NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 666-6911

April 18, 1984

Docket No. 50-423
B11134

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Reference: (1) B. J. Youngblood letter to W. G. Counsil, Draft SER, dated December 20, 1983.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 3
Response to Materials Engineering Branch DSER Open Items

Attached is the Northeast Nuclear Energy Company (NNECO) response to the Materials Engineering Branch, Component Integrity Section DSER open items MTEB 251.1, MTEB 01(54), MTEB 02(55), and MTEB 03(56) concerning Millstone Unit No. 3 compliance with Appendices G and H of 10CFR50. We expect this response will resolve the Staff's concerns regarding these open items.

If there are any questions, please contact our licensing representative.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL

By Northeast Nuclear Energy Company Their Agent

W. G. Counsil

W. G. Counsil
Senior Vice President

C. F. Sears

By: C. F. Sears
Vice President
Nuclear and Environmental Engineering

B001
1/1

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me C. F. Sears, who being duly sworn, did state that he is Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Lorraine J. D'Amico
Notary Public

My Commission Expires March 31, 1988

Millstone Nuclear Power Station, Unit No. 3

Open Items

Materials Engineering Branch

Component Integrity

MTEB 251.1 Appendix G and H, 10CFR50 (Draft SER Section 5.3.2)

Appendices G and H, 10CFR Part 50 were revised in the Federal Register on May 27, 1983 and became effective on July 26, 1983. To demonstrate compliance with these requirements:

a. Provide full Charpy V-notch curves for the reactor beltline materials. The curves should be in terms of fracture energy (ft-lbs) and lateral expansion (mils) versus test temperature (°F).

b. Indicate the base and weld materials in the surveillance capsules. The identification should include the following:

   (1) Chemical composition
   (2) Heat treatment
   (3) Plate number for base materials and weld control number for weld materials.

c. Indicate the lead factors for all the surveillance capsules and their azimuthal positions within the reactor pressure vessel.

d. Provide technical justification for the surveillance capsule withdrawal schedule as outlined in Section 5.3.1.6 of the Millstone Nuclear Power Station, Unit No. 3 FSAR.

e. Provide pressure-temperature limits for the Millstone Nuclear Power Station, Unit No. 3 reactor vessel.

Response

Part (a) Please find attached (Figures 1 through 7) the Charpy V-notch curves for the Millstone Unit No. 3 reactor beltline materials. These curves originate from Combustion Engineering test data.

(b) Intermediate shell plate B9805-1, Lukens heat no. C4039-2 is the surveillance base material. The chemical composition (C-E analysis) and heat treatment of plate B9805-1 is given in Table 1.

The surveillance weld joins intermediate shell plate B9805-1 and lower shell plate B9820-2 (Luken's heat no. D1242-2), and represents the reactor vessel closing girth seam. It is of wire type B-4, wire heat no. 4P6052, flux type Linde 0091, and flux lot no. 0145. It is identified by weld control no. G1.59. The weldment chemical

composition (C-E analysis) and heat treatment is given in Table 2.

(c) The surveillance capsule azimuthal positions, and their corresponding lead factors are as follows:

Vessel Location	Lead Factor
58.5°	4.00
61°	3.69
121.5°	4.00
238.5°	4.00
241°	3.69
301.5°	4.00

(d) The revised surveillance capsule removal schedule is as follows:

Removal Time	Time Capsule Fluence (n/cm^2)
1st Refueling	3.60×10^{18}
5 EFPY	1.33×10^{19}
9 EFPY	2.38×10^{19}
15 EFPY	4.31×10^{19}
Standby	---
Standby	---

This schedule meets the requirements of ASTM E185-79. The Millstone weld metal is the most limiting surveillance material based upon predicted adjustments of reference temperature, ΔRT_{NDT}, per Regulatory Guide 1.99. With a calculated EOL ΔRT_{NDT} of less than 100°F, ASTM E185-79 requires that the program contain a minimum of 3 capsules which are to be removed at three (3) different times in plant life. Since six capsules are contained in the Millstone Unit 3 program, Westinghouse recommends removal of four capsules rather than three capsules during the plant's life. The removal schedule selected allows for the removal of the first capsule as soon as it is practical to assure that the material is not sensitive to irradiation. The second and third capsule removals are selected to represent 1/4T

and inner wall end-of-life fluences, respectively. The fourth capsule removal is to represent between one to two times the inner wall end-of-life fluence, and will provide valuable data should the utility wish to extend the plant's design life.

(e) Heatup and Cooldown curves are attached as Figures 1a and 2a.

TABLE 1

CHEMICAL COMPOSITION OF PLATE B9805-1 (WT.%)

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V
.23	1.32	.010	.010	.21	.61	.03	.57	.05	.006

Heat Treatment: Stress relieved 23 hours, 36 minutes at 1150 ± 50°F.

TABLE 2

CHEMICAL COMPOSITION OF WELD WIRE HEAT NO. 4P6052

LINDE 0091 FLUX, LOT NO. 0145 (WT. %)

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V
.14	1.25	.011	.009	.12	.03	.03	.48	.07	.004

Heat Treatment: Stress relieved 7 hours, 45 minutes at 1150 ± 50°F.

