REACTOR CORE PHYSICS DESIGN AND OPERATING DATA FOR CYCLES 1, 2, AND 3 OF THE MONTICELLO BWR NUCLEAR GENERATING PLANT

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1.0 INTRODUCTION

The purpose of this report is to provide operating reactor reference data for use in the qualification of the package of codes referred to as the Advanced Recycle Methodology Package (ARMP). The data were assembled and the results are reported under contract RP519-2 between the Electric Power Research Institute (EPRI) and Nuclear Associates International Corporation (NAI). Questions concerning the material presented should be directed to the Electric Power Research Institute, attention of Dr. R.N. Whitesel, Project Manager.

The objective of this work has been to obtain and document a complete set of reactor operating data from a prototypical BWR extending through three cycles of operation.

The data forms utilized in this report are the result of several tasks which established the data set requirements, the design data, and the operating data requirements for the Monticello Nuclear Generating Plant. The operating data includes BWR history, statepoint, criticality measurements, and transient data. After the format and content of the data forms were established, procedures were written for the acquisition of design data, the acquisition of operating data, data verification, and data correction or addition of new data. The data forms and procedures were then transmitted to the Northern States Power Co. (NSP) representatives for comment. After the comments were received and resolved, arrangements were made to visit the NSP offices and the Monticello reactor site for the collection of data. The collected data were reduced, where necessary, and typed on the forms presented in this report. The final data were verified by an NAI project engineer and are reproduced in this document. The report is issued in loose-leaf form so that the data can be corrected and/or supplemented as required.

The use of these data as input to the analytical models EPRI-CELL, EPRI-NODE, and EPRI-THERM are given in Section 4.0. It is assumed that those who use the data have the necessary nuclear engineering background to understand the terms and data manipulation outlined to provide input to the analytical models.

2.0 SUMMARY

Procedures were written and used for the collection of design and operating data from a boiling water reactor (BWR). The design and operating data were assembled carefully in tabular form and have been verified by experienced nuclear engineers of both NSP and NAI. Data sources are identified on the forms to permit a quality audit. The resulting tables provide a source of reactor data for input to the ARMP code package which has not been available previously in a single document. A link is provided between these data and input to the EPRI-CELL, EPRI-NODE, and EPRI-THERM codes by reference to the appropriate tables and data items. Notations helpful for input preparation are included.

3.0 PROCEDURES

3.1 Procedure for the Acquisition of BWR Design Data

3.1.1 Scope

This procedure applies to the acquisition of BWR design data from the Monticello reactor owned by Northern States Power Co. (NSP).

3.1.2 Purpose

The purpose of this procedure is to assure a uniform high quality and completeness of information gathered for input to the EPRI-CELL, EPRI-NODE, and EPRI-THERM codes.

3.1.3 Definitions

FSAR = Final Safety Analysis Report

3.1.4 References

1. FSAR
2. Core and Fuel Assembly Drawings
3. Fuel Procurement Documents
4. Material Specifications

3.1.5 Pre-requisites

1. Obtain current reference material or access to the same.
2. Request assistance of Utility Personnel.
3. Arrange for a visit to Utility offices and/or reactor site.
4. Obtain blank forms to be filled out during data acquisition.

3.1.6 Data Acquisition Procedure

1. Complete forms from data sources below, referencing sources of entries.
2. Obtain nuclear, thermal and hydraulic design parameters from the FSAR:

   a. nuclear and control parameters: Chapter 3
   b. thermal-hydraulic parameters: Chapter 3
   c. instrumentation: Chapter 7
3. Obtain fuel loading and material information from fuel procurement documentation and material specifications or QC records.
4. Obtain additional information from supplementary sources such as in-house documents and other documents in the public domain.
5. Obtain additional information from as-built drawings and other documents available to the Utility.
6. Request that Utility representative verify the data entered.
7. Consult EPRI about items for which information is not available. Request EPRI assistance to obtain the needed data.
8. Note the unavailability of data not available.
9. Obtain as-built drawings and other pertinent documents, whenever possible. Make Xerox copies to provide backup documentation.
10. Convert design data to appropriate units as indicated on the data collection forms.
11. Data will be originally entered on the forms by hand and then typed on forms to be used in the final report.
12. Verify the typed data in accordance with the Procedure for Data Verification (Section 3.3) and sign each sheet thus verified in the space provided on the forms.

3.2 Procedure for the Acquisition of BWR Operating Data

3.2.1 Scope

This procedure applies to the acquisition of BWR operating data from the Monticello reactor owned by Northern States Power Co. (NSP).

3.2.2 Purpose

The purpose of this procedure is to assure a uniform high quality and completeness of information gathered for input to the EPRI-CELL, EPRI-NODE, and EPRI-THERM codes.

3.2.3 Definitions

FSAR = Final Safety Analysis Report
NSSS = Nuclear Steam Supply System

3.2.4 References

1. Operating Log Books
2. NSSS process computer output
3. Strip charts and other charts
4. FSAR
5. Technical Specification
6. Other Plant Records

3.2.5 Pre-requisites

1. Request assistance of Utility Personnel.
2. Arrange for a visit to the reactor site and/or Utility office where records are kept.
3. Obtain blank forms to be filled out during data acquisition.

3.2.6 Data Acquisition Procedure

1. Operating data can be obtained only from the Utility which operates the plant. The initial step is to send a copy of the data acquisition forms to the Utility representative for review and comment, requesting their assistance in collection of the data.
2. Schedule a visit to the site to assist in the collection and verification of data.
3. The primary sources of operating data for the Monticello reactor are:

   a. Fuel Warranty Service Data Form A-2
   b. Process Computer Edit OD7, Control Rod Positions
   c. Process Computer Edit OD3, Core Thermal Power and APRM Calibration
4. Care should be exercised in choosing data to ensure that operating conditions are representative; e.g., steady-state operating conditions existed when steady-state operating data is desired.
5. Organize and match the various operating data sets to construct a description of the operating history. The data are to be separated into four categories:

   a. Operating history
   b. Statepoints
   c. Critical data
   d. Transient data
6. Operating history data are to be converted into graphical form to represent the time history of power, flow and subcooling with a nominal time increment of 250-500 MWD/MT. The data shall represent the average over the time interval.
7. For each statepoint, derive a set of salient parameters representing the operating conditions of that statepoint. Operating data including whole core TIP traces will be used as input.

8. Obtain BWR data on specific 'cold' criticals and transient conditions which can be used in BWR benchmarking and restart analyses.
9. Convert operating data to appropriate units as indicated on the data collection forms.
10. Data will be originally entered on the forms by hand and then typed on forms to be used in the final report.
11. Verify the typed data in accordance with the Procedure for Data Verification (Section 3.3) and sign each sheet thus verified in the space provided on the forms.

3.3 Procedure for Data Verification

3.3.1 Scope

This procedure applies to data acquired from the Monticello reactor (BWR) owned by the Northern States Power Co. (NSP).

All data which is entered into the data formats shall be subjected to this verification procedure. The data consists of the reference design parameters, the core and component description, and the operating data. All data will be verified by either the independent check for reasonableness, independent spot check, or the independent audit. The definition of these types of verification and the identification of which segments of data are to be verified by a given procedure are outlined below.

3.3.2 Purpose

The purpose of this procedure is to assure a uniform high quality and completeness of information gathered for input to the EPRI-CELL, EPRI-NODE, and EPRI-THERM codes.

3.3.3 Independent Check for Reasonableness

This verification procedure provides for an independent check of all data which is contained on the data formats. This type of verification will ensure that all data has been reviewed by an individual other than the one who entered the data into the format. The steps to be followed in the independent check for reasonableness are:

1. Verify that each data item is complete; i.e., all columns contain the appropriate entry.

2. Based on engineering judgement, substantiate that all entries are reasonable; i.e., the data values entered fall into a range of expected values based on prior experience. Entries which cannot be verified by this technique should be subjected to the spot check verification procedure outlined below.
3. All entries which are rejected by this check for reasonableness shall be subjected to the spot check procedure.

3.3.4 Spot Check Verification

The spot check verification procedure provides for an independent check of all data items rejected by the independent check for reasonableness and those items listed below. The intent of this procedure is to provide an independent check of both the final data value entered into the data format and the reduction of the data item from raw data if appropriate. The data items subjected to this procedure are key items for developing an accurate core model. All of the following items shall be verified by the spot check procedure:

1. All items rejected by the check for reasonableness procedure.
2. All operating data items contained in the BWR statepoints.
3. All design data contained in the core and component description formats.

The procedure to be followed for the spot check verification is outlined below:

a. Each data item subjected to this verification shall be independently checked to ensure that the value entered into the format agrees with and/or was correctly reduced from the raw data source.
b. Any data item which cannot be verified shall be rejected and subjected to the independent audit.

3.3.5 Independent Audit

The independent audit procedure provides for the most thorough form of data verification. All data items rejected by the spot check procedure and those items listed below will be subjected to this procedure. The intent of this procedure is to eliminate any data discrepancies and to provide verification of those data items which could have been subjected to interpretational judgement. The following items shall be subjected to this procedure:

1. All data items rejected from the spot check procedure.
2. All data items which have been entered into the data format with the comment column entry of "subject to interpretation".
3. All data items which have been entered into the data format with the comment column entry of "conflicting sources".

The steps to be followed in the independent audit are:

a. All data items subjected to this procedure shall be independently reviewed to establish the correct data entry.
b. The data items which were rejected by the spot check procedure shall be reviewed to determine the correct entry. If necessary, data sources other than the one listed in the data format should be utilized to determine the correct entry. If the data item cannot be satisfactorily resolved the best estimate should be entered into the format along with the range of error or tolerance for the data value.
c. The data items which were entered with the comment "subject to interpretation" shall be reviewed to determine the correct entry. If necessary, data sources other than the one listed in the data format should be utilized to determine the correct entry. If the data item cannot

be satisfactorily resolved the best estimate should be entered into the format along with the range of error or tolerance for the data value.

d. The data items which were entered with the comment "conflicting sources" shall be reviewed to determine the correct entry. If necessary, data sources other than the one listed in the data format should be utilized to determine the correct entry. If the data item cannot be satisfactorily resolved the best estimate should be entered into the format along with the range of error or tolerance for the data value.

3.4 Procedure for Data Correction and Addition of New Data

3.4.1 Scope

This procedure applies to data acquired from the Monticello reactor (BWR) owned by the Northern States Power Co. (NSP).

All data which is either a correction or an addition to the data formats shall be entered into the data formats per this procedure. An addition to the data formats is considered to be any data item which is not contained in the current revision of the data format. A correction is considered to be the change of a data item which is contained in the current revision of the data format. All corrections and additions shall be subjected to the Procedure for Data Verification.

3.4.2 Purpose

The purpose of this procedure is to assure a uniform high quality and completeness of information gathered for input to the EPRI-CELL, EPRI-NODE, and EPRI-THERM Codes.

3.4.3 Data Additions

All data additions shall be entered into the data format in accordance with the steps outlined below:

1. All columns for the data item being entered must contain an entry.
2. The value for the data item is entered in the value column.
3. The source from which the data value was obtained or derived is entered into the source column.
4. The date of verification will be entered in the space provided by the individual performing the independent data verification.

5. The comment column should contain one of the following types of entries:

   a. "conflicting sources" if the data item was found to have different values from different sources. The value believed to be correct should be entered in the value column, both sources should be entered into the source column. This type of data discrepancy will be resolved by the verification procedure.
   b. "subject to interpretation" if there is any doubt about the validity of the value entered into the data format. This type of entry will be resolved by the verification procedure.
   c. "none" if no comment is necessary or appropriate.
   d. or any other comment which may be applicable to the data entry.

3.4.4 Data Corrections

All data corrections shall be entered into the data format in accordance with the following procedure:

1. The data formats are of the loose-leaf design such that when a data item entry is to be corrected the entire sheet shall be removed and replaced with the corrected sheet.
2. The corrected sheet shall contain the following entries:

   a. The revision number and date shall be updated to reflect this change.
   b. The comment column for the data item(s) changed shall contain the entry of "changed mm/dd/yy" and any other applicable comment.
   c. The verification space shall contain the date entry mm/dd/yy for which this corrected sheet was verified.

4.0 INPUT TO ANALYTICAL MODELS

4.1 EPRI-CELL (BWR)

The description which follows assumes familiarity with the ARMP EPRI-CELL document (Part II, Chapter 5). Relevant EPRI-CELL input is shown in Table 4.1-1. Table 4.1-2 lists sources for the various input items of Table 4.1-1. The various procedures enumerated under these sources are discussed below.

Procedure 1 --- The extra region includes everything in the assembly which is not in the fuel pin cell; e.g., zirconium channels, water rod cell(s). XTRA is the volume fraction of the total assembly associated with the extra region.

Procedure 2 --- The saturated moderator temperature is a function of the steam pressure and is determined from the steam tables. The core pressure is either obtained from operating data or can be estimated by adding 10 to 15 psia to the steam dome pressure.

Procedure 3 --- The volume fractions are calculated in standard fashion. The grids are homogenized within the moderator region of the pin cells. The extra region includes the stainless steel curtains.

Procedure 4 --- The buckling is calculated according to the mixed buckling model prescription (see paragraph 3.2, Chapter 4, Part I of the ARMP documentation).

Procedure 5 --- If not available by assay, the U-234 weight fraction may be determined approximately from the U-235 weight fraction times 0.008.

Procedure 6 --- The non-uniform Dancoff correction accounts for the fact that not all fuel rods are separated by one rod pitch. Those rods adjacent to a water rod are separated by two rod pitches and those adjacent to the wide and/or narrow gap are separated by the distance "pitch + gap". DPITCH is the center-to-center distance between two fuel pins separated by a non-uniform pitch. CFRAC is the weighting factor associated to the value DPITCH (CFRAC is 0.25 for a pin located on the wide or narrow gap, 0.50 for a pin located at a corner).

TABLE 4.1-1 EPRI-CELL Sample Input, BWR

```
ENGIN. INPUT  MONTICELLO   .00 VOID, 2.95 INTERNAL
$ENGNR PELOR=.244, CLADIR=.2495, CLADOR=.2815, PITCH=.738,
TRES(1)=900.,PRESS=1020.,RHFUEL=.9273 , CLAD=1 , GRID=2 , SPECT=1 , POWR=1.0,
XTRA=.25868 , MESH=0, TFUEL=900.0, TCLAD=600. , TMOD=547. ,
                          VFMOD(1)=.0076268 , VFMOD(5)=.0011745,
OPTION(21)=1,1,1,
VFXTR(1)=.18412 , VFXTR(3)=.04738 ,
OPTION(3)=1 , OPTION(17)=4, OPTION(18)=1 , OPTION(16)=1,
OPTION(15)=1, BUCK(1)=.0000,.0000,.0000 , BUCKL= -.025  ,
WF235=.0295 , DPITCH(1)=0.0  ,                    CFRAC(1)=.00,
WF234=.000236  ,
$END
```

TABLE 4.1-2 EPRI-CELL Input Data Sources, BWR

Input Item	Source
PELOR	Table 1.2, Item 5.4
CLADIR	Table 1.2, Item 5.13
CLADOR	Table 1.2, Item 5.12
PITCH	Table 1.2, Item 4.4
TRES	Table 1.1, Item 10
PRESS	Table 1.1, Item 6
RHFUEL	Table 1.2, Item 5.9
POWR	Table 1.1, Item 2 or Item 3
XTRA	Table 1.2, Items 4.2 to 4.6, See Procedure 1
TFUEL	Table 1.1, Item 10
TCLAD	Table 1.1, Item 9
TMOD	Table 1.1, Item 6, See Procedure 2
VFMOD	Table 1.2, Items 4.7, 4.8, 4.9; See Procedure 3
VFXTR	Table 1.2, Items 2.4, 2.5, 2.8, 4.14, 4.15; See Procedure 3
BUCK	See Procedure 4
BUCKL	See Procedure 4
WF235	Table 1.3, Part A
WF234	See Procedure 5
DPITCH	See Procedure 6
CFRAC	See Procedure 6

4.2 EPRI-NODE

Familiarity with the ARMP EPRI-NODE Documents (Part II, Chapters 14 and 15) is assumed. Only input items pertinent to the data tables are discussed. Table 4.2-1 lists sources for the various input items of EPRI-NODE-B.

TABLE 4.2-1 EPRI-NODE-B Input Data Sources

Card Type	Input Item	Source
01	ΔX	Table 1.2, Item 4.2
	ΔZ	Table 1.2, Item 4.17 (with Card Type 02, Kmax)
	p^{th}	Table 1.4, Part A, Item 1
	P^{rated}	Table 1.1, Item 1
	Flow(W1)	Table 1.4, Part A, Item 2
	Subcl	Table 1.4, Part A, Item 3
03	B1-B49	All data are processed from PDQ or EPRI-CELL
	B50	Table 1.2, Items 4.14, 4.15
	B51	Table 1.2, Item 7.3
	B52	Table 1.2, Item 5.12
	B53	Table 1.2, Item 4.4
	B54	Table 1.2, Item 4.5
	B55	Table 1.2, Item 4.3
04	——	Table 1.2, Items 1.1, 1.4
05	——	Table 1.2, Items 1.7, 1.8
13	C(1)	Table 1.1, Items 11, 16; Table 1.2, Item 1.1; Table 1.4, Part A, Item 4; Steam Tables
	C(2)	Table 1.1, Item 15
	C(4)	Table 1.4, Part A, Item 4
XENON	XPTH	Table 1.4, Part A, Item 1; Table 1.2, Item 1.1
	RC	Table 1.1, Item 17
	XNC	Table 1.2, Item 1.1
DETECTOR-1	MON	Table 1.2, Item 1.12

4.3 EPRI-THERM

Familiarity with the ARMP EPRI-THERM Documents (Part II, Chapters 16 and 17) is assumed. Only input items pertinent to the data tables are discussed. Table 4.3-1 lists sources for various input items of EPRI-THERM-B.

TABLE 4.3-1 EPRI-THERM-B Input Data Sources

Card No.	Input Item	Source
1	NR	Table 1.2, Item 1.4
	NC	Table 1.2, Item 1.1
	NRODS	Table 1.2, Item 4.5
2	MWT	Table 1.1, Item 1
	PCTP	Table 1.4, Part A, Item 1; also Parts C and D
3	LEN	Table 1.2, Item 4.17
	DROD	Table 1.2, Item 5.12
	ELS	Table 1.2, Item 1.15
4	RC	Table 1.1, Item 17
	PDOME	Table 1.1, Item 6; also Table 1.4, Parts A,C and D
	PCORE	Table 1.1, Item 6, Comments
5	PUMPH	Table 1.1, Item 12
	R	Table 1.1, Items 15, 16
6	CUFA	Table 1.1, Item 27
7	TFW	Table 1.1, Item 19; also Table 1.4, Parts C and D
	TCR	Table 1.1, Item 21
	TCLU1	Table 1.1, Item 25; also Table 1.4, Parts C and D
	TCLU2	Table 1.1, Item 26; also Table 1.4, Parts C and D
8	WT	Table 1.1, Item 15; also Table 1.4, Parts C and D
	WCR	Table 1.1, Item 22
	FCRD	Table 1.1, Item 23
	WFW	Table 1.1, Item 20; also Table 1.4, Parts C and D
	WCL	Table 1.1, Item 24; also Table 1.4, Parts C and D
9	QLOSS	Table 1.1, Item 28
	PPW1	Table 1.1, Item 29
	PPW2	Table 1.1, Item 29
	EFF	Table 1.1, Item 30
11	CLTH	Table 1.2, Item 5.14
	CCON	Table 1.2, Item 5.10
	GCOND	Table 1.2, Items 5.4, 5.13
12, 13	SP	Table 1.2, Item 4.1
14	A(L)	Table 1.1, Item 11; Table 1.2, Item 1.1
	VINC(L)	Table 1.1, Items 11, 16; Table 1.2, Item 1.1; Table 1.4, Part A, Item 4; Steam Tables

TABLE 4.3-1 (Continued)

Card No.	Input Item	Source
14	ELCK1(L)	Table 1.2, Items 4.2, 4.3, 5.12
	ELCK2(L)	Table 1.1, Item 14
	DE(L)	Table 1.1, Item 16; Table 1.2, Items 1.1, 4.3, 5.12
	NO(L)	Table 1.2, Item 4.5
	DEH(L)	Table 1.2, Items 4.5, 5.12

BWR CYCLE 1 DATA

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REACTOR: Monticello
CYCLE: 1

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Sheet 1 of 5
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1. full rated power (MWt)	1670.	FSAR Table 3-1-1	none
2. power density (KW/l)	40.61	FSAR Table 3-1-1	none
3. linear power (KW/ft)	5.7	FSAR Table 1-6-1	none
4. core loading (STU)	103.28	NEDC 20165 Table 1-2	Calculated value from assembly loading
5. cycle exposure (MWD/STU)	7125.	NSP	none
6. system pressure steam dome (psia)	1015.	FSAR Table 1-6-1	Core pressure = dome pressure + 18 psi
7. inlet enthalpy (BTU/lb)	523.0	FSAR Table 3-1-1	none
8. subcooling, (BTU/lb) ($HSAT_{core}$ - HIN)	24.6	NAI	HSAT based on core pressure
9. average fuel rod surface temperature (oF)	558.	FSAR Table 1-6-1	none
10. average fuel temperature (^{o}F)	900.	FSAR Table 1-6-1	none

Verified By: E. Jow Date: 07/15/76

REACTOR: Monticello
CYCLE: 1

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Sheet 2 of 5
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
11. active core flow area (ft^2)	52.631	NAI	Calculated from assembly dimensions
12. core ΔP @ 100% flow (psi)	16.69	NSP	Measured pressure drop across core support plate, psi
13. inlet orifice coefficient (central/peripheral)	not available	Vendor proprietary	
14. spacer single phase loss coefficient	not available	Vendor proprietary	
15. core total flow (lbs/hr)	57.6×10^6	FSAR Table 3-1-1	none
16. core active flow (lbs/hr)	51.84×10^6	NAI	bypass flow assumed to be 10%
17. fraction of heat generated in fuel	0.965	FSAR Table 3-1-1	none
18. fraction of heat deposited in bypass flow	.02	NAI	none
19. feedwater temperature at rated power (^oF)	376.3	FSAR Table 1-6-1	none
20. feedwater flow at rated power (lbs/hr)	6.747×10^6	FSAR Table 1-6-1	none

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
21. control rod drive flow temperature (^{o}F)	80.	FSAR Figure 1-3-2B	none
22. control rod drive flow (lbs/hr)	30,000	Idem	none
23. fraction of control rod drive flow to lower plenum	1.0	NSP operation manual B.1.3.21	none
24. cleanup system flow (lbs/hr)	80,000	FSAR Figure 1-3-2B	none
25. inlet temperature to cleanup system (^{o}F)	529.	Idem	none
26. outlet temperature to cleanup system (^{o}F)	442.	Idem	none
27. steam carry under fraction	not available	vendor proprietary	assume .002
28. thermal loss from reactor vessel and piping (MWt)	.6	FSAR Figure 1-3-2B	none
29. recirculation pump power (MW/pump)	2.4	Idem	Calculated from heat balance and adjusted for pump efficiency
30. recirculation pump efficiency	.90	maintenance instructions NX-7831-342	none

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello
CYCLE: 1

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Sheet 4 of 5
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
31. fuel enrichment, w/o U-235			
Cycle 1			
type 1	2.95	NEDS-20016 Table 3-1	
type 2	1.91	Idem	
type 3	1.13	Idem	
Cycle 2			
type 1			
type 2			
type 3			
type 4			

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
type 5 with Gd_2O_3, w/o per rod			
Cycle 3			
type 1			
type 2			
type 3			
type 4			
type 5 with Gd_2O_3, w/o per rod			

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

DATA WORK SHEET

TABLE 1.2

BWR CORE AND COMPONENT DESCRIPTION

Sheet 1 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.0 Core			
1.1 Total number of fuel assemblies	484	FSAR Table 3-1-1	none
1.2 Number of fuel assembly types*	1	NEDC-20165 Table 1-2	dishing ignored
1.3 Number of fuel assemblies of each type	484	NEDC 20165 Table 1-2	none
1.4 Location of individual fuel assemblies		NEDC 20143 Figure 4-3	diagram #1.2-1 attached
1.5 Total number of control rods	121	FSAR Table 3-1-1	none
1.6 Number of control rod types	1	FSAR P 3-5-1	none
1.7 Number of control rods of each type	121	FSAR Table 3-1-1	none

*The term "fuel assembly type" used throughout this BWR document is defined according to the fuel enrichments and the amount of gadolinia contained in the fuel rods in an assembly. The curtain(s) which is(are) located outside of the fuel can is(are) not included in this definition.

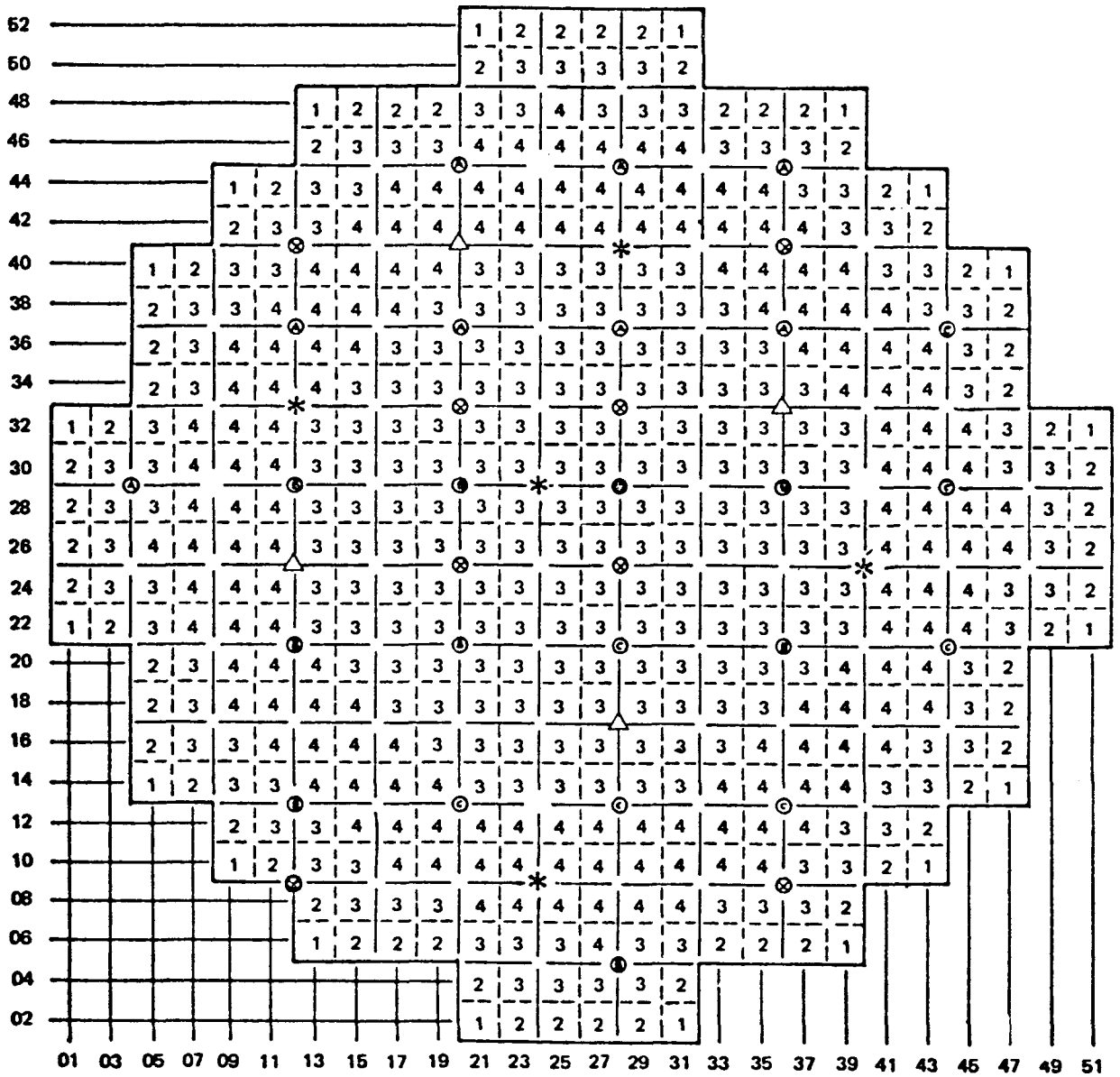
Verified By: [illegible] Date: 07/15/76

Diagram 1.2-1

Location of Individual Fuel Assemblies

Location of Control Curtains

MONTICELLO



FUEL TYPE 1 DISHED NO CURTAIN
2 DISHED HALF CURTAIN
3 DISHED FULL CURTAIN
4 UNDISHED FULL CURTAIN

REACTOR: Monticello

CYCLE: 1

DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

Sheet 2 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.8 Location of control rods and control group identification		RWNE July 1971 N18.01.01	diagram #1.2-2 attached
1.9 Number of burnable control curtains	216	FSAR Table 3-1-1	none
1.10 Location of control curtains		NEDC-20143 Figure 4-3	diagram #1.2-1 attached
1.11 Total number of incore flux monitors	96	FSAR Table 1-6-1	none
1.12 Location of incore flux monitors		operation manual B.1.1 Figure 30	diagram #1.2-3 attached
1.13 Core shroud Material-composition	SS	FSAR P 3-6.1	none
1.14 Core shroud thickness (in.)	1 3/4"	operation manual B.1.1 Page 42	none
1.15 Height of downcomer above core (ft)	13 to 13.83	operation manual B.1.1 Figure 1a	none
1.16 Inlet orifice locations		GE 117C 2010	diagram #1.2-4 attached
1.17 Core layout - plan view		MFG 104R919 (GE) NX-7831-197 (NSP)	diagram #1.2-5 attached

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

DATA WORK SHEET

Table 1.2

BWR Core and Component Description

Sheet 3 of 14

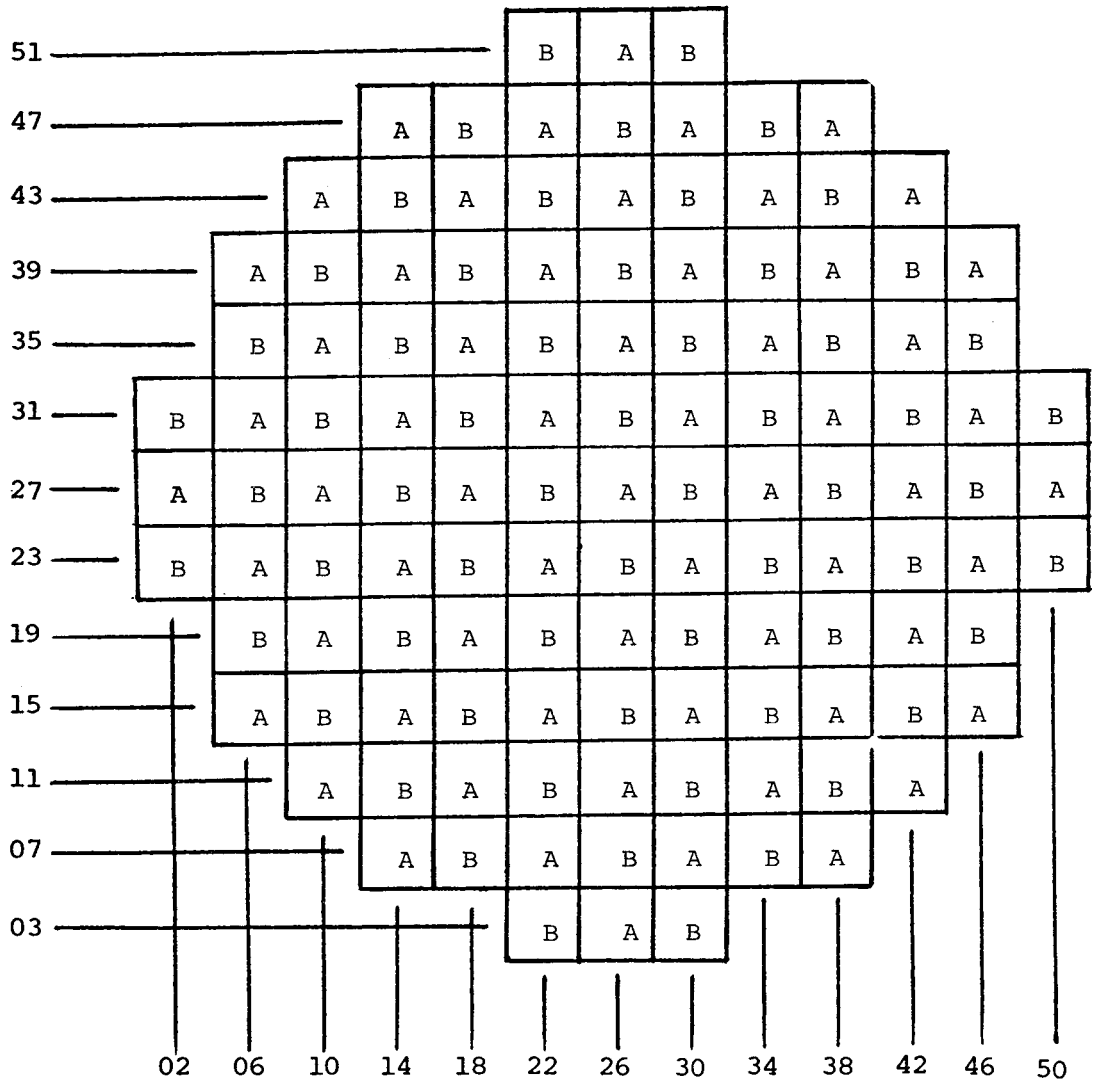
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.18 Core layout - elevation view		operation manual B. 1.1 Figure 1a	diagram # 1.2-6 attached

Verified By: E. Tow Date: 07/15/76

Diagram 1.2-2

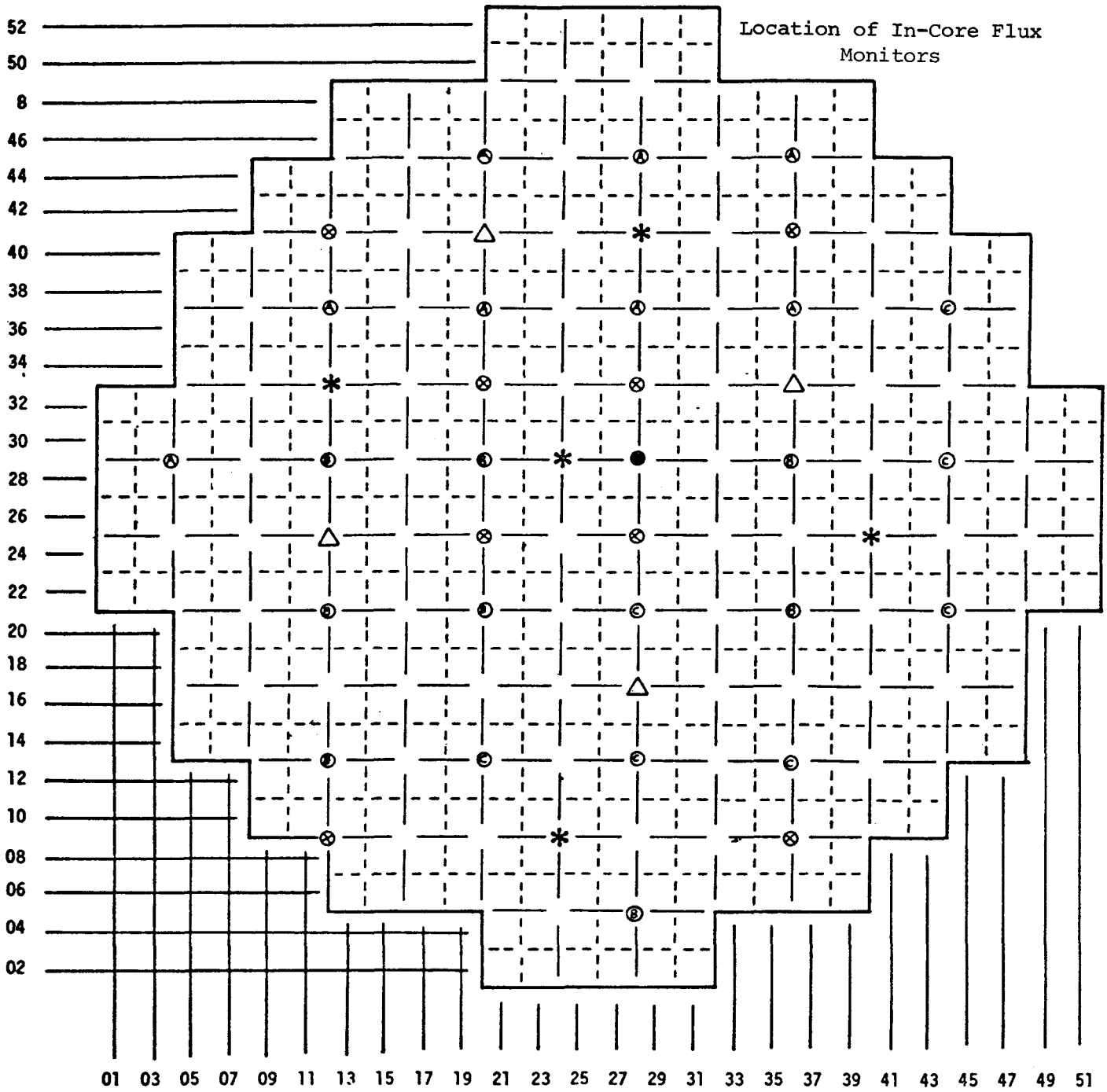
Rod Location and Sequence



MONTICELLO

Diagram 1.2-3

Location of In-Core Flux Monitors



- LPRM Location (Letter indicates TIP machine)
- LPRM Location (Common location for all TIP machines)
- IRM Locations
- SRM Locations
- Source Locations

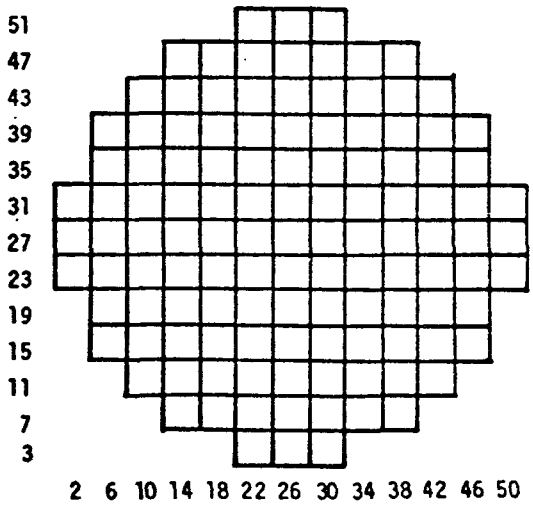
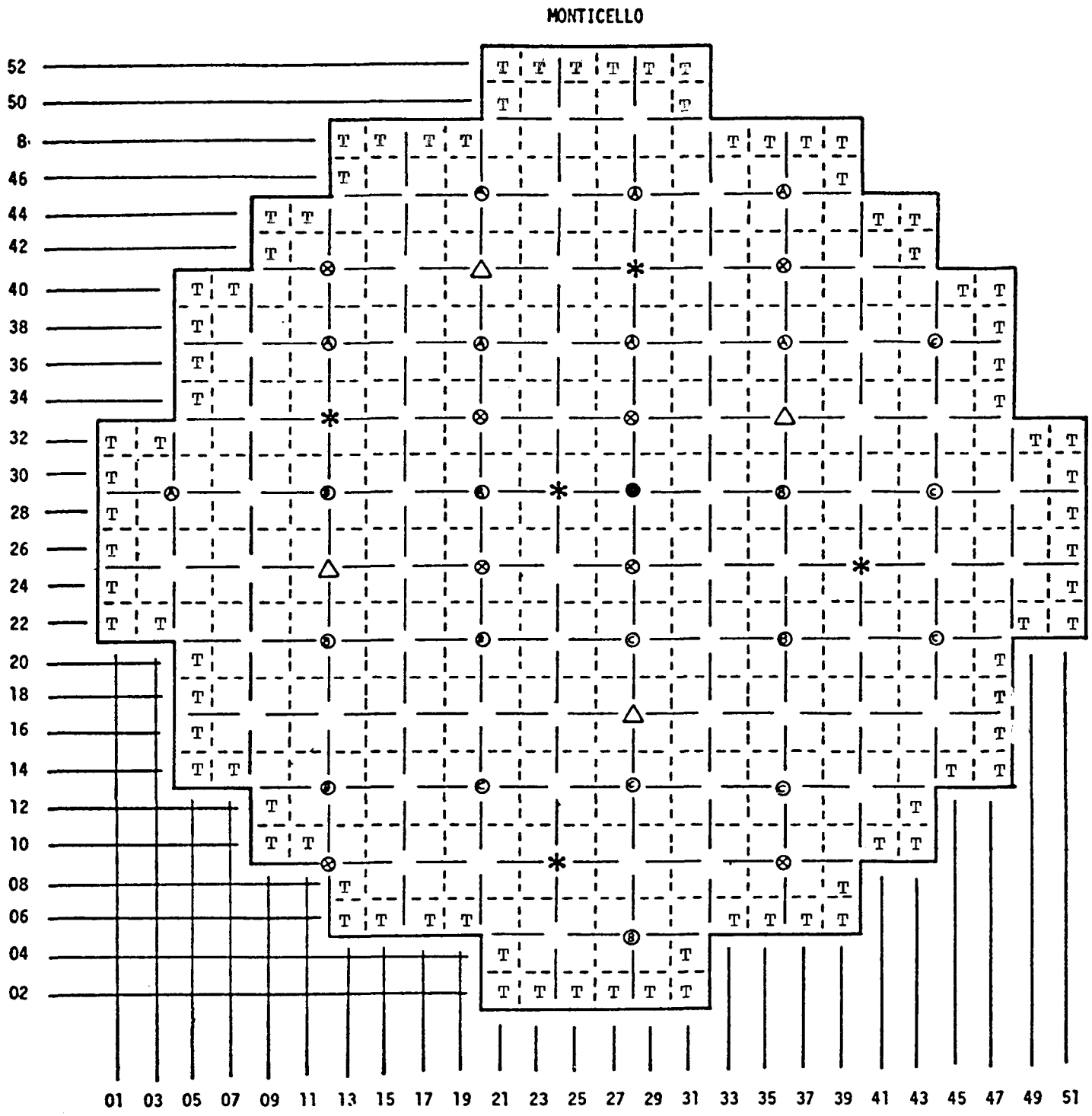


Diagram 1.2-4

Inlet Orifice Locations

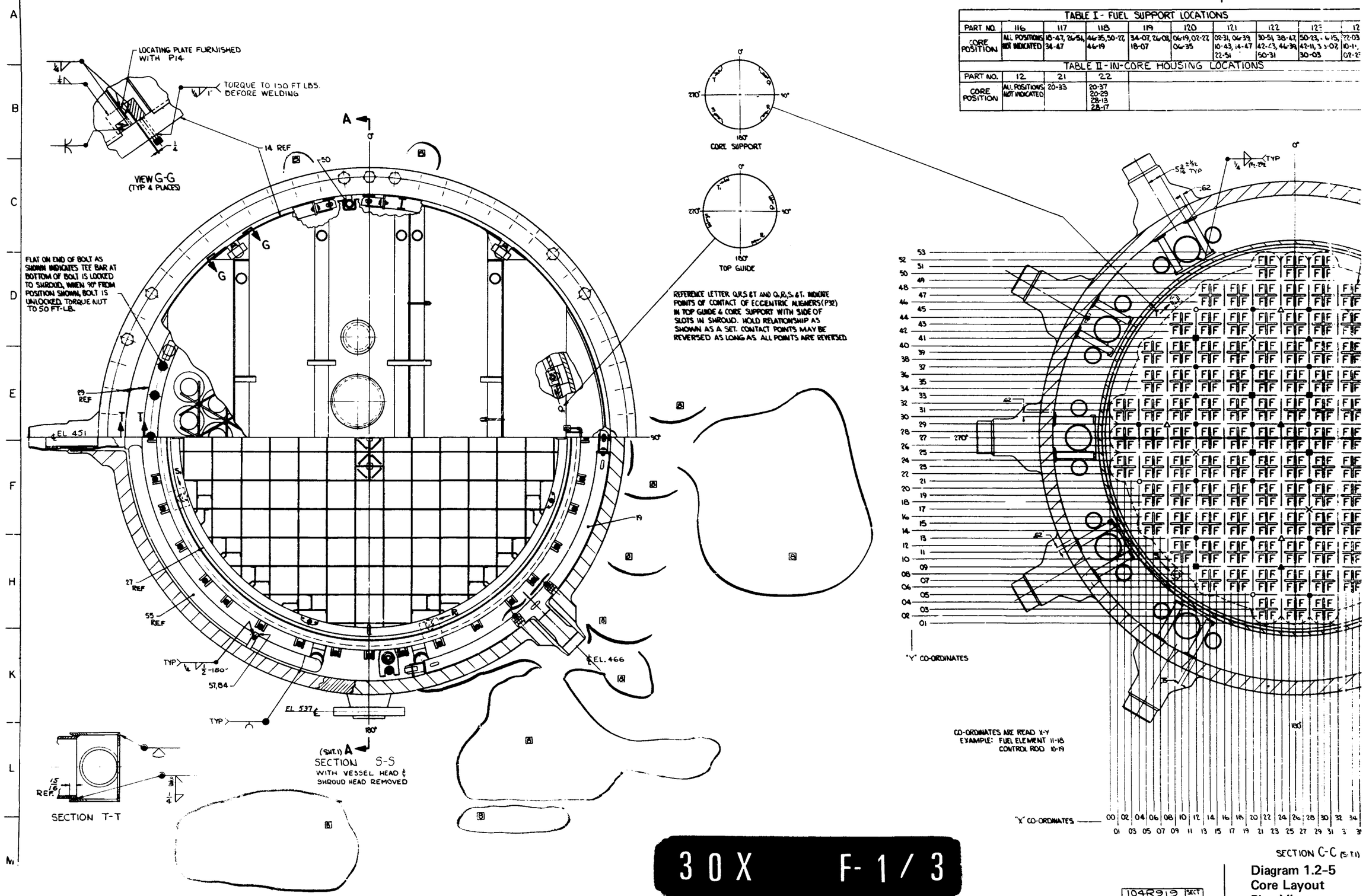


T = tightly orificed, remainder are loosely orificed.

104R919

TABLE I - FUEL SUPPORT LOCATIONS									
PART NO.	116	117	118	119	120	121	122	123	12
CORE POSITION	ALL POSITIONS NOT INDICATED	18-47, 26-54, 34-47	46-35, 50-27, 46-19	34-07, 26-08, 18-07	06-19, 02-27, 06-35	02-31, 06-39, 10-43, 14-47, 22-51	30-51, 38-47, 42-23, 46-39, 50-31	50-23, 46-15, 42-11, 34-07, 30-03	22-03, 10-11, 02-2

TABLE II - IN-CORE HOUSING LOCATIONS				
PART NO.	12	21	22	
CORE POSITION	ALL POSITIONS NOT INDICATED	20-33	20-37 20-29 28-13 28-17	



30X F-1/3

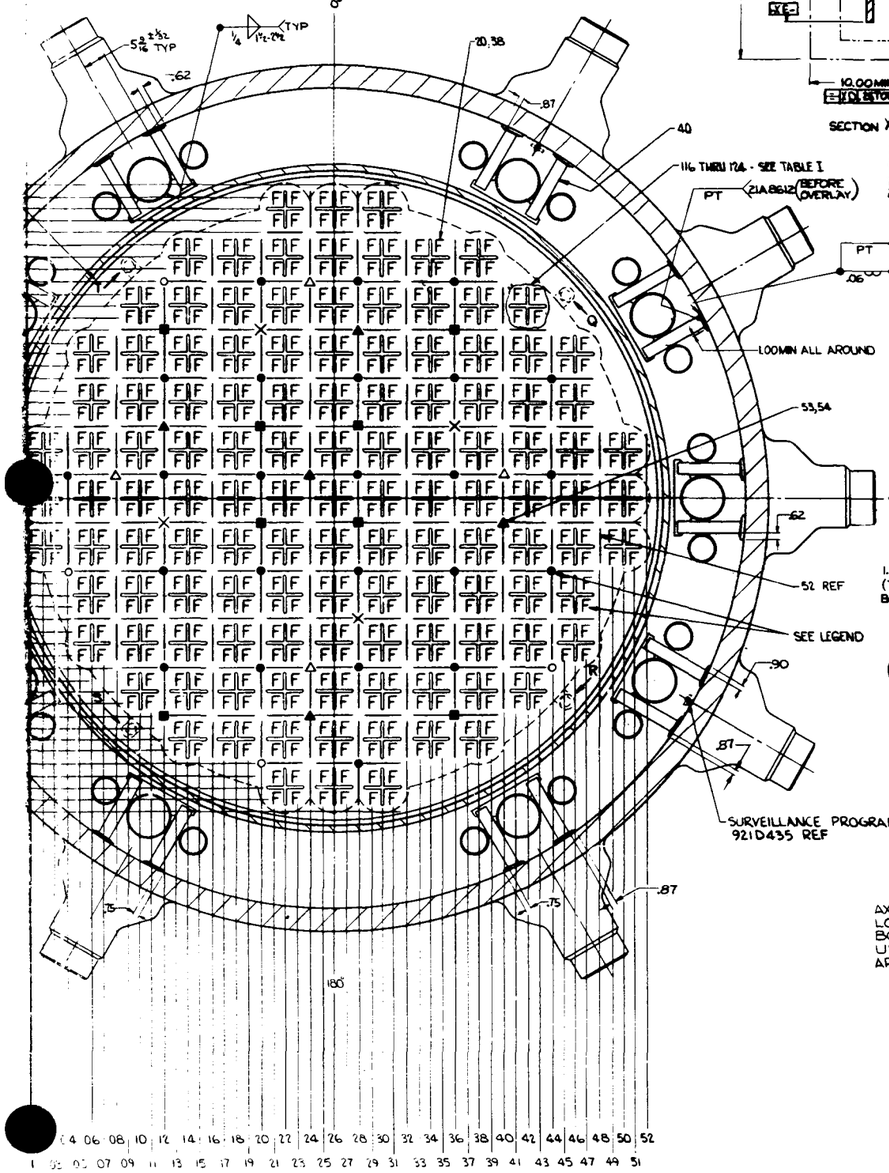
104R919 SECT
CONT ON SHT FINAL SHEET 1 OF 3
REV. DATE 23 SEP 60

Diagram 1.2-5
Core Layout
Plan View

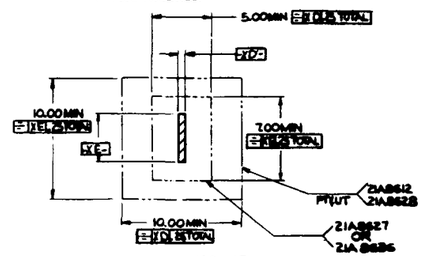
FUEL SUPPORT LOCATIONS					
119	120	121	122	123	124
34-07, 26-08, 18-07	06-19, 02-22, 06-35	02-31, 06-39, 10-43, 14-47, 22-51	30-51, 38-47, 42-43, 46-39, 50-31	50-23, 46-15, 42-11, 38-07, 30-03	22-03, 14-07, 10-11, 06-15, 02-23

IN-CORE HOUSING LOCATIONS

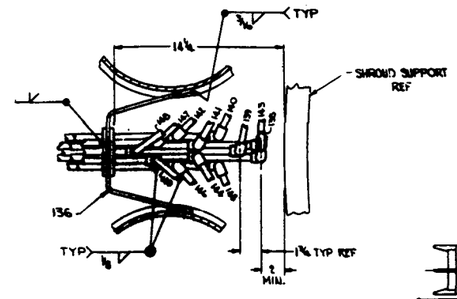
LEGEND
- ○ SPARE LOCAL POWER RANGE MONITOR POSITION
- ● LOCAL POWER RANGE MONITOR
- ■ INTERMEDIATE RANGE MONITOR
- ▲ DESIGN NEUTRON SOURCE
- △ SPARE NEUTRON SOURCE LOCATION
- × SOURCE RANGE MONITOR
- F FUEL ASSEMBLY



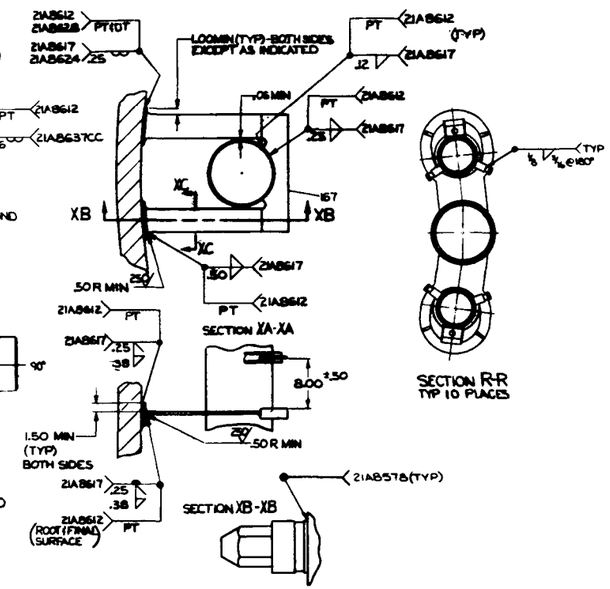
SECTION C-C (SHT 1)

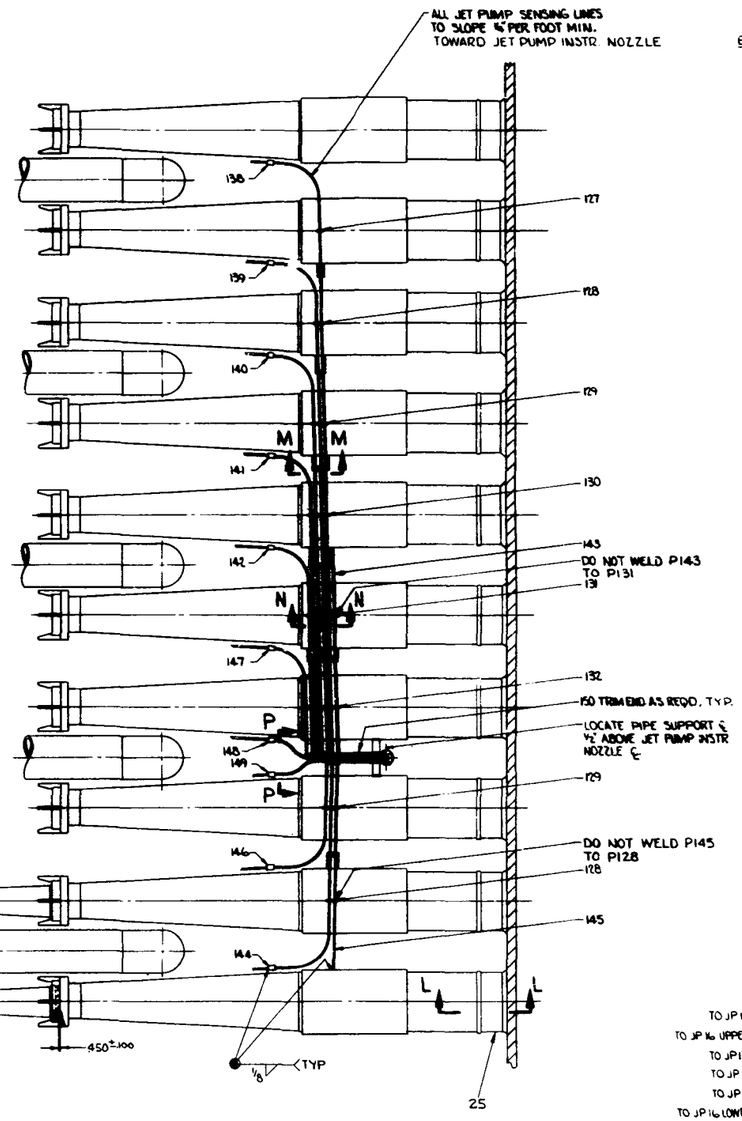


SECTION XC-XC



SECTION P-P
TYP 2 PLACES





VIEW J-J
TYP 2 PLACES

SEE SECTION B-B FOR SPECIFIC BRACKET CALLOUTS P160 THRU P165 ON JET PUMP SENSING LINES.

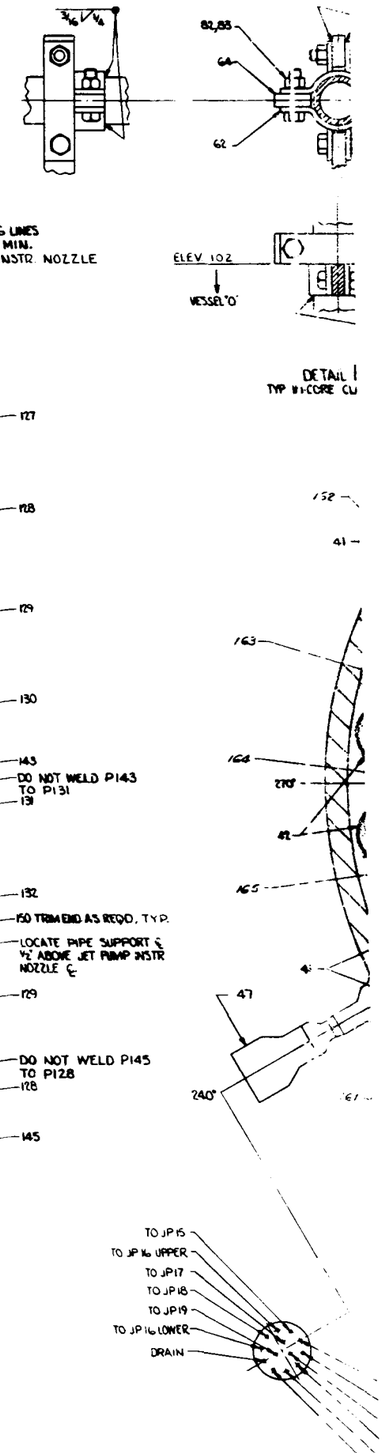


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Diagram 1.2-5
Core Layout
Plan View

104R919 SHT 2 OF 3

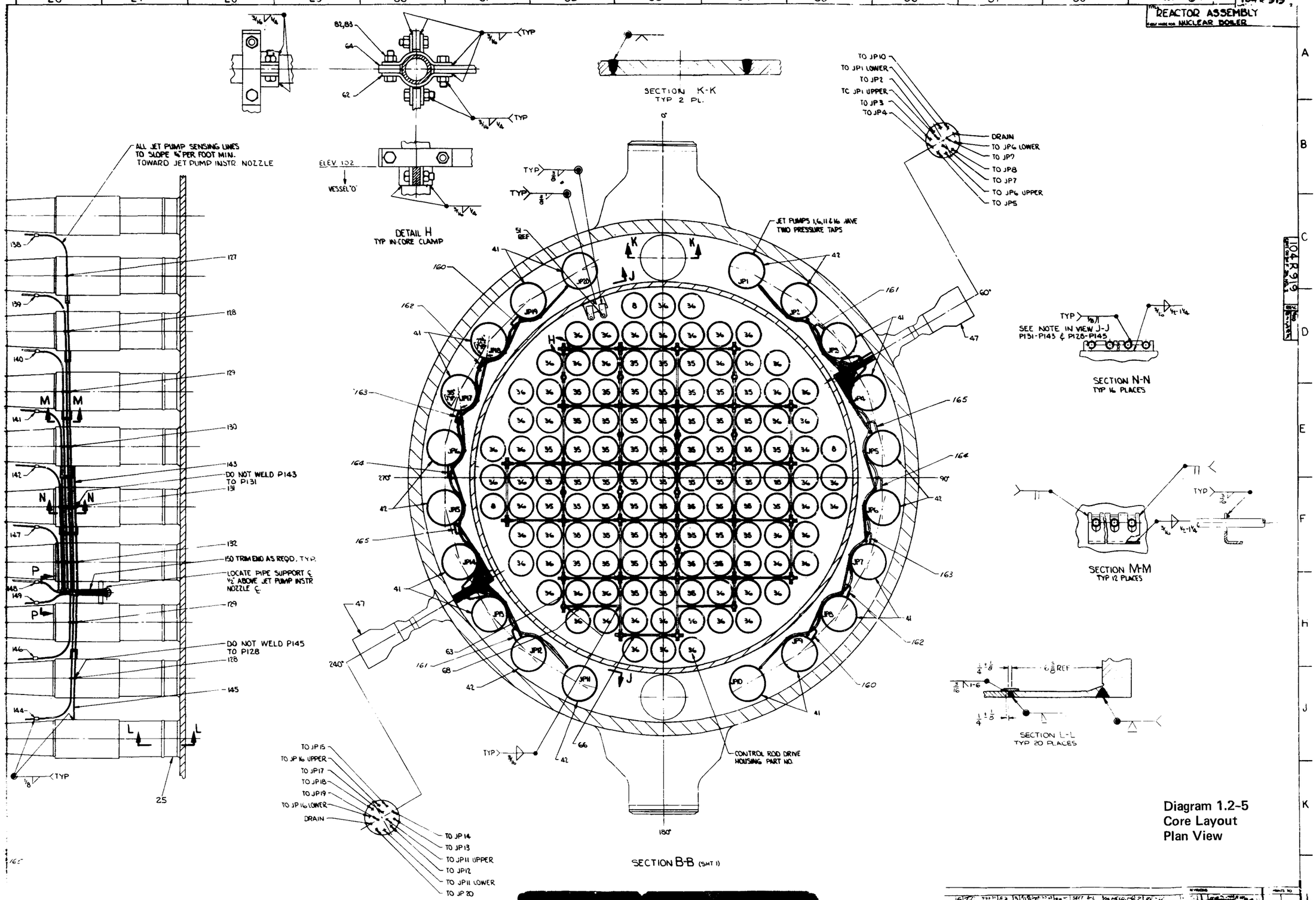


Diagram 1.2-5
Core Layout
Plan View

30X F-3/3

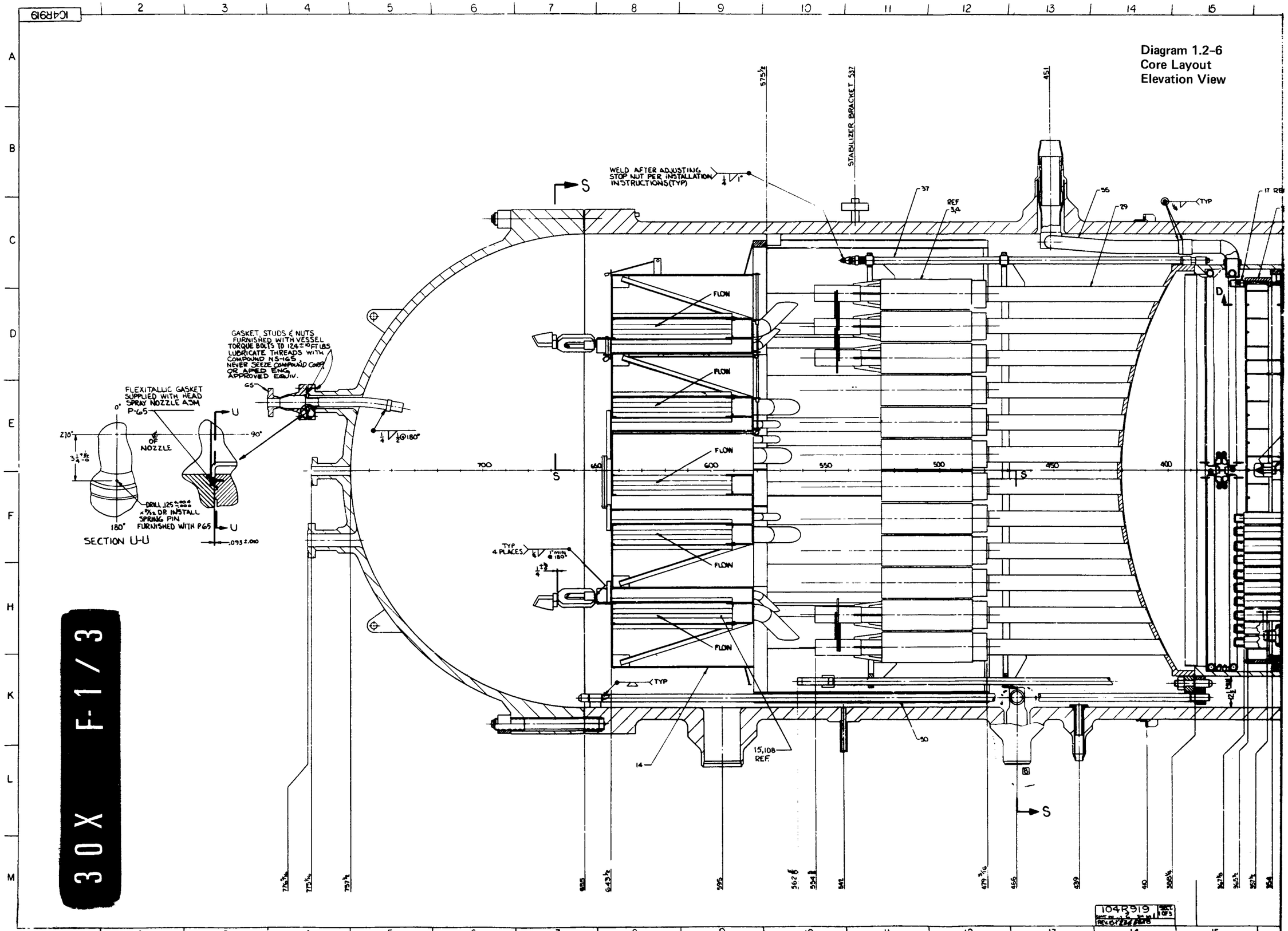


Diagram 1.2-6
Core Layout
Elevation View
STABILIZER BRACKET 537
WELD AFTER ADJUSTING STOP NUT PER INSTALLATION INSTRUCTIONS (TYP)
GASKET STUDS & NUTS FURNISHED WITH VESSEL TORQUE BOLTS TO 124±10 FT LBS LUBRICATE THREADS WITH COMPOUND NS-165, NEVER SEIZE COMPOUND CORP OR APPED ENG APPROVED EQUIV.
FLEXITALLIC GASKET SUPPLIED WITH HEAD SPRAY NOZZLE ASM P-65
SECTION U-U
DRILL .125 DR INSTALL SPRING PIN FURNISHED WITH P65
TYP 4 PLACES
FLOW
REF 34
15,108 REF
30X F-1/3
104R919

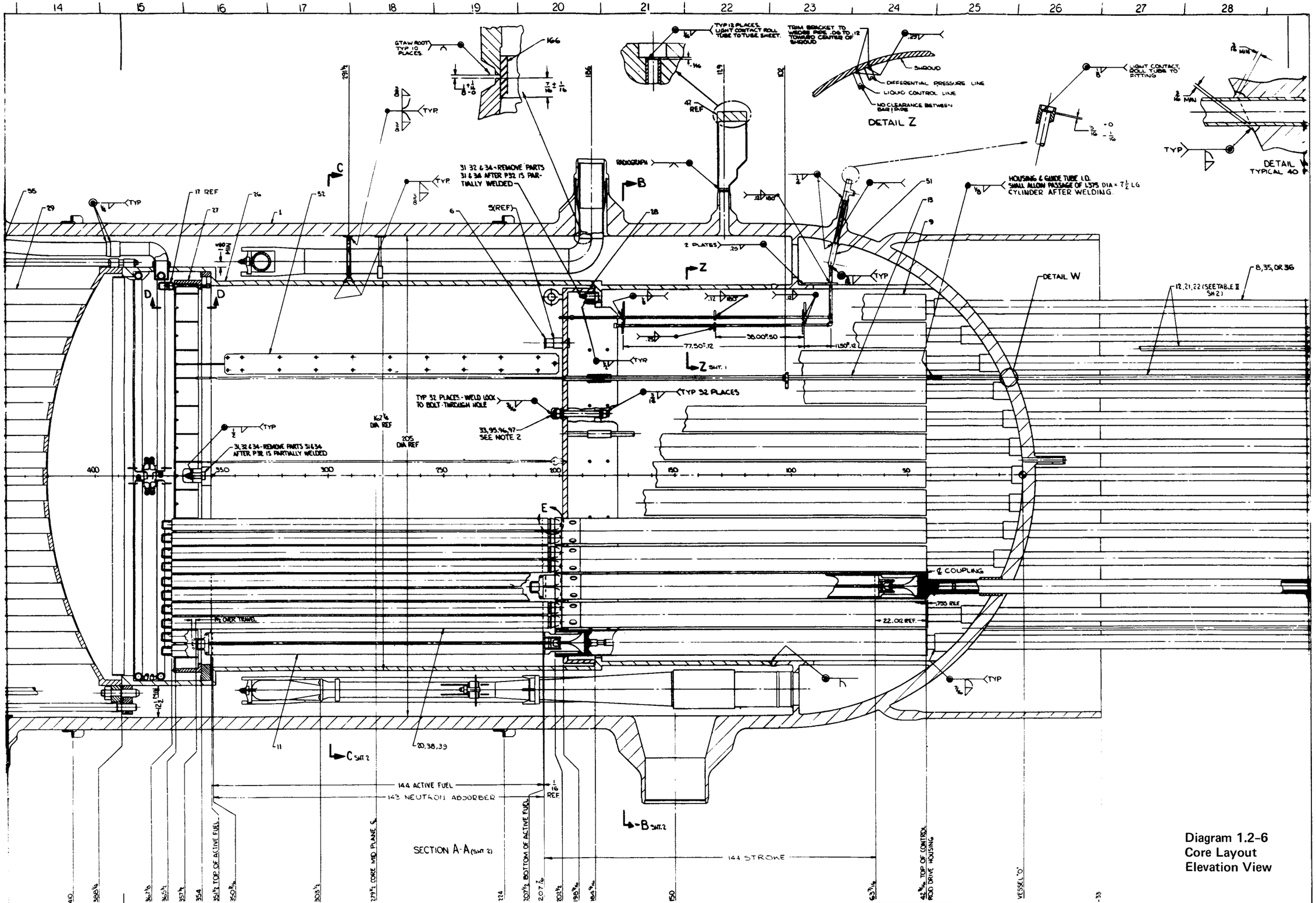
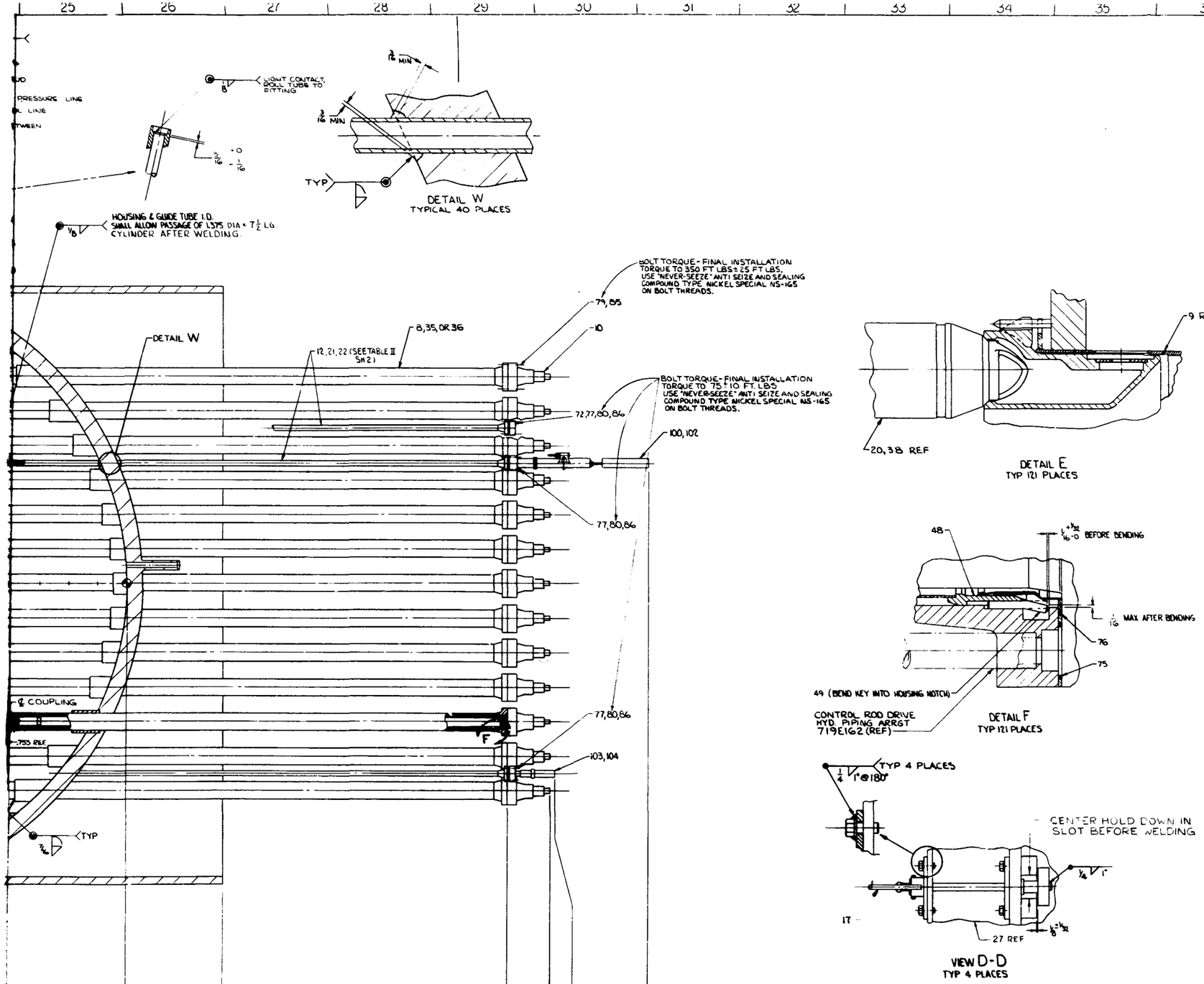


Diagram 1.2-6
Core Layout
Elevation View

30X F-2/3



GENERAL ELECTRIC 104R919

REACTOR ASSEMBLY

NUCLEAR BOILER

(MONTICELLO)-2-1

PL. ISSUED

NOTES:

1. REFERENCE DRAWINGS AND DOCUMENTS:
   INSTALLATION SPECIFICATION 22A2186.
   INSTALLATION INSTRUCTION 22A2186AB.
   REACTOR INSTALLATION AND ASSEMBLY REQUIREMENTS DRAWING 15887269.

2. TORQUE 2" DIA. STUDS TO 625 FT. LBS ± 25 FT. LBS. AND 2½ DIA STUDS TO 1225 FT LBS ± 25 FT LBS. USE LUBRICANT SIMILAR TO NEVER-SEEZ ANTI-SEIZE AND SEALING COMPOUND TYPE NICKEL NS-165 EXCEPT COMPOSITION OF LUBRICANT NOT TO EXCEED 150 PPM LEAD, 200 PPM CHLORINE, 20 PPM FLUORINE, AND 350 PPM SULPHUR. USE ON THREADS AND NUT FACES ONLY. DO NOT CONTAMINATE ANY OTHER SURFACES. REMOVE ALL EXCESS LUBRICANT AFTER TORQUEING.

Diagram 1.2-6
Core Layout
Elevation View

30X F-3/3

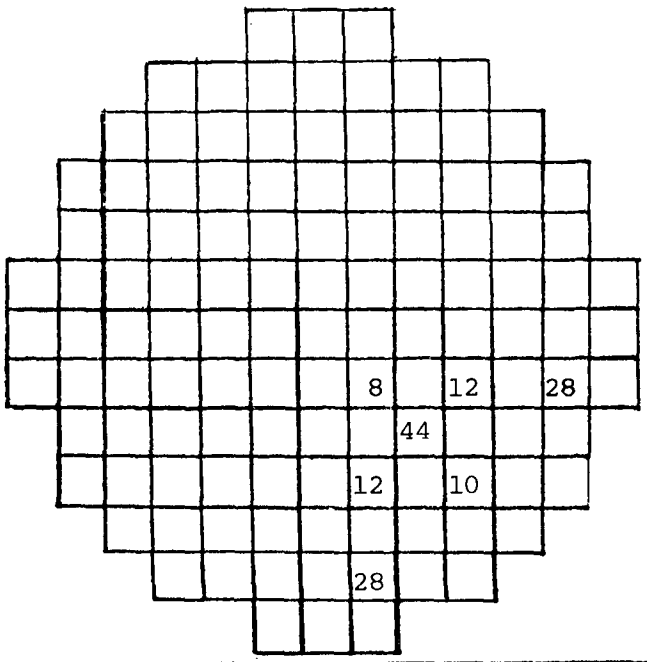
104R919 SECT 12 OF 3

REV 04

MONTICELLO SINGLE REVISION STATUS

REACTOR: Monticello CYCLE: 3 Exposure: 7900 MWD/STU	TABLE 1.4 BWR OPERATING DATA PART D - BWR TRANSIENT DATA	Sheet 6 of 6 Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Transient Data Conditions during transient in time intervals sufficient to monitor Xenon transients including conditions prior to transient			
11. Control rod positions (by location)	See below	HB #3-15 6/21/74 8^h51	none
12. Single channel TIP traces during transient (if available)	not available		



Quarter-core symmetry

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello
CYCLE: 3
Exposure: 7900 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART D - BWR TRANSIENT DATA

Sheet 5 of 6
Rev. 0 Date: 5/10/76

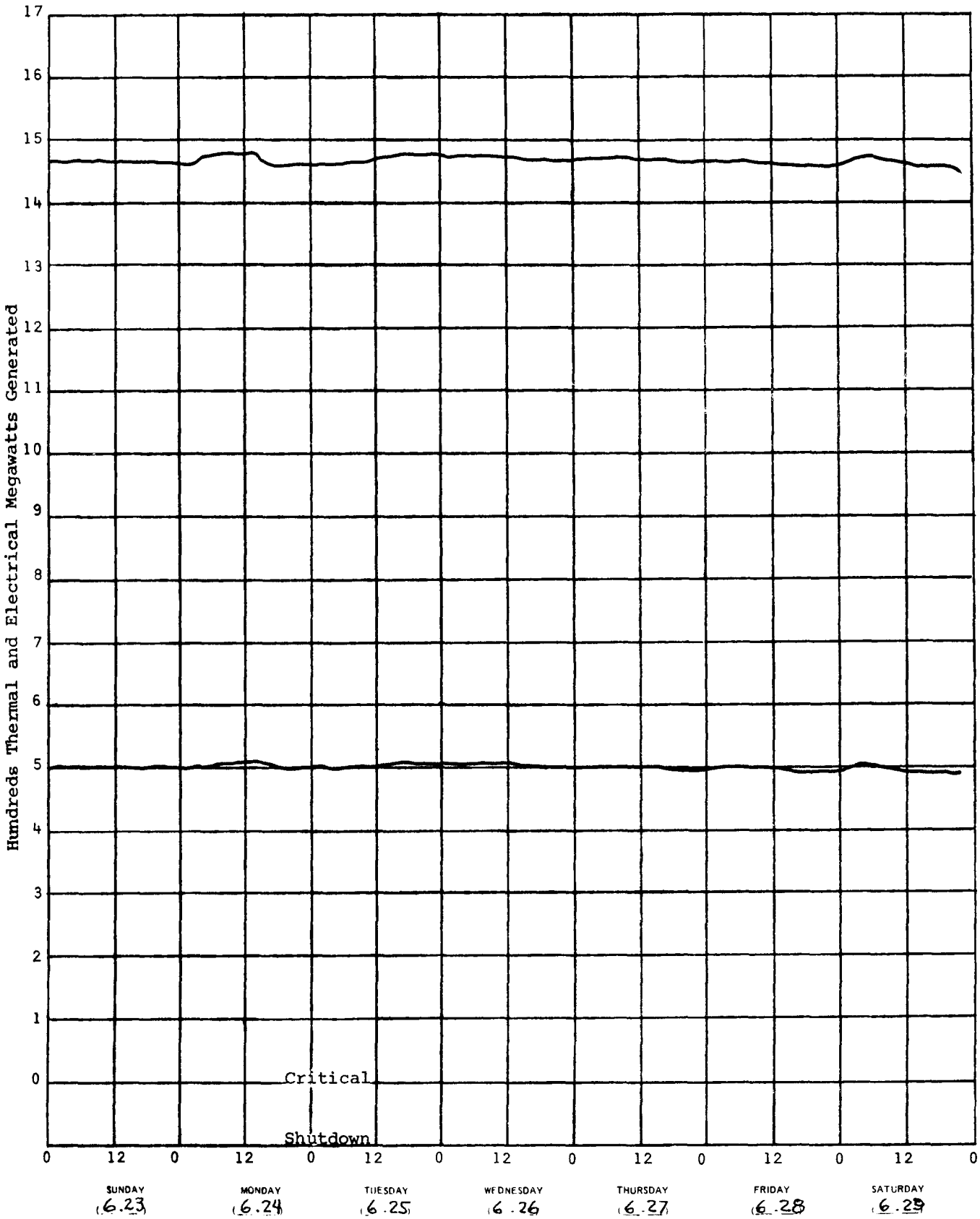
ITEM (Unit)	VALUE	SOURCE	COMMENTS
1. Core Power (MWt)	1488.45	HB #3-15 6/21/74 8^h48	none
2. Total core flow (10^6 lbs/hr)	53.02×10^6	Idem	none
3. Xenon condition		Idem	See attached power histogram
4. Inlet subcooling (BTU/lb)	24.08	Idem	21.63 from HB corrected for core pressure
5. System pressure (psia)	1013.	Idem	Calculated core pressure = 1029.3 psia
6. Feedwater flow (lbs/hr)	5.95×10^6	Idem	none
7. Feedwater temperature (^oF)	367.8	Idem	none
8. Cleanup system flow (gal/min)	164.	Idem	none
9. Inlet temperature to clean-up system (^oF)	494.	Idem	none
10. Outlet temperature of cleanup system	428.	Idem	none

Verified By: [illegible] Date: 07/20/76

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 6 . 29 . 74



Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

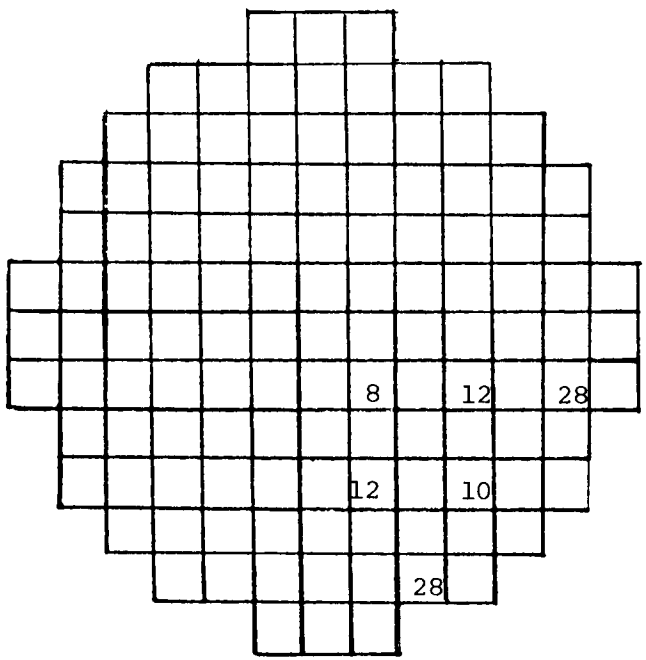
Week Ending 6 . 22 . 74

REACTOR: Monticello
CYCLE: 3
Exposure: 7900 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART D - BWR TRANSIENT DATA

Sheet 4 of 6
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Transient Data Conditions during transient in time intervals sufficient to monitor Xenon transients including conditions prior to transient			
11. Control rod positions (by location)	See below	HB #3-13A 6/19/74 21^h07	none
12. Single channel TIP traces during transient (if available)	not available		



Quarter-core symmetry

Verified By: E. Tooly Date: 07/20/76

REACTOR: Monticello
CYCLE: 3
Exposure: 7900 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART D - BWR TRANSIENT DATA

Sheet 3 **of** 6
Rev. 0 **Date:** 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1. Core power (MWt)	971.30	HB #3-13A 6/19/74 20^h53	none
2. Total core flow (10^6 lbs/hr)	30.85×10^6	Idem	none
3. Xenon condition		Idem	See attached power histogram
4. Inlet subcooling (BTU/lb)	28.53	Idem	26.99 from HB corrected for core pressure
5. System pressure (psia)	982.	Idem	Calculated core pressure = 992.2 psia
6. Feedwater flow (lbs/hr)	3.71×10^6	Idem	none
7. Feedwater temperature (^oF)	335.	Idem	none
8. Cleanup system flow (gal/min)	164.	Idem	none
9. Inlet temperature to clean-up system (^oF)	483.0	Idem	none
10. Outlet temperature of cleanup system	412.0	Idem	none

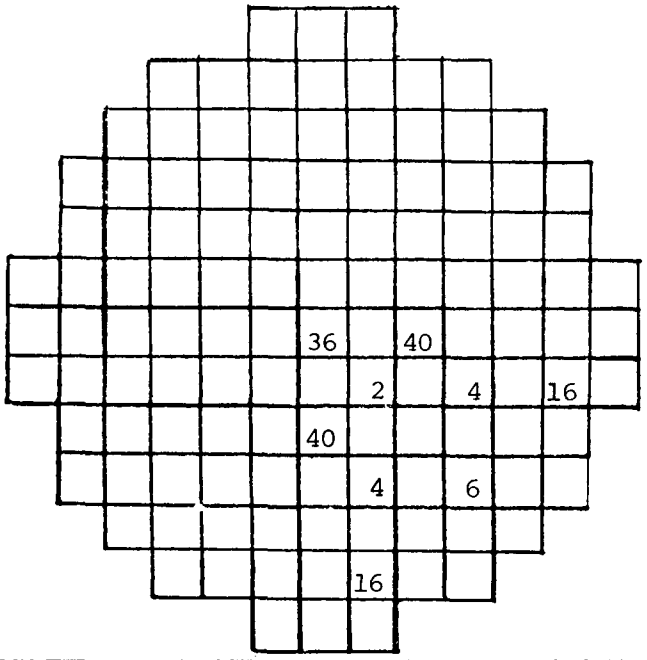
Verified By: E. Tozer **Date:** 07/20/76

REACTOR: Monticello
CYCLE: 3
Exposure: 7900 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART D - BWR TRANSIENT DATA

Sheet 2 of 6
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Transient Data Conditions during transient in time intervals sufficient to monitor Xenon transients including conditions prior to transient			
11. Control rod positions (by location)	See below	HB #3-13 6/19/74 18^h15	
12 Single channel TIP traces during transient (if available)	not available		



Quarter-core symmetry

Verified By: E. Torres **Date:** 07/20/76

REACTOR: Monticello
CYCLE: 3
Exposure: 7900 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART D - BWR TRANSIENT DATA

Sheet 1 of 6
Rev. 0 Date: 5/10/76

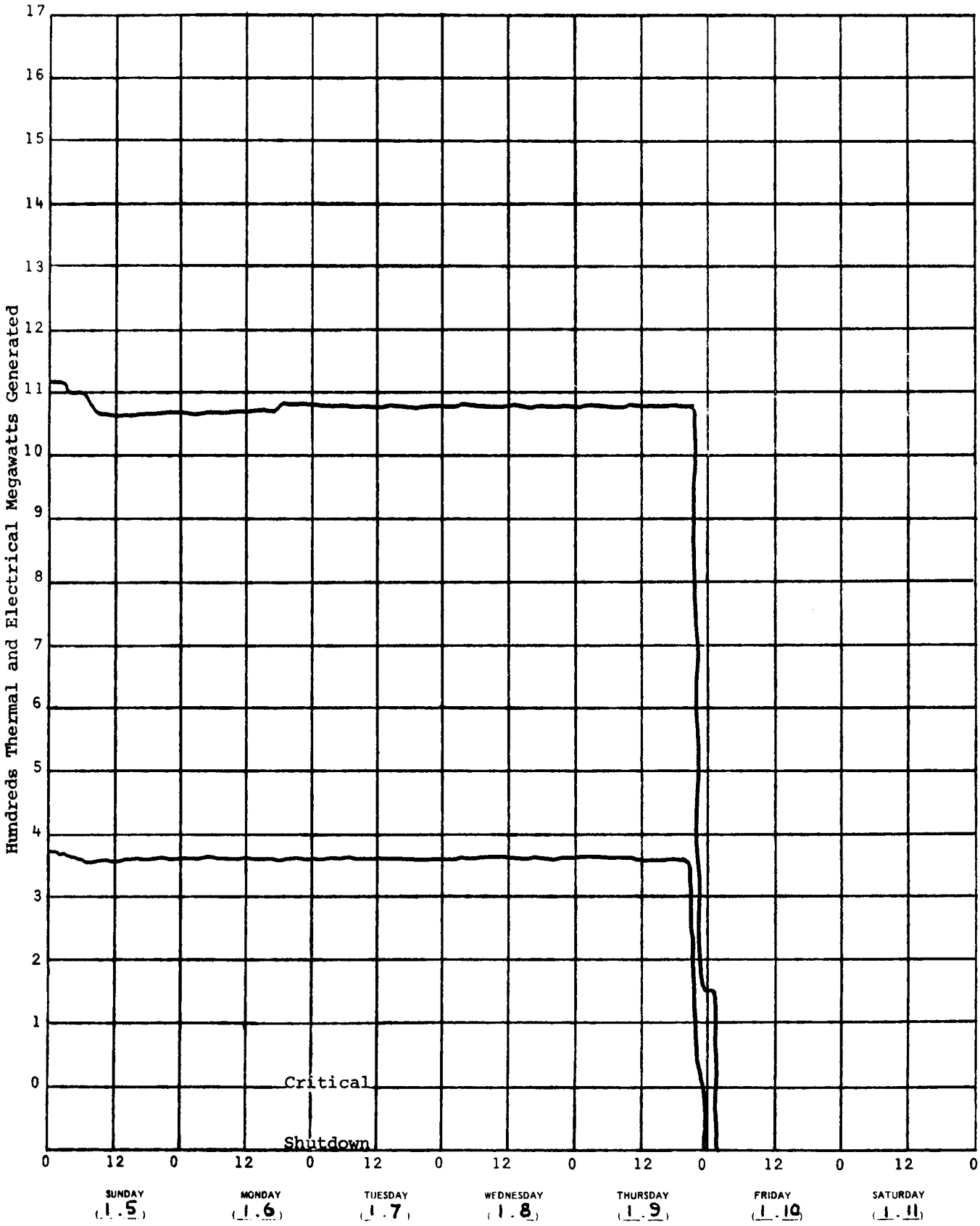
ITEM (Unit)	VALUE	SOURCE	COMMENTS
1. Core power (MWt)	457.09	HB #3-13 6/19/74 18^h17	18^h17 = 18h, 17m past midnight
2. Total core flow (10^6 lbs/hr)	21.2×10^6	Idem	none
3. Xenon condition		Idem	See attached power histogram
4. Inlet subcooling (BTU/lb)	21.97	Idem	20.61 from HB corrected for core pressure
5. System pressure (psia)	957.0	Idem	Calculated core pressure = 965.5 psia
6. Feedwater flow (lbs/hr)	1.64×10^6	Idem	none
7. Feedwater temperature (^oF)	289.7	Idem	none
8. Cleanup system flow (gal/min)	164.0	Idem	none
9. Inlet temperature to clean-up system (^oF)	484.0	Idem	none
10. Outlet temperature of clean-up system (^oF)	412.0	Idem	none

