79	76	75	76
24	96	86	81	78	76	77
25	99	89	82	79	77	79
26	101	91	84	81	79	80
27	104	93	86	82	80	81
28	106	95	88	84	82	83
29	109	97	90	86	83	84
30	112	100	91	87	85	86
31	115	102	93	89	86	87
32	117	104	96	91	88	89
33	120	107	98	93	90	90
34	123	109	100	95	91	92
35	126	111	102	96	93	93
36	129	114	104	98	95	95
37	131	116	106	100	97	96
38	134	119	108	102	98	98
39	137	121	110	104	100	100
40	140	124	113	106	102	101

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 76 (°F)	TC # 77 (°F)	TC # 78 (°F)	TC # 79 (°F)	TC # 80 (°F)	TC # 81 (°F)
41	142	126	115	108	104	103
42	145	129	117	110	106	105
43	148	131	119	112	107	106
44	150	134	122	114	109	108
45	153	136	124	116	111	110
46	155	138	126	118	113	112
47	158	141	128	120	115	114
48	160	144	131	123	117	116
49	163	146	133	125	120	118
50	165	148	136	127	122	120
51	167	151	138	129	124	122
52	170	153	140	132	126	124
53	172	155	143	134	128	126
54	174	158	145	136	131	129
55	176	160	147	138	133	131
56	178	162	150	141	135	133
57	180	164	152	143	137	135
58	182	167	154	145	140	137
59	183	169	156	148	142	139
60	185	171	159	150	144	142
Max Temp:	185	171	159	150	144	142
Max Allowed:	394	394	393	393	393	394

OMEGA POINT LABORATORIES

Time (min)	TC # 82 (°F)	TC # 83 (°F)	TC # 84 (°F)	TC # 85 (°F)	TC # 86 (°F)	TC # 87 (°F)
0	69	69	68	69	69	69
1	69	69	69	69	69	69
2	69	69	69	69	69	69
3	69	69	69	69	69	69
4	69	69	69	69	69	69
5	69	69	69	69	69	69
6	69	69	69	69	69	69
7	69	69	69	69	69	69
8	69	69	69	69	69	69
9	69	69	69	69	69	69
10	69	69	69	69	69	69
11	70	69	69	69	69	69
12	70	69	69	70	69	69
13	70	70	69	70	69	69
14	70	70	70	70	70	69
15	71	70	70	70	70	70
16	71	71	70	71	70	70
17	72	71	71	71	71	70
18	73	72	72	72	71	71
19	73	73	72	72	72	71
20	74	74	73	73	72	72
21	75	75	74	74	73	72
22	76	76	75	75	74	73
23	78	77	76	75	75	74
24	79	78	77	77	76	75
25	80	79	78	78	77	76
26	82	81	79	79	78	77
27	83	82	81	80	79	78
28	84	83	82	81	80	79
29	86	85	83	82	81	80
30	87	86	84	84	83	81
31	89	88	86	85	84	83
32	90	89	87	87	85	84
33	92	91	89	88	87	85
34	93	92	90	90	88	87
35	95	93	92	91	90	88
36	96	95	93	92	91	90
37	98	96	95	94	92	91
38	99	98	96	95	94	92
39	101	99	98	97	95	94
40	102	101	99	98	97	95

OMEGA POINT LABORATORIES

Time (min)	TC # 82 (°F)	TC # 83 (°F)	TC # 84 (°F)	TC # 85 (°F)	TC # 86 (°F)	TC # 87 (°F)
41	104	102	101	100	98	97
42	106	104	102	101	100	98
43	107	106	104	103	101	99
44	109	108	106	105	103	101
45	111	109	107	106	104	102
46	113	111	109	108	106	104
47	115	113	111	110	108	106
48	117	115	113	111	109	107
49	119	117	115	113	111	109
50	121	119	117	115	113	111
51	123	121	118	117	115	112
52	125	123	120	119	117	114
53	127	125	122	121	118	116
54	129	127	124	123	120	118
55	131	129	126	125	122	119
56	133	131	128	127	124	121
57	135	133	131	129	126	123
58	138	135	133	131	128	125
59	140	137	135	133	130	127
60	142	140	137	135	132	129
Max Temp:	142	140	137	135	132	129
Max Allowed:	394	394	393	394	394	394

OMEGA POINT LABORATORIES

Time (min)	TC # 88 (°F)	TC # 89 (°F)	TC # 90 (°F)	TC # 91 (°F)	TC # 92 (°F)	TC # 93 (°F)
0	68	70	69	69	69	70
1	68	70	70	69	69	70
2	68	70	70	69	69	70
3	68	70	70	69	69	70
4	68	70	70	69	69	70
5	68	70	70	69	69	70
6	68	70	70	69	69	70
7	68	70	70	69	69	70
8	68	70	70	69	70	70
9	68	70	70	69	70	70
10	68	70	70	69	70	70
11	68	70	70	70	70	70
12	68	70	70	70	70	70
13	69	70	70	70	70	70
14	69	70	70	70	70	71
15	69	70	70	70	70	71
16	69	71	71	70	70	71
17	70	71	71	71	71	71
18	70	71	71	71	71	72
19	71	72	72	72	72	72
20	71	72	72	72	72	73
21	72	73	73	73	73	73
22	73	74	73	73	73	74
23	73	75	74	74	74	75
24	74	75	75	75	75	75
25	75	76	76	76	76	76
26	76	77	77	77	77	77
27	77	78	78	78	78	78
28	78	79	79	79	79	79
29	80	80	80	80	80	80
30	81	82	81	81	81	81
31	82	83	82	82	82	82
32	83	84	83	83	83	83
33	85	85	85	84	84	84
34	86	87	86	86	86	85
35	87	88	87	87	87	86
36	89	89	89	88	88	87
37	90	91	90	90	89	88
38	91	92	91	91	91	90
39	93	94	93	92	92	91
40	94	95	94	94	93	92

Time (min)	TC # 88 (°F)	TC # 89 (°F)	TC # 90 (°F)	TC # 91 (°F)	TC # 92 (°F)	TC # 93 (°F)
41	96	96	95	95	94	93
42	97	98	97	96	96	94
43	99	99	98	98	97	95
44	100	100	99	99	98	97
45	102	102	101	100	100	98
46	103	103	102	102	101	99
47	105	105	104	103	102	100
48	106	106	105	104	103	102
49	108	108	106	106	105	103
50	109	109	108	107	106	104
51	111	111	109	108	108	105
52	113	112	111	110	109	107
53	114	114	112	111	110	108
54	116	115	114	113	112	109
55	118	117	115	114	113	110
56	120	119	117	116	115	112
57	121	120	119	118	116	113
58	123	122	120	119	118	115
59	125	124	122	121	119	116
60	127	126	124	122	121	117
Max Temp:	127	126	124	122	121	117
Max Allowed:	393	395	394	394	394	395

OMEGA POINT LABORATORIES

Time (min)	TC # 94 (°F)	TC # 95 (°F)	TC # 96 (°F)	TC # 97 (°F)	TC # 98 (°F)	TC # 99 (°F)
0	69	69	69	70	71	71
1	69	69	69	70	71	71
2	69	69	69	70	71	71
3	69	69	69	70	71	71
4	69	69	69	70	71	71
5	69	69	69	70	71	71
6	69	69	69	71	71	71
7	69	69	69	71	72	71
8	69	69	69	71	72	72
9	69	69	69	72	73	72
10	69	69	69	73	73	73
11	70	69	69	74	75	73
12	70	69	69	75	76	74
13	70	70	70	76	77	75
14	70	70	70	78	79	77
15	70	70	70	80	81	78
16	70	70	70	82	83	80
17	70	70	70	84	85	82
18	71	70	70	86	87	83
19	71	71	70	89	89	86
20	72	71	71	91	92	88
21	72	71	71	93	94	90
22	73	72	71	96	97	92
23	73	72	72	98	99	94
24	74	73	72	101	102	97
25	75	73	73	103	104	99
26	75	74	73	106	107	102
27	76	75	74	108	110	104
28	77	75	74	111	112	106
29	78	76	75	113	115	109
30	79	77	75	116	118	111
31	80	78	76	118	120	114
32	81	79	77	121	123	117
33	82	79	77	123	126	119
34	83	80	78	126	128	122
35	84	81	79	128	131	125
36	85	82	80	131	134	127
37	86	83	81	133	136	130
38	87	84	81	136	139	133
39	88	85	82	138	142	135
40	89	86	83	141	144	138

OMEGA POINT LABORATORIES

Time (min)	TC # 94 (°F)	TC # 95 (°F)	TC # 96 (°F)	TC # 97 (°F)	TC # 98 (°F)	TC # 99 (°F)
41	90	87	84	143	147	140
42	91	88	85	146	149	143
43	92	89	86	148	152	146
44	93	90	86	150	154	148
45	95	91	87	152	157	151
46	96	92	88	154	159	153
47	97	93	89	156	162	156
48	98	94	90	158	163	158
49	99	95	91	160	165	160
50	100	96	92	162	167	163
51	102	97	93	163	169	165
52	103	98	94	164	171	167
53	104	99	95	166	172	169
54	105	100	95	167	174	171
55	106	102	97	168	176	172
56	107	103	97	170	177	174
57	109	104	98	171	178	176
58	110	105	99	172	180	178
59	111	106	100	174	181	179
60	112	107	101	175	183	181
Max Temp:	112	107	101	175	183	181
Max Allowed:	394	394	394	395	396	396

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 100 (°F)	TC # 101 (°F)	TC # 102 (°F)	TC # 103 (°F)	TC # 104 (°F)	TC # 105 (°F)
0	70	70	70	70	70	70
1	70	70	70	70	70	70
2	70	70	70	70	70	70
3	70	70	71	70	70	70
4	71	70	71	70	70	70
5	71	70	71	70	70	70
6	71	70	71	70	70	70
7	71	70	71	70	70	70
8	71	70	71	70	70	70
9	71	71	71	70	70	70
10	72	71	71	70	70	71
11	72	71	71	70	70	71
12	73	72	71	70	70	71
13	73	72	72	70	70	71
14	74	73	72	71	70	71
15	75	74	73	71	71	71
16	77	75	73	72	71	72
17	78	76	74	72	72	72
18	79	77	75	73	72	73
19	81	78	76	73	73	73
20	83	80	78	74	73	74
21	85	81	79	75	74	75
22	87	83	80	77	75	76
23	89	85	82	78	76	77
24	91	87	83	79	77	78
25	93	89	85	80	79	79
26	95	91	87	82	80	80
27	97	93	88	83	81	81
28	100	95	90	85	83	83
29	102	97	92	86	84	84
30	104	99	94	88	86	86
31	107	101	96	90	87	87
32	109	103	98	91	89	88
33	112	106	100	93	90	90
34	114	108	102	95	92	91
35	117	110	104	97	93	93
36	119	113	106	98	95	94
37	122	115	108	100	97	96
38	124	117	110	102	98	97
39	127	120	112	104	100	99
40	129	122	114	106	102	100

OMEGA POINT LABORATORIES

Time (min)	TC # 100 (°F)	TC # 101 (°F)	TC # 102 (°F)	TC # 103 (°F)	TC # 104 (°F)	TC # 105 (°F)
41	132	124	116	108	103	102
42	135	127	118	109	105	103
43	137	129	120	111	106	105
44	140	131	123	113	108	107
45	142	134	125	115	110	108
46	145	136	127	117	112	110
47	147	138	129	119	113	111
48	149	141	131	121	115	113
49	152	143	134	123	117	115
50	154	146	136	125	119	117
51	156	148	138	127	121	118
52	159	150	140	129	123	120
53	161	152	142	131	125	122
54	163	154	145	133	127	124
55	165	157	147	136	129	126
56	167	159	149	138	131	128
57	169	161	151	140	133	130
58	171	163	153	142	135	132
59	173	165	155	144	136	133
60	174	166	157	146	138	135
Max Temp:	174	166	157	146	138	135
Max Allowed:	395	395	395	395	395	395

Time (min)	TC # 106 (°F)	TC # 107 (°F)	TC # 108 (°F)	TC # 109 (°F)	TC # 110 (°F)	TC # 111 (°F)
0	71	70	70	70	70	69
1	71	70	70	70	70	69
2	71	70	70	70	70	70
3	71	70	70	70	70	70
4	71	70	70	70	70	70
5	71	70	70	70	70	70
6	71	70	70	70	70	70
7	71	70	70	70	70	70
8	71	70	70	70	70	70
9	71	70	70	70	70	70
10	71	70	70	70	70	70
11	71	70	70	70	70	70
12	71	70	71	70	70	70
13	72	70	71	71	70	70
14	72	70	71	71	70	70
15	72	71	71	71	70	70
16	72	71	71	71	71	70
17	73	71	72	71	71	71
18	73	72	72	72	71	71
19	74	72	73	72	72	71
20	75	72	73	73	72	72
21	76	73	74	73	73	72
22	77	74	75	74	73	73
23	78	75	76	75	74	74
24	79	75	77	75	75	74
25	80	76	78	76	76	75
26	82	77	79	77	77	76
27	83	78	80	78	78	77
28	84	79	81	79	79	78
29	85	81	82	80	80	79
30	87	82	83	82	81	81
31	88	83	85	83	82	82
32	90	84	86	84	83	83
33	91	86	88	85	85	84
34	92	87	89	87	86	86
35	94	88	90	88	87	87
36	95	90	92	90	89	88
37	97	91	93	91	90	90
38	98	93	94	92	91	91
39	100	94	96	94	93	92
40	101	95	97	95	94	94

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 106 (°F)	TC # 107 (°F)	TC # 108 (°F)	TC # 109 (°F)	TC # 110 (°F)	TC # 111 (°F)
41	103	97	99	97	96	95
42	104	98	100	98	97	97
43	106	99	102	99	99	98
44	107	101	103	100	100	99
45	109	102	104	102	101	100
46	110	104	106	103	103	102
47	112	105	107	105	104	103
48	113	106	109	106	105	104
49	115	108	110	107	107	106
50	117	109	112	109	108	107
51	118	111	113	110	109	109
52	120	112	115	111	111	110
53	122	114	117	113	112	111
54	124	115	118	115	114	113
55	125	117	120	116	115	114
56	127	118	121	117	117	116
57	129	120	123	119	118	117
58	131	122	125	121	120	119
59	133	123	127	122	121	120
60	135	125	128	124	123	122
Max Temp:	135	125	128	124	123	122
Max Allowed:	396	395	395	395	395	394

OMEGA POINT LABORATORIES

Time (min)	TC # 112 (°F)	TC # 113 (°F)	TC # 114 (°F)	TC # 115 (°F)	TC # 116 (°F)	TC # 117 (°F)
0	69	70	70	69	69	70
1	69	70	70	69	69	70
2	69	70	70	69	69	70
3	69	70	70	69	69	70
4	69	70	70	69	69	70
5	69	70	70	69	69	70
6	70	70	70	69	69	70
7	70	70	70	69	69	70
8	69	70	70	69	69	70
9	70	70	70	69	69	70
10	70	70	70	69	69	70
11	70	70	70	69	69	70
12	70	70	70	69	69	70
13	70	70	70	70	69	70
14	70	70	70	70	70	70
15	70	70	71	70	70	70
16	70	71	71	70	70	71
17	71	71	71	70	70	71
18	71	71	72	71	70	71
19	72	72	72	71	71	71
20	72	72	73	72	71	72
21	73	73	73	72	72	72
22	73	73	74	73	72	73
23	74	74	75	74	73	73
24	75	75	76	75	73	74
25	76	76	77	75	74	74
26	77	77	78	76	75	75
27	77	78	79	77	76	76
28	79	79	80	78	77	77
29	79	80	81	79	78	78
30	81	81	82	81	79	79
31	82	82	83	82	80	79
32	83	84	84	83	81	80
33	84	85	86	84	82	81
34	86	86	87	86	83	82
35	87	88	88	87	84	84
36	88	89	90	88	86	85
37	90	90	91	90	87	86
38	91	91	92	91	88	87
39	93	93	94	92	90	88
40	94	94	95	94	91	90

Time (min)	TC # 112 (°F)	TC # 113 (°F)	TC # 114 (°F)	TC # 115 (°F)	TC # 116 (°F)	TC # 117 (°F)
41	95	96	96	95	92	91
42	97	97	98	96	93	92
43	98	98	99	98	95	93
44	99	100	100	99	96	95
45	101	101	102	100	97	96
46	102	102	103	102	99	97
47	103	104	104	103	100	98
48	105	105	106	104	101	99
49	106	106	107	106	102	100
50	107	108	108	107	104	102
51	109	109	110	108	105	103
52	110	110	111	109	106	104
53	111	112	112	110	107	105
54	113	113	114	112	108	106
55	114	114	115	113	110	107
56	116	116	116	114	111	108
57	117	117	117	115	112	109
58	118	118	119	117	113	111
59	120	120	120	118	114	111
60	122	121	122	119	116	113
Max Temp:	122	121	122	119	116	113
Max Allowed:	394	395	395	394	394	395

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 118 (°F)	TC # 119 (°F)	TC # 120 (°F)	TC # 121 (°F)	TC # 122 (°F)	TC # 123 (°F)
0	70	70	70	70	70	70
1	70	70	70	70	70	70
2	70	70	70	70	70	70
3	70	70	70	70	70	70
4	70	70	70	70	70	70
5	70	70	70	70	70	70
6	70	70	70	71	71	70
7	70	70	70	71	71	70
8	70	70	70	72	72	71
9	70	70	70	73	73	72
10	70	70	70	74	75	73
11	70	70	70	75	77	74
12	70	70	70	77	79	76
13	70	70	70	78	81	77
14	70	70	70	80	83	79
15	70	70	70	83	86	81
16	70	70	70	85	89	83
17	70	70	70	87	92	85
18	71	71	70	90	95	88
19	71	71	71	92	98	90
20	71	71	71	95	101	92
21	72	71	71	98	104	95
22	72	72	71	100	107	97
23	72	72	71	103	110	100
24	73	72	72	106	113	103
25	73	73	72	108	116	105
26	74	73	72	111	119	108
27	75	74	73	113	122	111
28	75	74	73	116	125	113
29	76	75	74	119	128	116
30	77	75	74	122	131	119
31	78	76	75	124	133	121
32	79	77	75	127	136	124
33	79	78	76	129	139	127
34	81	78	77	132	142	129
35	81	79	77	134	145	132
36	82	80	78	137	147	135
37	83	81	79	139	150	137
38	84	82	79	142	153	140
39	86	83	80	144	156	142
40	87	84	81	147	158	145

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 118 (°F)	TC # 119 (°F)	TC # 120 (°F)	TC # 121 (°F)	TC # 122 (°F)	TC # 123 (°F)
41	88	85	82	149	161	147
42	89	86	83	152	163	149
43	90	87	84	154	166	152
44	91	88	84	156	168	154
45	92	89	85	159	171	157
46	93	90	86	161	173	159
47	95	91	87	163	175	161
48	96	92	88	165	177	163
49	97	93	89	167	180	166
50	98	94	90	169	181	168
51	99	95	91	171	183	170
52	100	96	91	173	185	172
53	101	97	92	175	187	174
54	102	98	93	177	188	176
55	103	99	94	178	190	177
56	104	100	95	180	191	179
57	105	100	96	182	192	181
58	106	102	97	183	194	182
59	107	102	98	185	195	184
60	108	103	98	186	196	185
Max Temp:	108	103	98	186	196	185
Max Allowed:	395	395	395	395	395	395

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 124 (°F)	TC # 125 (°F)	TC # 126 (°F)	TC # 127 (°F)	TC # 128 (°F)	TC # 129 (°F)
0	70	70	70	69	69	65
1	70	70	70	69	69	65
2	70	70	70	69	69	65
3	70	70	70	69	69	65
4	70	70	70	69	69	65
5	70	70	70	69	69	65
6	70	70	70	69	69	65
7	70	70	70	69	69	65
8	70	70	70	69	69	65
9	70	71	70	69	69	65
10	71	71	70	69	69	65
11	72	71	70	69	69	65
12	72	72	70	69	70	66
13	73	72	71	70	70	66
14	74	73	71	70	70	66
15	75	74	71	70	70	66
16	77	75	72	70	70	66
17	78	76	73	71	70	67
18	80	77	73	71	71	67
19	81	78	74	72	71	68
20	83	79	75	73	72	68
21	85	81	76	73	73	69
22	87	82	77	74	73	69
23	89	84	78	75	74	70
24	91	86	80	77	75	71
25	93	88	81	78	76	72
26	95	90	83	79	77	73
27	98	91	84	80	79	74
28	100	93	86	81	80	75
29	102	95	88	83	81	77
30	104	98	90	84	82	78
31	107	100	91	86	84	79
32	109	102	93	88	85	81
33	111	104	95	89	87	82
34	114	106	97	91	88	84
35	116	108	99	93	90	85
36	118	111	101	94	92	87
37	121	113	103	96	93	88
38	123	115	105	98	95	90
39	126	117	107	100	97	91
40	128	119	109	102	98	93

OMEGA POINT LABORATORIES

Time (min)	TC # 124 (°F)	TC # 125 (°F)	TC # 126 (°F)	TC # 127 (°F)	TC # 128 (°F)	TC # 129 (°F)
41	130	122	111	103	100	95
42	133	124	113	105	102	96
43	135	126	115	107	103	98
44	137	128	117	109	105	100
45	139	130	119	111	107	101
46	142	133	121	112	108	102
47	144	135	123	114	110	104
48	146	137	125	116	111	105
49	148	139	127	117	113	107
50	150	141	129	119	114	108
51	153	143	131	121	116	109
52	155	145	132	123	118	111
53	157	147	134	124	119	112
54	159	149	136	126	121	114
55	161	151	138	128	122	116
56	163	153	140	130	124	117
57	165	155	142	132	126	119
58	167	157	144	133	127	120
59	168	159	146	135	129	122
60	170	161	148	137	131	124
Max Temp:	170	161	148	137	131	124
Max Allowed:	395	395	395	394	394	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 130 (°F)	TC # 131 (°F)	TC # 132 (°F)	TC # 133 (°F)	TC # 134 (°F)	TC # 135 (°F)
0	66	67	66	66	66	67
1	66	66	66	66	66	67
2	66	66	66	66	66	67
3	66	66	66	66	66	67
4	66	66	66	66	66	67
5	66	66	66	66	66	67
6	66	66	66	66	66	67
7	66	66	66	66	66	67
8	66	66	66	66	66	67
9	66	66	66	66	66	67
10	66	67	66	66	66	67
11	66	66	66	66	66	67
12	66	67	66	66	66	67
13	66	67	66	66	66	67
14	66	67	67	66	66	67
15	66	67	67	67	67	67
16	66	67	67	67	67	68
17	67	67	67	67	67	68
18	67	68	67	68	68	68
19	68	68	68	68	68	69
20	68	68	68	68	68	69
21	69	69	69	69	69	70
22	69	69	69	70	70	70
23	70	70	70	70	70	71
24	71	71	70	71	71	72
25	72	72	71	72	72	73
26	72	72	72	73	73	73
27	73	73	73	74	74	75
28	75	74	74	75	75	75
29	76	75	75	76	76	77
30	77	76	76	77	77	78
31	78	78	77	78	78	79
32	80	79	78	80	80	80
33	81	80	80	81	81	81
34	82	82	81	82	82	83
35	84	83	82	84	84	84
36	85	84	84	85	85	85
37	87	86	85	87	86	87
38	89	87	87	88	88	88
39	90	89	88	90	90	90
40	92	90	90	91	91	91

OMEGA POINT LABORATORIES

Time (min)	TC # 130 (°F)	TC # 131 (°F)	TC # 132 (°F)	TC # 133 (°F)	TC # 134 (°F)	TC # 135 (°F)
41	93	92	91	93	92	93
42	95	93	93	94	94	94
43	96	95	94	96	95	96
44	98	97	96	97	97	97
45	99	98	97	99	99	98
46	101	100	99	100	100	100
47	102	101	100	102	101	101
48	104	102	102	103	102	102
49	105	104	103	104	104	104
50	106	105	104	105	105	105
51	108	106	106	106	106	106
52	109	108	107	108	107	107
53	110	109	108	109	108	108
54	112	110	109	110	109	109
55	113	111	110	111	111	110
56	115	113	112	112	112	112
57	116	114	113	114	113	113
58	118	116	114	115	114	114
59	119	117	116	116	116	115
60	121	118	117	118	117	117
Max Temp:	121	118	117	118	117	117
Max Allowed:	391	392	391	391	391	392

OMEGA POINT LABORATORIES

Time (min)	TC # 136 (°F)	TC # 137 (°F)	TC # 138 (°F)	TC # 139 (°F)	TC # 140 (°F)	TC # 141 (°F)
0	67	66	66	67	67	66
1	67	66	66	67	67	66
2	67	66	66	67	67	66
3	67	66	66	67	67	66
4	67	65	66	67	67	66
5	67	66	66	67	67	66
6	67	66	66	67	67	66
7	67	66	66	67	67	66
8	67	66	66	67	67	66
9	67	66	66	67	67	66
10	67	66	66	67	67	66
11	67	66	66	67	67	66
12	67	66	66	67	67	66
13	67	66	66	67	67	66
14	67	66	66	67	67	66
15	67	66	66	67	67	66
16	67	66	67	67	67	67
17	68	66	67	67	68	67
18	68	67	67	68	68	67
19	68	67	68	68	68	67
20	69	67	68	68	68	67
21	69	68	68	68	69	68
22	70	68	69	69	69	68
23	70	69	69	69	69	68
24	71	69	70	70	70	69
25	71	70	71	70	70	69
26	72	70	71	71	71	70
27	73	71	72	72	72	70
28	74	72	73	72	72	71
29	75	73	74	73	73	72
30	76	74	75	74	74	72
31	77	75	76	75	74	73
32	78	76	77	76	75	74
33	79	77	78	77	76	75
34	80	78	79	78	77	76
35	82	79	80	79	78	77
36	83	81	81	80	79	78
37	84	82	83	81	81	79
38	86	83	84	82	82	80
39	87	84	85	84	83	81
40	88	86	87	85	84	82

Time (min)	TC # 136 (°F)	TC # 137 (°F)	TC # 138 (°F)	TC # 139 (°F)	TC # 140 (°F)	TC # 141 (°F)
41	90	87	88	86	85	83
42	91	89	89	88	87	85
43	93	90	91	89	88	86
44	94	91	92	90	89	87
45	96	93	94	92	91	88
46	97	94	95	93	92	90
47	98	96	96	94	93	91
48	100	97	98	96	94	92
49	101	99	99	97	96	93
50	102	100	100	98	97	94
51	104	101	102	100	98	95
52	105	102	103	101	99	97
53	106	103	104	102	100	98
54	107	105	105	103	102	99
55	108	106	106	104	103	100
56	109	107	107	105	104	101
57	110	108	108	106	105	102
58	111	109	109	107	106	103
59	113	110	110	108	107	104
60	114	111	111	109	108	105
Max Temp:	114	111	111	109	108	105
Max Allowed:	392	391	391	392	392	391

OMEGA POINT LABORATORIES

Time (min)	TC # 142 (°F)	TC # 143 (°F)	TC # 144 (°F)	TC # 145 (°F)	TC # 146 (°F)	TC # 147 (°F)
0	66	67	67	66	66	67
1	66	67	67	66	66	67
2	66	67	67	66	66	67
3	66	67	67	66	66	67
4	66	67	67	66	66	67
5	66	67	67	66	67	67
6	66	67	67	67	67	68
7	66	67	67	67	68	68
8	66	67	67	68	69	69
9	66	67	67	68	71	71
10	66	67	67	70	73	72
11	66	67	67	71	75	74
12	66	67	67	73	77	76
13	66	67	67	74	80	79
14	66	67	67	76	83	81
15	66	67	67	79	86	84
16	66	67	67	81	89	87
17	67	67	67	83	93	90
18	67	67	67	86	96	93
19	67	67	67	88	99	96
20	67	68	68	91	102	99
21	67	68	68	93	106	102
22	68	68	68	96	109	105
23	68	68	68	99	112	108
24	68	69	68	101	116	111
25	69	69	69	104	119	115
26	70	69	69	107	122	117
27	70	70	69	109	125	120
28	70	70	70	112	128	123
29	71	71	70	115	131	126
30	72	71	70	117	134	129
31	73	72	71	119	137	132
32	73	72	71	122	140	135
33	74	73	72	124	143	137
34	75	74	72	127	145	140
35	76	74	73	129	148	143
36	77	75	73	131	151	145
37	78	76	74	134	153	148
38	79	77	75	136	156	151
39	80	78	75	138	158	153
40	81	79	76	140	161	156

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 142 (°F)	TC # 143 (°F)	TC # 144 (°F)	TC # 145 (°F)	TC # 146 (°F)	TC # 147 (°F)
41	82	79	77	143	163	158
42	83	80	78	145	166	161
43	84	81	78	147	168	163
44	85	82	79	149	171	165
45	86	83	80	151	173	168
46	87	84	81	153	175	170
47	88	85	82	155	178	173
48	89	86	82	157	180	175
49	90	87	83	159	182	178
50	91	88	84	161	184	180
51	93	89	85	163	186	182
52	94	90	86	165	188	185
53	95	91	87	166	189	187
54	96	92	88	168	191	189
55	97	93	88	170	193	191
56	98	94	89	171	194	193
57	99	95	90	173	195	194
58	100	95	91	174	196	196
59	101	96	91	176	198	197
60	102	97	92	177	199	198
Max Temp:	102	97	92	177	199	198
Max Allowed:	391	392	392	391	391	392

OMEGA POINT LABORATORIES

Time (min)	TC # 148 (°F)	TC # 149 (°F)	TC # 150 (°F)	TC # 151 (°F)	TC # 152 (°F)	TC # 153 (°F)
0	67	60	66	66	66	66
1	67	60	66	66	66	66
2	67	60	66	66	66	66
3	67	60	66	66	66	66
4	67	60	66	66	66	66
5	67	60	66	66	66	66
6	67	60	66	66	66	66
7	67	60	66	66	66	66
8	68	60	66	66	66	66
9	68	60	66	66	66	66
10	69	60	66	66	66	66
11	70	61	66	66	66	66
12	71	61	66	66	66	66
13	72	62	67	67	66	66
14	73	63	67	67	67	67
15	75	63	68	67	67	67
16	77	64	68	67	67	67
17	79	65	69	68	67	67
18	81	67	69	68	68	68
19	83	68	70	69	68	68
20	85	69	71	70	69	68
21	87	71	72	70	69	69
22	89	73	73	71	70	70
23	92	74	75	72	71	70
24	94	76	76	73	72	71
25	97	78	78	75	73	72
26	99	80	79	76	74	73
27	102	82	81	77	75	74
28	104	84	82	79	77	75
29	107	86	84	80	78	77
30	109	88	86	82	79	78
31	112	90	88	83	81	79
32	114	92	90	85	82	81
33	117	95	91	86	84	82
34	119	97	93	88	86	84
35	122	99	95	90	87	85
36	124	101	97	92	89	87
37	127	103	99	94	90	89
38	129	106	101	95	92	90
39	131	108	103	97	94	92
40	134	110	105	99	95	93

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 148 (°F)	TC # 149 (°F)	TC # 150 (°F)	TC # 151 (°F)	TC # 152 (°F)	TC # 153 (°F)
41	136	112	107	101	97	95
42	138	120	109	102	99	97
43	141	123	111	104	100	98
44	143	125	113	106	102	100
45	145	127	115	108	104	101
46	148	129	117	110	105	103
47	150	131	119	111	107	104
48	152	133	121	113	108	105
49	154	129	123	115	110	107
50	157	132	125	117	112	108
51	159	134	127	118	113	110
52	162	136	129	120	115	111
53	164	145	131	122	117	113
54	167	141	133	124	118	114
55	170	148	135	126	120	116
56	172	149	138	128	122	118
57	175	148	140	130	124	119
58	177	156	142	132	126	121
59	179	154	144	134	128	123
60	180	155	147	136	130	125
Max Temp:	180	156	147	136	130	125
Max Allowed:	392	385	391	391	391	391

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 154 (°F)	TC # 155 (°F)	TC # 156 (°F)	TC # 157 (°F)	TC # 158 (°F)	TC # 159 (°F)
0	66	66	67	66	66	66
1	66	66	67	66	66	66
2	66	66	67	66	66	66
3	66	66	67	66	66	66
4	66	67	67	66	66	66
5	66	67	67	66	66	66
6	66	67	67	66	66	66
7	66	67	67	66	66	66
8	66	67	67	66	66	66
9	66	67	67	66	66	66
10	66	67	67	66	66	66
11	66	67	67	67	66	66
12	66	67	67	67	66	66
13	66	67	67	67	66	66
14	66	67	67	67	66	67
15	67	67	67	67	66	67
16	67	67	68	67	66	67
17	67	67	68	67	67	67
18	68	68	68	68	67	67
19	68	68	68	68	67	68
20	68	68	69	68	68	68
21	69	69	69	69	68	69
22	69	69	70	69	68	69
23	70	70	70	70	69	70
24	71	71	71	71	70	70
25	72	72	72	71	71	71
26	73	72	73	72	72	72
27	74	73	74	73	72	73
28	75	74	75	74	73	74
29	76	75	76	75	74	75
30	77	77	77	76	75	76
31	78	78	78	77	77	77
32	80	79	79	79	78	78
33	81	81	81	80	79	79
34	83	82	82	81	81	81
35	84	83	83	83	82	82
36	86	85	85	84	83	83
37	87	86	86	86	85	85
38	89	88	88	87	86	86
39	90	89	89	89	88	88
40	92	91	91	90	89	89

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 154 (°F)	TC # 155 (°F)	TC # 156 (°F)	TC # 157 (°F)	TC # 158 (°F)	TC # 159 (°F)
41	93	92	92	91	91	90
42	95	94	94	93	92	92
43	97	95	95	95	93	93
44	98	97	97	96	95	95
45	100	98	98	97	96	96
46	101	100	100	99	98	97
47	102	101	101	100	99	99
48	104	102	102	101	100	100
49	105	104	104	103	102	101
50	106	105	105	104	103	102
51	108	106	106	105	104	104
52	109	108	107	106	105	105
53	110	109	109	108	106	106
54	112	110	110	109	108	107
55	113	112	111	110	109	108
56	115	113	113	111	110	110
57	117	115	114	113	112	111
58	118	116	116	114	113	113
59	120	118	117	116	115	114
60	122	119	119	117	116	115
Max Temp:	122	119	119	117	116	115
Max Allowed:	391	391	392	391	391	391

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 160 (°F)	TC # 161 (°F)	TC # 162 (°F)	TC # 163 (°F)	TC # 164 (°F)	TC # 165 (°F)
0	67	69	69	69	69	70
1	66	69	69	69	69	70
2	66	69	69	69	69	70
3	66	69	69	69	69	70
4	66	69	69	69	69	70
5	66	69	69	69	69	70
6	66	69	69	69	69	70
7	66	69	69	69	69	70
8	66	69	69	69	69	70
9	66	69	69	69	69	70
10	67	69	69	69	69	70
11	67	69	69	69	69	70
12	67	69	69	69	69	70
13	67	69	69	69	69	70
14	67	69	70	69	69	70
15	67	69	70	69	70	71
16	67	69	70	70	70	71
17	67	70	70	70	70	71
18	68	70	70	70	70	71
19	68	70	70	70	70	72
20	68	70	71	70	70	72
21	69	71	71	71	71	72
22	69	71	71	71	71	73
23	70	72	72	72	72	73
24	70	72	72	72	72	74
25	71	73	73	73	73	75
26	72	74	73	73	73	75
27	73	75	74	74	74	76
28	74	75	75	75	75	77
29	75	76	76	76	75	78
30	76	77	77	77	76	78
31	77	78	78	77	77	79
32	78	79	79	79	78	80
33	79	81	80	79	79	81
34	80	82	81	81	80	82
35	81	83	82	81	81	83
36	83	84	83	82	82	84
37	84	85	84	83	83	86
38	86	86	85	84	84	87
39	87	88	87	86	86	88
40	88	89	88	87	87	89

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 160 (°F)	TC # 161 (°F)	TC # 162 (°F)	TC # 163 (°F)	TC # 164 (°F)	TC # 165 (°F)
41	90	90	89	88	88	90
42	91	92	90	89	89	91
43	93	93	91	90	90	93
44	94	95	93	92	92	94
45	95	96	94	93	93	95
46	97	97	96	94	94	97
47	98	99	97	96	96	98
48	99	100	98	97	97	99
49	101	101	100	99	98	100
50	102	103	101	100	99	101
51	103	104	102	101	101	102
52	104	105	103	102	102	103
53	105	106	105	103	103	105
54	106	107	106	104	104	106
55	108	108	107	106	105	107
56	109	109	108	107	106	108
57	110	111	109	108	107	108
58	111	112	110	109	108	109
59	113	113	111	109	109	110
60	114	114	112	111	110	111
Max Temp:	114	114	112	111	110	111
Max Allowed:	392	394	394	394	394	395

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 166 (°F)	TC # 167 (°F)	TC # 168 (°F)	TC # 169 (°F)	TC # 170 (°F)	TC # 171 (°F)
0	70	70	70	69	69	69
1	70	70	70	69	69	69
2	70	70	70	69	69	69
3	70	70	70	69	69	69
4	70	70	70	69	69	69
5	70	70	70	69	69	69
6	70	70	70	69	70	69
7	70	70	70	70	70	69
8	70	70	70	70	70	70
9	70	70	70	70	71	70
10	70	70	70	71	72	71
11	70	70	70	72	73	72
12	70	70	70	73	75	73
13	70	70	70	75	76	75
14	71	70	70	76	78	76
15	71	70	70	78	79	78
16	71	70	70	79	81	80
17	71	70	71	81	83	82
18	72	71	71	83	85	84
19	72	71	71	85	88	86
20	72	71	71	87	90	88
21	73	72	71	89	92	91
22	73	72	72	91	95	93
23	74	72	72	94	97	96
24	74	73	72	96	100	98
25	75	73	72	98	103	101
26	76	74	73	101	105	103
27	77	74	73	103	108	106
28	77	75	73	105	110	109
29	78	76	74	108	113	111
30	79	76	74	110	116	114
31	80	77	75	113	118	117
32	81	78	75	115	121	119
33	82	79	76	117	124	122
34	83	79	77	120	126	124
35	84	80	77	122	129	127
36	85	81	78	124	131	129
37	86	82	79	127	133	132
38	87	83	79	129	136	134
39	88	84	80	131	138	137
40	89	85	81	133	141	139

OMEGA POINT LABORATORIES

Time (min)	TC # 166 (°F)	TC # 167 (°F)	TC # 168 (°F)	TC # 169 (°F)	TC # 170 (°F)	TC # 171 (°F)
41	90	86	81	136	143	142
42	91	87	82	138	145	144
43	93	88	83	140	148	146
44	94	89	84	142	150	149
45	95	90	85	144	153	151
46	96	91	86	146	155	153
47	97	92	86	148	157	156
48	99	93	87	151	160	158
49	100	94	88	153	162	160
50	101	95	89	155	164	163
51	102	96	90	157	166	165
52	103	97	91	159	168	167
53	104	98	92	160	171	170
54	105	99	93	162	173	172
55	106	100	93	164	175	174
56	106	100	94	167	177	176
57	107	101	95	168	179	178
58	108	102	96	171	181	180
59	109	103	97	172	183	182
60	110	104	97	174	185	184
Max Temp:	110	104	97	174	185	184
Max Allowed:	395	395	395	394	394	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 172 (°F)	TC # 173 (°F)	TC # 174 (°F)	TC # 175 (°F)	TC # 176 (°F)	TC # 177 (°F)
0	69	70	69	69	69	68
1	69	70	69	69	69	68
2	69	70	69	69	69	68
3	69	70	69	69	69	68
4	69	70	69	69	69	68
5	69	70	69	69	69	68
6	69	70	69	69	69	68
7	69	70	69	69	69	68
8	70	70	69	69	69	69
9	70	70	69	69	69	69
10	70	70	69	69	69	69
11	71	70	70	69	69	69
12	72	71	70	69	69	69
13	73	72	70	69	70	69
14	74	72	70	70	70	69
15	75	73	71	70	70	69
16	77	74	72	70	71	70
17	78	75	72	71	71	70
18	80	76	73	72	72	71
19	82	77	74	72	72	72
20	84	79	75	73	73	72
21	86	80	76	74	74	73
22	88	82	78	75	75	74
23	90	84	79	76	76	75
24	92	86	80	78	77	76
25	95	87	82	79	78	77
26	97	89	84	80	80	78
27	99	91	85	82	81	80
28	102	93	87	83	82	81
29	104	95	89	85	84	82
30	107	98	91	86	85	84
31	109	100	92	88	87	85
32	111	102	94	90	88	87
33	114	104	96	91	90	88
34	116	106	98	93	92	90
35	119	108	100	95	93	91
36	121	111	102	97	95	93
37	124	113	104	99	97	95
38	126	115	106	100	98	96
39	128	117	108	102	100	98
40	131	119	110	104	102	99

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 172 (°F)	TC # 173 (°F)	TC # 174 (°F)	TC # 175 (°F)	TC # 176 (°F)	TC # 177 (°F)
41	133	122	112	106	103	101
42	135	124	114	108	105	102
43	137	126	116	109	106	104
44	140	128	118	111	108	105
45	142	130	120	113	110	107
46	144	132	122	115	111	108
47	147	135	124	117	113	110
48	149	137	126	119	115	111
49	151	139	129	121	117	113
50	153	141	131	123	118	115
51	156	143	133	125	120	117
52	158	145	135	127	122	118
53	160	148	137	129	124	120
54	162	150	139	131	126	122
55	164	152	142	133	129	124
56	167	154	144	135	131	126
57	169	157	146	137	133	128
58	171	159	148	140	135	130
59	173	161	150	142	137	132
60	175	163	153	144	139	135
Max Temp:	175	163	153	144	139	135
Max Allowed:	394	395	394	394	394	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 178 (°F)	TC # 179 (°F)	TC # 180 (°F)	TC # 181 (°F)	TC # 182 (°F)	TC # 183 (°F)
0	68	68	68	70	69	69
1	68	68	68	70	69	69
2	68	68	68	70	69	69
3	68	68	68	70	69	69
4	68	68	68	70	69	69
5	68	68	68	70	69	69
6	68	68	68	70	69	69
7	68	68	68	70	69	69
8	68	68	68	70	69	69
9	68	68	68	70	69	69
10	69	68	68	70	69	69
11	69	68	68	70	69	69
12	69	68	68	70	70	69
13	69	68	68	70	70	69
14	69	69	69	70	70	70
15	70	69	69	71	70	70
16	70	69	69	71	70	70
17	70	70	70	71	71	70
18	71	70	70	72	71	70
19	72	71	71	72	72	71
20	72	72	72	73	72	71
21	73	73	72	74	73	72
22	74	74	73	74	73	73
23	75	75	74	75	74	73
24	76	76	75	76	75	74
25	77	77	76	77	76	75
26	78	78	77	78	77	76
27	80	79	78	79	78	77
28	81	81	79	80	79	78
29	82	82	81	82	80	79
30	84	83	82	83	82	80
31	85	85	83	84	83	81
32	86	86	85	86	84	82
33	88	88	86	87	85	84
34	90	89	88	88	87	85
35	91	91	89	90	88	86
36	93	92	90	91	90	88
37	94	94	92	93	91	89
38	96	95	93	94	93	90
39	97	97	95	96	94	92
40	99	98	96	97	95	93

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 178 (°F)	TC # 179 (°F)	TC # 180 (°F)	TC # 181 (°F)	TC # 182 (°F)	TC # 183 (°F)
41	100	100	98	99	97	95
42	102	101	99	100	98	96
43	103	102	101	101	100	97
44	105	104	102	103	101	99
45	106	105	103	104	102	100
46	107	106	105	105	104	102
47	109	108	106	107	105	103
48	110	109	107	108	106	104
49	112	110	109	109	108	106
50	113	112	110	111	109	107
51	115	113	112	112	111	108
52	117	115	113	114	112	110
53	118	117	115	115	114	111
54	120	119	117	117	115	113
55	122	121	118	118	117	114
56	124	122	120	120	118	116
57	126	124	122	122	120	117
58	128	126	124	124	122	119
59	130	128	126	126	123	120
60	132	130	127	127	125	122
Max Temp:	132	130	127	127	125	122
Max Allowed:	393	393	393	395	394	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 184 (°F)	TC # 185 (°F)	TC # 186 (°F)	TC # 187 (°F)	TC # 188 (°F)	TC # 189 (°F)
0	69	69	69	68	69	70
1	69	69	69	68	69	70
2	69	69	69	68	69	70
3	69	69	69	68	69	70
4	69	69	69	68	69	70
5	69	69	69	68	69	70
6	69	69	69	68	69	70
7	69	69	69	68	69	70
8	69	69	69	68	69	70
9	69	69	69	68	69	70
10	69	69	69	69	69	70
11	69	69	69	69	69	70
12	69	69	69	69	69	70
13	69	69	69	69	69	70
14	69	69	70	69	69	71
15	70	69	70	69	69	71
16	70	69	70	69	70	71
17	70	70	70	70	70	71
18	70	70	70	70	70	72
19	71	70	71	70	71	72
20	71	71	71	71	71	72
21	72	71	72	72	72	73
22	72	72	72	72	72	73
23	73	72	73	73	73	74
24	73	73	74	74	73	74
25	74	74	75	74	74	75
26	75	75	75	75	75	76
27	76	75	76	76	76	77
28	77	76	77	77	77	77
29	78	77	78	78	77	78
30	79	78	79	79	78	79
31	80	79	80	80	79	80
32	81	81	81	81	80	81
33	82	82	82	82	81	82
34	84	83	84	83	82	83
35	85	84	85	85	84	84
36	86	85	86	86	85	85
37	88	87	88	87	86	86
38	89	88	89	88	87	87
39	91	90	90	90	88	88
40	92	91	91	91	90	89

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 184 (°F)	TC # 185 (°F)	TC # 186 (°F)	TC # 187 (°F)	TC # 188 (°F)	TC # 189 (°F)
41	93	92	93	92	91	90
42	95	94	94	94	92	91
43	96	95	96	95	93	93
44	98	96	97	96	95	94
45	99	98	98	98	96	95
46	100	99	100	99	97	96
47	102	100	101	100	98	97
48	103	102	102	101	99	98
49	104	103	103	102	100	99
50	106	104	104	103	102	100
51	107	106	106	105	103	102
52	108	107	107	106	104	103
53	109	108	108	107	105	104
54	111	109	109	108	106	105
55	112	110	110	109	107	106
56	114	112	111	110	108	107
57	115	113	113	111	109	108
58	117	114	114	113	110	109
59	118	116	115	114	112	110
60	120	117	117	115	113	111
Max Temp:	120	117	117	115	113	111
Max Allowed:	394	394	394	393	394	395

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 190 (°F)	TC # 191 (°F)	TC # 192 (°F)	TC # 193 (°F)	TC # 194 (°F)	TC # 195 (°F)
0	70	69	70	69	69	69
1	70	69	70	69	69	69
2	70	69	70	69	69	69
3	70	69	70	69	69	69
4	70	69	70	69	69	69
5	70	69	70	69	69	69
6	70	69	70	69	69	70
7	70	69	70	69	69	69
8	70	69	70	69	70	70
9	70	69	70	69	70	70
10	70	70	70	70	70	70
11	70	70	70	70	70	70
12	70	70	70	70	71	71
13	70	70	70	71	72	72
14	71	70	70	71	73	73
15	71	70	71	72	74	74
16	71	70	71	73	75	75
17	71	70	71	74	77	77
18	71	70	71	76	79	79
19	72	71	71	77	81	81
20	72	71	71	79	83	83
21	73	71	72	81	86	85
22	73	72	72	82	88	88
23	73	72	72	84	91	90
24	74	73	73	87	94	93
25	75	73	73	89	97	96
26	75	74	73	91	100	99
27	76	74	74	94	103	102
28	77	75	74	96	107	105
29	77	75	75	99	110	109
30	78	76	75	101	113	112
31	79	77	76	104	117	115
32	80	77	76	106	120	118
33	81	78	77	109	123	122
34	82	79	77	111	127	125
35	82	80	78	114	130	128
36	83	81	79	117	133	131
37	84	81	79	120	136	134
38	85	82	80	122	140	138
39	86	83	81	125	143	141
40	88	84	82	128	146	144

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 190 (°F)	TC # 191 (°F)	TC # 192 (°F)	TC # 193 (°F)	TC # 194 (°F)	TC # 195 (°F)
41	89	85	82	130	150	147
42	90	86	83	133	153	150
43	91	87	84	136	157	154
44	92	88	85	139	160	157
45	93	89	86	142	164	161
46	94	90	86	144	167	164
47	95	91	87	147	171	167
48	96	92	88	150	174	171
49	97	93	89	153	177	174
50	98	94	90	155	180	177
51	99	95	91	158	183	180
52	100	96	91	160	187	183
53	101	97	92	163	189	186
54	102	98	93	165	192	189
55	103	99	94	168	194	191
56	104	99	95	170	196	194
57	105	100	95	172	198	196
58	106	101	96	174	200	198
59	107	102	97	176	202	200
60	108	103	98	178	203	202
Max Temp:	108	103	98	178	203	202
Max Allowed:	395	394	395	394	394	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 196 (°F)	TC # 197 (°F)	TC # 198 (°F)	TC # 199 (°F)	TC # 200 (°F)	TC # 201 (°F)
0	69	68	68	68	68	68
1	69	68	68	68	68	69
2	69	68	68	68	68	68
3	69	68	68	68	68	68
4	69	68	68	68	68	69
5	69	68	68	68	68	69
6	69	68	68	68	68	68
7	69	68	68	68	68	69
8	69	68	68	68	68	69
9	69	69	68	68	68	69
10	69	69	69	68	68	69
11	69	69	69	69	69	69
12	69	69	69	69	69	69
13	70	69	69	69	69	69
14	70	70	70	69	70	70
15	71	70	70	70	70	70
16	72	71	71	70	71	71
17	73	71	71	71	71	72
18	74	72	72	72	72	72
19	75	73	73	73	73	73
20	76	74	74	74	74	74
21	78	75	75	75	75	75
22	79	77	76	76	77	77
23	81	78	78	77	78	78
24	83	80	79	79	79	80
25	85	81	81	80	81	81
26	88	83	82	82	83	83
27	90	85	84	84	84	84
28	92	87	86	85	86	86
29	95	89	87	87	88	88
30	97	90	89	88	89	90
31	100	92	91	90	91	91
32	102	94	92	92	93	93
33	105	96	94	94	94	95
34	107	98	96	95	96	97
35	110	100	98	97	98	98
36	112	102	100	99	100	100
37	115	104	102	101	102	102
38	118	107	104	103	104	104
39	120	109	106	105	106	106
40	123	111	108	107	108	108

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 196 (°F)	TC # 197 (°F)	TC # 198 (°F)	TC # 199 (°F)	TC # 200 (°F)	TC # 201 (°F)
41	126	113	110	109	110	110
42	128	115	112	111	112	112
43	131	118	114	113	114	114
44	134	120	116	115	116	116
45	137	123	118	117	118	118
46	140	125	121	119	120	120
47	142	127	123	121	122	122
48	145	130	125	124	124	125
49	148	132	127	126	127	127
50	151	135	129	128	129	129
51	153	137	132	130	131	131
52	156	139	134	133	134	134
53	159	142	136	135	136	136
54	161	144	139	137	138	138
55	164	147	141	140	141	141
56	166	149	144	142	143	143
57	169	152	146	144	146	146
58	172	154	149	147	148	148
59	174	156	151	149	151	151
60	177	159	153	152	153	153
Max Temp:	177	159	153	152	153	153
Max Allowed:	394	393	393	393	393	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 202 (°F)	TC # 203 (°F)	TC # 204 (°F)	TC # 205 (°F)	TC # 206 (°F)	TC # 207 (°F)
0	69	69	69	68	68	68
1	69	69	69	68	68	68
2	69	69	69	68	68	68
3	69	69	69	68	68	68
4	69	69	69	68	68	68
5	69	69	69	68	68	68
6	69	69	69	68	68	68
7	69	69	69	68	68	68
8	69	69	69	68	68	68
9	69	69	69	69	68	68
10	69	69	69	69	68	68
11	70	69	69	69	68	68
12	70	69	69	69	68	68
13	70	70	70	69	69	69
14	70	70	70	69	69	69
15	71	70	70	70	69	69
16	71	71	71	70	70	70
17	72	71	71	70	70	70
18	73	72	72	71	70	71
19	73	73	72	72	71	72
20	74	74	73	72	72	72
21	76	75	74	73	73	73
22	77	76	75	74	74	74
23	78	77	76	75	75	75
24	80	79	77	77	76	76
25	81	80	79	78	77	77
26	83	81	80	79	78	79
27	84	83	82	81	80	80
28	86	85	83	82	81	81
29	88	86	85	84	82	82
30	90	88	86	85	84	84
31	91	90	88	86	85	85
32	93	91	89	88	87	87
33	95	93	91	90	88	88
34	97	95	93	91	90	89
35	99	97	94	93	91	91
36	100	98	96	94	93	92
37	102	100	98	96	94	93
38	104	102	100	97	96	95
39	106	104	101	99	97	97
40	108	106	103	101	99	98

OMEGA POINT LABORATORIES

Time (min)	TC # 202 (°F)	TC # 203 (°F)	TC # 204 (°F)	TC # 205 (°F)	TC # 206 (°F)	TC # 207 (°F)
41	110	108	105	103	100	100
42	112	109	107	104	102	101
43	114	111	109	106	104	103
44	116	113	110	108	105	104
45	118	115	112	110	107	106
46	120	117	114	111	109	108
47	122	120	116	113	111	109
48	124	122	118	115	112	111
49	127	124	120	117	114	113
50	129	126	122	119	116	115
51	131	128	124	121	118	116
52	133	130	126	122	120	118
53	135	132	128	124	121	120
54	138	134	130	126	123	122
55	140	136	132	128	125	124
56	142	139	134	130	127	125
57	145	141	136	133	129	127
58	147	144	138	135	131	129
59	150	146	141	137	133	131
60	152	148	143	139	135	133
Max Temp:	152	148	143	139	135	133
Max Allowed:	394	394	394	393	393	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 208 (°F)	TC # 209 (°F)	TC # 210 (°F)	TC # 211 (°F)	TC # 212 (°F)	TC # 213 (°F)
0	68	67	67	67	67	68
1	68	67	67	67	67	68
2	68	67	67	67	67	68
3	68	67	67	67	67	68
4	68	67	67	67	67	68
5	68	67	67	67	67	68
6	68	67	67	67	67	68
7	68	67	67	67	67	68
8	68	68	67	67	67	68
9	68	68	67	67	67	68
10	68	68	68	67	68	69
11	69	68	68	68	68	69
12	69	68	68	68	68	69
13	69	68	68	68	68	69
14	69	68	68	68	68	69
15	70	68	68	68	68	70
16	70	69	68	68	69	70
17	71	69	69	69	69	70
18	71	70	69	69	69	71
19	72	70	70	70	70	71
20	73	71	70	70	70	72
21	73	72	71	71	71	72
22	74	72	72	72	72	73
23	75	73	73	72	73	74
24	76	74	73	73	73	75
25	78	75	74	74	74	76
26	79	76	75	75	75	77
27	80	77	76	76	76	78
28	81	78	77	77	77	79
29	82	79	78	78	79	80
30	84	81	79	79	80	81
31	85	82	81	80	81	82
32	86	83	82	81	82	83
33	88	84	83	83	83	84
34	89	86	84	84	84	86
35	90	87	86	85	86	87
36	92	88	87	86	87	88
37	93	90	88	88	88	90
38	95	91	89	89	90	91
39	96	92	91	90	91	92
40	98	94	92	91	92	94

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 208 (°F)	TC # 209 (°F)	TC # 210 (°F)	TC # 211 (°F)	TC # 212 (°F)	TC # 213 (°F)
41	99	95	93	93	94	95
42	101	97	95	94	95	97
43	102	98	96	95	97	98
44	104	99	97	97	98	100
45	105	101	99	98	100	101
46	107	102	100	100	101	103
47	109	104	102	101	103	104
48	110	106	104	103	104	106
49	112	107	105	104	106	108
50	114	109	107	106	108	109
51	115	111	108	108	109	111
52	117	112	110	109	111	112
53	119	114	111	111	113	114
54	121	116	113	113	114	116
55	122	117	115	114	116	117
56	124	119	117	116	118	119
57	126	121	118	118	119	120
58	128	123	120	119	121	122
59	129	124	122	121	122	124
60	131	126	123	123	124	126
Max Temp:	131	126	123	123	124	126
Max Allowed:	393	392	392	392	392	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 214 (°F)	TC # 215 (°F)	TC # 216 (°F)	TC # 217 (°F)	TC # 218 (°F)	TC # 219 (°F)
0	68	68	68	68	68	68
1	68	68	68	68	68	68
2	68	68	68	68	68	68
3	68	68	69	68	68	68
4	68	68	69	68	68	68
5	68	68	69	68	68	68
6	68	68	69	68	68	68
7	68	68	69	68	68	68
8	68	68	69	68	68	68
9	68	68	69	68	68	68
10	68	68	69	69	69	68
11	68	68	69	69	69	69
12	69	68	69	69	70	69
13	69	68	69	70	70	70
14	69	69	69	70	71	71
15	69	69	69	71	73	72
16	70	69	69	72	74	73
17	70	70	70	73	75	75
18	71	70	70	74	77	77
19	71	70	70	76	79	79
20	72	71	70	77	82	81
21	73	71	71	79	84	83
22	73	72	71	81	86	86
23	74	73	72	83	89	88
24	75	73	72	85	92	91
25	76	74	73	87	95	93
26	77	75	73	89	97	96
27	78	76	74	91	100	99
28	79	77	74	93	104	102
29	80	77	75	96	107	105
30	81	78	76	98	110	109
31	82	79	77	100	113	112
32	83	80	77	103	116	115
33	84	81	78	105	120	118
34	86	82	79	108	123	121
35	87	83	80	110	126	125
36	88	85	81	112	129	128
37	90	86	81	115	133	131
38	91	87	82	117	136	134
39	92	88	83	120	139	138
40	94	89	84	122	142	141

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 214 (°F)	TC # 215 (°F)	TC # 216 (°F)	TC # 217 (°F)	TC # 218 (°F)	TC # 219 (°F)
41	95	90	85	125	145	144
42	97	91	86	127	149	147
43	98	93	86	130	152	150
44	99	94	87	133	155	153
45	101	95	88	135	158	157
46	102	96	89	138	162	160
47	104	98	90	140	165	164
48	105	99	91	143	169	167
49	107	100	92	146	172	171
50	108	101	93	149	176	174
51	110	103	94	151	179	178
52	111	104	95	154	182	181
53	113	105	96	156	185	184
54	114	107	97	159	188	187
55	116	108	98	162	191	190
56	117	109	99	164	194	193
57	119	111	100	167	196	195
58	120	112	101	169	198	198
59	122	113	102	171	200	200
60	124	115	103	173	202	202
Max Temp:	124	115	103	173	202	202
Max Allowed:	393	393	393	393	393	393

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 220 (°F)	TC # 221 (°F)	TC # 222 (°F)	TC # 223 (°F)	TC # 224 (°F)	TC # 225 (°F)
0	68	69	68	67	68	69
1	68	69	68	67	68	69
2	68	69	68	67	68	69
3	68	69	68	67	68	69
4	68	69	68	67	68	69
5	68	69	68	67	68	69
6	68	69	68	67	68	69
7	68	69	68	67	68	69
8	68	69	68	68	68	69
9	68	69	68	68	68	69
10	68	69	68	68	68	69
11	68	69	68	68	68	69
12	68	69	69	68	68	70
13	69	70	69	68	69	70
14	69	70	69	69	69	70
15	70	71	70	69	70	71
16	71	71	70	70	70	72
17	72	72	71	71	71	72
18	73	73	72	72	72	73
19	74	74	73	73	73	74
20	75	75	74	74	74	75
21	77	76	75	75	75	76
22	79	78	76	76	77	77
23	81	79	78	78	79	79
24	82	81	79	79	80	80
25	84	82	81	81	82	82
26	86	84	82	82	83	84
27	89	86	84	84	85	85
28	91	88	86	86	87	87
29	93	90	88	87	88	89
30	96	91	89	89	90	90
31	98	93	91	91	92	92
32	100	95	93	92	93	93
33	103	97	94	94	95	95
34	106	99	96	95	97	97
35	108	101	98	97	98	98
36	111	102	99	99	100	100
37	113	104	101	100	101	101
38	116	106	103	102	102	103
39	119	108	104	103	104	104
40	121	110	106	105	106	106

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 220 (°F)	TC # 221 (°F)	TC # 222 (°F)	TC # 223 (°F)	TC # 224 (°F)	TC # 225 (°F)
41	124	112	108	107	107	107
42	127	114	110	108	109	109
43	129	117	112	110	111	111
44	132	119	114	112	113	113
45	135	121	116	114	115	114
46	138	124	118	116	116	116
47	141	126	120	118	118	118
48	144	129	122	120	120	120
49	147	131	124	122	122	122
50	150	134	126	124	124	124
51	153	136	129	126	126	126
52	156	139	131	128	128	128
53	159	141	133	130	130	130
54	162	144	135	132	133	132
55	164	146	138	135	135	134
56	167	149	140	137	137	136
57	170	151	142	139	139	138
58	172	154	145	141	141	141
59	175	156	147	144	144	143
60	177	158	150	146	146	145
Max Temp:	177	158	150	146	146	145
Max Allowed:	393	394	393	392	393	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 226 (°F)	TC # 227 (°F)	TC # 228 (°F)	TC # 229 (°F)	TC # 230 (°F)	TC # 231 (°F)
0	69	69	69	70	70	69
1	69	69	69	70	70	69
2	69	69	69	70	70	69
3	69	69	69	70	70	69
4	69	69	69	70	70	69
5	69	69	69	70	70	69
6	69	69	69	70	70	69
7	69	69	69	70	70	69
8	69	69	69	70	70	69
9	69	69	69	70	70	69
10	69	69	69	70	70	69
11	70	69	69	70	70	70
12	70	69	69	70	70	70
13	70	70	70	70	70	70
14	70	70	70	71	71	70
15	71	70	70	71	71	71
16	71	71	71	72	71	71
17	72	71	71	72	72	72
18	73	72	72	73	72	72
19	74	73	72	73	73	73
20	75	74	73	74	74	74
21	76	75	74	75	75	75
22	77	76	75	76	76	76
23	79	77	77	77	77	77
24	80	79	78	79	78	78
25	81	80	79	80	80	79
26	83	81	81	81	81	80
27	84	83	82	83	82	82
28	86	85	84	84	84	83
29	88	86	85	86	85	84
30	90	88	87	87	86	85
31	91	89	88	89	88	87
32	93	91	90	90	89	88
33	94	93	91	91	91	89
34	96	94	93	93	92	91
35	97	96	94	94	93	92
36	99	97	96	96	95	93
37	100	99	97	97	96	94
38	102	100	99	99	97	96
39	104	102	100	100	99	97
40	105	103	102	101	100	98

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 226 (°F)	TC # 227 (°F)	TC # 228 (°F)	TC # 229 (°F)	TC # 230 (°F)	TC # 231 (°F)
41	107	105	103	102	101	99
42	109	106	105	104	102	100
43	110	108	106	105	104	102
44	112	110	108	107	105	103
45	114	111	109	108	107	104
46	116	113	111	110	108	106
47	118	115	113	112	110	107
48	120	117	115	113	111	109
49	122	119	116	115	113	110
50	124	121	118	117	115	112
51	125	123	120	118	116	113
52	127	124	122	120	118	115
53	129	126	124	122	120	117
54	131	128	126	124	121	118
55	134	130	128	126	123	120
56	136	133	130	127	125	122
57	138	135	132	129	127	124
58	140	137	134	131	128	125
59	142	139	136	133	130	127
60	145	141	138	135	132	129
Max Temp:	145	141	138	135	132	129
Max Allowed:	394	394	394	395	395	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 232 (°F)	TC # 233 (°F)	TC # 234 (°F)	TC # 235 (°F)	TC # 236 (°F)	TC # 237 (°F)
0	69	69	69	69	69	70
1	70	69	69	69	69	70
2	70	69	69	69	69	70
3	69	69	69	69	69	70
4	69	69	69	69	69	70
5	69	69	69	69	69	70
6	70	69	69	69	69	70
7	70	69	69	69	69	70
8	70	69	69	69	69	70
9	70	69	69	69	69	70
10	70	69	69	69	69	70
11	70	69	69	69	70	70
12	70	69	69	69	70	70
13	70	69	69	69	70	70
14	70	69	70	70	70	70
15	70	70	70	70	70	71
16	71	70	70	70	70	71
17	71	70	70	70	70	71
18	72	71	71	71	71	71
19	72	71	71	71	71	72
20	73	72	72	72	72	72
21	73	72	72	72	72	73
22	74	73	73	73	73	73
23	75	74	74	73	73	74
24	76	75	74	74	74	75
25	77	75	75	75	75	76
26	78	77	76	76	76	76
27	79	78	77	77	77	77
28	80	79	78	77	78	78
29	81	80	79	79	79	79
30	82	81	80	79	80	80
31	84	82	81	81	81	81
32	85	83	82	82	82	82
33	86	84	84	83	83	83
34	87	86	85	84	84	84
35	89	87	86	85	85	86
36	90	88	87	86	86	87
37	91	89	88	87	88	88
38	92	90	90	88	89	89
39	93	91	91	90	90	90
40	95	93	92	91	91	91

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 232 (°F)	TC # 233 (°F)	TC # 234 (°F)	TC # 235 (°F)	TC # 236 (°F)	TC # 237 (°F)
41	96	94	93	92	92	93
42	97	95	94	93	93	94
43	99	97	96	94	95	95
44	100	98	97	96	96	96
45	101	99	98	97	97	97
46	102	100	99	98	98	99
47	104	101	100	99	100	100
48	105	103	102	100	101	101
49	106	104	103	102	102	103
50	108	106	104	103	104	104
51	109	107	106	104	105	105
52	111	108	107	106	106	107
53	112	110	108	107	108	108
54	114	111	110	109	109	109
55	115	113	111	110	111	111
56	117	114	113	111	112	112
57	119	116	115	113	114	114
58	120	117	116	115	115	115
59	122	119	118	116	117	117
60	124	121	119	117	118	118
Max Temp:	124	121	119	117	118	118
Max Allowed:	394	394	394	394	394	395

OMEGA POINT LABORATORIES

Time (min)	TC # 238 (°F)	TC # 239 (°F)	TC # 240 (°F)
0	70	69	70
1	70	69	70
2	70	69	70
3	70	70	70
4	70	70	70
5	70	70	70
6	70	70	70
7	70	70	70
8	70	70	70
9	70	70	70
10	70	70	70
11	70	70	70
12	70	70	70
13	70	70	70
14	70	70	70
15	70	71	70
16	71	71	71
17	71	71	71
18	72	72	71
19	72	72	72
20	73	73	72
21	73	73	72
22	74	74	73
23	75	75	73
24	75	76	73
25	76	77	74
26	77	77	75
27	78	78	75
28	79	79	76
29	80	80	77
30	81	81	77
31	82	82	78
32	83	83	79
33	84	84	79
34	86	85	80
35	87	86	81
36	88	87	82
37	89	88	82
38	90	89	83
39	91	90	84
40	92	91	85

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	TC # 238 (°F)	TC # 239 (°F)	TC # 240 (°F)
41	93	92	86
42	95	93	86
43	96	95	87
44	97	96	88
45	98	97	89
46	100	98	90
47	101	99	90
48	102	100	91
49	103	101	92
50	105	103	93
51	106	104	94
52	108	105	95
53	109	106	96
54	110	107	97
55	111	109	97
56	113	110	98
57	114	111	99
58	116	112	100
59	117	113	101
60	118	115	102
Max Temp:	118	115	102
Max Allowed:	395	394	395

Time (min)	TC # 241 (°F)	TC # 242 (°F)	TC # 243 (°F)	TC # 244 (°F)	TC # 245 (°F)	TC # 246 (°F)
0	70	70	69	69	71	70
1	70	70	69	69	71	70
2	70	70	69	69	71	70
3	70	70	70	69	71	70
4	70	70	70	69	71	70
5	71	72	72	70	71	70
6	73	74	74	70	71	70
7	75	77	77	72	71	70
8	77	81	81	73	72	70
9	80	85	85	75	72	70
10	83	90	89	77	73	71
11	86	95	94	80	74	71
12	90	100	99	83	75	72
13	94	106	104	86	77	73
14	97	111	109	89	79	74
15	101	116	113	92	81	75
16	105	120	118	95	82	77
17	108	125	123	99	85	78
18	112	130	127	102	87	80
19	115	135	131	106	90	82
20	119	139	136	109	92	84
21	122	143	140	113	95	86
22	126	147	144	116	98	88
23	129	151	148	120	100	90
24	132	155	152	123	103	92
25	135	159	156	126	106	95
26	138	163	160	130	108	97
27	141	167	164	133	111	99
28	144	170	167	136	114	101
29	147	174	172	140	117	104
30	150	178	175	143	119	106
31	153	181	179	146	122	108
32	156	185	182	149	125	110
33	159	188	185	152	127	113
34	162	192	188	155	130	115
35	165	196	191	158	133	117
36	169	198	195	162	136	120
37	172	201	198	164	138	122
38	176	204	201	167	141	124
39	182	207	203	170	144	127
40	185	209	206	173	146	129

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 241 (°F)	TC # 242 (°F)	TC # 243 (°F)	TC # 244 (°F)	TC # 245 (°F)	TC # 246 (°F)
41	185	211	208	176	149	132
42	187	212	210	179	151	134
43	190	214	211	181	154	136
44	191	214	212	183	156	139
45	193	215	213	186	159	141
46	195	216	214	188	161	144
47	196	217	215	189	163	146
48	198	217	215	191	166	148
49	199	218	216	193	168	151
50	201	219	217	194	170	153
51	202	220	218	196	172	155
52	204	221	219	197	174	157
53	205	223	221	198	176	160
54	207	224	222	200	178	162
55	208	225	223	201	179	164
56	210	226	224	202	181	166
57	211	228	226	204	183	168
58	212	230	228	205	185	170
59	213	232	230	207	187	172
60	213	234	232	208	188	174
Max Temp:	213	234	232	208	188	174
Max Allowed:	395	395	394	394	396	395

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 247 (°F)	TC # 248 (°F)	TC # 249 (°F)	TC # 250 (°F)	TC # 251 (°F)	TC # 252 (°F)
0	70	70	70	70	69	69
1	70	70	70	70	69	69
2	70	70	70	70	69	70
3	70	70	70	70	69	69
4	70	70	70	70	69	70
5	70	70	70	70	69	70
6	70	70	70	70	69	70
7	70	70	70	70	69	70
8	70	70	70	70	69	70
9	70	70	70	70	70	70
10	71	70	70	70	70	70
11	71	71	71	71	70	70
12	72	71	71	71	71	71
13	72	72	72	72	71	71
14	73	72	72	72	72	72
15	74	73	73	73	73	73
16	75	74	74	74	74	74
17	77	75	75	75	75	75
18	78	76	76	76	76	76
19	80	78	77	77	77	77
20	81	79	78	79	79	78
21	83	81	80	80	80	79
22	85	82	81	82	81	81
23	86	84	83	83	83	82
24	88	86	84	85	84	83
25	90	87	86	86	86	85
26	92	89	88	88	87	86
27	94	90	89	89	89	88
28	95	92	91	91	90	89
29	97	93	92	92	91	90
30	99	95	93	94	93	91
31	101	97	95	95	94	93
32	103	99	97	96	95	94
33	105	100	98	98	97	96
34	107	102	100	99	98	97
35	109	104	101	101	100	99
36	111	106	103	102	101	100
37	114	108	105	104	103	101
38	116	110	106	105	104	103
39	118	111	108	107	106	104
40	120	113	110	109	108	106

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 247 (°F)	TC # 248 (°F)	TC # 249 (°F)	TC # 250 (°F)	TC # 251 (°F)	TC # 252 (°F)
41	122	116	112	110	109	108
42	124	118	113	112	111	109
43	127	120	115	114	112	111
44	129	122	117	116	114	112
45	131	124	119	117	116	114
46	133	126	121	119	118	116
47	136	128	123	121	119	117
48	138	130	125	123	121	119
49	140	132	127	125	123	121
50	142	135	129	127	125	123
51	145	137	132	129	127	124
52	147	139	134	131	129	126
53	149	141	136	133	131	128
54	151	144	138	135	133	130
55	154	146	140	138	135	132
56	156	148	142	140	137	134
57	158	150	145	142	139	136
58	160	152	147	144	141	138
59	162	154	149	146	143	140
60	165	157	151	148	145	142
Max Temp:	165	157	151	148	145	142
Max Allowed:	395	395	395	395	394	394

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 253 (°F)	TC # 254 (°F)	TC # 255 (°F)	TC # 256 (°F)	TC # 257 (°F)	TC # 258 (°F)
0	71	70	70	70	61	61
1	71	70	70	70	61	61
2	71	70	70	70	62	61
3	71	70	70	70	62	61
4	71	70	70	70	62	61
5	71	70	70	70	62	61
6	71	70	70	70	62	62
7	71	70	70	70	63	62
8	71	70	70	70	63	62
9	71	71	70	71	63	62
10	71	71	70	71	63	63
11	72	71	71	71	64	63
12	72	72	71	72	64	63
13	72	72	72	72	65	64
14	73	72	72	73	65	64
15	74	73	73	73	66	65
16	74	74	74	74	67	66
17	75	75	75	75	68	66
18	76	76	76	76	69	67
19	77	77	77	77	70	68
20	79	78	78	78	71	69
21	80	80	79	79	72	70
22	81	81	80	81	73	72
23	83	82	82	82	75	73
24	84	83	83	83	76	74
25	85	85	84	84	77	75
26	86	86	86	86	79	77
27	88	87	87	87	80	78
28	89	89	88	88	81	80
29	90	90	89	90	83	81
30	92	91	91	91	84	83
31	93	93	92	92	86	84
32	94	94	93	94	87	86
33	96	95	95	95	89	87
34	97	97	96	97	90	89
35	99	98	98	98	92	90
36	100	100	99	99	93	92
37	101	101	101	101	95	93
38	103	102	102	102	96	95
39	104	104	104	104	98	96
40	106	106	105	105	99	98

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 253 (°F)	TC # 254 (°F)	TC # 255 (°F)	TC # 256 (°F)	TC # 257 (°F)	TC # 258 (°F)
41	108	107	107	107	101	99
42	109	109	108	108	102	101
43	111	110	110	110	104	102
44	112	112	111	111	106	104
45	114	114	113	113	107	106
46	116	115	115	115	109	107
47	117	117	117	116	110	109
48	119	119	118	118	112	110
49	121	120	120	120	114	112
50	122	122	122	121	115	114
51	124	124	124	123	117	115
52	126	126	125	125	119	117
53	128	128	127	127	121	119
54	130	129	129	129	122	120
55	131	131	131	130	124	122
56	133	133	133	132	126	124
57	135	135	135	134	128	126
58	137	137	136	136	129	127
59	139	139	138	138	131	129
60	141	141	140	139	133	131
Max Temp:	141	141	140	139	133	131
Max Allowed:	396	395	395	395	386	386

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 259 (°F)	TC # 260 (°F)	TC # 261 (°F)	TC # 262 (°F)	TC # 263 (°F)	TC # 264 (°F)
0	61	60	61	60	60	60
1	61	60	61	60	61	60
2	61	60	61	61	61	60
3	61	61	62	61	61	61
4	61	61	62	61	61	61
5	61	61	62	61	61	61
6	62	61	62	61	61	61
7	62	61	62	61	62	61
8	62	61	63	62	62	61
9	62	62	63	62	62	62
10	63	62	63	62	63	62
11	63	62	63	63	63	62
12	63	63	64	63	63	62
13	64	63	64	63	64	63
14	64	64	65	64	64	63
15	65	65	66	65	65	64
16	66	65	66	66	66	64
17	66	66	67	66	66	65
18	67	67	68	67	67	65
19	68	68	70	68	68	66
20	70	70	71	70	69	67
21	71	71	72	71	70	67
22	72	72	73	72	71	68
23	73	73	74	73	72	69
24	74	74	75	74	73	70
25	76	76	77	75	74	71
26	77	77	78	77	76	72
27	78	78	79	78	77	73
28	80	80	81	79	78	74
29	81	81	82	81	79	75
30	83	82	83	82	81	76
31	84	84	84	83	82	77
32	86	85	86	84	83	78
33	87	87	87	86	85	80
34	89	88	89	87	86	81
35	90	90	90	89	87	82
36	91	91	91	90	89	83
37	93	93	93	91	90	84
38	94	94	95	93	91	86
39	96	96	96	94	93	87
40	97	97	97	96	94	88

OMEGA POINT LABORATORIES

Time (min)	TC # 259 (°F)	TC # 260 (°F)	TC # 261 (°F)	TC # 262 (°F)	TC # 263 (°F)	TC # 264 (°F)
41	99	99	99	97	95	89
42	100	100	100	99	97	90
43	102	102	102	100	98	91
44	103	103	103	101	99	93
45	105	105	105	103	100	94
46	106	106	106	104	102	95
47	108	108	108	106	103	96
48	109	109	109	107	104	97
49	111	111	111	108	106	98
50	113	112	112	110	107	99
51	115	114	114	111	108	100
52	116	116	115	113	109	101
53	118	117	117	114	111	102
54	120	119	118	116	112	103
55	121	120	120	117	113	104
56	123	122	121	118	114	105
57	125	124	123	120	115	106
58	126	125	125	121	117	107
59	128	127	126	123	118	108
60	129	129	128	124	119	109
Max Temp:	129	129	128	124	119	109
Max Allowed:	386	385	386	385	385	385

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 265 (°F)	TC # 266 (°F)	TC # 267 (°F)	TC # 268 (°F)	TC # 269 (°F)	TC # 270 (°F)
0	61	61	61	60	61	59
1	62	61	61	60	61	59
2	62	61	61	60	61	60
3	62	62	61	60	61	60
4	63	63	62	61	62	60
5	65	64	64	61	62	60
6	67	67	66	61	62	60
7	70	71	68	62	62	61
8	73	75	72	64	63	61
9	76	79	75	65	63	61
10	80	84	79	67	64	61
11	83	89	83	69	65	62
12	87	94	87	71	66	63
13	91	99	92	74	67	63
14	95	104	96	77	69	64
15	99	109	101	79	70	66
16	103	114	105	82	72	67
17	106	118	110	86	74	68
18	110	123	115	89	76	70
19	114	128	119	92	79	72
20	118	132	124	95	81	74
21	121	137	128	99	83	75
22	125	141	133	102	86	77
23	128	145	137	106	88	79
24	132	150	142	109	91	81
25	135	154	146	113	94	83
26	138	158	150	116	96	86
27	142	162	155	119	99	88
28	145	166	159	122	102	90
29	148	170	164	126	104	92
30	151	174	168	129	107	94
31	154	178	172	133	110	97
32	157	181	176	136	112	99
33	160	185	180	139	115	102
34	164	189	183	142	118	104
35	167	192	187	145	121	106
36	171	196	191	148	123	109
37	175	199	194	151	126	111
38	179	201	198	154	129	113
39	181	204	201	157	131	116
40	185	206	204	160	134	118

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 265 (°F)	TC # 266 (°F)	TC # 267 (°F)	TC # 268 (°F)	TC # 269 (°F)	TC # 270 (°F)
41	187	207	206	163	137	121
42	190	209	207	166	139	123
43	192	210	208	169	142	126
44	195	211	209	172	145	128
45	197	212	209	175	147	131
46	200	213	210	177	150	133
47	202	214	210	180	152	136
48	204	215	210	182	155	138
49	205	216	211	184	157	140
50	206	218	212	186	160	143
51	207	219	212	188	162	145
52	208	221	214	189	164	148
53	209	223	215	191	166	150
54	210	225	216	192	168	153
55	210	226	217	193	170	155
56	211	229	219	194	172	157
57	212	231	220	196	174	159
58	213	233	222	197	176	161
59	214	235	224	198	178	164
60	215	237	226	199	180	166
Max Temp:	215	237	226	199	180	166
Max Allowed:	386	386	386	385	386	384

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 271 (°F)	TC # 272 (°F)	TC # 273 (°F)	TC # 274 (°F)	TC # 275 (°F)	TC # 276 (°F)
0	59	59	60	59	59	59
1	60	59	61	59	59	59
2	60	59	61	59	59	59
3	60	59	61	60	60	59
4	60	59	61	60	60	59
5	60	60	61	60	60	60
6	61	60	61	60	60	60
7	61	60	62	60	60	60
8	61	60	62	61	61	60
9	61	60	62	61	61	61
10	62	61	62	61	61	61
11	62	61	63	61	62	61
12	63	62	63	62	62	62
13	63	62	64	62	63	62
14	64	63	64	63	63	63
15	65	64	65	64	64	64
16	66	65	66	65	65	65
17	67	66	67	66	66	66
18	69	67	68	67	67	67
19	70	68	69	68	68	68
20	72	70	70	69	70	69
21	73	71	72	71	71	70
22	75	73	73	72	72	72
23	77	75	75	74	74	73
24	78	76	76	75	75	74
25	80	78	78	77	77	76
26	82	80	80	79	78	77
27	84	81	81	80	80	79
28	85	83	83	82	81	81
29	87	85	85	84	83	82
30	89	87	86	85	85	84
31	91	88	88	87	86	85
32	93	90	90	88	88	87
33	95	92	91	90	89	88
34	97	94	93	92	91	90
35	100	95	95	93	92	91
36	102	97	96	95	94	93
37	104	99	98	96	95	95
38	106	101	99	98	97	96
39	108	103	101	99	98	98
40	110	105	103	100	100	99

OMEGA POINT LABORATORIES

Time (min)	TC # 271 (°F)	TC # 272 (°F)	TC # 273 (°F)	TC # 274 (°F)	TC # 275 (°F)	TC # 276 (°F)
41	112	107	104	102	101	101
42	115	109	106	103	103	102
43	117	111	108	105	104	104
44	119	113	110	107	106	106
45	122	115	112	109	108	107
46	124	117	113	110	109	109
47	126	119	115	112	111	110
48	128	121	117	114	113	112
49	131	124	119	116	115	114
50	133	126	122	118	117	116
51	136	128	124	120	119	118
52	138	130	126	122	120	120
53	140	133	128	124	122	122
54	143	135	130	126	124	123
55	145	137	132	128	126	125
56	147	140	135	131	128	127
57	150	142	137	133	130	129
58	152	144	139	135	133	131
59	154	147	141	137	135	133
60	156	149	143	139	136	135
Max Temp:	156	149	143	139	136	135
Max Allowed:	384	384	385	384	384	384

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 277 (°F)	TC # 278 (°F)	TC # 279 (°F)	TC # 280 (°F)	TC # 281 (°F)	TC # 282 (°F)
0	61	60	60	59	61	60
1	61	60	60	60	61	60
2	62	60	61	60	61	60
3	62	61	61	60	61	60
4	62	61	61	60	61	60
5	62	61	61	60	62	61
6	62	61	61	61	62	61
7	63	61	61	61	62	61
8	63	61	62	61	62	61
9	63	62	62	61	63	61
10	63	62	62	62	63	62
11	64	62	62	62	63	62
12	64	63	63	62	63	62
13	64	63	63	63	64	63
14	65	64	64	63	64	63
15	66	64	64	64	65	64
16	66	65	65	65	66	64
17	67	66	66	66	67	65
18	68	67	67	67	68	66
19	70	68	68	68	68	67
20	71	69	69	69	70	68
21	72	70	71	70	71	69
22	73	72	72	71	72	70
23	74	73	73	72	73	71
24	76	74	74	74	74	72
25	77	76	76	75	76	74
26	79	77	77	77	77	75
27	80	79	79	78	79	76
28	82	80	80	80	80	78
29	83	82	82	81	82	79
30	85	83	83	83	83	81
31	86	85	85	84	85	82
32	88	86	86	86	86	84
33	90	88	88	87	88	85
34	91	89	89	89	89	87
35	92	91	91	90	91	88
36	94	92	92	92	92	90
37	95	94	93	93	94	91
38	97	95	95	95	95	93
39	98	97	96	96	97	95
40	100	98	98	97	98	96