FIGURE 1

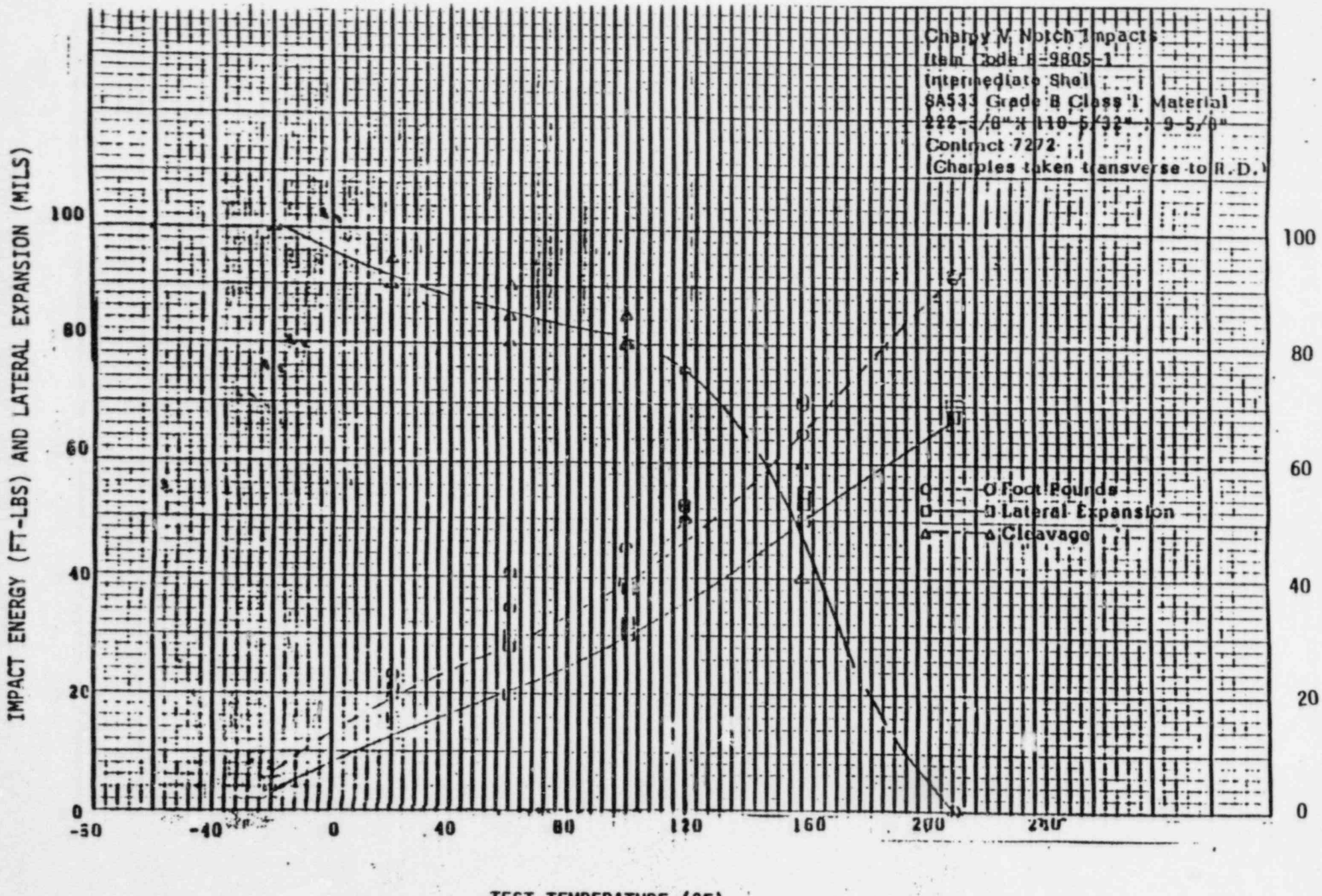

Charpy V Notch Impacts
Item Code E-9805-1
Intermediate Shel
SA533 Grade B Class 1 Material
222-5/8" x 110-5/32" x 9-5/8"
Contract 7272
(Charples taken transverse to R.D.)
O Foot Pounds
□ Lateral Expansion
△ Cleavage
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
0
20
40
60
80
100
-50
-40
0
40
80
120
160
200