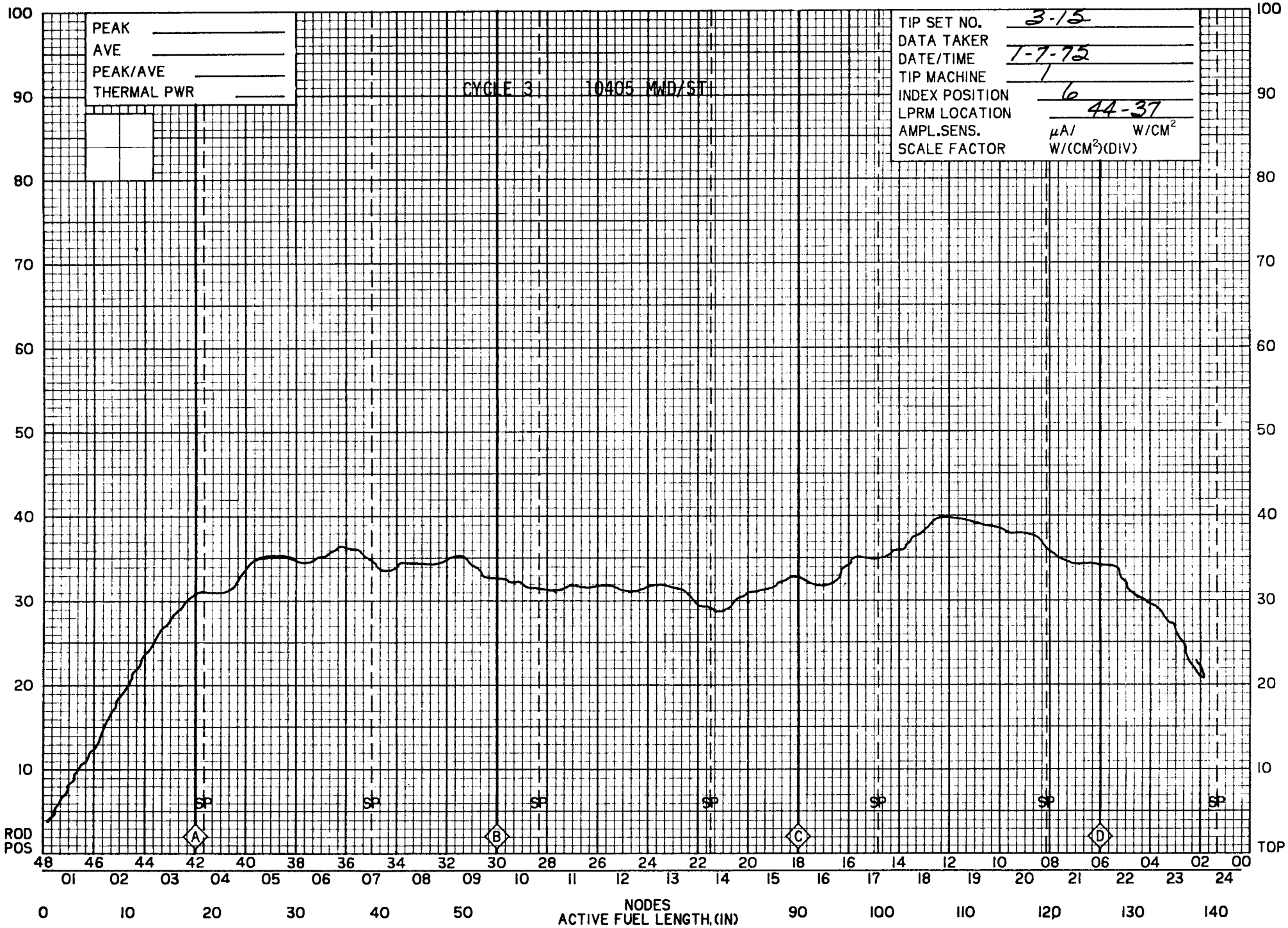
Verified By: [illegible] Date: 07/20/76

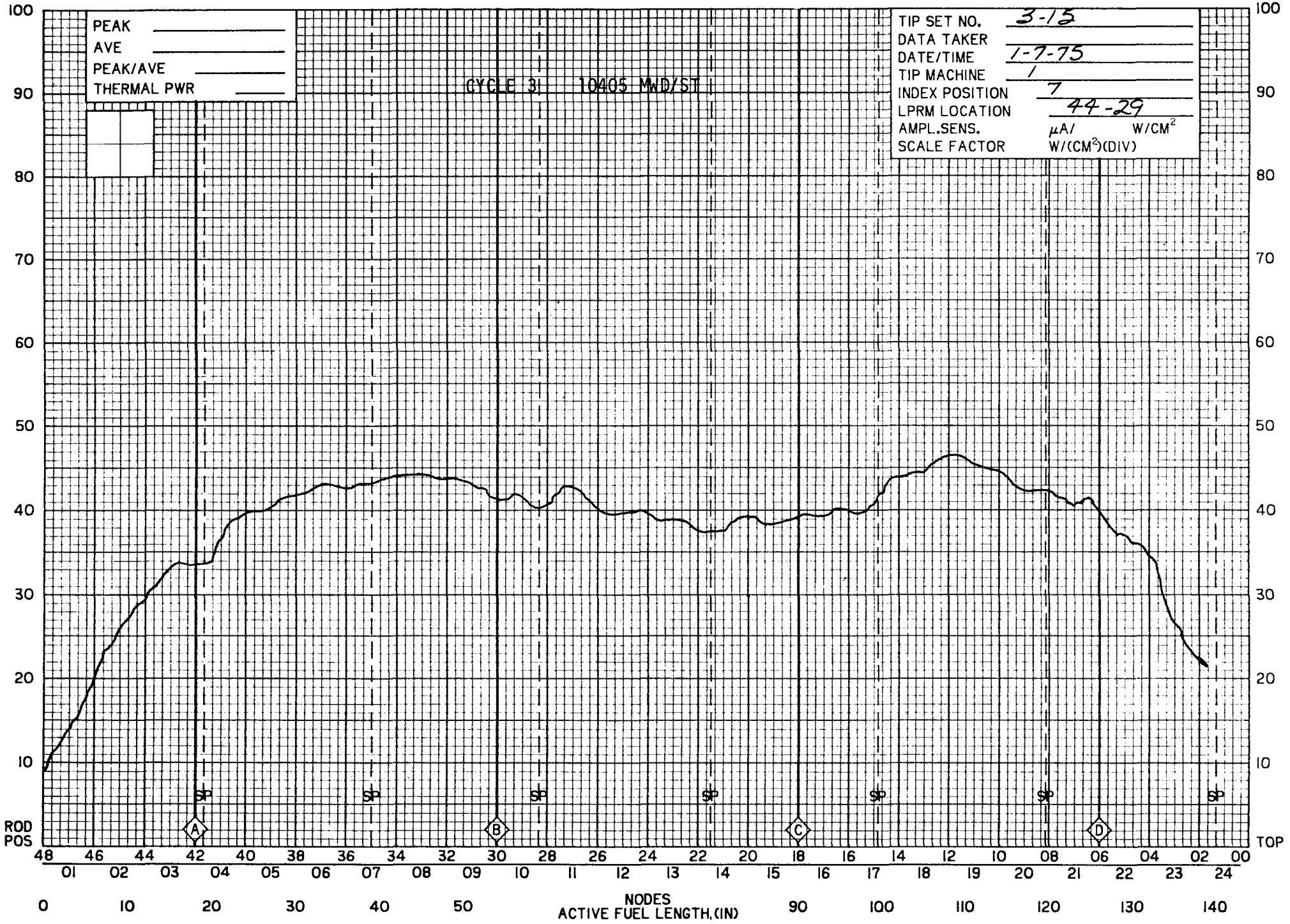
Monticello Nuclear Generating Plant

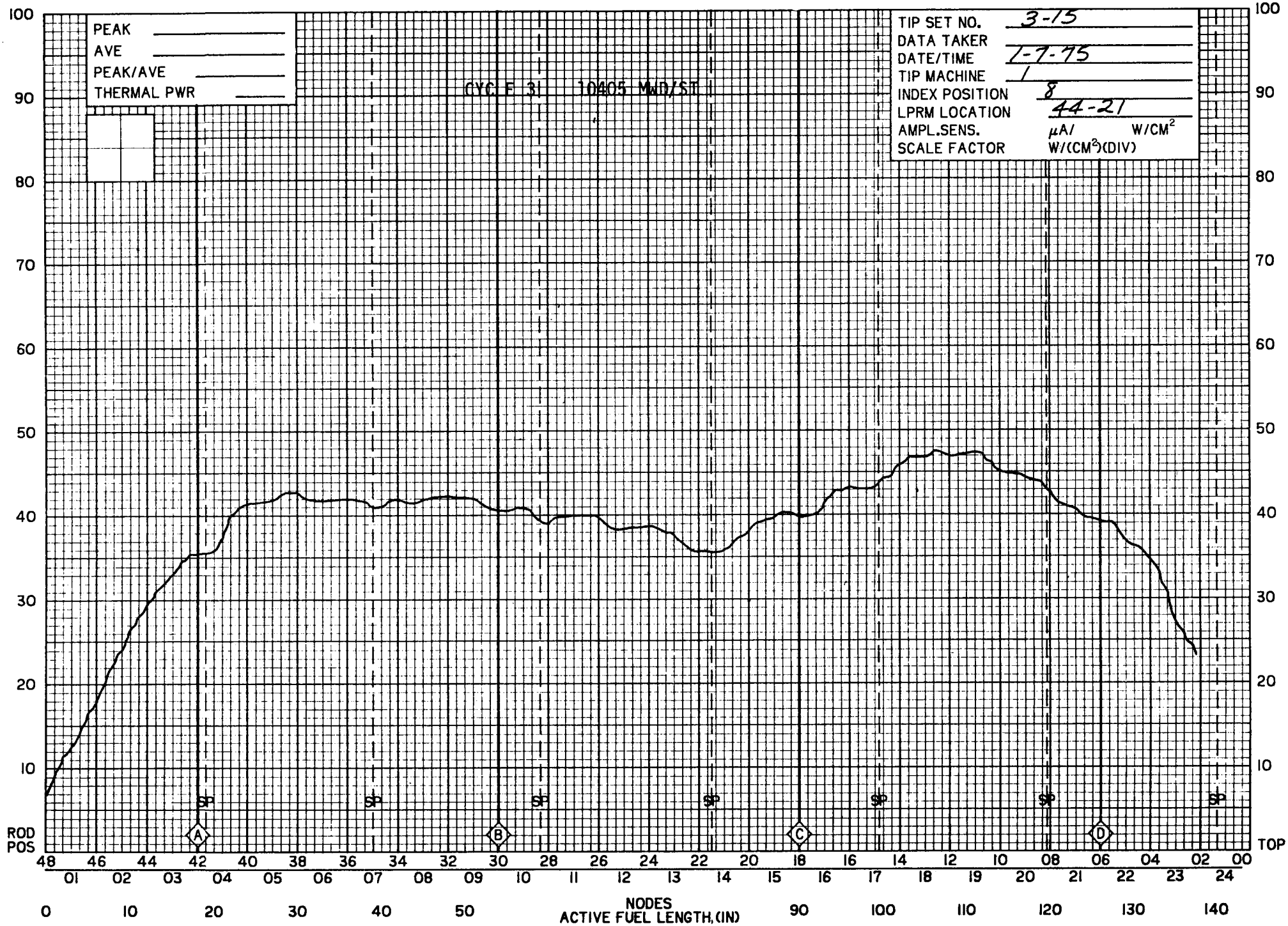
WEEKLY OPERATING HISTORY

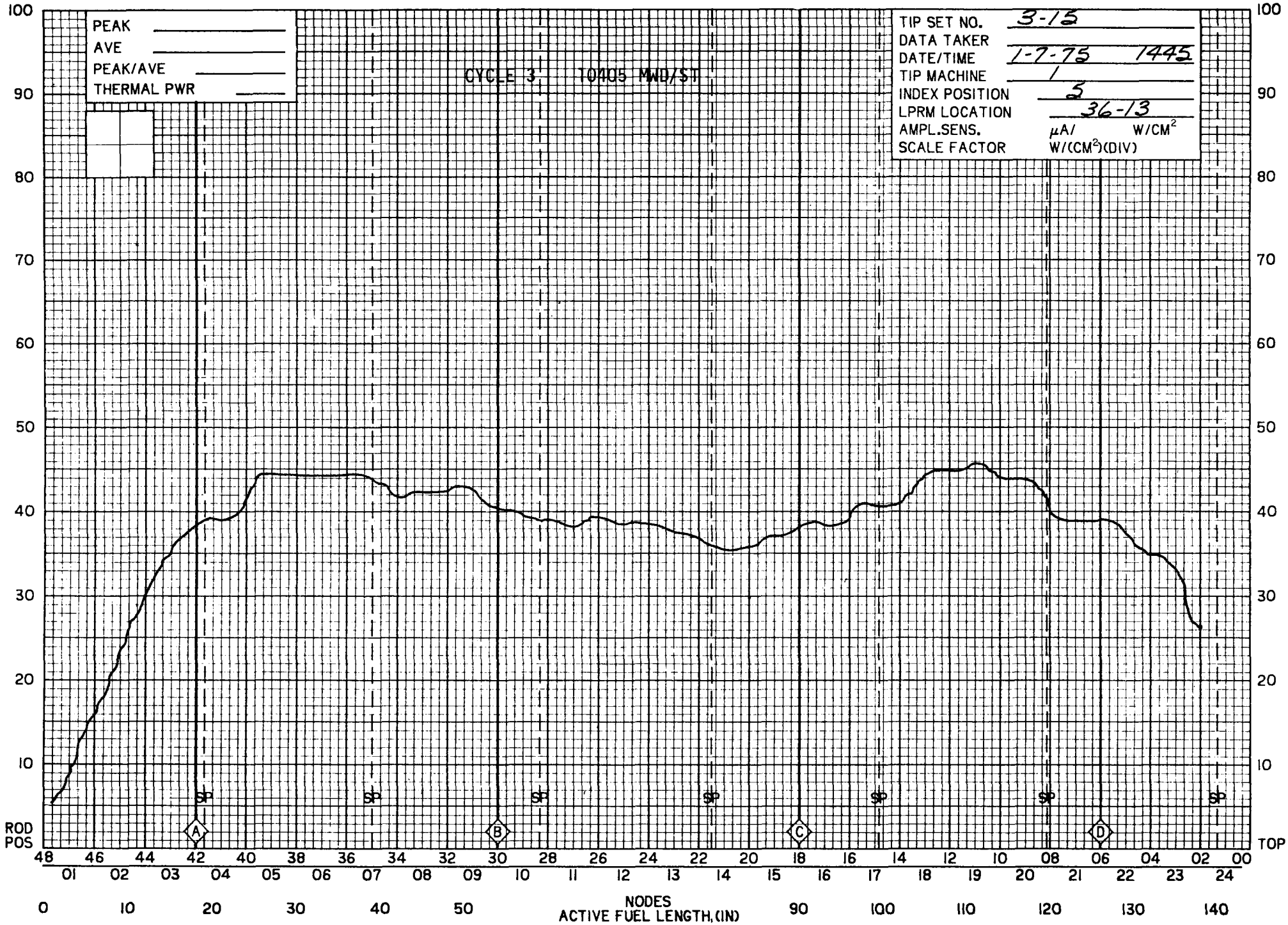
Week Ending 1 - 11 - 75

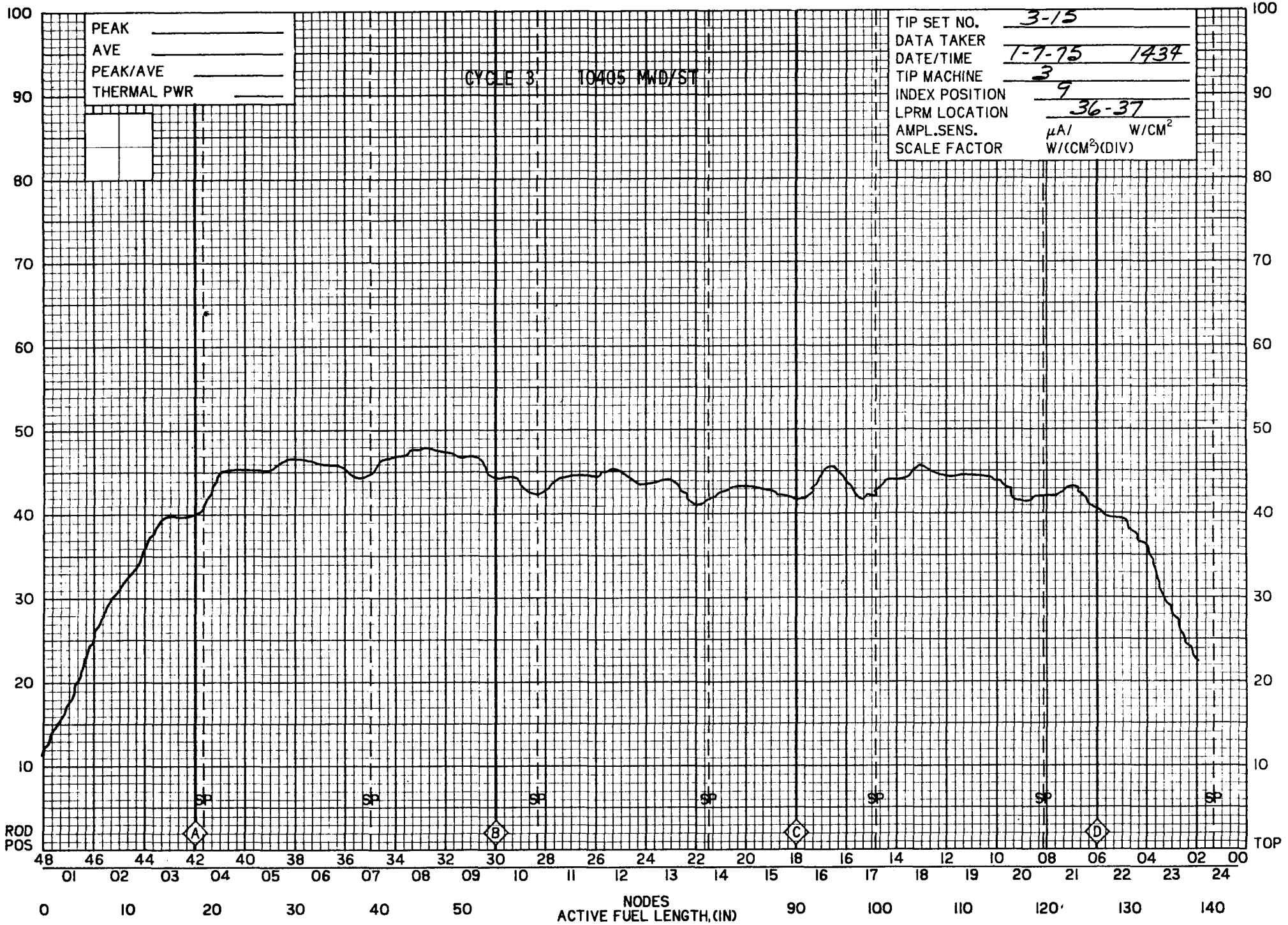



PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3
10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-72
TIP MACHINE 1
INDEX POSITION 6
LPRM LOCATION 44-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-13
DATA TAKER
DATE/TIME 1-7-75
TIP MACHINE 1
INDEX POSITION 7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYC. F 3
10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75
TIP MACHINE 1
INDEX POSITION 8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1445
TIP MACHINE 1
INDEX POSITION 5
LPRM LOCATION 36-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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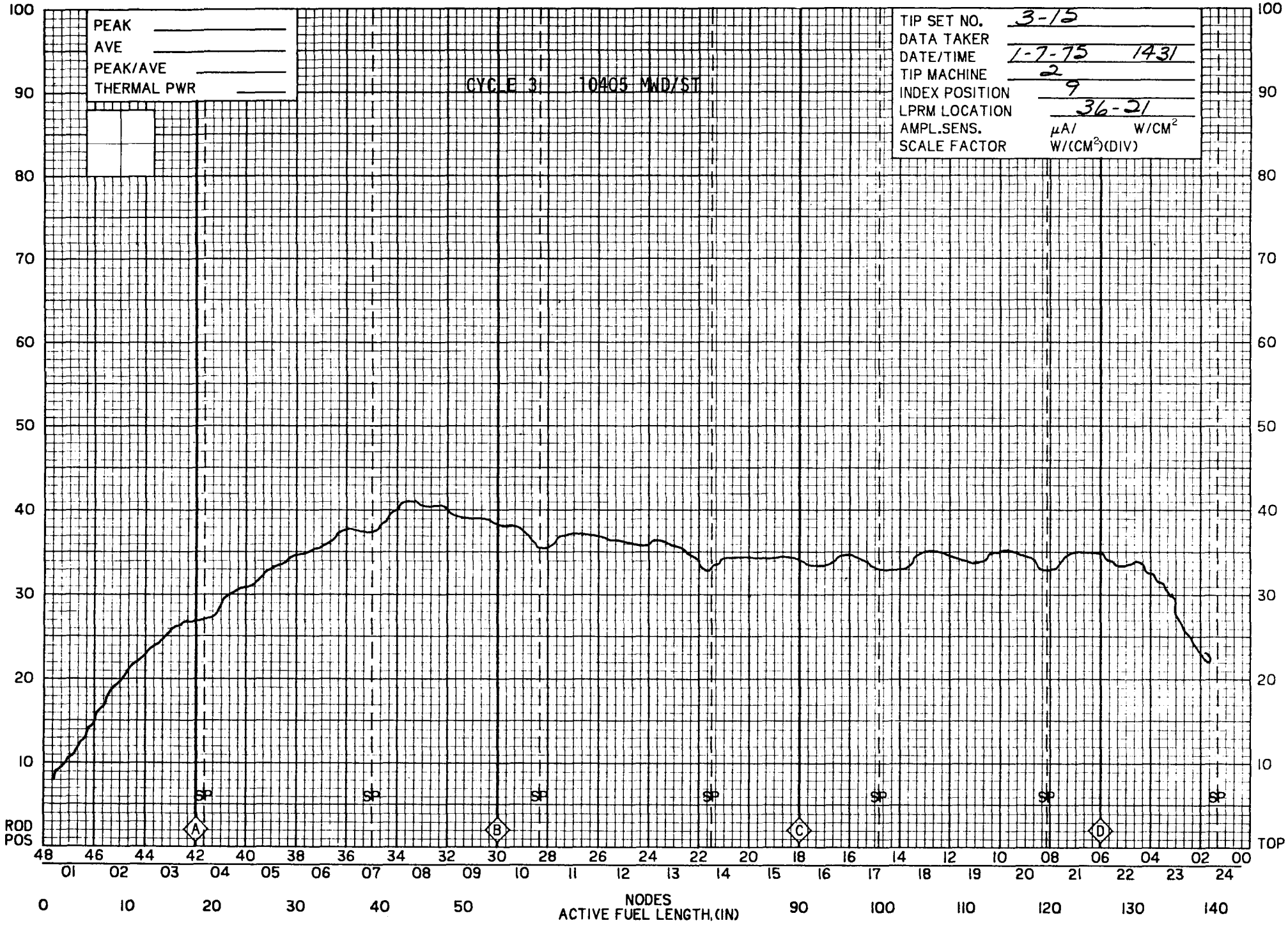
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1434
TIP MACHINE 3
INDEX POSITION 9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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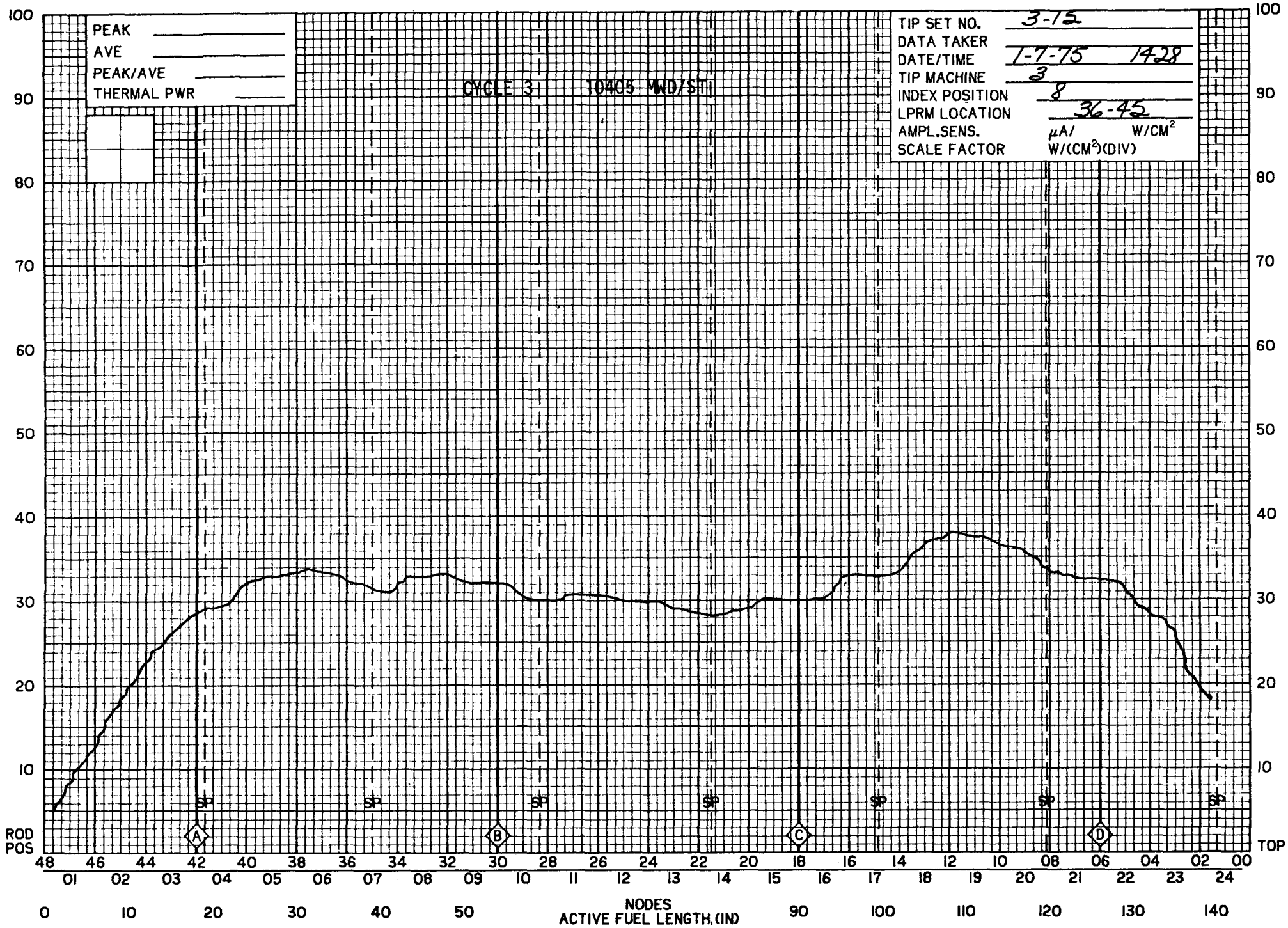
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1431
TIP MACHINE 2
INDEX POSITION 9
LPRM LOCATION 36-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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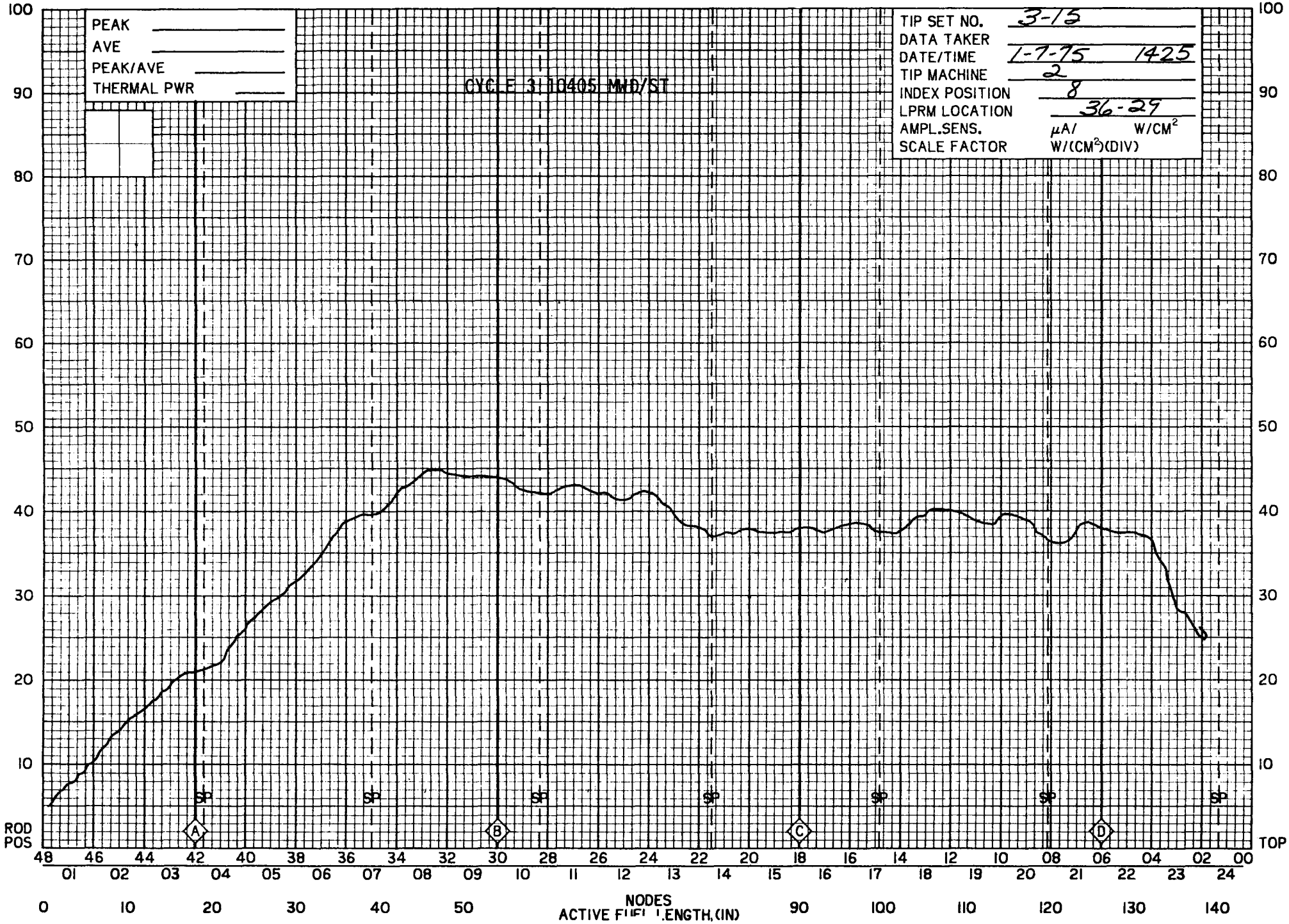
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1428
TIP MACHINE 3
INDEX POSITION 8
LPRM LOCATION 36-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)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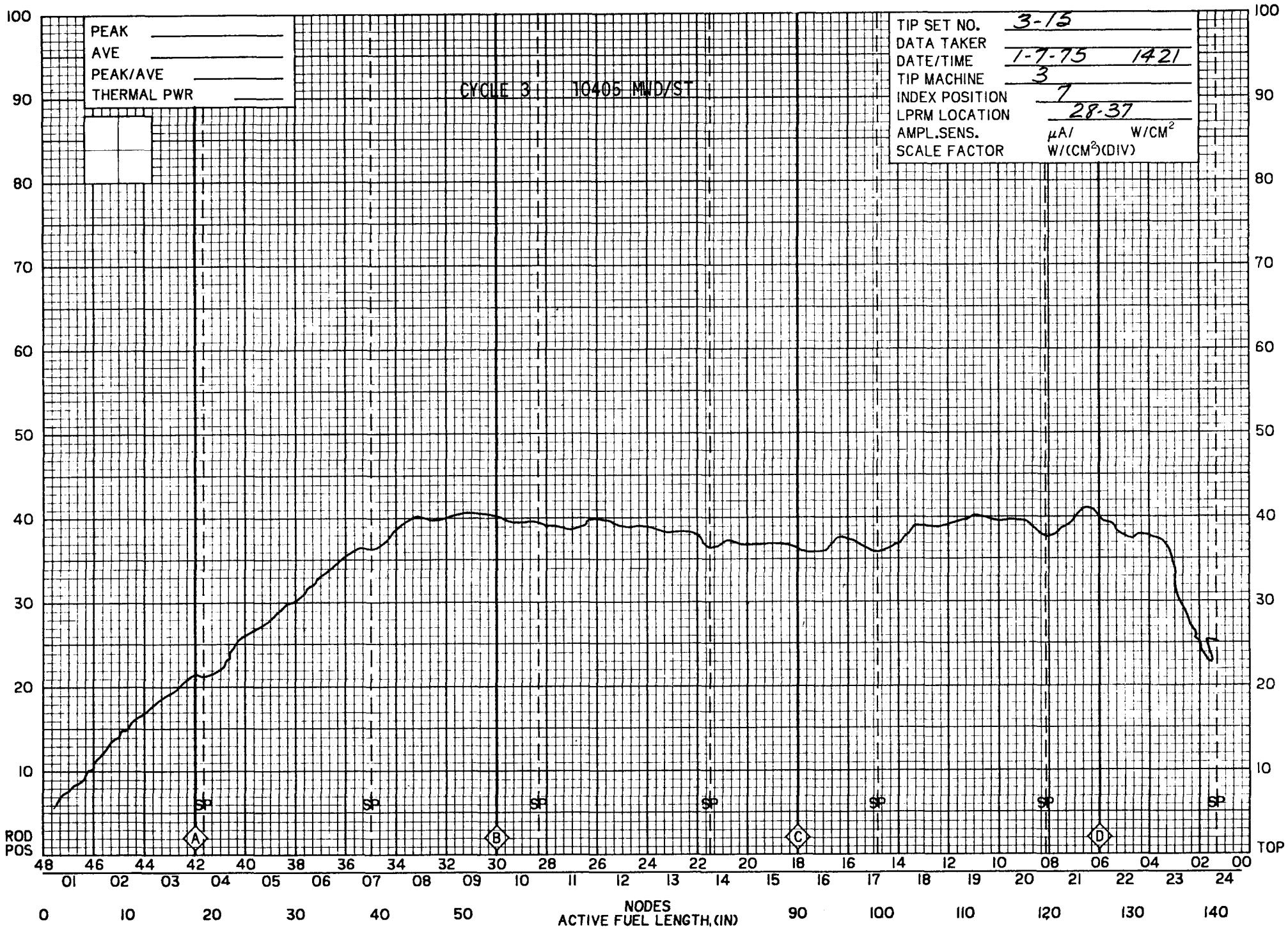
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1425
TIP MACHINE 2
INDEX POSITION 8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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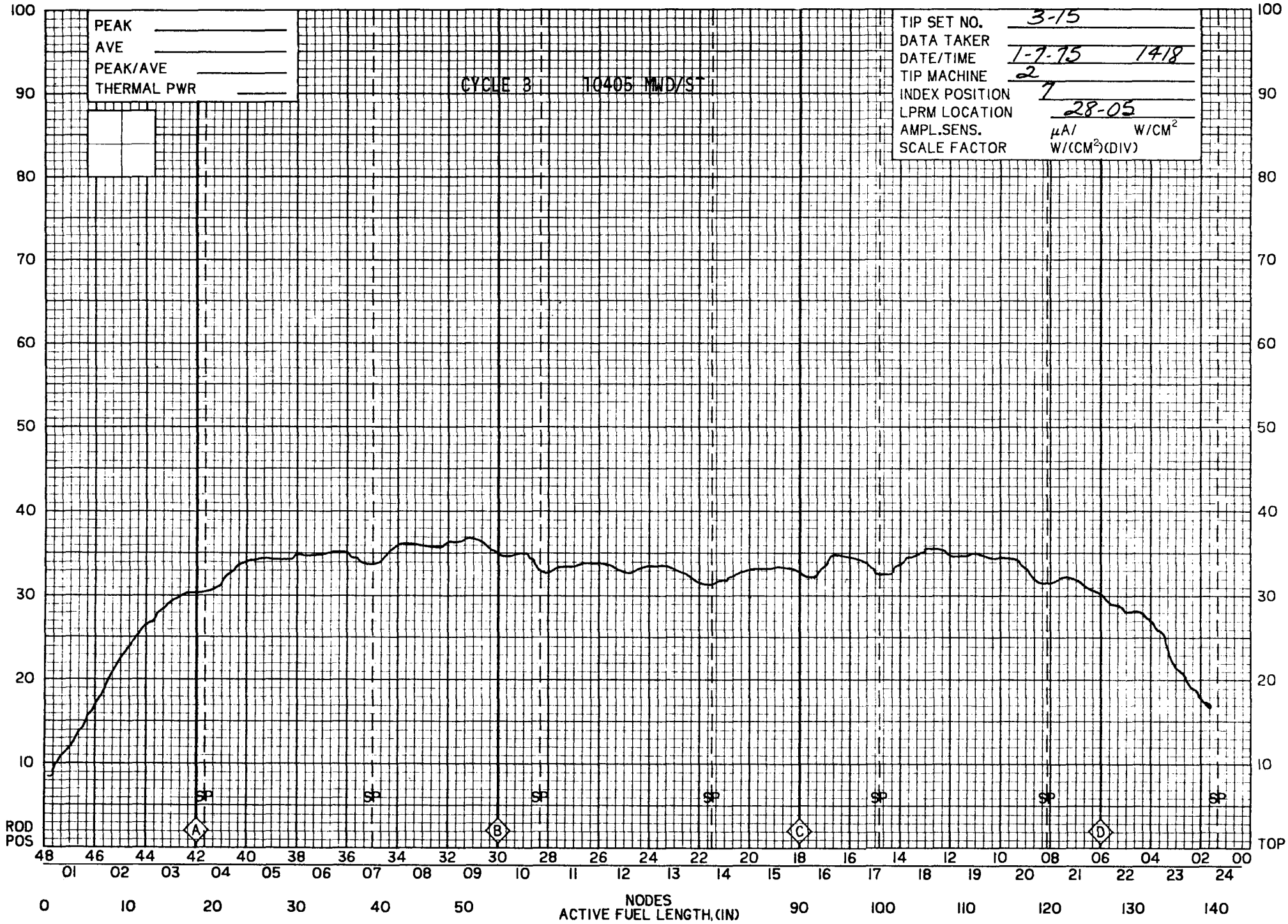
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1421
TIP MACHINE 3
INDEX POSITION 7
LPRM LOCATION 28-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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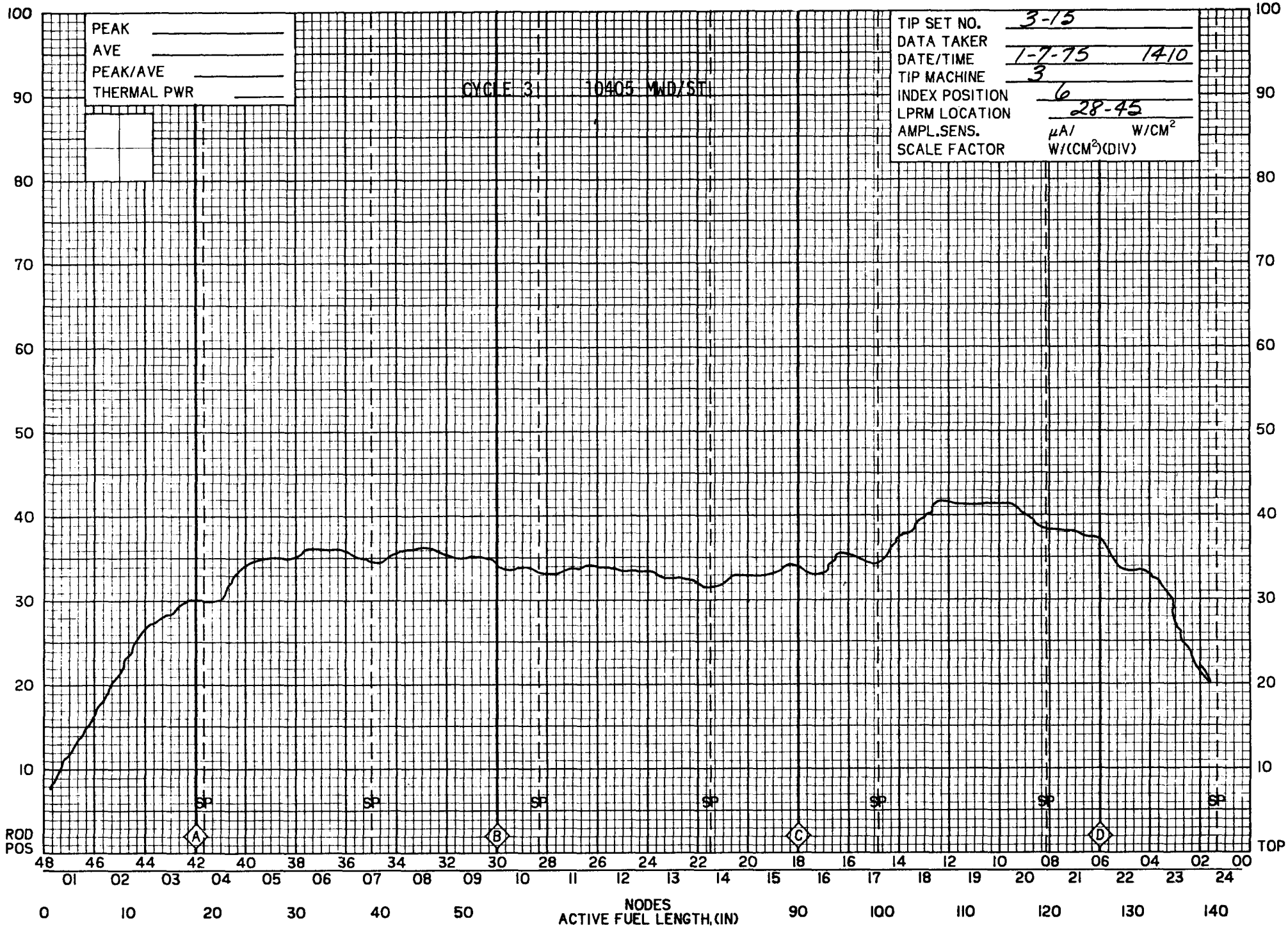
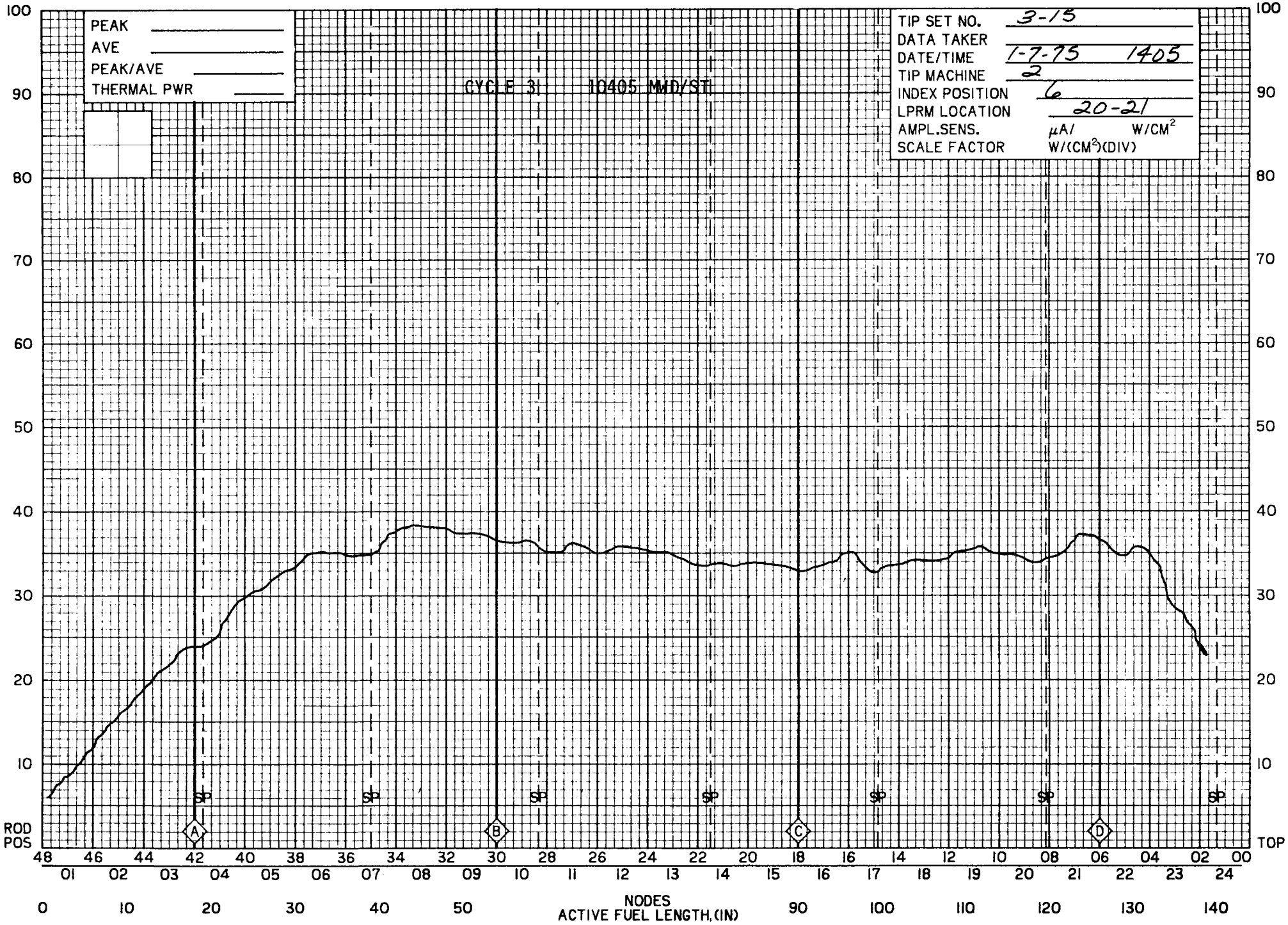
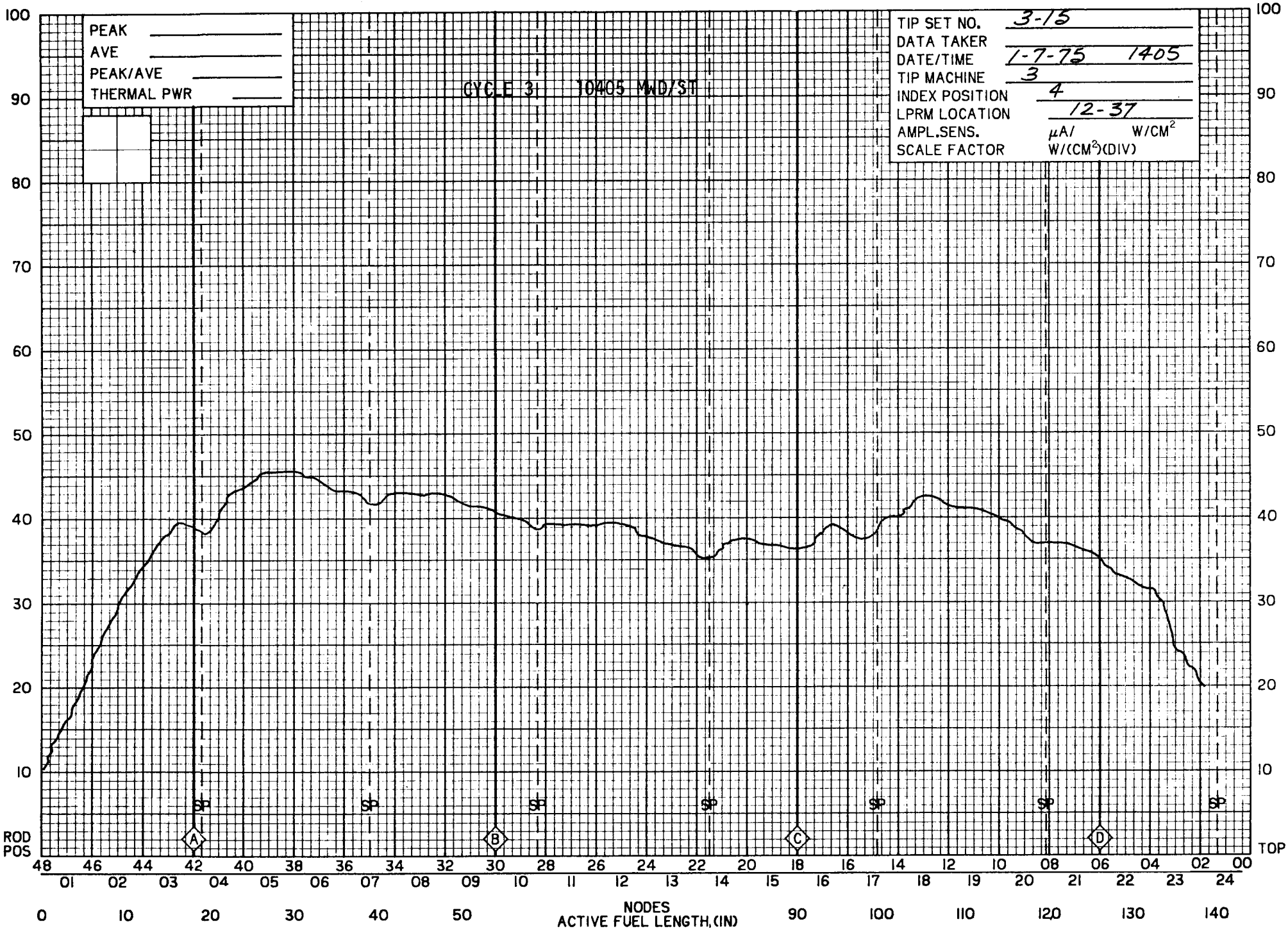
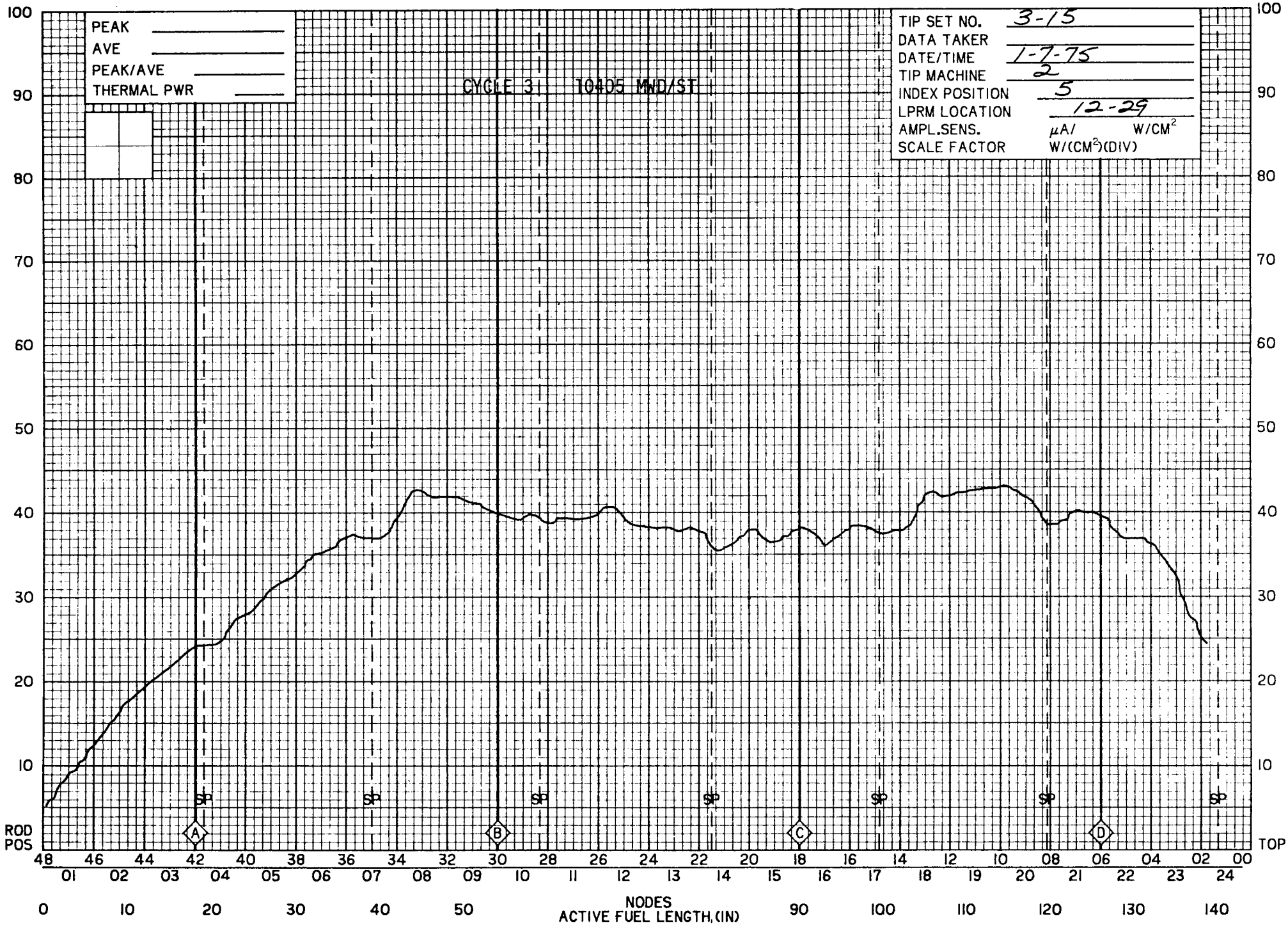
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1418
TIP MACHINE 2
INDEX POSITION 7
LPRM LOCATION 28-05
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1410
TIP MACHINE 3
INDEX POSITION 6
LPRM LOCATION 28-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 10405 MWD/ST
TIP SET NO. 3-13
DATA TAKER
DATE/TIME 1-7-75 1405
TIP MACHINE 2
INDEX POSITION 6
LPRM LOCATION 20-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1405
TIP MACHINE 3
INDEX POSITION 4
LPRM LOCATION 12-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)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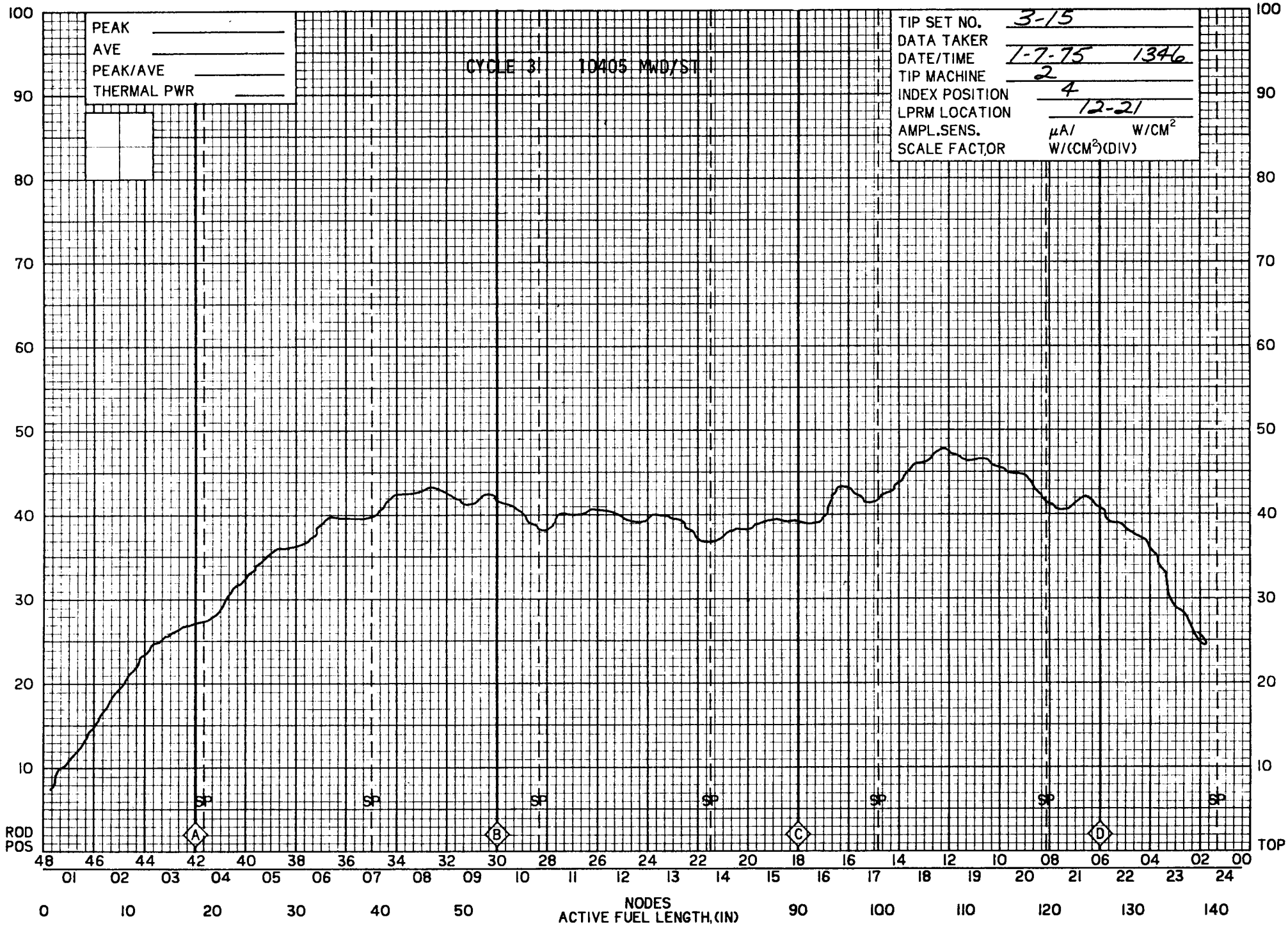
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75
TIP MACHINE 2
INDEX POSITION 5
LPRM LOCATION 12-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)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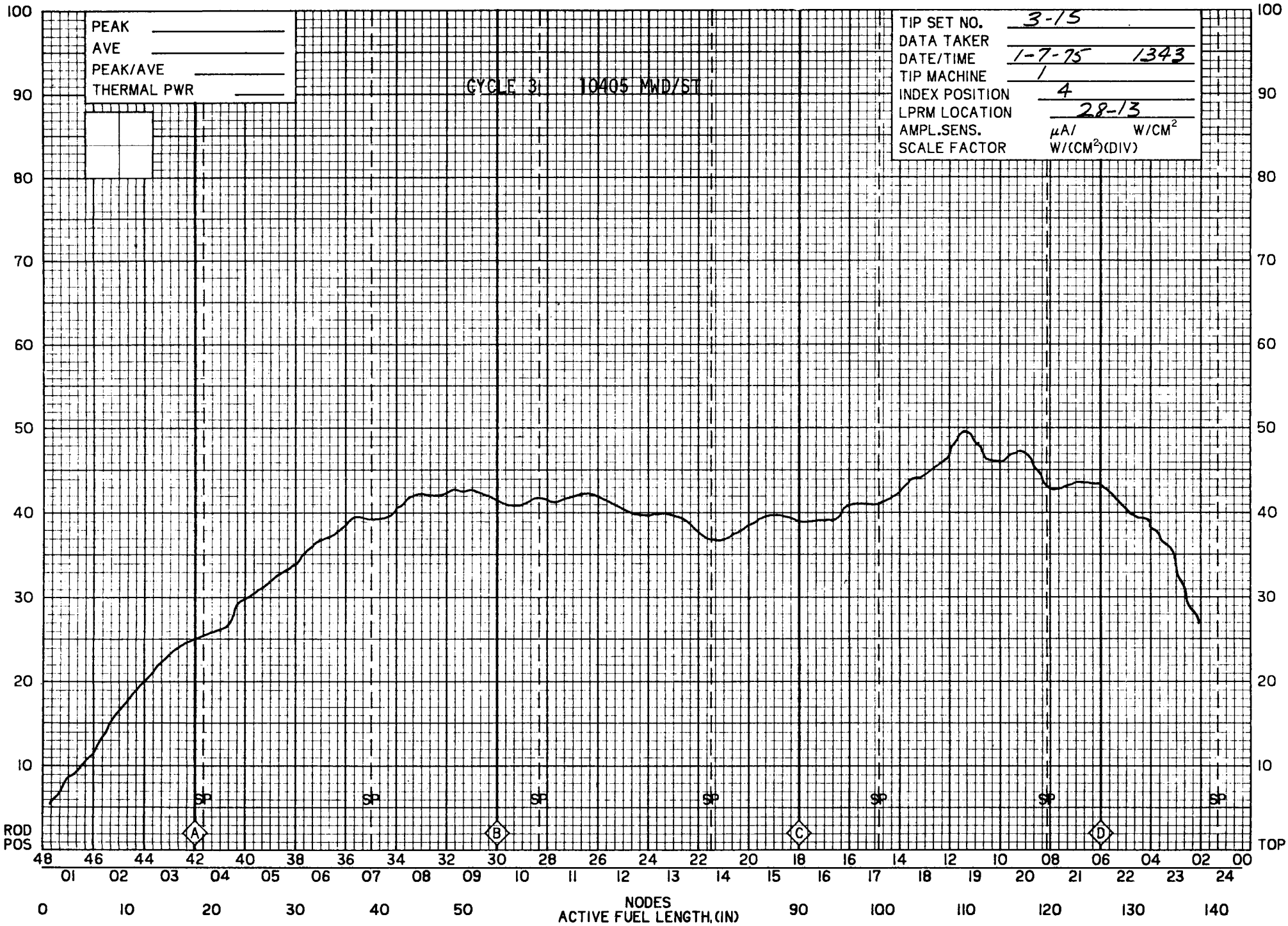
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1346
TIP MACHINE 2
INDEX POSITION 4
LPRM LOCATION 12-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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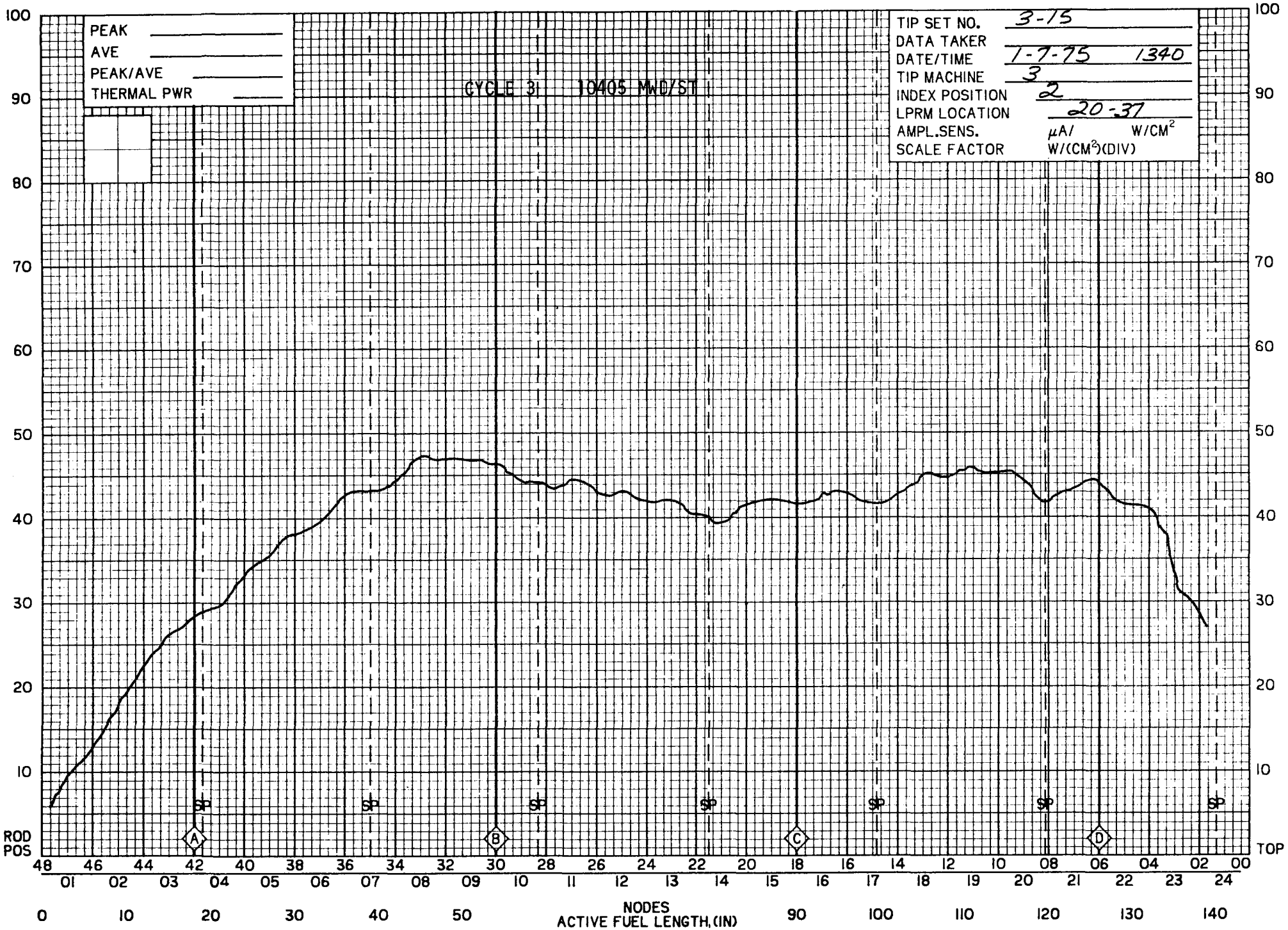
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1343
TIP MACHINE 1
INDEX POSITION 4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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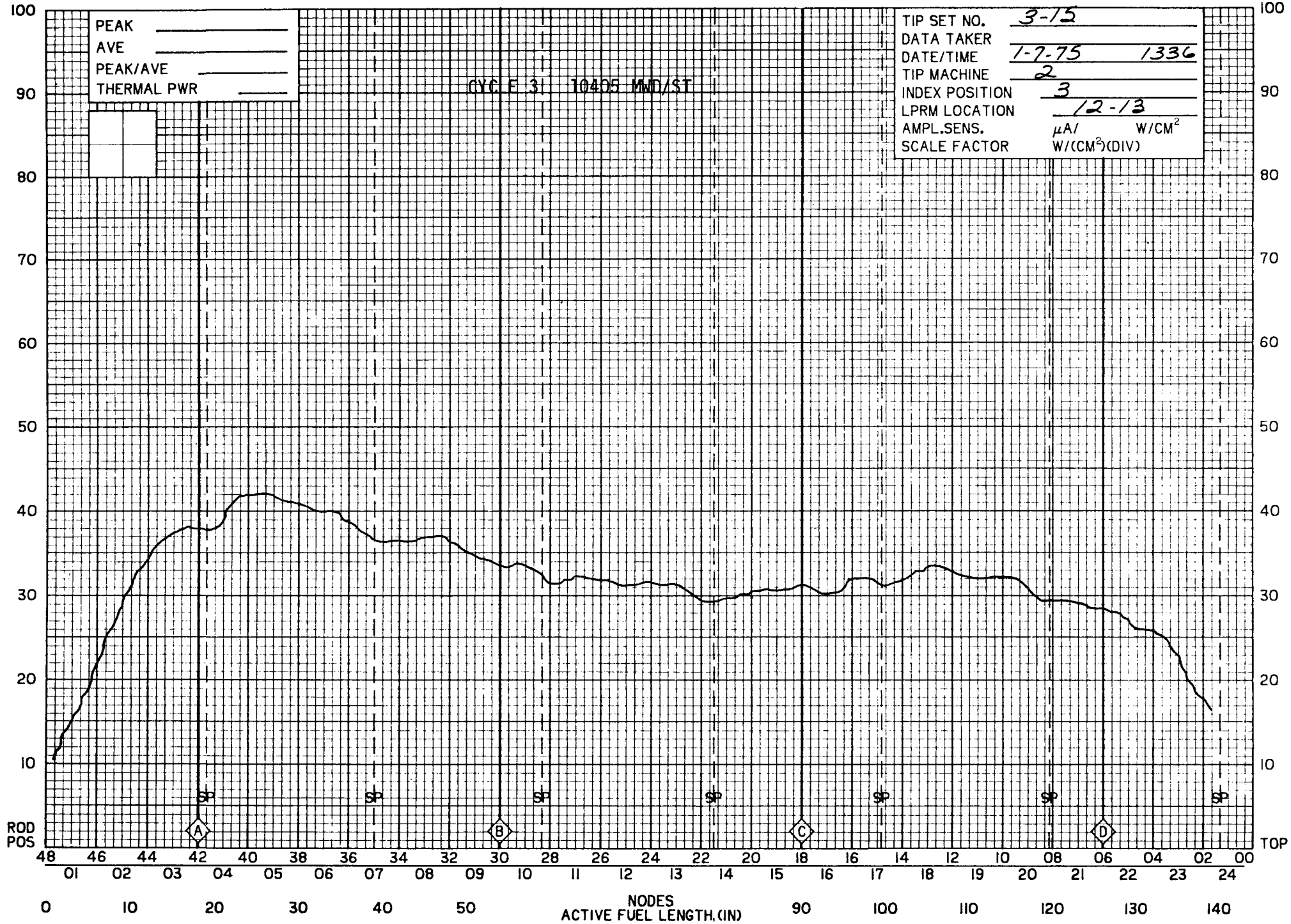
THERMAL PWR
CYCLE 31 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1340
TIP MACHINE 3
INDEX POSITION 2
LPRM LOCATION 20-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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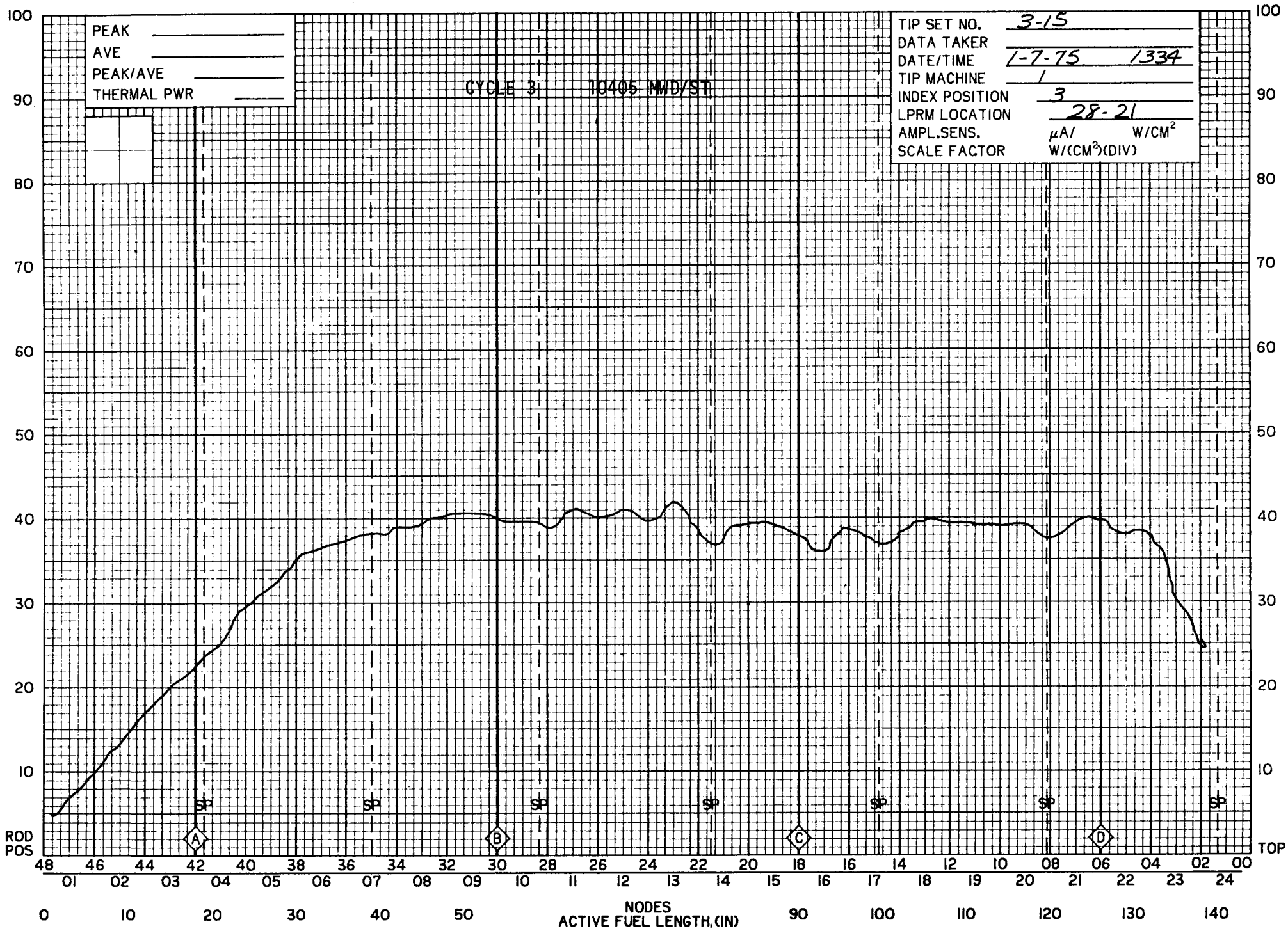
AVE
PEAK/AVE
THERMAL PWR
CYC. E 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1336
TIP MACHINE 2
INDEX POSITION 3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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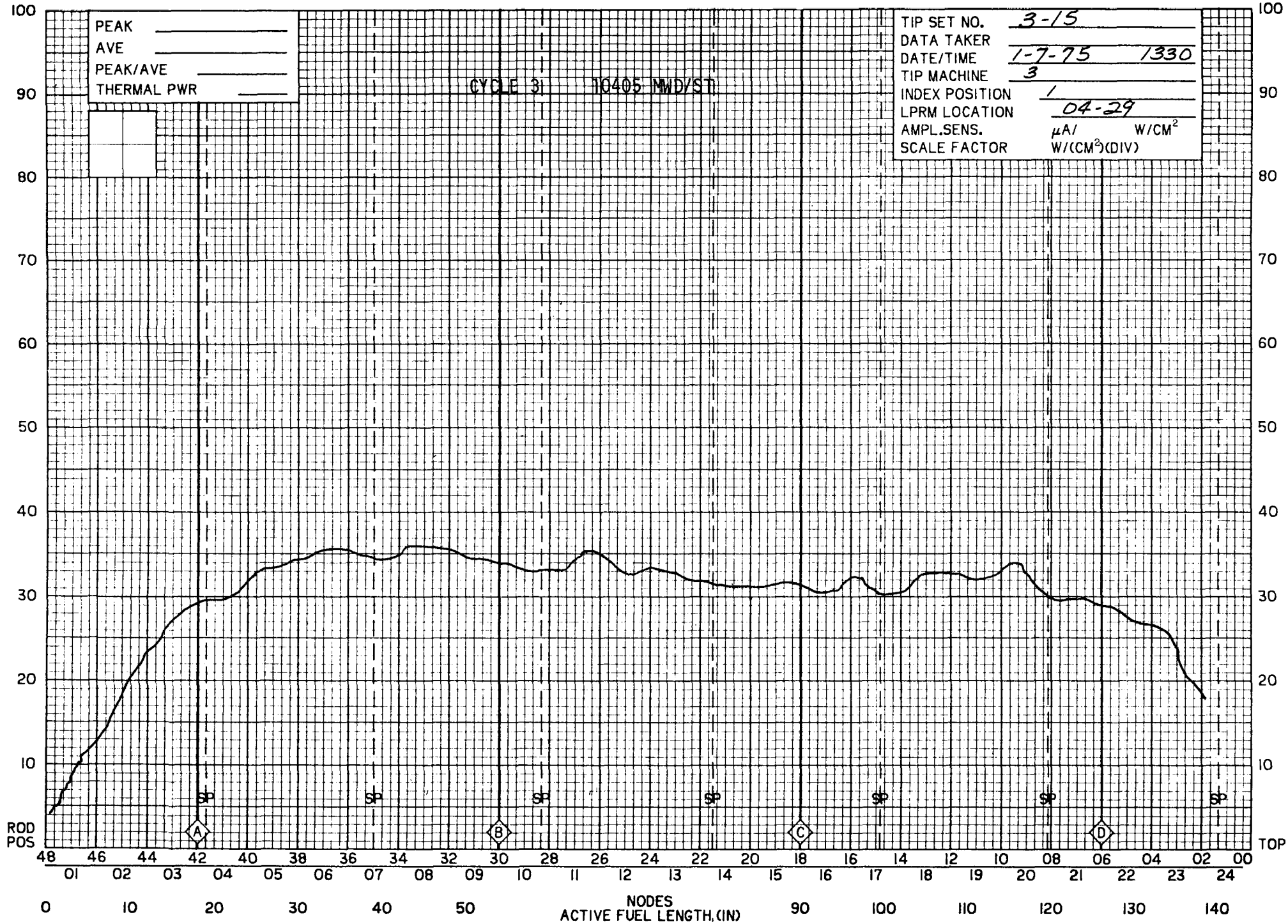
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1334
TIP MACHINE 1
INDEX POSITION 3
LPRM LOCATION 28-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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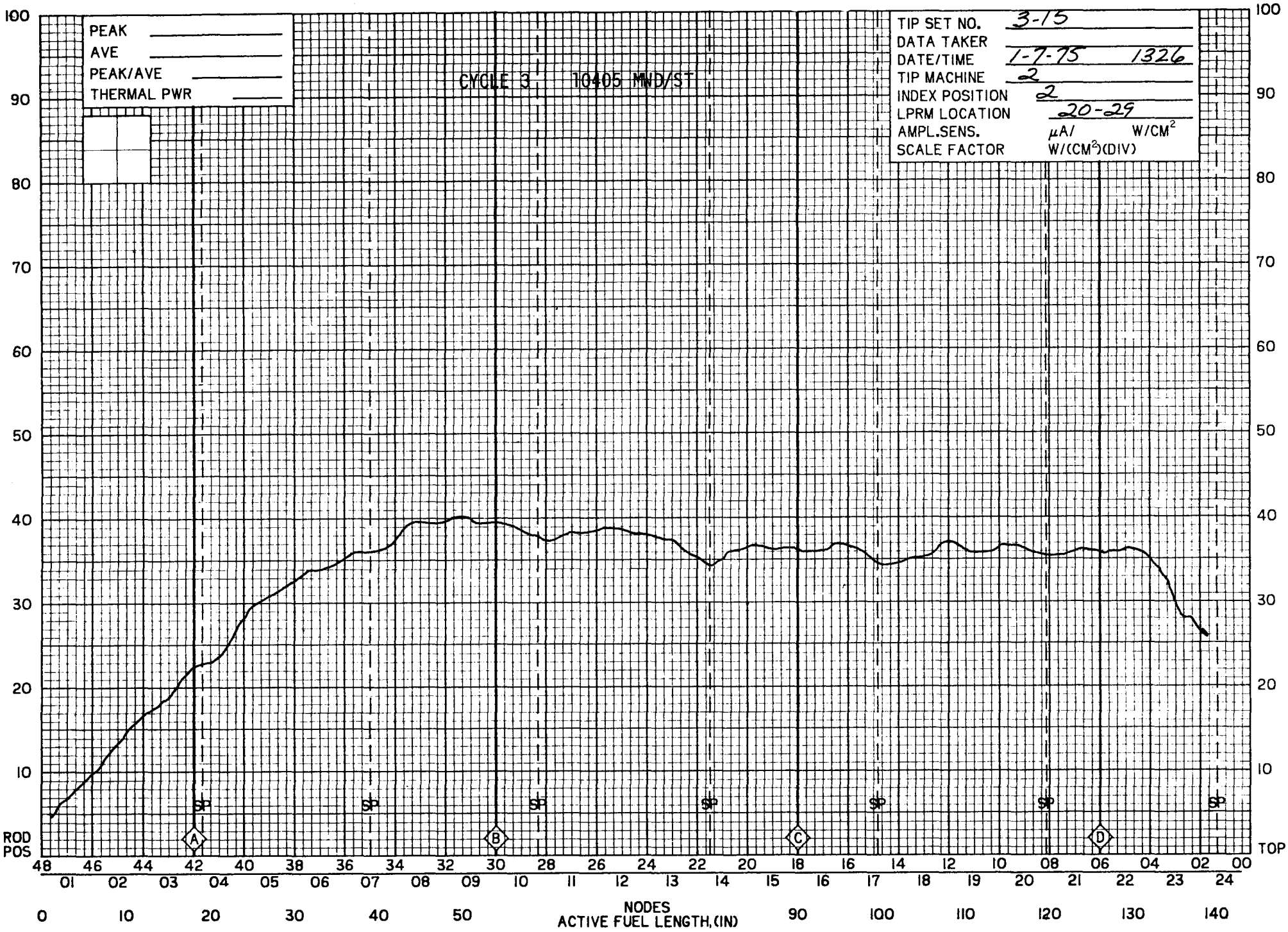
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1330
TIP MACHINE 3
INDEX POSITION 1
LPRM LOCATION 04-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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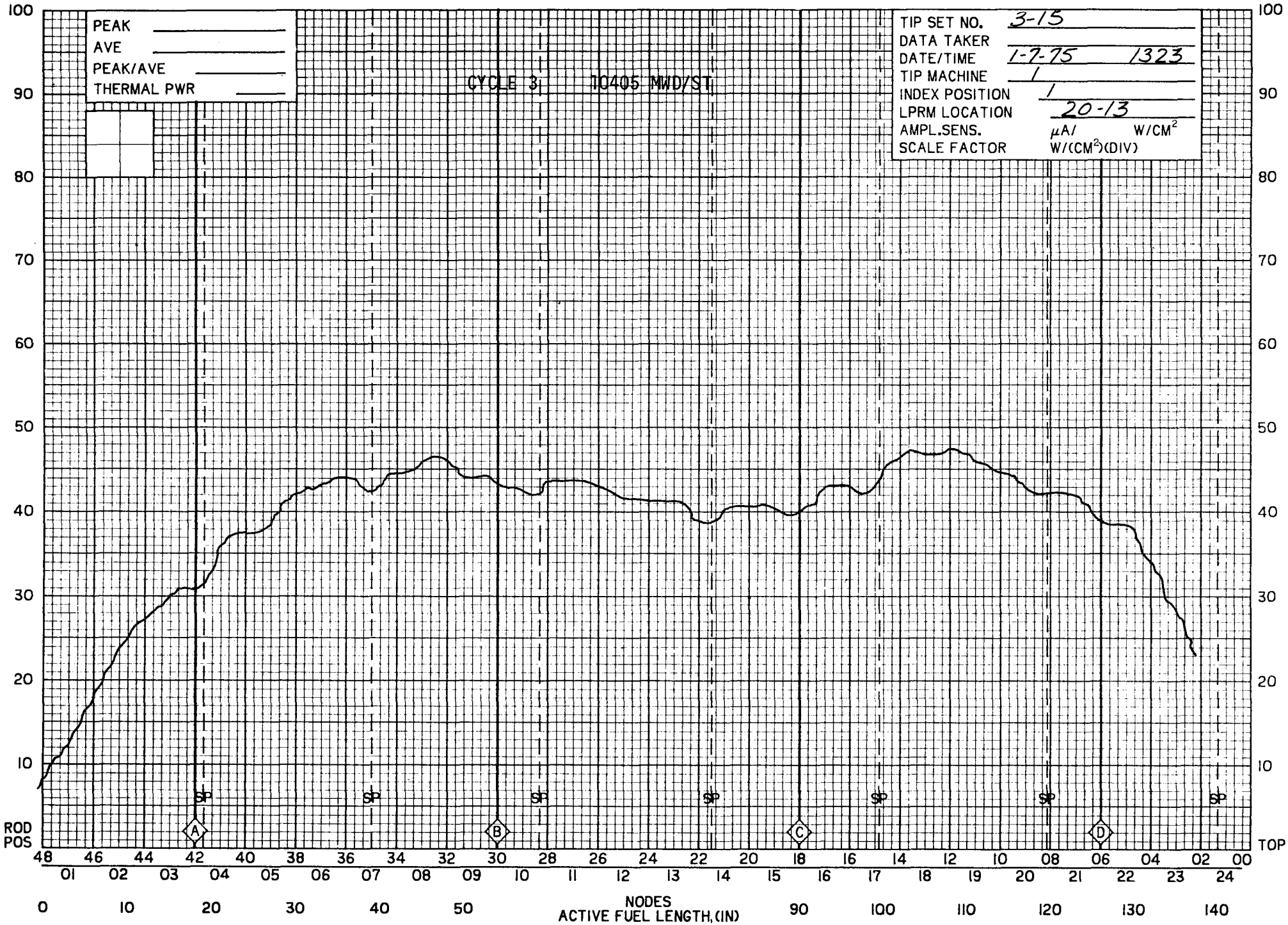
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1326
TIP MACHINE 2
INDEX POSITION 2
LPRM LOCATION 20-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)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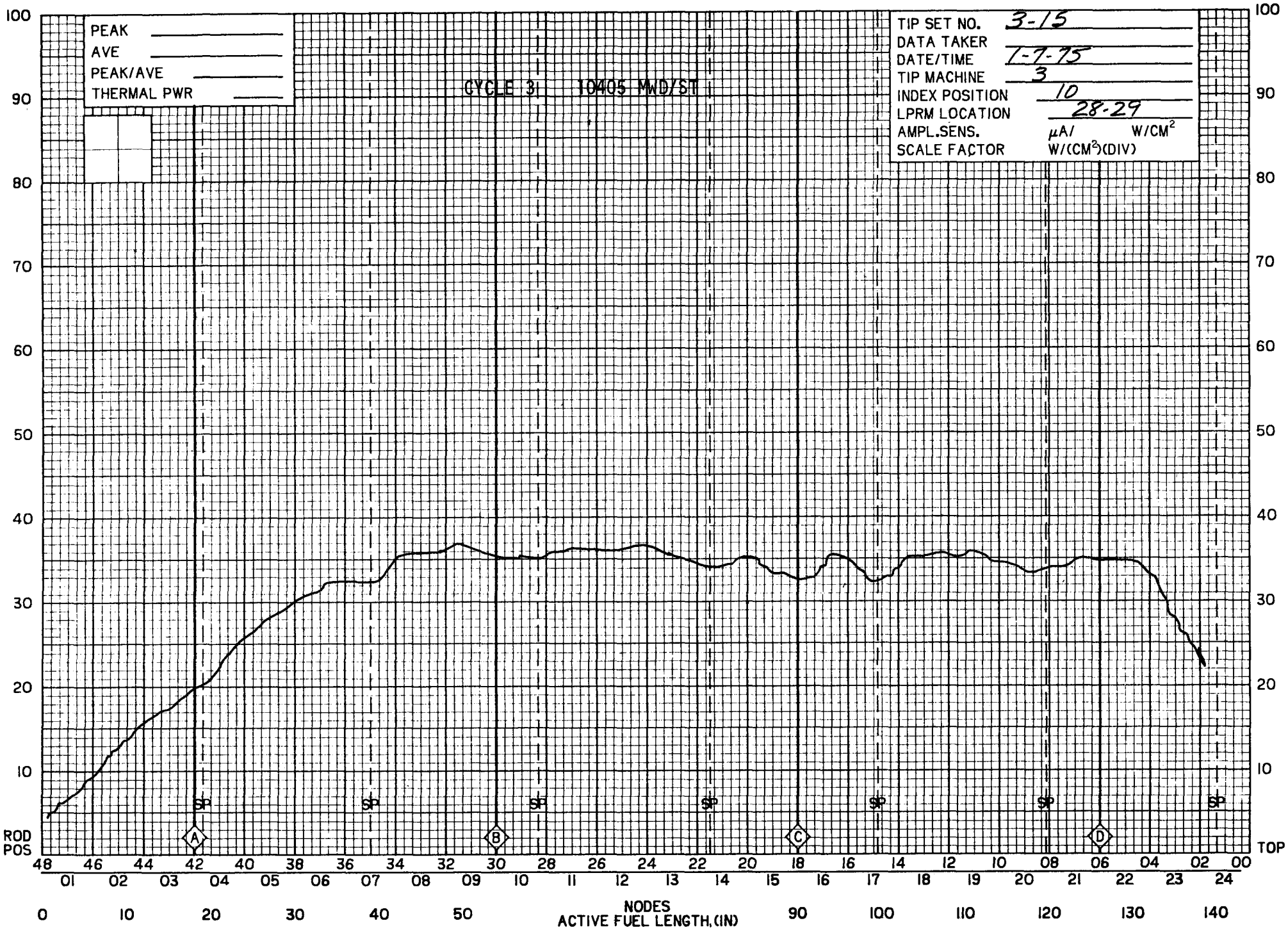
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1323
TIP MACHINE 1
INDEX POSITION 1
LPRM LOCATION 20-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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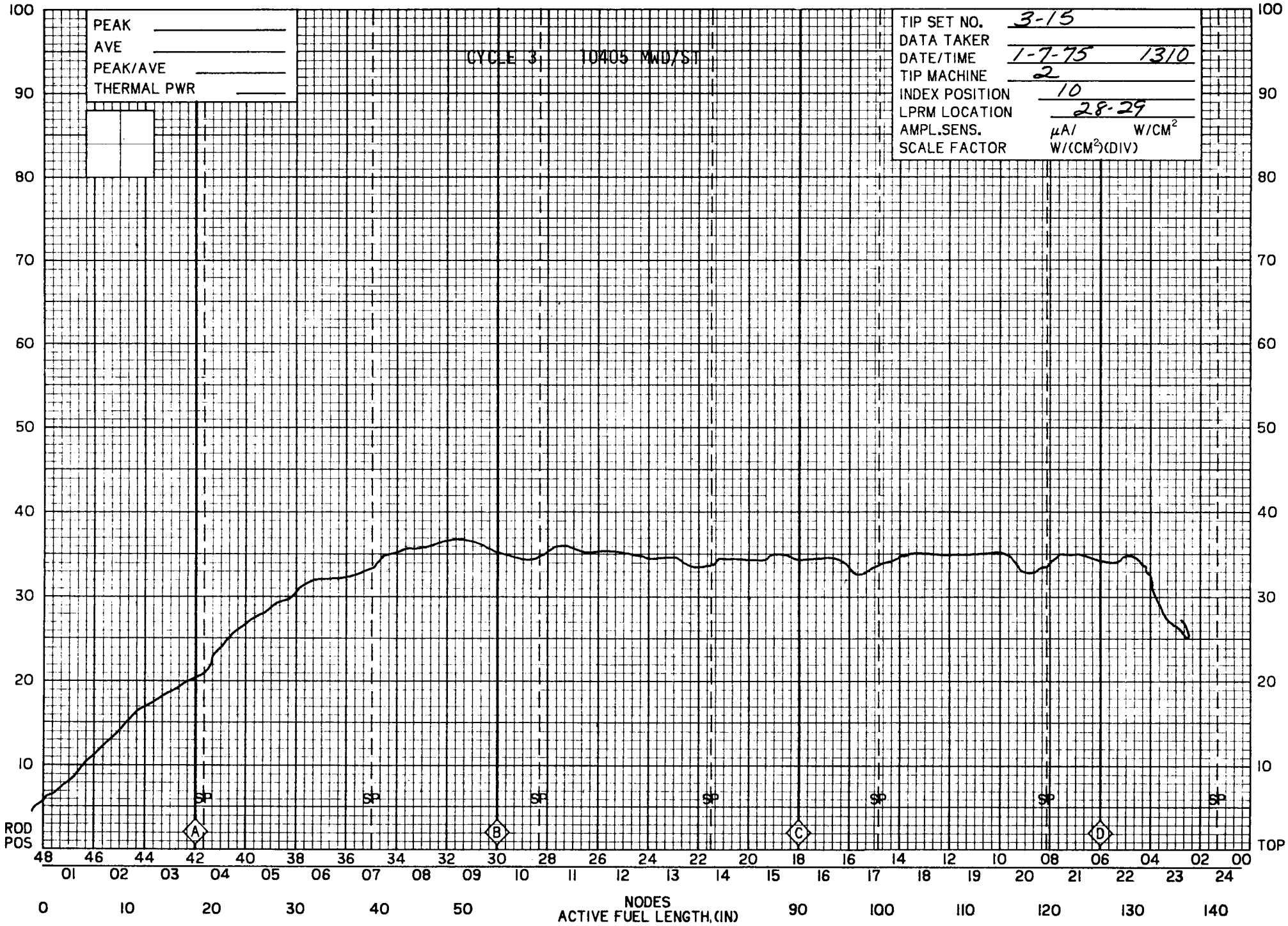
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75
TIP MACHINE 3
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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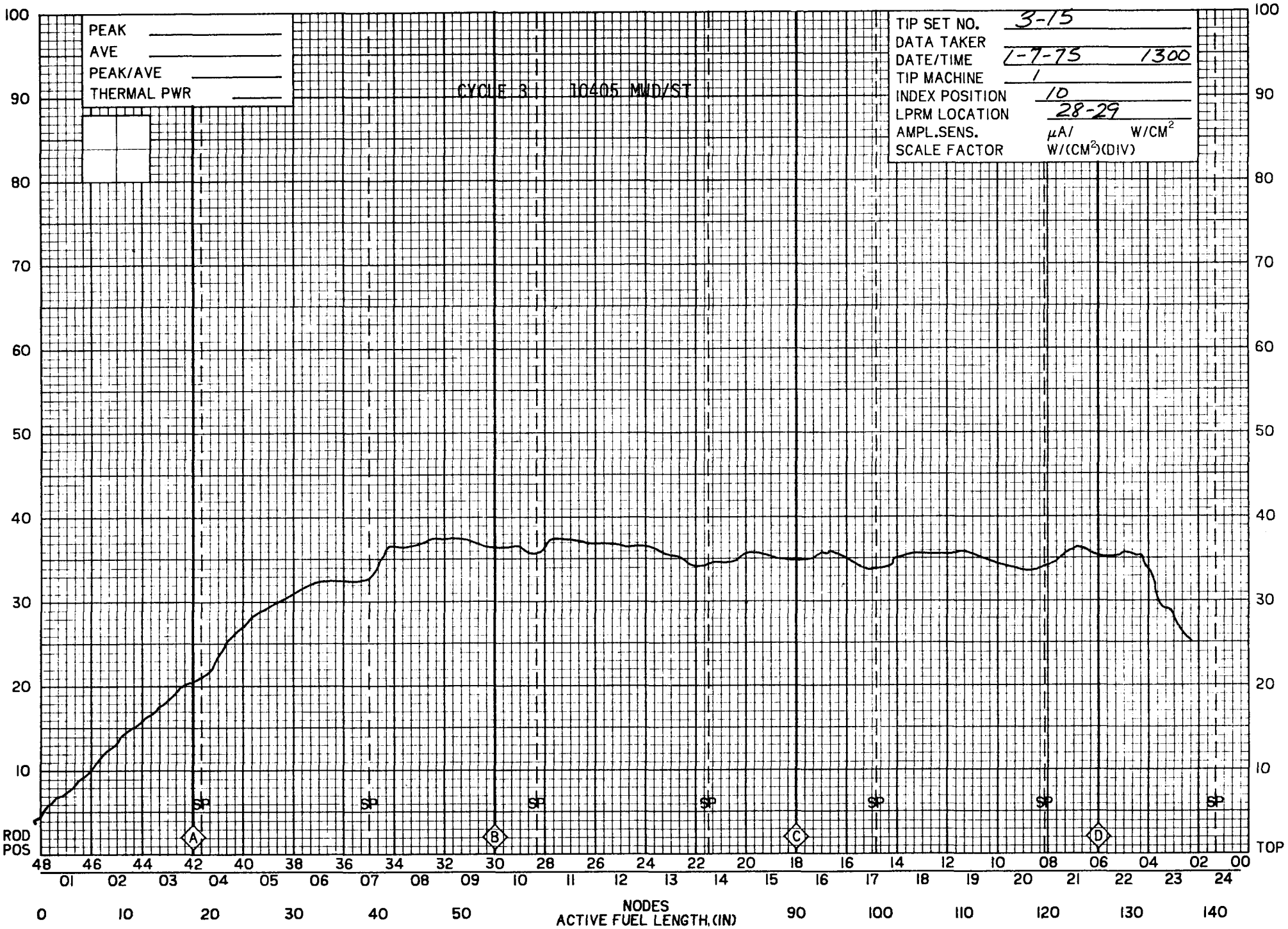
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1310
TIP MACHINE 2
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 10405 MWD/ST
TIP SET NO. 3-15
DATA TAKER
DATE/TIME 1-7-75 1300
TIP MACHINE 1
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

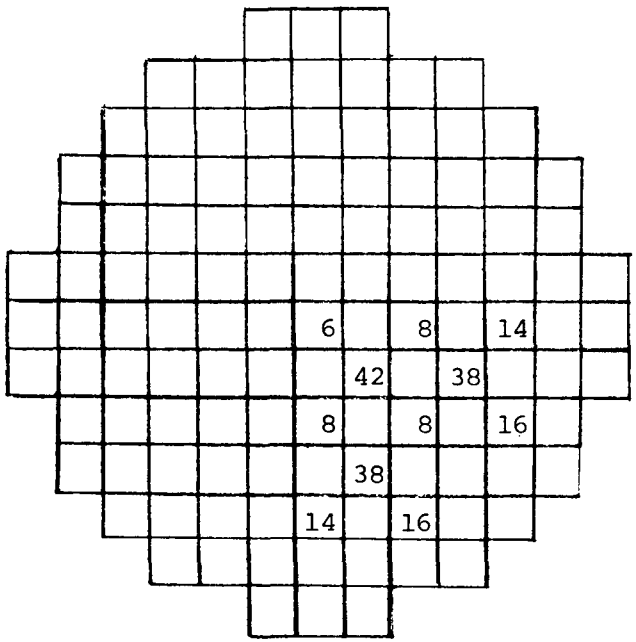
REACTOR: Monticello
CYCLE: 3
Exposure: 10405 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 12 of 12
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



1/4 core symmetry

Verified By: E. Tew Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure 10405 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	488.	HB #3-101 1/6/75	none
11. Outlet temperature to cleanup system (oF)	419.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available			See attached set of TIP traces Trace not available for 20-45.
14. Xenon history-past 48 hours Time (hrs)/Core power (%)			See attached power histogram
15. Control rod positions (by location)	See Sheet #12		

Verified By: [illegible] Date: 07/20/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 01/06/75 0825 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
365.40	1072.00	40.40	29.06	39.92	12.45	2.00	0.0817	983.32

RWL	DPM	WFW	HFW	HD	DHO	CXE
37.22	7.01	4.14	317.29	508.73	21.91	0.1052

RAR	65.563	65.875	65.500	65.781	65.563	65.750
AGAF	0.979	0.974	0.980	0.976	0.979	0.976

IB 1

RAPL	-204.27	5.11	20.43	35.75	51.07	66.39
	81.71	91.92	102.13	112.35	127.67	204.27

QFW	QCR	QCU	QRAD	QPUMP	TFW
1061.437	9.091	1.809	0.600	0.910	343.977

HF	HFG	HG	HS	WCR	HCR
539.80	652.66	1192.45	1191.81	0.0277	70.61

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0799	476.66	399.44	517.48	1670.00	1670.00

PPW	0.4867	0.4920

CAP	0.00979	0.00974	0.00980	0.00976	0.00979	0.00976
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.60

WTC	17.80	23.00	31.70	40.30	49.00	57.60

MONTICELLO NUCLEAR GENERATING PLANT
Manual Heat Balance Form

H.B. No. 3-101 DATE: 1/6/75 TIME: 1530

BY: DEN

INPUT DATA

ITEM	QUANTITY	INSTRUMENT	COMP Pt.	VALUE	UNITS
1*	Gross Gen. Output	C08,w/gen	G101	365.2	MWE
2*	Aux. Plant Load	------	G170	19.2	MWE
3*	A Feedwater Flow	C05,FLR 6/96	F533	2.10	Mlb/hr
4*	B Feedwater Flow	C05,FLR 6/96	F534	2.12	Mlb/hr
5*	A Feedwater Temp.	C06,TR 1148A	R100	338	°F
6*	B Feedwater Temp.	C06, TR 1148B	R102	336	°F
7*	Total Core Flow	C04,2.3.92A/B	R261	40.5	Mlb/hr
8*	Reactor Pressure	C05,PR 6/98	R223	968	psig
9*	CR Drive Temp	-------	F127	~95	°F
10	Cleanup Inlet Temp.	C04, Pos.1	R236	488	°F
11	Cleanup Outlet Temp.	C04, Pos.4	R237	419	°F
12	Cleanup Flow	C04, 12-141 A&B	R228,R229	161	GPM
13	A Recirc Pump PWR	C04,2-184-24A	R233	.48	MWE
14	B Recirc Pump PWR	C04,2-184-24B	R234	.50	MWE
15	Rod Drive Flow	C05,FR-2-3-95	R227(Klb/hr)	54	GPM

*Available From SL5

APRM READINGS

No.	%POWER	Comp Pt.
1	65.50	R212
2	65.34	R214
3	65.41	R216
4	65.75	R213
5	65.69	R215
6	65.69	R217

PHYSICAL PROPERTIES

ITEM		VALUE	(BTU/lb)
16	Steam Enthalpy	1191.81	
17	A FW Enthalpy	311.12	
18	B FW Enthalpy	309.13	
19	Cleanup Inlet Enth.	473.45	
20	Cleanup Outlet Enth.	374.82	
21	Rod Drive Enth.	67.10	

EVALUATION: COMPUTER ( ) or MANUAL (✓)

ITEM	QUANTITY	EQUATION	VALUE	
22	Total Steam Flow	(3) + (4) + (15) x 4.95E-4	4.25	MLB/HR
23	Core Thermal Power		3757.21	MBTU/HR
24	Core Thermal Power	(23)/3.413	1101.24	MWT
25	% Rated Power	(24)/16.70	65.94	%
26	Heat Rate	(23) x 10^3/ ((1) - (2))	10.86	KBTU/KW-HR
27	Net Plant Efficiency	((1) - (2)) x 100/(24)	31.42	%

Note: Attach Computer Edit(s) To This Form If Applicable

COMMENTS:

REACTOR: Monticello
CYCLE: 3
Exposure 10405 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 10 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1072.	HB #3-101 1/6/75	See attached HB #3-101 and OD-3 dated 1/6/75
2. System pressure (psig)	968.	Idem	Calculated core pressure = 995.11 psia
3. Recirculation flow (lbs/hr)	40.40×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	4.14×10^6	Idem	none
6. Feedwater flow temperature (oF)	343.98	Idem	none
7. Time at associated power level (hr)	>12.	Idem	none
8. Inlet subcooling (BTU/lb)	23.82	Idem	21.91 from OD-3 corrected for core pressure
9. Cleanup system flow (gal/min)	not available		

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 10138 MWD/STU

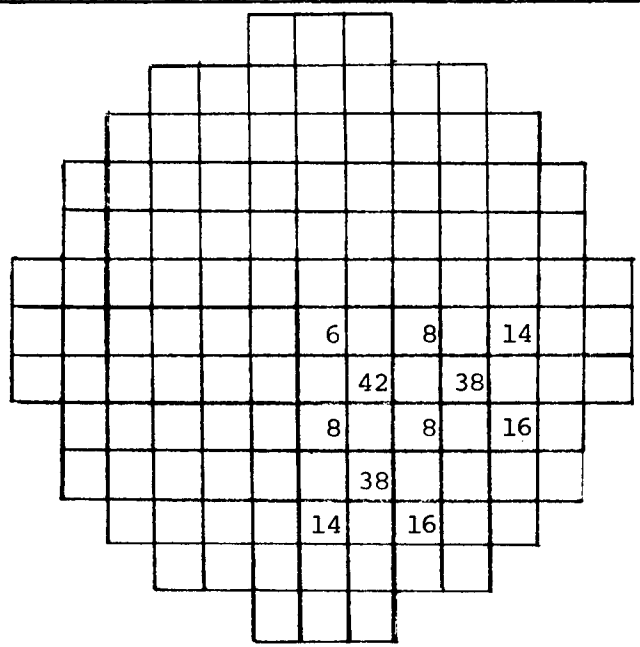
TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 9 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



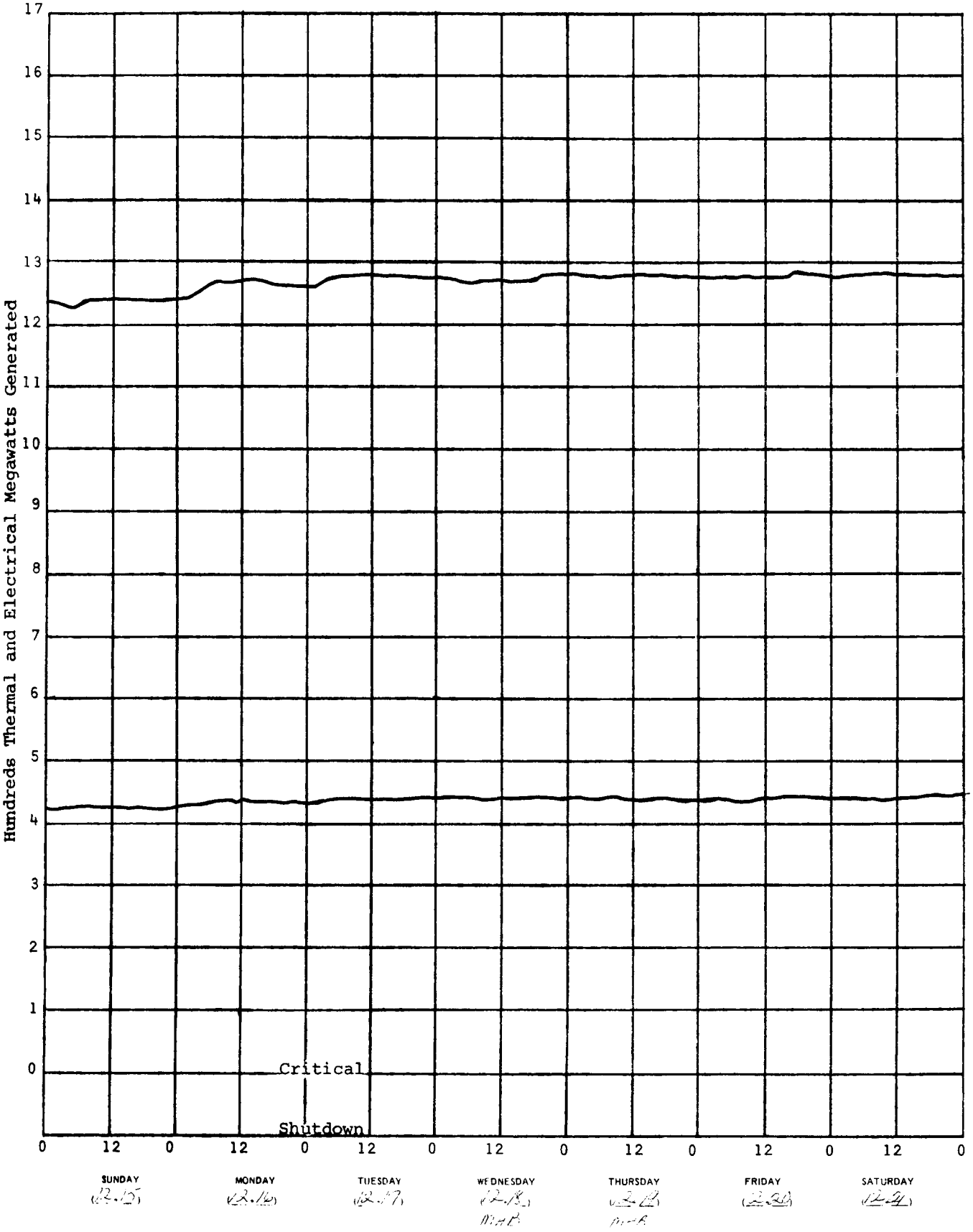
1/4 core symmetry

Verified By: E Tech Date: 07/20/76

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 12 - 21 - 74



REACTOR: Monticello
CYCLE: 3
Exposure 10138 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	491.	Idem	none
11. Outlet temperature to cleanup system (oF)	422.	Idem	none
12. Machine normalized TIP data from process computer	Not available		
13. Graphs of TIP traces from plotter if available	Not available		Original not reproducible
14. Xenon history-past 48 hours Time (hrs)/Core power (%)			See attached power histogram
15. Control rod positions (by location)	See Sheet #9		

Verified By: S. Terak Date: 05/20/76

REACTOR: Monticello

CYCLE: 3

Exposure 10138 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 7 of 12

Rev. 0 Date: 5/10/76

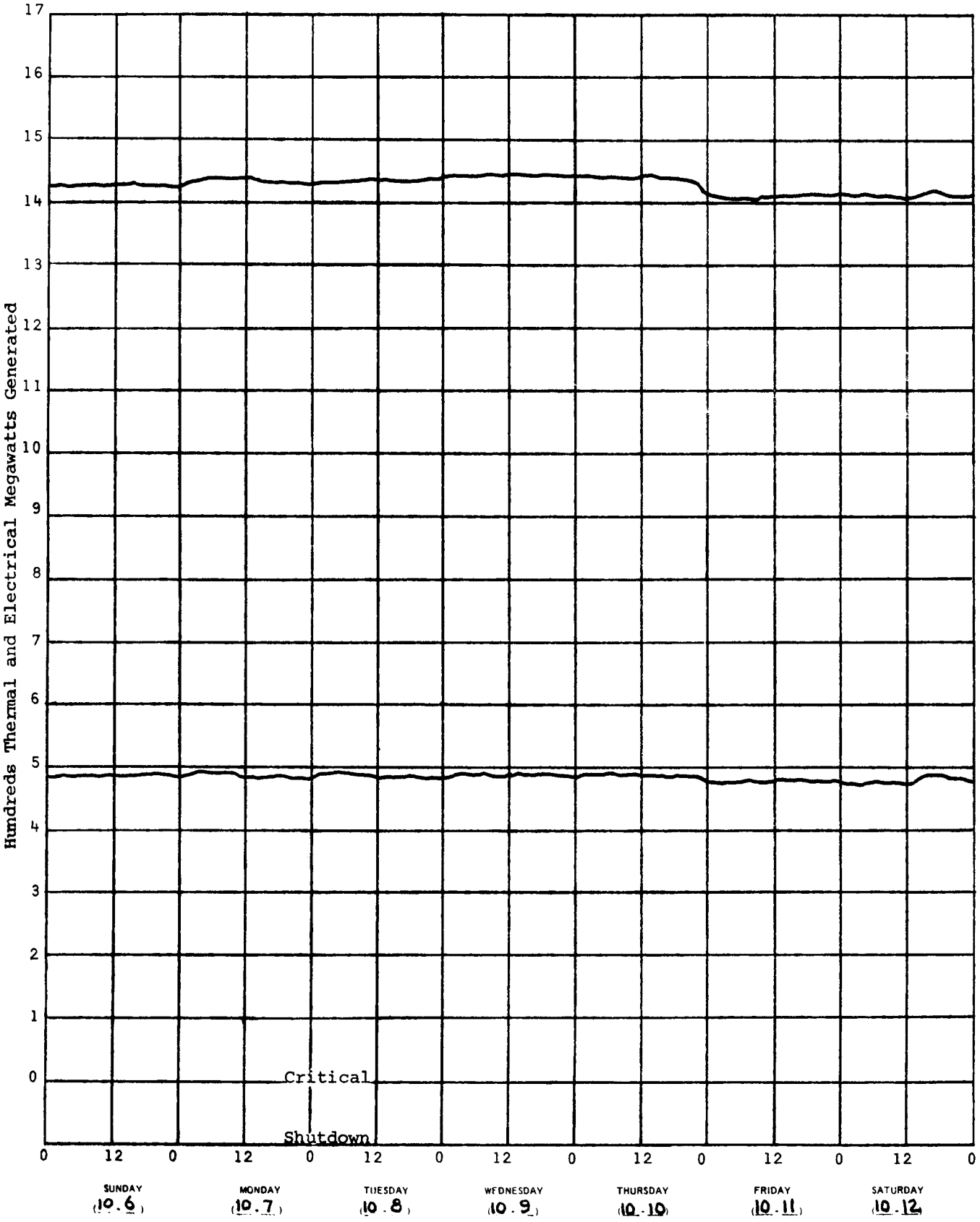
ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1276.77	Heat Balance dated 12/16/74	none
2. System pressure (psig)	982.	Idem	Calculated core pressure = 1011.5 psia
3. Recirculation flow temperature (oF)	48.4×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	5.00×10^6	Idem	none
6. Feedwater flow temperature (oF)	357.5	Idem	none
7. Time at associated power level (hr)	>18.	Idem	none
8. Inlet subcooling (BTU/lb)	23.16	Idem	20.91 from heat balance corrected for core pressure
9. Cleanup system flow (gal/min)	162.	Idem	none

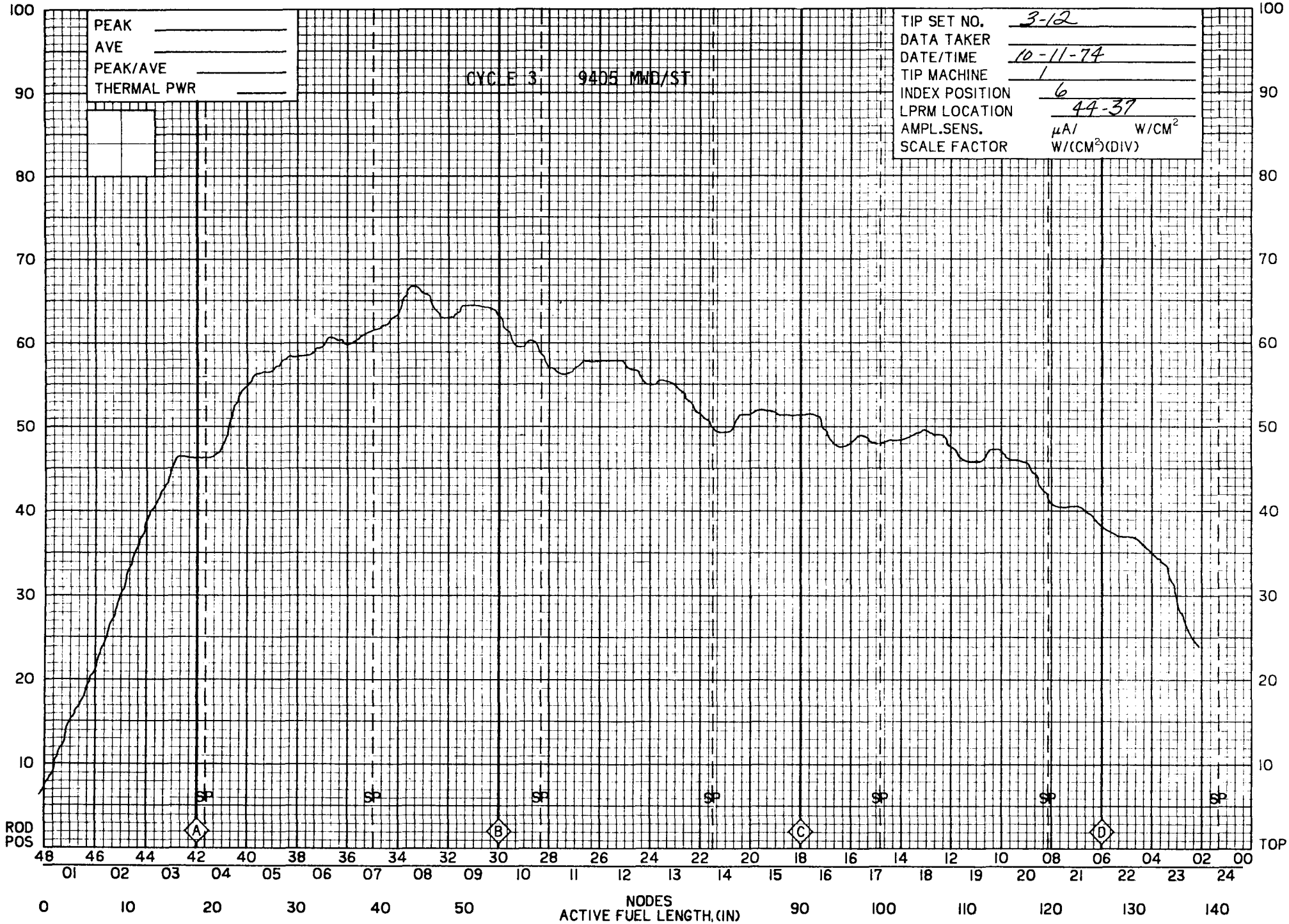
Verified By: [illegible] Date: 07/20/76

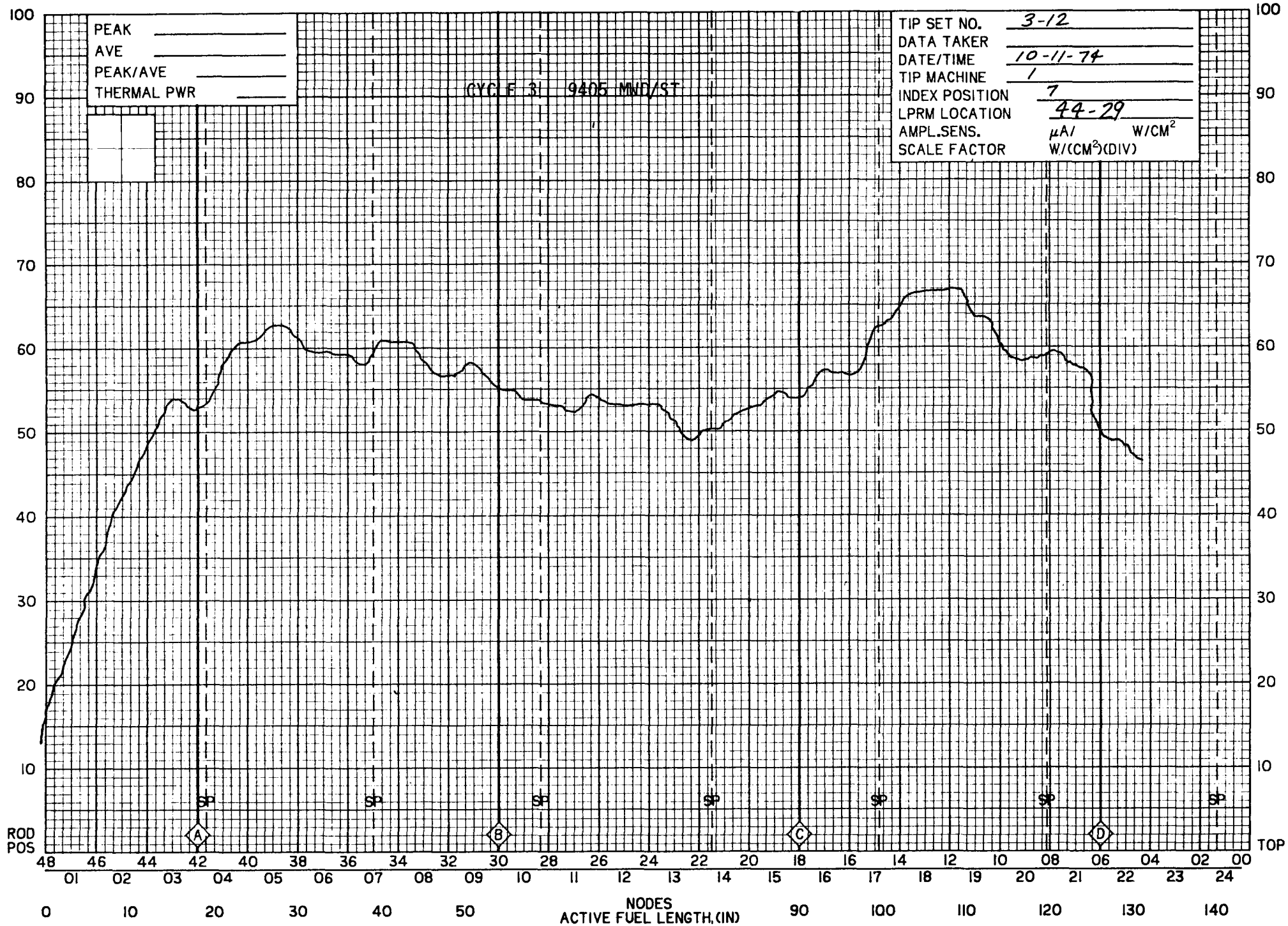
Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 10 . 12 . 74




PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 6
LPRM LOCATION 44-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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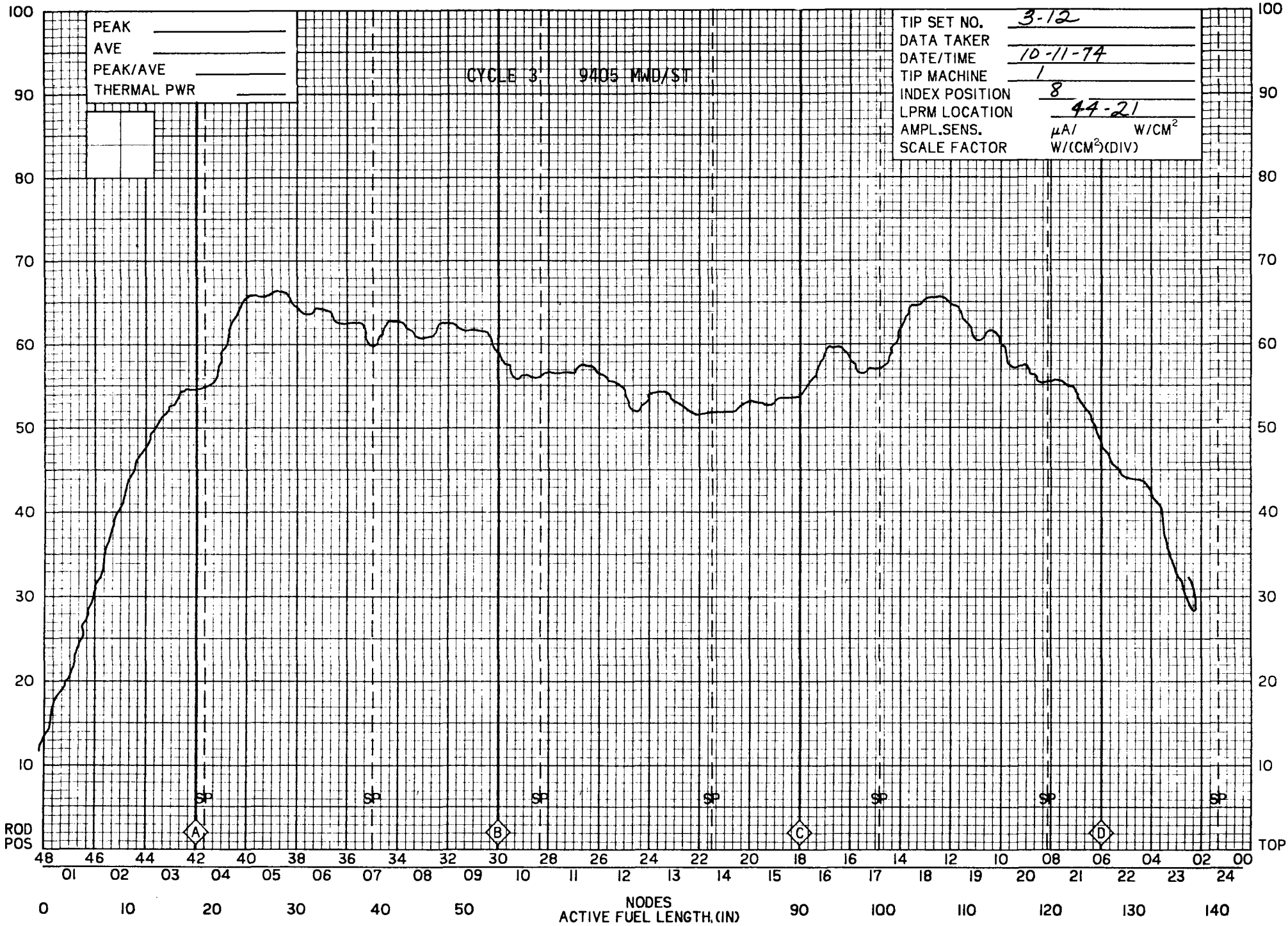
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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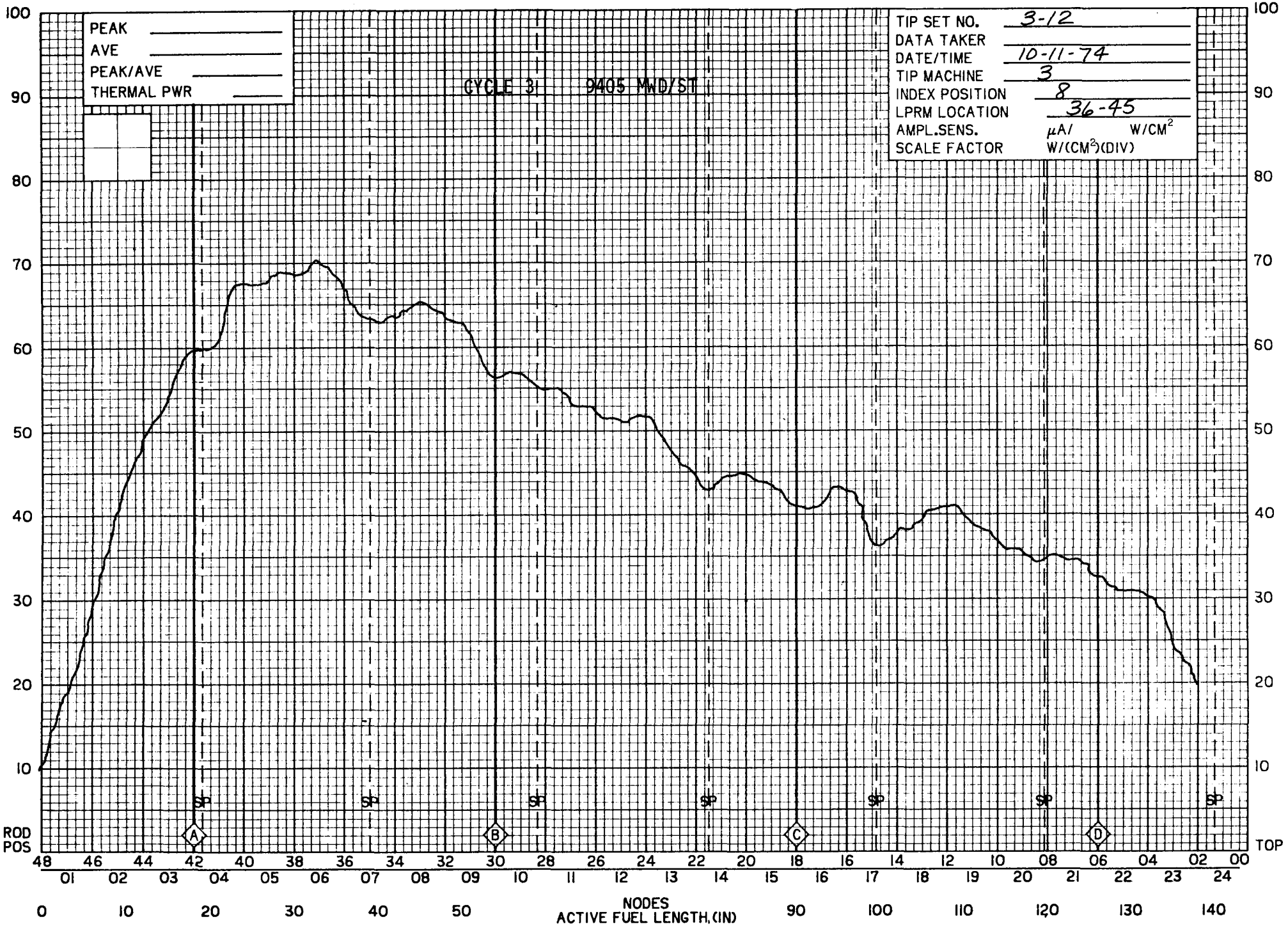
NODES
ACTIVE FUEL LENGTH, (IN)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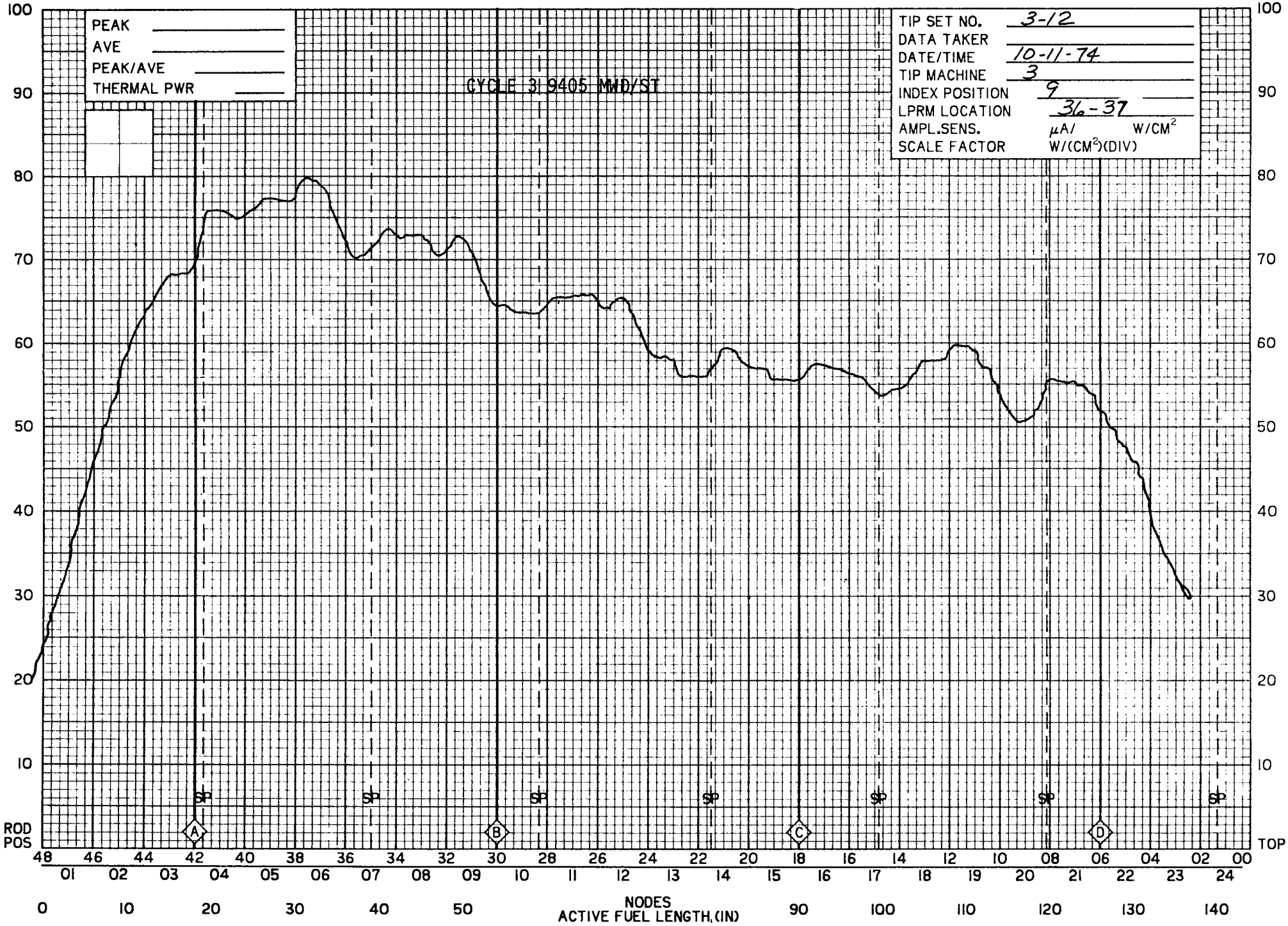
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 3
INDEX POSITION 8
LPRM LOCATION 36-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 3
INDEX POSITION 9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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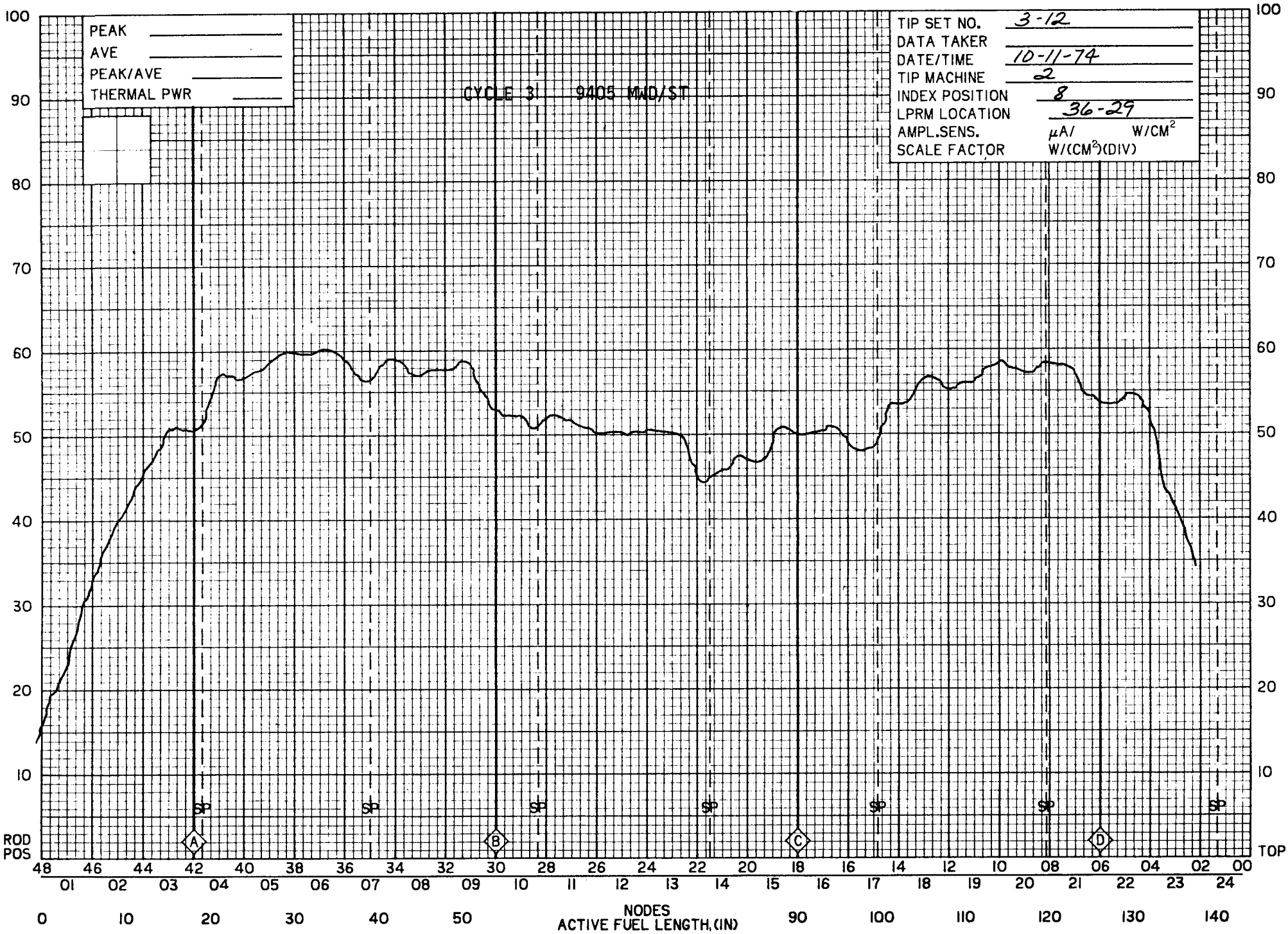
NODES
ACTIVE FUEL LENGTH, (IN)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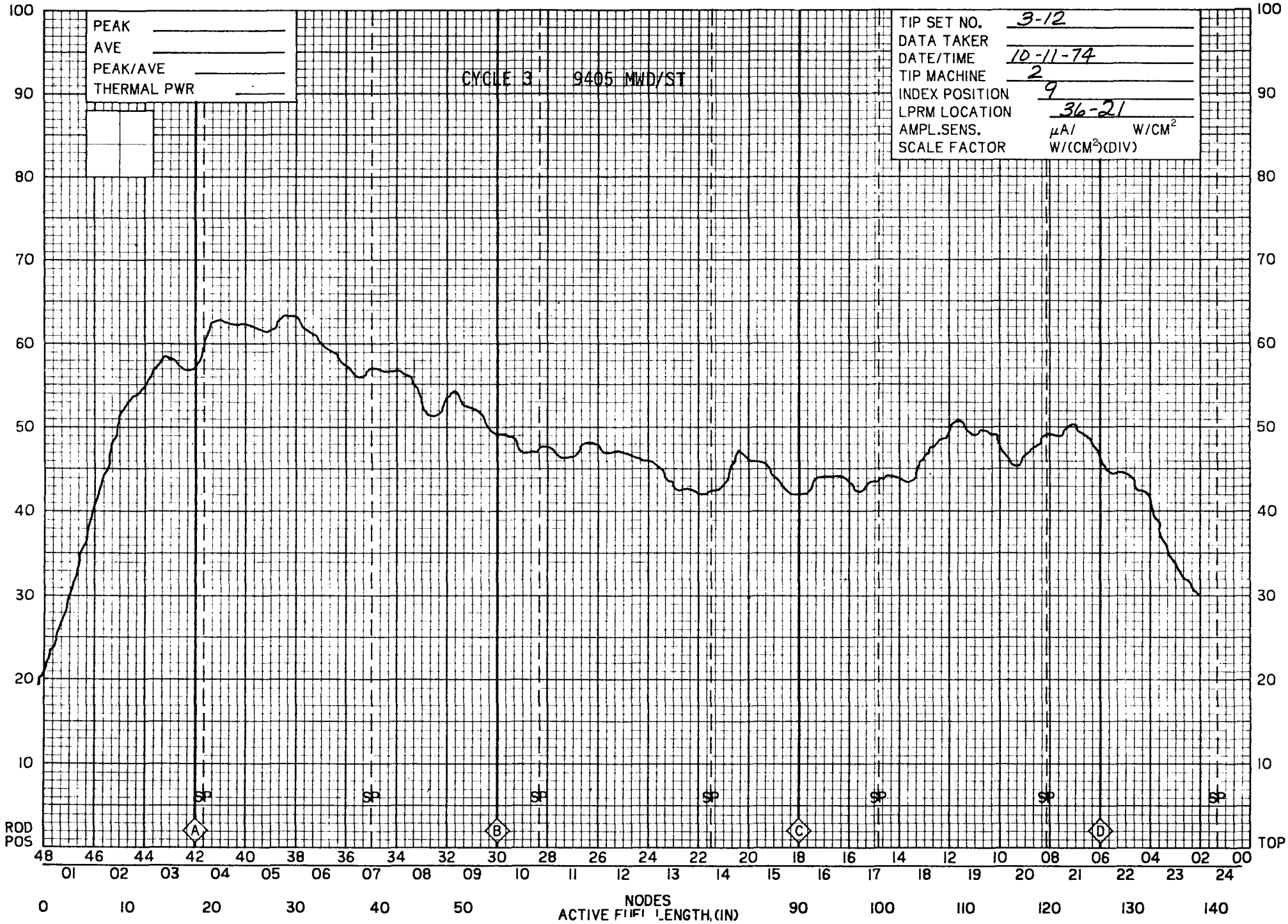
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 2
INDEX POSITION 8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 2
INDEX POSITION 9
LPRM LOCATION 36-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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NODES
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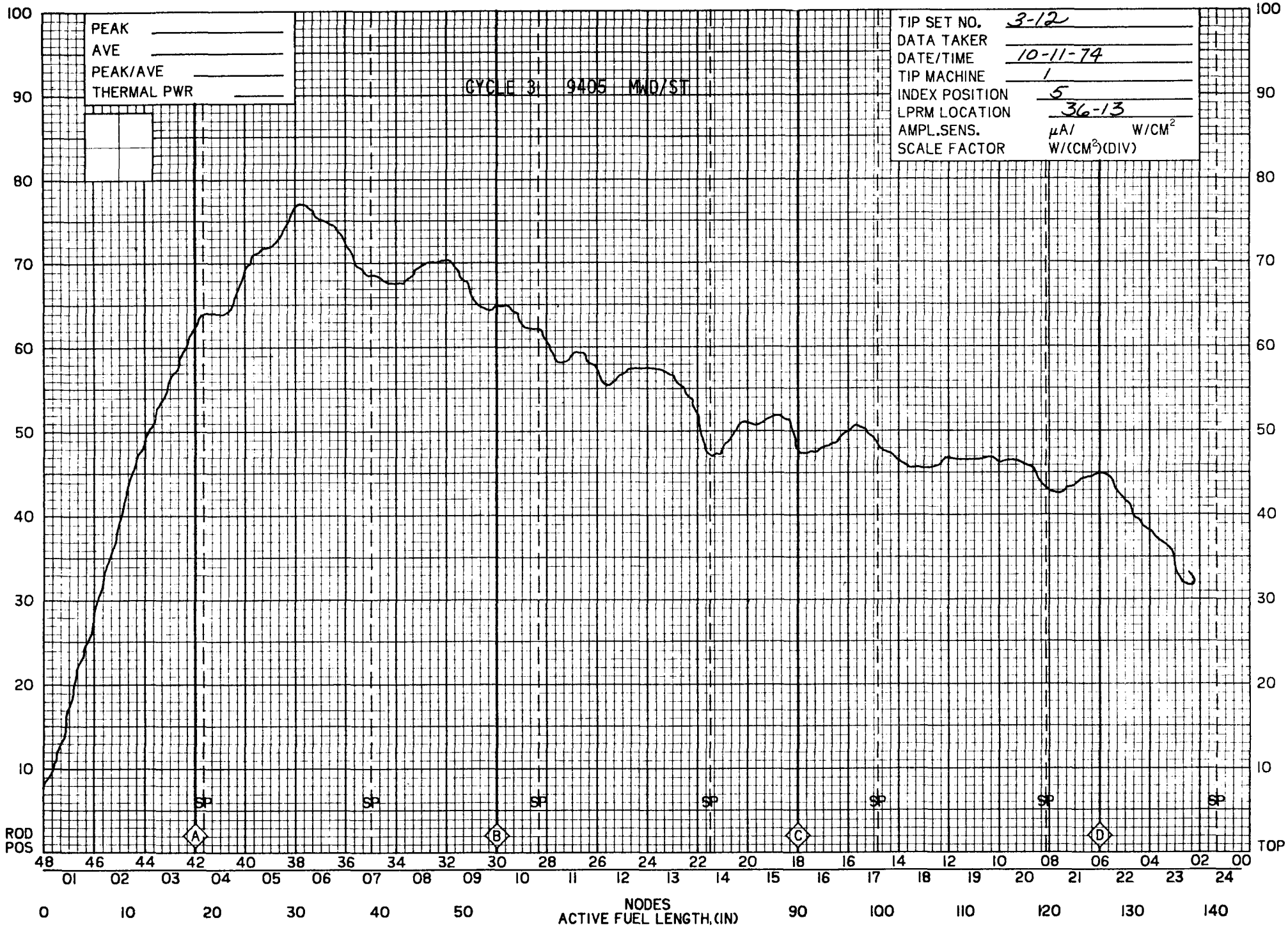
ACTIVE FUEL LENGTH,(IN)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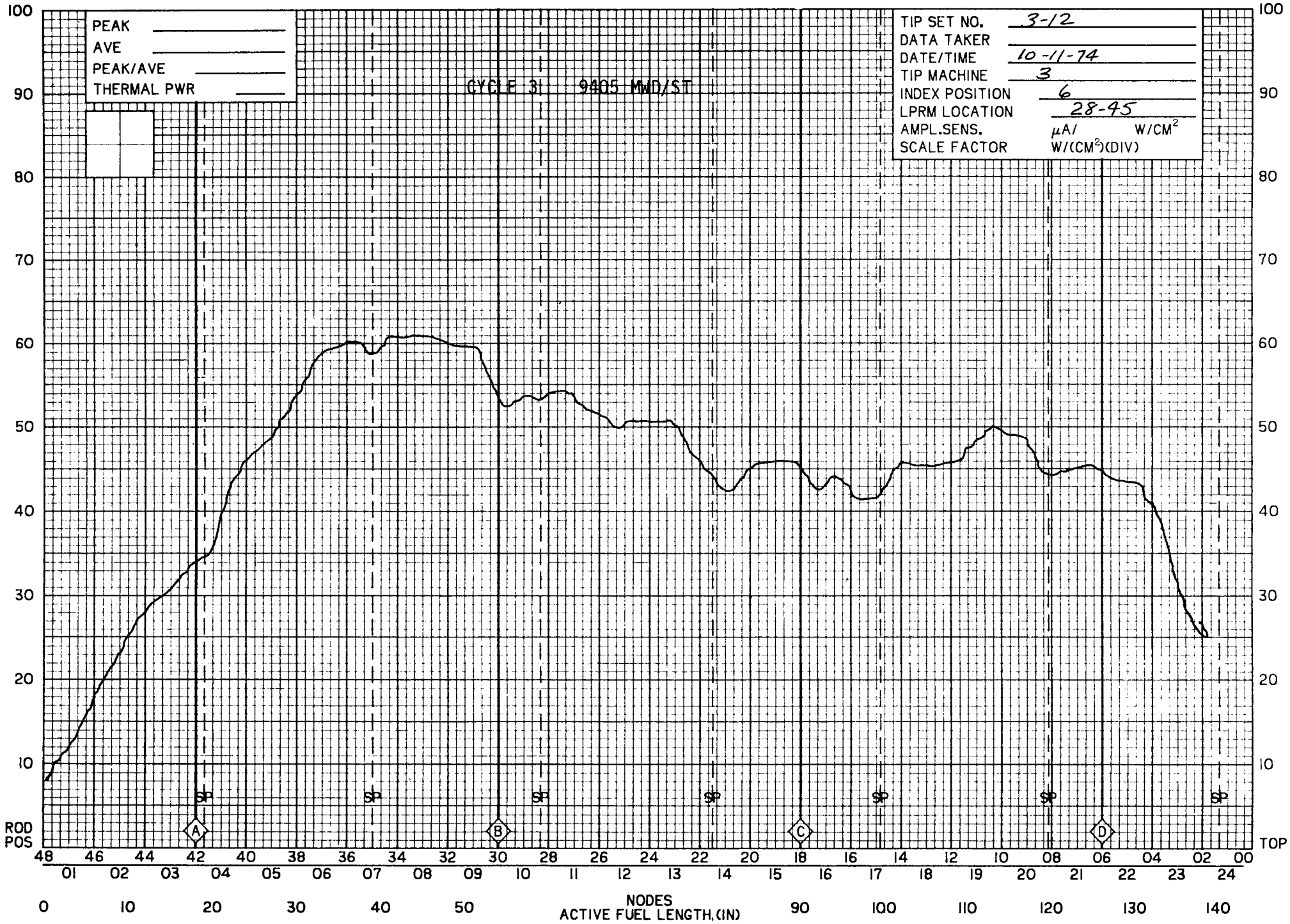
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 5
LPRM LOCATION 36-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 3
INDEX POSITION 6
LPRM LOCATION 28-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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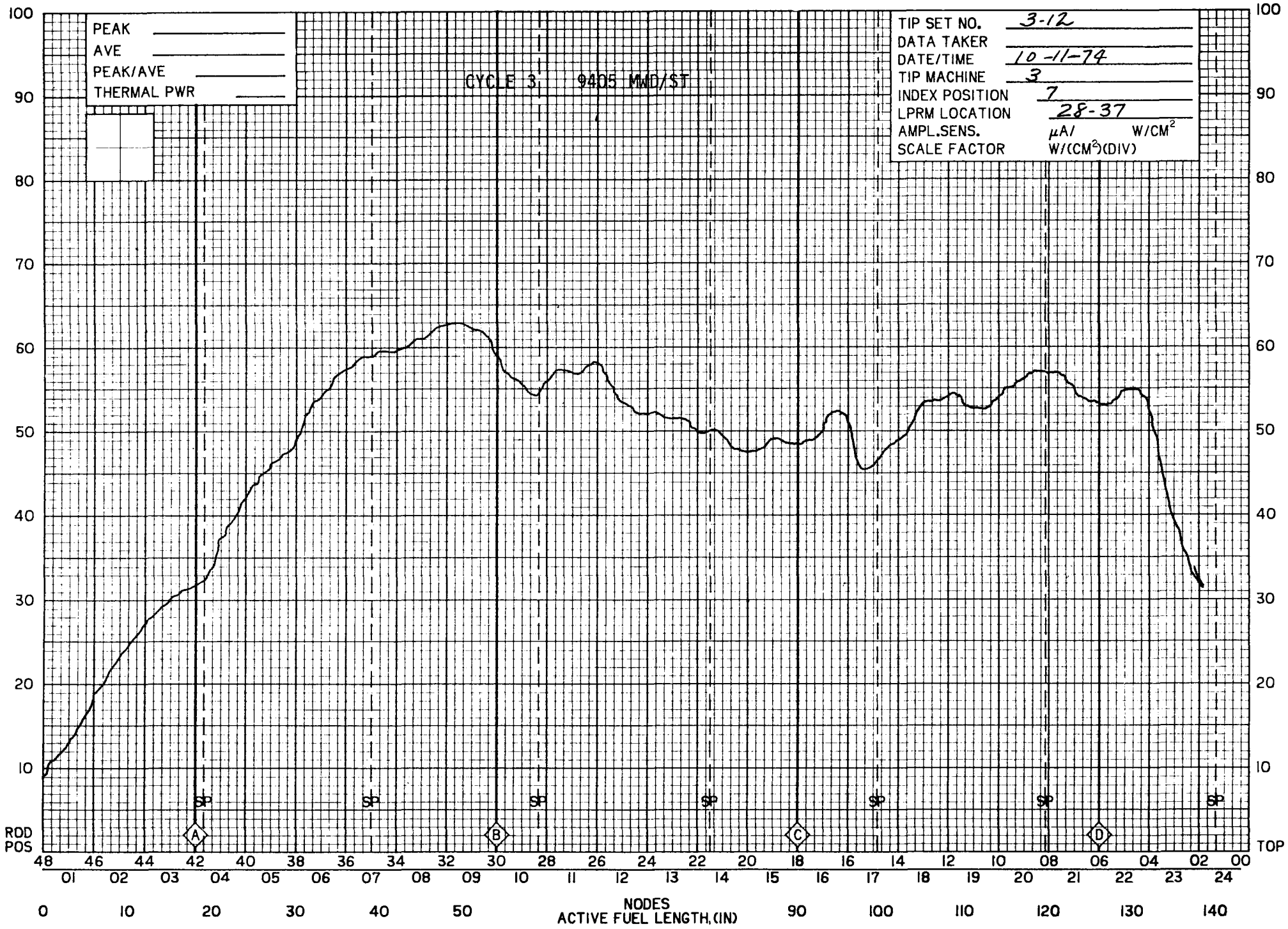
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 3
INDEX POSITION 7
LPRM LOCATION 28-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
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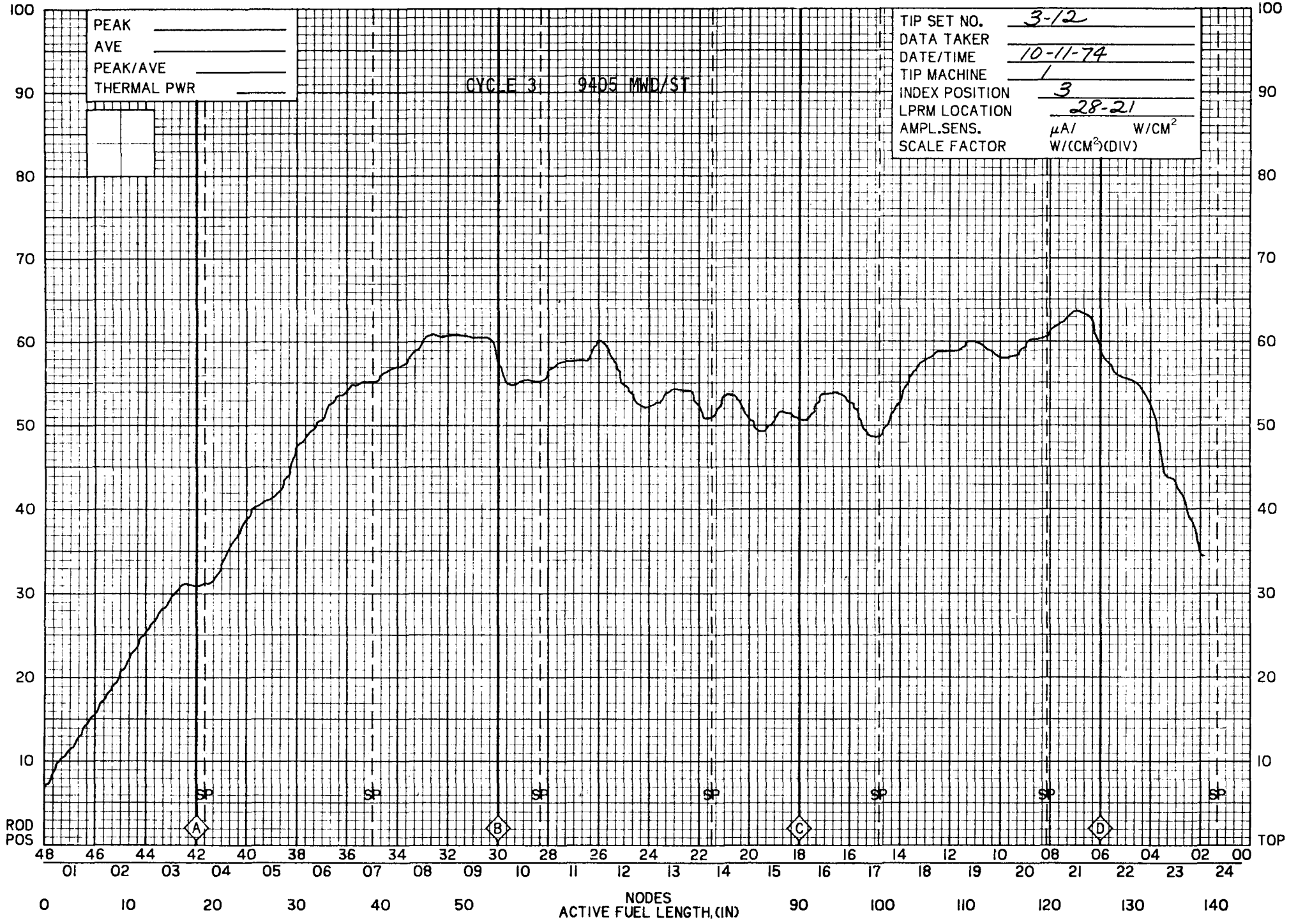
NODES
ACTIVE FUEL LENGTH, (IN)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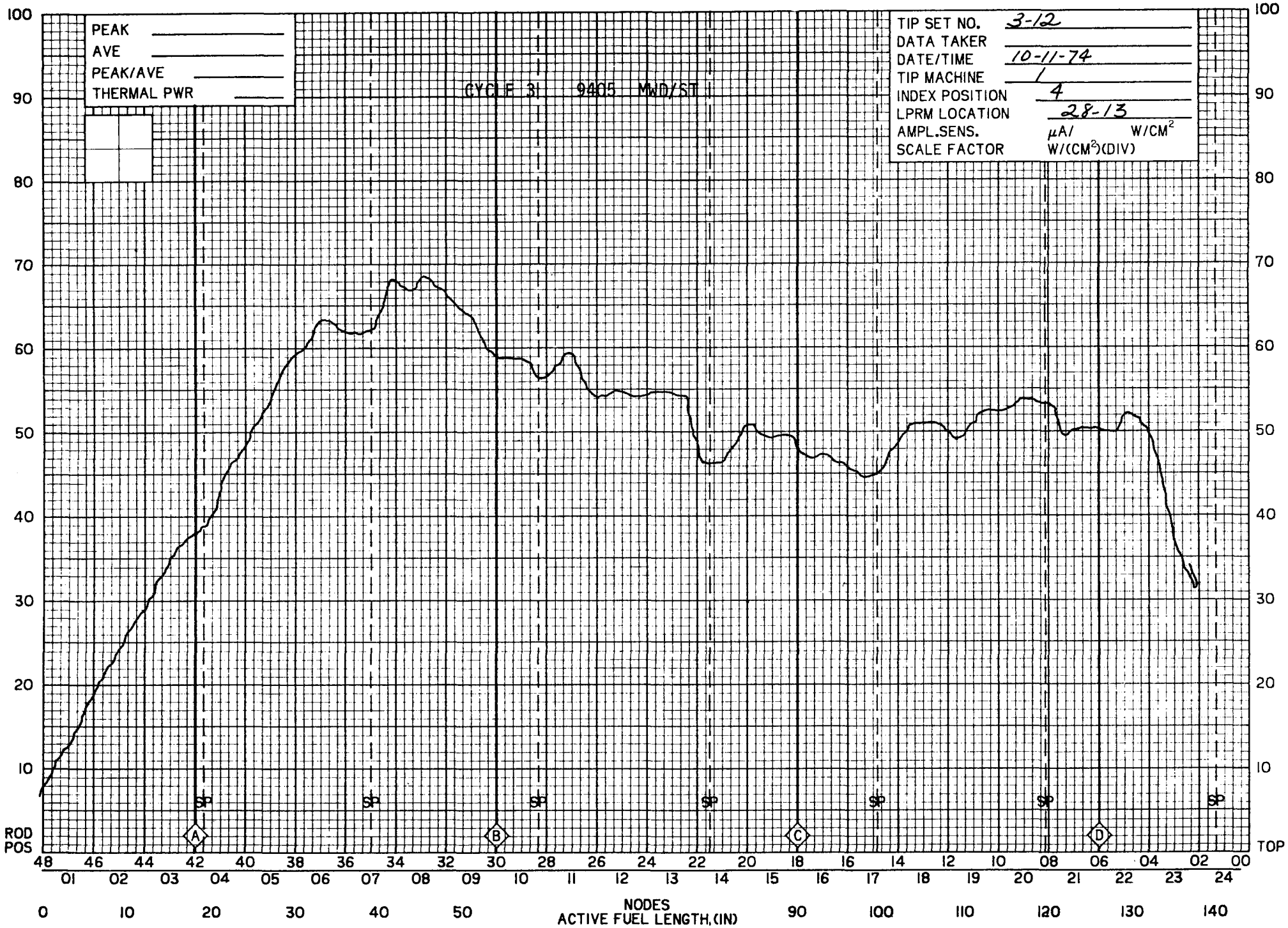
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 3
LPRM LOCATION 28-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
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70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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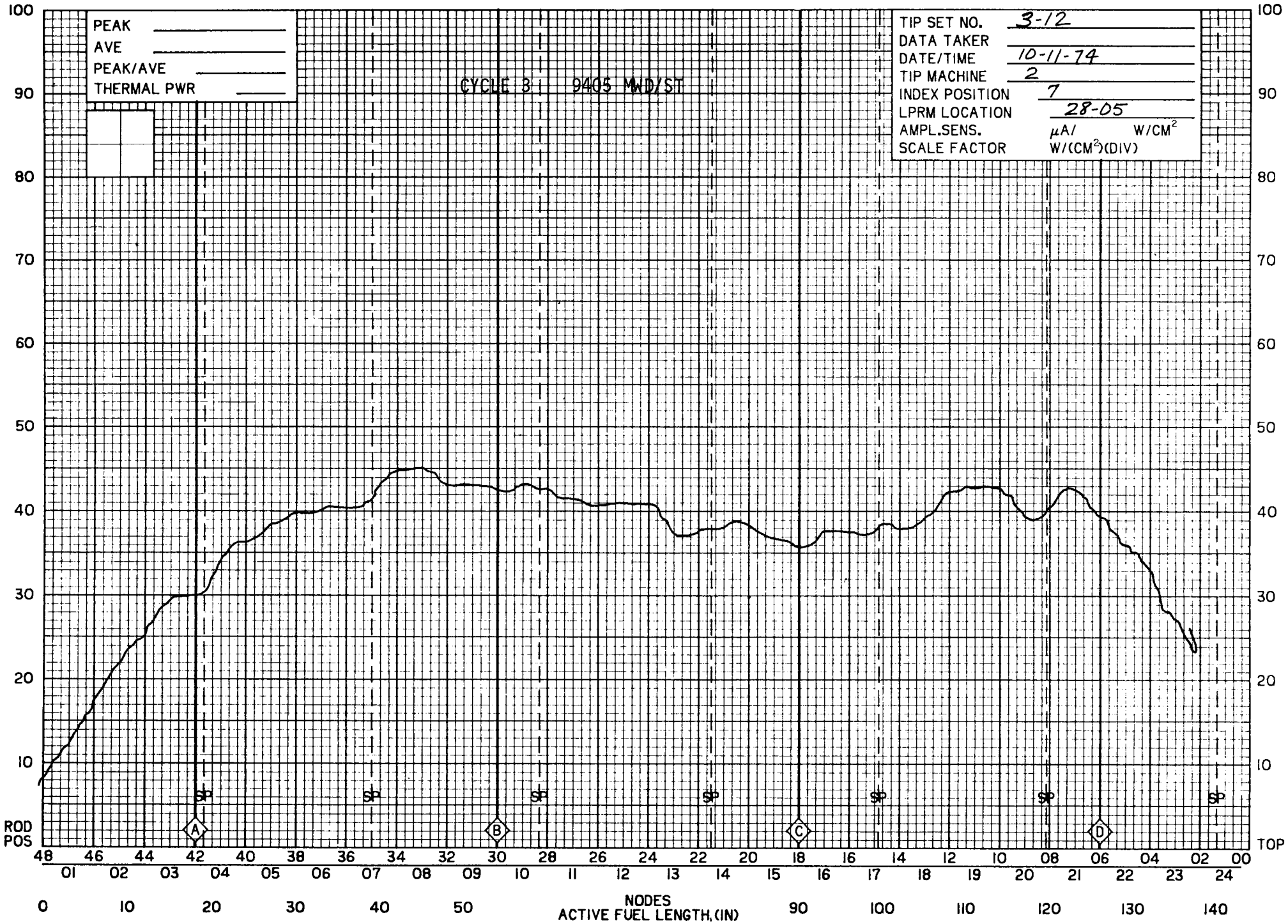
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 2
INDEX POSITION 7
LPRM LOCATION 28-05
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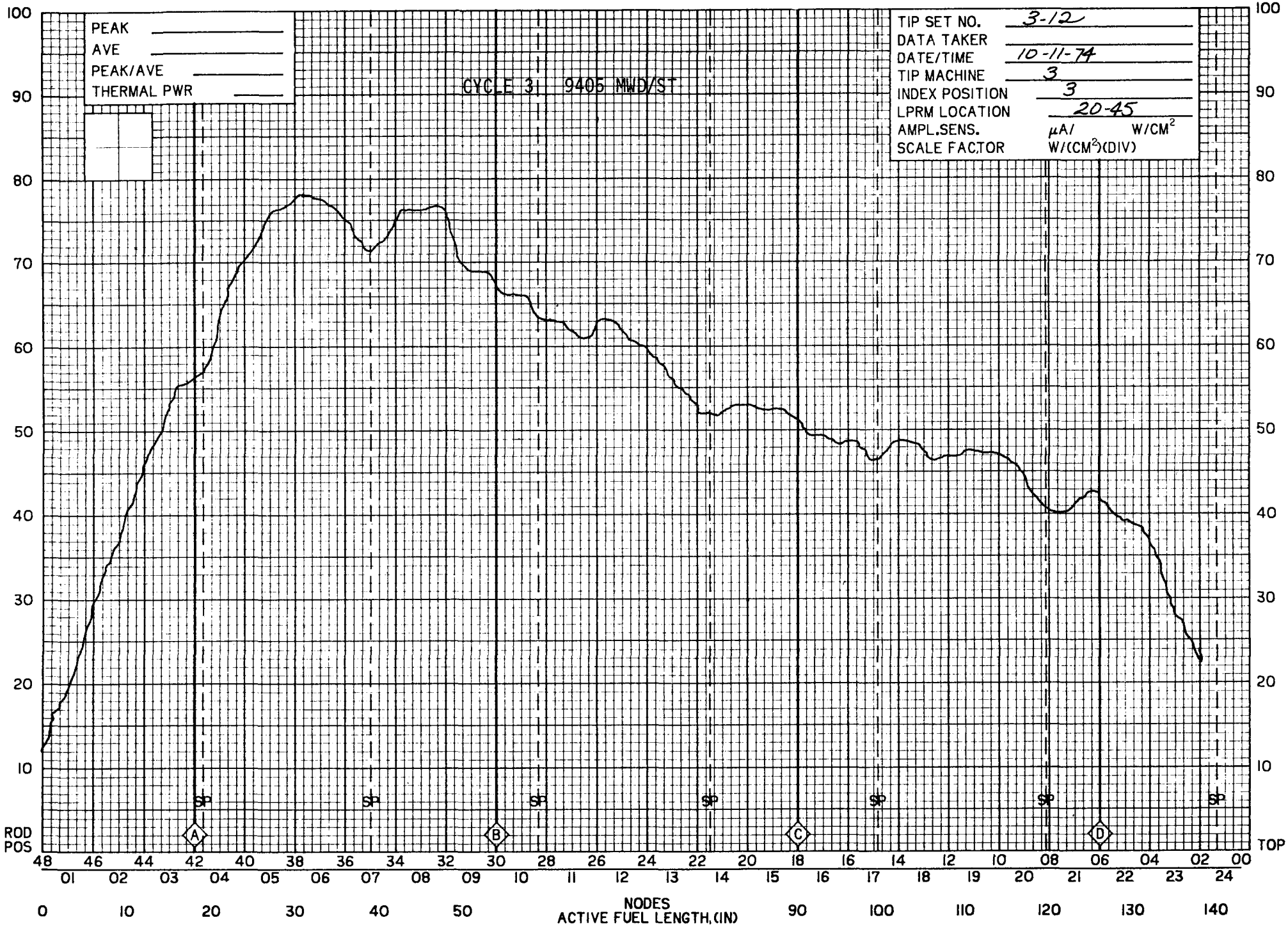
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
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DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 3
INDEX POSITION 3
LPRM LOCATION 20-45
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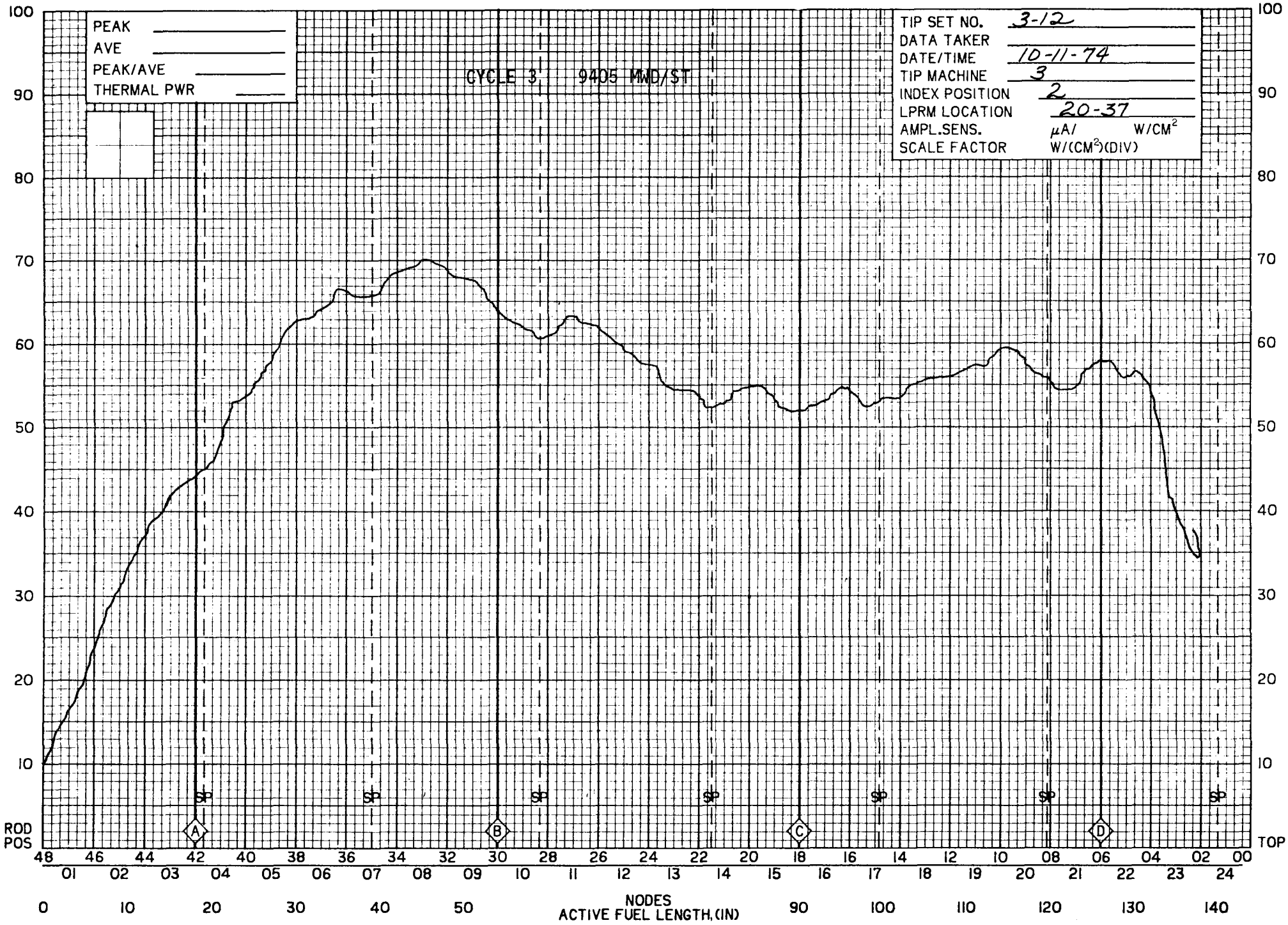
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DATE/TIME 10-11-74
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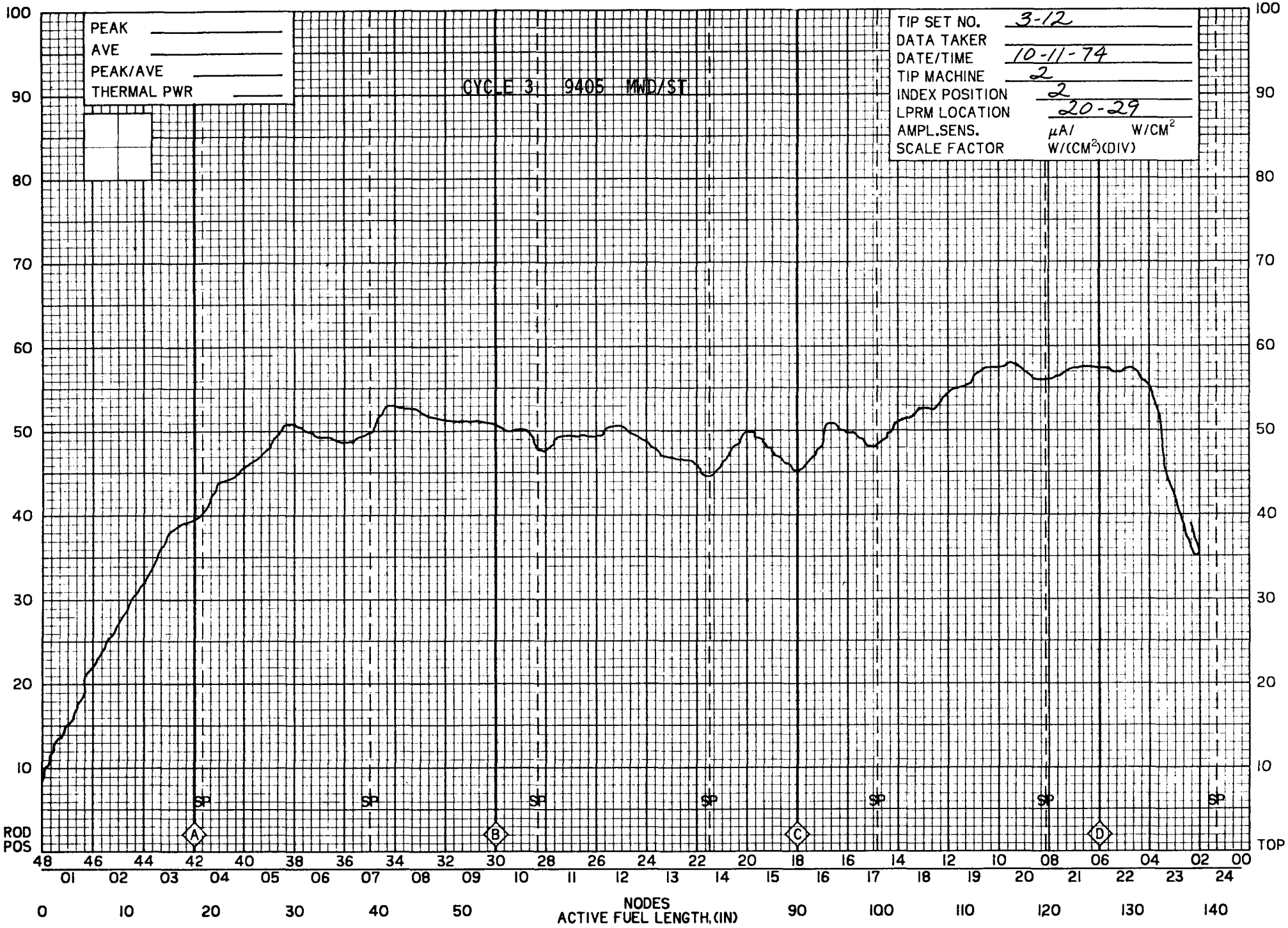
NODES
ACTIVE FUEL LENGTH, (IN)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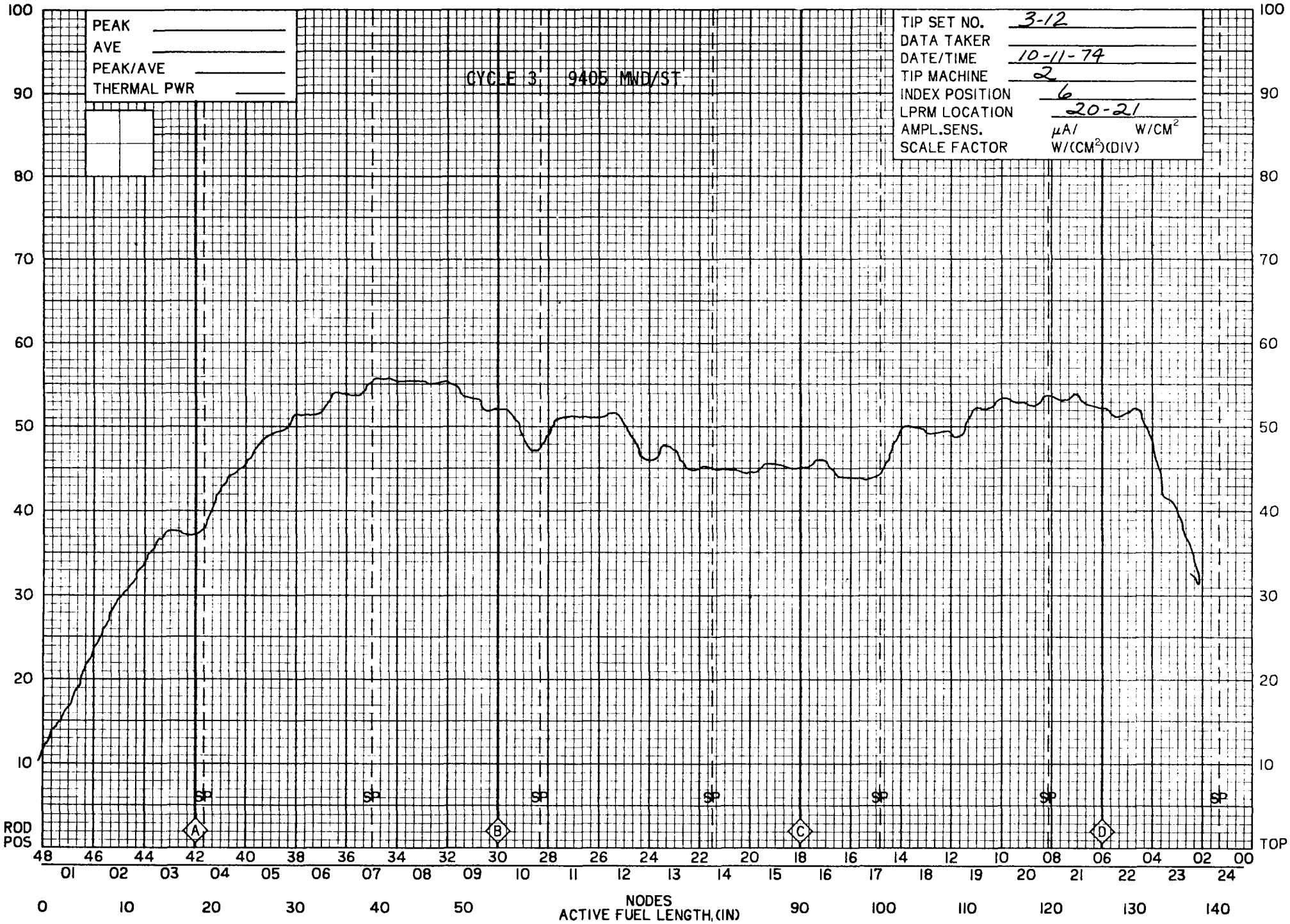
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DATA TAKER
DATE/TIME 10-11-74
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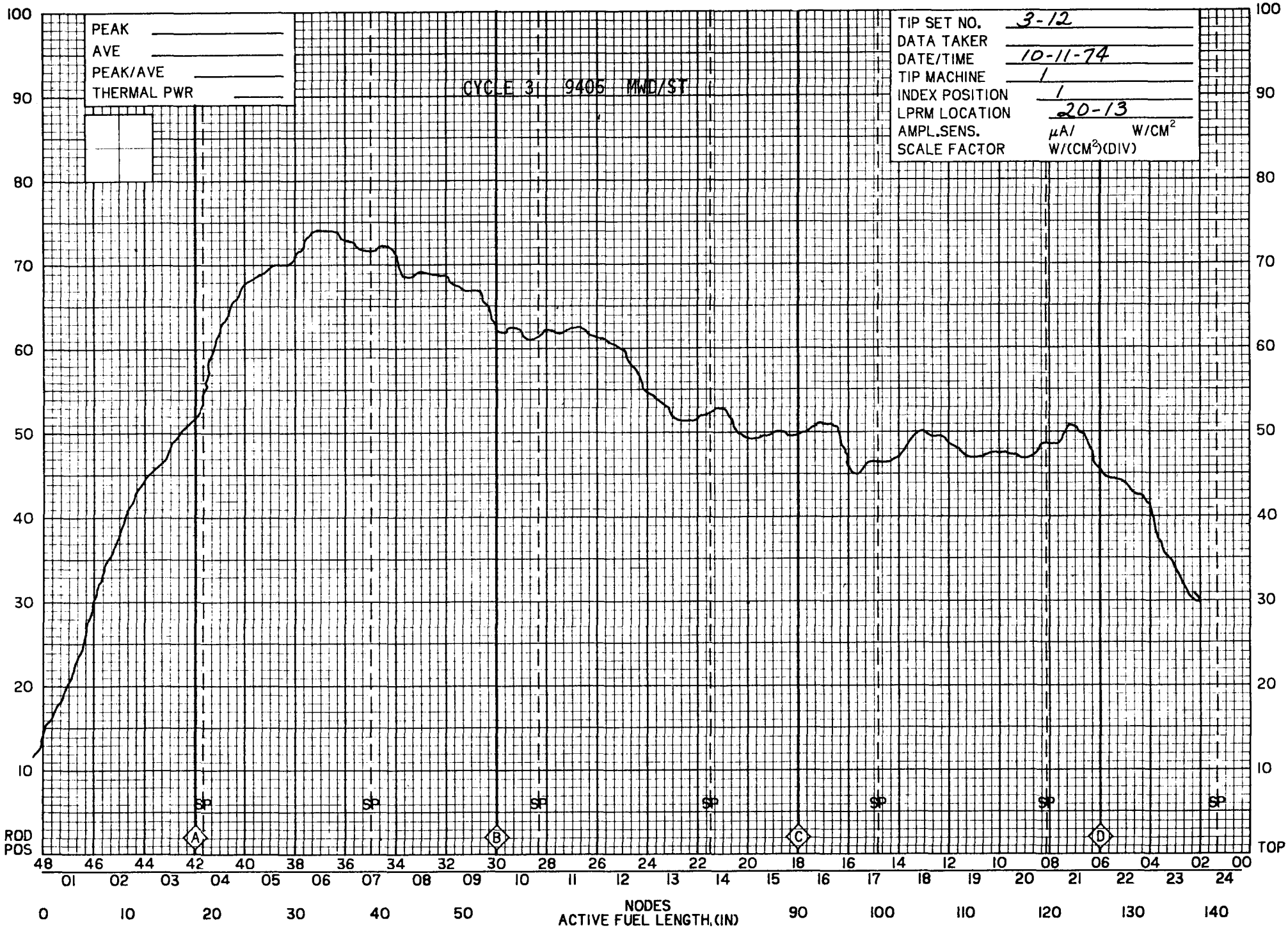
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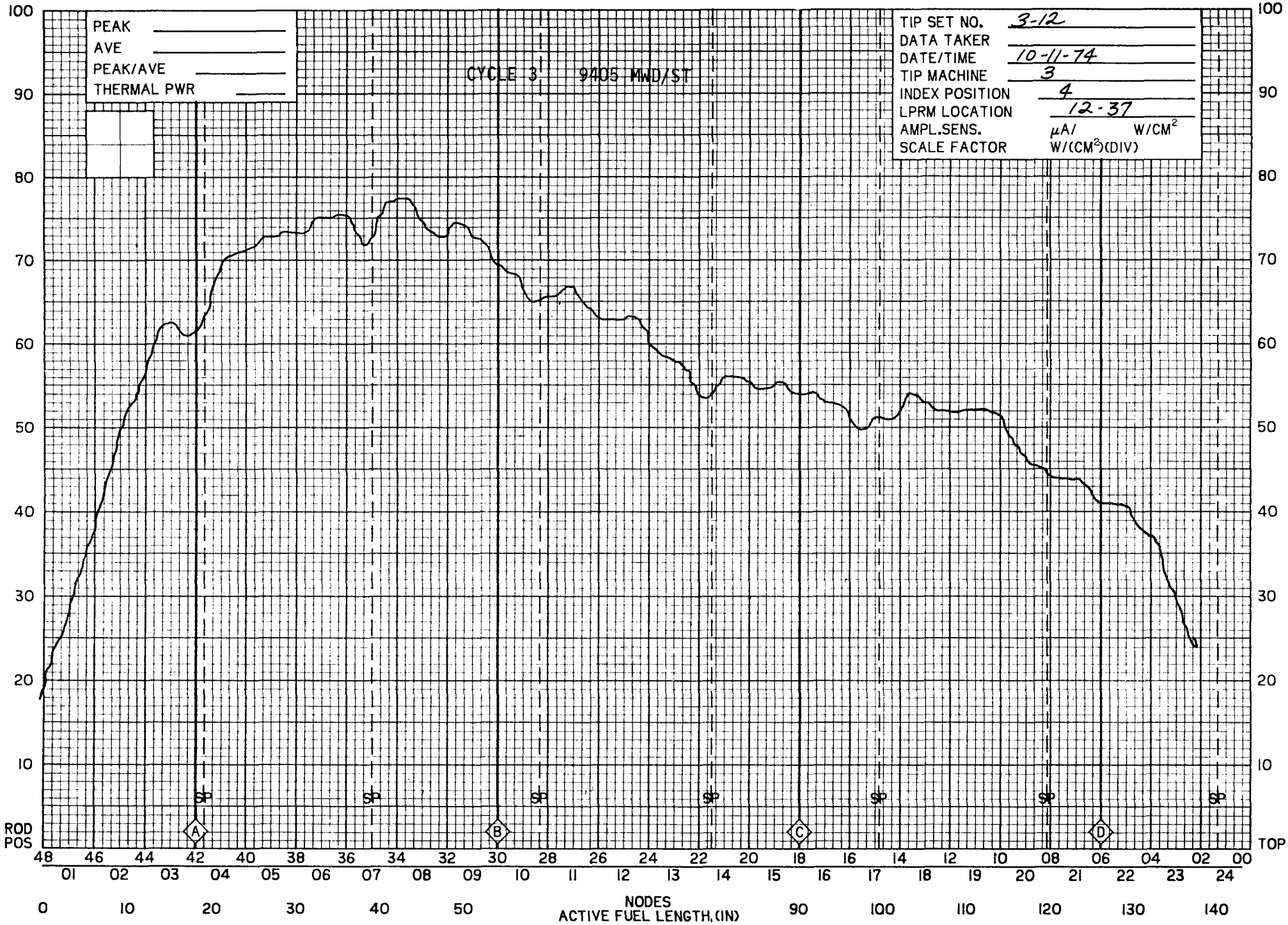
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ROD POS
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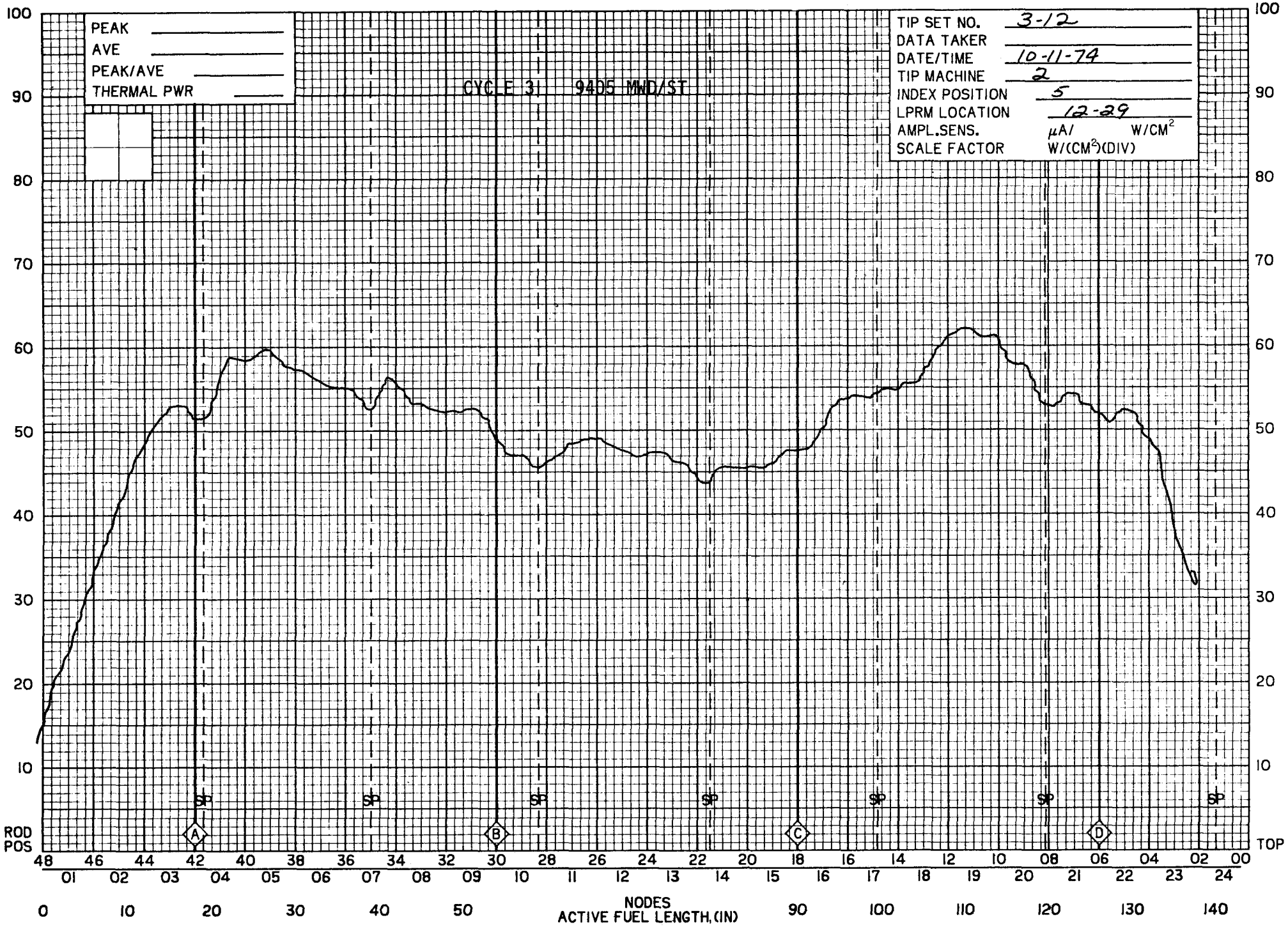
ACTIVE FUEL LENGTH,(IN)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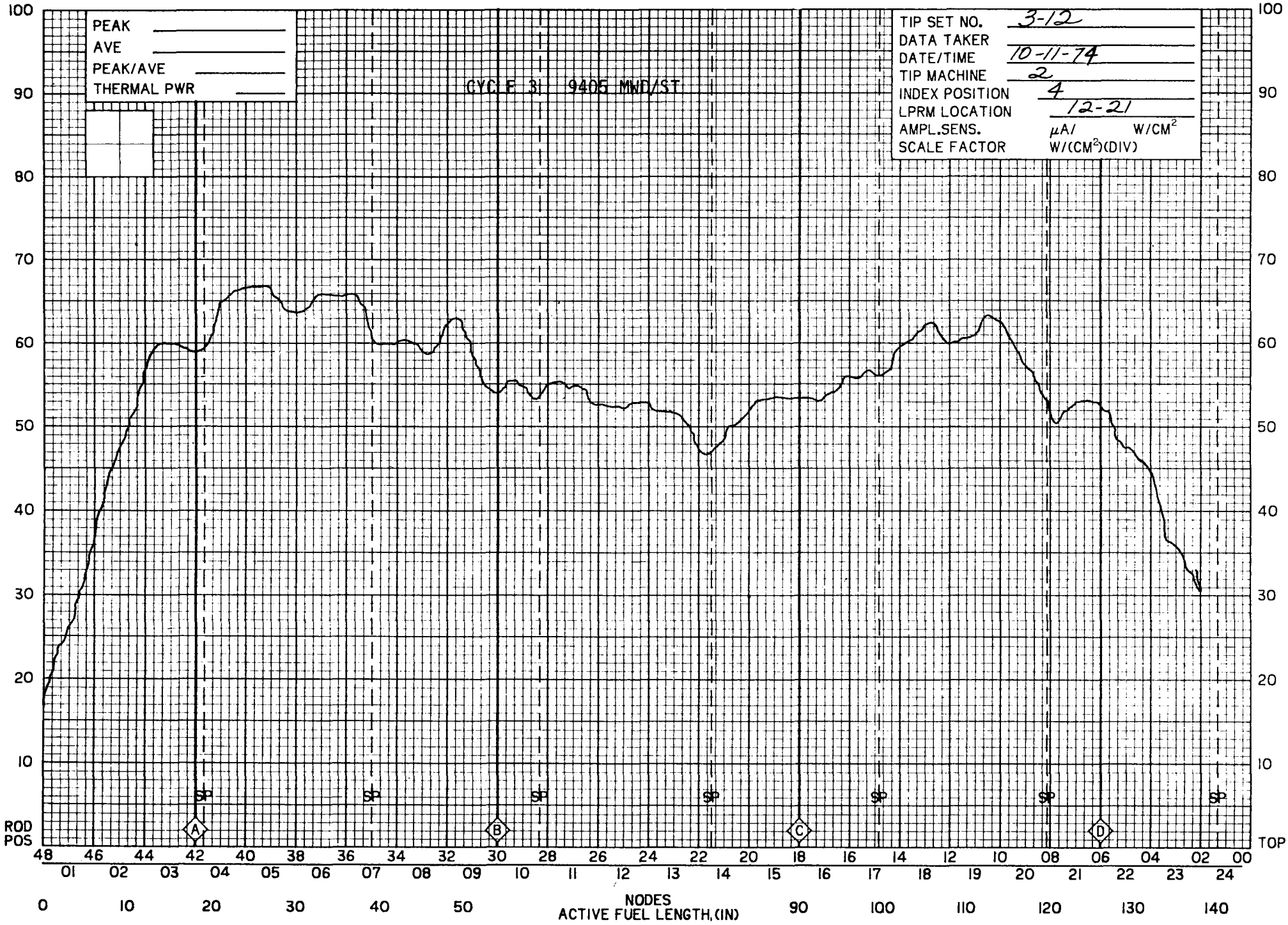
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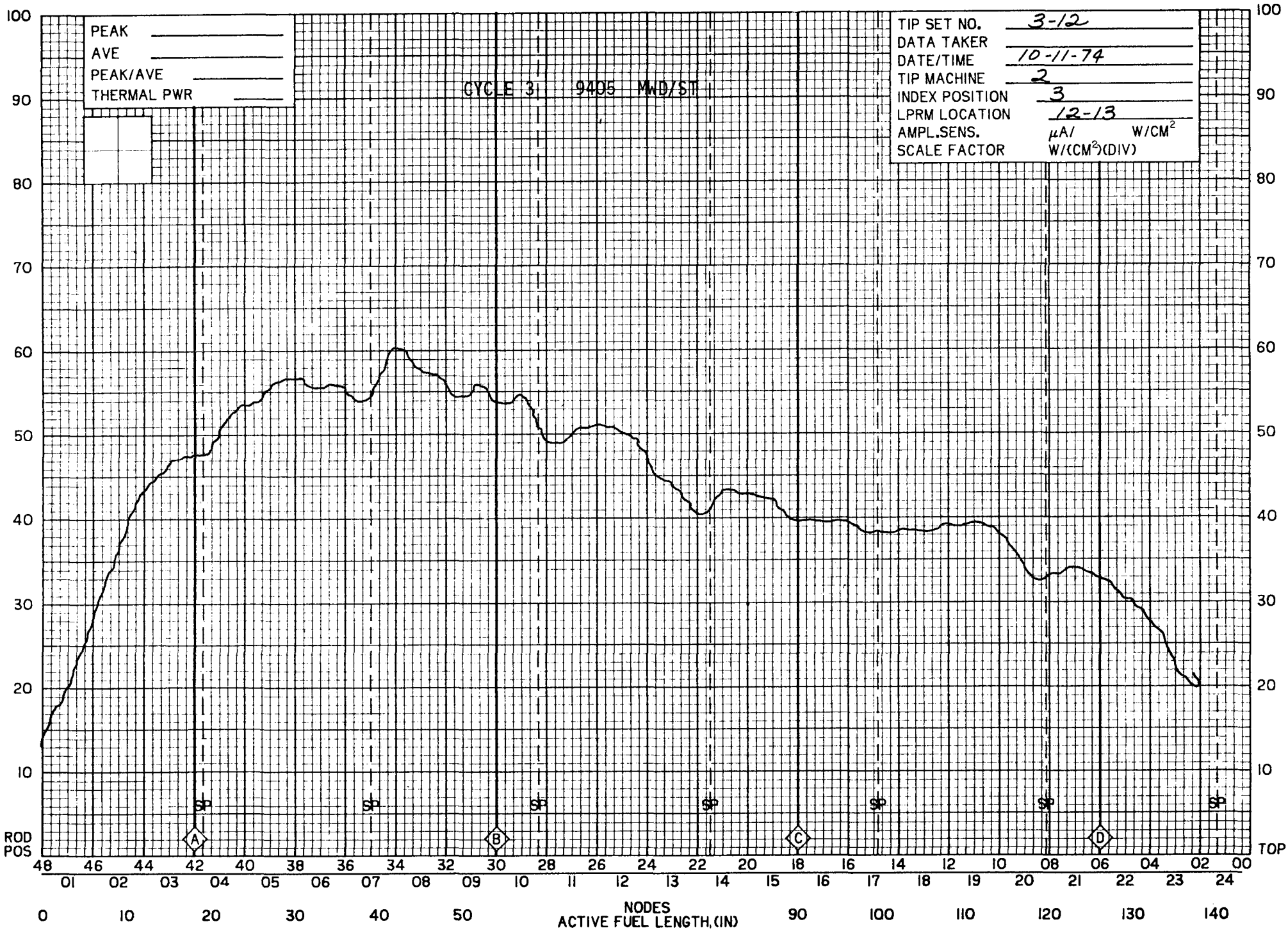
ACTIVE FUEL LENGTH, (IN)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CYCLE 3 9405 MWD/ST
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DATA TAKER
DATE/TIME 10-11-74
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INDEX POSITION 3
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AMPL.SENS. μA/ W/CM²
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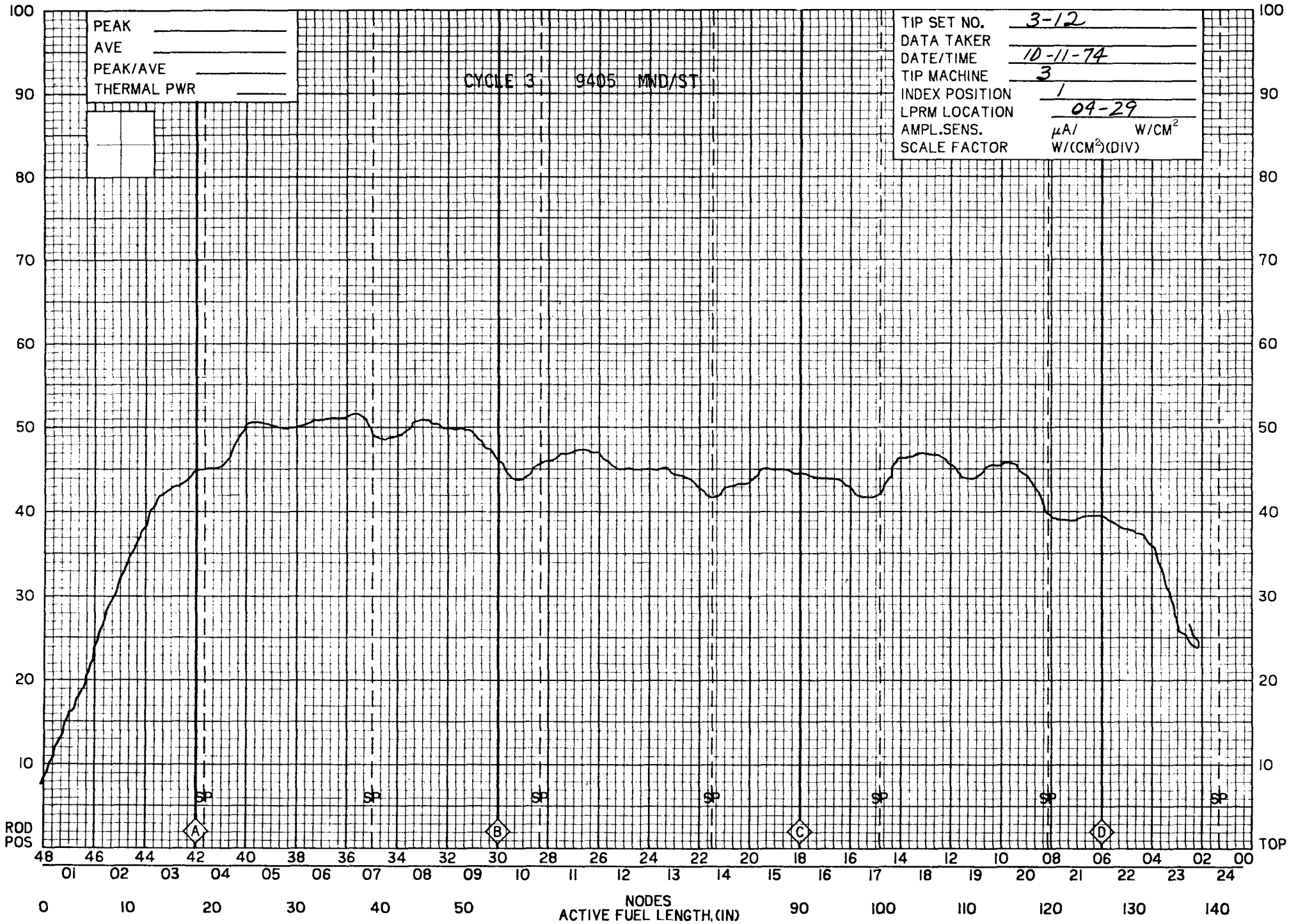
ACTIVE FUEL LENGTH,(IN)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DATA TAKER
DATE/TIME 10-11-74
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SCALE FACTOR W/(CM²)(DIV)
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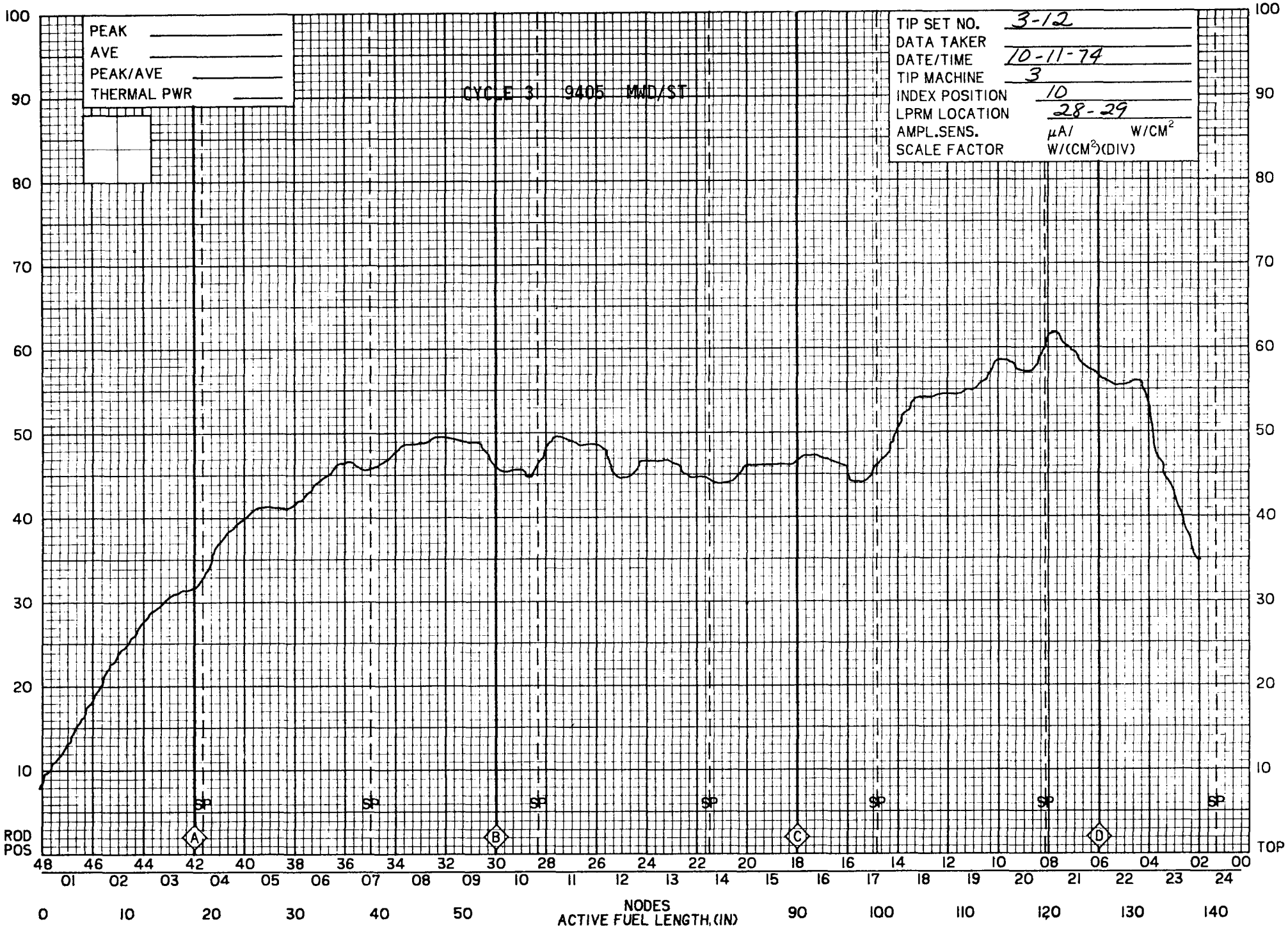
NODES
ACTIVE FUEL LENGTH, (IN)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CYCLE 3 9405 MWD/ST
TIP SET NO. 3-12
DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 3
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
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ROD POS
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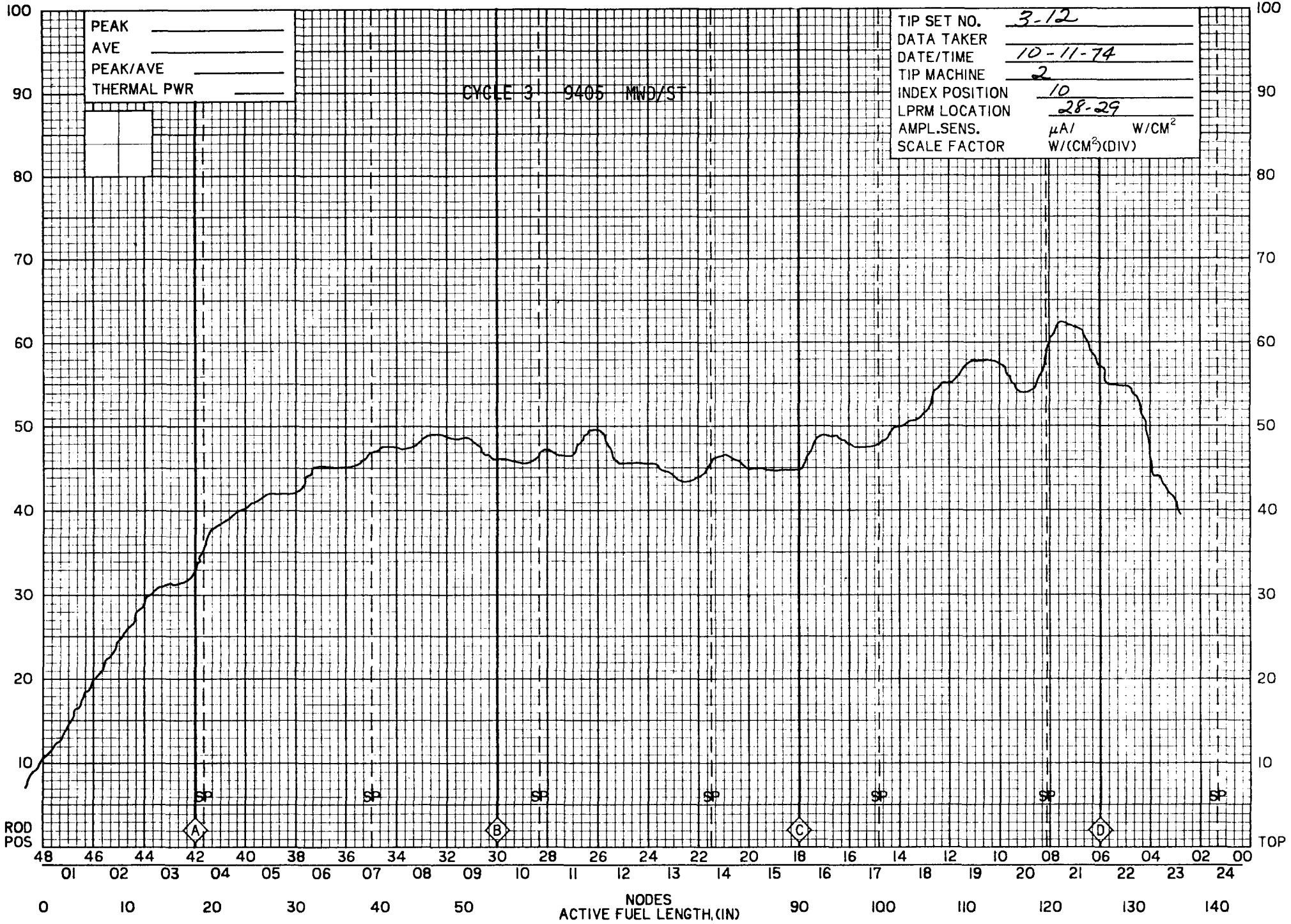
NODES
ACTIVE FUEL LENGTH, (IN)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PEAK/AVE
THERMAL PWR
CYCLE 3 9405 MWD/ST
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DATE/TIME 10-11-74
TIP MACHINE 2
INDEX POSITION 10
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SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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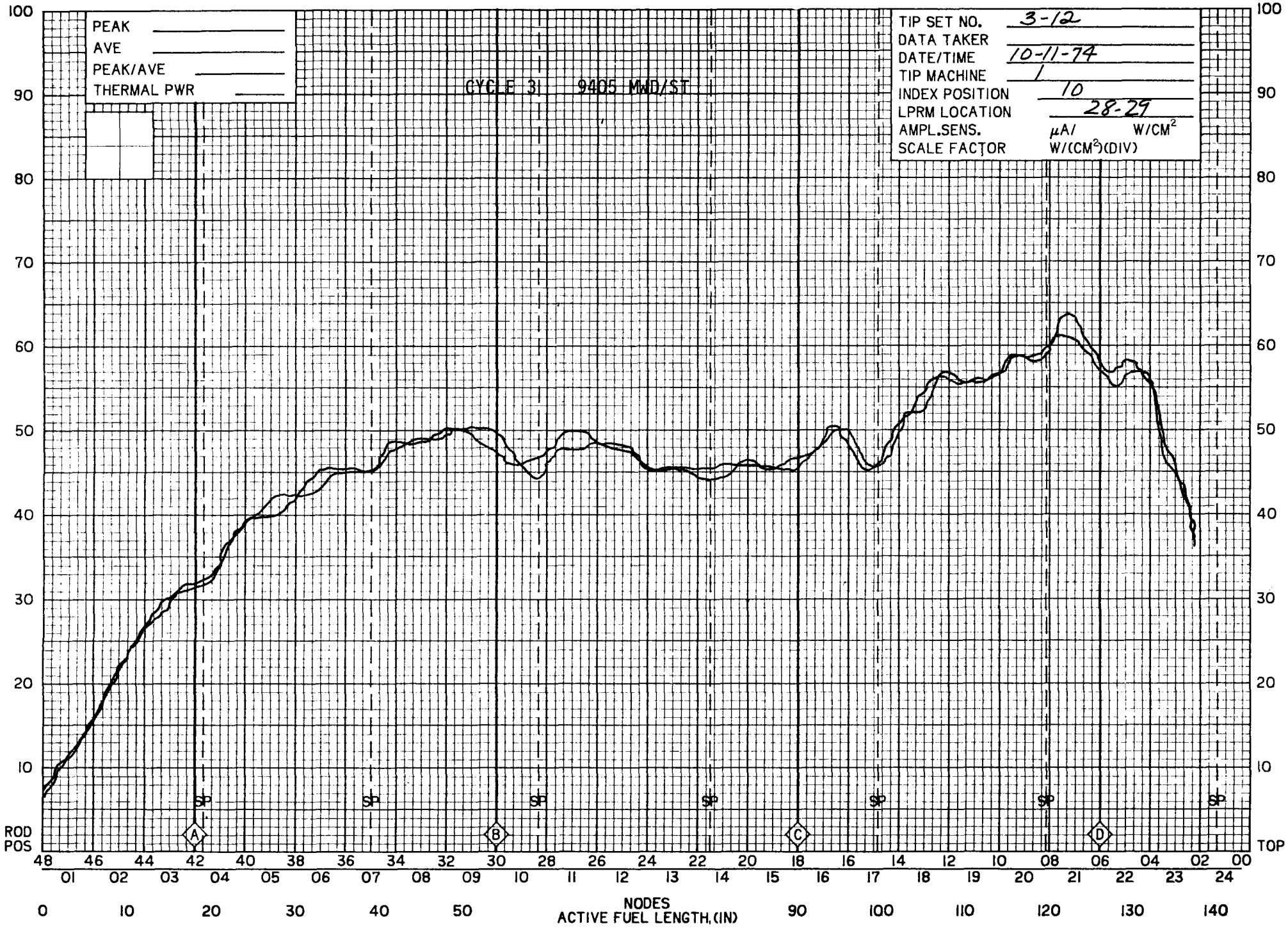
NODES
ACTIVE FUEL LENGTH,(IN)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THERMAL PWR
CYCLE 31 9405 MWD/ST
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DATA TAKER
DATE/TIME 10-11-74
TIP MACHINE 1
INDEX POSITION 10
LPRM LOCATION 28-29
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SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)

REACTOR: Monticello

CYCLE: 3

Exposure: 9405 MWD/STU

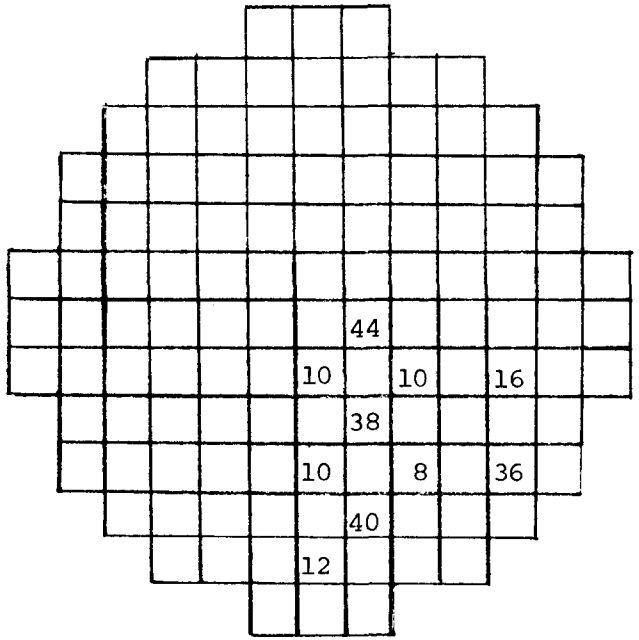
TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 6 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



1/4 core symmetry

Verified By: E Ford Date: 07/20/76

REACTOR: Monticello
CYCLE: 3
Exposure 9405 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	493.	Idem	none
11. Outlet temperature to cleanup system (oF)	428.	Idem	none
12. Machine normalized TIP data from process computer	Not available		
13. Graphs of TIP traces from plotter if available			See attached set of TIP traces
14. Xenon history-past 48 hours Time (hrs)/Core power (%)			See attached power histogram
15. Control rod positions (by location)	See Sheet #6		

Verified By: [illegible] Date: 07/20/76

OD-3 CORE THERMAL POWER AND APRM CALIBRATION 10/11/74 0854 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	P
479.80	1414.16	50.37	38.91	49.10	16.03	2.00	0.1078	1010

RWL	DPM	WFW	HFW	HD	DHO	CXE
34.95	11.77	5.62	337.61	514.98	21.97	0.1141

RAP	84.781	85.460	84.906	85.719	85.750	85.219
AGAF	0.999	0.991	0.997	0.988	0.988	0.994

IB 1

RAPL	-200.24	5.01	20.02	35.04	50.06	65.08
	80.10	90.11	100.12	110.13	125.15	200.24

QFW	QCR	QCU	QRAD	QPUMP	TFW
1404.750	9.220	1.760	0.600	2.157	363.496

HF	HFG	HG	HS	WCR	HCR
543.99	647.45	1191.44	1190.80	0.0281	70.68

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0814	481.55	407.77	522.61	1670.00	1670.00

PPW	1.1340	1.1857

CAP	0.00990	0.00991	0.00997	0.00988	0.00988	0.00994
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.60

WTC	17.80	23.00	31.70	40.30	49.00	57.60

MONTICELLO NUCLEAR GENERATING PLANT
Manual Heat Balance Form

H.B. No. 3-64 DATE: 10/11/74 TIME: 1012

BY: DEN

INPUT DATA

ITEM	QUANTITY	INSTRUMENT	COMP Pt.	VALUE	UNITS
1*	Gross Gen. Output	C08,w/gen	G101	480.0	MWE
2*	Aux. Plant Load	------	G170	18.9	MWE
3*	A Feedwater Flow	C05,FLR 6/96	F533	2.815	Mlb/hr
4*	B Feedwater Flow	C05,FLR 6/96	F534	2.775	Mlb/hr
5*	A Feedwater Temp.	C06,TR 1148A	R100	364.3	°F
6*	B Feedwater Temp.	C06, TR 1148B	R102	365.7	°F
7*	Total Core Flow	C04,2.3.92A/B	R261	50.5	Mlb/hr
8*	Reactor Pressure	C05,PR 6/98	R223	996	psig
9*	CR Drive Temp	-------	F127	99	°F
10	Cleanup Inlet Temp.	C04, Pos.1	R236	493	°F
11	Cleanup Outlet Temp.	C04, Pos.4	R237	428	°F
12	Cleanup Flow	C04, 12-141 A&B	R228,R229	163	GPM
13	A Recirc Pump PWR	C04,2-184-24A	R233	1.13	MWE
14	B Recirc Pump PWR	C04,2-184-24B	R234	1.18	MWE
15	Rod Drive Flow	C05,FR-2-3-95	R227(Klb/hr)	.54	GPM

*Available From SL5

APRM READINGS

No.	%POWER	Comp Pt.
1	85.5	R212
2	85.6	R214
3	85.8	R216
4	85.5	R213
5	85.7	R215
6	85.2	R217

PHYSICAL PROPERTIES

ITEM		VALUE	(BTU/lb)
16	Steam Enthalpy		
17	A FW Enthalpy		
18	B FW Enthalpy		
19	Cleanup Inlet Enth.		
20	Cleanup Outlet Enth.		
21	Rod Drive Enth.		

EVALUATION: COMPUTER ( ) or MANUAL (✓)

ITEM	QUANTITY	EQUATION	VALUE	
22	Total Steam Flow	(3) + (4) + (15) x 4.95E-4	5.62	MLB/HR
23	Core Thermal Power		4790.7	MBTU/HR
24	Core Thermal Power	(23)/3.413	1404.1	MWT
25	% Rated Power	(24)/16.70	84.08	%
26	Heat Rate	(23) x 10^3/ ((1) - (2))	10.39	KBTU/KW-HR
27	Net Plant Efficiency	((1) - (2)) x 100/(24)	32.84	%

Note: Attach Computer Edit(s) To This Form If Applicable

COMMENTS:

REACTOR: Monticello

CYCLE: 3

Exposure 9405 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 4 of 12

Rev. 0 Date: 5/10/76

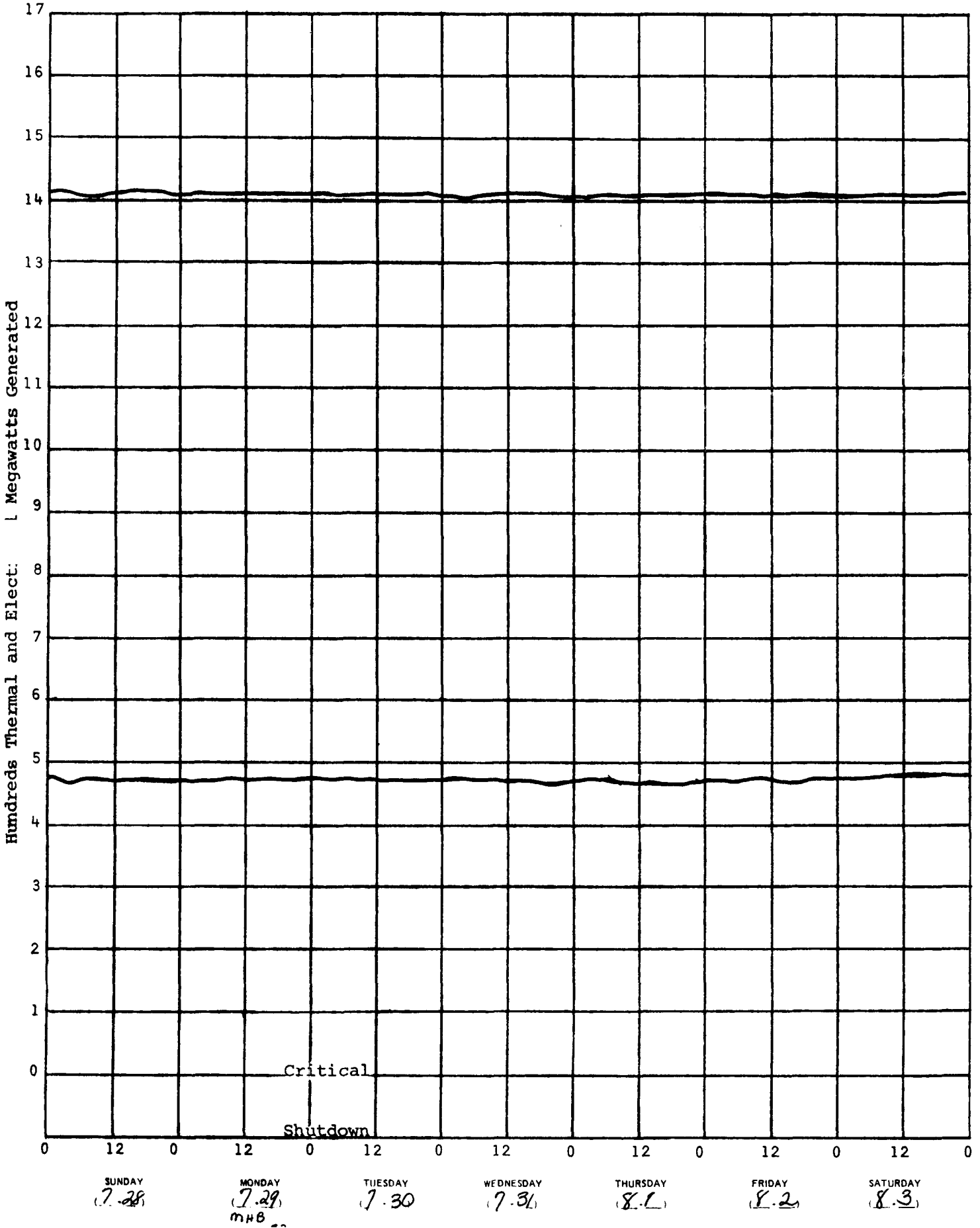
ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1414.16	HB #3-64 10/11/74	See attached HB #3-64 and OD-3 dated 10/11/74
2. System pressure (psig)	996.	Idem	Calculated core pressure = 1026.1 psia
3. Recirculation flow (lbs/hr)	50.37×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	5.59×10^6	Idem	none
6. Feedwater flow temperature (oF)	365.	Idem	none
7. Time at associated power level (hr)	>12.	Idem	none
8. Inlet subcooling (BTU/lb)	24.28	Idem	21.97 from OD-3 corrected for core pressure
9. Cleanup system flow (gal/min)	163.	Idem	none

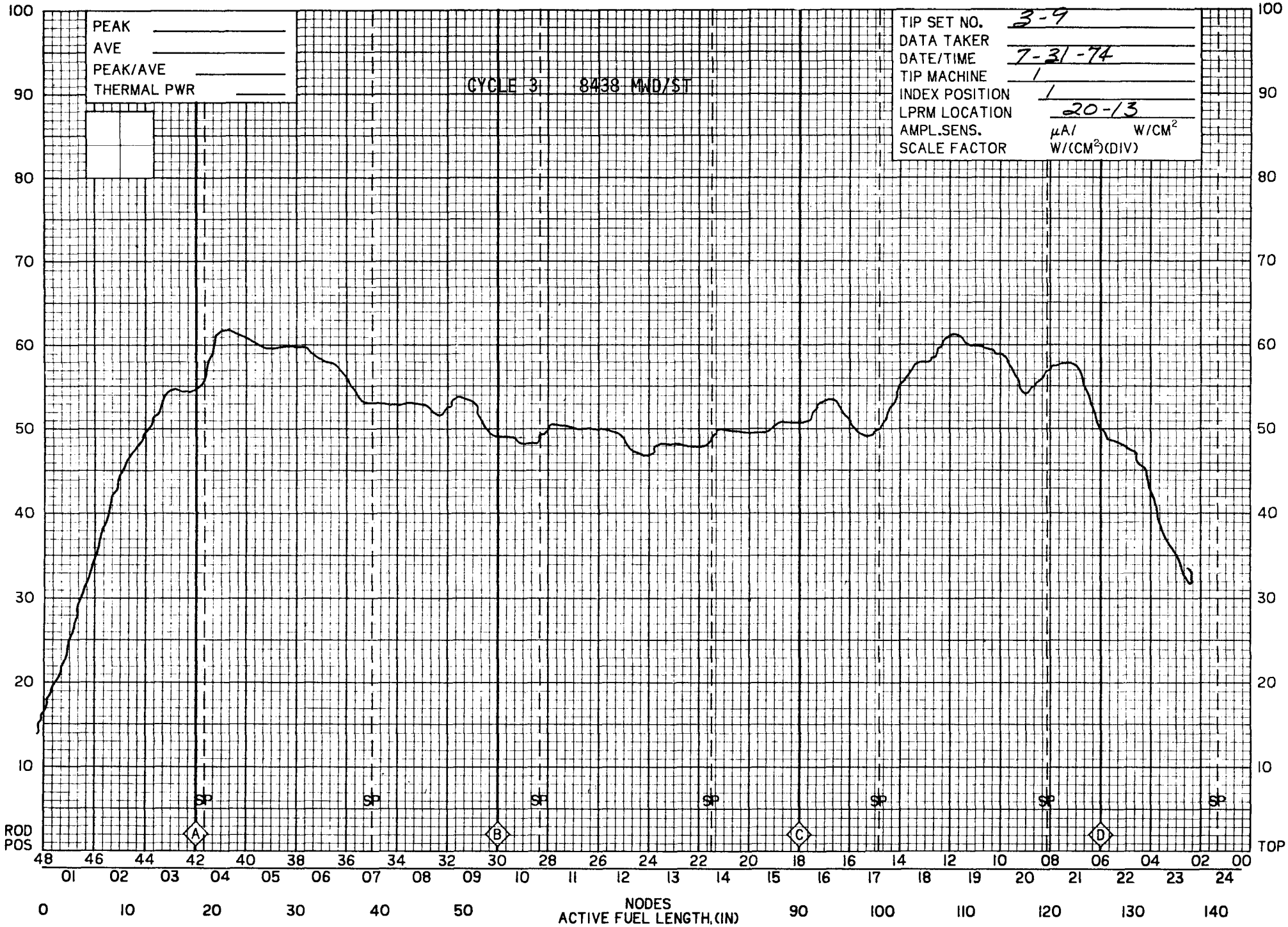
Verified By: E Tow Date: 07/20/76

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 8 - 3 - 74

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DATE/TIME 7-31-74
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SCALE FACTOR W/(CM³)(DIV)
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ROD POS
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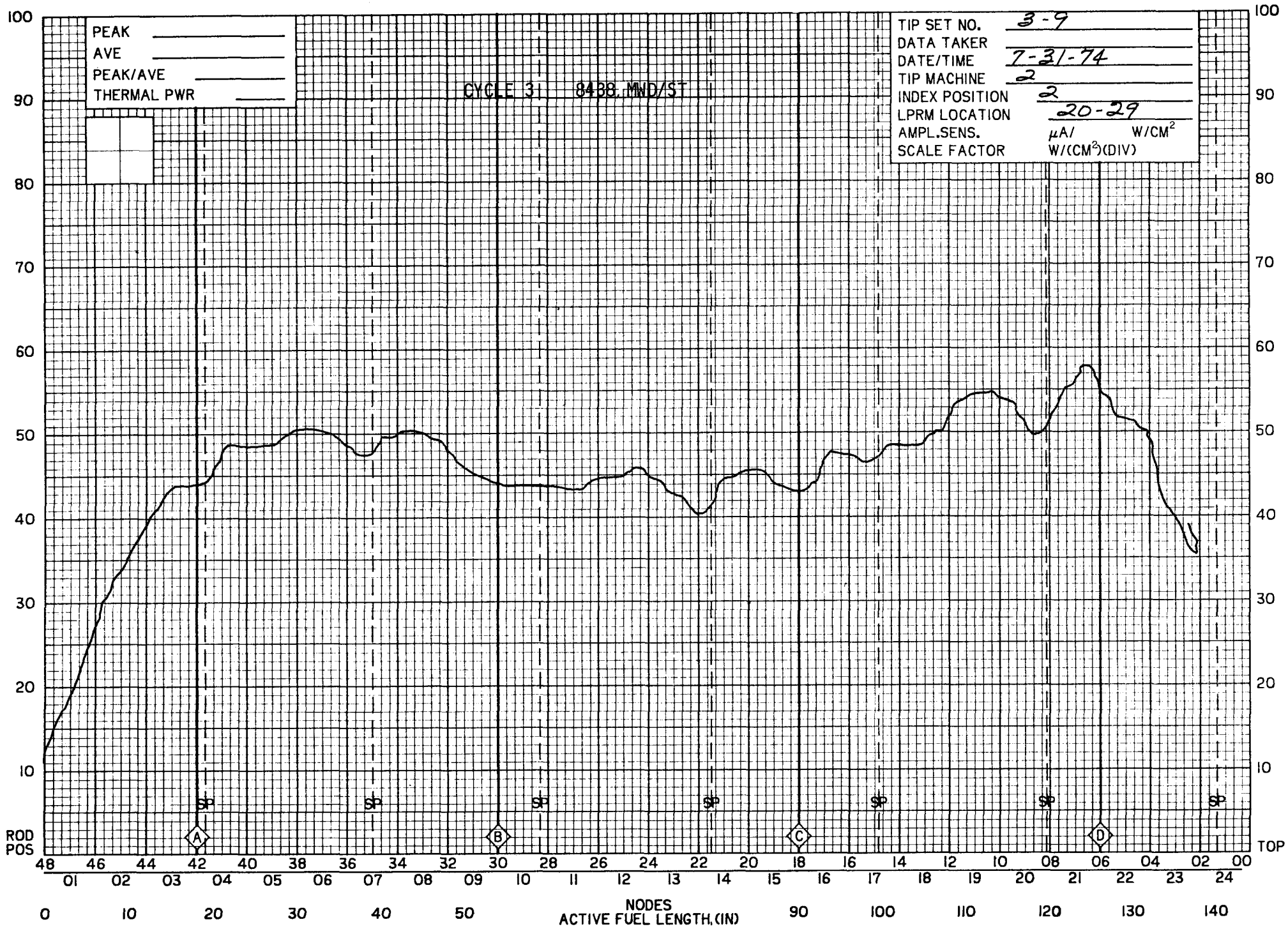
NODES
ACTIVE FUEL LENGTH,(IN)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CYCLE 3 8438 MWD/ST
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DATE/TIME 7-31-74
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INDEX POSITION 2
LPRM LOCATION 20-29
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SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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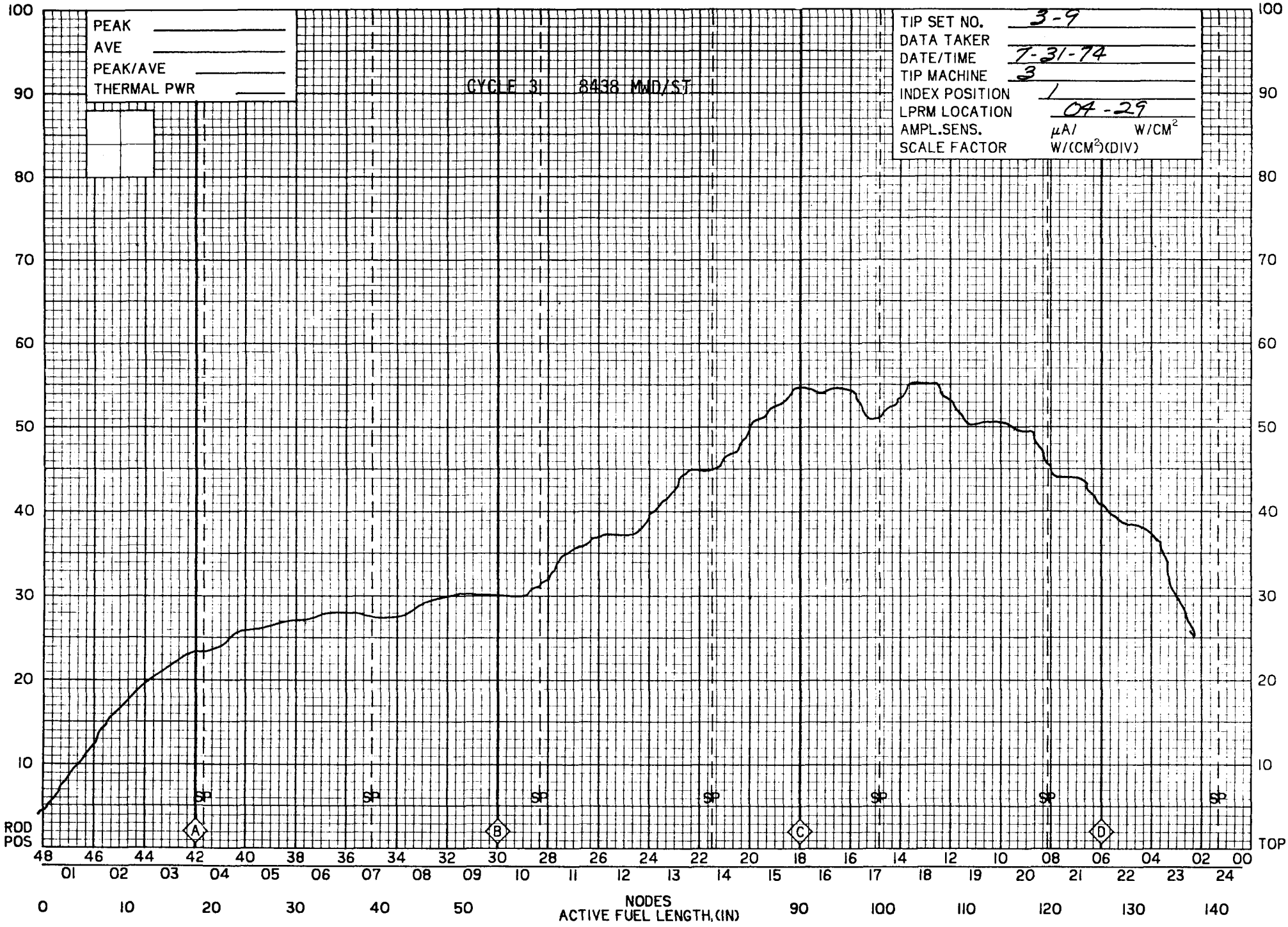
ACTIVE FUEL LENGTH, (IN)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DATE/TIME 7-31-74
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NODES
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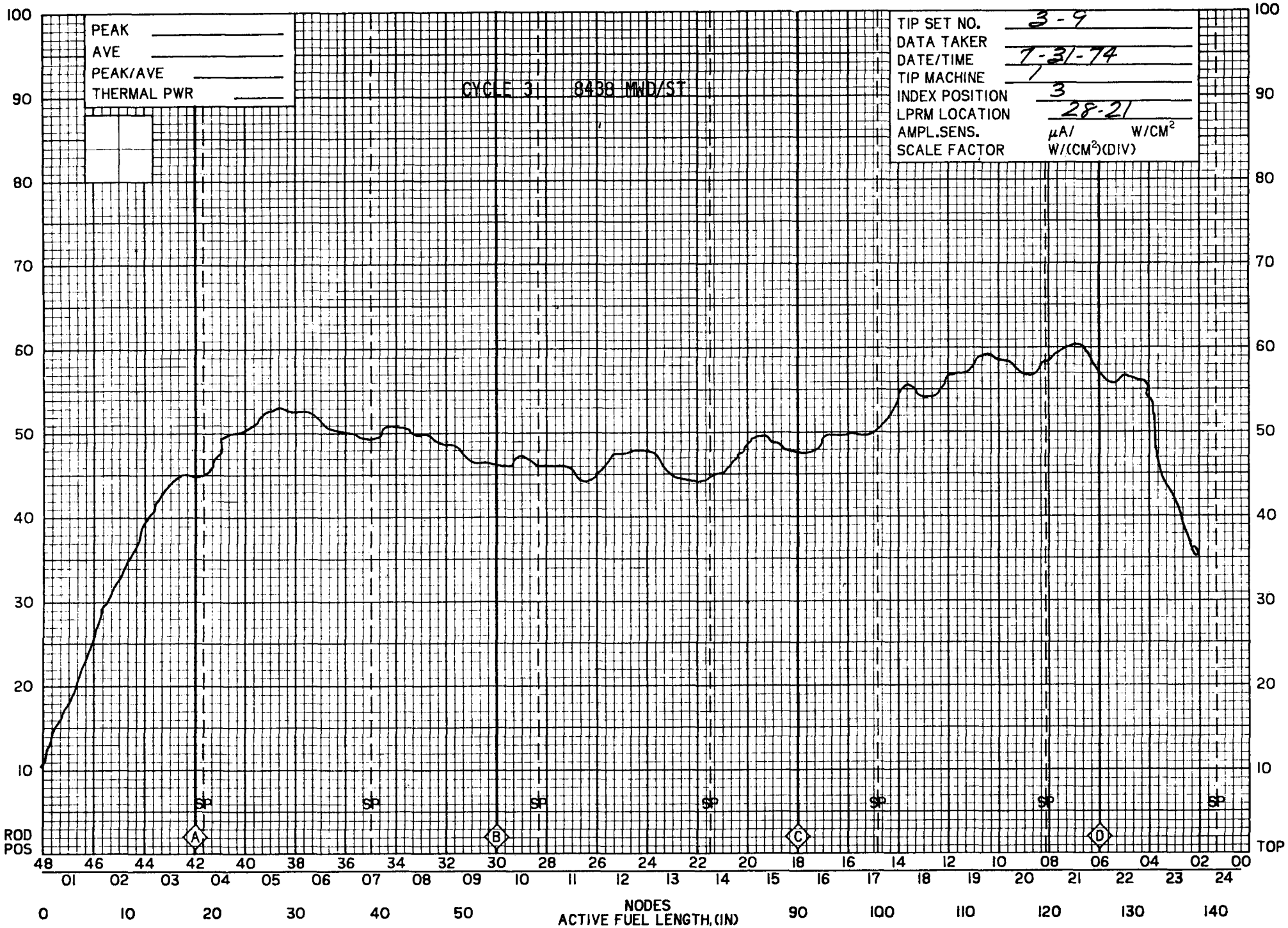
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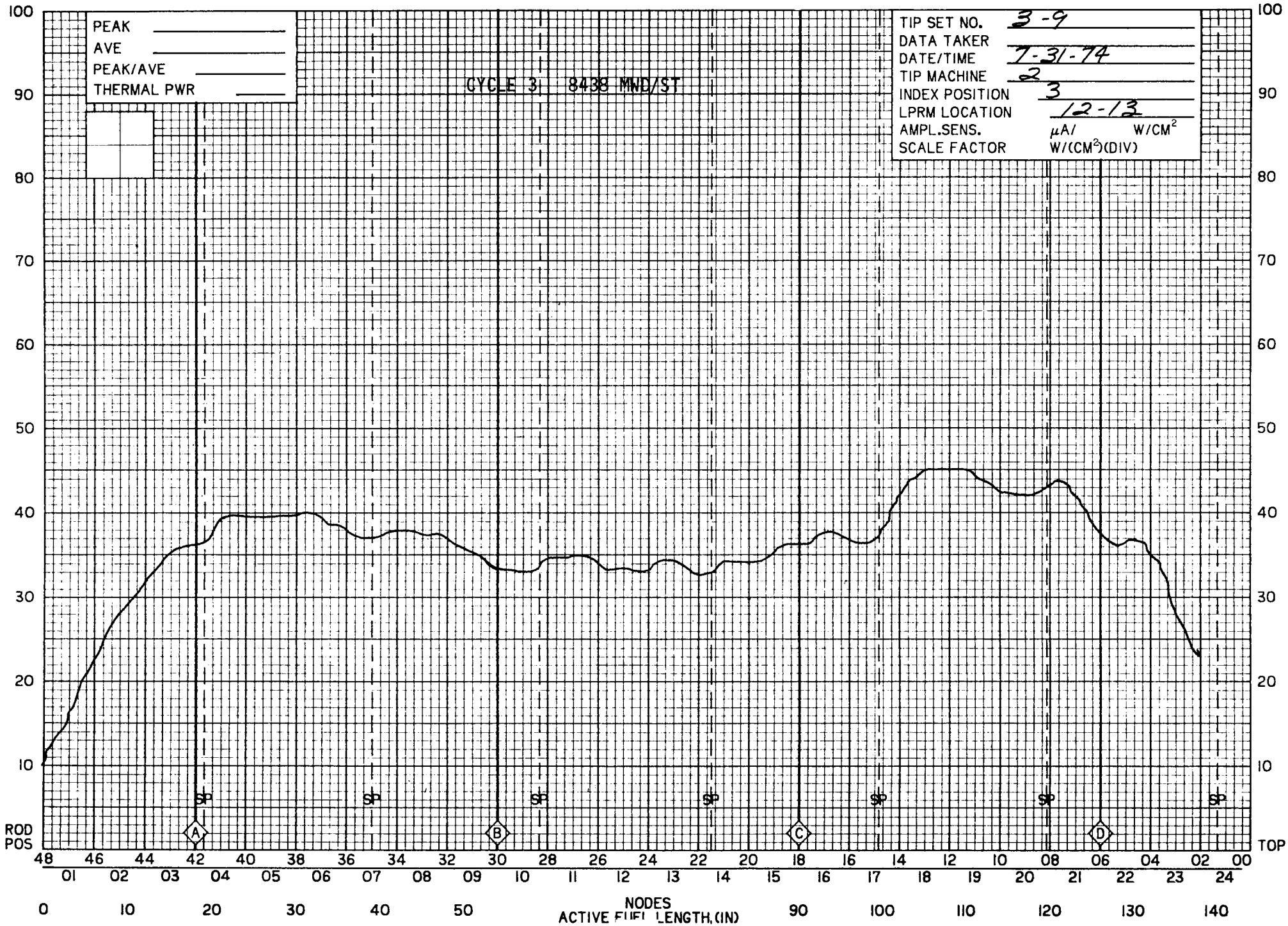
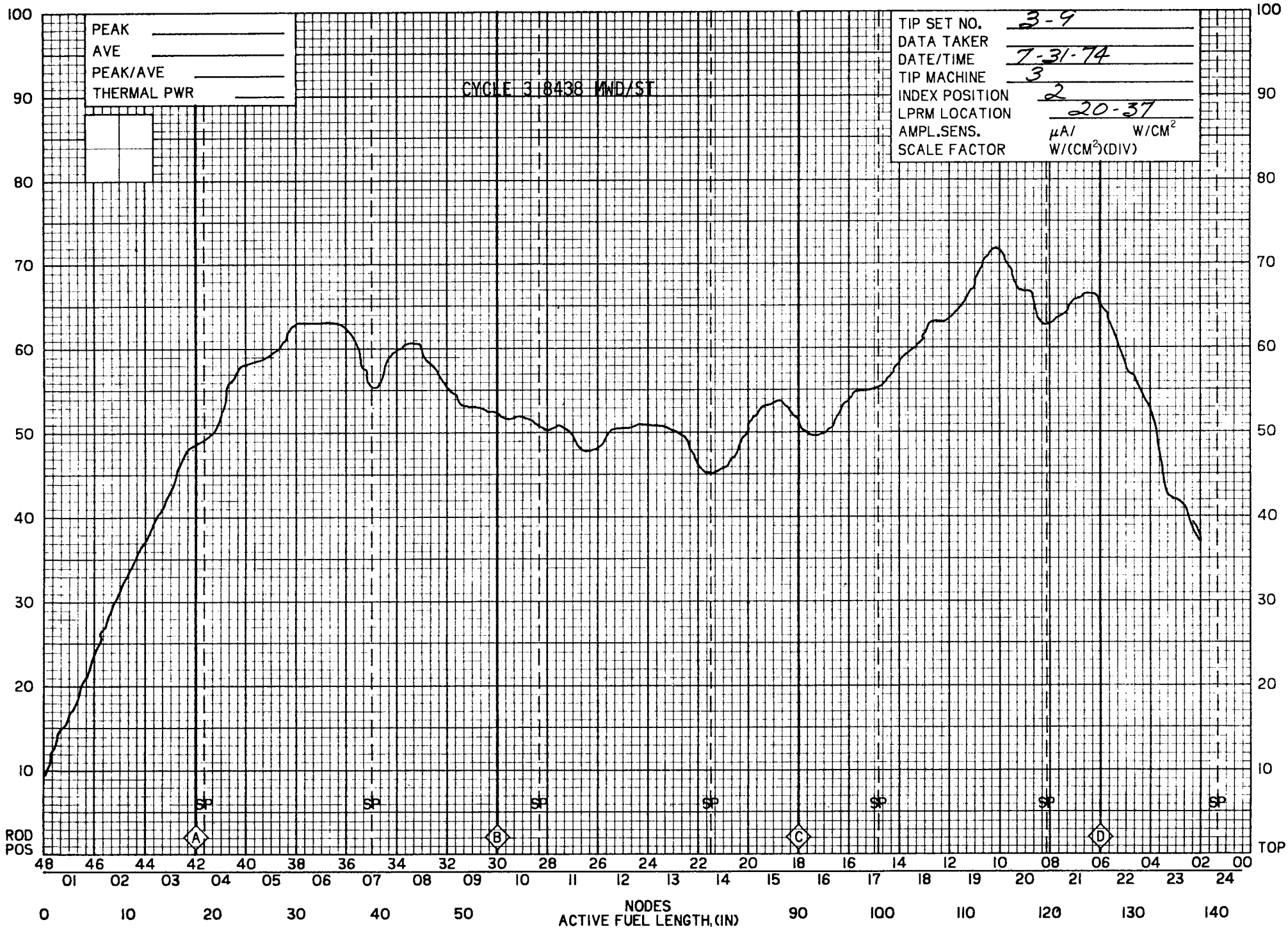
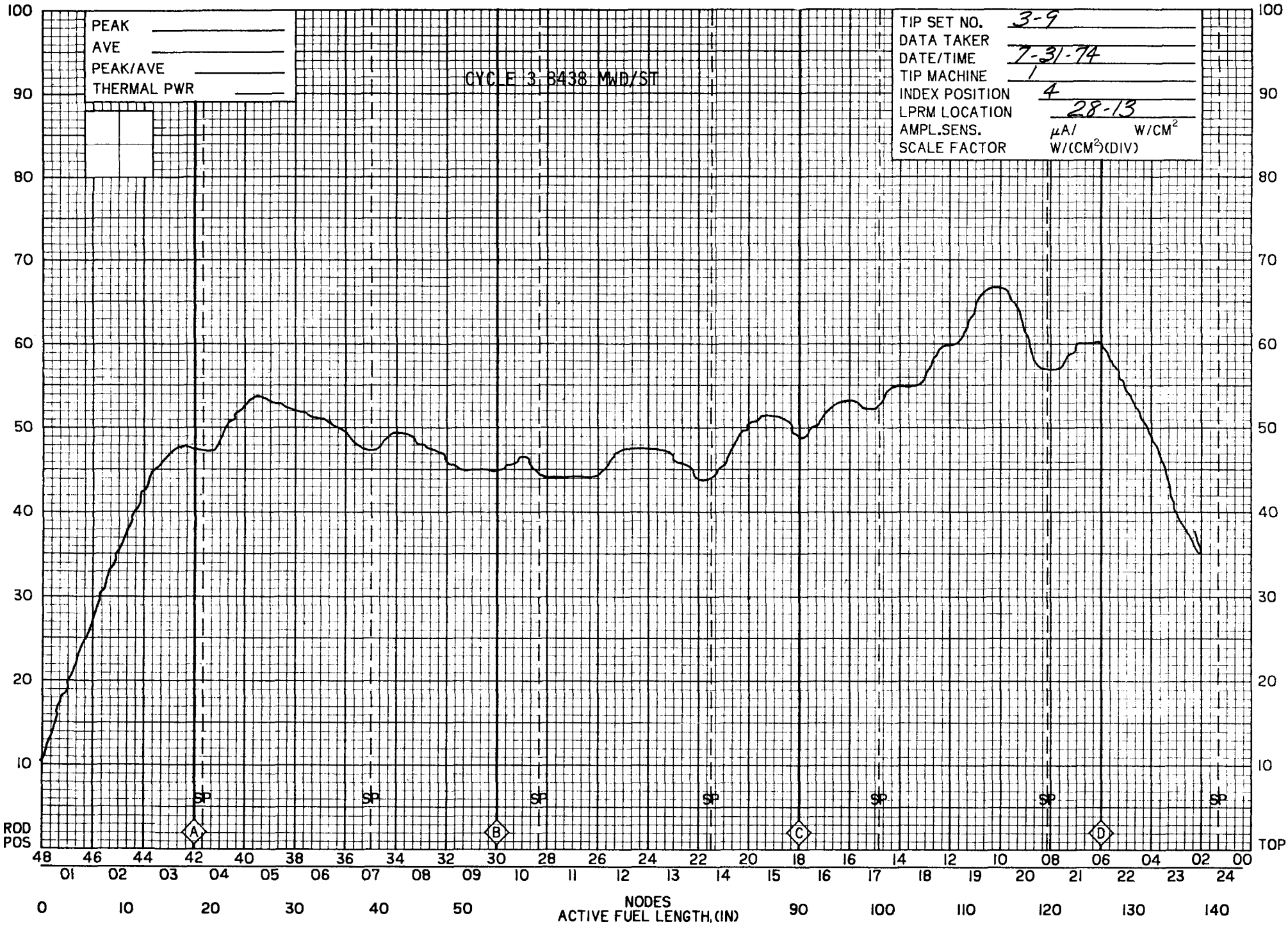
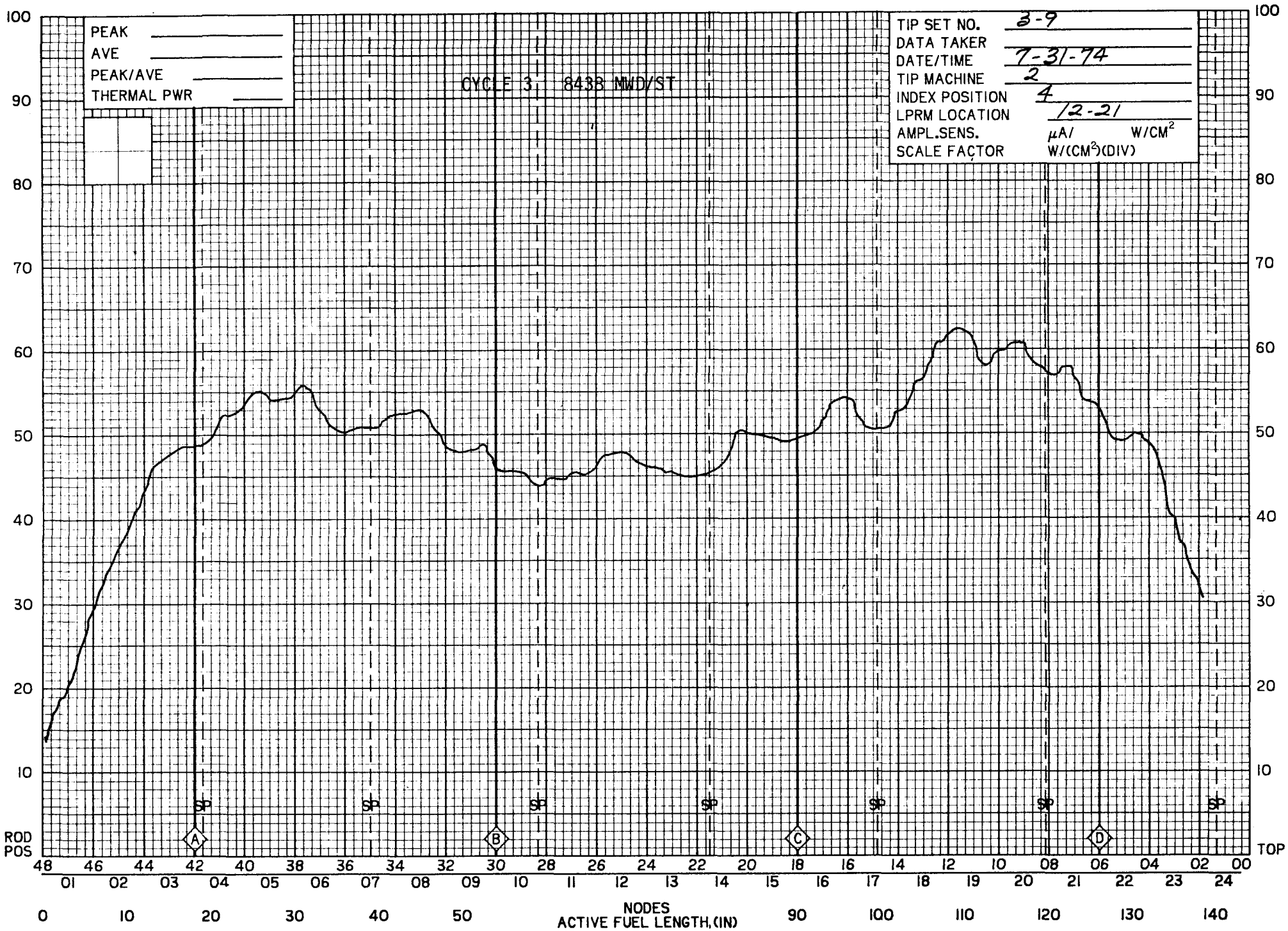
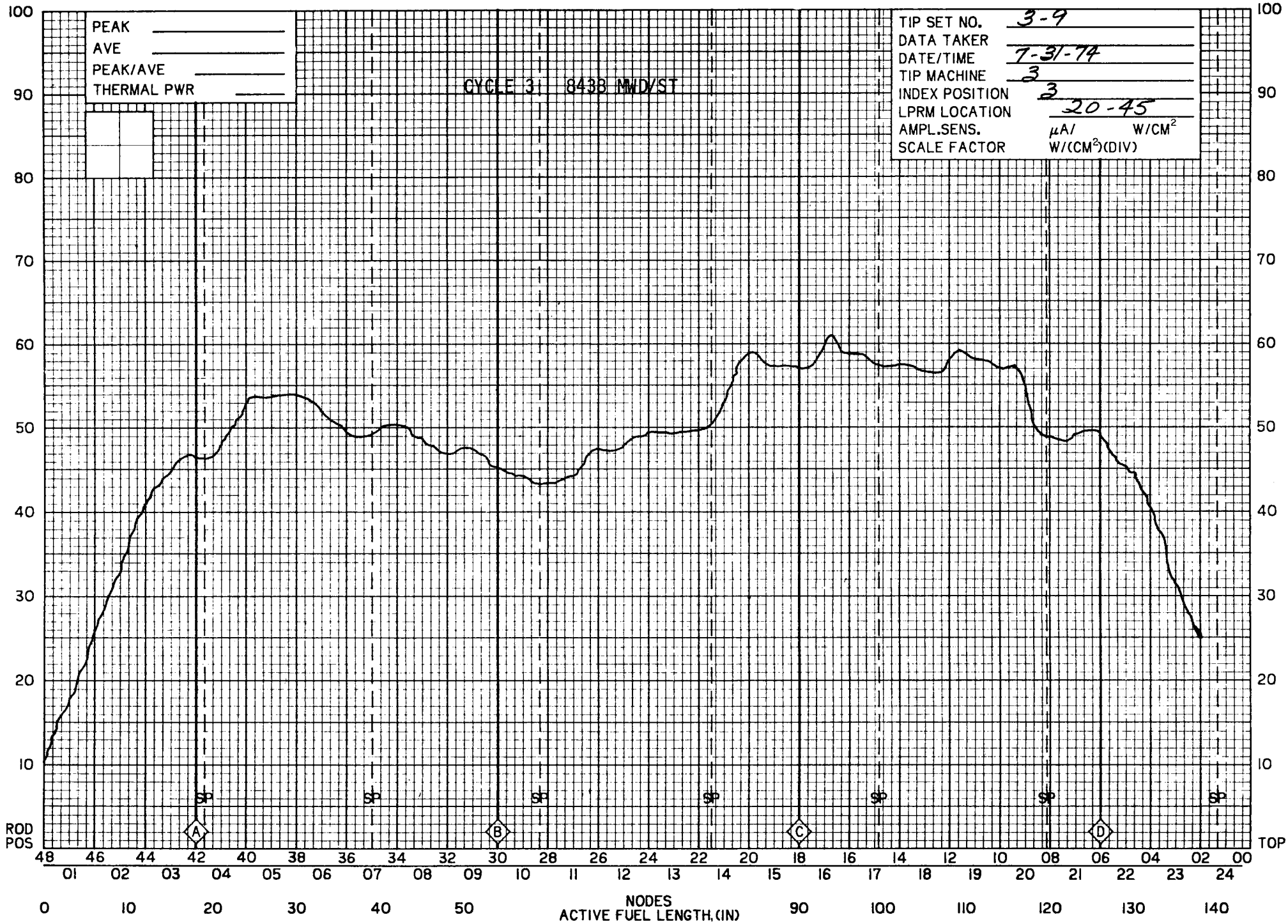
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)

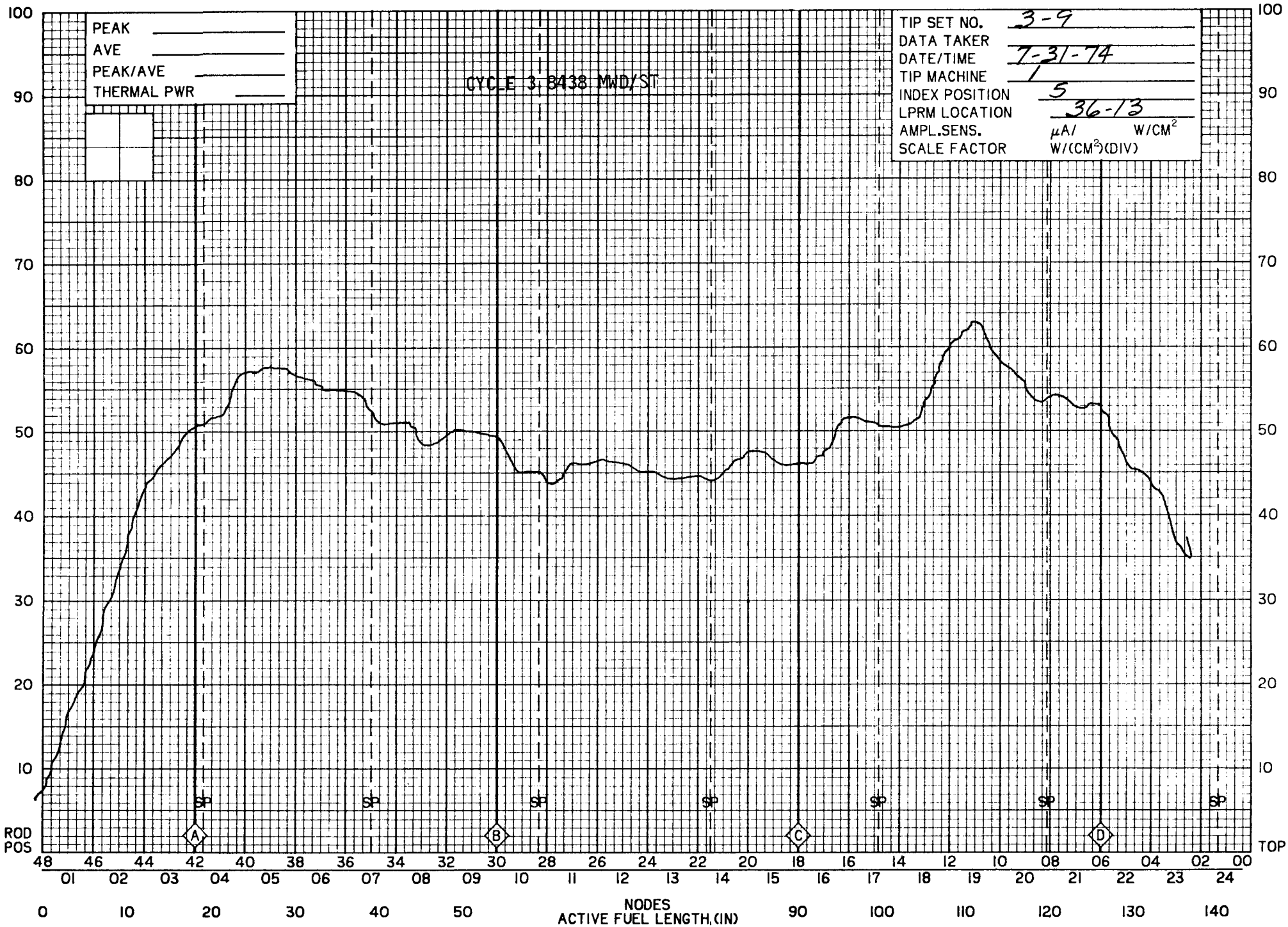

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 18438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 2
LPRM LOCATION 20-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3, 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 1
INDEX POSITION 4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 4
LPRM LOCATION 12-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 3
LPRM LOCATION 20-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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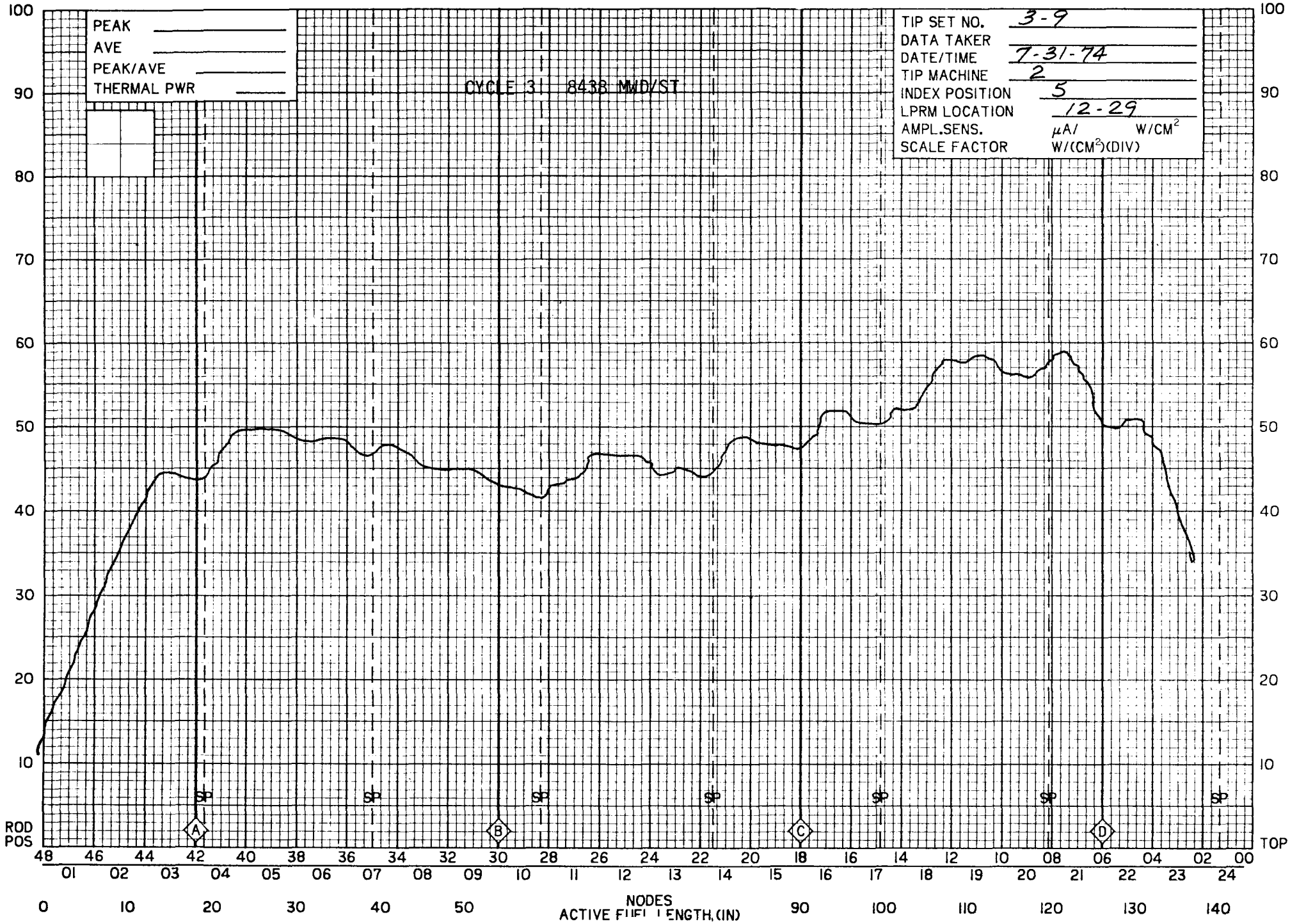
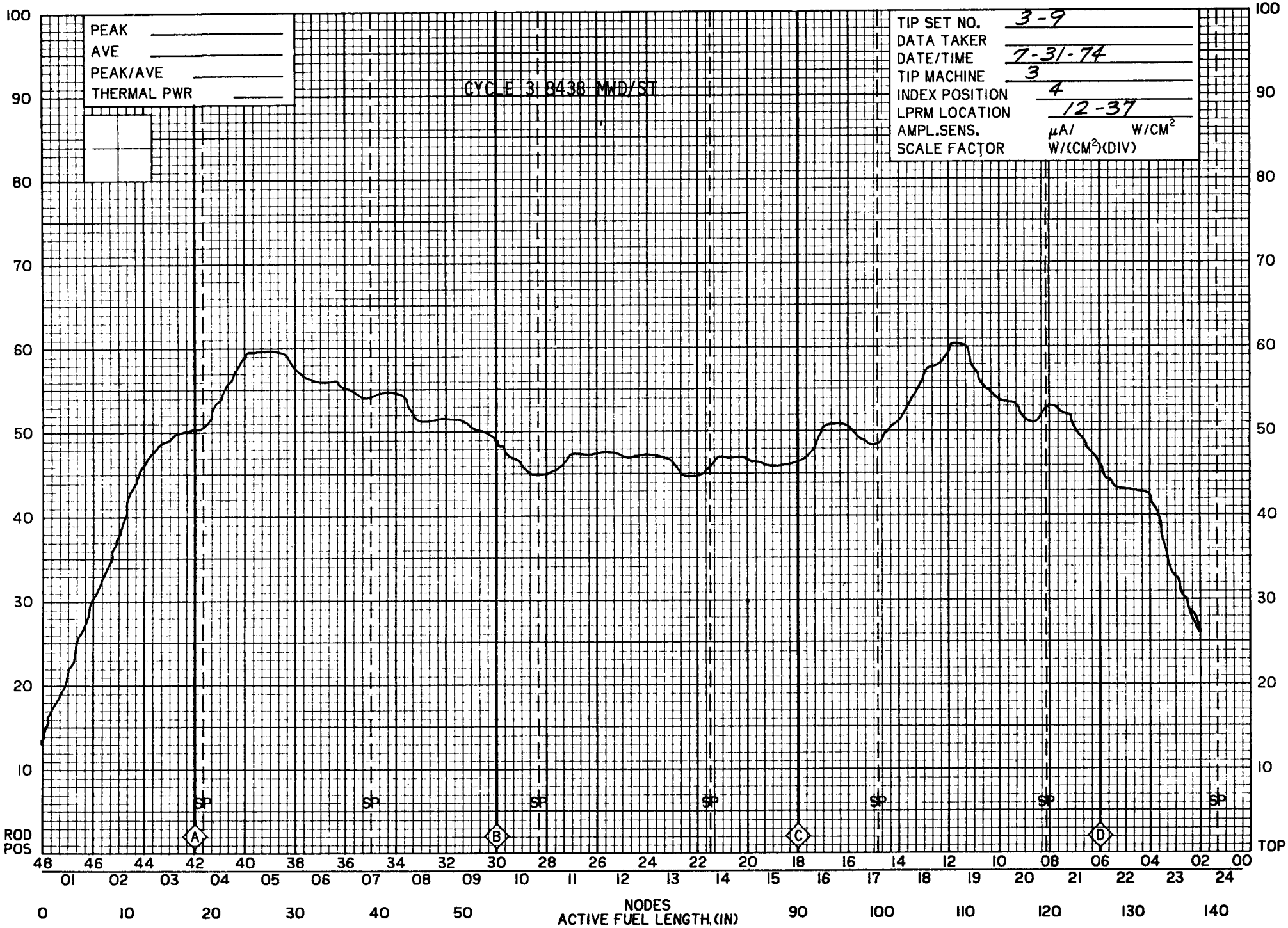
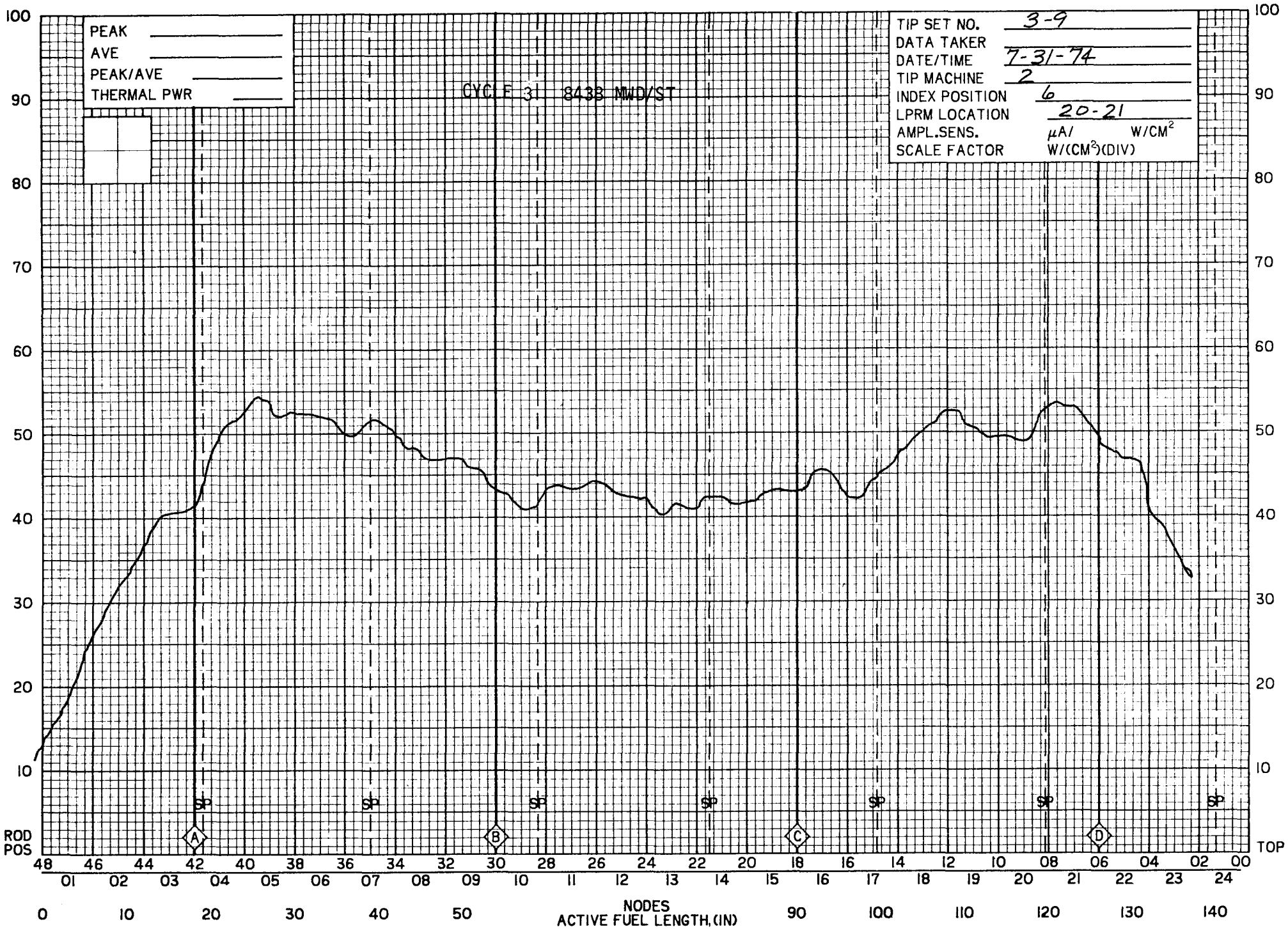
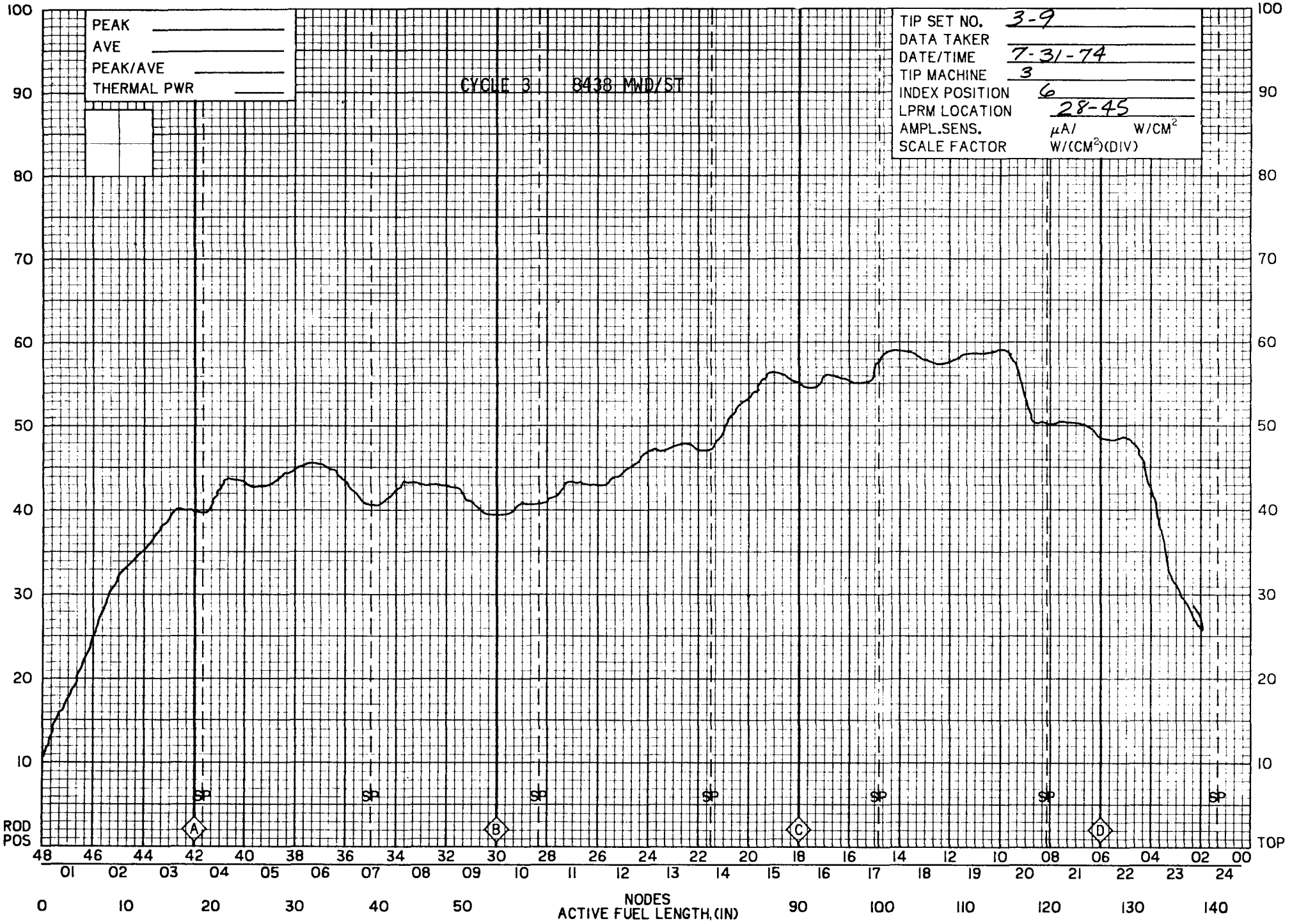
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3, 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 1
INDEX POSITION 5
LPRM LOCATION 36-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

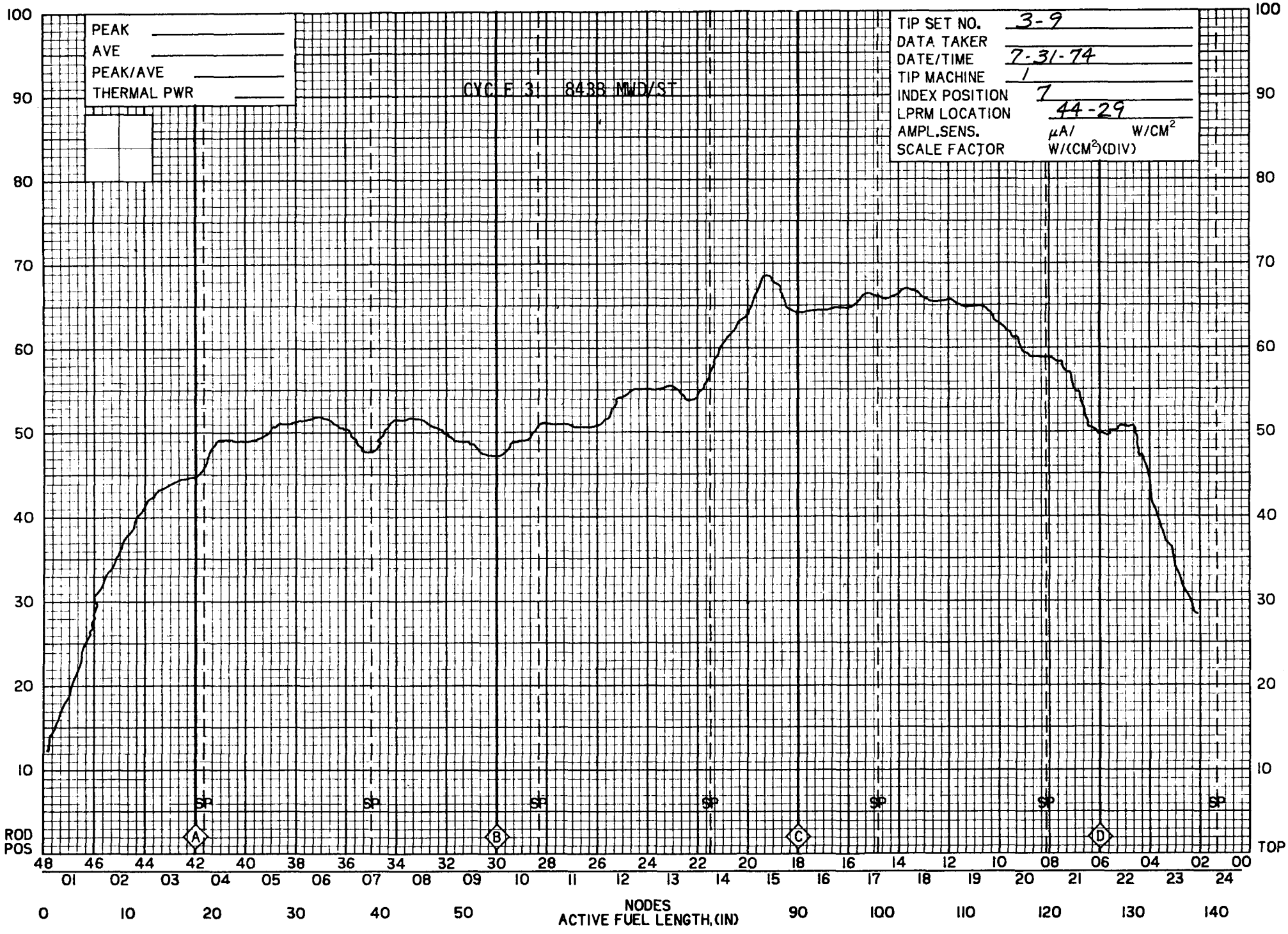

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 5
LPRM LOCATION 12-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)

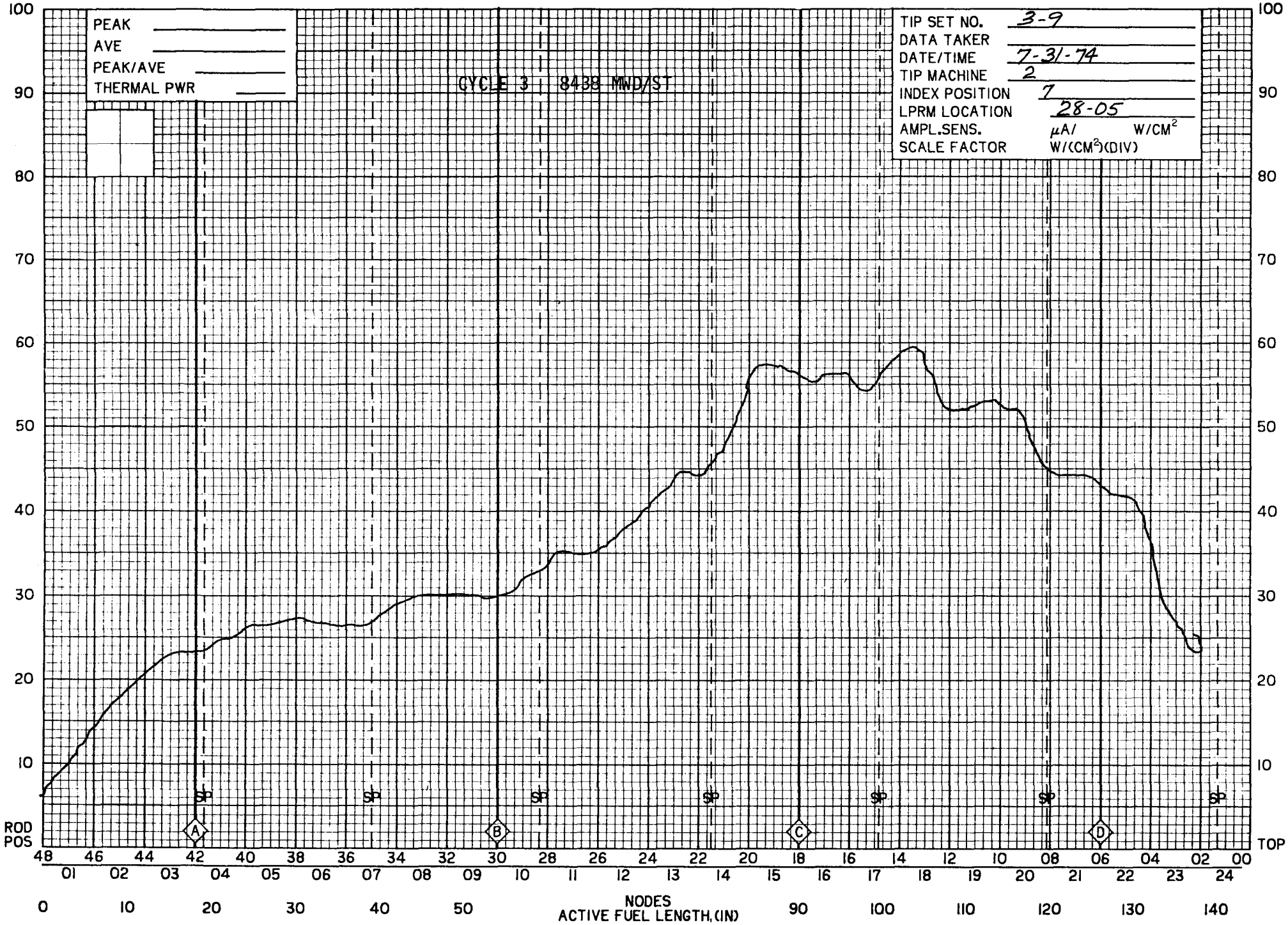

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 18438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 4
LPRM LOCATION 12-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)