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 277 (°F)	TC # 278 (°F)	TC # 279 (°F)	TC # 280 (°F)	TC # 281 (°F)	TC # 282 (°F)
41	101	99	99	99	100	98
42	102	101	100	100	101	99
43	104	102	102	102	102	100
44	106	104	103	103	104	102
45	107	105	105	105	105	103
46	109	107	106	106	107	104
47	110	108	108	108	108	106
48	112	110	109	109	109	107
49	113	112	111	111	111	108
50	115	113	113	112	112	109
51	117	115	114	114	114	111
52	119	117	116	115	115	112
53	121	118	118	117	117	114
54	122	120	119	119	118	115
55	124	122	121	120	120	117
56	126	124	123	122	122	118
57	128	126	125	124	123	120
58	130	127	126	126	125	122
59	132	129	128	127	127	123
60	134	131	130	129	128	125
Max Temp:	134	131	130	129	128	125
Max Allowed:	386	385	385	384	386	385

OMEGA POINT LABORATORIES

Time (min)	TC # 283 (°F)	TC # 284 (°F)	TC # 285 (°F)	TC # 286 (°F)	TC # 287 (°F)	TC # 288 (°F)
0	59	59	62	60	60	60
1	60	59	62	60	60	60
2	60	59	62	61	61	60
3	60	59	62	61	61	61
4	60	59	62	61	61	61
5	60	60	63	61	61	61
6	61	60	63	61	61	61
7	61	60	63	61	62	61
8	61	60	63	62	62	61
9	62	61	63	62	62	62
10	62	61	64	62	62	62
11	62	61	64	63	63	62
12	63	62	64	63	63	62
13	64	62	65	63	63	63
14	64	63	66	64	64	63
15	65	64	66	64	64	63
16	66	64	67	65	65	64
17	66	65	68	66	66	64
18	68	66	69	67	66	65
19	68	67	70	68	67	65
20	70	68	71	69	68	66
21	71	69	72	70	69	67
22	72	71	73	71	70	67
23	73	72	74	72	71	68
24	74	73	75	73	72	69
25	75	74	77	75	73	70
26	77	75	78	76	74	71
27	78	77	79	77	75	72
28	80	78	80	78	76	72
29	81	80	82	80	78	73
30	82	81	83	81	79	74
31	84	83	85	82	80	75
32	86	84	86	84	81	76
33	87	86	88	85	83	77
34	89	87	89	87	84	78
35	90	89	91	88	85	79
36	92	90	92	90	87	80
37	93	92	93	91	88	81
38	95	93	95	92	89	82
39	97	95	96	94	91	84
40	98	96	98	95	92	85

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 283 (°F)	TC # 284 (°F)	TC # 285 (°F)	TC # 286 (°F)	TC # 287 (°F)	TC # 288 (°F)
41	100	98	99	97	93	86
42	101	99	100	98	95	87
43	103	100	102	99	96	88
44	104	102	103	100	97	89
45	106	103	104	102	98	91
46	107	104	105	103	100	91
47	108	106	107	104	101	93
48	109	107	108	105	102	94
49	111	108	109	106	103	95
50	113	110	111	108	104	96
51	114	111	112	109	105	97
52	116	113	113	110	106	98
53	117	114	115	111	107	99
54	119	115	116	113	108	100
55	120	117	117	114	109	101
56	122	118	119	115	111	102
57	123	120	120	117	112	103
58	125	122	122	118	113	104
59	126	123	123	119	114	104
60	128	125	125	121	115	105
Max Temp:	128	125	125	121	115	105
Max Allowed:	384	384	387	385	385	385

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 289 (°F)	TC # 290 (°F)	TC # 291 (°F)	TC # 292 (°F)	TC # 293 (°F)	TC # 294 (°F)
0	65	65	65	64	65	65
1	65	65	65	64	65	65
2	65	65	65	64	65	65
3	65	65	65	64	65	65
4	65	65	65	64	65	65
5	66	66	66	64	65	65
6	68	68	68	65	65	65
7	69	70	70	66	66	65
8	72	73	72	66	66	65
9	74	77	75	68	66	66
10	77	81	79	69	67	66
11	80	85	82	71	68	66
12	83	90	86	73	68	67
13	87	95	91	75	70	67
14	90	100	95	78	71	68
15	94	104	99	81	72	69
16	98	109	104	83	74	70
17	101	114	108	86	75	72
18	105	119	112	89	77	73
19	109	123	117	92	80	75
20	112	128	121	95	82	76
21	116	132	125	99	84	78
22	119	136	129	102	86	80
23	123	140	133	105	89	82
24	126	144	137	108	91	84
25	129	148	141	111	94	86
26	133	152	145	115	97	88
27	136	156	148	118	99	90
28	139	159	152	121	102	92
29	142	163	155	124	104	95
30	145	166	159	127	107	97
31	148	170	162	130	109	99
32	151	173	165	133	112	101
33	154	176	167	136	115	103
34	157	179	171	138	117	106
35	159	182	173	141	120	108
36	162	185	176	144	122	110
37	165	188	179	147	125	112
38	167	190	182	149	127	115
39	169	193	184	152	130	117
40	172	195	187	155	132	119

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 289 (°F)	TC # 290 (°F)	TC # 291 (°F)	TC # 292 (°F)	TC # 293 (°F)	TC # 294 (°F)
41	174	197	189	157	135	122
42	176	199	192	160	137	124
43	178	202	194	162	139	126
44	180	204	196	165	142	128
45	183	206	198	167	144	131
46	185	207	199	170	147	133
47	187	209	201	172	149	136
48	188	210	202	174	152	138
49	190	211	204	176	154	140
50	192	212	205	179	156	143
51	193	212	207	181	159	145
52	194	213	208	183	161	147
53	196	214	209	185	163	150
54	197	215	210	187	165	152
55	199	216	210	189	167	154
56	200	217	211	191	170	157
57	202	219	212	193	172	159
58	205	220	213	195	174	161
59	208	221	214	198	176	163
60	208	223	215	200	178	166
Max Temp:	208	223	215	200	178	166
Max Allowed:	390	390	390	389	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 295 (°F)	TC # 296 (°F)	TC # 297 (°F)	TC # 298 (°F)	TC # 299 (°F)	TC # 300 (°F)
0	65	65	65	64	65	64
1	65	65	65	64	65	64
2	65	65	65	64	65	64
3	65	65	65	64	65	64
4	65	65	65	64	65	64
5	65	65	65	65	65	64
6	65	65	65	65	65	64
7	65	65	65	65	65	64
8	65	65	65	65	65	64
9	65	65	65	65	65	64
10	66	65	65	65	65	65
11	66	65	66	66	66	65
12	66	66	66	66	66	65
13	67	66	66	66	66	66
14	67	67	67	67	67	66
15	68	67	68	68	68	67
16	69	68	69	68	68	68
17	70	69	70	70	70	69
18	71	70	71	71	70	70
19	73	72	72	72	72	71
20	74	73	73	73	73	72
21	76	75	75	74	74	73
22	78	76	76	76	75	74
23	79	78	77	77	77	76
24	81	80	79	79	78	77
25	83	81	81	81	80	79
26	85	83	82	82	82	80
27	86	85	84	84	83	82
28	88	87	86	85	85	83
29	90	88	87	87	86	85
30	92	90	89	89	88	86
31	93	92	91	90	89	88
32	95	93	92	92	91	90
33	97	95	94	93	92	91
34	99	96	95	95	94	92
35	101	98	97	96	95	94
36	103	100	98	98	97	95
37	105	101	100	99	98	97
38	107	103	101	101	99	98
39	109	105	103	102	101	99
40	111	107	105	104	102	101

OMEGA POINT LABORATORIES

Time (min)	TC # 295 (°F)	TC # 296 (°F)	TC # 297 (°F)	TC # 298 (°F)	TC # 299 (°F)	TC # 300 (°F)
41	113	108	106	106	104	102
42	115	110	108	107	106	104
43	117	112	110	109	107	105
44	119	114	112	111	109	107
45	122	116	114	113	111	109
46	124	118	116	114	112	110
47	126	121	118	116	114	112
48	128	123	120	118	116	114
49	131	125	122	120	118	116
50	133	127	124	122	120	118
51	135	129	126	124	122	120
52	137	132	128	126	124	121
53	140	134	130	129	126	123
54	142	136	133	131	128	125
55	144	138	135	133	130	127
56	147	141	137	135	132	129
57	149	143	139	137	134	131
58	151	145	141	139	136	133
59	153	147	144	141	138	135
60	156	150	146	144	140	137
Max Temp:	156	150	146	144	140	137
Max Allowed:	390	390	390	389	390	389

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 301 (°F)	TC # 302 (°F)	TC # 303 (°F)	TC # 304 (°F)	TC # 305 (°F)	TC # 306 (°F)
0	65	65	64	65	65	65
1	65	65	64	65	65	65
2	65	65	64	65	65	65
3	65	65	64	65	65	65
4	65	65	64	65	65	65
5	65	65	64	65	65	65
6	65	65	65	65	65	65
7	65	65	65	65	65	65
8	65	65	65	65	65	65
9	65	65	65	65	65	65
10	65	66	65	66	66	65
11	66	66	65	66	66	65
12	66	66	66	66	66	66
13	66	66	66	67	66	66
14	67	67	67	67	67	66
15	67	67	67	68	67	67
16	68	68	68	68	68	68
17	69	69	69	69	69	68
18	70	70	70	70	70	69
19	71	70	70	71	70	70
20	72	72	72	72	72	71
21	73	73	73	73	73	72
22	75	74	74	74	74	73
23	76	75	75	75	75	74
24	77	77	77	77	76	75
25	79	78	78	78	77	76
26	80	79	79	79	79	77
27	82	81	81	81	80	79
28	83	82	82	82	82	80
29	85	84	84	84	83	82
30	86	85	85	85	85	83
31	88	87	87	87	86	85
32	89	88	88	88	88	86
33	91	90	90	90	89	88
34	92	91	91	91	91	89
35	93	93	93	93	92	90
36	95	94	94	94	93	92
37	96	95	95	95	95	93
38	98	97	97	97	96	95
39	99	98	98	98	98	97
40	100	100	100	100	99	98

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 301 (°F)	TC # 302 (°F)	TC # 303 (°F)	TC # 304 (°F)	TC # 305 (°F)	TC # 306 (°F)
41	102	101	101	101	101	99
42	103	102	103	103	102	101
43	105	104	104	104	103	102
44	106	105	106	105	105	103
45	108	107	107	107	106	104
46	109	108	109	108	107	106
47	111	110	110	110	109	107
48	113	112	112	112	110	108
49	115	114	114	113	111	109
50	116	115	115	115	113	111
51	118	117	117	117	115	112
52	120	119	119	118	116	114
53	122	121	121	120	118	116
54	124	122	122	122	120	117
55	125	124	124	124	121	119
56	127	126	126	125	123	121
57	129	128	128	127	125	122
58	131	130	130	129	127	124
59	133	132	132	131	128	126
60	135	134	134	133	130	128
Max Temp:	135	134	134	133	130	128
Max Allowed:	390	390	389	390	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 307 (°F)	TC # 308 (°F)	TC # 309 (°F)	TC # 310 (°F)	TC # 311 (°F)	TC # 312 (°F)
0	65	64	65	65	65	65
1	65	64	65	65	65	65
2	65	64	65	65	65	65
3	65	64	65	65	65	65
4	65	64	65	65	65	65
5	65	65	65	65	65	65
6	65	65	66	65	65	65
7	65	65	66	65	65	65
8	66	65	66	65	65	65
9	66	65	66	65	66	65
10	66	65	66	66	66	65
11	66	66	66	66	66	66
12	66	66	67	66	66	66
13	67	66	67	66	66	66
14	67	67	68	67	67	66
15	68	68	68	68	67	67
16	68	68	69	68	68	67
17	69	69	70	69	69	68
18	70	70	71	70	70	68
19	71	71	72	71	70	69
20	72	72	73	72	71	69
21	73	73	74	73	72	70
22	74	74	75	74	73	71
23	75	75	76	75	74	72
24	76	77	77	77	75	72
25	77	78	79	78	76	73
26	79	79	80	79	77	74
27	80	81	81	80	79	75
28	81	82	82	81	80	76
29	83	83	84	83	81	77
30	84	85	85	84	82	77
31	86	86	87	85	83	79
32	87	88	88	87	84	79
33	89	89	90	88	86	80
34	90	90	91	90	87	81
35	91	92	92	91	88	82
36	93	93	94	92	89	84
37	94	95	95	93	91	84
38	96	96	96	95	92	86
39	97	97	98	96	93	87
40	99	99	99	97	94	88

OMEGA POINT LABORATORIES

Time (min)	TC # 307 (°F)	TC # 308 (°F)	TC # 309 (°F)	TC # 310 (°F)	TC # 311 (°F)	TC # 312 (°F)
41	100	100	100	99	96	89
42	101	101	102	100	97	90
43	102	103	103	101	98	91
44	104	104	104	102	99	92
45	105	105	106	103	100	93
46	106	107	107	105	102	94
47	108	108	108	106	103	95
48	109	110	109	107	104	96
49	110	111	111	108	105	97
50	112	113	112	109	106	98
51	113	114	114	111	107	99
52	115	116	115	112	108	100
53	117	117	117	113	109	101
54	118	119	118	115	109	102
55	120	120	120	116	111	102
56	121	122	121	117	111	103
57	123	124	122	118	113	104
58	125	125	124	120	113	105
59	126	127	126	121	115	106
60	128	128	127	123	116	107
Max Temp:	128	128	127	123	116	107
Max Allowed:	390	389	390	390	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 313 (°F)	TC # 314 (°F)	TC # 315 (°F)	TC # 316 (°F)	TC # 317 (°F)	TC # 318 (°F)
0	66	65	65	64	65	64
1	66	65	65	64	65	64
2	66	65	65	64	65	64
3	66	65	65	65	65	64
4	66	66	66	65	65	64
5	68	67	67	65	66	64
6	69	69	69	66	66	65
7	71	72	72	67	66	65
8	74	75	75	68	66	65
9	77	79	78	70	67	65
10	80	83	81	72	68	66
11	83	88	85	73	68	66
12	87	92	89	76	70	67
13	91	97	93	78	71	68
14	94	102	97	81	72	68
15	98	106	102	83	74	70
16	102	111	106	86	75	71
17	106	115	110	89	77	72
18	109	120	114	92	79	74
19	113	124	118	95	81	76
20	117	129	122	98	84	77
21	120	133	126	101	86	79
22	124	137	129	104	88	81
23	128	141	133	107	91	83
24	131	145	137	110	93	85
25	135	149	141	113	96	87
26	138	153	145	116	98	89
27	142	157	148	119	101	91
28	145	161	152	122	103	94
29	149	165	156	125	106	96
30	153	170	160	128	108	98
31	156	174	164	131	111	100
32	160	178	168	134	113	103
33	163	181	172	137	116	105
34	167	185	175	140	118	107
35	170	189	178	143	121	110
36	173	192	182	146	124	112
37	177	196	185	149	126	114
38	180	199	189	152	129	117
39	183	202	192	154	131	119
40	186	205	195	157	134	121

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 313 (°F)	TC # 314 (°F)	TC # 315 (°F)	TC # 316 (°F)	TC # 317 (°F)	TC # 318 (°F)
41	189	207	198	160	136	124
42	193	209	200	162	139	126
43	197	211	202	165	142	129
44	202	213	206	167	144	131
45	208	213	208	170	147	134
46	211	214	210	173	149	136
47	212	214	210	175	152	138
48	212	214	211	178	154	141
49	212	215	211	180	157	144
50	213	215	212	182	159	146
51	213	215	212	184	161	148
52	214	216	212	185	164	151
53	214	216	212	187	166	153
54	214	217	213	189	168	156
55	215	218	213	190	170	158
56	215	219	214	192	172	160
57	215	220	214	193	174	163
58	216	221	215	194	176	165
59	217	223	216	195	178	167
60	217	225	217	196	180	169
Max Temp:	217	225	217	196	180	169
Max Allowed:	391	390	390	389	390	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 319 (°F)	TC # 320 (°F)	TC # 321 (°F)	TC # 322 (°F)	TC # 323 (°F)	TC # 324 (°F)
0	65	64	66	67	67	67
1	65	64	67	67	67	67
2	65	64	67	67	67	67
3	65	64	66	67	67	67
4	65	64	67	67	67	67
5	65	64	67	67	67	67
6	65	64	67	67	68	67
7	65	64	67	67	68	67
8	65	65	67	67	68	68
9	65	65	67	68	68	68
10	65	65	67	68	68	68
11	66	65	68	68	68	68
12	66	66	68	69	69	69
13	67	66	68	69	70	69
14	68	67	69	70	70	70
15	68	68	70	71	71	71
16	70	69	71	72	72	72
17	71	70	72	73	73	73
18	72	72	73	74	74	74
19	74	73	75	75	75	75
20	75	75	76	77	77	76
21	77	76	78	78	78	77
22	79	78	79	79	80	79
23	81	79	81	81	81	80
24	82	81	82	82	82	82
25	84	83	84	84	84	83
26	86	84	85	86	85	85
27	88	86	87	87	87	86
28	89	88	88	89	88	87
29	91	89	90	90	90	89
30	93	91	92	92	91	90
31	95	92	93	93	93	92
32	97	94	95	95	94	93
33	99	96	96	96	96	95
34	101	97	98	97	97	96
35	103	99	99	99	99	98
36	105	101	101	100	100	99
37	107	103	102	102	102	101
38	109	105	104	104	103	102
39	112	107	106	106	105	104
40	114	109	108	107	107	106

OMEGA POINT LABORATORIES

Time (min)	TC # 319 (°F)	TC # 320 (°F)	TC # 321 (°F)	TC # 322 (°F)	TC # 323 (°F)	TC # 324 (°F)
41	116	111	110	109	108	107
42	118	113	112	111	110	109
43	120	115	114	113	112	111
44	123	117	116	115	114	113
45	125	120	118	117	116	115
46	127	122	120	119	118	117
47	130	124	122	121	120	118
48	132	126	124	123	122	120
49	135	129	126	125	124	122
50	137	131	128	127	126	124
51	139	133	131	129	128	126
52	142	135	133	131	130	128
53	144	138	135	133	132	131
54	146	140	137	135	134	133
55	149	142	140	138	136	135
56	151	145	142	140	138	137
57	154	147	144	142	140	139
58	156	149	146	144	142	141
59	158	152	149	146	145	143
60	160	154	151	148	147	145
Max Temp:	160	154	151	148	147	145
Max Allowed:	390	389	391	392	392	392

OMEGA POINT LABORATORIES

Time (min)	TC # 325 (°F)	TC # 326 (°F)	TC # 327 (°F)	TC # 328 (°F)	TC # 329 (°F)	TC # 330 (°F)
0	67	67	67	67	67	67
1	67	67	67	67	67	67
2	67	67	67	67	67	67
3	67	67	67	67	67	67
4	67	67	67	67	67	67
5	67	67	67	67	67	67
6	67	67	67	67	67	67
7	67	67	67	67	67	67
8	67	67	67	67	67	67
9	67	68	67	68	67	68
10	68	68	68	68	68	68
11	68	68	68	68	68	68
12	68	68	68	68	68	68
13	69	69	69	69	69	69
14	69	70	69	70	69	69
15	70	70	70	70	70	70
16	71	71	71	71	71	71
17	72	72	72	72	72	71
18	73	73	73	73	73	72
19	74	74	74	74	74	73
20	75	75	75	75	75	74
21	77	76	76	77	76	75
22	78	78	77	78	77	76
23	79	79	79	79	79	78
24	81	80	80	80	80	79
25	82	82	81	82	81	80
26	83	83	83	83	82	81
27	85	84	84	84	84	83
28	86	86	86	86	85	84
29	88	87	87	87	87	86
30	89	89	88	89	88	87
31	90	90	90	90	89	88
32	92	91	91	91	91	90
33	93	93	93	93	92	91
34	95	95	94	94	94	93
35	96	96	95	96	95	94
36	98	97	97	97	97	96
37	99	99	98	99	98	97
38	101	100	100	100	99	99
39	103	102	101	102	101	100
40	104	104	103	103	102	101

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 325 (°F)	TC # 326 (°F)	TC # 327 (°F)	TC # 328 (°F)	TC # 329 (°F)	TC # 330 (°F)
41	106	105	104	104	103	103
42	108	107	106	106	105	104
43	109	109	108	108	106	105
44	111	110	109	109	108	106
45	113	112	111	111	109	108
46	115	114	113	112	110	109
47	117	116	114	114	112	111
48	118	118	116	116	113	112
49	120	120	118	117	115	113
50	122	122	120	119	117	115
51	124	124	122	121	118	117
52	126	126	124	123	120	118
53	128	127	126	125	122	120
54	130	129	128	127	124	122
55	132	131	130	129	126	124
56	135	133	131	131	128	125
57	136	135	133	132	130	127
58	139	137	135	135	131	129
59	141	139	137	136	133	131
60	143	141	139	138	135	133
Max Temp:	143	141	139	138	135	133
Max Allowed:	392	392	392	392	392	392

OMEGA POINT LABORATORIES

Time (min)	TC # 331 (°F)	TC # 332 (°F)	TC # 333 (°F)	TC # 334 (°F)	TC # 335 (°F)	TC # 336 (°F)
0	67	68	67	67	67	67
1	67	68	67	67	67	67
2	67	68	67	67	67	67
3	67	68	67	67	67	67
4	67	68	67	67	67	67
5	67	68	67	67	67	67
6	67	68	67	67	67	67
7	68	68	67	67	67	67
8	68	68	67	67	67	67
9	68	68	68	67	67	67
10	68	68	68	67	68	67
11	68	69	68	68	68	68
12	69	69	69	68	68	68
13	69	70	69	69	69	68
14	70	70	70	69	69	68
15	70	71	70	70	70	69
16	71	72	71	71	71	70
17	72	73	72	72	71	70
18	73	74	73	73	72	71
19	74	75	74	74	73	72
20	75	76	76	75	74	72
21	76	77	77	76	75	73
22	77	78	78	77	77	74
23	79	80	79	78	78	75
24	80	81	81	80	79	75
25	81	82	82	81	80	76
26	82	84	83	82	81	77
27	84	85	84	83	82	78
28	85	86	86	84	83	79
29	87	88	87	86	84	80
30	88	89	88	87	86	81
31	89	90	90	88	87	82
32	91	92	91	90	88	83
33	92	93	92	91	89	84
34	93	94	93	92	90	85
35	95	96	95	93	91	86
36	96	97	96	95	93	87
37	98	99	97	96	94	88
38	99	100	99	97	95	89
39	100	101	100	99	96	90
40	102	103	102	100	98	91

Time (min)	TC # 331 (°F)	TC # 332 (°F)	TC # 333 (°F)	TC # 334 (°F)	TC # 335 (°F)	TC # 336 (°F)
41	103	104	103	101	99	92
42	104	105	104	102	100	93
43	106	107	106	104	101	94
44	107	108	107	105	102	95
45	108	109	108	106	103	96
46	110	111	110	107	104	97
47	111	112	111	109	106	98
48	113	114	113	110	106	99
49	114	115	114	111	108	100
50	116	117	116	113	109	101
51	117	119	117	114	110	102
52	119	120	119	116	111	103
53	121	122	120	117	112	104
54	122	124	122	118	113	105
55	124	125	124	120	114	106
56	126	127	125	121	115	106
57	127	128	127	123	117	107
58	129	130	128	124	118	108
59	131	132	130	126	119	109
60	132	133	131	127	120	110
Max Temp:	132	133	131	127	120	110
Max Allowed:	392	393	392	392	392	392

OMEGA POINT LABORATORIES

Time (min)	TC # 337 (°F)	TC # 338 (°F)	TC # 339 (°F)	TC # 340 (°F)	TC # 341 (°F)	TC # 342 (°F)
0	67	67	67	67	67	67
1	67	67	67	67	67	67
2	67	67	67	67	67	67
3	67	67	67	67	67	67
4	68	68	68	67	67	67
5	68	69	69	67	67	67
6	70	71	71	67	67	67
7	72	74	73	68	68	67
8	75	77	76	68	68	67
9	78	81	79	70	68	68
10	82	86	82	71	69	68
11	85	90	86	73	69	68
12	89	95	90	75	70	69
13	93	100	95	77	71	69
14	97	105	99	79	72	70
15	101	110	103	82	74	71
16	105	114	107	85	75	72
17	108	119	111	87	77	74
18	112	124	115	90	79	75
19	116	128	119	93	81	77
20	120	132	124	96	83	78
21	123	137	127	99	85	80
22	127	141	131	102	88	82
23	130	145	135	105	90	83
24	134	149	139	108	92	85
25	137	153	143	111	95	87
26	140	156	147	115	97	89
27	143	160	150	118	99	90
28	147	163	154	120	102	92
29	150	167	157	124	104	94
30	153	171	160	126	107	96
31	156	174	163	129	109	98
32	160	178	167	132	111	100
33	163	182	170	135	114	102
34	166	185	174	138	116	104
35	169	189	177	141	119	107
36	173	192	180	144	121	109
37	176	196	184	147	124	111
38	179	199	187	149	126	113
39	181	204	190	152	129	115
40	185	208	193	155	131	117

OMEGA POINT LABORATORIES

Time (min)	TC # 337 (°F)	TC # 338 (°F)	TC # 339 (°F)	TC # 340 (°F)	TC # 341 (°F)	TC # 342 (°F)
41	187	210	197	158	134	120
42	189	211	200	160	136	122
43	191	212	203	163	138	124
44	193	213	206	166	141	126
45	195	214	209	169	144	129
46	197	214	211	172	146	131
47	199	215	212	175	149	133
48	200	215	212	177	151	136
49	202	216	212	179	153	138
50	203	216	212	181	156	140
51	204	216	213	182	158	142
52	205	217	214	184	160	145
53	206	218	214	185	162	147
54	207	219	214	187	164	149
55	208	221	215	188	166	151
56	209	222	215	190	168	153
57	210	224	216	191	169	155
58	211	226	217	192	171	157
59	212	228	219	194	173	159
60	212	230	221	195	175	161
Max Temp:	212	230	221	195	175	161
Max Allowed:	392	392	392	392	392	392

OMEGA POINT LABORATORIES

Time (min)	TC # 343 (°F)	TC # 344 (°F)	TC # 345 (°F)	TC # 346 (°F)	TC # 347 (°F)	TC # 348 (°F)
0	67	67	67	67	67	67
1	67	67	67	67	67	67
2	67	67	67	67	67	67
3	67	67	67	67	67	67
4	67	67	67	67	67	67
5	67	67	67	67	67	67
6	67	67	67	67	67	67
7	67	67	67	67	67	67
8	67	67	67	67	67	67
9	67	67	67	67	67	67
10	68	68	67	67	68	68
11	68	68	68	68	68	68
12	68	68	68	68	68	68
13	69	69	68	68	69	68
14	70	69	69	69	69	69
15	70	70	69	70	70	70
16	71	71	70	70	71	70
17	72	72	71	71	72	71
18	73	73	72	72	73	72
19	75	74	73	73	74	73
20	76	75	74	75	75	74
21	78	77	76	76	77	76
22	79	78	77	77	78	77
23	81	80	79	79	79	78
24	82	81	80	80	81	80
25	84	83	81	81	82	81
26	85	84	83	83	83	82
27	87	86	84	84	85	84
28	89	87	86	85	86	85
29	90	88	87	87	87	87
30	92	90	89	88	89	88
31	93	91	90	90	90	90
32	95	93	91	91	91	91
33	97	95	93	93	93	92
34	99	96	95	94	94	94
35	100	98	96	95	96	95
36	102	99	97	97	97	96
37	104	101	99	98	98	97
38	106	102	100	100	100	99
39	108	104	102	101	101	100
40	110	106	103	102	102	102

OMEGA POINT LABORATORIES

Time (min)	TC # 343 (°F)	TC # 344 (°F)	TC # 345 (°F)	TC # 346 (°F)	TC # 347 (°F)	TC # 348 (°F)
41	112	108	105	104	104	103
42	114	109	106	105	105	104
43	116	111	108	107	107	106
44	118	113	110	108	108	107
45	120	115	111	110	110	108
46	122	117	113	112	111	110
47	124	119	115	113	113	111
48	126	121	117	115	114	113
49	129	123	119	117	116	114
50	131	125	120	119	118	116
51	133	127	122	121	119	117
52	135	129	124	122	121	119
53	137	131	126	124	123	120
54	139	133	128	126	125	122
55	141	135	130	128	126	124
56	144	137	132	130	128	126
57	145	139	134	132	130	127
58	147	141	136	134	132	129
59	150	143	138	136	134	131
60	152	145	140	138	135	132
Max Temp:	152	145	140	138	135	132
Max Allowed:	392	392	392	392	392	392

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 349 (°F)	TC # 350 (°F)	TC # 351 (°F)	TC # 352 (°F)	TC # 353 (°F)	TC # 354 (°F)
0	68	67	67	67	64	64
1	68	67	67	67	64	65
2	68	67	67	67	64	65
3	68	67	67	67	64	65
4	68	67	67	67	64	65
5	68	67	67	67	64	65
6	68	67	67	67	64	65
7	68	67	67	67	64	65
8	68	67	67	68	64	65
9	68	68	67	68	65	65
10	68	68	68	68	65	65
11	68	68	68	68	65	66
12	68	68	68	68	65	66
13	69	68	68	69	66	66
14	69	69	69	69	66	67
15	70	69	69	70	67	67
16	70	70	70	71	68	68
17	71	71	71	71	68	68
18	72	71	72	72	69	69
19	73	72	73	73	70	70
20	74	73	74	74	71	71
21	75	74	75	75	72	72
22	76	76	76	76	73	73
23	78	77	77	78	75	74
24	79	78	78	79	76	75
25	80	79	80	80	77	76
26	82	81	81	81	78	78
27	83	82	82	83	79	79
28	84	83	84	84	81	80
29	86	85	85	85	82	82
30	87	86	86	87	84	83
31	89	88	88	88	85	85
32	90	89	89	90	87	86
33	92	91	91	91	88	88
34	93	92	92	93	89	89
35	95	93	93	94	91	90
36	96	95	95	95	92	92
37	97	96	96	97	93	93
38	99	98	97	98	95	94
39	100	99	99	99	96	95
40	101	100	100	100	98	97

OMEGA POINT LABORATORIES

Time (min)	TC # 349 (°F)	TC # 350 (°F)	TC # 351 (°F)	TC # 352 (°F)	TC # 353 (°F)	TC # 354 (°F)
41	102	102	101	102	99	98
42	104	103	103	103	100	100
43	105	104	104	105	101	101
44	106	106	106	106	103	102
45	108	107	107	107	104	104
46	109	108	108	109	106	105
47	110	109	109	110	107	106
48	112	111	111	111	108	108
49	113	112	112	113	110	109
50	115	114	113	114	111	110
51	116	115	115	116	112	112
52	118	117	117	117	113	113
53	119	118	118	118	115	114
54	121	120	119	120	116	115
55	122	121	121	121	117	116
56	124	123	122	123	119	118
57	126	125	124	124	120	119
58	127	126	126	126	122	121
59	129	128	127	127	124	122
60	130	129	129	129	125	123
Max Temp:	130	129	129	129	125	123
Max Allowed:	393	392	392	392	389	389

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 355 (°F)	TC # 356 (°F)	TC # 357 (°F)	TC # 358 (°F)	TC # 359 (°F)	TC # 360 (°F)
0	64	64	65	66	65	66
1	64	64	65	66	65	66
2	64	64	66	66	65	66
3	64	64	66	66	65	66
4	64	64	65	66	65	66
5	64	64	66	66	66	66
6	65	64	66	66	65	66
7	64	64	66	66	65	65
8	64	64	66	66	66	66
9	65	65	66	66	66	66
10	65	65	66	66	66	66
11	65	65	66	66	66	66
12	65	65	66	67	66	66
13	66	65	67	67	66	67
14	66	66	67	67	67	67
15	66	66	68	67	67	67
16	67	67	68	68	68	67
17	68	67	69	69	68	68
18	68	68	69	70	69	68
19	69	69	70	70	70	69
20	70	70	71	71	70	69
21	71	70	72	72	71	70
22	72	72	73	73	72	70
23	73	73	74	74	73	71
24	74	74	75	75	74	72
25	75	75	76	76	75	73
26	77	76	77	77	76	73
27	78	77	78	78	77	74
28	79	79	80	80	78	75
29	80	80	81	81	79	76
30	82	81	83	82	81	77
31	83	83	84	84	82	78
32	85	84	86	85	83	79
33	86	86	87	86	84	80
34	88	87	88	88	86	81
35	89	88	89	89	87	82
36	90	90	91	91	88	83
37	92	91	92	92	90	84
38	93	93	94	93	91	85
39	95	94	95	95	92	86
40	96	96	96	96	94	88

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 355 (°F)	TC # 356 (°F)	TC # 357 (°F)	TC # 358 (°F)	TC # 359 (°F)	TC # 360 (°F)
41	97	97	97	97	95	89
42	99	98	99	99	96	90
43	100	99	100	100	98	91
44	101	101	102	101	99	92
45	102	102	103	102	100	93
46	104	103	104	103	101	94
47	105	104	105	104	102	95
48	107	106	106	105	103	96
49	108	107	107	106	104	97
50	109	108	108	108	105	98
51	110	109	109	109	106	99
52	111	110	110	110	107	100
53	112	112	112	111	108	101
54	114	113	113	112	109	102
55	115	114	114	113	110	102
56	116	115	115	115	111	103
57	118	117	117	116	112	104
58	119	118	118	117	113	105
59	120	120	119	118	113	106
60	122	121	120	118	114	106
Max Temp:	122	121	120	118	114	106
Max Allowed:	389	389	390	391	390	391

OMEGA POINT LABORATORIES

Time (min)	TC # 361 (°F)	TC # 362 (°F)	TC # 363 (°F)	TC # 364 (°F)	TC # 365 (°F)	TC # 366 (°F)
0	65	65	64	64	65	64
1	65	64	64	64	65	64
2	65	64	64	64	65	65
3	65	65	64	64	65	65
4	66	65	65	64	65	64
5	67	67	66	65	65	64
6	68	68	67	65	65	65
7	70	71	69	65	65	64
8	71	74	72	66	66	65
9	74	77	75	67	66	65
10	77	81	78	68	66	65
11	80	85	81	70	67	66
12	83	90	85	72	68	66
13	86	95	89	74	69	66
14	90	99	93	76	70	67
15	93	104	97	78	71	68
16	97	108	101	81	72	69
17	100	112	105	83	74	70
18	104	117	109	86	76	71
19	107	120	112	89	77	72
20	111	124	116	91	79	73
21	114	129	120	94	81	75
22	117	132	123	97	83	77
23	120	136	127	100	85	79
24	124	140	131	102	87	80
25	127	144	134	106	90	82
26	130	147	138	108	92	84
27	133	151	141	111	94	86
28	136	154	144	114	96	87
29	139	157	147	117	98	89
30	142	160	151	119	101	91
31	145	164	154	122	103	93
32	148	167	157	125	106	95
33	151	170	160	127	108	97
34	153	173	163	130	110	99
35	156	176	166	133	112	101
36	159	179	169	135	115	103
37	162	182	172	138	117	105
38	164	185	174	140	119	107
39	167	188	177	143	122	109
40	169	190	180	145	124	111

Time (min)	TC # 361 (°F)	TC # 362 (°F)	TC # 363 (°F)	TC # 364 (°F)	TC # 365 (°F)	TC # 366 (°F)
41	172	193	183	148	126	113
42	174	196	185	150	128	115
43	177	198	188	153	131	117
44	179	201	190	155	133	119
45	182	203	192	158	135	122
46	184	205	194	160	137	124
47	187	207	196	162	140	126
48	189	208	197	164	142	128
49	191	210	199	167	144	130
50	193	211	201	169	146	132
51	195	212	202	171	148	134
52	197	213	205	172	151	136
53	198	213	207	175	153	138
54	200	213	209	177	155	140
55	202	213	210	179	157	142
56	203	214	210	181	159	144
57	206	214	211	182	161	146
58	207	214	212	184	162	148
59	208	214	212	186	164	150
60	209	214	213	187	166	152
Max Temp:	209	214	213	187	166	152
Max Allowed:	390	390	389	389	390	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 367 (°F)	TC # 368 (°F)	TC # 369 (°F)	TC # 370 (°F)	TC # 371 (°F)	TC # 372 (°F)
0	64	64	65	64	65	64
1	64	64	65	64	65	64
2	64	64	65	64	65	64
3	64	64	65	64	65	64
4	64	64	65	64	65	64
5	64	64	65	64	65	64
6	64	64	65	64	65	65
7	64	64	65	64	65	64
8	64	64	65	64	65	64
9	65	65	65	64	65	65
10	65	64	65	65	65	65
11	65	65	65	65	66	65
12	65	65	66	65	66	65
13	66	66	66	66	66	65
14	66	66	66	65	66	66
15	67	66	66	66	67	66
16	67	67	67	67	68	67
17	68	68	68	67	68	67
18	69	68	68	68	69	68
19	70	69	69	69	70	69
20	72	70	70	70	71	70
21	73	71	71	71	72	71
22	74	73	73	72	72	72
23	75	74	73	73	74	73
24	77	75	75	75	75	74
25	79	77	77	76	76	75
26	80	78	78	77	77	77
27	82	80	80	79	79	78
28	83	81	81	79	80	79
29	85	83	82	81	81	81
30	87	85	84	82	83	82
31	88	86	85	84	84	84
32	90	88	87	85	86	85
33	92	90	88	87	87	86
34	93	91	90	89	89	88
35	95	93	91	90	90	90
36	97	95	93	92	92	91
37	99	96	95	94	94	93
38	100	98	97	95	96	95
39	102	100	98	97	97	96
40	104	101	100	99	99	98

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 367 (°F)	TC # 368 (°F)	TC # 369 (°F)	TC # 370 (°F)	TC # 371 (°F)	TC # 372 (°F)
41	106	103	101	100	100	99
42	108	104	102	101	102	101
43	109	106	104	103	103	102
44	111	107	106	104	105	104
45	113	109	107	106	106	105
46	115	110	108	107	107	106
47	117	112	109	108	108	107
48	119	113	110	109	109	108
49	120	115	111	110	110	109
50	122	117	113	111	111	110
51	124	118	114	112	112	111
52	126	120	116	114	113	112
53	128	122	118	115	115	114
54	130	124	119	117	116	115
55	132	125	121	119	118	117
56	133	127	123	120	120	118
57	136	129	125	122	121	120
58	138	131	126	124	123	121
59	139	133	128	126	124	123
60	142	135	130	127	126	124
Max Temp:	142	135	130	127	126	124
Max Allowed:	389	389	390	389	390	389

OMEGA POINT LABORATORIES

Time (min)	TC # 373 (°F)	TC # 374 (°F)	TC # 375 (°F)	TC # 376 (°F)	TC # 377 (°F)	TC # 378 (°F)
0	65	65	64	64	65	65
1	65	65	64	64	66	66
2	65	65	64	64	65	65
3	65	65	64	64	65	65
4	65	64	65	64	65	65
5	65	65	64	64	66	65
6	65	65	64	65	66	66
7	65	65	64	64	66	66
8	65	65	65	65	65	66
9	65	65	64	65	66	66
10	65	65	65	65	66	66
11	66	65	65	65	66	66
12	66	66	65	65	66	66
13	66	66	66	65	67	66
14	66	66	66	66	66	66
15	67	67	66	67	67	66
16	67	67	67	67	68	67
17	68	68	67	68	68	68
18	69	68	68	68	69	68
19	69	69	69	69	69	69
20	71	70	70	70	70	70
21	71	71	70	70	71	70
22	72	72	71	71	72	71
23	73	73	73	72	73	72
24	74	74	73	73	74	73
25	76	75	75	75	75	74
26	77	76	76	76	76	75
27	78	78	77	77	78	76
28	80	79	78	78	79	78
29	81	80	80	79	80	79
30	82	82	81	81	81	80
31	84	83	82	82	82	81
32	85	84	84	84	84	82
33	87	86	85	85	85	84
34	88	87	86	86	87	85
35	90	89	88	88	88	86
36	91	91	90	90	90	88
37	93	92	91	91	91	89
38	95	94	93	93	92	91
39	96	95	95	94	95	92
40	97	97	96	96	96	94

Time (min)	TC # 373 (°F)	TC # 374 (°F)	TC # 375 (°F)	TC # 376 (°F)	TC # 377 (°F)	TC # 378 (°F)
41	99	98	97	97	97	95
42	101	100	99	99	99	97
43	102	101	100	100	100	99
44	104	103	102	102	101	100
45	105	104	103	103	103	101
46	106	105	104	104	104	103
47	108	106	106	105	105	104
48	108	108	107	107	107	105
49	109	108	108	108	108	106
50	110	109	108	109	109	108
51	111	110	109	109	110	108
52	112	111	110	110	111	109
53	113	112	111	111	111	110
54	115	113	112	112	112	111
55	116	115	114	113	113	112
56	117	116	115	115	114	112
57	119	118	116	116	115	113
58	120	119	118	117	116	115
59	122	120	119	118	117	116
60	123	122	121	120	118	117
Max Temp:	123	122	121	120	118	117
Max Allowed:	390	390	389	389	390	390

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 379 (°F)	TC # 380 (°F)	TC # 381 (°F)	TC # 382 (°F)	TC # 383 (°F)	TC # 384 (°F)
0	64	65	66	65	65	65
1	64	65	66	65	65	65
2	64	65	66	65	65	65
3	64	65	66	66	65	65
4	64	65	66	66	65	66
5	64	65	66	65	65	65
6	64	64	66	65	65	65
7	64	65	66	65	65	65
8	64	65	66	66	65	65
9	65	65	66	65	65	65
10	65	65	66	66	65	65
11	65	66	66	66	65	65
12	65	66	66	66	65	66
13	65	66	67	66	66	66
14	65	66	67	67	66	66
15	66	67	67	66	67	66
16	66	67	68	67	67	66
17	66	67	68	68	67	67
18	67	68	69	68	68	67
19	68	69	70	69	68	68
20	68	69	70	70	69	68
21	70	70	71	70	70	68
22	70	71	72	72	71	69
23	71	72	73	72	71	70
24	72	73	74	73	72	70
25	73	74	75	74	73	71
26	74	75	76	75	74	72
27	75	76	77	77	75	73
28	76	77	78	77	76	73
29	77	78	79	78	77	73
30	78	79	80	80	78	74
31	79	81	82	81	79	75
32	81	82	83	82	80	76
33	82	83	84	83	81	77
34	84	85	86	85	82	78
35	85	86	87	86	83	79
36	86	88	88	87	84	80
37	88	89	90	89	86	81
38	89	90	91	90	87	82
39	91	92	93	91	88	82
40	92	93	94	93	90	84

OMEGA POINT LABORATORIES

Time (min)	TC # 379 (°F)	TC # 380 (°F)	TC # 381 (°F)	TC # 382 (°F)	TC # 383 (°F)	TC # 384 (°F)
41	94	94	95	94	91	85
42	95	96	97	95	92	86
43	97	97	98	97	93	87
44	98	99	99	98	94	88
45	99	100	101	99	96	89
46	100	101	102	100	97	90
47	102	103	103	102	98	91
48	103	104	104	103	99	92
49	104	105	106	104	100	93
50	105	106	107	105	101	94
51	106	107	108	106	102	95
52	107	108	109	107	103	95
53	108	109	109	108	104	96
54	109	110	110	109	104	97
55	110	111	111	109	105	98
56	111	111	112	110	106	99
57	111	112	112	111	107	99
58	112	113	113	111	107	100
59	113	114	114	112	108	101
60	115	115	115	113	109	102
Max Temp:	115	115	115	113	109	102
Max Allowed:	389	390	391	390	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 385 (°F)	TC # 386 (°F)	TC # 387 (°F)	TC # 388 (°F)	TC # 389 (°F)	TC # 390 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	65	65	64	64	64	64
4	65	65	65	64	64	64
5	66	66	66	64	64	64
6	67	68	67	65	64	64
7	69	71	69	65	64	64
8	72	74	71	66	65	64
9	74	77	74	67	65	64
10	77	81	77	68	65	65
11	80	85	80	70	66	65
12	83	90	84	71	67	65
13	87	94	88	73	68	66
14	90	98	91	75	69	66
15	94	103	95	77	70	67
16	97	108	99	80	71	68
17	101	112	103	82	73	69
18	104	116	107	85	74	70
19	108	121	111	87	76	72
20	111	125	115	90	78	73
21	115	129	118	93	80	74
22	118	133	122	95	82	76
23	121	137	126	98	84	78
24	125	141	129	101	86	80
25	128	144	133	104	88	81
26	131	148	136	107	90	83
27	134	151	139	109	93	85
28	136	154	143	112	95	87
29	139	157	146	115	97	89
30	142	161	149	118	100	91
31	145	164	152	120	102	93
32	147	166	155	123	104	95
33	150	169	158	126	106	97
34	152	172	160	128	109	99
35	155	175	163	131	111	101
36	157	177	166	133	113	103
37	160	180	168	136	116	105
38	162	183	171	138	118	107
39	164	185	174	141	120	109
40	166	188	176	143	123	111

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 385 (°F)	TC # 386 (°F)	TC # 387 (°F)	TC # 388 (°F)	TC # 389 (°F)	TC # 390 (°F)
41	169	191	179	146	125	113
42	171	193	181	148	127	115
43	173	196	184	150	129	117
44	175	198	186	153	132	119
45	177	200	189	155	134	121
46	180	202	193	158	136	123
47	182	204	196	160	138	125
48	184	206	199	163	141	128
49	186	207	202	165	143	130
50	188	209	204	168	145	132
51	190	210	206	170	148	134
52	192	211	208	173	150	136
53	193	212	210	177	153	139
54	195	212	210	181	155	141
55	196	213	211	185	158	143
56	197	213	211	188	161	145
57	199	214	211	190	163	148
58	200	215	212	191	166	150
59	202	215	212	193	168	153
60	203	216	212	194	170	155
Max Temp:	203	216	212	194	170	155
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 391 (°F)	TC # 392 (°F)	TC # 393 (°F)	TC # 394 (°F)	TC # 395 (°F)	TC # 396 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	64	64	64	64	64	64
7	64	64	64	64	64	64
8	64	64	64	64	64	64
9	64	64	64	64	64	64
10	64	64	64	64	64	65
11	65	65	65	65	65	65
12	65	65	65	65	65	65
13	65	65	65	65	65	65
14	66	66	65	65	65	66
15	66	66	66	66	66	66
16	67	67	66	66	66	66
17	68	67	67	67	67	67
18	69	68	68	68	68	68
19	70	69	69	69	69	69
20	71	70	70	70	70	69
21	72	71	71	71	70	70
22	74	73	72	72	72	71
23	75	74	73	73	73	73
24	77	75	74	74	74	74
25	78	77	76	75	75	75
26	80	78	77	77	76	76
27	82	80	79	78	78	78
28	83	81	80	79	79	79
29	85	83	82	81	81	80
30	87	85	83	82	82	82
31	89	86	85	84	84	83
32	90	88	86	86	85	85
33	92	90	88	87	87	87
34	94	91	90	89	88	88
35	96	93	91	90	90	90
36	97	95	93	92	92	91
37	99	97	95	94	93	93
38	101	98	96	95	95	94
39	103	100	98	97	96	96
40	104	101	99	98	98	97

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 391 (°F)	TC # 392 (°F)	TC # 393 (°F)	TC # 394 (°F)	TC # 395 (°F)	TC # 396 (°F)
41	106	103	101	100	99	99
42	108	104	102	101	101	100
43	110	106	103	103	102	102
44	112	107	105	104	103	103
45	113	109	106	105	105	104
46	115	110	107	106	106	105
47	117	112	108	107	107	106
48	119	113	110	108	108	108
49	121	115	111	110	109	109
50	123	117	113	111	110	110
51	125	119	114	112	111	111
52	127	121	116	114	112	112
53	129	123	118	115	114	114
54	131	125	120	117	116	115
55	133	127	122	119	117	117
56	136	129	124	121	119	119
57	138	131	125	123	121	120
58	140	133	127	124	123	122
59	142	135	130	126	124	124
60	144	137	132	128	126	126
Max Temp:	144	137	132	128	126	126
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 397 (°F)	TC # 398 (°F)	TC # 399 (°F)	TC # 400 (°F)	TC # 401 (°F)	TC # 402 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	64	64	64	64	64	64
7	64	64	64	64	64	64
8	64	64	64	64	64	64
9	64	64	64	64	64	64
10	65	65	65	65	65	64
11	65	65	65	65	65	65
12	65	65	65	65	65	65
13	65	65	65	65	65	65
14	65	66	66	65	66	65
15	66	66	66	66	66	66
16	66	67	67	66	66	66
17	67	67	67	67	67	67
18	68	68	68	68	68	67
19	68	69	69	68	68	68
20	69	70	70	69	69	68
21	70	70	70	70	70	69
22	71	71	71	71	71	70
23	72	73	73	72	72	71
24	74	74	74	73	73	72
25	75	75	75	74	74	73
26	76	76	76	76	75	74
27	77	77	77	77	76	75
28	79	79	79	78	77	76
29	80	80	80	80	79	78
30	82	82	81	81	80	79
31	83	83	83	82	81	80
32	85	85	84	84	83	81
33	86	86	86	85	84	83
34	88	88	87	87	86	84
35	89	89	89	88	87	86
36	91	91	90	90	89	87
37	92	92	92	91	90	89
38	94	94	93	93	92	90
39	95	95	95	94	93	91
40	97	97	96	96	95	93

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 397 (°F)	TC # 398 (°F)	TC # 399 (°F)	TC # 400 (°F)	TC # 401 (°F)	TC # 402 (°F)
41	98	98	98	97	96	94
42	100	100	99	99	97	96
43	101	101	100	100	99	97
44	102	102	102	101	100	99
45	104	103	103	103	101	100
46	105	105	104	104	103	101
47	106	106	105	105	104	102
48	107	107	106	106	105	104
49	108	108	107	107	106	105
50	109	109	108	108	107	106
51	110	110	109	109	108	107
52	111	111	110	110	109	108
53	113	113	112	111	110	108
54	114	114	113	112	111	109
55	116	116	115	113	112	110
56	118	117	116	115	113	111
57	119	119	117	116	114	112
58	121	120	119	117	116	113
59	122	122	120	119	117	115
60	124	124	122	120	118	116
Max Temp:	124	124	122	120	118	116
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 403 (°F)	TC # 404 (°F)	TC # 405 (°F)	TC # 406 (°F)	TC # 407 (°F)	TC # 408 (°F)
0	64	64	64	64	65	65
1	64	64	64	64	65	65
2	64	64	64	64	65	65
3	64	64	64	64	65	65
4	64	64	64	64	65	65
5	64	64	64	64	65	65
6	64	64	64	64	65	65
7	64	64	64	65	65	65
8	64	64	64	65	65	65
9	64	64	65	65	65	65
10	65	65	65	65	65	65
11	65	65	65	65	65	65
12	65	65	65	65	65	65
13	65	65	65	65	65	65
14	65	65	66	66	66	66
15	66	66	66	66	66	66
16	66	66	66	67	67	66
17	67	67	67	67	67	66
18	67	67	68	68	68	67
19	68	68	68	68	68	67
20	69	69	69	69	69	68
21	69	70	70	70	69	68
22	70	70	71	71	70	69
23	71	71	72	72	71	69
24	72	72	72	73	72	70
25	73	73	74	74	73	70
26	74	74	75	75	73	71
27	75	76	76	76	74	72
28	76	77	77	77	75	72
29	77	78	78	78	76	73
30	79	79	79	79	77	74
31	80	80	80	80	78	74
32	81	82	82	81	79	75
33	83	83	83	82	80	76
34	84	84	84	84	81	77
35	85	86	86	85	83	78
36	87	87	87	86	84	79
37	88	89	88	88	85	80
38	90	90	90	89	86	81
39	91	91	91	90	87	82
40	93	93	92	91	88	83

OMEGA POINT LABORATORIES

Time (min)	TC # 403 (°F)	TC # 404 (°F)	TC # 405 (°F)	TC # 406 (°F)	TC # 407 (°F)	TC # 408 (°F)
41	94	94	94	93	90	83
42	95	96	95	94	91	84
43	97	97	96	95	92	85
44	98	98	98	97	93	86
45	99	100	99	98	94	87
46	101	101	100	99	95	88
47	102	102	101	100	97	89
48	103	103	103	101	98	90
49	104	104	104	102	99	91
50	105	105	105	103	100	92
51	106	106	105	104	101	93
52	107	107	106	105	101	94
53	108	108	107	106	102	95
54	108	108	108	107	103	95
55	109	109	108	107	104	96
56	110	110	109	108	104	97
57	111	111	110	109	105	98
58	112	112	111	110	106	98
59	113	113	112	110	107	99
60	114	114	113	111	107	100
Max Temp:	114	114	113	111	107	100
Max Allowed:	389	389	389	389	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 409 (°F)	TC # 410 (°F)	TC # 411 (°F)	TC # 412 (°F)	TC # 413 (°F)	TC # 414 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	65	65	64	64	64	64
4	65	65	65	64	64	64
5	66	67	66	64	64	64
6	67	68	67	65	64	64
7	69	71	69	65	64	64
8	71	73	71	66	65	64
9	73	76	73	67	65	64
10	75	80	76	68	65	65
11	78	83	79	69	66	65
12	81	87	82	70	67	65
13	84	91	86	72	67	66
14	87	95	89	74	68	67
15	90	99	93	76	70	68
16	93	103	96	78	71	68
17	96	107	100	80	72	70
18	100	111	103	82	74	71
19	103	115	107	84	76	72
20	106	119	110	87	77	74
21	109	123	114	89	79	75
22	112	127	117	92	81	77
23	116	130	121	94	83	78
24	119	134	124	97	85	80
25	122	138	128	100	87	82
26	125	141	131	102	89	84
27	128	145	135	105	92	85
28	131	148	138	108	94	87
29	134	151	141	110	96	89
30	137	154	144	113	98	91
31	139	157	147	115	100	93
32	142	160	150	118	103	95
33	145	163	153	121	105	97
34	147	166	156	123	107	99
35	150	169	158	126	109	101
36	152	172	161	128	112	103
37	155	174	164	130	114	105
38	157	177	166	133	116	107
39	159	179	169	135	119	109
40	162	182	171	138	121	111

OMEGA POINT LABORATORIES

Time (min)	TC # 409 (°F)	TC # 410 (°F)	TC # 411 (°F)	TC # 412 (°F)	TC # 413 (°F)	TC # 414 (°F)
41	164	184	174	140	123	113
42	166	187	176	142	125	115
43	169	189	179	145	128	118
44	171	192	181	147	130	120
45	173	194	184	149	132	122
46	175	196	186	152	134	124
47	177	199	188	154	137	126
48	179	201	190	156	139	129
49	181	203	192	158	141	131
50	183	205	194	161	143	133
51	185	207	196	163	146	135
52	187	209	198	165	148	138
53	189	210	200	167	150	140
54	191	212	202	169	152	142
55	193	212	204	172	155	144
56	195	213	206	174	157	147
57	197	213	207	176	159	149
58	199	214	209	178	161	151
59	200	214	210	180	163	153
60	201	215	210	182	166	155
Max Temp:	201	215	210	182	166	155
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 415 (°F)	TC # 416 (°F)	TC # 417 (°F)	TC # 418 (°F)	TC # 419 (°F)	TC # 420 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	64	64	64	64	64	64
7	64	64	64	64	64	64
8	64	64	64	64	64	64
9	64	64	64	64	64	64
10	65	64	64	64	64	64
11	65	65	65	65	65	65
12	65	65	65	65	65	65
13	66	65	65	65	65	65
14	66	66	66	66	66	66
15	67	67	66	66	66	66
16	68	67	67	67	67	67
17	69	68	68	68	68	68
18	70	69	69	69	69	69
19	71	71	70	70	70	70
20	72	72	71	71	71	71
21	74	73	72	72	72	72
22	75	74	74	73	73	73
23	77	76	75	75	74	74
24	78	77	76	76	76	76
25	80	79	78	77	77	77
26	81	80	79	79	79	78
27	83	82	81	80	80	80
28	85	84	82	82	81	81
29	86	85	84	83	83	83
30	88	87	85	85	84	84
31	90	88	87	86	86	86
32	91	90	88	88	87	87
33	93	92	90	89	89	89
34	95	93	92	91	90	90
35	96	95	93	92	92	92
36	98	96	95	94	93	93
37	100	98	96	95	95	95
38	102	100	98	97	96	96
39	103	101	99	98	98	98
40	105	103	101	100	99	99

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 415 (°F)	TC # 416 (°F)	TC # 417 (°F)	TC # 418 (°F)	TC # 419 (°F)	TC # 420 (°F)
41	107	104	102	101	101	100
42	109	105	103	102	102	102
43	111	107	105	104	103	103
44	113	109	106	105	104	104
45	115	110	107	106	105	105
46	117	112	109	108	107	106
47	119	114	111	109	108	108
48	121	116	113	111	110	109
49	124	118	114	112	111	111
50	126	120	116	114	113	112
51	128	122	119	116	115	114
52	130	125	121	118	117	116
53	132	127	123	120	119	118
54	134	129	125	122	121	120
55	137	131	127	124	123	122
56	139	134	129	126	125	124
57	141	136	131	128	127	126
58	143	138	133	130	129	128
59	146	140	135	132	131	130
60	148	142	138	135	133	132
Max Temp:	148	142	138	135	133	132
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 421 (°F)	TC # 422 (°F)	TC # 423 (°F)	TC # 424 (°F)	TC # 425 (°F)	TC # 426 (°F)
0	64	64	64	64	65	65
1	64	64	64	64	65	65
2	64	64	64	64	65	65
3	64	64	64	64	65	65
4	64	64	64	64	65	65
5	64	64	64	64	65	65
6	64	64	64	64	65	65
7	64	64	64	64	65	65
8	64	64	64	64	65	65
9	64	64	64	64	65	65
10	64	64	64	64	65	65
11	65	65	65	64	65	65
12	65	65	65	65	66	65
13	65	65	65	65	66	66
14	66	66	66	66	66	66
15	66	66	66	66	67	67
16	67	67	67	67	67	67
17	68	68	68	67	68	68
18	69	69	68	68	69	68
19	70	69	69	69	70	69
20	71	70	70	70	71	70
21	72	72	71	71	72	71
22	73	73	72	72	73	72
23	74	74	74	73	74	73
24	75	75	75	75	75	74
25	77	76	76	76	76	75
26	78	78	77	77	77	76
27	80	79	79	79	79	78
28	81	81	80	80	80	79
29	82	82	82	81	81	80
30	84	84	83	83	83	82
31	85	85	85	84	84	83
32	87	86	86	86	86	84
33	88	88	87	87	87	86
34	90	90	89	89	89	87
35	91	91	90	90	90	89
36	93	93	92	92	91	90
37	94	94	93	93	93	92
38	96	95	95	95	94	93
39	97	97	96	96	96	95
40	99	98	98	97	97	96

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 421 (°F)	TC # 422 (°F)	TC # 423 (°F)	TC # 424 (°F)	TC # 425 (°F)	TC # 426 (°F)
41	100	100	99	99	99	97
42	101	101	100	100	100	99
43	102	102	102	101	101	100
44	104	103	103	103	103	101
45	105	105	104	104	104	102
46	106	106	105	105	105	104
47	108	107	107	106	106	105
48	109	109	108	107	107	106
49	110	110	109	109	108	107
50	112	112	111	110	109	108
51	114	114	112	111	110	109
52	116	115	114	113	111	110
53	118	117	116	114	113	111
54	119	119	117	116	114	112
55	121	121	119	118	116	113
56	123	122	121	119	117	115
57	125	124	123	121	119	116
58	127	126	124	123	121	118
59	129	128	126	124	122	119
60	131	130	128	126	124	121
Max Temp:	131	130	128	126	124	121
Max Allowed:	389	389	389	389	390	390

OMEGA POINT LABORATORIES

Time (min)	TC # 427 (°F)	TC # 428 (°F)	TC # 429 (°F)	TC # 430 (°F)	TC # 431 (°F)	TC # 432 (°F)
0	65	65	65	65	65	65
1	65	65	65	65	65	65
2	65	65	65	65	65	65
3	65	65	65	65	65	66
4	65	65	65	65	65	65
5	65	65	65	65	65	65
6	65	65	65	65	65	66
7	65	65	65	65	65	66
8	65	65	65	65	65	66
9	65	65	65	65	66	66
10	65	65	65	66	66	66
11	65	66	66	66	66	66
12	66	66	66	66	66	66
13	66	66	66	66	66	66
14	66	67	67	67	67	66
15	67	67	67	67	67	67
16	67	68	68	68	67	67
17	68	69	69	69	68	67
18	69	69	70	70	69	68
19	70	70	71	70	69	68
20	70	71	71	71	70	68
21	71	72	72	72	71	69
22	72	73	73	73	71	69
23	73	74	74	74	72	70
24	75	75	76	75	73	70
25	76	77	77	76	74	71
26	77	78	78	77	74	72
27	78	79	79	78	75	72
28	79	80	80	79	76	73
29	81	82	81	80	77	74
30	82	83	82	81	78	74
31	83	84	84	82	79	75
32	85	85	85	83	80	76
33	86	87	86	85	81	76
34	87	88	88	86	82	77
35	89	90	89	87	83	78
36	90	91	90	88	84	79
37	91	92	92	90	85	80
38	93	94	93	91	86	81
39	94	95	94	92	87	81
40	96	96	95	93	88	82

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 427 (°F)	TC # 428 (°F)	TC # 429 (°F)	TC # 430 (°F)	TC # 431 (°F)	TC # 432 (°F)
41	97	98	97	94	89	83
42	98	99	98	96	91	84
43	99	100	99	97	92	85
44	101	101	100	98	93	86
45	102	102	101	99	94	87
46	103	103	102	100	95	88
47	104	104	103	101	96	89
48	105	105	104	102	97	89
49	106	106	105	103	98	90
50	107	107	106	104	99	91
51	108	108	107	105	100	92
52	109	109	108	106	101	93
53	110	110	109	107	102	94
54	111	112	110	108	102	95
55	112	113	111	109	103	95
56	114	114	113	110	104	96
57	115	116	114	111	105	97
58	116	117	115	112	106	98
59	118	118	116	113	107	98
60	119	120	118	114	108	99
Max Temp:	119	120	118	114	108	99
Max Allowed:	390	390	390	390	390	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 433 (°F)	TC # 434 (°F)	TC # 435 (°F)	TC # 436 (°F)	TC # 437 (°F)	TC # 438 (°F)
0	65	65	65	65	65	64
1	65	65	65	65	65	64
2	65	65	65	65	65	64
3	65	65	65	65	65	64
4	65	65	65	65	65	64
5	65	65	65	65	65	64
6	65	65	65	65	65	65
7	66	66	65	65	65	65
8	66	66	66	65	65	65
9	67	67	66	65	65	65
10	67	67	67	65	65	65
11	68	69	68	65	66	66
12	70	70	70	66	66	67
13	71	72	72	66	67	67
14	73	74	74	67	68	68
15	75	76	76	68	68	69
16	78	79	79	69	69	70
17	80	82	81	70	70	72
18	83	85	84	71	72	73
19	86	88	87	72	73	74
20	89	92	90	74	74	76
21	92	95	94	76	76	78
22	95	99	97	77	78	79
23	98	102	100	79	79	81
24	101	106	104	81	81	83
25	104	110	108	83	83	85
26	108	114	111	85	84	86
27	111	118	115	88	86	88
28	114	122	118	90	88	90
29	118	126	122	92	90	91
30	121	130	126	94	91	93
31	124	134	129	97	93	95
32	128	137	133	99	95	97
33	131	141	136	102	96	99
34	134	145	139	104	98	101
35	137	148	143	107	100	102
36	141	152	146	109	102	104
37	144	155	149	112	104	106
38	147	159	153	114	105	108
39	150	162	156	117	108	110
40	153	166	159	120	110	112

OMEGA POINT LABORATORIES

Time (min)	TC # 433 (°F)	TC # 434 (°F)	TC # 435 (°F)	TC # 436 (°F)	TC # 437 (°F)	TC # 438 (°F)
41	156	170	162	123	112	114
42	159	173	166	125	114	116
43	162	177	169	128	116	118
44	165	181	172	131	119	121
45	168	185	175	133	121	123
46	171	189	179	136	123	125
47	174	193	182	139	125	127
48	177	196	185	141	128	129
49	180	199	188	144	130	131
50	183	202	190	146	132	134
51	186	206	193	149	135	136
52	188	209	196	151	137	138
53	191	211	199	154	139	141
54	194	213	202	156	142	143
55	198	214	206	159	144	146
56	203	215	210	161	146	148
57	209	216	212	164	149	150
58	209	217	213	167	151	153
59	210	218	214	171	153	155
60	211	218	215	174	156	158
Max Temp:	211	218	215	174	156	158
Max Allowed:	390	390	390	390	390	389

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Time (min)	TC # 439 (°F)	TC # 440 (°F)	TC # 441 (°F)	TC # 442 (°F)	TC # 443 (°F)	TC # 444 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	65	64	64	64	64	64
7	65	65	65	64	64	64
8	65	65	65	65	65	65
9	65	65	65	65	65	65
10	66	66	65	65	65	65
11	66	66	66	66	66	65
12	67	67	67	67	67	66
13	68	68	67	67	67	67
14	69	69	68	68	68	67
15	70	70	70	69	69	68
16	72	72	71	71	71	70
17	73	73	72	72	72	71
18	75	75	74	74	73	72
19	76	76	76	75	75	74
20	78	78	78	77	77	75
21	80	80	79	79	79	77
22	81	82	81	81	81	79
23	83	84	83	83	83	81
24	85	86	85	85	84	83
25	86	87	87	87	86	84
26	88	89	89	89	88	86
27	90	91	91	91	90	88
28	91	92	93	92	91	89
29	93	94	94	94	93	91
30	95	96	96	96	95	92
31	97	98	97	98	97	94
32	99	100	99	100	99	96
33	101	102	101	102	101	98
34	102	104	103	104	103	100
35	104	106	105	106	104	102
36	106	108	107	108	106	103
37	108	110	109	110	108	105
38	110	112	111	112	110	107
39	112	114	113	114	112	109
40	114	116	115	116	114	111

OMEGA POINT LABORATORIES

Time (min)	TC # 439 (°F)	TC # 440 (°F)	TC # 441 (°F)	TC # 442 (°F)	TC # 443 (°F)	TC # 444 (°F)
41	116	118	118	118	116	113
42	118	120	120	120	118	115
43	121	122	122	122	120	117
44	123	124	124	124	122	118
45	125	127	126	126	124	120
46	127	129	129	129	126	122
47	129	131	131	131	128	124
48	132	134	133	133	131	126
49	134	136	136	135	133	129
50	136	138	138	138	135	131
51	139	141	140	140	137	133
52	141	143	143	142	140	135
53	143	146	145	145	142	137
54	146	148	148	147	144	139
55	149	151	151	150	147	142
56	151	154	153	153	149	144
57	153	156	156	155	152	146
58	156	159	158	158	154	149
59	159	162	161	160	157	151
60	161	164	164	163	159	153
Max Temp:	161	164	164	163	159	153
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 445 (°F)	TC # 446 (°F)	TC # 447 (°F)	TC # 448 (°F)	TC # 449 (°F)	TC # 450 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	64	64	64	64	64	64
7	64	64	64	64	64	64
8	64	64	64	64	64	64
9	64	64	64	64	64	64
10	64	64	64	64	64	64
11	65	65	65	65	65	65
12	65	65	65	65	65	65
13	66	66	66	66	66	66
14	67	66	66	67	66	66
15	67	67	67	67	67	67
16	68	68	68	68	68	68
17	70	69	69	69	69	69
18	71	70	70	70	70	70
19	72	71	71	72	71	71
20	74	73	73	73	73	72
21	76	74	74	74	74	73
22	77	76	75	75	75	74
23	79	77	77	77	76	76
24	81	79	78	78	78	77
25	82	81	80	80	79	78
26	84	82	81	81	80	79
27	86	84	83	83	82	81
28	87	85	84	84	83	82
29	89	87	85	85	85	83
30	90	88	87	87	86	85
31	92	89	88	88	87	86
32	93	91	90	90	89	87
33	95	92	91	91	90	88
34	97	93	92	92	91	90
35	99	95	94	94	92	91
36	100	96	95	95	94	92
37	102	98	96	97	95	93
38	104	99	98	98	97	95
39	106	101	100	100	98	96
40	107	103	101	102	100	98

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Time (min)	TC # 445 (°F)	TC # 446 (°F)	TC # 447 (°F)	TC # 448 (°F)	TC # 449 (°F)	TC # 450 (°F)
41	109	105	103	103	101	99
42	111	106	105	105	103	101
43	113	108	106	106	105	102
44	114	110	108	108	106	104
45	116	112	110	110	108	105
46	118	114	111	112	110	107
47	120	115	113	113	111	109
48	122	117	115	115	113	110
49	124	119	117	117	115	112
50	126	121	118	119	116	114
51	128	123	120	120	118	115
52	130	125	122	122	120	117
53	132	127	124	124	122	119
54	134	128	126	126	123	120
55	136	130	127	127	125	122
56	138	132	129	129	127	124
57	140	134	131	131	128	126
58	142	136	133	133	130	127
59	144	138	135	134	132	129
60	147	140	137	136	134	131
Max Temp:	147	140	137	136	134	131
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 451 (°F)	TC # 452 (°F)	TC # 453 (°F)	TC # 454 (°F)	TC # 455 (°F)	TC # 456 (°F)
0	64	64	64	64	64	65
1	64	64	64	64	64	65
2	64	64	64	64	64	65
3	64	64	64	64	64	65
4	64	64	64	64	64	65
5	64	64	64	64	64	65
6	64	64	64	64	64	65
7	64	64	64	64	64	65
8	64	64	64	64	64	65
9	64	64	64	65	65	65
10	64	65	65	65	65	65
11	65	65	65	65	65	65
12	65	65	66	66	65	65
13	66	66	66	66	66	66
14	66	67	67	67	66	66
15	67	67	68	68	67	66
16	68	68	69	68	68	67
17	69	69	70	69	69	67
18	70	70	71	70	69	68
19	71	72	72	71	70	69
20	72	73	73	73	71	69
21	73	74	74	74	72	70
22	75	75	75	75	74	71
23	76	77	77	76	75	72
24	77	78	78	77	76	73
25	78	79	79	79	77	73
26	80	81	81	80	78	74
27	81	82	82	81	80	75
28	82	83	83	83	81	76
29	84	85	85	84	82	77
30	85	86	86	85	83	78
31	86	87	87	87	85	79
32	87	89	89	88	86	80
33	89	90	90	90	87	81
34	90	91	92	91	88	82
35	91	93	93	93	89	83
36	92	94	95	94	91	84
37	94	96	97	96	92	85
38	95	98	98	97	93	86
39	96	99	100	99	95	87
40	98	101	102	100	96	88

OMEGA POINT LABORATORIES

Time (min)	TC # 451 (°F)	TC # 452 (°F)	TC # 453 (°F)	TC # 454 (°F)	TC # 455 (°F)	TC # 456 (°F)
41	99	102	103	102	97	89
42	101	104	105	104	99	90
43	103	106	107	105	100	91
44	104	107	108	107	101	92
45	106	109	110	108	103	93
46	108	111	112	110	104	94
47	109	112	113	111	106	95
48	111	114	115	113	107	96
49	113	116	117	115	108	97
50	114	117	118	116	110	98
51	116	119	120	118	111	99
52	118	121	122	119	113	100
53	119	123	123	121	114	101
54	121	124	125	123	115	102
55	123	126	127	124	117	103
56	124	128	128	126	118	104
57	126	129	130	127	120	105
58	128	131	132	129	121	106
59	129	133	134	131	123	107
60	131	134	136	132	124	108
Max Temp:	131	134	136	132	124	108
Max Allowed:	389	389	389	389	389	390

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 457 (°F)	TC # 458 (°F)	TC # 459 (°F)	TC # 460 (°F)	TC # 461 (°F)	TC # 462 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	65	64	64	64	64	64
7	65	65	64	64	64	64
8	65	65	65	64	64	64
9	66	65	65	64	64	64
10	66	66	66	64	64	64
11	67	67	67	64	65	65
12	69	69	68	65	65	65
13	70	70	70	65	66	66
14	72	72	71	66	66	67
15	74	74	73	66	67	68
16	76	77	76	67	68	69
17	78	79	78	68	69	70
18	81	82	81	70	70	71
19	83	85	84	71	72	72
20	86	88	87	72	73	74
21	89	91	90	74	75	76
22	92	95	93	76	76	77
23	95	98	96	78	78	79
24	97	102	99	79	79	80
25	100	105	102	81	81	82
26	103	109	106	83	83	84
27	106	112	109	85	84	86
28	109	116	112	88	86	87
29	112	120	116	90	88	89
30	115	123	119	92	89	90
31	119	127	123	94	91	92
32	122	131	126	97	93	94
33	125	134	130	99	94	95
34	128	138	133	102	96	97
35	131	142	137	104	97	98
36	134	145	140	107	99	100
37	137	149	144	110	101	102
38	140	152	147	113	102	103
39	143	156	150	116	104	105
40	146	159	153	119	106	107

OMEGA POINT LABORATORIES

Time (min)	TC # 457 (°F)	TC # 458 (°F)	TC # 459 (°F)	TC # 460 (°F)	TC # 461 (°F)	TC # 462 (°F)
41	149	163	156	122	107	109
42	152	167	160	126	110	111
43	155	170	163	129	112	112
44	158	174	166	132	114	115
45	161	177	170	135	117	117
46	164	181	173	138	119	119
47	168	184	177	141	121	121
48	171	188	181	144	124	123
49	174	191	184	147	126	125
50	178	194	188	150	129	127
51	181	197	191	153	131	130
52	184	200	194	156	133	132
53	187	203	196	158	136	134
54	189	206	199	161	138	136
55	192	209	202	163	141	139
56	194	212	205	165	143	141
57	197	214	209	168	145	144
58	201	215	211	170	148	146
59	205	216	212	172	150	148
60	208	217	213	174	152	151
Max Temp:	208	217	213	174	152	151
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 463 (°F)	TC # 464 (°F)	TC # 465 (°F)	TC # 466 (°F)	TC # 467 (°F)	TC # 468 (°F)
0	63	63	64	64	64	64
1	64	63	64	64	64	64
2	64	63	64	64	64	64
3	64	63	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	64	64	64	64	64	64
7	64	64	64	64	64	64
8	64	64	64	64	64	64
9	64	64	64	65	65	64
10	64	64	65	65	65	65
11	65	65	65	65	65	65
12	65	65	66	66	66	65
13	66	66	66	66	66	66
14	66	67	67	67	67	67
15	67	68	68	68	68	68
16	68	69	69	69	69	68
17	70	70	70	70	70	69
18	71	71	72	72	71	71
19	72	73	73	73	73	72
20	74	74	75	75	74	74
21	76	76	77	77	76	75
22	77	78	78	78	78	77
23	79	80	80	80	80	78
24	81	81	82	82	81	80
25	82	83	84	84	83	82
26	84	85	86	86	85	84
27	86	87	87	87	87	85
28	87	88	89	89	88	87
29	89	90	91	91	90	88
30	91	92	92	92	91	90
31	92	93	94	94	93	92
32	94	95	95	95	94	93
33	95	96	97	97	96	94
34	97	98	98	98	97	96
35	98	99	100	100	99	97
36	100	100	101	101	100	98
37	101	102	103	103	102	100
38	103	103	104	104	103	101
39	104	105	106	106	105	103
40	106	107	107	108	107	104

OMEGA POINT LABORATORIES

Time (min)	TC # 463 (°F)	TC # 464 (°F)	TC # 465 (°F)	TC # 466 (°F)	TC # 467 (°F)	TC # 468 (°F)
41	108	109	109	110	109	106
42	110	110	111	112	111	108
43	112	112	113	114	112	110
44	113	114	115	116	114	111
45	115	116	117	118	116	113
46	117	118	119	120	118	115
47	119	120	121	122	120	117
48	121	122	123	124	122	118
49	123	124	125	126	124	120
50	126	126	127	128	126	122
51	128	128	129	130	128	124
52	130	130	131	132	130	126
53	132	132	133	134	132	128
54	134	135	135	136	134	130
55	136	137	137	139	137	132
56	139	139	140	141	139	134
57	141	141	142	143	141	136
58	143	144	144	145	143	139
59	145	146	146	148	145	141
60	148	148	149	150	148	143
Max Temp:	148	148	149	150	148	143
Max Allowed:	388	388	389	389	389	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 469 (°F)	TC # 470 (°F)	TC # 471 (°F)	TC # 472 (°F)	TC # 473 (°F)	TC # 474 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	64	64	64	64	64
6	64	64	64	64	64	64
7	64	64	64	64	64	64
8	64	64	64	64	64	64
9	64	65	65	65	65	65
10	65	65	65	65	65	65
11	65	65	65	65	65	65
12	65	65	65	65	65	65
13	66	66	66	66	66	66
14	67	67	66	66	67	66
15	67	67	67	67	67	67
16	68	68	68	68	68	68
17	69	69	69	69	69	69
18	70	70	70	70	70	69
19	72	71	71	71	71	70
20	73	73	72	72	72	71
21	74	74	74	73	73	72
22	76	75	75	75	74	74
23	78	77	76	76	76	75
24	79	78	78	77	77	76
25	81	80	79	79	78	77
26	82	81	80	80	79	78
27	84	83	82	81	81	79
28	86	84	83	83	82	81
29	87	86	84	84	83	82
30	89	87	86	86	84	83
31	90	89	87	87	86	85
32	91	90	88	88	87	86
33	93	91	90	89	88	87
34	94	93	91	90	89	88
35	95	94	92	92	91	90
36	97	95	93	93	92	91
37	98	96	94	94	93	92
38	99	97	95	95	94	93
39	101	99	97	96	95	94
40	102	100	98	97	97	96

OMEGA POINT LABORATORIES

Time (min)	TC # 469 (°F)	TC # 470 (°F)	TC # 471 (°F)	TC # 472 (°F)	TC # 473 (°F)	TC # 474 (°F)
41	103	101	99	99	98	97
42	105	103	100	100	99	98
43	106	104	102	101	100	99
44	108	106	103	102	101	100
45	110	107	105	104	103	102
46	111	109	106	105	104	103
47	113	111	108	107	106	104
48	115	112	109	108	107	106
49	117	114	111	110	109	107
50	118	116	113	112	111	109
51	120	117	114	113	112	110
52	122	119	116	115	114	112
53	124	121	118	116	115	113
54	126	123	119	118	117	115
55	128	125	121	120	118	117
56	130	126	123	121	120	118
57	132	128	124	123	122	120
58	134	130	126	125	123	121
59	136	132	128	126	125	123
60	138	134	130	128	127	125
Max Temp:	138	134	130	128	127	125
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 475 (°F)	TC # 476 (°F)	TC # 477 (°F)	TC # 478 (°F)	TC # 479 (°F)	TC # 480 (°F)
0	64	64	64	64	65	64
1	64	64	64	64	65	64
2	64	64	64	64	65	64
3	64	64	64	64	65	65
4	64	64	64	64	65	65
5	64	64	64	64	65	65
6	64	64	64	64	65	65
7	64	64	64	64	65	65
8	64	64	65	65	65	65
9	65	65	65	65	65	65
10	65	65	65	65	65	65
11	65	65	65	65	65	65
12	65	65	66	65	66	66
13	66	66	66	66	66	66
14	66	67	67	66	66	66
15	67	67	67	67	67	67
16	68	68	68	68	67	68
17	69	69	69	69	68	68
18	69	70	70	69	68	69
19	70	71	71	70	69	70
20	72	72	72	71	69	71
21	73	73	73	72	70	72
22	74	74	74	74	71	73
23	75	75	75	75	72	74
24	76	76	76	76	72	75
25	77	78	78	77	73	76
26	78	79	79	78	74	77
27	79	80	80	80	75	79
28	81	81	82	81	76	80
29	82	83	83	82	77	81
30	83	84	84	83	78	82
31	84	85	85	85	79	83
32	86	86	87	86	80	84
33	87	88	88	87	81	86
34	88	89	89	88	82	87
35	89	90	90	89	83	88
36	90	91	92	91	83	89
37	92	92	93	92	84	90
38	93	94	94	93	85	91
39	94	95	95	94	86	92
40	95	96	96	95	87	93

OMEGA POINT LABORATORIES

Project No. 97257 TVA/TSI November 17, 1994

Time (min)	TC # 475 (°F)	TC # 476 (°F)	TC # 477 (°F)	TC # 478 (°F)	TC # 479 (°F)	TC # 480 (°F)
41	96	97	98	96	88	94
42	97	98	99	98	89	95
43	99	99	101	99	90	97
44	100	101	102	100	91	98
45	101	102	104	102	92	99
46	102	104	105	103	93	100
47	104	105	107	105	94	102
48	105	107	108	106	94	103
49	107	108	110	108	95	104
50	108	110	111	109	96	106
51	110	111	112	110	97	107
52	111	113	114	112	98	108
53	113	115	116	113	99	109
54	114	116	117	115	100	111
55	116	118	119	116	101	112
56	117	119	120	118	102	113
57	119	121	122	119	103	115
58	120	122	123	121	104	116
59	122	124	125	122	105	117
60	123	125	126	124	106	119
Max Temp:	123	125	126	124	106	119
Max Allowed:	389	389	389	389	390	389

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 481 (°F)	TC # 482 (°F)	TC # 483 (°F)	TC # 484 (°F)	TC # 485 (°F)	TC # 486 (°F)
0	65	65	65	65	65	65
1	65	65	65	65	65	65
2	65	65	65	65	65	65
3	65	65	65	65	65	65
4	65	65	65	65	65	65
5	66	66	66	66	65	66
6	67	67	66	67	66	68
7	68	68	67	69	67	70
8	69	69	68	70	69	73
9	71	71	70	72	71	78
10	73	73	72	75	73	82
11	75	75	74	77	75	88
12	77	77	76	80	77	94
13	79	80	78	83	80	101
14	81	82	81	86	83	108
15	83	85	83	89	87	116
16	85	87	86	93	90	125
17	87	90	89	96	94	133
18	90	93	92	100	97	142
19	92	96	95	104	101	152
20	94	99	98	108	105	161
21	97	102	101	112	109	171
22	99	105	104	116	114	181
23	102	108	107	120	118	191
24	104	111	111	124	122	201
25	107	115	114	128	127	212
26	110	118	118	132	132	222
27	113	121	121	136	136	231
28	116	124	125	140	141	240
29	119	128	128	144	146	249
30	121	131	132	148	151	258
31	124	135	136	152	155	267
32	127	138	139	156	161	276
33	129	141	143	161	165	285
34	132	144	147	165	170	294
35	134	147	150	169	174	303
36	137	151	154	174	179	312
37	139	154	158	178	184	322
38	142	157	161	182	188	331
39	144	160	165	186	192	340
40	147	163	168	190	197	350