FIGURE 2

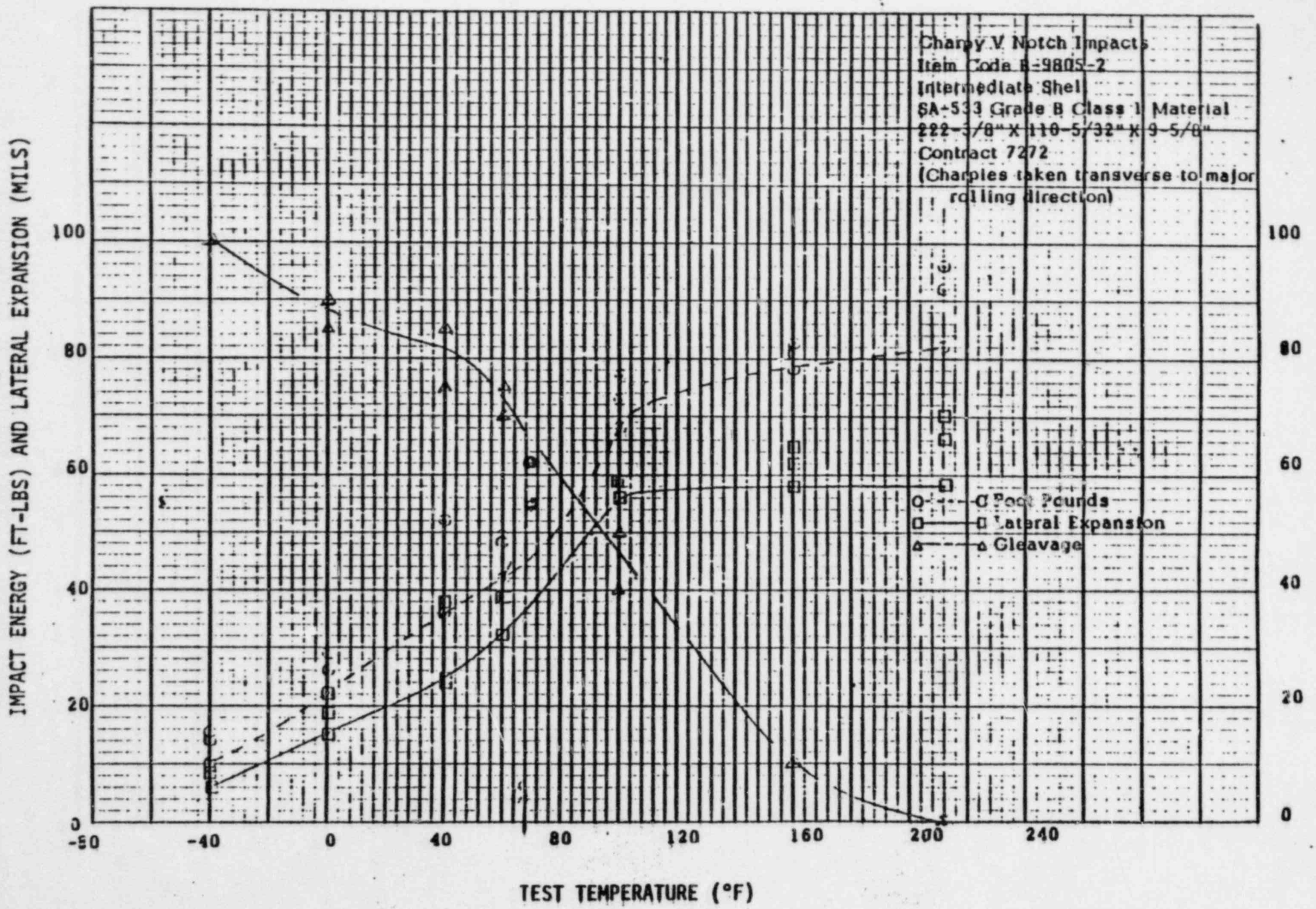

Charpy V Notch Impacts
Item Code B-9805-2
Intermediate Shell
SA-533 Grade B Class 1 Material
222-3/8" X 110-5/32" X 9-5/8"
Contract 7272
(Charpies taken transverse to major rolling direction)
Foot Pounds
Lateral Expansion
Cleavage
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
0
20
40
60
80
100
-80
-40
0
40
80
120
160
200
240