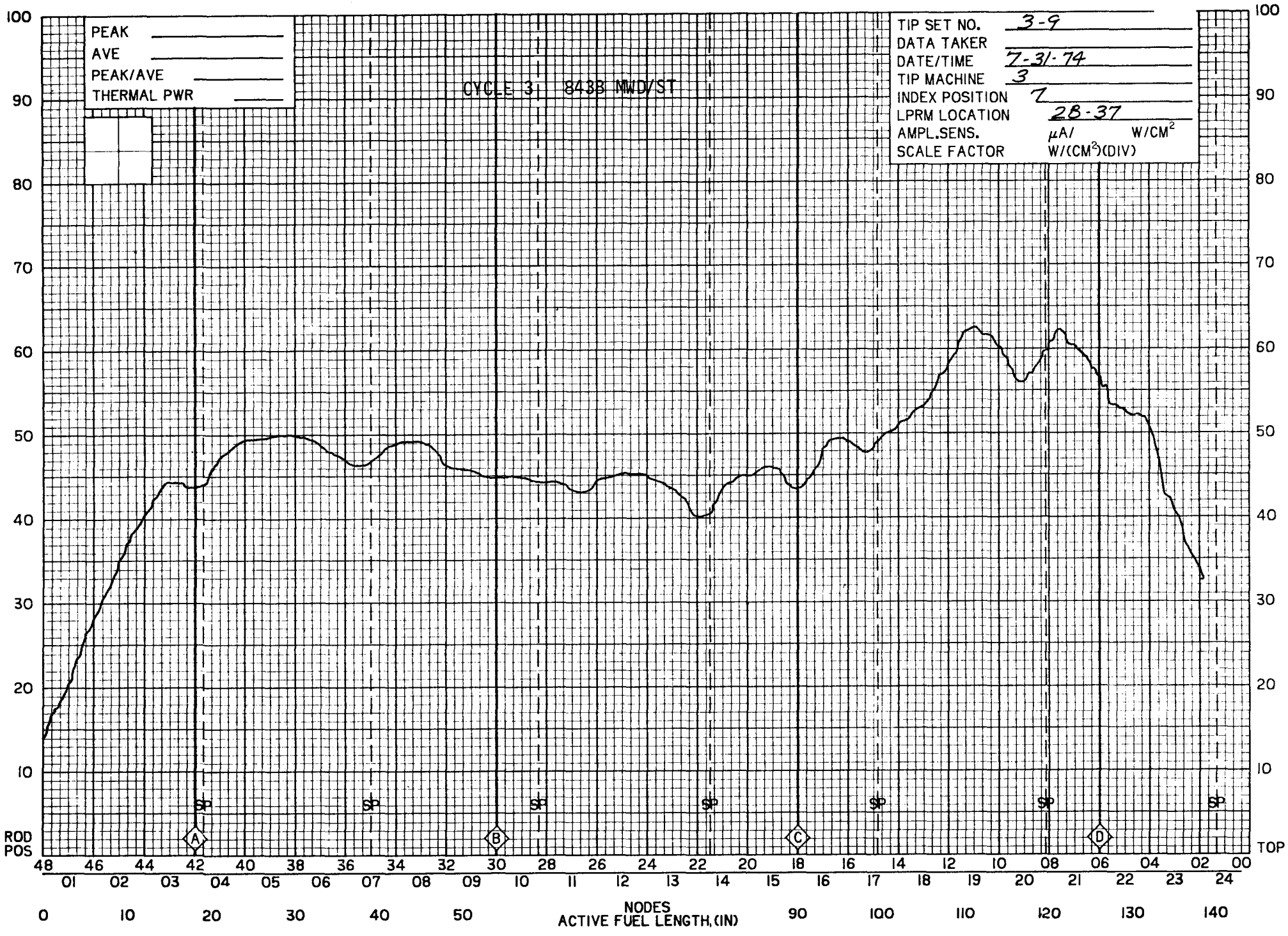
PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 1
INDEX POSITION 6
LPRM LOCATION 44-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 31 8433 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 6
LPRM LOCATION 20-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 6
LPRM LOCATION 28-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 1
INDEX POSITION 7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 7
LPRM LOCATION 28-05
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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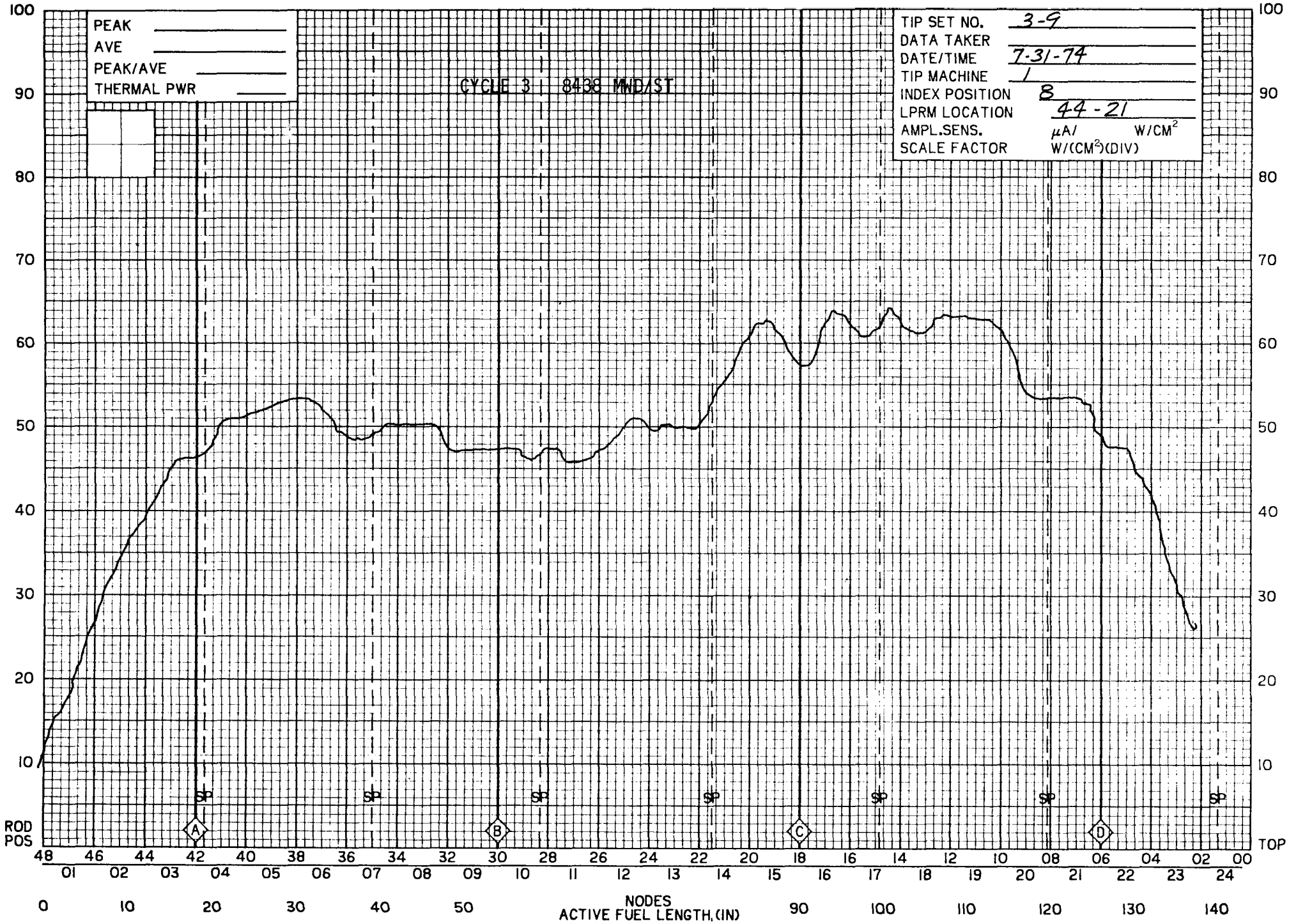
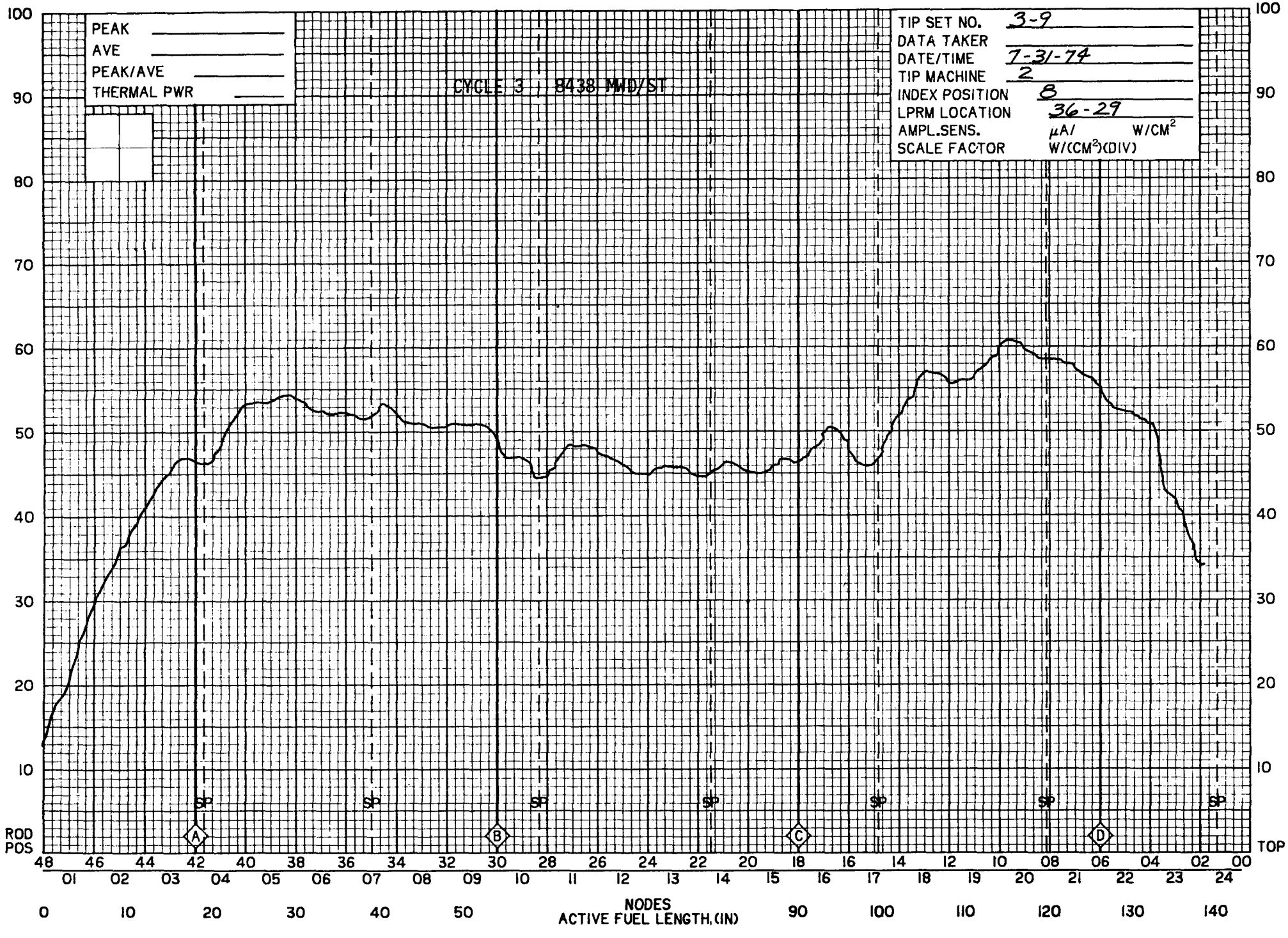
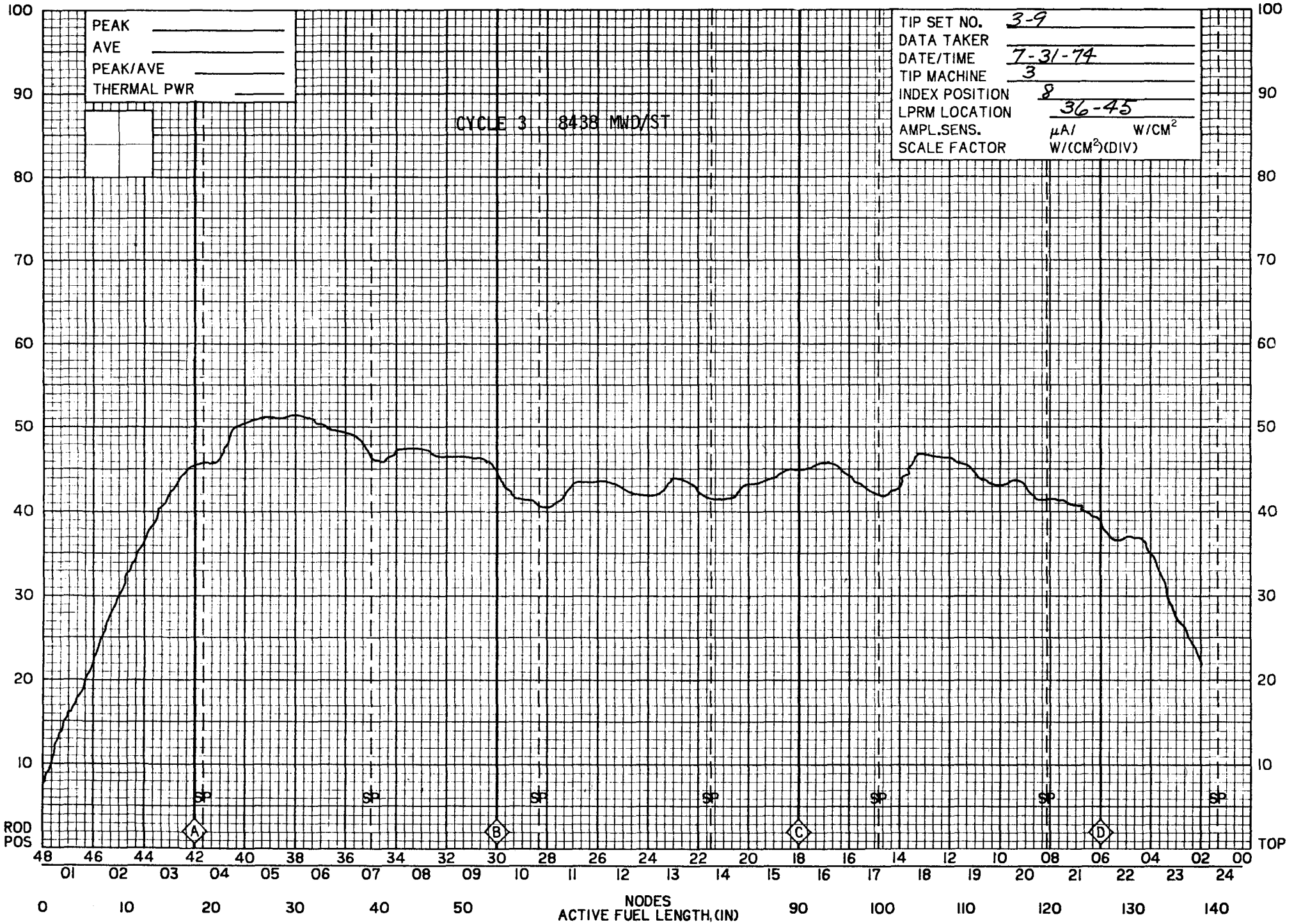
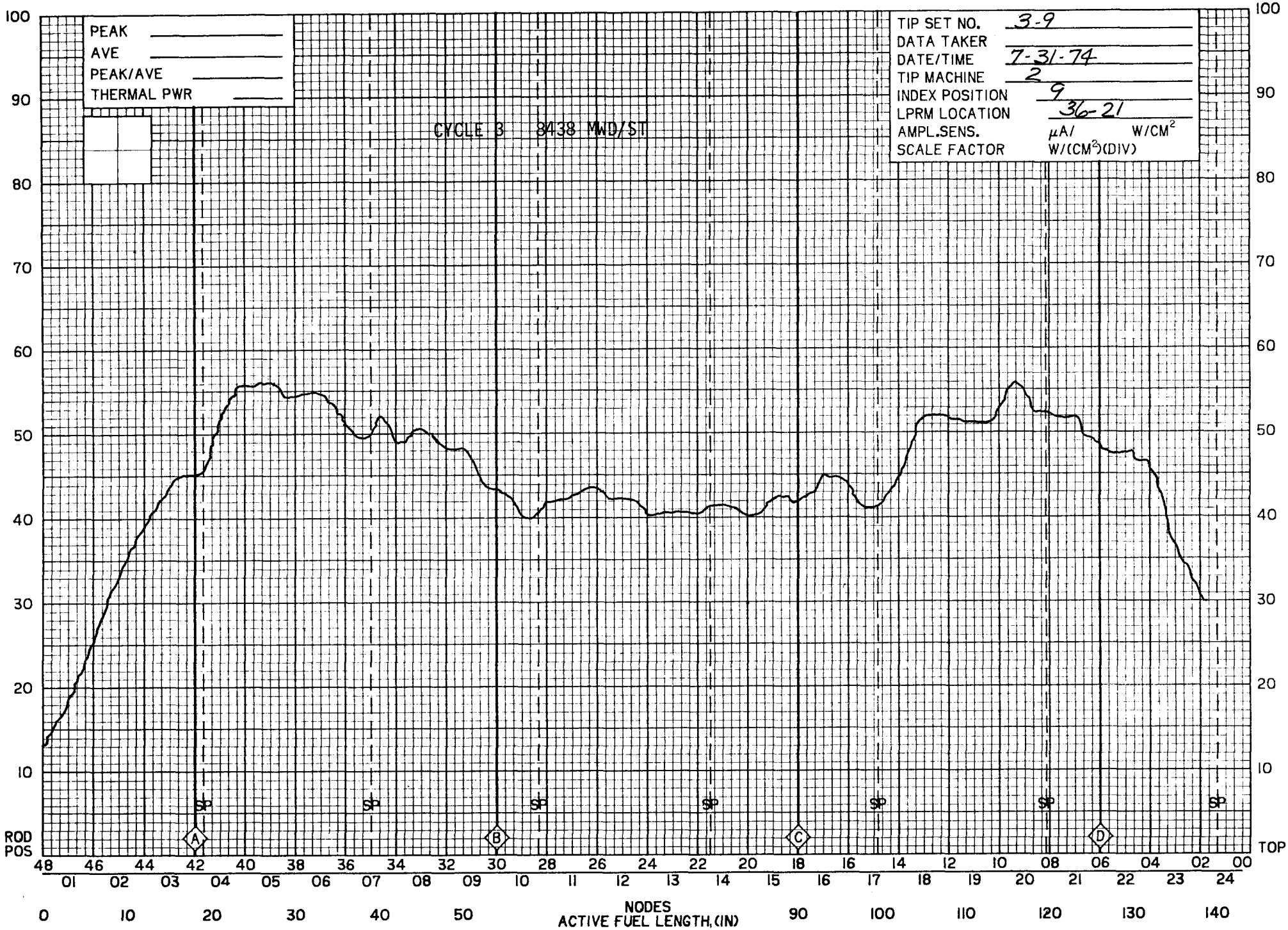
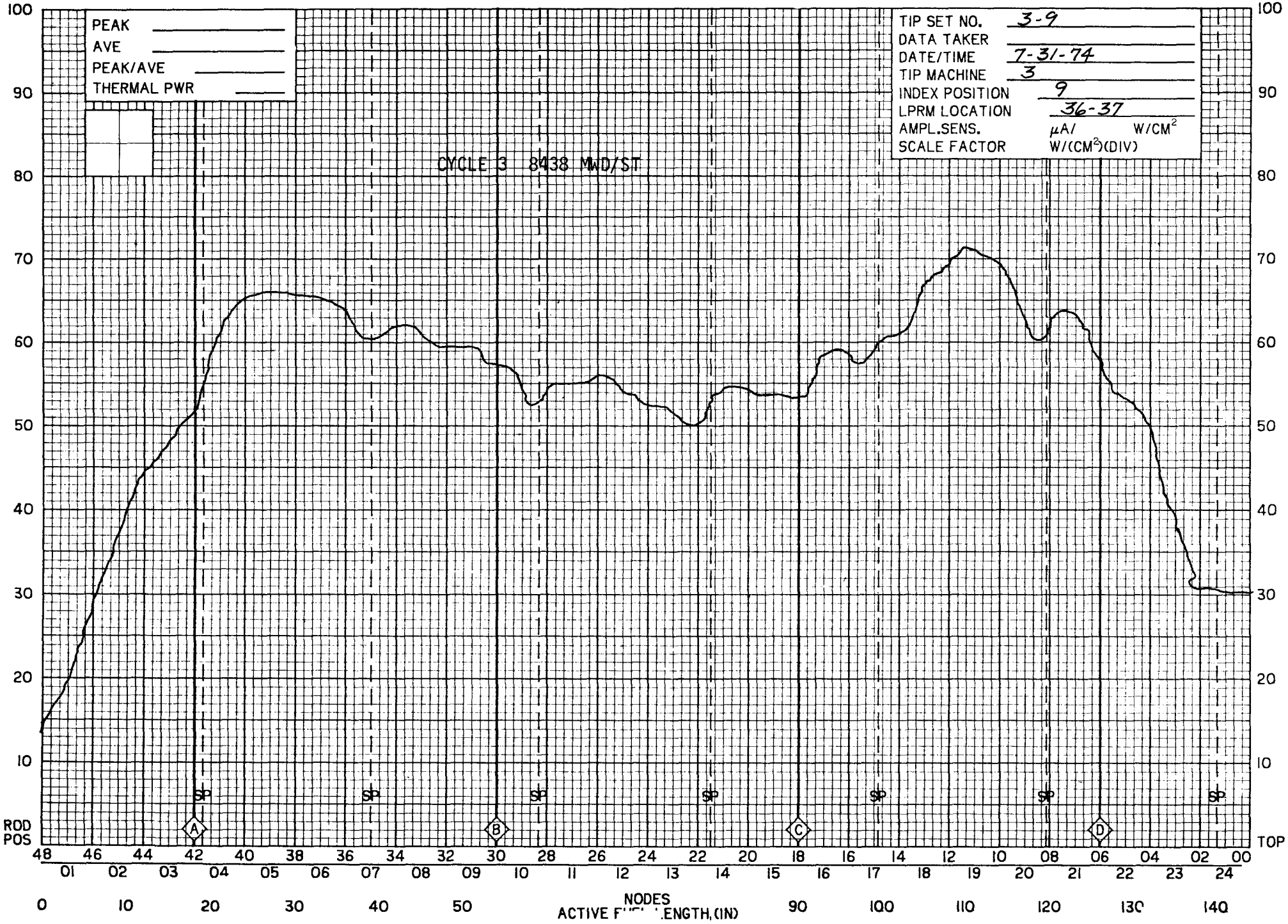
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 7
LPRM LOCATION 28-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 1
INDEX POSITION 8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 8
LPRM LOCATION 36-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 3 8438 MWD/ST
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 2
INDEX POSITION 9
LPRM LOCATION 36-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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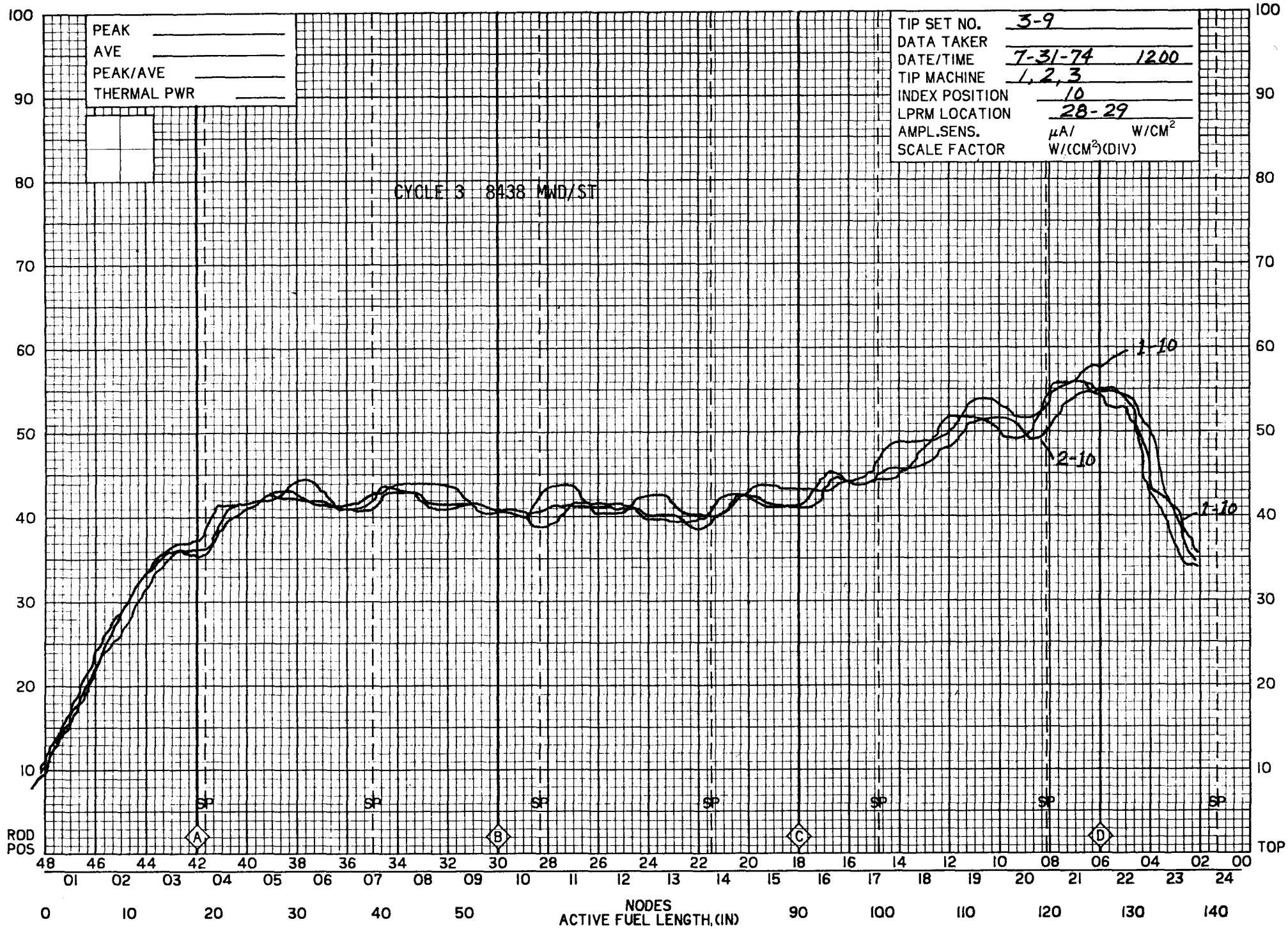
AVE
PEAK/AVE
THERMAL PWR
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74
TIP MACHINE 3
INDEX POSITION 9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
CYCLE 3 8438 MWD/ST
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
TIP SET NO. 3-9
DATA TAKER
DATE/TIME 7-31-74 1200
TIP MACHINE 1, 2, 3
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
CYCLE 3 8438 MWD/ST
1-10
2-10
1-10
SP
A
B
C
D
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)

REACTOR: Monticello

CYCLE: 3

Exposure: 8438 MWD/STU

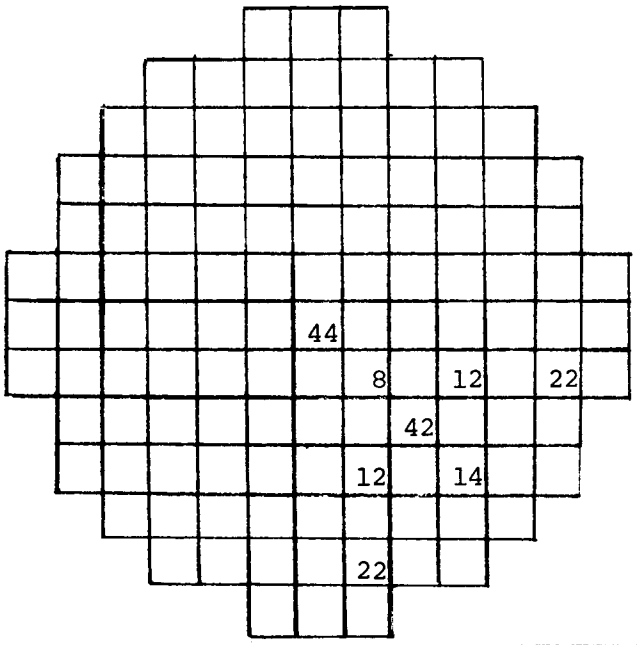
TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 3 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



1/4 core symmetry

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello
CYCLE: 3
Exposure 8438 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 2 of 12
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	493.	Idem	none
11. Outlet temperature to clean-up system (oF)	429.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available			See attached set of TIP traces
14. Xenon history-past 48 hours Time (hrs)/Core power (%)			See attached power histogram
15. Control rod positions (by location)	See Sheet #3		

Verified By: [illegible] Date: 07/20/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 07/29/74 0849 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
485.34	1424.08	49.67	38.86	49.12	16.04	2.00	0.1085	1014.70

RWL	DPM	WFW	HFW	HD	DHO	CXE
36.24	11.54	5.66	338.46	515.39	22.48	0.1166

RAP	85.553	84.990	86.053	84.928	84.896	86.271
AGAF	0.997	1.003	0.991	1.004	1.004	0.988

IB 1

RAPL	-200.65	5.02	20.07	35.11	50.16	65.21
	80.26	90.20	100.33	110.36	125.41	200.65

QFW	QCR	QCU	QRAD	QPUMP	TFW
1414.203	9.576	1.806	0.600	2.090	364.301

HF	HFG	HG	HS	WCR	HCR
544.66	646.63	1191.28	1190.64	0.0292	70.69

WCU	HCU1	HCU2	ID	REFCTP	RATCTP
0.0820	481.74	406.59	522.94	1670.00	1670.00

PPW	1.1465	1.1008

CAP	0.00997	0.01003	0.00991	0.01004	0.01004	0.00988
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.60
WTC	17.80	23.00	31.70	40.30	49.00	57.60

MONTICELLO NUCLEAR GENERATING PLANT
Manual Heat Balance Form

H.B. No. 3-32 DATE: 7/29/74 TIME: 900

BY: JH

INPUT DATA

ITEM	QUANTITY	INSTRUMENT	COMP Pt.	VALUE	UNITS
1*	Gross Gen. Output	C08,w/gen	G101	483.9	MWE
2*	Aux. Plant Load	------	G170	25.0	MWE
3*	A Feedwater Flow	C05,FLR 6/96	F533	2.853	Mlb/hr
4*	B Feedwater Flow	C05,FLR 6/96	F534	2.817	Mlb/hr
5*	A Feedwater Temp.	C06,TR 1148A	R100	365.48	°F
6*	B Feedwater Temp.	C06, TR 1148B	R102	366.51	°F
7*	Total Core Flow	C04,2.3.92A/B	R261	49.6	Mlb/hr
8*	Reactor Pressure	C05,PR 6/98	R223	1001	psig
9*	CR Drive Temp	-------	F127	118	°F
10	Cleanup Inlet Temp.	C04, Pos.1	R236	493	°F
11	Cleanup Outlet Temp.	C04, Pos.4	R237	429	°F
12	Cleanup Flow	C04, 12-141 A&B	R228,R229	164	GPM
13	A Recirc Pump PWR	C04,2-184-24A	R233	1.14	MWE
14	B Recirc Pump PWR	C04,2-184-24B	R234	1.10	MWE
15	Rod Drive Flow	C05,FR-2-3-95	R227(Klb/hr)	.56	GPM

*Available From SL5

APRM READINGS

No.	%POWER	Comp Pt.
1	85.77	R212
2	86.37	R214
3	85.24	R216
4	85.24	R213
5	85.21	R215
6	86.62	R217

PHYSICAL PROPERTIES

ITEM		VALUE (BTU/lb)
16	Steam Enthalpy	
17	A FW Enthalpy	
18	B FW Enthalpy	
19	Cleanup Inlet Enth.	
20	Cleanup Outlet Enth.	
21	Rod Drive Enth.	

EVALUATION: COMPUTER ( ) or MANUAL ( )

ITEM	QUANTITY	EQUATION	VALUE	
22	Total Steam Flow	(3) + (4) + (15) x 4.95E-4	5.70	MLB/HR
23	Core Thermal Power		48526	MBTU/HR
24	Core Thermal Power	(23)/3.413	1422.3	MWT
25	% Rated Power	(24)/16.70	85.17	%
26	Heat Rate	(23) x 10^3/ ((1) - (2))	10.57	KBTU/KW-HR
27	Net Plant Efficiency	((1) - (2)) x 100/(24)	32.26	%

Note: Attach Computer Edit(s) To This Form If Applicable

COMMENTS:

REACTOR: Monticello

CYCLE: 3

Exposure 8438 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 1 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1424.08	HB #3-32 7/29/74	See attached HB #3-32 and OD-3 dated 7/29/74
2. System pressure (psig)	1000.	Idem	Calculated core pressure = 1029.9 psia
3. Recirculation flow (lbs/hr)	49.67×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	5.67×10^6	Idem	none
6. Feedwater flow temperature (oF)	366.	Idem	none
7. Time at associated power level (hr)	>24.	Idem	none
8. Inlet subcooling (BTU/lb)	24.76	Idem	22.48 from OD-3 corrected for core pressure
9. Cleanup system flow (gal/min)	164.	Idem	none

Verified By: [illegible] Date: 07/20/76

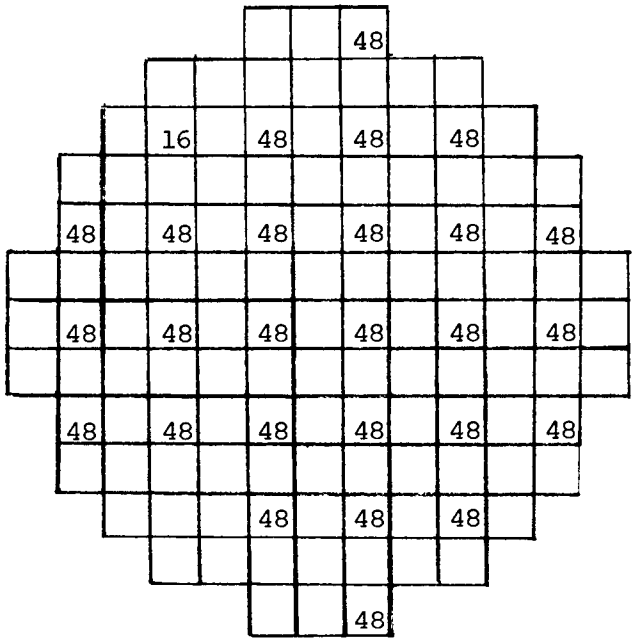
REACTOR: Monticello
CYCLE: 3
Exposure: 7619 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART B- BWR COLD CRITICAL DATA

Sheet 2 of 2
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data			
1. Moderator temperature (oF)	168.	NSP	none
2. Xenon condition	No Xenon	NSP	none
3. Control rod positions (by location)		NSP	none



Rod position in notches

- 48 indicates a rod completely withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E Torok Date: 07/20/76

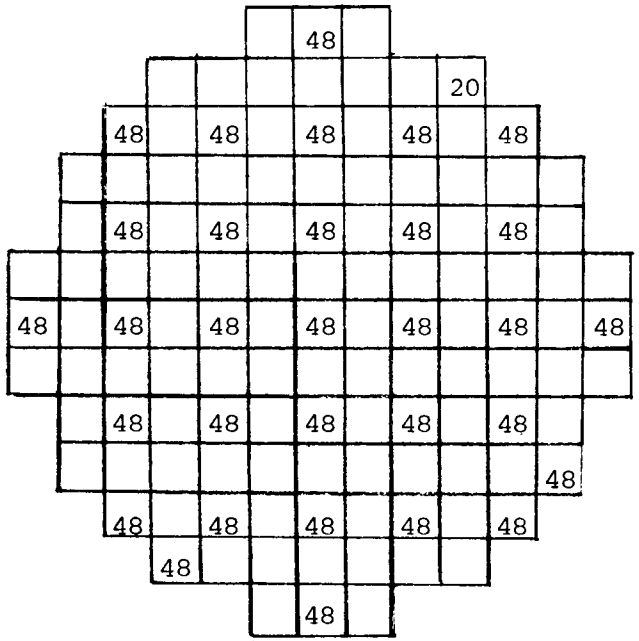
REACTOR: Monticello
CYCLE: 3
Exposure: 7619 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART B- BWR COLD CRITICAL DATA

Sheet 1 of 2
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data			
1. Moderator temperature (oF)	168.	NSP	none
2. Xenon condition	No Xenon	NSP	none
3. Control rod positions (by location)		NSP	none



Rod position in notches

- 48 indicates a rod completely withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E Teal Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 10250 MWD/STU to 10425 MWD/STU

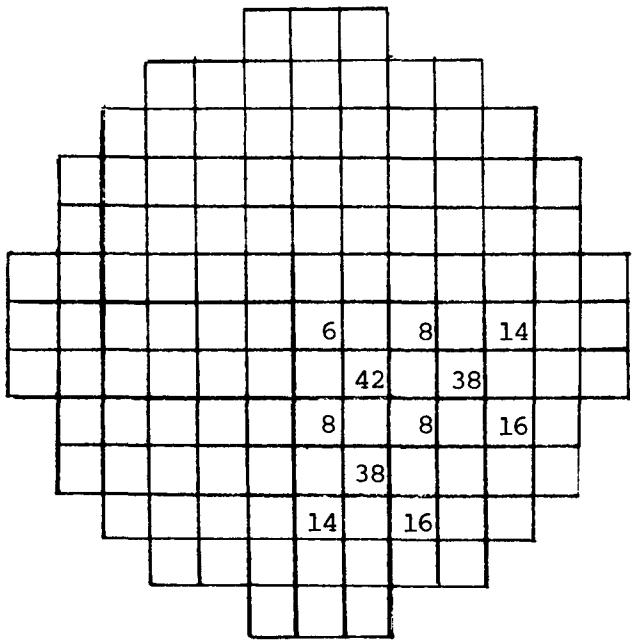
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 12 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1274.33	HB #3-97 12/27/74	HB #3-97 is at 10275 MWD/STU
2. Core total flow (lbs/hr)	50.80×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.18	Idem	19.81 from HB #3-97 corrected for core pressure
4. System pressure (psig)	982.	Idem	Calculated core pressure = 1012.3 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Teol Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 10050 MWD/STU to 10250 MWD/STU

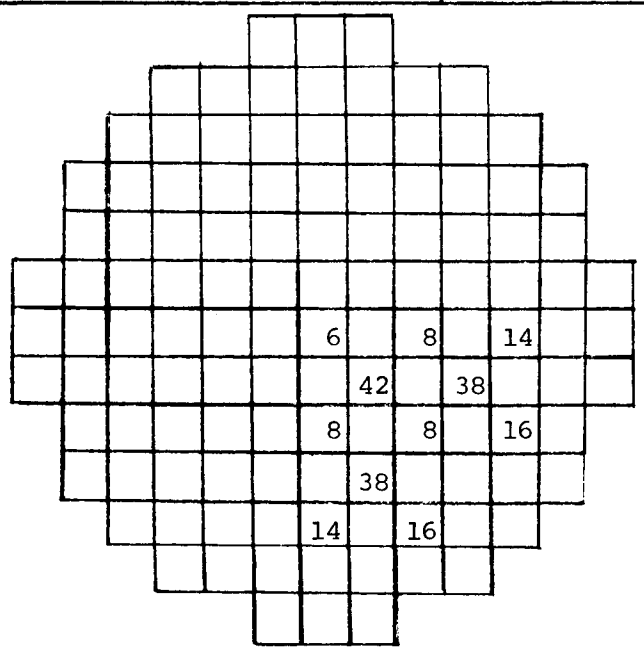
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 11 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1276.77	Heat Balance dated 12/16/74	Heat Balance is at 10138 MWD/STU
2. Core total flow (lbs/hr)	48.48×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.16	Idem	20.91 from HB dated 2/16/74 corrected for core pressure
4. System pressure (psig)	982.	Idem	Calculated core pressure = 1011.5 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Jerel Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 9788 MWD/STU to 10050 MWD/STU

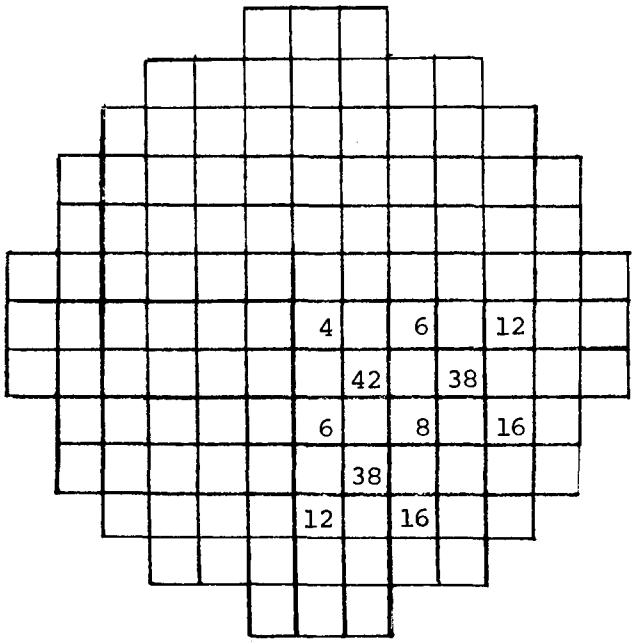
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 10 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1400.58	HB #3-85 11/29/74	HB #3-85 is at 9921 MWD/STU
2. Core total flow (lbs/hr)	57.35×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	21.40	Idem	18.70 from HB #3-85 corrected for core pressure
4. System pressure (psig)	984.	Idem	Calculated core pressure = 1016.6 psia



5. Control rod positions (by location)
   1/4 core symmetry

Verified By: E Tesl Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 9500 MWD/STU to 9788 MWD/STU

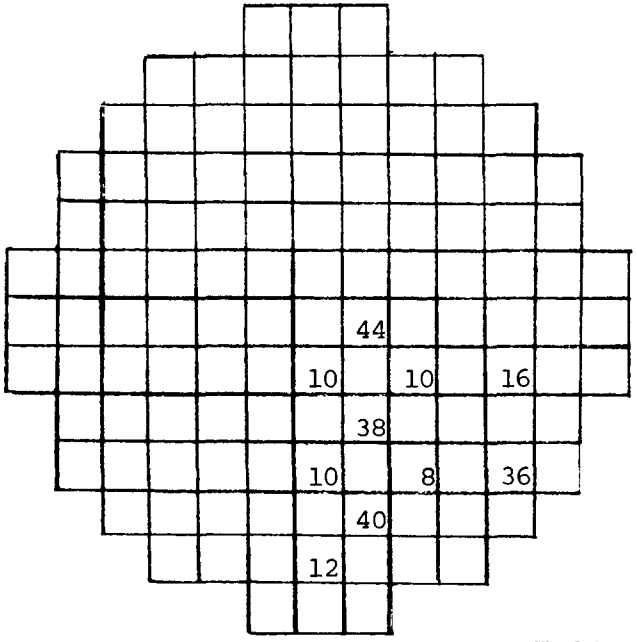
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 9 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1397.56	HB #3-71 10/28/74	HB #3-71 is at 9639 MWD/STU
2. Core total flow (lbs/hr)	50.37×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.12	Idem	21.81 from HB #3-71 corrected for core pressure
4. System pressure (psig)	999.	Idem	Calculated core pressure = 1029.1 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Jerab Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 9251 MWD/STU to 9500 MWD/STU

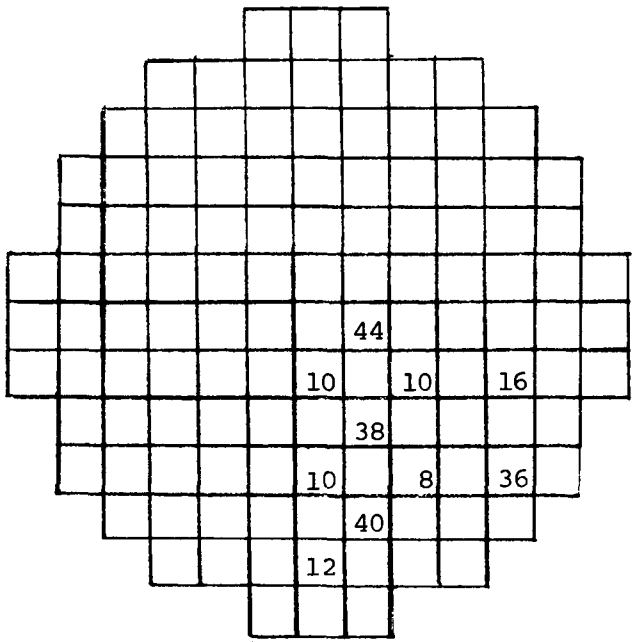
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 8 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1414.16	HB #3-64 10/11/74	HB #3-64 is at 9405 MWD/STU
2. Core total flow (lbs/hr)	50.37×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.28	Idem	21.97 from HB #3-64 corrected for core pressure
4. System pressure (psig)	996.	Idem	Calculated core pressure = 1026.1 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tonk Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 9050 MWD/STU to 9251 MWD/STU

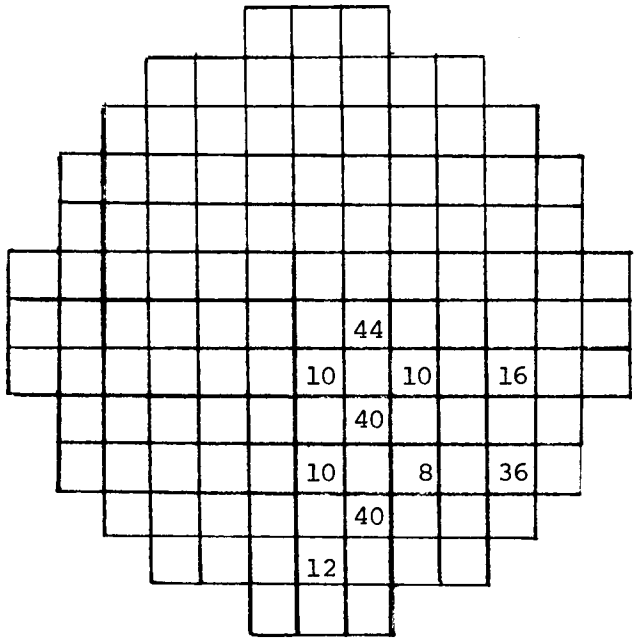
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 7 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1473.52	HB #3-56 9/23/74	HB #3-56 is at 9153 MWD/STU
2. Core total flow (lbs/hr)	51.25×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.79	Idem	22.43 from HB #3-56 corrected for core pressure
4. System pressure (psig)	1001.	Idem	Calculated core pressure = 1031.4 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 8847 MWD/STU 9050 MWD/STU

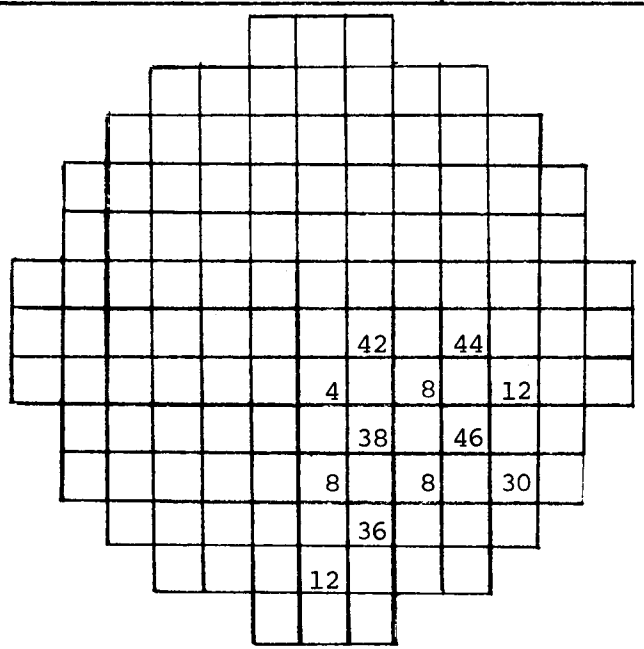
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 6 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1374.98	HB #3-49 9/9/74	HB #3-49 is at 8961 MWD/STU
2. Core total flow (lbs/hr)	55.22×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.02	Idem	19.45 from HB #3-49 corrected for core pressure
4. System pressure (psig)	998.	Idem	Calculated core pressure = 1029.8 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Teal Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 8650 MWD/STU to 8847 MWD/STU

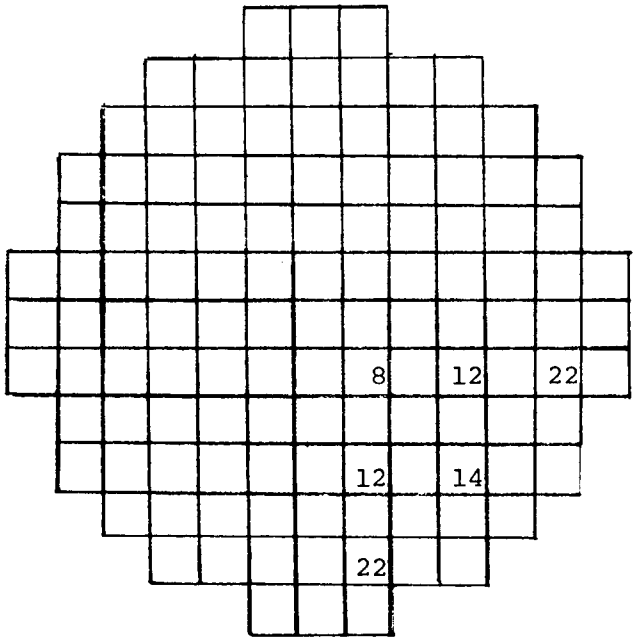
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 5 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1434.48	HB #3-42 8/21/74	HB #3-42 is at 8723 MWD/STU
2. Core total flow (lbs/hr)	50.15×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.67	Idem	22.37 from HB #3-42 corrected for core pressure
4. System pressure (psig)	1001.	Idem	Calculated core pressure = 1031.0 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Jerd Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 8438 MWD/STU to 8650 MWD/STU

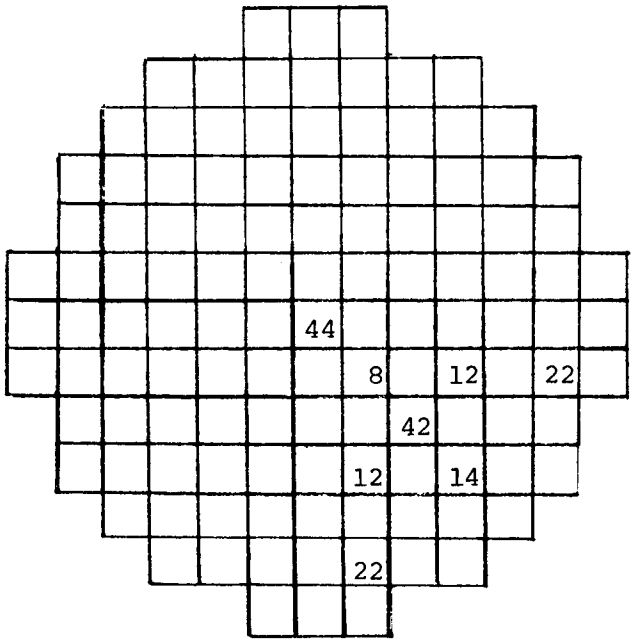
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 4 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1395.25	HB #3-37 8/9/74	HB #3-37 is at 8561 MWD/STU
2. Core total flow (lbs/hr)	48.27×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.99	Idem	22.78 from HB #3-37 for core pressure
4. System pressure (psig)	999.	Idem	Calculated core pressure = 1028.4 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Terry Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 8135 MWD/STU to 8438 MWD/STU

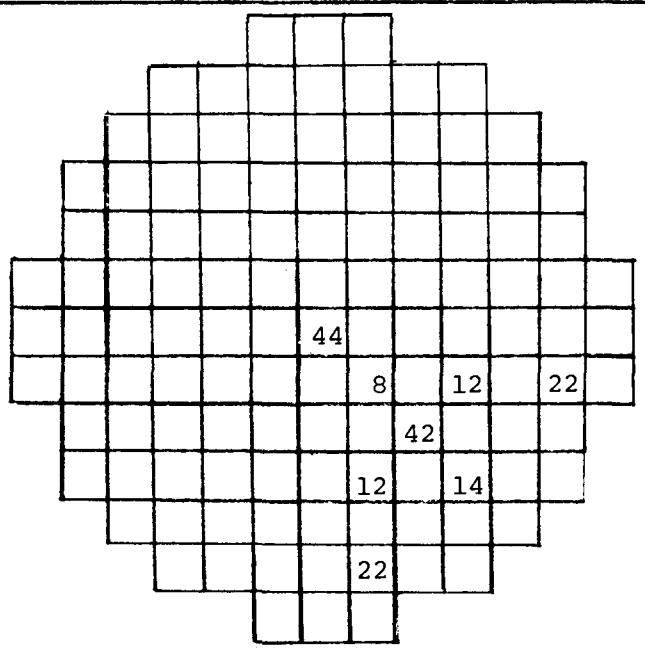
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 3 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1401.41	HB #3-29 7/22/74	HB #3-29 is at 8312 MWD/STU
2. Core total flow (lbs/hr)	48.32×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.98	Idem	22.77 from HB #3-29 corrected for core pressure
4. System pressure (psig)	998.	Idem	Calculated core pressure = 1027.4 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Torb Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 7835 MWD/STU to 8135 MWD/STU

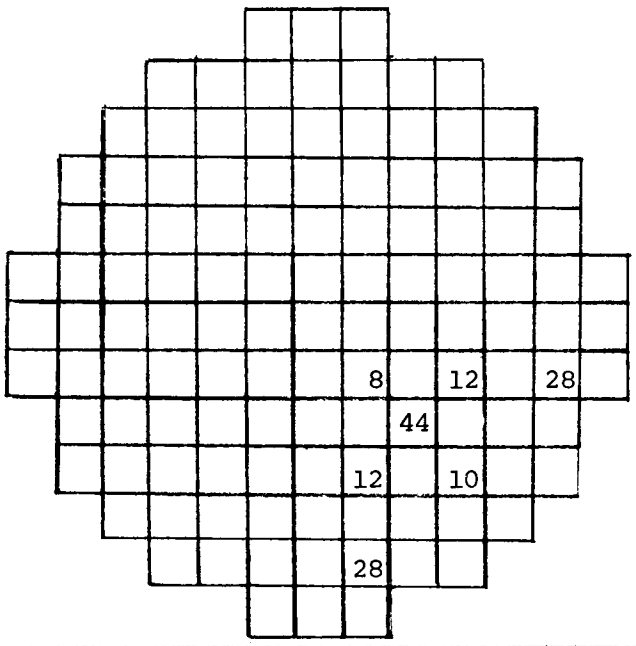
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 2 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1485.53	HB #3-16 6/24/74	HB #3-16 is at 8009 MWD/STU
2. Core total flow (lbs/hr)	54.83×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.36	Idem	20.82 from HB #3-16 corrected for core pressure
4. System pressure (psig)	999.	Idem	Calculated core pressure = 1030.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tank Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

Exposure: 7619 MWD/STU to 7835 MWD/STU

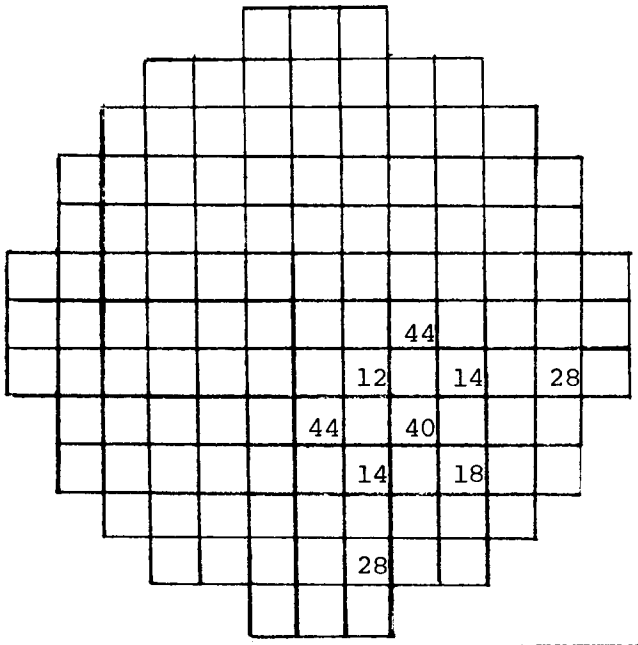
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 1 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1578.34	HB #3-8 6/3/74	HB #3-8 is at 7790 MWD/STU
2. Core total flow (lbs/hr)	47.89×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	27.44	Idem	25.25 from HB #3-8 corrected for core pressure
4. System pressure (psig)	1001.	Idem	Calculated core pressure = 1030.3 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Toul Date: 07/20/76

REACTOR: Monticello
CYCLE: 3

DATA WORK SHEET
TABLE 1.3 PART B
BWR Average Fuel Rod Loading

Sheet 4 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	4		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.45 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated values from assembly loading 183.52 kgU
2. U-238 (kg)	2.8705	Idem	
3. U-235 (kg)	0.0422	Idem	
4. U-234 (kg)	0.0003	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	2.9130	Idem	
7. UO_2 (kg)	3.3047	Idem	

Verified By: E. Terol Date: 07/30/76

REACTOR: Monticello
CYCLE: 3

DATA WORK SHEET
TABLE 1.3 PART B
BWR Average Fuel Rod Loading

Sheet 3 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	3		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.87 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated values from assembly loading 183.52 kgU
2. U-238 (kg)	2.8581	Idem	
3. U-235 ((kg)	0.0545	Idem	
4. U-234 (kg)	0.0004	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	2.9130	Idem	
7. UO_2 (kg)	3.3047	Idem	

Verified By: E Jerly Date: 07/20/76

REACTOR: Monticello
CYCLE: 3

DATA WORK SHEET
TABLE 1.3 PART B
BWR Average Fuel Rod Loading

Sheet 2 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	2		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	2.14 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated values from assembly loading 183.52 kgU
2. U-238 (kg)	2.8502	Idem	
3. U-235 (kg)	0.0623	Idem	
4. U-234 (kg)	0.0005	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	2.9130	Idem	
7. UO_2 (kg)	3.3047	Idem	

Verified By: E Ferk Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

DATA WORK SHEET

TABLE 1.3 PART B

BWR Average Fuel Rod Loading

Sheet 1 of 4

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	1		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	2.87 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated values from assembly loading 183.52 kgU
2. U-238 (kg)	2.8287	Idem	
3. U-235 (kg)	.0836	Idem	
4. U-234 (kg)	.0007	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	2.9130	Idem	
7. UO_2 (kg)	3.3047	Idem	

Verified By: E. Ford Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

DATA WORK SHEET

TABLE 1.3 PART A

BWR Average Assembly Fuel Loading

Sheet 2 of 2

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Weight of Material			
1. Gd-natural (kg)	not available	Vendor Proprietary	
2. U-238 (kg)	178.67	NAI	Calculated values from assembly loading 183.52 kgU
3. U-235 (kg)	4.81	Idem	
4. U-234 (kg)	0.04	Idem	
5. U-236 (kg)	0.00	Idem	
6. U-total (kg)	183.52	NEDC 20165 Table 1-2	
7. UO_2 (kg)	208.20	NAI	NEDC 20165 Table 1-2

Verified By: E. Tew Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

DATA WORK SHEET

TABLE 1.3 PART A

BWR Average Assembly Fuel Loading

Sheet 1 of 2

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Assembly Type	2.62	NEDS-20016 Table 3-1	reload 2 assembly average U-235 enrichment
Enrichment, w/o U-235			
type 1	2.87	Idem	none
type 2	2.14	Idem	none
type 3	1.87	Idem	none
type 4	1.45	Idem	none
type 5 Gd_2O_3 (w/o per rod)	2.87 not available	Vendor Proprietary	none

Verified By: E. Tew Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
7.0 Water (or inert) Rod Cell for each water (or inert) cell type			
7.1 Tube material	Zr-2	NSP	none
7.2 Tube density (g/cm^3)	6.56	NAI 70-52	none
7.3 Tube O.D. (in.)	.493	NSP	none
7.4 Tube I.D. (in.)	.425	NSP	none
7.5 Inert material density (gm/cc)	.7395	NAI	at 0 void, 547°F, 1020 psia
7.6 Inert material O.D. (in.)			not applicable; square geometry .64 x .64 in^2
7.7 Inert material I.D. (in.)			

Verified By: E. Tozzi Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
6.0 Instrument Rod Cell			
6.1 Instrument guide tube material	SS†	FSAR Page 3-6-3	none
6.2 Instrument guide tube density (g/cm^3)	7.91†	NAI 70-52	none
6.3 Tube O.D. (in.) LPRM TIP	0.7 0.375	NSP	none
6.4 Tube I.D. (in.) LPRM TIP	.6575 .3325	NSP	Computed using thickness of .0425 inch
6.5 Detector types	U-235 fission chamber†	NSP	none
6.6 Number of instrument guide tubes	40†	FSAR Page 3-6-3	none

† = No change from previous cycle

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REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
5.10 Fuel clad material	Zr-2†	NEDS-20016 Table 3-1	none
5.11 Clad density (g/cm^3)	6.56†	NAI 70-52	none
5.12 Clad O.D. (in.)	.493	NEDS 20016 Table 3-1	none
5.13 Clad I.D. (in.)	.425	NAI	Calculated from 5-12 and 5-14
5.14 Clad thickness (in.)	.034	NEDS 20016 Table 3-1	none
5.15 Unheated length at top of fuel rod (in.)	11.24	NEDS 20016 Table 3-1	Gas plenum length used.
5.16 Fuel rod enrichment, w/o U235 Gd_2O_3, w/o per rod	2.87,2.14,1.87,1.45	NEDS 20016 Table 3-1	none

† = No change from previous cycle

Verified By: E. [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 11 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
5.0 Fuel Rod (For each fuel rod type)			data on this page applicable to all fuel rod types listed in 4-19
5.1 Fuel pellet material	UO_2 †	NEDS 20016 Table 3-1	none
5.2 Fuel pellet density (%TD)	95. †	Idem	none
5.3 Fuel pellet length (in.)	.420	NEDS 20360 Rev 1 4/1/76	
5.4 Fuel pellet O.D. (in.)	.416	Idem	none
5.5 Fuel pellet dish factor	not available †		
5.6 Fuel pellet chamfer factor	not available †		
5.7 Fuel pellet dish O.D. (in.)	not available †		
5.8 Fuel pellet dish depth (in.)	not available †		
5.9 Fuel stack density (%TD)	94.1	NAI	Computed from reload 2 assembly loading

† = No change from previous cycle

Verified By: E. Tomb Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.19 Fuel enrichments (w/o U-235)			
type 1 no Gd	2.87	NEDS 20016 Table 3-1	none
type 2 no Gd	2.14	Idem	none
type 3 no Gd	1.87	NEDS 20016 Table 3-1	none
type 4 no Gd	1.45	Idem	none
type 5 with Gd Gd_2O_3 , w/o per rod	2.87 not available	Vendor Proprietary	none

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 9 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.10 Spacer grid thickness (in.)	not available	vendor proprietary	
4.11 Spacer grid width (in.)	not available	vendor proprietary	
4.12 Can (or channel)material	Zr-4†	NEDS 20016 Table 3-1	none
4.13 Can (or channel) density (g/cm^3)	6.56†	NAI 70-52	none
4.14 Can thickness (in.)	.080†	NEDS 20016 Table 3-1	none
4.15 Can outside dimensions (in.)	5.438†	NEDS 20016 Table 3-1	none
4.16 Can corner radius O.D. (in.)	not available†		
4.17 Active fuel length (in.)	144.0†	NEDS 20016 Table 3-1	none
4.18 Burnable poison positions per assembly	4	Idem	none

† = No change from previous cycle

Verified By: E. Tenly Date: 07/20/76

Diagram 1.2-9

Fuel Assembly - Cycle 3

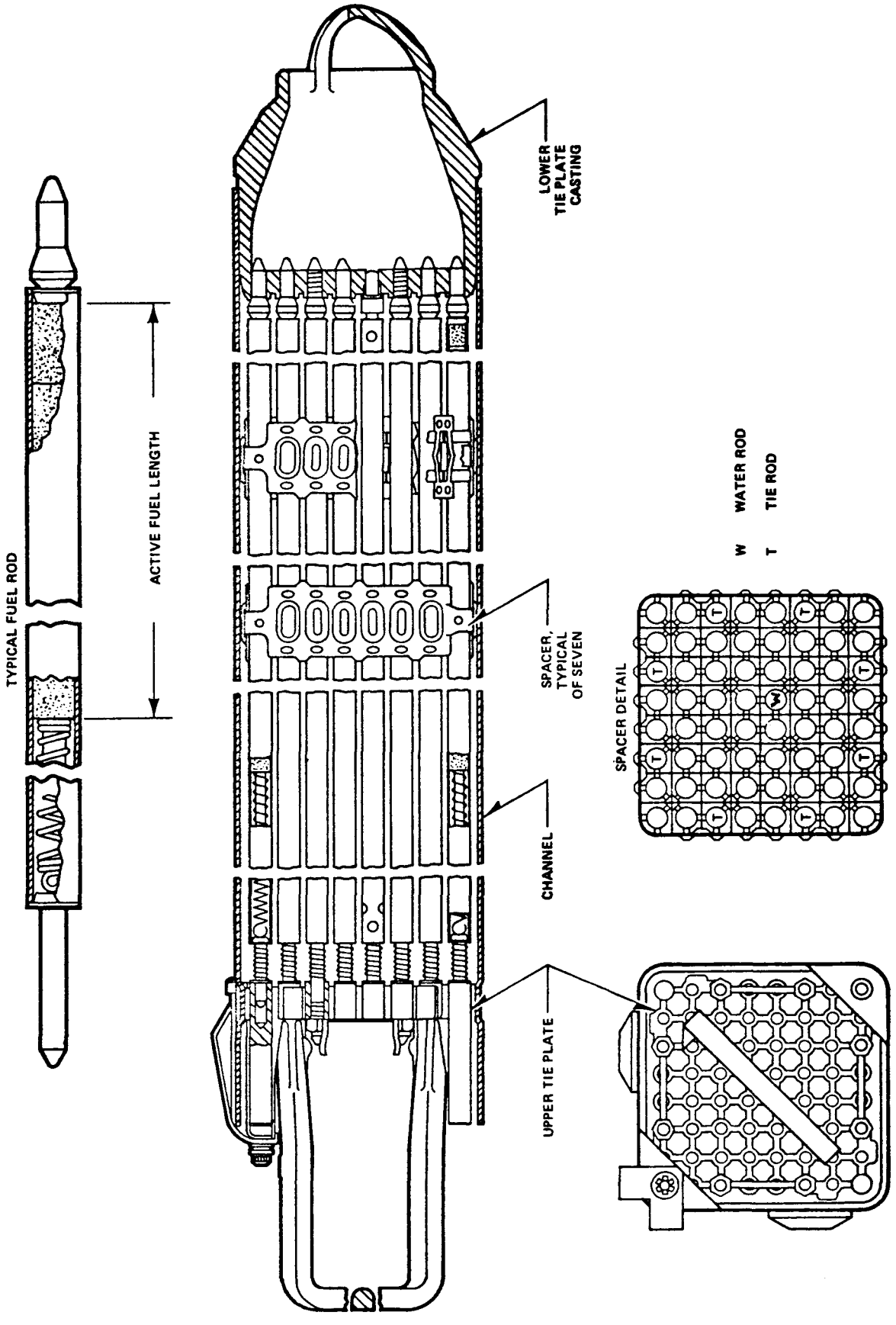


Diagram 1.2-8

Assembly Layout Plan View - Cycle 3

2.62 wt% U-235 BUNDLE AVERAGE

WIDE-WIDE CORNER

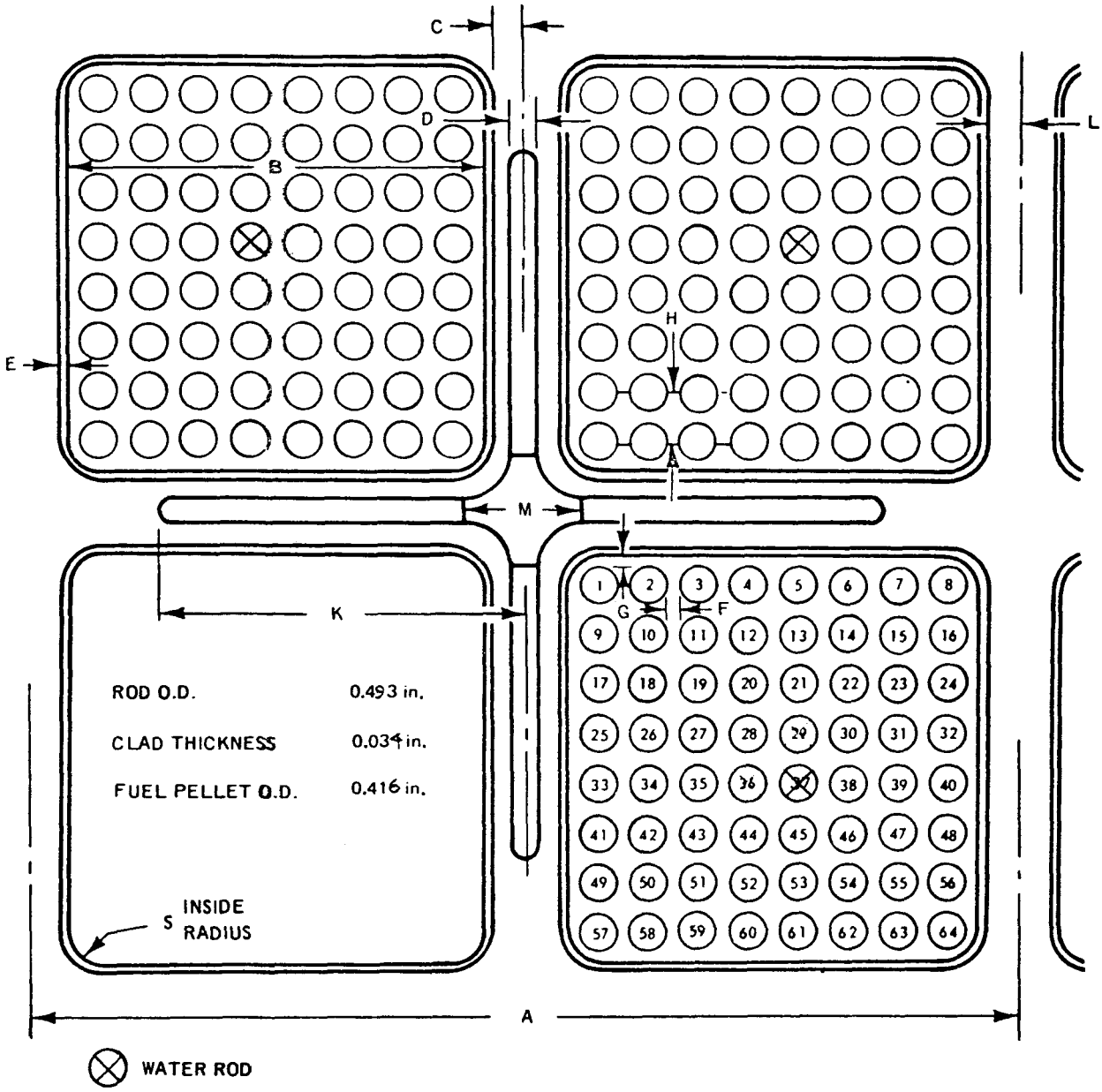
4	3	T 2	2	2	T 2	2	3
3	2	1	1	1	1	1	2
T 2	1	G 5	1	1	1	G 5	T 1
2	1	1	1	1	1	1	1
2	1	1	1	WS	1	1	1
T 2	1	1	1	1	1	1	T 1
2	1	G 5	1	1	1	G 5	1
3	2	T 1	1	1	T 1	1	2

ROD TYPE	ENRICHMENT wt % U-235	Gd_2O_3 wt %	NUMBER OF RODS
1	2.87	0	40
2	2.14	0	14
3	1.87	0	4
4	1.45	0	1
5	2.87	vendor proprietary	4
WS	–	0	1

WS – SPACER CAPTURE WATER ROD
T – TIE RODS
G – GADOLINIUM RODS

Diagram 1.2-7

Typical Core Lattice Unit - Cycle 3



DIM. IDENTIFICATION	A	B	C	D	E	F	G	H	I	J
DIM. INCHES	12.0	5.278	0.375	0.312	0.080	0.147	0.1525	0.640		

DIM. IDENTIFICATION	K	L	M	N	O	P	Q	R	S	
DIM. INCHES	4.875									

REACTOR: Monticello
CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.0 Fuel Assembly (For each assembly type)			only one new fuel assembly type introduced in Cycle 3
4.1 Assembly layout - plan view elevation view		NDEC 20165 Fig 1-3 FSAR Figure 3-41	diagram #1.2-8 attached diagram #1.2-9 attached
4.2 Assembly pitch (in.)	6.†	NSP	diagram #1.2-7 attached
4.3 Assembly geometry	8x8	NEDS 20016 Table 3-1	none
4.4 Fuel rod pitch (in.)	.640	Idem	none
4.5 Fuel rods per assembly	63.	Idem	none
4.6 Water holes (inert pins) per assembly	1	Idem	none
4.7 Spacer grids per assembly	7†	operation manual Page 3-1-1	none
4.8 Spacer grid material	Inc .718 † Zr-4	NSP	none
4.9 Spacer mass per grid (g)	Inc-718:47 † Zr-4:244	NSP	assume same as in Cycle 1

† = No change from previous cycle

Verified By: [signature] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 7 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.16 Absorber composition	B_4C granules †	FSAR Table 3-1-1	none
3.17 Control rod pitch (in.)	12.0†	FSAR Table 3-1-1	none
3.18 Number of control material tubes/rod	84†	Idem	none
3.19 Control rod guide tube material	SS†	FSAR Page 3-6-2	none
3.20 Control rod guide tube thickness (in.)	.165†	FSAR Page 3-6-2	.165 nominal .134 minimum

† = No change from previous cycle

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.8 Absorber clad material	SS†	FSAR Table 3-1-1	none
3.9 Absorber clad density (g/cm^3)	7.91†	NAI 70-52	none
3.10 Absorber clad O.D. (in.)	0.188†	FSAR Table 3-1-1	none
3.11 Absorber clad thickness (in.)	.025†	FSAR Table 3-1-1	none
3.12 Absorber material	Boron†	Idem	none
3.13 Absorber density (%TD)	70.†	FSAR Page 3-5-1	none
3.14 Absorber length (in.)	143.†	FSAR Table 3-1-1	none
3.15 Absorber O.D. (in.)	.138†	NAI	Calculated assuming no gap between poison and clad

† = No change from previous cycle

Verified By: E. Jones Date: 07/20/76

REACTOR: Monticello
CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 5 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.0 Control Rod - Cruciform Type			
3.1 Control blade width - tip to tip- (in.)	9.75†	FSAR Table 3-1-1	none
3.2 Blade thickness (in.)	.312 †	FSAR Figure 3-4-2	none
3.3 Blade hub radius (in.)	not available		
3.4 Blade tip radius (in.)	not available		
3.5 Blade sheath material	SS †	FSAR Table 3-1-1	none
3.6 Blade sheath density (g/cm^3)	7.91 †	NAI 70-52	none
3.7 Blade sheath thickness (in.)	.062 †	NAI	Calculated assuming no gap between sheath and rod

† = No change from previous cycle

Verified By: E Tew Date: 07/20/76

REACTOR: Monticello
CYCLE: 3

TABLE 1.2
DATA WORK SHEET
BWR Core and Component Description

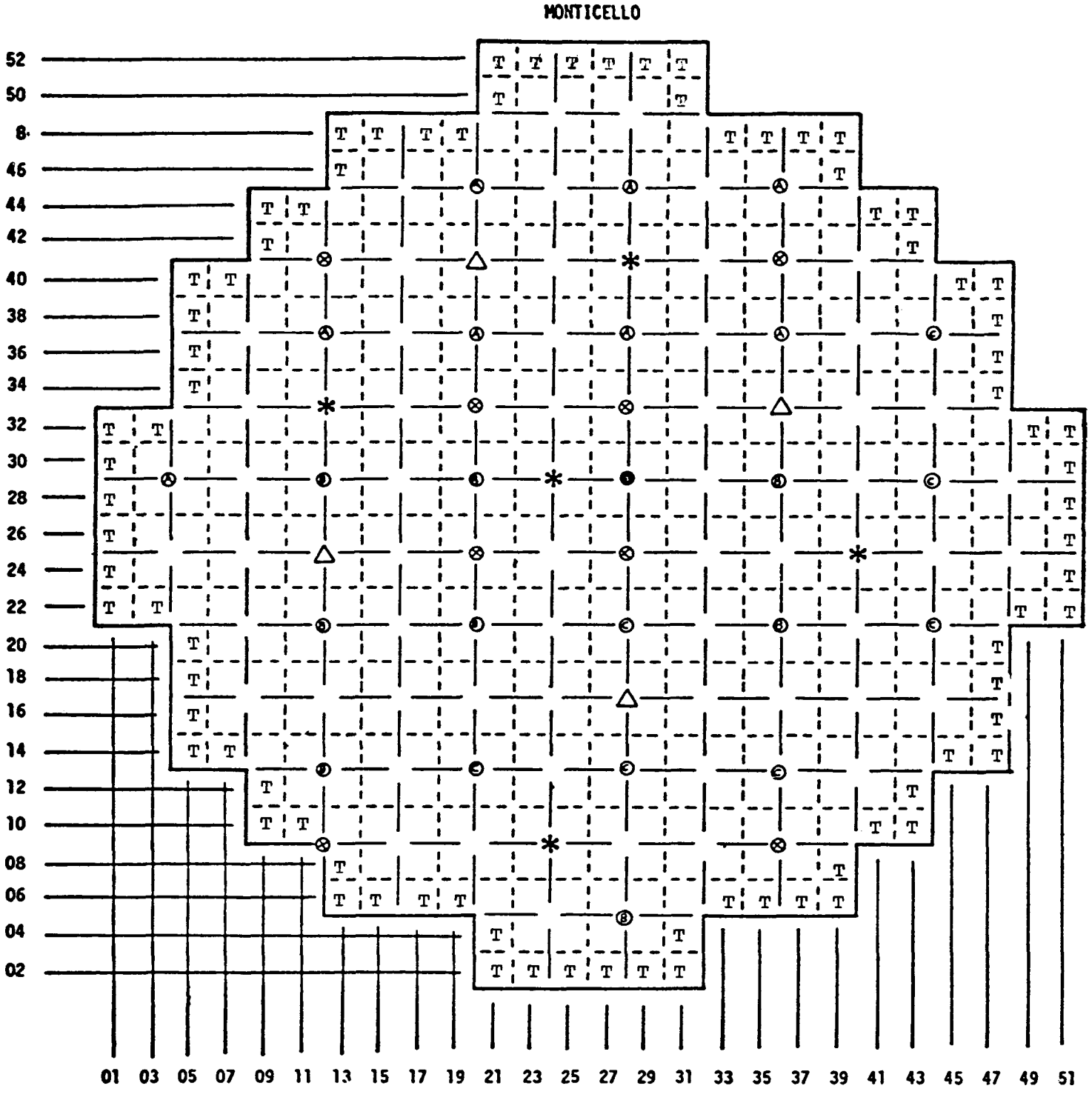
Sheet 4 of 14
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
2.0 Control Curtains			all curtains removed
2.1 Curtain material			
2.2 Curtain material density (g/cm^3)			
2.3 Initial poison concentration (ppm)			
2.4 Curtain thickness (in.)			
2.5 Curtain width (in.)			
2.6 Curtain length (in.)			
2.7 Curtain structural material			
2.8 Stainless steel stiff backing dimension (in.)			

Verified By: E. Tech Date: 07/20/76

Diagram 1.2-4

Inlet Orifice Locations



T = tightly orificed, remainder are loosely orificed.

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 3 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.16 Inlet orifice locations		G.E. 117C 2010	diagram #1.2-4 attached
1.17 Core layout - plan view		MFG 104R919 (GE) NX-7831-197 (NSP)	See diagram # 1.2-5 for Cycle 1
1.18 Core layout - elevation view		operation manual B.1.1 Figure 1a	See diagram # 1.2-6 for Cycle 1

Verified By: E. Tool Date: 07/20/76

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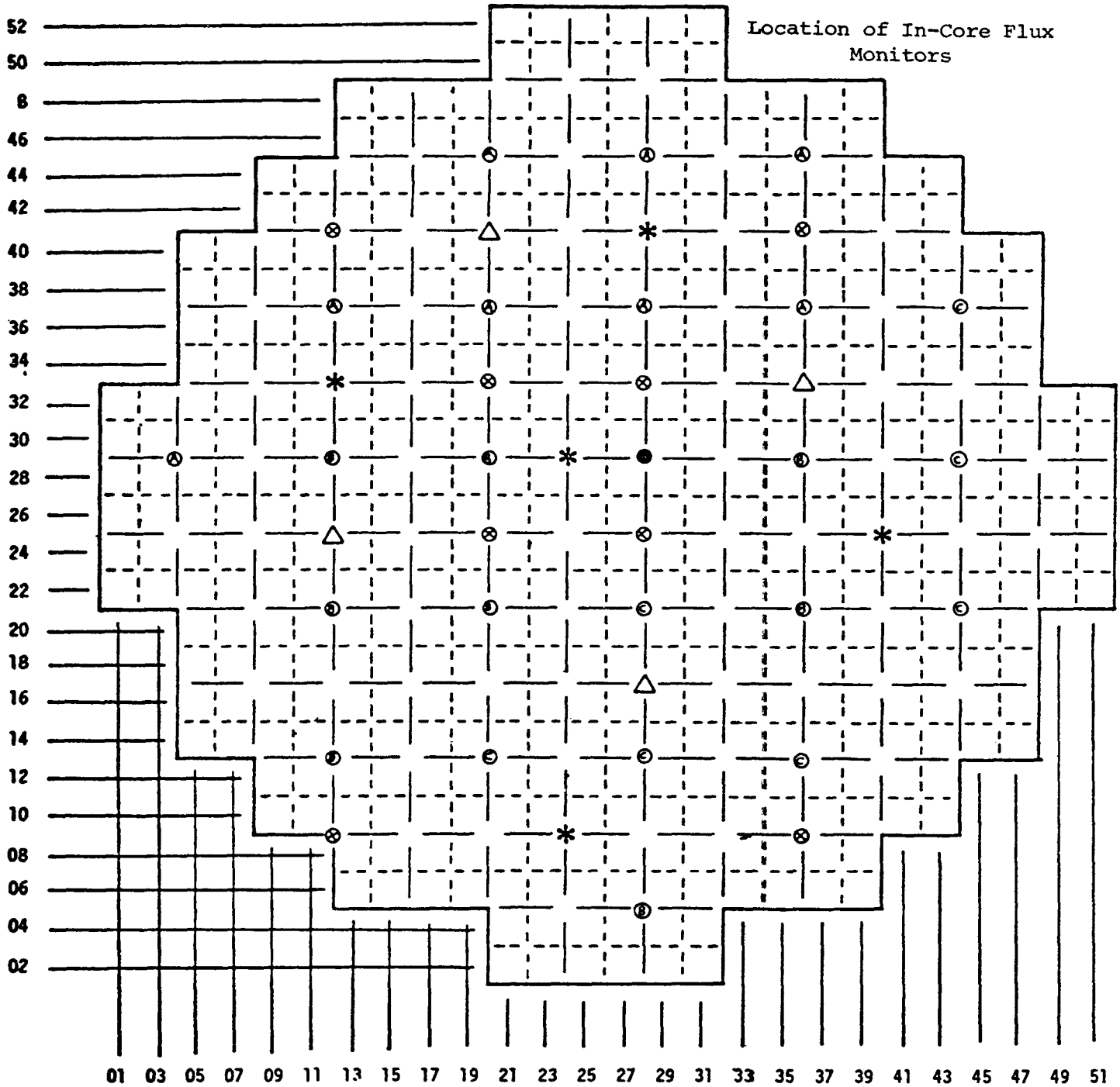
Diagram 1.2-3

Location of In-Core Flux Monitors



- LPRM Location (Letter indicates TIP machine)
- LPRM Location (Common location for all TIP machines)
- IRM Locations
- SRM Locations
- Source Locations

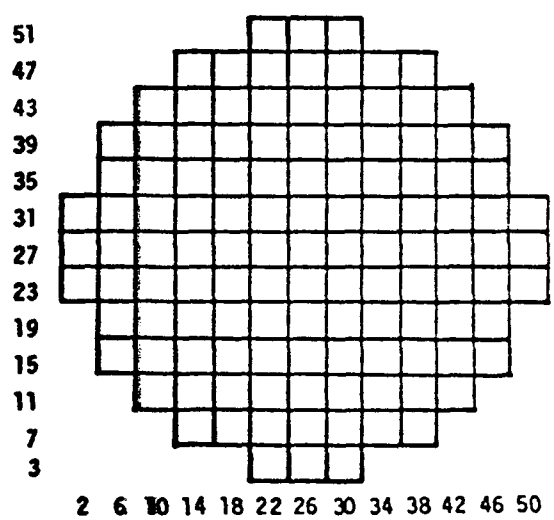
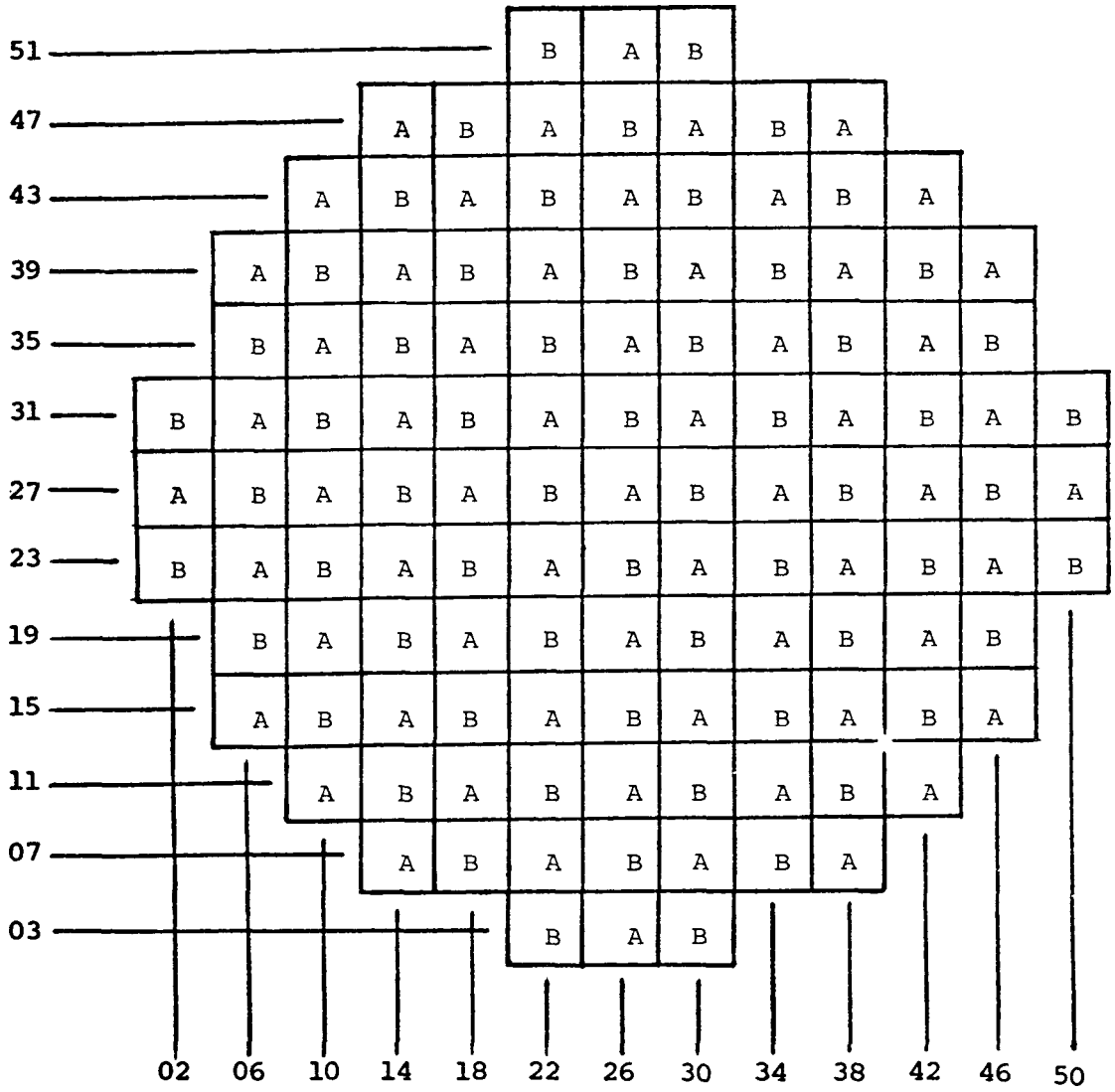


Diagram 1.2-2

Rod Location and Sequence



REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 2 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.8 Location of control rods and control group identification		RWNE July 1971 N18.01.01	diagram #1.2-2 attached
1.9 Number of burnable control curtains	0	NEDC 20165 Figure 5-2	none
1.10 Location of control curtains		Idem	
1.11 Total number of incore flux monitors	96 †	FSAR Table 1-6-1	none
1.12 Location of incore flux monitors		operation manual B.1.1 Figure 30	diagram #1.2-3 attached
1.13 Core shroud material-composition	SS †	FSAR Page 3-6•1	none
1.14 Core shroud thickness (in.)	1 3/4" †	operation manual B.1.1 Page 42	none
1.15 Height of downcomer above core (ft)	13 to 13.83†	operation manual B.1.1 Figure 1a	none

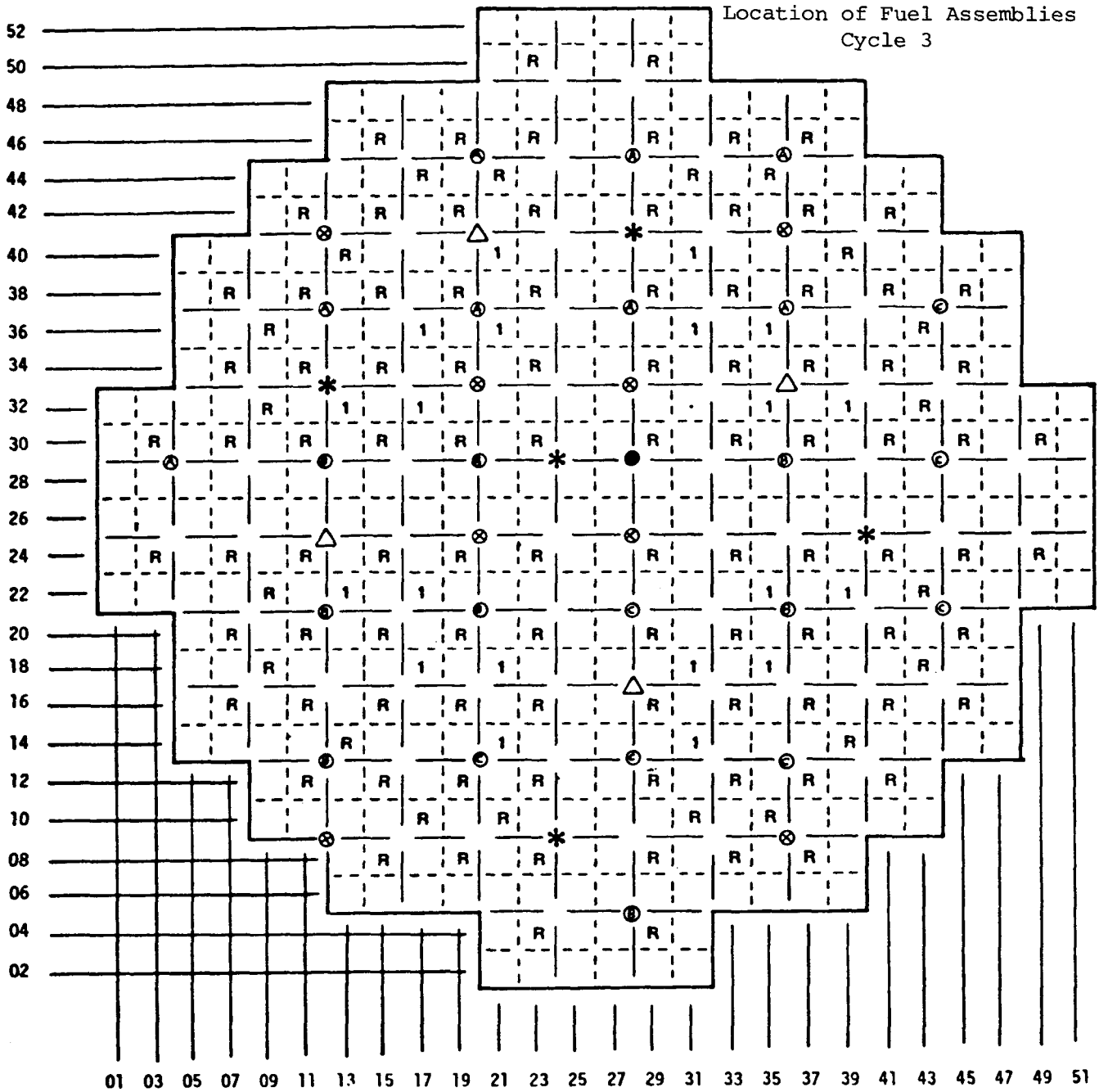
† = No change from previous cycle

Verified By: E. Tow Date: 07/20/76

MONTICELLO

Diagram 1.2-1

Location of Fuel Assemblies
Cycle 3



LPRM Location (Letter indicates TIP machine)

LPRM Location (Common location for all TIP machines)

IRM Locations

SRM Locations

Source Locations

R Reload 2 Fuel

1 Reload 1 Fuel

REACTOR: Monticello

CYCLE: 3

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 1 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.0 Core			
1.1 Total number of fuel assemblies	484†	FSAR Table 3-1-1	none
1.2 Number of fuel assembly types*	3	NEDC 20165 Table 1-1	none
1.3 Number of fuel assemblies of each type	348 20 116	NEDC 20165 Table 1-1	none
1.4 Location of individual fuel assemblies		NEDC 20165 Figure 5-2	diagram #1.2-1 attached
1.5 Total number of control rods	121†	FSAR Table 3-1-1	none
1.6 Number of control rod types	1†	FSAR Page 3-5-1	none
1.7 Number of control rods of each type	121†	FSAR Table 3-1-1	none

*The term "fuel assembly type" used throughout this BWR document is defined according to the fuel enrichments and the amount of gadolinia contained in the fuel rods in an assembly. The curtain(s) which is(are) located outside of the fuel can is(are) not included in this definition.

† = No change from previous cycle

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.1

BWR Reference Design Parameters at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Cycle 3			
rod type 1	2.87	NEDS-20016 Table 3-1	New 8x8 assemblies introduced in Cycle 3
rod type 2	2.14	Idem	
rod type 3	1.87	Idem	
rod type 4	1.45	Idem	
rod type 5 with Gd_2O_2, w/o per rod	2.87 not available	Vendor Proprietary	

Verified By: E. Tess Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Cycle 2			
Rod type 1	2.56†	NEDS-20016 Table 3-1	Previously Described only one new fuel type introduced in Cycle 2
Rod type 2	1.94†	Idem	
Rod type 3	1.69†	Idem	
Rod type 4	1.33†	Idem	
Rod type 5 with Gd_2O_3, w/o per rod	2.56† not available	Vendor Proprietary	

† = No change from previous cycle

Verified By: E Tow Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.1

BWR Reference Parameters

at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
31. fuel enrichment, w/o U-235			
Cycle 1			
Rod type 1	2.95 †	NEDS-20016 Table 3-1	Previously described under Cycle 1 Repeated for completeness
Rod type 2	1.91 †	Idem	
Rod type 3	1.13 †	Idem	

† = No change from previous cycle

Verified By: E. Tool Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
29. recirculation pump power (mw/pump)	2.4†	NSP operation manual B.1.4-5	Calculated from heat balance and adjusted for pump efficiency
30. recirculation pump efficiency	.90†	maintenance instructions NX-7831-342	none

† = No change from previous cycle

Verified By: [illegible] Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Sheet 3 of 7

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
19. feedwater temperature at rated power (oF)	376.3†	FSAR Table 1-6-1	none
20. feedwater flow rated power (lbs/hr)	6.747×10^6†	Idem	none
21. control rod drive flow temperature (oF)	80.†	FSAR Figure 1-3-2B	none
22. control rod drive flow (lbs/hr)	30,000†	FSAR Figure 1-3-2B	none
23. fraction of control rod drive flow to lower plenum	1.0†	NSP operation manual B.1.3.21	none
24. cleanup system flow (lbs/hr)	80,000†	FSAR Figure 1-3-2B	none
25. inlet temperature to cleanup system (oF)	529.†	Idem	none
26. outlet temperature to cleanup system (oF)	442.†	Idem	none
27. steam carry under fraction	not available	Vendor Proprietary	
28. thermal loss from reactor vessel and piping (MWt)	.6†	FSAR Figure 1-3-2B	none

† = No change from previous cycle

Verified By: E Tonly Date: 07/20/76

REACTOR: Monticello

CYCLE: 3

TABLE 1.1

BWR Reference Deisgn Parameters at Rated Conditions

Sheet 2 of 7

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
11. active core flow area (ft^2)	52.770	NAI	Calculated from assembly dimensions
12. core ΔP 100% flow (psi)	16.69†	NSP	Measured pressure drop across core support plate, psi
13. inlet orifice coefficient (central/peripheral)	not available	Vendor Proprietary	
14. spacer single phase loss coefficient	not available	Vendor Proprietary	
15. core total flow (lbs/hr)	57.6×10^6 †	FSAR Table 3-1-1	none
16. core active flow (lbs/hr)	51.84×10^6 †	NAI	bypass flow assumed to be 10%
17. fraction of heat generated in fuel	0.965†	FSAR Table 3-1-1	none
18. fraction of heat deposited in bypass flow	.02†	NAI	none

† = No change from previous cycle

Verified By: E. Tomy Date: 07/20/76

REACTOR: Monticello
CYCLE: 3

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1. full rated power (MWt)	1670.†	FSAR Table 3-1-1	none
2. power density (KW/ft)	40.61†	FSAR Table 3-1-1	none
3. linear power (KW/ft)	5.7†	FSAR Table 1-6-1	none
4. core loading (STU)	101.9	NEDC 20165 Table 1-1	none
5. cycle exposure (MWD/STU)	2806.	NSP	none
6. system pressure steam dome (psia)	1015.†	FSAR Table 1-6-1	Core Pressure = dome pressure + 18 psi = 1033 psia
7. inlet enthalpy (BTU/lb)	523.0†	FSAR Table 3-1-1	none
8. subcooling, BTU/lb ($HSAT_{core}$ - HIN)	24.6†	NAI	HSAT based on core pressure
9. average fuel rod surface temperature (oF)	558.†	FSAR Table 1-6-1	none
10. average fuel temperature (oF)	900.†	FSAR Table 1-6-1	none

† = No change from previous cycle

Verified By: [illegible] Date: 07/20/76

BWR CYCLE 3 DATA

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1.4, Part B	Operating Data, BWR Cold Critical Data
1.4, Part C	Operating Data, BWR Statepoints
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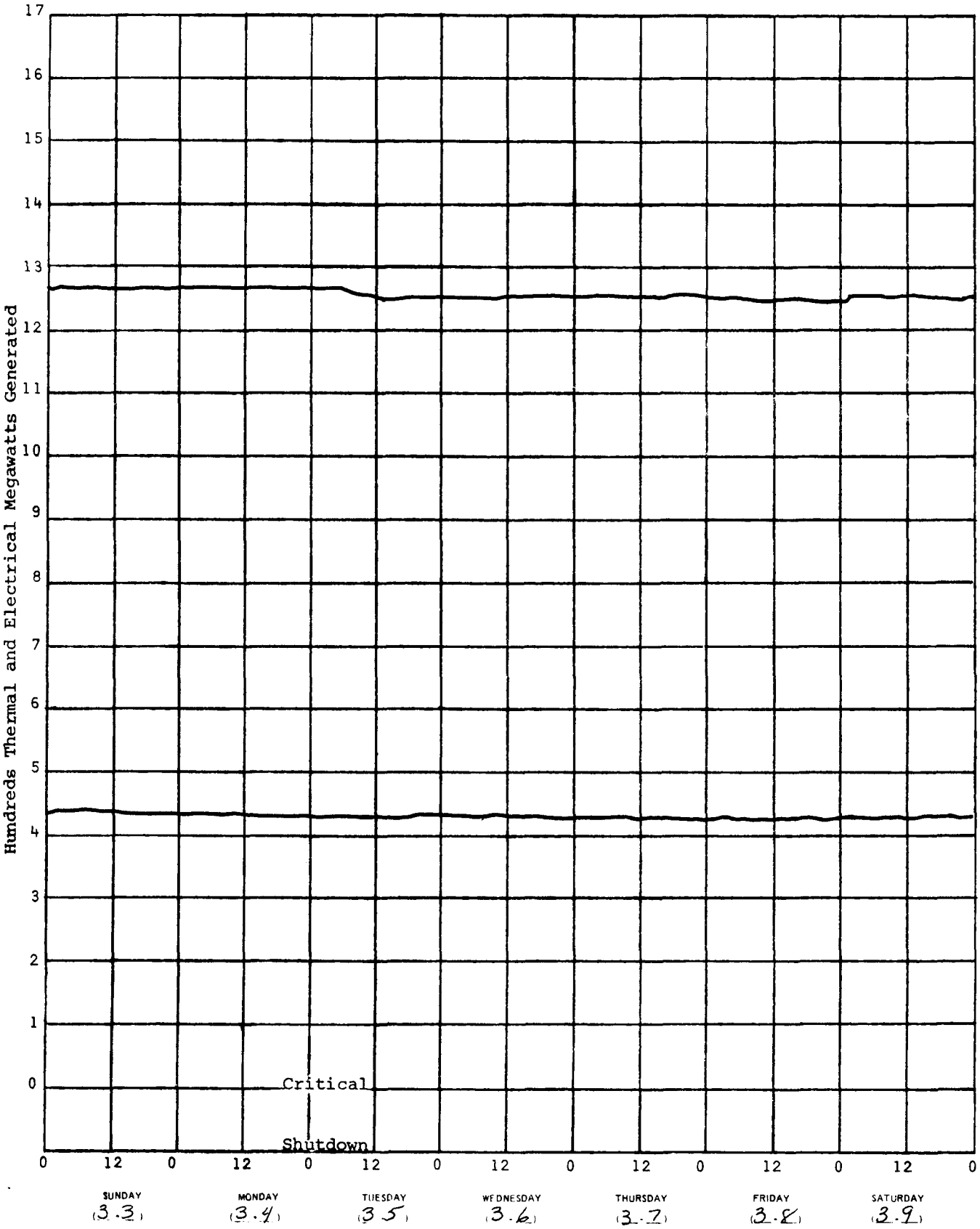
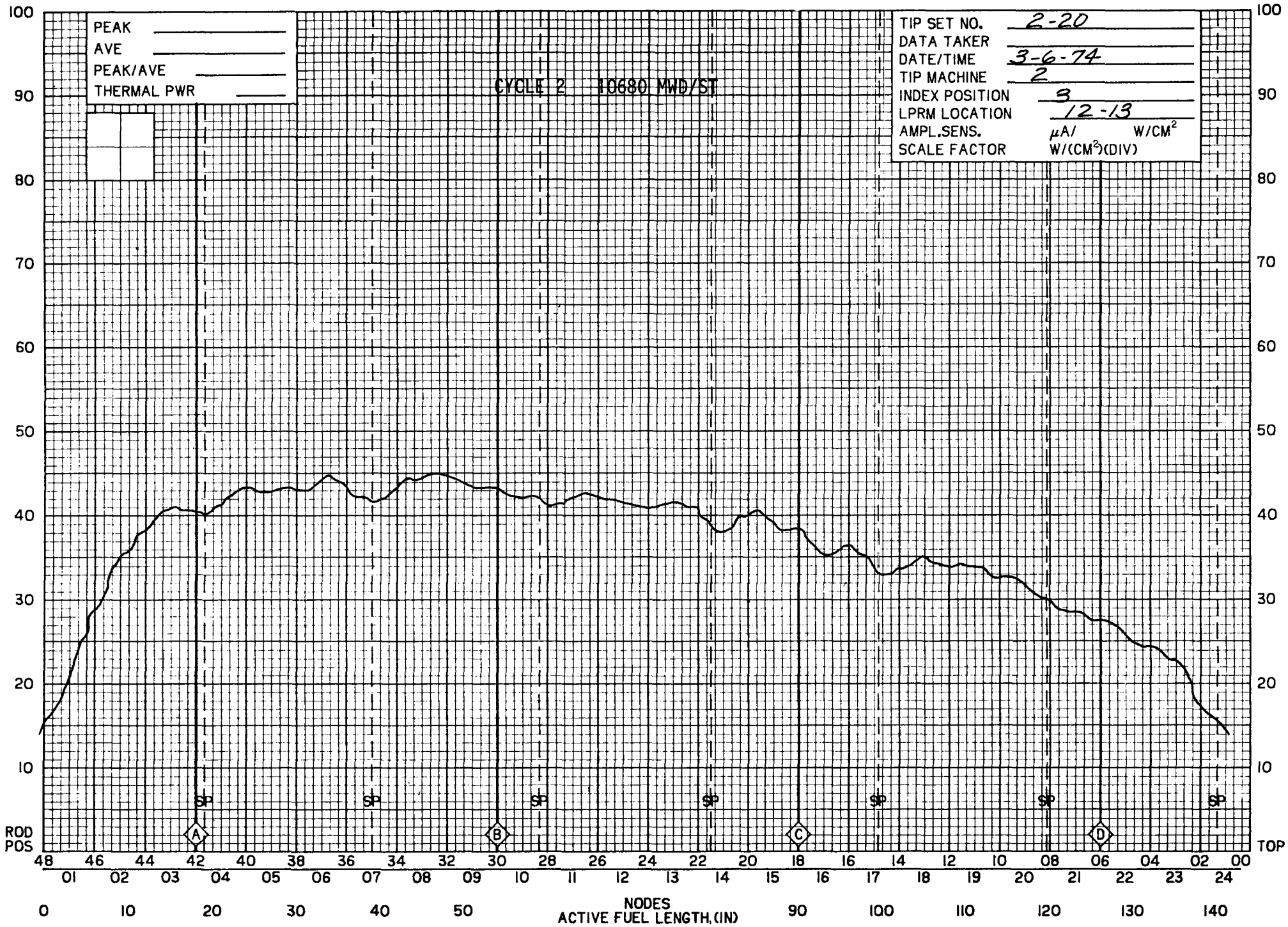
Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 3 . 9 . 74




PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 2-20
DATA TAKER
DATE/TIME 3-6-74
TIP MACHINE 2
INDEX POSITION 3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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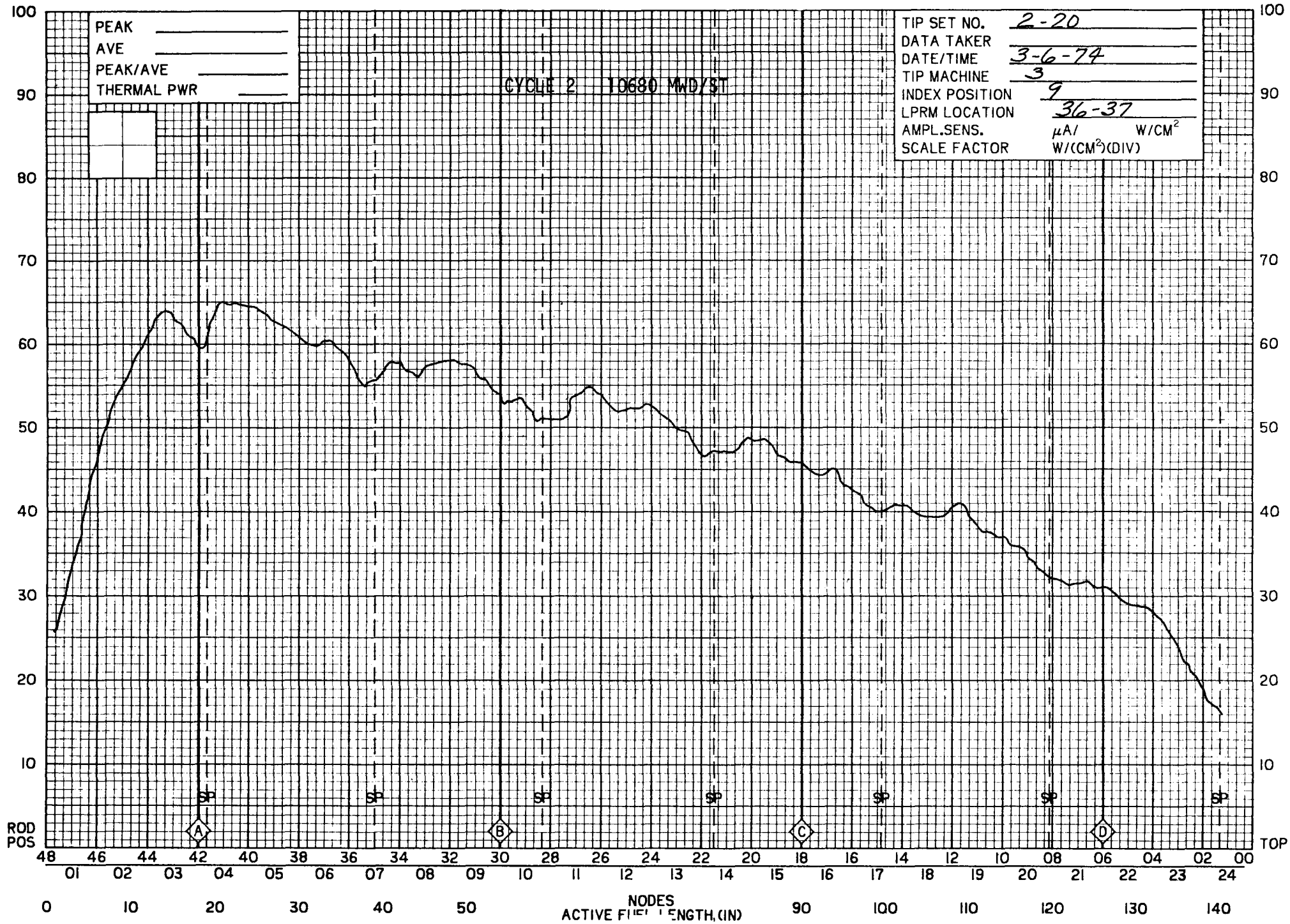
NODES
ACTIVE FUEL LENGTH, (IN)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THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 2-20
DATA TAKER
DATE/TIME 3-6-74
TIP MACHINE 3
INDEX POSITION 9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
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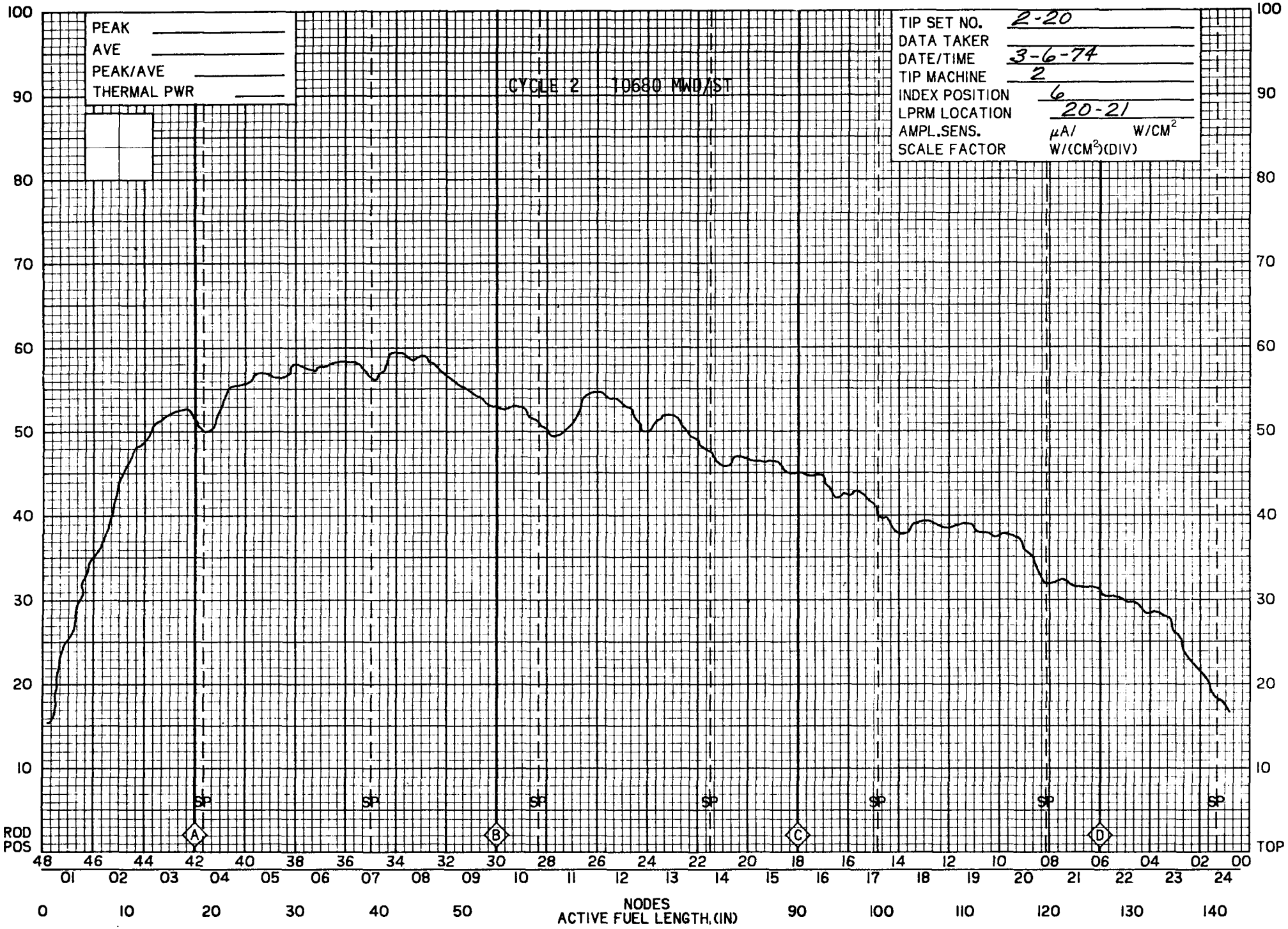
D
NODES
ACTIVE FUEL LENGTH, (IN)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DATA TAKER
DATE/TIME 3-6-74
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INDEX POSITION 6
LPRM LOCATION 20-21
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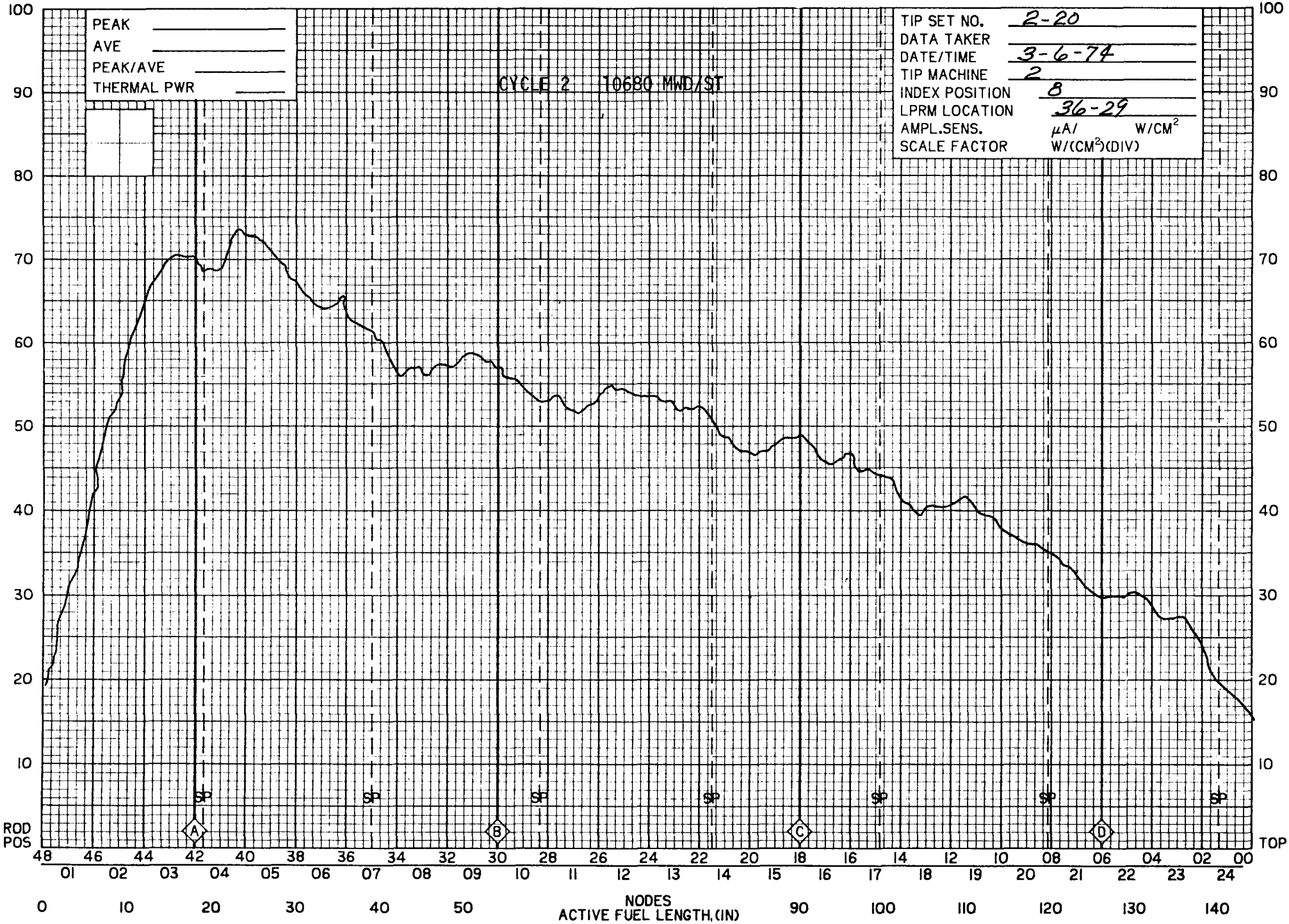
D
NODES
ACTIVE FUEL LENGTH, (IN)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DATE/TIME 3-6-74
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SCALE FACTOR W/(CM²)(DIV)
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10
TOP
ROD POS
SP
A
B
C
D
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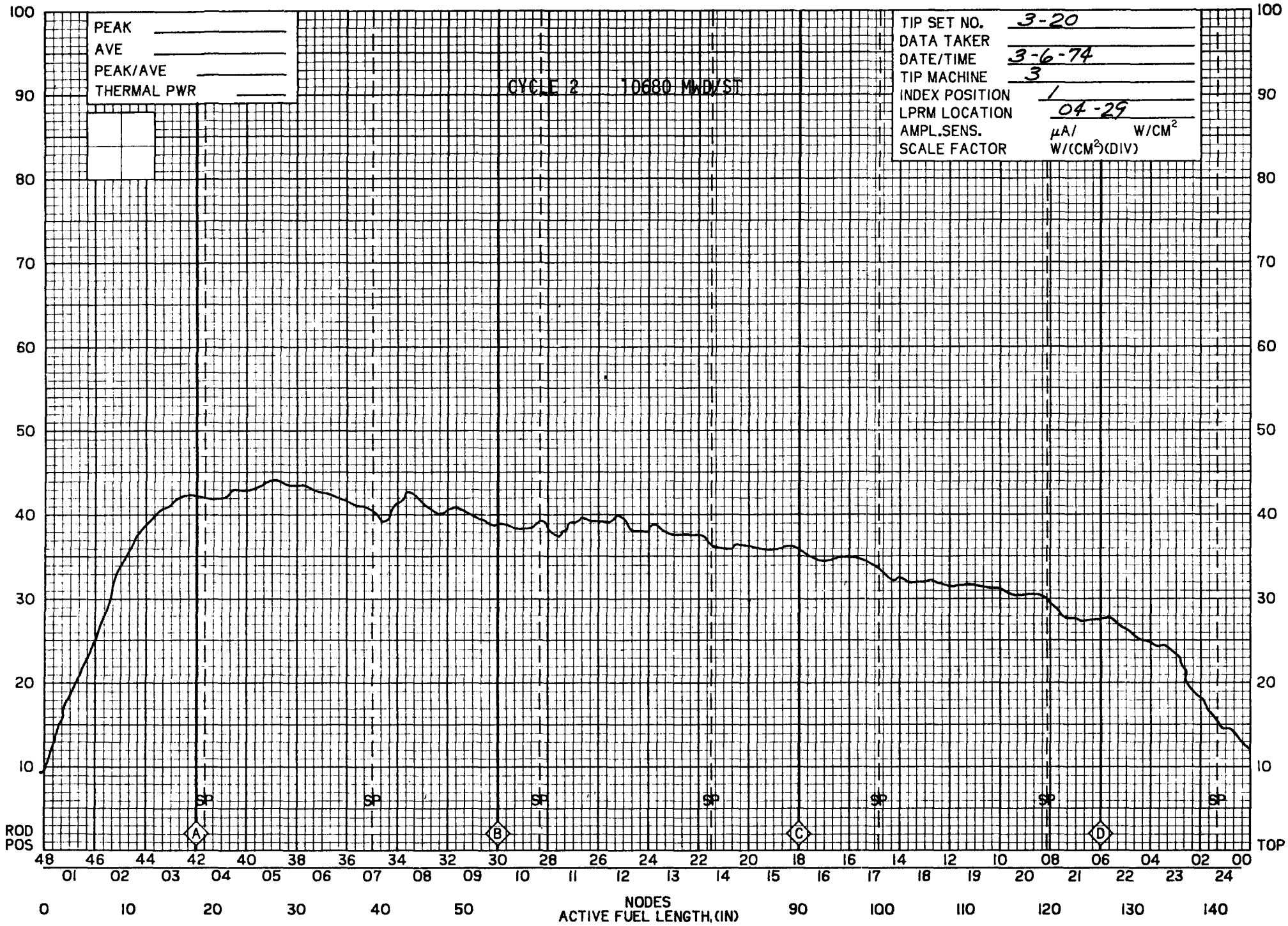
ACTIVE FUEL LENGTH,(IN)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THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 3-20
DATA TAKER
DATE/TIME 3-6-74
TIP MACHINE 3
INDEX POSITION 1
LPRM LOCATION 04-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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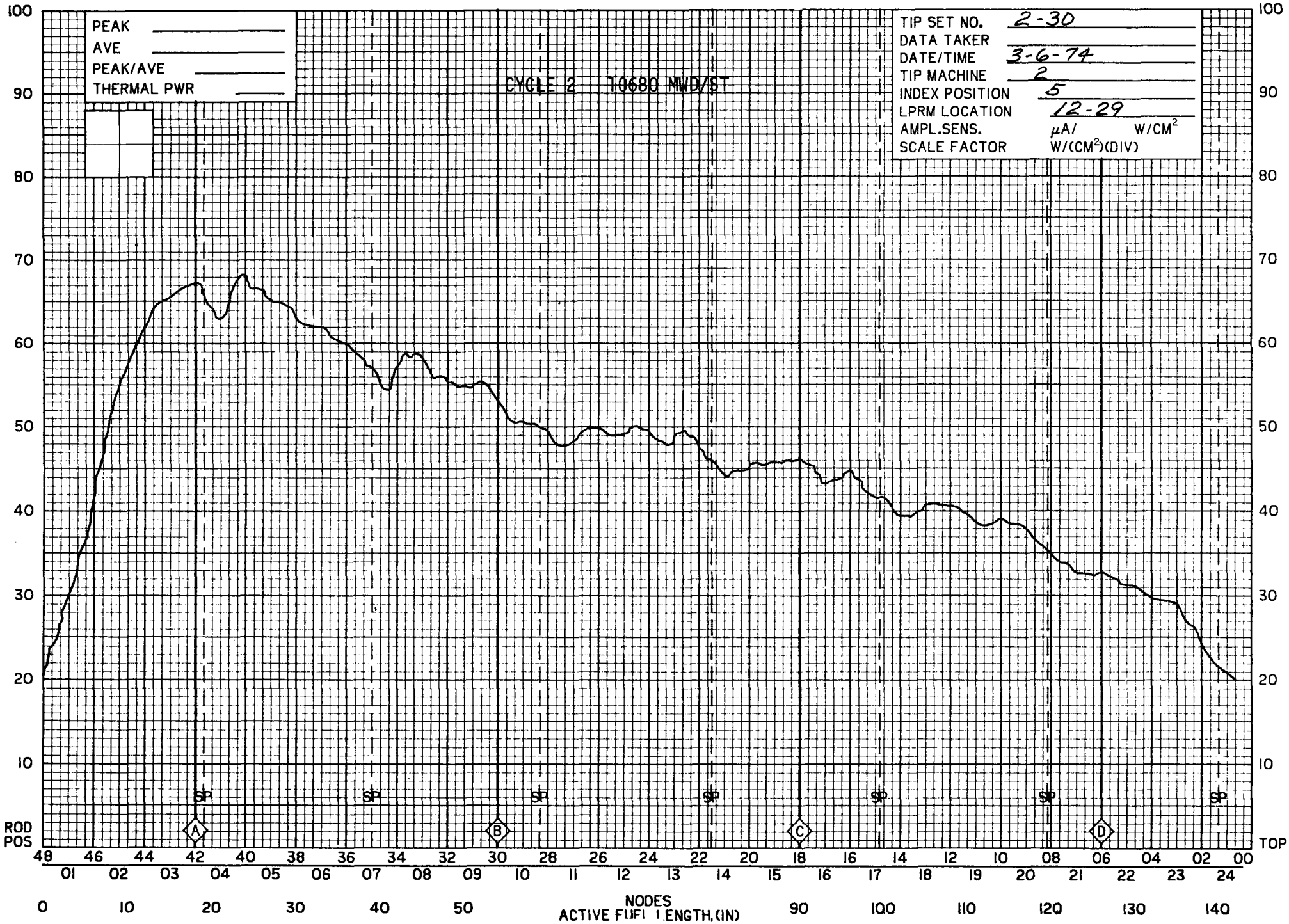
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 2-30
DATA TAKER
DATE/TIME 3-6-74
TIP MACHINE 2
INDEX POSITION 5
LPRM LOCATION 12-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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80
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50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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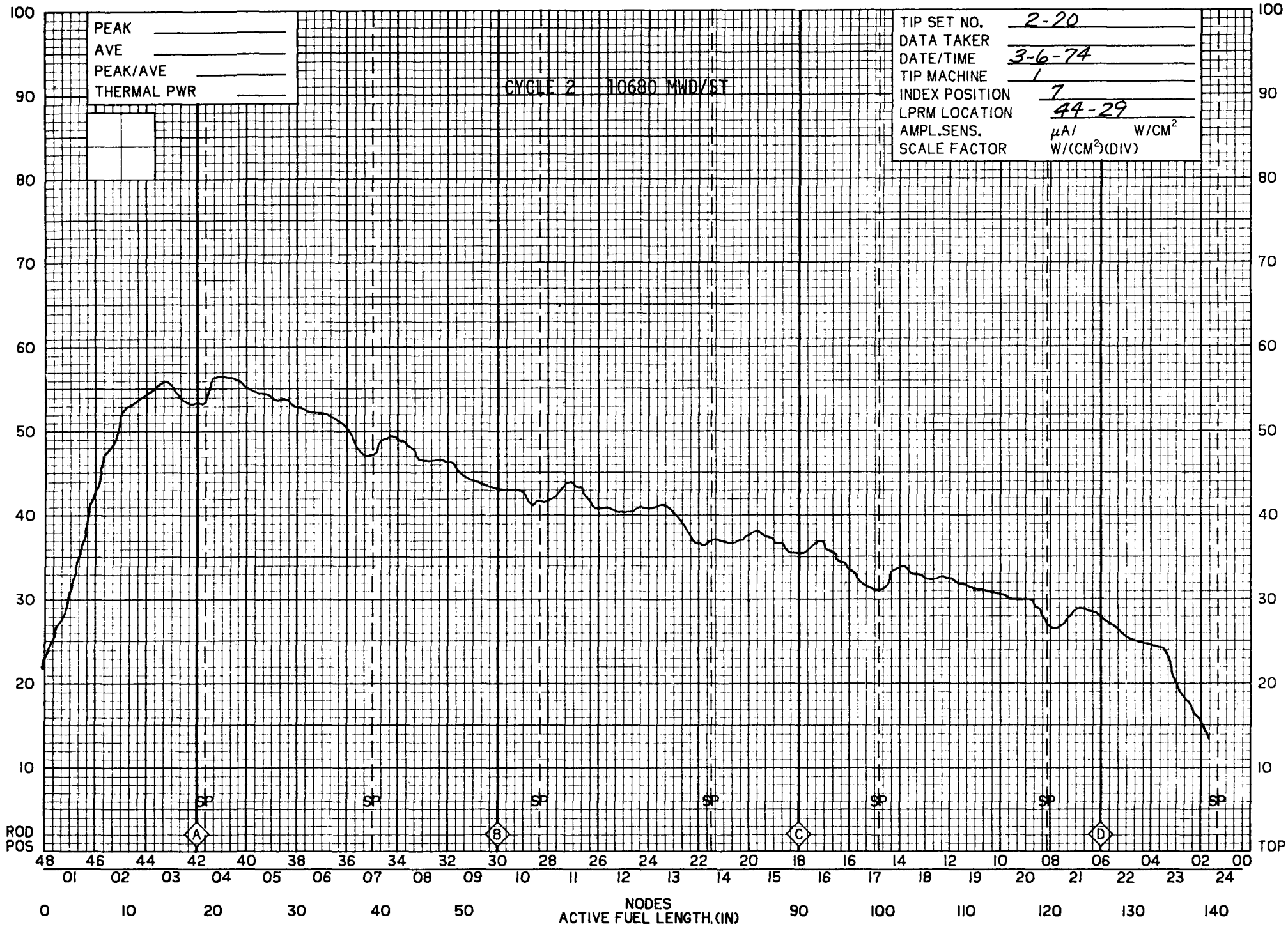
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 2-20
DATA TAKER
DATE/TIME 3-6-74
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INDEX POSITION 7
LPRM LOCATION 44-29
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SCALE FACTOR W/(CM²)(DIV)
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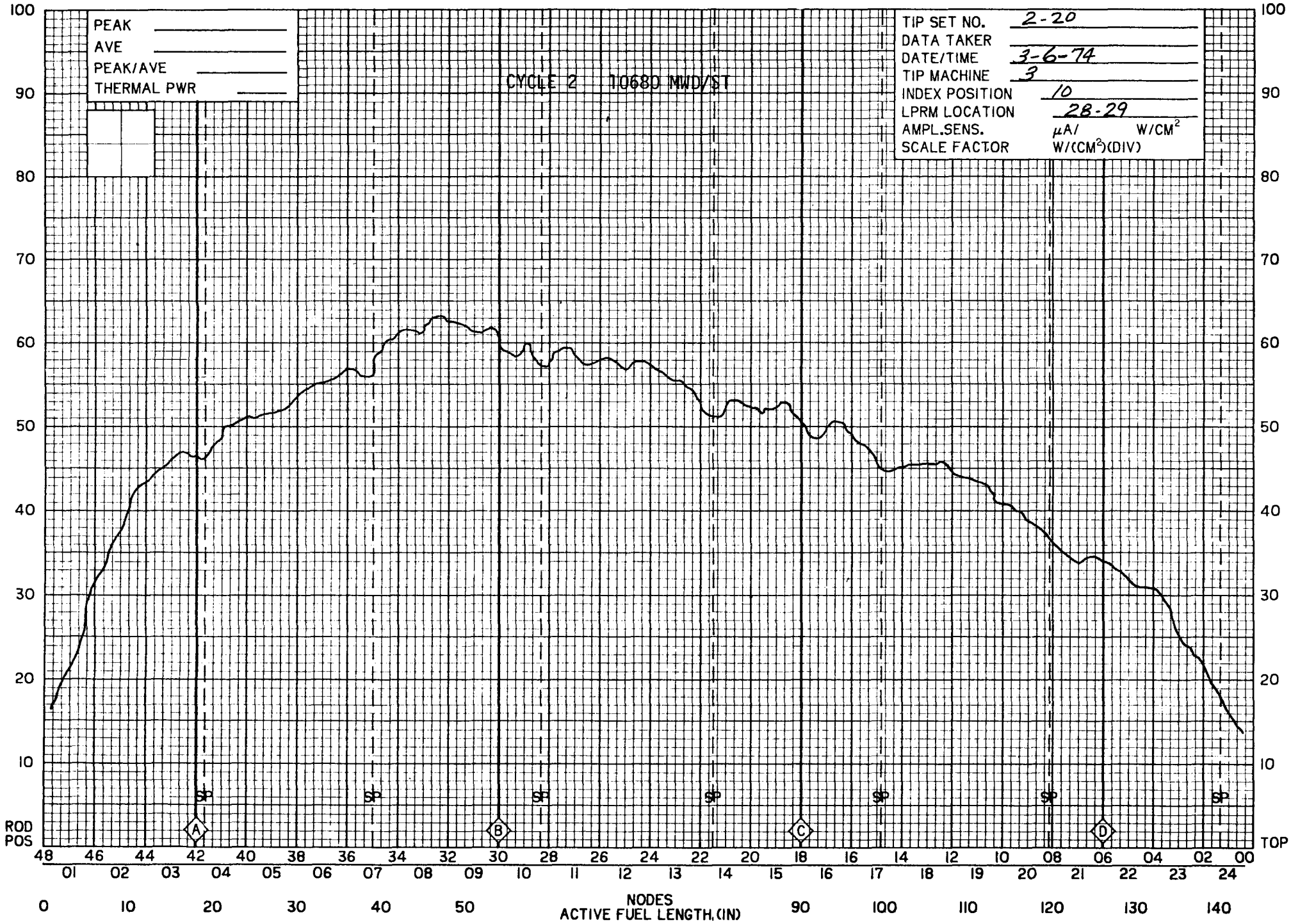
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 2-20
DATA TAKER
DATE/TIME 3-6-74
TIP MACHINE 3
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH (IN)

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10680 MWD/ST
TIP SET NO. 2-20
DATA TAKER
DATE/TIME 3-6-74
TIP MACHINE 2
INDEX POSITION 2
LPRM LOCATION 20-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)

REACTOR: Monticello

CYCLE: 2

Exposure: 10680 MWD/STU

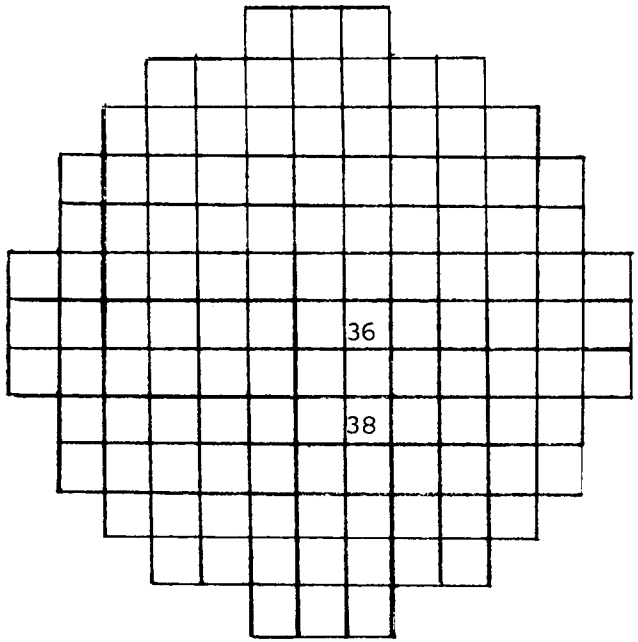
TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 12 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



Verified By: [illegible] Date: 05/19/76

REACTOR: Monticello

CYCLE: 2

Exposure 10680 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 11 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	496.0	Idem	none
11. Outlet temperature to cleanup system (oF)	424.0	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter is available			See attached set of TIP traces *
14. Xenon history-past 48 hours Time (hrs)/Core power (%)			See attached power histogram
15. Control rod positions (by location)	See Sheet #12		

*TIP traces were not available for the following locations: 12-21, 12-37, 20-13, 20-29, 20-37, 20-45, 28-5, 28-13, 28-21, 28-37, 28-45, 36-13, 36-21, 36-45, 44-21, 44-37.