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 481 (°F)	TC # 482 (°F)	TC # 483 (°F)	TC # 484 (°F)	TC # 485 (°F)	TC # 486 (°F)
41	149	166	172	194	200	359
42	153	169	175	198	204	369
43	155	172	178	202	208	378
44	158	175	182	204	212	388
45	160	178	185	207	214	397
46	163	181	189	210	217	406
47	165	184	192	211	220	416
48	167	187	194	211	223	425
49	169	190	197	212	225	435
50	172	192	199	213	228	444
51	175	195	201	214	231	454
52	178	198	203	215	233	464
53	180	200	205	216	236	473
54	183	202	207	218	239	483
55	185	205	209	219	242	492
56	194	207	211	221	245	502
57	199	209	212	223	249	511
58	196	210	214	225	253	520
59	197	212	215	228	258	530
60	198	213	216	230	262	539
Max Temp:	199	213	216	230	262	539
Max Allowed:	390	390	390	390	390	390

OMEGA POINT LABORATORIES

Time (min)	TC # 487 (°F)	TC # 488 (°F)	TC # 489 (°F)	TC # 490 (°F)	TC # 491 (°F)	TC # 492 (°F)
0	65	65	65	65	64	64
1	64	64	64	64	64	64
2	65	65	64	64	64	64
3	65	64	65	65	64	64
4	65	65	65	65	64	64
5	66	65	65	65	65	64
6	68	66	66	66	66	65
7	71	67	68	67	67	66
8	75	68	70	68	68	67
9	80	70	72	70	70	68
10	86	72	74	72	71	69
11	92	74	77	74	73	71
12	99	77	79	77	76	72
13	106	79	82	79	78	74
14	114	83	85	82	80	76
15	122	86	88	85	82	78
16	131	90	92	88	85	79
17	140	93	95	91	88	82
18	149	97	98	94	90	84
19	159	101	102	97	93	86
20	168	106	105	101	96	88
21	178	110	109	104	99	90
22	188	114	113	107	102	92
23	197	119	116	111	104	95
24	207	124	120	114	107	97
25	217	128	124	118	110	99
26	226	133	128	121	114	102
27	236	139	132	125	117	104
28	244	144	136	128	120	106
29	253	150	140	132	123	109
30	262	155	144	135	126	111
31	271	160	149	139	129	114
32	281	166	154	142	133	116
33	290	171	159	146	136	119
34	299	175	164	149	139	121
35	308	180	169	153	142	123
36	317	185	174	156	145	126
37	326	190	179	160	149	128
38	335	194	183	163	152	131
39	345	198	188	166	155	133
40	354	202	191	170	158	136

OMEGA POINT LABORATORIES

Time (min)	TC # 487 (°F)	TC # 488 (°F)	TC # 489 (°F)	TC # 490 (°F)	TC # 491 (°F)	TC # 492 (°F)
41	363	206	195	173	161	138
42	373	209	198	176	164	141
43	382	213	201	179	167	143
44	392	216	203	183	171	146
45	402	219	206	185	173	148
46	412	221	208	188	176	151
47	422	224	209	191	179	154
48	432	227	211	194	182	156
49	442	230	212	196	185	159
50	452	233	214	199	187	161
51	462	235	215	201	190	164
52	472	238	216	203	193	166
53	481	241	218	205	195	169
54	490	245	220	206	198	171
55	500	248	222	208	201	174
56	509	252	224	211	203	176
57	518	255	226	212	205	179
58	527	259	228	213	207	182
59	537	264	230	214	208	185
60	546	268	233	216	209	187
Max Temp:	546	268	233	216	209	187
Max Allowed:	390	390	390	390	389	389

Time (min)	TC # 493 (°F)	TC # 494 (°F)	TC # 495 (°F)	TC # 496 (°F)	TC # 497 (°F)	TC # 498 (°F)
0	65	65	65	64	65	65
1	65	65	65	65	65	65
2	65	65	65	65	65	65
3	65	65	65	65	65	65
4	65	65	65	65	65	65
5	66	66	66	65	65	65
6	67	67	67	66	65	65
7	68	69	70	67	66	66
8	70	72	73	68	67	67
9	72	76	76	69	68	69
10	73	80	80	71	69	70
11	75	84	85	73	71	72
12	77	89	90	75	73	74
13	80	94	95	77	75	76
14	82	99	101	79	77	79
15	84	105	107	82	79	81
16	87	110	112	85	81	84
17	90	116	118	88	84	87
18	93	122	125	91	87	89
19	96	128	131	94	89	92
20	99	134	137	97	92	95
21	102	140	143	100	95	98
22	105	146	150	103	98	101
23	109	153	156	107	101	104
24	112	159	162	110	104	107
25	115	165	169	114	108	110
26	119	172	175	117	111	113
27	122	178	181	121	114	116
28	126	184	187	124	117	119
29	130	190	193	128	121	122
30	133	196	199	132	124	125
31	137	202	205	136	127	128
32	141	207	211	139	130	131
33	144	213	216	143	134	134
34	148	217	221	147	137	137
35	151	221	225	151	141	140
36	155	226	230	155	144	143
37	159	231	235	159	147	146
38	163	236	239	163	151	149
39	166	241	244	167	154	152
40	170	246	248	170	157	155

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 493 (°F)	TC # 494 (°F)	TC # 495 (°F)	TC # 496 (°F)	TC # 497 (°F)	TC # 498 (°F)
41	173	251	253	174	161	158
42	177	256	258	178	164	161
43	180	260	263	181	168	164
44	184	265	268	185	171	167
45	187	270	273	188	174	170
46	191	275	279	192	178	173
47	194	280	285	195	181	176
48	197	285	291	198	184	179
49	200	290	297	200	187	181
50	204	295	303	203	190	184
51	207	300	310	206	194	186
52	209	306	316	208	197	189
53	211	312	322	209	200	191
54	212	318	328	211	203	194
55	213	324	334	212	206	196
56	215	330	340	214	209	199
57	216	336	345	215	211	201
58	218	342	351	216	213	203
59	220	348	356	217	214	205
60	223	354	362	219	215	206
Max Temp:	223	354	362	219	215	206
Max Allowed:	390	390	390	389	390	390

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 499 (°F)	TC # 500 (°F)	TC # 501 (°F)	TC # 502 (°F)	TC # 503 (°F)	TC # 504 (°F)
0	65	64	64	64	64	64
1	65	65	64	64	64	65
2	65	65	64	64	64	65
3	65	64	64	64	64	65
4	65	64	65	65	64	65
5	65	64	65	65	65	65
6	65	64	66	66	65	66
7	65	65	67	68	66	68
8	65	65	68	69	67	70
9	65	65	69	71	68	72
10	66	65	71	73	69	76
11	66	65	73	75	70	79
12	67	66	75	77	72	83
13	68	66	77	79	74	88
14	69	67	79	81	76	93
15	70	68	82	83	78	98
16	71	69	85	86	80	103
17	72	70	87	88	83	109
18	74	71	90	91	85	114
19	75	72	93	94	88	120
20	77	73	96	97	91	126
21	79	75	99	100	93	132
22	80	76	102	102	96	138
23	82	78	105	105	99	145
24	84	80	108	109	102	151
25	86	82	111	112	105	157
26	89	84	114	115	108	163
27	91	85	117	118	111	169
28	93	87	120	121	114	175
29	95	90	123	125	117	181
30	98	92	126	128	120	187
31	100	94	129	131	123	193
32	102	96	133	135	126	199
33	105	99	136	138	129	206
34	107	101	139	142	132	212
35	110	103	142	145	135	217
36	112	106	145	149	139	222
37	115	108	149	152	142	228
38	117	111	152	155	145	233
39	120	113	155	159	148	238
40	122	116	158	162	151	243

OMEGA POINT LABORATORIES

Time (min)	TC # 499 (°F)	TC # 500 (°F)	TC # 501 (°F)	TC # 502 (°F)	TC # 503 (°F)	TC # 504 (°F)
41	124	119	161	166	155	248
42	127	121	164	169	158	253
43	129	124	167	173	161	258
44	132	126	170	176	165	263
45	134	129	173	180	169	268
46	137	131	176	183	172	273
47	139	134	178	186	176	278
48	142	136	181	190	179	283
49	144	139	184	193	182	288
50	147	142	187	196	186	294
51	149	144	189	199	189	299
52	152	147	192	202	193	304
53	155	150	195	205	196	310
54	158	152	197	208	198	316
55	161	155	199	210	201	322
56	164	158	201	211	204	328
57	167	162	203	212	206	334
58	169	165	205	213	208	341
59	172	169	207	214	209	347
60	174	172	209	215	211	353
Max Temp:	174	172	209	215	211	353
Max Allowed:	390	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 505 (°F)	TC # 506 (°F)	TC # 507 (°F)	TC # 508 (°F)	TC # 509 (°F)	TC # 510 (°F)
0	64	64	64	65	65	65
1	64	64	64	64	65	65
2	64	64	64	65	65	65
3	65	64	64	65	65	65
4	65	64	64	65	65	65
5	65	65	65	65	65	65
6	66	65	65	65	66	65
7	68	66	65	66	66	65
8	70	67	66	66	67	66
9	73	68	67	67	69	66
10	76	69	67	68	70	67
11	80	71	68	69	71	68
12	84	72	70	70	73	70
13	88	74	71	72	75	71
14	92	76	73	73	77	73
15	97	78	74	75	80	75
16	102	80	76	77	82	77
17	107	82	78	79	85	79
18	112	85	79	81	88	82
19	118	87	81	83	90	85
20	124	90	83	86	93	87
21	130	92	85	88	96	90
22	136	95	86	91	99	93
23	143	98	88	93	103	96
24	149	101	90	96	106	99
25	155	104	92	99	109	102
26	161	107	94	101	113	105
27	166	109	96	104	116	108
28	172	113	98	107	120	111
29	177	116	100	110	124	114
30	182	119	101	113	127	117
31	188	122	103	116	131	120
32	193	125	105	119	135	123
33	198	128	108	122	139	126
34	203	131	110	125	143	129
35	208	135	112	128	146	131
36	213	138	114	131	150	134
37	217	141	116	134	154	137
38	222	144	118	138	158	140
39	227	147	120	141	162	143
40	231	151	122	144	166	145

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 505 (°F)	TC # 506 (°F)	TC # 507 (°F)	TC # 508 (°F)	TC # 509 (°F)	TC # 510 (°F)
41	236	154	124	148	169	148
42	241	157	126	151	173	151
43	246	160	128	155	177	154
44	251	164	131	158	180	157
45	256	167	133	161	184	159
46	261	170	135	165	188	162
47	266	173	138	168	191	164
48	272	176	140	171	196	167
49	277	180	142	174	199	169
50	283	183	144	177	201	172
51	288	186	146	180	204	174
52	294	189	149	183	206	177
53	300	192	151	187	208	179
54	307	195	153	190	210	181
55	313	197	155	194	212	184
56	320	200	158	198	213	186
57	326	202	160	201	215	188
58	333	204	163	204	216	190
59	339	206	165	206	218	192
60	345	208	168	208	220	193
Max Temp:	345	208	168	208	220	193
Max Allowed:	389	389	389	390	390	390

OMEGA POINT LABORATORIES

Time (min)	TC # 511 (°F)	TC # 512 (°F)	TC # 513 (°F)	TC # 514 (°F)	TC # 515 (°F)	TC # 516 (°F)
0	65	65	65	65	65	65
1	65	65	65	65	65	65
2	65	65	65	65	65	65
3	65	65	65	65	65	65
4	65	65	65	65	65	65
5	65	65	65	65	65	65
6	65	65	65	65	65	65
7	65	66	66	65	66	66
8	66	66	66	66	66	67
9	66	67	67	66	67	68
10	67	68	68	67	68	69
11	68	69	70	68	70	70
12	70	71	71	70	71	71
13	71	73	73	71	72	73
14	73	74	75	73	74	75
15	75	76	77	75	76	77
16	77	79	79	77	79	79
17	79	81	81	80	81	81
18	81	83	83	82	83	84
19	84	85	85	85	86	86
20	86	88	88	87	89	89
21	89	90	90	90	92	92
22	92	93	93	92	94	95
23	94	95	95	94	97	98
24	97	98	98	97	100	101
25	99	100	100	100	103	105
26	102	103	103	102	106	108
27	104	105	105	105	109	112
28	106	107	108	107	112	115
29	109	110	110	110	115	119
30	111	112	113	112	118	123
31	114	115	115	114	121	127
32	116	117	118	117	124	130
33	118	119	120	119	127	134
34	121	122	123	122	130	138
35	123	124	125	124	132	142
36	126	127	127	126	135	146
37	128	129	130	129	138	150
38	130	131	132	131	141	154
39	133	134	135	134	144	159
40	135	136	137	136	147	163

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 511 (°F)	TC # 512 (°F)	TC # 513 (°F)	TC # 514 (°F)	TC # 515 (°F)	TC # 516 (°F)
41	138	139	140	138	150	167
42	140	141	142	141	153	171
43	142	143	144	143	156	174
44	145	146	147	145	159	178
45	147	148	149	148	162	182
46	150	150	151	150	165	185
47	152	153	154	152	168	188
48	154	155	156	155	171	192
49	157	157	158	157	174	195
50	159	160	160	159	177	198
51	161	162	163	162	180	201
52	163	164	165	164	182	204
53	166	166	167	166	185	207
54	168	168	169	169	188	210
55	170	171	172	171	190	213
56	172	173	174	173	192	215
57	174	175	176	175	194	217
58	176	177	178	178	196	218
59	178	179	180	180	198	220
60	180	181	182	182	200	223
Max Temp:	180	181	182	182	200	223
Max Allowed:	390	390	390	390	390	390

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 517 (°F)	TC # 518 (°F)	TC # 519 (°F)	TC # 520 (°F)	TC # 521 (°F)	TC # 522 (°F)
0	65	64	65	65	65	65
1	65	64	65	65	65	65
2	65	64	65	65	65	65
3	65	64	65	65	65	65
4	65	64	65	65	65	65
5	65	64	65	65	65	65
6	65	65	65	65	65	65
7	66	65	65	65	65	65
8	67	66	65	65	65	65
9	68	66	65	65	65	66
10	69	67	65	65	66	67
11	70	68	65	66	67	68
12	71	69	66	66	68	69
13	73	70	66	67	69	70
14	74	71	67	68	71	72
15	76	72	67	69	72	74
16	78	74	68	71	74	75
17	80	75	69	72	75	77
18	82	77	70	74	76	78
19	84	79	71	75	78	80
20	86	80	72	77	80	82
21	89	82	73	79	82	85
22	91	84	74	80	85	87
23	94	86	76	82	86	89
24	96	88	77	84	88	91
25	99	89	79	86	90	93
26	102	91	80	87	91	95
27	104	93	82	89	93	98
28	107	95	84	91	95	100
29	110	98	86	93	97	102
30	113	100	87	95	99	104
31	116	102	89	97	101	106
32	119	104	91	99	103	108
33	123	106	93	101	105	110
34	126	108	95	103	107	112
35	129	110	97	105	109	114
36	132	113	99	107	111	116
37	136	115	101	109	114	118
38	139	117	103	111	116	120
39	143	120	105	113	118	122
40	146	122	107	115	120	124

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 517 (°F)	TC # 518 (°F)	TC # 519 (°F)	TC # 520 (°F)	TC # 521 (°F)	TC # 522 (°F)
41	150	124	110	117	122	126
42	154	126	112	119	124	129
43	157	129	114	121	126	130
44	161	131	116	123	128	133
45	164	134	119	125	130	135
46	168	136	121	127	132	137
47	171	139	123	130	135	139
48	174	141	126	132	137	141
49	177	144	128	134	139	143
50	181	146	130	136	141	145
51	184	149	133	138	143	147
52	187	151	135	140	146	150
53	190	154	137	142	148	152
54	192	157	139	145	151	155
55	195	160	142	147	154	157
56	197	163	144	149	157	160
57	199	165	146	152	160	163
58	201	167	148	154	163	166
59	203	170	151	156	165	168
60	205	172	153	159	168	171
Max Temp:	205	172	153	159	168	171
Max Allowed:	390	389	390	390	390	390

OMEGA POINT LABORATORIES

Time (min)	TC # 523 (°F)	TC # 524 (°F)	TC # 525 (°F)	TC # 526 (°F)	TC # 527 (°F)	TC # 528 (°F)
0	65	65	65	65	64	64
1	65	65	65	65	64	64
2	65	65	65	65	64	65
3	65	65	65	65	64	65
4	65	65	66	65	64	65
5	65	65	68	66	65	65
6	65	66	71	67	65	66
7	65	68	75	69	66	67
8	65	70	81	71	67	69
9	66	72	87	74	68	71
10	66	75	95	77	69	74
11	67	78	103	80	71	77
12	68	81	111	83	73	80
13	69	84	120	87	74	84
14	70	87	129	90	76	88
15	71	91	139	95	78	93
16	72	94	149	99	80	97
17	74	98	161	104	83	102
18	75	102	172	108	85	107
19	77	107	184	113	87	112
20	79	111	197	118	90	117
21	81	116	210	123	92	122
22	83	121	223	128	95	127
23	84	125	235	133	97	133
24	86	130	247	138	99	138
25	88	135	260	143	102	143
26	90	139	273	148	104	149
27	93	144	285	153	107	154
28	95	149	298	158	109	159
29	97	154	311	163	112	164
30	99	158	325	169	115	170
31	101	163	338	175	117	175
32	103	168	351	181	120	182
33	105	174	364	188	123	190
34	108	180	377	194	126	198
35	110	186	390	199	128	200
36	112	190	403	203	131	207
37	115	198	415	206	133	210
38	117	200	427	209	136	212
39	119	204	439	212	138	214
40	122	208	451	214	141	220

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 523 (°F)	TC # 524 (°F)	TC # 525 (°F)	TC # 526 (°F)	TC # 527 (°F)	TC # 528 (°F)
41	124	211	463	217	143	225
42	126	214	474	220	146	230
43	128	217	486	222	149	234
44	131	220	497	225	151	239
45	133	223	509	228	154	244
46	136	226	520	231	156	248
47	138	229	531	234	159	252
48	140	232	542	237	162	257
49	143	235	553	240	165	261
50	145	239	564	244	167	265
51	148	242	575	248	170	270
52	150	245	586	252	173	274
53	152	249	597	256	176	278
54	155	252	608	260	178	283
55	157	256	619	264	181	287
56	159	260	630	269	184	292
57	162	264	641	273	186	296
58	164	268	651	277	189	301
59	166	272	662	282	192	306
60	169	276	670	287	194	311
Max Temp:	169	276	670	287	194	311
Max Allowed:	390	390	390	390	389	389

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 529 (°F)	TC # 530 (°F)	TC # 531 (°F)	TC # 532 (°F)	TC # 533 (°F)	TC # 534 (°F)
0	64	64	64	65	65	65
1	64	64	64	65	65	65
2	65	64	65	65	65	65
3	65	64	65	65	65	65
4	65	65	65	65	65	65
5	65	65	65	65	65	65
6	66	65	65	65	65	65
7	67	66	66	65	65	65
8	68	67	67	66	66	65
9	71	68	68	67	66	66
10	73	70	69	68	67	66
11	76	71	70	69	68	67
12	80	73	71	71	69	68
13	84	74	73	72	71	69
14	88	76	74	74	72	70
15	92	78	76	76	74	72
16	96	80	78	78	76	73
17	101	82	80	80	78	74
18	105	84	81	82	80	76
19	110	87	83	84	82	78
20	115	89	85	86	84	79
21	120	91	87	88	86	81
22	125	94	89	90	88	83
23	130	96	91	93	90	85
24	135	98	93	96	92	86
25	140	101	96	98	95	88
26	146	104	98	101	97	90
27	151	106	100	104	99	92
28	157	109	102	107	102	94
29	162	112	104	109	104	96
30	168	114	106	112	107	98
31	175	117	108	115	109	100
32	181	120	111	118	112	102
33	187	123	113	120	114	104
34	194	126	115	123	116	106
35	201	129	117	125	119	108
36	208	132	119	128	121	110
37	210	135	122	130	123	112
38	213	138	124	133	125	114
39	216	141	126	135	127	116
40	220	144	128	137	129	118

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 529 (°F)	TC # 530 (°F)	TC # 531 (°F)	TC # 532 (°F)	TC # 533 (°F)	TC # 534 (°F)
41	224	147	131	140	132	120
42	229	150	133	142	134	122
43	234	153	135	144	136	124
44	238	156	137	146	138	125
45	242	159	140	148	140	127
46	247	162	142	150	142	129
47	251	165	144	153	144	131
48	256	168	146	155	146	133
49	260	171	148	157	148	134
50	265	173	150	159	150	136
51	269	176	153	161	152	138
52	274	179	155	163	154	140
53	279	181	157	165	156	142
54	284	184	159	167	158	143
55	289	187	161	169	160	145
56	294	189	164	171	161	147
57	299	192	166	173	163	149
58	305	194	168	175	165	150
59	310	196	170	177	167	152
60	316	198	172	179	169	154
Max Temp:	316	198	172	179	169	154
Max Allowed:	389	389	389	390	390	390

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 535 (°F)	TC # 536 (°F)	TC # 537 (°F)	TC # 538 (°F)	TC # 539 (°F)	TC # 540 (°F)
0	64	65	65	65	65	65
1	64	65	65	65	65	65
2	64	65	65	65	65	65
3	64	65	65	65	65	65
4	64	65	65	65	65	65
5	64	65	66	66	66	66
6	65	66	66	67	66	67
7	65	68	68	68	67	69
8	65	70	69	70	69	71
9	65	72	71	73	71	74
10	66	74	74	76	73	77
11	67	77	76	79	76	81
12	68	80	80	83	80	85
13	69	84	83	87	83	90
14	71	88	87	91	88	96
15	72	92	91	95	92	102
16	74	96	96	100	97	108
17	76	100	101	105	102	113
18	78	104	106	110	107	118
19	80	108	111	115	112	123
20	81	112	116	119	117	128
21	84	116	121	124	122	133
22	86	121	126	129	126	138
23	88	125	131	133	131	143
24	90	129	136	138	135	147
25	92	132	140	142	139	152
26	94	136	144	146	144	156
27	96	139	148	150	148	161
28	99	143	153	154	152	165
29	100	146	157	158	156	169
30	102	149	161	162	160	173
31	104	153	164	165	165	177
32	106	156	168	169	169	181
33	107	159	172	173	173	185
34	109	162	175	176	177	189
35	111	164	179	180	181	192
36	112	167	182	183	185	196
37	114	170	186	187	188	199
38	116	173	189	190	192	202
39	118	176	192	194	195	205
40	119	178	195	197	198	207

OMEGA POINT LABORATORIES

Time (min)	TC # 535 (°F)	TC # 536 (°F)	TC # 537 (°F)	TC # 538 (°F)	TC # 539 (°F)	TC # 540 (°F)
41	121	181	199	200	202	209
42	122	184	202	203	205	211
43	124	186	204	207	207	213
44	125	188	207	210	210	214
45	127	191	209	212	212	215
46	128	193	212	214	214	217
47	130	196	215	216	217	218
48	131	198	217	218	219	220
49	133	200	218	220	220	221
50	134	203	220	222	222	224
51	135	205	221	224	223	226
52	137	207	223	226	225	228
53	139	209	225	228	227	231
54	140	211	227	230	229	234
55	141	213	230	232	231	237
56	143	215	232	235	234	240
57	144	217	234	238	236	243
58	146	220	237	240	239	247
59	147	222	240	243	242	251
60	148	225	243	247	245	255
Max Temp:	148	225	243	247	245	255
Max Allowed:	389	390	390	390	390	390

OMEGA POINT LABORATORIES

Time (min)	TC # 541 (°F)	TC # 542 (°F)	TC # 543 (°F)	TC # 544 (°F)	TC # 545 (°F)	TC # 546 (°F)
0	65	65	65	64	64	65
1	65	65	65	65	64	65
2	65	65	65	65	64	65
3	65	65	65	65	64	65
4	65	65	65	65	64	65
5	65	66	65	65	65	67
6	66	67	66	67	65	68
7	67	68	68	68	66	71
8	68	69	69	70	67	74
9	69	71	71	72	68	77
10	71	73	74	74	70	81
11	73	75	76	77	71	86
12	75	78	79	79	74	90
13	77	82	83	83	76	95
14	80	86	86	86	79	101
15	83	91	90	89	82	106
16	85	95	94	93	85	112
17	88	99	99	97	89	118
18	92	104	103	100	92	124
19	95	108	107	104	96	129
20	98	112	112	109	99	134
21	101	116	116	113	103	139
22	104	121	121	118	106	144
23	108	125	126	122	110	149
24	111	129	130	127	114	154
25	114	133	135	131	117	158
26	117	137	139	135	121	163
27	121	141	143	139	125	167
28	124	145	148	143	128	172
29	127	149	152	147	132	176
30	130	153	156	150	135	180
31	133	157	160	154	138	184
32	136	160	163	157	142	188
33	139	164	167	160	145	192
34	142	167	170	163	148	195
35	144	171	174	166	151	199
36	147	174	177	169	154	202
37	150	178	181	172	157	205
38	153	181	184	175	160	208
39	155	184	187	178	163	210
40	158	188	190	180	165	212

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 541 (°F)	TC # 542 (°F)	TC # 543 (°F)	TC # 544 (°F)	TC # 545 (°F)	TC # 546 (°F)
41	161	191	193	183	168	214
42	163	194	196	186	171	216
43	166	197	198	189	173	219
44	168	200	201	191	175	221
45	170	203	203	194	178	223
46	173	205	206	196	180	226
47	175	208	208	199	183	229
48	178	210	210	201	185	233
49	180	211	212	204	187	236
50	182	213	214	206	189	240
51	185	215	216	208	191	244
52	187	216	217	210	194	248
53	190	218	219	212	196	252
54	192	219	221	214	198	257
55	194	221	223	216	201	261
56	197	222	225	217	204	266
57	199	224	227	219	207	270
58	201	226	230	220	208	275
59	203	229	232	222	210	280
60	205	232	235	224	211	284
Max Temp:	205	232	235	224	211	284
Max Allowed:	390	390	390	389	389	390

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 547 (°F)	TC # 548 (°F)	TC # 549 (°F)	TC # 550 (°F)	TC # 551 (°F)	TC # 552 (°F)
0	65	65	65	64	64	64
1	65	65	65	65	64	64
2	65	65	65	65	64	64
3	65	65	65	65	64	64
4	65	65	65	65	64	65
5	66	66	66	66	65	65
6	66	67	67	67	65	65
7	68	70	69	68	66	66
8	70	73	71	70	67	67
9	72	76	74	72	68	68
10	75	79	78	75	70	70
11	78	83	82	79	71	72
12	82	88	87	83	74	74
13	86	92	92	88	76	77
14	91	97	97	93	78	79
15	96	102	102	98	81	82
16	101	107	108	103	84	86
17	107	112	114	109	87	90
18	113	117	119	115	90	94
19	118	122	124	120	94	98
20	124	127	130	126	98	102
21	130	132	135	131	101	105
22	136	137	140	136	106	109
23	142	142	145	141	111	112
24	148	147	150	146	115	116
25	154	152	155	151	119	119
26	160	157	159	156	123	123
27	165	161	164	161	127	127
28	171	166	169	166	130	131
29	175	170	173	170	134	135
30	179	174	177	175	137	139
31	183	179	181	180	141	143
32	186	183	186	184	144	146
33	190	187	190	188	147	150
34	193	192	194	191	149	153
35	196	195	197	195	151	156
36	199	199	201	198	154	159
37	202	202	205	201	157	163
38	205	206	208	205	160	166
39	207	208	211	208	162	169
40	209	211	213	211	165	172

OMEGA POINT LABORATORIES

Time (min)	TC # 547 (°F)	TC # 548 (°F)	TC # 549 (°F)	TC # 550 (°F)	TC # 551 (°F)	TC # 552 (°F)
41	210	213	215	213	168	175
42	212	216	216	215	172	178
43	213	217	218	216	175	181
44	214	219	219	218	178	184
45	216	221	221	219	181	186
46	217	222	223	221	184	189
47	218	224	225	223	186	192
48	220	226	228	226	188	194
49	221	228	230	228	190	196
50	223	230	233	231	193	200
51	226	233	236	234	195	203
52	228	236	240	237	198	206
53	231	239	244	241	200	208
54	234	243	249	245	202	209
55	238	247	253	249	204	209
56	241	251	259	254	206	210
57	245	256	264	259	208	210
58	250	262	270	264	209	211
59	255	267	276	270	209	212
60	260	274	282	276	210	213
Max Temp:	260	274	282	276	210	213
Max Allowed:	390	390	390	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 553 (°F)	TC # 554 (°F)	TC # 555 (°F)	TC # 556 (°F)	TC # 557 (°F)	TC # 558 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	65	64	64	64	64	64
5	65	65	64	64	64	64
6	66	65	65	64	64	64
7	67	66	66	64	64	65
8	69	67	67	65	65	66
9	71	68	69	65	65	66
10	73	70	71	66	66	67
11	76	71	73	67	67	68
12	78	73	75	68	68	69
13	81	76	78	69	70	71
14	85	78	81	71	72	72
15	88	81	83	72	73	74
16	92	84	86	73	75	75
17	96	88	89	75	77	77
18	101	91	92	76	80	79
19	105	95	95	78	81	81
20	109	98	98	79	83	83
21	113	102	101	81	85	85
22	118	106	104	82	87	87
23	122	109	107	83	89	89
24	125	113	110	85	91	91
25	129	116	113	86	93	93
26	133	119	115	88	95	95
27	137	123	118	89	97	97
28	141	126	121	90	99	99
29	144	130	124	92	101	101
30	148	133	126	93	102	103
31	151	136	129	94	104	105
32	154	139	132	96	106	107
33	158	142	134	97	108	109
34	161	145	137	98	110	111
35	164	148	139	99	112	113
36	167	151	142	101	113	115
37	170	154	144	102	115	117
38	173	157	147	103	117	119
39	176	159	149	104	118	121
40	179	162	152	106	120	122

OMEGA POINT LABORATORIES

Time (min)	TC # 553 (°F)	TC # 554 (°F)	TC # 555 (°F)	TC # 556 (°F)	TC # 557 (°F)	TC # 558 (°F)
41	182	165	154	107	122	124
42	185	167	157	108	123	126
43	188	170	159	109	125	127
44	191	173	162	111	127	129
45	194	175	164	112	128	131
46	197	178	166	113	130	132
47	199	181	169	114	131	134
48	203	183	171	115	133	136
49	206	186	173	116	135	137
50	208	188	176	117	136	138
51	209	191	178	118	138	140
52	210	193	181	120	139	141
53	212	196	183	121	140	143
54	213	198	185	122	142	144
55	215	200	188	123	143	146
56	216	203	190	124	145	147
57	218	205	192	125	146	149
58	220	207	195	126	148	150
59	222	209	197	127	149	151
60	224	212	199	128	150	153
Max Temp:	224	212	199	128	150	153
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 559 (°F)	TC # 560 (°F)	TC # 561 (°F)	TC # 562 (°F)	TC # 563 (°F)	TC # 564 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	65	65	64	64	65	64
6	65	65	65	65	65	64
7	66	66	65	65	66	64
8	68	67	66	66	68	65
9	69	69	67	66	69	66
10	71	70	69	67	71	67
11	73	72	70	69	74	68
12	75	74	72	70	76	69
13	78	77	74	72	79	70
14	81	80	77	74	82	72
15	84	83	79	76	85	74
16	87	86	82	79	89	75
17	90	89	85	81	92	77
18	93	92	88	84	96	80
19	96	96	91	86	100	82
20	99	99	95	89	103	84
21	103	103	98	92	107	86
22	106	106	102	95	111	89
23	109	110	105	98	114	91
24	112	114	109	101	118	93
25	115	118	113	104	122	96
26	118	121	117	107	125	98
27	121	125	120	110	129	101
28	125	129	123	113	133	103
29	127	132	126	116	137	106
30	130	136	129	120	140	108
31	133	140	132	123	144	110
32	136	143	136	126	148	112
33	138	147	139	129	152	114
34	141	150	142	132	155	116
35	143	154	145	135	159	118
36	146	157	148	138	162	120
37	148	160	151	141	166	122
38	151	164	155	144	169	124
39	153	167	158	146	172	126
40	156	170	160	149	175	128

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 559 (°F)	TC # 560 (°F)	TC # 561 (°F)	TC # 562 (°F)	TC # 563 (°F)	TC # 564 (°F)
41	158	172	163	152	178	130
42	160	175	166	155	181	132
43	162	178	168	158	184	133
44	165	180	171	160	186	135
45	167	183	173	163	189	137
46	169	185	176	166	191	139
47	171	187	178	168	193	140
48	173	190	181	171	196	142
49	175	192	183	173	198	143
50	177	194	185	176	200	145
51	179	196	187	178	202	147
52	180	198	190	181	203	148
53	182	200	192	183	205	150
54	184	202	193	185	207	151
55	186	204	195	188	208	153
56	188	206	197	190	210	155
57	190	208	199	192	211	156
58	192	209	201	194	213	158
59	193	210	203	196	214	159
60	195	211	205	197	215	161
Max Temp:	195	211	205	197	215	161
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 565 (°F)	TC # 566 (°F)	TC # 567 (°F)	TC # 568 (°F)	TC # 569 (°F)	TC # 570 (°F)
0	64	64	64	64	64	64
1	64	64	64	64	64	64
2	64	64	64	64	64	64
3	64	64	64	64	64	64
4	64	64	64	64	64	64
5	64	65	65	65	64	64
6	64	65	65	65	65	65
7	65	66	66	65	65	65
8	65	67	67	66	66	66
9	66	68	68	67	67	67
10	67	69	70	69	68	69
11	68	71	72	70	70	71
12	70	73	74	73	72	73
13	72	75	77	75	74	75
14	74	77	80	78	77	78
15	76	80	84	81	80	81
16	79	83	88	84	83	85
17	82	86	92	88	86	88
18	85	89	96	92	90	92
19	89	92	101	96	94	96
20	92	94	107	101	98	101
21	96	97	112	105	102	105
22	100	100	118	109	106	109
23	103	104	123	114	111	113
24	107	107	129	119	115	118
25	111	110	133	123	120	122
26	115	113	138	128	124	126
27	119	116	142	133	129	130
28	123	120	147	138	134	134
29	126	122	150	144	139	138
30	130	125	153	150	144	141
31	133	128	157	156	149	145
32	136	131	160	162	152	148
33	140	134	163	166	155	152
34	143	137	165	171	159	155
35	145	139	168	175	163	158
36	148	142	170	178	166	162
37	151	144	173	181	169	165
38	153	147	175	183	175	168
39	155	149	177	186	179	171
40	158	152	179	188	183	174

OMEGA POINT LABORATORIES

Project No 97257 TVA / TSI November 17, 1994

Time (min)	TC # 565 (°F)	TC # 566 (°F)	TC # 567 (°F)	TC # 568 (°F)	TC # 569 (°F)	TC # 570 (°F)
41	160	154	181	190	186	177
42	162	156	184	193	189	181
43	164	158	186	195	192	184
44	166	160	189	197	194	187
45	168	163	191	199	197	190
46	170	166	193	200	199	192
47	172	169	195	202	200	195
48	174	171	197	203	202	198
49	176	174	200	205	203	200
50	177	176	202	206	205	202
51	179	178	204	207	206	204
52	181	180	206	208	207	206
53	183	182	208	209	208	208
54	185	186	210	210	209	209
55	186	188	211	211	209	211
56	188	192	211	212	210	212
57	190	194	212	212	211	214
58	192	197	213	213	212	215
59	193	199	213	213	212	216
60	195	200	214	214	213	218
Max Temp:	195	200	214	214	213	218
Max Allowed:	389	389	389	389	389	389

OMEGA POINT LABORATORIES

Time (min)	TC # 571 (°F)	TC # 572 (°F)	TC # 573 (°F)	TC # 574 (°F)
0	64	64	64	64
1	64	64	64	64
2	64	64	64	64
3	64	64	64	64
4	64	64	64	64
5	64	64	64	64
6	65	64	65	65
7	65	64	65	65
8	66	64	66	66
9	67	65	67	67
10	69	65	68	69
11	70	66	69	71
12	73	67	71	73
13	75	67	73	75
14	77	69	75	78
15	80	70	78	81
16	83	71	81	84
17	86	73	84	88
18	90	75	87	91
19	93	77	90	95
20	97	79	93	99
21	100	81	97	103
22	104	83	100	108
23	108	85	104	112
24	112	87	107	117
25	116	89	111	121
26	120	92	115	125
27	124	94	119	128
28	128	96	122	132
29	132	99	126	135
30	135	101	129	138
31	139	103	133	142
32	142	106	136	145
33	146	108	140	149
34	149	110	143	153
35	152	113	146	156
36	156	115	149	158
37	159	117	152	160
38	163	119	155	163
39	166	122	158	165
40	169	124	160	167

OMEGA POINT LABORATORIES

Time (min)	TC # 571 (°F)	TC # 572 (°F)	TC # 573 (°F)	TC # 574 (°F)
41	173	126	163	169
42	176	128	165	171
43	180	130	168	173
44	184	132	170	174
45	187	134	172	176
46	190	136	175	178
47	193	138	177	179
48	196	140	179	181
49	198	142	181	183
50	200	144	183	185
51	202	146	185	186
52	204	148	187	188
53	206	150	189	190
54	207	151	191	192
55	209	153	193	193
56	211	155	195	195
57	212	157	196	197
58	212	159	198	202
59	213	160	200	204
60	213	162	202	204
Max Temp:	213	162	202	204
Max Allowed:	389	389	389	389

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	E119 Std (°F)	Furnace Avg (°F)	Ambient (°F)	Furnace # 1 (°F)	Furnace # 2 (°F)	Furnace # 3 (°F)
0	68	66	69	66	66	67
1	254	102	68	118	122	95
2	440	256	68	352	353	280
3	627	521	68	744	725	695
4	813	784	69	1078	1050	1142
5	1000	976	68	1261	1264	1371
6	1060	1120	68	1386	1385	1518
7	1120	1221	68	1404	1476	1566
8	1180	1263	69	1348	1479	1511
9	1240	1238	69	1275	1412	1414
10	1300	1185	70	1197	1345	1318
11	1327	1196	69	1189	1348	1299
12	1346	1280	69	1308	1450	1447
13	1364	1355	70	1455	1559	1522
14	1380	1419	69	1521	1658	1598
15	1395	1427	70	1471	1620	1581
16	1410	1407	69	1415	1547	1514
17	1423	1423	69	1408	1548	1526
18	1436	1448	69	1421	1566	1557
19	1448	1456	69	1421	1556	1554
20	1459	1457	70	1415	1543	1540
21	1470	1462	70	1418	1539	1537
22	1480	1478	70	1426	1556	1549
23	1490	1493	70	1443	1573	1566
24	1499	1511	71	1451	1597	1581
25	1508	1525	70	1471	1621	1588
26	1517	1533	71	1487	1632	1589
27	1525	1536	70	1493	1629	1586
28	1533	1533	71	1493	1620	1578
29	1541	1536	71	1500	1617	1580
30	1548	1548	70	1514	1626	1597
31	1555	1553	71	1519	1630	1599
32	1562	1558	71	1524	1632	1600
33	1569	1564	70	1532	1633	1608
34	1576	1568	71	1534	1633	1606
35	1582	1574	71	1543	1636	1614
36	1588	1585	71	1557	1644	1623
37	1594	1594	71	1567	1652	1632
38	1600	1603	71	1575	1662	1641
39	1606	1610	71	1580	1669	1644
40	1612	1617	72	1585	1677	1650

OMEGA POINT LABORATORIES

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	E119 Std (°F)	Furnace Avg (°F)	Ambient (°F)	Furnace # 1 (°F)	Furnace # 2 (°F)	Furnace # 3 (°F)
41	1617	1625	72	1596	1683	1654
42	1622	1633	72	1607	1689	1663
43	1627	1637	72	1612	1692	1664
44	1633	1638	72	1607	1694	1665
45	1638	1640	72	1606	1696	1665
46	1642	1646	72	1613	1698	1668
47	1647	1650	72	1625	1700	1671
48	1652	1653	72	1628	1701	1673
49	1656	1656	72	1624	1707	1674
50	1661	1659	72	1632	1710	1676
51	1665	1664	72	1640	1713	1678
52	1669	1667	72	1650	1715	1682
53	1674	1669	72	1642	1722	1685
54	1678	1676	72	1648	1726	1685
55	1682	1684	73	1648	1733	1692
56	1686	1693	73	1652	1741	1699
57	1690	1699	73	1654	1748	1705
58	1693	1703	73	1656	1753	1709
59	1697	1705	73	1656	1754	1709
60	1701	1700	73	1649	1750	1704

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	Furnace # 4 (°F)	Furnace # 5 (°F)	Furnace # 6 (°F)	Furnace # 7 (°F)	Furnace # 8 (°F)
0	67	66	66	66	66
1	108	91	82	113	91
2	321	193	181	246	180
3	743	353	348	414	314
4	1094	534	559	573	466
5	1296	716	762	721	620
6	1442	885	929	855	765
7	1523	1038	1079	980	901
8	1501	1144	1191	1083	1010
9	1416	1166	1216	1109	1056
10	1328	1134	1186	1084	1045
11	1340	1156	1197	1104	1062
12	1463	1223	1256	1156	1110
13	1586	1266	1325	1200	1148
14	1681	1304	1392	1250	1196
15	1625	1344	1435	1289	1245
16	1541	1369	1436	1296	1272
17	1554	1394	1455	1317	1298
18	1579	1423	1481	1340	1324
19	1566	1444	1497	1354	1344
20	1545	1457	1510	1364	1358
21	1541	1473	1509	1373	1371
22	1555	1489	1528	1387	1392
23	1573	1501	1536	1401	1413
24	1594	1516	1558	1419	1436
25	1602	1529	1559	1438	1455
26	1598	1536	1565	1451	1467
27	1590	1541	1572	1457	1473
28	1578	1544	1561	1458	1478
29	1582	1548	1560	1463	1482
30	1594	1557	1572	1473	1493
31	1596	1561	1582	1481	1496
32	1597	1565	1585	1497	1501
33	1600	1572	1584	1507	1510
34	1601	1577	1594	1517	1513
35	1609	1583	1595	1525	1522
36	1624	1593	1604	1532	1530
37	1634	1603	1616	1541	1539
38	1642	1612	1625	1550	1547
39	1646	1618	1642	1560	1550
40	1652	1625	1647	1569	1557

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	Furnace # 4 (°F)	Furnace # 5 (°F)	Furnace # 6 (°F)	Furnace # 7 (°F)	Furnace # 8 (°F)
41	1660	1633	1659	1576	1565
42	1668	1642	1664	1582	1575
43	1673	1647	1666	1586	1582
44	1669	1647	1665	1593	1584
45	1669	1650	1665	1601	1586
46	1672	1655	1668	1609	1593
47	1677	1657	1674	1608	1600
48	1677	1659	1685	1611	1601
49	1678	1662	1687	1619	1601
50	1682	1666	1684	1618	1608
51	1689	1670	1693	1621	1613
52	1693	1670	1693	1620	1618
53	1696	1681	1697	1628	1617
54	1698	1702	1714	1634	1623
55	1705	1715	1722	1644	1633
56	1712	1729	1738	1652	1642
57	1717	1734	1744	1662	1647
58	1719	1737	1742	1665	1653
59	1719	1738	1749	1669	1657
60	1714	1732	1742	1669	1652

Project No. 97257 TVA / TSI November 17, 1994

Time (min)	Furnace # 9 (°F)	Furnace # 10 (°F)
0	67	66
1	103	100
2	244	213
3	473	403
4	722	623
5	926	819
6	1073	966
7	1177	1070
8	1234	1127
9	1194	1123
10	1128	1088
11	1155	1106
12	1228	1163
13	1277	1215
14	1314	1275
15	1344	1314
16	1358	1321
17	1383	1343
18	1413	1372
19	1429	1391
20	1436	1399
21	1449	1412
22	1465	1428
23	1483	1445
24	1499	1457
25	1512	1473
26	1520	1487
27	1524	1493
28	1525	1494
29	1532	1500
30	1543	1511
31	1548	1520
32	1551	1527
33	1558	1532
34	1562	1538
35	1572	1545
36	1585	1555
37	1595	1564
38	1602	1574
39	1608	1583
40	1615	1590

OMEGA POINT LABORATORIES

Time (min)	Furnace # 9 (°F)	Furnace # 10 (°F)
41	1623	1598
42	1637	1605
43	1641	1606
44	1643	1610
45	1644	1619
46	1652	1627
47	1659	1630
48	1660	1634
49	1663	1640
50	1669	1642
51	1676	1645
52	1682	1648
53	1672	1653
54	1677	1656
55	1689	1663
56	1698	1670
57	1705	1677
58	1711	1682
59	1712	1683
60	1706	1680

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 #4: PROJECT NO. 97257

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 Humphreys — Omega Point Laboratories, Inc. — Date 9/26/94

TVA / TSI — Date 9/27/94

II. ELECTRICAL CABLE INSTALLATION

N/A

Omega Point Laboratories, Inc. — Date

TVA / TSI — Date

III. THERMOCOUPLE INSTALLATION

C Humphreys — Omega Point Laboratories, Inc. — Date 9/26/94

TVA / TSI — Date 9/27/94

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
Omega Point Laboratories, Inc.

11/10/94
Date

TVA / TSI

11/10/94
Date

V. FINAL PRE-BURN INSPECTION

C Humphrey
Omega Point Laboratories, Inc.

11/16/94
Date

TVA / TSI

11/17/94
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 & (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
Purchase order received from TSI to begin construction on these four test decks.	7/18/94	CH
Construction of Test Deck #7 begins by OPI welders.	7/20/94	CH
Conduit sections are cut and installation begins on Test Deck #7 by OPI 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 OPI technicians.	7/29	CH
Test Deck #7 assembly is verified by OPI QA/QC.	7/29	CH
All thermocouples are verified on Test Deck #7 by OPI 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	8/2	CH

EVENT LOG

TVA/TSI

Client #11960

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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 is 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

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
verified by OPL QA.	8/4/94	CH
Vertical section of deck #7 on LB end is boxed in with the V-rib panel. Thermo-Zag and held with stainless steel tie wire. This boxed 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-Zag 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

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
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

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
end thermocouple placement started 8/18 Continues for Test # 6.	8/19/94	CH
Thermocouple placement verification is done by OPC QA/QC for Test #6.	8/22	CH
OPC technicians start welding side panels on Test # 4.	8/22	CH
Mark Talley TVA arrives at Omega Point to manage Therm-Dag installers.	8/22	CH
TVA insulators arrive at OPC to complete Test #7 and start ampacity test insulation. The following installers are on site: Arnold Wright ~~Gary Cole~~ Bernard McQueen John H. Stewart, Jr. Ben Loveless	8/23	CH
Daniele Oudinot USNRC arrived at OPC to witness insulation procedures on 8/22/94.	8/23	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.
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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
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.	8/24	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.		
Upgrade is started on	8/25	CH

EVENT LOG

TVA/TSI

Client #11960

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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-Tag 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.	8/26/96	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 Thermo-Lag over	8/27	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
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 alley 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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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

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-Tag 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 OPL QA/QC!	9/8/94	CH
Type B load plates are installed on Test Deck #6 enclosure of the four 3" conduits. Type shore and fold method is used with a backing piece at the butt joint. a ¼" threaded rod fencloses this group of conduits at this joint.	9/9	CH
OPL welders continue	9/10	
construction of Test Deck #4	9/10	CH
TVA installers continue	9/10	CH
insulation of Test Deck #6 with the wraps of the four 1" conduits using Type A brass plates and staggered butt joints. Started the junction	9/10	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. 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. Stainless steel tie wire used for stitching the stress skin on Test Deck #6.	9/12 9/13 9/13	CH CH CH
QC technicians begin thermocouple layout for Test Deck #4.	9/14	CH
Thermocouples are applied to conduits on Test Deck #4. Continued to install stress skin on ~~Assembly~~ Test Deck #6. Skim coat is applied over the stress skin.	9/15 CH 9/14	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
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 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-Saf panel were installed between conduits and some scrap pieces on top of LB's to provide an even top surface before the Therm-Saf panels were applied. Tie wraps to conduit straps thru panels keeps the boxes held tightly.	9/16/94	CH
Installed sidest on the 7 conduit enclosure on deck #5. Added stress skin 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
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
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 Talley TVA on site. Shipment of T-L received.	9/26	CH
Test deck #4 is turned over to TVA installers Arnold Wright and ~~Wayne~~ Derrick Starnes.	9/27	CH
Installation of the Therm Lag panel begins on the Darex boxed 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 Thermo-Lag panel are cut to fit around the conduit with the seams butting at the vertical centerline. Small pieces of Thermo-Lag 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 skin and trowel grade material. Staples attach the stress skin 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 ~~deck~~ 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 Therm-o-lag is applied over the spaced tie wires on the 3 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 Therm-o-lag 330-1 panel. The top and bottom cable tray sections are bare. A piece of 3/8" Therm-o-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 Therm-o-lag coverage on the (3) cable tray assembly of deck #4.	10/4	CH
	10/4	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
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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97260 #7 Steel deck with (7) 4" steel conduits. (1) 3/4" alum.. & (1) 3/4" steel conduit.

ITEM	DATE	INITIALS
Completed butt joint seam on test deck #4 1" conduit box with 3" stress skin overlap, stapled and skimmed with trowel grade material. Installed two layers of the preformed conduit sections over the exposed 1" metal conduits. These layers are pretwistered and the seams are staggered 90° and fastened with stainless steel tie wire 6" o.c.	10/6/94	CH
Continued with the stresskin 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	10/7 10/8	CH CH
	10/8/94	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
pieces prebuttered and held with tie wire.	10/8/94	CH
D. 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

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ITEM	DATE	INITIALS
More spin 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 Fitchcock " " "		
Herb Stansberry " " "		
Connie Humphrey " " "		
Cleda Patton " " "		
Laudencio Castanon " " "		
Richard Beasley " " "		
JJ Pierce TVA	10/18	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
Mark Sallee TVA	10/18/94	CH
Rick Woodyo "		
Brian Kent "		
Rich Johnson TSI		
Tim Hill "		
Jet Singh USNRC		
Jess Beitel 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 #92TE003, 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	
	10/19	

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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 " " "		
Dingji 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 #921E003. calibration due 1/20/95. 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	JS
Test Deck #6 was torn down to inspect the condition of the Thermo-Lag material.	10/20	JS
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	JS JS JS

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
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
Reg Priest Omega Point Labs		
Kerry Hitchcock " " "		
Cleda 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:
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 #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

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 penetration seals are completed by OPI technicians on Test Deck #4. This test article is inspected by OPI 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 witness this test are:		
Dee Priest Omega Point Labs	11/17	CH
Connie Humphrey " " "		
Cleda Patton " " "		
Kerry Hitchcock " " "		
Richard Beasley " " "		
Herb Stansbury " " "	11/17	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
Laudencio Catanon Omega Point	11/17/94	CH
Mark Talley TVA		
Kent Brown "		
Rick Woody "		
Brian Hunt "		
Gordon Bunsey 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 Deck #4 WP/WR NO. 97257

LOT/CONTRACT NO. E94-03028, E94-03047, * Trowell 94-08008 EXPIRATION DATE Feb. 95

CRAFTSMAN F94-04095 Sally DATE 9/28/94

QC INSPECTOR C Humphrey DATE 9/27/94

TYPICAL DRAWING NO. 47W243-14

Thickness Min = 1/2" Max = 3/4"

MONITORING POINTS

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

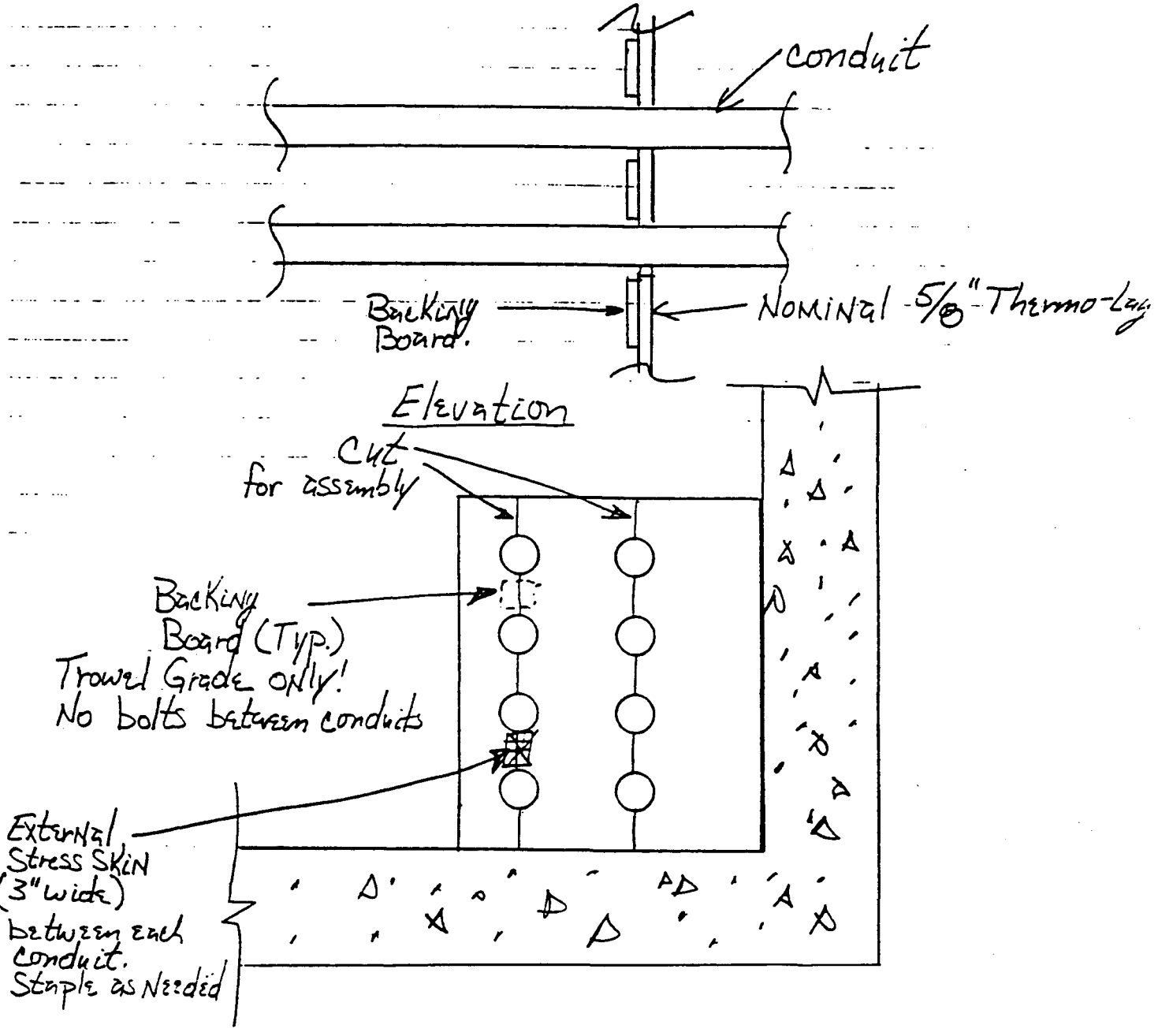
* OPL installed 1/4" bolts (welded) per TVA requirements to simulate Nelson Studs

REMARKS: - Start Installation -
Cut section of board to enclose large box section of 8 conduits.
- Both types of seames will be demonstrated A) ON UNIstrut frame & B) with backing board.
The backing board behind the cut sections (ground conduit) will not be bolted. Trowel Grade is used to hold the backing board.

645

SUBJECT Deck #4 97257 PROJECT

COMPUTED BY [signature] DATE 9/27/94 CHECKED BY C Humphrey DATE 9/27/94



Note: Bolts will be spaced on 12" for backing on Full length seam

G-98 REV. 0 SRN-98-01

Sheet 1 of 2

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck #4 WP/WR NO. 97257

LOT/CONTRACT NO. Trowell 94-08008 EXPIRATION DATE Feb 95

CRAFTSMAN [signature] DATE 9/28/94

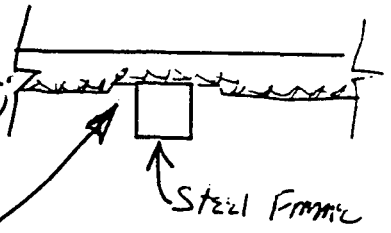
QC INSPECTOR C Humphrey DATE 9/28/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

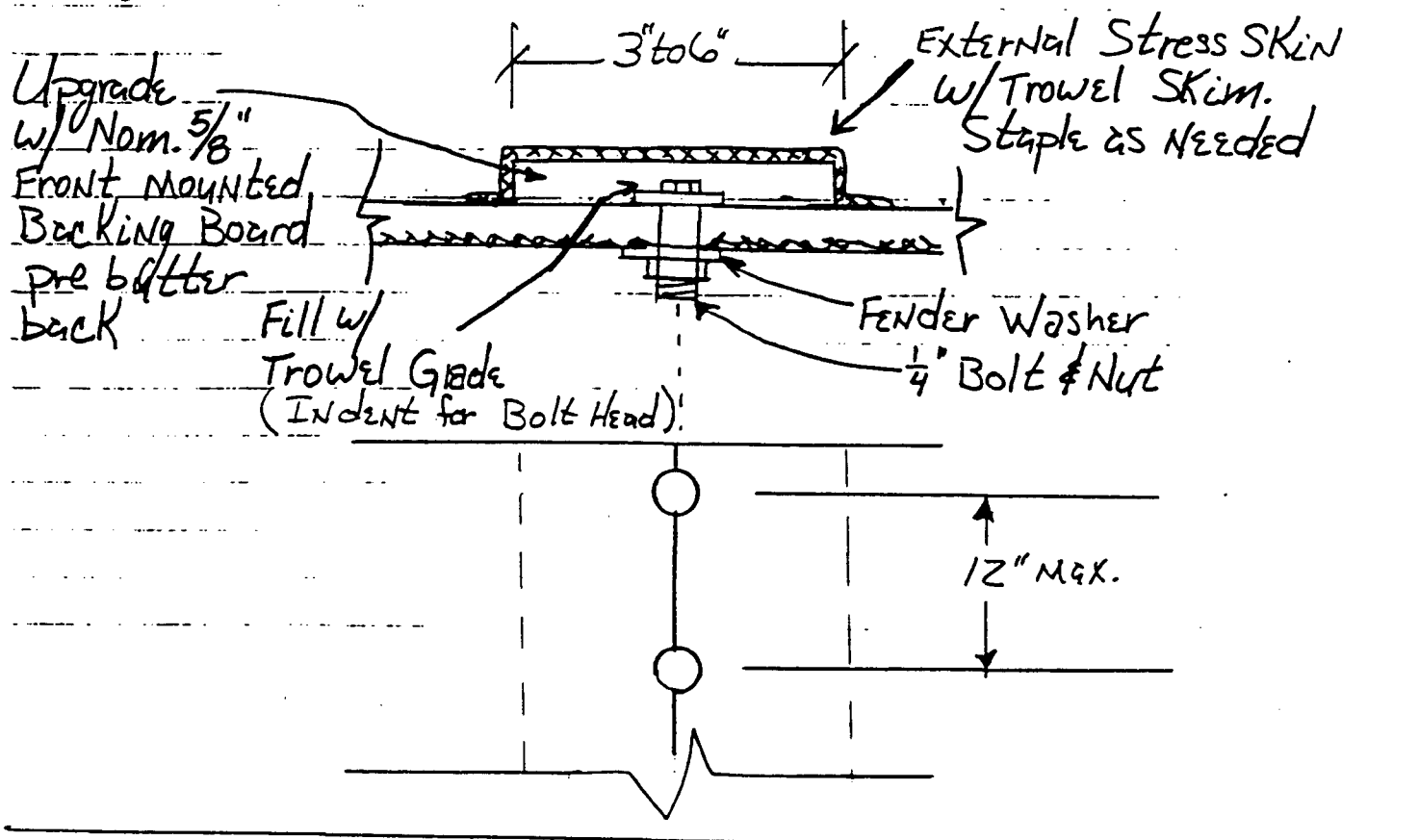
	FIRST LAYER	SECOND LAYER
FASTENER SPACING	OK	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	Not yet	
MESH OVERLAPS	Not yet	

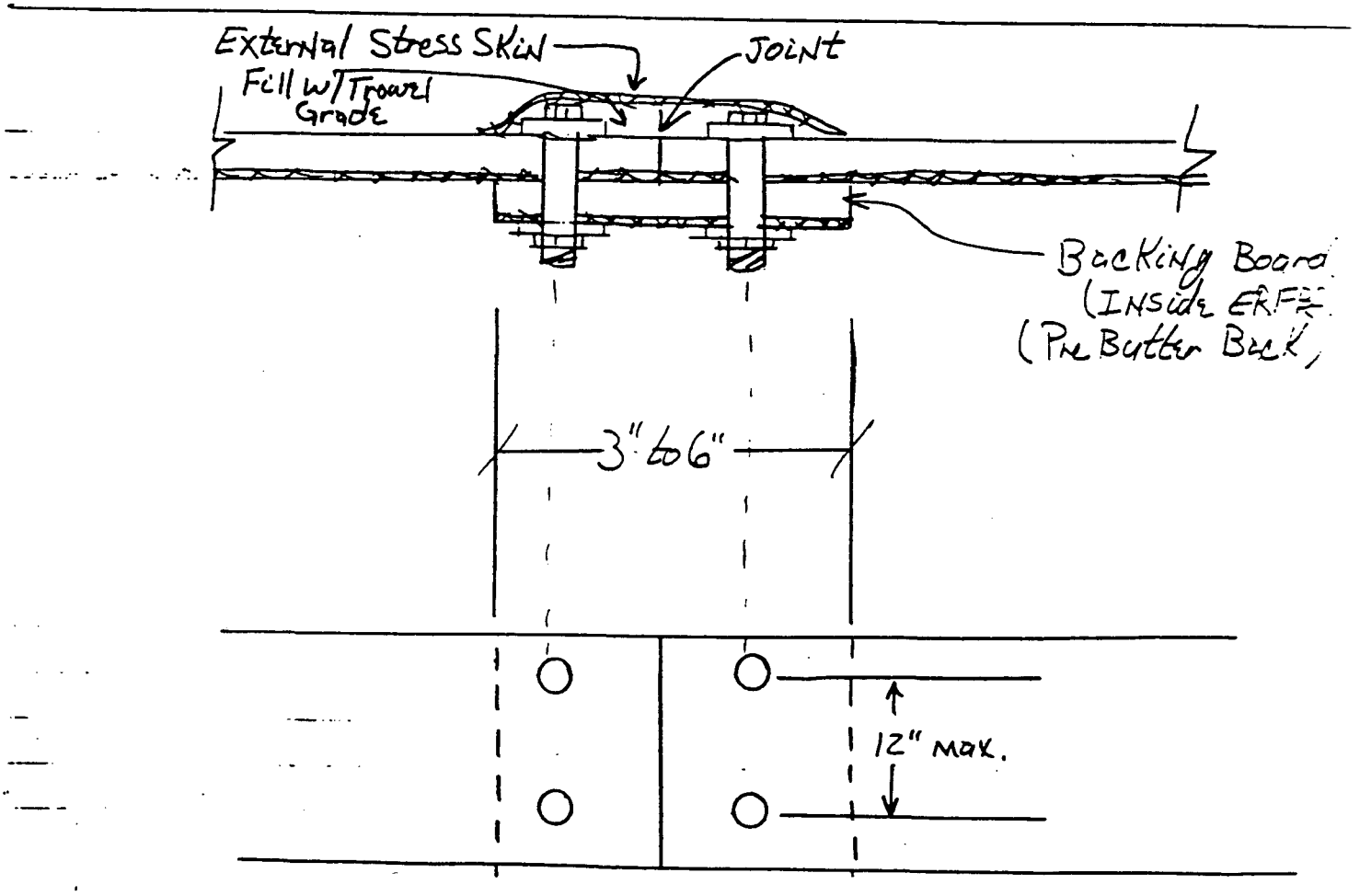
REMARKS: Assembled Large Conduit Box. Pre buttered all joints. Ribs on back side of board are smashed where Thermo-Lag Board is in contact with Steel frame.



SUBJECT TWO Types of SQN Joints PROJECT

COMPUTED BY [signature] DATE 9/28/94 CHECKED BY C Humphreys DATE 9/28/94





ATTACHMENT 1

DATA SHEET

RACEWAY ID 97257 WP/WR NO. Deck #4

LOT/CONTRACT NO* Nom. 3" board F94-03018 EXPIRATION DATE Trowel 94-08008 Feb. 95

CRAFTSMAN [signature] DATE 9/29/94

QC INSPECTOR C Humphrey DATE 9/29/94

TYPICAL DRAWING NO. _____

* Max = $\frac{1}{2}$" Min = $\frac{1}{4}$"

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	6"	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA * See Below	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	Not yet	
MESH OVERLAPS	Not yet	

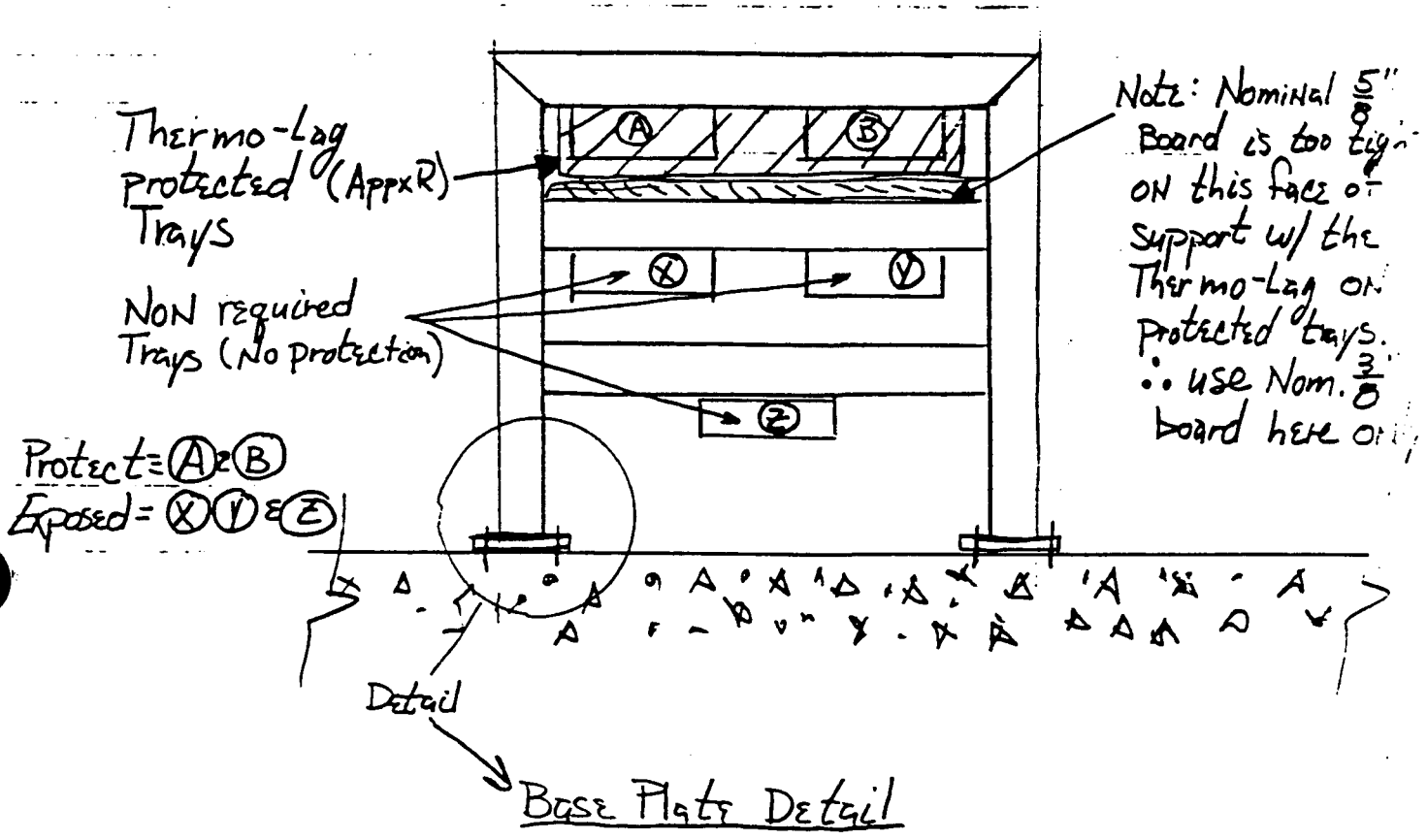
REMARKS: Started work on Cable tray Seismic Qualified Structural Steel Supports. The 18" rule may be ~~impractible~~ Un-Practical due to close spacing of the trays.

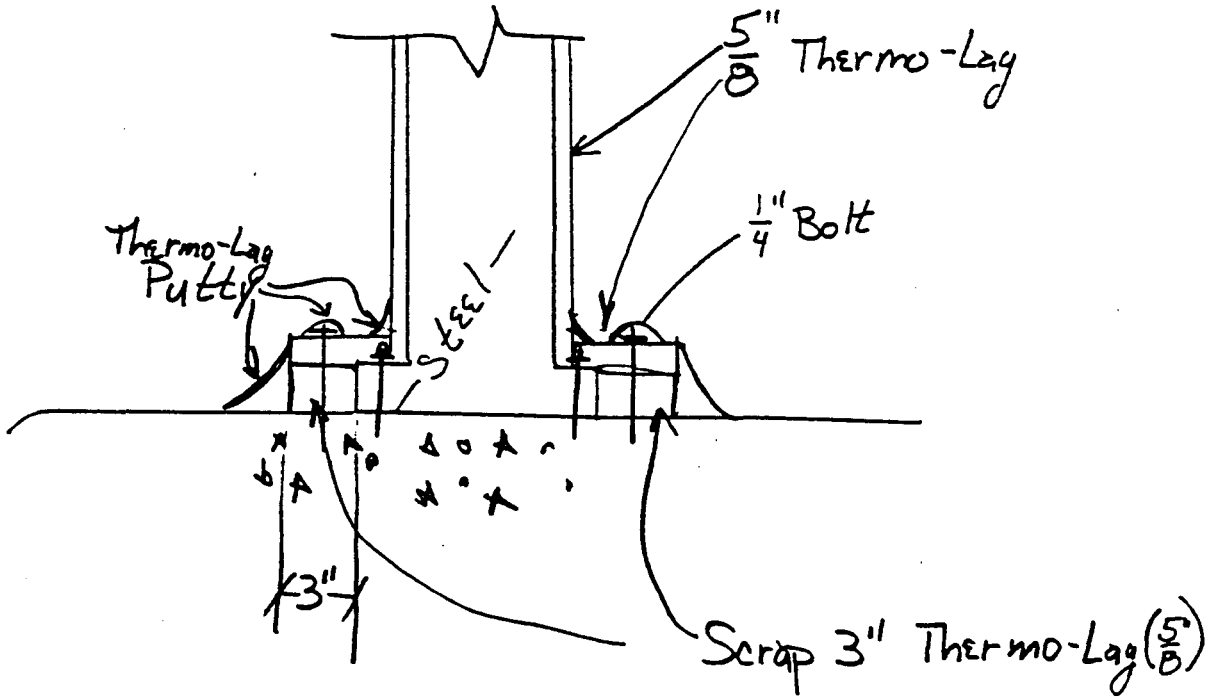
645

SUBJECT 97257 PROJECT Deck #4

COMPUTED BY [signature] DATE 9/29/94 CHECKED BY C Humphrey DATE 9/29/94

Note: Deck is inverted (upside-down) for construction of ERFBS





ATTACHMENT 1

DATA SHEET

RACEWAY ID 97257 WP/WR NO. Deck #4 Trowel 94-08008

LOT/CONTRACT NO. _____ EXPIRATION DATE Feb 95

CRAFTSMAN [signature] DATE 9/30/94

QC INSPECTOR C Humphrey DATE 9/30/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	See Remarks	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	Not yet	
MESH OVERLAPS	Not yet	

REMARKS: The tie wire spacing was exceeded on the steel. This should be OK (≈7" on one tie) Dwg. requirement will still be 6".

Continued work on steel support.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK #4 WP/WR NO. 97257

LOT/CONTRACT NO. _____ EXPIRATION DATE JAN 1995 TROWEL 93-11049 per TSI Letter of 8/3/94 to CAL BANNING OPL

CRAFTSMAN Kent W Power DATE 10/1/94

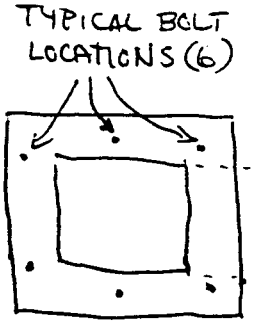
QC INSPECTOR C Humphrey DATE 10/1/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

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

REMARKS: Continued application of the ERFBS to the tray support structure of the specimen with dead trays between the supports. Drilled for and installed anchor bolts in the concrete to secure the baseplate protection. Since bolt holes were at some of the joint locations, used 1¼" washers under the securing nuts. Total of six bolts used to secure ERFBS on each baseplate. (SEE ~~BASE~~ DETAIL 9/29/94)



BASE SKETCH

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck #4 WP/WR NO. 97257

LOT/CONTRACT NO. 5/8 BOARD 94-03047 3/8 BOARD F94-0318 EXPIRATION DATE JAN 95 TRAVEL 93-11045

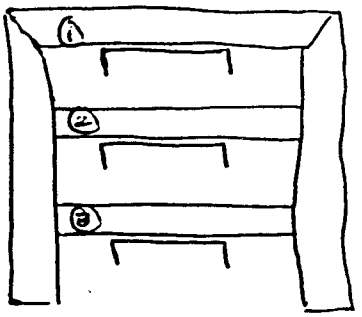
CRAFTSMAN Kent W Brown DATE 10/3/94

QC INSPECTOR C T Humphrey DATE 10/3/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	6" MAX	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE	NOT YET	
MESH OVERLAPS	2" MID TRAY ONLY	



REMARKS: NOMINAL 5/8" THICK PANEL ; MIN 1/2" MAX 11/16" THICKNESS MEASUREMENTS ON 3/8" PIECE TAKEN 9/29/94 CONTINUED WRAPPING TRAY SUPPORTS ON THE DOUBLE TRAY ASSEMBLY (SEE 9/29) AND STARTED THE SINGLE TRAY ASSEMBLY. THE MIDDLE TRAY IS WRAPPED; TOP + BOTTOM ARE NOT. A 3/8" BOARD HAD TO BE USED ON SUPPORT (3) ONLY IN THE SEGMENT IMMEDIATELY ADJACENT TO THE MIDDLE TRAY. ALL OTHER MATERIAL 5/8".

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECIC #4 WP/WR NO. 97257

LOT/CONTRACT NO. F94-02012 EXPIRATION DATE JAN/95

TROWEL GRADE 93-11049

CRAFTSMAN Kent W Brown DATE 10/4/94

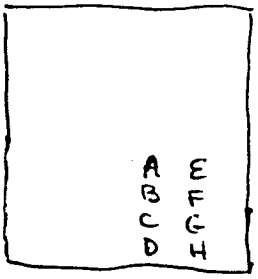
QC INSPECTOR C Humphrey DATE 10/4/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	6"	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	NOT YET	
MESH OVERLAPS	N/A	

4" CONDUIT IDEA



PREFORMED SECTION

H - #158400
F94-07063 CF
AND
#158400
F92-08038 CF

REMARKS: FINISHED APPLICATION OF THE BOARD MATERIAL TO THE TRAY SUPPORT STRUCTURE WITH ONE TRAY ON EACH CROSS MEMBER. COMPLETED APPLICATION OF THE TIE WIRES. APPLIED TROWEL GRADE MTL TO THE OUTSIDE OF THE 4" PREFORMED SECTIONS FOR CONDUIT H (4")*. INSTALLED THERMO LAG ON BASEPLATES OF TRAY SUPPORTS. BEGAN SKIM COAT OF THE ABOVE TRAY SUPPORT.

* TROWEL GRADE APPLIED W/ THE SECTIONS OFF OF THE CONDUIT DUE TO LACK OF ACCESS.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK #4 WP/WR NO. 97257

LOT/CONTRACT NO. ~~F94-03C47~~ F94-03C47 AND F94-07014 EXPIRATION DATE _____

CRAFTSMAN Kent W Brown DATE 10/5/94

QC INSPECTOR C Humphrey DATE 10/5/94

TYPICAL DRAWING NO. _____

PANEL(S) MIN 5/16"
MAX 3/4"

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	NELSON STUDS (CPLT INSTALLED)	
SEAMS OFFSET	NA	1/4" BOLTS WELDED TO UNISTRUT PER
JOINTS OFFSET	NA	NA - 12 MNTS TO SIMULATE
18" RULE	NA	THE STUDS
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	NOT YET	
MESH OVERLAPS	N/A	

REMARKS: BEGAN CUTTING PANELS FOR USE IN ENCLOSING 2 - 1" CONDUITS. BEGAN "SCOTCH BRITE" SURFACE FINISHING OF THE TRAY SUPPORT STRUCTURES. APPLIED PANELS TO BOX 66/ 1" CONDUITS. SEE S/28 FOR JOINT DETAILS (SHEET 2 OF 2). JOINT ON THE TOP OF THE ENCLOSURE IS THE UPPER SKETCH, JOINT ON THE SIDE IS PER THE LOWER SKETCH.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck #4 WP/WR NO. 97257

LOT/CONTRACT NO. SEE NEXT PAGE EXPIRATION DATE

CRAFTSMAN Kent W Brown DATE 10/6/94

QC INSPECTOR C Humphrey DATE 10/6/94

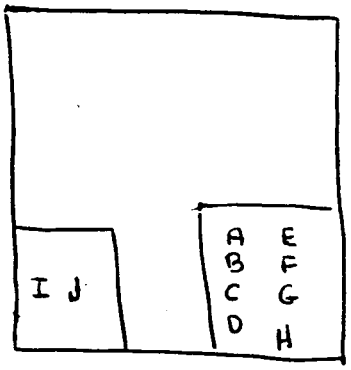
TYPICAL DRAWING NO.

MONITORING POINTS

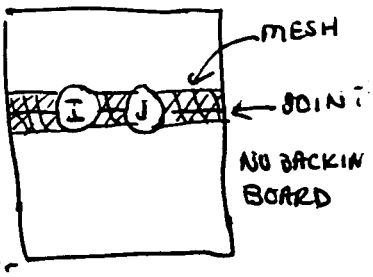
	FIRST LAYER	SECOND LAYER
FASTENER SPACING	OK	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NA	
SURFACE APPEARANCE	NA	
MESH OVERLAPS	OK	

REMARKS: DID THE JOINT ON THE END OF THE 1" BOX. UNLIKE THE END JOINT ON THE BOX ON THE 4" CONDUITS, THE IS NO BACKING BOARD BEHIND THE SEAM (SEE SKETCH #37). AS WITH THE REFERENCE JOINT, 3" WIDE EXTERNAL STRESS SKIN WAS APPLIED ALONG THE LENGTH OF THE JOINT, STAPLED AND SKIMMED. BEGAN APPLICATION OF THE EXTERNAL STRESS SKIN ON THE 1" CONDUIT BOX. INSTALLED PREFORMED THERMO LAG SECTIONS ON THE 1" CONDUITS.

CONDUIT ID



BOX W/ 1" CONDUITS



SUBJECT 97257 PROJECT DECK #4

Kent W Brown 10/6/94 C Humphrey 10/6/94
COMPUTED BY DATE CHECKED BY DATE

MATERIALS USED ON 1" CONDUITS PER SKETCH ON THE PREVIOUS PAGE

I	INSIDE	F94-02053	DB
		F94-02053	DB
	OUTSIDE	F94-07023	RM
		F94-07023	CF
J	INSIDE	F94-02053	DB
		F94-02053	DB
	OUTSIDE	F94-07023	CF
		F94-07023	RM

TROWEL GRADE APPLIED ON THE INSIDE OF EACH SECTION. SEAMS TURNED AT 90°.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK #4 WP/WR NO. 97257 94-08008

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

CRAFTSMAN Kurt (W) Parson DATE 10/7/94

QC INSPECTOR C Humphrey DATE 10/7/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	6"	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NOT CHECKED YET	
SURFACE APPEARANCE	NOT YET	
MESH OVERLAPS	~3"	

REMARKS: Continued application of the stress skin to the box w/1" conduits. A thin layer of trowel grade is first put on, the stress skin is applied and stapled and then covered with a thin layer of trowel grade. Stress skin seams are overlapped ~3". Stress skin is stitched together at approx 6" intervals. Began application of the stress skin (by the same process) to the box w/ the 4" conduits.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK #4 WP/WR NO. 97257
94-08008

LOT/CONTRACT NO. TROWEL GRADE 93-11049 EXPIRATION DATE FEB 95 Jan 95

CRAFTSMAN Kenneth Brown DATE 10/7/94

QC INSPECTOR C Humphrey DATE 10/7/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	6"	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	NA	
CIRCUMFERENCE	NOT CHECKED YET	
SURFACE APPEARANCE	NOT YET	
MESH OVERLAPS	~3"	

REMARKS: Continued application of the stress skin to the box w/1" conduits. A thin layer of trowel grade is first put on, the stress skin is applied and stapled and then covered with a thin layer of trowel grade. Stress skin seams are overlapped ~3". Stress skin is stitched together at approx 6" intervals. Began application of the stress skin (by the same process) to the box w/the 4" conduits.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck #4 WP/WR NO. 97257

LOT/CONTRACT NO. SEE NEXT PAGE EXPIRATION DATE

CRAFTSMAN Kent W Brown DATE 10/6/94

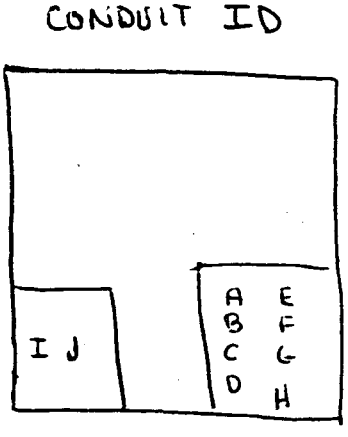
QC INSPECTOR C Humphrey DATE 10/6/94

TYPICAL DRAWING NO.

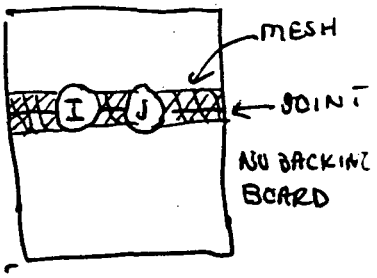
MONITORING POINTS

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

REMARKS: DID THE JOINT ON THE END OF THE 1" BOX. UNLIKE THE END JOINT ON THE BOX ON THE 4" CONDUITS, THE IS NO BACKING BOARD BEHIND THE SEAM (SEE SKETCH S/27). AS WITH THE REFERENCE JOINT, 3" WIDE EXTERNAL STRESS SKIN WAS APPLIED ALONG THE LENGTH OF THE JOINT, STAPLED AND SKUMMED. BEGAN APPLICATION OF THE EXTERNAL STRESS SKIN ON THE 1" CONDUIT BOX. INSTALLED PREFORMED THERMO LAG SECTIONS ON THE 1" CONDUITS.