FIGURE 3

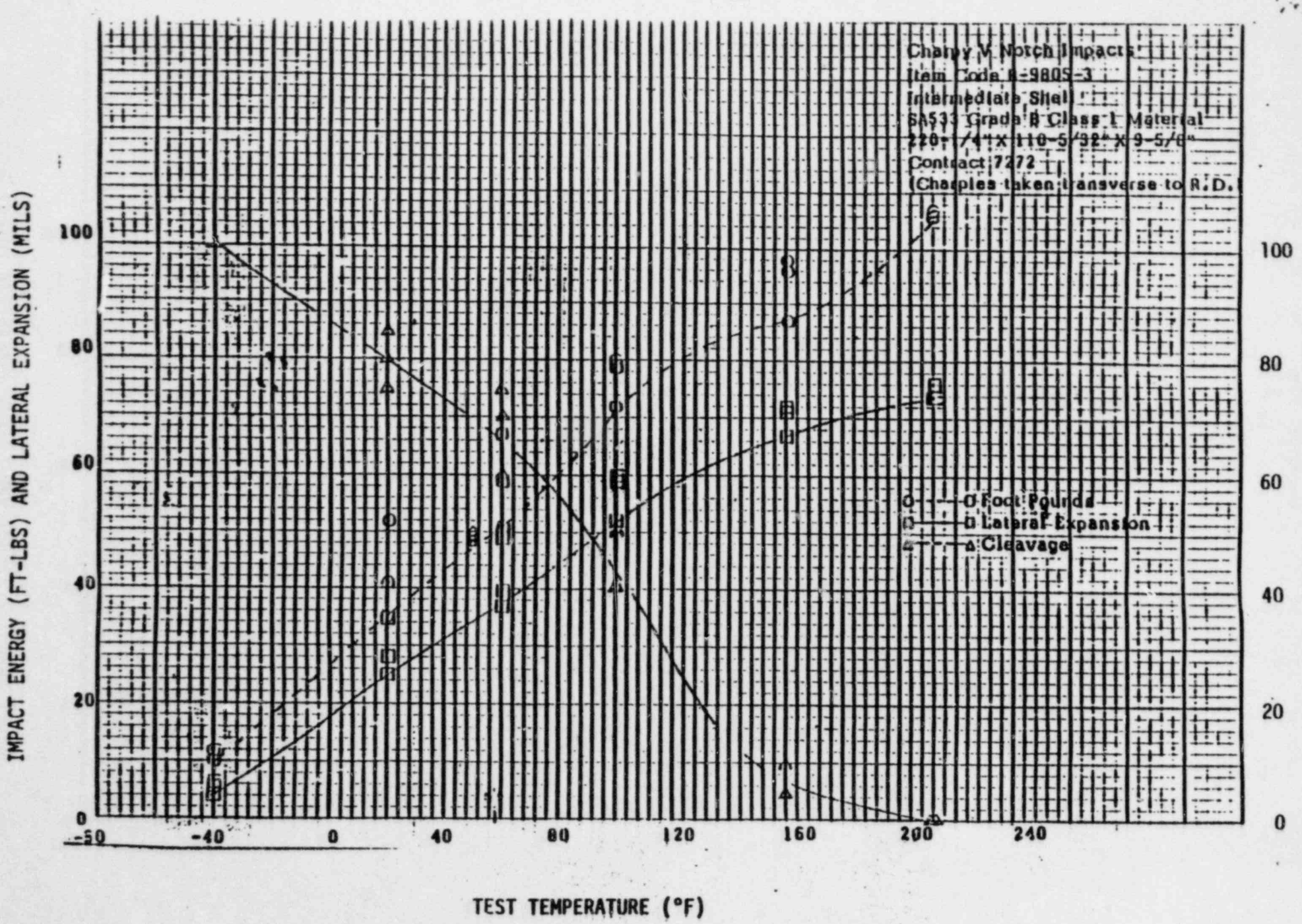

Charpy V Notch Impacts
Item Code B-9805-3
Intermediate Shel
SA533 Grade B Class 1 Material
220 - 1/4" X 110-5/32" X 9-5/8"
Contract 7272
(Charpies taken transverse to R.D.
O Foot Pounds
□ Lateral Expansion
△ Cleavage
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
0
20
40
60
80
100
-50
-40
0
40
80
120
160
200
240

FIGURE 4

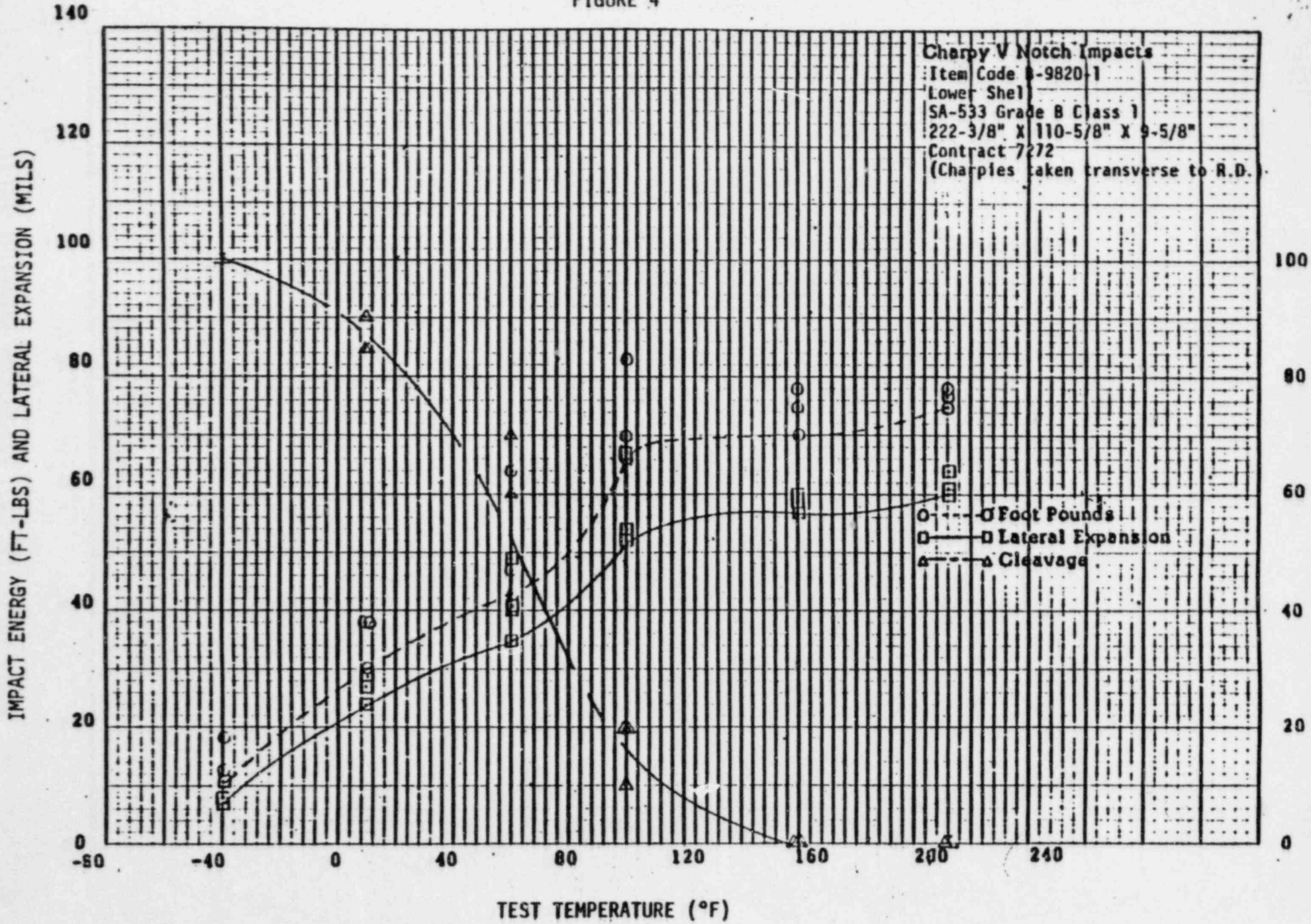

Charpy V Notch Impacts
Item Code B-9820-1
Lower Shell
SA-533 Grade B Class 1
222-3/8" X 110-5/8" X 9-5/8"
Contract 7272
(Charpies taken transverse to R.D.)
Foot Pounds
Lateral Expansion
Cleavage
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
140
120
100
80
60
40
20
0
-80
-40
0
40
80
120
160
200
240