Verified By: E. Tarly Date: 07/19/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 03/08/74 1020 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
434.00	1266.72	47.67	34.85	45.65	14.69	2.00	0.0995	1007.32

RWL	DPM	WFW	HFW	HD	DHO	CXE
36.45	10.30	4.98	330.23	513.77	21.29	0.1071

RAP	75.438	77.000	76.563	76.219	76.125	76.156
AGAF	1.005	0.985	0.991	0.995	0.996	0.996

IB 1

RAPL	-198.91	4.97	19.89	34.81	49.73	64.65
	79.56	89.51	99.45	109.40	124.32	198.91

QFW	QCR	QCU	QRAD	QPUMP	TFW
1256.766	9.139	1.851	0.600	1.611	356.406

HF	HFG	HG	HS	WCR	HCR
543.53	648.03	1191.56	1190.92	0.0278	70.67

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0808	482.02	403.87	521.62	1670.00	1670.00

PPW	0.7777	0.9547

CAP	0.01005	0.00985	0.00991	0.00995	0.00996	0.00996
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.60
WTC	17.80	23.00	31.70	40.30	49.00	57.60

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 3/08/74 H.B. NO. 2-121
TIME 1100 BY JH

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS	
*	1	GROSS GEN. OUTPUT	GMWE	C08	W/GEN	435.2	MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	17.5	MWE
*	3	HP COND. VACUUM	HPCV	C07	PR 1264	.7	IN HG ABS
*	4	LP COND. VACUUM	LPCV	C07	PR 1264	.6	IN HG ABS
	5	REACTOR PRESSURE	PR	C05	6-98	993	PSIG
	6	ROD DRIVE FLOW	WRD	C05	3-306	162	GPM
*	7	TOTAL CORE FLOW	Wc	C05	FR-2-3-95	47.7	MLB/HR
	8	A RECIRC. PUMP PWR	Q_{PA}	C04	2-184-24A	.74	MW
	9	B RECIRC. PUMP PWR	Q_{PB}	C04	2-184-24B	.93	MW
	10	CLEANUP FLOW	W_{CU}	C04	12-141A&B	53	GPM
	11	CLEANUP INLET TEMP.	T_{CUI}	C04	POS. 1	496	°F
	12	CLEANUP OUTLET TEMP.	T_{CUO}	C04	POS. 4	424	°F
	13	ROD DRIVE TEMP.	T_{RD}	COMP	F-127	90	°F
	14	A FEEDWATER FLOW	W_{FWA}	C18	6-79A(x)	(Ma) -2.435	MLB/HR
	15	B FEEDWATER FLOW	W_{FWB}	C18	6-79B(x)	(Ma) -2.554	MLB/HR
	16	A FEEDWATER TEMP.	T_{FWA}	C18	6-79A(z)/TR1148	(Ma) -356.82	°F
	17	B FEEDWATER TEMP.	T_{FWB}	C18	6-79B(z)/TR1148	(Ma) -358.24	°F

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	5	
19	SATURATED STEAM ENTHALPY	h_{gs}	5	
20	A FEEDWATER ENTHALPY	h_{FWA}	5 , 16	
21	B FEEDWATER ENTHALPY	h_{FWB}	5 , 17	
22	CLEANUP INLET ENTHALPY	h_{CUT}	5 , 11	
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	5 , 12	
24	ROD DRIVE ENTHALPY	h_{RD}	5 , 13	

HEAT BALANCE CALCULATIONS

		QUANTITY	SYMBOL	EQUATION	VALUE	
	25	ROD DRIVE FLOW	W_{RD}	.000495 x 6		MLB/HR
	26	TOTAL STEAM FLOW	W_S	14 + 15 + 25		MLB/HR
*	27	CORE INLET ENTHALPY	h_{IN}	See below		MLB/HR
	28	ENERGY OUT - STEAM	Q_S	26 + 19		MBTU/HR
	29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x 10 (22 - 23)		MBTU/HR
	30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4		MBTU/HR
	31	NET ENERGY OUT	Q_{OUT}	28 + 29 ÷ 30		MBTU/HR
	32	ENERGY IN - FEEDWATER	Q_{FW}	14 x 20 + 15 x 21		MBTU/HR
	33	ENERGY IN - ROD DRIVES	Q_{RD}	25 x 24		MBTU/HR
	34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x (8 + 9)		MBTU/HR
	35	NET ENERGY IN	Q_{IN}	32 + 33 + 34		MBTU/HR
	36	CORE THERMAL POWER	Q_{CORE}	31 - 35		MBTU/HR
	37	CORE THERMAL POWER	P_{CORE}	36 / 3.413	1266.29	MWT
	38	CORE THERMAL POWER	%P	37 / 1670	75.83	% OF RATED
*	39	HEAT RATE	HR	36 x 10^3 (1 - 2)	10.34	BTU/KW-HR

$$h_{IN} = \frac{(7 - 25 - 14 - 15)\,18 + 14\,20 + 15\,21}{7}$$

APRM	READING
1	75.59
2	76.72
3	75.44
4	76.38
5	75.66
6	75.50

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS:

REACTOR: Monticello
CYCLE: 2
Exposure 10680 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Rev. 1 Date: 5/10/76

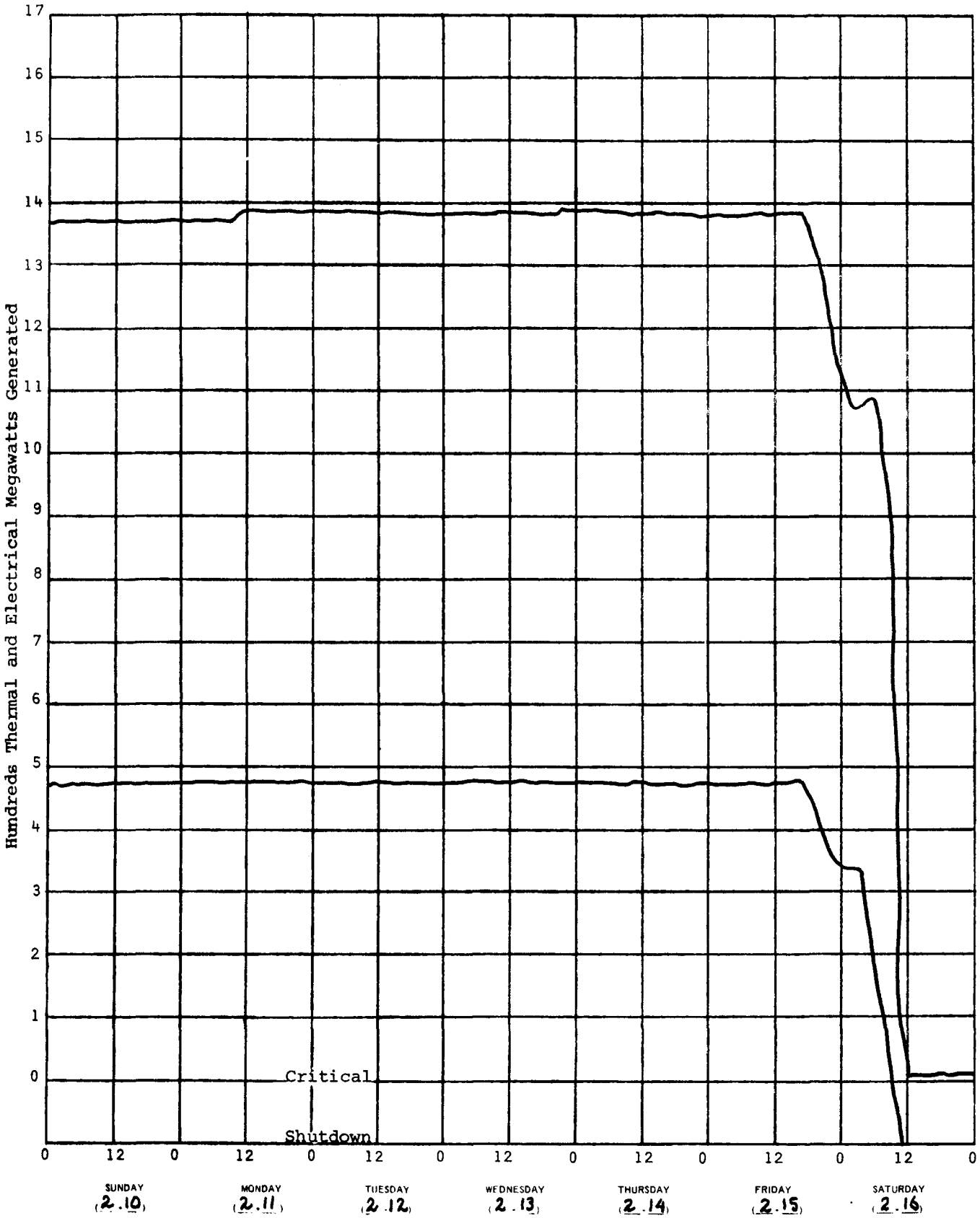
ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1266.72	HB #2-121 3/8/74	See attached HB #2-121 and OD-3 dated 3/8/74
2. System pressure (psig)	993.	Idem	Calculated core pressure = 1022.2 psia
3. Recirculation flow (lbs/hr)	47.7×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	4.99×10^6	Idem	none
6. Feedwater flow temperature (oF)	357.5	Idem	none
7. Time at associated power level (hr)	>24.	Idem	none
8. Inlet subcooling (BTU/lb)	23.47	Idem	21.29 from HB #2-121 corrected for core pressure
9. Cleanup system flow (gal/min)	53.0	Idem	none

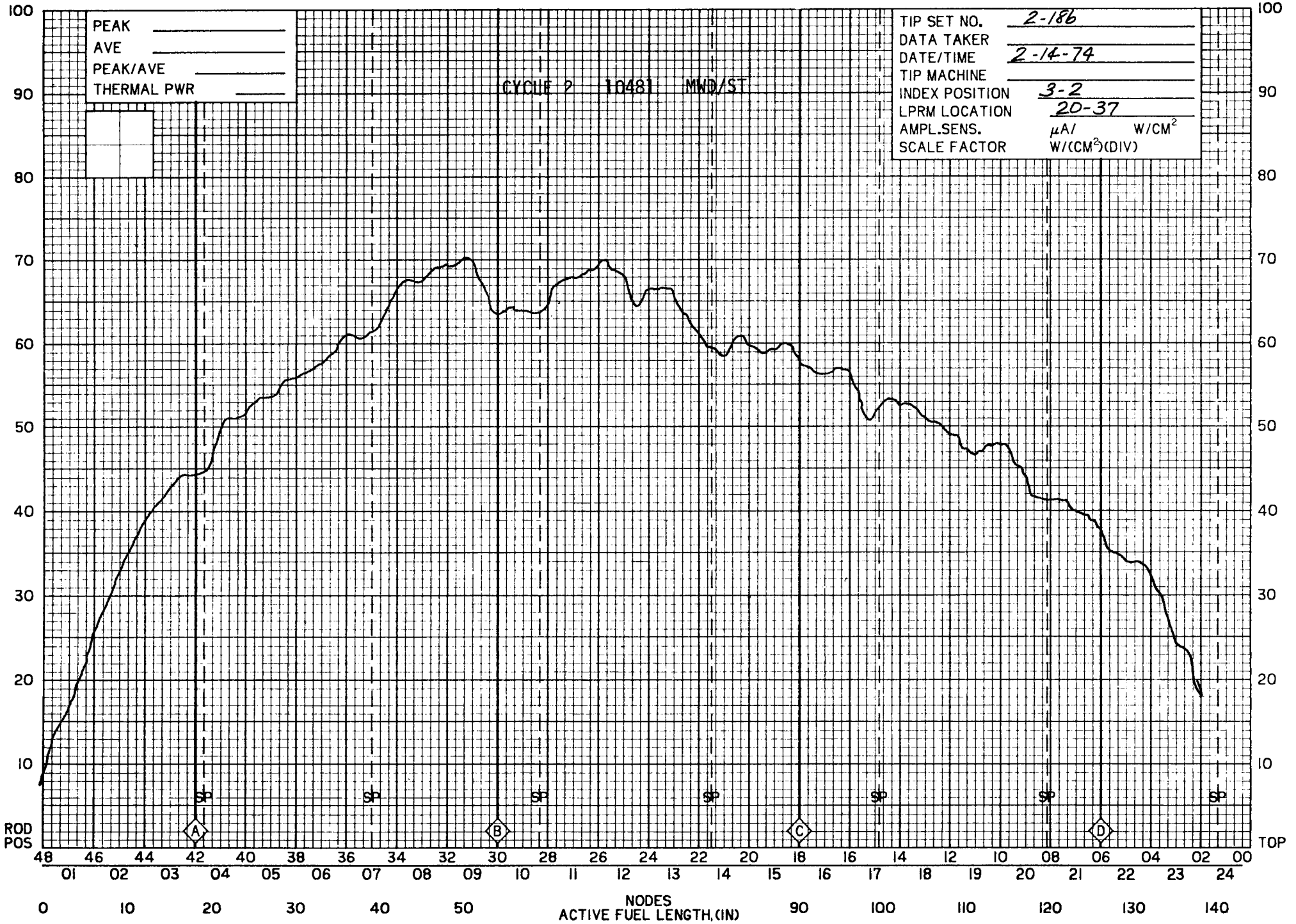
Verified By: _____ Date: _____

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 2 . 16 . 74

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CYCLE 2 10481 MWD/ST
TIP SET NO. 2-186
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-2
LPRM LOCATION 20-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
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ROD POS
TOP
SP
A
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C
D
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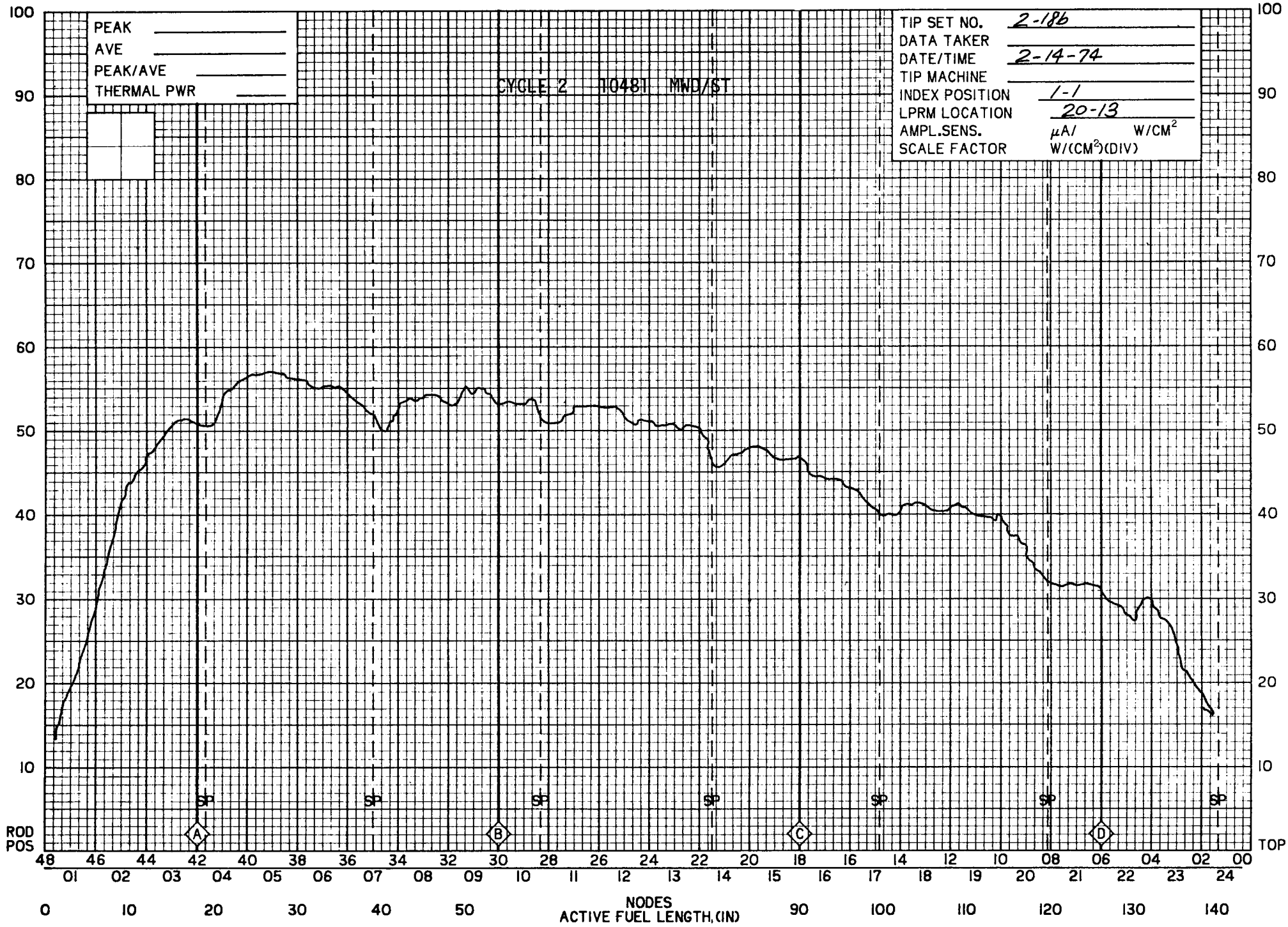
NODES
ACTIVE FUEL LENGTH,(IN)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THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-186
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 1-1
LPRM LOCATION 20-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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ROD POS
TOP
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A
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D
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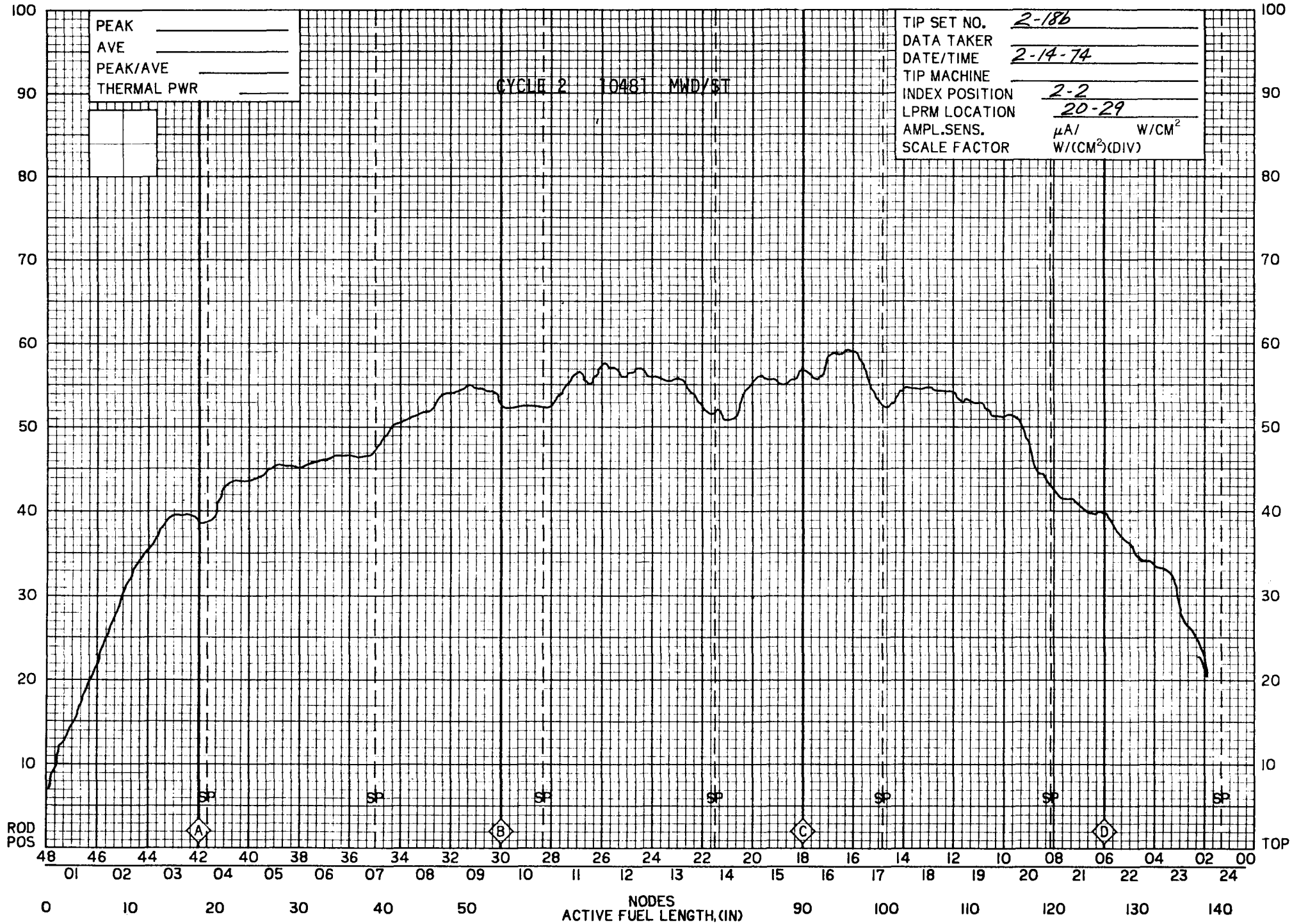
ACTIVE FUEL LENGTH, (IN)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PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-186
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 2-2
LPRM LOCATION 20-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
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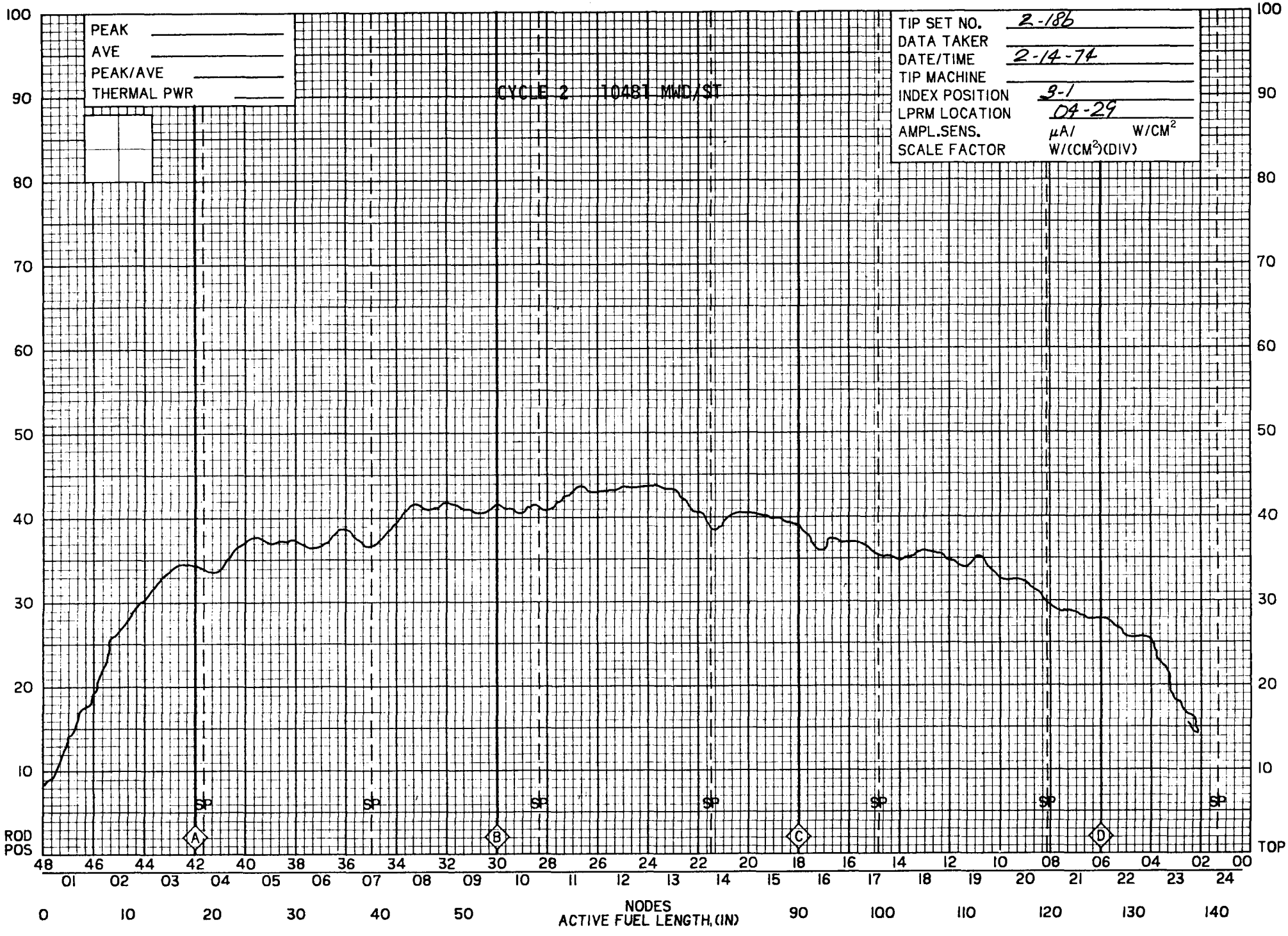
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-186
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-1
LPRM LOCATION 04-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
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70
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10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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NODES
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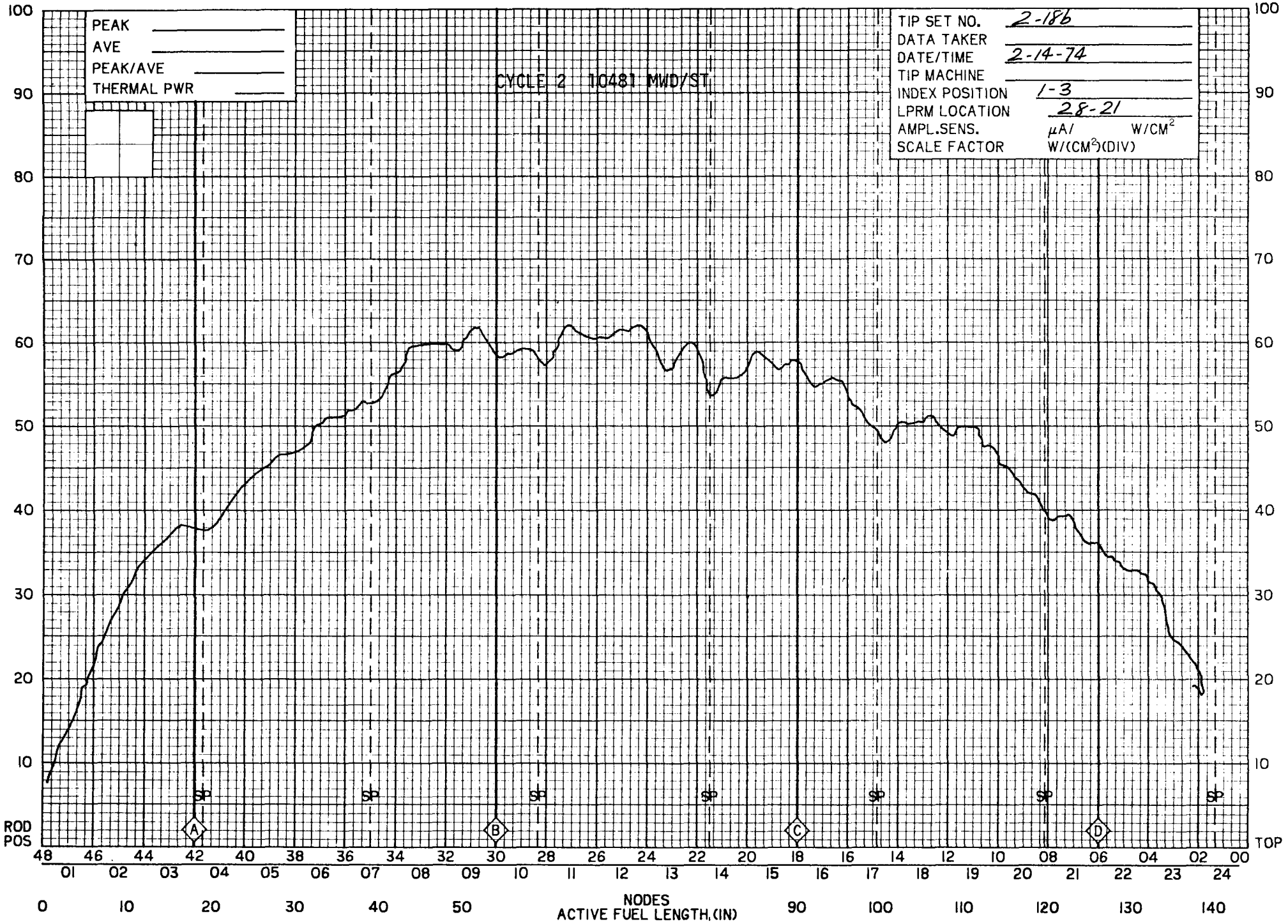
ACTIVE FUEL LENGTH, (IN)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THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 1-3
LPRM LOCATION 28-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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90
80
70
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50
40
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20
10
ROD POS
TOP
SP
A
B
C
D
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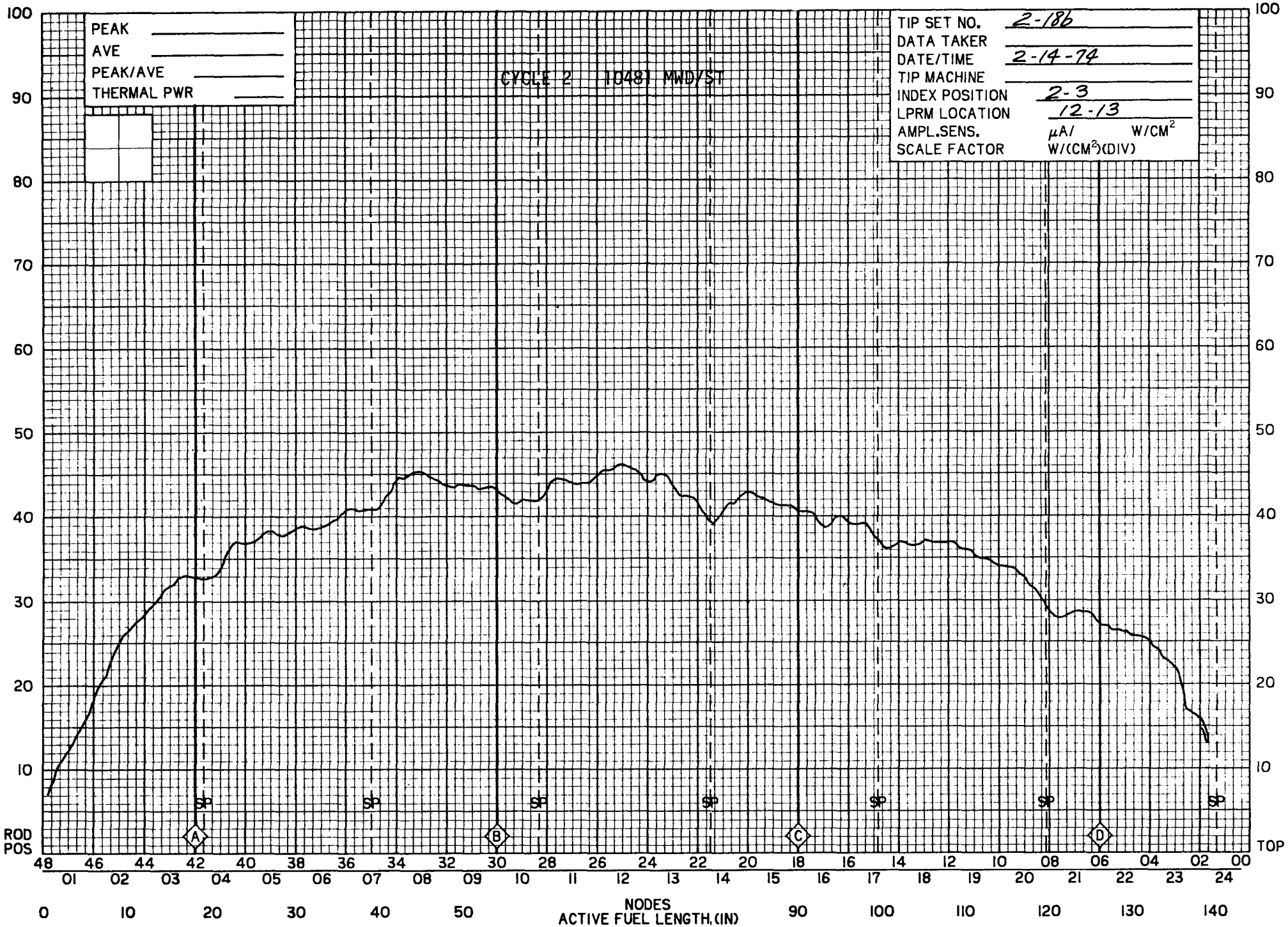
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)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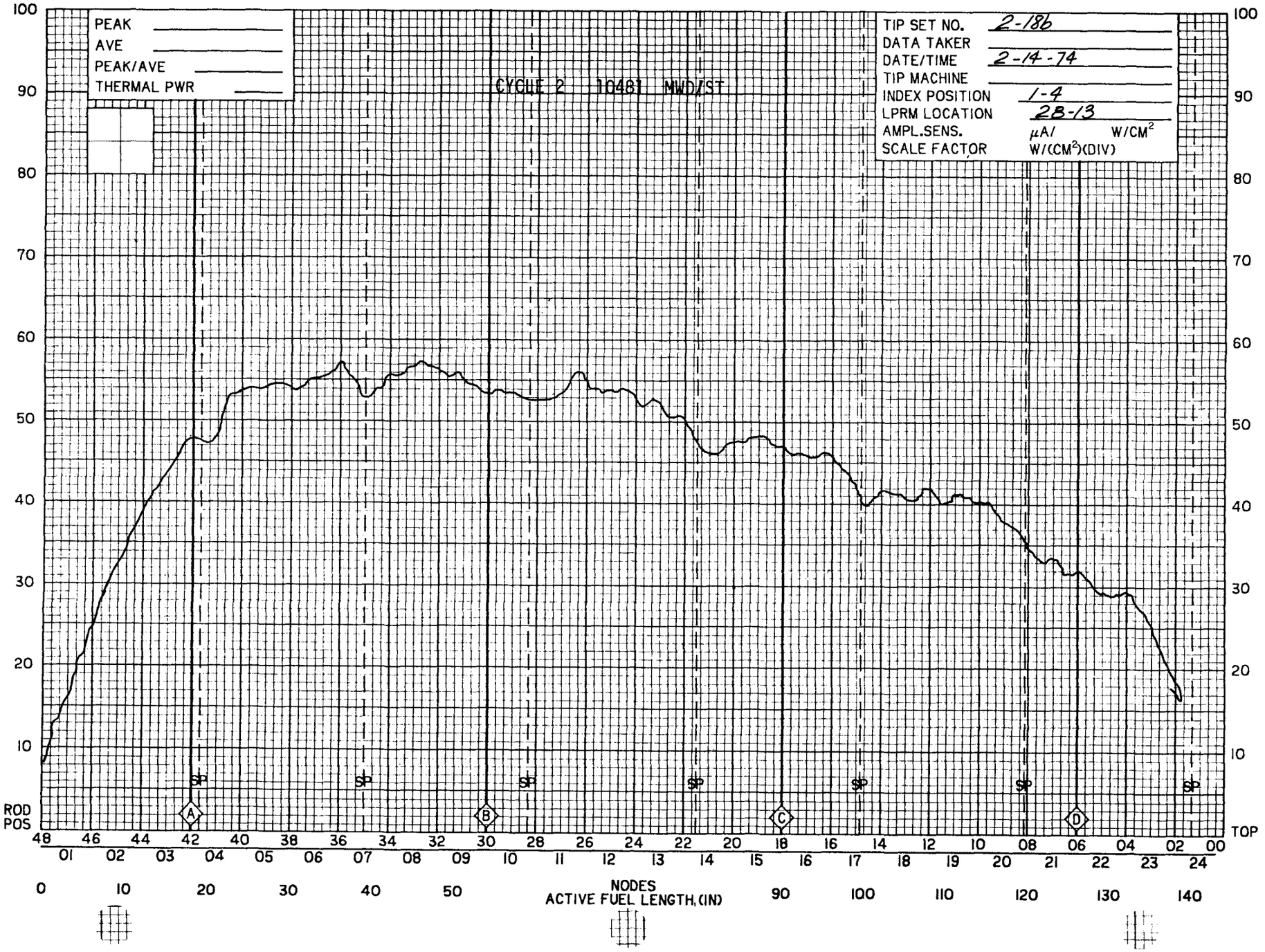
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 2-3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 1-4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
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20
10
ROD POS
TOP
SP
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C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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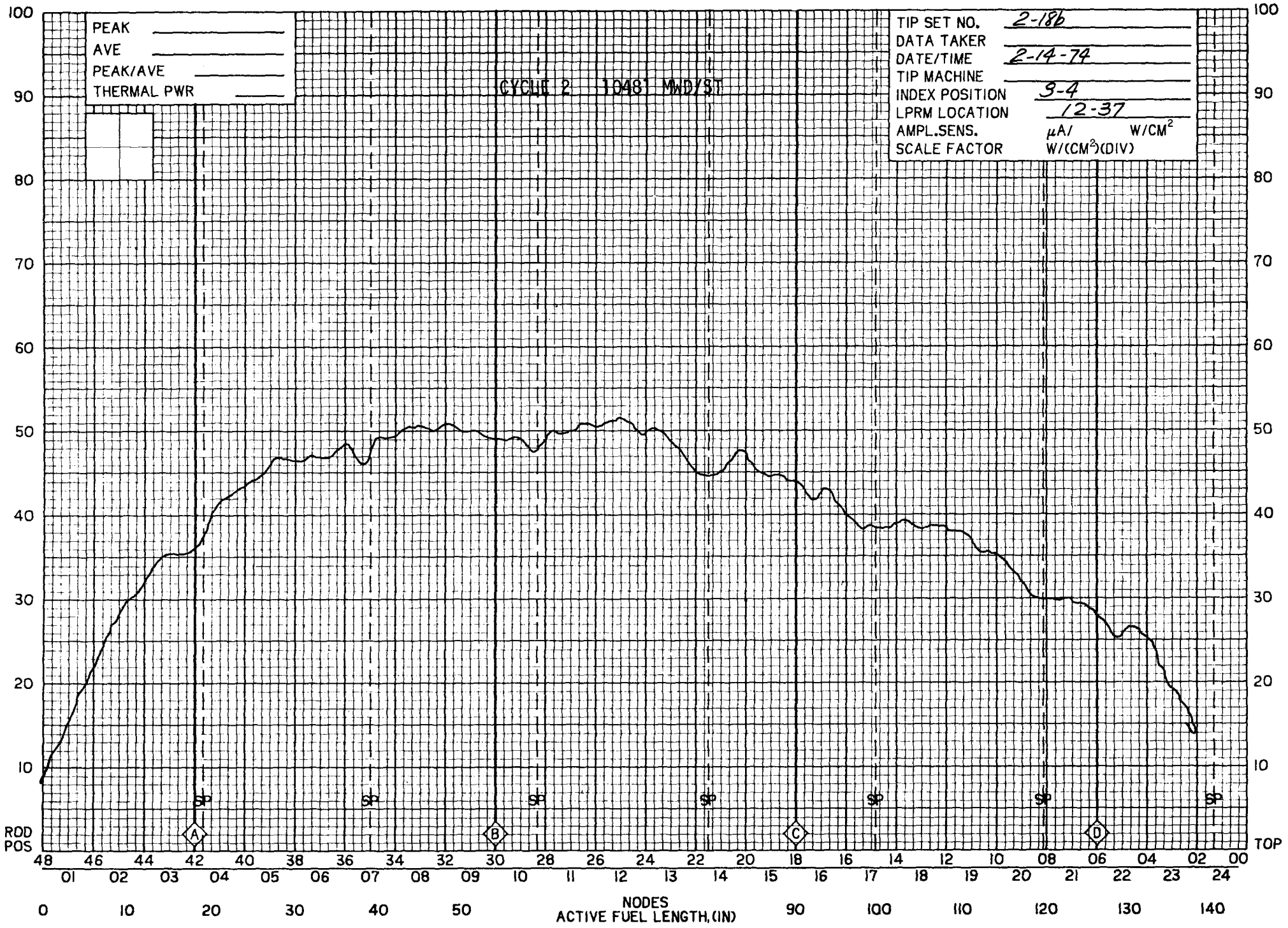
NODES
ACTIVE FUEL LENGTH, (IN)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CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-4
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SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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NODES
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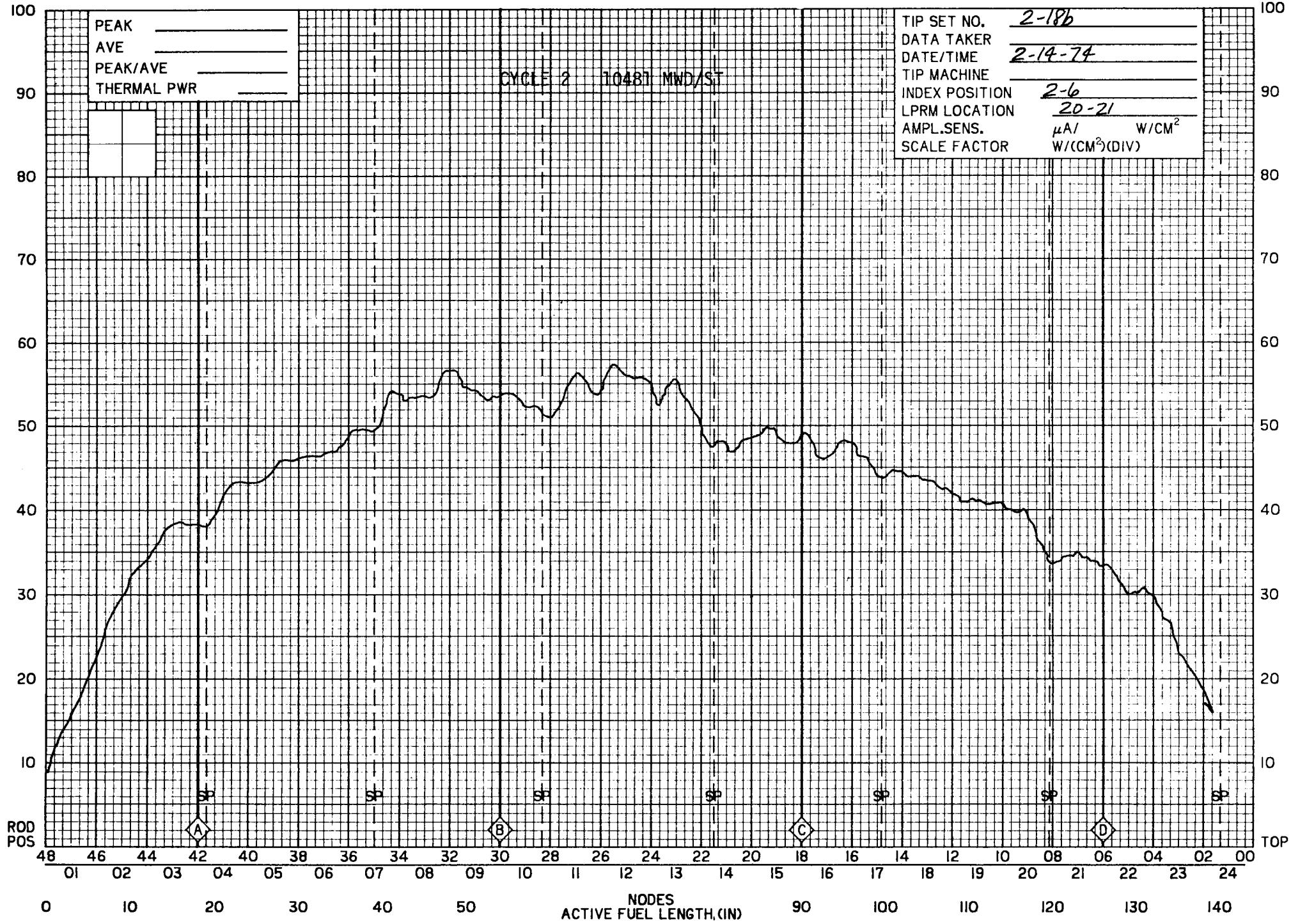
ACTIVE FUEL LENGTH, (IN)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DATA TAKER
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TIP MACHINE
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SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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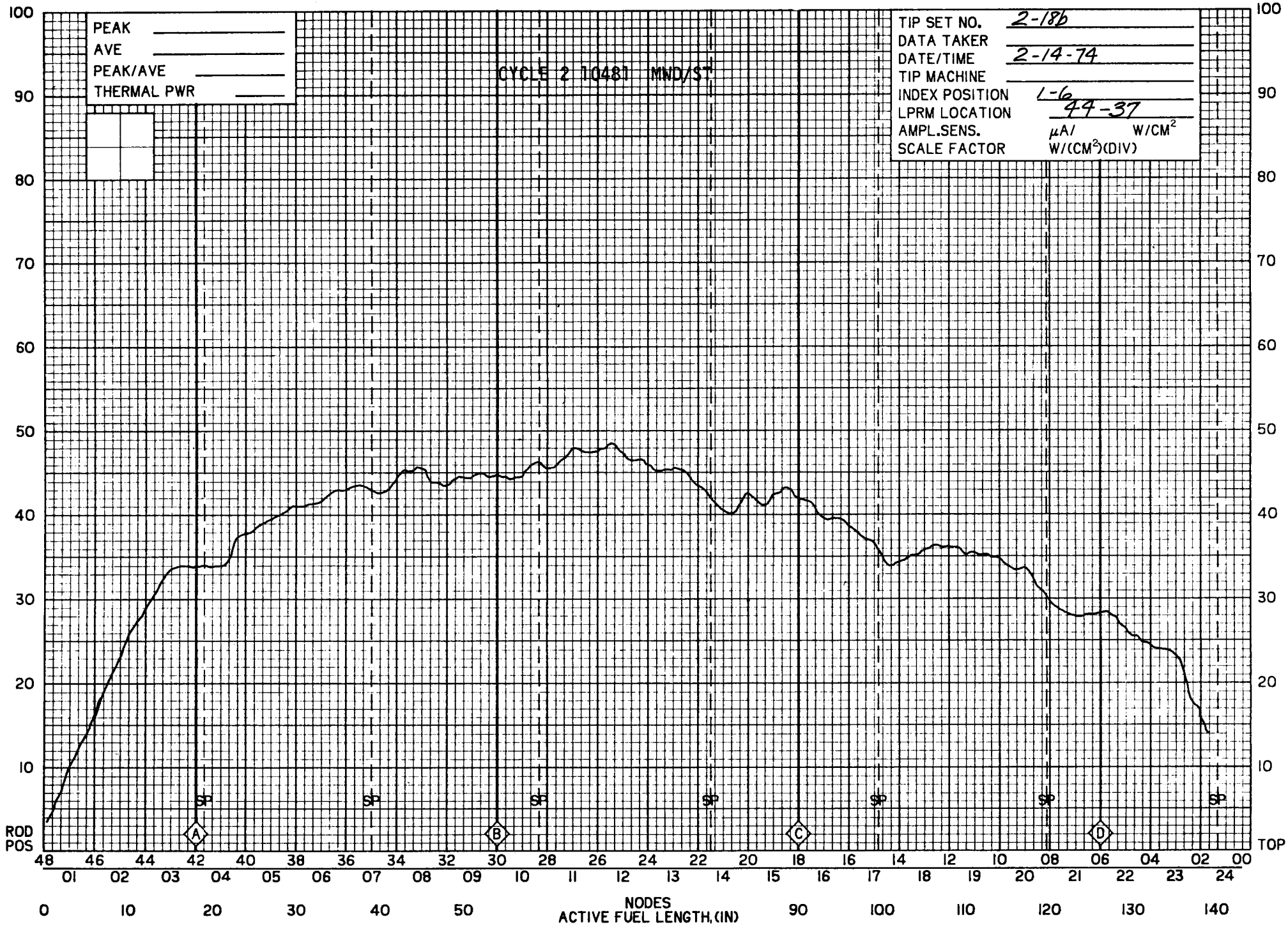
NODES
ACTIVE FUEL LENGTH, (IN)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TIP SET NO. 2-18b
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TIP MACHINE
INDEX POSITION 1-6
LPRM LOCATION 44-37
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NODES
ACTIVE FUEL LENGTH, (IN)

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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-6
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SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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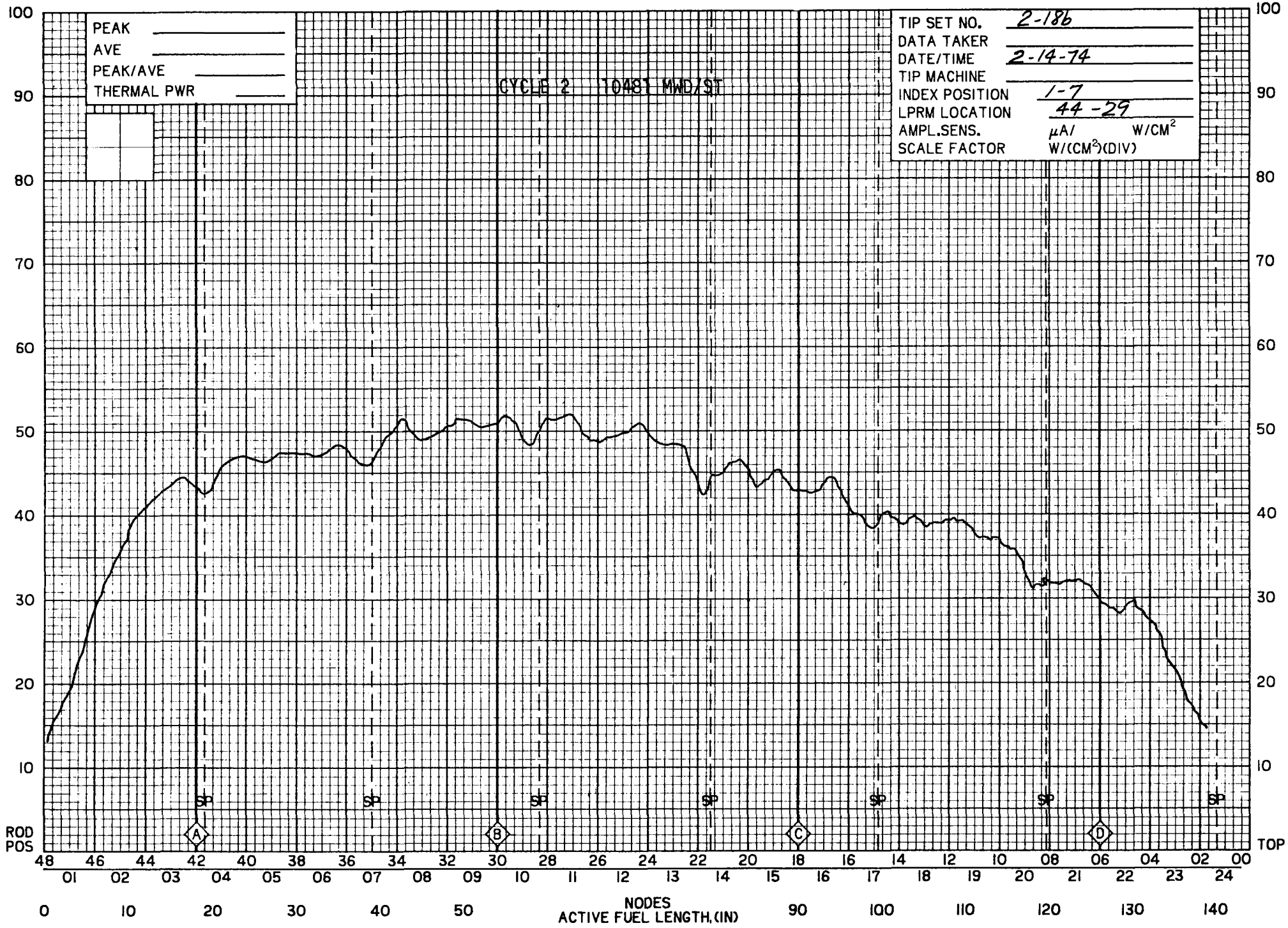
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DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 1-7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
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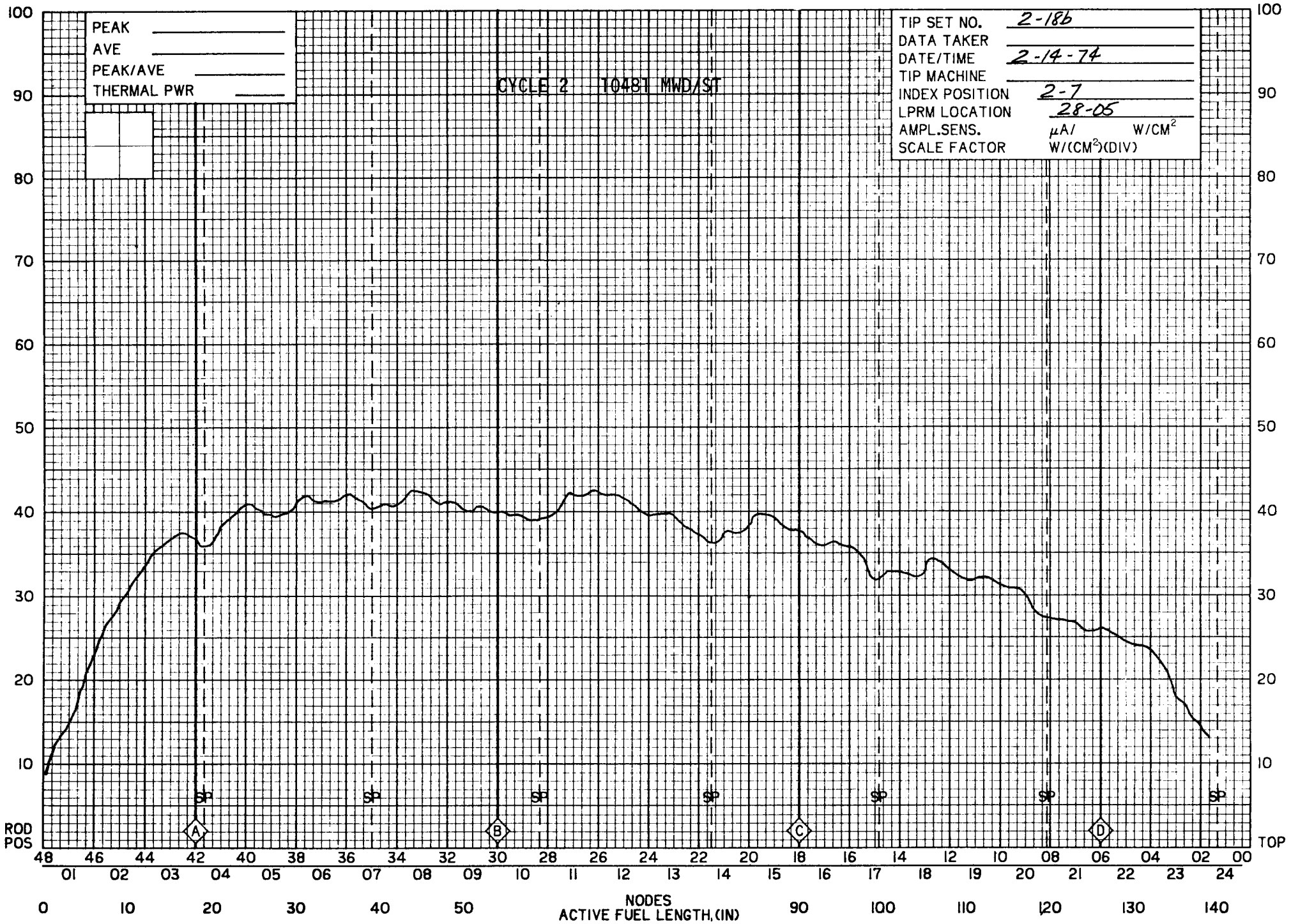
ACTIVE FUEL LENGTH,(IN)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DATE/TIME 2-14-74
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D
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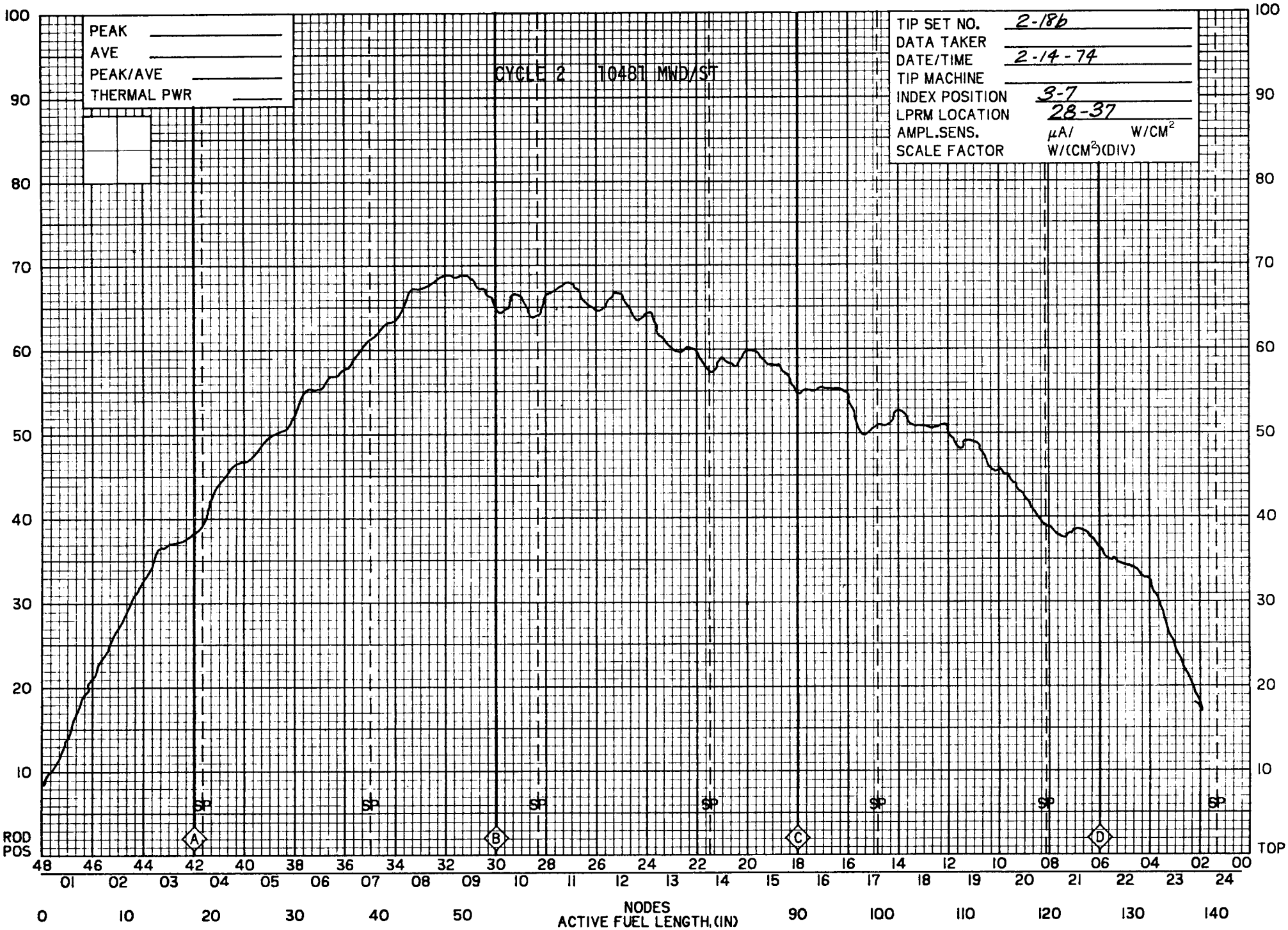
ACTIVE FUEL LENGTH, (IN)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THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-7
LPRM LOCATION 28-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
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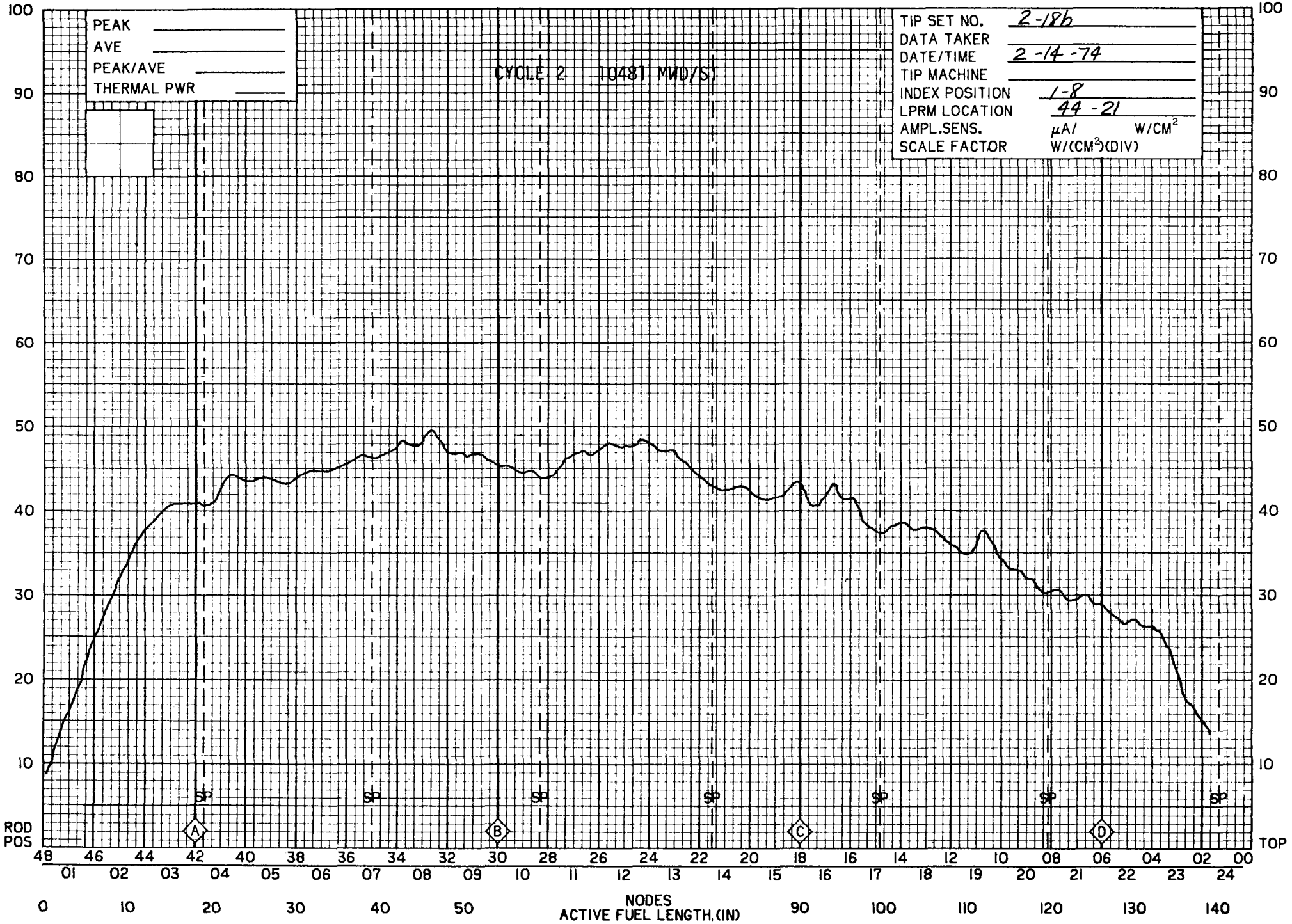
NODES
ACTIVE FUEL LENGTH, (IN)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THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 1-8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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10
ROD POS
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D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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NODES
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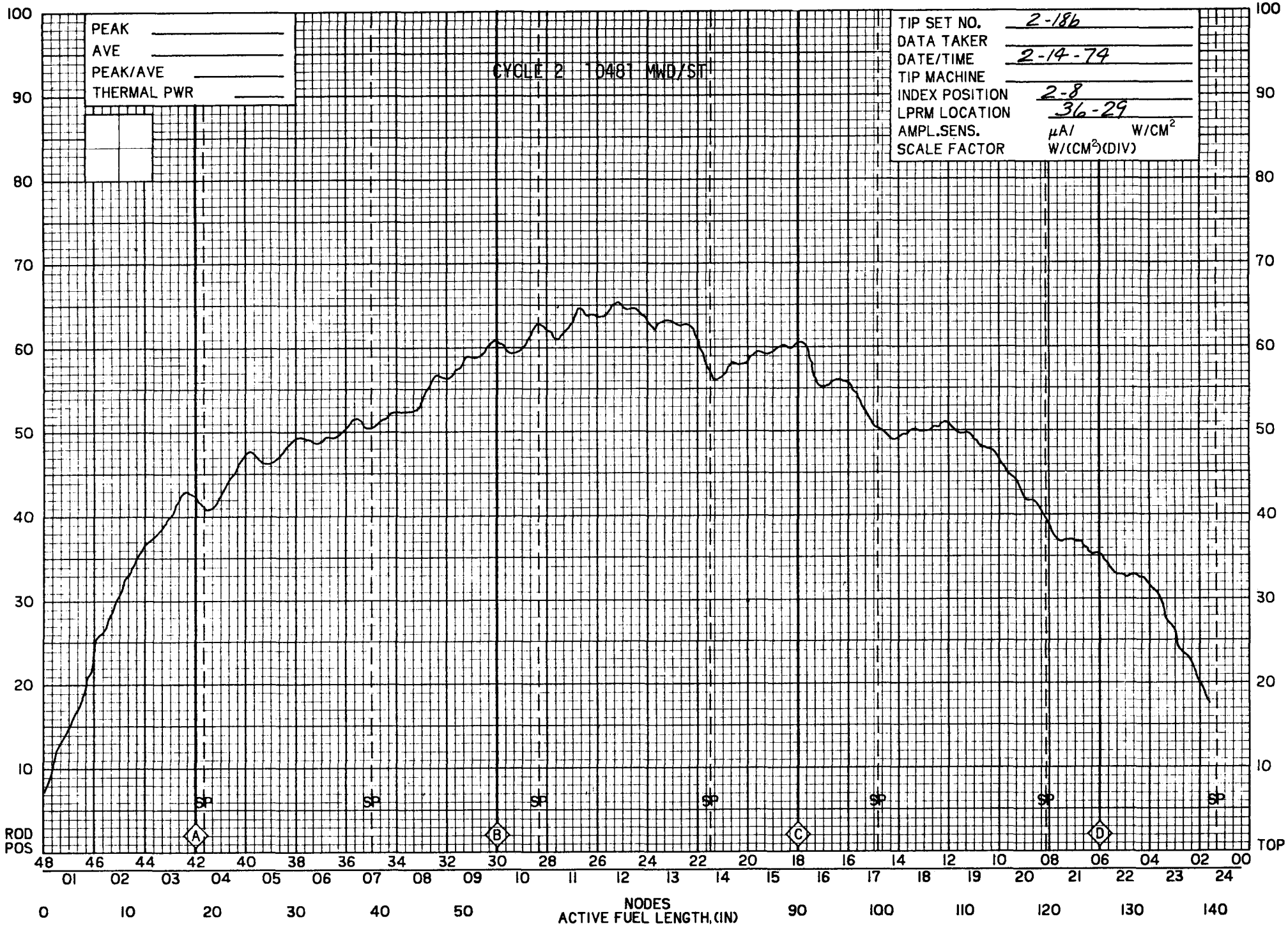
ACTIVE FUEL LENGTH, (IN)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PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 2-8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
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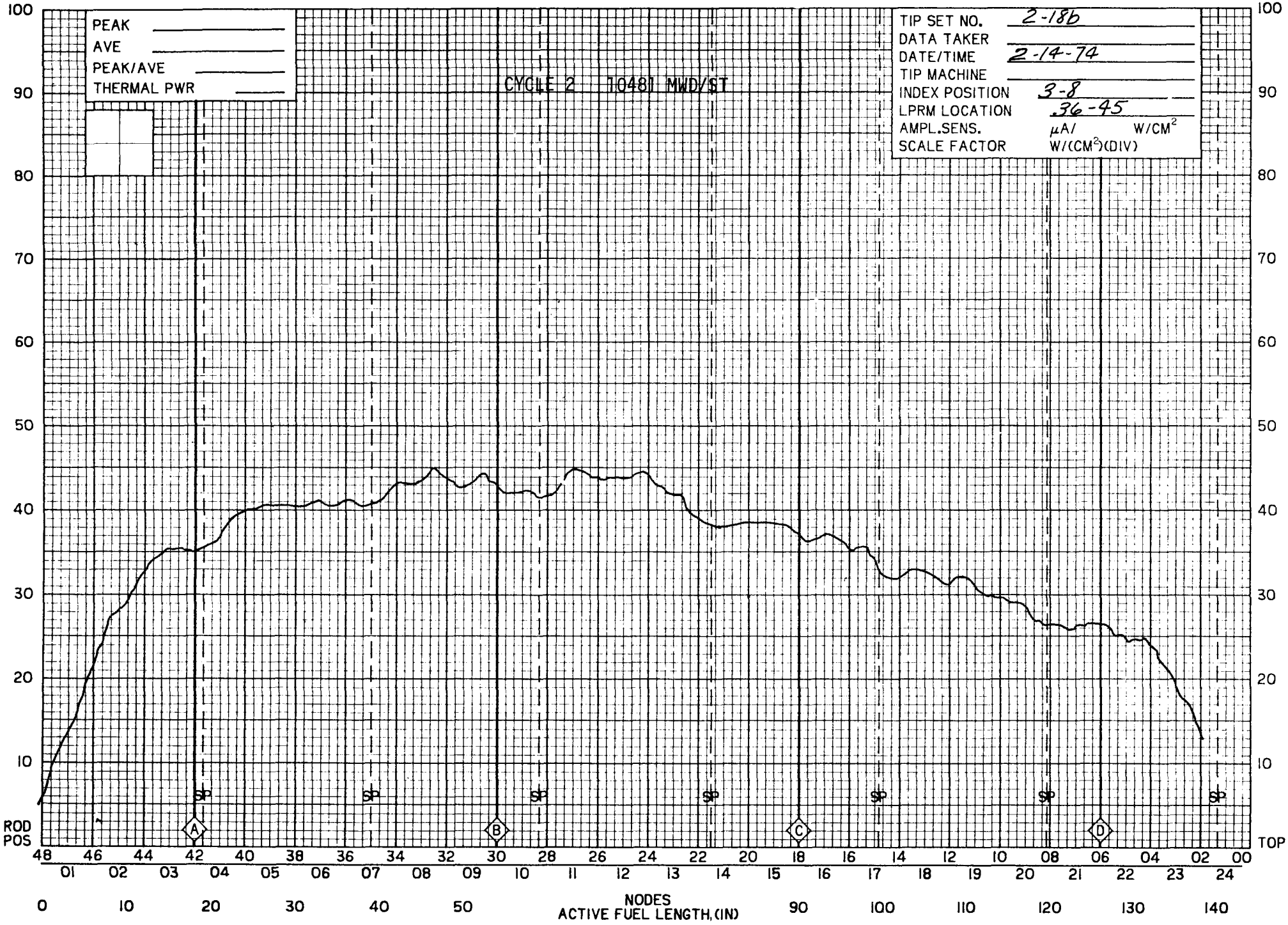
NODES
ACTIVE FUEL LENGTH,(IN)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THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-8
LPRM LOCATION 36-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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ROD POS
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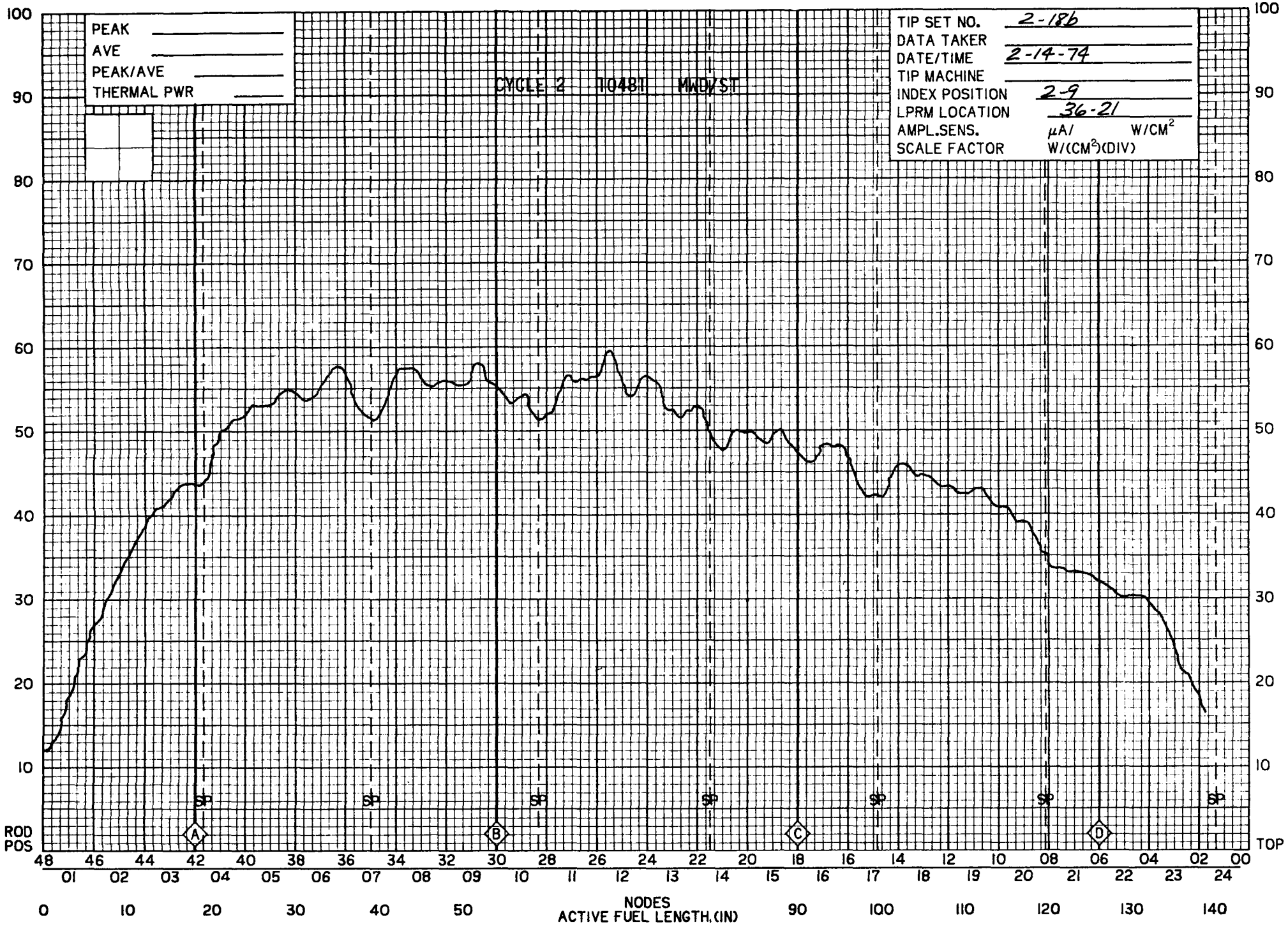
NODES
ACTIVE FUEL LENGTH, (IN)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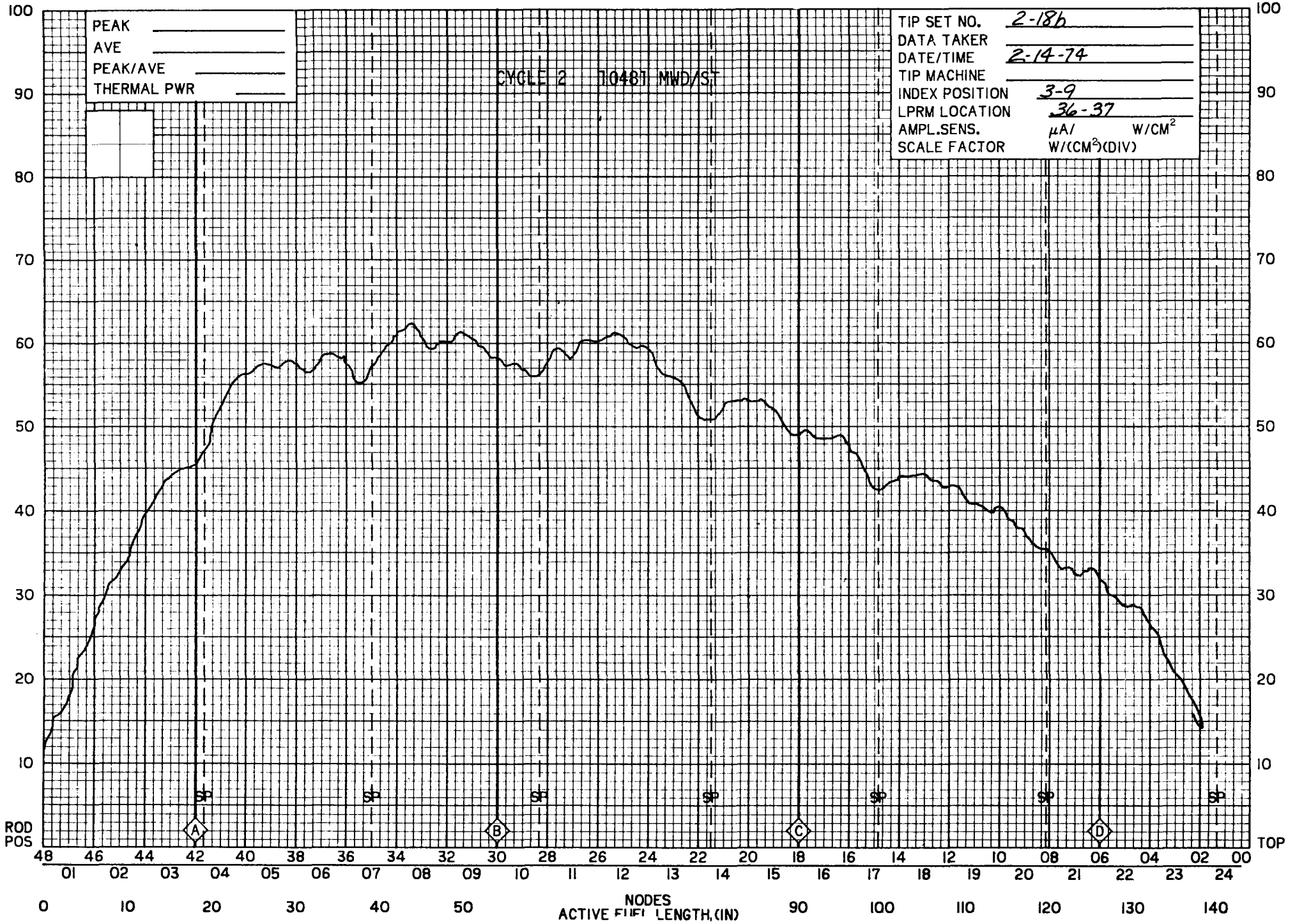
PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 2-9
LPRM LOCATION 36-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH,(IN)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PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION 3-9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
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20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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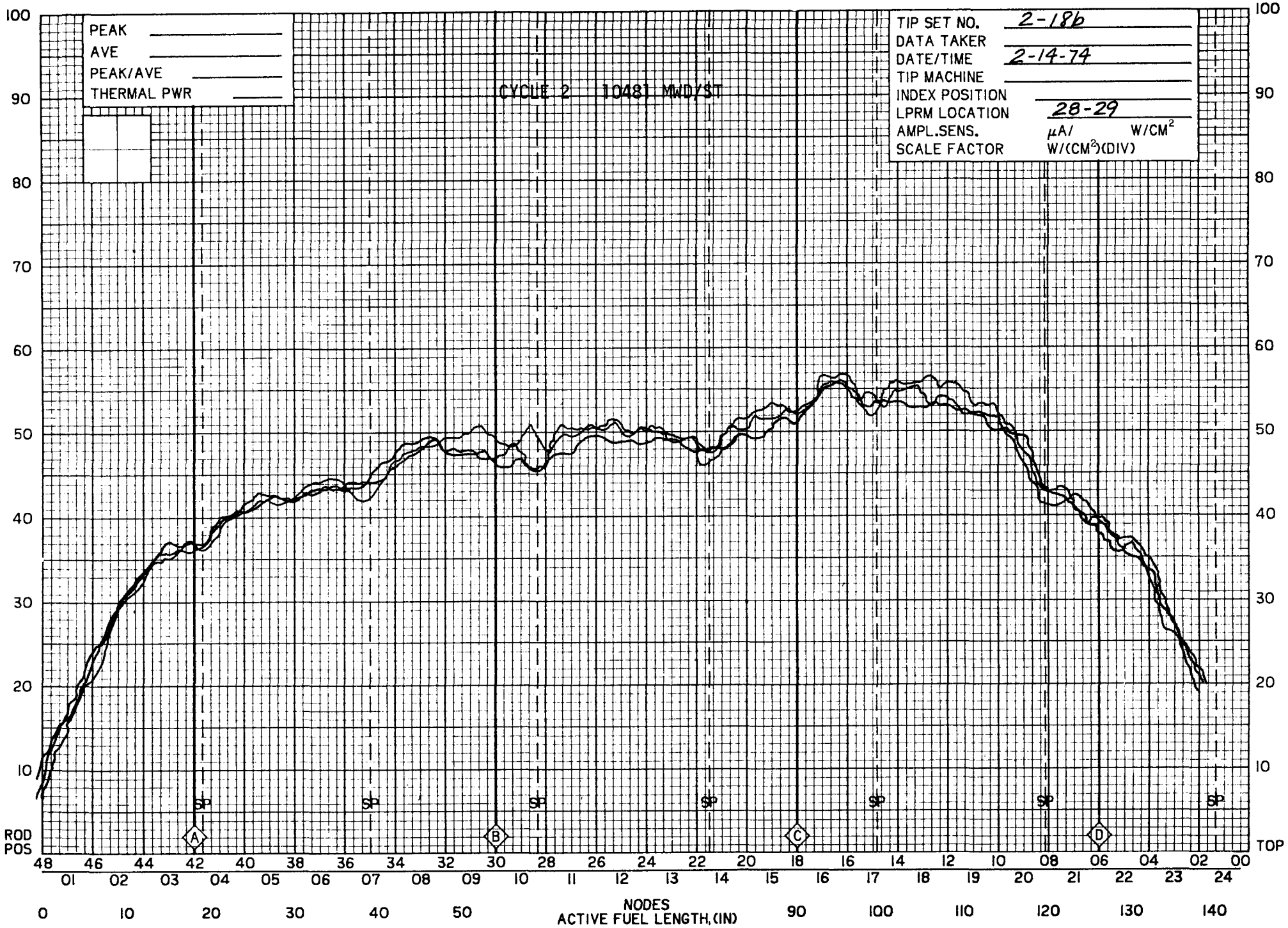
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)


PEAK
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PEAK/AVE
THERMAL PWR
CYCLE 2 10481 MWD/ST
TIP SET NO. 2-18b
DATA TAKER
DATE/TIME 2-14-74
TIP MACHINE
INDEX POSITION
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

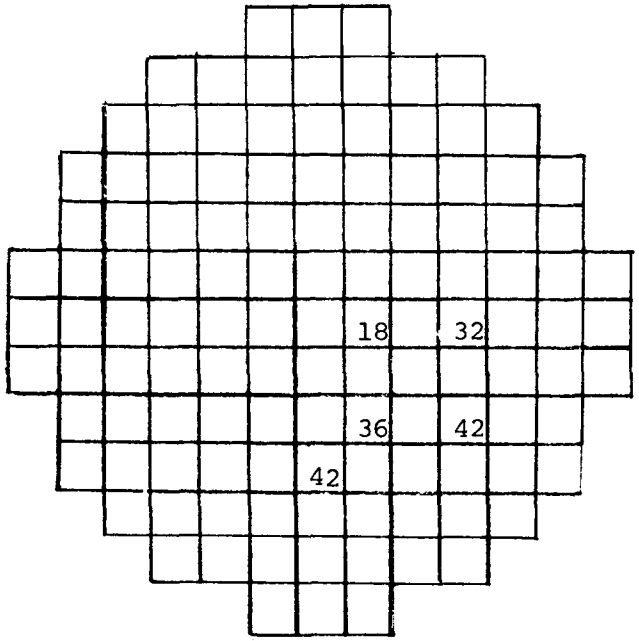
REACTOR: Monticello
CYCLE: 2
Exposure: 10481 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 9 of 12
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



1/4 core symmetry

Verified By: E. Torok Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure 10481 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 8 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	496	Idem	none
11. Outlet temperature to cleanup system (oF)	428	Idem	none
12. Machine normalized TIP data from process computer			
13. Graphs of TIP traces from plotter if available			See attached set of TIP traces
14. Xenon history-past 48 hours Time (hrs)/Core power (%)			See attached power histogram
15. Control rod positions (by location)	See Sheet #9		

Verified By: E. Tcz Date: 07/19/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 02/15/74 0827 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
475.40	1377.13	54.73	38.77	52.94	17.19	2.00	0.1081	1002

RWL	DPM	WFW	HFW	HD	DHO	CXE
37.22	13.59	5.46	336.59	514.46	19.47	0.1023

RAP	83.250	82.344	82.250	83.094	82.469	83.313
AGAF	0.991	1.001	1.003	0.992	1.000	0.990

IB 1

RAPL	-201.91	5.05	20.19	35.33	50.48	65.62
	80.76	90.86	100.95	111.05	126.19	201.91

QFW	QCR	QCU	QRAD	QPUMP	TFW
1368.219	9.141	1.830	0.600	2.662	362.520

HF	HFG	HG	HS	WCR	MCR
542.72	649.03	1191.75	1191.11	0.0278	70.66

WCU	HCU1	HCU2	ID	REFCTP	RAICTP
0.0816	481.93	405.40	522.18	1670.00	1670.00

PPW	1.4295	1.4332

CAP	0.00991	0.01001	0.01003	0.00992	0.01000	0.00990
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.60
WTC	17.80	23.00	31.70	40.30	49.00	57.60

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 2/15/74 H.B. NO. 2-113
TIME 852 BY JH

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS	
*	1	GROSS GEN. OUTPUT	GMWE	CO8	W/GEN	473.0	MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	18.9	MWE
*	3	HP COND. VACUUM	HPCV	CO7	PR 1264	.7	IN HG ABS
*	4	LP COND. VACUUM	LPCV	CO7	PR 1264	.6	IN HG ABS
	5	REACTOR PRESSURE	PR	CO5	6-98	989	PSIG
	6	ROD DRIVE FLOW	WRD	CO5	3-306	53	GPM
*	7	TOTAL CORE FLOW	Wc	CO5	FR-2-3-95	54.8	MLB/HR
	8	A RECIRC. PUMP PWR	Q_{PA}	CO4	2-184-24A	1.46	MW
	9	B RECIRC. PUMP PWR	Q_{PB}	CO4	2-184-24B	1.40	MW
	10	CLEANUP FLOW	W_{CU}	CO4	12-141A&B	164	GPM
	11	CLEANUP INLET TEMP.	TCUI	CO4	POS. 1	496	°F
	12	CLEANUP OUTLET TEMP.	T_{CUO}	CO4	POS. 4	428	°F
	13	ROD DRIVE TEMP.	T_{RD}	COMP	F-127	90	°F
	14	A FEEDWATER FLOW	W_{FWA}	C18	6-79A(x)	(Ma) 2.693	MLB/HR
	15	B FEEDWATER FLOW	W_{FWB}	C18	6-79B(x)	(Ma) 2.801	MLB/HR
	16	A FEEDWATER TEMP.	T_{FWA}	C18	6-79A(z)/TR1148	(Ma) 363.10	°F
	17	B FEEDWATER TEMP.	T_{FWB}	C18	6-79B(z)/TR1148	(Ma) 364.32	°F

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	5	
19	SATURATED STEAM ENTHALPY	h_{gs}	5	
20	A FEEDWATER ENTHALPY	h_{FWA}	5 , 16	
21	B FEEDWATER ENTHALPY	h_{FWB}	5 , 17	
22	CLEANUP INLET ENTHALPY	h_{CUT}	5 , 11	
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	5 , 12	
24	ROD DRIVE ENTHALPY	h_{RD}	5 , 13	

HEAT BALANCE CALCULATIONS

		QUANTITY	SYMBOL	EQUATION	VALUE	
	25	ROD DRIVE FLOW	W_{RD}	.000495 x 6		MLB/HR
	26	TOTAL STEAM FLOW	W_S	14 + 15 + 25		MLB/HR
*	27	CORE INLET ENTHALPY	h_{IN}	See below		MLB/HR
	28	ENERGY OUT - STEAM	Q_S	26 + 19		MBTU/HR
	29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x 10 (22 - 23)		MBTU/HR
	30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4		MBTU/HR
	31	NET ENERGY OUT	Q_{OUT}	28 + 29 ÷ 30		MBTU/HR
	32	ENERGY IN - FEEDWATER	Q_{FW}	14 x 20 + 15 x 21		MBTU/HR
	33	ENERGY IN - ROD DRIVES	Q_{RD}	25 x 24		MBTU/HR
	34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x (8 + 9)		MBTU/HR
	35	NET ENERGY IN	Q_{IN}	32 + 33 + 34		MBTU/HR
	36	CORE THERMAL POWER	Q_{CORE}	31 - 35		MBTU/HR
	37	CORE THERMAL POWER	P_{CORE}	36 / 3.413	1382.26	MWT
	38	CORE THERMAL POWER	%P	37 / 1670	82.77	% OF RATED
*	39	HEAT RATE	HR	36 x 10^3 (1 - 2)	10.39	BTU/KW-HR

$$h_{IN} = \frac{(7 - 25 - 14 - 15)\,18 + 14\,20 + 15\,21}{7}$$

APRM	READING
1	83.78
2	82.81
3	83.28
4	83.00
5	83.62
6	84.02

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS:

REACTOR: Monticello
CYCLE: 2
Exposure 10481 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 7 of 12

Rev. 0 Date: 5/10/76

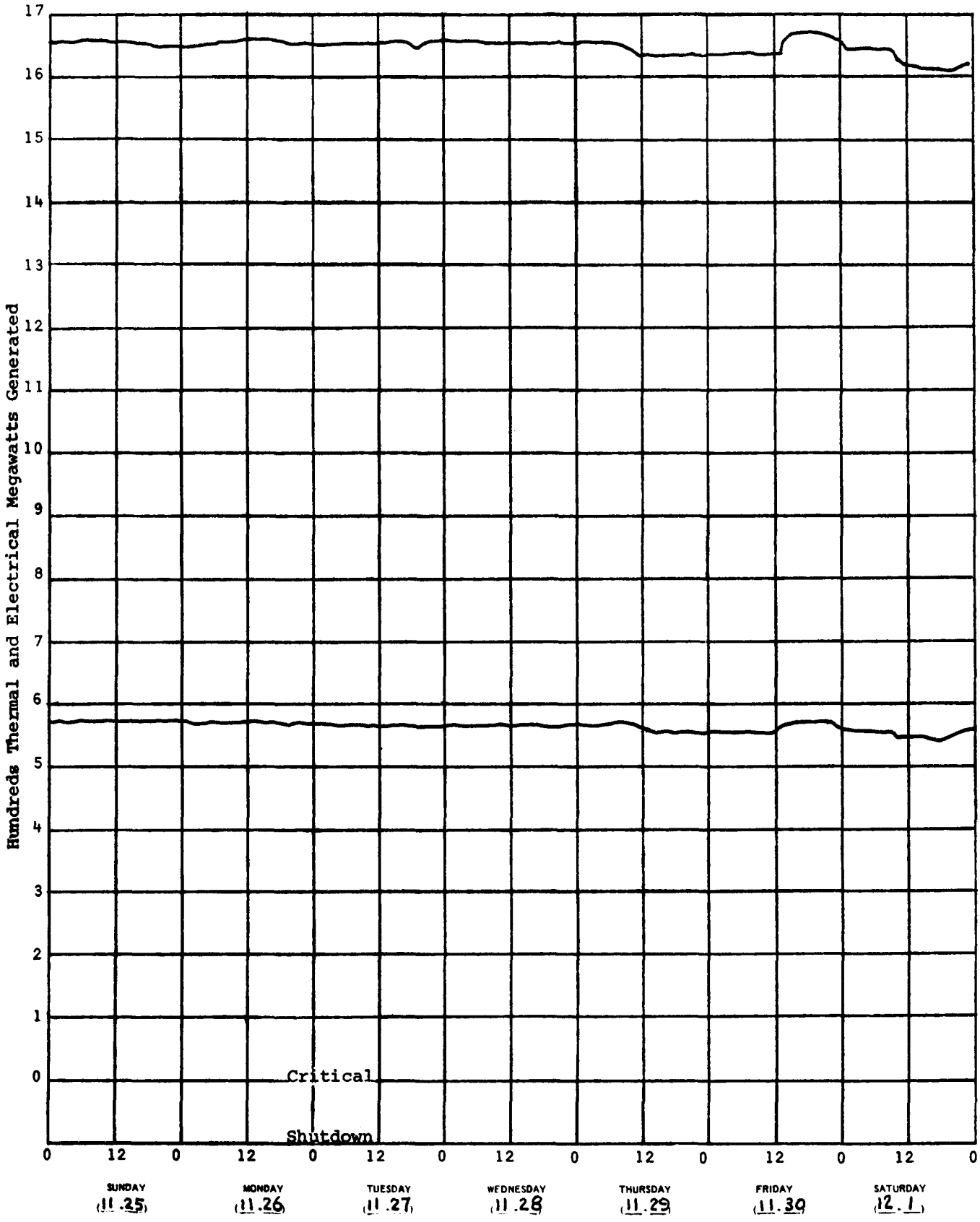
ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1377.13	HB #2-113 2/15/74	HB #2-13 and OD-3 dated 2/15/74 are attached
2. System pressure (psig)	989.	Idem	Calculated core pressure = 1020.6 psia
3. Recirculation flow (lbs/hr)	54.73×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	5.46×10^6	Idem	none
6. Feedwater flow temperature (oF)	363.7	Idem	none
7. Time at associated power level (hr)	>24.	Idem	none
8. Inlet subcooling (BTU/lb)	22.01	Idem	19.47 from HB #2-13 corrected for core pressure
9. Cleanup system flow (gal/min)	164.	Idem	none