BOX W/ 1" CONDUITS



SUBJECT 97257 PROJECT DECK #4

Kent W Parsons 10/6/94 C Humphrey 10/6/94
COMPUTED BY DATE CHECKED BY DATE

MATERIALS USED ON 1" CONDUITS PER SKETCH ON THE PREVIOUS PAGE

I	INSIDE	F94-02053	DB
		F94-02053	DB
	OUTSIDE	F94-07023	RM
		F94-07023	CF
J	INSIDE	F94-02053	DB
		F94-02053	DB
	OUTSIDE	F94-07023	CF
		F94-07023	RM

TROWEL GRADE APPLIED ON THE INSIDE OF EACH SECTION. SEAMS TURNED AT 90°.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK 4 WP/WR NO. 97257

LOT/CONTRACT NO. TROWEL F94-08008 EXPIRATION DATE FEB 95

CRAFTSMAN J.L. Pierce DATE 10/8/94

QC INSPECTOR C Humphrey DATE 10/8/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

	FIRST LAYER	SECOND LAYER
FASTENER SPACING	Tie Wire on conduits - 6"	
SEAMS OFFSET	NA	
JOINTS OFFSET	NA	
18" RULE	N/A	
CIRCUMFERENCE	N/A	
SURFACE APPEARANCE	Not finished	
MESH OVERLAPS	Yes & stitched.	

REMARKS: Installing preshaped conduit pieces to the 4" conduits. Lot #'s are as follows: Thickness of each piece with tolerance (5/8" ± 1/8")

Conduit H - F94-07003, F92-08038

" D - F94-07003, F94-06082

" G - F94-07003, F92-10031

" C - F94-06051, F94-06082

" F F94-07003, F44-06082

" S F94-07003 F94-06082

" E F94-07003 (2 pieces)

" A F94-07003 (2 pieces)

Completed installation of stress skin on 8-conduit enclosure.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck 4 WP/WR NO. 97257

LOT/CONTRACT NO. Trowel 94-03008 EXPIRATION DATE FEB 95

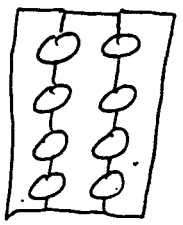
CRAFTSMAN J.J. Pierce DATE 10/10/94

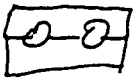
QC INSPECTOR C Humphrey DATE 10/10/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

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





REMARKS: Installed frame around conduits where they enter boxed enclosure (see sketch). Framing held in place with trowel only. Installed border around boxed enclosures. Hilti Kwik bolts used to hold border to concrete. Spacing is 12" max. Panel Lot # 94-07014 (used on frame & border) is within dimension tolerances. (i.e. 5/8" ± 1/8")

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK 4 WP/WR NO. 97257

LOT/CONTRACT NO. TROWEL 94-08008 EXPIRATION DATE FEB 95

CRAFTSMAN J.J. Pierce DATE 10/11/94

QC INSPECTOR C Humphrey DATE 10/11/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

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

REMARKS: Completed installation of border around large enclosure. Panel Lot #94-07014; thickness within tolerance (5/8" ± 1/8"). Install putty balls over bolts. Started skim coat on large enclosure.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck 4 WP/WR NO. 97257

LOT/CONTRACT NO. Trowel 94-08008 EXPIRATION DATE Feb 95

CRAFTSMAN J.L. Pierce DATE 10/12/94

QC INSPECTOR C Humphrey DATE 10/12/94

TYPICAL DRAWING NO. _____

MONITORING POINTS

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

REMARKS: Installed trowel balls over nuts. Applied skim coat over part of assembly.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK 4 WP/WR NO. 97257

LOT/CONTRACT NO. TROWEL 94-08008 EXPIRATION DATE FEB 95

CRAFTSMAN J.F. Pierce DATE 10/13/94

QC INSPECTOR C Humphrey DATE 10/13/94

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: Applied trowel as final coat on part of the enclosures. Completed installation of putty over nuts.

ATTACHMENT 1

DATA SHEET

RACEWAY ID DECK 4 WP/WR NO. 97257

LOT/CONTRACT NO. TROWEL 94-08008 EXPIRATION DATE FEB 95

CRAFTSMAN JJ Pierce DATE 10/14/94

QC INSPECTOR C Humphrey DATE 10/14/94

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: Touched up thin spots on skim coat and performed general clean up of the deck. Still needs some touch-up.

ATTACHMENT 1

DATA SHEET

RACEWAY ID Deck 4 WP/WR NO. 97257

LOT/CONTRACT NO. Trowel 94-08008 EXPIRATION DATE FEB 95

CRAFTSMAN J.J. Pierce DATE 10/18/94

QC INSPECTOR C. Patton DATE 10-18-94

TYPICAL DRAWING NO. _____

MONITORING POINTS

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

JJP 10/18/94

REMARKS: Completed touch up of final trowel grade skim coat. Deck is now ready for 30 day cure. The two sided enclosures were walked on and layed on numerous times during the finishing of the skim coats.

TVA/TSI TEST PLAN CLARIFICATION NO.: 001

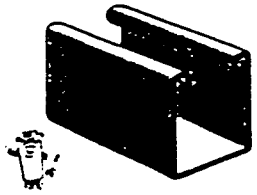
Test Plan Revision No.: 1 Section No.: Appendix A
Dated 7-11-94

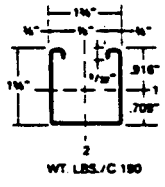
Requirements: Appendix A of Test Plan
Design Drawings (Page no.4 of 7)
This design specifies the use of Unistrut Part No. P1001A and plate steel sized at 1/2"x3" x 7-1/2" for the support of Thermo-Lag assemblies.
(See attached page)

Clarification and Discussion:
Due to the unavailability of Unistrut Part No. P1001A. Omega Point Labs has substituted Unistrut Part No. P1001, using 3/8"x 2"x 6-1/2" plate steel.
Description of parts:

P 1000® CHANNEL AND COMBINATIONS

1⅝" UNISTRUT CHANNEL WIDTH SERIES

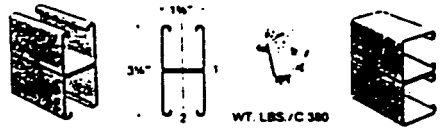




P 1000 channel and combinations are roll formed from 12 gauge (.105") strip steel.

Standard lengths 10 and 20 feet.

P 1000 CHANNEL



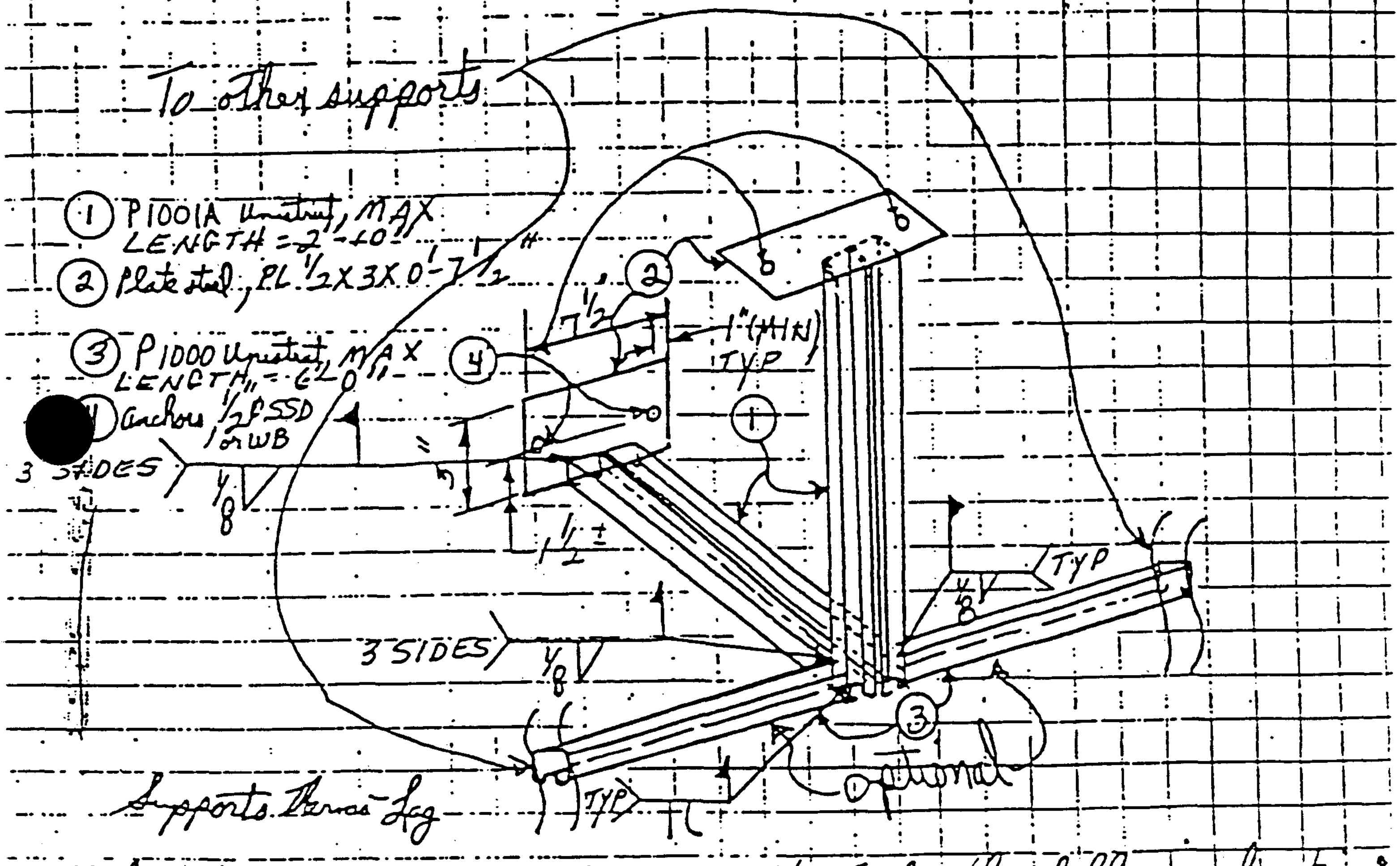
P 1001 P 1001 A

TVA Representative: J.J. Price Date: 9/20/94

OPL Engineering Rep.: [signature] Date: 9/20/94

OPL QA/QC Rep.: C Humphreey Date: 9/20/94

cc: Mark Salley, TVA
Rubin Feldman, TSI



Add the above supports to drawing 48N 1314-5 for the following locations:

R2

① ≃ 6'7 1/2" W of ℄ at A1 — Elev ≃ 761' — 47A053-90 series can apply
② ≃ 15'11" W of ℄ at A1
③ ≃ 0'8" W of ℄ at A1
④ ≃ 11'4" W of ℄ at A1
⑤ ≃ 17'4" W of ℄ at A1

WP 11605
PAGE VI-58 OF VI-10

FCR-3451 R2

TVA/TSI TEST PLAN CLARIFICATION No. 001

Certifications of Calibration and Conformance

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97332-38
RECEIVED FROM PMC
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1416 - 11960
DATE RECEIVED 8-16-94
DATE INSPECTED 8-16-94
INSPECTED BY: CPatton

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	
TC Plug	11400	200	200	0	T-1 Plug	Y	Y	Good	None	X			
TC Jack	11400	200	200	0	T-2 Jack	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Janice Welch
PMC Corporation
57 Harvey Road

Londonderry NH 03053

PO Number: 1140-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	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 AMARILLO

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 10

ITEM	QUANTITY ORDERED	PART NUMBER / DESCRIPTION	QTY. BACK ORDERED	QTY. SHIPPED
1	100	T-1 PLUG	0	100
2	100	T-2 JACK	0	100

SPECIAL INSTRUCTIONS:

2850

SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8-15-94	UPS	1	9#	X			X	GP

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.

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: QBatton

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 Cyl

FORM
1/29/93

675

676

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Janice Welch
PMC Corporation
57 Harvey Road

Londonderry NH 03053

PO Number: 1123-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
6/28/94	UPS Blue Label	MS-1123Q-97185	7-11-94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Teflon Coated Thermocouple Wire KK-TA/TA-24	40,000		
2.	Calibration data	1		

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Humphrey
Date 6/28/94

Special Instructions

Include Certificates of Conformance to ASTM E230-93 Special Limits of Error and Calibration data required to 200°F, 400°F, 600°F, 800°F and 1000°F traceable to NIST

Ordered By: Constance A. Humphrey

Project #: ~~OPL Equipment~~ CH
TVA/TSI
Proj # 97185

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

Total	
Shipping	
Tax	
Invoice Total	

OMEGA POINT LABORATORIES
MATERIAL PURCHASING SPECIFICATIONS

SPECIFICATION NUMBER: MS--11230-97185

VENDOR: PMC

VENDOR PRODUCT NUMBER: KK-TA/TA-24

PRODUCT DESCRIPTION: Teflon Coated Thermocouple Wire

Material as defined above shall be provided in accordance with the Critical Characteristics as listed below:

TEST	DESCRIPTION	SPECIFICATION RANGES MINIMUM	MAXIMUM
ASTM E230-93	Std. Temperature-EMF Tables for Standardized Thermocouples	Temp. Range +32°F to +545°F Special Limits of Error ±2°F	

QUALITY ASSURANCE REQUIREMENTS

1.0 QUALITY PROGRAM

Seller shall furnish this item in accordance with Quality Program approved by Omega Point Laboratories. Material specified herein is to be produced and tested in accordance with vendor quality standards, methods, guidelines and manufacturing instructions as defined in that Quality Program.

2.0 QUALITY VERIFICATION

Receiving Inspection - Buyer shall inspect items upon receipt to verify compliance with purchase order requirements. Rejected items shall be returned at seller's expense.

Document Review - Final acceptance shall be based on satisfactory review of required certifications and/or supporting documents.

3.0 CERTIFICATIONS

3.1 Certification that supplied materials comply with this material specification and listing Critical Characteristics shall be provided. This certificates shall reference Omega Point Labs purchase order number and specification number for all material furnished under this specification. This Certification shall be signed by the appropriate vendor representative.

3.2 The material furnished under this specification shall be a product that complies with the following:

3.2.1 Has been tested and passed all tests specified herein.

3.2.2 Manufacturing methods for this material have not changed. Vendor will advise Omega Point in writing of any changes in the manufacturing prior to material manufacture.

3.2.3 Raw materials used in the manufacture of this material meet Vendor specifications.

4.0 AUDITS/RIGHTS OF ACCESS

Omega Point Labs reserves the right to audit your facility to verify compliance with the purchase order and specification requirements with a minimum ten (10) day notice.

5.0 IDENTIFICATION

Seller shall identify each item with a unique traceability number by physical marking or tagging. These identification numbers shall be traceable to certifications and packing lists.

6.0 PACKING/SHIPPING

All materials shall be packaged in air tight, moisture free containers and shall be free of foreign substances such as dirt, oil, grease or other deleterious materials.

All materials shall be suitably crated, boxed or otherwise prepared for shipment to prevent damage during handling and shipping.

QUALITY ASSURANCE APPROVAL

C Humphrey

Title Quality Assurance Mgr.

Date 6/28/94

CH

AVL Verification

Class: B

OMEGA POINT LABORATORIES

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OMEGA POINT LABORATORIES
COMMERCIAL GRADE DEDICATION

PURCHASING SPEC. NO: MS-1123Q-97185

PRODUCT: Thermocouple Wire

MANUFACTURER: PMC Corporation
57 Harvey Road
Londonderry, NH 03053

SUPPLIER: (same)
ADDRESS:
CITY:
STATE/ZIP:
PHONE: (603) 432-9473

TECHNICAL EVALUATION

DESCRIPTION: Teflon Coated Thermocouple Wire

DOES IT PERFORM SAFETY FUNCTION? YES:

Material testing and equipment calibration

DOES ITEM MEET CRITERIA OF CGI DEFINITION? Yes

Item meets all three criteria of CGI listed below:

a) not subject to design or specification requirements that are unique to nuclear facilities; and

b) used in applications other than nuclear facilities; and

c) is ordered from manufacturer or supplier on the basis of specifications set forth in the manufacturers published product description.

TECHNICAL EVALUATION PERFORMED BY:

Project Manager
Date 6/28/94

VERIFIED BY:

C Humphrey
Q/A Manager
Date 6/28/94

PRODUCT: Teflon Coated Thermocouple Wire

SPEC NO: KK-TA/TA-24

IDENTIFICATION OF CRITICAL CHARACTERISTICS:

TEST	DESCRIPTION	SPECIFICATION RANGES MINIMUM	MAXIMUM
ASTM E230-93	Std. Temperature-EMF Tables for Standardized Thermocouples	Temp. Range +32°F to +545°F Special Limits of Error ±2°F	

IDENTIFICATION OF CRITICAL CHARACTERISTICS PERFORMED BY:

PROJECT MANAGER
DATE 6/28/94

VERIFIED BY:

C. Humphreys
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.

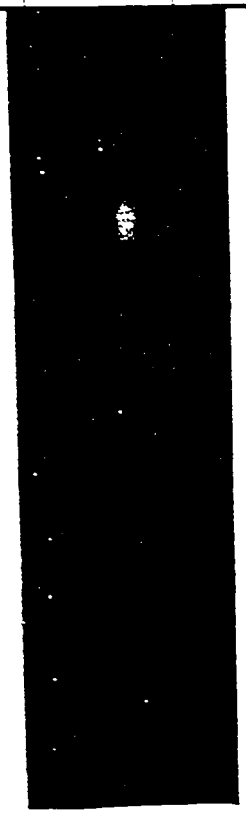
Calibrated conductors for high system accuracy

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

583

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.

EELS, SPOOLS & COILS > All shipments, unless specified otherwise by PMC, are made on non-returnable reels, spools or coils in one continuous length.

H GES & 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.

684

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 R
ELMENDORF, TX 7811

78238

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG0001	60	50	60	L0794

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP	CODE
11330			1. MFT 5 METERS 2. CFT 6 FEET 3. POUNDS 7 OT 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-TX/TX-24 REF. MS11230-97105 SCHED. SHIP 8.5/94	18,705'
2	20000.00	KK-TX/TX-24 REF. MS11230-97106 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 SDT

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8/16/94	—	4	129#	✓		✓		

PACKING SLIP

685

PMC CORPORATION
57 HARVEY ROAD, LONDONDERRY, N.H. 03053 • (603) 432-WIRE
SPECIALIZING IN WIRE, CABLES & TEMPERATURE

SOLD TO

OMEGA POINT LABS, INC.
15015 SHADY FALLS ROAD
ELMENDORF, TX 78112

78238

SHIP TO

OMEGA POINT LABS, INC
15015 SHADY FALLS RD
ELMENDORF, TX 781[illegible]

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OME5001	60	60	[illegible]	[illegible]

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP
11230		

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	20000.0	KK-TA T4-24 REF. MC11230-27135 SCHED. SHIP 8/31 94	5000
3	1.00	CALIBRATION AT 200, 400, 600, 800 AND 1000°F [illegible] 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 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

686

SOLD TO

OMEGA POINT LABS, INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

SHIP TO

OMEGA POINT LABS, INC.
16015 SHADY FALLS RD
ELMENDORF, TX 7811

78238

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
7/27/94	OMEG001	50	50	K0	10774

CUSTOMER P.O. NUMBER	REQUESTED SHIP	SCHEDULED SHIP	CODE
11231			1. MFT 5. METER 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. MS11300-97185	13556
3	1.00	CALIBRATION AT 300, 400, 500, 600 AND 1000°F (+0 CAL DATA REQUIRED	1

UNIT PRICES ARE BASED ON COPPER AT $ /lb.. SILVER AT $ /TROY OZ. HOWEVER UNIT PRICES INVOICED WILL BE BASED ON MATERIAL COST ON DATE OF SHIPMENT.

AL INSTRUCTIONS:

UPS Blue

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
7/29/94	—	2	93	✓			✓	—

PACKING SLIP

PMC

CERTIFICATE OF CONFORMANCE

TO OMEGA POINT LABS INC. DATE 8/15/94

16015 SHADY FALLS RD. CUSTOMER PO# 11230

ELMENDORF, TX 78112 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

688

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

Quality Assurance Manager

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

Good KK material to Special Limits on

Run # 0518

1-13-94

Wire used for Spool 105-966

690

HAI-KP™ NON-MAGNETIC THERMOCOUPLE GRADE

SIZE 0201 GROSS 32.52

B & S 24 TARE 1.65

HEAT# 6230 NET 30.87

COIL# 2

P.O.

RES. Ω/Ft.

SPEC.# 20752

P/N KKP-24

DATE FEB 17 93

TEST TEMP	KP EMF vs. Pt-67 (MV)	Dev. from KP EMF (MV)
200°F	2.813	+.004
300°F	4.323	+.007
400°F	6.115	+.003
500°F	7.965	+.006
1000°F	17.504	+.005
1600°F	28.474	+.031
2000°F	35.334	

HARRISON ALLOYS

HARRISON

HAI-KN™ MAGNETIC THERMOCOUPLE GRADE

SIZE 0201 GROSS 30.00

B & S 24 TARE 1.65

HEAT# 5605 NET 28.35

COIL# 13

P.O.

RES. Ω/Ft.

SPEC.# 20753

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	-.022
400°F	-2.200	-.005
500°F	-2.595	+.005
1000°F	-4.747	+.017
1600°F	-7.692	-.001
2000°F	-9.521	

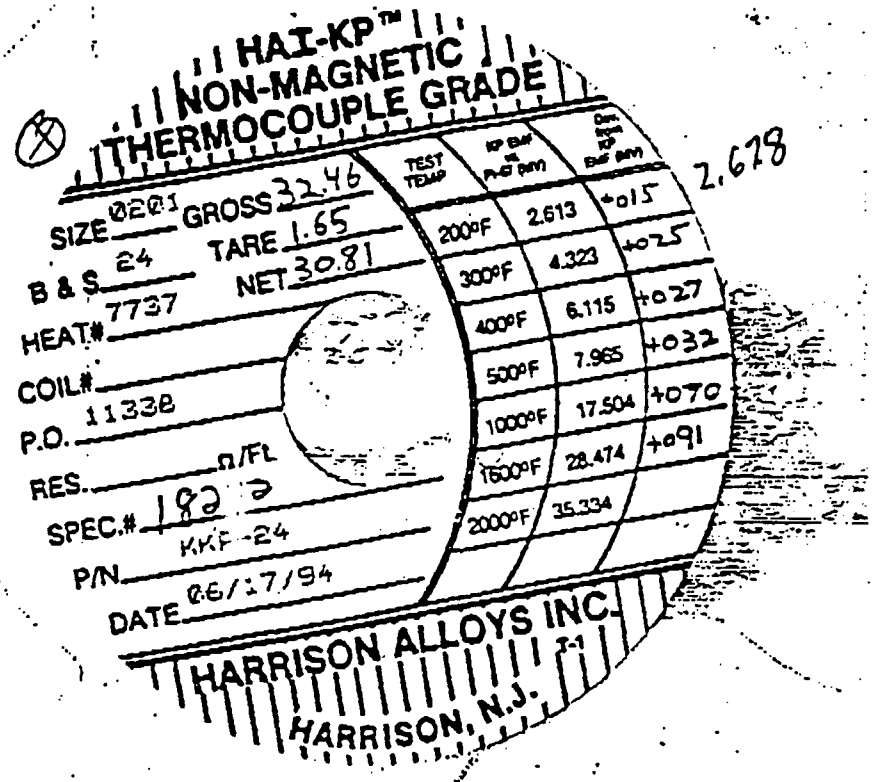
HARRISON ALLOYS INC.

HARRISON, N.J.

Bare Wire Reel # 18242 used on Spool #5

691

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



2.678

.692

Bare Wire Riel# 17623 used On Spool#'s 105967, 105968, 105969, 105970, 105971 + 105972

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE .0201 GROSS 33.31
B & S 24 TARE 1.65
HEAT# 5605 NET 31.66
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	-7.692	-.008
2000°F	-9.521	

HARRISON ALLOYS INC.
HARRISON, N.J.

These Two Reels were used in The Manufacture of Spool # 106460

T.C.

693

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)	Diff 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)	Diff from KN EMF (MV)
200°F	-1.206	-.003
300°F	-1.770	-.013
400°F	-2.200	-.062
500°F	-2.595	+.002
1000°F	-4.747	-.036
1600°F	-7.692	-.101
2000°F	-9.521	-.180

HARRISON ALLOYS INC.
HARRISON, N.J.

HAI-KP™
NON-MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 32.64
B & S 24 TARE 1.65
HEAT# 6748 NET 30.99
COIL# 6
P.O. P11338REPL
RES. Ω/Ft.
SPEC.# 18554
P/N KKP-24
DATE 07/27/94

TEST TEMP	KP EMF vs Pt-67 (MV)	Dev. from KP EMF (MV)
200°F	2.613	-.001
300°F	4.323	-.003
400°F	6.115	-.005
500°F	7.965	-.013
1000°F	17.504	-.026
1600°F	28.474	-.002
2000°F	35.334	-.125

HARRISON ALLOYS INC.
HARRISON, N.J.

HAI-KN™
MAGNETIC
THERMOCOUPLE GRADE

SIZE .020 GROSS 31.64
B & S 24 TARE 1.65
HEAT# 2975 NET 29.99
COIL# 2
P.O. P11338 REPL
RES. Ω/Ft.
SPEC.# 18555
P/N KKN-24
DATE 05/15/94

TEST TEMP.	KN EMF vs Pt-67 (MV)	Dev. from KN EMF (MV)
200°F	-1.206	-.003
300°F	-1.770	-.013
400°F	-2.200	-.062
500°F	-2.595	+.002
1000°F	-4.747	-.036
1600°F	-7.692	-.101
2000°F	-9.521	-.180

HARRISON ALLOYS INC.
HARRISON, N.J.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97257-97260
RECEIVED FROM PMC
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 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

OMEGA POINT LABS, INC.
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

78208

SHIP TO

OMEGA [illegible]
16015 SHADY F[illegible]
ELMENDORF, TX 78[illegible]

DATE RECEIVED	CUSTOMER NO.	E	O	T	PMC JOB NO.
8/11/94	OME3001	[illegible]	[illegible]	[illegible]	[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	FR-1A-TA-24 REF. MS11390-11960	12285
2	1.00	CALIBRATION AT [illegible] 400, [illegible], [illegible] 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]L INSTRUCTIONS:

DATE SHIPPED	BILL OF LADING NO.	NO. OF PACKAGES	WEIGHT	PPD	COL.	PARTIAL	COMPLETE	PACKED BY
8-31-94	—	2	83	✓			✓	

PACKING SLIP

PMC

CERTIFICATE OF CONFORMANCE

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

16015 SHADY FALLS ROAD CUSTOMER PO# 1139-0

EIMENDORF, 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

699

These Two Reels were used to Manufacture Job No 18959

T.C.

Good 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. ___ Ω/Ft
SPEC.# 18578
P/N KKP -24
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	7.965	-004
1000°F	17.504	-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 1.55 NET 30.39
HEAT# 2879
COIL# 1
P.O. 11338
RES. ___ Ω/Ft
SPEC.# 18579
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
QA 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

702

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 Humphreys

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.

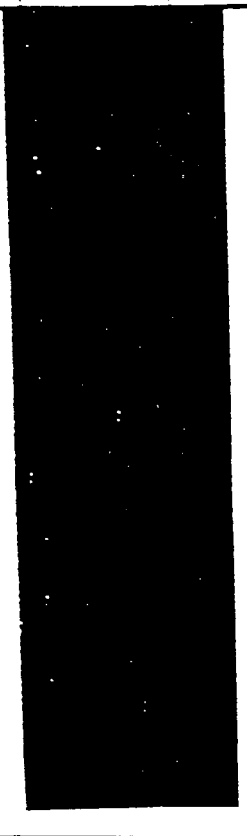
Calibrated conductors for high system accuracy

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.

:ELS, SPOOLS & COILS > All shipments, unless specified otherwise by PMC, are made on non-returnable reels, spools or coils in one continuous length.

S & 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.	CONID 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 Specs. at Rothe.

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Rothe Development
4614 Sinclair Road

San Antonio TX 78222

PO Number: 1131-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/19/94	Their Truck		8-2-94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Digital Calibrator SN# 703297 - Calibration Service	1	$60.00	$60.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 7-19-94

Special Instructions

Please include Certificate of Calibration and Calibration Data Sheets

Ordered By: Cleda Patton

Project #: OPL Equipment

Total	$60.00
Shipping	
Tax	
Invoice Total	**$60.00**

EQUIPMENT DELIVERY RECEIPT

712

Rothe Development, Inc.
[redacted]ogy Services Division
[redacted]nclair 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]d 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

713

CHARGE # 107 CONTROL # 556 - 8477

WORK ORDER # 44184

RECEIVED FROM Omega Point Laboratories DATE 07/20/94

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

CONTACT (NAME) Ms. Connie Humphrey FAX#

PURCHASE ORDER # 1131-Q

CUSTOMER COMMENTS TAXABLE 8.25%

ITEM

MFG Omega

MODEL CL-466-L-1

SERIAL # 703297

TYPE Digital Temp Calibrator

ACCES. RCVD. Power cord
Probe Handle

- [ ] REPAIR
- [ ] OPERATIONAL CHECK
- [x] CALIBRATION

CALIBRATION DATE 29 July 94

DATE DUE 29 Jan 95

CALIBRATION INTERVAL 6 mo.

- [x] RECEIVED IN SPECS.
- [ ] RECEIVED INOPERATIVE
- [ ] RECEIVED OUT OF SPECS.

CKT REF #	QTY.	MFG PART #	DESCRIPTION	COST

ROTHE TECH.	OUR P.O. #
WW	
REPAIR LABOR HRS.	SERVICE CODE
	J

PARTS TOTAL		
REPAIR LABOR		
SHIPPING		
TEAR DOWN CHARGE		
CALIBRATION	160.00	
TAX	12	40
TOTAL	172	40

R #'s 2030, 2081, 150

OMMENTS CAL DATA PROVIDED

ORK PERFORMED:

Cal'd

EN 74 °F

H. 34 %

SPECS: (MFG) RDI

PROCEDURE: (MFG) RDI OTHER

RDI 2002

SHIP VIA: _____ DATE: _____ RECEIVED BY: _____

Rothe Development Inc.

Metrology Services Division

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 210-648-3131 FAX 210-648-4091

714

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	Losan	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]IST TEST# 250839
[redacted]IST TEST# 251316
Hz WWVB Transmission

INSPECTED BY Joe A Mendoza
COMMENTS:

RDI 1001

ROTHE DEVELOPMENT METROLOGY SERVICES

715

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.	CONTD 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

718

OMEGA POINT LABORATORIES
CALIBRATION DATA SHEET

DIGITAL CALIBRATOR
OMEGA ENGINEERING MODEL CL 466-L
SN# 703297

Calibration Date 2/24/94 Next Cal. Due on or before: 8/24/94

Calibration Frequency: Every six months.

Equipment to be returned to qualified facility for recalibration against suitable NBS / Mil. Std.45662 / 10 CFR 50 standards.

Sent to (for Calibration): Rothe Development
4614 Sinclair Rd.
San Antonio, TX
78222

Ship Date: 2/14/94

Return Date: 2/28/94

P.O. #: 11120

Attach calibration label to the Digital Calibrator and any supporting documentation ("As Returned" specifications) to this form.

720

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Rothe Development
4614 Sinclair Road

San Antonio TX 78222

PO Number: 1112-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	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	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

721

Rothe Development, Inc.
[redacted]ogy Services Division
[redacted]inclair 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

[redacted]ed 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

722

CHARGE # 107 CONTROL # 556 - 8477

WORK ORDER # 42180

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

R #'s 20, 30, 150, 243

COMMENTS CAL DATA PROVIDED

WORK PERFORMED: Optimized mV + mA functions.

Cal'd

EN 72 °F

H. 27 %

SPECS: (MFG) RDI

PROCEDURE: (MFG) RDI OTHER

RDI 2002

SHIP VIA: _____ DATE: _____ RECEIVED BY: _____

Rothe Development Inc.

Metrology Services Division

4614 SINCLAIR RD., SAN ANTONIO, TEXAS 78222 210-648-3131 FAX 210-648-4091

723

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]ST TEST# 251316
Hz [illegible]WVB 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 ✓ RECEIVED OUT OF SPECS _____

RECEIVED INOPERATIVE _____

TYPE J	DEG F	INCOMING	OUTGOING	TOL
-5.760	-200	-200.0	-200.0	+/- .6
-3.492	-100	-100.0	-100.0	+/- .6
0.000	32	32.0	32.0	+/- .6
1.942	100	99.9	99.9	+/- .6
7.947	300	299.8	299.8	+/- .6
14.108	500	499.8	499.8	+/- .6
21.785	750	749.8	749.8	+/- .6
29.515	1000	999.8	999.8	+/- .6
37.688	1250	1249.8	1249.8	+/- .6
46.503	1500	1500.0	1500.0	+/- .6
53.525	1700	1700.0	1700.0	+/- .6

	DEG C	INCOMING	OUTGOING	TOL
-4.632	-100	-100.0	-100.0	+/- .5
0.000	0	.0	.0	+/- .5
5.268	100	99.9	99.9	+/- .5
16.325	300	299.8	299.8	+/- .5
33.096	600	599.8	599.8	+/- .5
51.875	900	899.9	899.9	+/- .5

TYPE K	DEG F	INCOMING	OUTGOING	TOL
-2.699	-100	-100.0	-100.0	+/- 1.2
0.000	32	32.0	32.0	+/- .8
1.520	100	100.0	100.0	+/- .8
6.092	300	299.9	299.9	+/- .8
10.560	500	499.8	499.8	+/- .8
16.349	750	749.7	749.7	+/- .8
22.251	1000	999.7	999.7	+/- .8
28.148	1250	1249.7	1249.7	+/- .8
33.913	1500	1499.8	1499.8	+/- .8
39.485	1750	1749.8	1749.8	+/- .8
44.856	2000	2000.0	2000.0	+/- .8
49.996	2250	2250.0	2250.0	+/- .8
54.845	2500	2500.0	2500.0	+/- .8

TYPE K	DEG C	INCOMING	OUTGOING	TOL
-3.553	-100	-99.6	-99.6	+/- .8
[illegible].000	0	.0	.0	+/- .5
[illegible].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
[illegible].286	200	199.9	199.9	+/- .4
[illegible]4.860	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
[illegible]3.110	700	699.9	699.9	+/- .4
[illegible]8.783	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: 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	
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

127

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Floyd Passmore
Metroplex Metrology Lab
2312 Municipal Parkway

Bedford TX 76021

PO Number:

1103-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	F.O.B.	Date Required	Terms
1/13/94	UPS Ground			30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	0-100 psi Pressure gauge Model No. JD-GF Serial No. 92 LE 003	1	$25.00	$25.00
2.	0-60 psi Pressure gauge Model No. JC-GF Serial NO. 92 LE 002	1	$25.00	$25.00
	plus tax & shipping			

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 1-13-94

Special Instructions

Please include Certificates of Calibration and Calibration Data

Ordered By: Cleda Patton

Project #: OPL Equipment

Total	**$50.00**
Shipping	
Tax	
Invoice Total	**$50.00**

TEST Nº 424132

METROPLEX METROLOGY LABORATORY INCORPORATED
P.O. BOX 210249 BEDFORD, TEXAS 76095-7249
2312 MUNICIPAL PARKWAY BEDFORD, TEXAS 76021-4642
METRO (817) 267-4999

Certificate of Calibration

We certify the accuracy of this Mc Daniel Controls, Inc. 0 to 100 Liquid Filled PSI Gage, Mod.# None, S/N 92LE003, subdivided in 1 lb. increments, property of Omega Point Laboratories, Inc., 16015 Shady Falls Road, Elmendorf, Texas. The accuracy of this instrument has been determined from **Reference Standards** which have been calibrated from **Master Standards** which were certified by **The National Institute of Standards and Technology.**

The accuracy of this pressure gage meets all the requirements of **Federal Specifications GGG-G-76E, GG-G-66-B** and **Instrument Calibration Procedure (I.C.P.) No. D25A and M20.** The calibration certification of this instrument is in compliance with **MIL-STD-45662A.** This instrument has been calibrated in an upright position at 72°F 45%RH.

Instrument used in calibration: Chandler Dead Weight Tester, S/N 20759 (Cal. 12/28/93 Due 12/28/94). **NIST Test #737/229495. Expires: 10-2-94.**
Received Condition: In Tolerance
Technician ID: #4

LABORATORY WEIGHT PRESSURE	DISPLAYED INDICATED PRESSURE OF PSI GAGE	DEVIATION OF PSI GAGE	LIMITS OF UNCERTAINTY
10	10	0	0
20	20	0	0
30	30	0	0
40	39.9	-.1	.1%
50	49.2	-.8	.1%
60	59.3	-.7	.1%
70	69.3	-.7	.1%
80	79.4	-.6	.1%
90	89.4	-.6	.1%
100	100.5	+.5	.1%

CALIBRATION TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY — CONFORMS WITH GOVERNMENT REGULATIONS

TEST IN COMPLIANCE WITH MIL-STD-45662A

President

Weta Passmore
Date Cal: 1-20-94
Date Due: 1-20-95

WP/kb

INVOICE 730 No. 42531

METROPLEX METROLOGY LABORATORY

PHONE Metro (817) 267-4999
FAX (817) 540-1410

2312 MUNICIPAL PARKWAY

PLEASE REMIT TO P.O. BOX 210249
BEDFORD, TEXAS 76095-7249

BEDFORD, TEXAS 76021

Refer to above number in correspondence regarding this charge.

February 1, 1994

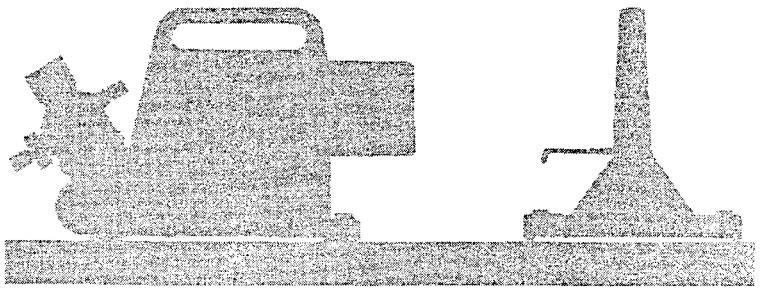
SOLD TO Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

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

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

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. 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

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

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 438300 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	3 Pieces 5 Pieces	F92-10009 F93-06008
Item 05	8 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
David O'Bryant
Manager Quality Control

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

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1384X6 - THERMO-	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

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1584X6 - THERMO-	1	F93-11048
LAG RIBBED PANEL, NOMINAL 5/8"	9	F94-02012
4' X 6½'	6	F94-02053
	9	F94-03018
	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
Manager Quality Control

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

21334

799

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT: 30 JUNE 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-05093	2000 LB. (40 x 50 LB. PAILS	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 ÷

ITEM 08

EXPIRATION DATE: DECEMBER 1994

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: Danielle Bryant DATE: 30 JUNE 1994

TSI

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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
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

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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
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
David O Bryant
Manager Quality Control

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158340 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 3/4"	10 Pieces	F94-02053
Item 12	10 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant
David O'Bryant
Manager Quality Control

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

TSI

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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
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 TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185.8687
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

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

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Temp Recorder	NA	0	1	0	Recorder # 0301 chart tape # 27	Y	N	Good	None	X			Receiving Verifications Only. Temperature Recorder has been returned to TSI. CP
Thermo Lag 1" pre shaped conduit	NA	0	16	0	Part # 158100 F94-02053	Y	Y	Good	None	X			
Thermo Lag 4" pre shaped conduit	NA	0	5	0	Part # 158400 F9-105037	Y	Y	Good	None	X			
Thermo Lag 4" pre shaped 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	Y	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	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	4	0	Part # 1384X6 F94-02012	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	1	0	Part # 1384X6 F94-03018	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 3/8"	NA	0	1	0	Part # 1384X6 F94-06057	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	1	0	Part # 1584X6 F93-11048	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	9	0	Part # 1584X6 F94-02012	Y	Y	Good	None	X			

FORM
1/29/93

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. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	6	0	Part# 158416 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# 158416 F94-03018	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	7	0	Part# 158416 F94-03028	Y	Y	Good	None	X			
Thermo Lag 330 Ribbed Panel 5/8"	NA	0	14	0	Part# 158416 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	F0162494	Y	Y	Good	None	X			
Stainless Steel Bidding	NA	0	100lb	0	16ga, Type 304	Y	Y	Good	None	X			
Stainless Steel Banding	NA	0	3 rolls	0	070693	Y	Y	Good	None	X			
Stainless steel Clips	NA	0	1000	0	1126691	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	10	0	Part# 158340 F94-02053	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	2	0	Part# 238340 F92-02005	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped conduit	NA	0	1	0	Part# 238340 F92-03029	Y	Y	Good	None	X			
Thermo Lag 3/4" pre Shaped Conduit	NA	0	1	0	Part# 238340 F94-02012	Y	Y	Good	None	X			
Thermo Lag 3/4" pre shaped Conduit	NA	0	6	0	Part# 238340 F94-04005	Y	Y	Good	None	X			

FORM
1/29/93

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 17 PIECES GROSS WEIGHT 9440 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 1"	16 Pieces	F94-02053
Item 01	16 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant
Manager Quality Control

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

TSI

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CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 158400 THERMO-LAG Preshaped Conduit Sections Thickness: 0.625" ± 0.125" Nom. Size: 4"	5 Pieces	F9-105037
	3 Pieces	F92-09051
	10 Pieces	F92-11018
	10 Pieces	F94-03018
Item 02		
	28 Pieces (In 2 Cartons)	
No Shelf Life On Conduit		

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant

David O'Bryant
Manager Quality Control

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

TSI

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 238100 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 1"	16 Pieces	F94-04005
Item 03 No Shelf Life On Conduit	16 Pieces (In 1 Carton)	

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant

David O'Bryant
Manager Quality Control

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

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 338300 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3"	8 Pieces	F94-02053
Item 04	8 Pieces (In 1 Carton)	

No Shelf Life On Conduit

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O Bryant

David O'Bryant
Manager Quality Control

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

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 438300 THERMO-LAG Preshaped Conduit	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
David O'Bryant
Manager Quality Control

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

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1384X6 - THERMO-	1 PANEL	F93-11048 ✓
LAG 330 RIBBED PANEL	4	F94-02012 ✓
NOMINAL 3/8" THICK, 4'x6½' NOM.	1	F94-03018 ✓
	1	F94-06051 ✓
ITEM 06	7 PANELS (ON 1 PALLET)	

NO SHELF LIFE LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

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

David O'Bryant
Manager Quality Control

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PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1584X6 - THERMO-	1	F93-11048
LAG RIBBED PANEL, NOMINAL 5/8"	9	F94-02012
4' X 6½'	6	F94-02053
	9	F94-03018
	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

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PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STRESS SKIN-ASTM E437 type 304 stainless steel, plain weave, 8 x 8 square mesh wire cloth, 0.017 dia. wire, or equal.	100 LB. (IN 1 CARTON)	F062494

Item 09

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

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

David O'Bryant
Manager Quality Control

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 30 JUNE 1994

TEMPERATURE RECORDER 030117 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
STAINLESS STEEL TIE WIRE 16 Gauge, Annealed type 304	100 LB. (3 ROLLS)	N/A
Item 10		
STAINLESS STEEL BANDING Type 304 Thickness: .0.020" x 0.5" x 200 Ft. Rolls	3 Rolls	070693
STAINLESS STEEL CLIPS SIZE. 1/2" WIDE X 0.020"	1 CARTON (1000 CLIPS)	112691
ITEM 11	(ALL ABOVE ITEMS IN 1 CARTON)	

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV 92362V, to Omega Point Laboratories San Antonio, TX, for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112.

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

David O'Bryant
Manager Quality Control

TSI

PACKING LIST

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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

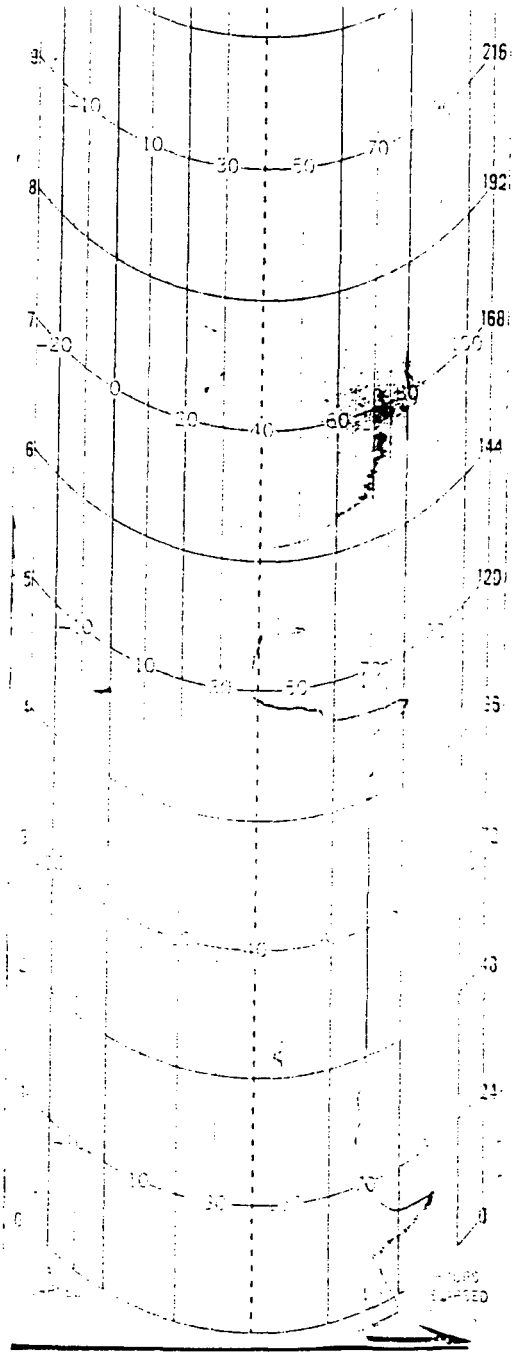
PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA Part No. 238340 THERMO-LAG Preshaped Conduit Sections Thickness: 0.375" ± 0.125" Nom. Size: 3/4"	2 Pieces	F92-02005
	1 Piece	F92-03029
	1 Piece	F94-02012
	6 Pieces	F94-04 05
Item 13	10 Pieces (In 1 Carton)	

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: T&I
DATE: 6-30-94 TIME: 1:30 pm
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

...subject to the classifications and tariffs in effect on the date of issue of this Original Bill of Lading,

SHORT FORM — ORIGINAL — NOT NEGOTIABLE

760

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 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		
1	✓	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 1 x 5 gal. pail containing temp recorder STORE ABOVE 32 F AND BELOW 100F AT ALL TIMES	2400		
1	✓	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		
1	✓	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.		
1	✓	CARTON TVA PART NO. 158340 ✓ 3/4" [redacted] 10 PCS. ITEM 12	50		
1	✓	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:
$ ______

...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 ...ification.

...certify 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.
...ment 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."
...mprint 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 ______

...ENT IS CORRECTLY DESCRIBED.

...EIGHT ______ 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." ...

C.O.D. SHIPMENT
C.O.D. Amt. ______
Collection Fee ______
Total Charges ______

...RMAL SCIENCE, INC. Shipper, Per [signature] Per ______ Shipper

...ost office address of shipper **2200 Cassens Dr., St. Louis, MO 63026** [signature: Dynamic Transit] Agent, Per ______

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

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]	8-2-94
DATE ORDER RECEIVED	SHIPPED VIA
8/ 2/94	UPS Next Day
OUR ORDER NO.	
12492	
RESALE NO./STATUS	
Interstate 0	
FREIGHT TERMS	

NG	INIT.	CONTACT
UPS-NEXT DAY AIR	Ken	Denise

QUANTITY ORDERED*	DESCRIPTION						QUANTITY SHIPPED*
	PART NUMBER	MESH	WIRE	MATERIAL	WIDTH	CODE	
300.00	SS-008-0170-36 M016	8X8	.017	304SS	36"	A	300.00

Attn: Richard Lohman

1 ROLL 100'-0" X 36"

MATERIAL RECEIVED BY _____

*UNIT OF MEASURE IS SQ. FT. UNLESS OTHERWISE NOTED.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97257-604-97332-38
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1430 - 11960
DATE RECEIVED ~~8-29-94~~ 8/31/94
DATE INSPECTED ~~8-29-94~~ 8/31/94 CH
INSPECTED BY: C Patton 8/31/94 CH

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
Stress Skin	NA	0	2rolls	0	SS-008-010-48	Y	N	Good	None	X			Receiving Verification Only
SS Tie Wire	NA	0	25lbs	0	16ga annealed type 304	Y	Y	GOOD	None	X			

FORM
1/29/93

PACKING LIST

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

63026

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

CUSTOMER ORDER NO.	DATE SHIPPED
125[illegible]	
DATE ORDER RECEIVED	SHIPPED VIA
8/[illegible]/94	UPS 4xDay Air
OUR ORDER NO.	
12569	
RESALE NO./STATUS	
Interstate 0	
FREIGHT TERMS	

NG	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

766

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

768

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 #9	(3500 Lbs)	A-3	pH	8.36	8 +

Temperature Recorder (1) with the shipment

Material Expiration Date: June 1994

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY TO LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS NOTED 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 97320 & 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 Records	NA	0	1	0	Chart #71 #40	Y	X	GOOD	None	X			Receiving Verification only
Thermo Lag 330-1 Trowel grade	NA	0	15	0	94-05093	Y	Y	GOOD	NONE	X			
" "	NA	0	45	0	94-08008	Y	Y	GOOD	NONE	X			
Thermo Lag 330-1 Ribbed Panel	NA	0	10	0	158400 F94-02012	Y	X	Good	None	X			
" "	NA	0	1	0	158400 F94-03028	X	Y	Good	None	X			
" "	NA	0	4	0	158400 F94-03047	Y	Y	Good	None	X			
" "	NA	0	7	0	158400 F94-04005	Y	Y	Good	None	X			
" "	NA	0	16	0	158400 F94-07014	Y	Y	Good	None	X			
" "	NA	0	1	0	158400 F94-07023	Y	Y	Good	None	X			
4" Thermo Lag 330-1 Preshaped Conduit	NA	0	1	0	158400 F92-08038	X	Y	Good	None	X			
4" Thermo Lag Preshaped Conduit	NA	0	1	0	158400 F92-10031	Y	Y	Good	None	X			
" "	NA	0	4	0	158400 F94-06051	Y	Y	Good	None	X			
" "	NA	0	8	0	158400 F94-06082	Y	Y	Good	None	X			
" "	NA	0	15	0	158400 F94-07003	Y	Y	Good	None	X			
1" Thermo Lag 330-1 Preshaped Conduit	NA	0	7	0	238100 F94-07023								
" "	NA	0	3	0	238100 F94-08003								

FORM
1/29/93

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960 97185-87 & 97332-38 97258-60
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1421 . 11960
DATE RECEIVED 8-25-94
DATE INSPECTED 8-25-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
3/4" Thermo Lag 330-1 Preshaped conduit	NA	0	4	0	158340 F94-02053	Y	Y	Good	None	X			Receiving Verification Only
" "	NA	0	6	0	158340 F94-03047	Y	Y	Good	None	X			
" "	NA	0	10	0	238340 F94-07014	Y	Y	Good	None	X			
1" Thermo Lag 330-1 Preshaped Conduit	NA	0	1	0	158100 F92-11009	X	Y	Good	None	X			
" "		0	5	0	158100 F93-09045	Y	Y	Good	None	X			
" "		0	3	0	158100 F93-09047	Y	Y	Good	None	X			
" "		0	1	0	158100 F94-06051	X	X	Good	None	X			
Stress Skin type 304	NA	0	1	0	TYPE 304 8X8 0.017dia	Y	Y	Good	None	X			

FORM
1/29/93

THIS SHIPPING ORDER

Impression, and retained by the Agent.

775

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. TVA CONTRACT NO. TV92363V

At ST. LOUIS, MISSOURI 63026 8/18 19 94 Shipper's No. 21398

Carrier DYNAMIC TRANSIT PREPAID Agent's No.

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

Consigned to TENNESSEE VALLEY AUTHORITY c/o OMEGA POINT LABORATORIES

Destination 16015 SHADY FALLS ROAD State of County of

Route ELMENDORFF, TX 78112

Delivering Carrier Vehicle or Car Initial No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Subj. to Correction)	Class or Rate	Check Column
2		PALLETS CONTAINING: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE TVA PART NO. TG-330 60 x 50 LB. PAILS STORE ABOVE 32F AT ALL TIMES 1 x 5 Gal. Pail Containing Temp. Recorder	3250 LBS.		
3		PALLETS CONTAINING: THERMO LAG PREFABRICATED PANELS TVA PART NO. 1584X6 30 PANELS 5/8" NOMINAL 4' x 6'	3500 LBS.		
2		PALLETS CONTAINING: ✓ 8 CARTONS: TVA PART NO. 158400 29 PIECES 4"	200 LBS.		
		✓ 1 CARTON: TVA PART NO. 238340 10 PIECES 3/4"	90 LBS.		
		✓ 1 CARTON: TVA PART NO. 158340 10 PIECES 3/4"	90 LBS.		
		✓ 1 CARTON: TVA PART NO. 158100 10 PIECES 1"	80 LBS.		
		✓ 1 CARTON: TVA PART NO. 238100 10 PIECES 1"	90 LBS.		
		[redacted]	[redacted]		
		✓ 1 CARTON: STAINLESS STEEL 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 blank 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.

CONSIGNEE'S 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 conveying item 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

Permanent post office address of shipper 2200 Cassens Dr., St. Louis, MO 63026

Agent must detach and retain this Shipping Order and must sign the Original Bill of Lading.

TSI

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

777

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

778

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

779

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 1584X6	1	F94-02012
THERMO LAG RIBBED PANEL	1	F94-03028
NOMINAL 5/8"	4	F94-03047
4' x 6½'	7	F94-04005
	16	F94-07014
	1	F94-07023
	30 PANELS (ON 3 PALLETS)	

NO SHELF LIFE ON PANELS

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

David O Bryant

DAVID O"BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
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780

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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781

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 238100 THERMO LAG PRESHAPED CONDUIT SECTIONS THICKNESS: 0.375" ± 0.125" NOMINAL SIZE: 1"	7 PIECES 3 PIECES 10 PIECES (IN 1 CARTON)	F94-07023 F94-08003

NO SHELF LIFE ON CONDUIT

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

David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

782

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. TVA CONTRACT #TV92362V DATE: 18 AUGUST 1994

TEMPERATURE RECORDER 40 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
TVA PART NO. 158340 THERMO LAG PRESHAPED CONDUIT SECTIONS THICKNESS: 0.625" ± 0.125" NOMINAL SIZE: 3/4"	4 PIECES 6 PIECES 10 PIECES (IN 1 CARTON)	F94-02053 F94-03047

NO SHELF LIFE ON CONDUIT

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

David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

783

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

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

784

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. 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

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
STRESS SKIN-ASTM E437 Type 304 stainless steel, plain weave 8x8 square mesh wire cloth 0.017 dia. wire	50 LBS. (IN 1 CARTON)	N/A

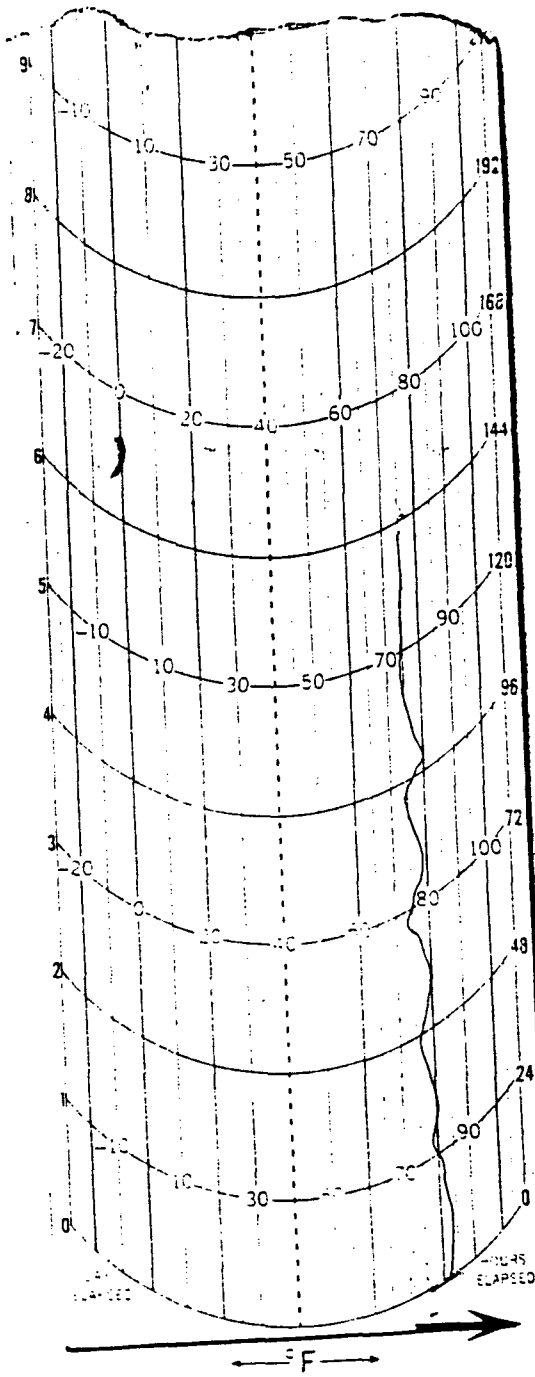
This will certify that the above listed THERMO LAG Materials, shipped under Contract Order No. TV92362V, to Omega Point Lab., Elmendorf, TX Meet the requirements of TSI's manufactured and written Quality Control Spec. for TVA This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER QUALITY CONTROL

DATE: 18 AUGUST 1994
BILL OF LADING: 21398
MODE OF TRANSPORT: DYNAMIC TRANSIT PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207



CAR NO.:
CITY: San Antonio, TX
CONSIGNEE: IVA/c/o Omega Point
CAR CONT.:
PER:
CITY: St. Louis
SHIPPER: TST
DATE: 7/18/94 TIME: 9:50
INSTR. NO.:

CHART 71

32 DAY (–30° + 110° F)
PART NO. 840-95
PARTLOW THERMA-GARD
NEW HARTFORD, N.Y. 13413
START

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TSI
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1439 . 11960
DATE RECEIVED 9-26-94
DATE INSPECTED 9-26-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Thermo-Lag panel 1"X4'X6½'	NA	0	1	0	F94-08003	Y	N	Good	NONE	X			Thermo-Lag 330-1 trowel grade update 3/95
" "	NA	0	20	0	F94-08021	Y	Y	Good	None	X			
" "	NA	0	1	0	F94-08022	Y	Y	Good	None	X			
Thermo-Lag 770-1 Panels 3/8"x40"x94"	NA	0	11	0	F94-08026	Y	Y	Good	None	X			
" "	NA	0	19	0	F94-08030	Y	Y	Good	None	X			
Thermo-Lag, Panel 5/8"X4'X6½'	NA	0	1	0	F94-08003	Y	Y	Good	None	X			
" "	NA	0	2	0	F94-08022	Y	Y	Good	None	X			
" "	NA	0	14	0	F94-08044	Y	Y	Good	None	X			
Stainless steel Banding ½"X0.20"X200'	NA	0	8 Rolls	0	NA	Y	Y	Good	None	X			
Stainless Steel Clips ½"	NA	0	1K	0	NA	Y	Y	Good	None	X			
Stainless Steel tie wire 16 gauge	NA	0	1 Roll	0	NA	Y	Y	Good	None	X			
Stress Skin-ASTM E437. 8X8 sq. mesh 0.017dia	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

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			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Thermo-Lag 770-1 trowel grade	NA	0	20	0	94-09009	Y	Y	GOOD	None	X			Thermo-Lag 770-1 trowel grade expires 3/95

FORM
1/29/93

8321

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

789

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 [redacted] **THERMAL SCIENCE, INC.** CONTRACT ORDER NO. TV92362V

At **ST. LOUIS, MISSOURI 63026** 9/23 19 94 Shipper's No. 21467

Carrier DYNAMIC TRANSIT PREPAID Agent's No.

Consigned to OMEGA POINT LABORATORIES c/o TVA CONTACT NO. TV92362V (Mail or street address of consignee—For purposes of notification only.)

Destination 16015 SHADY FALLS State of County of

Route ELMENDORFF, TX 78112

Delivering Carrier Vehicle or Car Initial No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Sub. to Correction)	Class or Rate	Check Column
3		PALLETS CONTAINING: THERMO LAG PANELS 22 PANELS NOMINAL 1" 4' x 6½' ITEM 01	4400#		
2		PALLETS CONTAINING: THERMO LAG PANELS 17 PANELS NOMINAL 5/8" 4'x6½' ITEM 02	1700#		
2		CARTONS CONTAINING: THERMO LAG PRESHAPED CONDUIT 16 PCS. 1.250" ± 0.250" SIZE: 5" ITEM 03	200#		
2		PALLETS CONTAINING: THERMO LAG 770-1 PANELS 30 PANELS 3/8" NOM. 40"x94" NOM. ITEM 04	2250#		
		PALLETS CONTAINING: THERMO LAG 330-1 COATING-TROWEL GRADE 10 x 50 LB. PAILS ITEM 05 STORE ABOVE 32f AND BELOW 100F AT ALL TIMES	550#		
		PALLETS CONTAINING: THERMO LAG 770-1 COATING-TROWEL GRADE 20 x 50 LB. PAILS ITEM 06 STORE ABOVE 32f AND BELOW 100f AT ALL TIMES	1100#		
		STAINLESS STEEL BANDING ITEM 07 1/2" x 0.20" x 200 ft. 8 ROLLS	80#		
		STAINLESS STEEL CLIPS ½" ITEM 08 1000 clips (1 box)	10#		
		STAINLESS STEEL TIE WIRE ITEM 09 16 gauge 1 ROLL	10#		
		STRESS SKIN-ASTM E437 type 304 ITEM 10 stainless steel, plain weave 8 x 8 sq. mesh wire cloth 0.017 dia. wire 1 ROLL	25#		

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per (Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per (The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$

C. O. D. SHIPMENT

C. O. D. Amt.

Collection Fee

Total Charges

The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.

NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed of declared value of the property is hereby specifically stated by the shipper to be not exceeding

THIS [redacted]ENT IS CORRECTLY DESCRIBED.

COR[redacted]EIGHT IS LBS.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation." NOTE: Preprinted certificates complying with 49 CFR 173, 430 (a) in effect on June 30, 1978, may be used through June 30, 1979.

Per Shipper

THERMAL SCIENCE, INC. Shipper, Per Agent, Per

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

TSI

PACKING LIST.

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES _____ GROSS WEIGHT 10,300 LBS.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO LAG RIBBED PANEL NOMINAL 1 " 4' x 6½'	1 PANEL	F94-08003
	20 PANELS	F94-08021
	1 PANEL	F94-08022
	22 PANELS (on 3 pallets)	

ITEM 01

NO SHELF LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓ THERMO-LAG 770-1 PANELS 3/8" NOMINAL 40" x 94" NOMINAL	11 PANELS 19 PANELS 30 PANELS (on 2 pallets)	F94-08026 F94-08030

ITEM 04

NO SHELF LIFE ON PANELS

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST.

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 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
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓Stainless Steel Banding 1/2" x 0.20" x 200 ft. ITEM 07	8 ROLLS	N/A
✓Stainless steel clips 1/2" ITEM 08	1 BOX (1000 clips)	N/A
✓Stainless steel tie wire 16 gauge ITEM 09	1 ROLL	N/A

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓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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Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO-LAG Preshaped Conduit Sections Thickness: 1.250" ± 0.250" Size: 5"	5 PIECES 11 PIECES 16 PIECES (in 2 cartons)	F94-08003 F94-08021

Item 03

NO SHELF LIFE ON CONDUIT

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE	500 LBS. (10 x 50 Lb. Pails)	94-08008

ITEM 05

EXP. DATE: MARCH 1995

✓1 x 5 Gal. Pail containing
Temperature recorder

SHELF LIFE SIX MONTHS
FROM DATE OF SHIPMENT

STORE ABOVE 32F AND BELOW 100F
AT ALL TIMES

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT: 23 SEPTEMBER 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
94-08008	500 LBS. (10 x 50 Lb. Pails)	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 ÷

EXPIRATION DATE:

SHELF LIFE: SIX MONTHS FROM DATE OF SHIPMENT
STORE MATERIAL ABOVE 32°F AND BELOW 100°F AT ALL TIMES

THIS IS TO CERTIFY THAT THE ABOVE DESIGNATED MATERIAL HAS BEEN TESTED AND DID COMPLY WITH LISTED SPECIFICATIONS WHEN SUPPLIED. THE MATERIAL IS SUBJECT TO THE CONDITIONS LISTED ON TSI'S INVOICE. THE ABOVE IS A COPY OF INFORMATION ON FILE AND THE LOT ACCEPTANCE DATA IS AVAILABLE FOR EXAMINATION.

REVIEWED BY: David O Bryant DATE: 23 Sept 1994

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 23 SEPTEMBER 1994

TEMPERATURE RECORDER 41 CHART TAPE NO. 71

TOTAL NO. OF PACKAGES See Page 1 GROSS WEIGHT See Page 1

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
✓THERMO LAG 770-1 COATING TROWEL GRADE ITEM 06 EXP. DATE: MARCH 1995 1 x 5 Gal. Pail containing Temperature Recorder SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT STORE ABOVE 32F AND BELOW 100F AT ALL TIMES	1000 LBS. (20 x 50 Lb. Pails)	94-09009

This will certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

G. Furaus

G. Furaus
Quality Assurance Manager

DATE OF SHIPMENT: 23 September 1994
BILL OF LADING: 21467
MODE OF TRANPORT: Dynamic Transit Prepaid

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

TSI

CERTIFICATE OF ANALYSIS

CUSTOMER

OMEGA POINT LABORATORY
%TENNESSEE VALLEY AUTHORITY
16015 SHADY FALLS RD
ELMENDORFF, TX 78112

DATE OF SHIPMENT 23 SEPTEMBER 1994
PURCHASE ORDER NO: CONTRACT #TV 92362V
RELEASE NO:
CUSTOMER PART NO:

PRODUCT DESCRIPTION: THERMO LAG 330-1 SUBLIMING COATING TROWEL GRADE

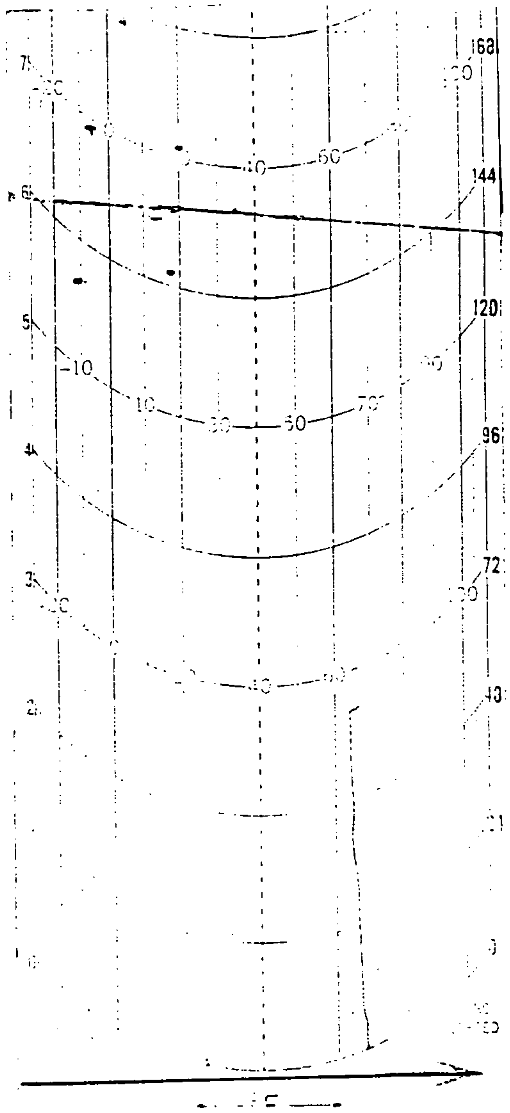
LOT NUMBER	QUANTITY	TEST NO:	DESCRIPTION	ANALYSIS	SPECIFICATION
4-09009	1000 LBS. (20 x 50 Lb. Pails)	A-2	WT/GALLON	10.16	10.5 ± 1.5
		A-3	pH	8.5	8 ±

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 PAGE NO. 1



CAR N[illegible]:

[illegible]: San Antonio, Tx

CONSIGNEE: TVA / Omega Pt

CAR COND:

PER:

C[illegible]: St. Louis

SHIPPER: TSL

DATE: 9-23-94 TIME: 10:15 am

INSTR. NO:

CHART 71

[illegible] ADVANCE CHART

32 DAY (−30° + 110° F)

PART NO. 840-95

PARTLOW THERMA-GARD

NEW HARTFORD, N.Y. 13413

START

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: Thermo-Lag 770

DATE PRINTED: 9/24/92
DATE REVISED: 1/15/91
By A. Thorpe

THERMAL SCIENCE, INC.
2200 Cassens Dr.
Fenton , MO 63026

PHONE: (314) 349-1233
EMERGENCY PHONE: (314) 349-1267

HMIS HAZARD RATINGS

LEAST	0	HEALTH HAZARD	2
SLIGHT	1	FLAMMABILITY HAZARD	0
MODERATE	2	REACTIVITY HAZARD	0
HIGH	3	MAXIMUM PERSONAL	
EXTREME	4	PROTECTION	B

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME:	Thermo-Lag 770	D.O.T. HAZARD CLASS:	none
		D.O.T. Shipping Name:	Cold Water Paint
PRODUCT CLASS :	Latex Fire Resistive Coating	D.O.T. UN Number:	none

SECTION II - PHYSICAL DATA

APPEARANCE AND ODOR :Milky white, pasty mastic, no odor.

BOILING POINT (at 760 mm Hg) :	220-240 F	SPECIFIC GRAVITY (water = 1):	1.16
VAPOR PRESSURE (at 20°C or 68°F):	nil	WEIGHT PER GALLON (lbs.) :	9.7
EVAPORATION RATE (ether = 1) :	much slower	PERCENT VOLATILES BY VOLUME:	40
VAPOR DENSITY (air = 1) :	0.6	SOLUBILITY IN WATER:	Yes
Volatile Organic Content (VOC) :	0.18 lb/gal	pH	7–8

SECTION III - HAZARDOUS COMPONENTS

TRADE NAME	CAS #	PERCENT BY VOLUME	OCCUPATIONAL EXPOSURE LIMITS OSHA PEL	ACGIH TLV
Ethylene Glycol	107-21-1	1.2 %		50 ppm
* Vinyl Acetate	108-05-4	<0.15	10 ppm 20ppm STEL	10 ppm 20ppm SHORT
Fibrous glass,continuous filament (total dust) (respirable dust)	65997-17-3	2 %	 15 mg/m^3 5 mg/m^3	 10 mg/m^3

* Indicates toxic chemicals subject to the reporting requirements of Section 313 of Title III and of 40 CFR 372
Carcinogenicity of fibrous glass: NTP: No IARC: Yes Z List: No OSHA Reg: No
IARC categorized fibrous glass as not classifiable with respect to human carcinogenicity.
Vinyl Acetate Monomer, a residual componet of this product, is a possible human cancer hazard based on tests with laboratory animals. Vinyl Acetate has not been identified as a carcinogen by NTP, IARC or OSHA. Total residual monomer does not exceed 0.15%.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION
OSHA : Non-combustible
DOT Non-combustible

FLASH POINT : None
TEST METHOD:

FLAMMABILITY LIMITS LEL: Not Applicable UEL: Not Applicable

EXTINGUISHING MEDIA : Non-flammable (aqueous emulsion).

SPECIAL FIRE FIGHTING PROCEDURES :Wet Product will not burn but will smoke and spatter if exposed to flames. Firefighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS : Sealed containers may rupture if overheated. Cool with water spray.

HAZARDOUS DECOMPOSITION PRODUCTS : Thermal oxidative decomposition can produce toxic gases, including oxides of nitrogen and carbon monoxide.

SECTION V - REACTIVITY DATA

STABILITY	UNSTABLE STABLE	X	CONDITIONS TO AVOID: Not applicable

INCOMPATIBILITY (MATERIALS TO AVOID) : Strong Oxidizers, Strong Bases

HAZARDOUS POLYMERIZATION	MAY OCCUR WILL NOT OCCUR X	CONDITIONS TO AVOID : Not applicable

SECTION VI - HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE :
Eyes: Direct contact with product may result in eye irritation.
Skin: Prolonged or repeated contact with product may cause skin irritation.
Breathing: Excessive inhalation can cause irritation of the mucous membranes of the nose, throat and respiratory tract, headache and nausea.
Swallowing: Excessive exposure may cause central nervous system effects, cardio-pulmonary effects, and kidney failure.

FIRST AID PROCEDURES :
If in Eyes: Flush with flowing water immediately and continuously for 15 minutes. Consult medical personnel.
If on Skin: Thoroughly wash exposed area with soap and water. Remove and wash contaminated clothing before reuse. . Consult medical personnel if swelling or reddening occurs.
If Swallowed: If conscious, give two glasses of water to drink. Get immediate medical attention.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED : Keep unnecessary people away. Contain spill with inert material (sand, earth, etc.) and transfer the material to containers for recovery or disposal. Keep spill out of sewers and open bodies of water. Floors may be slippery, care should be exercised to avoid falls.

WASTE DISPOSAL METHOD : Burn in adequate incinerator or bury in an approved landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE : Mechanical local exhaust at point of mist release is preferred.

RESPIRATORY PROTECTION : None required if good ventilation is maintained. Otherwise wear MSHA/NIOSH approved respirator suitable for vapor, mist or dust concentrations encountered.

PROTECTIVE GLOVES: Impervious, cotton lined rubber EYE PROTECTION: Safety glasses.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE : Use only with adequate ventilation. Prevent prolonged breathing of vapor or mist. Prevent contact with eyes. Do not take internally. Keep out of the reach of children.

STORAGE TEMP. MAX 100 F MIN 32 F

OTHER PRECAUTIONS :

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 REMARKS	ACCEPTANCE Accept	Hold	Reject	REMARKS
1.	TEST ARTICLE 3 STEEL COLUMNS	N/A	0	3	0	SIZE 16" X 36"	N	N	GOOD	NONE CH	X			TEST ARTICLES (ITEMS 1-6) REC'D WITH THIS SHPMT, BUT ARE NOT PART OF PROJECTS #97553 THRU #97555, RECEIVING VERIFICATION ONLY. CH
2.	TEST ARTICLE 1 STEEL COLUMN	N/A	0	1	0	SIZE 10" X 36"	N	N	"	"	X			
3.	TEST ARTICLE U SHAPE	N/A	0	1	0	CLADDED U-SHAPE	N	N	"	"	X			
4.	TEST ARTICLE CONDUIT 3"	N/A	0	1	0	3" X 10 FT CLADDED	N	N	"	"	X			
5.	TEST ARTICLE CONDUIT 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 12FT. 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

8077

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. RECEIVING VERIFICATION ONLY.
12.	12" THERMO-LAG 330 CONDUIT SECTIONS	N/A	0	3	0	F94-08021	Y	Y	"	"	X			
	"	N/A	0	13	0	F94-08022	Y	Y	"	"	X			
13.	THERMO-LAG HIGH TEMP FABRIC	N/A	0	1	0	440-75 42" X 60YD.	Y	Y	"	"	X			

FORM 1/29/93

8158

AMERICAN LOOSE LEAF BUSINESS PRODUCTS, ST. LOUIS, MO

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

809

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) the applicable motor carrier classification or tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

From THERMAL SCIENCE, INC. TVA CONTRACT 92362V

At ST. LOUIS, MISSOURI 63026 10/7/94 19 Shipper's No. 21494

Carrier DYNAMIC TRUCK PREPAID Agent's No.

Consigned to TENNESSEE VALLEY AUTHORITY % OMEGA POINT LABORATORY (Mail or street address of consignee—For purposes of notification only.)

Destination 16015 SHADY FALLS ROAD State of County of

Route

Delivering Carrier ELMENDORFF, TX 78112 Vehicle or Car Initial No.

No. Packages	HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES, SPECIAL MARKS AND EXCEPTIONS	* Weight (Sub. to Correction)	Class or Rate	Check Column
1		PALLET CONTAINING 3 COLUMNS 16 x 50 1 COLUMN 10' x 49 3 FT. LONG (ED TAYLOR)	800 Lb		
1		PALLET CONTAINING 3 INCH CONDUIT U SHAPE TEST ARTICLE	400 LB.		
1		PALLET CONTANING: 3 INCH CONDUIT 10 FT. STRAIGHT 1½ INCH CONDUIT 10 FT. STRAIGHT	100 LB		
1		PALLET CONTAINING: 18 INCH CABLE TRAY 12 FT	500 LB.		
		TVA ORDER/ 21494			
1		PALLET CONTAINING: 8 PANELS SIZE: 4' x 6½' NOMINAL THICKNESS: 1.25" + 0.250" ITEM 1	1800 LB.		
1		PALLET CONTANINING: 10 x 50 LB. PAILS THERMO LAG 330-1 SUBLIMING COATING ITEM 5 20 x 50 LB. PAILS THERMO LAG XXXX 770-1 COATING ITEM 6 1 x 5 gal. pail CONT. TEMP. RECORDER STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES	1750 LB.		
1		CARTONS OF THERMO LAG 330 PRESHAPED CONDUIT SIZE 1" x 250" 24 Pcs. (11) CARTON OF 2" x 1.250" 16 Pc. (12)	125 lb. 100 Lb.		
1		CARTON CONTAINING: 1 ROLL THERMO LAG 440-75 HI TEMP FABRIC SIZE: 42 INCH X 60 YDS.	30 LB.		

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per (Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

PPd

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per (The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$

† The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

† This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

* If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

† Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.

NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The 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, 1978, may be used through June 30, 1979.

Per Shipper

C. O. D. SHIPMENT

C. O. D. Amt.

Collection Fee

Total Charges

THERMAL SCIENCE, INC.

Shipper, Per 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

811

PAGE 2 OF 2

THERMAL SCIENCE INC.

PACKING LIST

SHIP TO:

OMEGA POINT LAB.

16015 SHADY FALLS RD

ELMENDORFF, TX 78112

P.O.# TEST ARTICLE

RELEASE NO:

DATE: 7 OCTOBER 1994

BILL OF LADING:

MODE: TRUCK LINE

CARRIER: DYNAMIC TRUCK PPD

TEMPERATURE RECORDER NO: NA

CHART TAPE NO: NA

TOTAL NO. OF PACKAGES: 1 PALLET

GROSS WEIGHT: 800 LB. LBS

PRODUCT DESCRIPTION	NET QUANITY	BATCH LOT NUMBER	NUMBER OF ITEMS PER BATCH/LOT
OLUMNS 16 X 50	3	NA	3
10 X 49	1	NA	1
3 FOOT LONG/			
(ED TAYLOR)			

Scott Pozzuck

HEAD OF SHIPPING

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

PURCHASE ORDER NO. CONTRACT ORDER NO. TV92362V DATE: 7 OCTOBER 1994

TEMPERATURE RECORDER 007763 CHART TAPE NO. 27

TOTAL NO. OF PACKAGES 5 PCS. GROSS WEIGHT 3805 LB.

PRODUCT DESCRIPTION	QUANTITY	BATCH NUMBER
THERMO LAG 330 PREFABRICATED PANELS SIZE: 4' x 6½' NOMINAL THICKNESS: 1.250" ± 0.250"	7 PANELS	F94-08021
	1	F94-08022
ITEM 1	8 PANELS (ON 1 PALLET)	

NO SHELF LIFE ON PANEL

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

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 330-1 SUBLIMING COATING TROWEL GRADE ITEM 5 EXP. DATE: MARCH 1995 1 x 5 gal. pail containing temp. recorder SHELF LIFE SIX MONTHS FROM DATE OF SHIPMENT STORE ABOVE 32 F AND BELOW 100 F AT ALL TIMES	500 LB. (10 x 50 LB. PAILS)	94-08008

This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point Laboratories, 16015 Shady Falls Road, Elmendorff, TX 78112. This material does not contain asbestos.

David O'Bryant

DAVID O'BRYANT
MANAGER OF QUALITY CONTROL

DATE OF SHIPMENT: 7 OCTOBER 1994
BILL OF LADING: 21494
MODE OF TRANSPORT: DYNAMIC TRUCK PREPAID

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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

815

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

THERMAL SCIENCE, INC. • 2200 CASSENS DR. • ST. LOUIS, MO 63026 • (314) 349-1233
Telex: 209901 (Answerback: TSI UR) • Telecopier (314) 349-1207

818

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

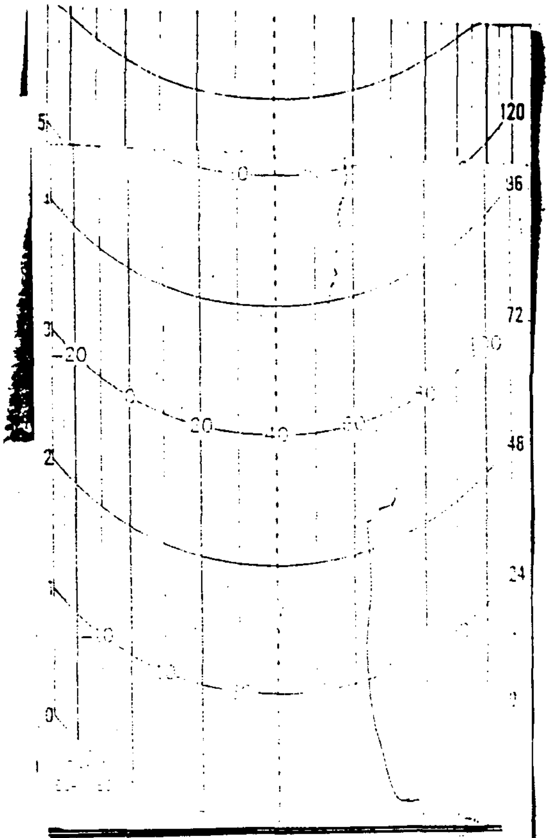
This is to certify that the above listed THERMO-LAG Materials shipped under Contract Order No. TV92362V, to Omega Point Laboratories, San Antonio, TX, Meet the requirements of Thermal Science, Inc. manufactured and written Quality Control specifications for Tennessee Valley Authority c/o Omega Point 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 ...
CITY San Antonio, TX.
CONSIGNEE TVA - Omaha-[illegible]
CAR CONT. ____________
PER. ____________
CITY ____ St. Louis
SHIPPER ____ TSI ____
DATE 10-8-94 TIME 8715
INSTR. No. ____________

CHART 27

2. FILL IN DATA

1. LOAD CARTRIDGE - AT ...

32 DAY (-20° + 110° F)

PART NO. 540-75

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
At 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 627

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 - !!!!!!!			

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

Per
(Signature of Consignor.)

If charges are to be prepaid, write or stamp here, "To be Prepaid."

Prepaid

Received $ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per
(The signature here acknowledges only the amount prepaid.)

Charges Advanced:

$

C. O. D. SHIPMENT

C. O. D. Amt.

Collection Fee

Total Charges

† The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classification.

† This is to certify that the above named articles are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

* If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."

† Shipper's imprint in lieu of stamp; not a part of Bill of Lading approved by the Department of Transportation.

NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed of declared value of the property is hereby specifically stated by the shipper to be not exceeding

THIS SHIPMENT IS CORRECTLY DESCRIBED.

CL EIGHT IS LBS.

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation." NOTE: Preprinted certificates complying with 49 CFR 173, 430 (a) in effect on June 30, 1978, may be used through June 30, 1979

Per Shipper

THERMAL SCIENCE, INC.