FIGURE 5

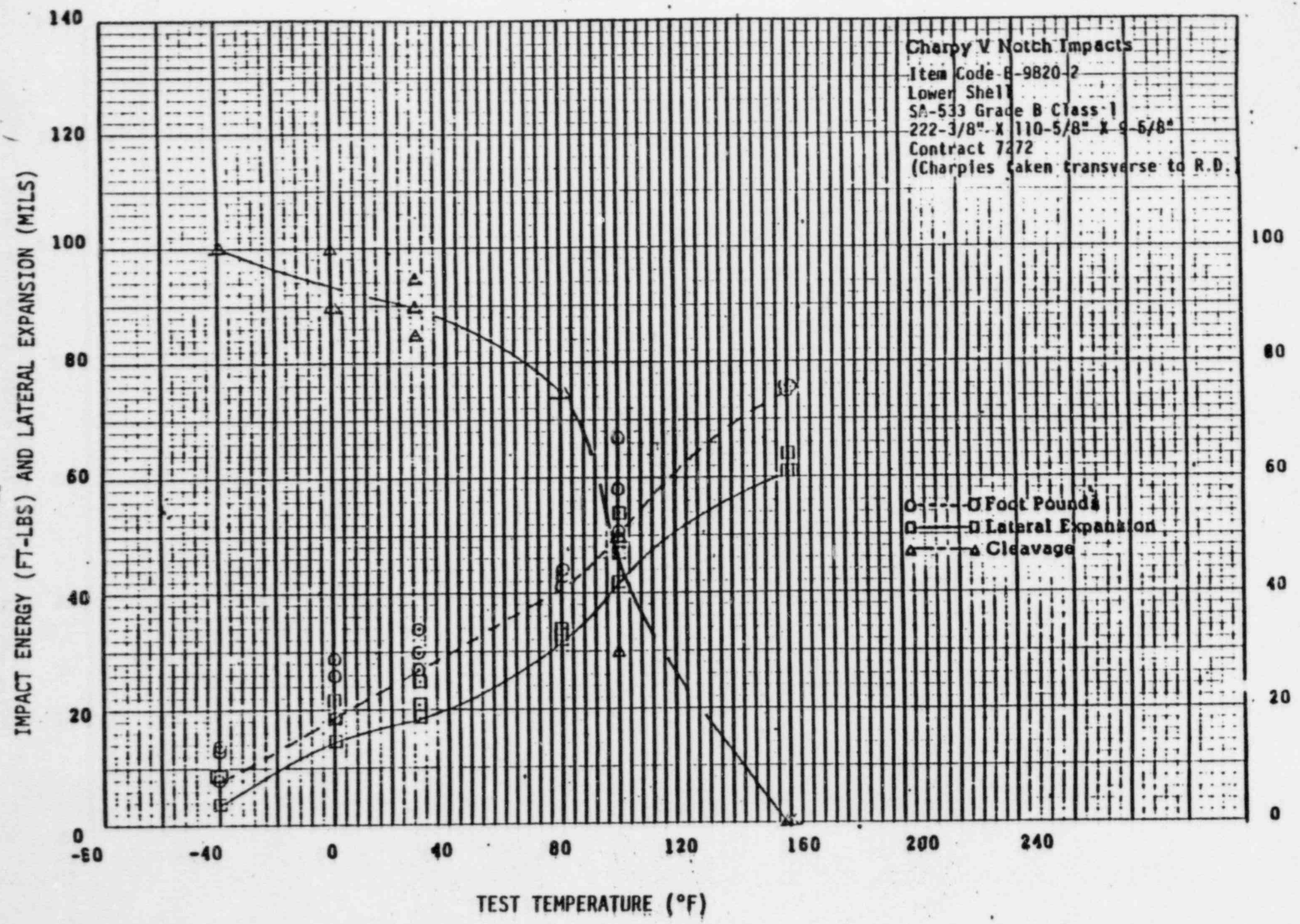

Charpy V Notch Impacts
Item Code B-9820-2
Lower Shell
SA-533 Grade B Class 1
222-3/8" X 110-5/8" X 9-5/8"
Contract 7272
(Charpies taken transverse to R.D.)
Foot Pounds
Lateral Expansion
Cleavage
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
140
120
100
80
60
40
20
0
-80
-40
0
40
80
120
160
200
240