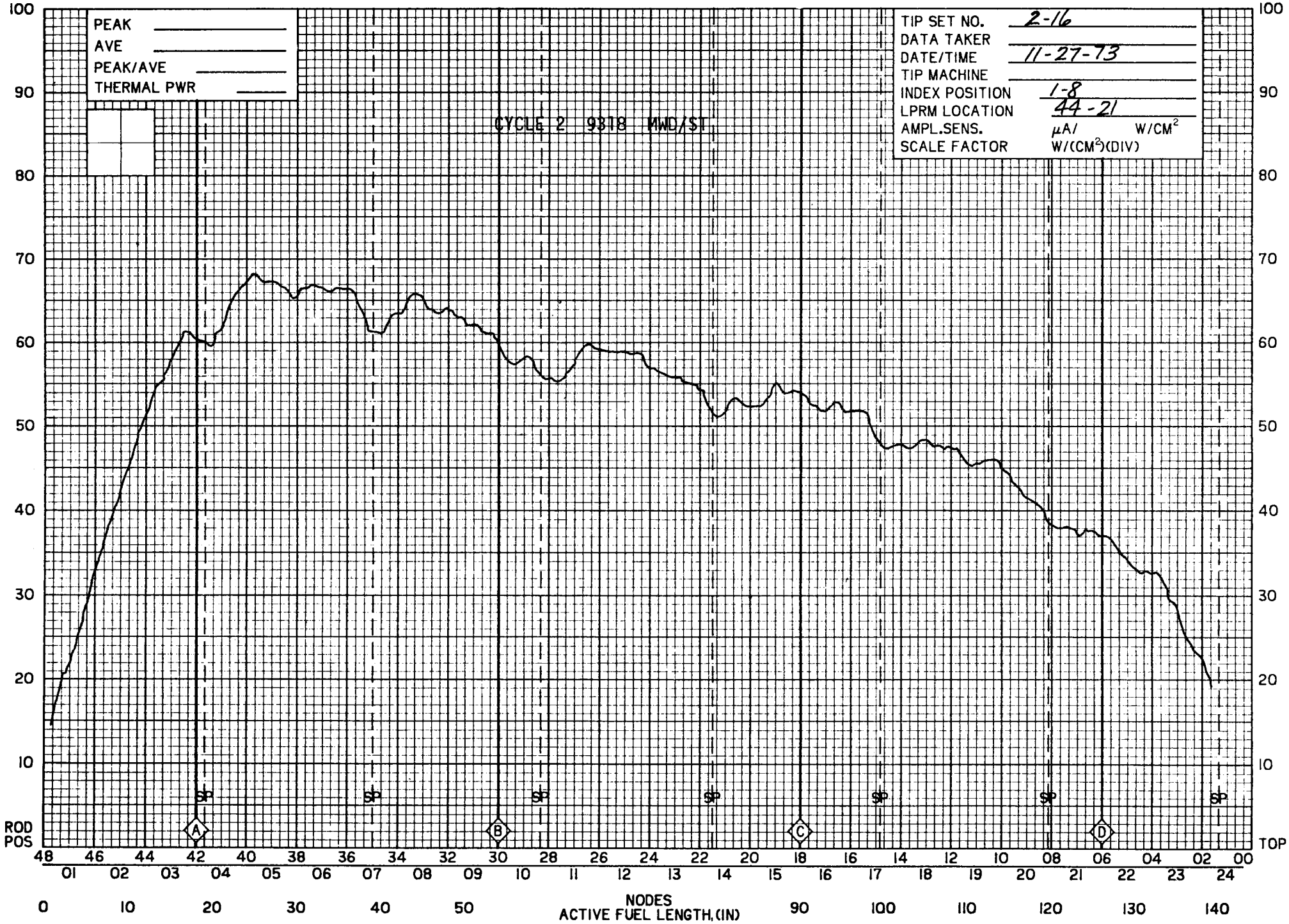
Verified By: [illegible] Date: 07/19/76

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 12 - 1 - 73

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CYCLE 2 9318 MWD/ST
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DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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NODES
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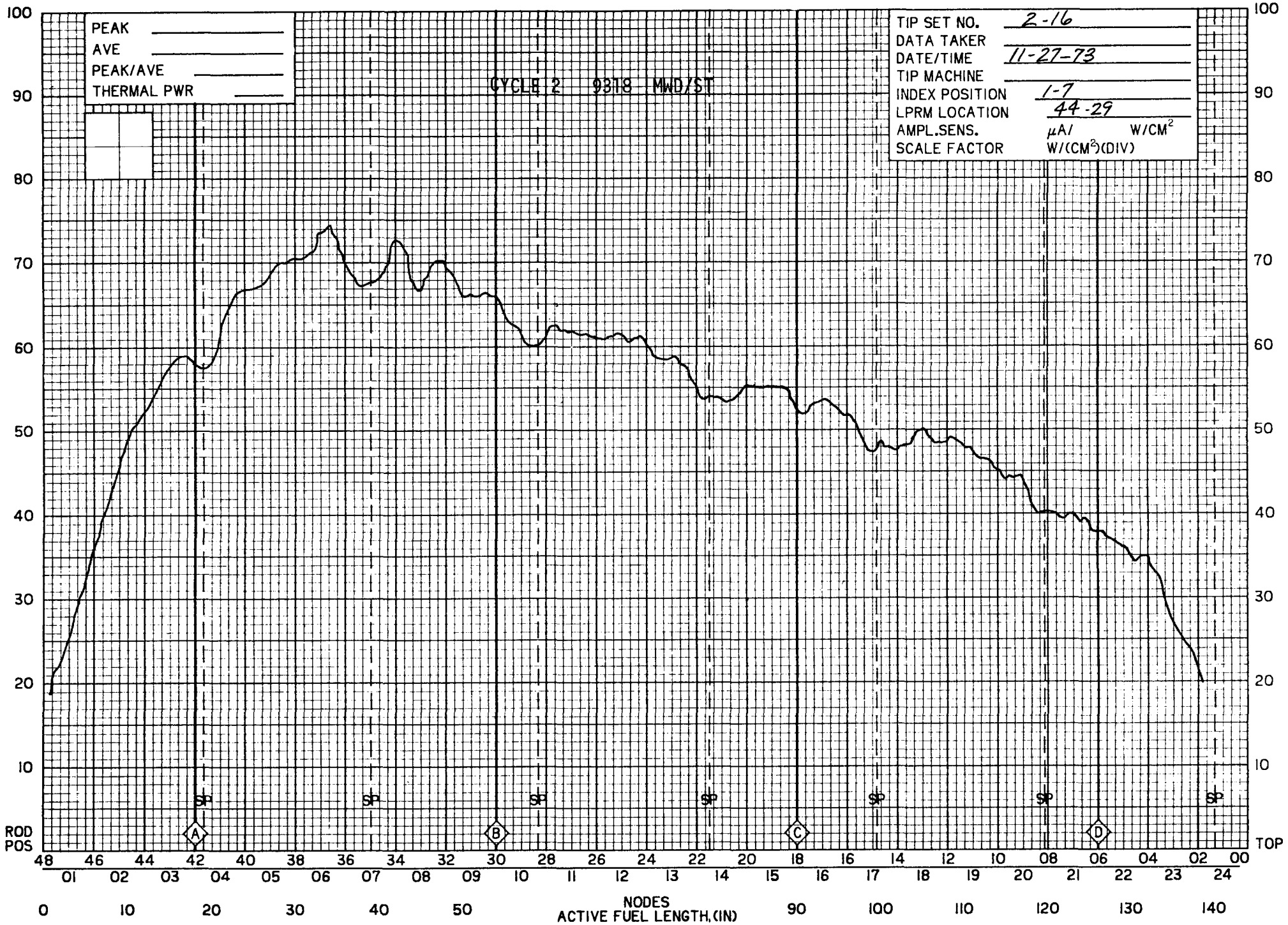
ACTIVE FUEL LENGTH, (IN)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CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
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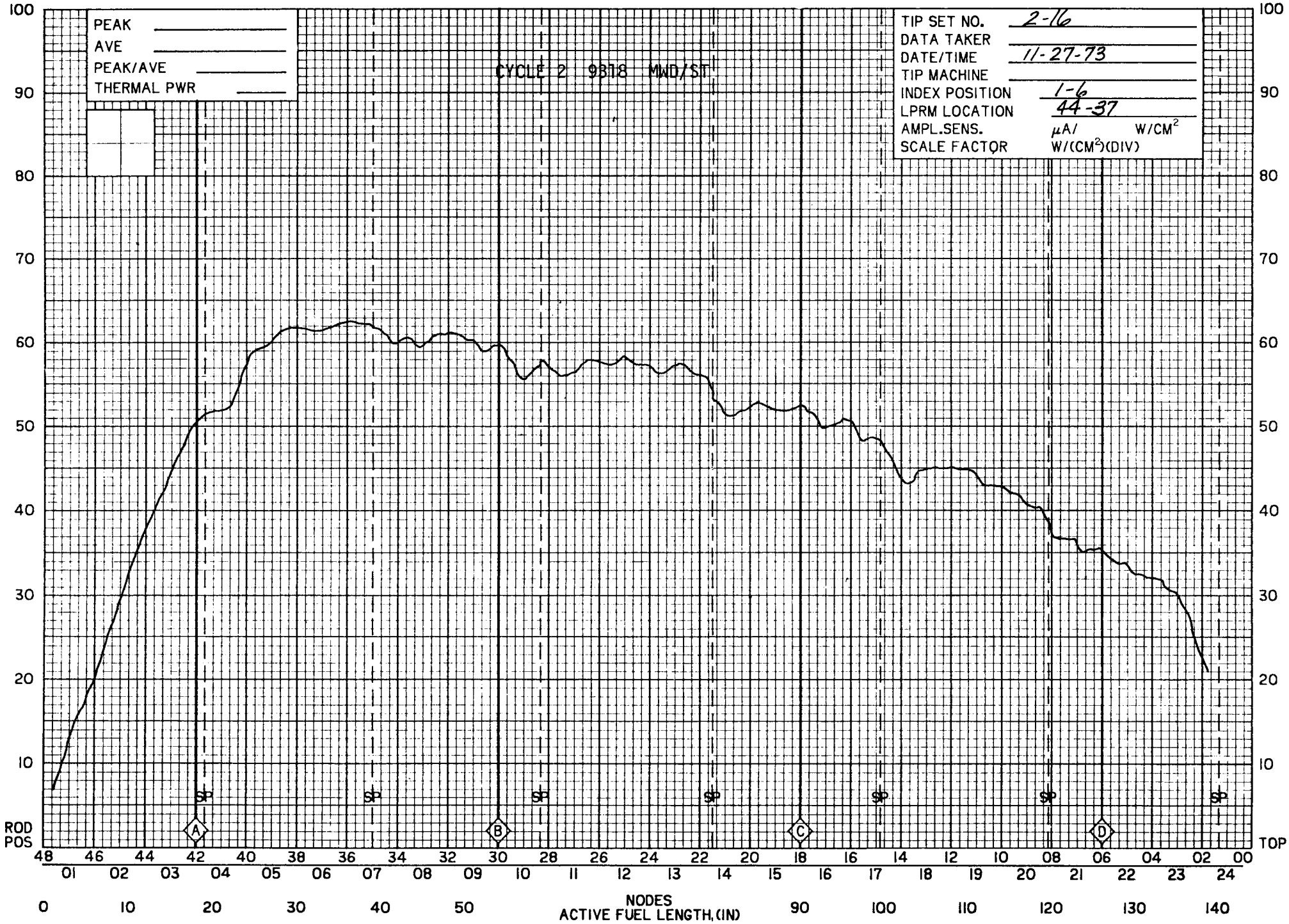
TIP MACHINE
INDEX POSITION 1-7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)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AVE
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THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-6
LPRM LOCATION 44-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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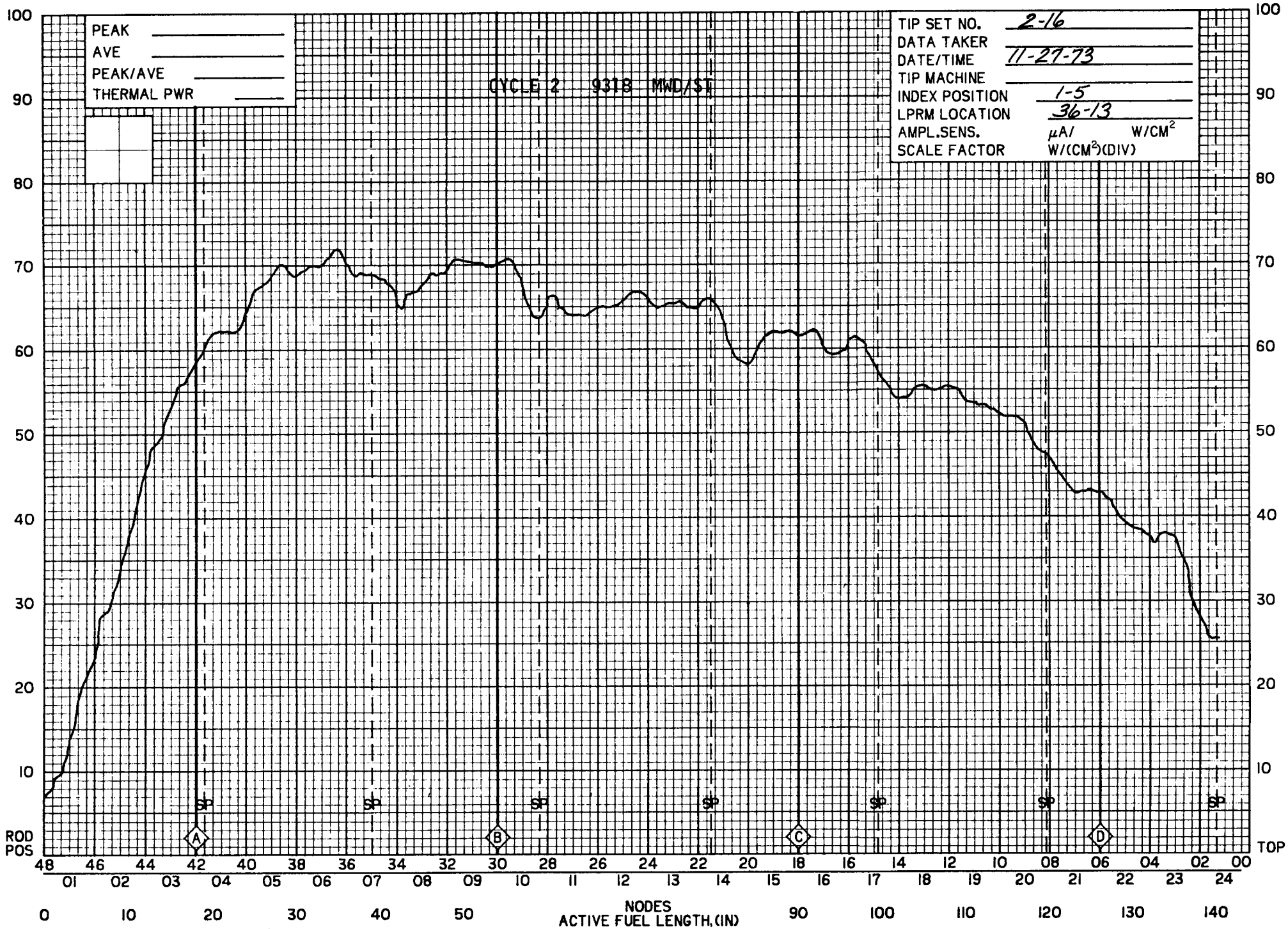
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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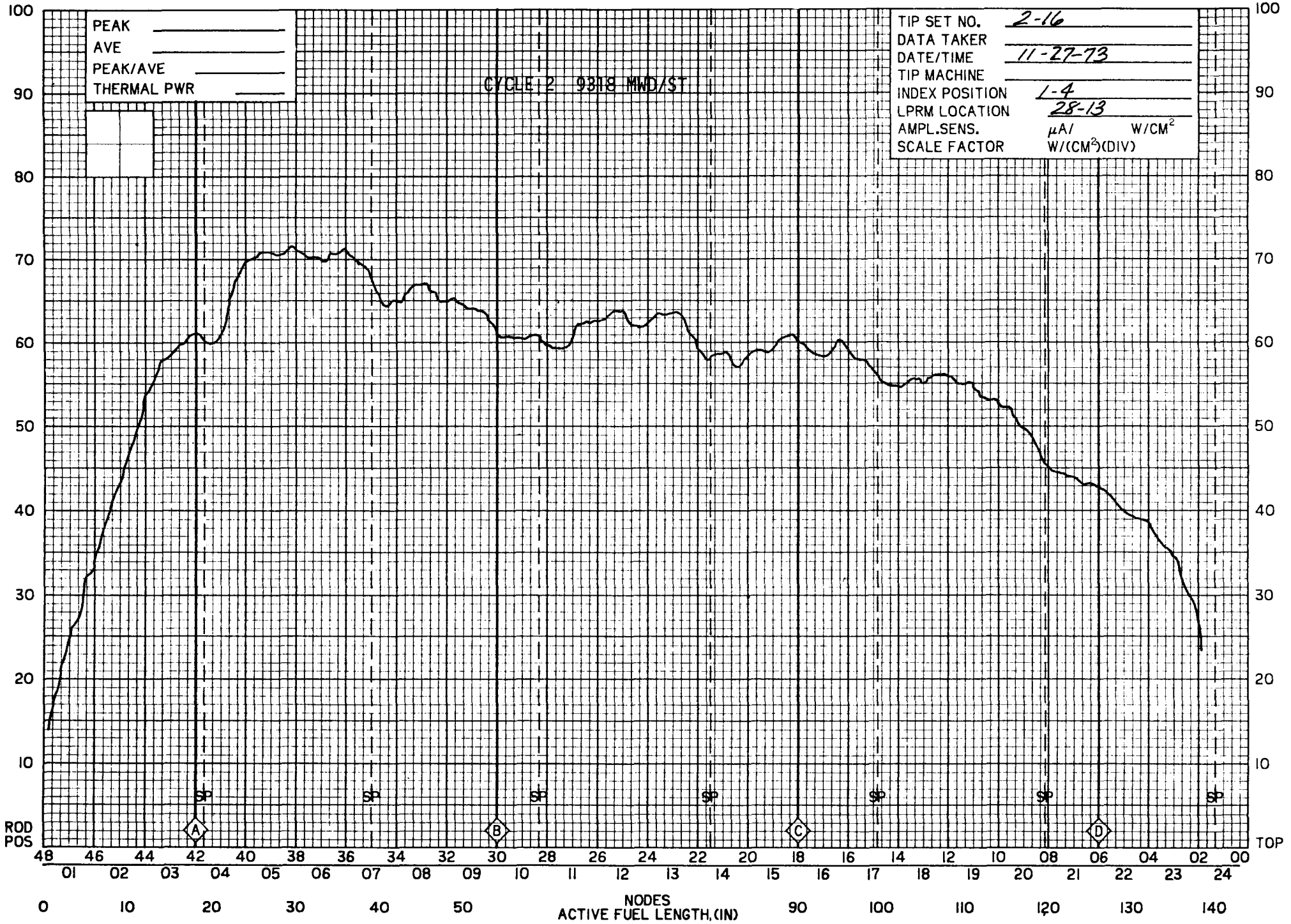
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-5
LPRM LOCATION 36-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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THERMAL PWR
CYCLE 12 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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NODES
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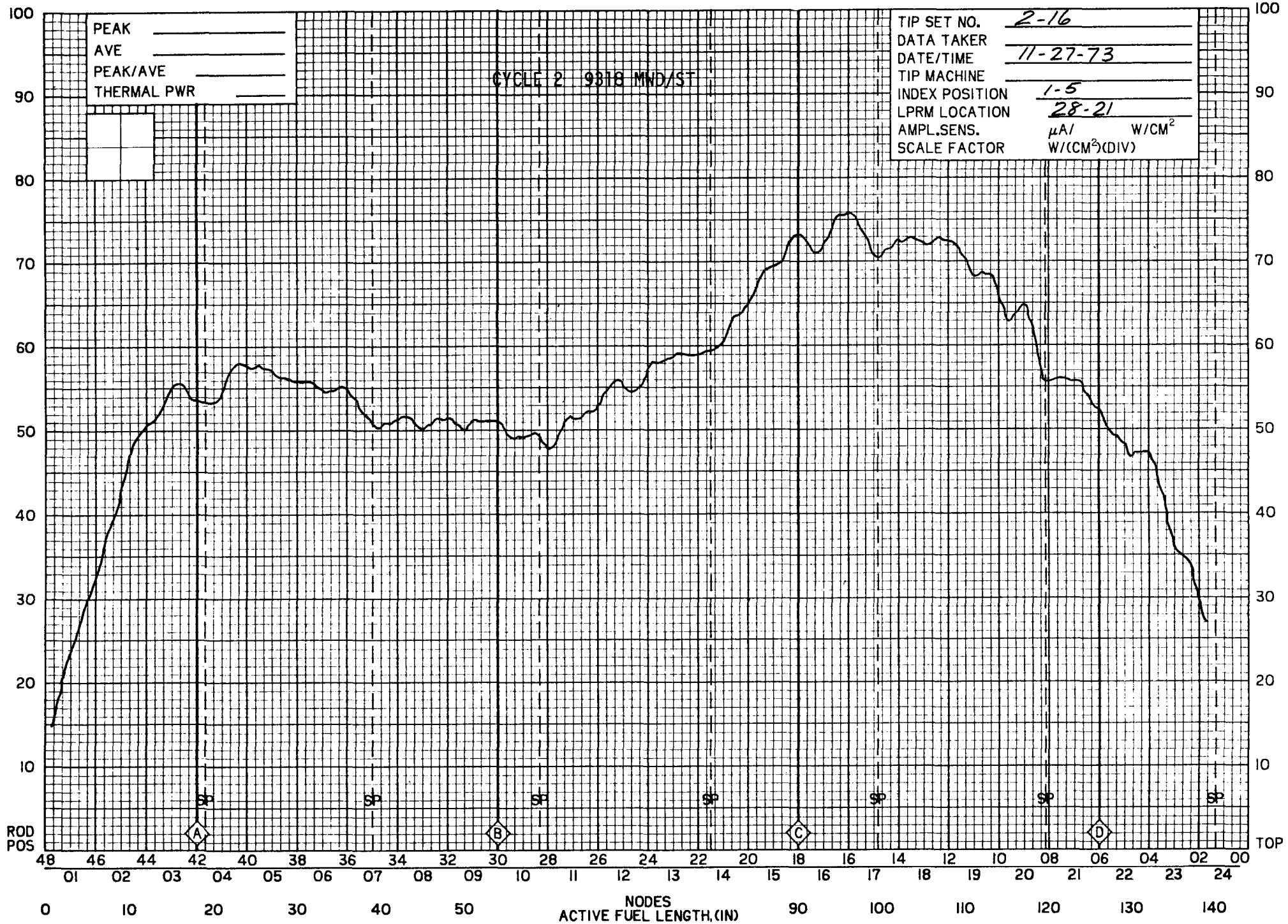
ACTIVE FUEL LENGTH, (IN)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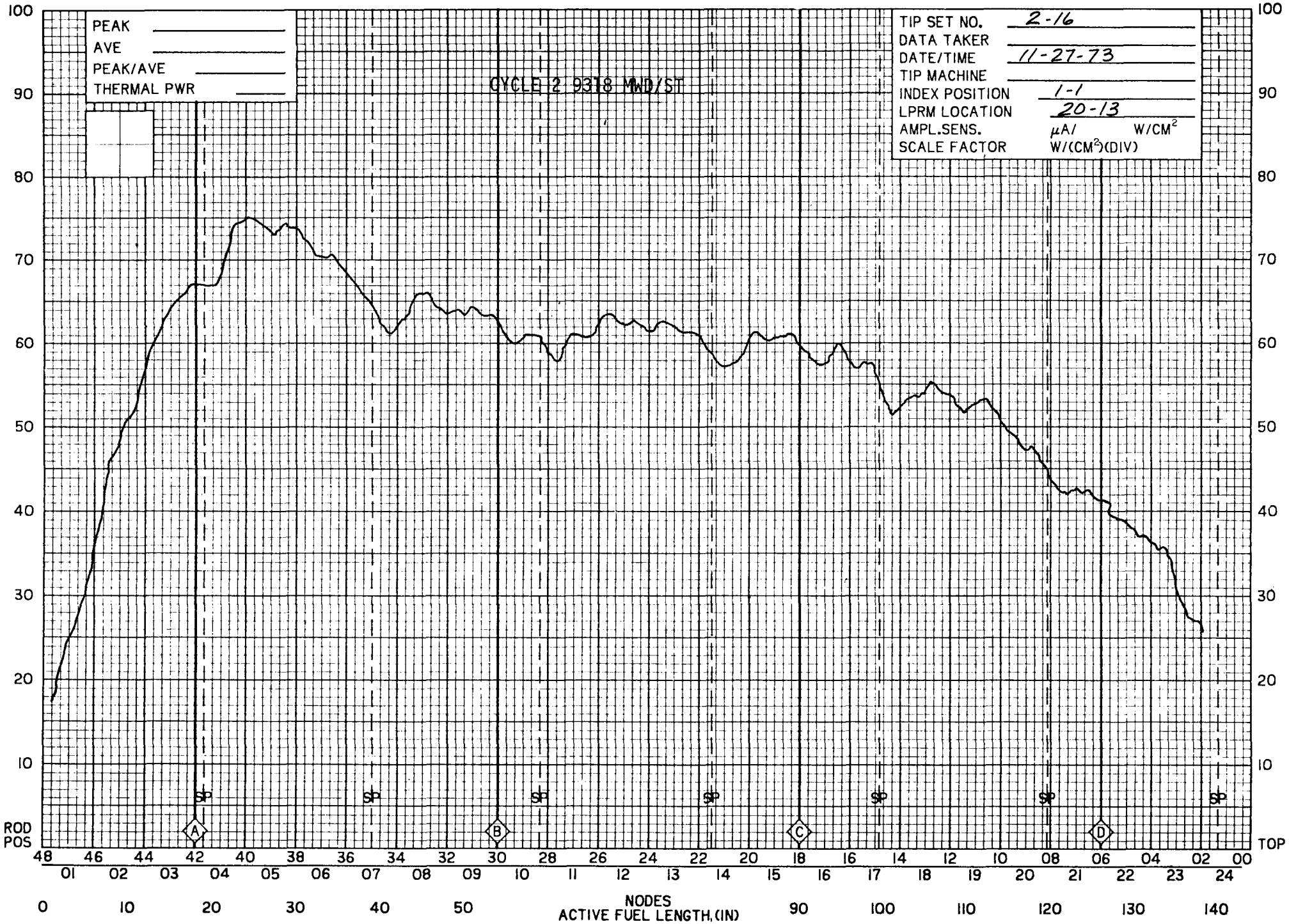
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-5
LPRM LOCATION 28-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)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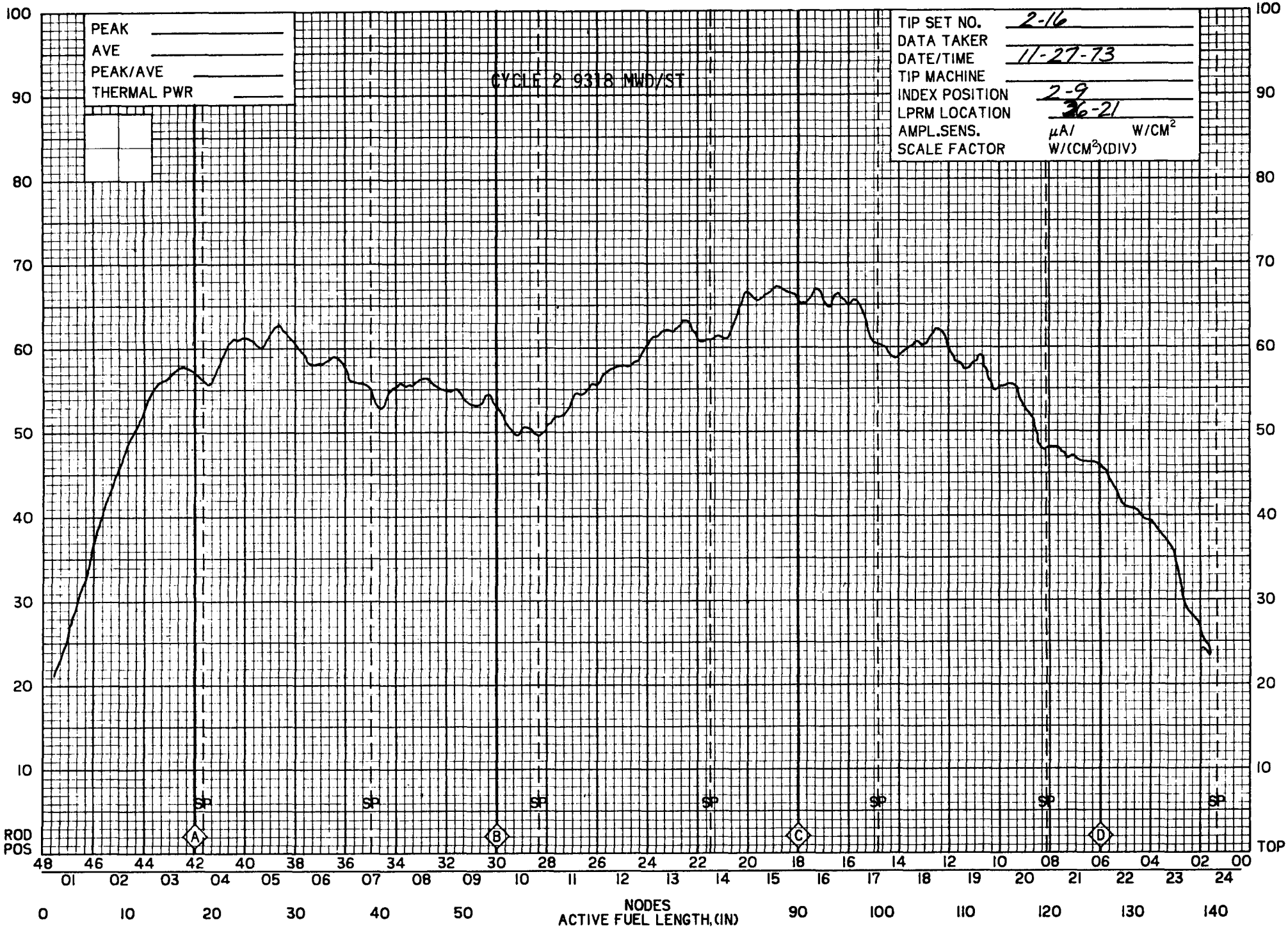
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-1
LPRM LOCATION 20-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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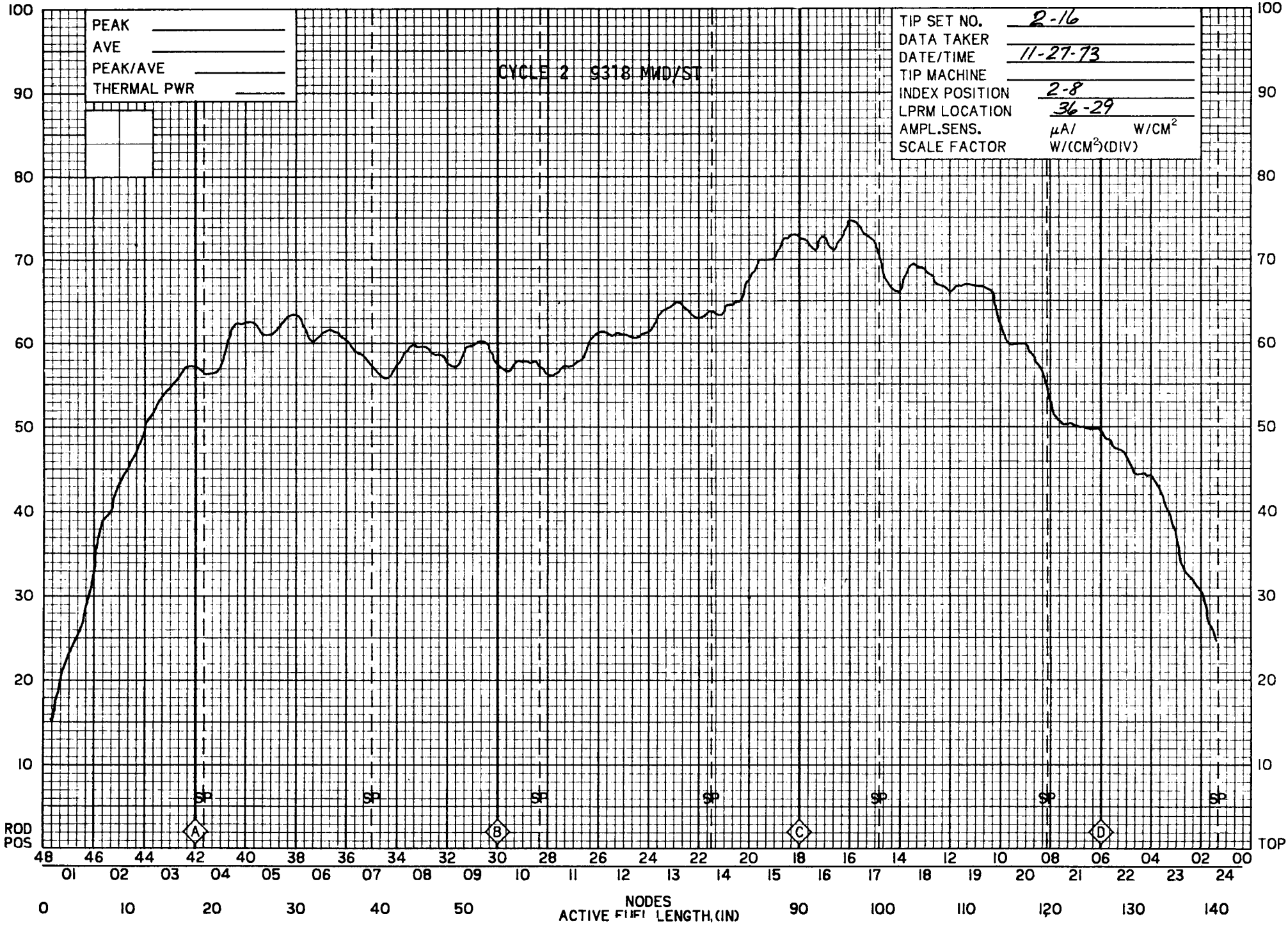
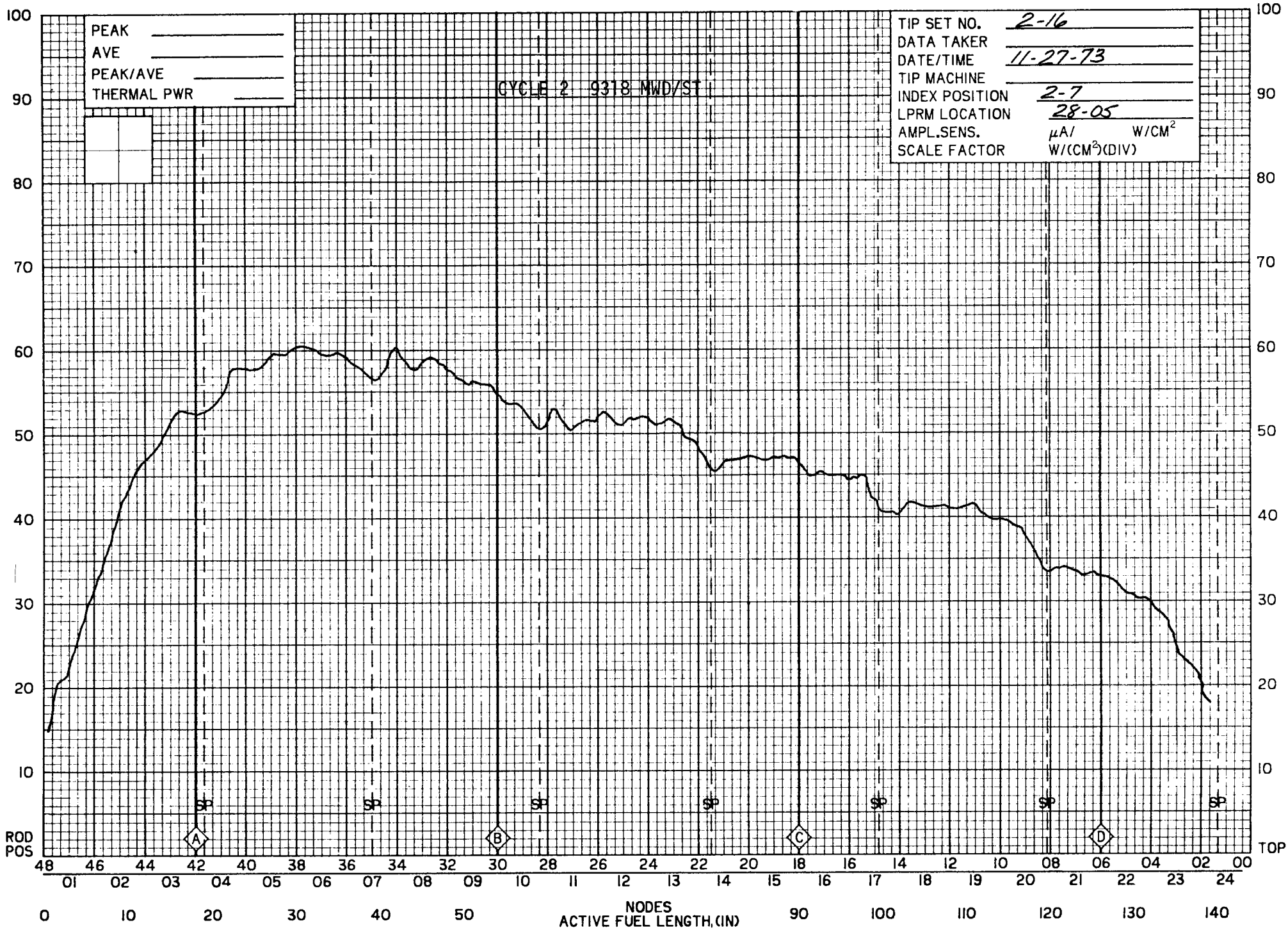
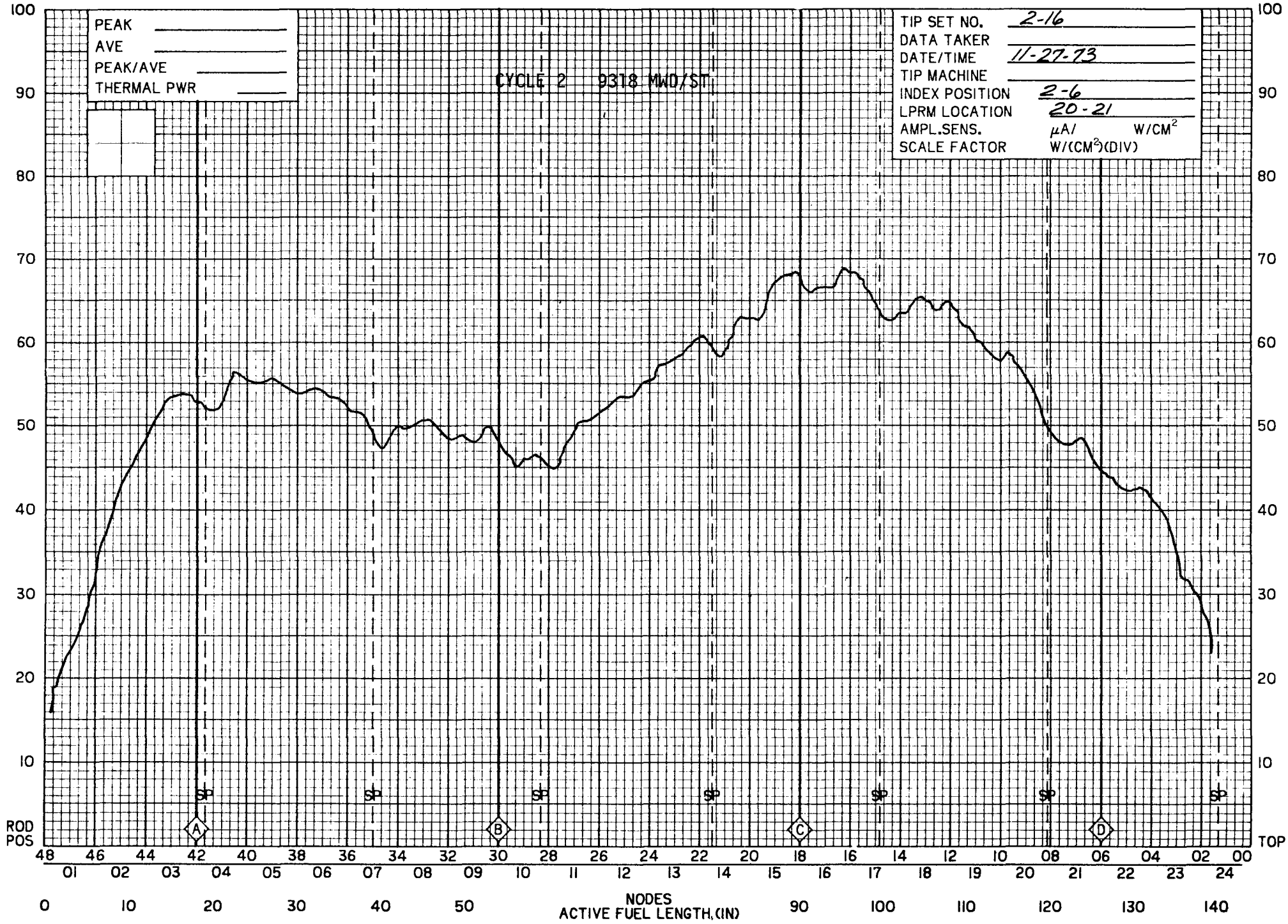
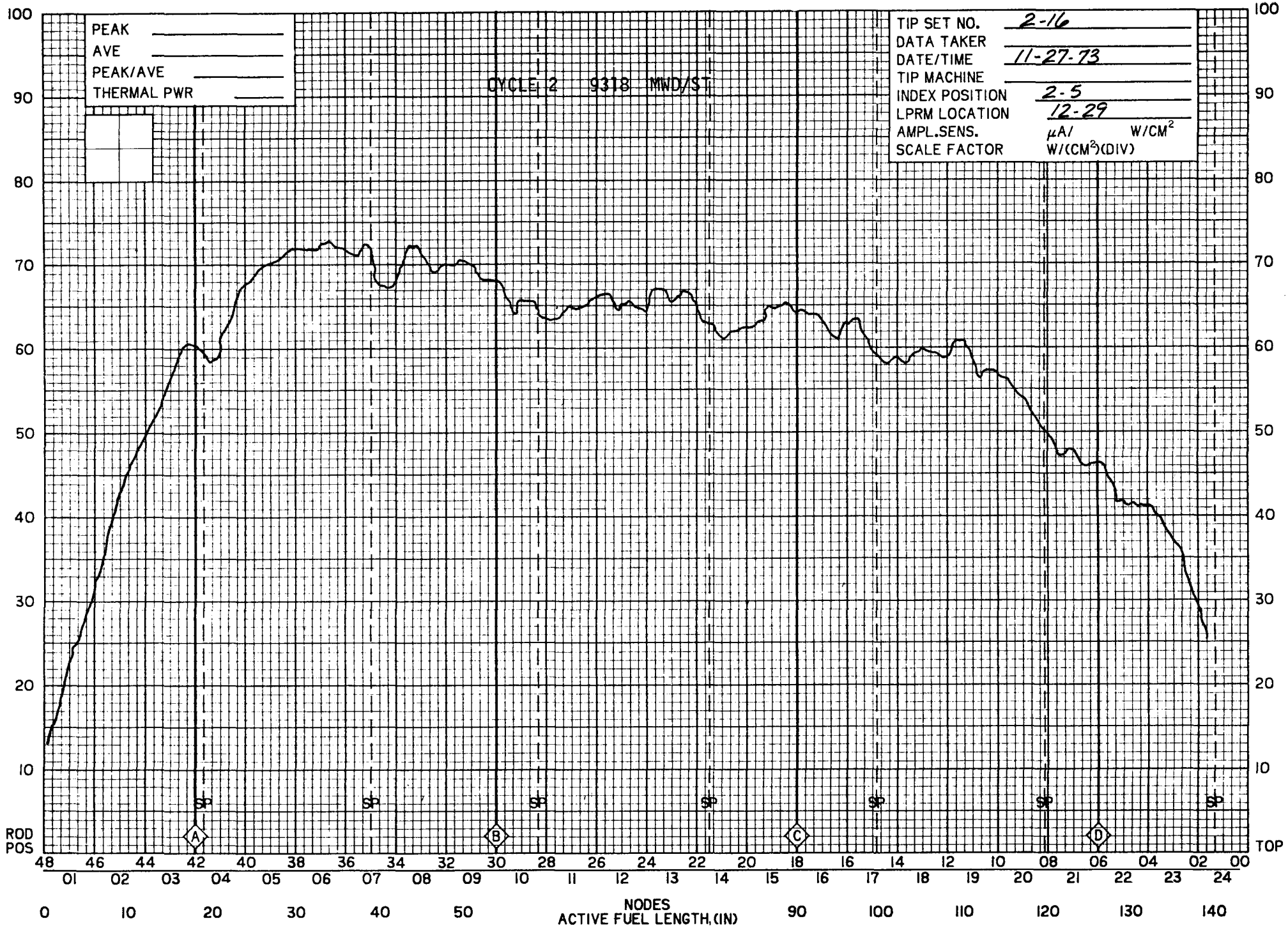
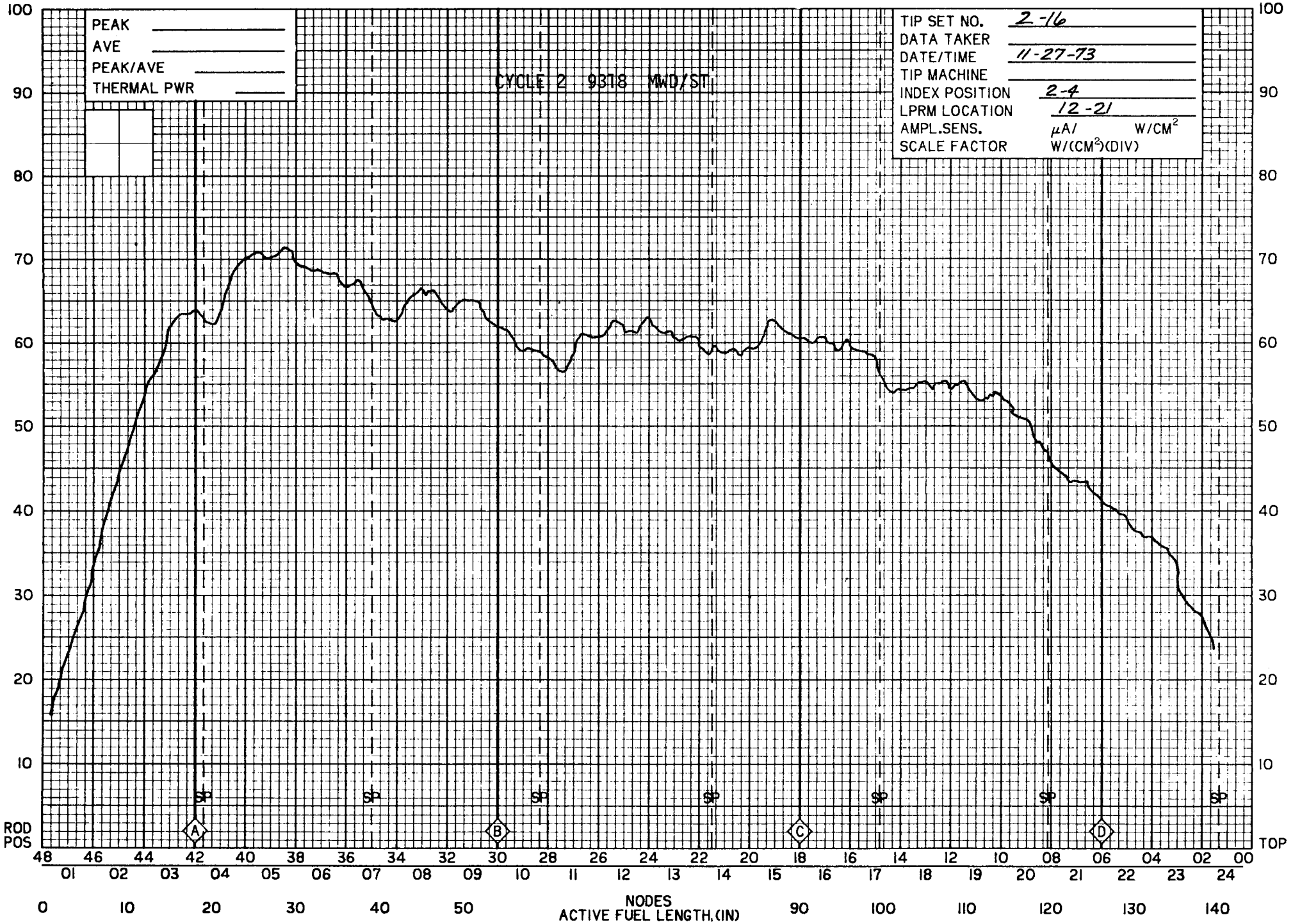
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-9
LPRM LOCATION 36-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-7
LPRM LOCATION 28-05
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-6
LPRM LOCATION 20-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-5
LPRM LOCATION 12-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9378 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-4
LPRM LOCATION 12-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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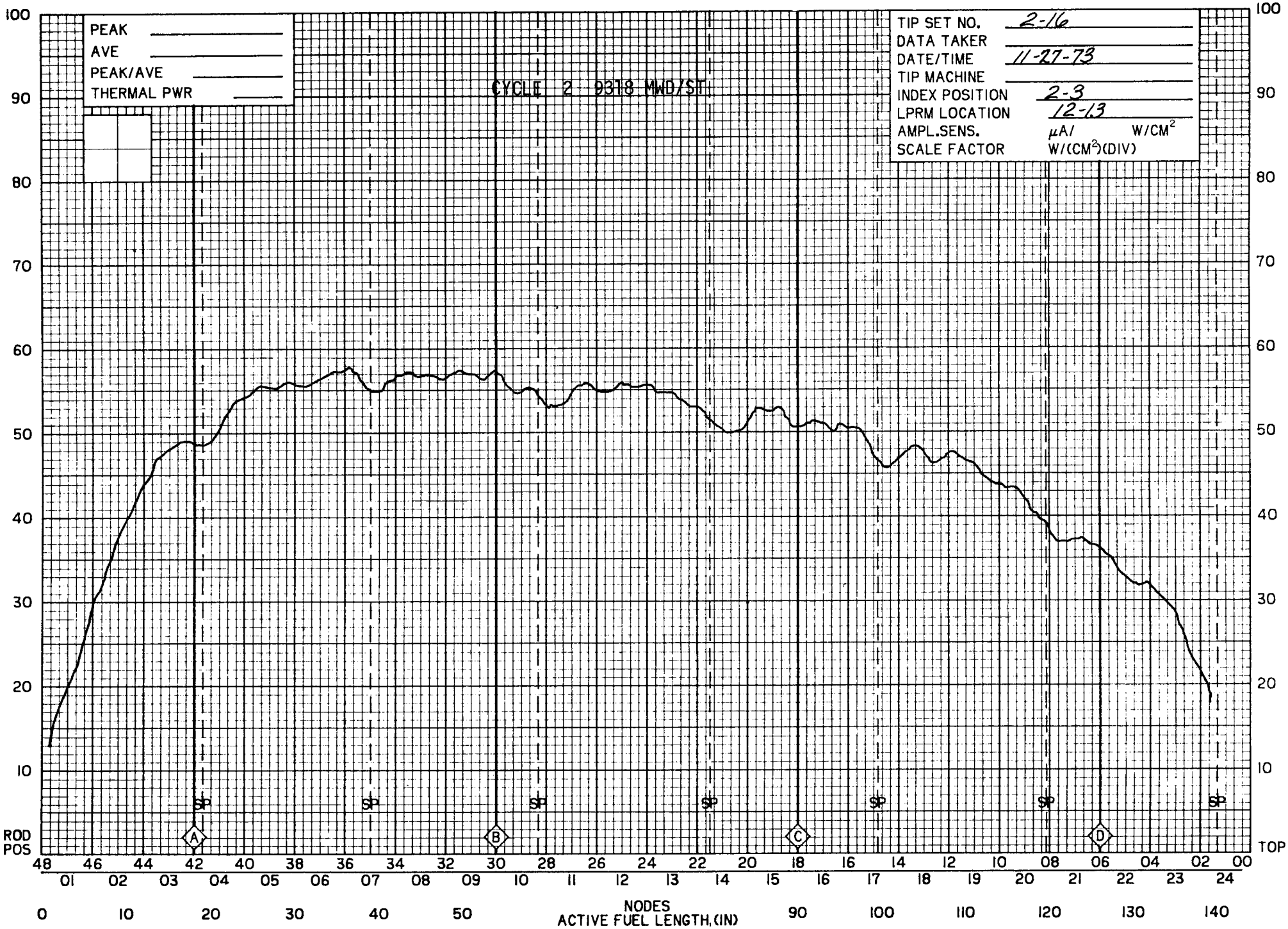
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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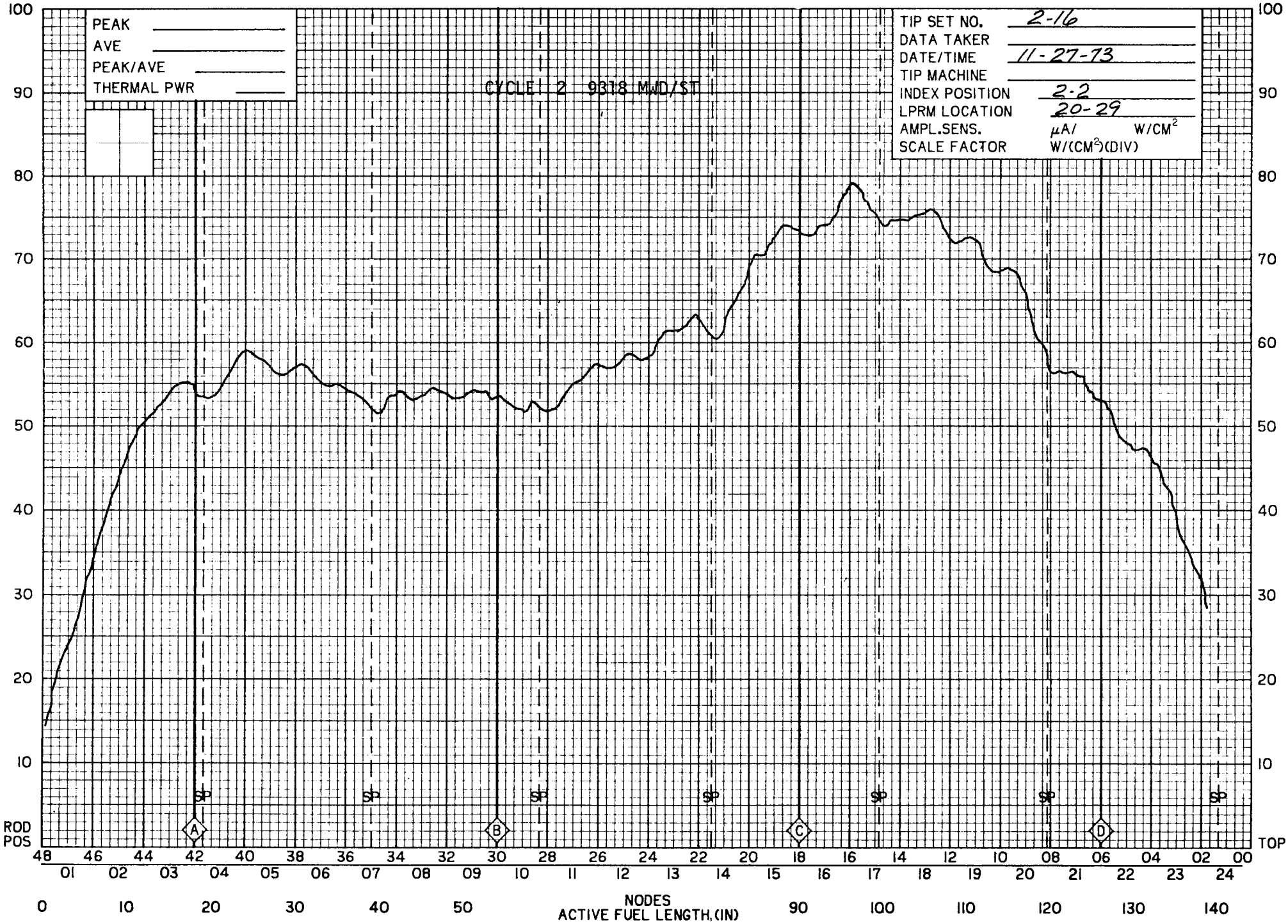
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9378 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH,(IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 12 9378 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 2-2
LPRM LOCATION 20-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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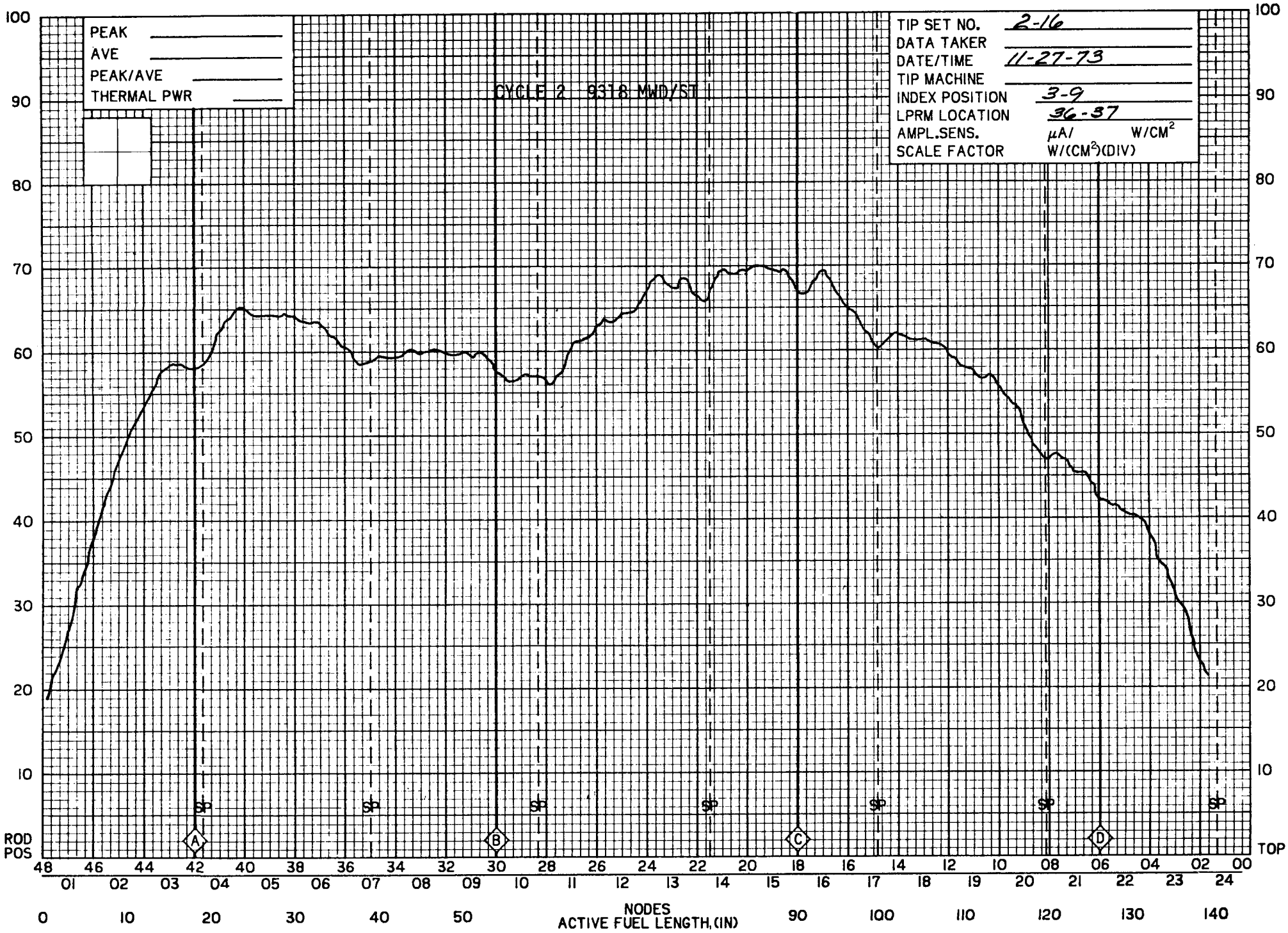
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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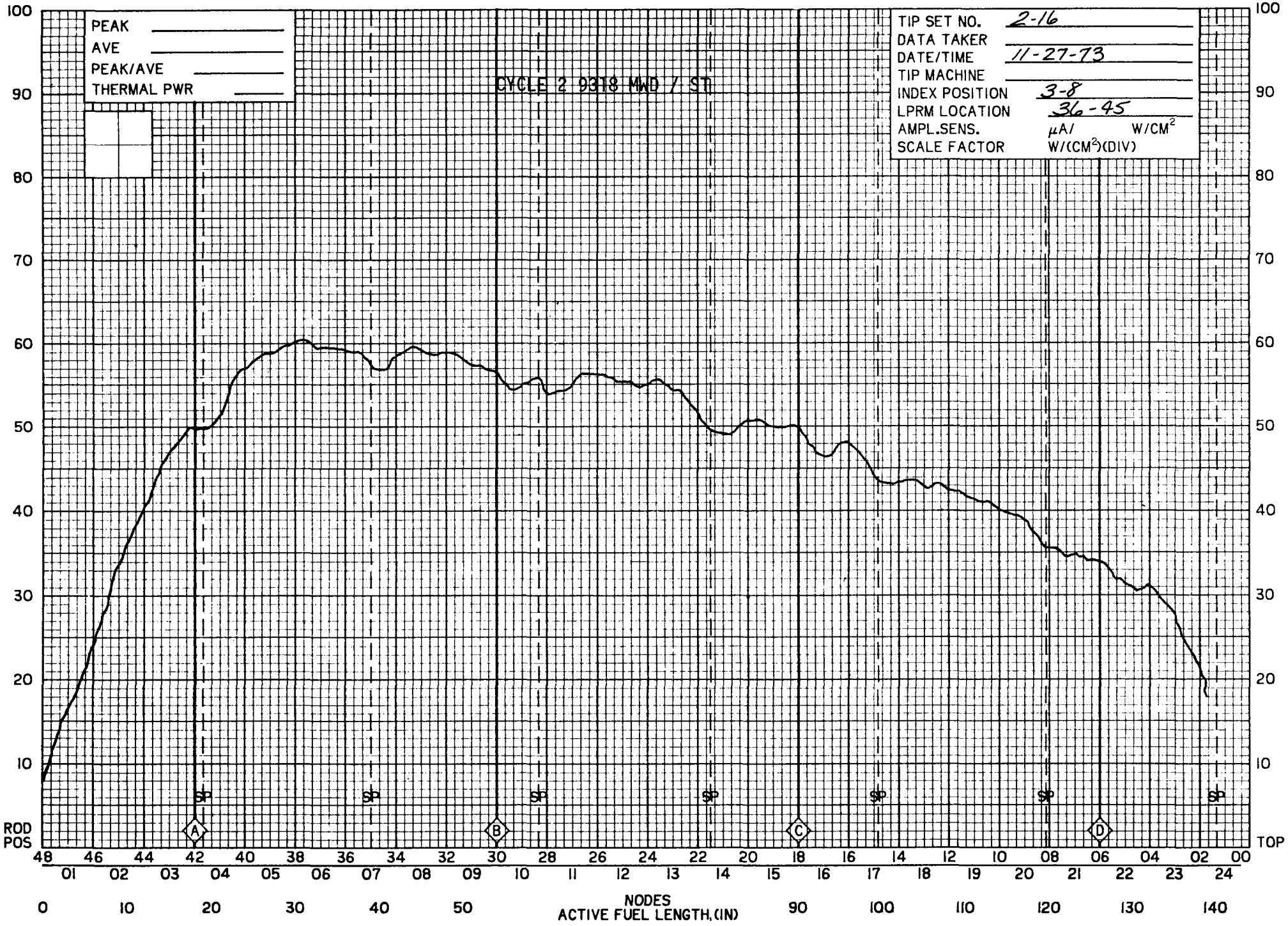
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD / ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-8
LPRM LOCATION 36-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
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NODES
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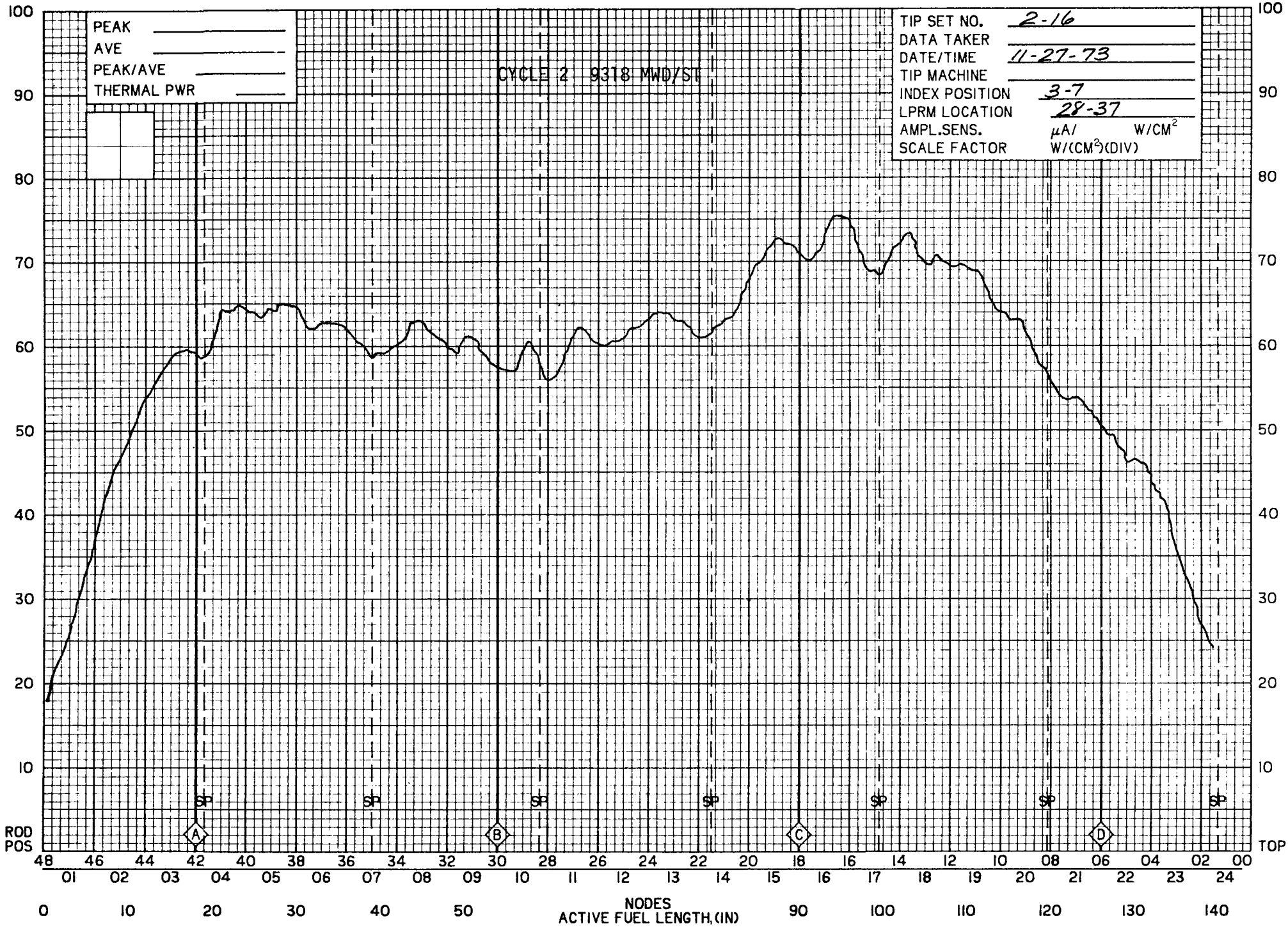
ACTIVE FUEL LENGTH,(IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-7
LPRM LOCATION 28-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
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90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
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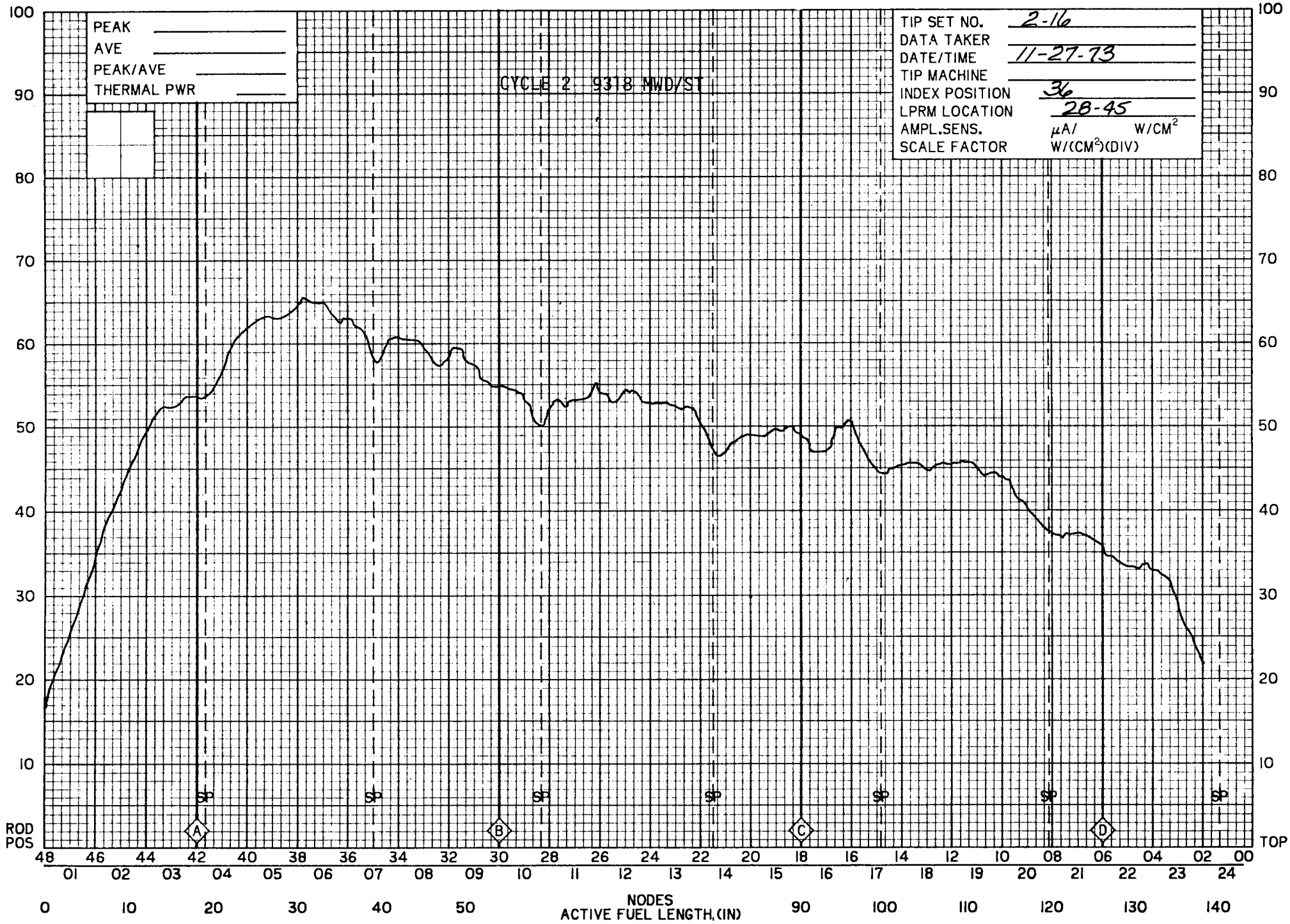
ACTIVE FUEL LENGTH, (IN)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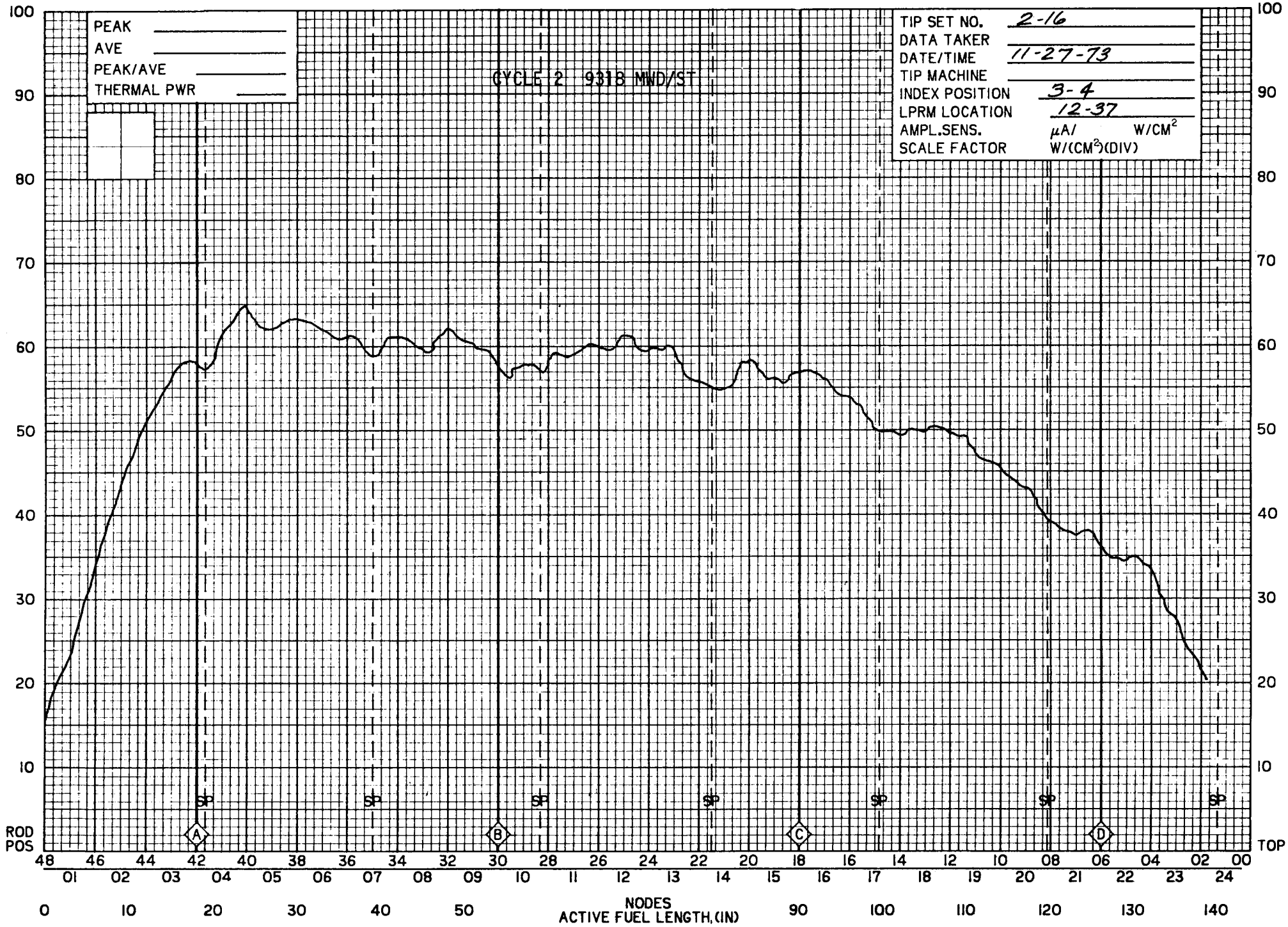
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 36
LPRM LOCATION 28-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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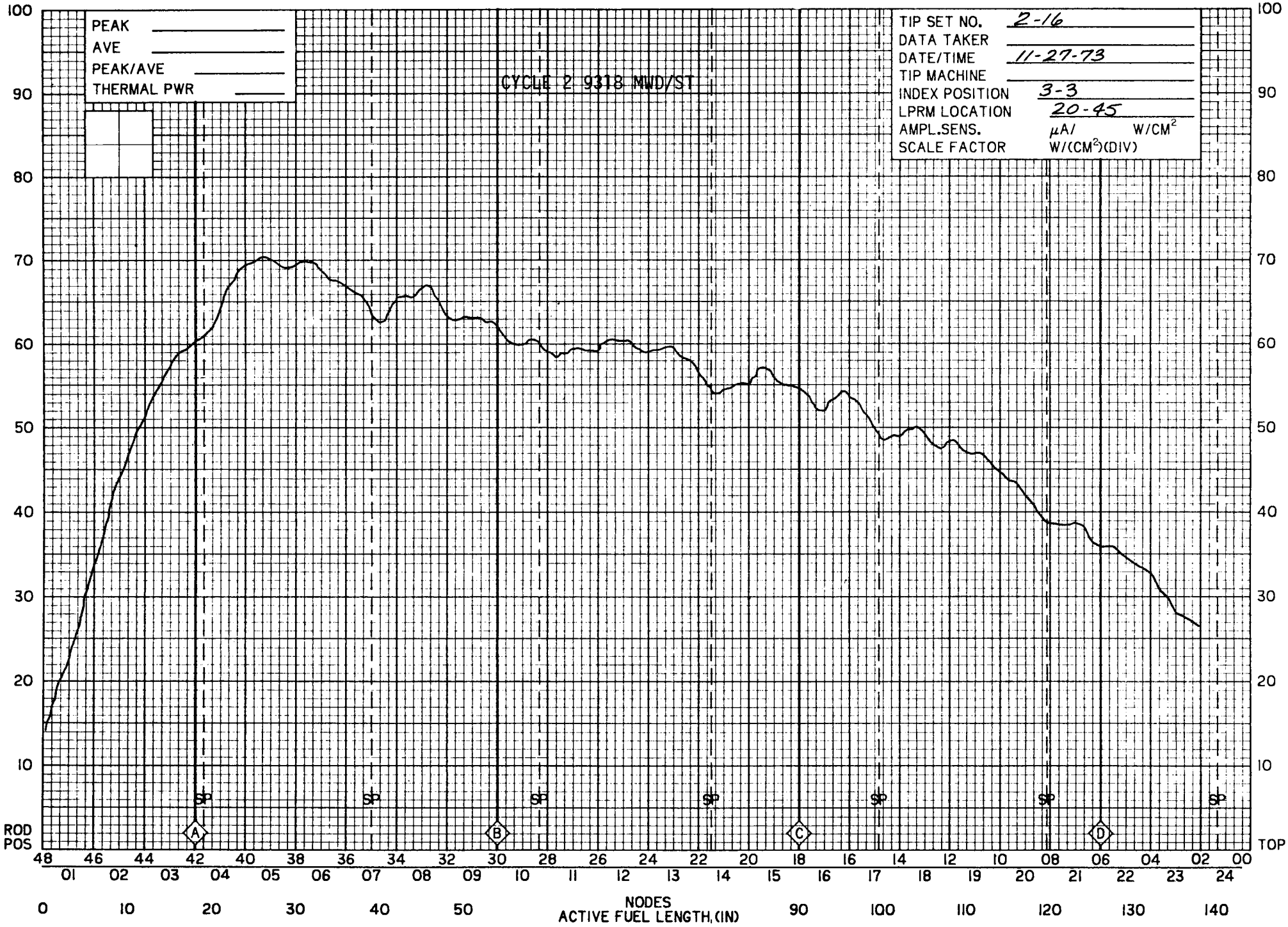
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-4
LPRM LOCATION 12-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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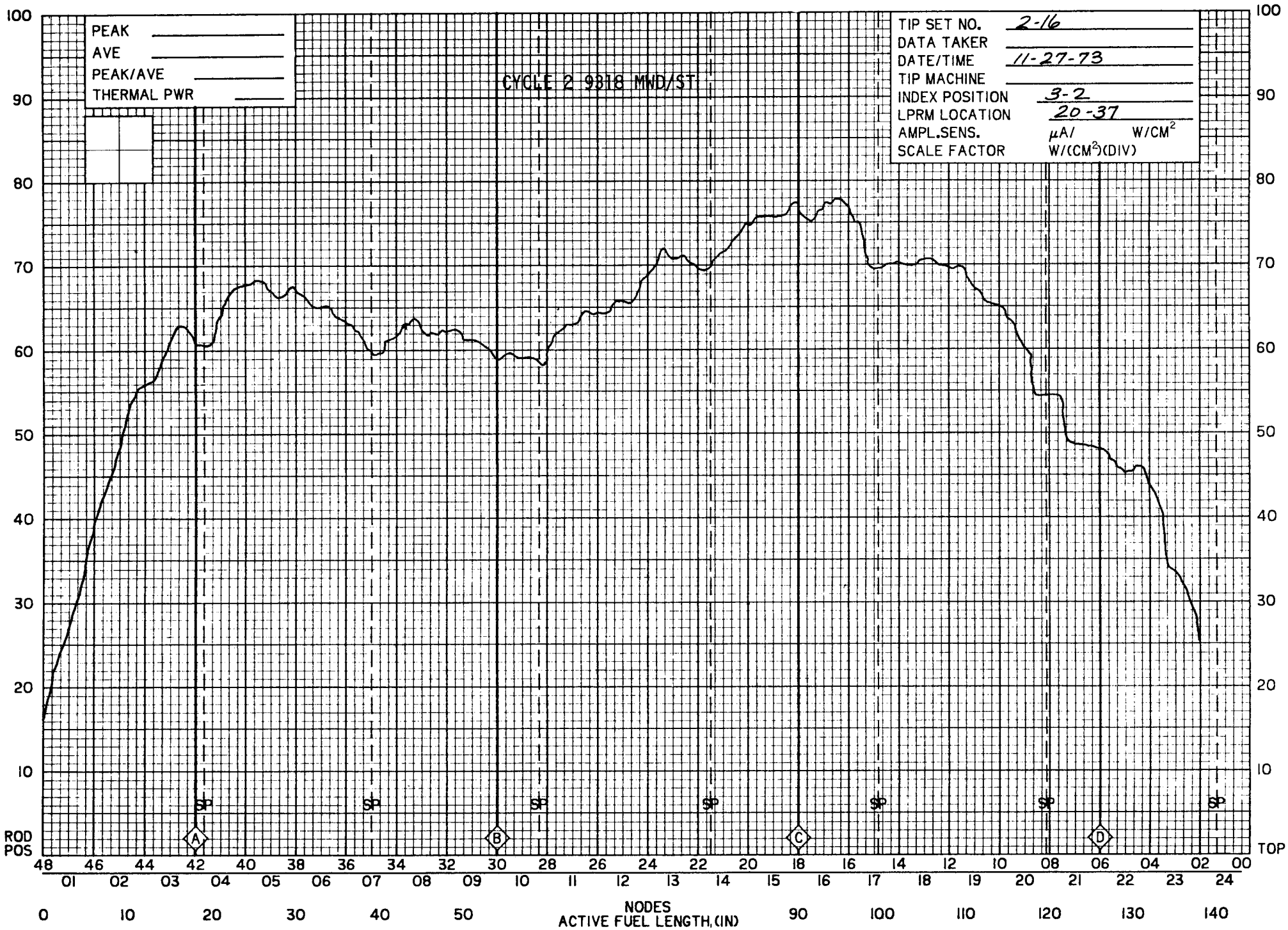
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-3
LPRM LOCATION 20-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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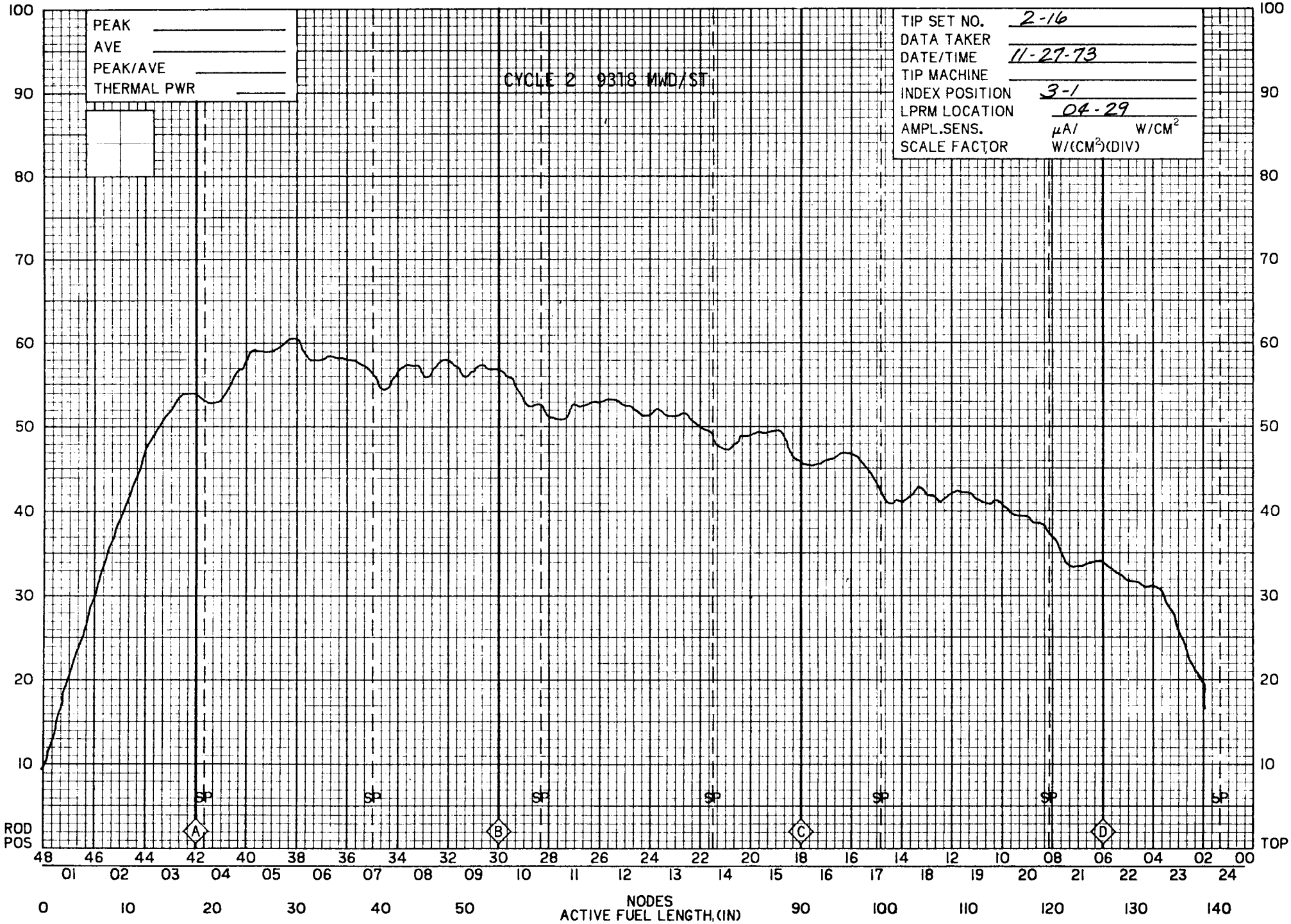
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9818 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-2
LPRM LOCATION 20-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)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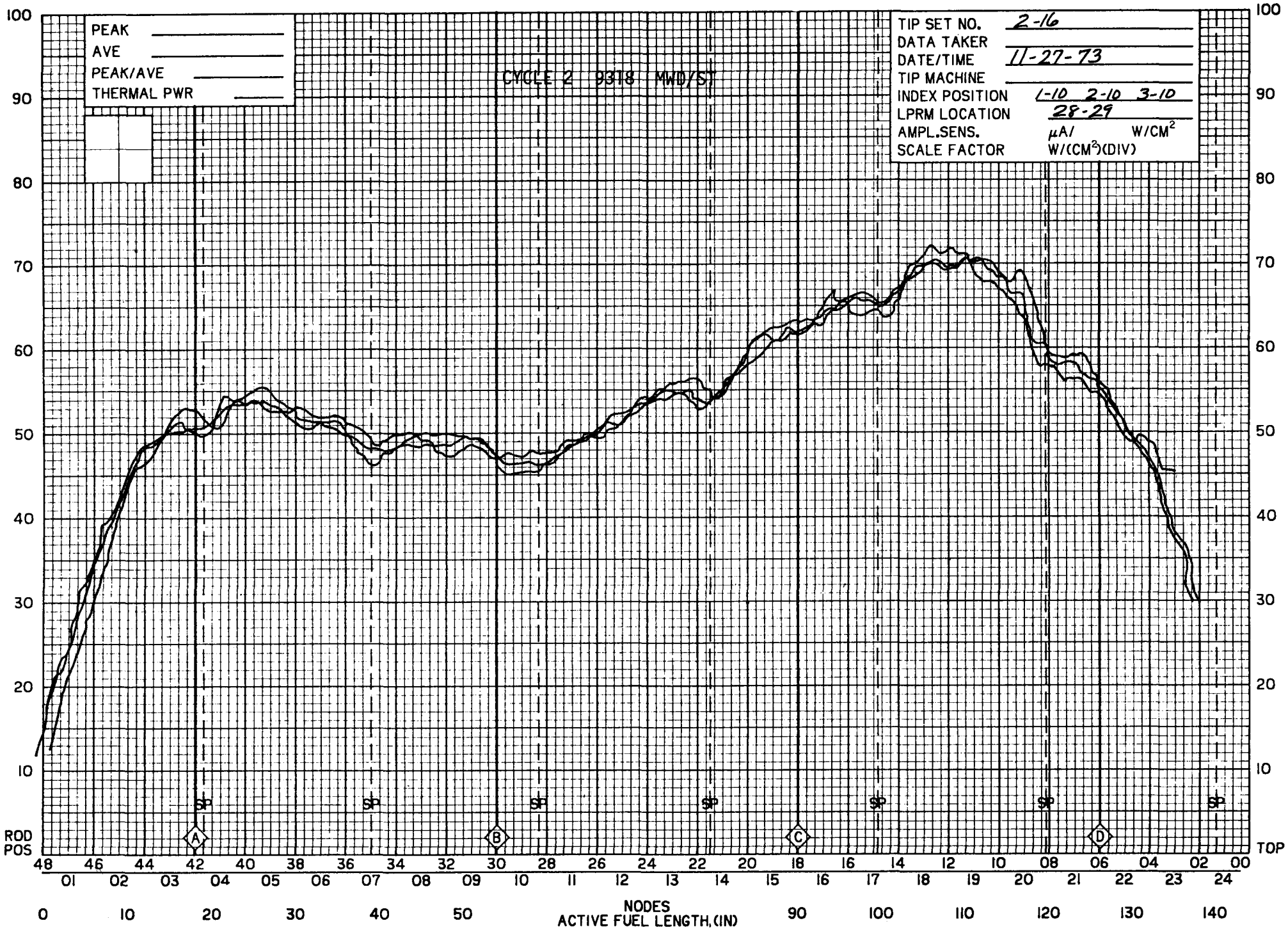
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 3-1
LPRM LOCATION 04-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 9318 MWD/ST
TIP SET NO. 2-16
DATA TAKER
DATE/TIME 11-27-73
TIP MACHINE
INDEX POSITION 1-10 2-10 3-10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

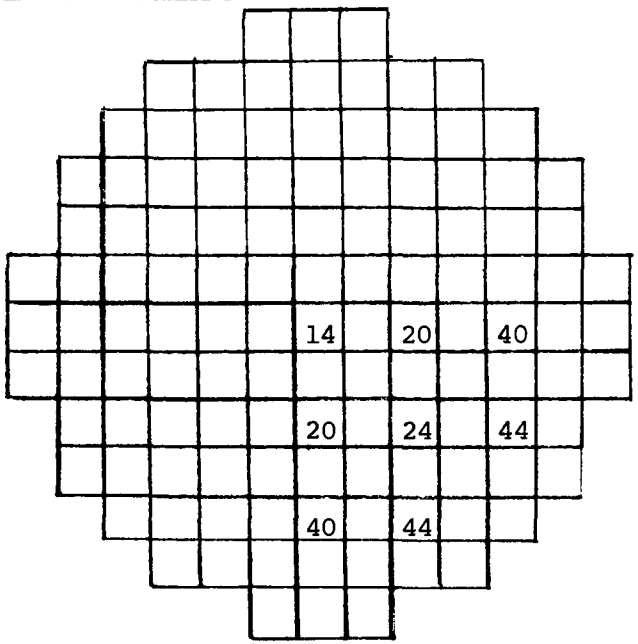
REACTOR: Monticello
CYCLE: 2
Exposure: 9318 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 6 of 12
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



1/4 core symmetry

Verified By: E Ford Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure 9318 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 5 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	498.	Idem	none
11. Outlet temperature to cleanup system (oF)	430.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available		Idem	See attached set of TIP traces
14. Xenon history-past 48 hours Time (hrs)/Core power (%)		Idem	See attached power histogram
15. Control rod positions (by location)	See Sheet #6		

Verified By: [illegible] Date: 07/19/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 11/26/73 0813 MONTICELLO

GMWE	CIP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
576.60	1672.00	56.37	45.16	55.95	18.10	2.00	0.1313	1020.

RWL	DPM	WFW	HFW	HD	DHO	CXE
36.23	15.20	6.75	348.70	517.01	22.41	0.1221

RAP	98.375	99.875	99.281	98.656	99.563	99.563
AGAF	1.018	1.002	1.008	1.015	1.006	1.006
IB	1					
RAPL	-196.52	4.91	19.65	34.39	49.13	63.87
	78.61	88.43	98.26	108.08	122.82	196.52

QFW	QCR	QCU	QRAD	QPUMP	TFW
1663.781	9.145	1.761	0.600	3.266	374.113

HF	HFG	HG	HS	WCR	HCR
545.55	645.50	1191.05	1190.41	0.0279	70.71

WCU	HCU1	HCU2	TD	REFCIP	RATCTP
0.0801	481.65	406.59	524.26	1670.00	1670.00

PPQ	1.7715	1.7407				
CAP	0.01018	0.01002	0.01008	0.01015	0.01006	0.01006
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00
WDC	2.50	5.50	9.20	12.60	16.00	18.60
WTC	17.80	23.00	31.70	40.30	49.00	57.60

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 11/26/73 H.B. NO. 2-78
TIME 8:35 BY JH

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS
*	1	GROSS GEN. OUTPUT	GMWE	CO8	W/GEN	576.8 MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	20.3 MWE
*	3	HP COND. VACUUM	HPCV	CO7	PR 1264	.9 IN HG ABS
*	4	LP COND. VACUUM	LPCV	CO7	PR 1264	.8 IN HG ABS
	5	REACTOR PRESSURE	PR	CO5	6-98	1006 PSIG
	6	ROD DRIVE FLOW	WRD	CO5	3-306	53 GPM
*	7	TOTAL CORE FLOW	Wc	CO5	FR-2-3-95	56.5 MLB/HR
	8	A RECIRC. PUMP PWR	QPA	CO4	2-184-24A	1.76 MW
	9	B RECIRC. PUMP PWR	QPB	CO4	2-184-24B	1.72 MW
	10	CLEANUP FLOW	WCU	CO4	12-141A&B	160 GPM
	11	CLEANUP INLET TEMP.	TCUI	CO4	POS. 1	498 °F
	12	CLEANUP OUTLET TEMP.	TCUO	CO4	POS. 4	430 °F
	13	ROD DRIVE TEMP.	TRD	COMP	F-127	88 °F
	14	A FEEDWATER FLOW	WFWA	C18	6-79A(x)	(Ma) 3.343 MLB/HR
	15	B FEEDWATER FLOW	WFWB	C18	6-79B(x)	(Ma) 3.404 MLB/HR
	16	A FEEDWATER TEMP.	TFWA	C18	6-79A(z)/TR1148	(Ma) 377.66 °F
	17	B FEEDWATER TEMP.	TFWB	C18	6-79B(z)/TR1148	(Ma) 378.16 °F

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	5	
19	SATURATED STEAM ENTHALPY	h_{gs}	5	
20	A FEEDWATER ENTHALPY	h_{FWA}	5 , 16	
21	B FEEDWATER ENTHALPY	h_{FWB}	5 , 17	
22	CLEANUP INLET ENTHALPY	h_{CUT}	5 , 11	
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	5 , 12	
24	ROD DRIVE ENTHALPY	h_{RD}	5 , 13	

HEAT BALANCE CALCULATIONS

		QUANTITY	SYMBOL	EQUATION	VALUE
	25	ROD DRIVE FLOW	W_{RD}	.000495 x 6	MLB/HR
	26	TOTAL STEAM FLOW	W_S	14 + 15 + 25	MLB/HR
*	27	CORE INLET ENTHALPY	h_{IN}	See below	MLB/HR
	28	ENERGY OUT - STEAM	Q_S	26 + 19	MBTU/HR
	29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x 10 (22 - 23)	MBTU/HR
	30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4	MBTU/HR
	31	NET ENERGY OUT	Q_{OUT}	28 + 29 ÷ 30	MBTU/HR
	32	ENERGY IN - FEEDWATER	Q_{FW}	14 x 20 + 15 x 21	MBTU/HR
	33	ENERGY IN - ROD DRIVES	Q_{RD}	25 x 24	MBTU/HR
	34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x (8 + 9)	MBTU/HR
	35	NET ENERGY IN	Q_{IN}	32 + 33 + 34	MBTU/HR
	36	CORE THERMAL POWER	Q_{CORE}	31 - 35	MBTU/HR
	37	CORE THERMAL POWER	P_{CORE}	36 / 3.413	1664.44 MWT
	38	CORE THERMAL POWER	%P	37 / 1670	99.67 % OF RATED
*	39	HEAT RATE	HR	36 x 10^3 (1 - 2)	10.20 BTU/KW-HR

$$h_{IN} = \frac{(7 - 25 - 14 - 15)\,18 + 14\,20 + 15\,21}{7}$$

APRM	READING
1	98.50
2	99.37
3	100.72
4	101.00
5	99.72
6	100.62

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS:

REACTOR: Monticello
CYCLE: 2
Exposure 9318 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1672.00	HB #2-78 11/26/73	See HB #2-78 and OD-3 dated 11/26/73 attached
2. System pressure (psig)	1006.	Idem	Calculated core pressure = 1038.2 psia
3. Recirculation flow (lbs/hr)	56.37×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	6.75×10^6	Idem	none
6. Feedwater flow temperature (oF)	377.9	Idem	none
7. Time at associated power level (hr)	>24.	Idem	none
8. Inlet subcooling (BTU/lb)	25.04	Idem	22.41 from OD-3 corrected for core pressure
9. Cleanup system flow (gal/min)	160.	Idem	none

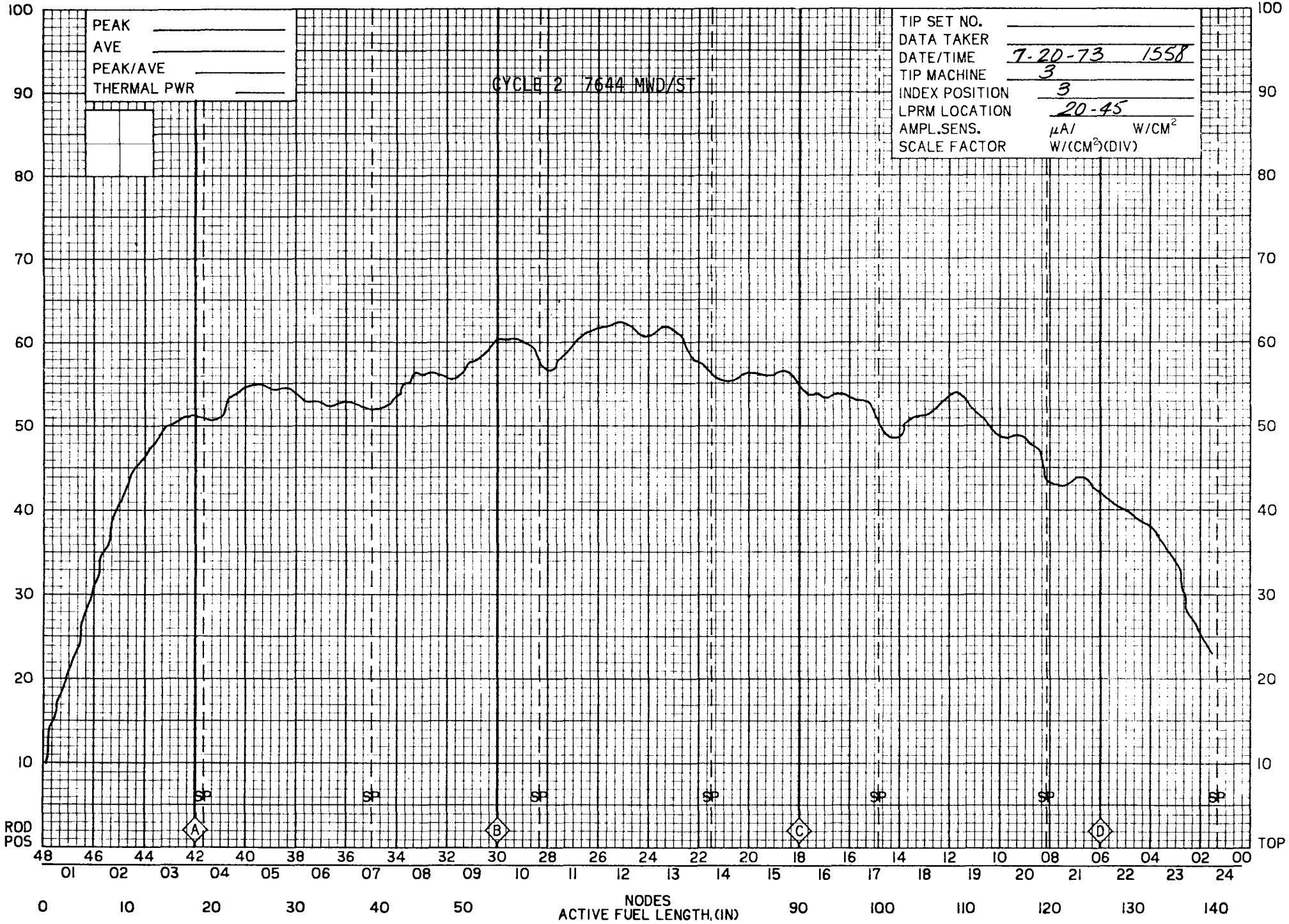
Verified By: E. Torel Date: 07/19/76

BURNUP HISTORY FOR July, 1973

DAY / Prev. Reading	DAILY MWDT	ACCUM MWDT THIS MONTH	GEN. METER READING AT MIDNIGHT	DAY'S MWHE (GEN. METER)	ACCUM MWHE THIS MONTH (GEN. METER)	DAY'S MWHE (COMPUTER)
1	1,661.5	1,661.5	24,462	13,670	13,670	13,664
2	1,664.2	3,325.7	25,835	13,730	27,400	13,661
3	1,668.3	4,994.0	27,201	13,660	41,060	13,694
4	1,666.1	6,660.1	28,567	13,660	54,720	13,683
5	1,665.4	8,325.5	29,934	13,670	68,390	13,661
6	1,644.9	9,970.4	31,285	13,510	81,900	13,448
7	1,403.9	11,374.3	32,410	11,250	93,150	11,323
8	1,659.0	13,033.3	33,762	13,520	106,670	13,528
9	1,665.8	14,699.1	35,120	13,580	120,250	13,604
10	1,666.3	10,365.4	36,482	13,620	133,870	13,611
11	1,664.9	18,030.3	37,842	13,600	147,470	13,591
12	1,660.9	19,691.2	39,197	13,550	161,020	13,558
13	1,652.0	21,343.2	40,555	13,580	174,600	13,547
14	1,449.0	22,792.2	41,732	11,770	186,370	11,707
15	1,649.0	24,441.0	43,083	13,510	199,880	13,535
16	1,667.0	26,108.0	44,452	13,690	213,570	13,682
17	1,668.4	27,776.4	45,819	13,670	227,240	13,668
18	1,666.0	29,442.4	47,181	13,620	240,860	13,619
19	*1,666.0	31,108.4	48,544	13,630	254,490	13,620
20	1,665.9	32,775.3	49,905	13,610	268,100	13,506*
21	1,666.4	34,441.7	51,280	13,750	281,850	13,421*
22	1,666.0*	36,107.7	52,643	13,630	295,480	12,815*
23	1,660.0*	37,767.7	54,013	13,700	309,180	13,620*
24	1,666.0*	39,433.7	55,380	13,670	322,850	13,620*
25	1,665.4	41,099.1	56,742	13,620	336,470	13,620*
26	1,663.2	42,762.3	58,110	13,680	350,150	13,521
27	1,666.0*	44,428.3	59,480	13,700	363,850	13,620*
28	1,668.2	46,096.5	60,858	13,780	377,630	13,780
29	1,665.7	47,762.2	62,234	13,760	391,390	13,760
30	1,496.2	49,258.4	63,512	12,780	404,170	12,269
31	38.6	49,297.0	63,519	70	404,240	86.5

Accum. Core Exposure: 1001.992

* Estimated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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73 1558
TIP MACHINE 3
INDEX POSITION 3
LPRM LOCATION 20-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
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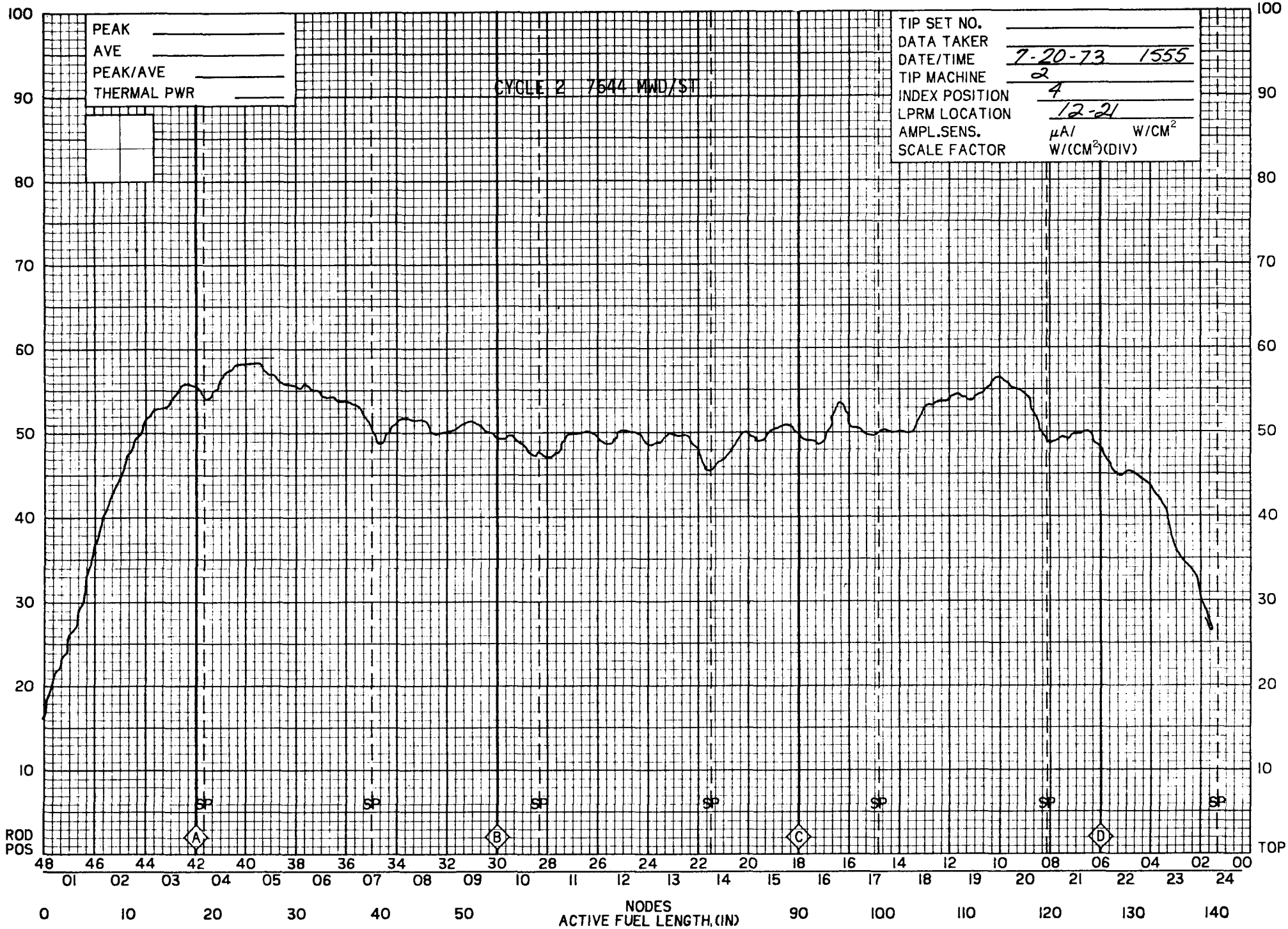
ACTIVE FUEL LENGTH,(IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73 1555
TIP MACHINE 2
INDEX POSITION 4
LPRM LOCATION 12-21
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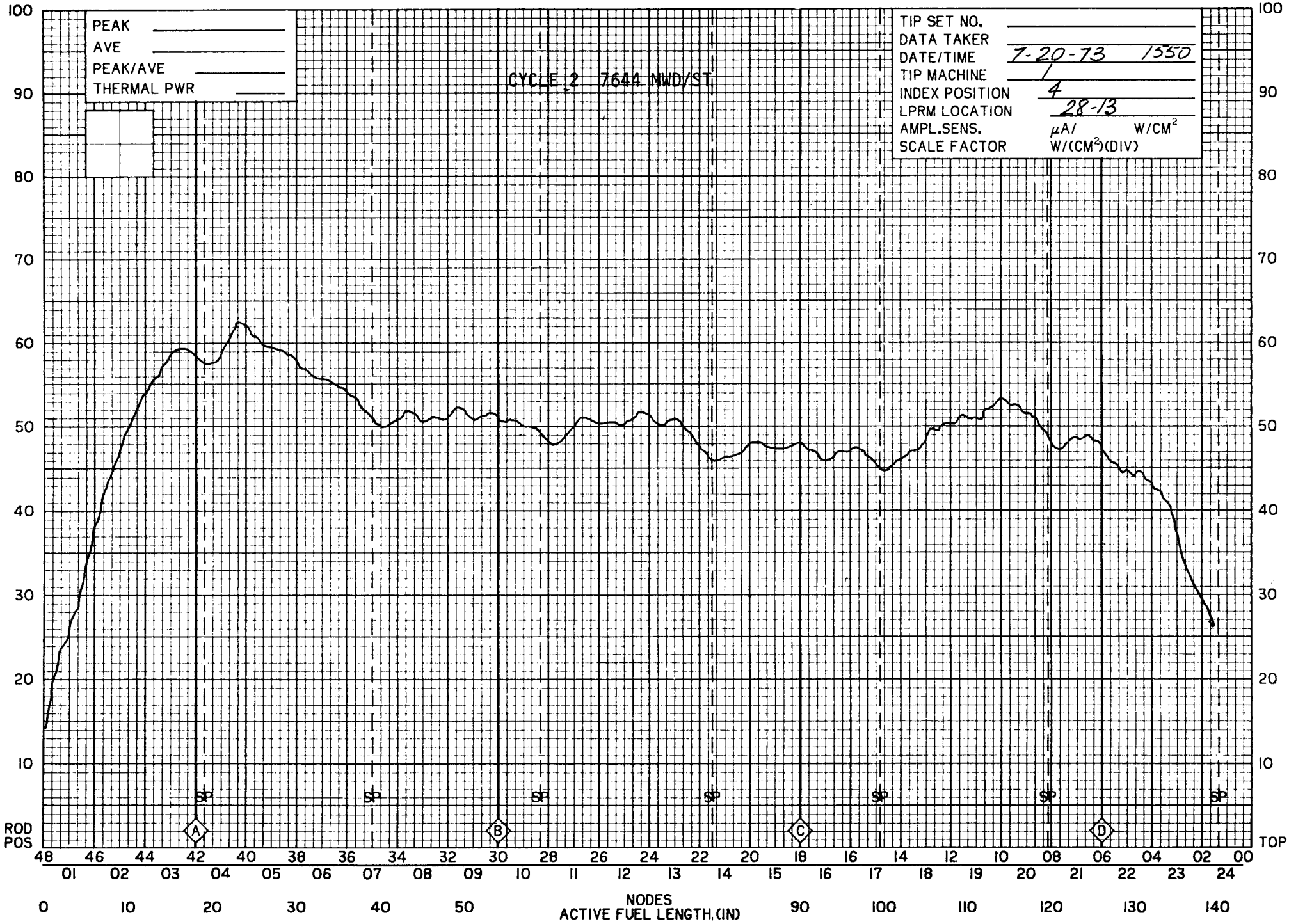
SCALE FACTOR W/(CM³)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH,(IN)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AVE
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CYCLE 2 7644 MWD/ST
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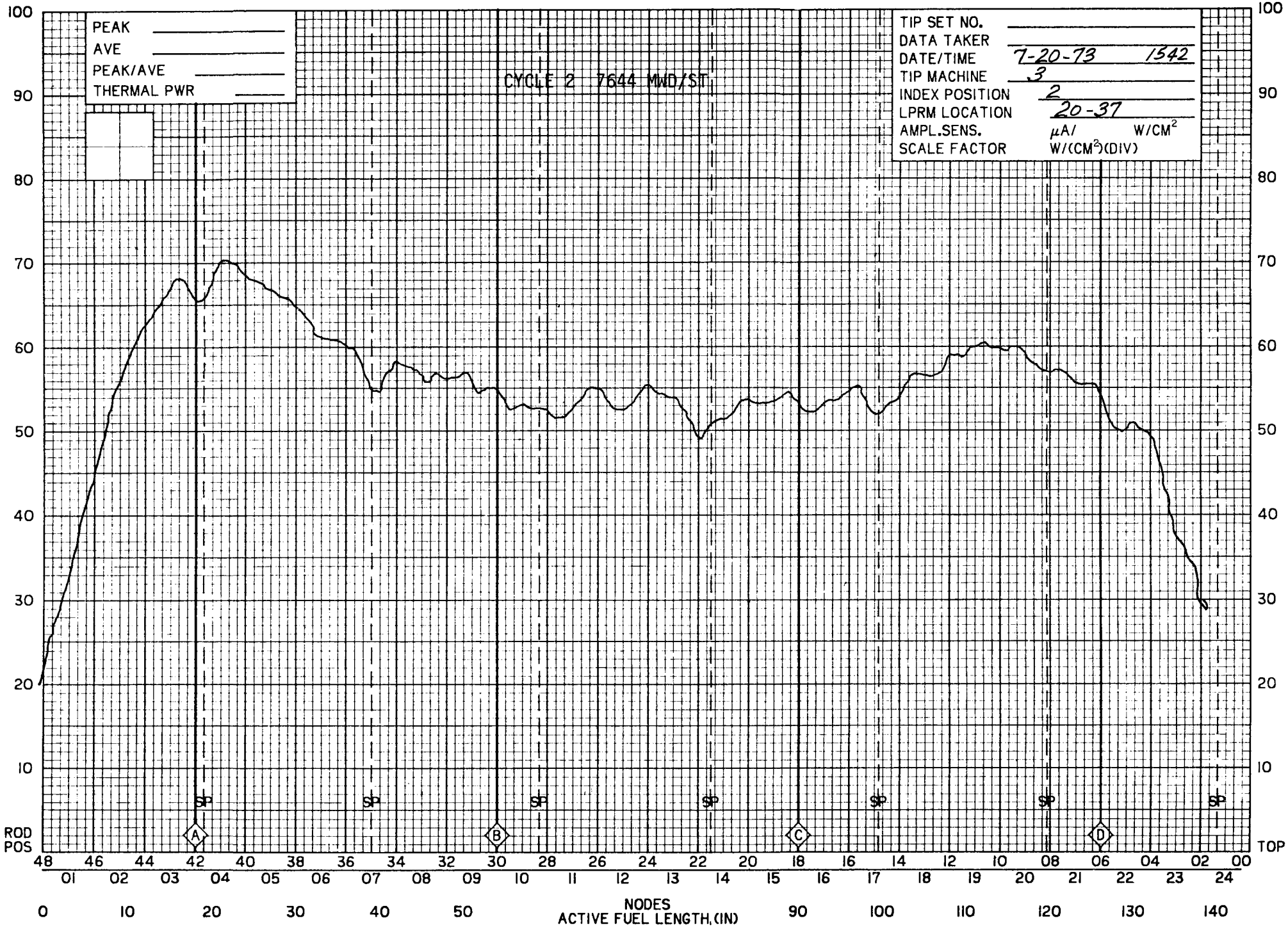
DATA TAKER
DATE/TIME 7-20-73 1550
TIP MACHINE 1
INDEX POSITION 4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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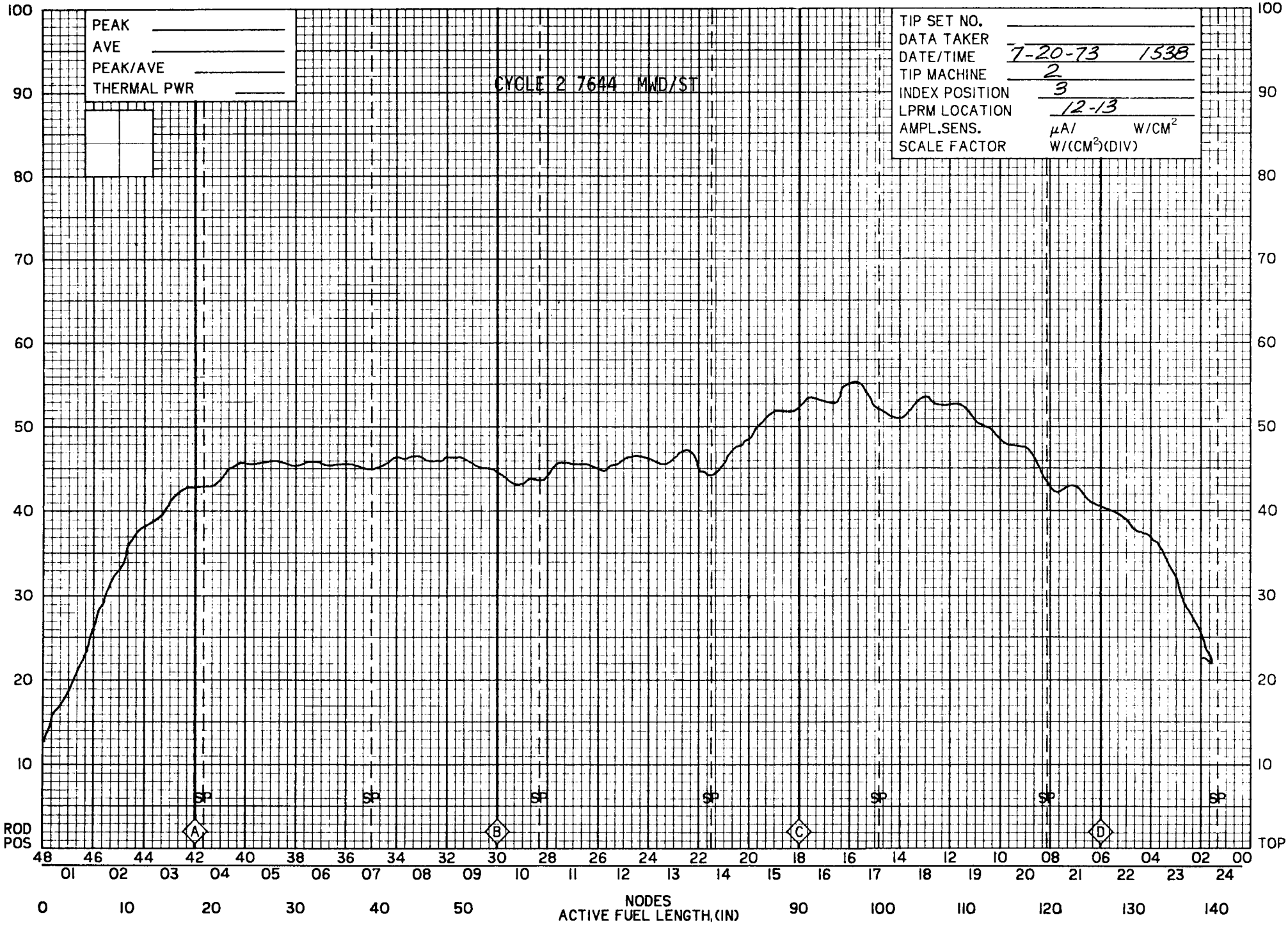
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73 1542
TIP MACHINE 3
INDEX POSITION 2
LPRM LOCATION 20-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
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CYCLE 2 7644 MWD/ST
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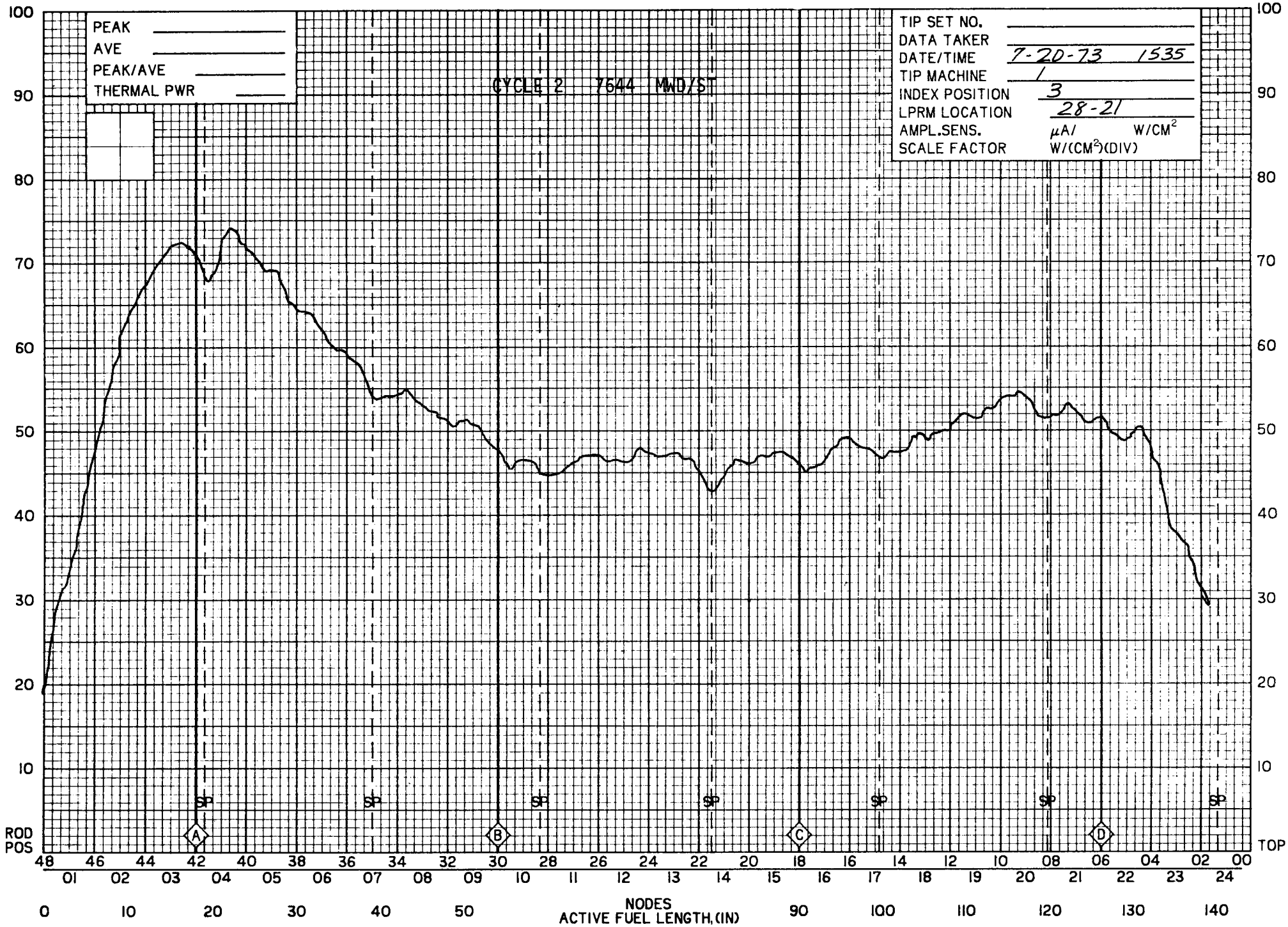
DATA TAKER
DATE/TIME 7-20-73 1538
TIP MACHINE 2
INDEX POSITION 3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
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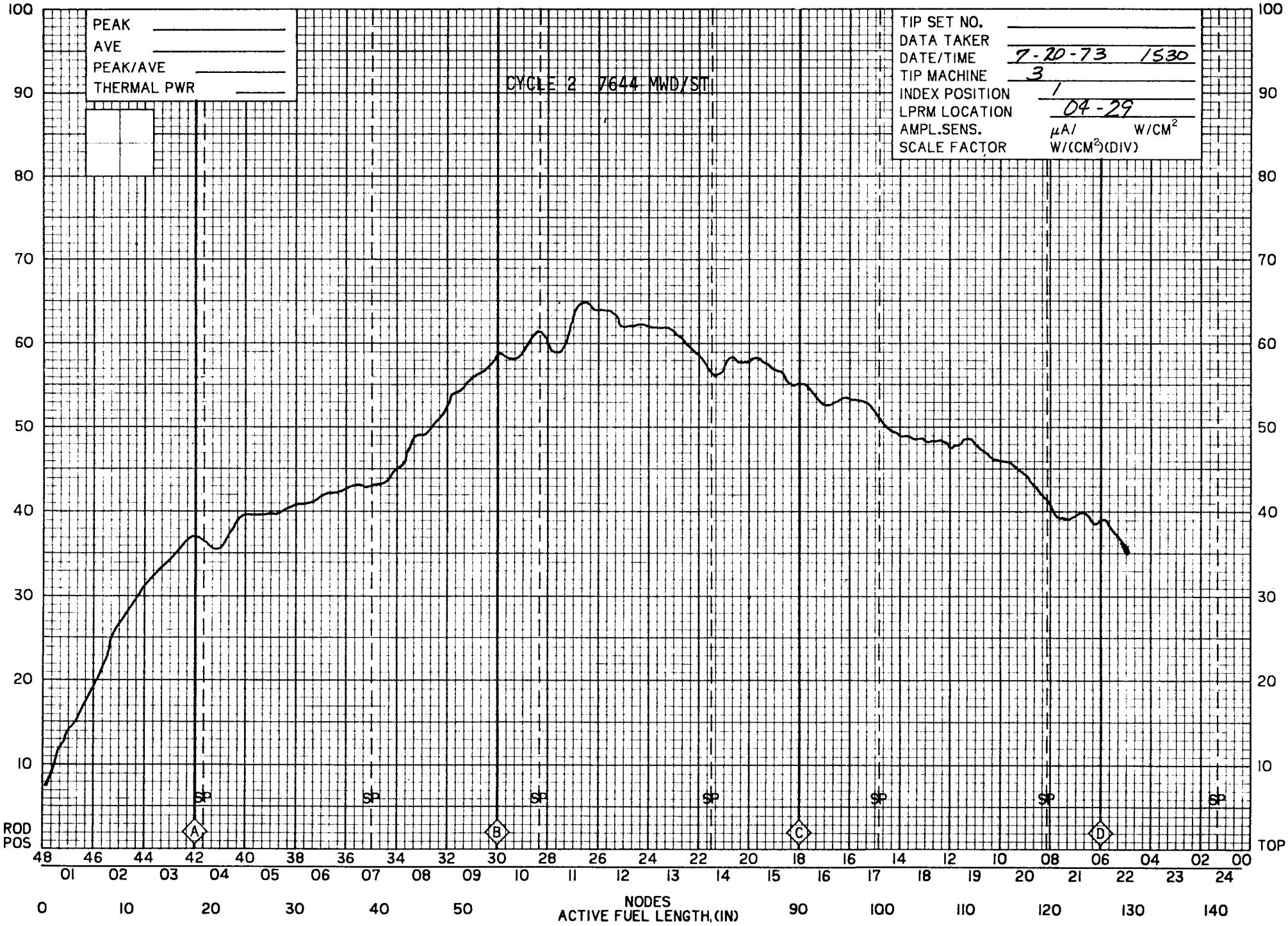
DATA TAKER
DATE/TIME 7-20-73 1535
TIP MACHINE 1
INDEX POSITION 3
LPRM LOCATION 28-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)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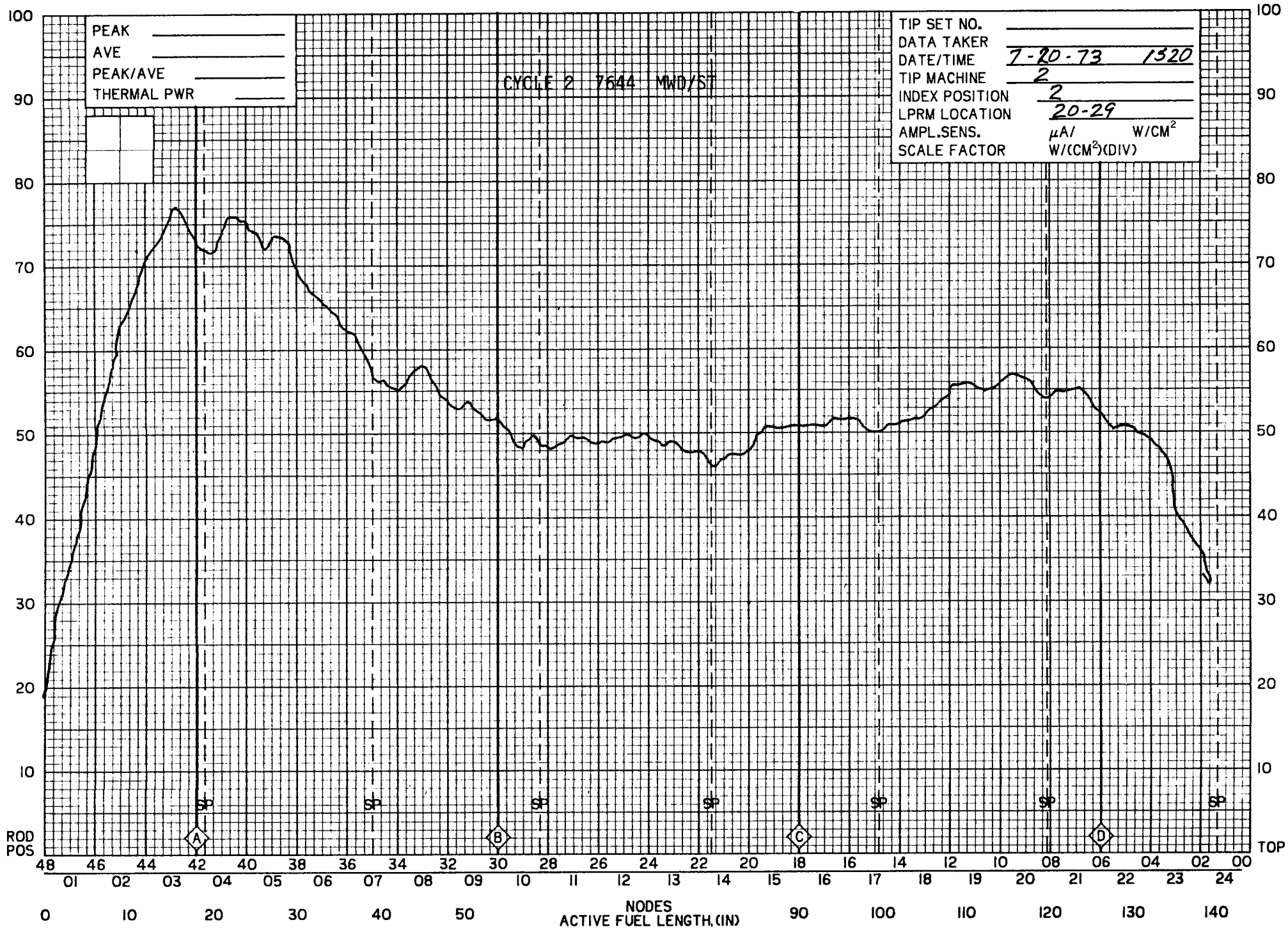
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73 1530
TIP MACHINE 3
INDEX POSITION 1
LPRM LOCATION 04-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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AVE
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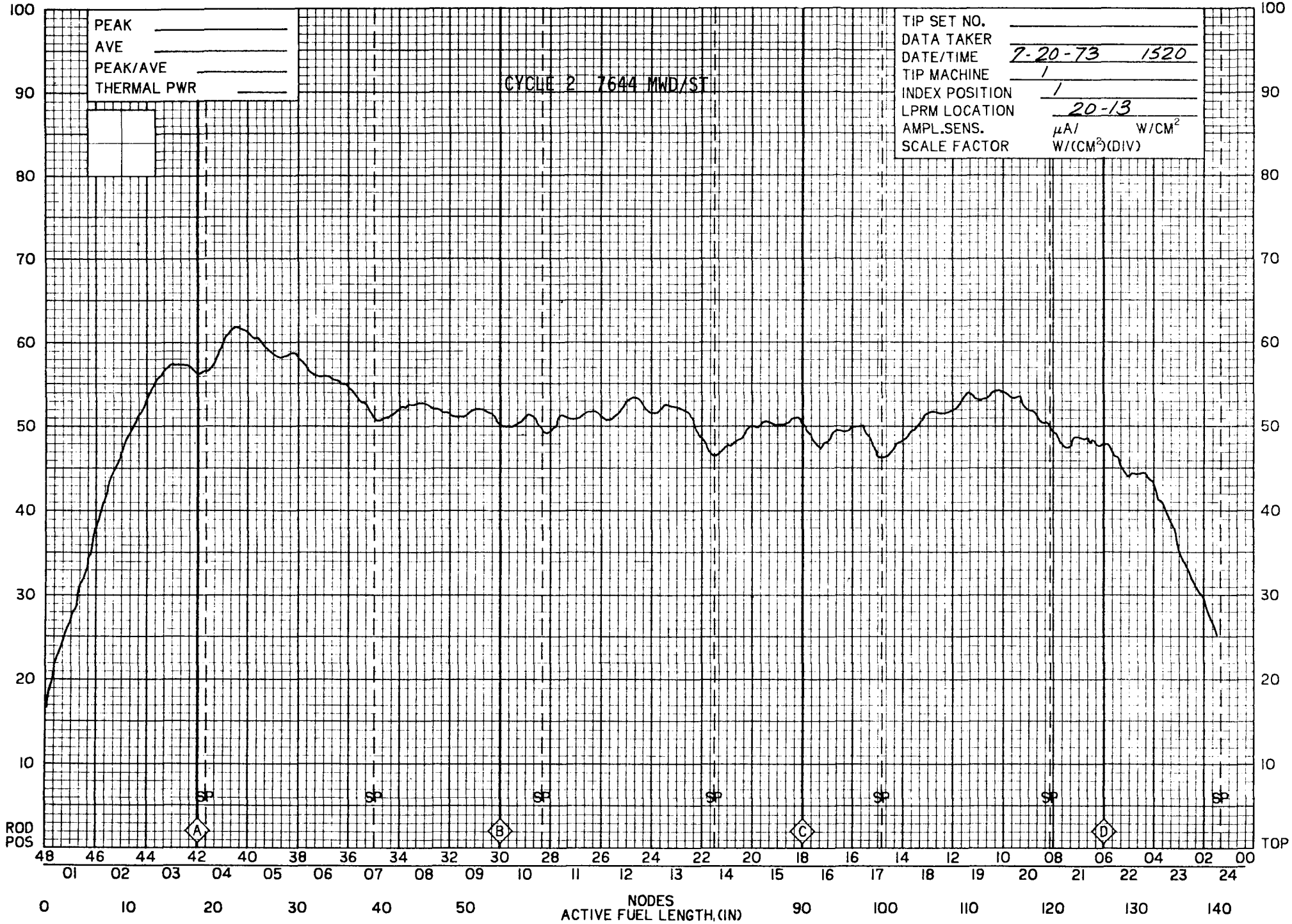
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73 1520
TIP MACHINE 2
INDEX POSITION 2
LPRM LOCATION 20-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)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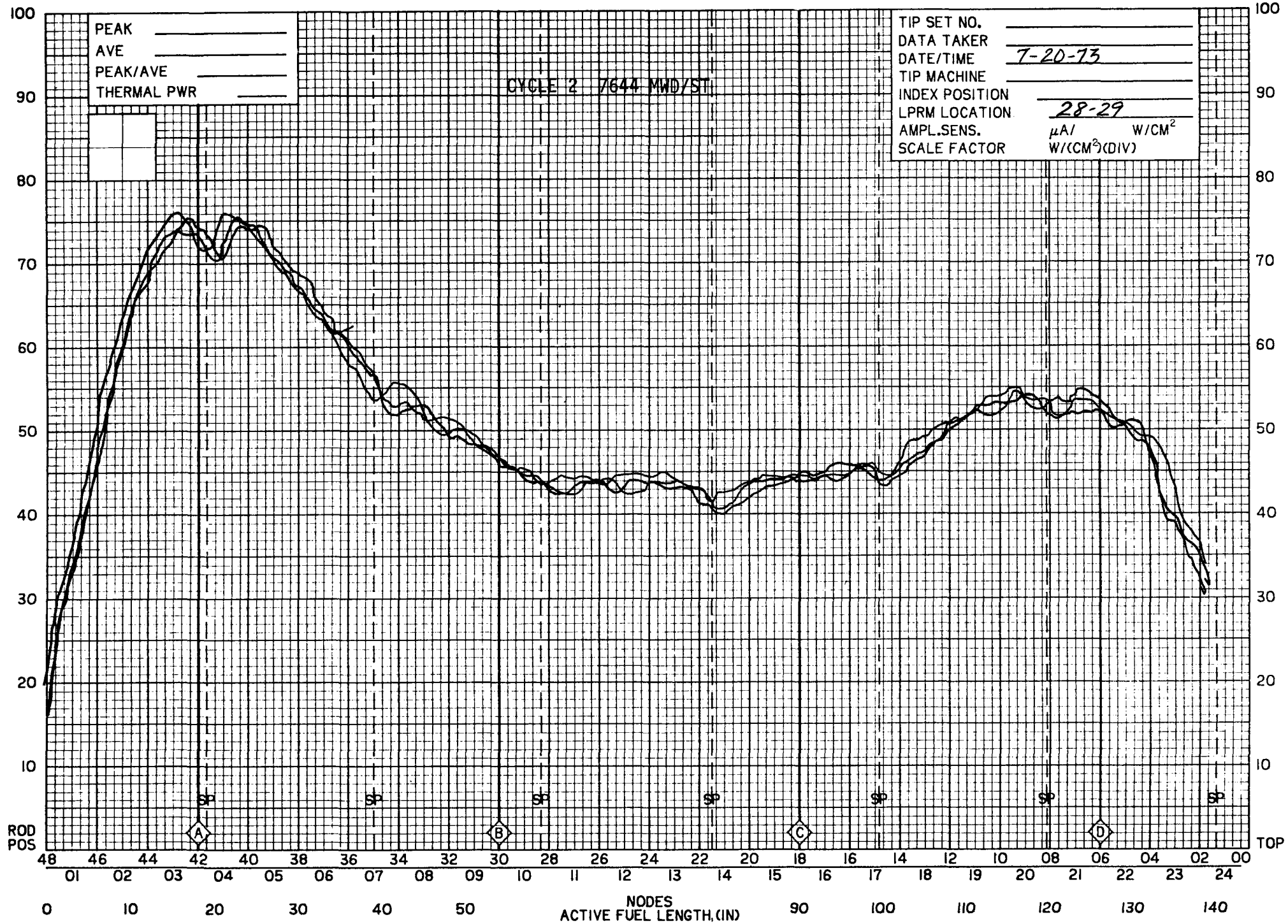
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73 1520
TIP MACHINE 1
INDEX POSITION 1
LPRM LOCATION 20-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 2 7644 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 7-20-73
TIP MACHINE
INDEX POSITION
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)

REACTOR: Monticello

CYCLE: 2

Exposure: 7644 MWD/STU

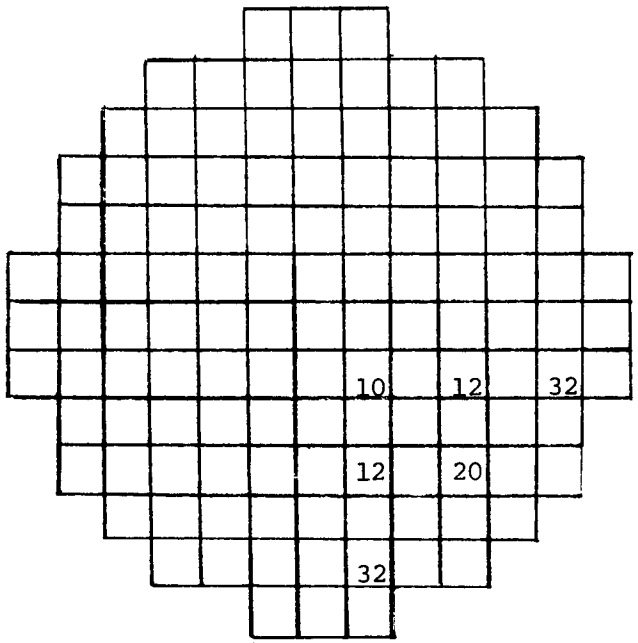
TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 3 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS



1/4 core symmetry

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure 7644 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 2 of 12

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (oF)	496.	Idem	none
11. Outlet temperature to cleanup system (oF)	431.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available		Idem	See attached set of TIP traces*
14. Xenon history-past 48 hours Time (hrs)/Core power (%)		Idem	See attached power histogram
15. Control rod positions (by location)	see sheet #3		

*TIP traces were not available for the following locations: 12-29, 12-37, 20-21, 28-5, 28-21, 28-37, 28-45, 36-13, 36-21, 36-29, 36-37, 36-45, 44-21, 44-29, 44-37.