Shipper, Per

Agent must detach and retain this Shipping Order and must sign the Original Bill of Lading.

Permanent post office address of shipper 2200 Cassens Dr., St. Louis, MO 63026

TSI

PACKING LIST

AND

CERTIFICATE OF CONFORMANCE

828

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

OMEGA POINT LABORATORIES

Q/A RECEIVING REPORT

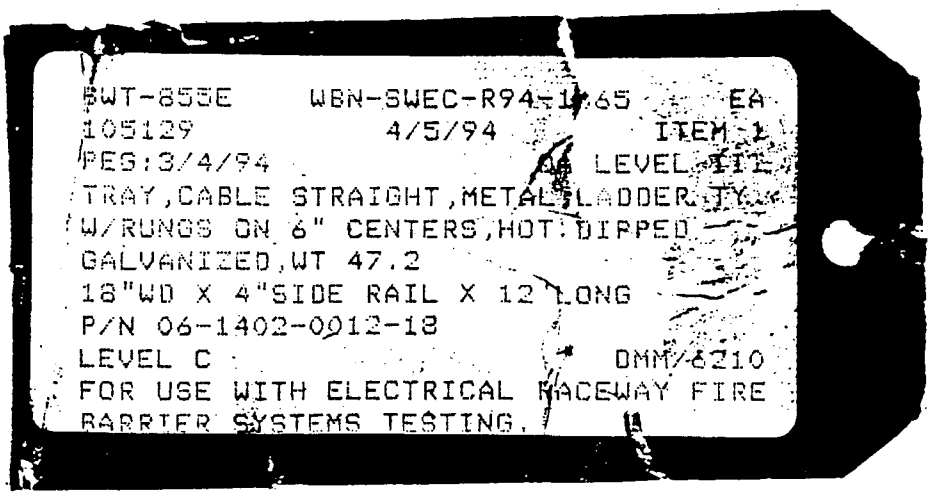
CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11210/TBD
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

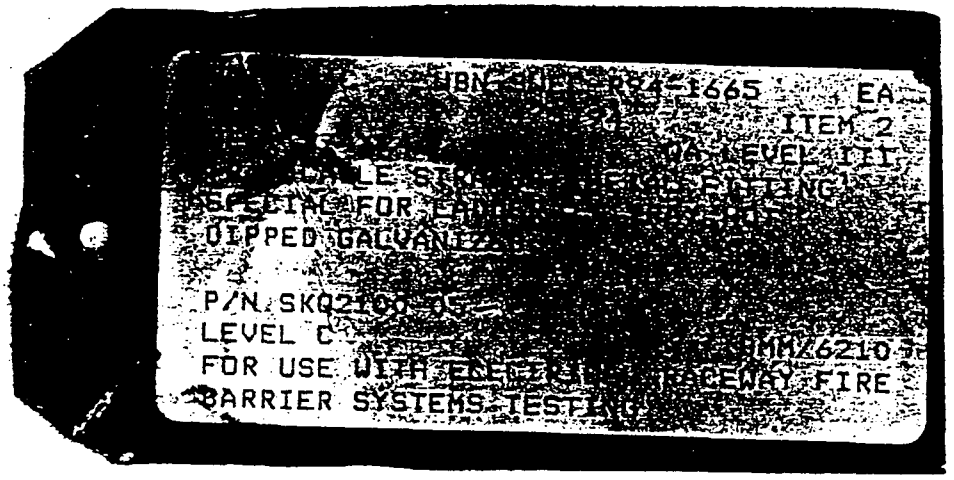
REPORT NUMBER 1384 - 11210
DATE RECEIVED 5-23-94
DATE INSPECTED 5-31-94
INSPECTED BY:

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D 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; materials were loose upon delivery; 6 pieces were slightly 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

830


BWT-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
P/N SKQ210-06
LEVEL C
DMM/6210
FOR USE WITH ELECTRICAL RACEWAY FIRE
BARRIER SYSTEMS TESTING

ELMENDORF ... FALLS RD 8 UU ... OVNT ... VALLEY AUTHORIT

05916702 TX 78112

FREIGHT BILL NUMBER 345 608 583

WATTS BAR NUCLEAR PLANT
SPRING CITY TN 37381
00994265

PO# ~~NONE~~

20

CITY RTE/BYD SCAC 2M

DEST SNT

OVERNITE PHONE NUMBER (210)662-0966

PICK UP DATE 05/16/94

ORIG KNX

ADV CAR ~~NONE~~

BL#

AD

OV 61.75

BD

Peggy

OVERNITE TRANSPORTATION COMPANY

345 608 583

COLLECT THIS AMOUNT $6

DRIVER COL

# PCS	HM	PT	DESCRIPTION OF ARTICLES AND SPECIAL MARKINGS	WEIGHT	NMFC	RATE	CHARGES
2			2 HANDLING UNIT(S) SK CABLE TRAYS 58.00% DISCOUNT 80205	300	061220-02	49.01 LESS	147. 85.

OVERNITE ★★★

Ckes Bent Damage
11 loose upon Del

TTL PCS

TTL WT 300

DELIVERY EXCEPTIONS

SIGNATURE [signature]

FIRM [signature]

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 TS1/TVA
CLIENT/PROJECT NUMBER 11960-97185, 86687
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1396 - 11960
DATE RECEIVED 7-15-94
DATE INSPECTED 7-15-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
1" C-Clamps	NA	0	16	0	512	Y	N	Good	None	X			Receiving Verification Only
2" C-Clamps	NA	0	16	0	515	Y	N	good	None	X			
2.5" C-Clamps	NA	0	3	0	516	Y	N	good	None	X			
3" C-Clamps	NA	0	12	0	517	X	N	good	None	X			
4" C-Clamps	NA	0	53	0	519	Y	N	good	None	X			
5" C-Clamps	NA	0	3	0	520	X	N	good	None	X			
Junction Box	NA	0	2	0	A3L6043612L	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	X	N	good	None	X			
1" Cap	NA	0	2	0	PLG100R	Y	N	good	None	X			
2" Cap	NA	0	5	0	PLG200A	X	N	good	None	X			
3" Cap	NA	0	1	0	PLG300A	Y	N	good	None	X			
3/4" Alum Coupling	NA	0	2	0	NA	Y	N	good	None	X			
4" LB's (conduit outlets) w/covers + gaskets	NA	0	7	0	NA	X	N	good	None	X			

FORM
1/29/93

SHIPPING TICKET

834

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

TO
OMEGA POINT LAB
16013 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-G

REF: 1023000

FOR THERMO-LAG FIRE TESTING

3 PALLETS @ 1056LB

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 7/14/19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT FED EX

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER DTK
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

0445008526

TRACKING NUMBER 0445008526

895

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 Weight 500 Lbs. Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
- [ ] 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, UN 1845, ____ x ____ kg, 904 III
- [ ] DESCRIPTION
- 12 [ ] HOLIDAY DELIVERY (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 [ ] 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

OMEGA POINT LABORATORIES

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185-87
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1388 - 11960
DATE RECEIVED 6-28-94
DATE INSPECTED 6-28-94
INSPECTED BY: A Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject
12" Radial Bend	NA	–	1	–	06-1079-9112-12-4	Y	N	Good	None	X		
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/1/2" turned edges	Y	N	"	"	X		
Splice plates	NA	–	49 pr	–	1079-1302-02	Y	N	"	"	X		
Hinged Splice plts	NA	–	12 pcs	–	1079-1302-02	Y	N	"	"	X		
Cable 16AWG	NA	–	1 reel	–	Reel #12963	Y	N	"	"	X		
Nuts/Bolts	NA	–	488	–	N/A	Y	N	"	"	X		

REMARKS: Receiving Verification Only. (1) 18" cable tray is damaged; (1) 24" cable tray is damaged & (2) 18" covers are damaged on one end.

FORM
1/29/93

8834

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" Alum Conduit	NA	-	2	-	AVK-542K	Y	N	Good	None	X			Receiving verification only
2" Alum Conduit	NA	-	5	-	AVK-543K	Y	N	"	"	X			Non-safety related material.
2.5" Alum Conduit	NA	-	1	-	BBN-621X	Y	N	"	"	X			
3" Alum Conduit	NA	-	2	-	BDF-089A	Y	N	"	"	X			
4" Alum Conduit	NA	-	22	-	BEV-087A	Y	N	"	"	X			
3/4" Steel Conduit	NA	-	2	-	AWD-014Y	Y	N	"	"	X			
1" Steel Conduit	NA	-	10	-	AWD-015W	Y	N	"	"	X			
3" Steel Conduit	NA	-	5	-	AWD-019L	Y	N	"	"	X			
4" Steel Conduit	NA	-	14	-	AWD-020F	Y	N	"	"	X			
5" Steel Conduit	NA	-	1	-	BBY-741J	Y	N	"	"	X			
3/4" Alum LB	NA	-	1	-	BTY-197J	Y	N	"	"	X			
2" Alum LB	NA	-	5	-	BTY-256W	Y	N	"	"	X			
2.5" Alum LB	NA	-	1	-	BTY-260H	Y	N	"	"	X			
3" Alum LB	NA	-	4	-	BTY-265V	Y	N	"	"	X			
3/4" Steel LB	NA	-	1	-	BTY-196L	Y	N	"	"	X			
1" Steel LB	NA	-	2	-	BTM-778C	Y	N	"	"	X			

FORM
1/29/93

Q/A RECEIVING REPORT

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

REPORT NUMBER 1386 . 11210
DATE RECEIVED 6-3-94
DATE INSPECTED 6-6-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
4" Steel LB	NA	–	5	–	BTY-191Y	Y	N	Good	None	X			Receiving Verification Only NON SAFETY-RELATED MATERIAL. CM
3/4" Steel Coupling	NA	–	2	–	BEV-325X	Y	N	"	"	X			
1" Steel Coupling	NA	–	4	–	BLD-538F	X	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	X	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

840

SHIPPING STOREROOM: BROWNS FERRY NUCLEAR PLANT — AUTHORITY: DAN OLIVER, SUPV., NSPS

TO:
OMEGA POINT LAB
16015 SHADY FALLS ROAD
ELKENDORF, 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	BBM-[illegible]21X	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.	XR 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-[illegible]20F	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	BTY-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-[illegible]44G	3	EA		
21.	15	Conduit Coupling, 4" Stl	BGD-652A	15	EA		
22.	2	Conduit Coupling, 3/4" Aluminum	BTY-644K	2	EA		
23.	5	Conduit Coupling, 2" Aluminum	BEV-326V	5	EA		
24.	1	Conduit Coupling, 2.5" Aluminum	BGW-557M	1	EA		
25.	4	Conduit Coupling, 3" Aluminum	BET-731P	4	EA		
26.	8	Conduit Coupling, 4" Aluminum	XBET-732M	8	EA		

This material shipped per memo from Claudia Dyar of 5-25-94 for Thermolag Test

REFERENCE TRACKING #9400031847
QA III
SHIPPED BY OVERNITE PER INSTRUCTIONS FROM K. WRIGHT/F. PRIEST

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 5-25- 19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT OVERNITE

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER W. BURT
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

841

CONSIGNEE — CUSTOMER COPY (BLUE)

OMEGA POINT LAB
[redacted]15 SHADY FALES RD
[redacted]ENDORF TX 78112
6358100

PO# NONE

31

OVERNITE PHONE NUMBER (210)662-0966

INBOUND TRAILER: 288858 OVNT
FREIGHT BILL NUMBER: 391 634 025
CITY RTE/BYD.SCAC: 2M
DEST: SNT
PICK UP DATE: 05/25/94
ORIG: DCT

SHIPPER: TVA
NUCLEAR PLANT
BROWNS FERRY RD
ATHENS AL 35611
02521271 (205)729-2000

391 634 025

ADV CAR
BL# 5569400740
AD OV BD

2P

DELIVERY RECEIPT COPY: 1

COLLECT THIS AMOUNT
$.
$.

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

4-2x10 4O. Conduit bent
Roger [signature] 6-2-94

4 ◄ TTL PCS — TTL WT ► 2567

DELIVERY EXCEPTIONS

SIGNATURE: Cleda Patton — FIRM

RECEIVED THE ABOVE PROPERTY IN GOOD CONDITION EXCEPT AS NOTED

ODOM	ARRIVE	DEPART
DATE	PCS	INITIALS

TOTAL CHARGES
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 AWD-019L	Y	N	Good	None	X			Receiving Verification Only
3" 90 Elbows	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

8422

SHIPPING TICKET

843

SHIPPER MARK WILLIAMS

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

SHIPPING STOREROOM NUCLEAR STORES WBNP

AUTHORITY MARK WILLIAMS

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					
	2	CONDUIT 3 in,galv. 720092260	AWD-0191	2	pc		
2	1	ELBOW 90 deg,3 in 1008122	BLB-258A	1	ea		
3	3	STRAP RETAINING 3 in PIPE 42981B	BJM-409R	3	ea		
		ALL ITEMS QA 3					
		5/2/94 THIS MATERIAL CONTAINS NO RADIOACTIVITY					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 4-28-94 19___ G. B. L. No. TV_____ METHOD OF SHIPMENT MOTOR

– SHIPPER'S COPY

RETAINED BY SHIPPER AS RECORD OF SHIPMENT.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185,86.487
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1397 - 11960
DATE RECEIVED 7-18-94
DATE INSPECTED 7-18-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
3/4" Strap 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-3-70)

TENNESSEE VALLEY AUTHORITY
SHIPPING TICKET

No. 856-94-00877 845

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

0005121

BILL TO

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1		STRAP 3/4" MAL IRON		4	EA		
2		PLUG 2 1/2".		1	EA		
		THIS MATERIAL SHIPPED FOR THERMOLAG TEST.					
		KEY : TRACKING # 9400031847					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

SHIPPED 07/15 19 94 G. B. L. No. TV

METHOD OF SHIPMENT FED EXP

3 – SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM 1677

COST CARRIER'S CHARGE

DELIVERY CHARGES

TOTAL COST

MATERIAL RECEIVED 19

NAME OF CARRIER

MATERIAL CHECKED IN BY

STORES LEDGER POSTED BY

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
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QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

0115008530

4159-   0115008530

RECIPIENT'S COPY

1 [redacted] Date 7-15-94

From (Your Name) Please Print — Your Phone Number (Very Important) (205-729-464[illegible])

Company: TVA/BROWNS FERRY NUCLEAR PLT — Department/Floor No.

Street Address: BROWNS FERRY ROAD

City: ATHENS — State: AL — ZIP Required: 35611

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 Hill Rd

City: Elmendorf — State: TX — ZIP Required: 7811[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 [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**

† Delivery commitment may be later in some areas.
*Declared Value Limit $500
**Call for delivery schedule

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
- 1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
- 2 ☑ DELIVER WEEKDAY

Saturday Service
- 31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
- 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
- 9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
- 4 ☐ DANGEROUS GOODS (Extra charge)
- 6 ☐ DRY ICE (Dangerous Goods Shipper's Declaration not required)
- Dry Ice, 9, UN 1845 ___ x ___ kg. 904 III
- ☐ ______
- 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6 PACKAGES — WEIGHT In Pounds Only — YOUR DECLARED VALUE (See right)

Total — Total — Total

DIM SHIPMENT (Chargeable Weight) ☐ ______ lbs.
L x W x H

Received At: 1 ☐ Regular Stop 3 ☐ Drop Box 2 ☑ On-Call Stop 4 ☐ BSC 5 ☐ Station

Emp. No. — Date
- ☐ Cash Received
- ☐ Return Shipment
- ☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold

Street Address
City — State — Zip
Received By: X
Date/Time Received — FedEx Employee Number

7 Release Signature:

Federal Express Use: Base Charges / Declared Value Charge / Other 1 / Other 2 / Total Charges

REVISION DATE 1/94
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. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
4" gal. conduit	NA	0	2	0	NA	Y	N	Good	None	X			Receiving Verification Only
1" gal. conduit	NA	0	3	0	NA	Y	N	Good	None	X			

FORM
1/29/93

8417

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97258-60+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. REC'D 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

849

SHIPPER J.M. WILLIAMS

POINT OF ORIGIN NEAR SPRING,CITY, TN 37381 8-26, 19 94

SHIPPING [redacted]EROOM WATTS BAR NUCLEAR PLANT

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

TO

OMEGA POINT LABORATURIES, INC
16015 SHADY FALLS RD
ELMENDORF, TX 78112
ATTN: MARK SALLEY

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT

0001429

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	EPP177P	2	EA		
4		2-1/2 - 3 IN LB COVER	EBT792M	5	EA		
5		2-1/2 -3 IN LB GASKET	EGP836C	5	EA		
6		1 IN GASKET BPQ043N		2	EA		
7		2IN GASKET	EGK730W	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

[redacted] 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

8350

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY

SHIPPING TICKET

No. 35694-01057

851

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR, ATHENS, AL. 35611 8-24- 19 94

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., M&PS

SHIP TO

OMEGA POINT LAB
16015 SHADY FALLS ROAD
ELKENDORF, 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 19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT FEDEX

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
CARRIER
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

852

5/20/94

TO:

Omega Point Lab
16015 Shady Falls Road
Elmendorf, Texas
78112-9784

Sirs,

This Material is being supplied to you by the TVA Browns Ferry Nuclear Plant in support of the Thermolag Fire and Ampacity Testing your facility is working on.

If you have any questions or need additional information please contact D.P. Burrell at 205-729-7589.

Claudia Hyde for

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

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII.
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS.
QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL PACKAGE TRACKING NUMBER 9569284303

4131M 9569284303

RECIPIENT'S COPY

1 Date

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

Company | Department/Floor No.

Street Address

City | State | ZIP Required

2 To (Recipient's Name) Please Print | Recipient's Phone Number (Very Important)

Company | Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)

City | State | ZIP

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 (Next business afternoon)
11 ☐ OTHER PACKAGING
16 ☐ FEDEX LETTER*
12 ☐ FEDEX PAK*
13 ☐ FEDEX BOX
14 ☐ FEDEX TUBE

Standard Overnight (Next business day)
51 ☐ OTHER PACKAGING
56 ☐ FEDEX LETTER*
52 ☐ FEDEX PAK*
53 ☐ FEDEX BOX
54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day †)
30 ☐ ECONOMY*
* Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only)
46 ☐ GOVT LETTER
41 ☐ GOVT PACKAGE

Freight Service (for packages over 150 lbs.)
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
80 ☒ TWO-DAY FREIGHT**
† Delivery commitment may be later in some areas
*Declared Value Limit $500
**Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
2 ☒ DELIVER WEEKDAY

Saturday Service
31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
4 ☐ DANGEROUS GOODS (Extra charge)
6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice, 9, UN 1845, ____ X ____ kg, 904 III
☐ DESCRIPTION
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6 PACKAGES (Fedex Use Only) | WEIGHT (Fedex Use Only) | YOUR DECLARED VALUE (See right)

Total | Total | Total

DIM SHIPMENT (Chargeable Weight)
☐ lbs.
L x W x H

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

7 Release Signature:

Emp. No. | Date

☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg. To Del. ☐ Chg. To Hold

Street Address

State | Zip

Received By: X

Date/Time Received | FedEx Employee Number

Federal Express Use
Base Charges
Other 1
Other 2
Total Charges

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

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97185-87+97257-60
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1414 . 11960
DATE RECEIVED 8-10-94
DATE INSPECTED 8-10-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			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' Length for a total of 70 feet

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY
SHIPPING TICKET

No. 55694-01017 855

ER: TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN: NEAR, ATHENS, AL. 35611 8-2- 19 94

SHIPPING STOREROOM: BROWNS FERRY NUCLEAR PLANT

AUTHORITY: SAM OLIVER, SUPV., M&PS

SHIP TO: MR OMEGA POINT LABS
16015 SHADY FALLS ROAD
ELMENDORF, TX 78112

ACCT NO. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT: 000515 ~~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.	AWD-015W	70	FT		
		SENT FOR FIRE TESTING PROGRAM					
		QA III					

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

SHIPPED 8-4- 19 94 G. B. L. No. TV N/A METHOD OF SHIPMENT FEDEX (TWO DAY FRT)

5 - SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST

CARRIER'S CHARGE

DELIVERY CHARGES

TOTAL COST

MATERIAL RECEIVED 19

NAME OF CARRIER 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.

AIRBILL PACKAGE TRACKING NUMBER 0115008810

4159M 0115008810

RECIPIENT'S COPY

Date 8-8-94

From (Your Name) Please Print

Your Phone Number (205-729-...41)

Company

Street Address

City ATHENS State AL ZIP Required 3 5 6

To (Recipient's Name) Please Print

Company

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.) 1601 ... Fall ...

City Edmond... State ... ZIP Required 78112

Department/Floor No.

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

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)

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

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

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.

5 DELIVERY AND SPECIAL HANDLING

DELIVER WEEKDAY
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)
DRY ICE
Dangerous Goods Shipper's Declaration not required
12 HOLIDAY DELIVERY (if offered) (Extra charge)

6 PACKAGES WEIGHT In Pounds Only YOUR DECLARED VALUE
1 125
Total Total 125 Total

DIM SHIPMENT (Chargeable Weight)
L x W x H

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

Emp. No. Date
Cash Received
Return Shipment
Third Party Chg. To Del. Chg. To Hold
Street
City State Zip

Received By:
X

Date/Time Received FedEx Employee Number

7 Release Signature:

FedEx 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 & 97332-88 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
		Ordered	Rec'd	B.O.						Accept	Hold	Reject	
Junction Box	0	0	1	0	Ref # 94-5349	Y	N/A	Good	None	X			Receiving Verification Only
1'X1'X5'													Note: CK

FORM
1/29/93

TVA 144 (FD-5-70)

TENNESSEE VALLEY AUTHORITY

SHIPPING TICKET

No. G 578591

858

SHIPPER TVA - HORACE CROWDEN

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

SHIPPING ROOM POWER SERVICE SHOPS

AUTHORITY 3FN-M-94-0071

TO

OMEGA POINT LAB
16015 Shady Falls Road
Elmendorf, Texas 78112
ATTN: W. D. Black

ACCT No. (DO NOT INCLUDE TRANSPORTATION CHARGES)

DEBIT

Record Only

BILL TO

Same

CREDIT

ITEM	QUANTITY ORDERED	DESCRIPTION	PSC – ITEM No. BIN No.	QUANTITY DELIVERED	UNIT	UNIT PRICE	AMOUNT
1		Junction box		1	ea		

Per: C. Allsbrooks
REF: 94-5349

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

7 – EXTRA COPY TO _____

TO DIVISION OF PURCHASING, CHATTANOOGA.

TO PURCHASING FOR ALL PERSONAL PROPERTY SHIPMENTS AUTHORIZED BY FORM 81, TRANSFER ORDER, OR USED AS EXTRA COPY AS REQUIRED.

5/20/94

TO: N. D. Black

Omega Point Lab
16015 Shady Falls Road
Elmendorf, Texas
78112-9784

Sirs,

This Material is being supplied to you by the TVA Browns Ferry Nuclear Plant in support of the Thermolag Fire and Ampacity Testing your facility is working on.

If you have any questions or need additional information please contact D.P. Burrell at 205-729-7589.

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

Q/A RECEIVING REPORT

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

REPORT NUMBER 14421 11960
DATE RECEIVED 10/6/94
DATE INSPECTED 10/6/94
INSPECTED BY: C Humphrey

ITEM DESCRIPTION	P.O. NO. OR ORDER NO.	QUANTITY			I.D. NO.	CNTRL MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
5" STEEL CONDUIT	N/A	0	4	0	BBY-74LJ	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. 53694-00010

SHIPPER TENNESSEE VALLEY AUTHORITY

POINT OF ORIGIN NEAR, ATHENS, AL. 35611 10-4- 19 94

SHIPPING STOREROOM BROWNS FERRY NUCLEAR PLANT

AUTHORITY DAN OLIVER, SUPV., MAPS

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

USVA #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

2817333775

PACKAGE TRACKING NUMBER 28193337

RECIPIENT'S COPY

862

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) 729-4641

Department/Floor No.

Street Address: BROWNS FERRY RD

City: ATHENS

State: AL

ZIP Required: 35611

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)

2 To (Recipient's Name) Please Print

Recipient's Phone Number (Very Important): ( )

Company: Omega Point Lab

Department/Floor

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

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 ☐ GOV'T LETTER
41 ☐ GOV'T PACKAGE

Freight Service (for packages over 150 lbs.)
70 ☐ OVERNIGHT FREIGHT** (Confirmed reservation required)
80 ☒ TWO-DAY FREIGHT**
† Delivery commitment may be later in some areas.
*Declared Value Limit $500.
**Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 ☐ HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
2 ☒ DELIVER WEEKDAY

Saturday Service
31 ☐ HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
9 ☐ SATURDAY PICK-UP (Extra charge)

Special Handling
4 ☐ DANGEROUS GOODS (Extra charge)
6 ☐ DRY ICE Dangerous Goods Shipper's Declaration not required
Dry Ice, 9, UN 1845 ____ x ____ kg. 904 III
☐ DESCRIPTION
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

6
PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE (See right)
1	300	
1	827	
Total 1	Total 1200 (827)	Total

DIM SHIPMENT (Chargeable Weight) 336
120 x 048 x 042 lbs.

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

REVISION DATE 4/94
PART #145412 FXEM 9/94
FORMAT #160
160
© 1993-94 FEDEX
PRINTED IN U.S.A.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TS1
CLIENT/PROJECT NUMBER 11960-92553-55
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 CK
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-3-70)

SHIPPING TICKET

NO. 850-15485

8P4

SHIPPER L. J. Wheeler

POINT OF ORIGIN Soddy Daisy, Tn 10-11 19 94

SHIPPING STOREROOM Sequoyah Nuclear Stores

AUTHORITY L. J. Wheeler

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	Bln-296W	3	EA		
	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 T#9941008800
and memo from Larry Mays to P. Truss

SHIPPING WEIGHT

DISTRIBUTION OF TRANSPORTATION CHARGES

DATE SHIPPED 10-11 19 94 B. L. No. TV

METHOD OF SHIPMENT Fed Ex

SHIPPING NOTICE

TO BE ENCLOSED WITH MATERIAL WHEN NO OTHER PACKING SLIP IS USED: OTHERWISE, TO CONSIGNEE UNDER SEPARATE COVER.

TO BE FILLED IN BY RECEIVING OFFICE

SERIAL NO. OF FORM

1677

COST
CARRIER'S CHARGE
DELIVERY CHARGES
TOTAL COST

MATERIAL RECEIVED 19
NAME OF CARRIER
MATERIAL CHECKED IN BY
STORES LEDGER POSTED BY

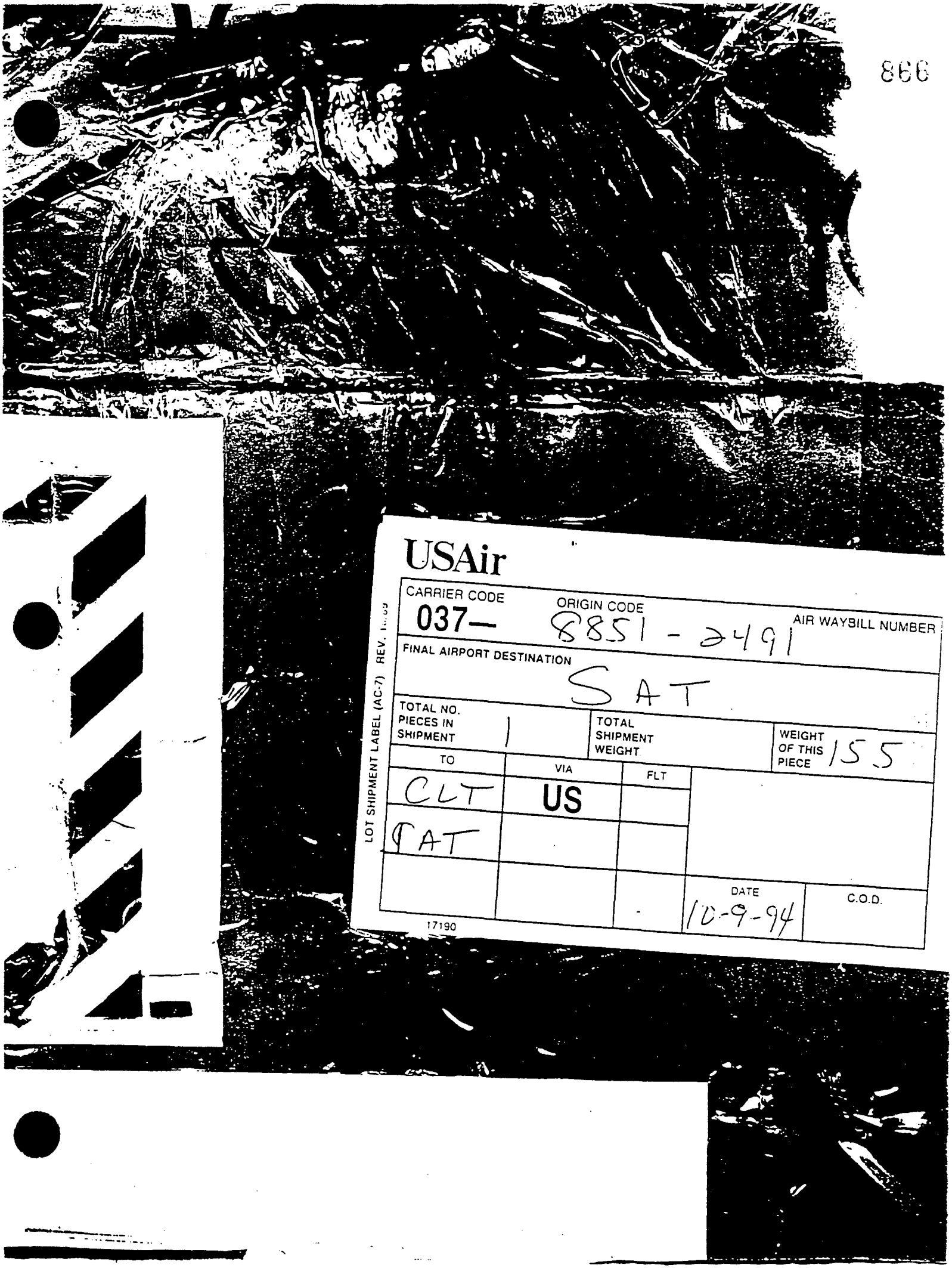
Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960-97553-55
RECEIVED FROM TVA
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1445.11960
DATE RECEIVED 10/10/94
DATE INSPECTED 10/10/94
INSPECTED BY: C Humphrey

ITEM DESCRIPTION	P.O. NO.	QUANTITY			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	
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. 11-89

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

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

№ 1272

CARRIER Sonic

DATE 867

SHIPPER

ADDRESS

CITY

AIRBILL NO. TEH 31453

CONSIGNEE Omega Point Labs

ADDRESS 16015 Shady Falls Rd

CITY Elmendorf TX 78112

NO PIECES	DESCRIPTION	WEIGHT		
1	Item Rent Panel			
	REFERENCE NO.			
	US 8851-2491	155		

Carrier & liability not more than $50.00 unless a greater value is declared. Carrier is not responsible for concealed damage nor for freight claims after 48 hours. Shipment is accepted in apparent good order except as noted

DRIVER

DRIVER

SHIPPERS SIG

DRIVER

TIME

C.O.D. AMOUNT →

DRIVER

RECEIVED GOOD ORDER

DATE

BUS/AIRLINE CHARGES →

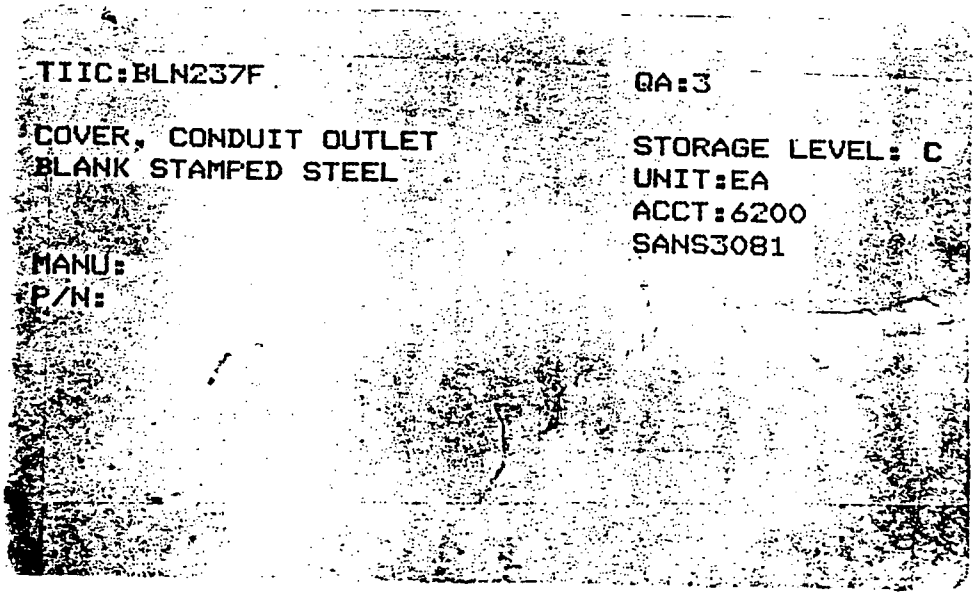
TIME

DATE

TOTAL →

BTY259N WBN-SWEC-R93-7273 EA
1006841 12-28-93 IT# 2
QA LEVEL III PEG DATE: 12-9-93
CONDUIT OUTLET,ELEC,MI,2",
THD RIGID HUB,TYPE LB,
P/N: LB-200-M
STORAGE LEVEL C MED/6230

BLN236H WBN EA.
44286B-01 03-12-90
QA. LEVEL III STORAGE LEVEL C
COND. OUTLET,ELECT. TYPE LB,FORM 35
PN:LB500-M
MFG:APPLETON ELECT.
SANE3606 NS/6200 RDR



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: CBatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Channel	1125Q	10	10	—	CAN3X4.1#X20	Y	Y	Good	None	X			
3"X4.10 Channel X20													
ANGLE IRON 4"X4"X½"X20	1125Q	1	1	—	ANG 4X C07	Y	Y	Good	None	X			

FORM
1/29/93

PURCHASE ORDER

870

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**

871

* * * * * * * * * * * * * * * *
* S A L E S O R D E R 28564 *
* * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

M+R's attached

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 1125-Q
PLACED BY: CLEDA
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		10	CHN 3X4.1#X20	3" X 4.1# CHANNEL X 20	820	28.75	335.75
02	1	1	ANG 4XC07	4 X 4 X 1/2 X 20	256	25.80	66.05

TOTAL WEIGHT: 1076 LBS

RECEIVED BY: Richard Reasby

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

smi STRUCTURAL METALS, INC.
BOX 911, SEGUIN, TEXAS 78156-0911
512-372-8200

CERTIFIED TEST REPORT

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

WE HEREBY CERTIFY THAT THE FOLLOWING DATA IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

DAN SCHACHT
QUALITY CONTROL MANAGER

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 F/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		

REMARKS: THIS STEEL IS MELTED AND MANUFACTURED IN THE USA AND IS FREE FROM MERCURY CONTAMINATION IN THE PROCE

FOR ADDITIONAL COPIES
CALL ACCOUNTING
(512) 372-8225.

STRUCTURAL METALS, INC.
BOX [redacted] SEGUIN, TEXAS 78156-0911
210-3[redacted]200

CERTIFIED TEST REPORT

IS A TRUE COPY FROM TESTS PERFORMED IN OUR LABORATORY.

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

DAN SCHACHT
QUALITY CONTROL MANAGER

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

T	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

T	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

KS: 100% MELTED AND MANUFACTURED IN THE USA AND FREE FROM MERCURY CONTAMINATION IN THE PROCESS

FOR ADDITIONAL COPIES
CALL ACCOUNTING
(210) 372-8225.

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960 - 97185, 97260, 97288, 97332, 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: 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	
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 3
PLACED BY: KERRY
SHIP VIA:
COMMENTS:

TELEPHONE #: (512) 635-8100

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

REQUEST DATE: 8/23/94

LI	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	1	1	TUB 6XC09X40	6 X 6 X 600 X 40	1410	1999.00	799.60
02	0	0		MUST HAVE MTR **	0	.00	.00
03	2	2	ANG 3XC03X25ALUM	2 X 2 X 1/4 X 25 ALUMINUM	56	255.00	141.53

WEIGHT: 1466 LBS
RECEIVED BY:

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

NAME [redacted]ND ADDRESS OF PRODUCER'S PLANT - USINE PRODUCTRICE
FIRMA U[redacted]CHRIFT DES HERSTELLERWERKS

VALE[redacted]
USINE DE [redacted]
57480 RETTEL FRANCE

PAGE-SHEET-S[redacted]1

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

ACHETEUR - PURCHASER - BESTELLER
FRANCOSTEEL CORPORATION SALES
HOUSTON
UNITED STATES

NO.COMMANDE ACHETEUR
PURCHASER'S ORDER N°
BESTELLUNG NR
FNY 553 - 8180 Q

NO COMMANDE USINE
PLANT ORDER NUMBER
WERKSBESTELL NUMMER
3-M -20227

AVIS D'EXPEDITION N°
DISPATCH NOTE N°
VERSANDANZEIGE NR
8 -130487

POSTE / ITEM / POST	DIMENSIONS EN POUCES / DIMENSIONS / ABMESSUNGEN	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)

TOTAL P.01
PAGE.001

666 8402

ANALYSE SUR TUBES EN % - PIPES ANALYSIS - ROHRANALYSE

POSTE / ITEM / POST	NO DE LA COULEE / NUMBER OF CAST / NUMMER DES GUSSES	C	MN	P	S	SI	AL	BO	CR	MO	V	CU	TI	NI	NB	SN
2	14836	0,126	1,440	0,012	0,007											
2	24904	0,160	1,450	0,018	0,008											
3	26255	0,131	1,400	0,016	0,009											
6	15158	0,158	1,430	0,013	0,007											
11	15158	0,158	1,430	0,013	0,007											
12	26401	0,169	1,510	0,020	0,007											

TRACTION - TENSILE TEST - ZUGVERSUCH
EPROUVETTE - TEST PIECE - PROBE

POSTE: VALEURS GARANTIES - GUARANTEED VALUES / GEWAHRLEISTETE WERTE

POSTE / ITEM / POST	RE (PSI)	RM (PSI)	A %	RM(A-2)
2	68655	74691	25,2	
2	71936	77592	25,2	
3	62073	71936	28,6	
6	69905	75562	28,5	
11	61348	71791	32,9	
12	63669	75997	32,2	

POSTE / ITEM / POST	ESSAI HYDRAULIQUE / HYDRAULIC TEST / WASSERPRUFDRUCK	
2	S	BAR
2	S	BAR
3	S	BAR
6	S	BAR
11	S	BAR
12	S	BAR

NOUS ATTESTONS QUE LES PRODUITS SONT CONFORMES AUX STIPULATIONS DE LA COMMANDE
WE CERTIFY THAT THE DELIVRED PRODUCTS COMPLY WITH THE REQUIREMENTS OF THE ORDER.
ES WIRD BESTATIGT, DAS DIE GELIEFERTEN-ERZEUGNISSE DEN BESTIMMUNGEN DER BESTELLUNG ENTSPRECHEN.

To: Kenny
From: B.T.
6X6X500
Sq. Tube

RESPONSABLE SECTEUR QUALITE
M. SZKOLNIK

PRODUCTEUR / PRODUCER / HERSTELLER

XT 77444

DATE DATUM 29/11/93

AUG 25 '94 11:02

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/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 ⅜" X 20'	11460	1	1	0	ANG-3½x2½x20S	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: 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

[redacted]

* * * * * * * * * * * * * * * * *
* S A L E S O R D E R 29259 *
* * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 11460
PLACED BY:
SHIP VIA:
COMMENTS:

TELEPHONE #: (210) 635-3100

ORDER DATE: 8/25/94
SALESMAN: CASEY HARRIS

REQUEST DATE: 8/25/94

[redacted]	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	1	1	ANB 3-1/2X2-1/2X005	3-1/2 X 2-1/2 X 5/8 X 20	144	30.95	44.57

[redacted]EIGHT: 144 LBS

RECEIVED BY: Kenny Hatchard

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

881

CO·STEEL LASCO

A Division of Co-Steel Inc.

Hopkins St. South, Whitby, Ontario, Canada L1N 5T1
TEL.: WHITBY 905-668-8811 • TORONTO 416-364-6138
FAX: 905-668-6469 DUNS 20-183-2094

MATERIAL LISTED BELOW WAS SHIPPED ON BILL OF LADING AND LOADING REPORT NUMBER

TESTING LABORATORY REPORT
COMPTE RENDU DU LABORATOIRE D'ESSAI

• PHYSICAL PROPERTIES • CHEMICAL ANALYSIS
• PROPRIÉTÉS PHYSIQUES • ANALYSE CHIMIQUE

JUL. 18,1994
20:25

097068

2231.4

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

ATTENTION--:

CLIENT ORDER NUMBERS / N° DE COMM DU CLIENT: SEE * BELOW PAGE # 01

MATERIAL TESTED / MATÉRIAU ÉPROUVÉ | HEAT NUMBER / N° DE CHALEUR | YIELD STRENGTH / LIMITE D'ÉLASTICITÉ | TENSILE STRENGTH / RÉSISTANCE DE TRACTION | ELONGATION GAUGE LENGTH % | TEST LOCATION / 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.	CONID MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Plate ½"x12"x20'	11320	1	1	0	FLT ½X12	Y		Good	None	X			
Sq tubing 4"x4"x¼"x20'	11320	1	1	0	TUB4X4C06X20	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

884

* * * * * * * * * * * * * * * * *
* S A L E S O R D E R 28761 *
* * * * * * * * * * * * * * * * *

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH
SAN ANTONIO, TX 78219

DELIVER PICKING TICKET

BILL TO: 000477
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 78112

SHIP TO:
OMEGA POINT LABORATORIES

16015 SHADY FALLS
ELMENDORF, TEXAS 781120000

PURCHASE ORDER: 11329
PLACED BY: CLETA
SHIP VIA:
COMMENTS:

TELEPHONE #: (512) 635-8100

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

REQUEST DATE: 7/20/94

IT	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	126.40
02	1	1	TUB 4XC06X20	4 X 4 X 250 X 20	244	516.10	103.22

T[illegible]IGHT: 652 LBS

RECEIVED BY: Jane Elizalde

NET BEFORE TAX	229.62
TAX.....	17.80
GRAND TOTAL...	247.42

B/L # 72969 [redacted]

TOLTEC STEEL PRODUCTS, INC.
5390 DIETRICH RD.
SAN ANTONIO, TX 78219

NUCOR STEEL
A Division of N[redacted]orporation
JEWETT, TEXAS 75846 [redacted] (903) 626-4461

Date [redacted]94

CERTIFIED MILL TEST REPORT

43579

SOLD TO: TOLTEC
5390 DETRICH RD.
SAN ANTONIO TX 78219

SHIP TO: TOLTEC
5390 DETRICH RD

SIZE / GRADE	HEAT NUMBER	CUSTOMER PO NUMBER	TENSILE PSI	YIELD PSI	8 INCH SCALE ELONG %	C	Mn	Si	S	P	V	Nb	Cu	Cr	Ni	Mo
1/2 X 12 ASTM A36-93/ASME SA36-89	345-0467	#534	73600	50000	27	.17	.74	.26	.03	.02	.000	.000	.48	.09	.11	.033
3/4 X 12 ASTM A36-93/ASME SA36-89	334-2690	#534	73700	49100	23	.13	.72	.21	.03	.01	.000	.000	.26	.14	.10	.031
1/2 X 10 ASTM A529-92 GD 50	343-0813	#534	81800	56400	21	.23	.90	.26	.04	.02	.000	.000	.40	.16	.12	.040
3/8 X 8 ASTM A36-93/ASME SA36-89	343-0790	#534	65500	47700	25	.16	.75	.22	.04	.02	.000	.000	.38	.10	.12	.038
2 X 1 X 1/8 ASTM A36-93/ASME SA36-89	332-2362	#534	80000	59500	28	.15	.82	.24	.04	.02	.000	.000	.37	.20	.16	.049
2 X 2 X 1/4 ASTM A36-93/ASME SA36-89	341-1165	#534	70500	50400	30	.15	.75	.22	.04	.02	.000	.000	.48	.17	.17	.057
4 X 3 X 3/8 ASTM A36-93/ASME SA36-89	342-0736	#534	63700	43800	27	.13	.71	.16	.03	.02	.000	.000	.33	.10	.10	.024
3 X 4.1 ASTM A36-93/ASME SA36-89	341-1085	#534	70500	49800	25	.12	.82	.25	.03	.01	.000	.000	.60	.13	.11	.034
6 X 8.2 ASTM A36-93/ASME SA36-89	343-0661	#534	72300	54400	24	.20	.85	.25	.04	.02	.000	.000	.55	.15	.13	.057

CHIEF METALLURGIST

MELTED AND MANUFACTURED IN U.S.A.

HANNA

Certification 391000 5/12/94 2

886

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

Sunbelt Metal Service Inc

P O Box 43839
Austin TX 78745

Ship To:

Sunbelt Metal Service Inc

South Loop 4
Buda TX 78610

Item	Heat #	ASTM Grade	Description	Yield	Tensile	Elong	Rockwell
7150712		2X3 RECT 3/16	HRA500 20.000FT				
NTINUED							
53179	01403	A500 B		66,000	76,000	26.0	B84
53179	45472	A500 B		68,500	76,500	27.0	B86
53184	51226	A500 B		62,000	73,000	28.0	B82

Total Weight 7,826

Heat #	C	MN	P	S	SI
01403	.170	.790	.012	.007	.020
45472	.170	.780	.017	.009	.030
51226	.160	.740	.015	.013	.020

4600412		5 SQ 1/4	HRA500 40.000FT				
5060	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

na Steel Corporation
2 Commerce Avenue
. Box 558
field, Alabama 35064
5) 780-1111
NS No. 00-402-9294

SUBJECT TO TERMS AND CONDITIONS ON BACK

Milton Stewart
Metallurgist

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97257
RECEIVED FROM Toltec
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1440 . 11960
DATE RECEIVED 9-23-94
DATE INSPECTED 9-26-94
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Angle iron 1½"x1½"x⅛"x20	11549	4	4	0	ANG1-½XC01	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: 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 29569 *
* * * * * * * * * * * * * * * * * *

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 781129000

PURCHASE ORDER: 1154 G
PLACED BY: KERRY
SHIP VIA:
COMMENTS:

TELEPHONE #: (210) 635-8100

ORDER DATE: 8/31/94
SALESMAN: CASEY HARNE

REQUEST DATE: 9 6 94

LI	ORDER QTY	SHIP QTY	COD PART NUMBER	DESCRIPTION	WEIGHT	UNIT COST	EXTEND COST
01	4	4	ANG 1-1 2XC11	1-1/2 X 1-1/2 X 1/8 X 20	98	26.15	26.03
02	1			****MILL CERTS REQUIRED	0	.00	.00

WEIGHT: 98 LBS

RECEIVED BY: Richard L. Beasley

NET BEFORE TAX	26.03
TAX...........	2.02
GRAND TOTAL...	28.05

STRUCTURAL METALS, INC.
BO[redacted]1, SEGUIN, TEXAS 78156-0911
512[redacted]8200

CERTIFIED TEST REPORT

The following tests co[redacted] to the requirements of the specifications listed.

IS A TRUE COPY FROM TESTS PERFO[redacted]N OUR LABORATORY.

QUALITY CONTROL MANAGER
DAN SCHMIDT

HT# SB2439
NO B9379472

S 170000 TOLTEC STEEL PRODUCTS, INC.
O 3550 DIETRICH RD.
L P O BOX SAN ANTONIO, TX 78219
D HOUSTON TX
T 77241
O

S 0001 TOLTEC STEEL PRODUCTS, INC.
H 3550 DIETRICH RD.
I P/U @ THE MILL SAN ANTONIO, TX 78219
P SEGUIN TX
T
O

HEAT NO	SECTION	SPECIFICATION	T #	YIELD PSI	TENSILE PSI	ELONG %	IN	R.A. %	BEND TEST DIAM	RSL	DATE ROLLED	LB/FT
360	L 2.5X2.5X3/16	ASTM A36-89	1	53300	75000	31.5	8				081692	2.95
396	L 1.5X1.5X1/8	ASTM A36-89	1	55700	75200	23.0	8				101992	1.20
032	L 2X2X1/4	ASTM A36-89	1	52200	74600	27.5	8				113092	3.09
385	L 3X2X3/16	ASTM A36-91	1	55400	77800	29.0	8				011393	3.07
			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

HEAT NO	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

REMARKS:
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 1399 - 11960
DATE RECEIVED 7-7-94
DATE INSPECTED 7-7-94
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	
7 Strand Bare #8	11210	1K	1K	0	BASTR7SD8	Y	Y	Good	None	X			
Copper Wire													

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Summers Electric
2400 Brockton

San Antonio TX 78217

PO Number: 1121-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Cleda Patton
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
6/27/94	Their Truck		6/30/94	30

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	7 Strand Bare #8 Copper Wire BARE8STR	1000	$0.69	$690.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 6-27-94

Special Instructions

Please include all Certificates of Conformance to Catalog Specifications

Ordered By: Cleda Patton

Project #: 11960

Total	$690.00
Shipping	
Tax	
Invoice Total	$690.00

SUMMERS ELECTRIC COMPANY

ORIGINAL

PACKING SLIP

NUMBER	PAGE
080330601	1

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

06-JUL-1994, 11:26

SOLD TO: 00540800
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
1121-Q		KERRY	DEL

ORDER DATE	SHIP DATE	SHIP VIA	TERMS	SALESMAN	TAX CODE	
28-JUN-1994	03-JUL-1994	Our Truck	PC	243	000	10th, Net 20th

LINE	QTY ORD	QTY B/O	QTY SHP	PART NUMBER / DESCRIPTION	BIN LOCATION / COST	U/M	UNIT PRICE	U/M	EXTENDED PRICE
002	1000	0	1000	CUP BARE-B STR SOFT DRAWN BARE C	33500	Y	140.00	M	140.00
3000		0	3000	3M 06228 STD CABLE TIE	19-E-5 06228		20.48	C	614.40

Freight, if applicable, to be billed later

SUB TOTAL	:	754.40
FREIGHT	:	.00
TAX	:	58.46
TOTAL	:	812.86

PICKED BY: CHECKED BY: DATE: CUSTOMER SIGNATURE:

MASTER FORM # 2190

894

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. RECD 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

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

John Harnett
Summers Electric
2400 Brockton

San Antonio TX 78217

PO Number: 1134-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	Kerry M. Hitchcock Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
7/22/94	Pick up		7/22/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Galv Cond Strap-KIN C105-4	7	$2.36	$16.49

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 7-22-94

Special Instructions

Please include Certificate of Conformance

Ordered By: Kerry Hitchcock

Project #: 11960 -group 1

Total	$16.49
Shipping	
Tax	$1.27
Invoice Total	**$17.76**

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

898

CONTROL

PACKING SLIP

M: 2400 BROCKTON
SAN ANTONIO, TX 78217

NUMBER	PAGE
080764101	1

22-JUL-1994, 08:53

TYA

SOLD TO: 08643800
OMEGA POINT LABORATORIES
16015 SHADY FALLS ROAD
ATTN: ACCOUNTS PAYABLE DEPT.
ELMENDORF, TX 78112

SHIP TO:
OMEGA POINT LABORATORIES
2400 BROCKTON
SAN ANTONIO, TX 78217

CUSTOMER PO NUMBER	JOB NAME	CONTACT	TYPE
340			WC

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
-JUL-1994	22-JUL-1994	Will Call	PC	236	000	10th, Net 20th

LINE	QTY. ORD.	QTY. B.O.	QTY. SHP.	PART NUMBER / DESCRIPTION	BIN LOC. / UPC	INST	UNIT PRICE	UM	EXTENDED PRICE
1	7	0	7	KIN C105-4 GALV COND STRAP	24-A-2 75951		235.63	C	16.49

SUB TOTAL	:	16.49
FREIGHT	:	.00
TAX	:	1.27
TOTAL	:	17.76

MASTER FORM #2250

PICKED BY [ ] CHECKED BY [ ] DATE [ ] CUSTOMER SIGNATURE [Kerry Hutchins]

899

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 7-22-94 we, Summers Electric, provided the material called for on your Purchase Order # 1134Q on our Bill of Lading (shipping document) # 080764101, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 7-26-94
Signature: John Harris
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME T31/TUA
CLIENT/PROJECT NUMBER 11960-9718S-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

9810

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 dPatton
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
902

PACKING SLIP NUMBER	PAGE
081251801	1

FROM: 2400 BROCKTON
SAN ANTONIO, TX 78217

18-AUG-1994, 10:43

SOLD TO: 09643800
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
1410		KERRY	DEL

ORDER DATE	SHIP DATE	SHIP VIA	FRT	SLS	TAX	TERMS
8-AUG-1994	18-AUG-1994	Our Truck	PC	236	000	10th, Net 20th

LINE	QTY. ORD.	QTY. B.O.	QTY. SHP.	PART NUMBER / DESCRIPTION	BIN LOC. / UPC	NST	UNIT PRICE	UM	EXTENDED PRICE
01	1	0	1	MS? 12X12X60		Y	186.00	E	186.00

WELDED ENDS 12X60 FLAT COVER 12 GA. NEMA 1
PAD

Freight, if applicable, to be billed later

SUB TOTAL	:	186.00
FREIGHT	:	.00
TAX	:	14.42
TOTAL	:	200.42

Deliver today 8-23 please code CD

MASTER FORM #225C

PICKED BY | CHECKED BY | DATE 8/23 | CUSTOMER SIGNATURE Richard Beasley 1:00

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 # 1141Q 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 Summesa 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	APP PLG300S	X	Y	Good	None	X			
1" gal Cond Strap	11450	10	10	0	KIN C105-1	X	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 906

NUMBER	PAGE
178378001	1

24-AUG-1994, 12:15

M: 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	INST	UNIT PRICE	UM	EXTENDED PRICE
01	4	0	4	BPT 110 4-IN STEEL LOCKNUT	11-B-3 00110		165.00	C	6.60
02	25	0	25	KIN C105-4 GALV COND STRAP	17-A-1 75951		235.63	C	58.91
03	15	0	15	KIN C105-3 GALV COND STRAP	17-A-1 75945		171.22	C	25.68
04	5	0	5	KIN C105-2-1/2 GALV COND STRAP	17-A-1 75942		158.45	C	7.92
05	20	0	20	KIN C105-2 GALV COND STRAP	17-A-1 75939		131.00	C	26.20
06	10	0	10	KIN C105-1 GALV COND STRAP	17-A-1 75930		95.05	C	9.51

SUB TOTAL	:	134.82
FREIGHT	:	.00
TAX	:	10.46
TOTAL	:	145.28

REV. 8/94

MASTER FORM #2263 SE-TX

PICKED BY 231 CHECKED BY 231 DATE 8/24/94 RECEIVED BY Kerry Hutchens

SUMMERS ELECTRIC COMPANY
A Summers Group, Inc. company

CUSTOMER

PACKING SLIP 907

PACKING SLIP NUMBER	PAGE
081360401	1

24-AUG-1994, 12:16

M: 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 Richard Beasley

908

SUMMERS ELECTRIC

June 18, 1992

To Whom It May concern:

I hereby certify that on 8-24-94 we, Summers Electric, provided the material called for on your Purchase Order # 11450 on our Bill of Lading (shipping document) # 081360401, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 9-27-94
Signature: John Harris
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

909

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) # 178328001, in accordance with all applicable requirements for shipment. I further certify that the supplies that were provided are of the quality specified and are in all respects in conformance with purchase order requirements.

Date: 9-27-94
Signature: John Harris
Title: INSIDE SALES

2400 BROCKTON
P.O. BOX 17747
SAN ANTONIO, TEXAS 78217
512/824-1451

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TVA/TSI
CLIENT/PROJECT NUMBER 11960/97553-55
RECEIVED FROM B-Line Systems
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1443.11960
DATE RECEIVED 10/5/94
DATE INSPECTED 10/11/94
INSPECTED BY: C Humphreys

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
12" steel cable tray	1157Q	2	2	0	248P-09-12-144	Y	Y	Good	None	X			

FORM
1/29/93

910

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Sue Messerlie
B-Line Systems
509 West Monroe

Highland IL 62249

PO Number: 1157-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
9/28/94	UPS Red Label			

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	12" steel cable tray 248P-09-12-144	2		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 9-28-94

Special Instructions

See attached purchasing specifications and Quality Assurance Requirements.

Ordered By: Constance A. Humphrey

Project #: TSI-97553-55

Total	$0.00
Shipping	
Tax	
Invoice Total	**$0.00**

VENDOR PURCHASING SPECIFICATION AND QUALITY ASSURANCE REQUIREMENTS

Vendor B-Line

Purchase Order No. 11570

Any or all of the following Quality Assurance requirements shall be incorporated as conditions to this procurement when corresponding box is marked. Failure to comply with any requirement specified herein may result in rejection and/or return of shipment at seller's expense.

1.0 QUALITY PROGRAM

☒ Seller shall furnish all items on this Purchase Order in accordance with Quality Program approved by Buyer.

2.0 QUALITY VERIFICATION

When additional quality verification activities are required as a condition to this procurement, invoices will not be paid until satisfactory completion of such activities. Excessive rejection rates may result in removal from buyer's Approved Vendors List.

☒ Receiving Inspection - Buyer shall inspect items upon receipt to verify compliance with purchase order requirements. Rejected items shall be returned at seller's expense.

☐ Independent Laboratory Tests - Samples of materials furnished shall be tested independently for conformance to specification requirements proir to final acceptance. Rejected materials shall be returned at seller's expense.

☐ Document Review - Final acceptance shall be based on satisfactory review of required certifications and other supporting documents.

3.0 CERTIFICATIONS

When certifications are required as a condition to this procurement, the seller shall furnish one reproducible copy either with or prior to each shipment. Shipments will not be accepted and invoices will not be paid until certifications are in buyer's possession.

PURCHASING SPECIFICATIONS
PAGE 2 OF 3

VENDOR B-Line
PURCHASE ORDER NO. 11570

☒ Certificate of Compliance/Conformance Required - Certification that materials and/or services comply with purchase order requirements. Certification shall reference purchase order number and traceability numbers (when applicable).

☐ Certified Test Report Required - Certification that material complies with applicable material specification(s) and the purchase order. Include actual results of required tests.

☐ Certificate of Calibration Required - Certification shall be traceable to National Bureau of Standards. (Renamed NIST, Nat. Institute of Science & Technology)

4.0 AUDITS/RIGHT OF ACCESS

☐ The buyer reserves the right to audit your facility to verify compliance with purchase order, code and specification requirements with minimum of ten (10) days notice.

☒ Shipments shall only originate from facilities approved by the buyer.

☐ Buyer reserves the right to inspect any or all work included in this order at seller's facility with as early notice as practicable.

5.0 IDENTIFICATION

☒ Seller shall identify each item with a unique traceability number by physical marking or tagging. Traceability numbers shall be traceable to certifications and packing lists.

☐ Seller shall identify each container with a unique identification number. The identification number shall be traceable to certifications and packing lists.

6.0 10 CFR, PART 21

☒ The material, equipment and/or services to be furnished under the provisions of this purchase order are involved in the testing of basic components of a Nuclear Regulatory Commission (NCR) licensed facility. Accordingly, the seller is subject to the provisions of 10 CFR, Part 21 (Reporting of Defects and Non-compliance)

PURCHASING SPECIFICATIONS
PAGE 3 OF 3

VENDOR B-Line
PURCHASE ORDER NO. 1157Q

7.0 PACKING/SHIPPING

☐ All materials shall be packaged in air tight, moisture free containers and shall be free from all foreign substances such as dirt, oil, grease or other deleterious material.

☒ All materials and equipment shall be suitably crated, boxed or otherwise prepared for shipment to prevent damage during handling and shipping. Wherever practical, equipment shall be palletized for ease of unloading and storage at destination. each container shall be clearly marked with buyer's purchase order number.

QUALITY ASSURANCE APPROVAL C Humphrey DATE 9/28/94

SHIPPING ORDER

15:56:40

S

B-LINE® SYSTEMS, INC.
509 West Monroe Street
Highland, Illinois 62249-0326
Phone: 618-654-2184

RS1 SYM 915

SHIPPING ORDER NO.
8942-9261

DATE
9/29/94

0026073

SOLD TO:

OMEGA POINT LABORATORY
16015 SHADDY FALLS RD

ELMENDORF TX 78112

Bernie 9-30 9P

SHIP TO:

OMEGA POINT LABORATORY
16015 SHADDY FALLS RD

ELMENDORF TX 78112

PAGE NO. 1 OF 1 TERMS - NET 30 DAYS 1-CTN=6 #

8942926 1

CUST. ORDER NO.	DATE RECEIVED	LAST SHIPPED	SHIPPING DATE	VIA	COL	PPD	CHG	ALLC
11579	9/29/94		10/03/94	AE		X	X	

DIV.	SALESMAN	SHIP FROM	F.O.B.	DATE SHIPPED	B/L	WEIGHT
7	8800 E	TROY	TROY	10-3-94	358077	79#

TOM FENOGLIO

1-12-73

ORDERED	DUE	SHIPPED	BACK ORDER	UNIT	*	PART NUMBER	DESCRIPTION
3		2 2	—	PC		248P09-12-144	STR SECTION ITM 1 ____ BUNDLE(S) OF ____ PC(S) EA.
		S/O				1126-34200	9/29/94 WGT. 36.1600 971-3204 ML
2		2 2	—	PR		9ZN-8004	SPLICE PLATE ITM 2 LOCATION: I002 H05-2 ____ CARTON(S) OF ____ PR(S) EA.
							WGT. 2.4000 703-0000 ML

FREIGHT CHARGES FROM TROY TO FOLLOW

TOTAL WEIGHT 77.1200

ANY SHORTAGE OR DAMAGE CLAIM MUST BE REPORTED IN WRITING TO ADDRESS SHOWN ABOVE, WITHIN TEN (10) DAYS FROM DATE OF SHIPMENT.

FORM 102 A

CERTIFICATE OF CONFORMANCE

916

P. O. No.: 11570 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.

Nick 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
02215441
OMEGA POINT LABORATORY

16015 SHADDY FALLS RD
ELMENDORF TX 78112

SHIPPER
00950456 P3067
B LINE SYSTEMS

EXIT ARFW DOCK
SAINT LOUIS MO 63147

DATE: 10/03/94
ORIGIN: STL
DEST.: SAT
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

RECEIVED IN GOOD CONDITION EXCEPT AS NOTED
FIRM:

BY: June Elizalde

DELIVERED BY: R Knight

DATE: 10-5-94

CONSIGNEE COPY

917

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI / TVA
CLIENT/PROJECT NUMBER 11960-97257-604 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: 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	
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

919

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: OMEGA POINT LABS Date: 8/26/94

Invoice: 21630

YOUR ORDER NO.	JOB NAME	Terms: 2% – 10 days, Net 30 days
1142 G		

QUANTITY	DESCRIPTION	LIST	UNIT	DISCOUNT	AMOUNT
10	D-255E-10 1 PIPE CLAMPS C C				
30	P-253-40 4 - - -				
	BACK ORDERED 10 P-253-40				

TAX

TOTAL

Received By C Humphreys ☐ 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: 9/30/[illegible]

Invoice: 21664

YOUR ORDER NO.	JOB NAME	Terms: 2% – 10 days, Net 30 days
1142 Q		

QUANTITY	DESCRIPTION	LIST	UNIT	DISCOUNT	AMOUNT
10	P-2559-40 4 Hole Down Straps				

TAX

TOTAL

Received By Jane Clifford

☐ Tax Exempt

U.S. Sales Co., Inc.

318 W. Melrose Place
San Antonio, Texas 78212
(210) 829-7044

August 30, 1994

CERTIFICATION OF COMPLIANCE

Omega Point Labs
16015 Shady Falls Rd.
Elmendorf, Texas 78112-9784

Attn: Cleda

Customer Order No. 1142 Q

Material: 20' P-1000 (PS-200)
40' P-1001 (PS-200 2T3)
10 P-2558-10
40 P-2558-40

This is to certify that the materials shipped to fill the above order have been manufactured in accordance with standard manufacturing procedures and specifications for these products.

U. S. SALES CO.

Johnny Boyd

Johnny Boyd, President

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960- 97185-87, 97257-60, 97832-38
RECEIVED FROM U.S. Sales
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1419 - 11960
DATE RECEIVED 8-23
DATE INSPECTED CP
INSPECTED BY: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
Channel	11420	20'	20'	0	P-1008 (PS-200)	Y		Good	None	X			partial shipment
Channel	11420	40'	40'	0	P-1001 (PS-200 2T3)	X		Good	None	X			

FORM
1/29/93

PURCHASE ORDER

Omega Point Laboratories, Inc.
16015 Shady Falls Road, Elmendorf, TX 78112-9784
(210) 635-8100 FAX: (210) 635-8101

Vendor:

Johnny Boyd
U.S. Sales Company, Inc.
318 W. Melrose Place

San Antonio TX 78212

PO Number: 1142-Q

Invoice, correspondence, all shipping papers, and packages must reference P.O. number.

Bill To:

Accounts Payable
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Ship To:

Constance A. Humphrey
Omega Point Laboratories, Inc.
16015 Shady Falls Road
Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/19/94	Their Truck		8/22/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	P1000 Channel	20'		$0.00
2.	P1001 Channel	40'		$0.00
3.	P2558-40 4" pipe straps	40		$0.00
4.	P2558-10 1" pipe straps	10		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-19-94

Special Instructions

Please include all Certificates of Conformance to Catalog Specifications

Ordered By: Constance A. Humphrey

Project #: TVA/TS1

Total	$0.00
Shipping	
Tax	
Invoice Total	**$0.00**

U. S. SALES COMPANY, INC.

CONTRACTORS SPECIALTIES
"SINCE 1948"
318 W. MELROSE PLACE
SAN ANTONIO, TEXAS 78212

PHONE 829-7044

Sold To: Omega Point Labs Date: 8/23/64

Invoice: 21596

YOUR ORDER NO.	JOB NAME	Terms: 2% – 10 days, Net 30 days
1142 Q		

QUANTITY	DESCRIPTION	LIST	UNIT	DISCOUNT	AMOUNT
20	P-1000 Channel to E & [illegible]				
40	P-1001 " " " (P-2002-3)				

TAX

TOTAL

Received By Richard Bailey ☐ 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: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. RECD Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE			REMARKS
		Order	Rec'd	B.O.						Accept	Hold	Reject	
KwikBolt	11480	200	200	0	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:	Ship To:
Accounts Payable Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784	Cleda Patton Omega Point Laboratories, Inc. 16015 Shady Falls Road Elmendorf, TX 78112-9784

Order Date	Ship Via	P.O. Spec. No.	Date Required	Terms
8/29/94	Their Truck		8/30/94	

Item No.	Description	Quantity Ordered	Unit Price	Extended Amount
1.	Hilti Bolt 1/4" x 2-1/4"	200		$0.00

"See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements."
QA Approval C Patton
Date 8-29-94

Special Instructions

Please include Certificate of Conformance.

Ordered By: Cleda Patton

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

HILTI®

No. 459353-01

929

* *FIRST ORIGINAL* * * *FIRST ORIGIN

13635 STEMMONS FREEWAY
FARMERS BRANCH, TX 75234

OMEGA POINT LABORATORIES
16015 SHADY FALL ROAD

ELMENDORF TX 79112

NOTES:
CLETA 0 - -

CUST. PO #
1148Q

ORDER DATE	ORDER #	SLS #	SLS NAME	SHIP LOC.	X-REF# = Y
08/29/94	459353-01	1750	RICHARD CARPENTER	51	09/29/94-16:16:33

ACCT. #	ACCT. NAME AND CUSTOMER PURCHASE ORDER NO.	DDAATT
8989177	OMEGA POINT LABORATORIES 1148Q	58-07-01

THANK YOU FOR CALLING HILTI CUSTOMER SERVICE 1-800-879-8000
DICK DAVITO EXT 6109

NE	ITEM #	ITEM DESCRIPTION	DUE	SHIP	B/O	BIN-LOC
1	000453605	KWIK BOLT II 14-214(100/BX) * * * END OF SHIPPER * * * HILTI IS CLASSIFIED AS A LARGE BUSINESS	2	2		R5

SHIPMENT MODE
☐ LOCAL ☐ BUS
☐ TRUCK ☐ AIR
☐ UPS ☐ WAL IN

CARRIER

BILL OF LADING #

FREIGHT COST

CHARGE TO CUSTOME
☐ YES ☐ NC

NO. OF PACKAGES

WEIGHT
_____LBS_____OZ

DATE SHIPPED

PICKED BY
GG

CHECKED BY

ECEIVED BY	DATE RECEIVED	PACKED BY

TLE

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. 459353-01 930

* *FIRST ORIGINAL* *
13635 STEMMONS FREEWAY
FARMERS BRANCH, TX 75234

SHIP TO
OMEGA POINT LABORATORIES
16015 SHADY FALL ROAD

ELMENDORF TX 78112

NOTES:
CLETA 0 - -

CUST. PO #
1148Q

ORDER DATE	ORDER #	SLS #	SLS NAME	SHIP LOC.	X-REF# = Y
08/29/94	459353-01	1750	RICHARD CARPENTER	51	09/29/94-16:16:23

ACCT. #	ACCT. NAME AND CUSTOMER PURCHASE ORDER NO.	DDAATT
8989177	OMEGA POINT LABORATORIES 1148Q	58-07-01

THANK YOU FOR CALLING HILTI CUSTOMER SERVICE 1-800-879-8000
DICK DAVITO EXT 6109

IN	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

CHECK
2

PACK
2

RECEIVED BY

DATE RECEIVED

TITLE

F202-6 (1-92) 000964502

COPY

SUBJECT TO TERMS AND CONDITIONS ON REVE

931

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. REC'D 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 Tatton
Date 8-31-94

Special Instructions

Please include Certificate of Conformance.

Ordered By: Kerry Hitchcock

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	$0.00

938

Tulsa, Oklahoma 74146
Phone (918) 252-6000

T/S NO.	T/S NAME	STORE NO.	ASSIGNED F.O. NO.	X REFERENCE NO.

☐-NEW ACCT. ☐ ADDRESS/NAME CHANGE

ACCOUNT NUMBER 5918111717

CUSTOMER PHONE NUMBER ( ) —

PURCHASE ORDER NUMBER 1151Q

BILL TO
NAME Omega Fruit
STREET
P.O. BOX
CITY STATE ZIP

SHIP TO
CITY STATE ZIP

MARKET CODES
MARKET ☐1 = Trans. ☐2 = Util. ☐3 = Telecom ☐4 = Non-Res. ☐5 = Res.
NATURE ☐1 = Maint. ☐2 = Renov. ☐3 = New Const. ☐4 = OEM ☐5 = Manufacturing ☐6 = Resale ☐7 = Export
SOLD TO GOV AGENCY ☐1 = Local ☐2 = State. ☐3 = Fed. ☐4 = Not Sold to Gov. Agency
SOLD FOR GOV PROJECT ☐1 = Local ☐2 = State. ☐3 = Fed. ☐4 = Not Sold to Gov. Project
POINT OF SALE: ☐1 = Office ☐2 = Job Site
KEY JOB SITE: YES NO IF YES KEY JOB SITE #

TAX STATUS T E
COMPLETE ONLY IF APPLICABLE
① Ship to T/S For Delivery ② Confirms Prior Whse. Shipmt.
IF TAX EXEMPT FORWARD CERTIFICATE TO TULSA
APPROVAL #
CUSTOMER SITE
PROMO
CONTRACT #

LINE NO.	CAT. NO.	DATED MAT. *	DESCRIPTION/NOTES	TOTAL QTY. ORDERED	DELIVERED QTY. VAN	DELIVERED QTY. STORE	TO BE SHIPPED QTY. STORE	TO BE SHIPPED QTY. WHSE	UNIT PRICE	$ AMOUNT
			KB3/633/4	2		2				
			KB 1/27	1		1				
			Tec 1/76	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 KMH

Salesmen are not authorized to make warranties regarding specific applications —

CUSTOMER'S SIGNATURE X [signature]

DATE 8-30-94 TITLE Tech

TOTAL ORDER
$
TAX
FREIGHT
NET ORDER $
SHIP C.O.D. $
APPROVED BY
DATE ENTERED TIME
S.E. OPERATOR

SUBJECT TO TERMS AND CONDITIONS ON REVERSE SIDE.

TOOLS WARRANTED TO ORIGINAL PURCHASER ONLY

000965350 F-333 (2/92)

935

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: C Patton

ITEM DESCRIPTION	P.O. NO.	QUANTITY Order	Rec'd	B.O.	I.D. NO.	CON'D MATL Y/N	CERT. REC'D Y/N	CONTAINER INTEGRITY	EXCEPTIONS	ACCEPTANCE Accept	Hold	Reject	REMARKS
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"x4 1/2" CH "See Special Instructions Regarding Purchasing Specifications for Quality Assurance Requirements." QA Approval C Patton Date 9/29/94	100		$0.00

Special Instructions

Certificate of Compliance/Conformance

Ordered By: Cleda Patton

Project #: TSI/TVA

Total	$0.00
Shipping	
Tax	
Invoice Total	**$0.00**

938

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 8781772

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			ICB 1/4-3/4	2		2				
2			ICB 1/4-4 1/2	1		1				

NOTES/SHIPPING INSTRUCTIONS

DELIVERY: ☐ COMPLETE ☐ PARTIAL AS SHOWN BALANCE TO BE SHIPPED.

CASH ☐ CHECK #

AMT. REC'D. $

DRIVER'S LICENSE # STATE EXP. DATE

PHONED IN ORDER ☐ NAME

LINE NO.	TOOL MODEL	PRODUCT SERIAL NO.

ITEMS INDICATED BY (*) HAVE LIMITED SHELF LIFE. RETURNS FOR CREDIT MORE THAN (30) THIRTY DAYS PAST INVOICE DATE WILL NOT BE ACCEPTED.

CUSTOMER'S INITIALS
X

Salesmen are not authorized to make warranties regarding specific applications —

CUSTOMER'S SIGNATURE X Kerry Hatchett

DATE 9/30 TITLE

TOTAL ORDER

$

TAX

FREIGHT

NET ORDER $

SHIP C.O.D. $

APPROVED BY

DATE ENTERED TIME

S.E. OPERATOR

SUBJECT TO TERMS AND CONDITIONS ON REVERSE SIDE.

TOOLS WARRANTED TO ORIGINAL PURCHASER ONLY

000965350 F-333 (2/92)

5400 South 122nd East Ave.
P.O. Box 21148
Tulsa, OK 74121
Phone (918) 252-6000
Telex No. 6868124
Fax No. (918) 252-6558

Date: October 13, 1994

Customer: Omega Point Laboratories Inc.

Customer P.O.: 1159-Q

Subject: **Certificate of Conformance**

Quantity: 2 Boxes 1/4 x 2 1/4 HKBII(Item #000453605)
1 Box 1/4 x 4 1/2 HKBII(Item #000453787)

To Whom it May Concern:

This is to certify that Hilti Kwik-Bolt II is manufactured in compliance with our standard specifications which state the following:

A. **Stud bolt material** is **AISI 1038** except for the following bolt sizes which are **AISI 11L41: 3/8 x 7, 3/4 x 12 and all 1" diameter bolts.** The **AISI 1038** bolt material meets the chemical requirements for **ASTM Specification A510** while the **AISI 11L41** material meets the chemical requirements for **ASTM Specification A108.**

B. The expansion **wedges** are made from **AISI 1010** steel except for the 3/4" x 12" and all 1" diameter which are made of AISI 304 Stainless Steel.

C. **Hex Nuts** are of commercial manufacture, meeting **ASTM A563, Gr. A,** and ANSI B18.2.2.

D. **Washers** are fabricated from SAE standard material in accordance with ASA Standard #B27.2-1965 SAE 1005/1020, superseded by **ANSI B18.22.1 1965 (R-1975).**

E. **Kwik-Bolts** conform to the description provided in Federal Specification **FF-S-325, Group II Type 4 Class I, Interim Amendment-3, dated July 16, 1965.**

F. **Bolts, Nuts and Washers are zinc plated** in accordance with **ASTM B633-85, Type III, SC1.**

The above products were manufactured in Tulsa, Oklahoma and supplied in accordance with Hilti's QA program, BHB-NQP-101 Rev. I, dated 01/94.

Sincerely,

J. Metcalf
Quality/Environmental Engineer

JM
coc2a

Q/A RECEIVING REPORT

CLIENT/PROJECT NAME TSI/TVA
CLIENT/PROJECT NUMBER 11960-97185-874 97257-60
RECEIVED FROM Ramsey Electric Supply Co.
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1407 - 11960
DATE RECEIVED 7-26-94
DATE INSPECTED 7-26-94
INSPECTED BY: C. 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"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	06-1079-1307-02	Y	N	Good	None	X			
Cover Conn 1"flg 3" Gap	NA	0	50	0	06-1079-1895-30	Y	N	Good	None	X			

FORM
1/29/93

WESTERN, INC. Manufa[illegible]rs

623 OLYMPIC BLVD. P.O. BOX 1399
MONTEBELLO, CALIFORNIA 90640-1399
TELEPHONE (213) 723-8919
FAX (213) 728-5023

PAGE 1

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
	7/22/94	0020056	PROF L @

	SHIP VIA	PART. DEL.	COMPLETE DELIVERY
7/25/94	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	[illegible]	[illegible]
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 1¼% 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.

PACKING LIST

THANK YOU

94

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

Southwestern Wire Cloth

P.O. BOX 35608
TULSA, OKLAHOMA 74153
(918) 251-2679
FAX (918) 251-0375

1831 W. SAM HOUSTON PARKWAY N.
HOUSTON, TEXAS 77043
(713) 973-2959
FAX (713) 973-1857

ORDER NO:
PAGE: 944
DATE:
REQ. SHIP DATE:

SOLD TO

SHIP TO

F.

CUSTOMER P. O.	ORDER DATE	SLSP	TERMS	SHIPPED FROM	SHIPPED VIA	FREIGHT
					~~Common~~ Carrier	

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

Cannonball Trucking, Inc.

P.O. Box 262523, Houston, Texas 77207-2523 • 644-7300
Fax # (713) 644-9431

58098

CTI W/B NO. ____
CTI CONTROL NO. 945
DATE 7-[illegible]-94

SH[redacted]S B/L NO. ____
[redacted]RS ORDER NO. ____
CONSIGNEES ORDER NO. ____
RELEASE NO. ____

INTRASTATE ☐ ICC ☐ LOCAL ☐

FROM: SHIPPER	TO: CONSIGNEE
Southwestern Wire Cloth	[illegible] Paint Laboratory
STREET ADDRESS: 1831 W Belt North	STREET ADDRESS: 16613 Shady Falls St. [illegible]
CITY: [illegible], 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		20			

BILL TO:	TARIFF MILEAGE	REGULATED BY	TARIFF
SPECIAL INSTRUCTIONS:	PLUS MILEAGE	ITEM NO.	COLUMN NO.

# PCS.	COMMODITY OR SERVICE RENDERED	HRS/WEIGHT	RATE	AMOUNT
2	Rolls Wire	100#		
[redacted]	FUEL SURCHARGE			
☐	EXTRA STOPS			
☐	EXCLUSIVE USE OF VEHICLE REQUESTED			
☐	EXPEDITED SERVICE REQUESTED			
	TOTAL →			

C.O.D. CHARGE TO BE PAID BY { SHIPPER ☐ CONSIGNEE ☐

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

(Signature of Shipper)

If charges are to be prepaid, write or stamp here. "To be Prepaid."

If charges are to be C.O.D. the carrier accepts no such responsibility, unless amount is here specified and this section signed by consignor.

$ ____ C.O.D. Amount

Signature of Shipper

Received $ ____ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per ____ (The signature here acknowledges only the amount prepaid.)

$ ____ Charges Advanced

PICK-UP RECORD (To be completed at Shipper's location)

SHIPPER NOTIFIED OF ARRIVAL		LOADING BEGAN		LOADING COMPLETED		UNIT RELEASED	
Date	Time	Date	Time	Date	Time	Date	Time

REASON FOR DELAY IN LOADING (IF ANY)
I hereby certify that the dates and time shown above are correct.
SHIPPER CO. NAME ____ BY ____ SHIPPER'S AGENT TITLE ____

DELIVERY RECORD AND RECEIPT (to be completed at Delivery location)

CONSIGNEE NOTIFIED OF ARRIVAL		UNLOADING BEGAN		UNLOADING COMPLETED		UNIT RELEASED	
Date	Time	Date	Time	Date	Time	Date	Time

REASON FOR DELAY IN UNLOADING (IF ANY)
I hereby certify that the dates and time shown above are correct.
CONSIGNEE CO. NAME ____ BY ____ CONSIGNEE'S AGENT TITLE ____

RECEIVE, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER'S NAME [illegible]		RECEIVER'S NAME RECEIVED ABOVE ARTICLES IN GOOD ORDER	CONSIGNEE
BY	DATE	BY [illegible]	DATE 7-20-94

[redacted] moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is carrier's or shipper's weight.
[redacted] the rate is dependent on value, shippers are required to state in writing the agreed [redacted] value of property hereby specifically stated by the shipper to be not exceeding: $ ____ per ____
[redacted] ood 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 defendent shall bear full responsibility for all legal fees and any interest expense subsequent 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 Alamo Bolt + Screw
PROJECT LOCATION Omega Point Labs

REPORT NUMBER 1394 - 11960
DATE RECEIVED 7-11-94
DATE INSPECTED 7-12-94
INSPECTED BY: CPatton

ITEM DESCRIPTION	P.O. NO.	QUANTITY			I.D. NO.	COND MATL Y/N	CERT. 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

946

947

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	070	11260	DEL. AM				NET 10	07/11/94	1

QTY. ORDERED	QTY. SHIPPED	QTY. BACK ORDERED	PROD. LINE	PART NO.	DESCRIPTION	UNIT PRICE	EXTENDED PRIC
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		

943

WE APPRECIATE YOUR BUSINESS.