FIGURE 6

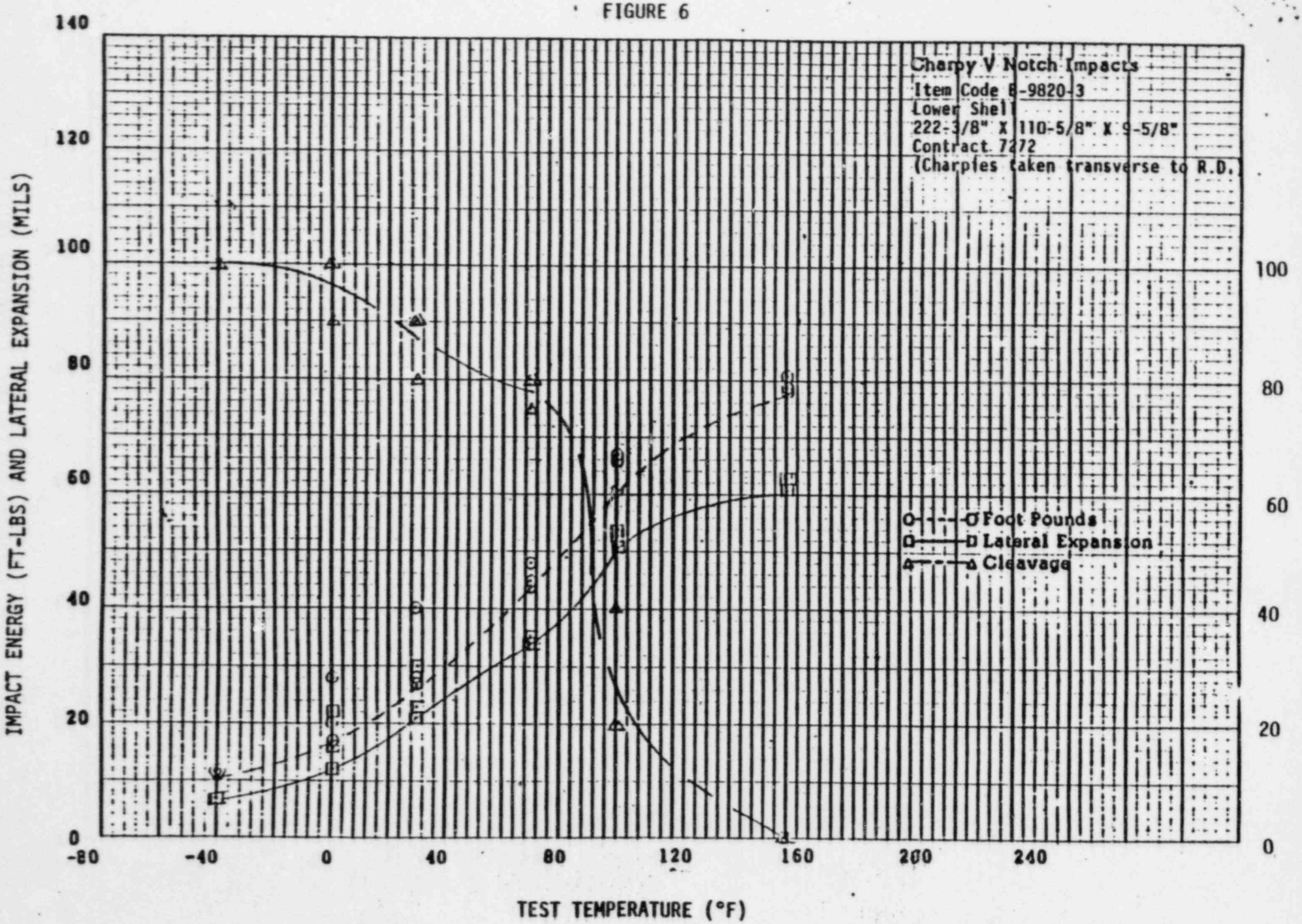
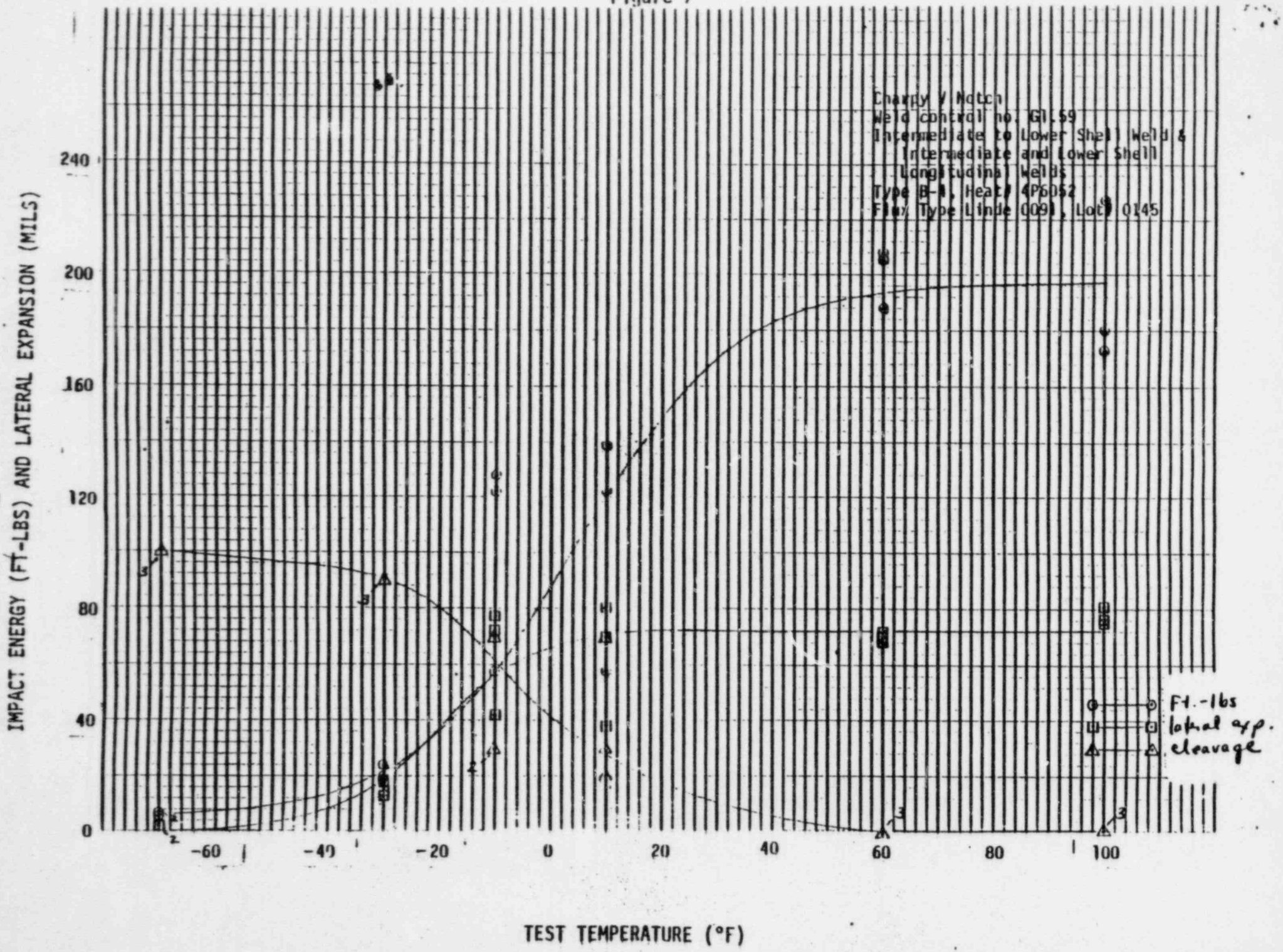