Verified By: E. Terral Date: 07/19/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 07/20/73 0806 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
572.00	1675.75	54.20	44.95	53.11	17.24	2.00	0.1316	1020.07

RWL	DPM	WFW	HFW	HD	DHO	CXE
35.64	13.86	6.78	351.36	517.07	23.18	0.1275

RAP	99.375	98.469	100.000	90.094	98.750	98.906
A AF	1.010	1.010	1.003	1.013	1.016	1.015

IB 1

RAPL	-198.07	4.95	19.81	34.66	49.52	64.37
	79.23	89.13	99.03	108.94	123.79	198.07

QFW	QCR	QCU	QRAD	QPUMP	TFW
1666.938	9.119	1.754	0.600	2.650	376.660

HF	HFG	HG	HS	WCR	HCR
545.49	645.58	1101.06	1190.42	0.0278	70.70

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0813	482.96	409.31	524.30	1670.00	1670.00

PPW	1.3725	1.4775

CAP	0.01010	0.01019	0.01003	0.01013	0.01016	0.01015
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.60
WTC	17.80	23.00	31.70	40.30	49.00	57.60

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 7/20/73 H.B. NO. 2-26
TIME 0805 BY JH

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS	
*	1	GROSS GEN. OUTPUT	GMWE	CO8	W/GEN	572.6	MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	26.3	MWE
*	3	HP COND. VACUUM	HPCV	CO7	PR 1264	2.9	IN HG ABS
*	4	LP COND. VACUUM	LPCV	CO7	PR 1264	2.2	IN HG ABS
	5	REACTOR PRESSURE	PR	CO5	6-98	1006	PSIG
	6	ROD DRIVE FLOW	WRD	CO5	3-306	53	GPM
*	7	TOTAL CORE FLOW	Wc	CO5	FR-2-3-95	54.2	MLB/HR 6.74
	8	A RECIRC. PUMP PWR	QPA	CO4	2-184-24A	1.30	MW
	9	B RECIRC. PUMP PWR	QPB	CO4	2-184-24B	1.45	MW
	10	CLEANUP FLOW	WCU	CO4	12-141A&B	163	GPM
	11	CLEANUP INLET TEMP.	TCUI	CO4	POS. 1	496	°F
	12	CLEANUP OUTLET TEMP.	TCUO	CO4	POS. 4	437	°F
	13	ROD DRIVE TEMP.	TRD	COMP	F-127	121	°F
	14	A FEEDWATER FLOW	WFWA	C18	6-79A(x)	(Ma) 3.352	MLB/HR
	15	B FEEDWATER FLOW	WFWB	C18	6-79B(x)	(Ma) 3.410	MLB/HR
	16	A FEEDWATER TEMP.	TFWA	C18	6-79A(z)/TR1148	(Ma) 377.90	°F
	17	B FEEDWATER TEMP.	TFWB	C18	6-79B(z)/TR1148	(Ma) 378.28	°F

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	5	
19	SATURATED STEAM ENTHALPY	h_{gs}	5	1190.39
20	A FEEDWATER ENTHALPY	h_{FWA}	5 , 16	352.51
21	B FEEDWATER ENTHALPY	h_{FWB}	5 , 17	352.90
22	CLEANUP INLET ENTHALPY	h_{CUT}	5 , 11	482.90
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	5 , 12	409.39
24	ROD DRIVE ENTHALPY	h_{RD}	5 , 13	92.23

HEAT BALANCE CALCULATIONS

	QUANTITY	SYMBOL	EQUATION	VALUE	
25	ROD DRIVE FLOW	W_{RD}	.000495 x 6	.026	MLB/HR
26	TOTAL STEAM FLOW	W_S	14 + 15 + 25	6.78	MLB/HR
* 27	CORE INLET ENTHALPY	h_{IN}	See below		MLB/HR
28	ENERGY OUT - STEAM	Q_S	26 + 19	8080.64	MBTU/HR
29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x 10 (22 - 23)	5.93	MBTU/HR
30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4	2.4	MBTU/HR
31	NET ENERGY OUT	Q_{OUT}	28 + 29 ÷ 30	8088.97	MBTU/HR
32	ENERGY IN - FEEDWATER	Q_{FW}	14 x 20 + 15 x 21	2385.00	MBTU/HR
33	ENERGY IN - ROD DRIVES	Q_{RD}	25 x 24	2.42	MBTU/HR
34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x (8 + 9)	9.38	MBTU/HR
35	NET ENERGY IN	Q_{IN}	32 + 33 + 34	2396.80	MBTU/HR
36	CORE THERMAL POWER	Q_{CORE}	31 - 35	5692.17	MBTU/HR
37	CORE THERMAL POWER	P_{CORE}	36 / 3.413	1667.79	MWT
38	CORE THERMAL POWER	%P	37 / 1670	99.86	% OF RATED
* 39	HEAT RATE	HR	36 x 10^3 (1 - 2)	10.419	BTU/KW-HR

$$h_{IN} = \frac{(7 - 25 - 14 - 15)\,18 + 14\,20 + 15\,21}{7}$$

APRM	READING
1	100.12
2	100.75
3	99.62
4	99.31
5	99.94
6	99.69

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS:

REACTOR: Monticello
CYCLE: 2
Exposure 7644 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART C - BWR STATEPOINTS

Rev. 0 **Date:** 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1675.75	HB #2-26 7/20/73	See HB #2-26 and OD-3 dated 7/20/73 attached
2. System pressure (psig)	1006.	Idem	Calculated core pressure = 1037.4 psia
3. Recirculation flow (lbs/hr)	54.2×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	6.76×10^6	Idem	none
6. Feedwater flow temperature (oF)	378.09	Idem	none
7. Time at associated power level (hr)	>24.	Idem	none
8. Inlet subcooling (BTU/lb)	25.69	Idem	23.18 from OD-3 corrected for core pressure
9. Cleanup system flow (gal/min)	163.	Idem	none

Verified By: [illegible] **Date:** 07/19/76

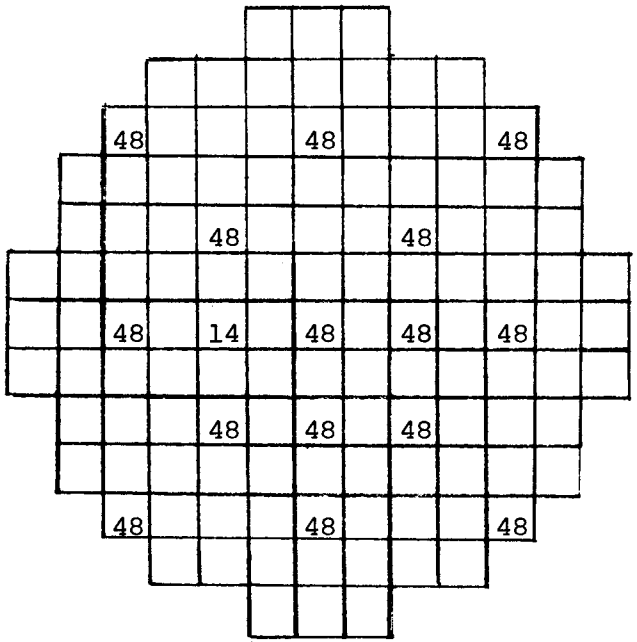
REACTOR: Monticello
CYCLE: 2
Exposure: 6802 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART B- BWR COLD CRITICAL DATA

Sheet 4 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data			
1. Moderator temperature (^{o}F)	200.	NSP	none
2. Xenon condition	No Xenon	NSP	none
3. Control rod positions (by location)		NSP	none



Rod position in notches

- 48 indicates a rod fully withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E. Jerab Date: 07/19/76

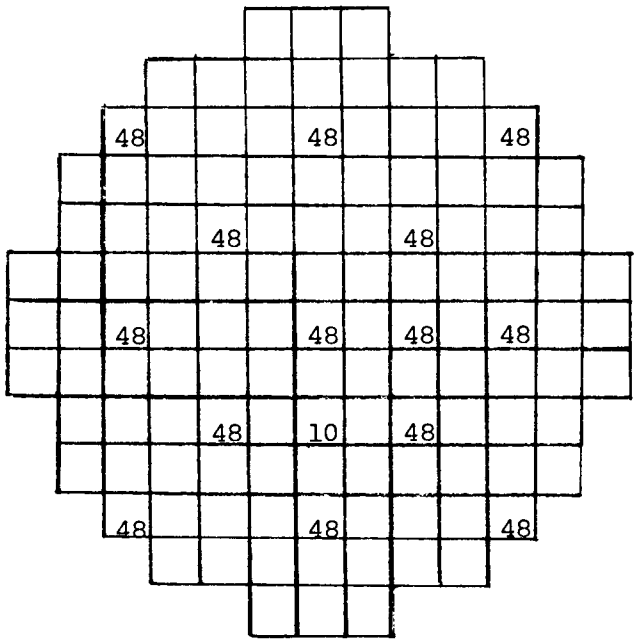
REACTOR: Monticello
CYCLE: 2
Exposure: 6802 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART B- BWR COLD CRITICAL DATA

Sheet 3 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data			
1. Moderator temperature (^{o}F)	140.	NSP	NONE
2. Xenon condition	No Xenon	NSP	NONE
3. Control rod positions (by location)		NSP	NONE



Rod position in notches

- 48 indicates a rod fully withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E. Tenly Date: 07/19/76

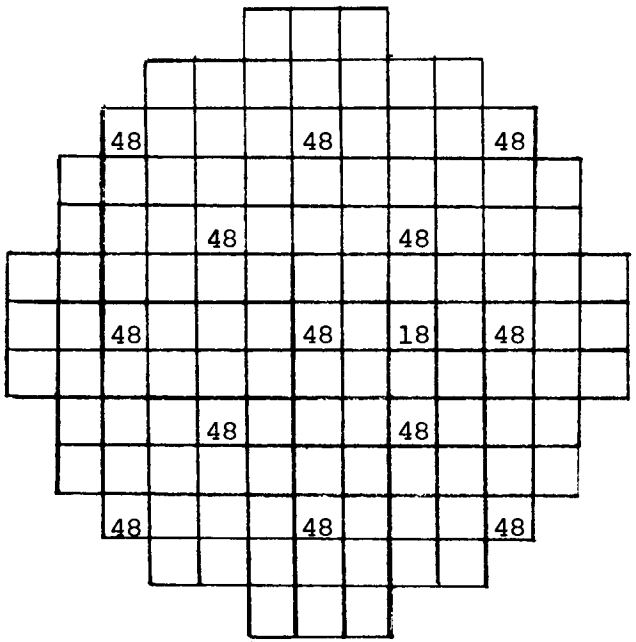
REACTOR: Monticello
CYCLE: 2
Exposure: 6802 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART B- BWR COLD CRITICAL DATA

Sheet 2 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data			
1. Moderator temperature (^{o}F)	80.	NSP	none
2. Xenon condition	No xenon	NSP	none
3. Control rod positions (by location)		NSP	none



Rod position in notches

- 48 indicates a rod fully withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E Tezel Date: 07/19/76

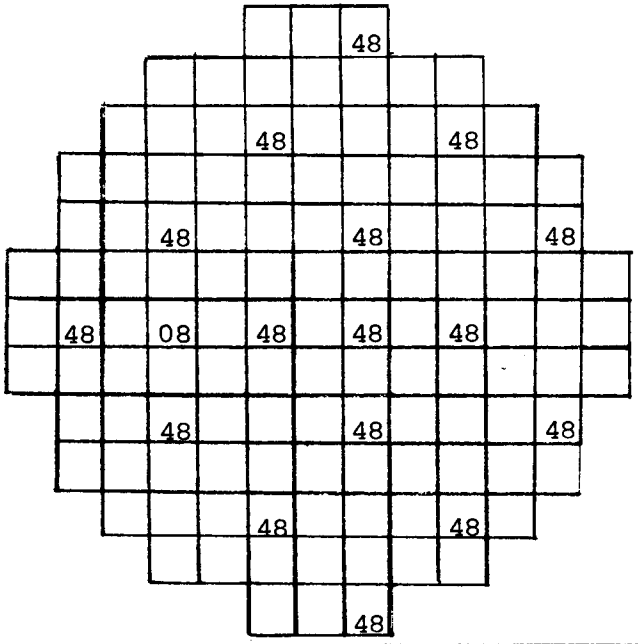
REACTOR: Monticello
CYCLE: 2
Exposure: 6802 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART B- BWR COLD CRITICAL DATA

Sheet 1 of 4
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data			
1. Moderator temperature (oF)	80.	NSP	none
2. Xenon condition	No xenon	NSP	none
3. Control rod positions (by location)		NSP	none



Rod position in notches

- 48 indicates a rod fully withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E Tonly Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

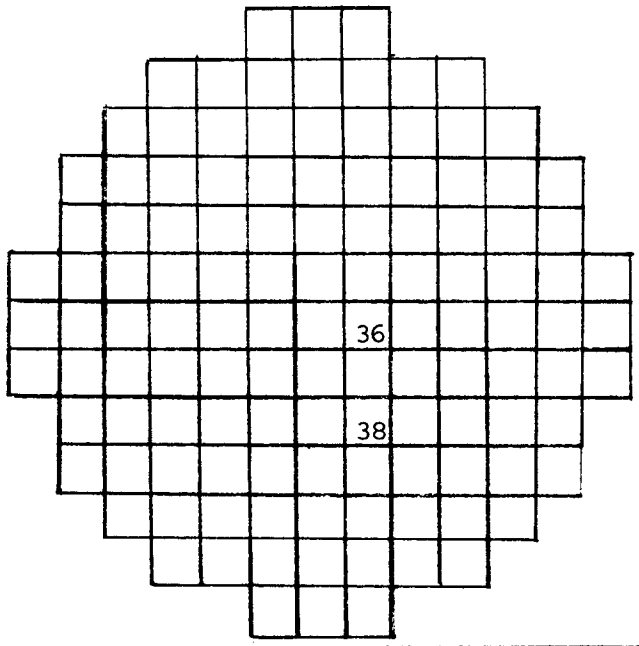
Exposure: 10550 MWD/STU to 10779 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1266.72	HB #2-121 3/8/74	HB #2-121 is at 10680 MWD/STU
2. Core total flow (lbs/hr)	47.67×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.47	Idem	21.29 from HB #2-121 corrected for core pressure
4. System pressure (psig)	993.	Idem	Calculated core pressure = 1022.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Foral Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

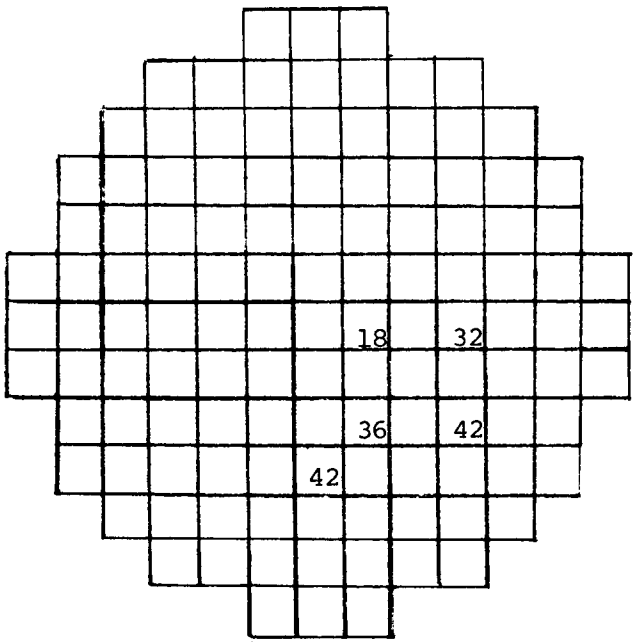
Exposure: 10350 MWD/STU to 10550 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1377.13	HB #2-113 2/15/74	HB #2-113 is at 10481 MWD/STU
2. Core total flow (lbs/hr)	54.73×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.01	Idem	19.47 from HB #2-113 corrected for core pressure
4. System pressure (psig)	988.	Idem	Calculated core pressure = = 1019.6 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Ford Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 10100 MWD/STU to 10350 MWD/STU

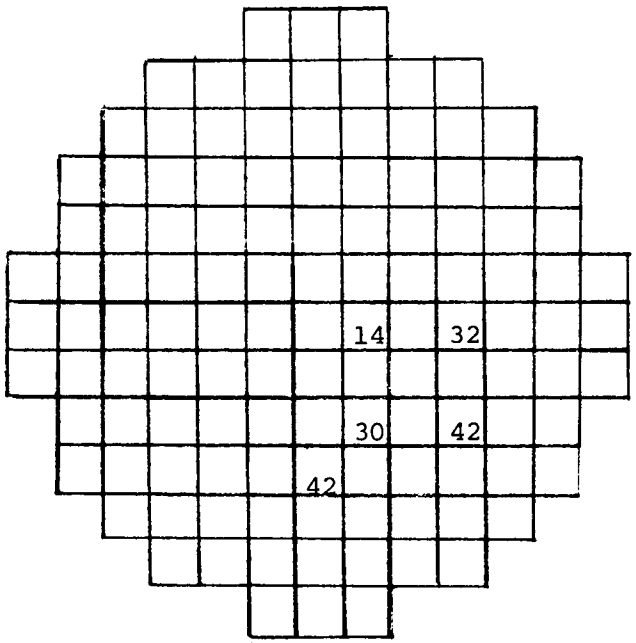
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 14 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1419.41	HB #2-104 1/25/74	HB #2-104 is at 10200 MWD/STU
2. Core total flow (lbs/hr)	54.10×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.82	Idem	20.32 from HB #2-104 corrected for core pressure
4. System pressure (psig)	998.	Idem	Calculated core pressure = 1029.4 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Ford Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 9887 MWD/STU to 10100 MWD/STU

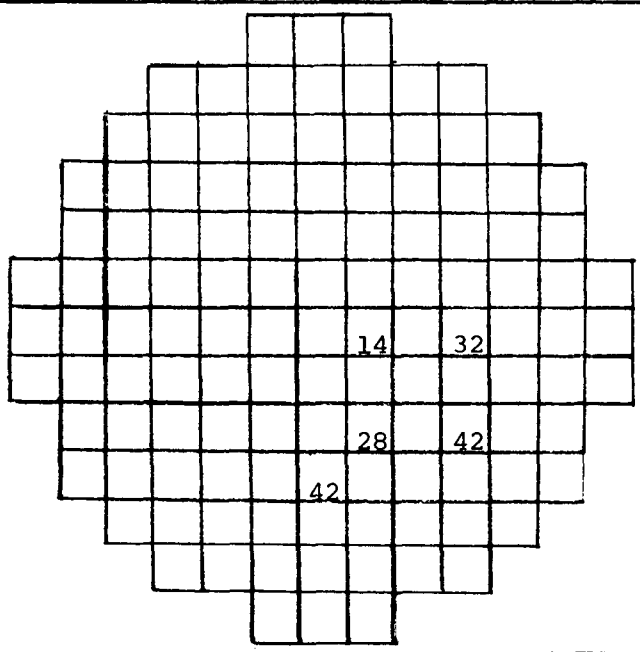
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 13 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1518.59	HB #2-98 1/11/74	HB #2-98 is at 9990 MWD/STU
2. Core total flow (lbs/hr)	57.50×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.61	Idem	19.91 from HB #2-98 corrected for core pressure
4. System pressure (psig)	991.	Idem	Calculated core pressure = 1023.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Ferrel Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 9550 MWD/STU to 9887 MWD/STU

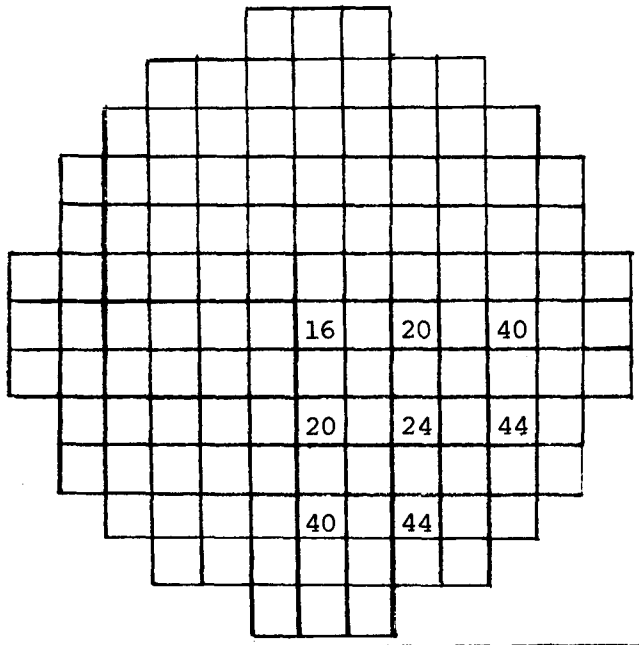
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 12 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1577.38	HB #2-89 12/21/73	HB #2-89 is at 9694 MWD/STU
2. Core total flow (lbs/hr)	57.83×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.26	Idem	20.55 from HB #2-89 corrected for core pressure
4. System pressure (psig)	1001.	Idem	Calculated core pressure = 1033.8 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Tong Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 9367 MWD/STU to 9550 MWD/STU

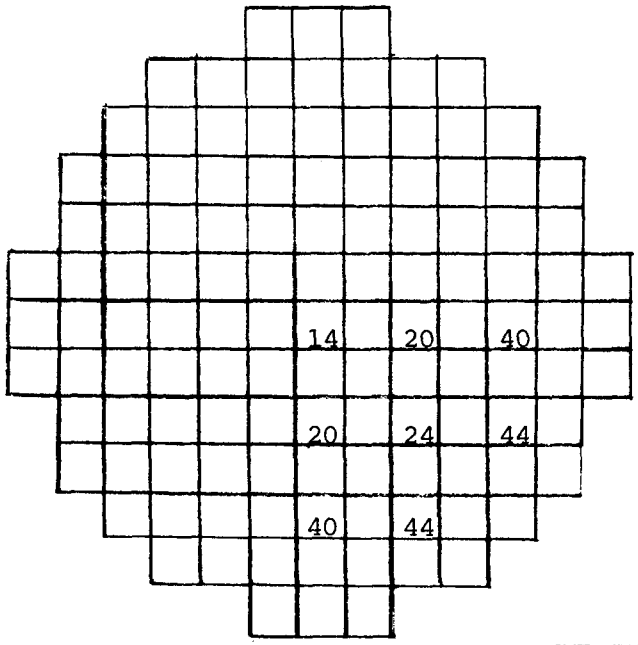
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 11 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1628.30	HB #2-83 12/7/73	HB #2-83 is at 9477 MWD/STU
2. Core total flow (lbs/hr)	57.52×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.88	Idem	21.18 from HB #2-83 corrected for core pressure
4. System pressure (psig)	1015.	Idem	Calculated core pressure = 1047.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Peck Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 9063 MWD/STU to 9367 MWD/STU

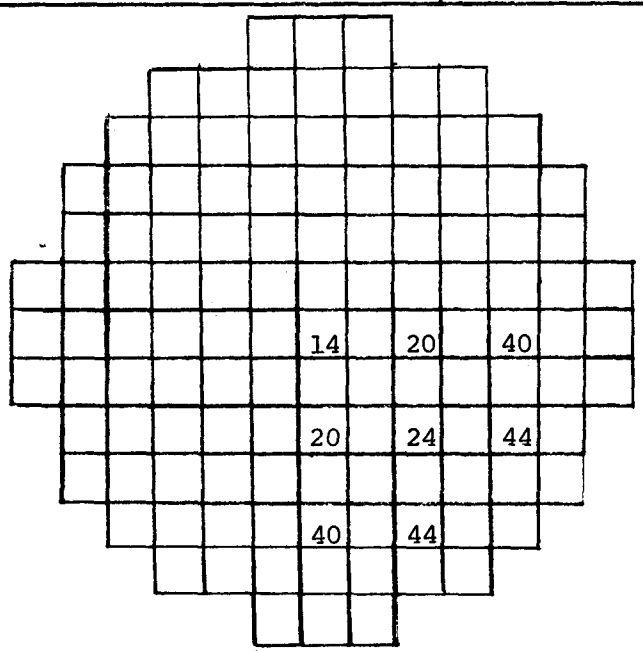
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 10 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1672.00	HB #2-78 11/26/73	HB #2-78 is at 9318 MWD/STU
2. Core total flow (lbs/hr)	56.37×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.04	Idem	22.41 from HB #2-78 corrected for core pressure
4. System pressure (psig)	1006.	Idem	Calculated core pressure = 1038.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Toab Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 8780 MWD/STU to 9063 MWD/STU

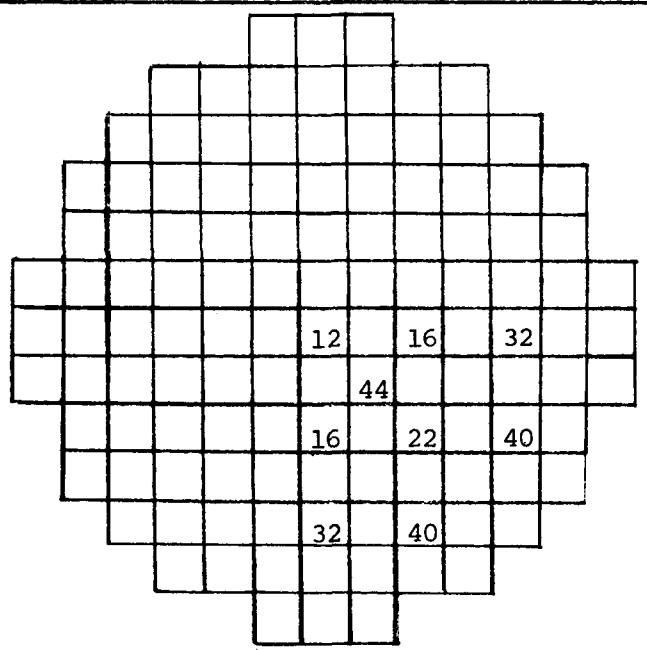
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 9 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1667.63	HB #2-69 11/2/73	HB #2-69 is at 9005 MWD/STU
2. Core total flow (lbs/hr)	56.45×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.82	Idem	22.19 from HB #2-69 corrected for core pressure
4. System pressure (psig)	1011.	Idem	Calculated core pressure = 1043.3 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 8580 MWD/STU to 8780 MWD/STU

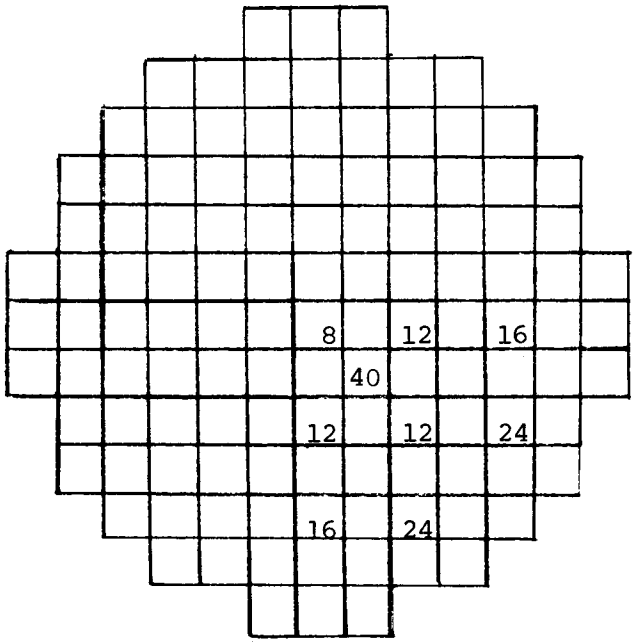
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 8 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1526.80	HB #2-60 10/12/73	HB #2-60 is at 8677 MWD/STU
2. Core total flow (lbs/hr)	57.52×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.82	Idem	20.12 from HB #2-60 corrected for core pressure
4. System pressure (psig)	998.	Idem	Calculated core pressure = 1030.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tomb Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

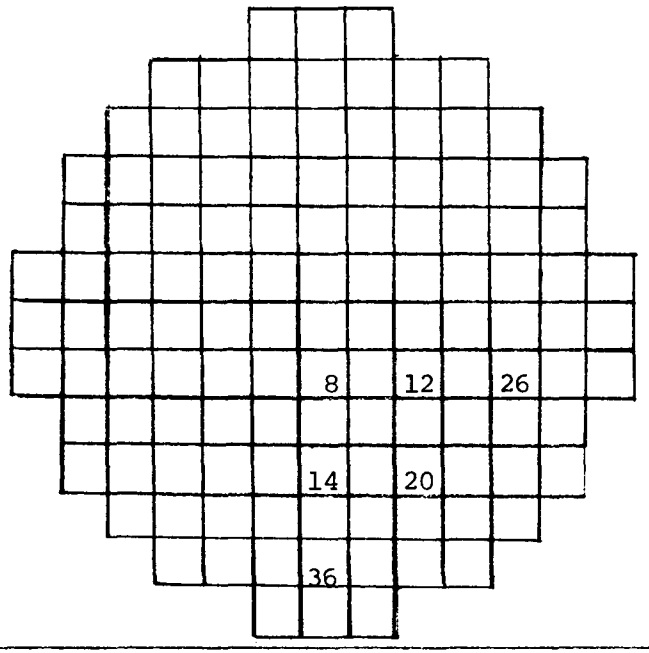
Exposure: 8300 MWD/STU to 8580 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1645.59	HB #2-52 9/21/73	HB #2-52 is at 8477 MWD/STU
2. Core total flow (lbs/hr)	57.60×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.13	Idem	21.43 from HB #2-52 corrected for core pressure
4. System pressure (psig)	1005.	Idem	Calculated core pressure = 1037.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 8100 MWD/STU to 8300 MWD/STU

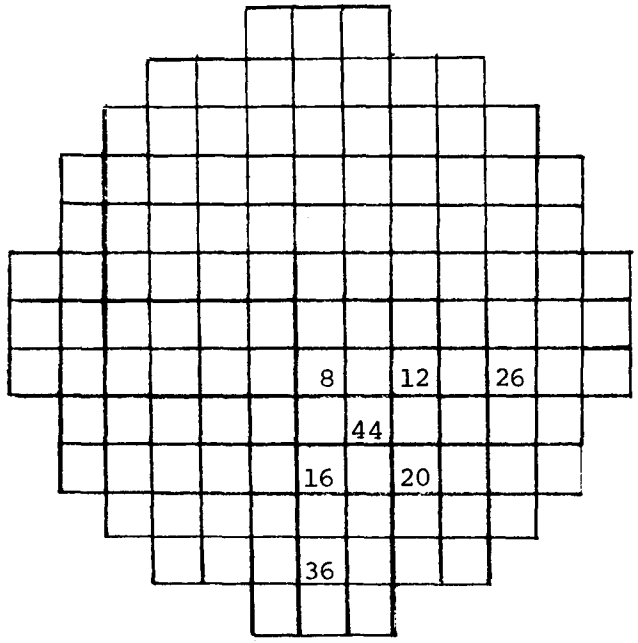
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 6 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1667.64	HB #2-44 9/7/73	HB #2-44 is at 8252 MWD/STU
2. Core total flow (lbs/hr)	55.17×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.17	Idem	22.61 from HB #2-44 corrected for core pressure
4. System pressure (psig)	1002.	Idem	Calculated core pressure = 1033.8 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 7820 MWD/STU to 8100 MWD/STU

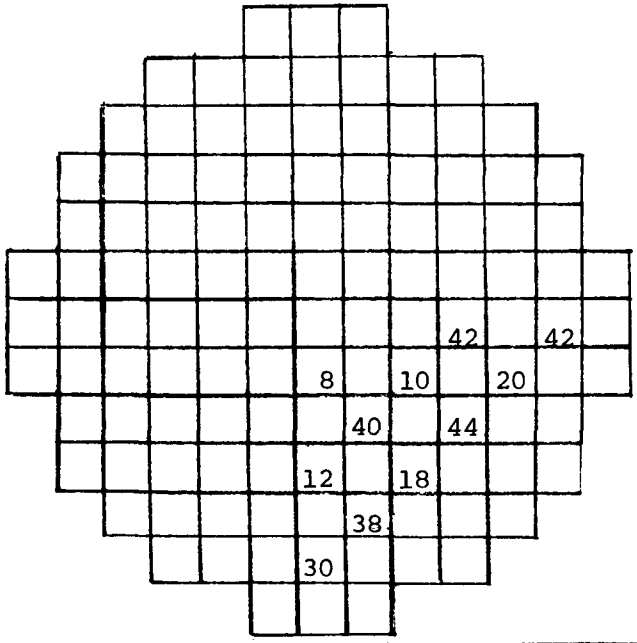
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 5 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR HISTORY average value over time interval		Core Heat Balance	
1. Core power (MWt)	1672.53	HB #2-39 8/24/73	HB #2-39 is at 8030 MWD/STU
2. Core total flow (lbs/hr)	56.45×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.85	Idem	22.22 from HB #2-39 corrected for core pressure
4. System pressure (psig)	1007.	Idem	Calculated core pressure = 1039.3 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Tor Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 7500 MWD/STU to 7820 MWD/STU

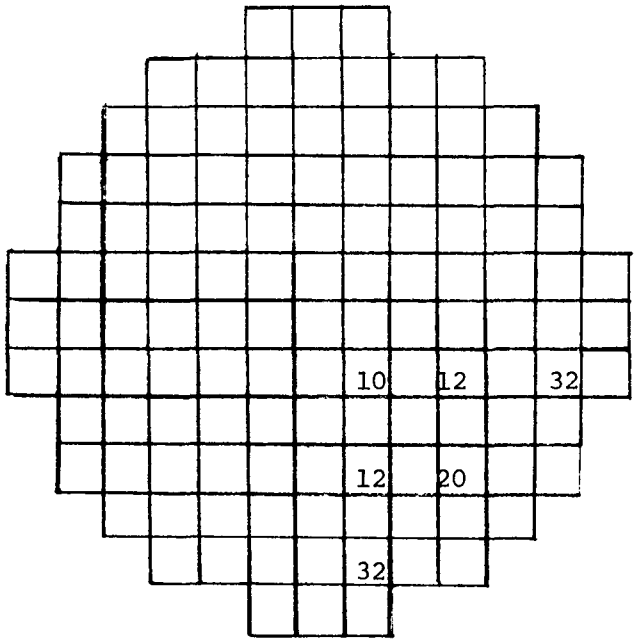
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 4 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR HISTORY average value over time interval		Core Heat Balance	
1. Core power (MWt)	1675.75	HB #2-26 7/20/73	HB #2-26 is at 7644 MWD/STU
2. Core total flow (lbs/hr)	54.20×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.69	Idem	23.18 from HB #2-26 corrected for core pressure
4. System pressure (psig)	1006.	Idem	Calculated core pressure = 1037.4 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 7200 MWD/STU to 7500 MWD/STU

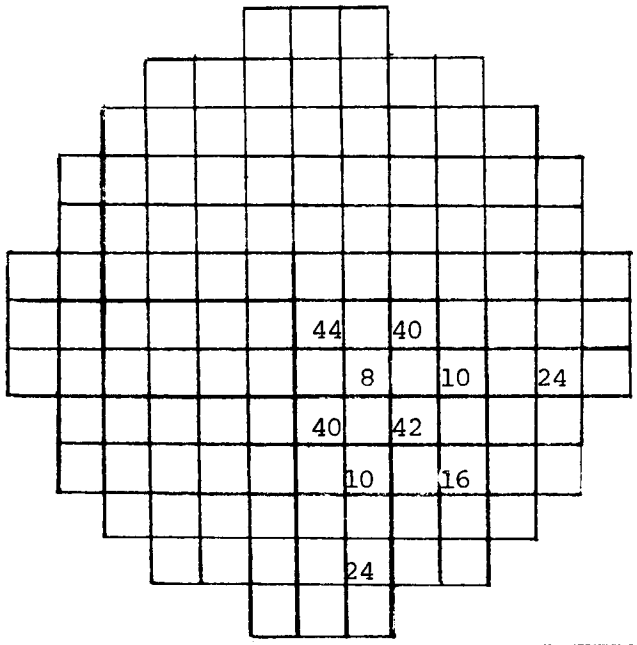
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 3 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1660.86	HB #2-17 6/29/73	HB #2-17 is at 7311 MWD/STU
2. Core total flow (lbs/hr)	55.5×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.10	Idem	22.52 from HB #2-17 corrected for core pressure
4. System pressure (psig)	1006.	Idem	Calculated core pressure = 1037.9 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 6868 MWD/STU to 7200 MWD/STU

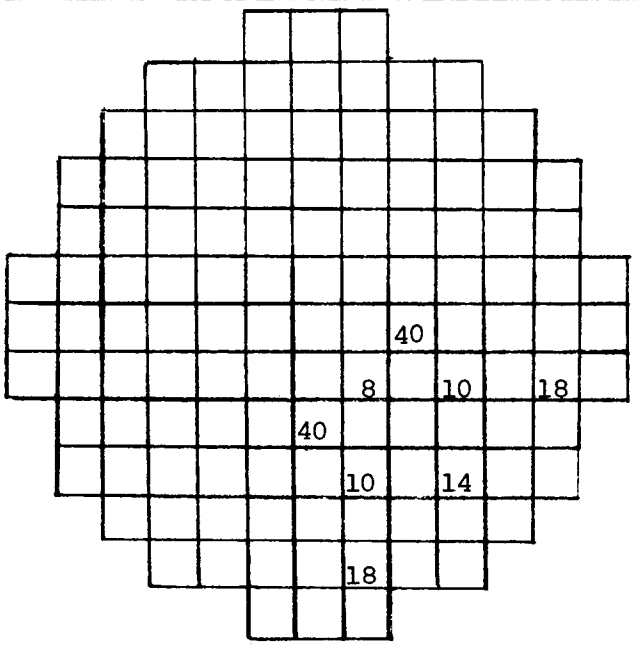
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 2 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1673.11	HB #2-12 6/15/73	HB #2-12 is at 7167 MWD/STU
2. Core total flow (lbs/hr)	57.55×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.42	Idem	21.72 from HB #2-12 corrected for Core Pressure
4. System pressure (psig)	1006.	Idem	Calculated core pressure = 1038.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Ford Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

Exposure: 6802 MWD/STU to 6868 MWD/STU

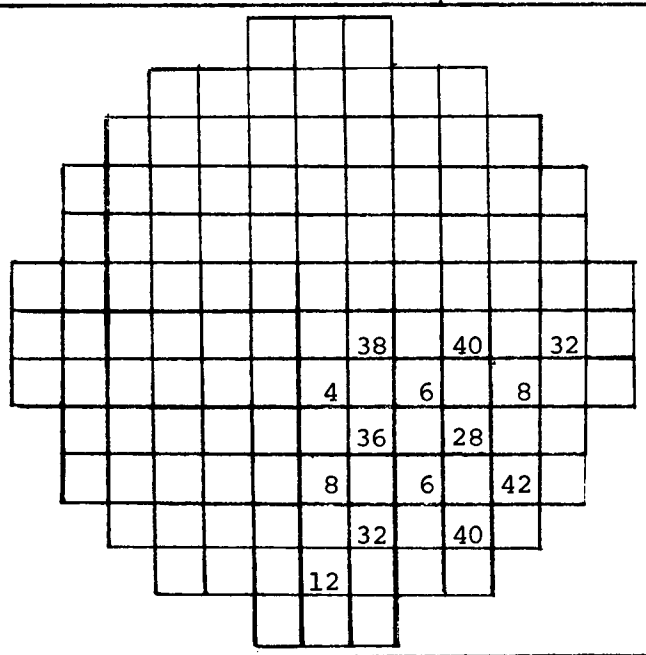
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 1 of 16

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1594.52	HB #2-1 5/25/73	HB #2-1 is at 6866 MWD/STU
2. Core total flow (lbs/hr)	57.42×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.65	Idem	20.96 from HB #2-1 corrected for core pressure
4. System pressure (psig)	1005.	Idem	Calculated core pressure = 1037.6 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Tcw Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

DATA WORK SHEET

TABLE 1.3 PART B

BWR Average Fuel Rod Loading

Sheet 4 of 4

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	4		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.33 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated from assembly loading 187.2 kgU (NEDC 20165 Table 1-2)
2. U-238 (kg)	3.7692	Idem	
3. U-235 (kg)	0.0508	Idem	
4. U-234 (kg)	0.004	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	3.8204	Idem	
7. UO_2 (kg)	4.3341	Idem	

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello
CYCLE: 2

DATA WORK SHEET

TABLE 1.3 PART B

BWR Average Fuel Rod Loading

Sheet 3 of 4

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	3		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.69 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated from assembly loading 187.2 kgU (NEDC 20165 Table 1-2)
2. U-238 (kg)	3.7553	Idem	
3. U-235 (kg)	0.0646	Idem	
4. U-234 (kg)	0.0005	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	3.8204	Idem	
7. UO_2 (kg)	4.3341	Idem	

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

DATA WORK SHEET

TABLE 1.3 PART B

BWR Average Fuel Rod Loading

Sheet 2 of 4

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	2		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.94 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated values from assembly loading 187.2 kgU (NEDC-20165 Table 1-2)
2. U-238 (kg)	3.7457	Idem	
3. U-235 (kg)	0.0741	Idem	
4. U-234 (kg)	.0006	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	3.8204	Idem	
7. UO_2 (kg)	4.3341	Idem	

Verified By: E. Terry Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

DATA WORK SHEET

TABLE 1.3 PART B

BWR Average Fuel Rod Loading

Sheet 1 of 4

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	1		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	2.56 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0	NAI	Calculated values from average assembly loading 187.2 kgU (NEDC-20165 Table 1-2)
2. U-238 (kg)	3.7218	Idem	
3. U-235 (kg)	0.0978	Idem	
4. U-234 (kg)	.0008	Idem	
5. U-236 (kg)	0.0	Idem	
6. U-total (kg)	3.8204	Idem	
7. UO_2 (kg)	4.3341	Idem	

Verified By: E. Tirado Date: 07/19/76

REACTOR: Monticello
CYCLE: 2

DATA WORK SHEET
TABLE 1.3 PART A
BWR Average Assembly Fuel Loading

Sheet 2 of 2
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Weight of Material			
1. Gd-natural (kg)	not available	vendor proprietary	
2. U-238 (kg)	182.86	NAI	none
3. U-235 (kg)	4.31	Idem	none
4. U-234 (kg)	0.03	Idem	none
5. U-236 (kg)	0.00	Idem	none
6. U-total (kg)	187.20	NEDC 20165 Table 1-2	none
7. UO_2 (kg)	212.37	NAI	none

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

DATA WORK SHEET

TABLE 1.3 PART A

BWR Average Assembly Fuel Loading

Sheet 1 of 2

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Assembly Type	2.30	NEDS-20016 Table 3-1	U-235 assembly average enrichment
Enrichment, w/o U-235			
type 1	2.56	Idem	none
type 2	1.94	Idem	none
type 3	1.69	Idem	none
type 4	1.33	Idem	none
type 5 Gd_2O_3 (w/o per rod)	2.56 not available	vendor proprietary	none

Verified By: [illegible] Date: 07/19/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 14 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
7.0 Water (or inert) Rod Cell for each water (or inert) cell type			no water rod cell
7.1 Tube material			
7.2 Tube density (g/cm^3)			
7.3 Tube O.D. (in.)			
7.4 Tube I.D. (in.)			
7.5 Inert material density (in.)			
7.6 Inert material O.D. (in.)			
7.7 Inter material I.D. (in.)			

Verified By: E Terat Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
6.0 Instrument Rod Cell			
6.1 Instrument guide tube material	SS†	FSAR Page 3-6-3	none
6.2 Instrument guide tube density (g/cm^3)	7.91†	NAI 70-52	
6.3 Tube O.D. (in.)	0.7†	APED 5706 Nov. 1968	none
6.4 Tube I.D. (in.)	.640 †	"	none
6.5 Detector types	U-235 fission chamber †	NSP	none
6.6 Number of instrument guide tubes	40†	FSAR Page 3-6-3	none

† = No change from previous cycle

Verified By: E. Terrell Date: 5/11/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 12 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
5.10 Fuel clad material	Zr-2†	NEDS 20016 Table 3-1	none
5.11 Clad density (g/cm^3)	6.56†	NAI 70-52	none
5.12 Clad O.D. (in.)	.563†	NEDS 20016 Table 3-1	none
5.13 Clad I.D. (in.)	.489	NAI	calculated from 5-12 and 5-14
5.14 Clad thickness (in.)	.037	NEDS 20016 Table 3-1	none
5.15 Unheated length at top of fuel rod (in.)	11.0	NEDS 20016 Table 3-1	Gas plenum length used
5.16 Fuel rod enrichment, w/o U-235 Gd_2O_3, w/o per rod	2.56, 1.94, 1.69, 1.33	NEDS 20016 Table 3-1	none

† = No change from previous cycle

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 11 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
5.0 Fuel (For each fuel rod type)			data on this page applicable to all fuel rod types listed on 4-19.
5.1 Fuel pellet material	UO_2 †	NEDS 20016 Table 3-1	none
5.2 Fuel pellet density (%TD)	95. †	Idem	none
5.3 Fuel pellet length (in.)	not available †		
5.4 Fuel pellet O.D. (in.)	.477	Idem	none
5.5 Fuel pellet dish factor	not available †		
5.6 Fuel pellet chamfer factor	not available †		
5.7 Fuel pellet dish O.D. (in.)	not available †		
5.8 Fuel pellet dish depth (in.)	not available †		
5.9 Fuel stack density (%TD)	93.9	NAI	reload 1 assembly average

† = No change from previous cycle

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 10 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.19 Fuel enrichments (w/o U-235)			
type 1 no Gd	2.56	NEDS-20016 Table 3-1	none
type 2 no Gd	1.94	Idem	none
type 3 no Gd	1.69	NEDS 20016 Table 3-1	none
type 4 no Gd	1.33	Idem	none
type 5 with Gd Gd_2O_3, w/o per rod	2.56 not available	Idem Vendor Proprietary	none

Verified By: E. Tc[illegible] Date: 07/16/76

REACTOR: Monticello
CYCLE: 2

TABLE 1.2
DATA WORK SHEET
BWR Core and Component Description

Sheet 9 of 14
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.10 Spacer grid thickness (in.)	not available	vendor proprietary	
4.11 Spacer grid width (in.)	not available	vendor proprietary	
4.12 Can (or channel) material	Zr-4†	NEDS-20016 Table 3-1	none
4.13 Can (or channel) density (g/cm^3)	6.56†	NAI 70-52	none
4.14 Can thickness (in.)	.080†	NEDS-20016 Table 3-1	none
4.15 Can outside dimensions (in.)	5.438†	NEDS-20016 Table 3-1	none
4.16 Can corner radius O.D. (in.)	not available		
4.17 Active fuel length (in.)	144.0†	NEDS-20016 Table 3-1	none
4.18 Burnable poison positions per assembly	3	Idem	none

† = No change from previous cycle

Verified By: [illegible] Date: 07/16/76

Diagram 1.2-9

Fuel Assembly - Cycle 1

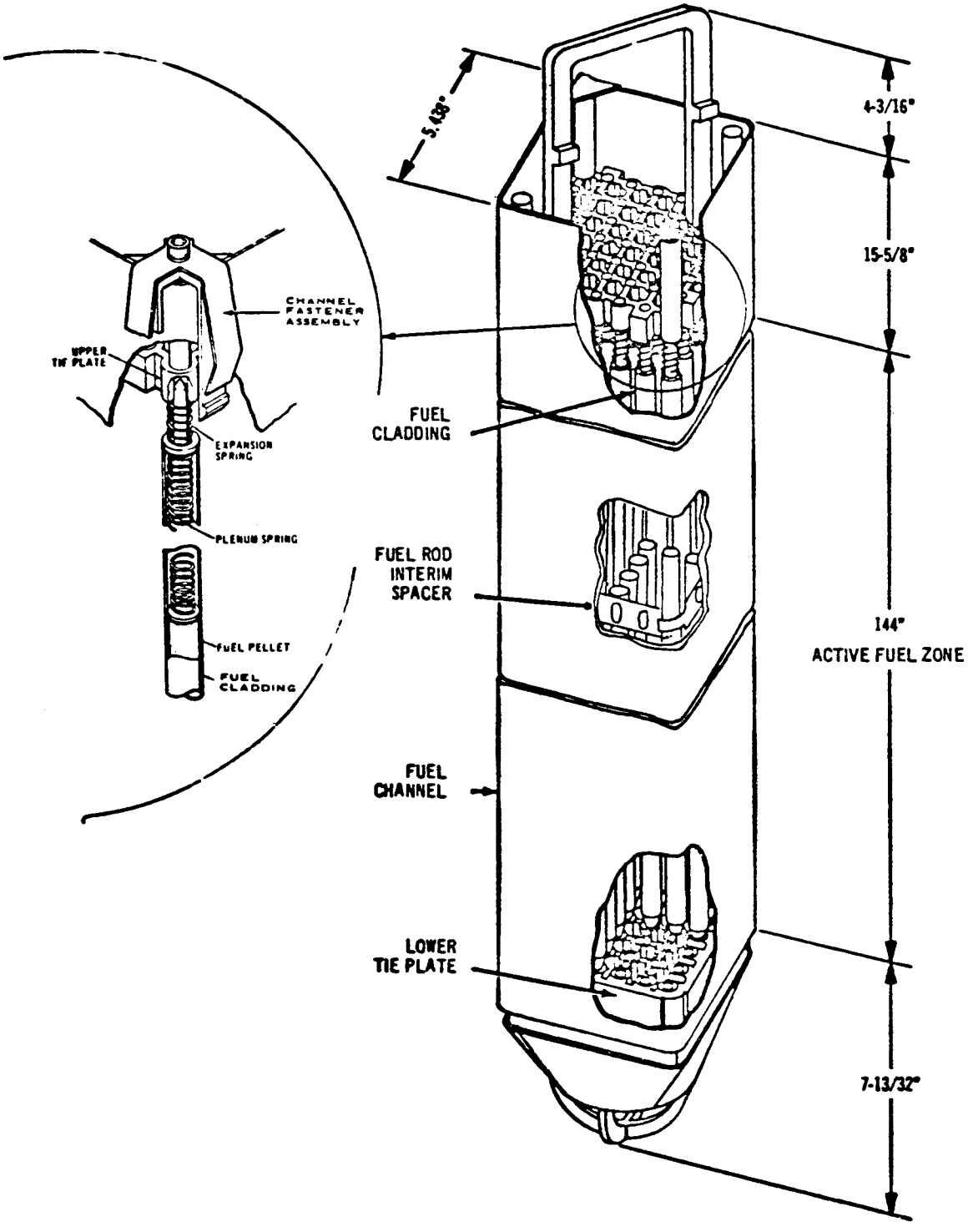


Diagram 1.2-8

Assembly Layout Plan View - Cycle 2

2.30 wt% U-235 BUNDLE AVERAGE

4	3	3 t	2	2 t	2	3
3	2	1	1	1	1	2
3 t	1	5	1	1	1	1 t
2	1	1	1	1	5	1
2 t	1	1	1	1	1	1 t
2	1	1	5	1	1	1
3	2	1 t	1	1 t	1	2

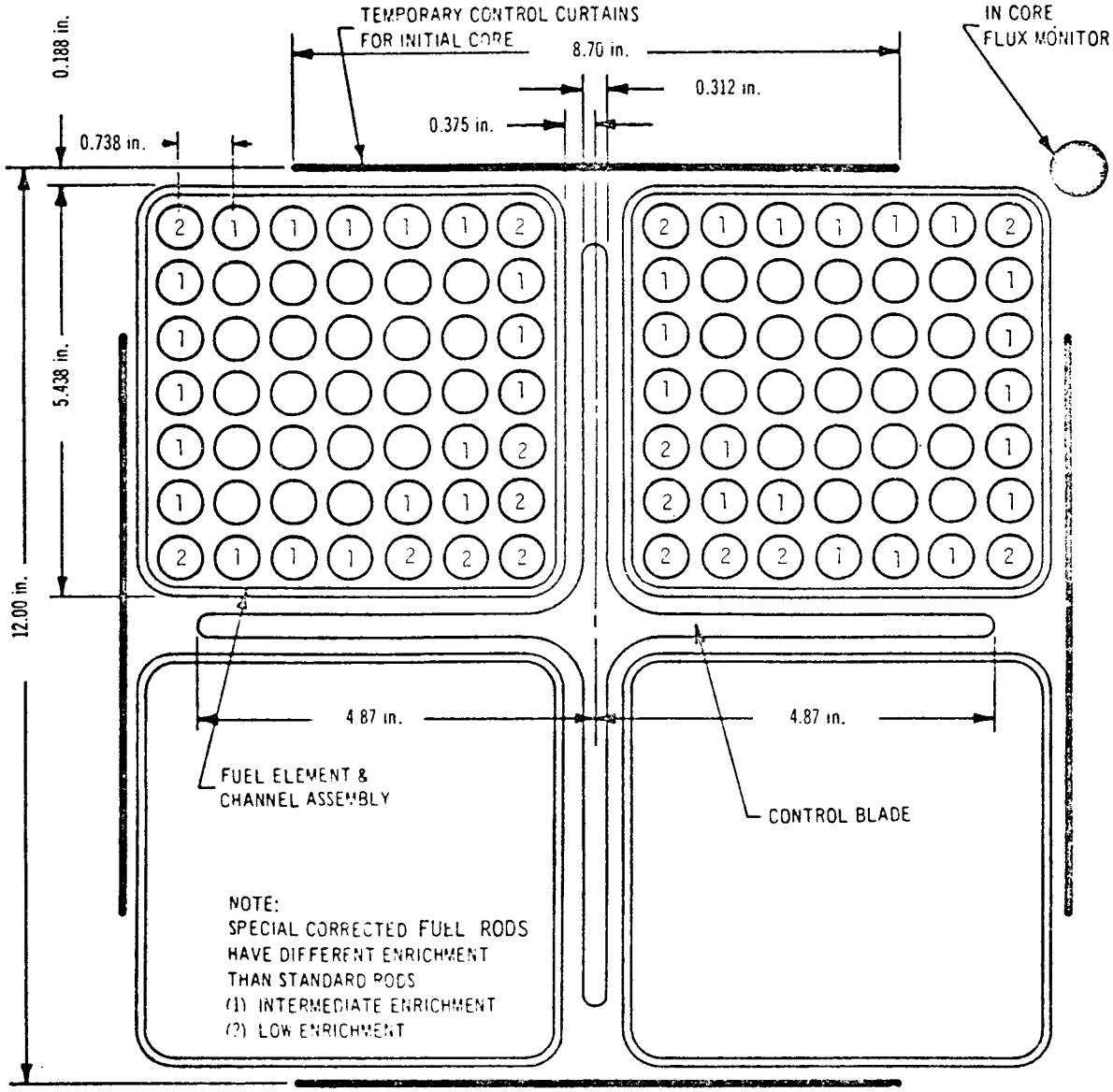
ROD TYPE	U-235 (wt%)	Gd_2O_3 (wt%)	NUMBER OF RODS
1	2.56	0	29
2	1.94	0	10
3	1.59	0	6
4	1.33	0	1
5	2.56		3

t = tie rod

Diagram 1.2-7

Typical Core Lattice Unit

Initial Core Loading



REACTOR: Monticello
CYCLE: 2

TABLE 1.2
DATA WORK SHEET
BWR Core and Component Description

Sheet 8 of 14
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.0 Fuel Assembly (For each assembly type)			
4.1 Assembly layout - plan view elevation view		NEDC-20165 Fig.1-2 FSAR Fig. 3-41	diagram #1.2-8 attached diagram #1.2-9 attached
4.2 Assembly pitch (in.)	6. †	FSAR Figure 3-4-2	diagram #1.2-7 attached
4.3 Assembly geometry	7 x 7 †	NEDS-20016 Table 3-1	none
4.4 Fuel rod pitch (in.)	.738 †	Idem	none
4.5 Fuel rods per assembly	49 †	Idem	none
4.6 Water holes (inert pins) per assembly	0 †	Idem	none
4.7 Spacer grids per assembly	7 †	operation manual Page 3-1-1	none
4.8 Spacer grid material	Inc-718 Zr-4 †	NSP	none
4.9 Spacer mass per grid (g)	Inc. 718:47 Zr-4:244 †	NSP	Assumed the same as in Cycle 1

† = No change from previous cycle

Verified By: E. Jones Date: 5/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 7 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.18 Number of control material tubes/rod	84†	FSAR Table 3-1-1	none
3.19 Control rod guide tube material	SS†	FSAR Page 3-6-2	none
3.20 Control rod guide tube thickness (in.)	.165†	FSAR Page 3-6-2	.165 nominal .134 minimum

† = No change from previous cycle.

Verified By: E. Tool Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 6 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.10 Absorber clad O.D. (in.)	0.188 †	FSAR Table 3-1-1	none
3.11 Absorber clad thickness (in.)	.025 †	FSAR Table 3-1-1	none
3.12 Absorber material	Boron†	Idem	none
3.13 Absorber density (%TD)	70.†	FSAR Page 3-5-1	none
3.14 Absorber length (in.)	143.†	FSAR Table 3-1-1	none
3.15 Absorber O.D. (in.)	.138†	NAI	Calculated assuming no gap between poison and clad
3.16 Absorber composition	B_4C granules†	FSAR Table 3-1-1	none
3.17 Control rod pitch (in.)	12.0†	FSAR Table 3-1-1	none

† = No change from previous cycle

Verified By: E. Tenal Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.0 Control Rod - Cruciform Type			
3.1 Control blade width - tip to tip- (in.)	9.75†	FSAR Table 3-1-1	none
3.2 Blade thickness (in.)	.312 †	FSAR Figure 3-4-2	none
3.3 Blade hub radius (in.)	not available		
3.4 Blade tip radius (in.)	not available		
3.5 Blade sheath material	SS†	FSAR Table 3-1-1	none
3.6 Blade sheath density (g/cm^3)	7.91 †	NAI 70-52	none
3.7 Blade sheath thickness (in.)	.062†	NAI	calculated assuming no gap between sheath and rod
3.8 Absorber clad material	SS†	FSAR Table 3-1-1	none
3.9 Absorber clad density (g/cm^3)	7.91†	NAI 70-52	none

† = No change from previous cycle

Verified By: E. Ford Date: 07/16/76

REACTOR: Monticello
CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
2.0 Control Curtains			
2.1 Curtain material	SS †	FSAR Table 3-1-1	none
2.2 Curtain material density (g/cm^3)	7.91†	NAI 70-52	none
2.3 Initial poison concentration (ppm)	5400 ppm † Nat. Boron	FSAR Table 3-1-1	none
2.4 Curtain thickness (in.)	.0625 †	Idem	none
2.5 Curtain width (in.)	8.70 †	Idem	none
2.6 Curtain length (in.)	141.25†	Idem	none
2.7 Curtain structural material	SS†	Idem	none
2.8 Stainless steel stiff backing dimension (in.)	.582 x .582† x 141.25	NX 7831-179 (NSP)	none

† = No change from previous cycle

Verified By: E. Ferd Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 3 of 14

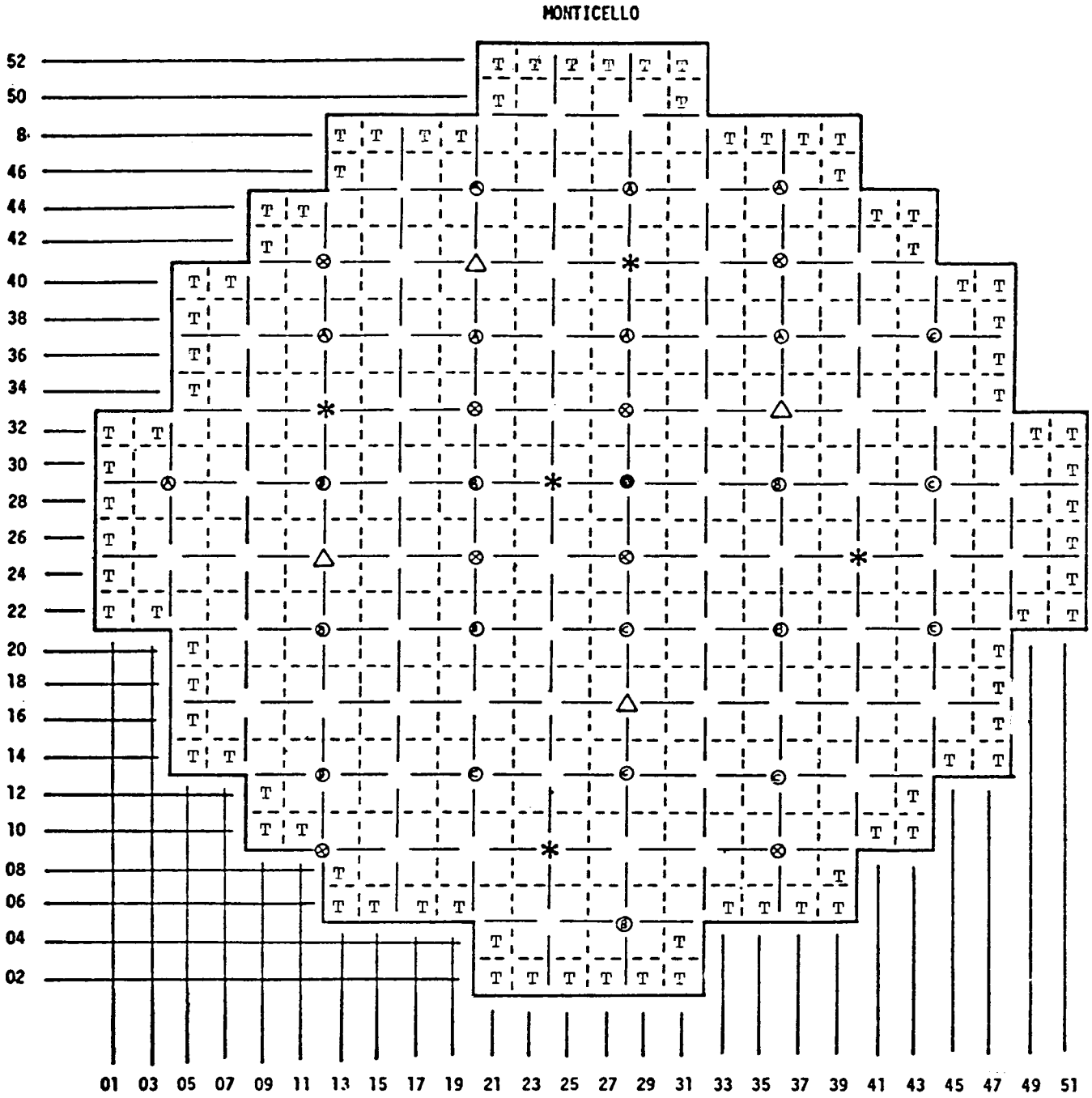
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.18 Core layout - elevation view		operation manual B.1.1 Figure 1a	See diagram # 1.2-6 for Cycle 1

Verified By: [illegible] Date: 07/16/76

Diagram 1.2-4

Inlet Orifice Locations



T = tightly orificed, remainder are loosely orificed.

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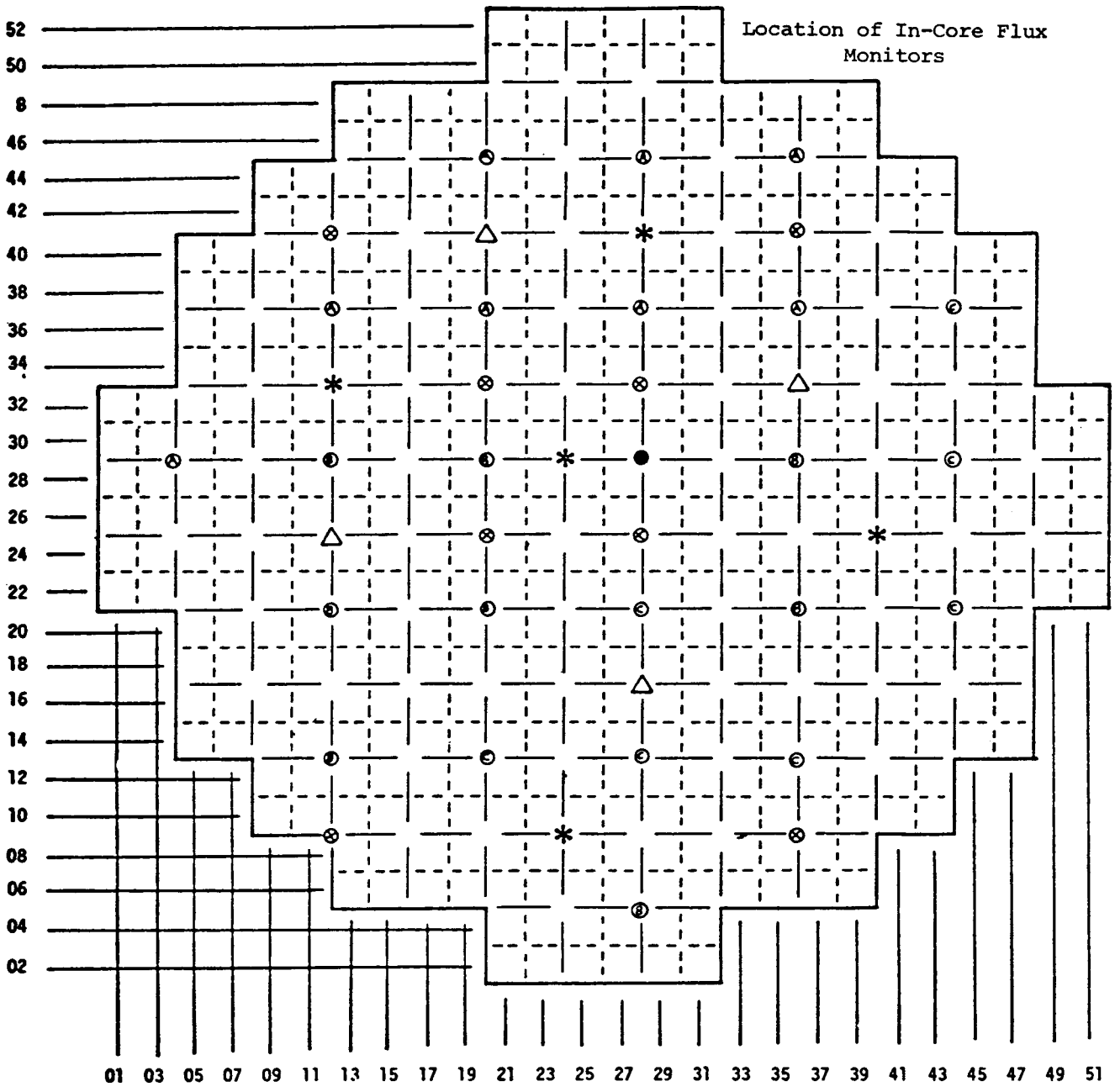
Diagram 1.2-3

Location of In-Core Flux Monitors



- LPRM Location (Letter indicates TIP machine)
- LPRM Location (Common location for all TIP machines)
- IRM Locations
- SRM Locations
- Source Locations

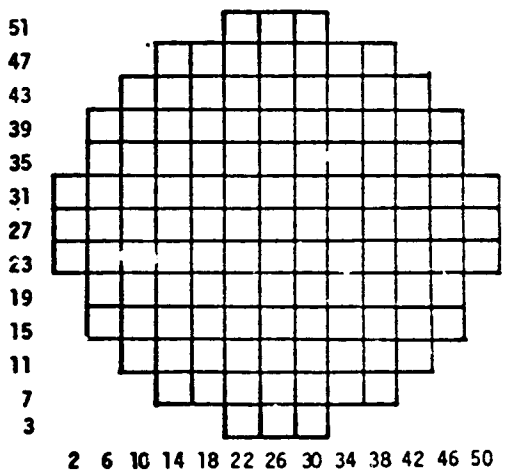
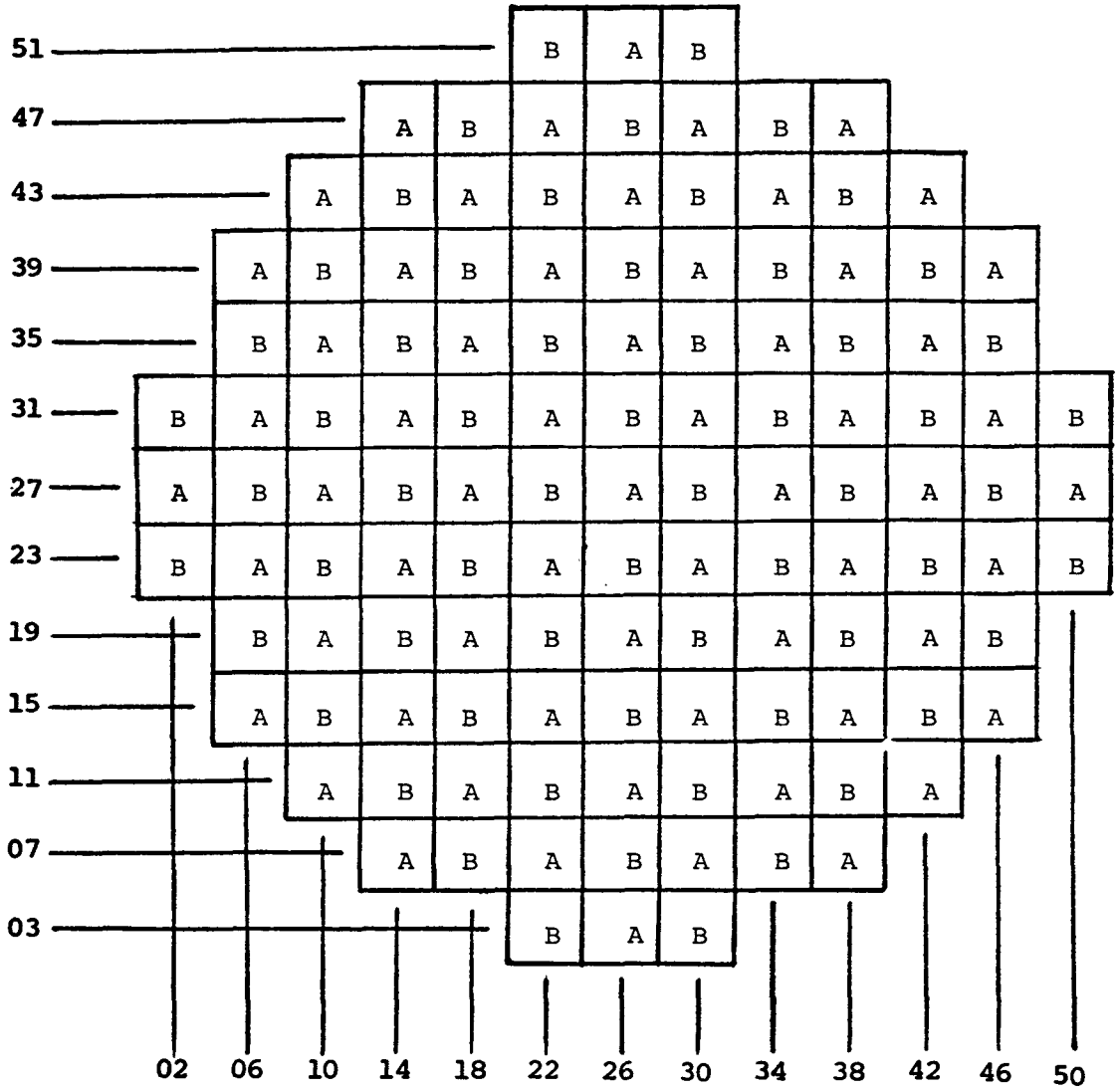


Diagram 1.2-2

Rod Location and Sequence



REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR CORE AND COMPONENT DESCRIPTION

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.8 Location of control rods and control group identification		RWNE July, 1971 N18.01.01	diagram # 1.2-2 attached
1.9 Number of burnable control curtains	44	Letter March 21, 1973 WTM: 83	none
1.10 Location of control curtains		Letter March 21, 1973 WTM:83	diagram # 1.2-1 attached
1.11 Total number of incore flux monitors	96 †	FSAR Table 1-6-1	none
1.12 Location of incore flux monitors		NSP operation manual B.1.1 Figure 30	diagram # 1.2-3 attached
1.13 Core shroud material-composition	SS †	FSAR Page 3-6-1	none
1.14 Core shroud thickness (in.)	1 3/4" †	NSP operation manual B.1.1 Page 42	none
1.15 Height of downcomer above core (ft)	13 tc 13.83 †	NSP operation manual B.1.1 Figure 1a	none
1.16 Inlet orifice locations		GE 117C 2010	diagram # 1.2-4 attached
1.17 Core layout- plan view		MFG104R919 (GE) NX-7831-197 (NSP)	See diagram # 1.2-5 for Cycle 1

† = No change from previous cycle

Verified By: E Terry Date: 07/16/76

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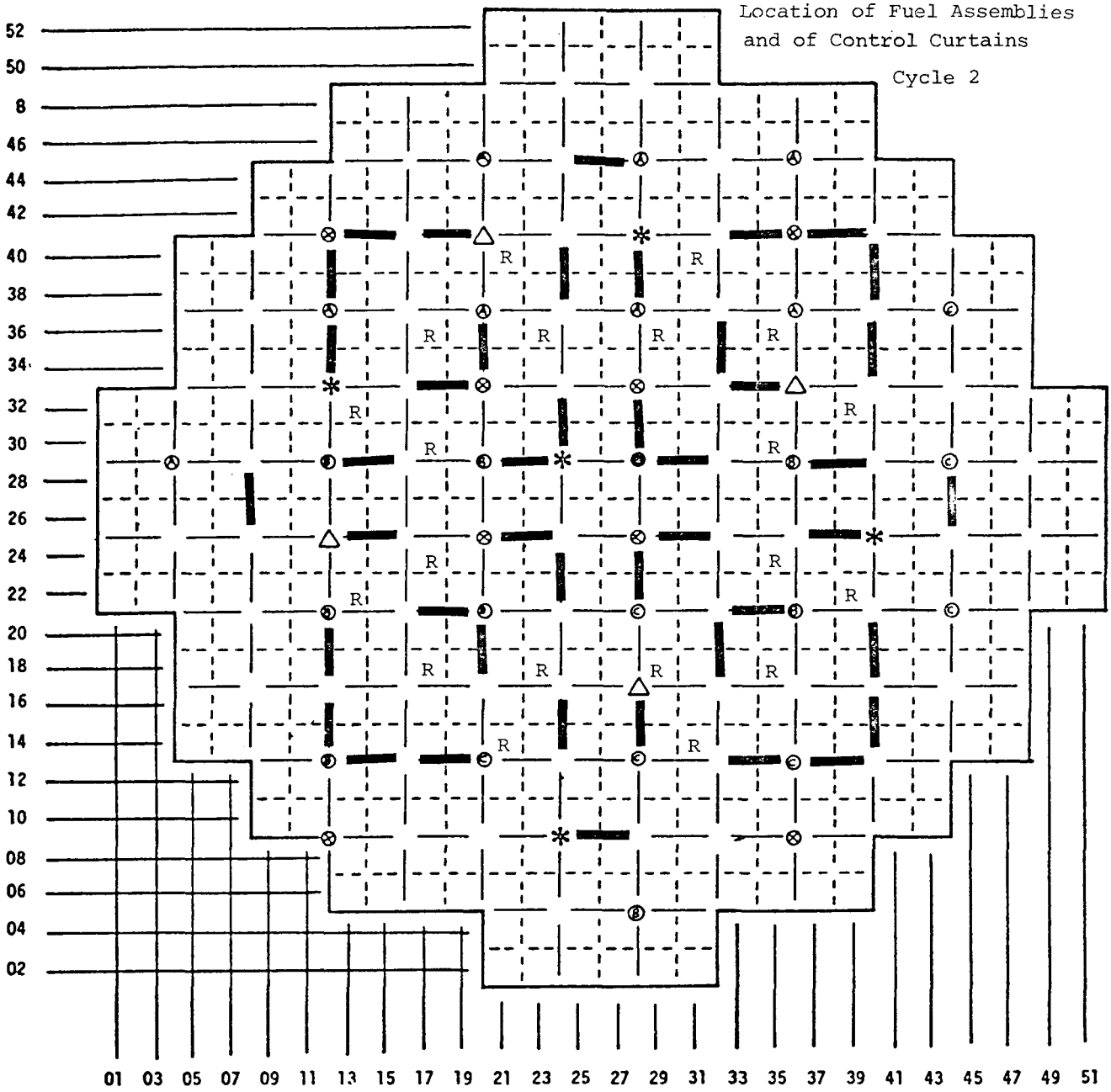
Diagram 1.2-1

Location of Fuel Assemblies and of Control Curtains

Cycle 2



LPRM Location (Letter indicates TIP machine)

LPRM Location (Common location for all TIP machines)

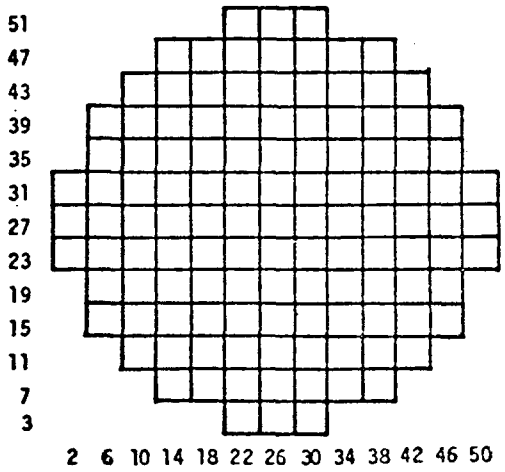
IRM Locations

SRM Locations

Source Locations

Remaining Curtains

R Reload Bundle



REACTOR: Monticello

CYCLE: 2

TABLE 1.2

DATA WORK SHEET

BWR Core and Component Description

Sheet 1 of 14

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1.0 Core			
1.1 Total number of fuel assemblies	484†	FSAR Table 3-1-1	none
1.2 Number of fuel assembly types*	2	NEDC-20165 Table 1-1	none
1.3 Number of fuel assemblies of each type	464 20	NEDC-20165 Table 1-1	none
1.4 Location of individual fuel assemblies		letter March 21, 1973 WTM:83	diagram #1.2-1 attached
1.5 Total number of control rods	121†	FSAR Table 3-1-1	none
1.6 Number of control rod types	1†	FSAR Page 3-5-1	none
1.7 Number of control rods of each type	121†	FSAR Table 3-1-1	none

*The term "fuel assembly type" used throughout this BWR document is defined according to the fuel enrichments and the amount of gadolinia contained in the fuel rods in an assembly. The curtain(s) which is(are) located outside of the fuel can is(are) not included in this definition.

† = No change from previous cycle

Verified By: E. Terrab Date: 07/16/76

REACTOR: Monticello
CYCLE: 2

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
type 5 with Gd_2O_3, w/o per rod	2.56 not available	Idem	none
Cycle 3			
type 1			
type 2			
type 3			
type 4			
type 5 with Gd_2O_3, w/o per rod			

Verified By: E. Terrel Date: 07/16/76

REACTOR: Monticello
CYCLE: 2

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
31. fuel enrichment, w/o U-235			
Cycle 1			
type 1	2.95†	NEDS-20016 Table 3-1	none
type 2	1.91†	Idem	none
type 3	1.13†	Idem	none
Cycle 2			
type 1	2.56	NEDS-20016 Table 3-1	none
type 2	1.94	Idem	none
type 3	1.69	Idem	none
type 4	1.33	Idem	none

† = No change from previous cycle

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 2

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Sheet 3 of 5

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
21. control rod drive flow temperature (^{o}F)	80.†	FSAR Figure 1-3-2B	none
22. control rod drive flow (lbs/hr)	30,000†	FSAR Figure 1-3-2B	none
23. fraction of control rod drive flow to lower plenum	1.0 †	NSP operation manual B.1.3.21	none
24. cleanup system flow (lbs/hr)	80,000†	FSAR Figure 1-3-2B	none
25. inlet temperature to cleanup system (^{o}F)	529.†	Idem	none
26. outlet temperature to cleanup system (^{o}F)	442.†	Idem	none
27. steam carry under fraction	not available	vendor proprietary	
28. thermal loss from reactor vessel and piping (MWt)	.6†	FSAR figure 1-3-2B	none
29. recirculation pump power (MW/pump)	2.4†	Idem	Calculated from heat balance and adjusted for pump efficiency
30. recirculation pump efficiency	.90†	maintenance instructions NX-7831-342	none

† = No change from previous cycle

Verified By: E. Jones Date: 07/16/76

REACTOR: Monticello
CYCLE: 2

TABLE 1.1
BWR Reference Design Parameters
at Rated Conditions

Sheet 2 of 5
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
11. active core flow area (ft^2)	52.631 †	NAI	Calculated from assembly dimensions
12. core ΔP 100% flow (psi)	16.69 †	NSP	Measured pressure drop across core support plate, psi
13. inlet orifice coefficient (central/peripheral)	not available	vendor proprietary	
14. spacer single phase loss coefficient	not available	vendor proprietary	
15. core total flow (lbs/hr)	57.6×10^6 †	FSAR Table 3-1-1	none
16. core active flow (lbs/hr)	51.84×10^6 †	NAI	bypass flow assumed to be 10%
17. fraction of heat generated in fuel	0.965†	FSAR Table 3-1-1	none
18. fraction of heat deposited in bypass flow	.02†	NAI	none
19. feedwater temperature at rated power (^oF)	376.3†	FSAR Table 1-6-1	none
20. feedwater flow at rated power (lbs/hr)	6.747×10^6 †	Idem	none

† = No change from previous cycle

Verified By: E Ford Date: 07/16/76

REACTOR: Monticello
CYCLE: 2

TABLE 1.1

BWR Reference Design Parameters

at Rated Conditions

Sheet 1 of 5

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
1. full rated power (MWt)	1670. †	FSAR Table 3-1-1	none
2. power density (KW/l)	40.61 †	Idem	none
3. linear power (KW/ft)	5.7 †	FSAR Table 1-6-1	none
4. core loading (STU)	103.1	NEDC-20165 Table 1-1	none
5. cycle exposure (MWD/STU)	3912.	NSP	none
6. system pressure steam dome (psia)	1015. †	FSAR Table 1-6-1	Core Pressure = Dome Pressure + 18 psia = 1033 psia
7. inlet enthalpy (BTU/lb)	523.0†	FSAR Table 3-1-1	none
8. subcooling, BTU/lb ($HSAT_{core}$ - HIN)	24.6†	NAI	HSAT based on Core Pressure
9. average fuel rod surface temperature (^{o}F)	558.†	FSAR Table 1-6-1	none
10. average fuel temperature (^{o}F)	900.†	FSAR Table 1-6-1	none

† = No change from previous cycle

Verified By: E. Ford Date: 07/16/76

BWR CYCLE 2 DATA

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DIAGRAM 1.5-1

I, J Fuel Location Convention

Used in EPRI-NODE-B

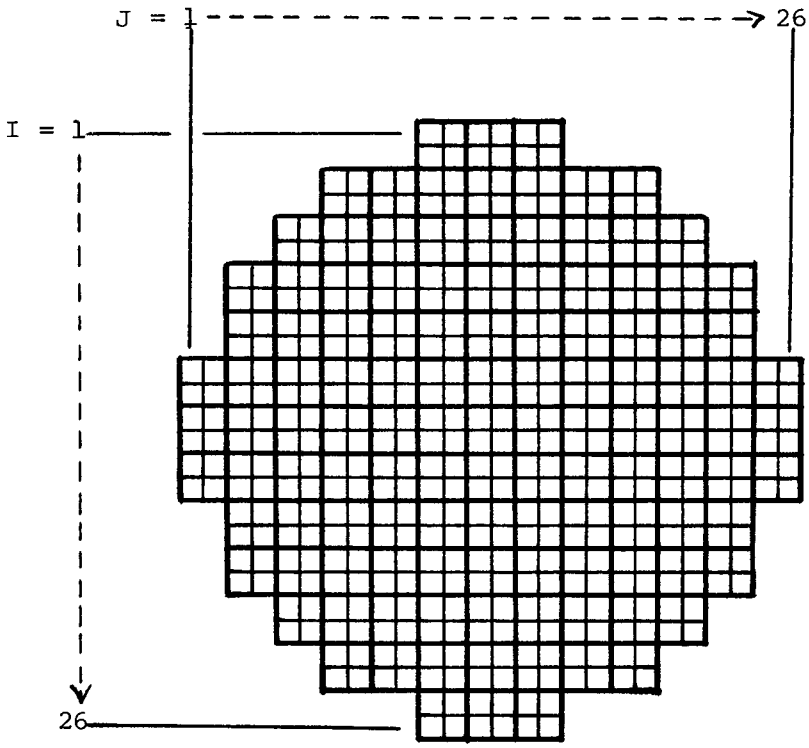


TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 17 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
X081			5,11
X082			23,12
X083			17,21
X084			21,19
X085			21,8
X086			8,6
X087			15,10
X088			17,12
X089			19,6
X090			21,17
X091			17,15
X092			8,23
X093			17,10
X094			15,4
X095			4,12
X096			19,17
X097			4,19
X098			19,4
X099			12,19
X100			23,17
X101			12,4
X102			2,15
X103			17,4
X104			23,10
X105			19,21
X106			18,5
X107			4,10
X108			7,7
X109			8,12
X110			10,6
X111			8,8
X112			15,2
X113			10,8
X114			21,6
X115			6,21
X116			12,23

Verified by E. Ford Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 16 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
X044			2,12
X045			10,15
X046			6,8
X047			12,6
X048			12,8
X049			15,17
X050			17,8
X051			5,9
X052			4,15
X053			6,6
X054			17,6
X055			22,18
X056			11,5
X057			19,23
X058			10,10
X059			6,12
X060			10,19
X061			23,19
X062			15,25
X063			17,23
X064			10,4
X065			8,17
X066			12,10
X067			10,23
X068			9,5
X069			23,8
X070			8,10
X071			15,8
X072			15,19
X073			15,6
X074			21,21
X075			17,19
X076			17,17
X077			20,20
X078			18,22
X079			6,19
X080			19,12

Verified by E. Fry Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 15 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
X007			5,18
X008			6,17
X009			20,7
X010			19,15
X011			11,22
X012			15,15
X013			22,11
X014			10,12
X015			12,21
X016			23,15
X017			21,10
X018			4,17
X019			19,10
X020			12,12
X021			9,22
X022			22,9
X023			6,10
X024			12,25
X025			8,21
X026			7,20
X027			16,22
X028			8,19
X029			5,16
X030			15,23
X031			25,15
X032			19,19
X033			8,4
X034			12,15
X035			8,15
X036			10,17
X037			21,15
X038			21,12
X039			16,5
X040			6,15
X041			22,16
X042			15,21
X043			10,21

Verified by E Torok Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 14 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0482	22,5	22,5	20,4
0483	13,13	13,13	
0484	14,14	14,14	
B031		16,7	18,9
B032		11,7	9,9
B033		18,9	16,9
B034		15,9	16,7
B035		12,9	11,7
B036		9,9	11,9
B037		20,11	18,18
B038		7,11	20,11
B039		18,12	18,11
B040		9,12	9,11
B041		18,15	18,16
B042		9,15	9,16
B043		20,16	9,18
B044		7,16	7,11
B045		18,18	16,18
B046		15,18	16,20
B047		12,18	11,20
B048		9,18	11,18
B049		16,20	20,16
B050		11,20	7,16
R134			13,7
R135			7,9
R184			9,24
R209			18,7
R241			9,19
R260			20,18
R336			20,9
X001			25,12
X002			12,2
X003			15,12
X004			12,17
X005			19,8
X006			4,8

Verified by E Tech Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 13 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0445	25,13	25,13	14,12
0446	26,14	26,14	22,14
0447	9,15	15,14	26,12
0448	26,13	26,13	22,13
0449	13,10	13,10	
0450	20,6	20,21	19,16
0451	20,5	7,5	23,11
0452	11,20	16,23	16,26
0453	13,15	13,15	
0454	19,10	8,17	
0455	11,15	11,15	11,14
0456	15,17	15,10	16,2
0457	16,17		
0458	9,14	9,14	
0459	10,14	11,14	
0460	14,15	14,15	2,11
0461	13,9	13,9	
0462	11,10	11,17	
0463	17,8	10,8	
0464	8,16	8,16	
0465	7,14	20,14	24,10
0466	12,15	12,15	
0467	10,15	17,15	21,18
0468	19,17	19,10	
0469	7,16	8,22	7,24
0470	8,10	8,10	
0471	11,19	11,19	
0472	14,10	14,10	
0473	8,15	8,15	
0474	14,20	14,20	
0475	14,25	14,25	15,20
0476	17,19	17,8	
0477	3,8	3,8	8,9
0478	13,26	13,26	13,22
0479	15,25	12,25	21,7
0480	13,20		
0481	14,7	14,7	

Verified by E. Tirby Date 7/18/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 12 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0408	16,13	16,13	15,1
0409	16,11	16,11	16,11
0410	14,12	14,12	2,16
0411	10,17	10,17	
0412	15,16	15,16	14,16
0413	19,16	19,16	
0414	10,18	10,18	10,18
0415	19,15	19,15	
0416	9,18	8,23	14,23
0417	5,7	22,20	24,14
0418	16,16	16,16	16,16
0419	18,11	9,16	3,17
0420	18,12	12,10	
0421	5,8	5,8	21,5
0422	15,18	16,10	18,10
0423	16,14	17,14	
0424	11,9	11,18	11,16
0425	8,17	19,17	
0426	17,12	10,12	
0427	14,9	14,9	
0428	6,7	21,20	14,21
0429	10,8	10,19	
0430	10,13	10,13	
0431	16,15	16,15	18,17
0432	17,11	10,11	7,10
0433	13,25	13,25	12,20
0434	9,16	18,16	
0435	14,26	14,26	14,22
0436	20,4	20,4	17,5
0437	11,16	11,16	
0438	12,20	12,20	
0439	9,13	9,13	
0440	16,18	16,9	16,1
0441	12,19	12,19	
0442	19,5	19,22	14,4
0443	10,16	17,16	17,20
0444	25,14	25,14	14,15

Verified by E. Terry Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 11 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0371	17,14	16,14	
0372	12,11	11,11	10,9
0373	3,16	3,16	11,4
0374	8,11	8,11	
0375	12,16	12,16	13,16
0376	20,15	20,15	
0377	15,8		
0378	18,16	18,11	19,7
0379	25,15	2,15	12,18
0380	26,15	1,15	3,16
0381	3,15	3,15	
0382	12,12	12,12	
0383	15,7	15,7	
0384	17,17	17,17	15,11
0385	17,10	17,10	14,18
0386	18,18	21,19	25,11
0387	16,2	16,25	5,17
0388	15,1	15,26	16,24
0389	17,9	17,9	17,9
0390	9,23	9,4	
0391	8,12	8,12	
0392	10,9	10,9	
0393	14,13	14,13	
0394	11,13	11,13	16,15
0395	20,14	7,14	3,10
0396	24,19	24,19	19,18
0397	11,11	12,11	
0398	20,13	7,13	7,8
0399	13,7	13,7	
0400	9,17	9,17	9,17
0401	14,16	14,16	
0402	20,16	15,19	
0403	15,20	15,20	
0404	10,19	17,19	
0405	13,8	13,8	
0406	8,14	19,14	20,17
0407	17,18	17,18	17,18

Verified by E. Terry Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 10 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0334	17,24	10,24	23,20
0335	7,5	20,5	4,11
0336	15,10		
0337	19,14	8,14	5,15
0338	16,20	11,21	
0339	10,12	10,15	
0340	22,7	22,7	24,13
0341	14,8	14,8	
0342	12,26	12,1	11,3
0343	15,19		
0344	2,11	25,16	18,24
0345	7,12	7,12	
0246	1,12	26,12	24,11
0347	22,22	22,22	20,23
0348	7,6	7,6	
0349	9,11	9,11	
0350	21,22	21,22	14,20
0351	16,9	11,9	11,2
0352	15,2	15,25	21,20
0353	16,1	16,26	14,25
0354	12,10	12,17	11,25
0355	9,12	5,18	3,19
0356	18,9	20,8	12,26
0357	17,15	17,12	
0358	2,12	25,12	18,15
0359	1,11	26,11	25,13
0360	14,19	14,19	9,21
0361	12,18	10,6	
0362	14,17	14,17	16,12
0363	18,13	18,13	
0364	18,15	18,5	18,4
0365	1,13	1,13	9,7
0366	12,25	15,2	15,18
0367	16,7	15,8	
0368	11,26	11,1	13,2
0369	16,8	16,8	
0370	14,18	14,18	22,20

Verified by E. Ford Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 9 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0297	8,4	8,4	7,12
0298	10,4	17,4	
0299	24,8	24,8	19,9
0300	6,20	6,7	13,8
0301	9,3	18,3	18,3
0302	7,4	7,4	10,5
0303	7,13	20,13	21,9
0304	8,3	8,3	9,8
0305	21,6	21,6	15,13
0306	17,16	17,11	22,5
0307	16,10	11,10	11,11
0308	24,9	24,18	24,18
0309	12,9	13,20	
0310	12,24	12,24	11,8
0311	5,19	5,19	6,5
0312	20,22	20,22	23,16
0313	22,21	22,21	3,9
0314	21,21	21,21	15,14
0315	19,13	8,13	5,12
0316	6,22	6,22	20,14
0317	5,22	5,22	7,23
0318	5,21	5,21	7,13
0319	11,17	16,17	
0320	22,8	22,8	11,19
0321	8,5	8,5	19,14
0322	18,17	18,17	
0323	13,17	13,17	
0324	13,18	13,18	
0325	6,6	6,6	12,13
0326	19,22	19,5	13,23
0327	20,21	20,6	1,14
0328	18,10	18,10	24,7
0329	12,17	15,17	16,25
0330	6,5	6,5	13,20
0331	11,25	11,2	13,10
0332	22,6	22,6	20,13
0333	21,7	21,7	14,19

Verified by E. Torf Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 8 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0260	15,9		
0261	26,16	1,16	2,14
0262	13,19	13,19	8,20
0263	16,12	16,12	16,13
0264	5,5	5,5	7,4
0265	5,6	5,6	7,14
0266	7,11	12,7	
0267	18,23	9,23	11,21
0268	9,10	9,10	9,10
0269	17,13	17,13	
0270	19,3	19,3	18,8
0271	10,11	10,16	
0272	17,4	17,23	13,6
0273	18,3	18,24	13,17
0274	23,8	23,8	20,12
0275	23,10	23,17	
0276	24,7	24,7	22,8
0277	4,18	4,18	16,6
0278	3,17	3,17	6,11
0279	4,10	4,10	26,14
0280	3,9	3,9	17,14
0281	25,16	2,16	17,22
0282	20,23	20,23	14,17
0283	19,24	19,24	18,19
0284	24,15	24,15	14,13
0285	1,14	1,14	5,13
0286	2,14	2,14	13,15
0287	9,4	18,4	11,6
0288	19,23	19,23	20,15
0289	14,2	14,2	15,7
0290	14,1	14,1	14,5
0291	10,3	17,3	23,7
0292	20,24	20,24	19,22
0293	4,19	4,19	18,12
0294	9,9	4,9	
0295	23,7	23,7	22,10
0296	10,10	10,10	12,11

Verified by E. Terry Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 7 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0223	16,24	16,24	4,16
0224	24,11	24,11	6,20
0225	15,24	15,24	16,19
0226	23,9	23,18	21,22
0227	24,10	24,10	21,11
0228	3,7	3,7	5,8
0229	4,17	4,17	6,14
0230	3,18	3,18	3,18
0231	7,24	7,24	8,22
0232	8,24	8,24	8,18
0233	23,19	23,19	9,15
0234	19,4	19,4	7,15
0235	15,26	12,26	11,24
0236	26,12	26,15	24,16
0237	12,2	12,2	
0238	11,2	16,2	14,10
0239	24,20	24,20	22,19
0240	20,3	20,3	19,5
0241	8,23		
0242	1,16	1,11	2,13
0243	25,11	25,11	17,13
0244	21,5	21,5	14,7
0245	25,12	25,15	15,9
0246	26,11	26,16	25,14
0247	11,1	16,1	14,2
0248	2,16	2,11	10,13
0249	7,15	7,15	
0250	23,20	23,20	18,20
0251	16,26	11,26	13,25
0252	2,15	2,12	12,9
0253	4,7	4,7	5,10
0254	16,25	11,25	22,17
0255	4,8	4,8	9,12
0256	12,1	15,1	16,3
0257	1,15	1,12	3,11
0258	13,16	13,16	
0259	11,18	16,18	

Verified by E Terry Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 6 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0186	7,22	7,22	3,14
0187	13,11	13,11	15,16
0188	14,11	14,11	12,16
0189	17,23	10,23	13,19
0190	18,24	9,24	10,14
0191	19,11	19,11	
0192	20,12	20,12	
0193	3,14	24,14	6,13
0194	13,3	13,24	8,13
0195	3,20	3,20	5,19
0196	7,3	7,3	8,5
0197	18,14	18,14	
0198	7,23	7,23	10,22
0199	9,24	9,3	9,3
0200	6,21	6,21	12,14
0201	4,20	4,20	9,20
0202	11,3	11,3	16,23
0203	24,18	24,9	24,9
0204	18,4	18,23	16,21
0205	23,18	23,9	6,22
0206	24,17	24,17	21,16
0207	17,3	17,24	7,18
0208	12,7		
0209	4,9		
0210	3,10	3,10	4,20
0211	13,1	13,1	13,5
0212	2,13	2,13	13,12
0213	16,3	16,3	16,4
0214	24,13	3,13	21,13
0215	12,3	12,3	
0216	24,12	24,12	
0217	15,3	15,3	13,21
0218	3,11	3,11	11,23
0219	10,24	10,3	4,7
0220	11,24	11,24	
0221	24,16	24,16	6,7
0222	13,2	13,2	12,7

Verified by E Torok Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 5 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0149	14,3	14,24	13,14
0150	22,12	5,12	1,11
0151	5,14	5,14	11,13
0152	20,7	20,7	7,21
0153	21,16	6,11	6,9
0154	14,4	14,23	9,14
0155	23,14	4,14	12,3
0156	4,11	4,11	4,14
0157	10,20	17,20	
0158	12,13	12,13	18,13
0159	15,15	15,15	12,1
0160	15,13	15,13	
0161	5,20	5,7	3,13
0162	8,13	19,13	
0163	16,19	16,19	
0164	21,20	6,20	14,6
0165	23,17	23,10	
0166	22,19	22,19	16,8
0167	11,12	11,12	13,11
0168	15,11	15,11	16,14
0169	19,12	19,12	
0170	11,8	11,8	
0171	3,12	3,12	14,14
0172	20,11	6,12	
0173	3,19	3,19	5,14
0174	15,14		
0175	15,12	15,12	15,26
0176	12,14	12,14	
0177	11,7	11,6	
0178	11,14	10,14	
0179	13,14	13,14	
0180	22,20	5,20	6,16
0181	12,8	12,8	
0182	13,12	13,12	25,16
0183	7,21	7,21	19,11
0184	8,22		
0185	10,23	10,4	14,8

Verified by E Teal Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 4 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0112	6,9	6,9	16,17
0113	23,16	23,16	4,13
0114	19,9	8,9	8,7
0115	11,22	16,22	18,23
0116	16,4	16,4	14,26
0117	4,14	23,14	15,3
0118	13,5	13,5	26,15
0119	14,5	14,5	9,4
0120	15,4	15,4	14,24
0121	12,22	15,22	15,22
0122	15,6	12,6	
0123	16,6	16,6	
0124	13,4	13,4	17,16
0125	13,24	13,3	13,13
0126	9,6	9,6	7,22
0127	6,14	6,14	1,16
0128	11,4	11,4	13,26
0129	23,11	23,11	23,14
0130	9,20	18,20	20,24
0131	22,15	22,12	26,11
0132	20,18	20,18	24,19
0133	14,23	14,4	10,11
0134	21,19		
0135	10,6		
0136	10,7	10,20	10,20
0137	9,7	9,20	
0138	8,21	8,21	14,3
0139	5,17	5,17	11,10
0140	12,21	15,21	
0141	15,21	15,6	
0142	17,5	17,5	5,21
0143	13,23	13,23	10,11
0144	18,20	18,7	20,3
0145	17,20	17,7	17,7
0146	22,14	22,14	14,11
0147	22,16	22,11	22,15
0148	14,21	14,21	11,26

Verified by E. Torok Date 7/16/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 3 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0075	7,9	7,18	5,20
0076	17,6	17,6	22,7
0077	4,15	4,15	14,9
0078	7,10	7,10	5,5
0079	4,16	4,16	23,13
0080	6,12	6,15	
0081	21,11	21,11	
0082	12,5	12,5	12,5
0083	21,12		
0084	5,15	22,15	26,16
0085	10,21	10,21	9,23
0086	22,18	22,18	26,13
0087	21,10	21,10	
0088	7,8	7,8	13,9
0089	11,23	11,23	21,14
0090	4,13	23,13	24,12
0091	6,17	6,17	4,18
0092	16,21		
0093	8,6	19,6	7,5
0094	9,19	18,19	18,21
0095	6,18	6,18	16,10
0096	6,15	21,15	
0097	24,14	3,14	8,14
0098	21,9	21,9	
0099	7,17	20,17	22,22
0100	10,5	10,5	22,6
0101	5,13	5,13	3,8
0102	12,6	12,21	
0103	20,8		
0104	18,5		
0105	11,6		
0106	4,12	4,12	11,15
0107	7,20	7,20	14,1
0108	8,18	19,18	19,20
0109	19,8	19,8	17,3
0110	19,7	19,7	3,15
0111	12,4	12,4	13,3

Verified by E. Peral Date 8/7/1976

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 2 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location	Cycle 2 I,J Location	Cycle 3 I,J Location
0038	5,18		
0039	22,9	22,9	
0040	22,17	22,17	11,17
0041	19,21	19,21	
0042	13,21	13,21	10,24
0043	20,17	7,17	5,22
0044	15,5	12,22	12,22
0045	5,10	5,10	
0046	5,9	5,9	19,13
0047	8,7	8,7	3,12
0048	15,22	15,5	15,5
0049	20,9	7,9	5,7
0050	16,22	16,5	19,3
0051	7,18	20,9	24,8
0052	8,9	8,18	7,17
0053	21,14	21,14	24,17
0054	18,19	18,8	18,6
0055	21,15	21,12	
0056	14,22	14,22	1,15
0057	12,23	12,23	10,16
0058	6,8	6,19	
0059	22,11	5,11	3,7
0060	22,10	22,10	
0061	8,8	8,8	9,6
0062	13,22	13,22	1,12
0063	6,11	6,16	
0064	19,6	8,6	20,22
0065	23,13	4,13	12,24
0066	21,13	21,13	20,10
0067	23,15	23,15	11,12
0068	11,5	11,22	8,24
0069	18,6	18,6	13,24
0070	18,8	9,8	
0071	9,22	9,22	8,16
0072	18,7	9,7	7,3
0073	7,19	7,19	
0074	21,17	21,17	23,18

Verified by E. Jones Date 8/18/76

TABLE 1.5

CORE LOADING WITH ASSEMBLY IDENTIFICATION

REACTOR: Monticello

Sheet 1 of 17

Cycle 1, 2 and 3

Rev. 0 Date 7/7/76

Assembly #	Cycle 1 I,J Location*	Cycle 2 I,J Location	Cycle 3 I,J Location
0001	3,13	24,13	8,11
0002	9,21	9,21	
0003	21,18	21,18	18,14
0004	6,16	21,16	
0005	22,13	22,13	23,9
0006	5,16	22,16	24,20
0007	17,22	17,22	22,21
0008	10,22	10,22	5,6
0009	15,23	15,23	9,13
0010	19,18	19,9	20,8
0011	7,7	7,7	20,21
0012	16,23		
0013	6,10	6,10	4,9
0014	6,19	6,8	20,6
0015	8,19	8,19	7,19
0016	11,21	16,21	17,24
0017	19,20	19,20	24,15
0018	19,19	19,19	20,19
0019	23,12	23,12	13,18
0020	18,21	18,21	20,5
0021	17,21	17,21	19,24
0022	9,8	9,19	6,18
0023	5,12	5,15	
0024	16,5	11,5	8,3
0025	20,10	20,10	22,12
0026	8,20	8,20	15,24
0027	14,24	14,3	13,4
0028	5,11	5,16	3,20
0029	13,6	13,6	10,3
0030	6,13	6,13	
0031	14,6	14,6	11,1
0032	18,22	18,22	1,13
0033	20,20	20,20	13,1
0034	20,19	20,19	
0035	21,8	21,8	7,6
0036	17,7	10,7	10,7
0037	9,5	9,5	

*See Diagram 1.5-1

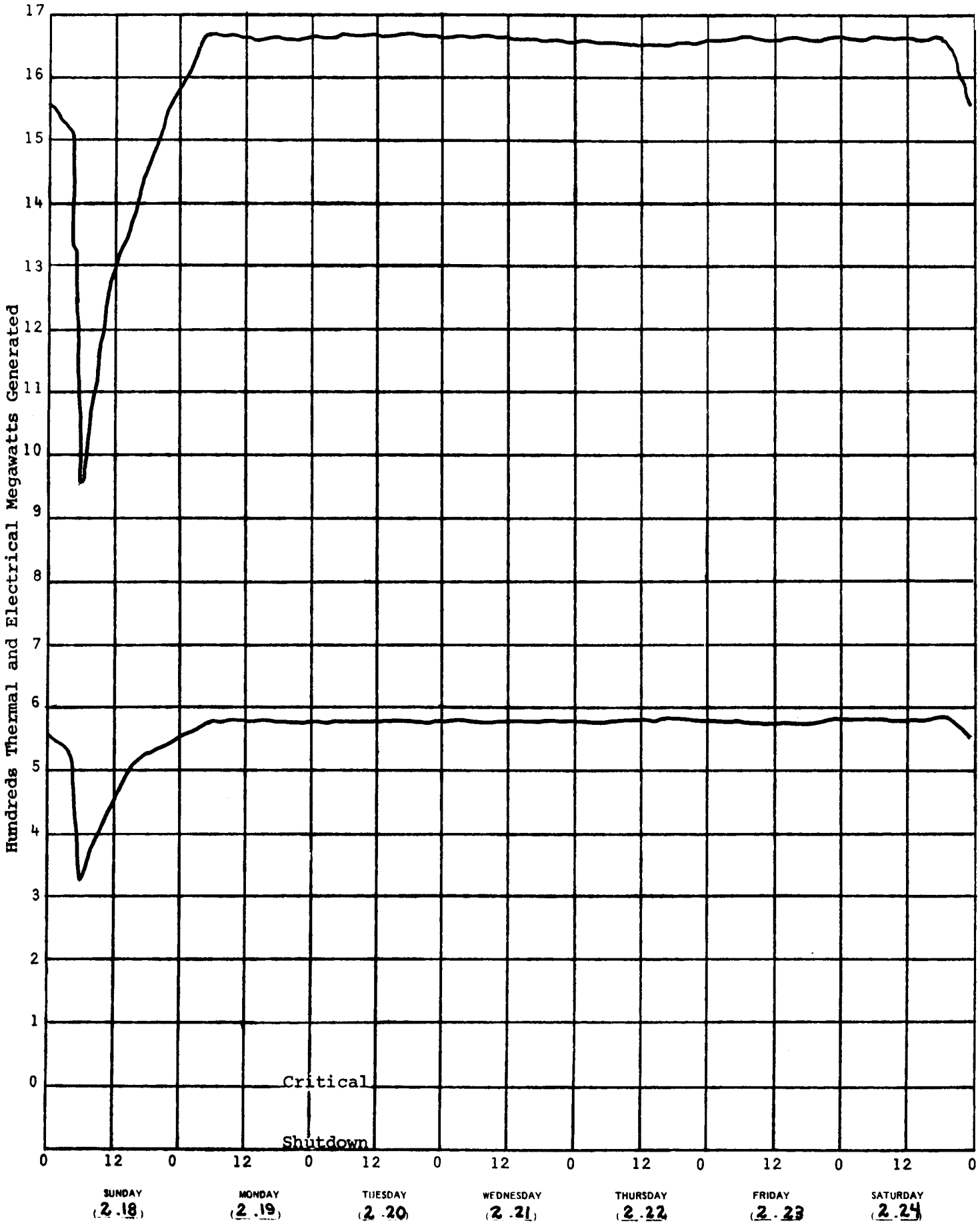
Verified by [illegible] Date 8/16/76

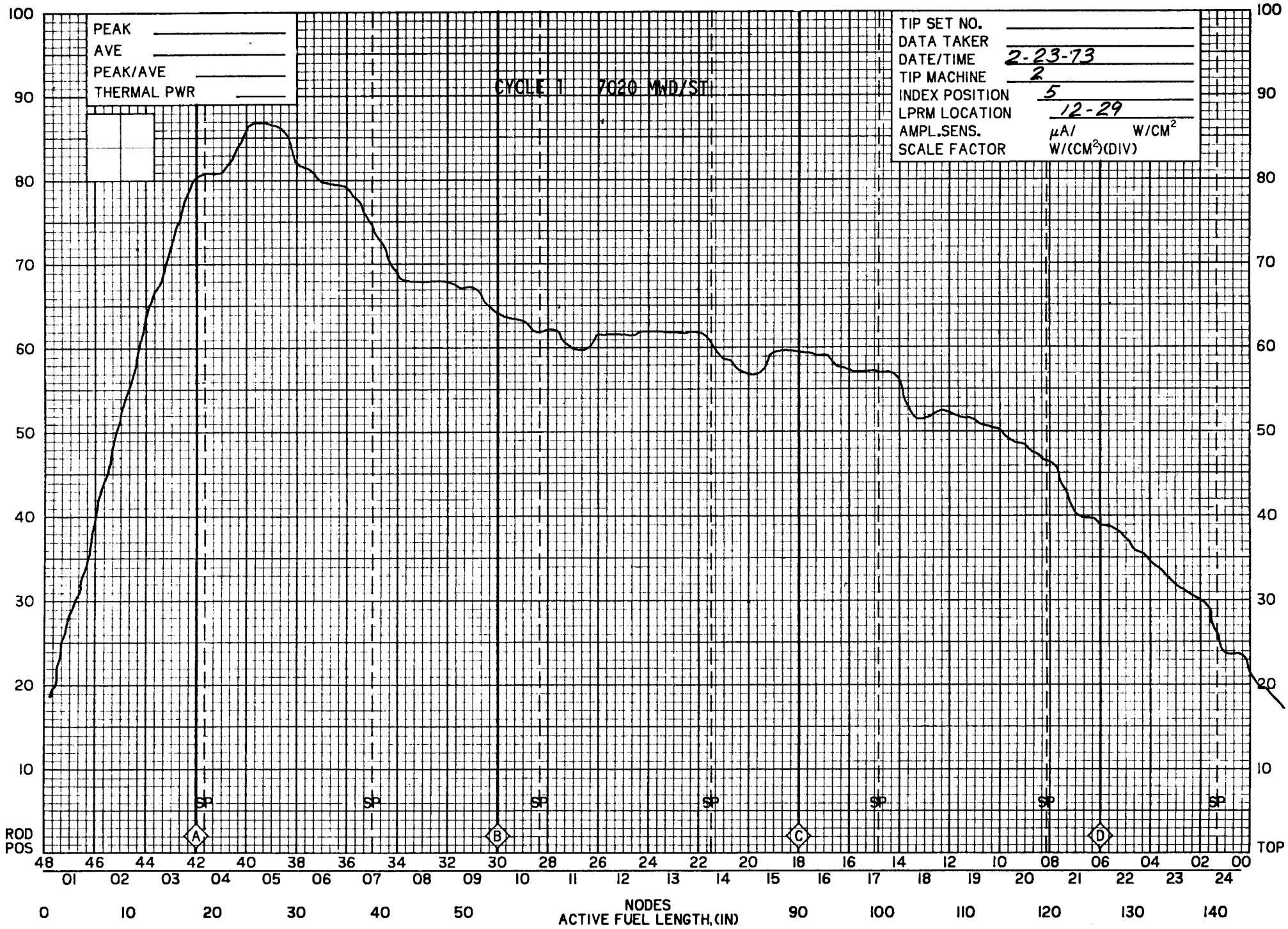
End Cycle 1

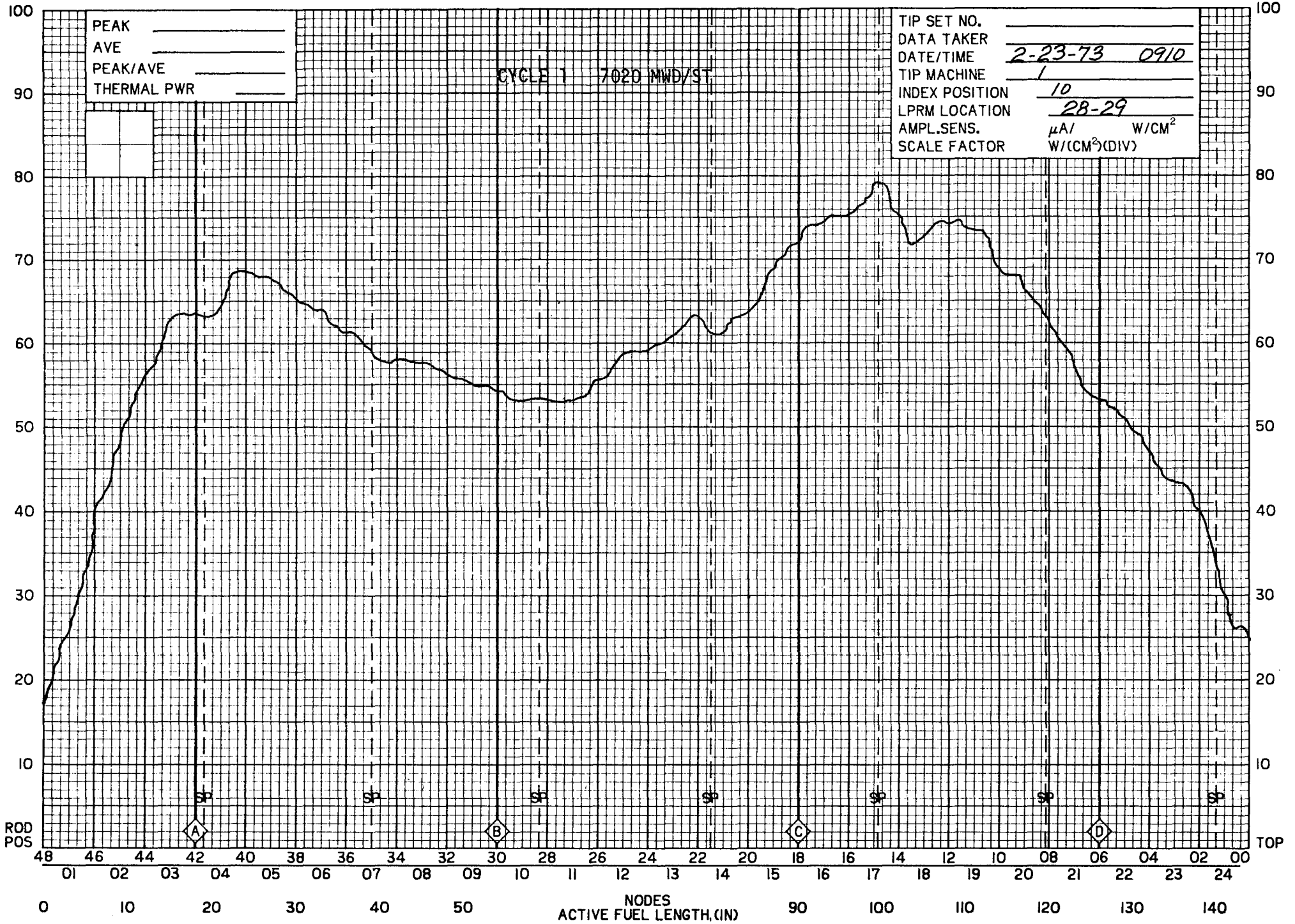
Monticello Nuclear Generating Plant

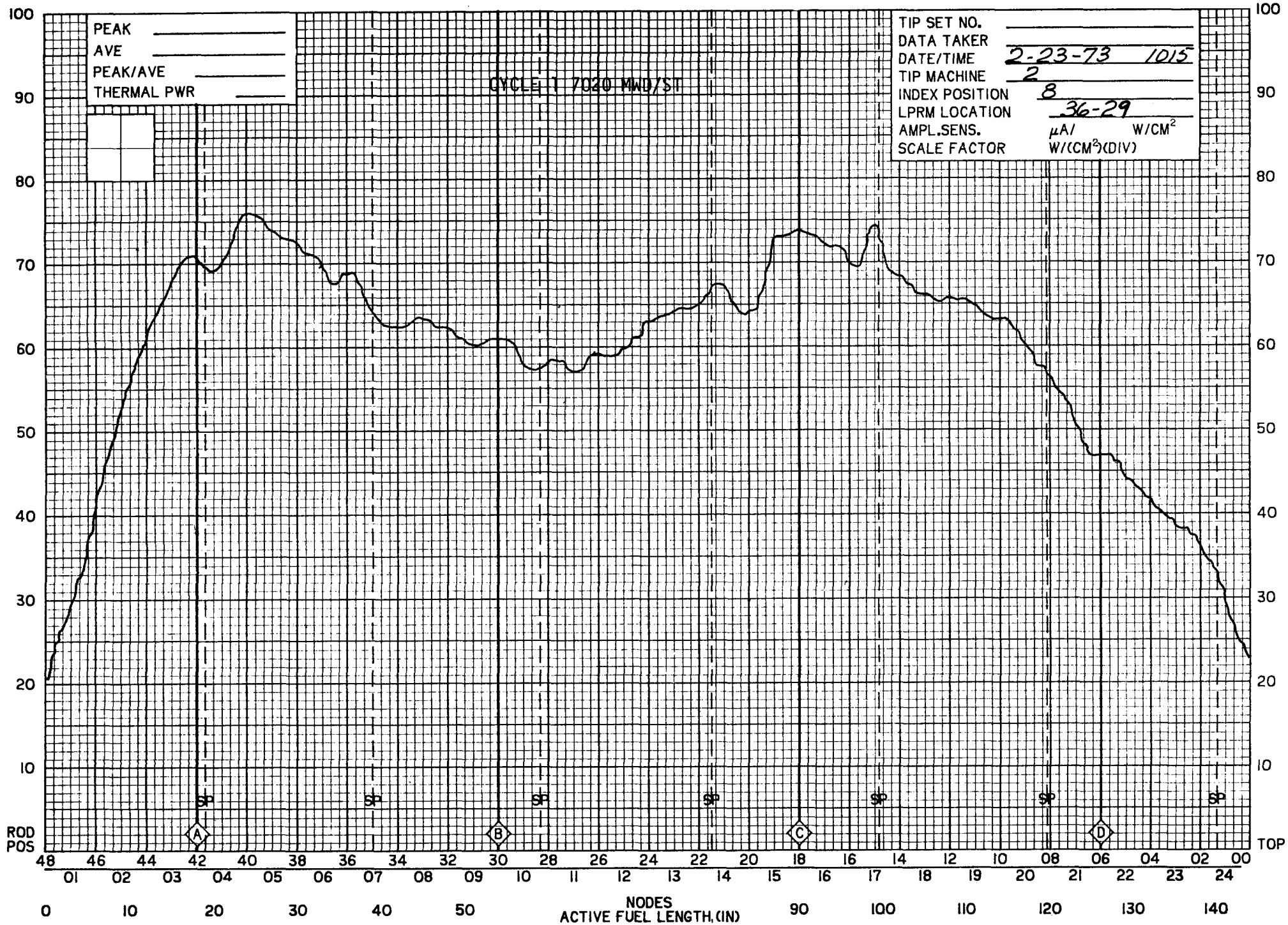
WEEKLY OPERATING HISTORY

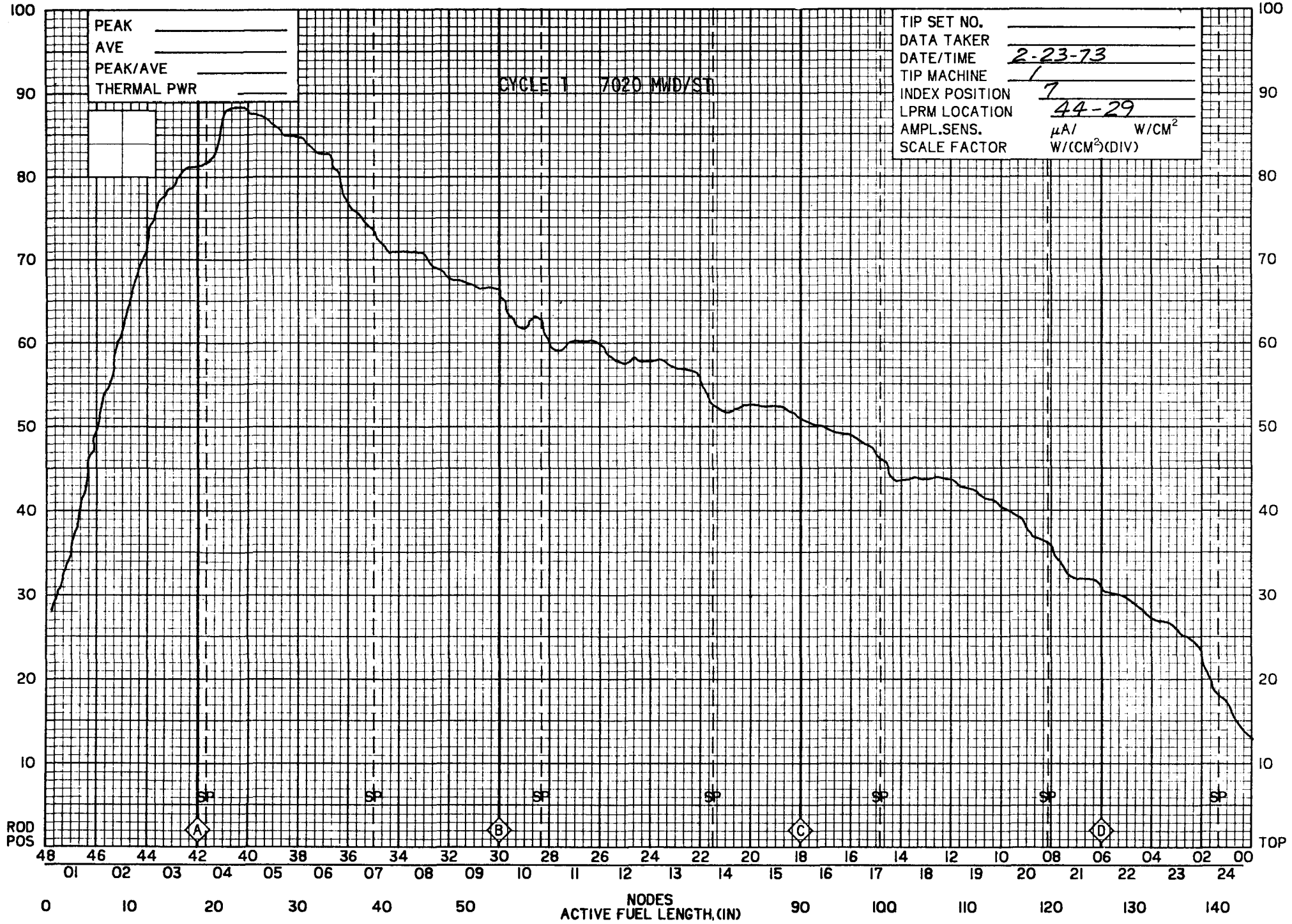
Week Ending 2 . 24 . 73

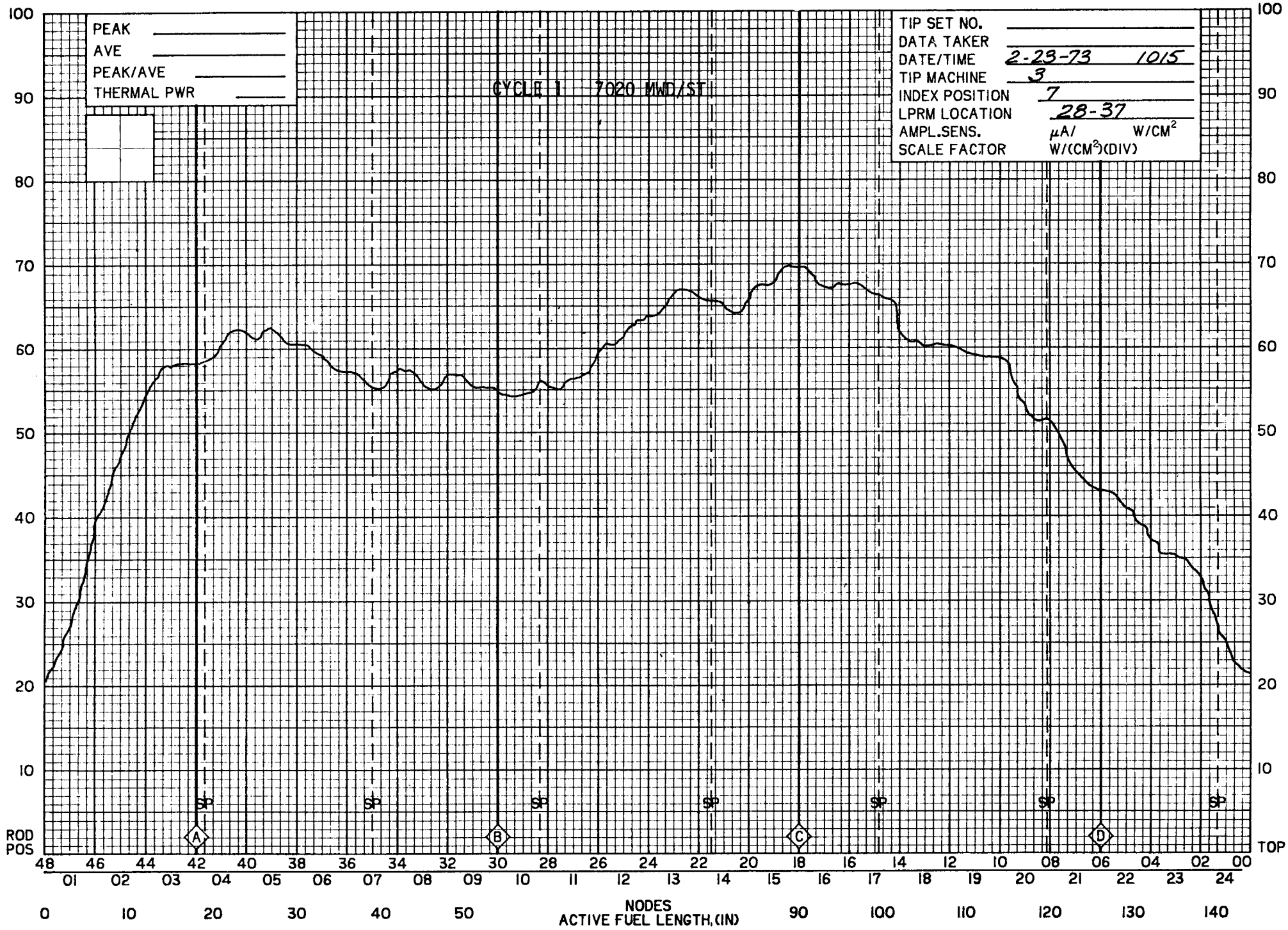



PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 7020 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 2-23-73
TIP MACHINE 2
INDEX POSITION 5
LPRM LOCATION 12-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 7020 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 2-23-73 0910
TIP MACHINE 1
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 7020 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 2-23-73 1015
TIP MACHINE 2
INDEX POSITION 8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 7020 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 2-23-73
TIP MACHINE 1
INDEX POSITION 7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 7020 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 2-23-73 1015
TIP MACHINE 3
INDEX POSITION 7
LPRM LOCATION 28-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)

REACTOR: Monticello

CYCLE: 1

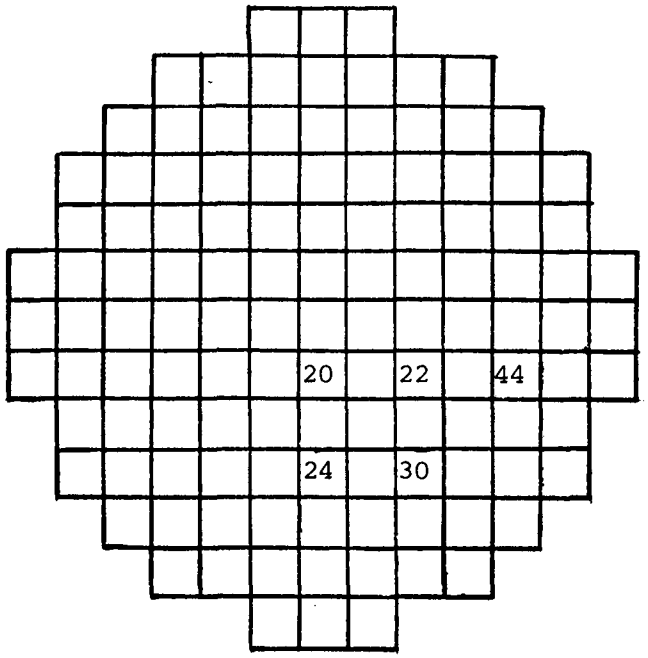
Exposure 7020 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C - BWR STATEPOINTS

Sheet 9 of 9

Rev. 0 Date: 5-10-76



1/4 core symmetry

Verified By: E. Terrell Date: 07/16/76

REACTOR: Monticello
CYCLE: 1
EXPOSURE 7020 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART C- BWR STATEPOINTS

Sheet 8 of 9
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
8. Inlet subcooling (BTU/lb)	24.23	Idem	21.53 from OD-3 corrected for Core Pressure
9. Cleanup system flow (gal/min)	162.	Idem	none
10. Inlet temperature to clean-up system (^{o}F)	496.	Idem	none
11. Outlet temperature to clean-up system (^{o}F)	431.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available		Idem	See attached set of TIP traces*
14. Xenon history-past 48 hours Time (hrs)/Core power (%)		Idem	See attached power histogram
15. Control rod positions (by location)	See Sheet #3		1/4 core symmetry

*TIP traces were not available for the following locations: 4-29, 12-13, 12-21, 12-37, 20-13, 20-21, 20-29, 20-37, 20-45, 28-5, 28-13, 28-21, 28-45, 36-13, 36-21, 36-37, 36-45, 44-21, 44-37

Verified By: [illegible] Date: 07/16/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 02/23/73 0845 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
580.00	1666.56	57.48	45.03	57.78	18.70	2.00	0.1309	1021.