THANK YOU

RECEIVED BY: [signature]

IVAN

SALE AMOUNT	63.00
SALES TAX	4.38
TOTAL	67.38

949

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

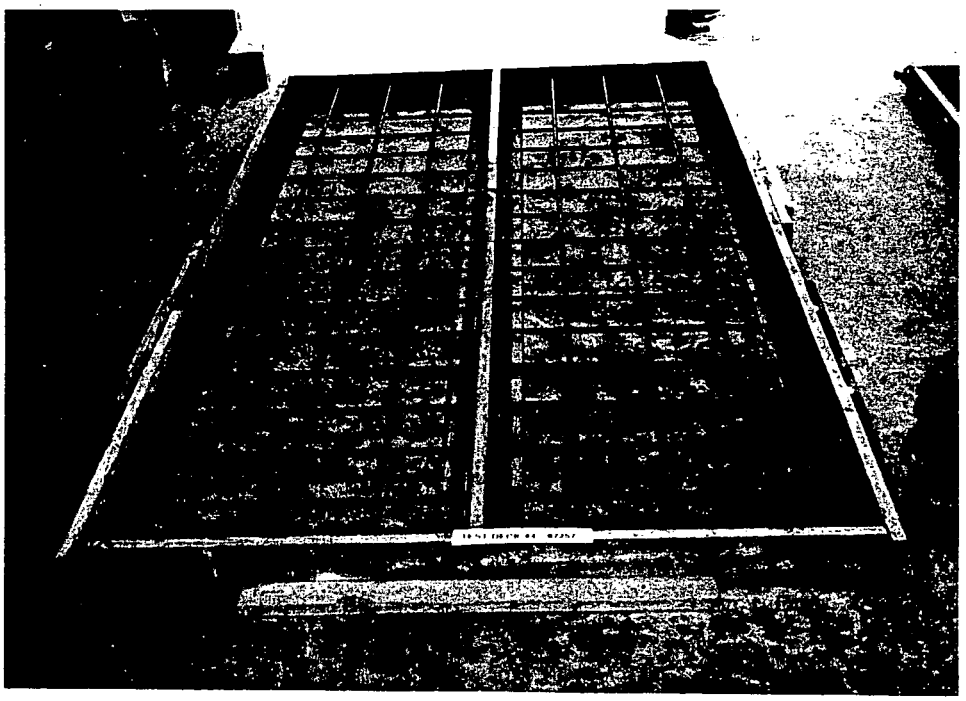
To Whom It May concern:

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: Susan H. DeBord
Title: Office Manager

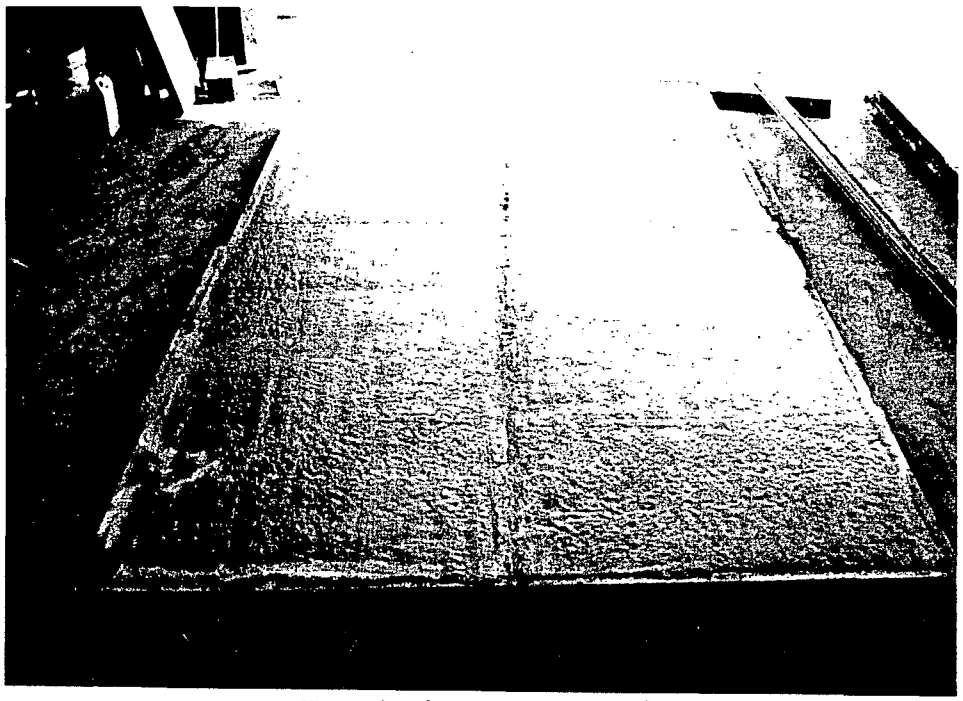
Appendix F

PHOTOGRAPHS

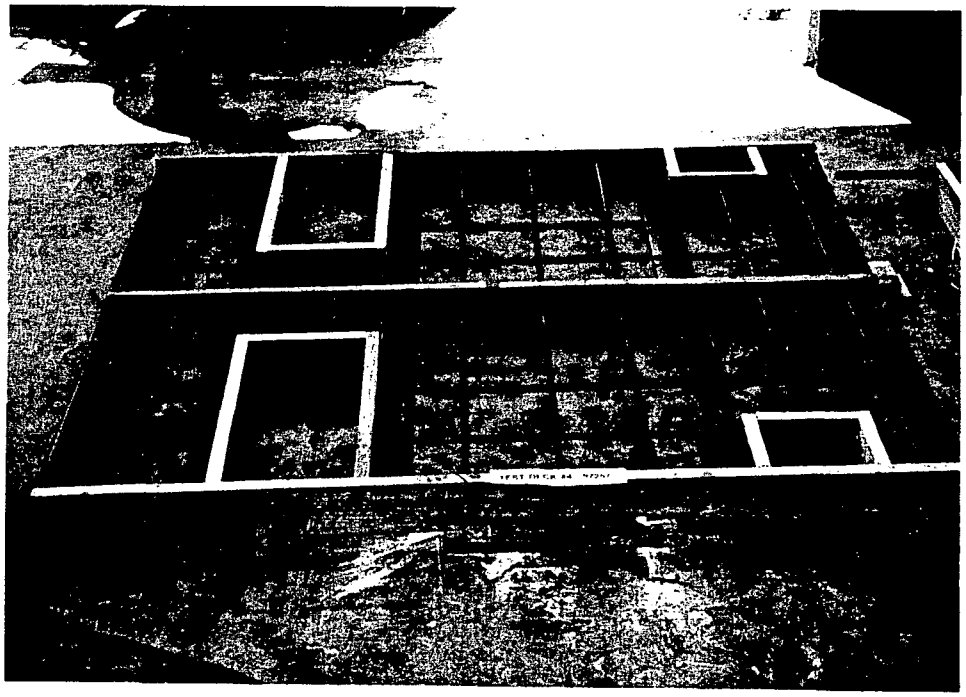


Steel forms for deck side walls.

Pouring concrete into steel forms for deck side walls.

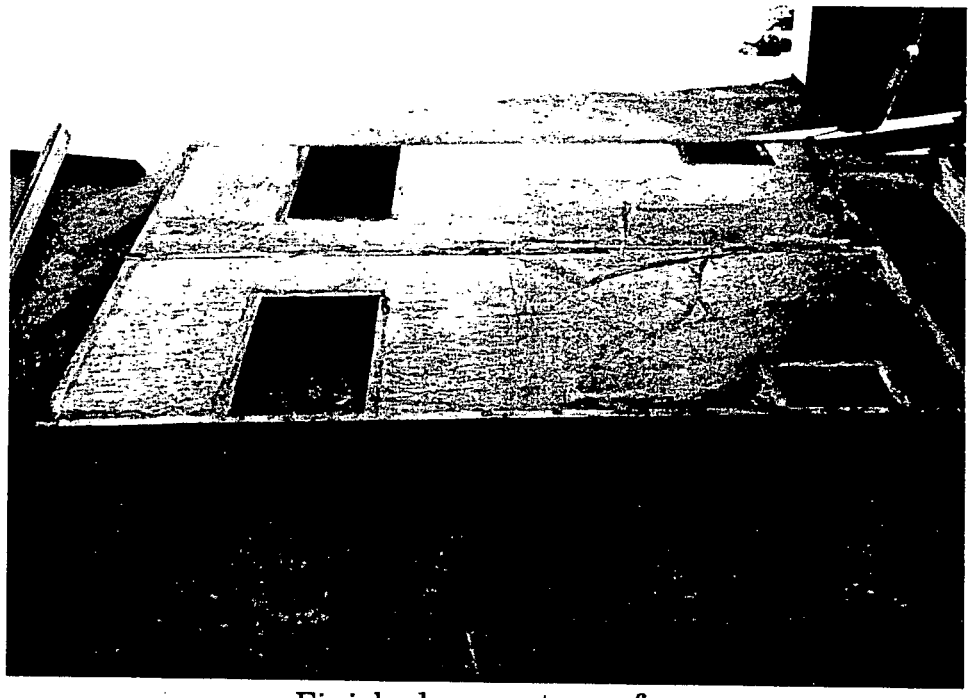


Finished concrete surface.

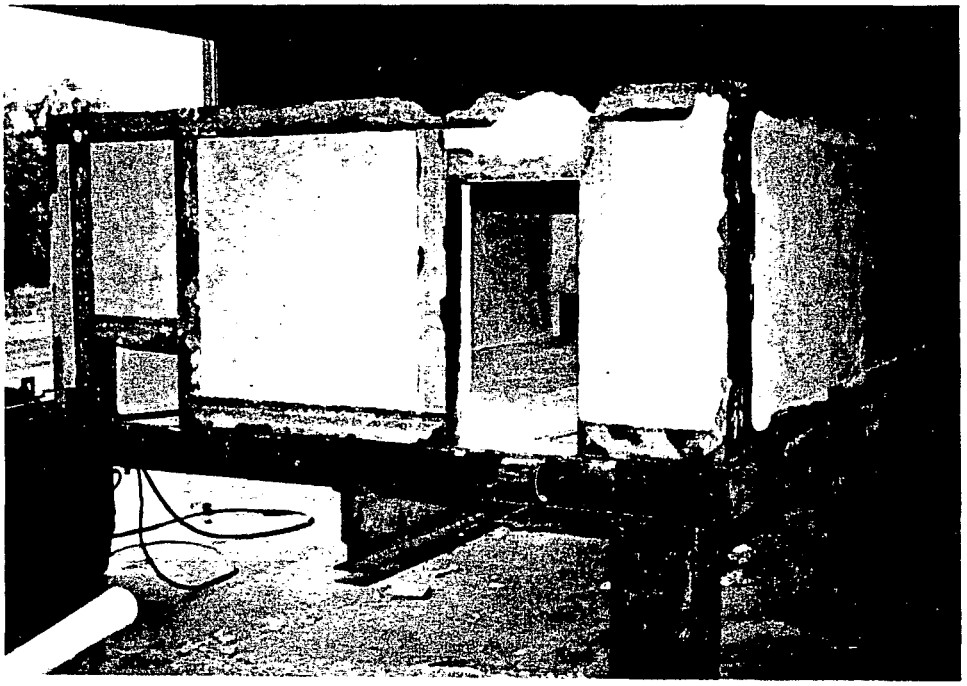


Steel forms for deck end walls.

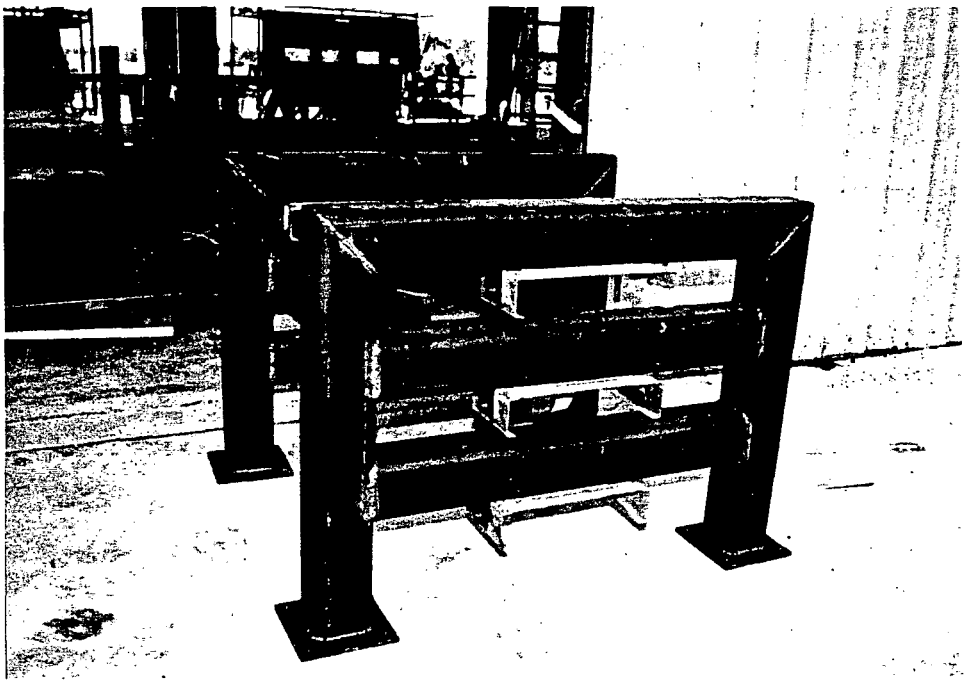
Pouring concrete into steel forms for deck end walls.



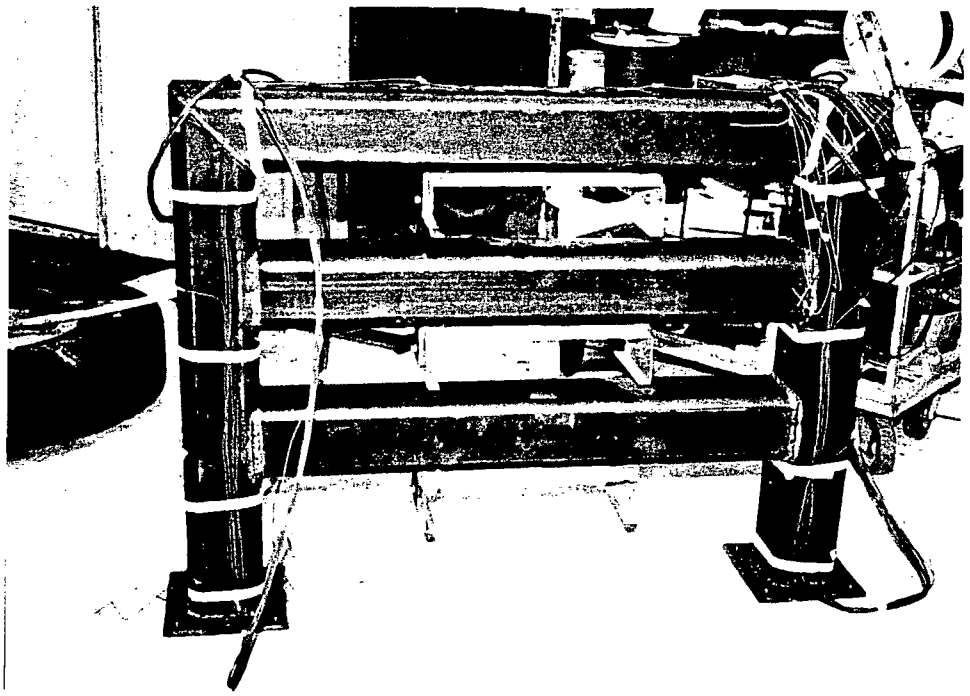
Finished concrete surface.



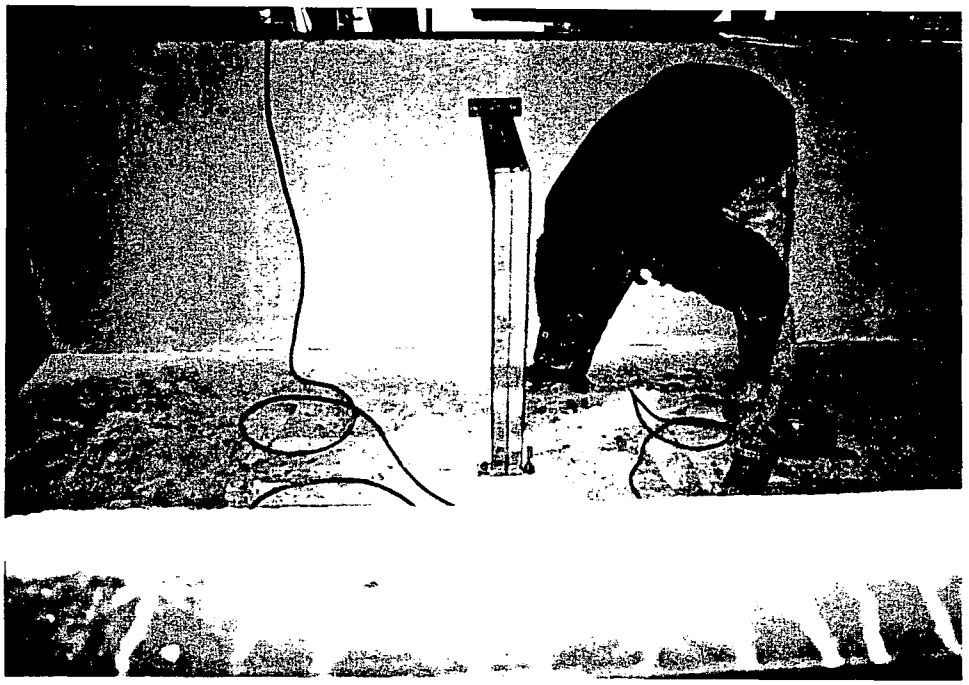
Assembled test deck, inverted for ease of construction.



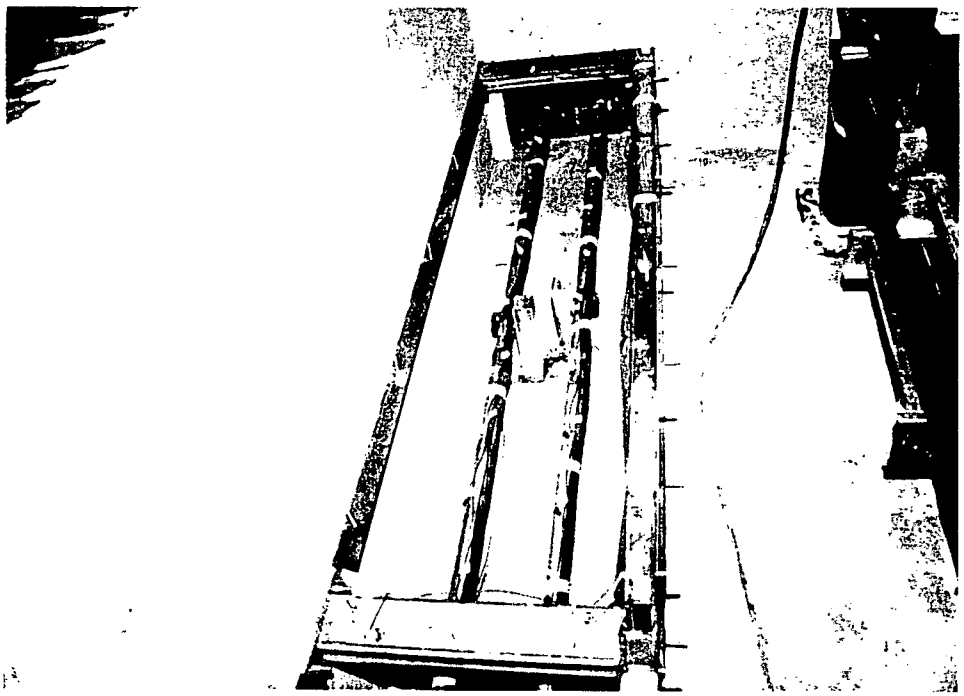
Assembled cable tray support systems.



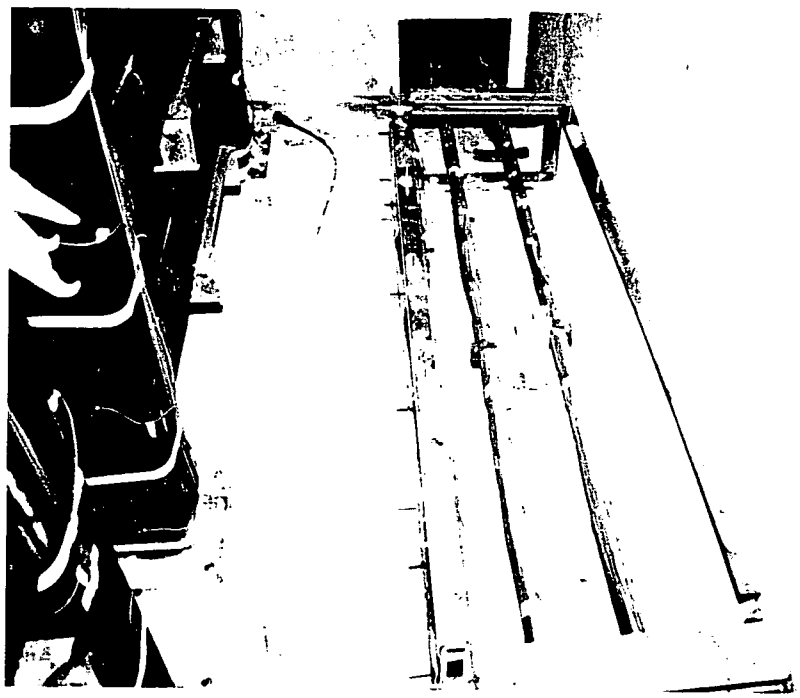
Thermocoupled cable tray support system.



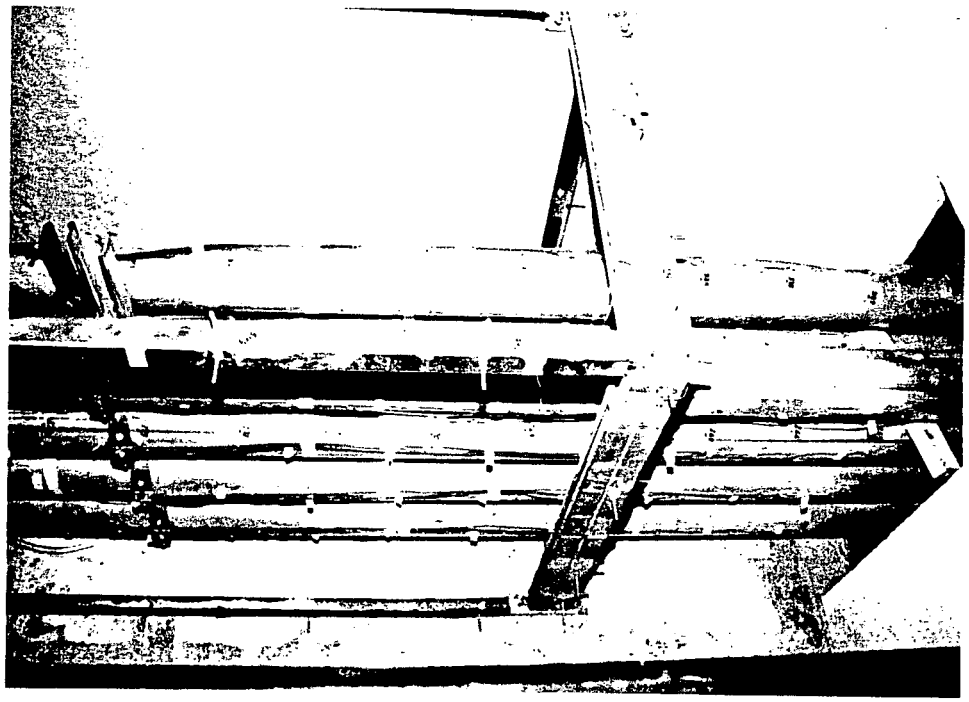
Installation of unistrut frame for two-sided enclosure.



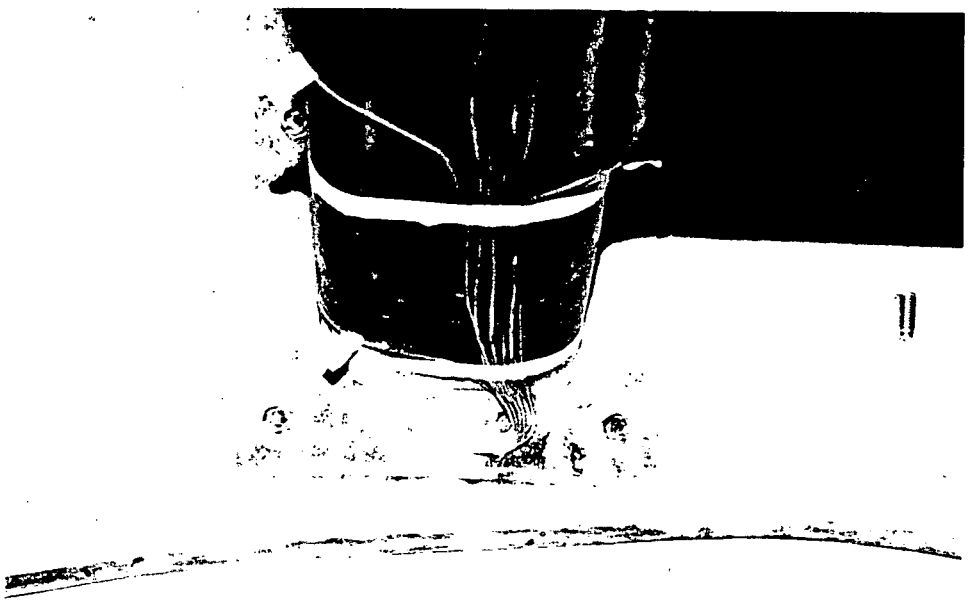
Small two-sided enclosure frame with two 1 in. steel conduits.



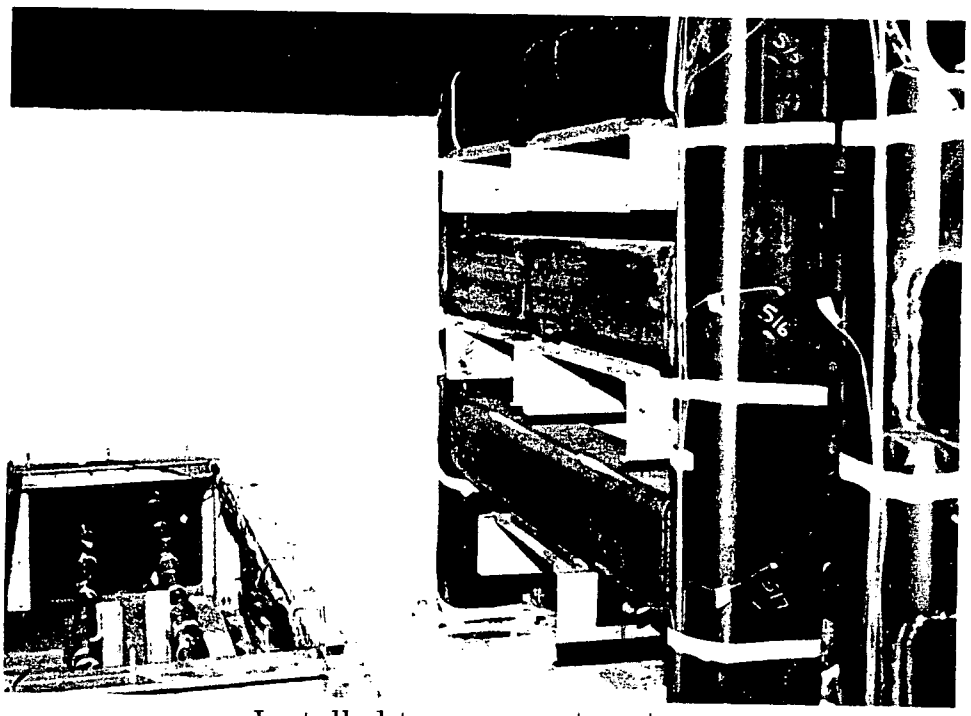
Small two-sided enclosure frame with two 1 in. steel conduits.



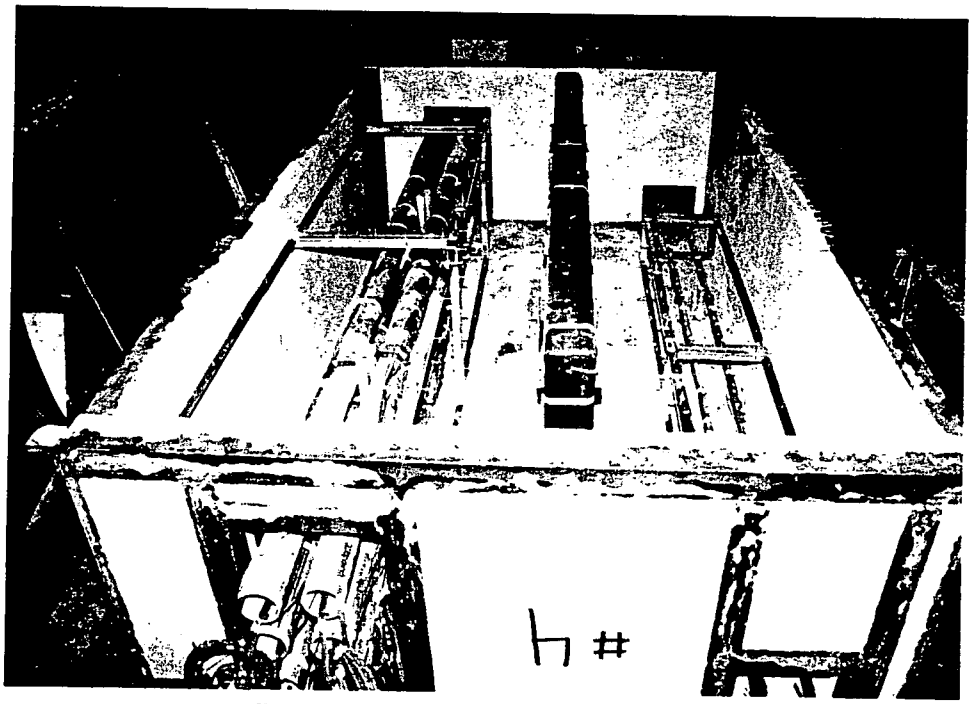
Large two-sided enclosure frame with eight 4 in. aluminum conduits.



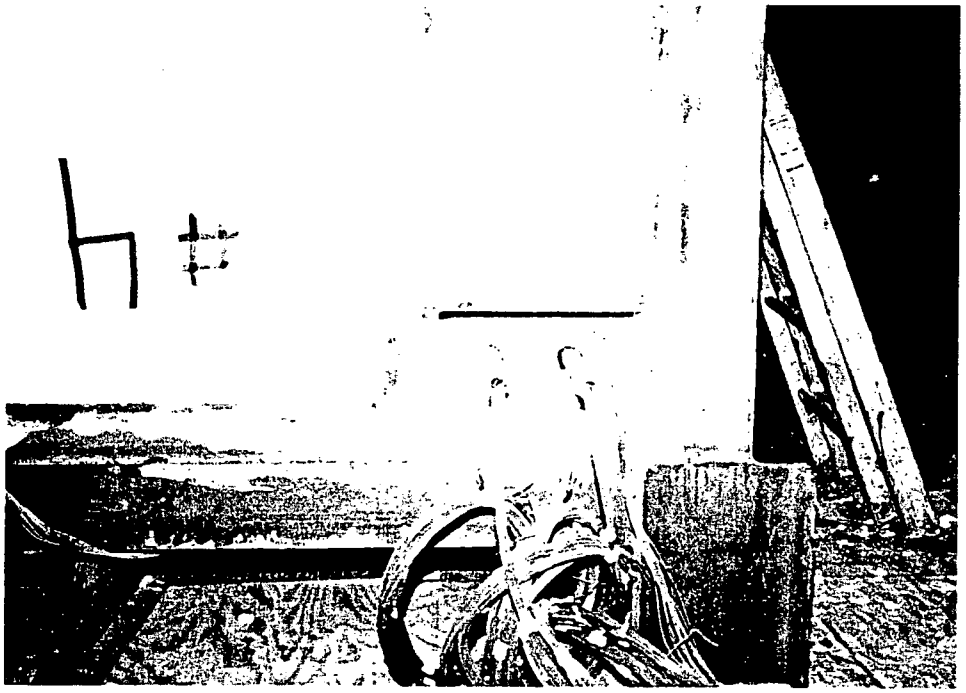
Thermocouples routed through mounting foot on tray support systems.



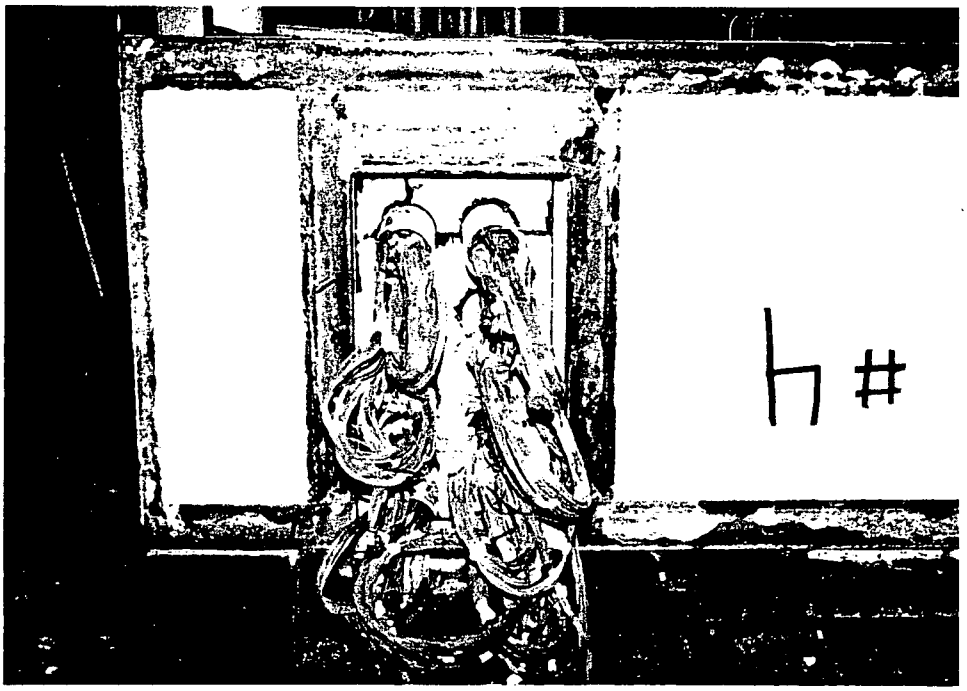
Installed tray support system.



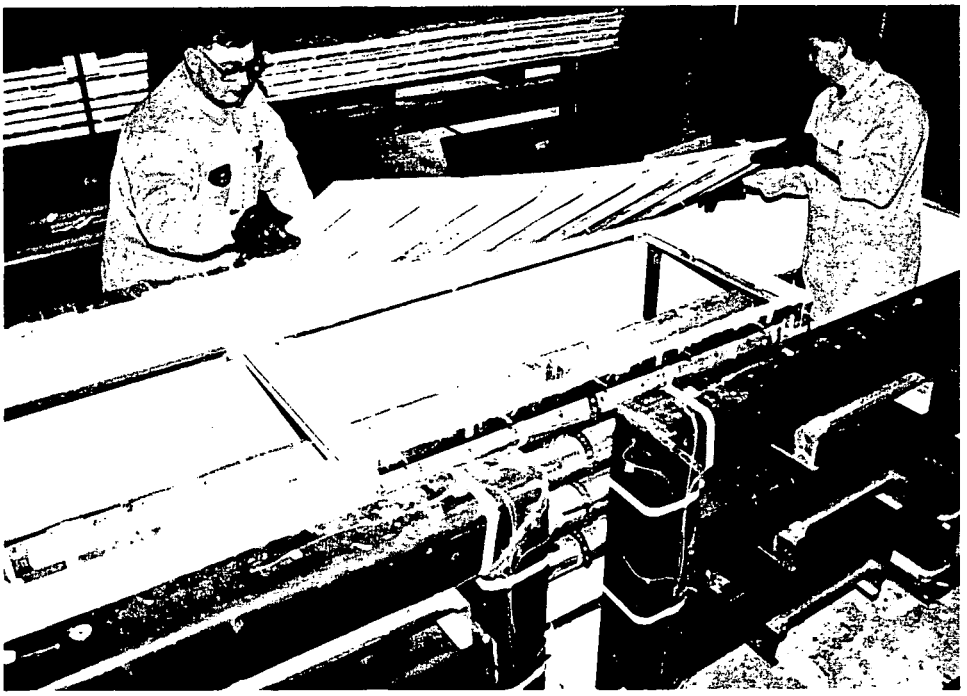
Raceway items fully installed.



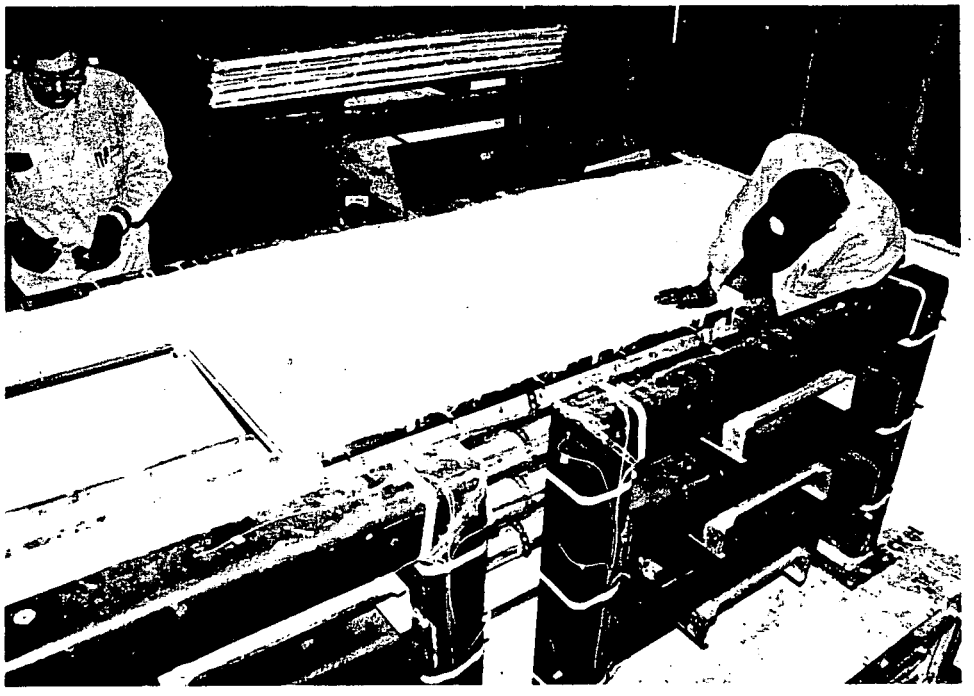
Damming board installed in left end of small enclosure.



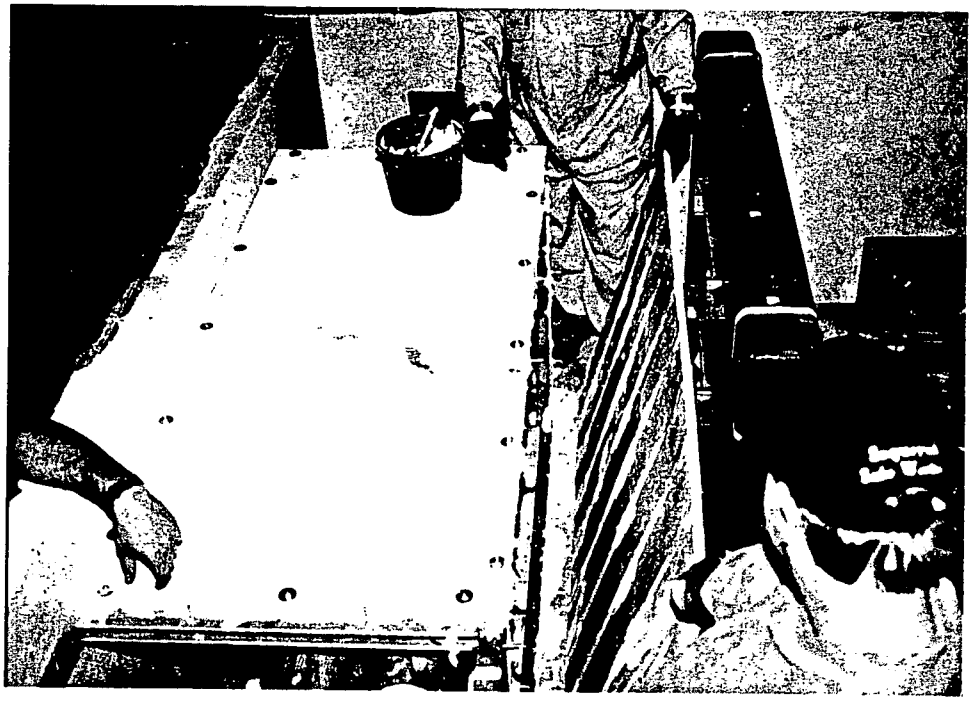
Damming board installed in left end of large enclosure.



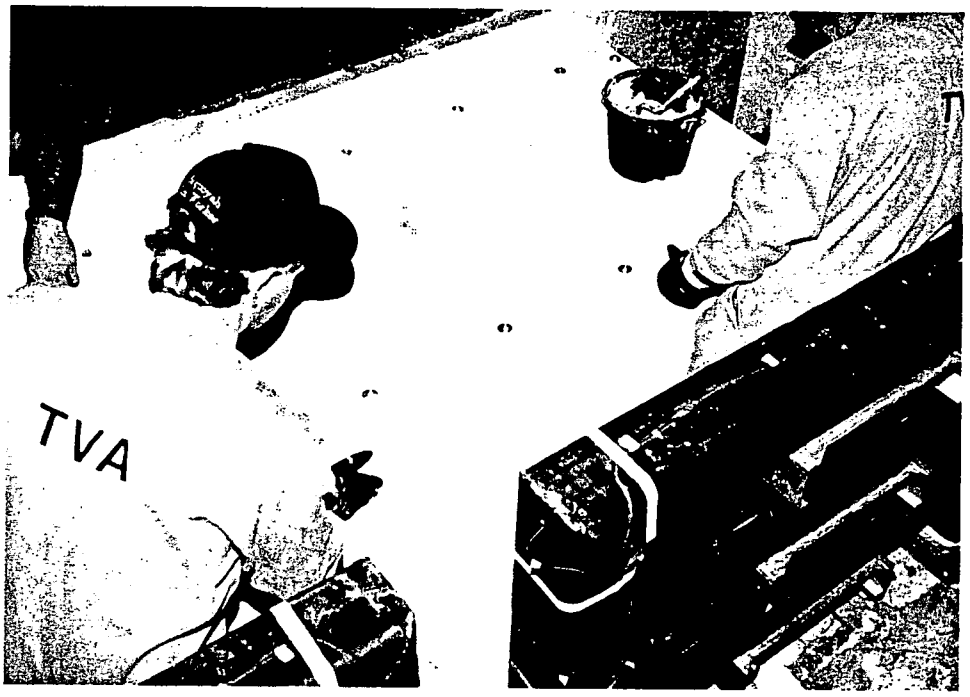
Panels installed onto pre-buttered unistrut framework.



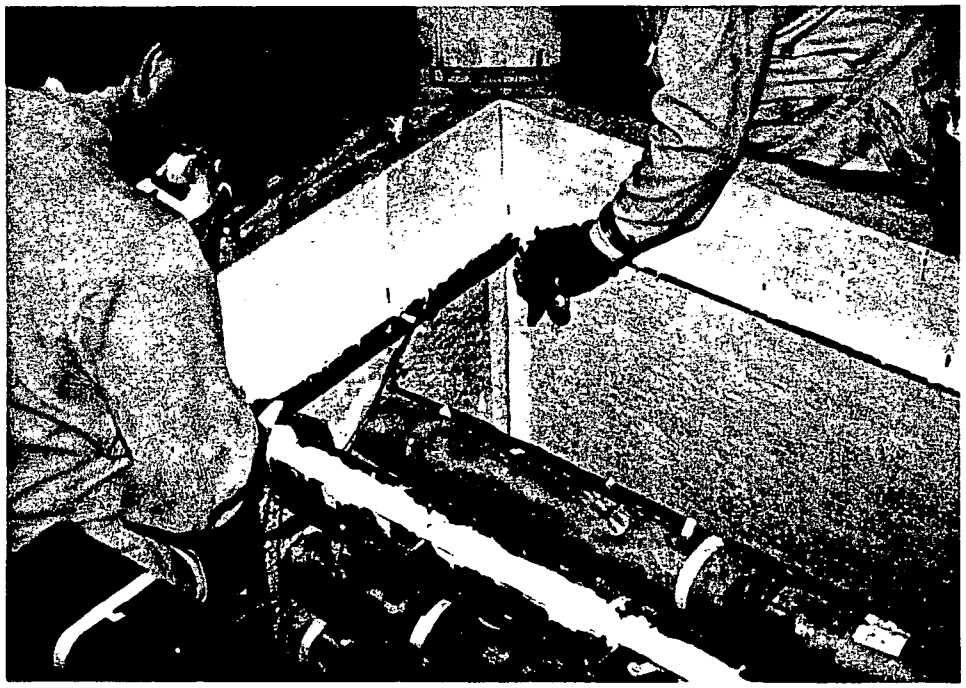
Panel pressed into place over bolts protruding from unistrut.



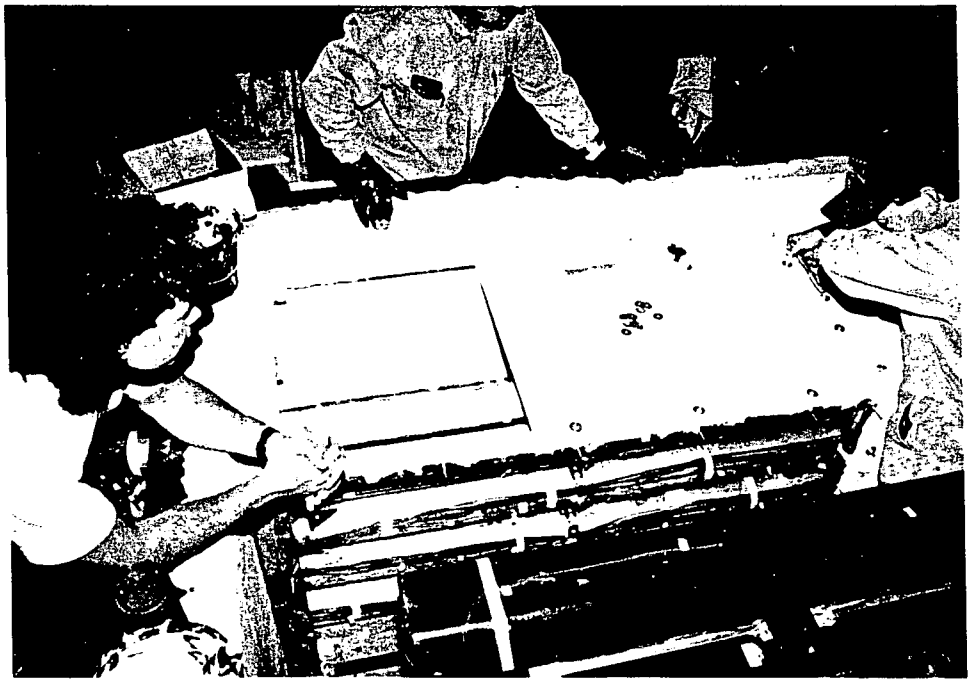
Panels installed onto pre-buttered side of unistrut framework.



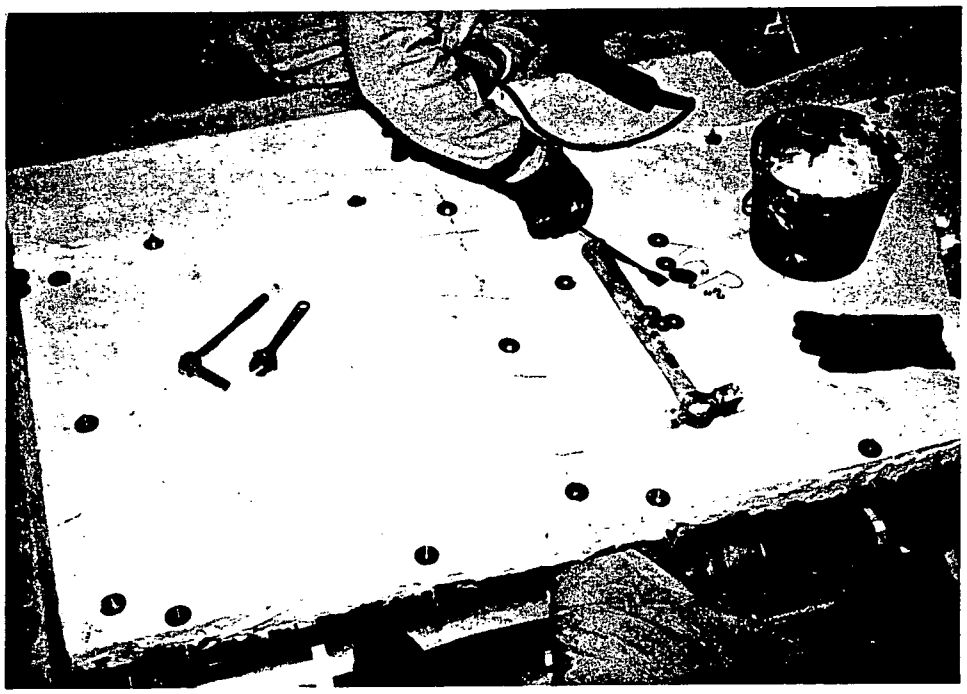
Panel pressed into place over bolts protruding from unistrut.



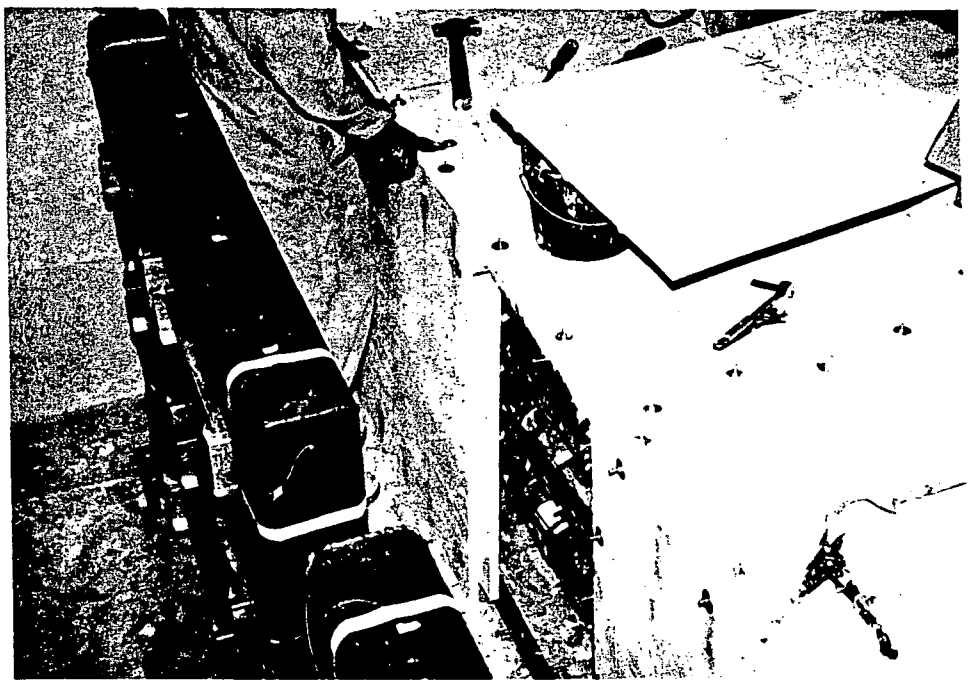
Unistrut frame pre-buttered prior to installation of panels.



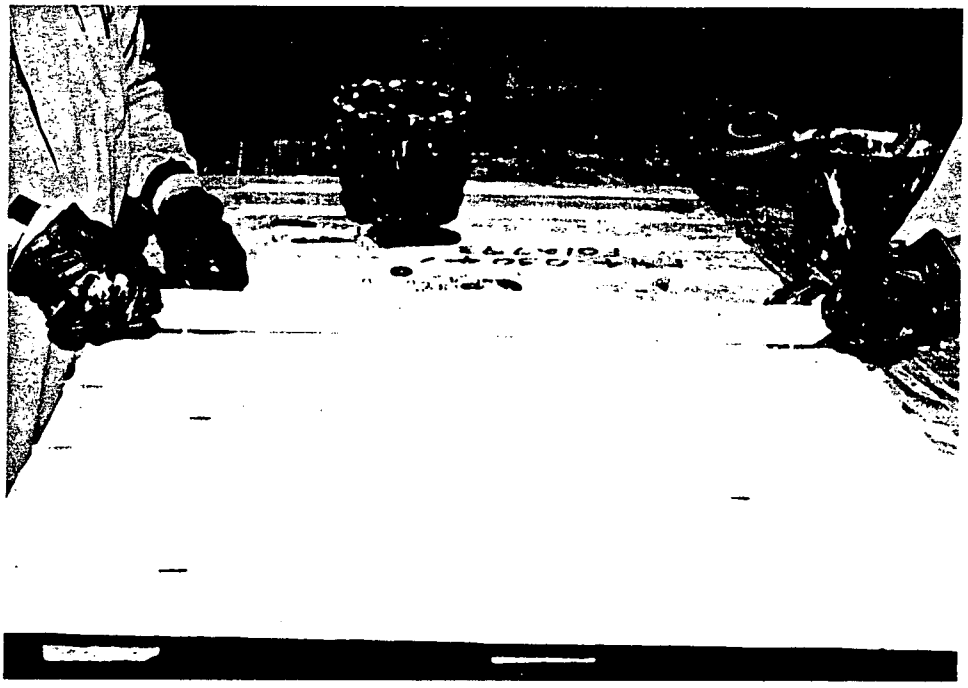
Panels secured to framework with washers and nuts.



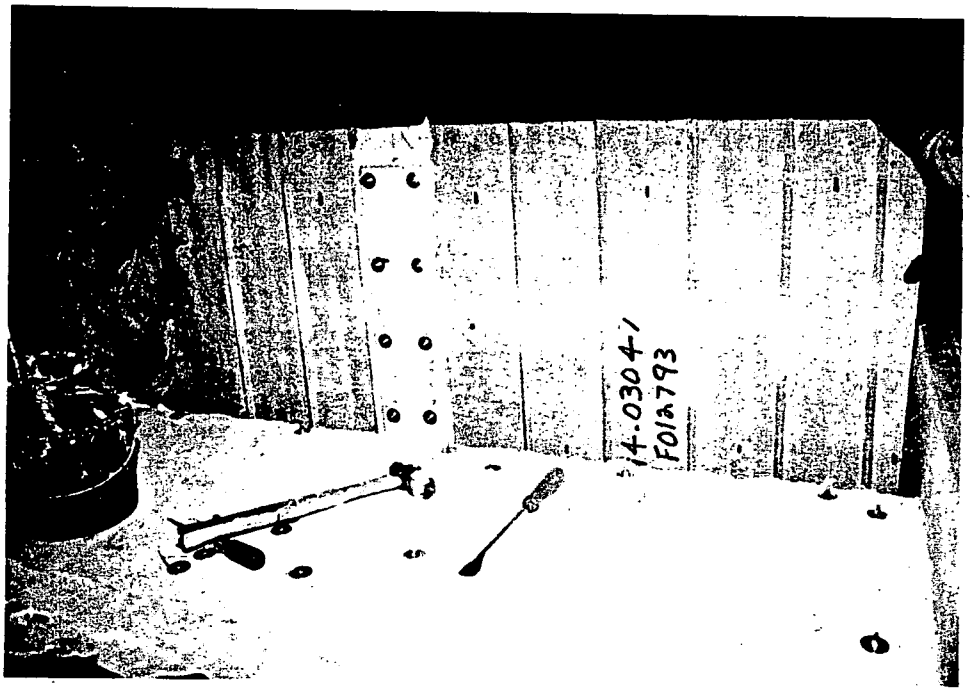
Joints between panels secured with bolts, washers and nuts.



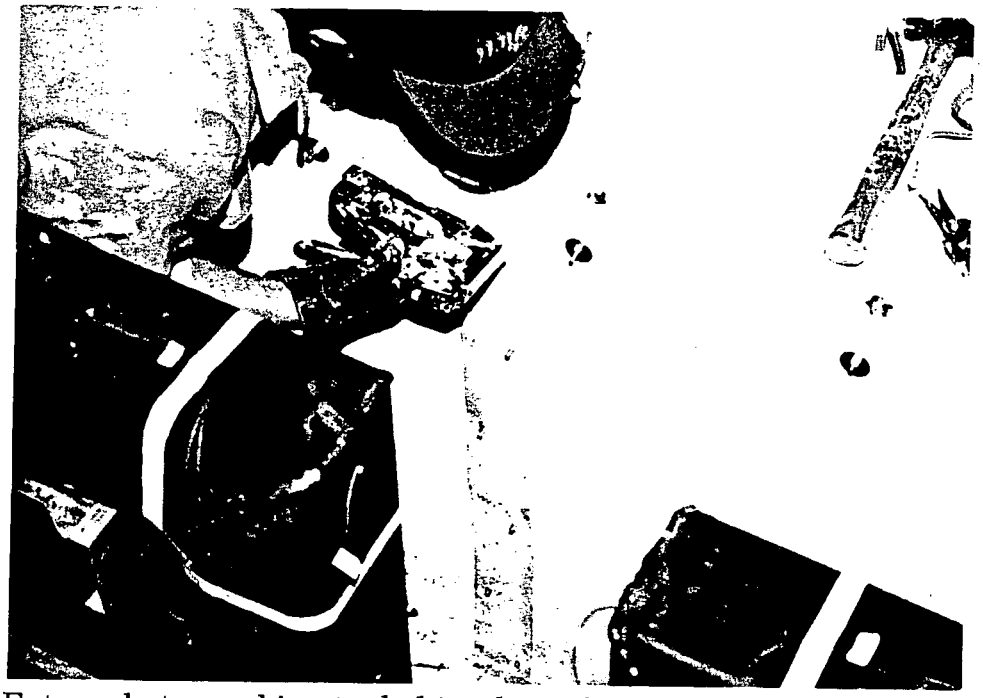
Strip of material behind panel to panel joint.



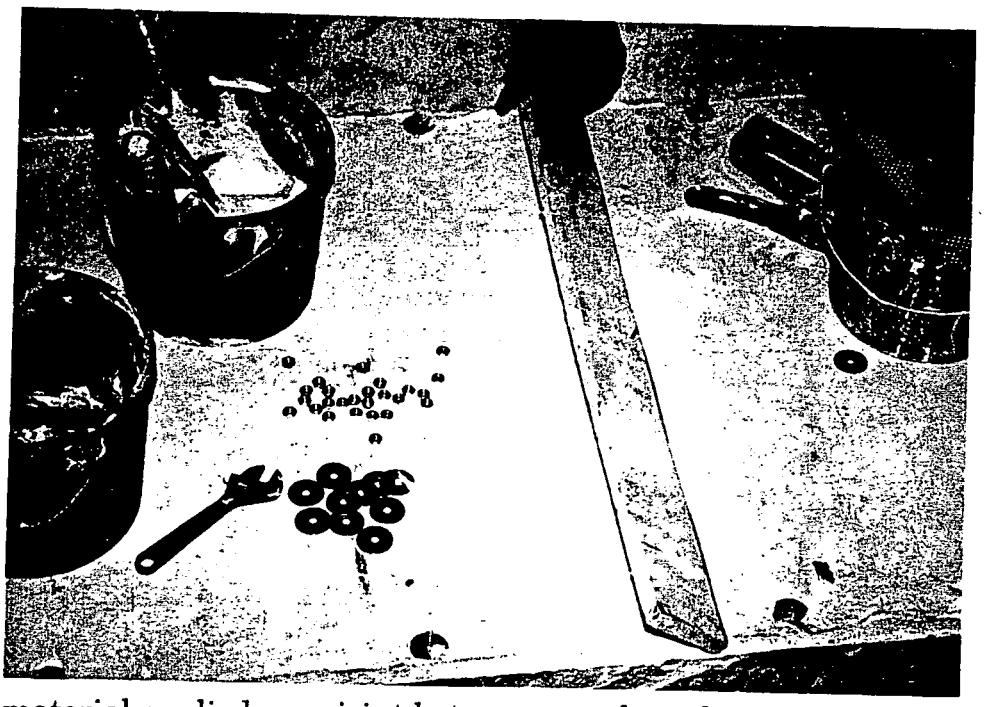
Strip of material installed along inside of panel to panel joint.



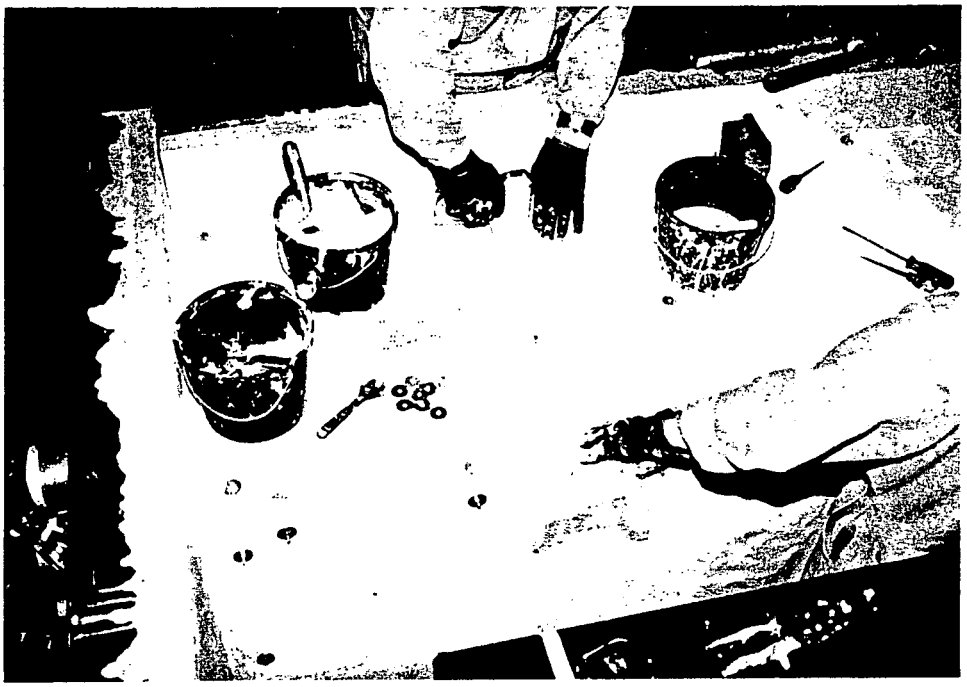
Jointed panel installed on side of unistrut framework.



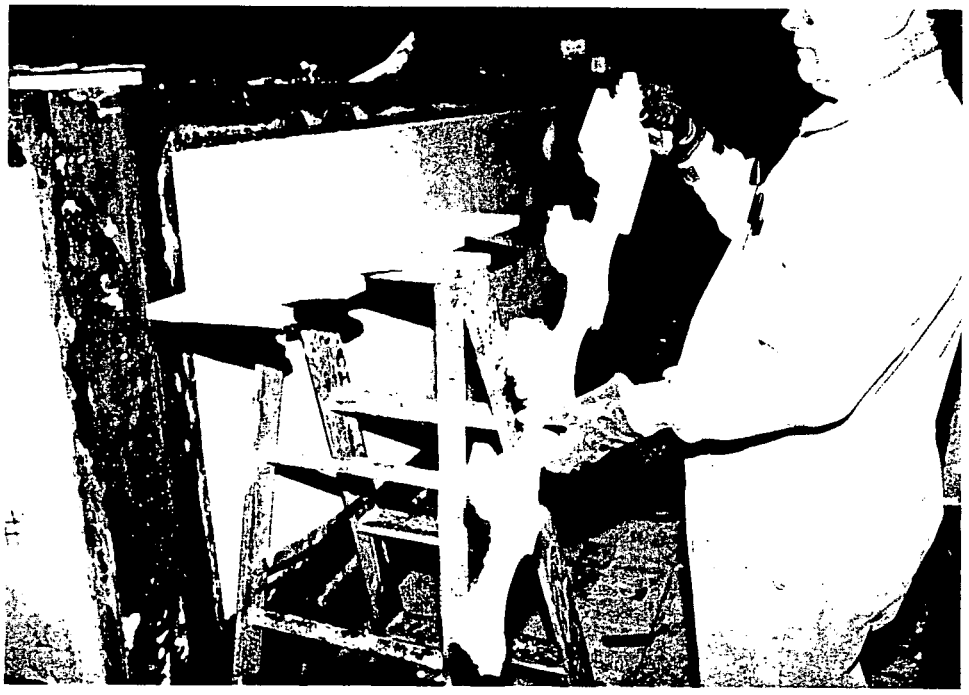
External stress skin stapled in place along panel to panel joints.



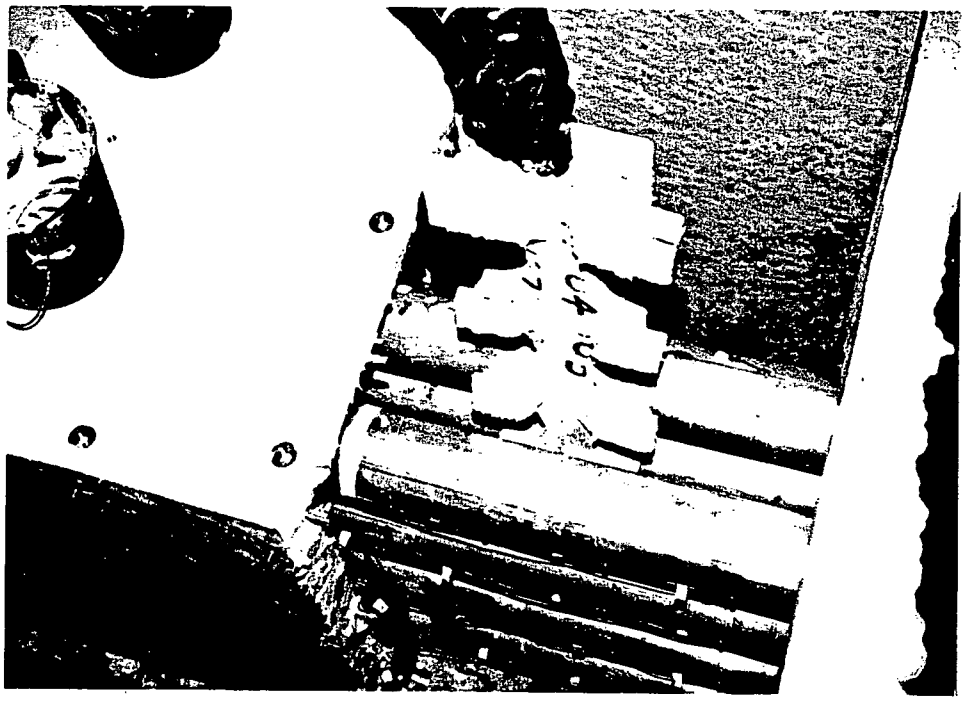
Strip of material applied over joint between panels on bottom of large enclosure.



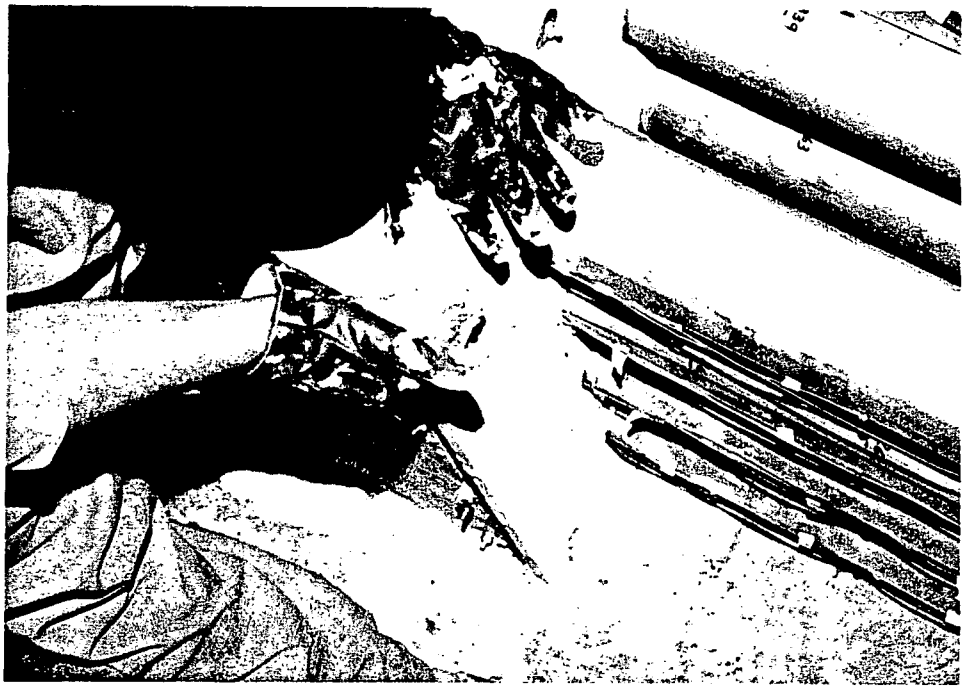
External stress skin installed over strip of material applied to panel joint.



Pre-buttered panels to be installed around conduits in end of enclosure.

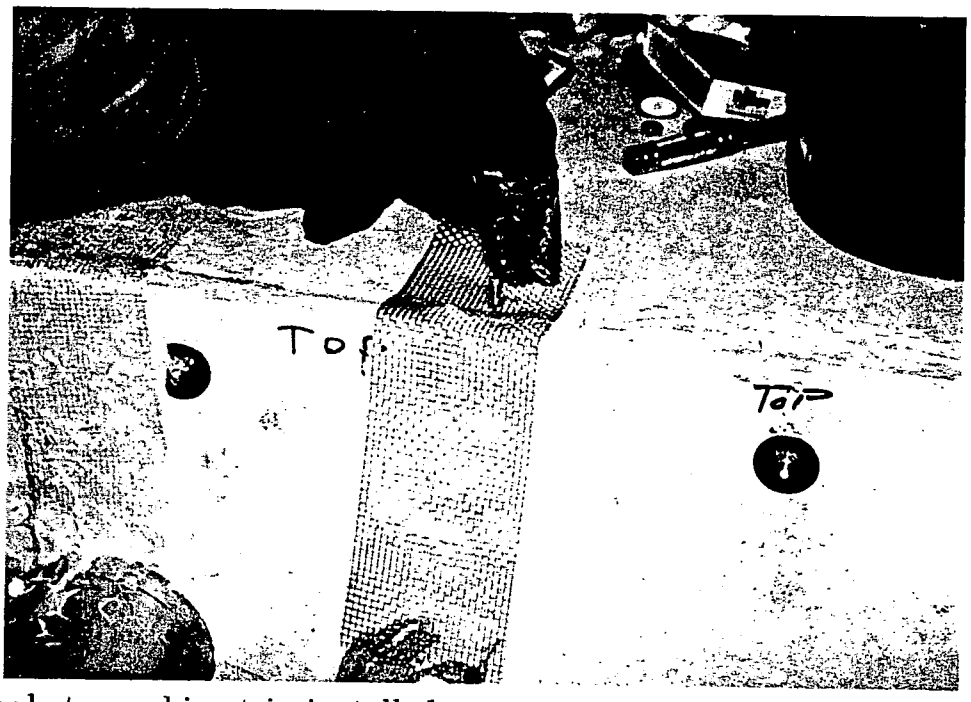


Pre-buttered panel installed around conduits in end of enclosure.



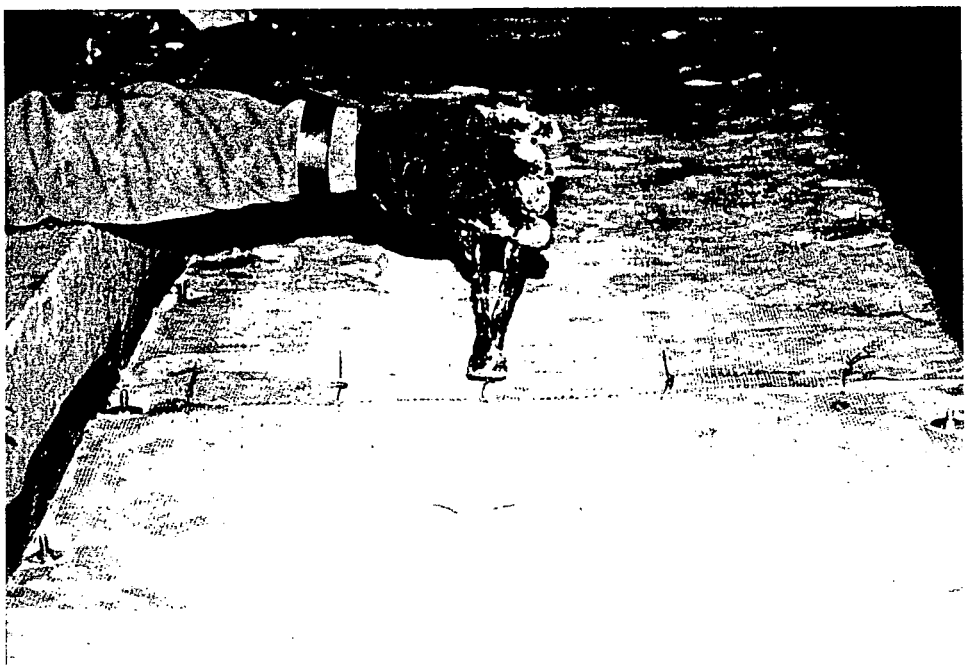
Pre-buttered panel installed around conduits in end of enclosure.

Pre-buttered panel installed around conduits in end of enclosure.

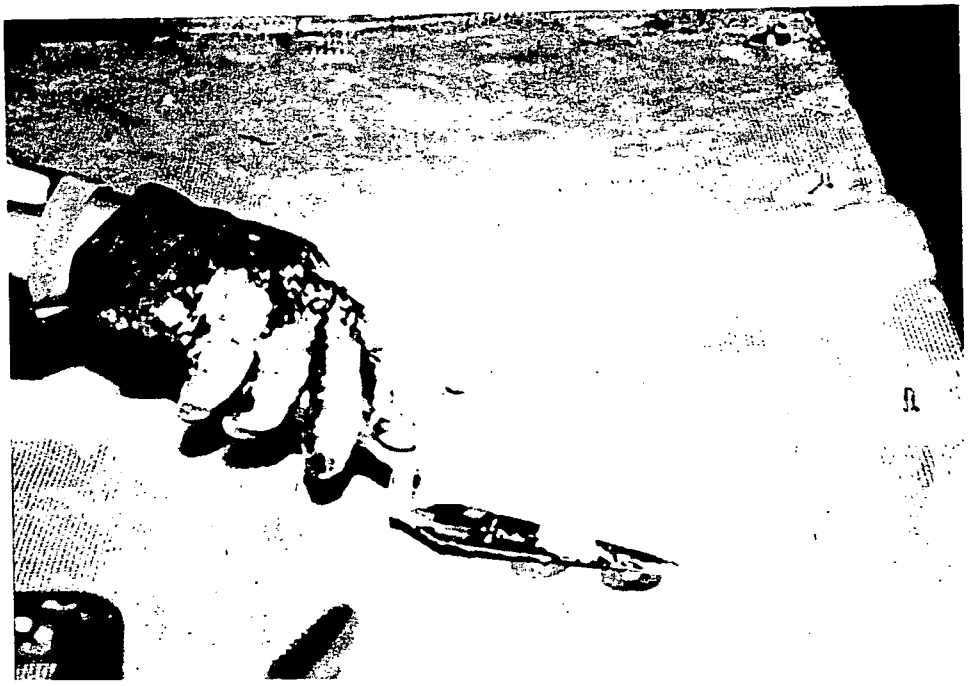


External stress skin strip installed across corner at right end of enclosure.

External stress skin installed over large enclosure.



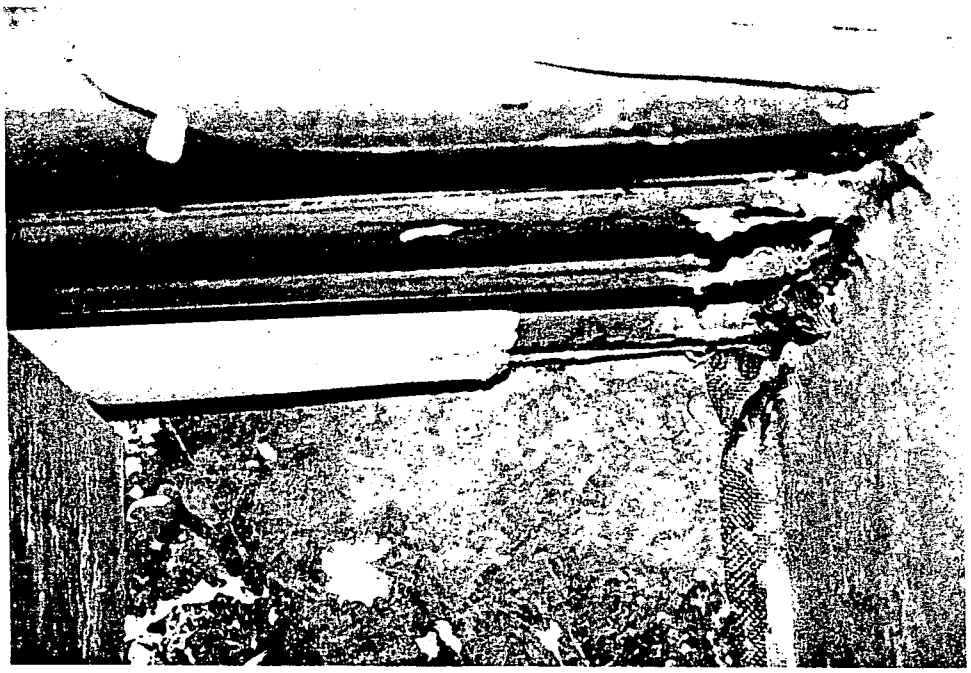
Stainless steel tie wire stitches installed at joints in external stress skin.



Skim coat of trowel grade material applied over external stress skin.

External stress skin installed on end of enclosure around conduits.

Skim coat of trowel grade material applied over external stress skin around conduits at right end of enclosure.



Pre-shaped conduit section installed onto conduits extending from enclosure.

Pre-shaped conduit section installed onto conduits extending from enclosure.

Pre-shaped conduit section installed onto conduits extending from enclosure.

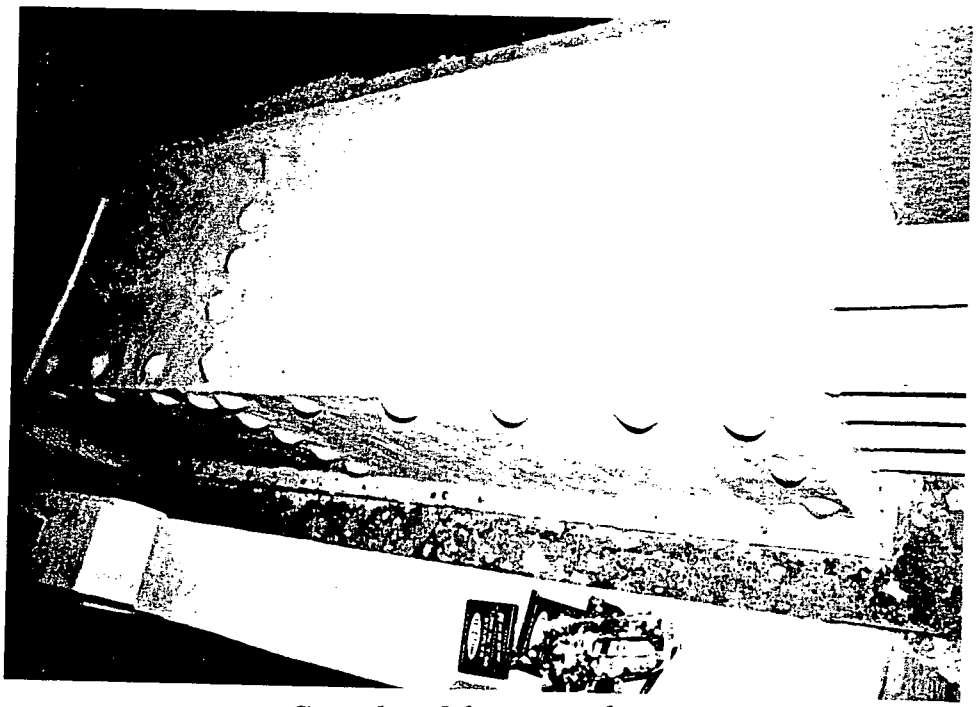
Pre-shaped conduit sections secured with stainless steel tie wire.

Pre-buttered panel installed around wrapped conduits.

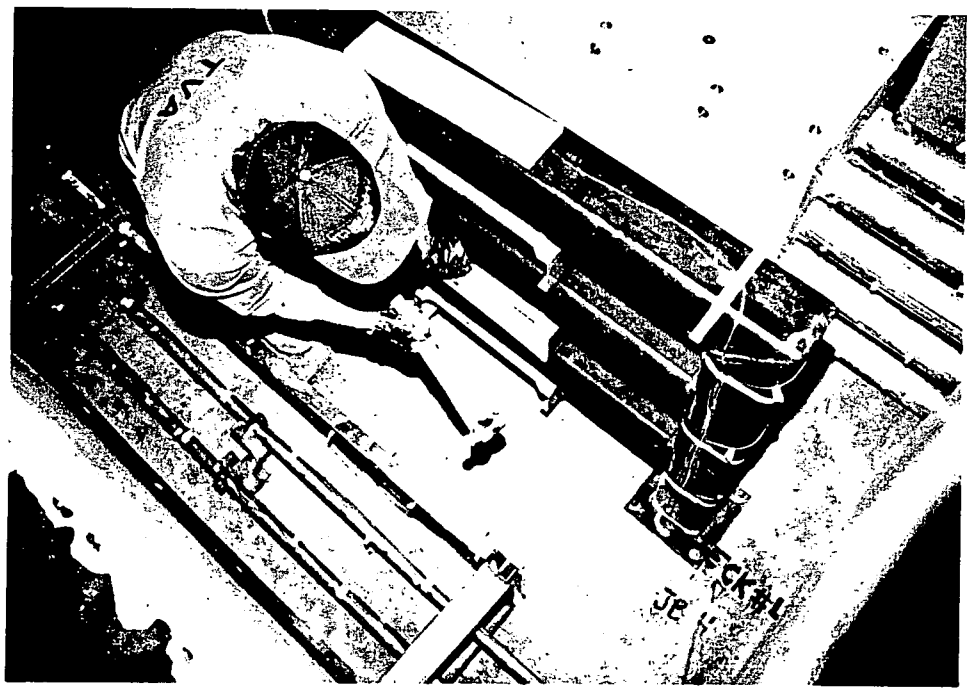
Mounds of trowel grade material applied over washers and nuts.

External stress skin patches installed over mounds of trowel grade material.

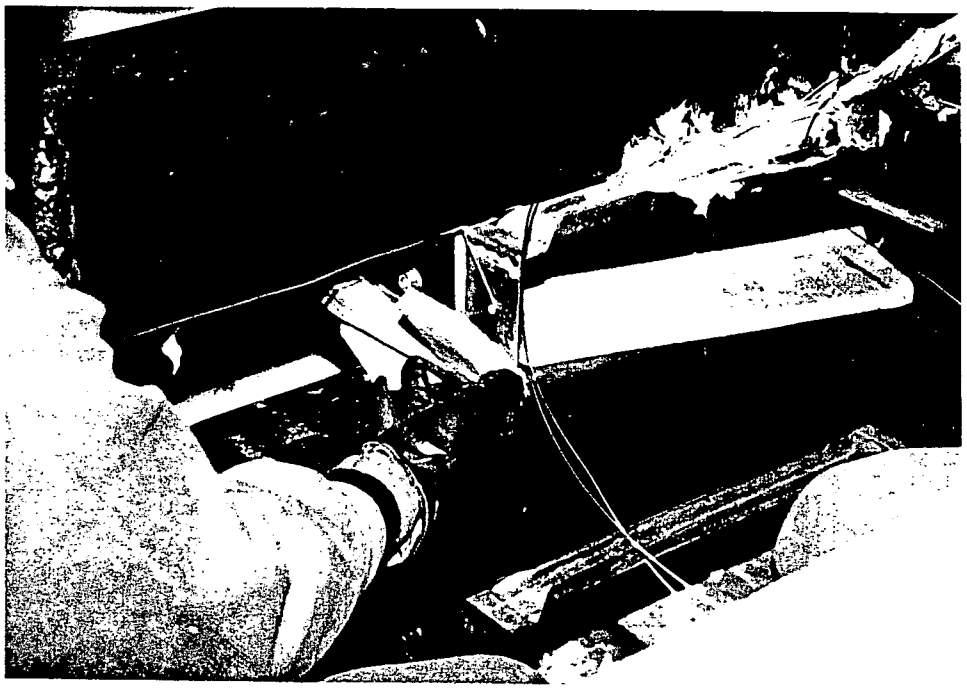
Skim coat of trowel grade material applied over large enclosure.