Charpy V Notch Impacts
Item Code 8-9820-3
Lower Shell
222-3/8" X 110-5/8" X 9-5/8"
Contract 7272
(Charpies taken transverse to R.D.
Foot Pounds
Lateral Expansion
Cleavage
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
140
120
100
80
60
40
20
0
-80
-40
0
40
80
120
160
200
240

Figure 7


Charpy V Notch
Weld control no. G1.59
Intermediate to Lower Shell Weld &
Intermediate and Lower Shell
Longitudinal Welds
Type B-A, Heat# 4P6052
Flux Type Linde 0091, Lot# 0145
IMPACT ENERGY (FT-LBS) AND LATERAL EXPANSION (MILS)
TEST TEMPERATURE (°F)
240
200
160
120
80
40
0
-60
-40
-20
0
20
40
60
80
100
Ft.-lbs
lateral exp.
cleavage

MATERIAL PROPERTY BASIS

CONTROLLING MATERIAL	:	PLATE METAL
COPPER CONTENT	:	CONSERVATIVELY ASSUMED TO BE 0.10 WT%
PHOSPHORUS CONTENT	:	0.010 WT%
RT_{NDT} INITIAL	:	60°F
RT_{NDT} AFTER 10 EFPY	:	1/4T, 122°F 3/4T, 101°F

CURVE APPLICABLE FOR HEATUP RATES UP TO 60°F/HR FOR THE SERVICE PERIOD UP TO 10 EFPY AND CONTAINS MARGINS OF 10°F AND 60 PSIG FOR POSSIBLE INSTRUMENT ERRORS