Completed large enclosure.

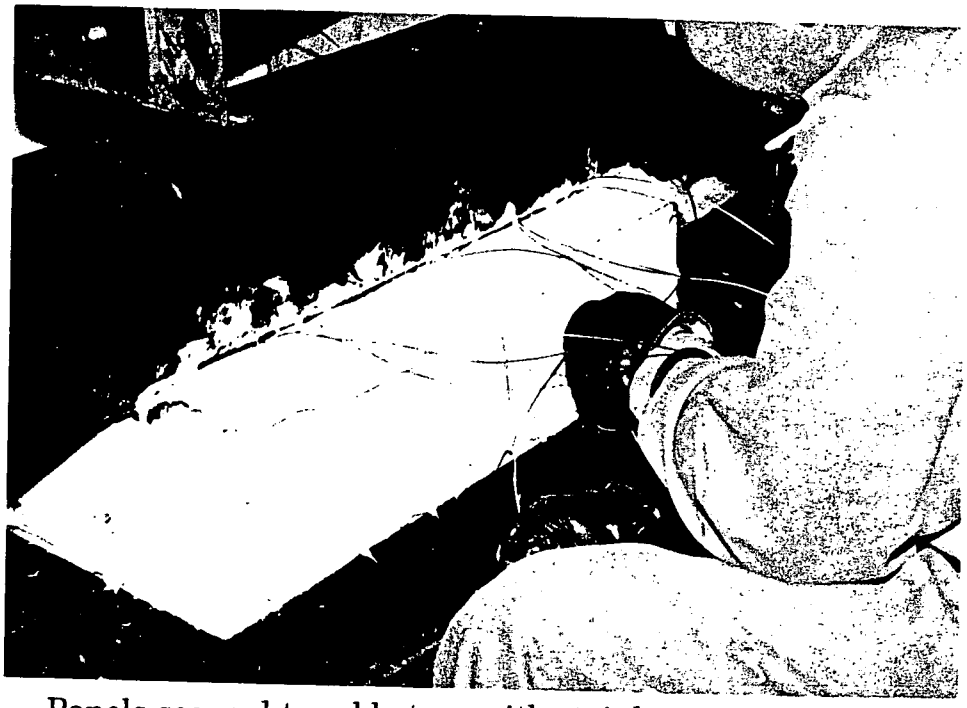


Panels installed in end of tray section to be wrapped.

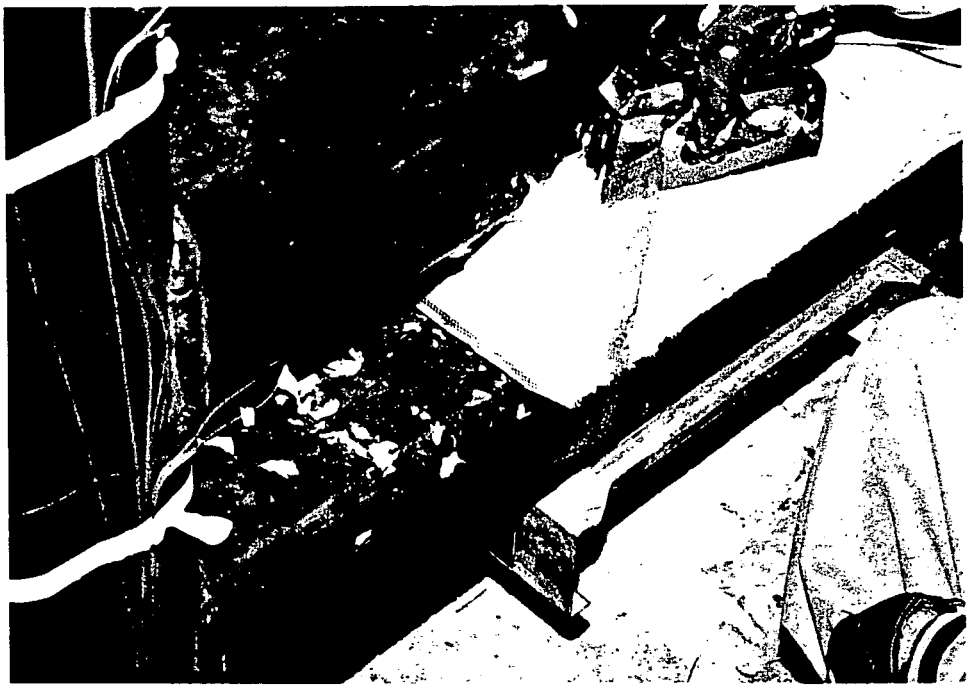


Panels installed onto cable tray side rails.

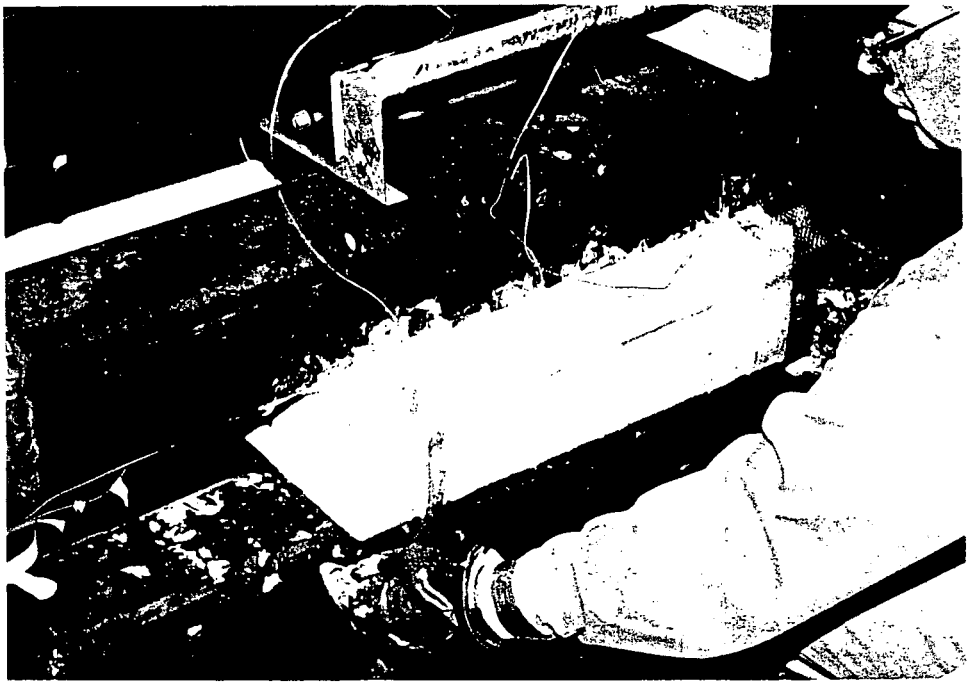
Panels secured to cable tray with stainless steel tie wires.



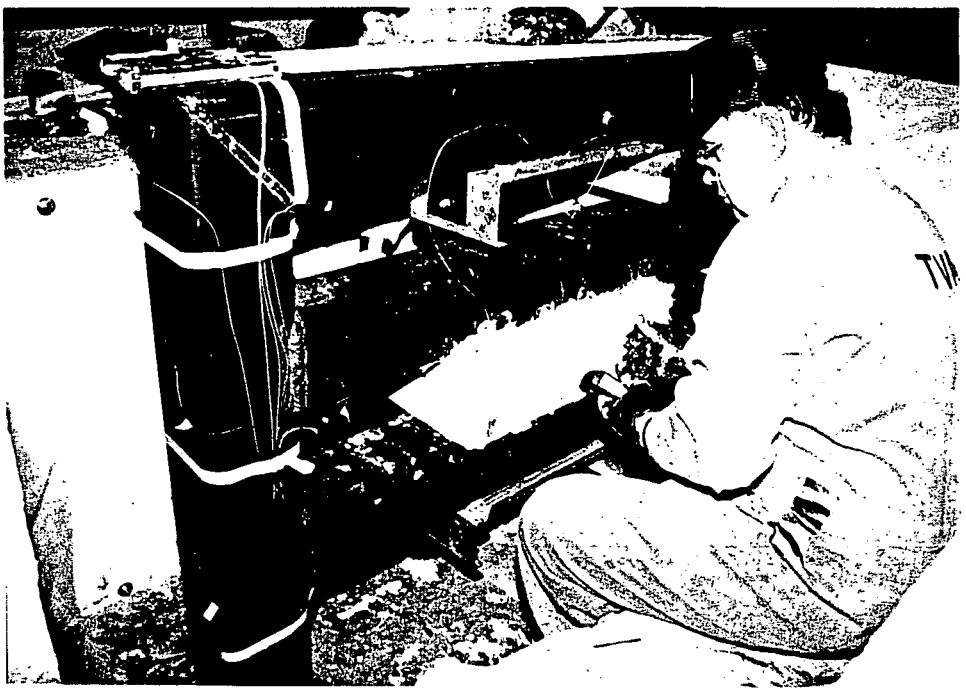
Panels secured to cable tray with stainless steel tie wires.



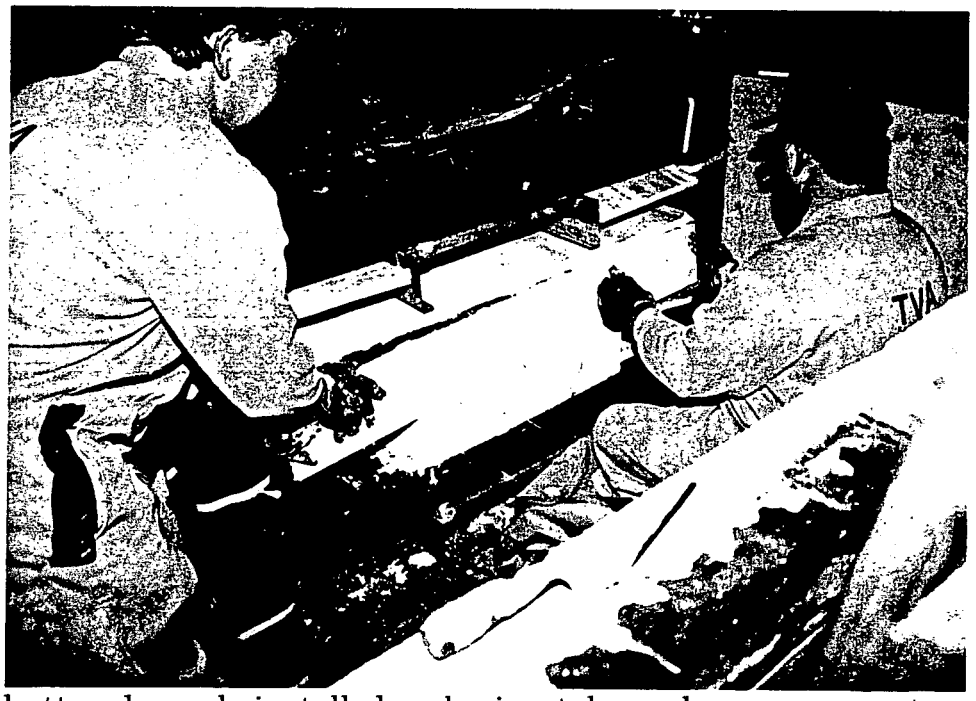
External stress skin installed onto side of cable tray section.



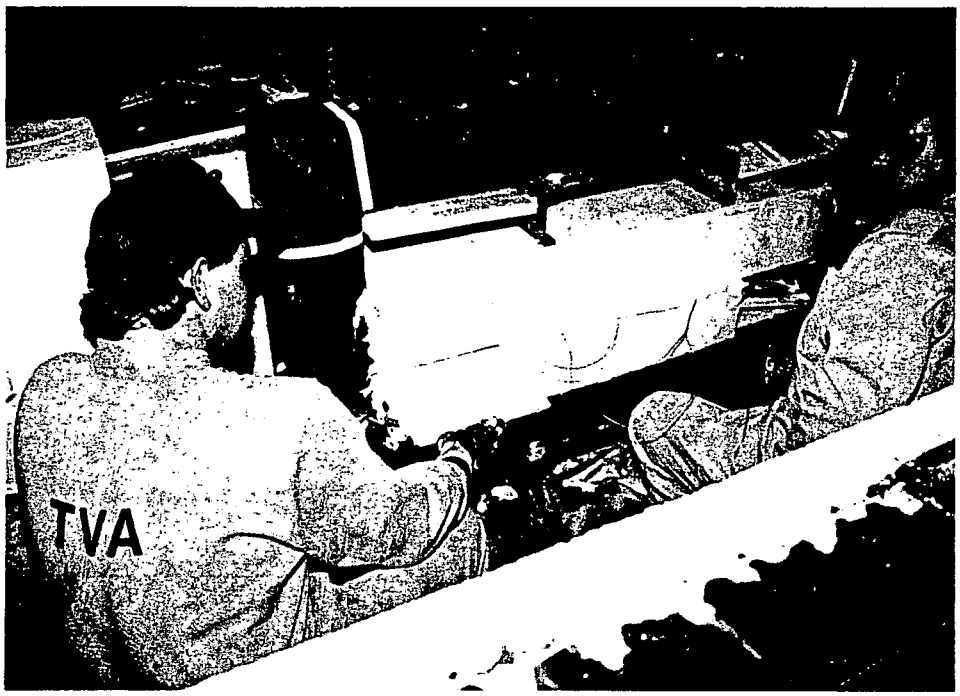
External stress skin installed on free ends of cable tray.



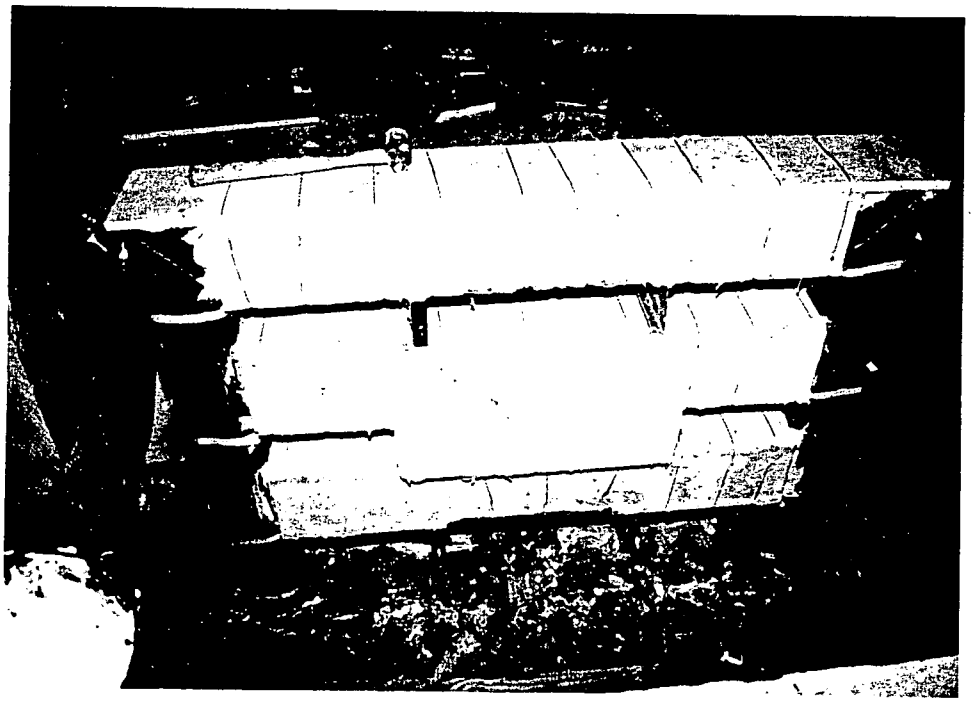
External stress skin installed on free ends of cable tray.



Pre-buttered panels installed on horizontal members on support system.

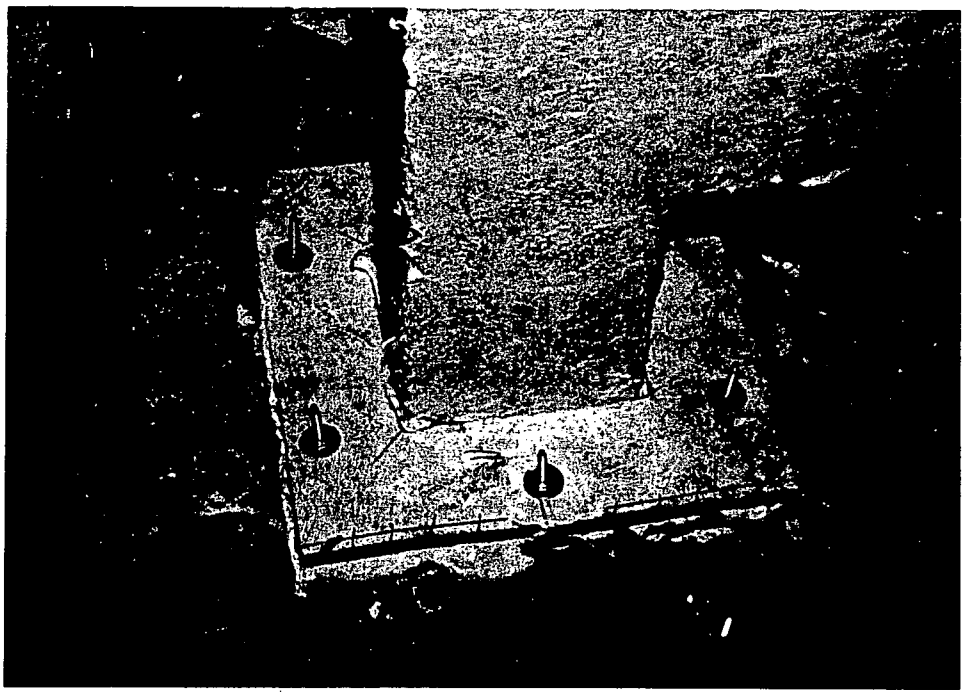


Pre-buttered panels installed on horizontal members on support system.

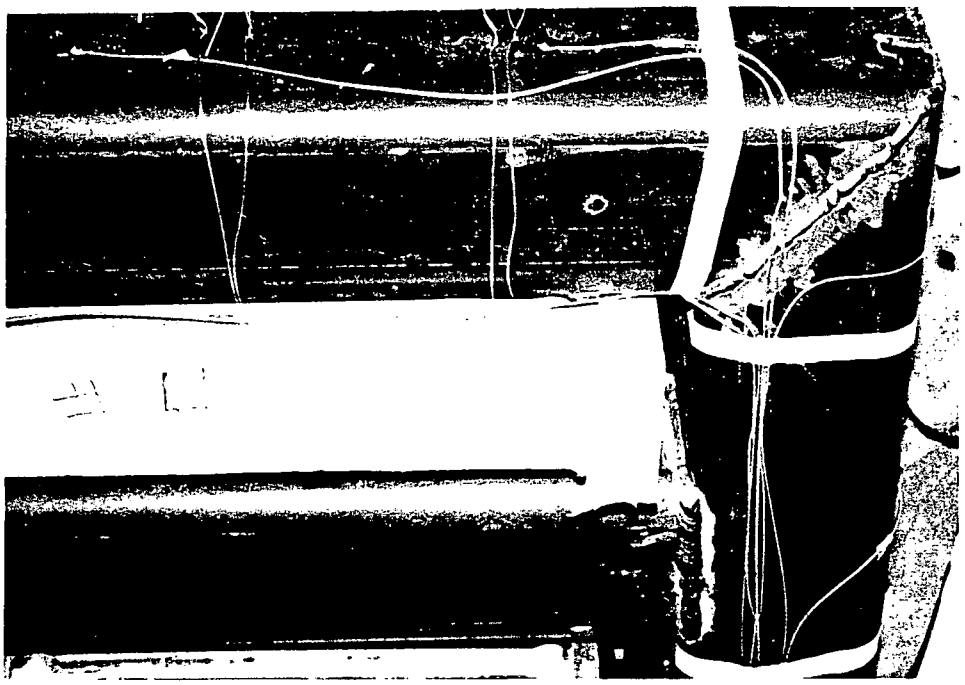


Pre-buttered panels installed on horizontal members on support system.

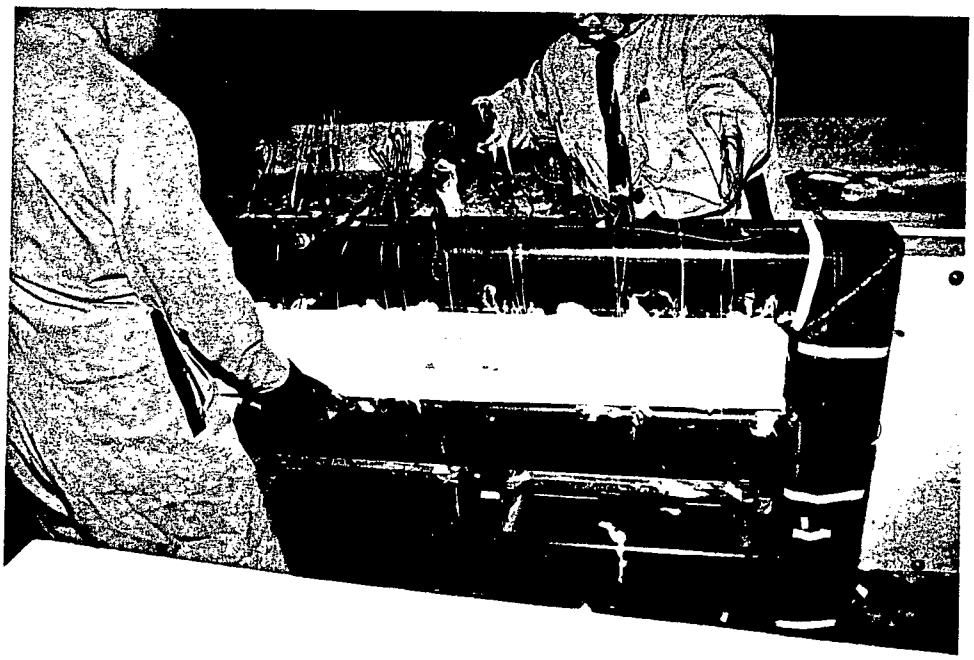
Skim coat of trowel grade material smoothed with a wet brush.



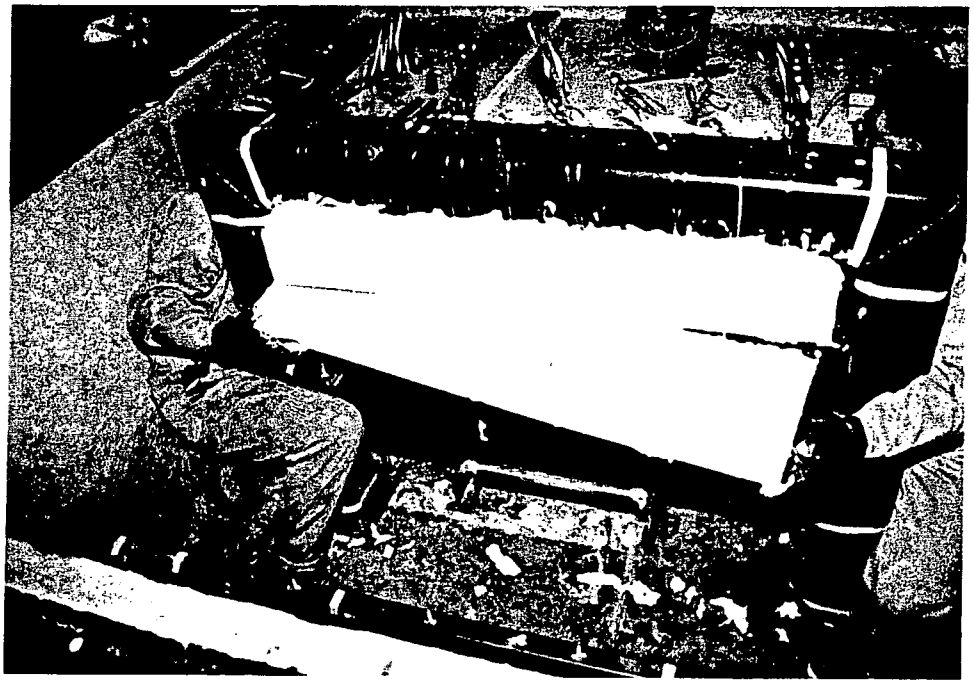
Pre-buttered panels installed over mounting pads as base plates.



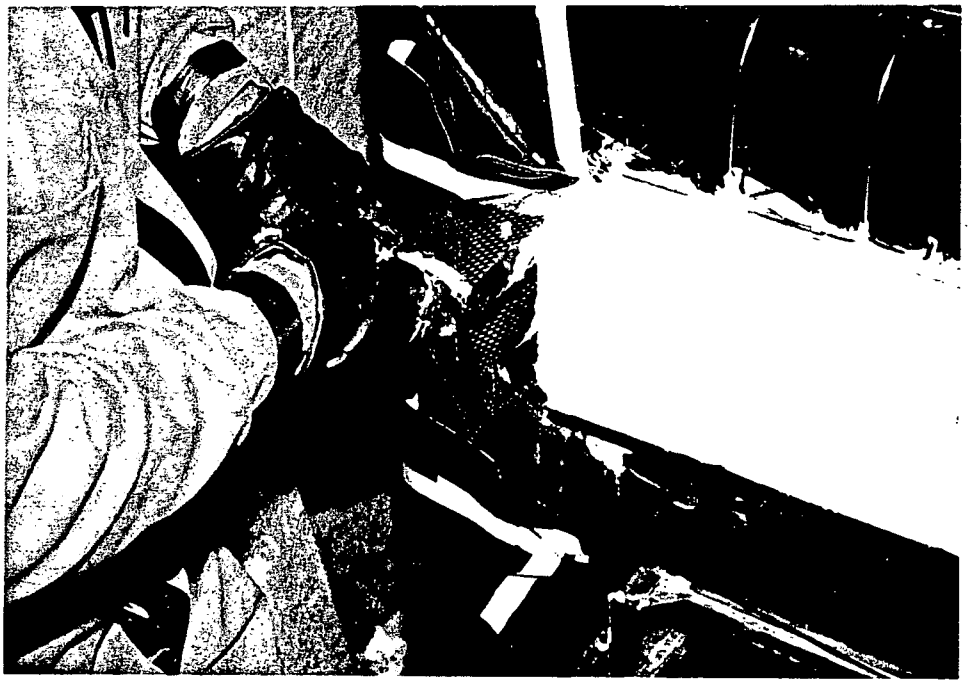
Panels installed in free ends of tray sections to be wrapped.



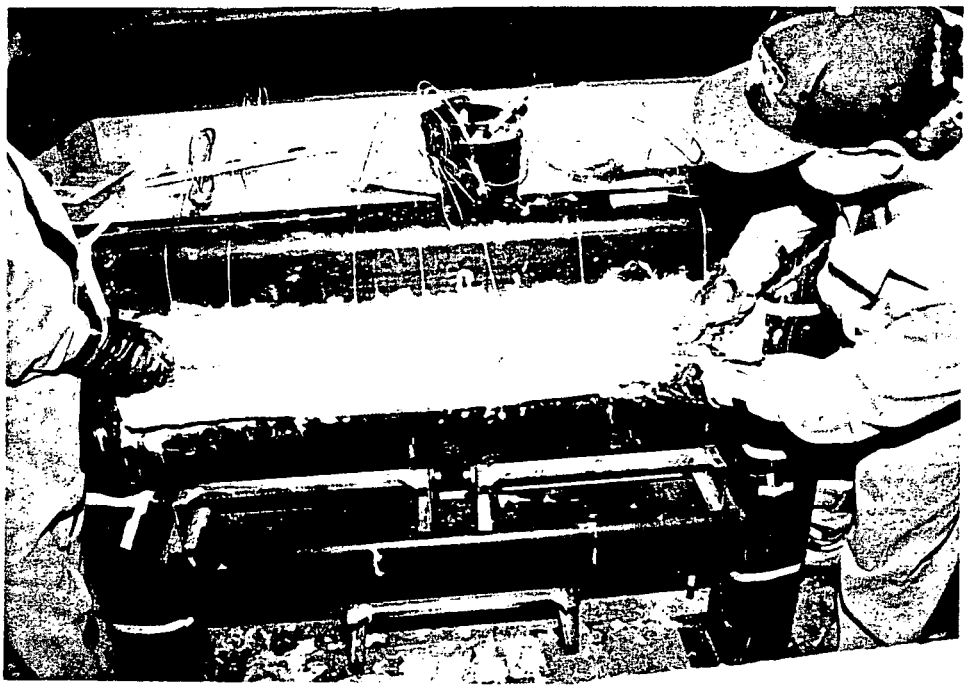
Pre-buttered panels installed over ends of trays.



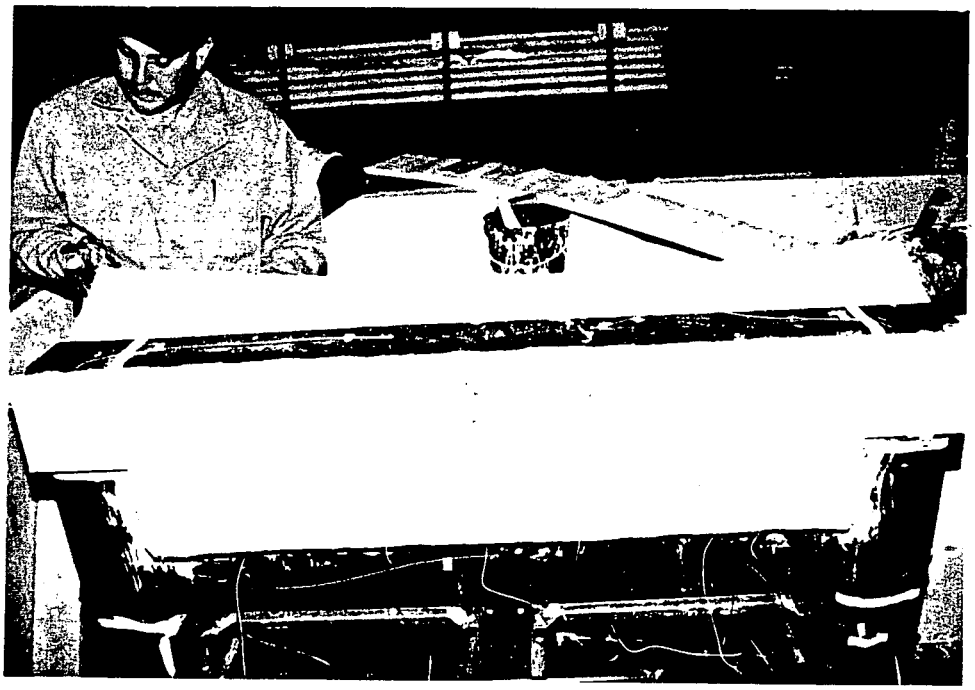
Pre-buttered panels installed over tops of trays.



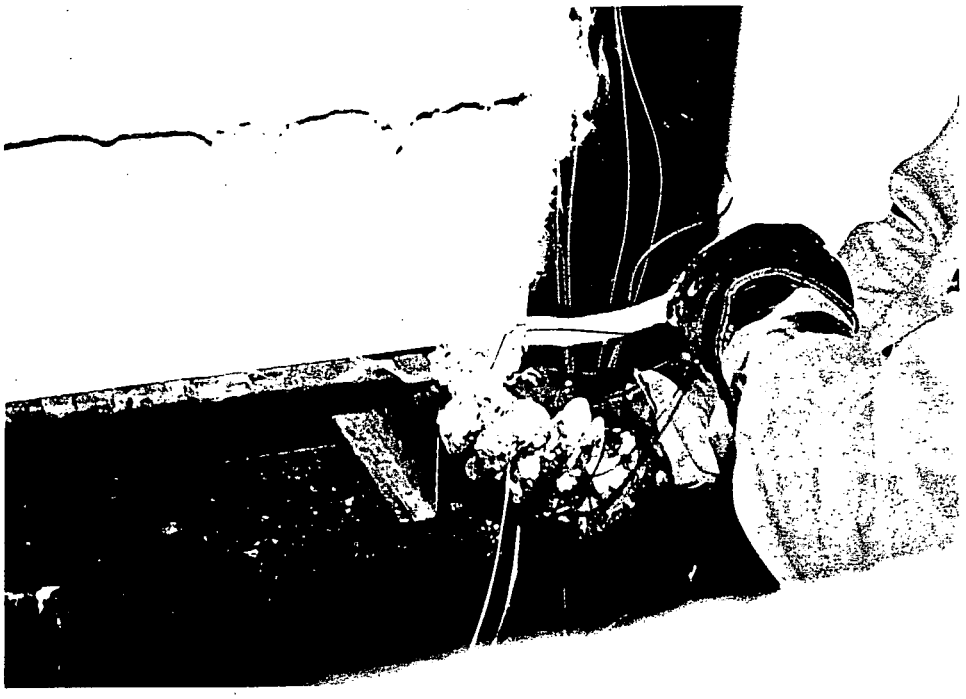
External stress skin installed over tray sides.



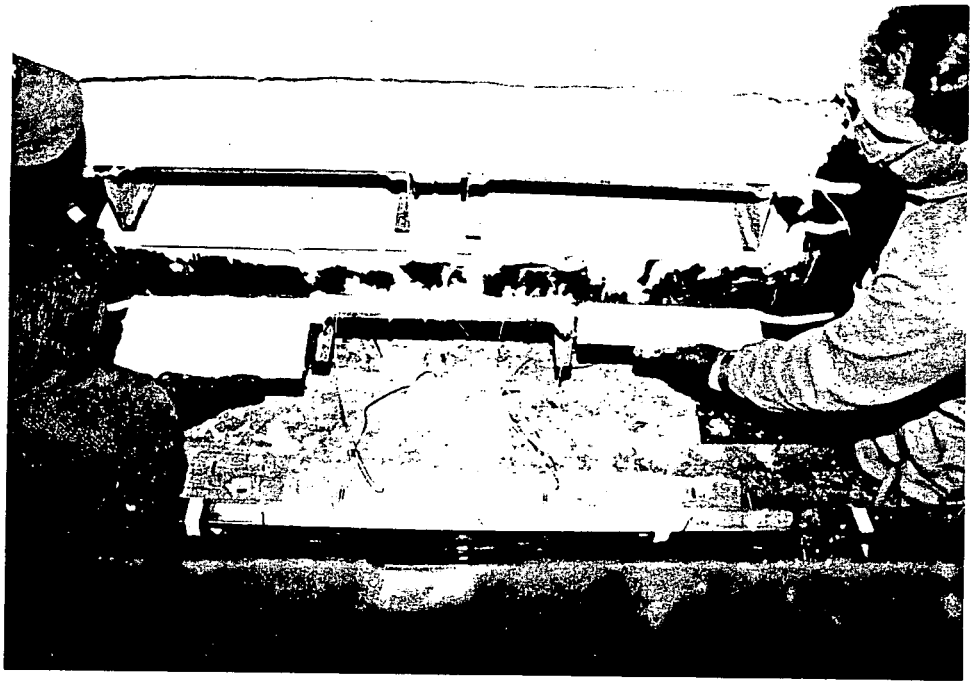
External stress skin installed over panels covering ends of trays.



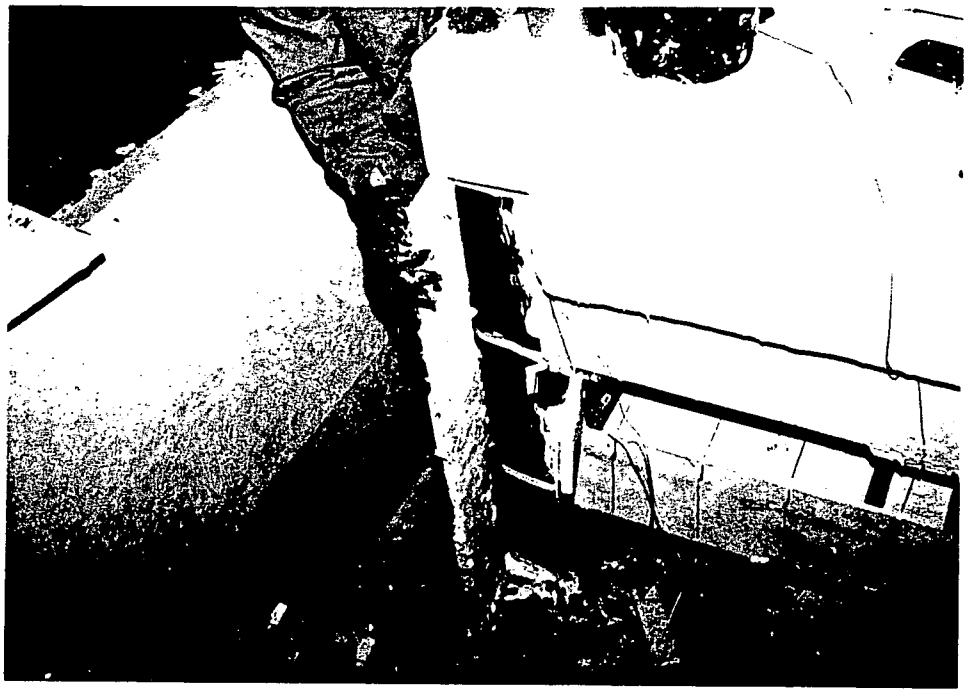
Pre-buttered panels installed over horizontal portions of tray support system.



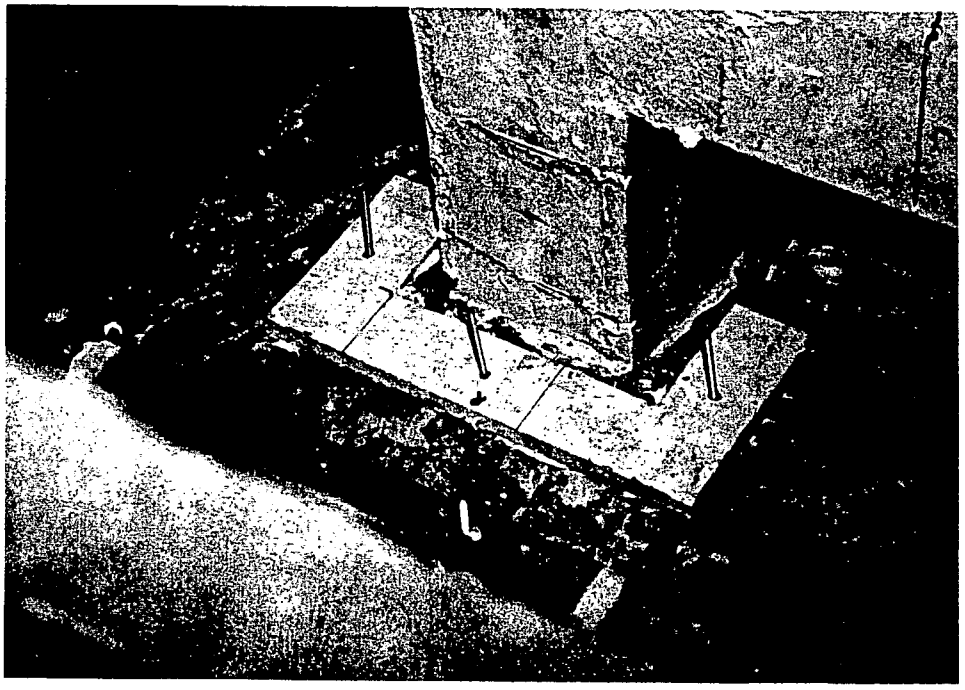
Panels secured with stainless steel tie wires.



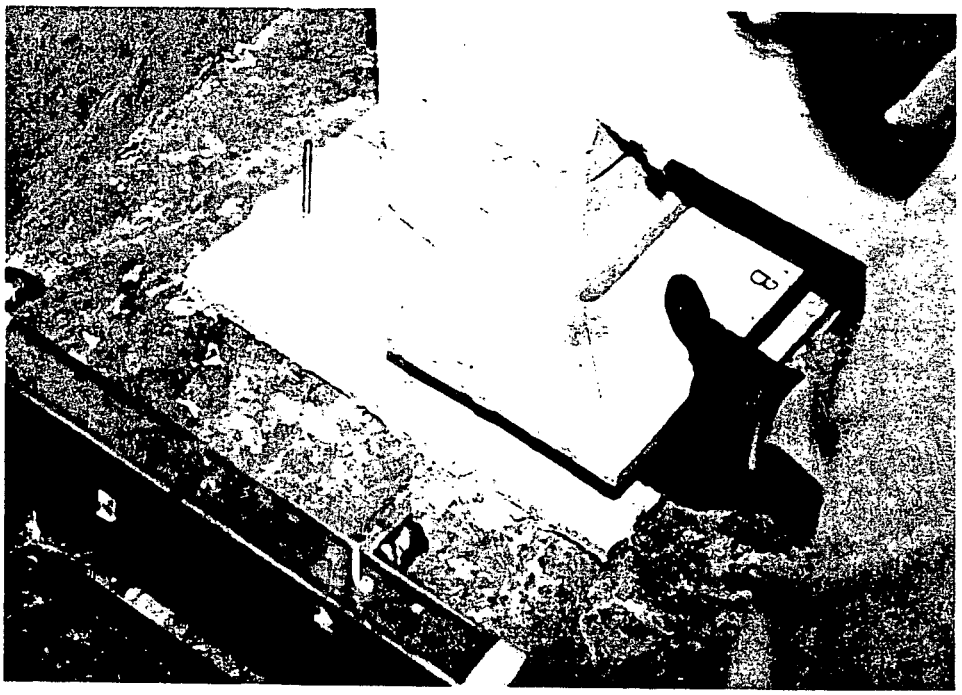
Pre-buttered panels installed over horizontal portions of tray support system.



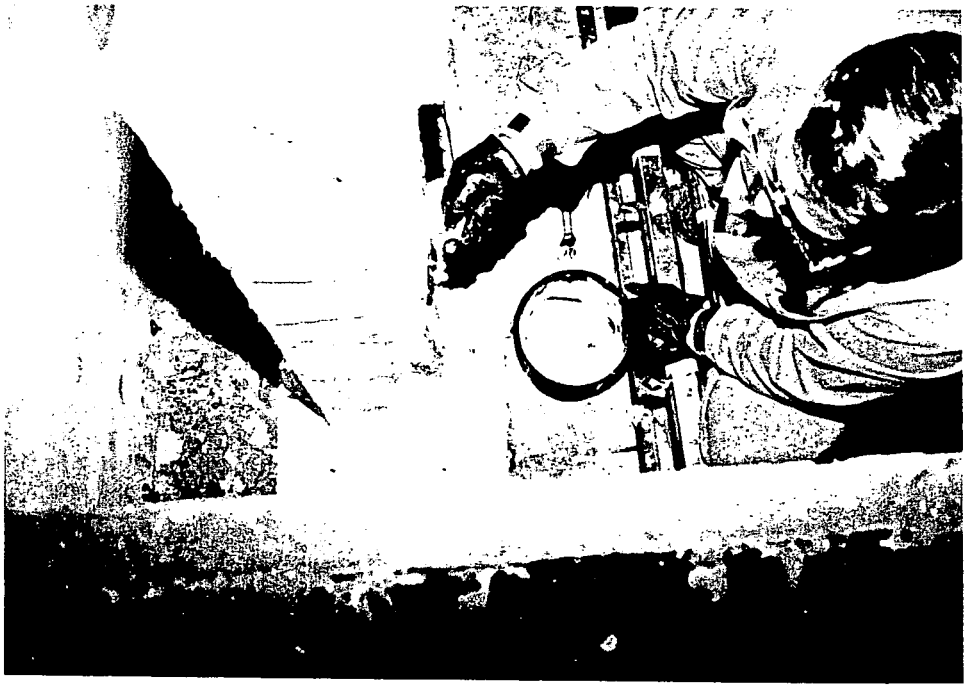
Pre-buttered panels installed over vertical portions of tray support system.



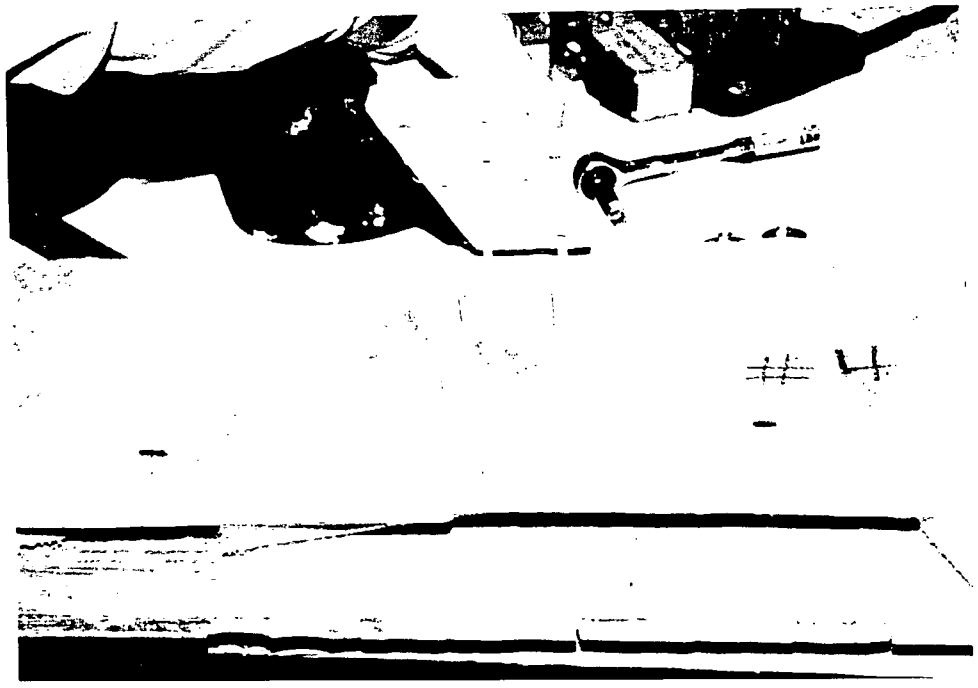
Pre-buttered panels installed over mounting pads as base plates.



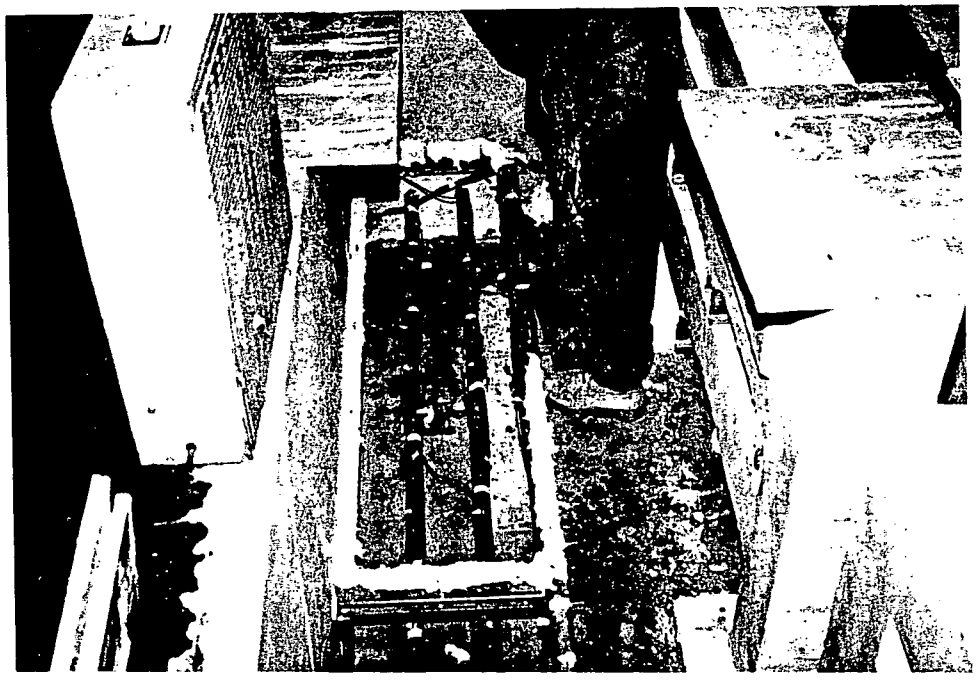
Pre-buttered panels installed over mounting pads as base plates.



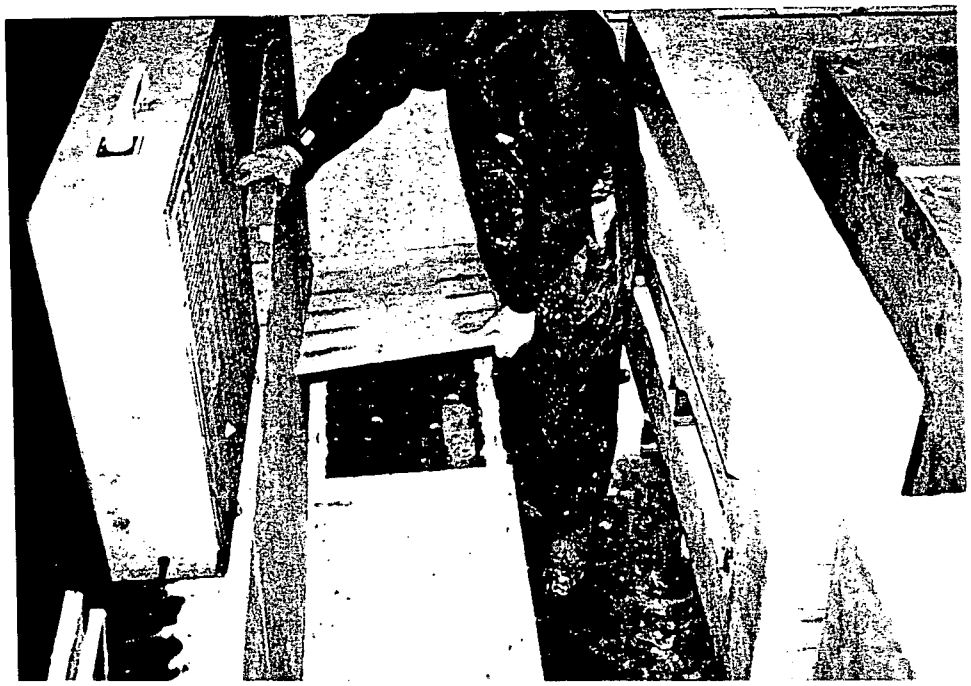
Skim coat of trowel grade material applied to support system.



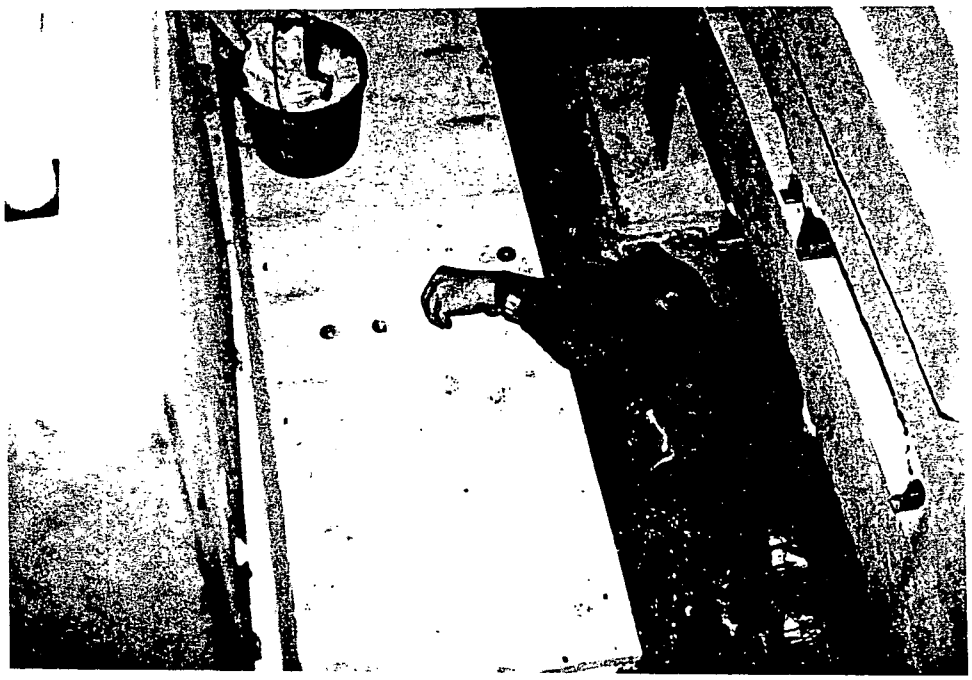
Strip of material bolted along panel joint.



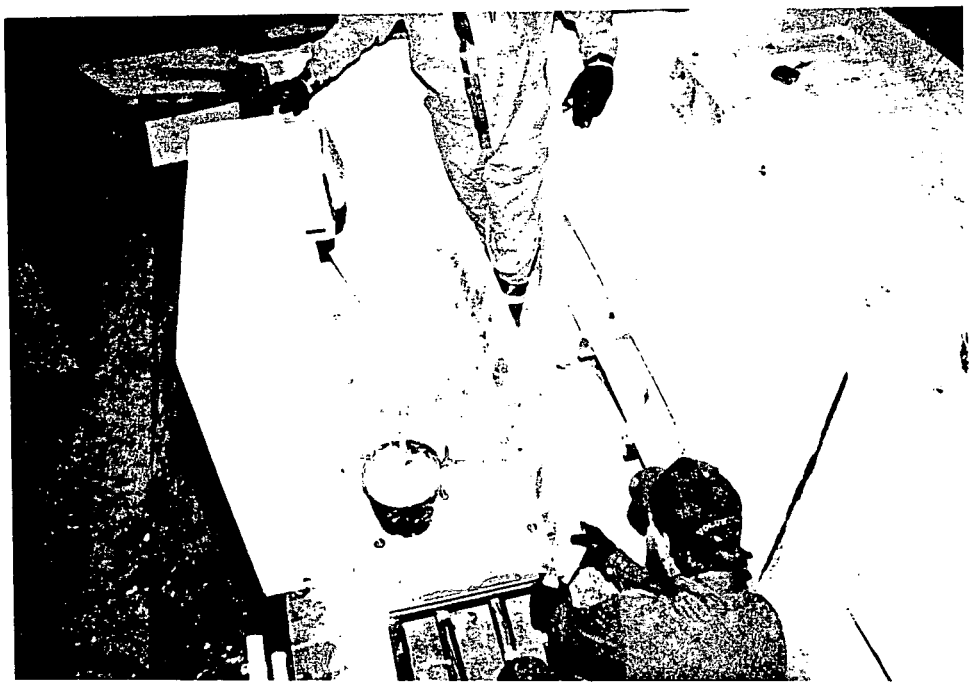
Unistrut frame pre-buttered prior to installation of panels.



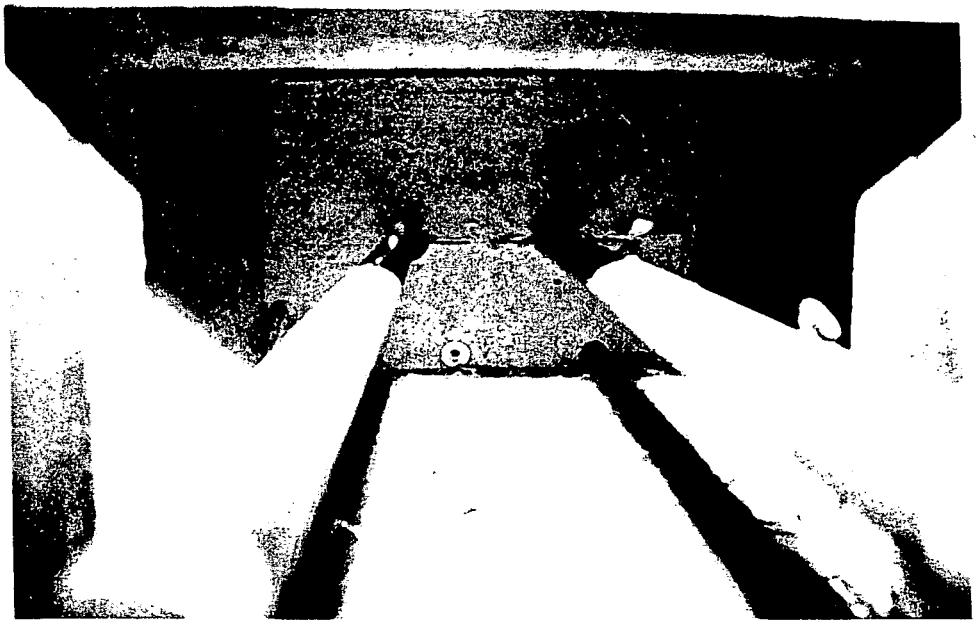
Panels installed onto unistrut framework.



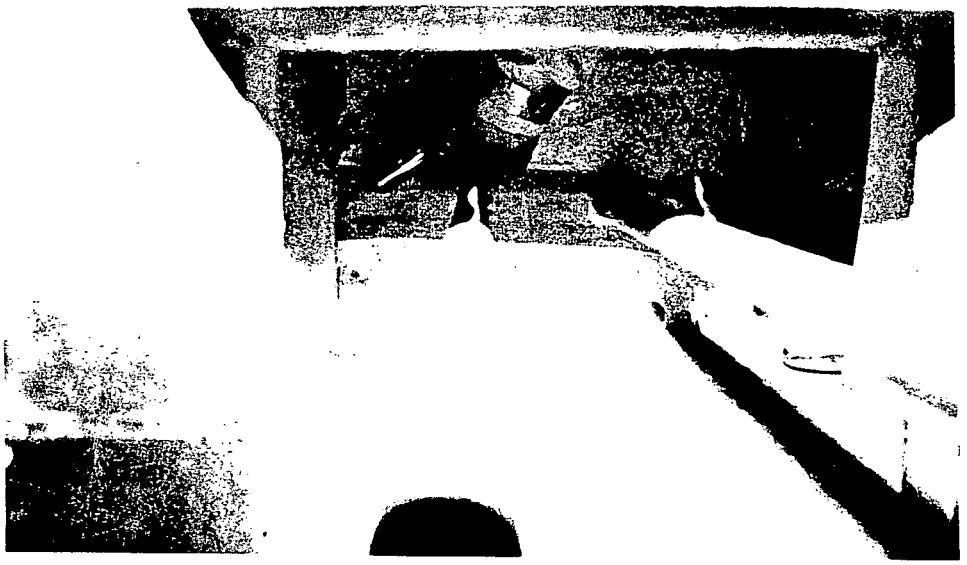
Bolts, washers and nuts installed at panel to panel joints.



Pre-buttered panel installed onto side of small enclosure.



Panels installed around conduits on right end of small enclosure.

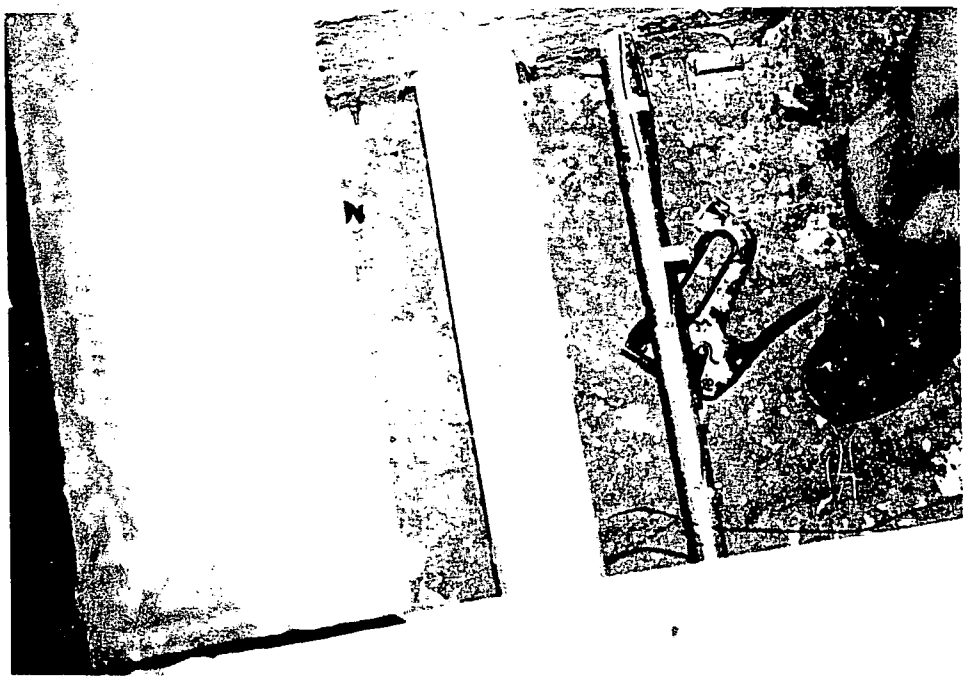


External stress skin stapled along joint between panels.

Pre-shaped conduit sections installed over conduits extending from enclosure.

Pre-shaped conduit sections secured with stainless steel tie wires.

Second layer of pre-shaped conduit sections installed.



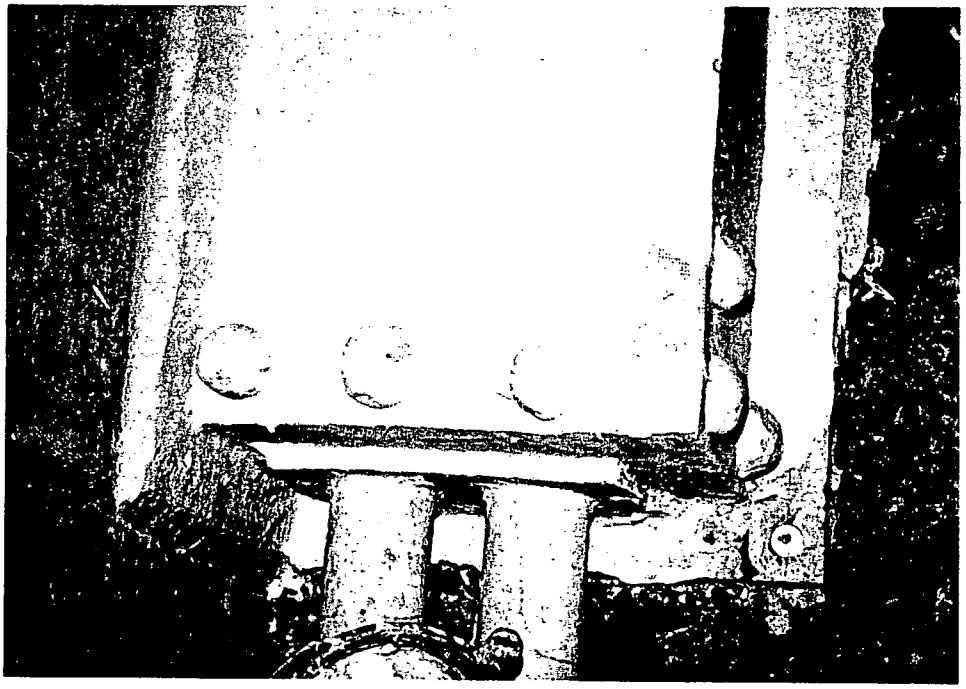
Second layer of pre-shaped conduit sections installed.

External stress skin installed around conduits on end of enclosure.

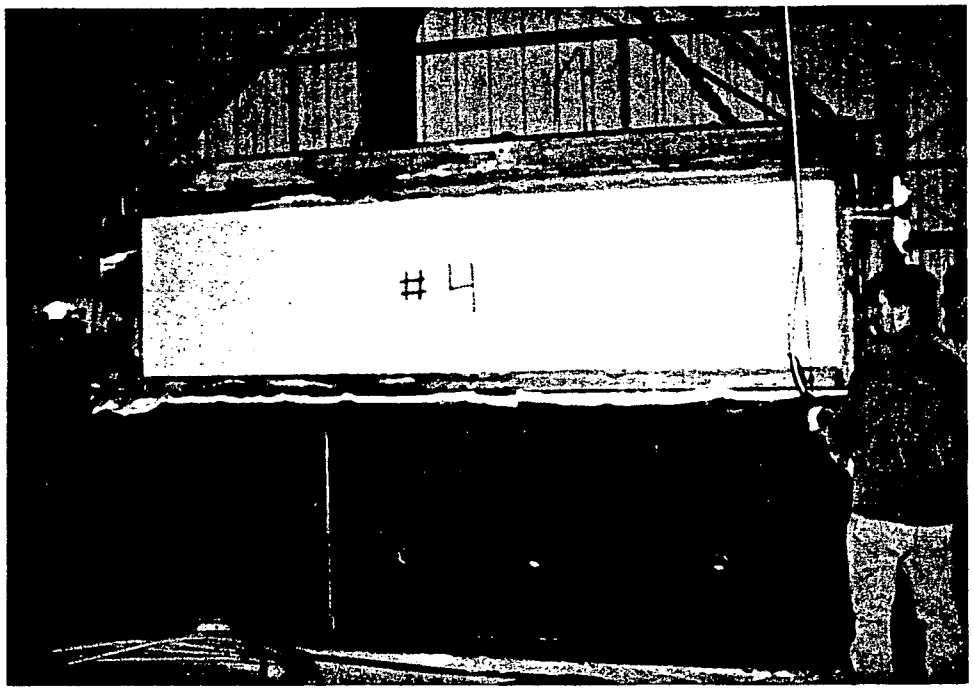
External stress skin installed around conduits on end of enclosure.

Skim coat of trowel grade material applied over external stress skin.

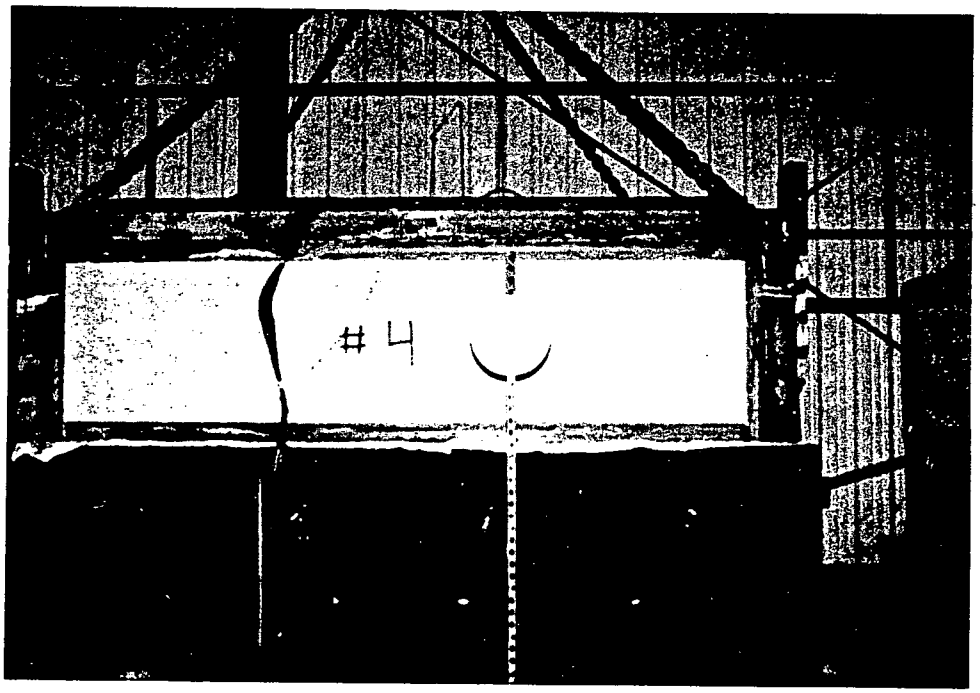
External stress skin installed over small enclosure.



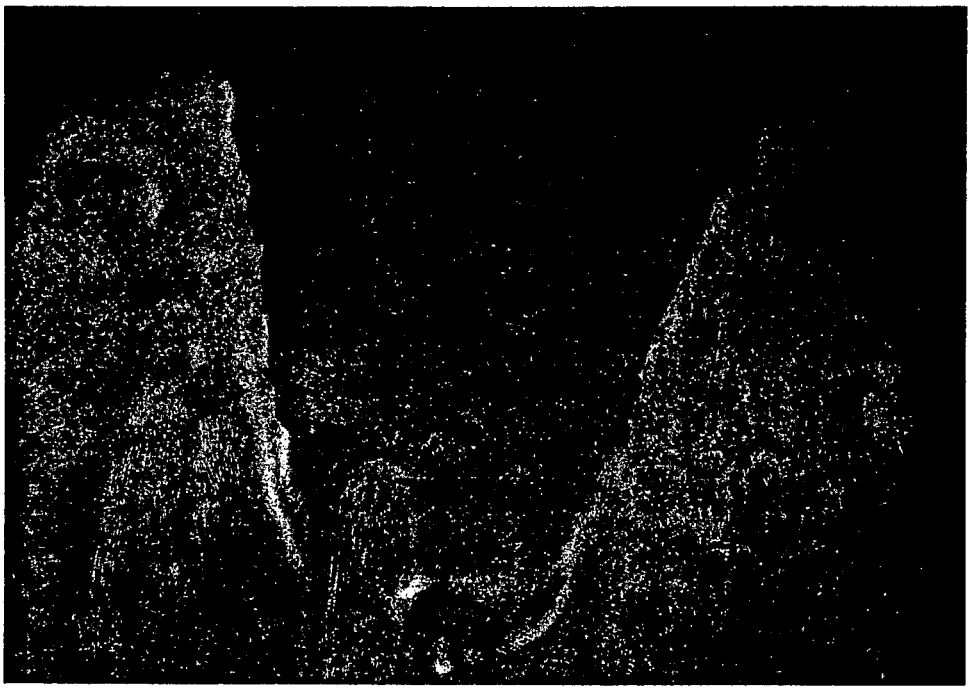
Mounds of trowel grade material applied over nuts and washers



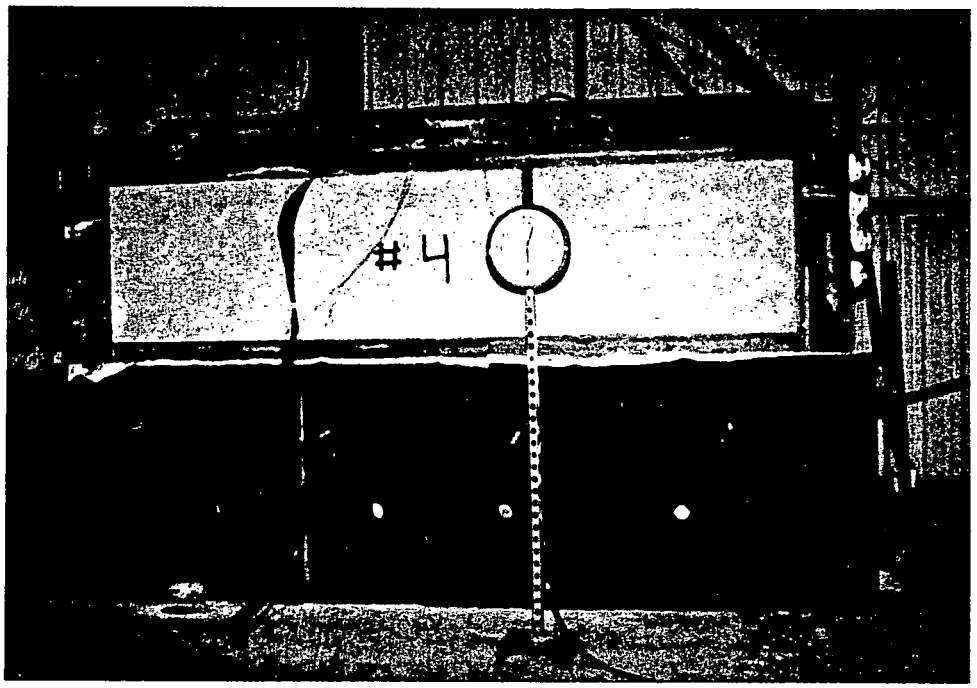
Test deck lowered onto test furnace.



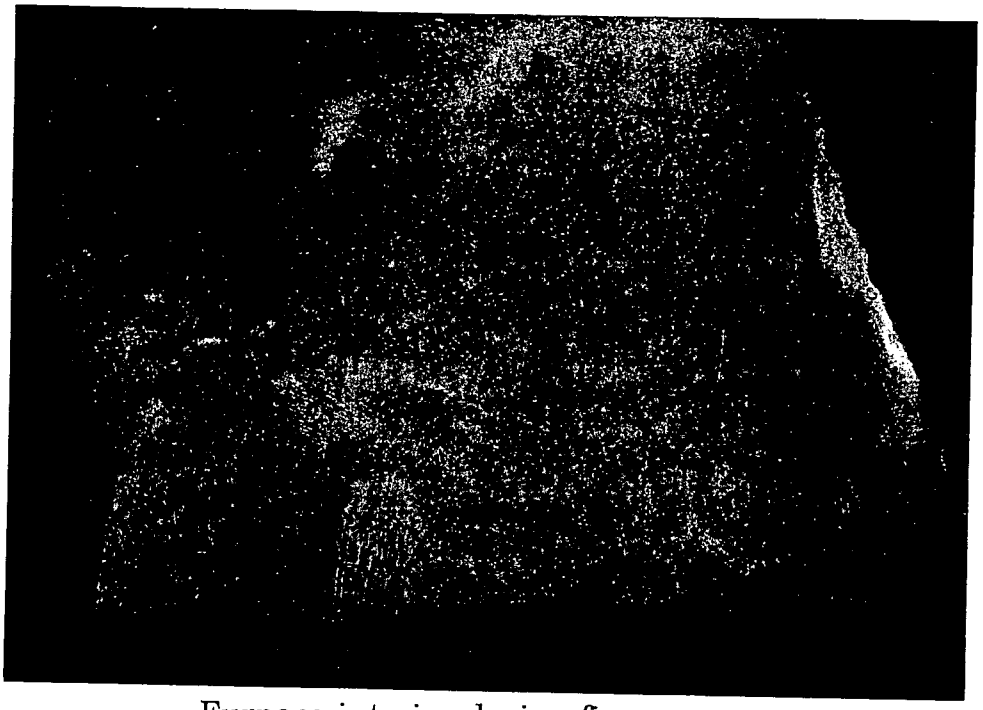
Test furnace prior to start of test.



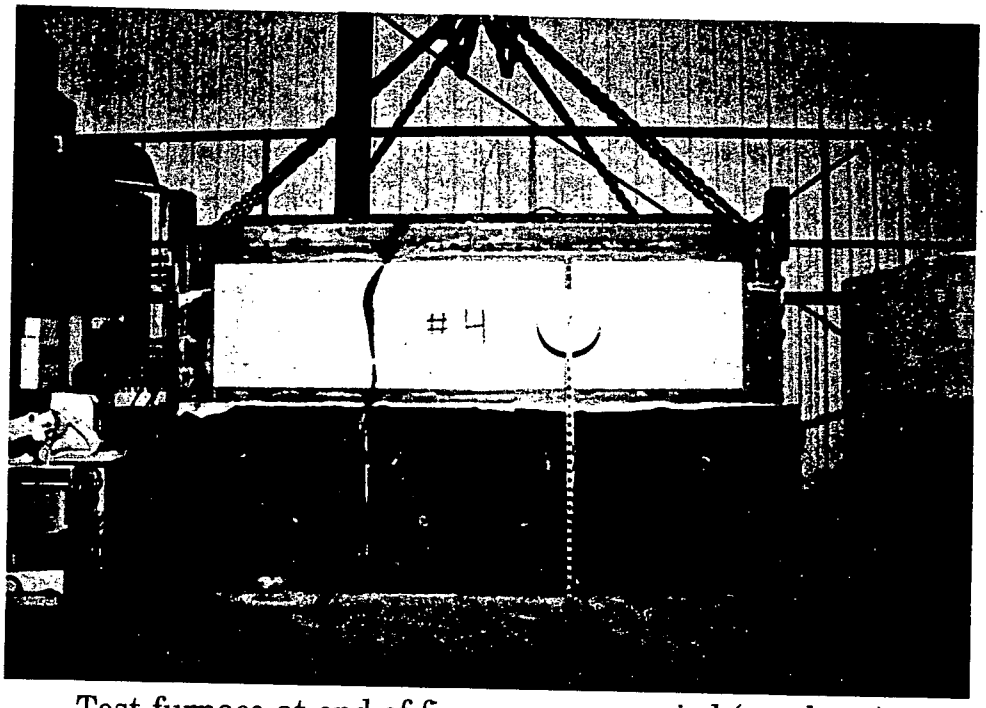
Furnace interior during fire exposure.



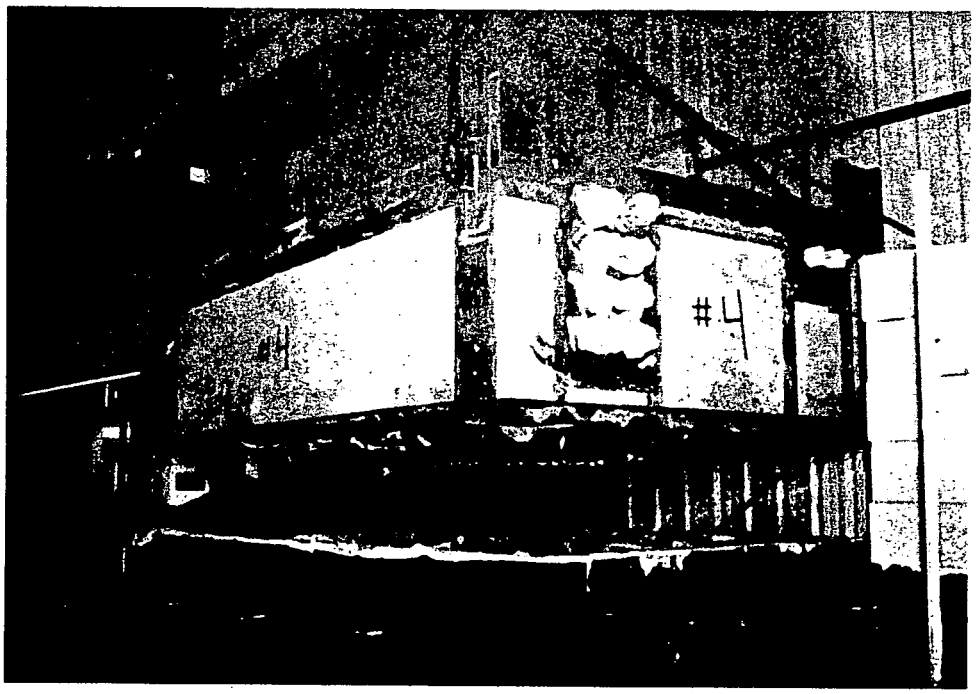
Test furnace at thirty minutes.



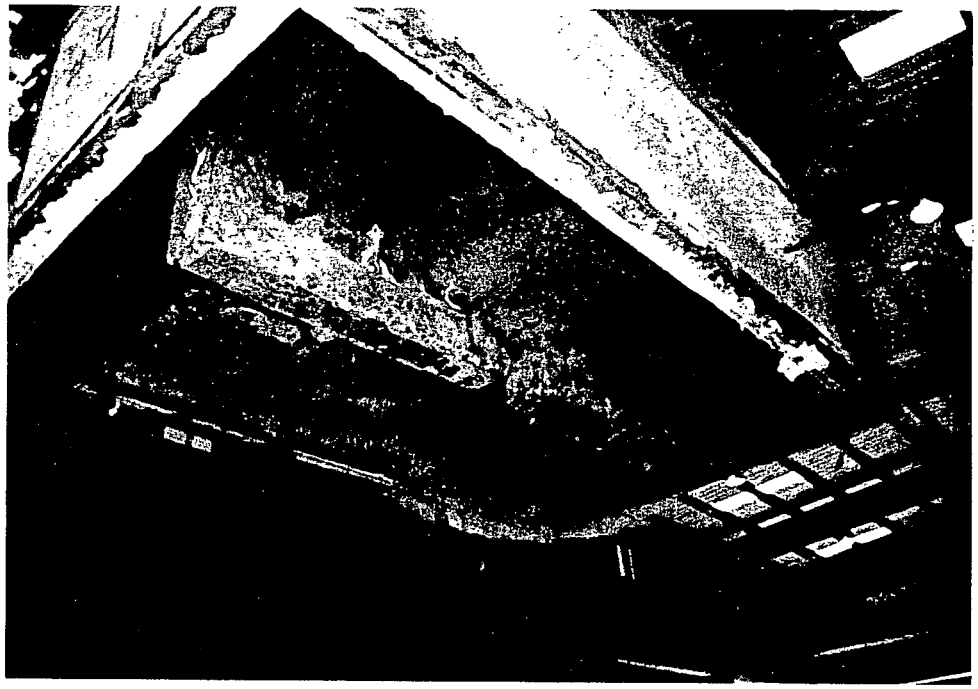
Furnace interior during fire exposure.



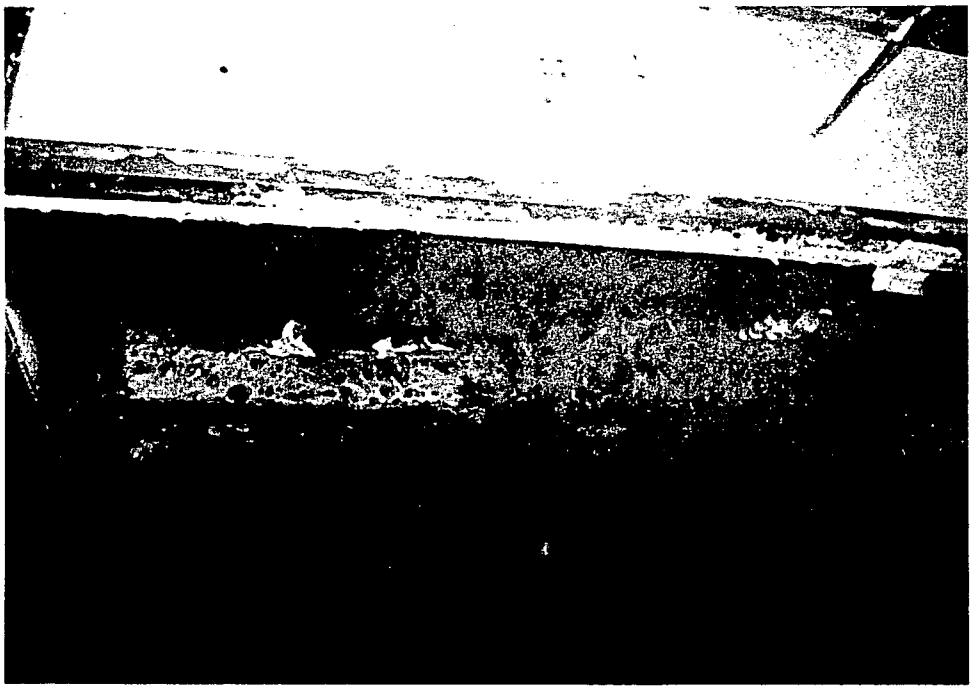
Test furnace at end of fire exposure period (one hour).



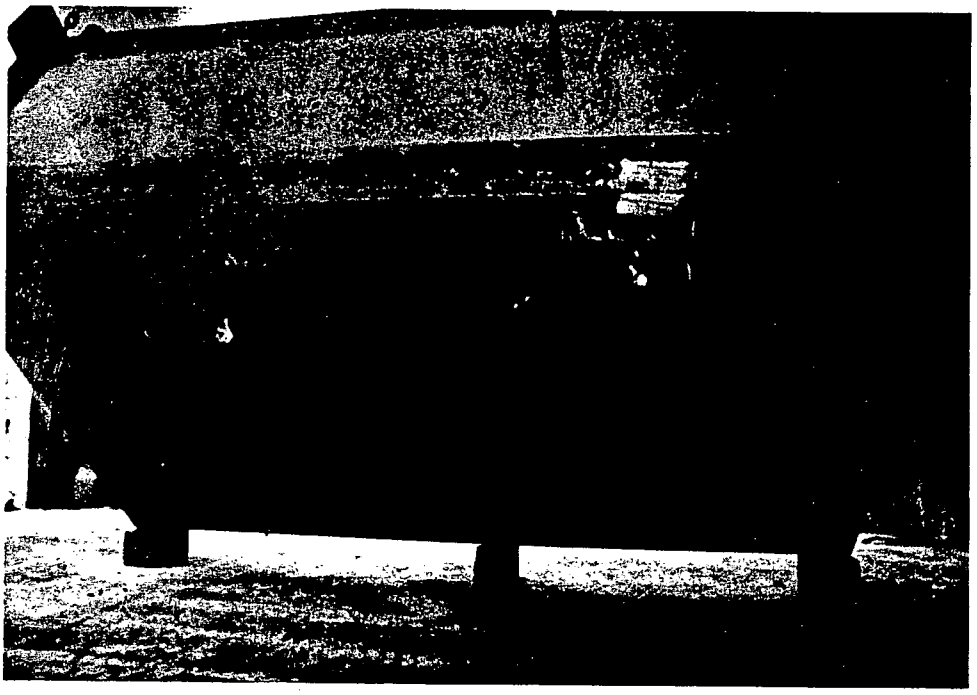
Test deck lifted from test furnace.



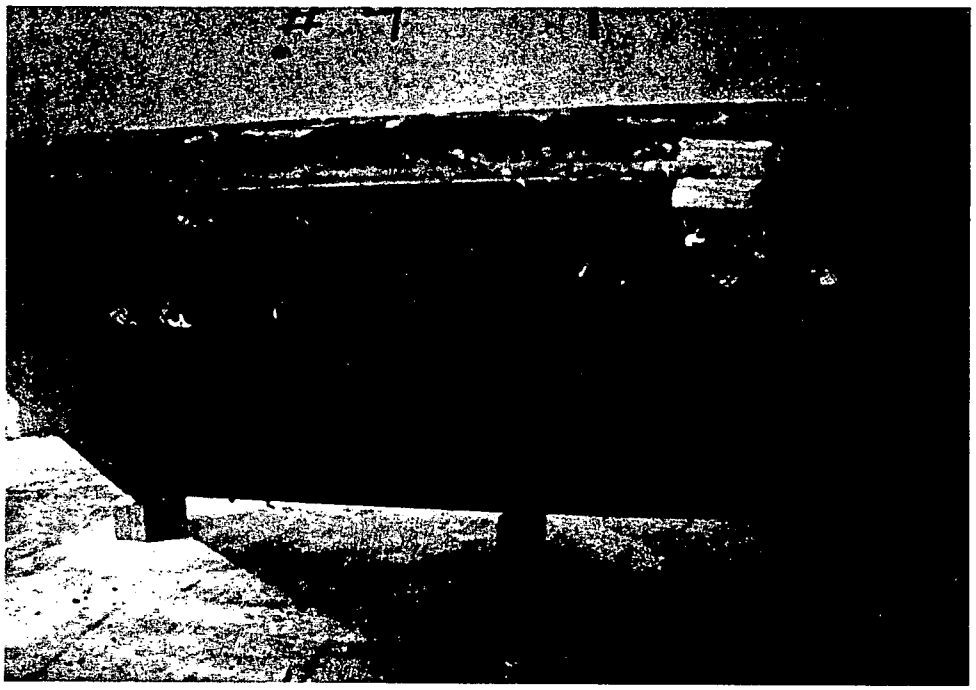
Test deck being moved into position for hose stream.



Test deck being moved into position for hose stream.



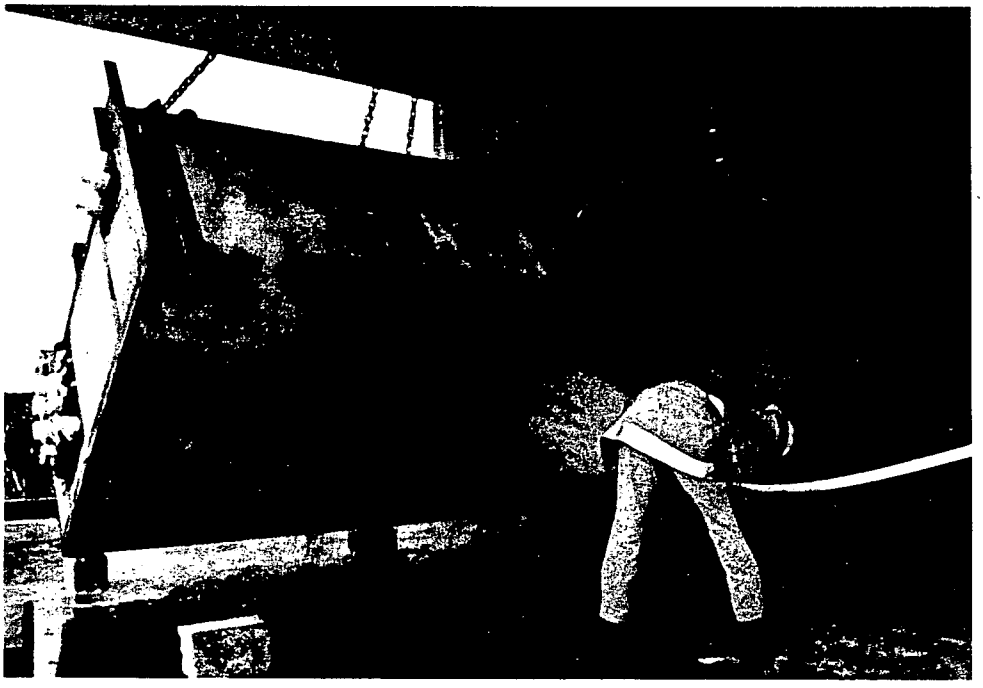
Test deck prior to hose stream test.



Test deck prior to hose stream test.

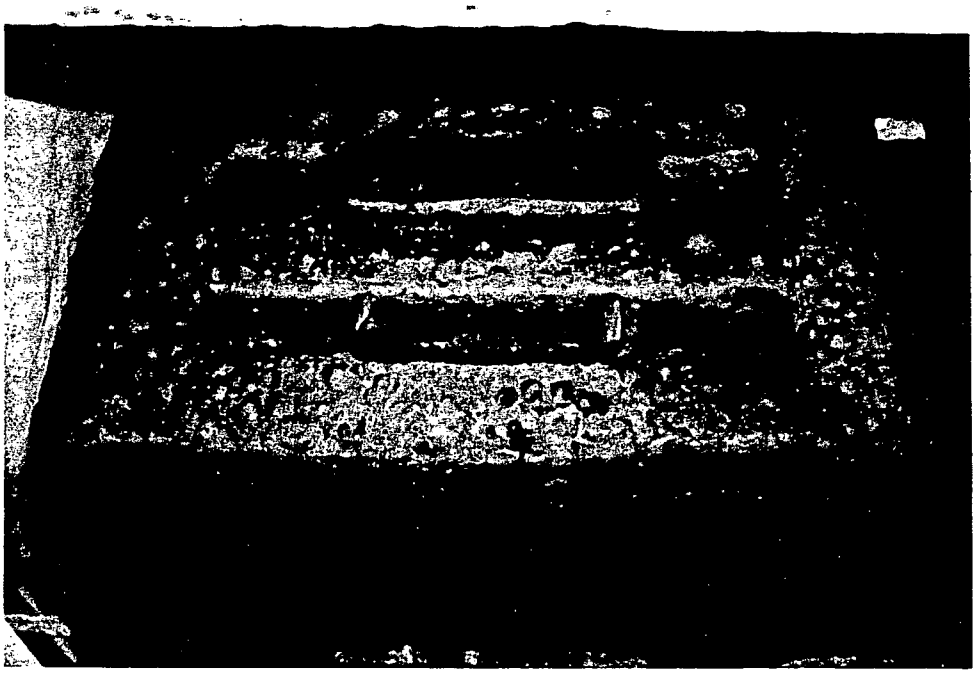
Water hose stream test.

Water hose stream test.

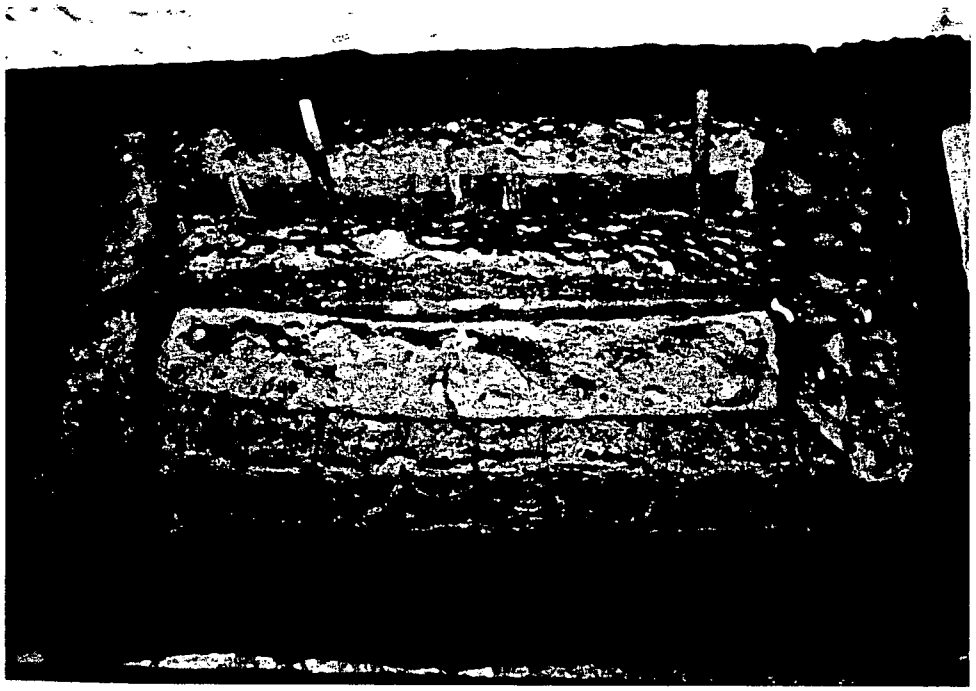


Water hose stream test.

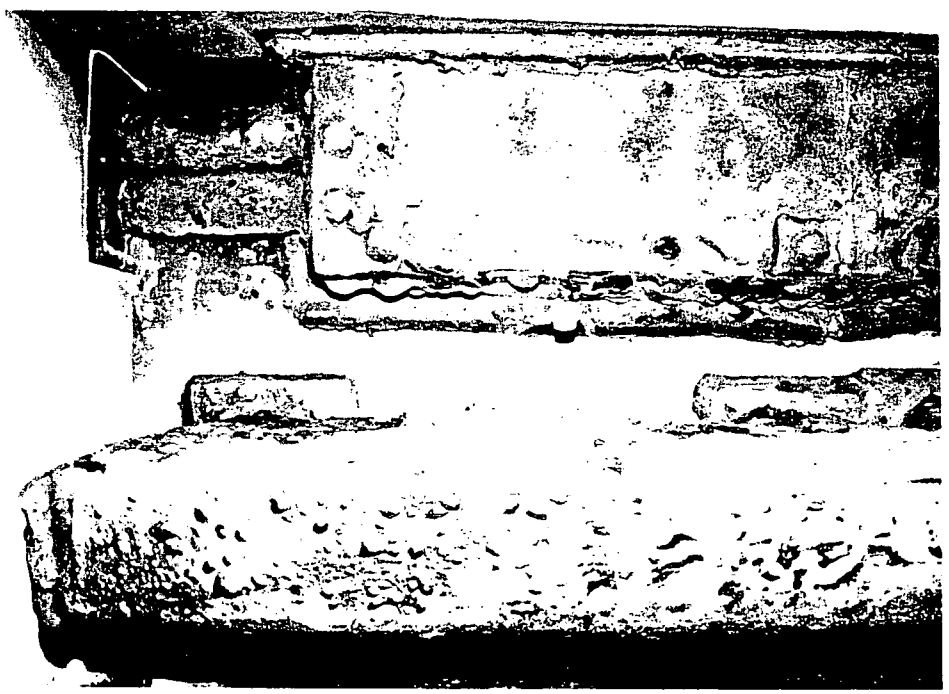
Test deck immediately after water hose stream test.



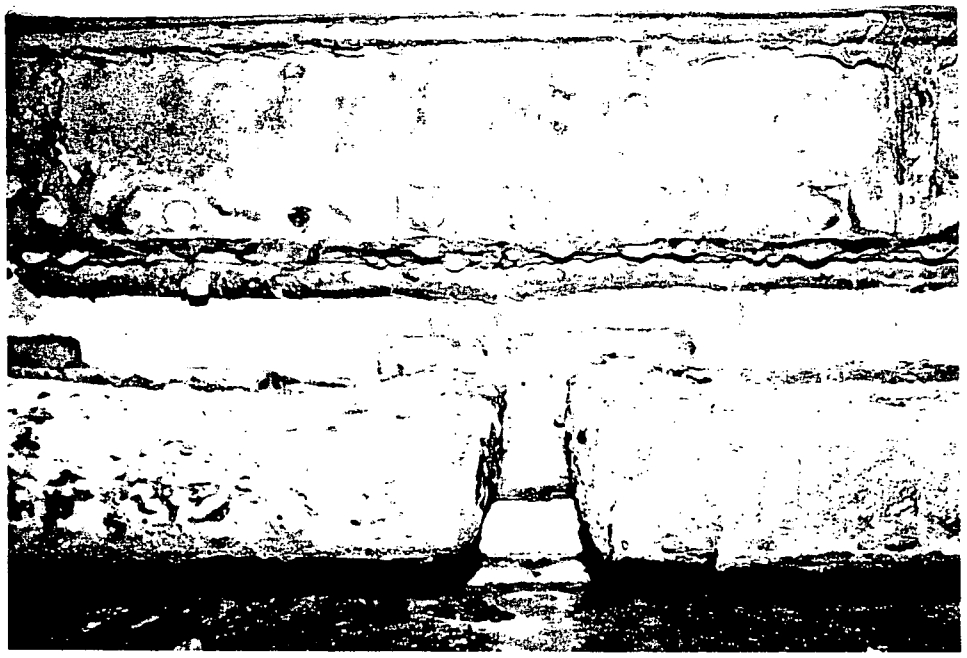
Left cable tray support system after hose stream test.



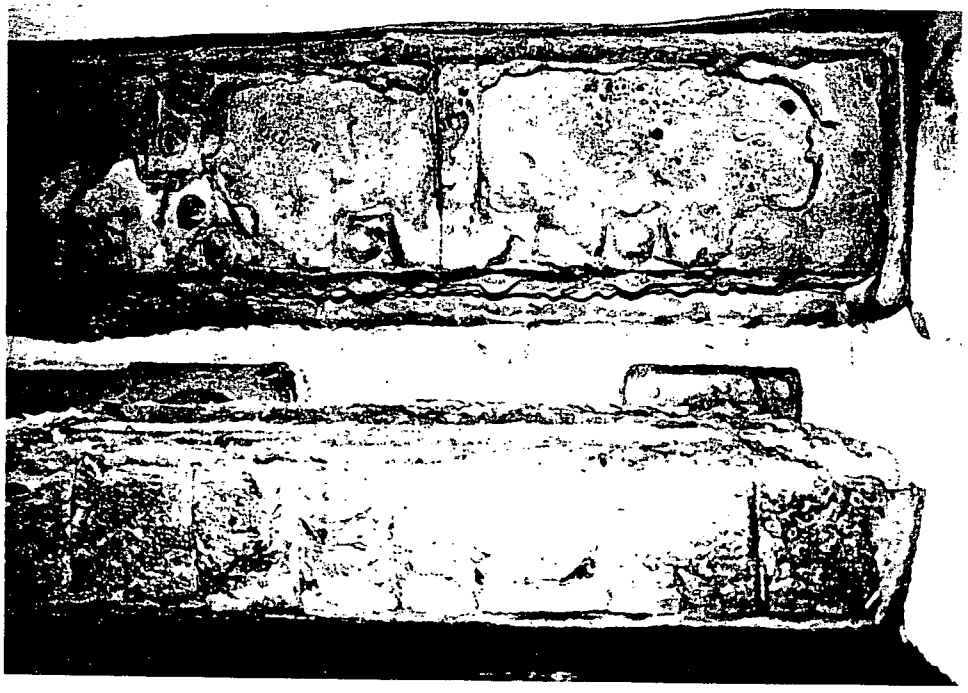
Right cable tray support system after hose stream test.



Conduit end of small enclosure after water hose stream.



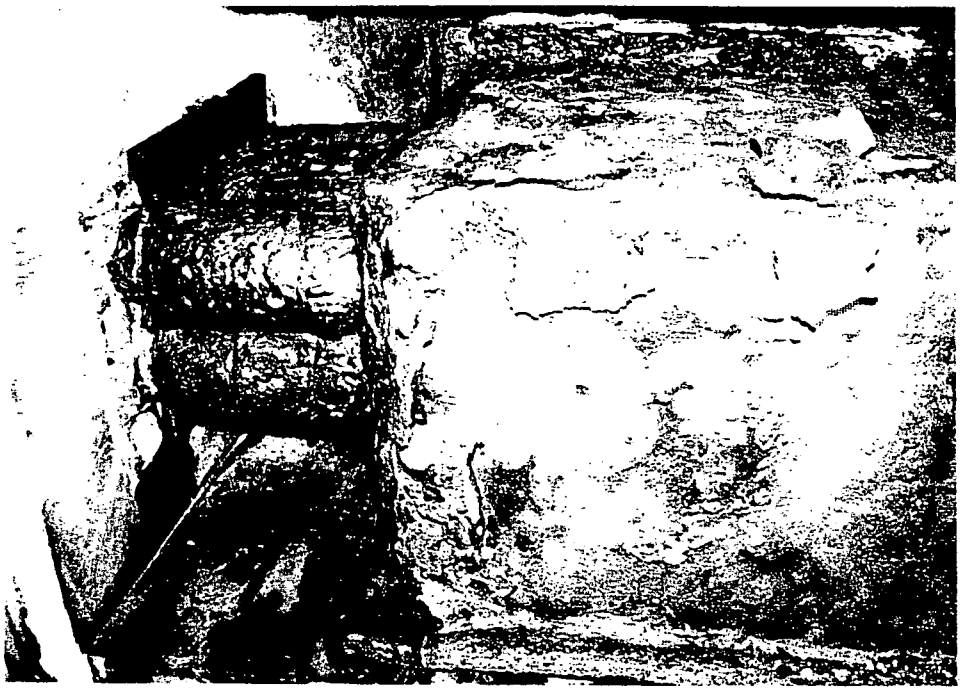
Middle of small enclosure after water hose stream.



End of small enclosure after water hose stream.

End of large enclosure after water hose stream.

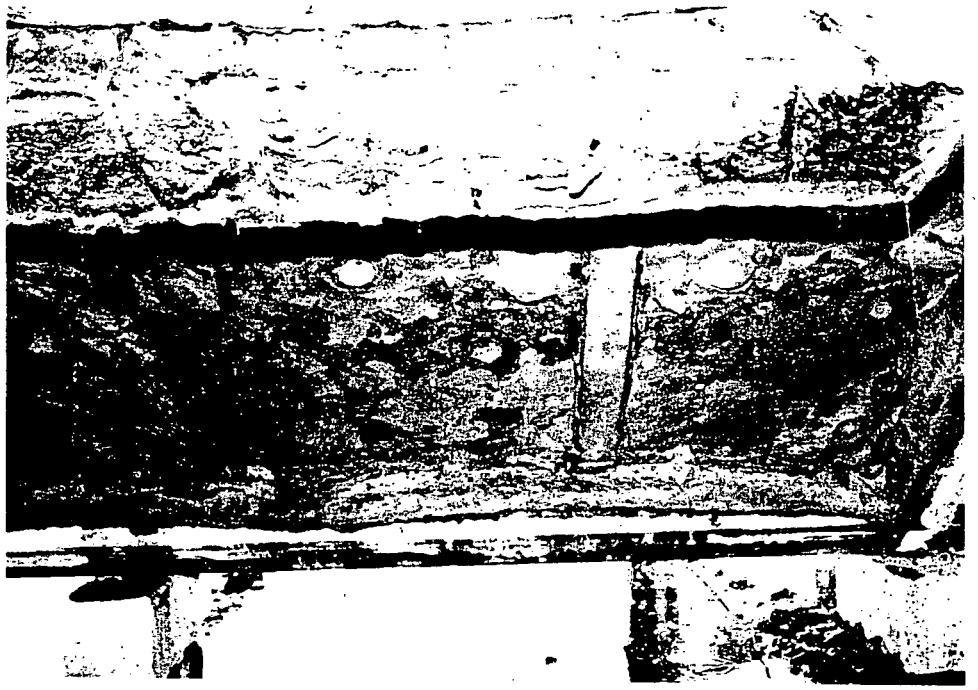
Middle of large enclosure after water hose stream.



Conduit end of large enclosure after water hose stream.

Test deck after water hose stream.

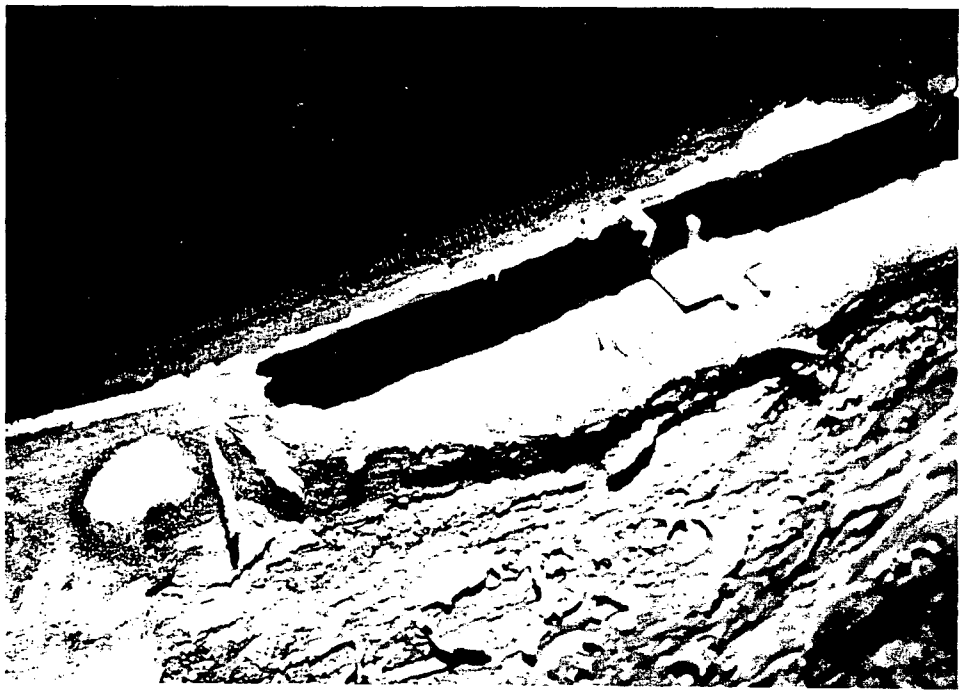
Trowel grade mound knocked loose from small enclosure during hose stream.



Trowel grade mound knocked loose from large enclosure during hose stream.

Trowel grade mounds removed from large enclosure.

External stress skin removed from large enclosure.

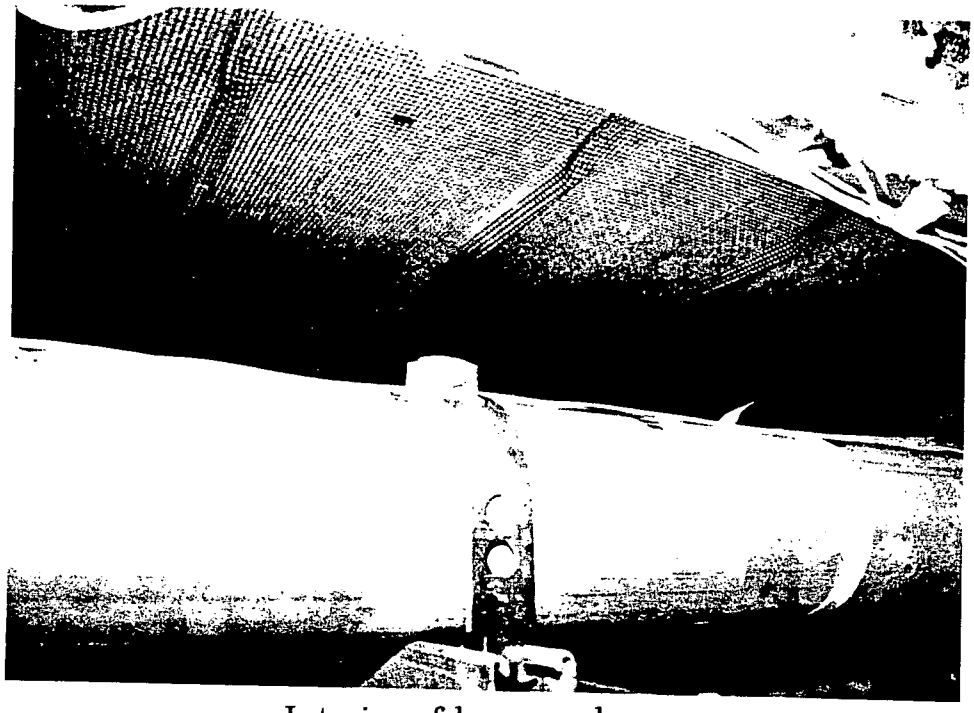


Material removed from bottom of large enclosure.

Strip removed from joint on bottom of large enclosure.

Material removed from bottom of large enclosure.

Material removed from bottom of large enclosure.



Interior of large enclosure.

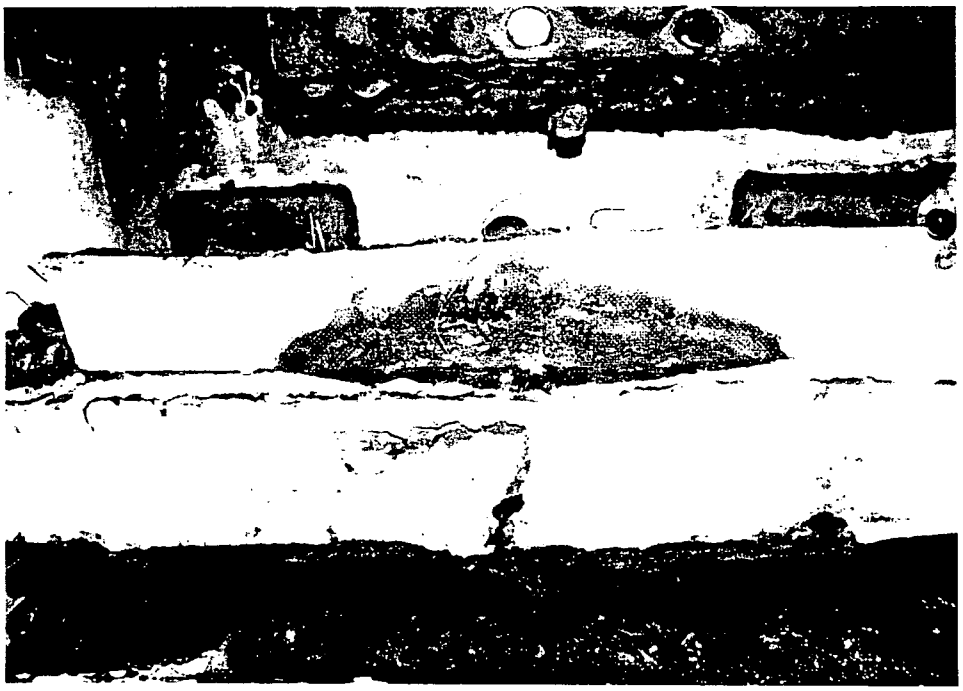
Material removed from side of large enclosure.

Material removed from side of large enclosure.

Material removed from conduits at end of large enclosure.

Material removed from conduits at end of large enclosure.

Material removed from bottom of right tray support.

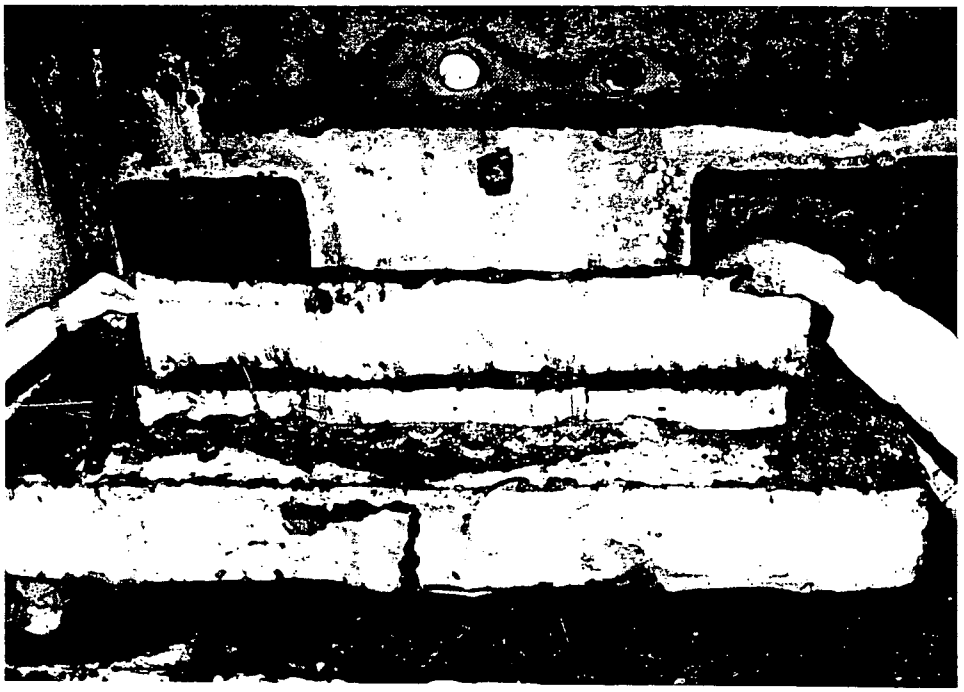


Material removed from rear of bottom bar of right support (bare tray on bar).

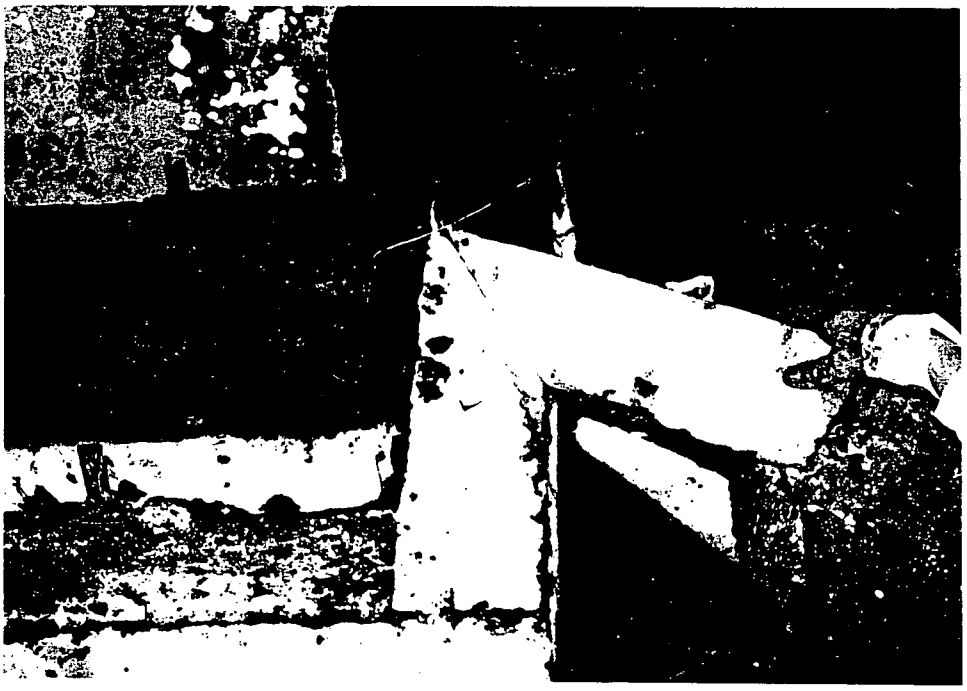
Rear of bottom bar of right support with material removed.

Material removed from right vertical leg of right support.

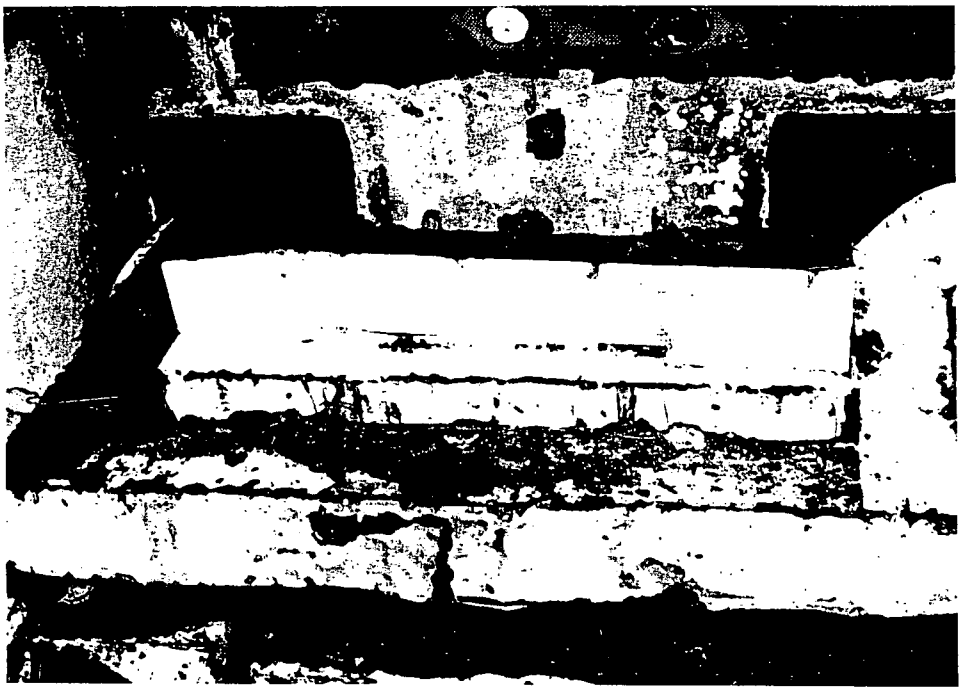
Material removed from left vertical leg of right support.



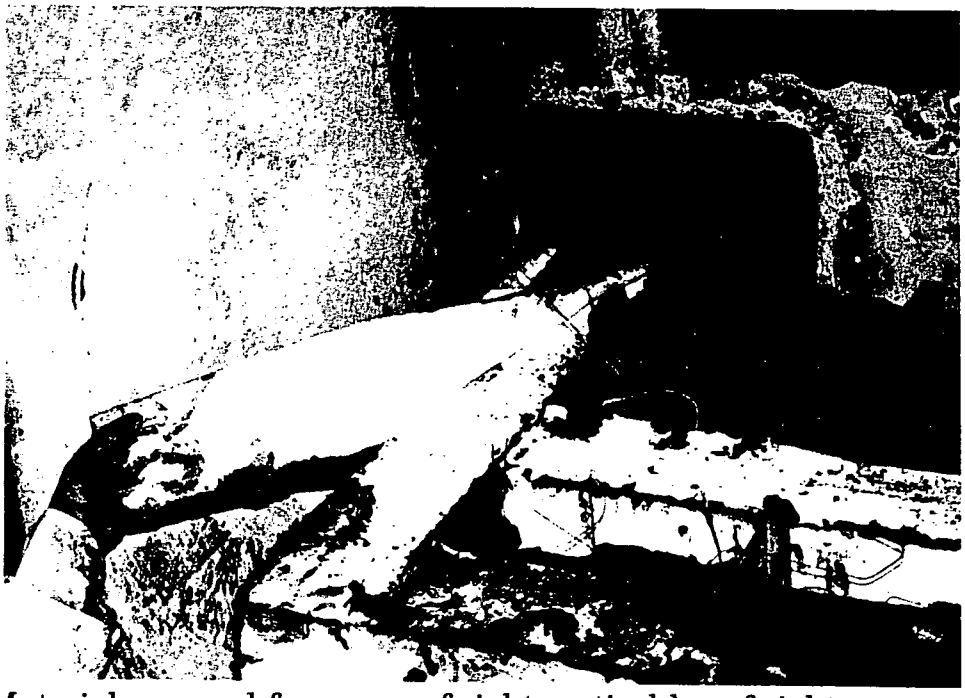
Material removed from bottom of middle bar of right support.



Material removed from rear of left vertical leg of right support.



Material removed from rear of middle bar of right support.

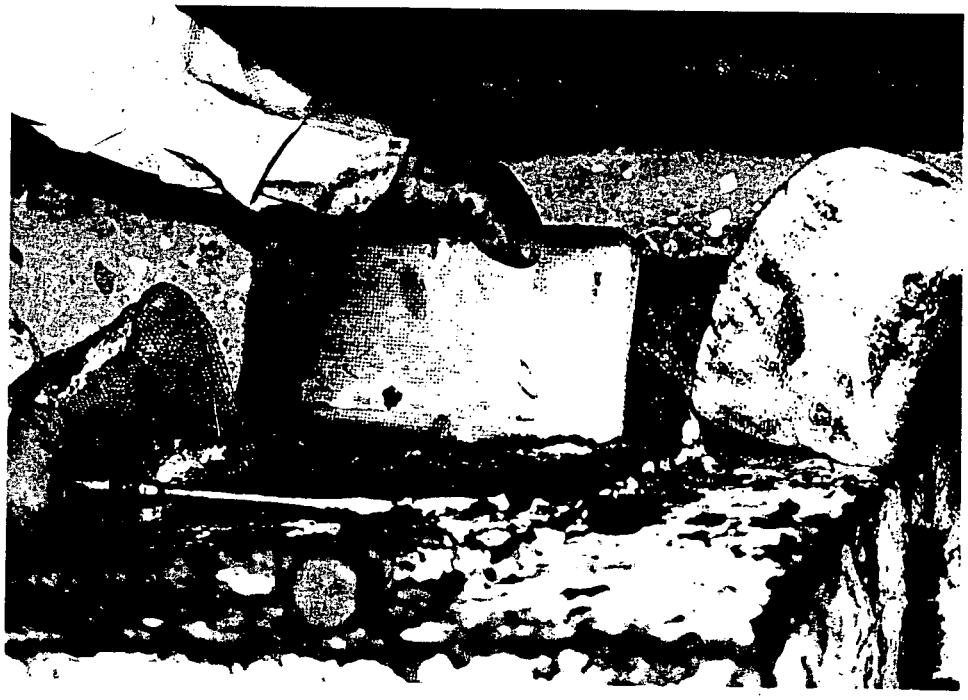


Material removed from rear of right vertical leg of right support.

External stress skin and panel removed from rear of center, wrapped tray of right support.

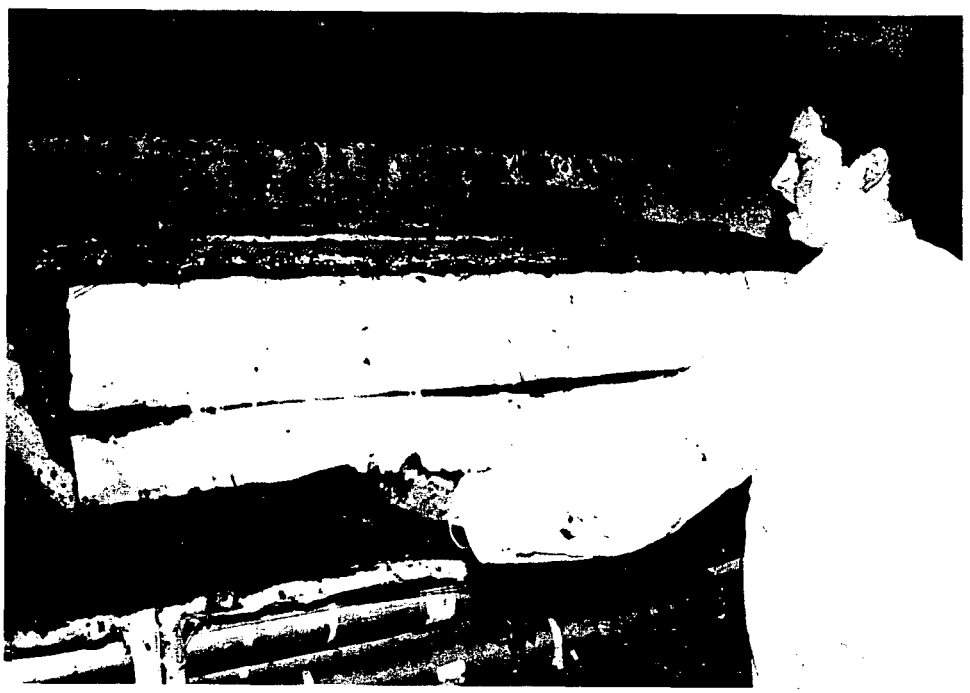
Material removed from rear of top bar of right support (under bare tray).

Material removed from top left side of bottom bar of right support (with bare tray).

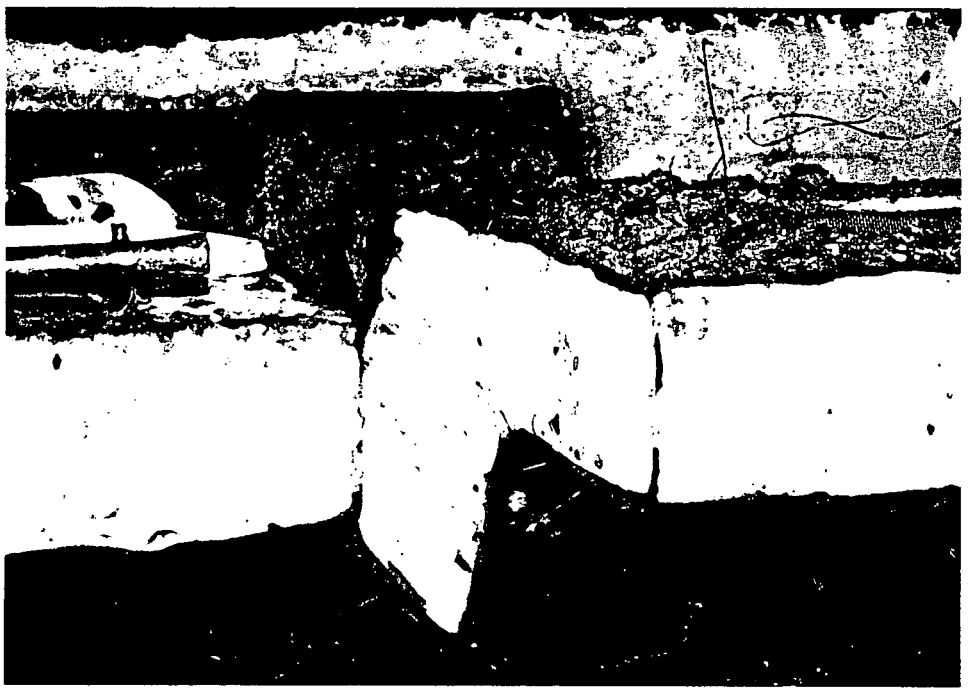


Material removed from top left side of top bar of right support (with bare tray).

Material removed from top left of middle bar of right support (with wrapped tray).

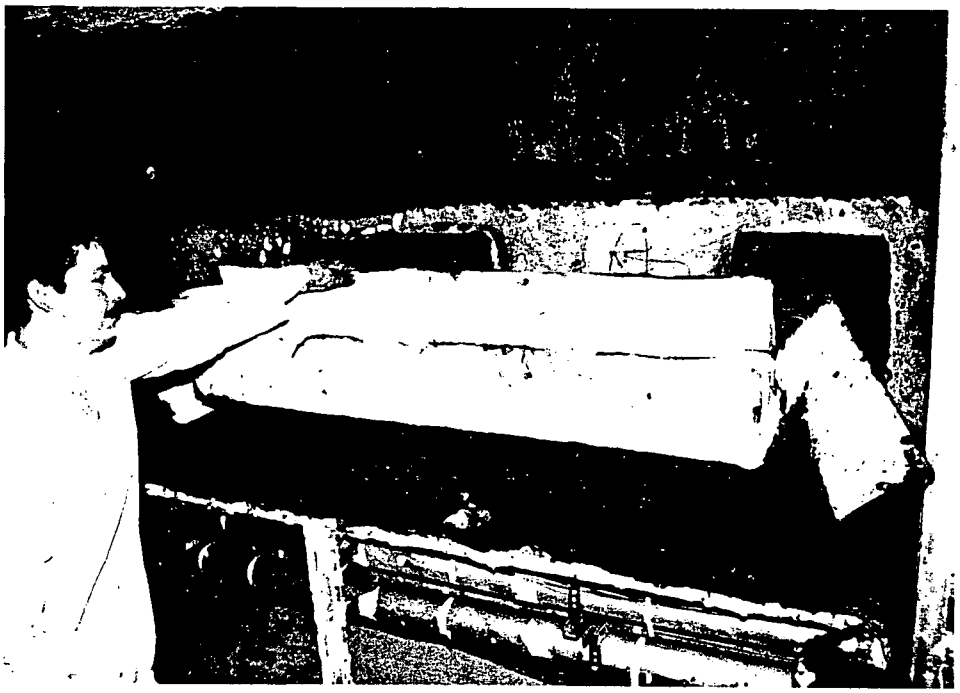


Material removed from bottom of left tray support.

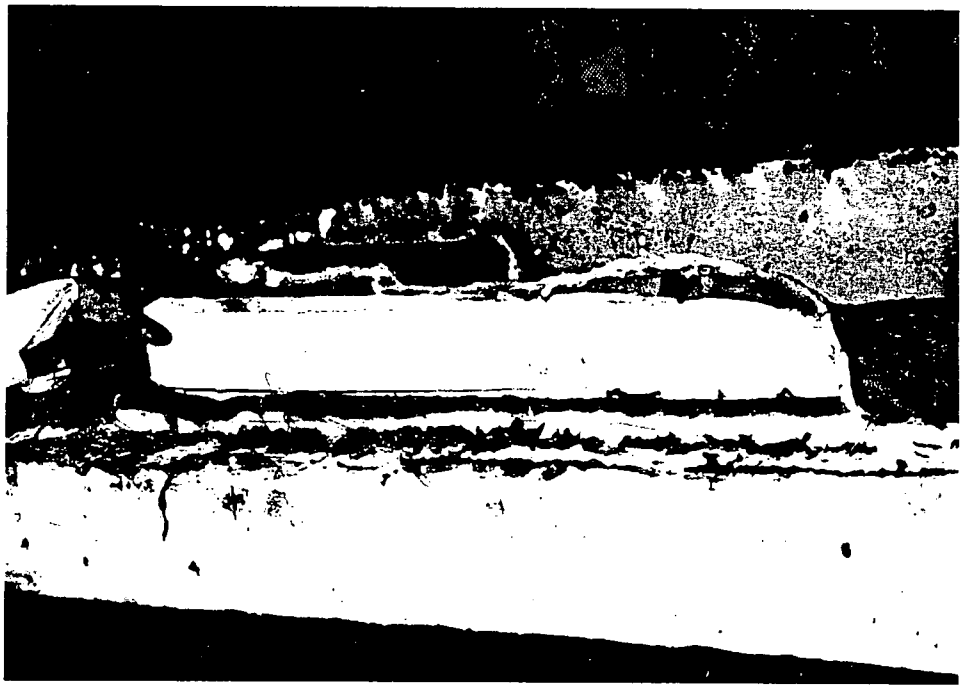


Material removed from right side of left vertical leg of left support.

Material removed from left side of left vertical leg of left support.

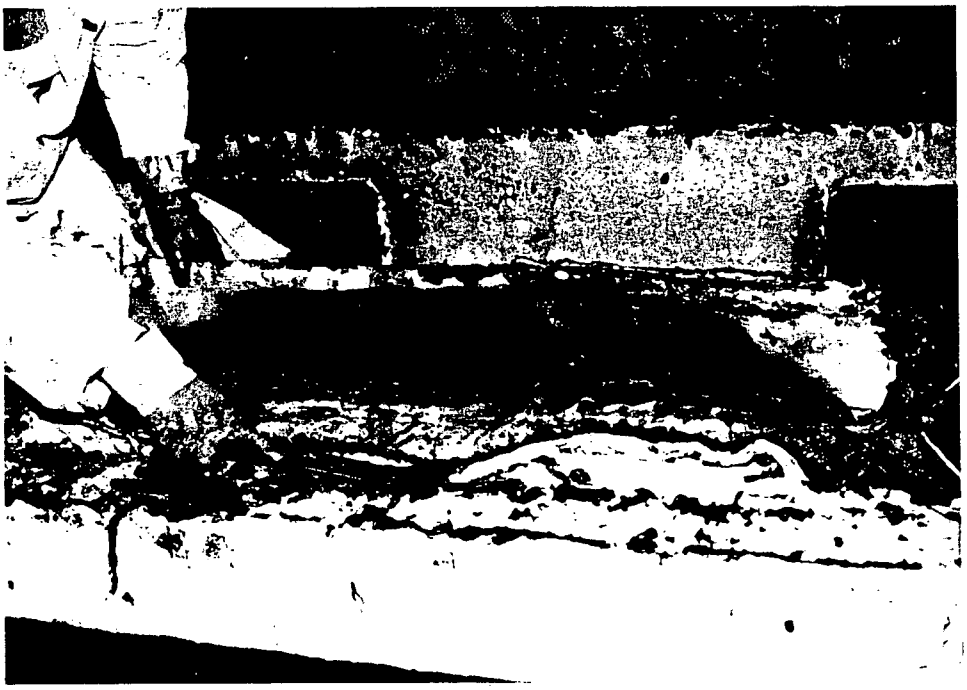


Material removed from rear of bottom bar of left support.

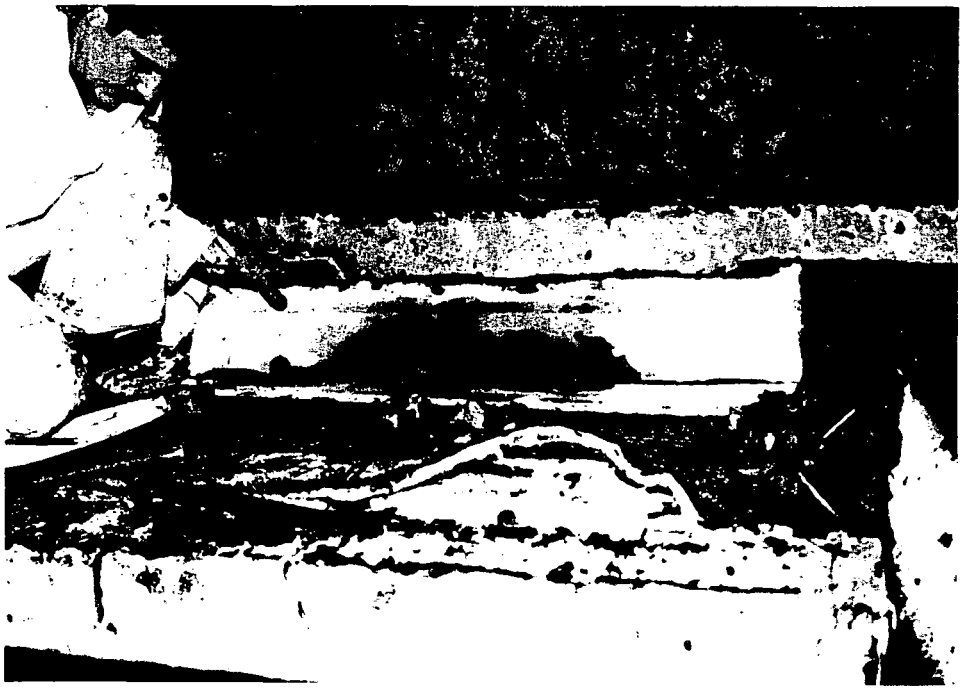


External stress skin and panel removed from rear of wrapped tray on left support.

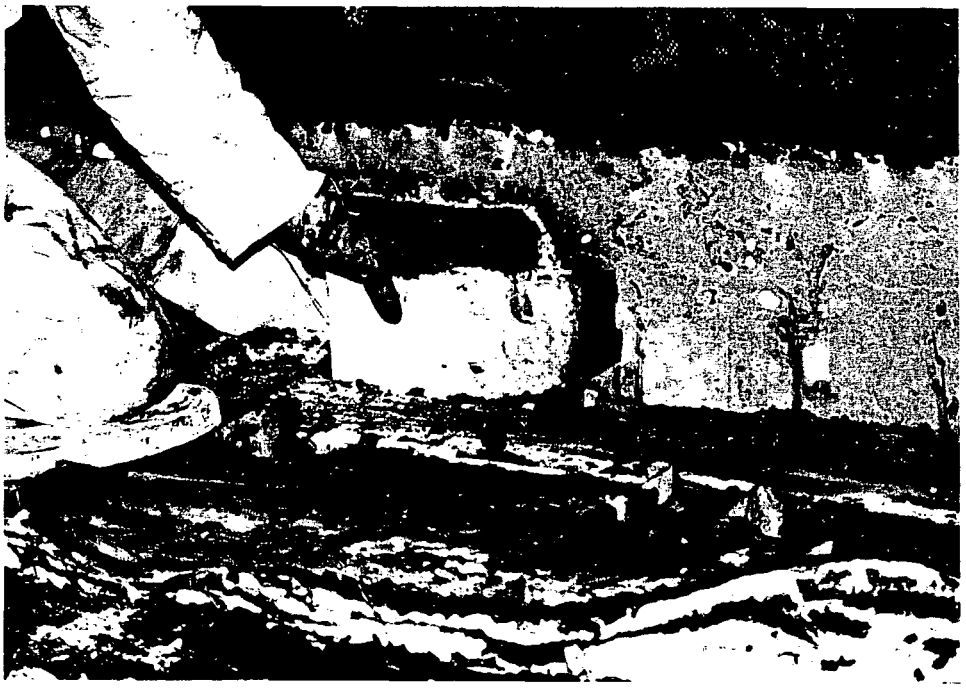
Material removed from rear of right leg of left support.



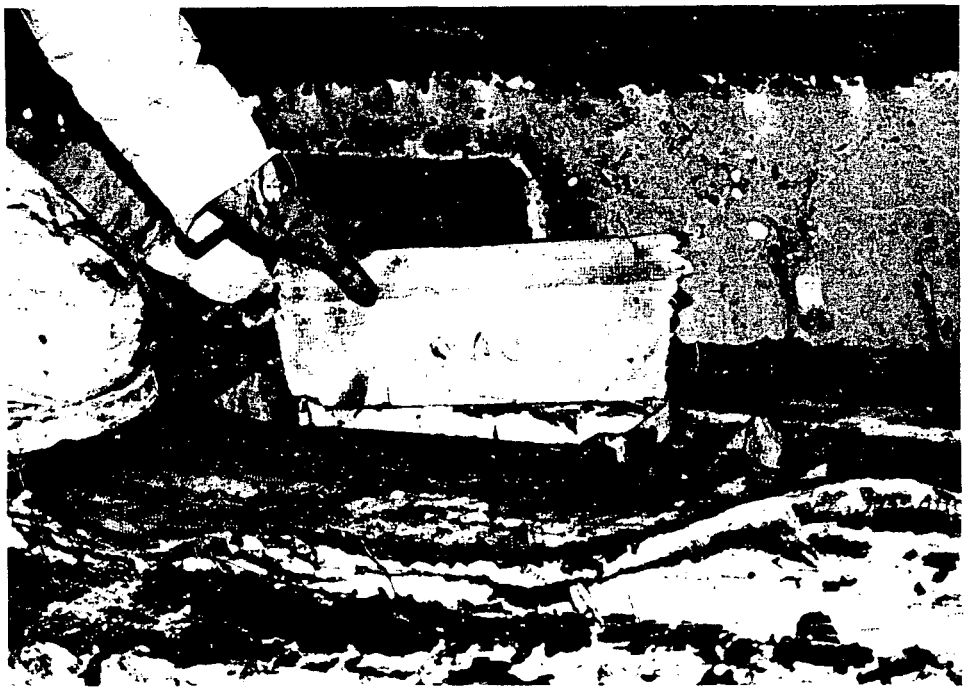
Material removed from rear of middle bar of left support (with bare trays).



Material removed from rear of top bar of left support (with bare tray).



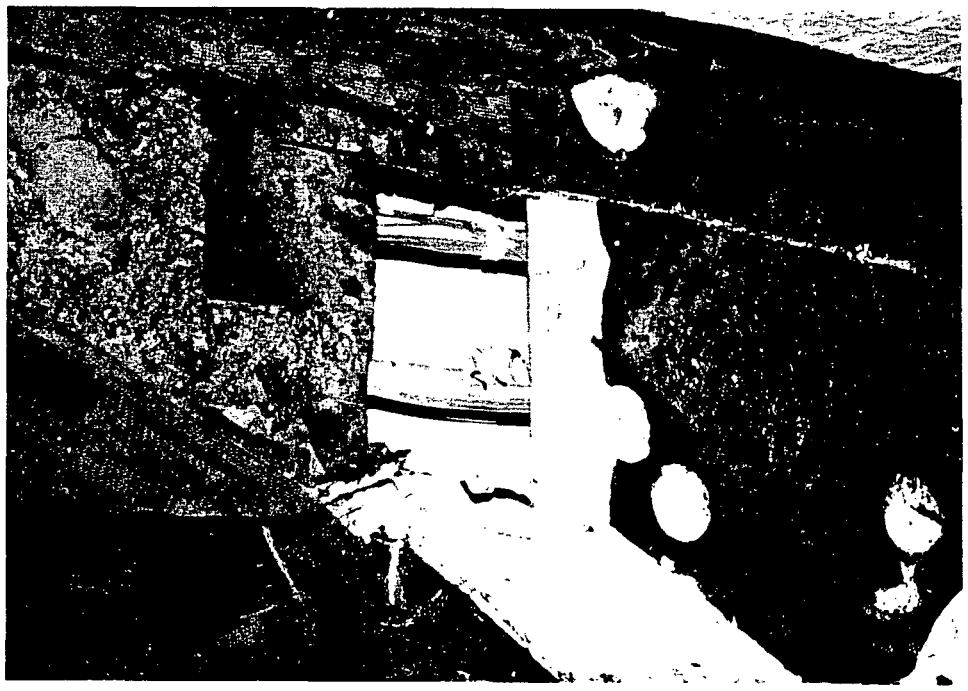
Material removed from right top of top bar on left support (with bare tray).



Material removed from bottom right of top bar of left support.

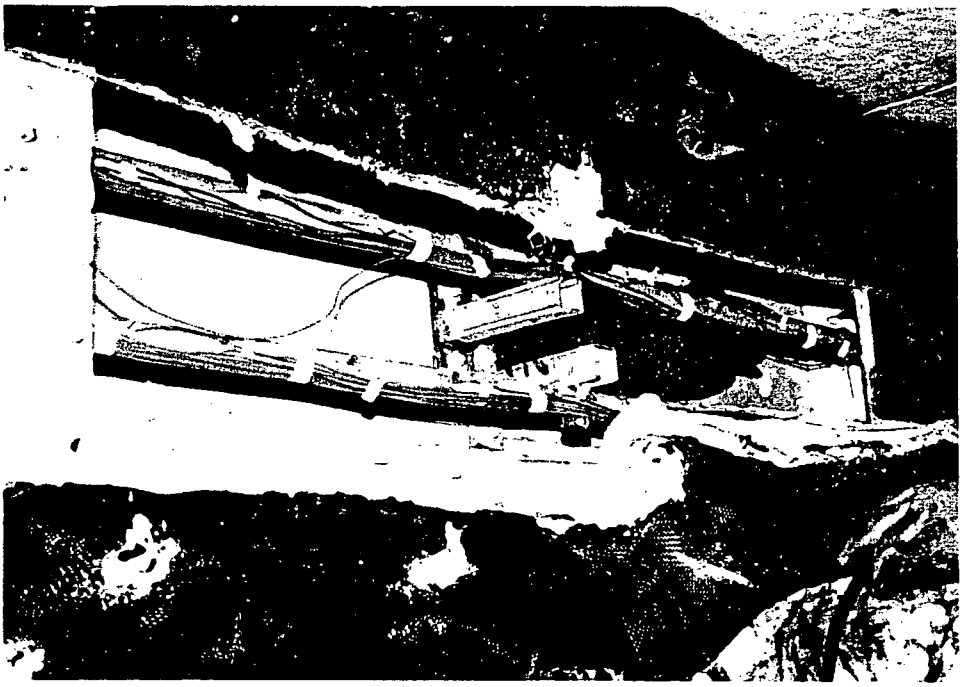
Material removed from rear of left leg of left support.

External stress skin removed from small enclosure.

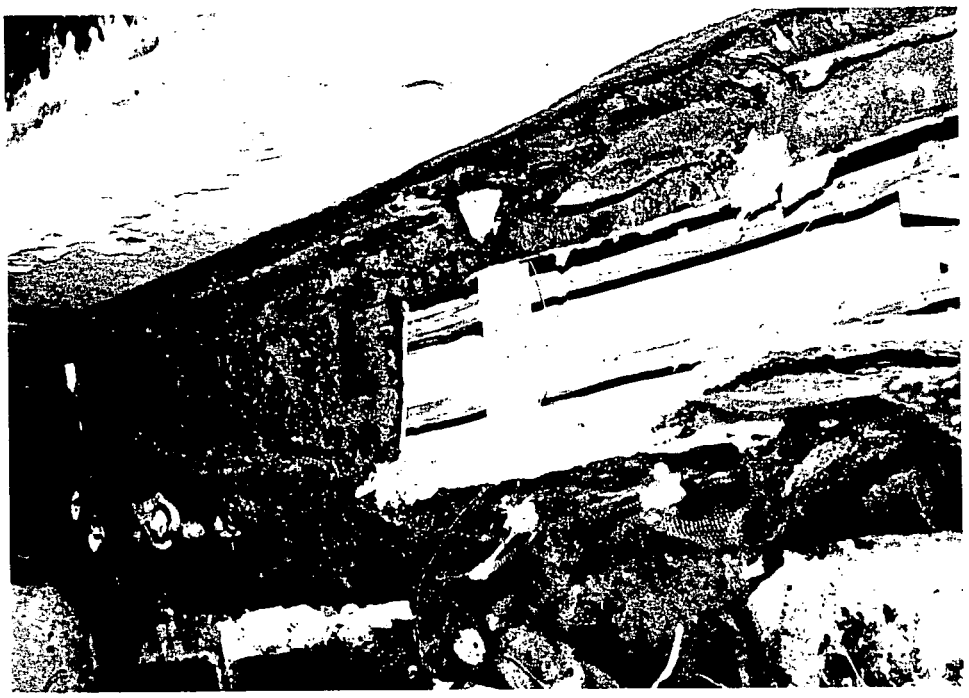


Material removed from small enclosure.

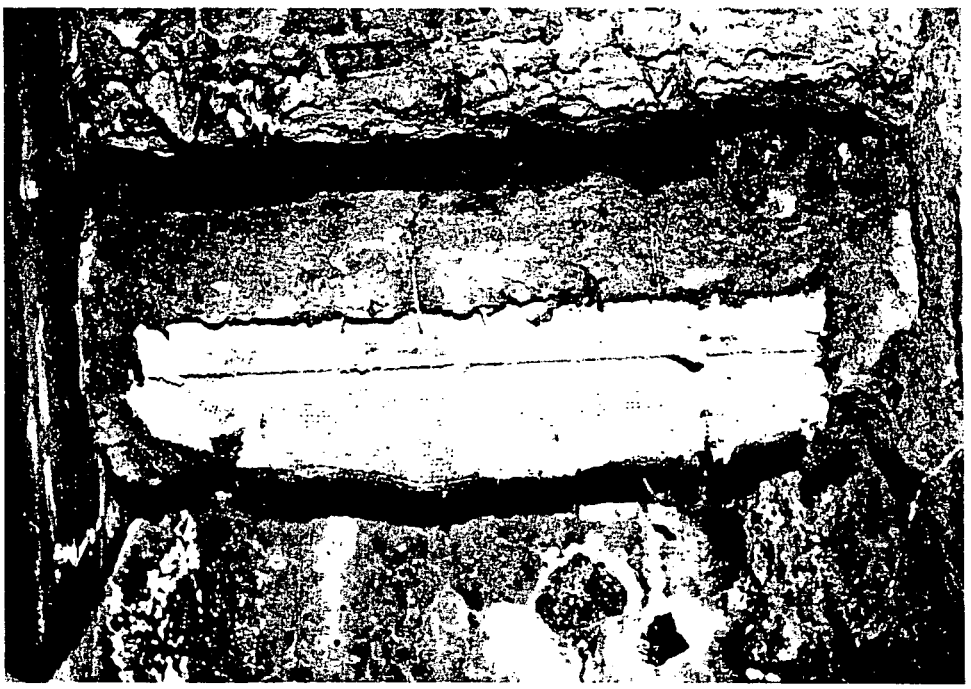
Material removed from small enclosure.



Interior of small enclosure.



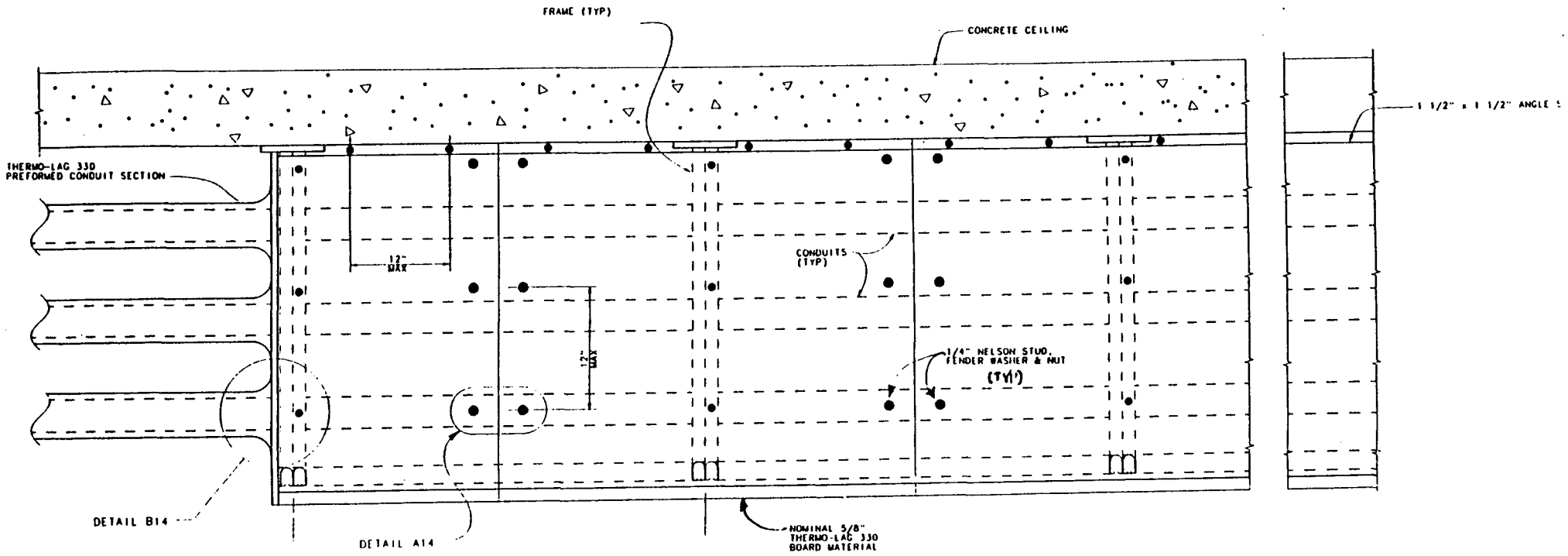
Interior of small enclosure.

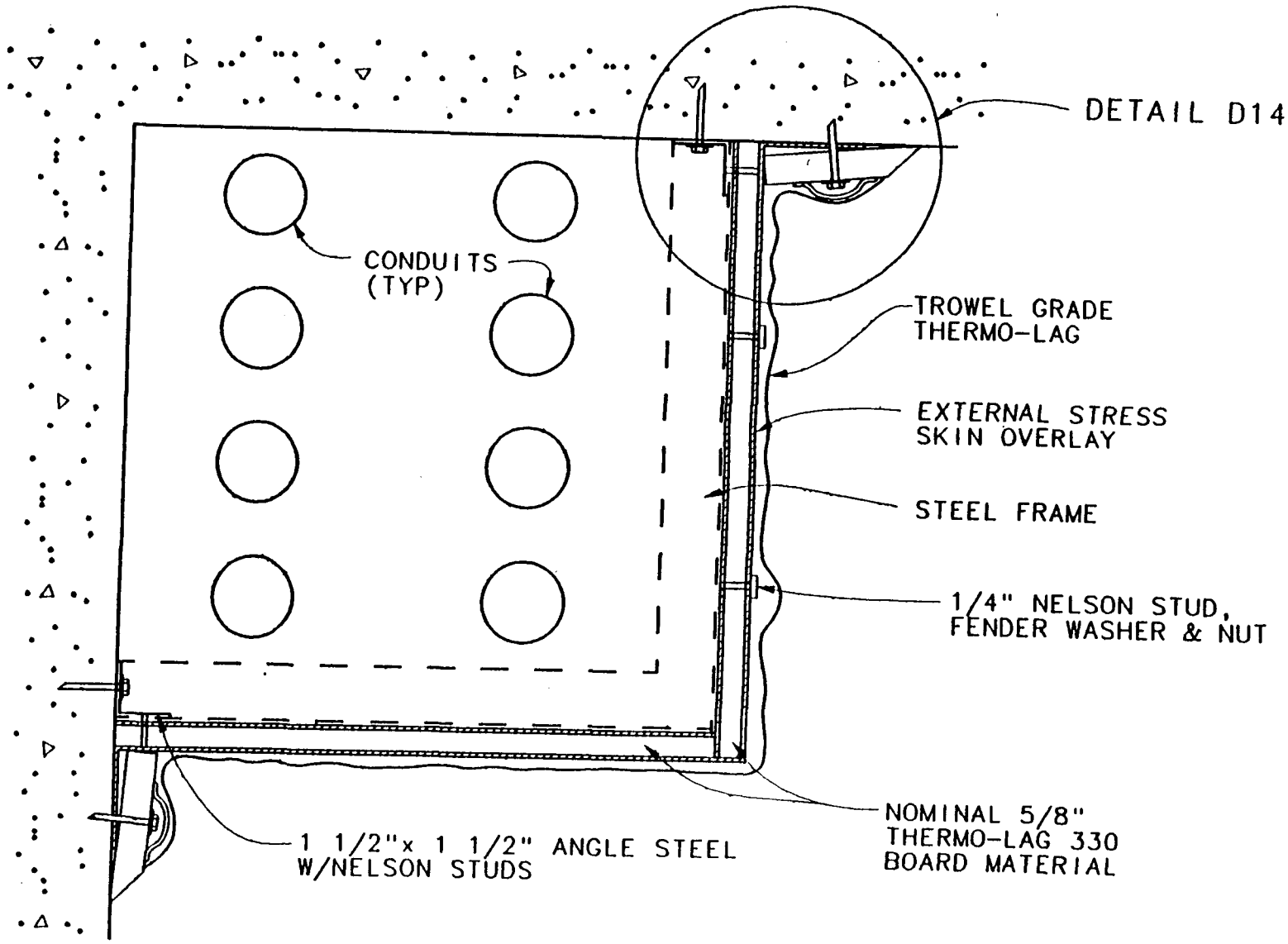


Material removed from conduits at end of small enclosure.

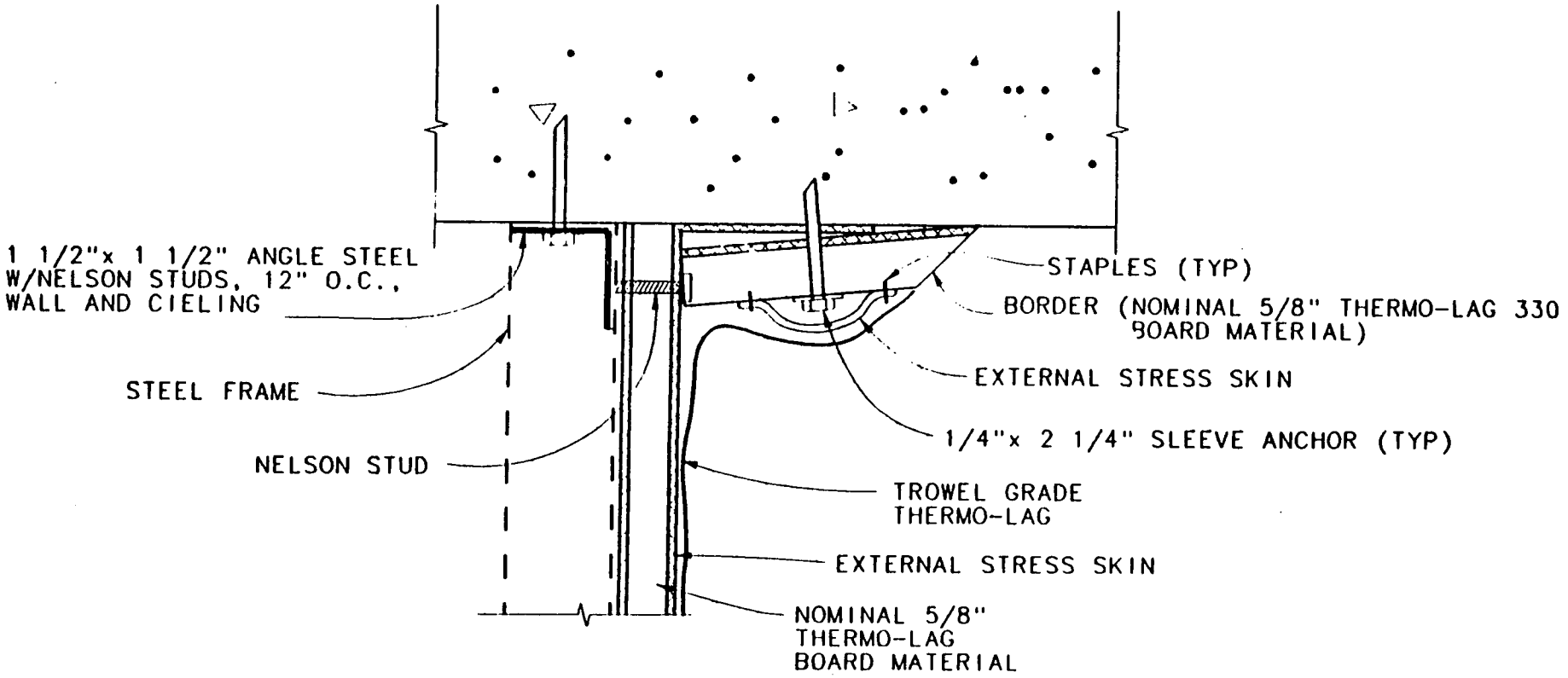
Appendix G

THERMO-LAG® INSTALLATION DETAILS

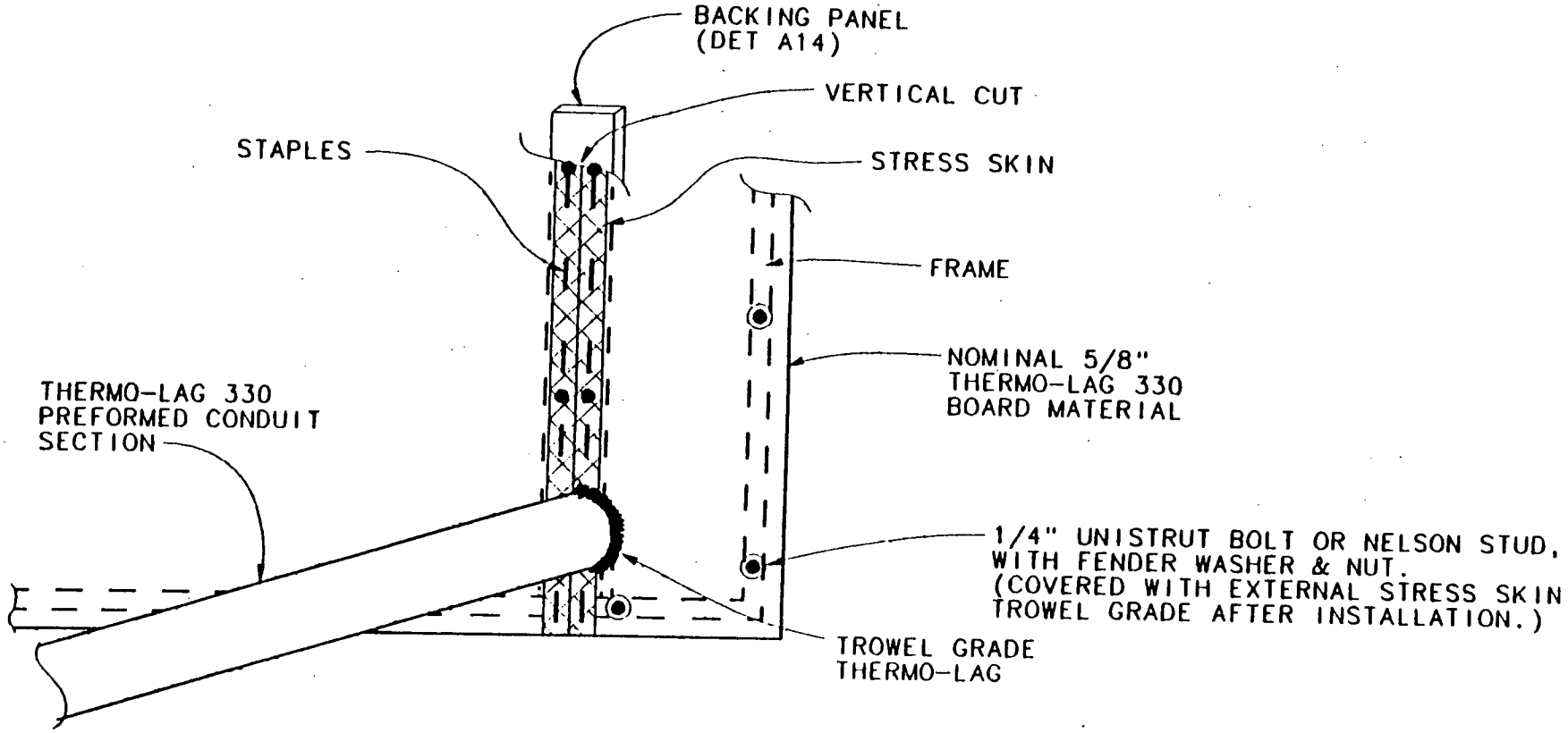

FRAME (TYP)
CONCRETE CEILING
1 1/2" x 1 1/2" ANGLE S
THERMO-LAG 330
PREFORMED CONDUIT SECTION
12"
MAX
CONDUITS
(TYP)
12"
MAX
1/4" NELSON STUD,
FENDER WASHER & NUT
(TYP)
DETAIL B14
DETAIL A14
NOMINAL 5/8"
THERMO-LAG 330
BOARD MATERIAL



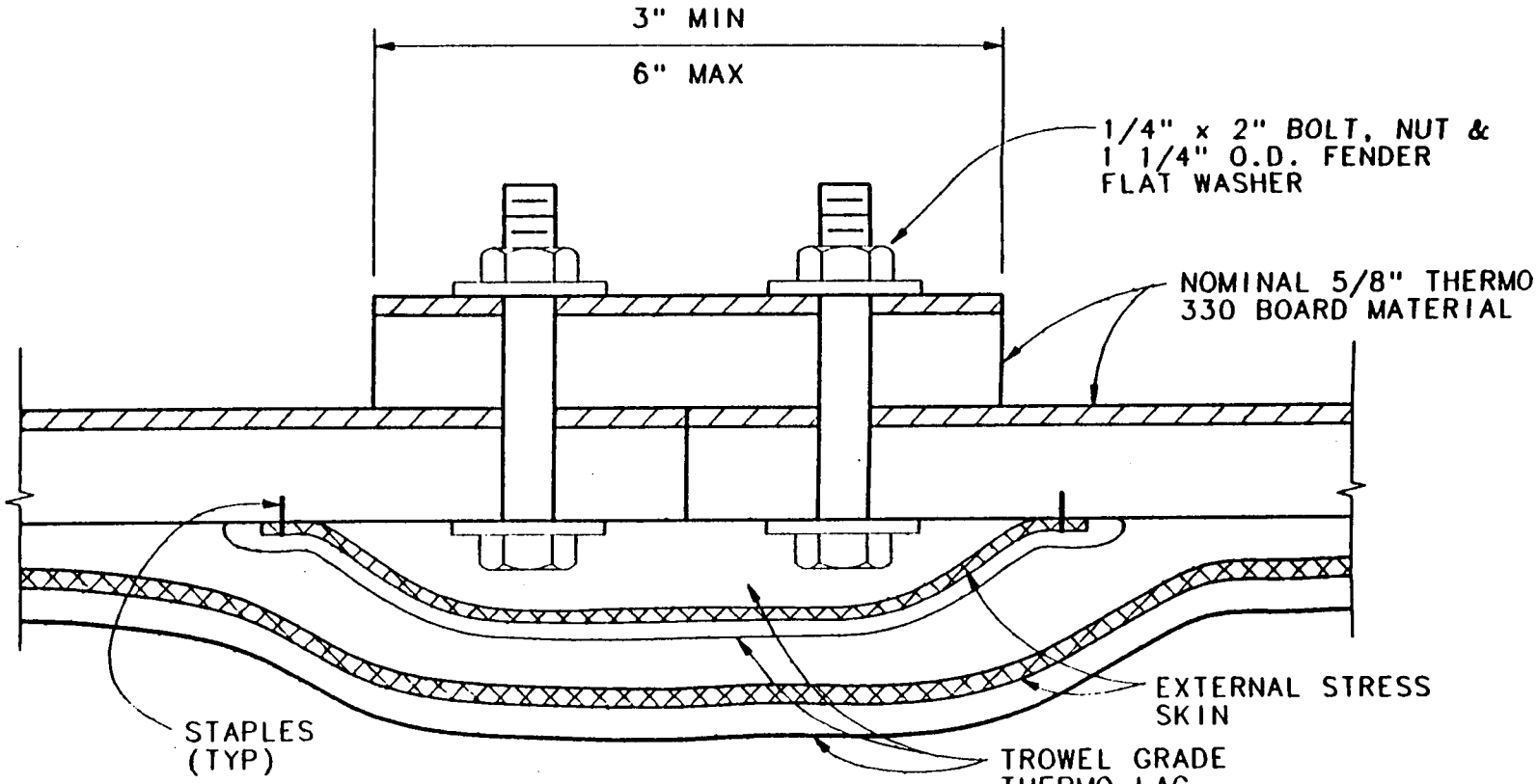
TYPICAL END VIEW TWO SIDE ENCLOSURE



DET D14
CONCRETE - THERMO-LAG INTERFACE



DET B14
THERMO-LAG END BOARD
PREFORMED CONDUIT SECTION INTERFACE



DET A14
JOINT BACKING BOARD