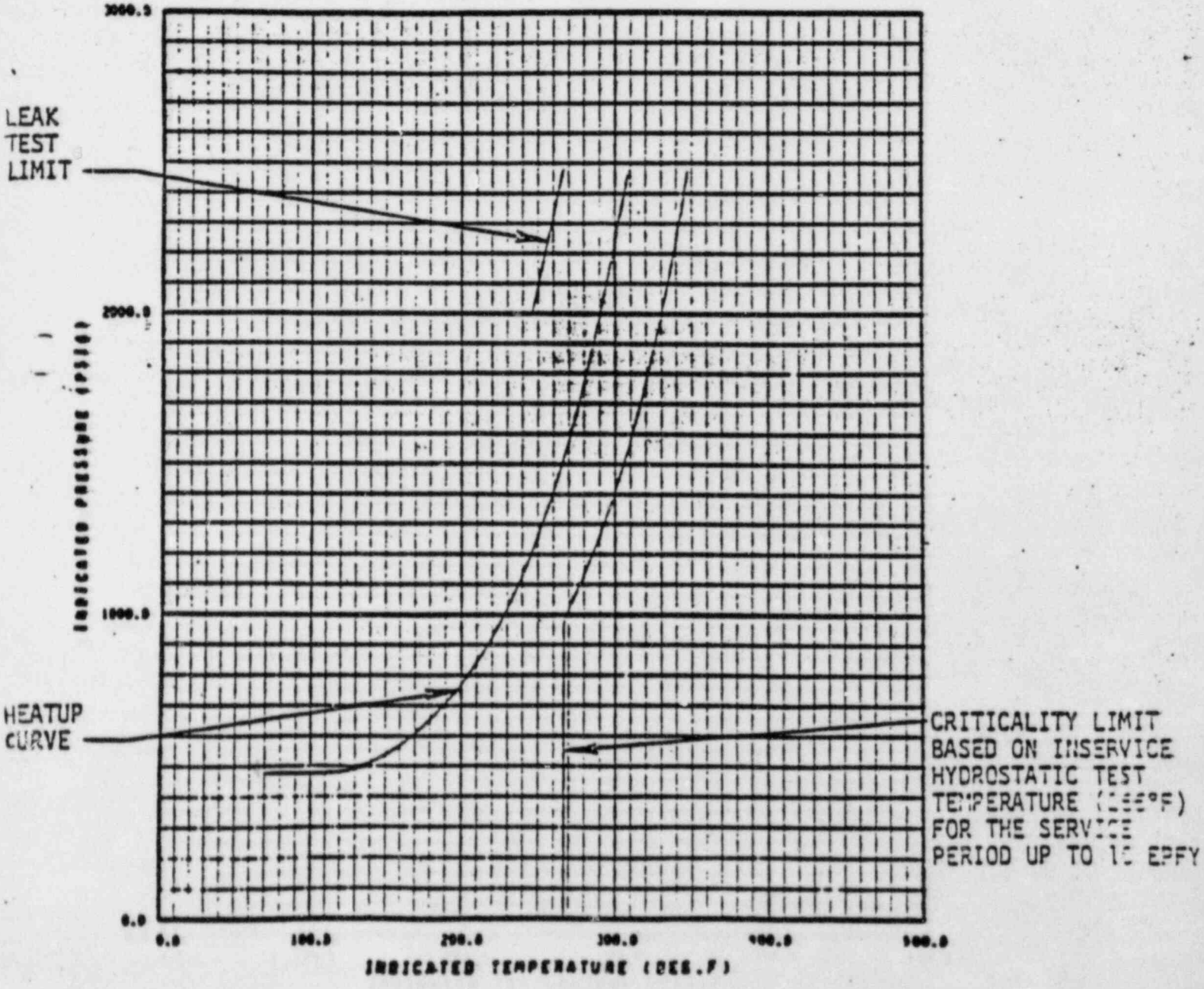


FIGURE 1a MILLSTONE UNIT 3 REACTOR COOLANT SYSTEM HEATUP LIMITATIONS APPLICABLE UP TO 10 EFPY

MATERIAL PROPERTY BASIS

CONTROLLING MATERIAL	:	PLATE METAL
COPPER CONTENT	:	CONSERVATIVELY ASSUMED TO BE 0.10 WT%
PHOSPHORUS CONTENT	:	0.010 WT%.
RT_{NDT} INITIAL	:	60°F
RT_{NDT} AFTER 10 EFPY	:	1/4T, 122°F 3/4T, 101°F

CURVE APPLICABLE FOR COOLDOWN RATES UP TO 100°F/HR FOR THE SERVICE PERIOD UP TO 10 EFPY AND CONTAINS MARGINS OF 10°F AND 60 PSIG FOR POSSIBLE INSTRUMENT ERRORS

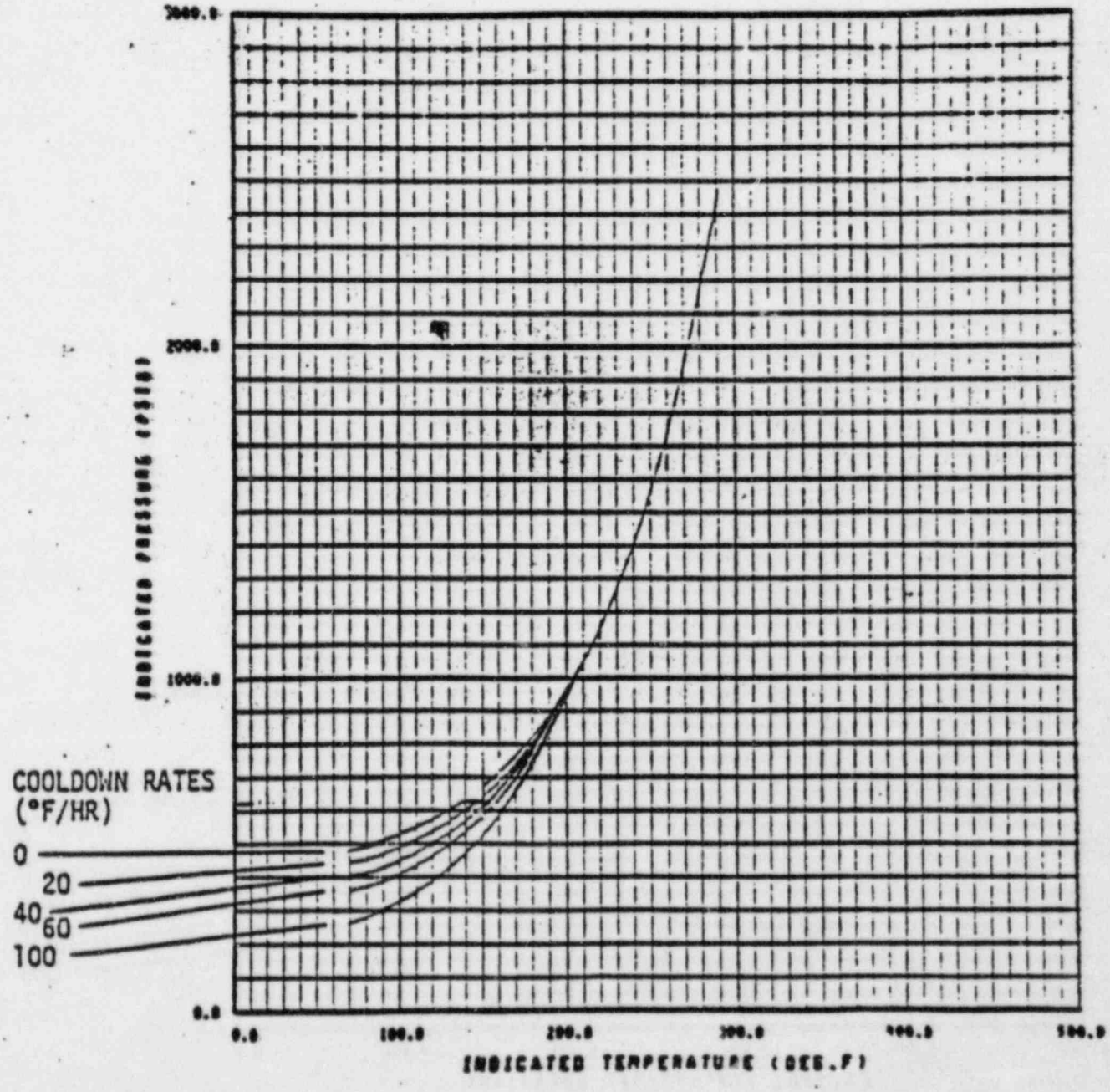


FIGURE 2a. MILLSTONE UNIT 3 REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS APPLICABLE UP TO 10 EFPY