RWL	DPM	WFW	HFW	HD	DHO	CXE
37.99	16.04	6.76	352.88	517.69	21.53	0.1200

RAP	99.750	100.906	100.188	100.281	100.813	100.250
AGAF	1.000	0.989	0.996	0.995	0.990	0.995

IB 1

RAPL	-199.91	5.00	19.00	34.08	49.98	64.97
	79.96	89.96	99.96	109.95	124.94	199.91

QFW	QCR	QCU	QRAD	QPUMP	TFW
1658.281	9.324	1.679	0.600	3.303	378.121

HF	HFG	HG	HS	WCR	HCR
545.77	645.23	1191.00	1190.36	0.0284	70.71

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0811	484.01	413.31	524.81	1670.00	1670.00

PPW	1.6792	1.8720

CAP	0.01000	0.00989	0.00996	0.00995	0.00990	0.00995
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.64
WTC	17.80	23.00	31.70	40.30	49.00	57.60

OD-6. THERMAL DATA IN FUEL ASSEMBLY IX,JY = 31,28 2/23/73 0759 MONTICELLO

CTP	WT	PBUN	PBUNAV	W	WBUNAV	XE	MFLPD	KZMF	MCHFR	KZMC
1666.	57.40	4.610	3.441	0.120	0.113	0.1654	0.636	16	3.20	18

OD-6. THERMAL DATA IN FUEL ASSEMBLY IX,JY = 41,22 2/23/73 0759 MONTICELLO

CTP	WT	PBUN	PBUNAV	W	WBUNAV	XE	MFLPD	KZMF	MCHFR	KZMC
1666.	57.40	4.728	3.441	0.118	0.113	0.1752	0.804	5	3.05	5

OD-6. THERMAL DATA IN FUEL ASSEMBLY IX,JY = 31,36 2/23/73 0759 MONTICELLO

CTP	WT	PBUN	PBUNAV	W	WBUNAV	XE	MFLPD	KZMF	MCHFR	KZMC
1666.	57.40	4.585	3.441	0.119	0.113	0.1656	0.628	5	3.42	16

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 2/23/73 H.B. NO. 241
TIME 0900 BY DEN

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS	
*	1	GROSS GEN. OUTPUT	GMWE	CO8	W/GEN	578.4	MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	20.6	MWE
*	3	HP COND. VACUUM	HPCV	CO7	PR 1264	1.1	IN HG ABS
*	4	LP COND. VACUUM	LPCV	CO7	PR 1264	0.9	IN HG ABS
	5	REACTOR PRESSURE	PR	CO5	6-98	1007	PSIG
	6	ROD DRIVE FLOW	WRD	CO5	3-306	55	GPM
*	7	TOTAL CORE FLOW	Wc	CO5	FR-2-3-95	57.5	MLB/HR
	8	A RECIRC. PUMP PWR	QPA	CO4	2-184-24A	1.923	MW calc.
	9	B RECIRC. PUMP PWR	QPB	CO4	2-184-24B	1.884	MW calc.
	10	CLEANUP FLOW	WCU	CO4	12-141A&B	162	GPM
	11	CLEANUP INLET TEMP.	TCUI	CO4	POS. 1	496	°F
	12	CLEANUP OUTLET TEMP.	TCUO	CO4	POS. 4	431	°F
	13	ROD DRIVE TEMP.	TRD	COMP	F-127	97	°F
	14	A FEEDWATER FLOW	WFWA	C18	6-79A(x)	(Ma) 3.392	MLB/HR
	15	B FEEDWATER FLOW	WFWB	C18	6-79B(x)	(Ma) 3.356	MLB/HR
	16	A FEEDWATER TEMP.	TFWA	C18	6-79A(z)/TR1148	(Ma) 377.3	°F
	17	B FEEDWATER TEMP.	TFWB	C18	6-79B(z)/TR1148	(Ma) 378.2	°F

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	(5)	
19	SATURATED STEAM ENTHALPY	h_{gs}	(5)	1192.1
20	A FEEDWATER ENTHALPY	h_{FWA}	(5), (16)	351.9
21	B FEEDWATER ENTHALPY	h_{FWB}	(5), (17)	352.8
22	CLEANUP INLET ENTHALPY	h_{CUI}	(5), (11)	482.9
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	(5), (12)	409.4
24	ROD DRIVE ENTHALPY	h_{RD}	(5), (13)	69.0

HEAT BALANCE CALCULATIONS

	QUANTITY	SYMBOL	EQUATION	VALUE	
25	ROD DRIVE FLOW	W_{RD}	.000495 x (6)	.027	MLB/HR
26	TOTAL STEAM FLOW	W_S	(14) + (15) + (25)	6.775	MLB/HR
* 27	CORE INLET ENTHALPY	h_{IN}	See below		MLB/HR
28	ENERGY OUT - STEAM	Q_S	(26) + (19)	8076.7	MBTU/HR
29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x (10) (22 - 23)	5.89	MBTU/HR
30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4	2.40	MBTU/HR
31	NET ENERGY OUT	Q_{OUT}	(28) + (29) ÷ (30)	8085.0	MBTU/HR
32	ENERGY IN - FEEDWATER	Q_{FW}	(14) x (20) + (15) x (21)	2377.6	MBTU/HR
33	ENERGY IN - ROD DRIVES	Q_{RD}	(25) x (24)	1.88	MBTU/HR
34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x ((8) + (9))	12.99	MBTU/HR
35	NET ENERGY IN	Q_{IN}	(32) + (33) + (34)	2392.5	MBTU/HR
36	CORE THERMAL POWER	Q_{CORE}	(31) - (35)	5692.5	MBTU/HR
37	CORE THERMAL POWER	P_{CORE}	(36) / 3.413	1667.9	MWT
38	CORE THERMAL POWER	%P	(37) / 1670	99.9	% OF RATED
* 39	HEAT RATE	HR	(36) x 10^3 ((1) - (2))	10,205	BTU/KW-HR

$$h_{IN} = \frac{((7) - (25) - (14) - (15))(18) + (14)(20) + (15)(21)}{(7)}$$

APRM	READING
1	100.0
2	100.5
3	100.8
4	100.8
5	100.2
6	100.2

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS: A: 320A & 3470V
B: 320A & 3400V

REACTOR: Monticello
CYCLE: 1
Exposure 7020 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART C- BWR STATEPOINTS

Sheet 7 of 9
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1667.9	HB #241 2/23/73	See attached HB #241 and OD-3 dated 2/23/73
2. System pressure (psig)	1007.	Idem	Calculated Core Pressure = 1039.7 psia
3. Recirculation flow (lbs/hr)	57.5×10^6	Idem	none
4. Recirculation flow temperature (^oF)			
5. Feedwater flow (lbs/hr)	6.75×10^6	Idem	none
6. Feedwater flow temperature (^oF)	377.8	Idem	none
7. Time at associated power level (hr)	>48.0		

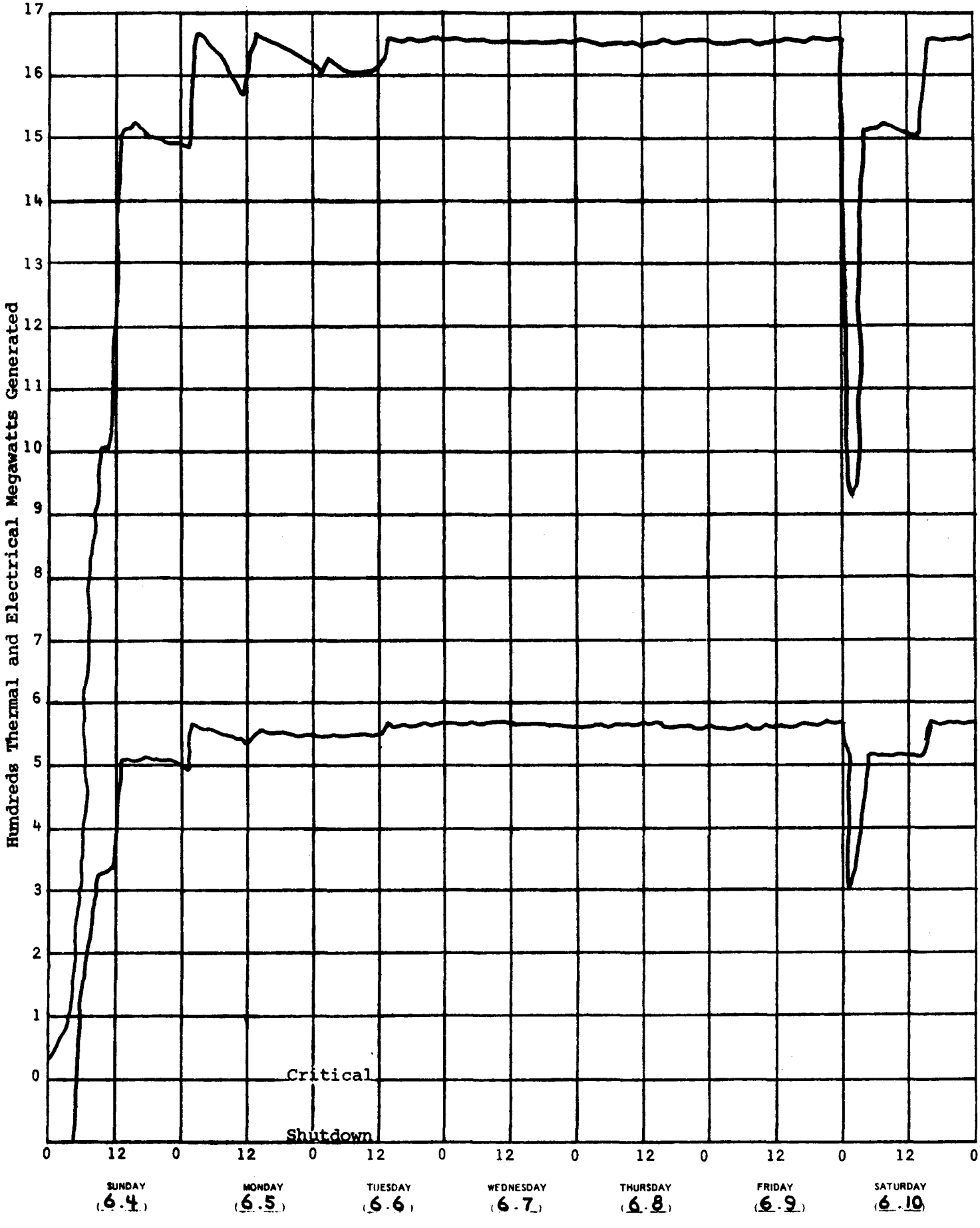
Verified By: E. Terz Date: 07/16/76

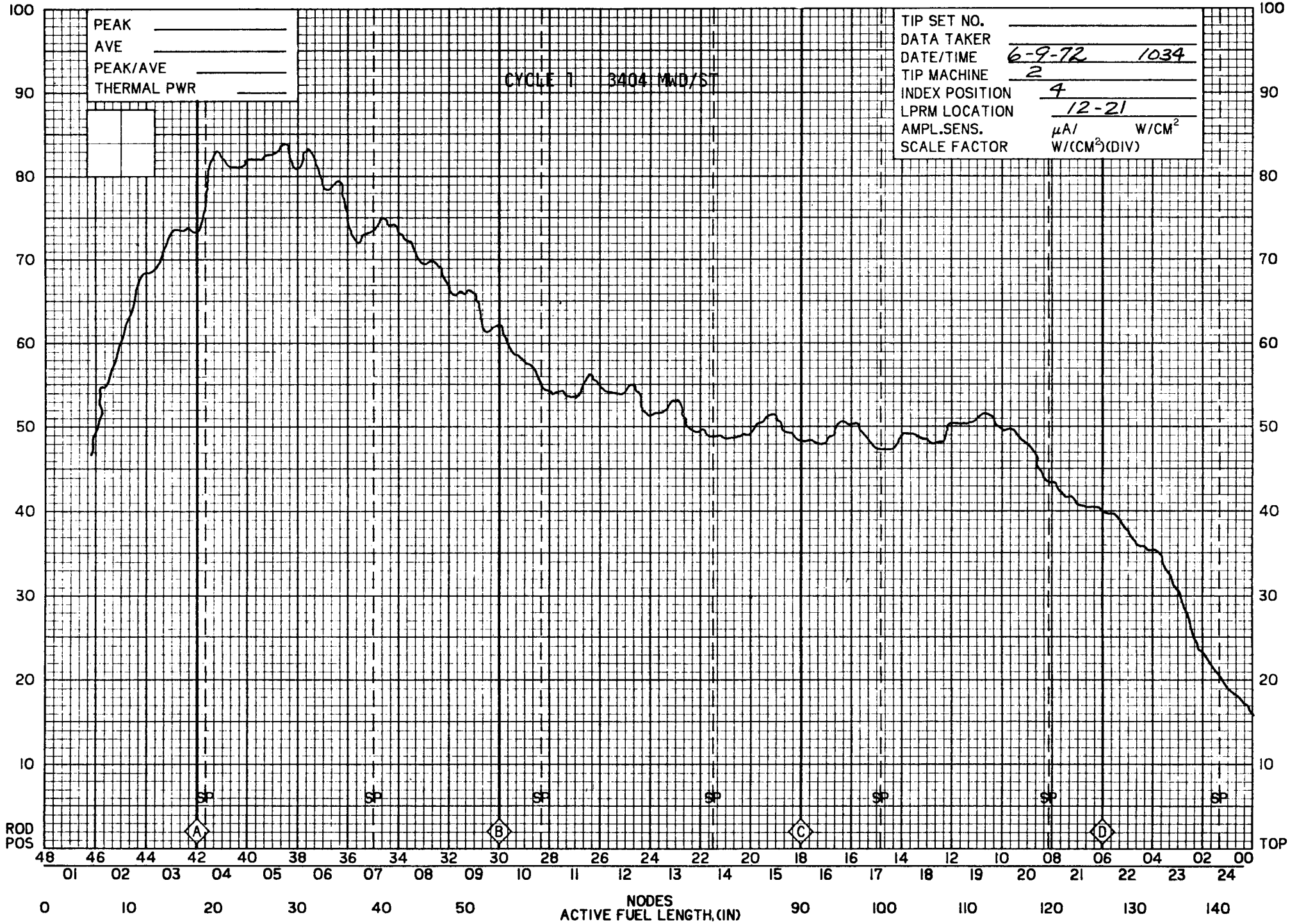
MIDDLE CYCLE 1

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 6 . 10 . 72

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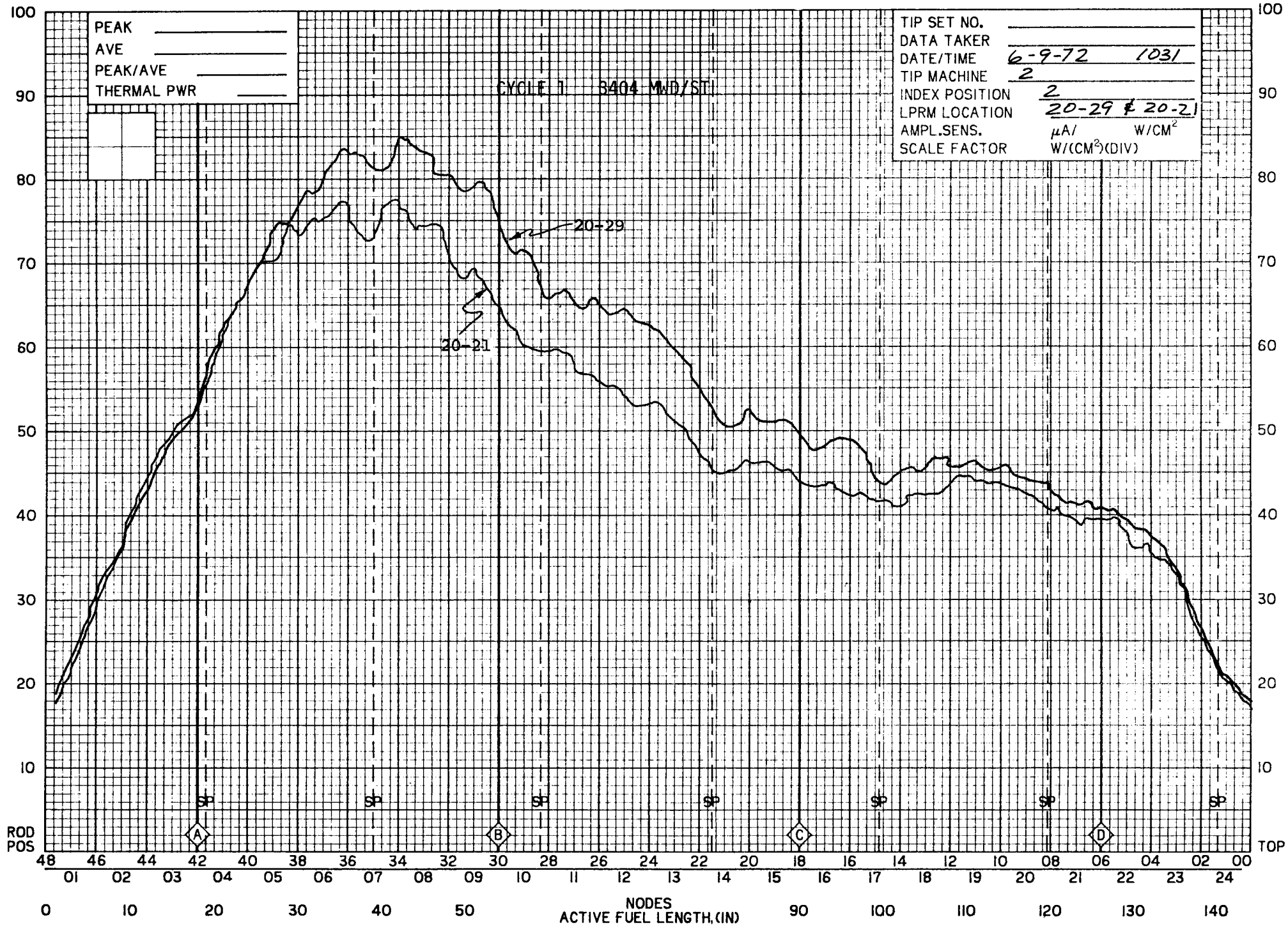
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72 1034
TIP MACHINE 2
INDEX POSITION 4
LPRM LOCATION 12-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)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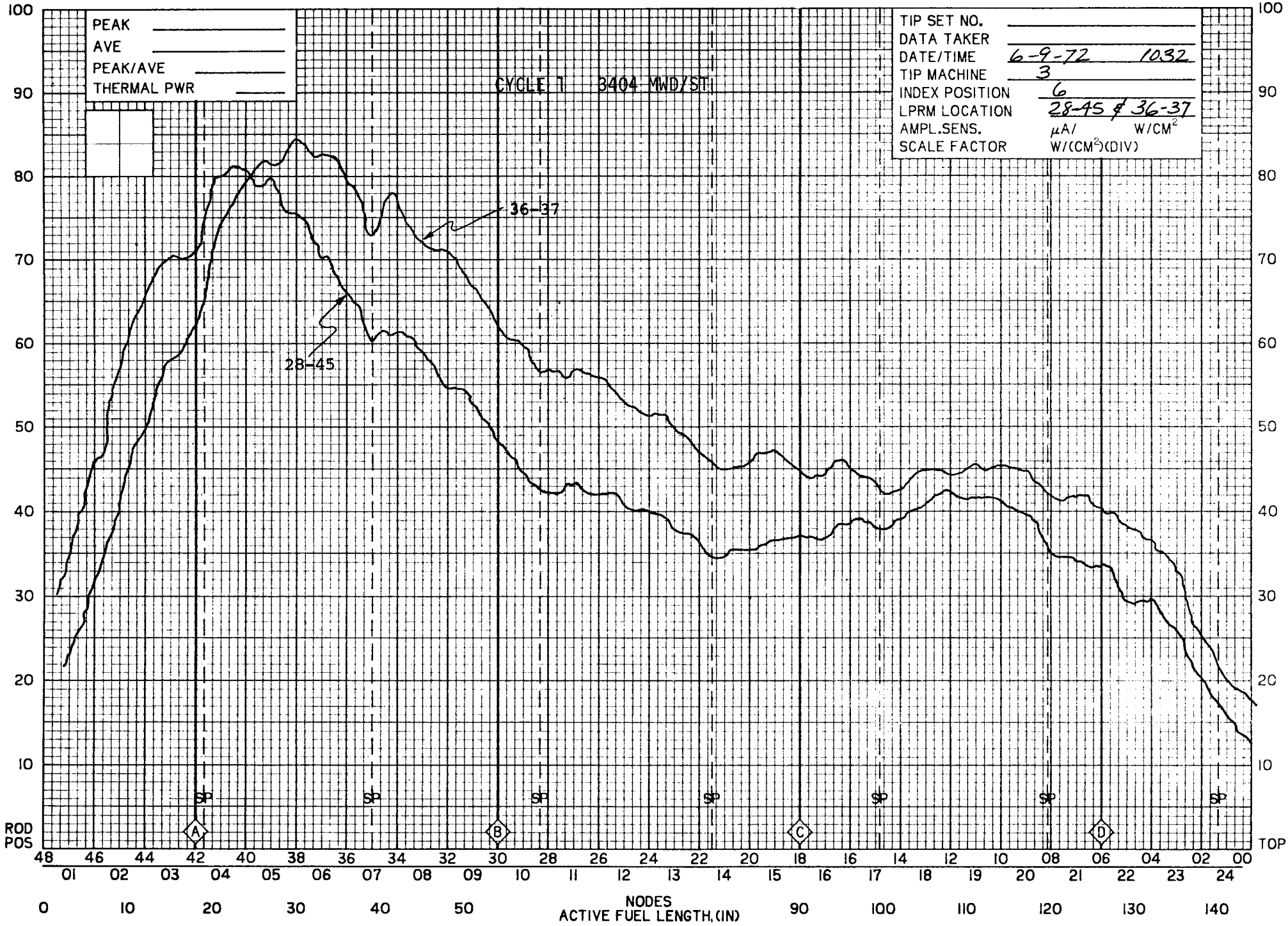
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72 1031
TIP MACHINE 2
INDEX POSITION 2
LPRM LOCATION 20-29 & 20-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
20-29
20-21
SP
A
B
C
D
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH,(IN)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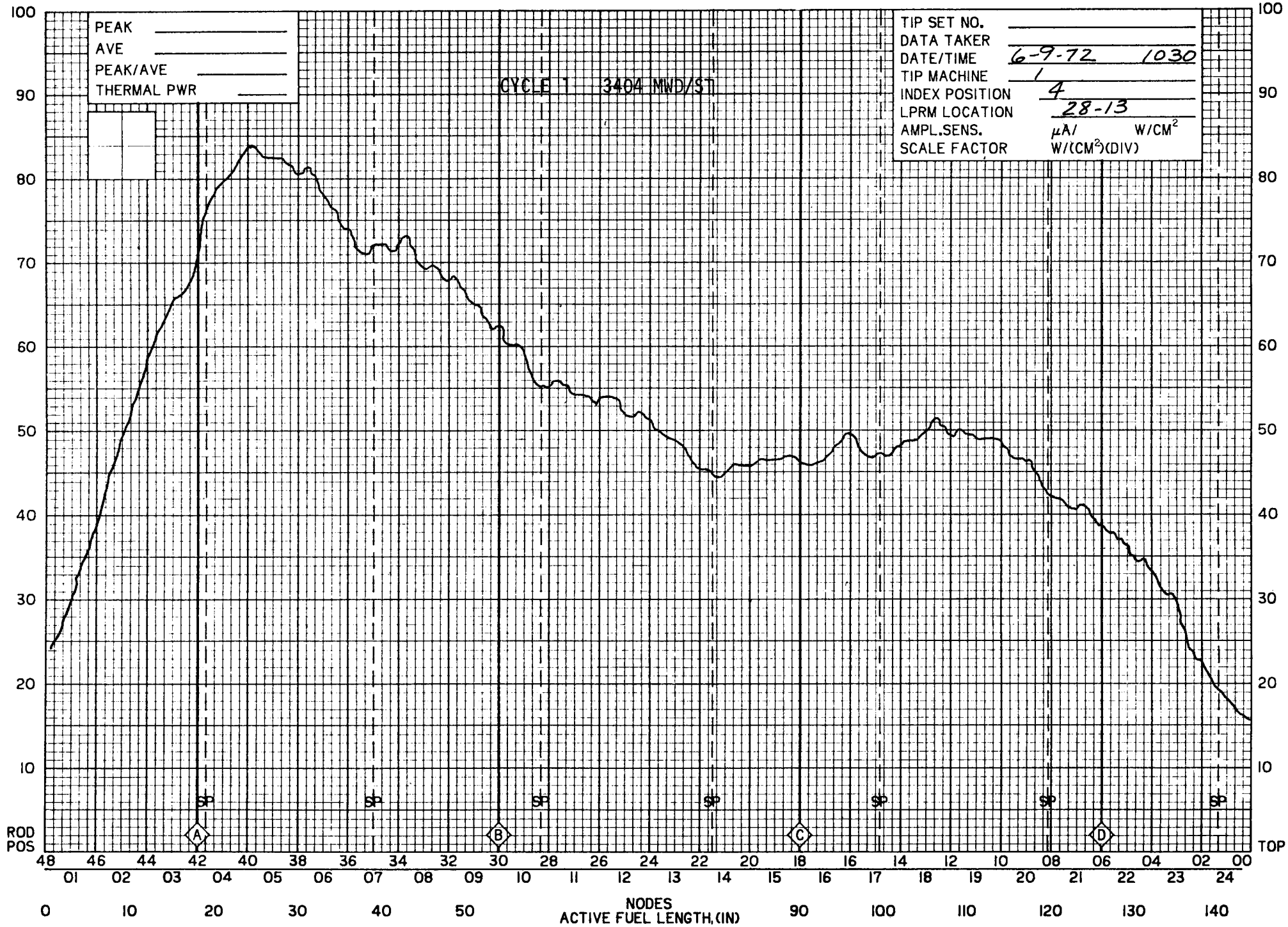
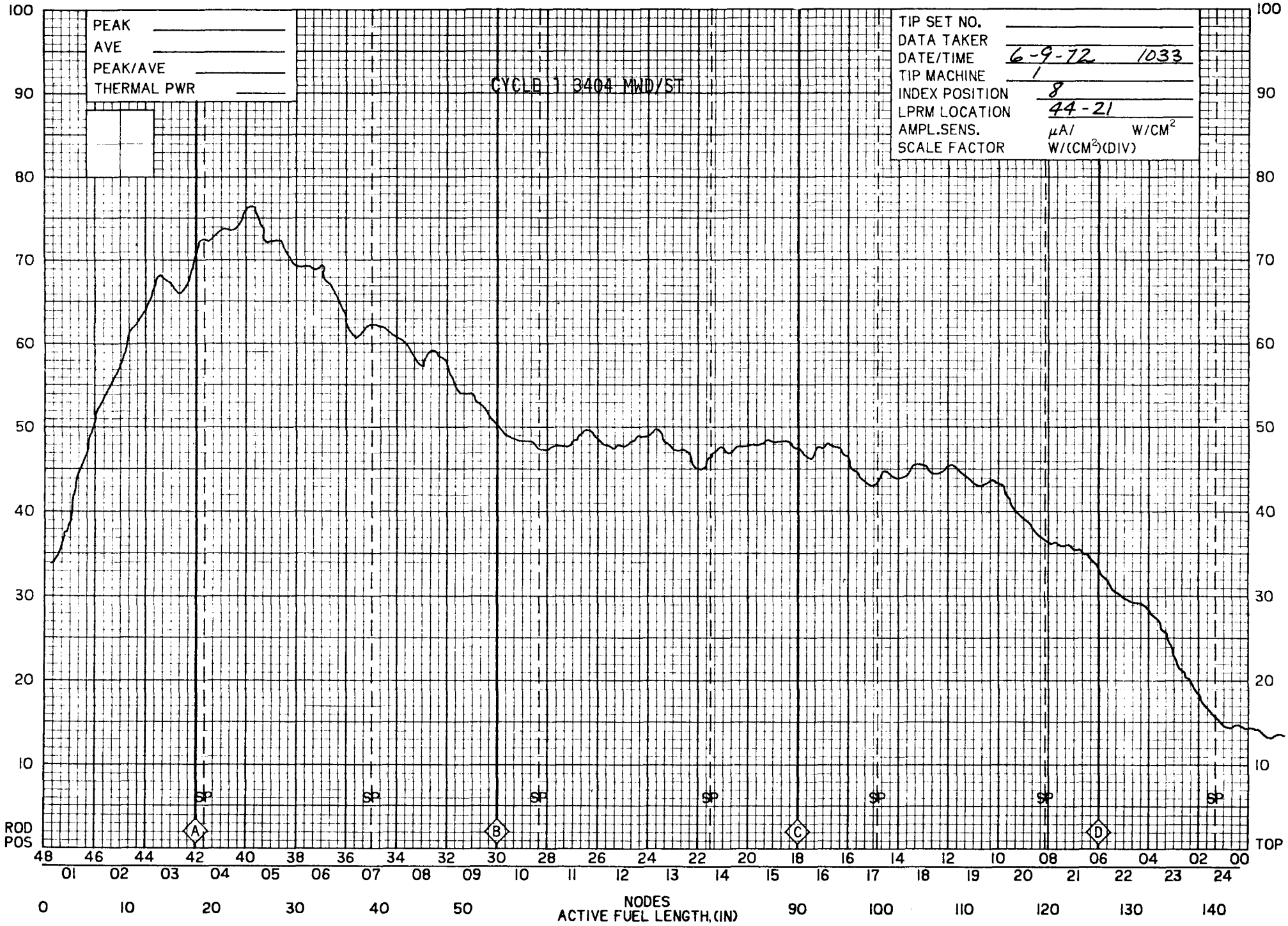
AVE
PEAK/AVE
THERMAL PWR
CYCLE 7 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72 1032
TIP MACHINE 3
INDEX POSITION 6
LPRM LOCATION 28-45 & 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
36-37
28-45
SP
A
B
C
D
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72 1030
TIP MACHINE 1
INDEX POSITION 4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)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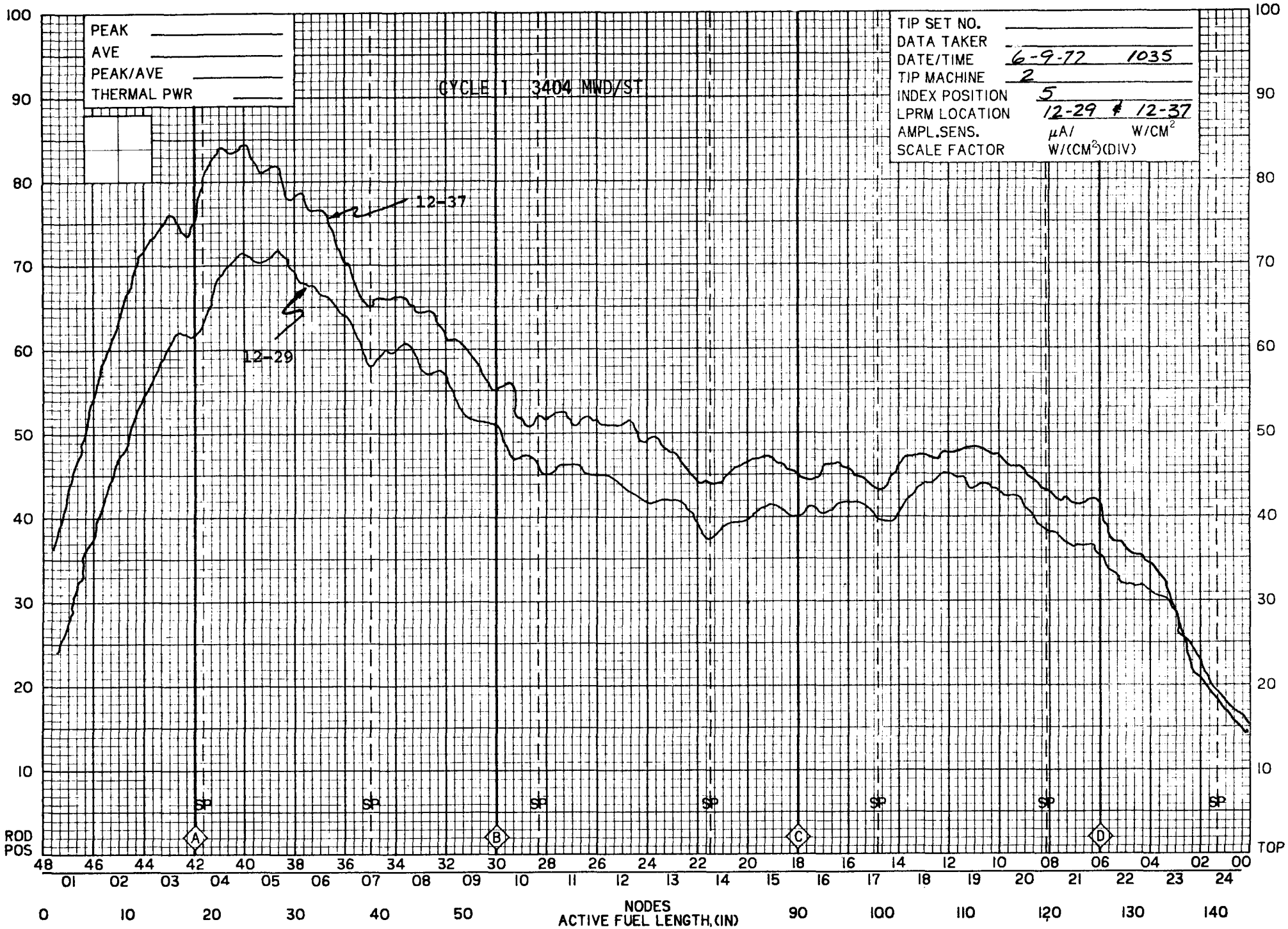
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72 1033
TIP MACHINE 1
INDEX POSITION 8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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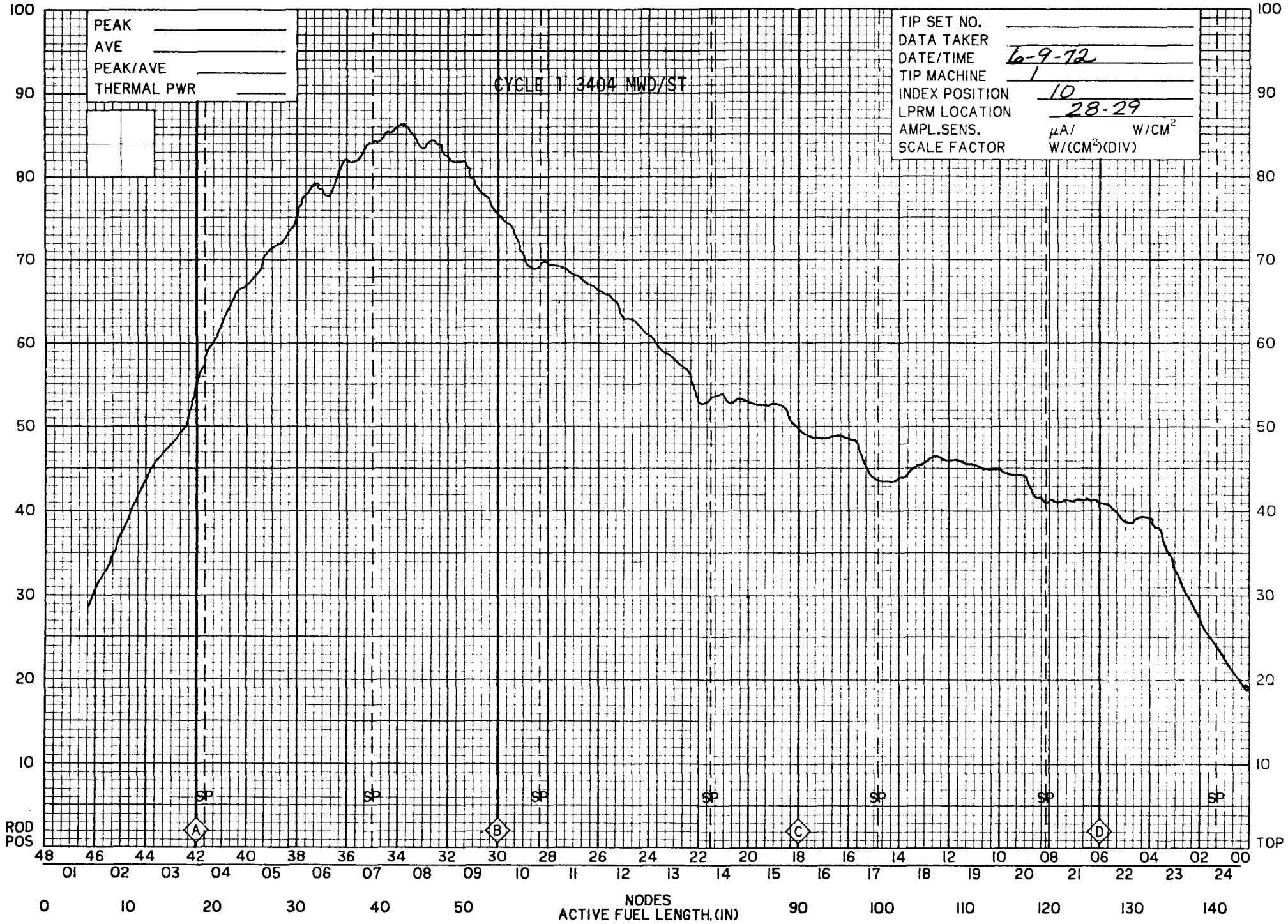
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72 1035
TIP MACHINE 2
INDEX POSITION 5
LPRM LOCATION 12-29 & 12-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
12-37
12-29
SP
A
B
C
D
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 3404 MWD/ST
TIP SET NO.
DATA TAKER
DATE/TIME 6-9-72
TIP MACHINE 1
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

REACTOR: Monticello

CYCLE: 1

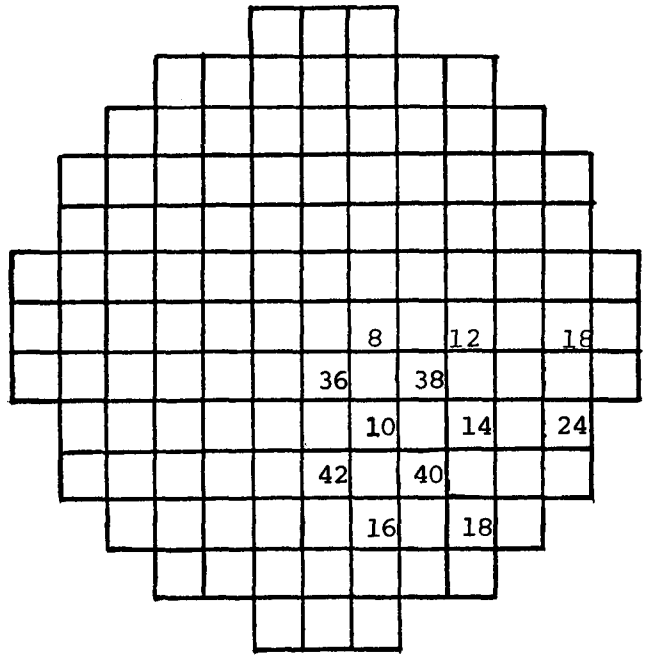
Exposure 3404 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C - BWR STATEPOINTS

Sheet 6 of 9

Rev. 0 Date: 5-10-76



1/4 core symmetry

Verified By: E. Tezel Date: 07/16/76

REACTOR: Monticello
CYCLE: 1
Exposure 3404 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART C- BWR STATEPOINTS

Sheet 5 of 9
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
8. Inlet subcooling (BTU/lb)	25.13	Idem	$HSAT_{core}$ = 547.73 HIN = 522.6
9. Cleanup system flow (gal/min)	160.	Idem	none
10. Inlet temperature to clean-up system (^{o}F)	516.	Idem	none
11. Outlet temperature to cleanup system (^{o}F)	445.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available		Idem	See attached set of TIP traces*
14. Xenon history-past 48 hours Time (hrs)/Core power (%)		Idem	See attached power histogram
15. Control rod positions (by location)	See Sheet #3		1/4 core symmetry

*TIP traces were not available for the following locations: 4-29, 12-13, 20-13, 20-37, 20-45, 28-5, 28-21, 28-37, 36-13, 36-21, 36-29, 36-45, 44-29, 44-37.

Verified By: E Kraus Date: 07/16/76

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 06/09/72 0935 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
571.80	1671.67	56.25	45.24	57.97	18.75	2.00	0.1313	1017

RWL	DPM	WFW	HFW	HD	DHO	CXE
37.20	16.31	6.76	351.22	516.92	22.15	0.1227

RAP	99.188	100.469	100.594	99.375	99.406	99.688
AGAF	1.009	0.996	0.995	1.007	1.007	1.004

IB 1

RAPL	-198.18	4.95	19.82	34.68	49.54	64.41
	79.27	89.18	99.09	109.00	123.86	198.18

QFW	QCR	QCU	QRAD	QPUMP	TFW
1663.547	9.336	1.639	0.600	3.434	376.535

HF	HFG	HG	HS	WCR	HCR
545.03	646.16	1191.19	1190.55	0.0285	70.70

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0807	482.59	413.31	524.19	1670.00	1670.00

PPW	1.8157	1.8772

CAP	0.01009	0.00996	0.00995	0.01007	0.01007	0.01004
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	5.50	9.20	12.60	16.00	18.64
WTC	17.80	23.00	31.70	40.30	49.00	57.60

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 6/9/72 H.B. NO. 134
TIME 0930 BY DEN

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS
*	1	GROSS GEN. OUTPUT	GMWE	CO8	W/GEN	571.2 MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	36.1 MWE
*	3	HP COND. VACUUM	HPCV	CO7	PR 1264	2.5 IN HG ABS
*	4	LP COND. VACUUM	LPCV	CO7	PR 1264	2.5 IN HG ABS
	5	REACTOR PRESSURE	PR	CO5	6-98	1002 PSIG 1017 psia
	6	ROD DRIVE FLOW	WRD	CO5	3-306	54 GPM
*	7	TOTAL CORE FLOW	Wc	CO5	FR-2-3-95	56.3 MLB/HR
	8	A RECIRC. PUMP PWR	QPA	CO4	2-184-24A	1.93 MW
	9	B RECIRC. PUMP PWR	QPB	CO4	2-184-24B	1.95 MW
	10	CLEANUP FLOW	WCU	CO4	12-141A&B	160 GPM
	11	CLEANUP INLET TEMP.	TCUI	CO4	POS. 1	516 °F
	12	CLEANUP OUTLET TEMP.	TCUO	CO4	POS. 4	445 °F
	13	ROD DRIVE TEMP.	TRD	COMP	F-127	121 °F
	14	A FEEDWATER FLOW	WFWA	C18	6-79A(x)	(Ma) 3.390 MLB/HR
	15	B FEEDWATER FLOW	WFWB	C18	6-79B(x)	(Ma) 3.386 MLB/HR
	16	A FEEDWATER TEMP.	TFWA	C18	6-79A(z)/TR1148	(Ma) 377.2 °F
	17	B FEEDWATER TEMP.	TFWB	C18	6-79B(z)/TR1148	(Ma) 377.7 °F

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	5	546.2
19	SATURATED STEAM ENTHALPY	h_{gs}	5	1192.3
20	A FEEDWATER ENTHALPY	h_{FWA}	5, 16	351.8
21	B FEEDWATER ENTHALPY	h_{FWB}	5, 17	352.3
22	CLEANUP INLET ENTHALPY	h_{CUT}	5, 11	506.9
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	5, 12	424.8
24	ROD DRIVE ENTHALPY	h_{RD}	5, 13	92.4

HEAT BALANCE CALCULATIONS

		QUANTITY	SYMBOL	EQUATION	VALUE
	25	ROD DRIVE FLOW	W_{RD}	.000495 x 6	.0267 MLB/HR
	26	TOTAL STEAM FLOW	W_S	14 + 15 + 25	6.803 MLB/HR
*	27	CORE INLET ENTHALPY	h_{IN}	See below	522.6 MLB/HR
	28	ENERGY OUT - STEAM	Q_S	26 + 19	8110.9 MBTU/HR
	29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x 10 (22 - 23)	6.50 MBTU/HR
	30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4	2.40 MBTU/HR
	31	NET ENERGY OUT	Q_{OUT}	28 + 29 ÷ 30	8119.8 MBTU/HR
	32	ENERGY IN - FEEDWATER	Q_{FW}	14 x 20 + 15 x 21	2885.5 MBTU/HR
	33	ENERGY IN - ROD DRIVES	Q_{RD}	25 x 24	2.47 MBTU/HR
	34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x (8 + 9)	13.24 MBTU/HR
	35	NET ENERGY IN	Q_{IN}	32 + 33 + 34	2901.2 MBTU/HR
	36	CORE THERMAL POWER	Q_{CORE}	31 - 35	5718.6 MBTU/HR
	37	CORE THERMAL POWER	P_{CORE}	36 / 3.413	1675.5 MWT
	38	CORE THERMAL POWER	%P	37 / 1670	100.3 % OF RATED
*	39	HEAT RATE	HR	36 x 10^3 (1 - 2)	10,491 BTU/KW-HR

$$h_{IN} = \frac{(7 - 25 - 14 - 15)\,18 + 14\,20 + 15\,21}{7}$$

APRM	READING
1	99.3
2	100.8
3	99.3
4	100.4
5	99.3
6	99.7

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS:

REACTOR: Monticello
CYCLE: 1
Exposure 3404 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART C- BWR STATEPOINTS

Sheet 4 of 9
Rev. 0 Date: 5/10/76

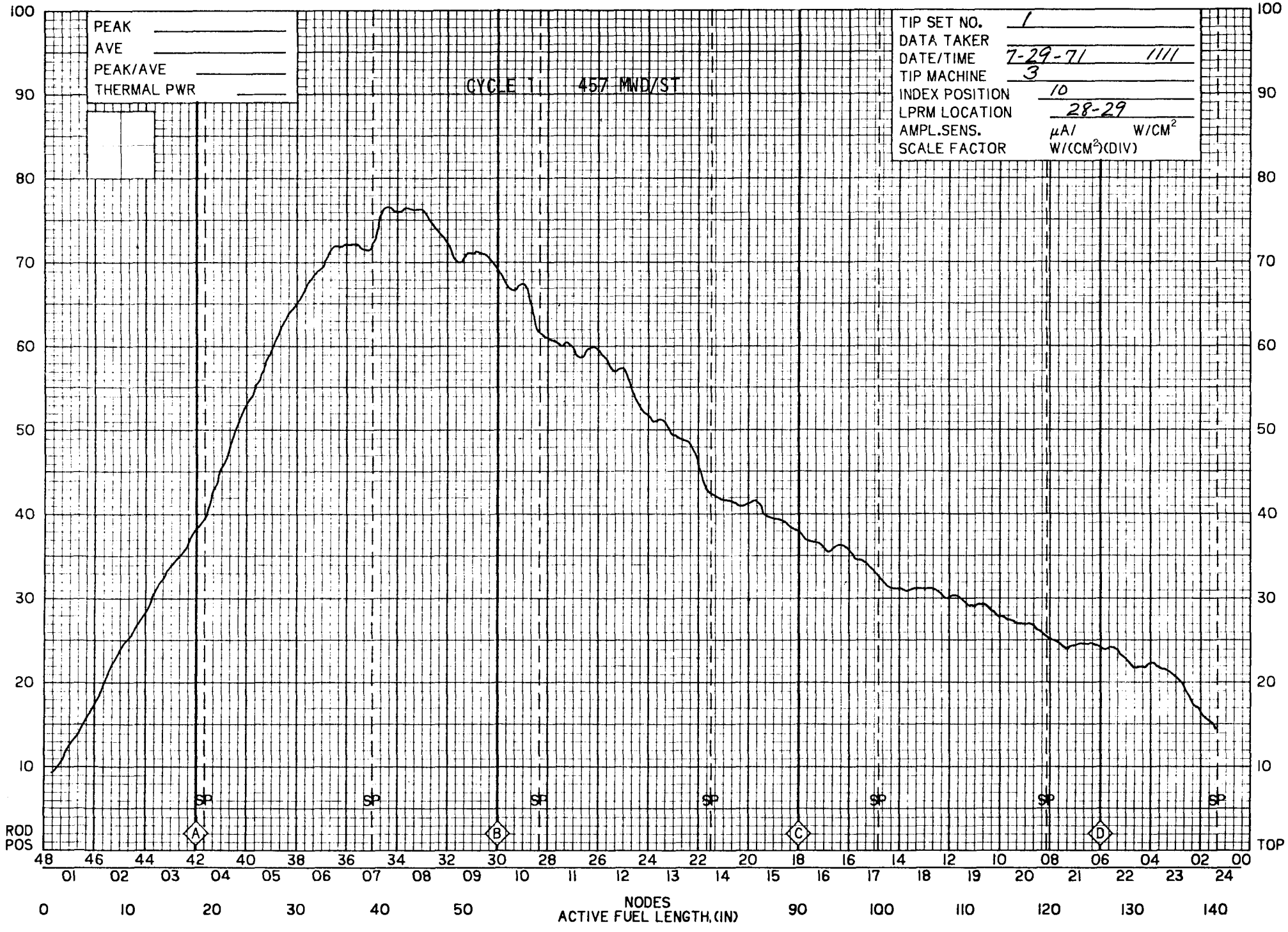
ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1675.5	HB #134 6/9/72	See attached HB #134 and OD-3 dated 6/9/72
2. System pressure (psig)	1002.	Idem	Calculated Core Pressure = 1034.2 psia
3. Recirculation flow (lbs/hr)	56.3×10^6	Idem	none
4. Recirculation flow temperature (^oF)			not required
5. Feedwater flow (lbs/hr)	6.78×10^6	Idem	none
6. Feedwater flow temperature (^oF)	377.45	Idem	none
7. Time at associated power level (hr)	>48.0		

Verified By: E. Torok Date: 07/16/76

Monticello Nuclear Generating Plant

WEEKLY OPERATING HISTORY

Week Ending 7 . 31 . 71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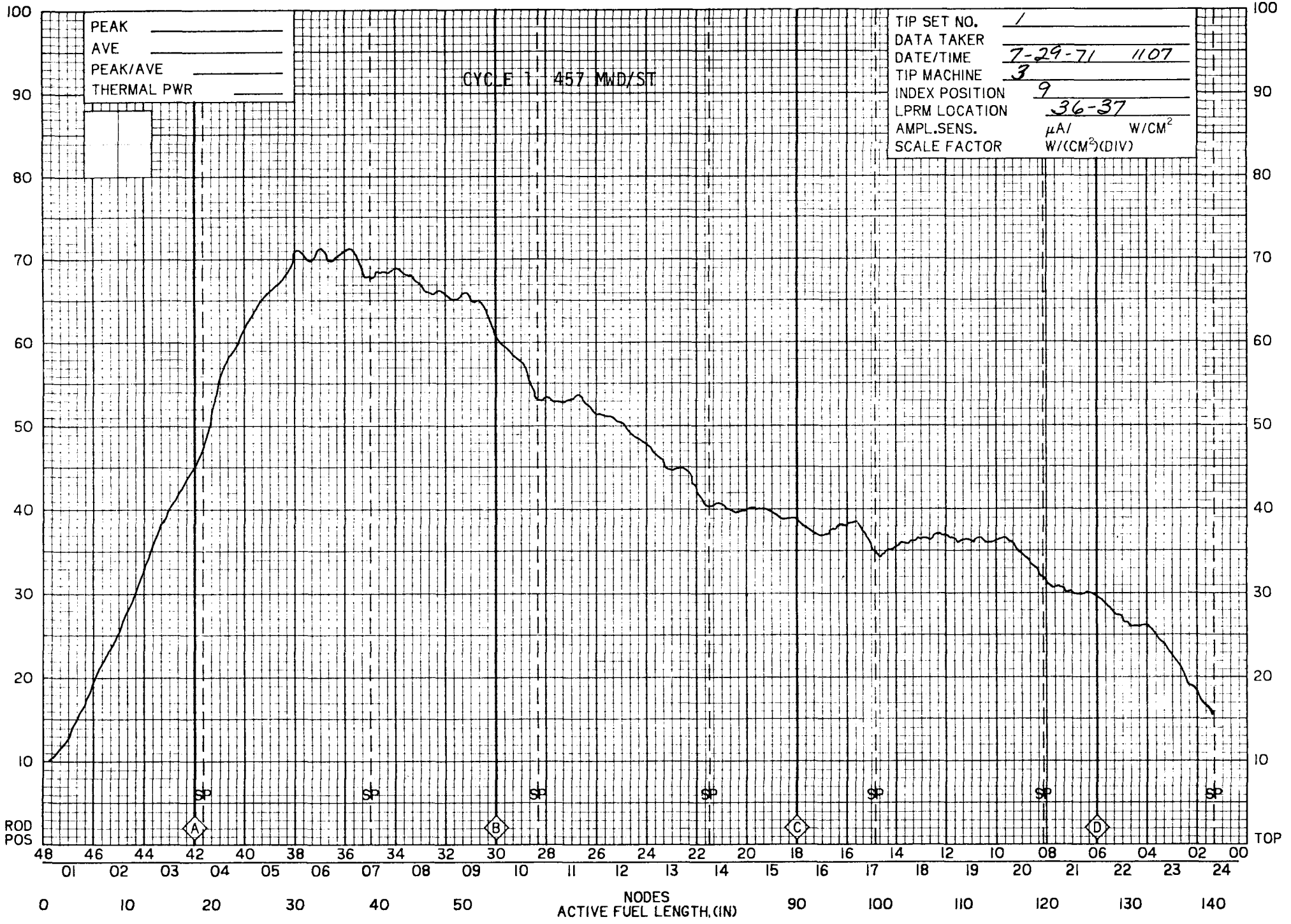
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1111
TIP MACHINE 3
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)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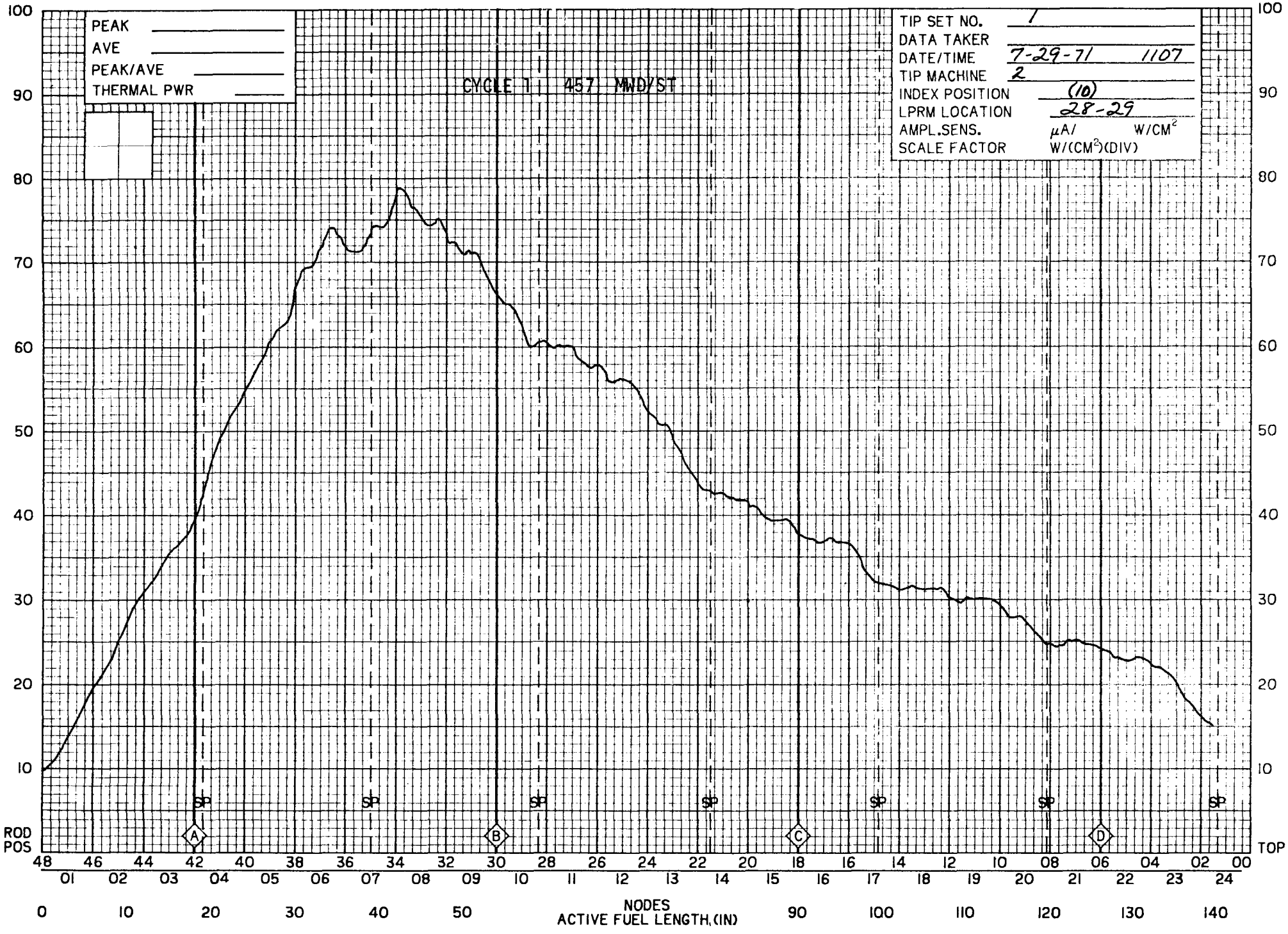
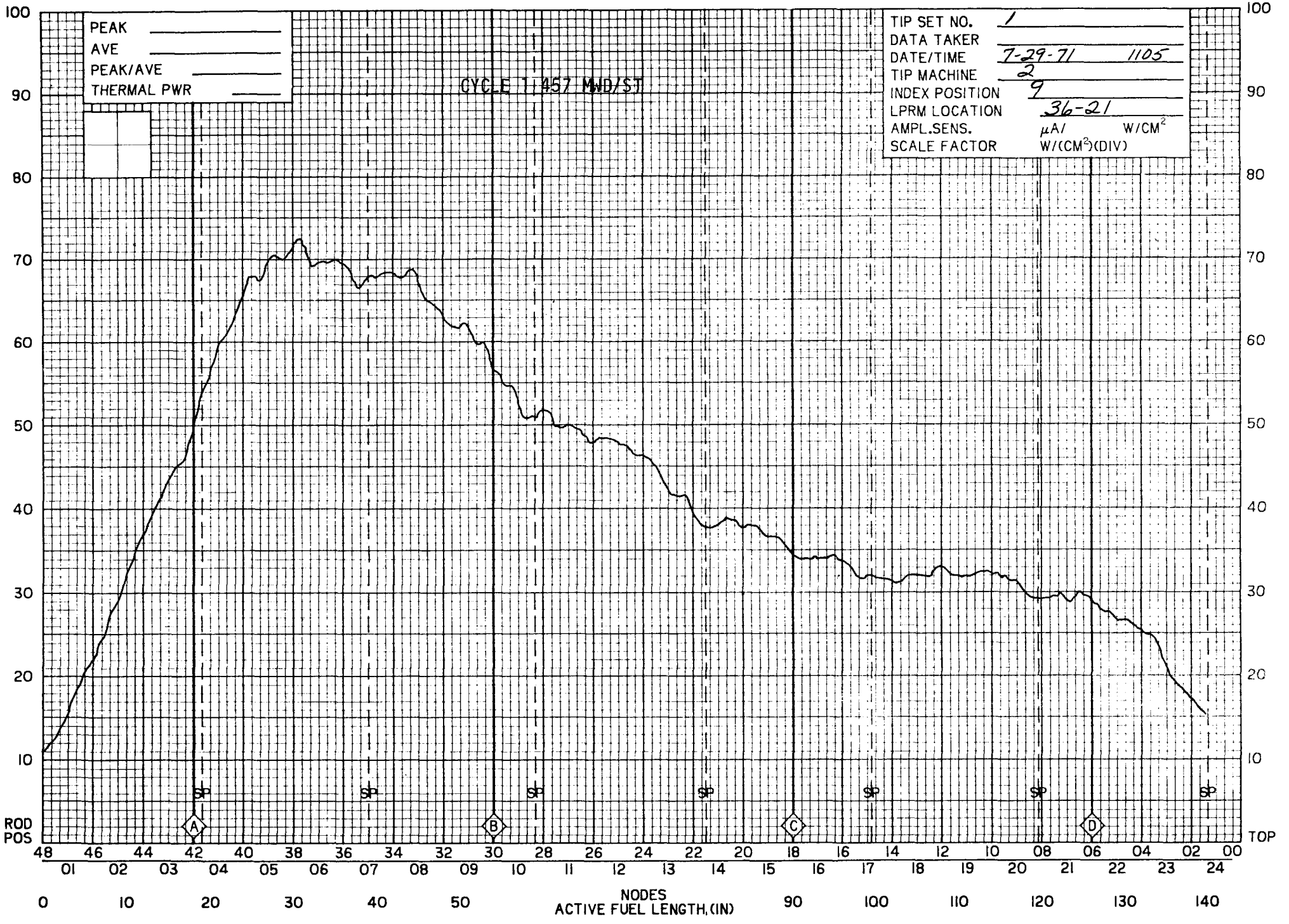
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1107
TIP MACHINE 3
INDEX POSITION 9
LPRM LOCATION 36-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1107
TIP MACHINE 2
INDEX POSITION (10)
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)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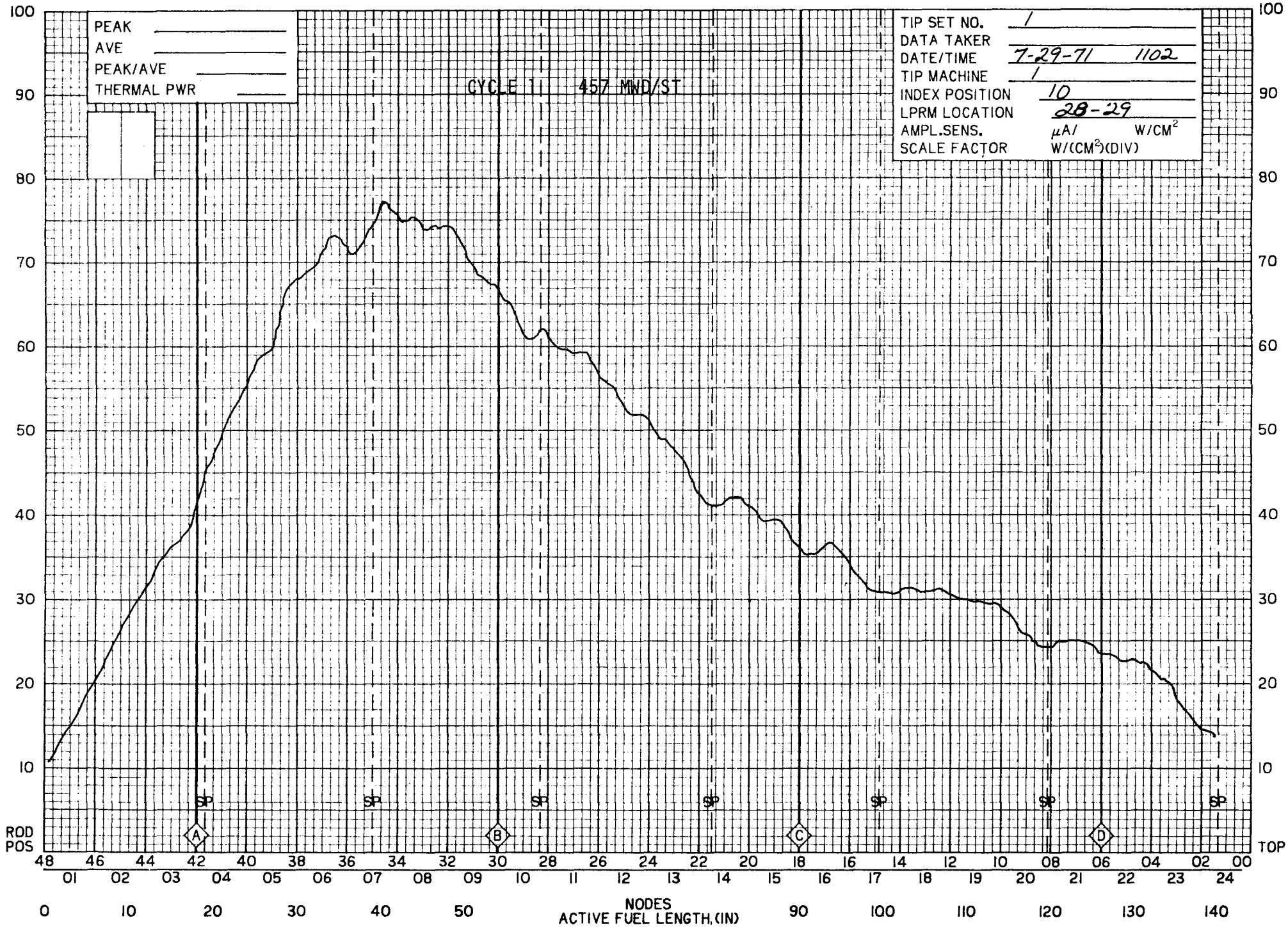
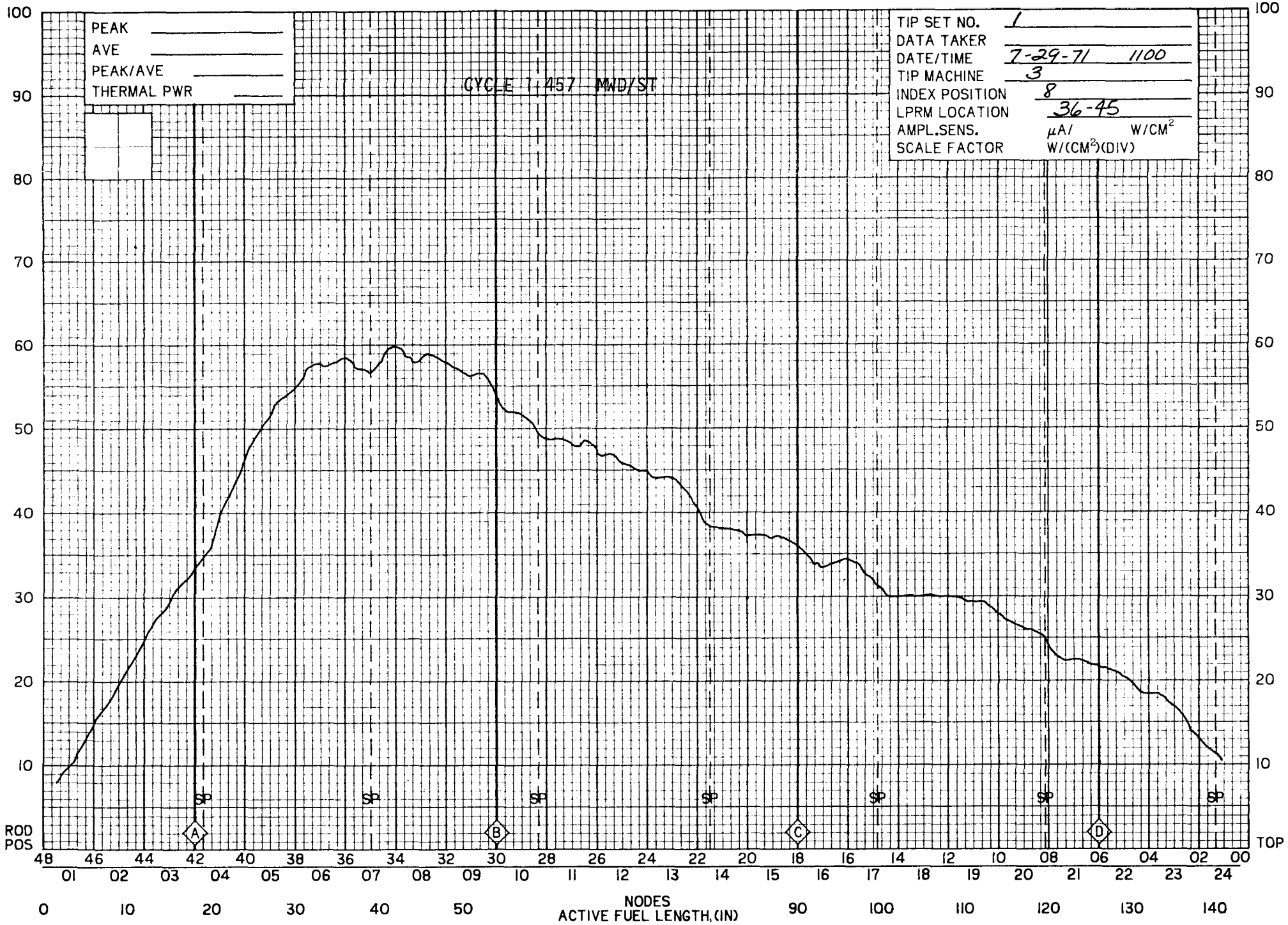
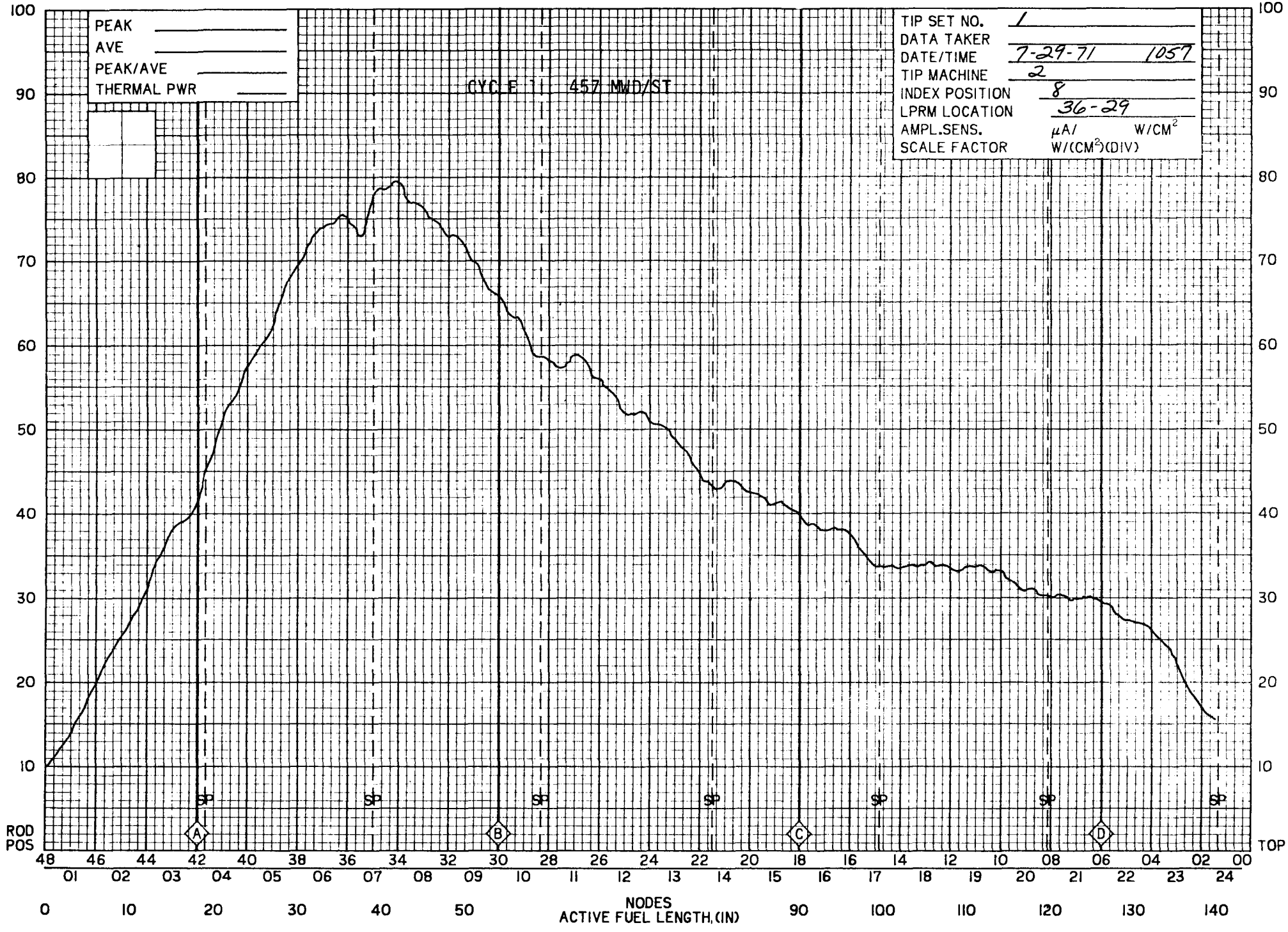
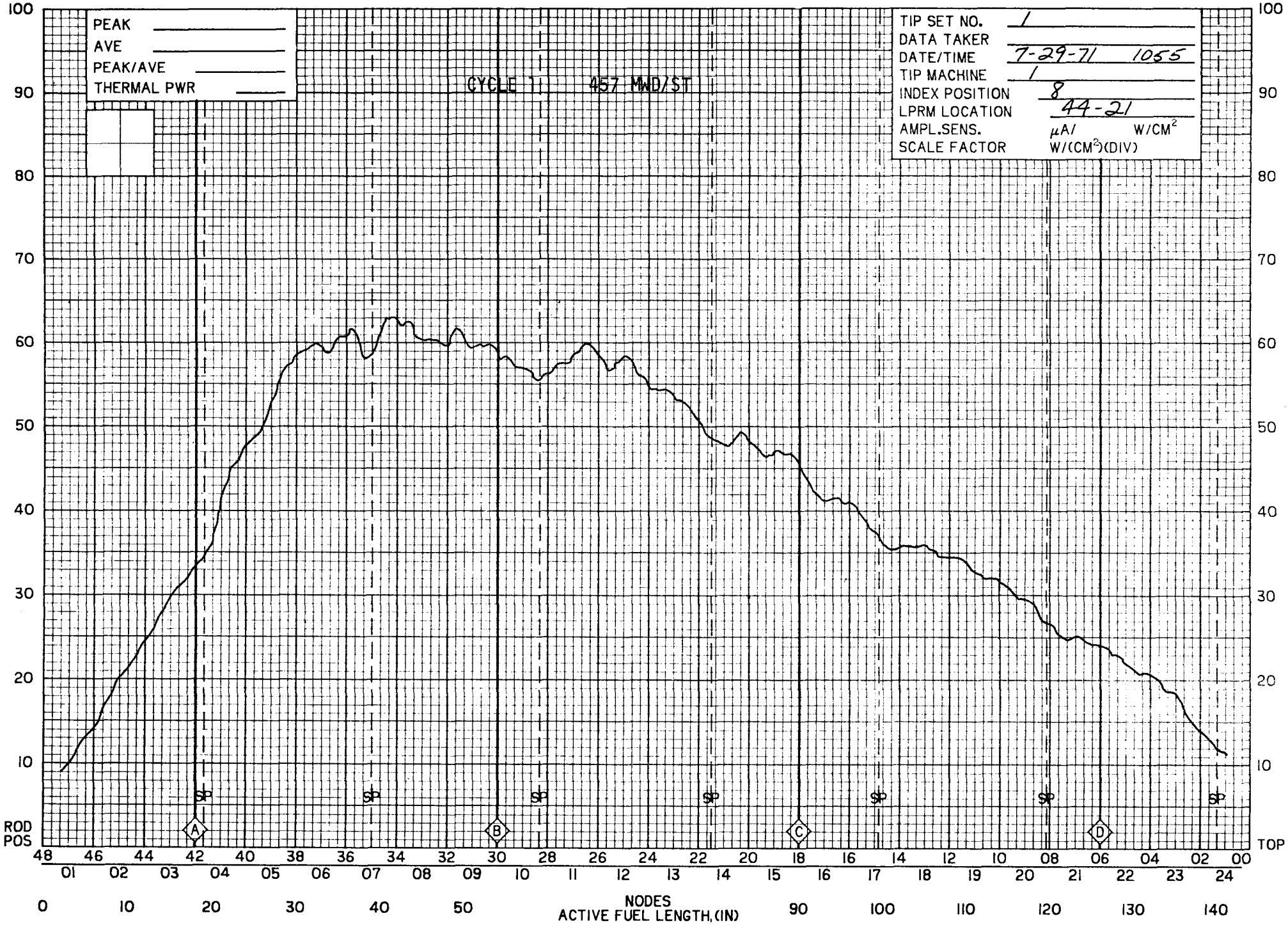
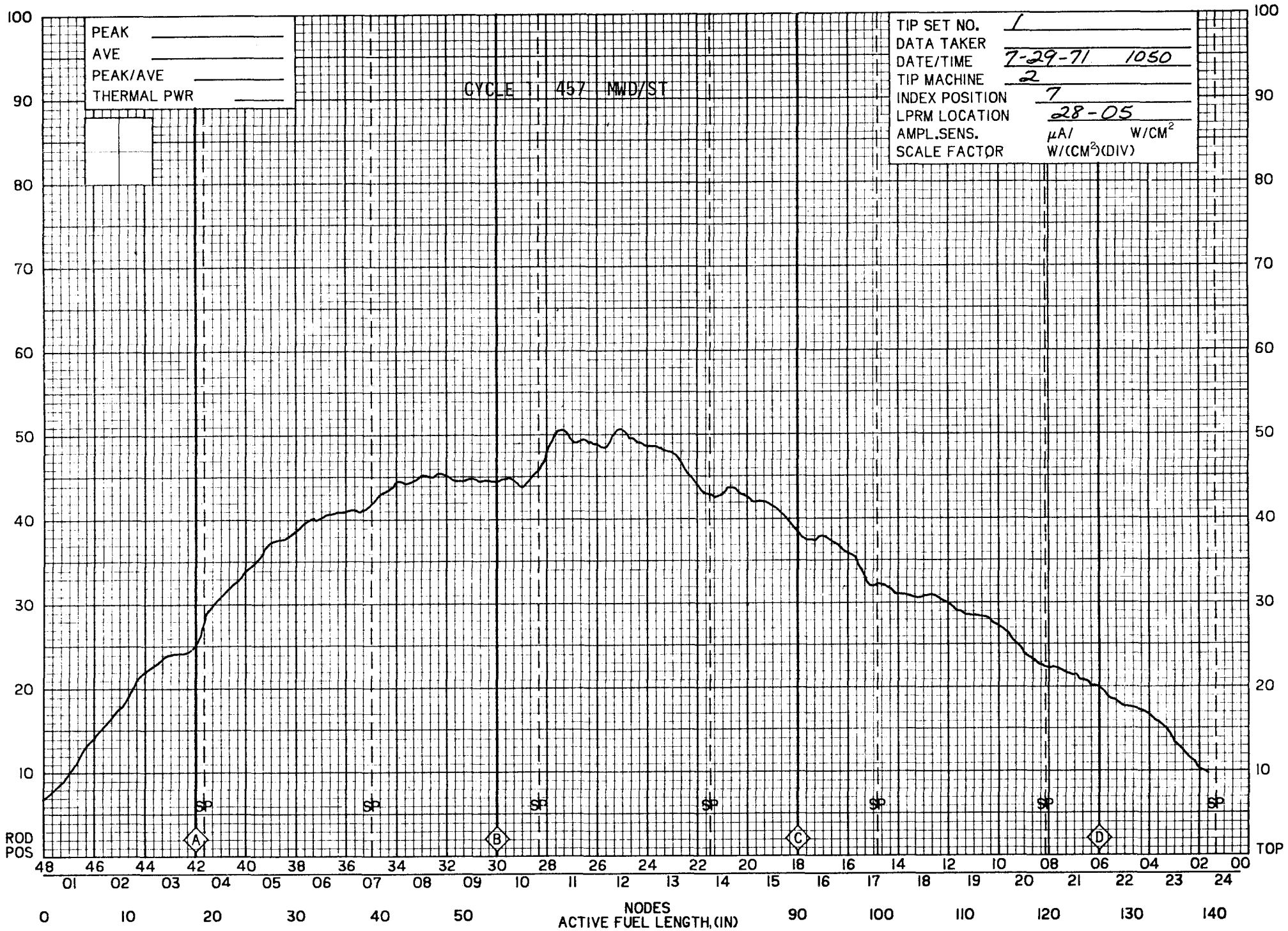
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1105
TIP MACHINE 2
INDEX POSITION 9
LPRM LOCATION 36-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)

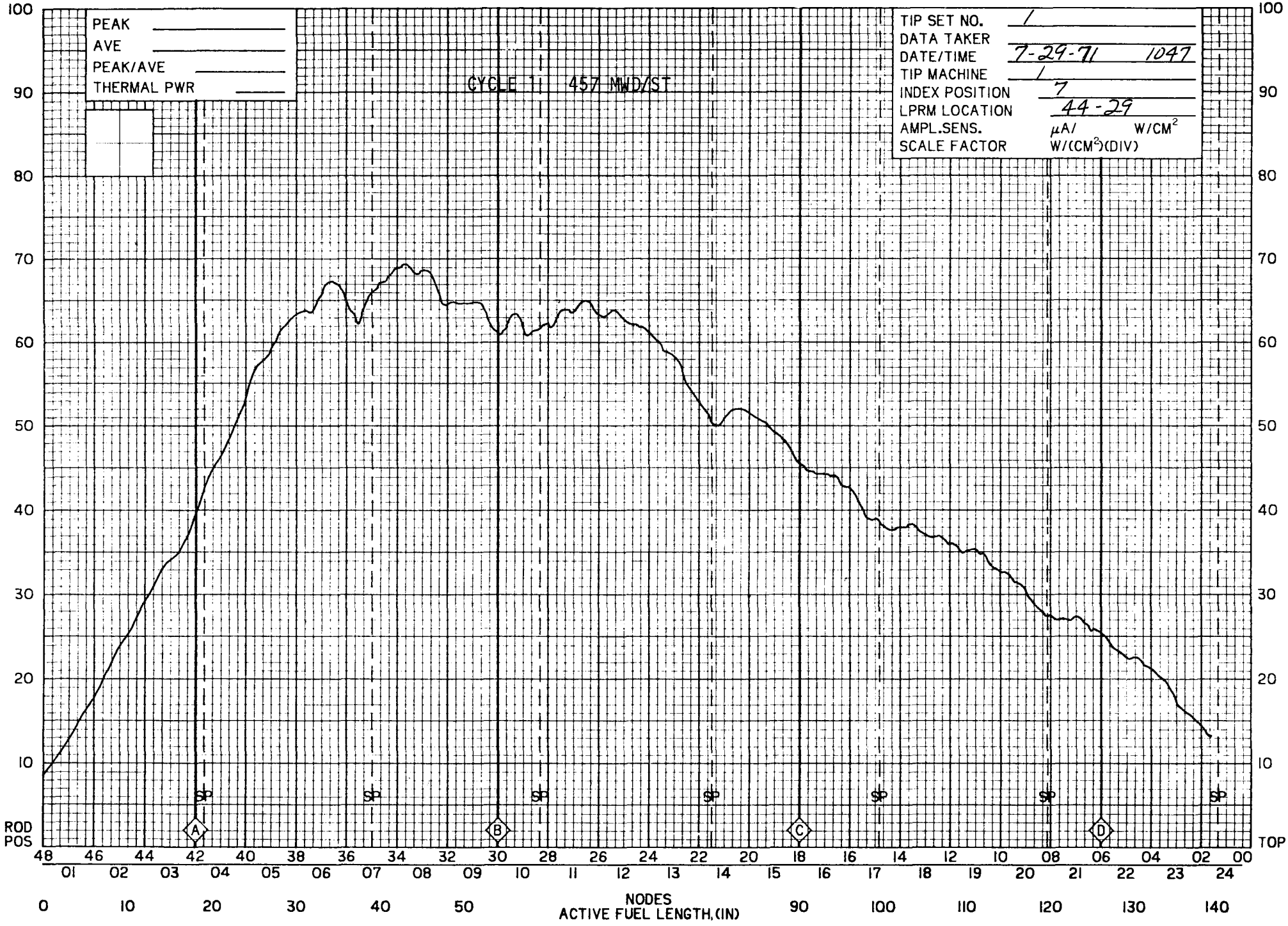

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 11 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1102
TIP MACHINE 1
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

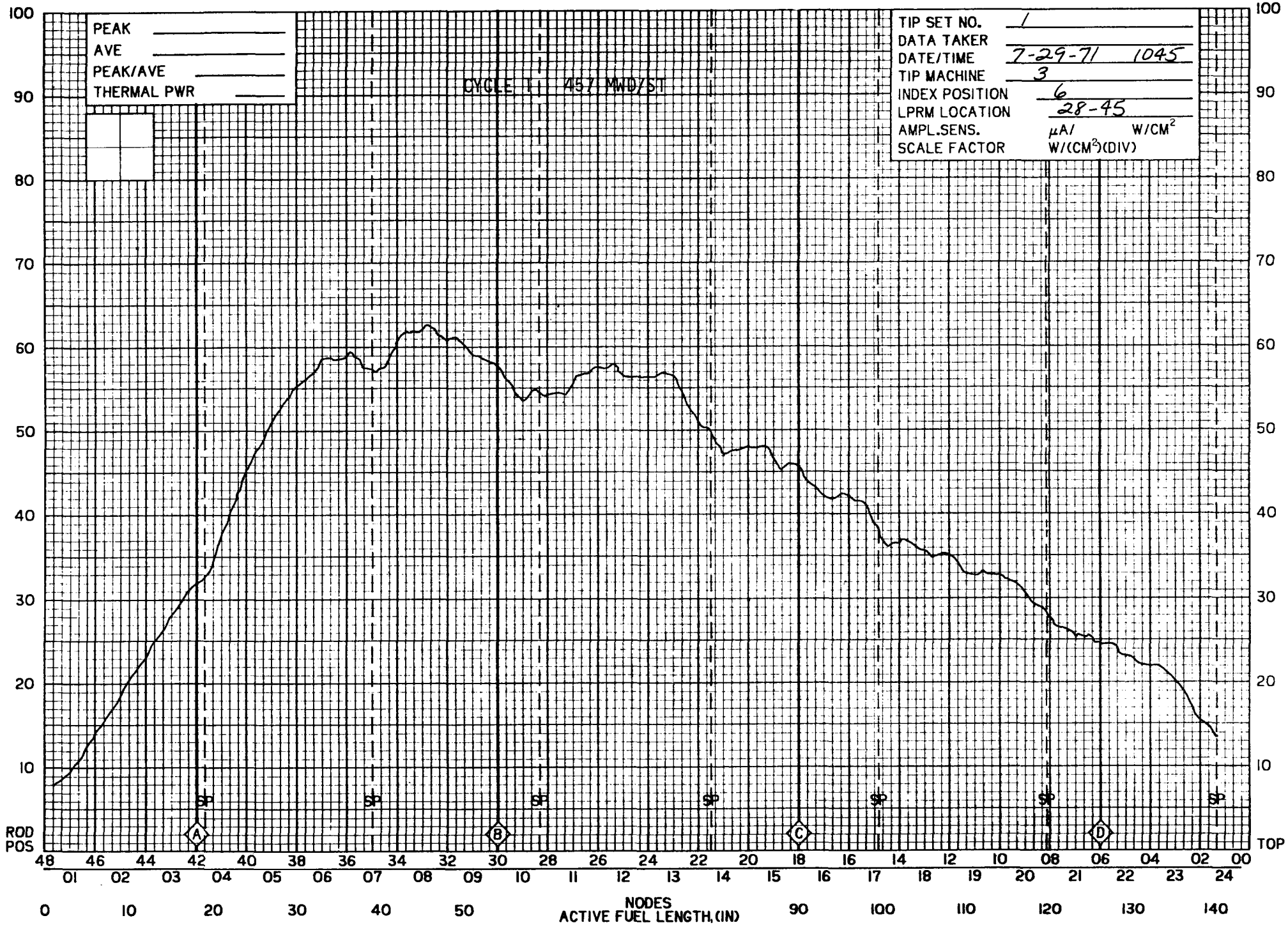

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1100
TIP MACHINE 3
INDEX POSITION 8
LPRM LOCATION 36-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)

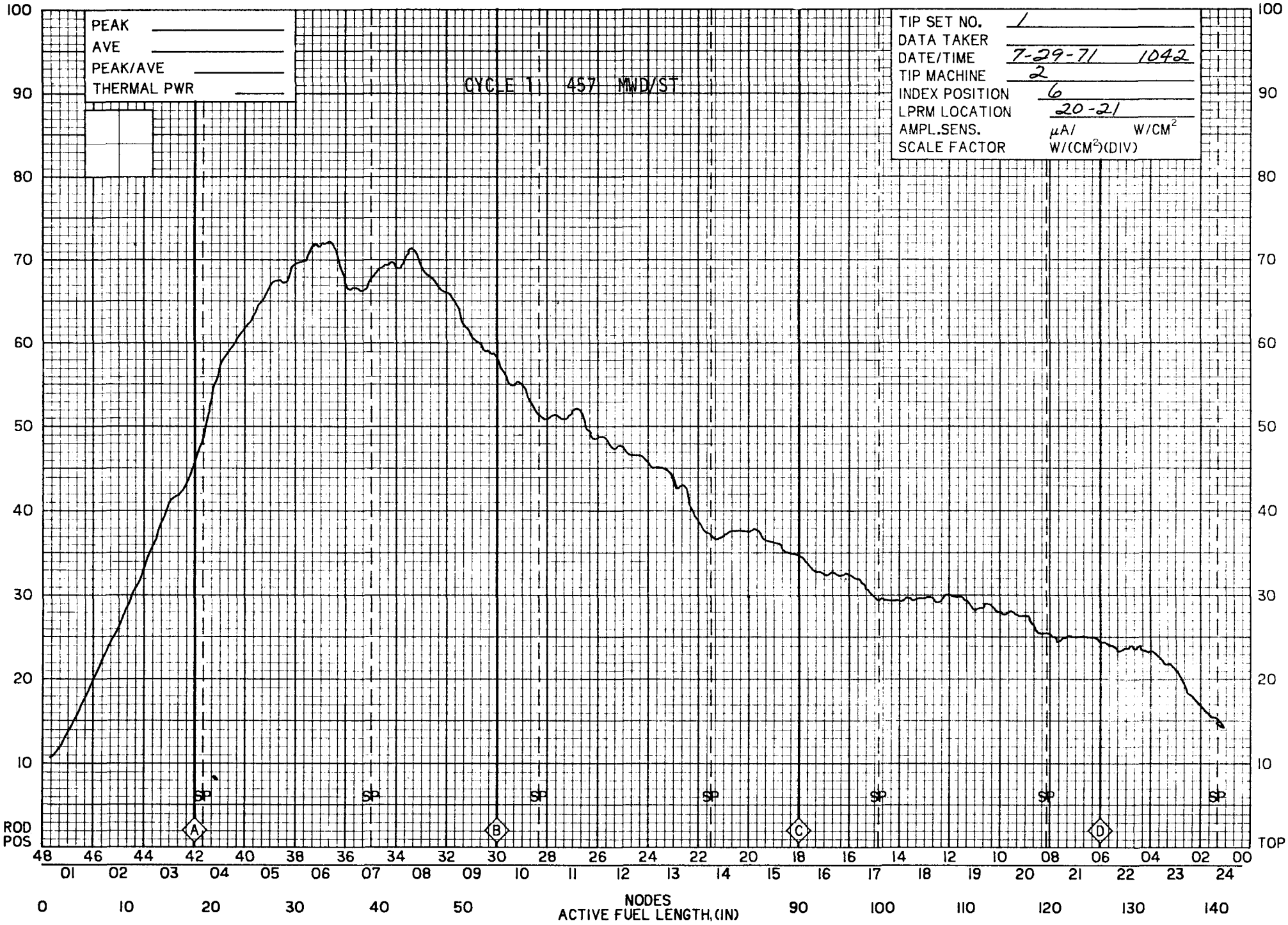

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 11 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1057
TIP MACHINE 2
INDEX POSITION 8
LPRM LOCATION 36-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
NODES
ACTIVE FUEL LENGTH, (IN)

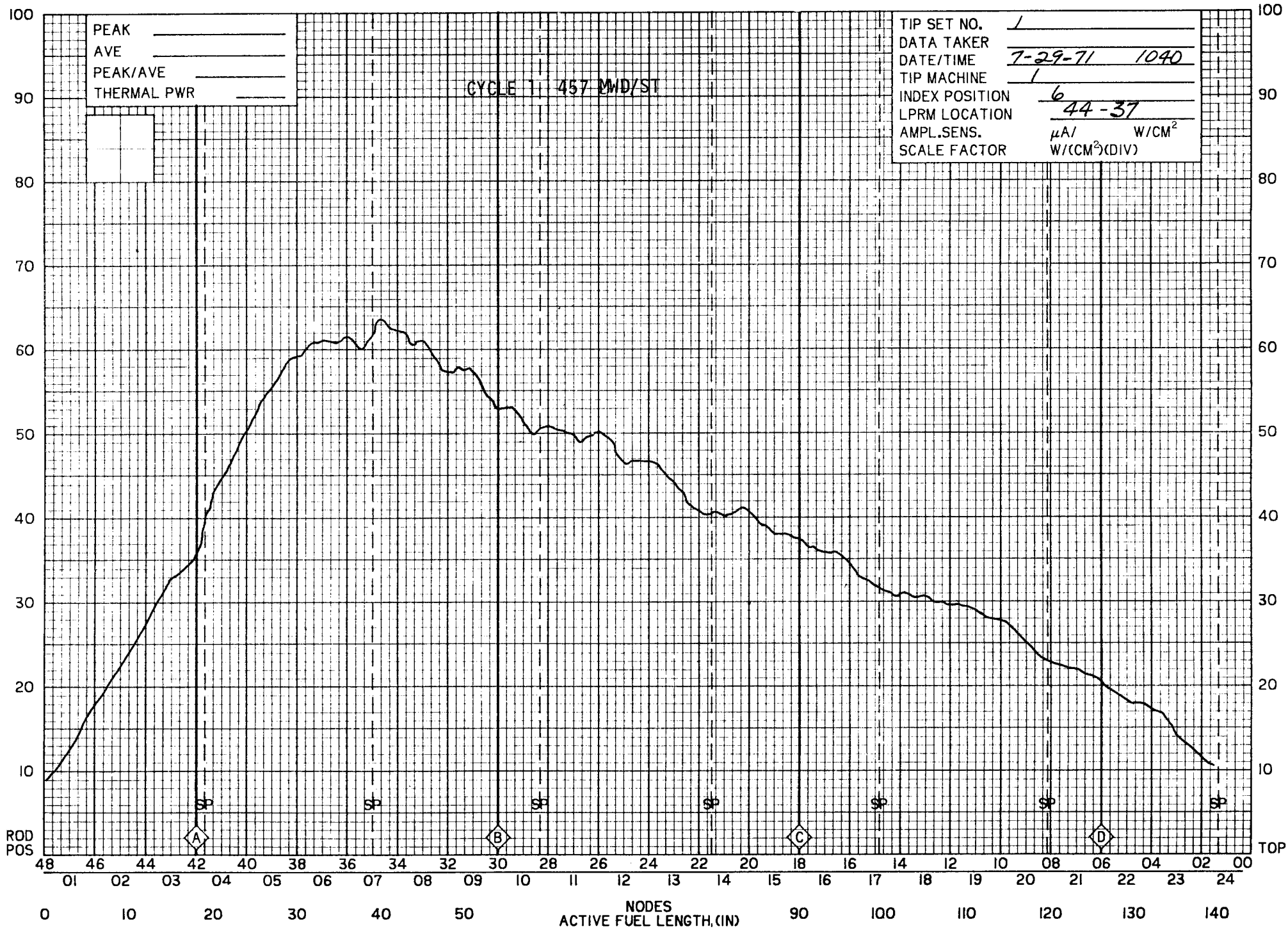

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1055
TIP MACHINE 1
INDEX POSITION 8
LPRM LOCATION 44-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)

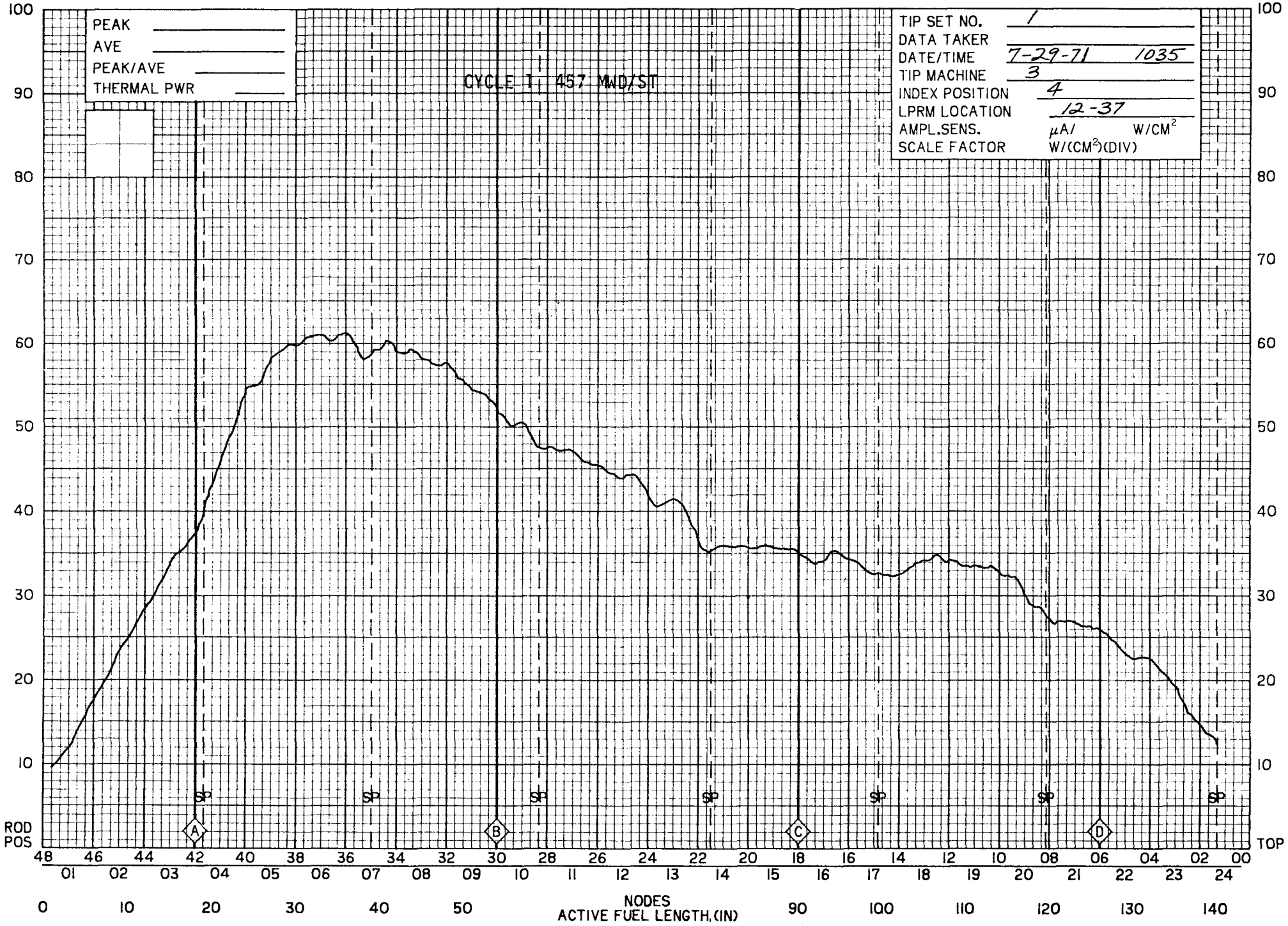

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1050
TIP MACHINE 2
INDEX POSITION 7
LPRM LOCATION 28-05
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

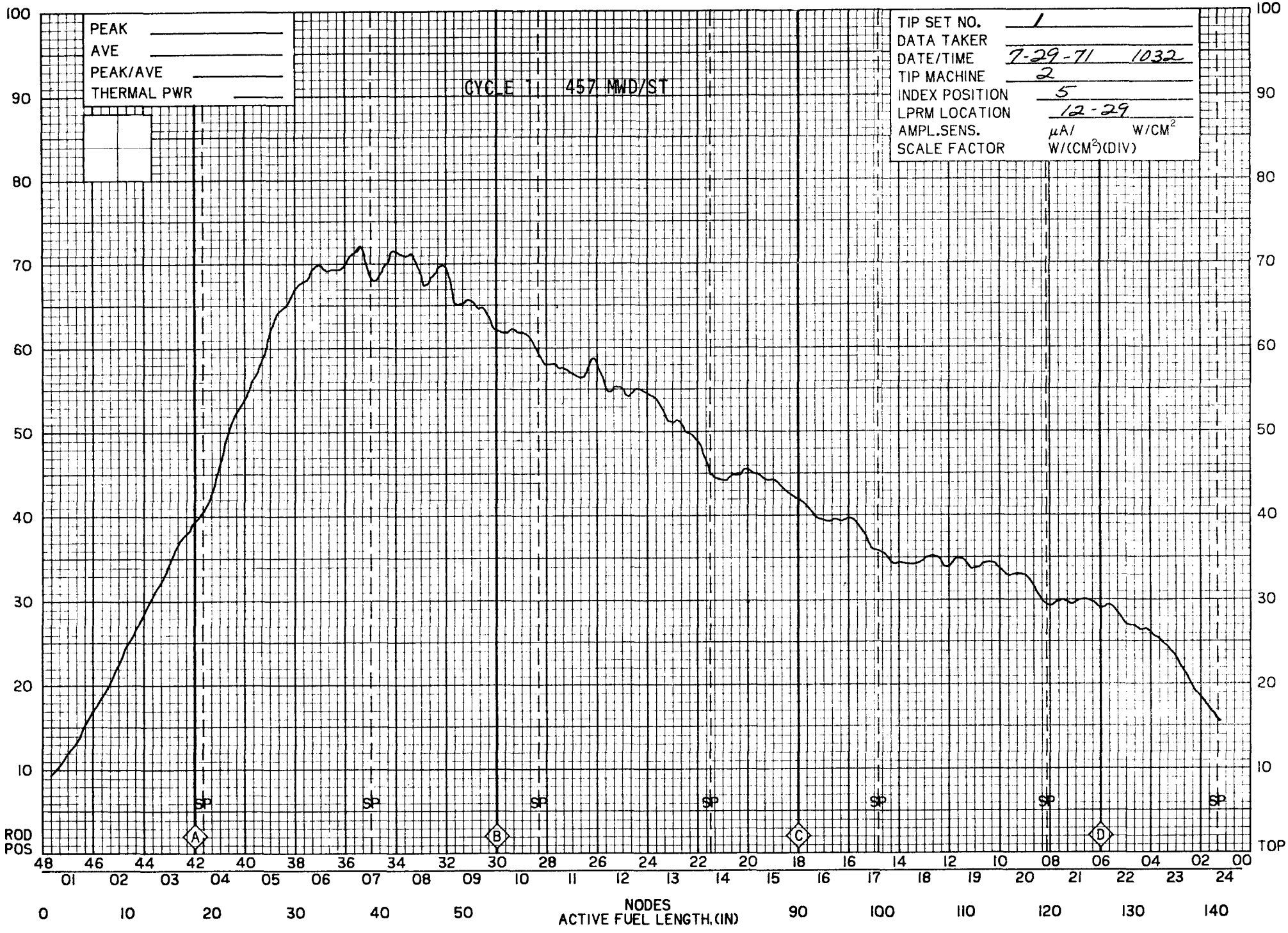

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1047
TIP MACHINE 1
INDEX POSITION 7
LPRM LOCATION 44-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)

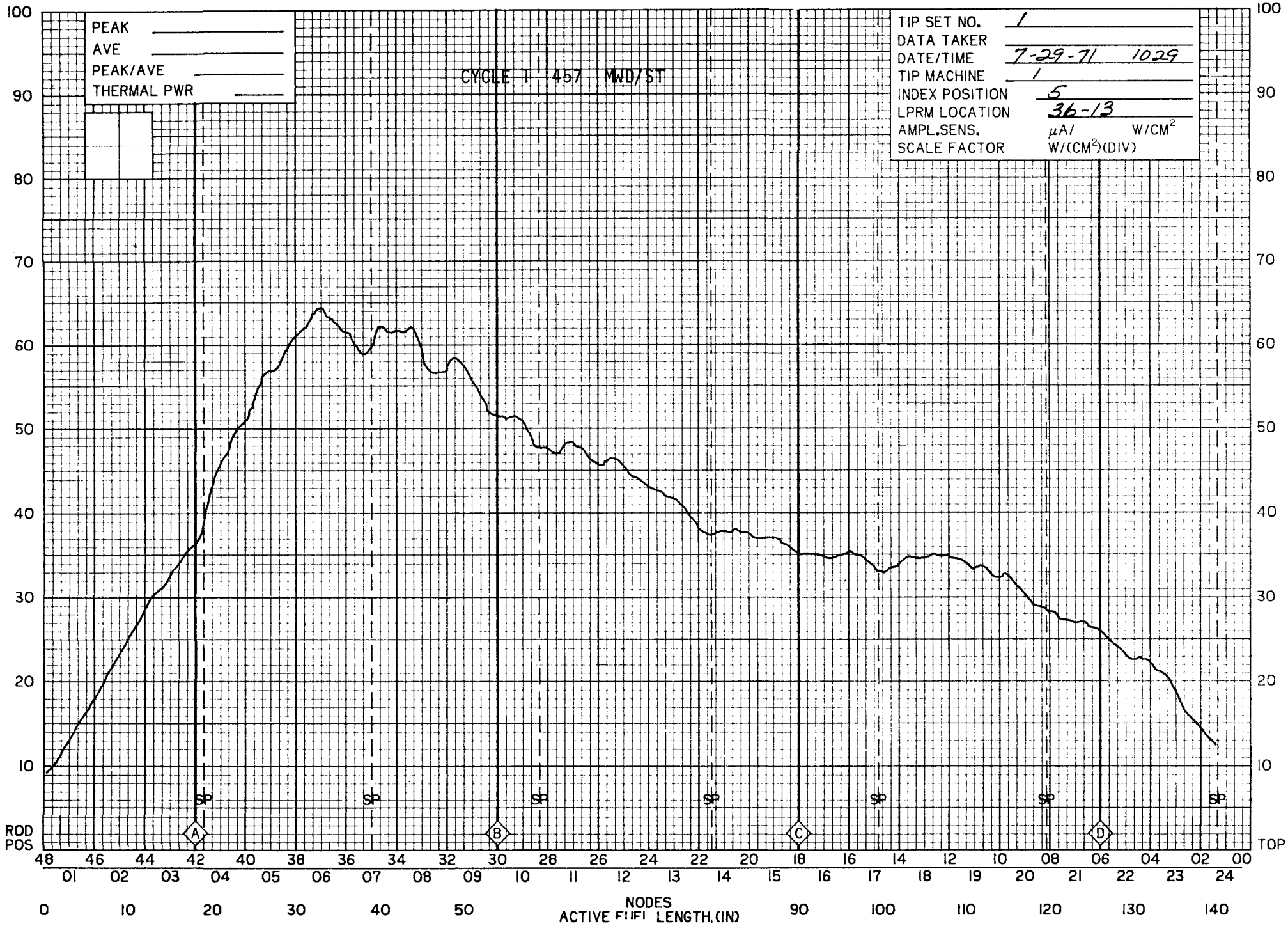

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1045
TIP MACHINE 3
INDEX POSITION 6
LPRM LOCATION 28-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

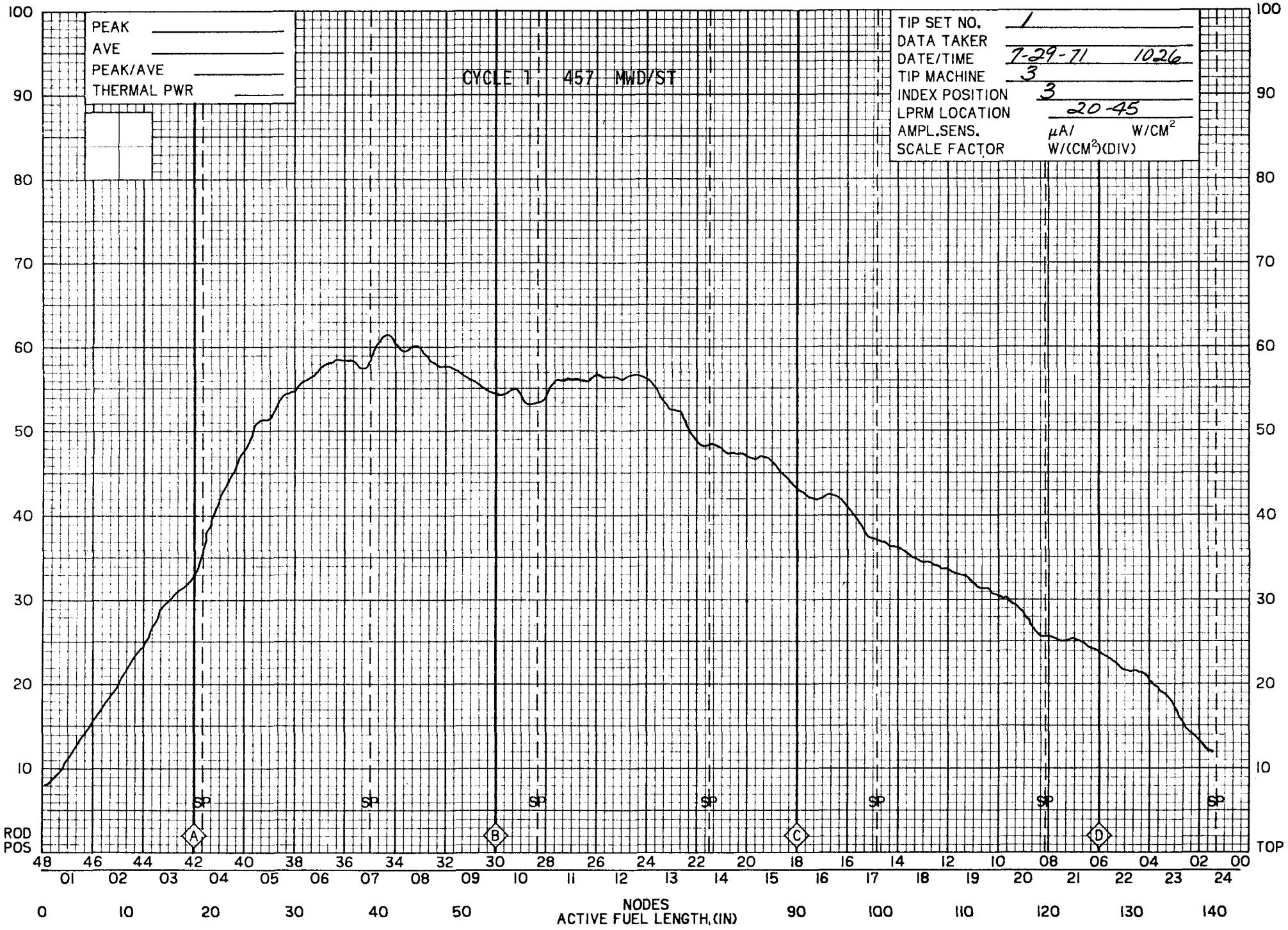

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1042
TIP MACHINE 2
INDEX POSITION 6
LPRM LOCATION 20-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)

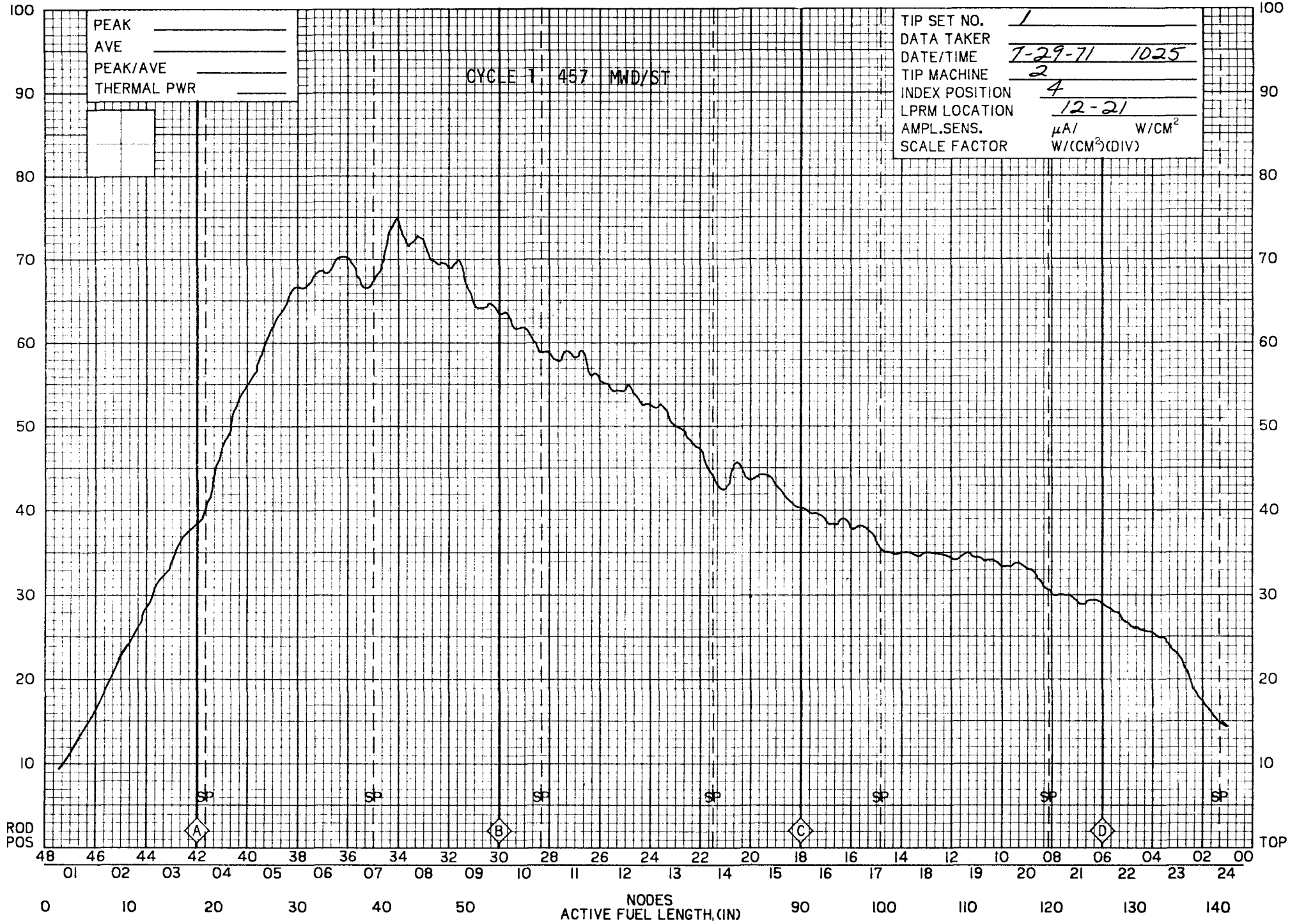

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1040
TIP MACHINE 1
INDEX POSITION 6
LPRM LOCATION 44-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

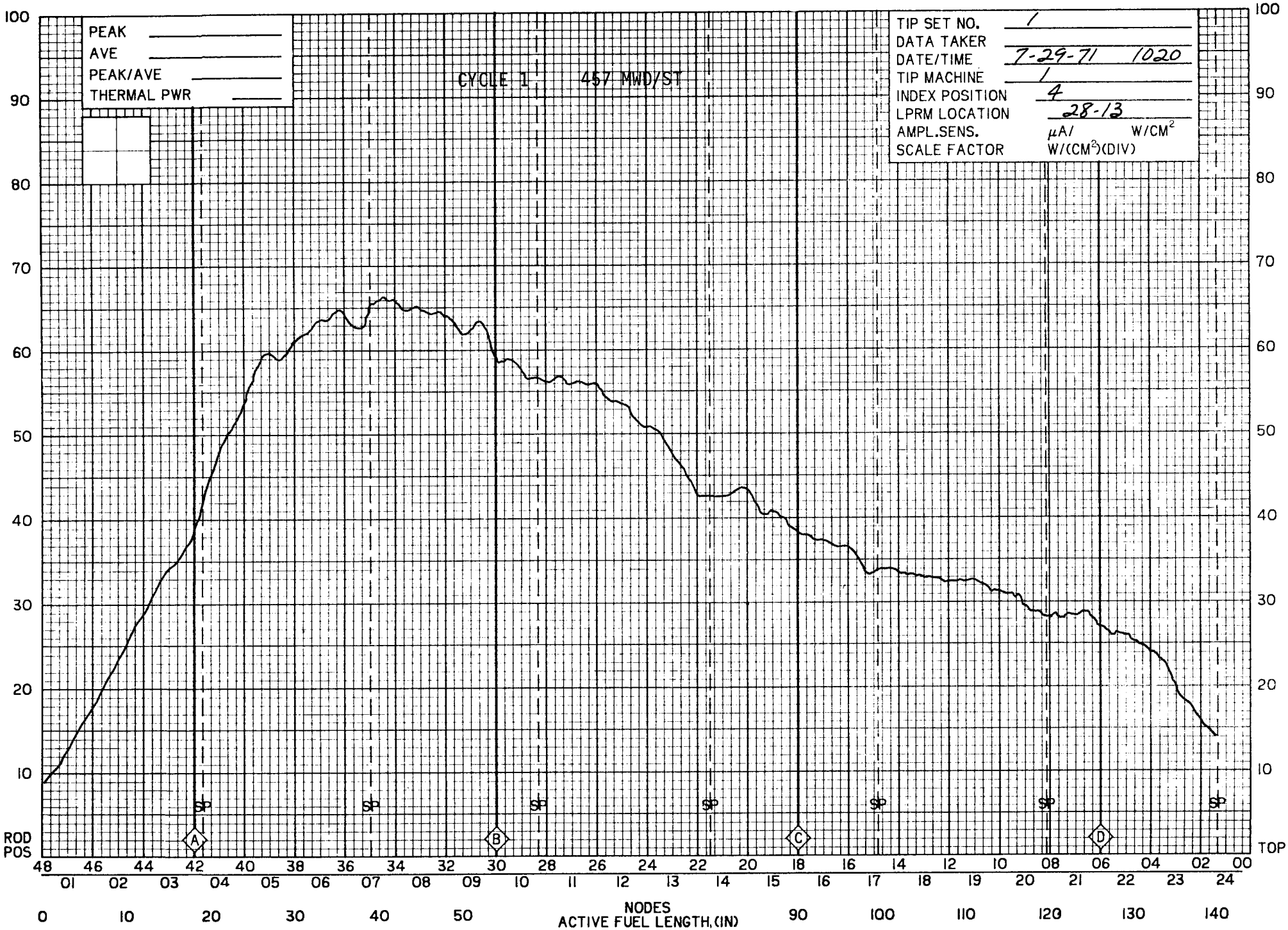

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE I 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1035
TIP MACHINE 3
INDEX POSITION 4
LPRM LOCATION 12-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)

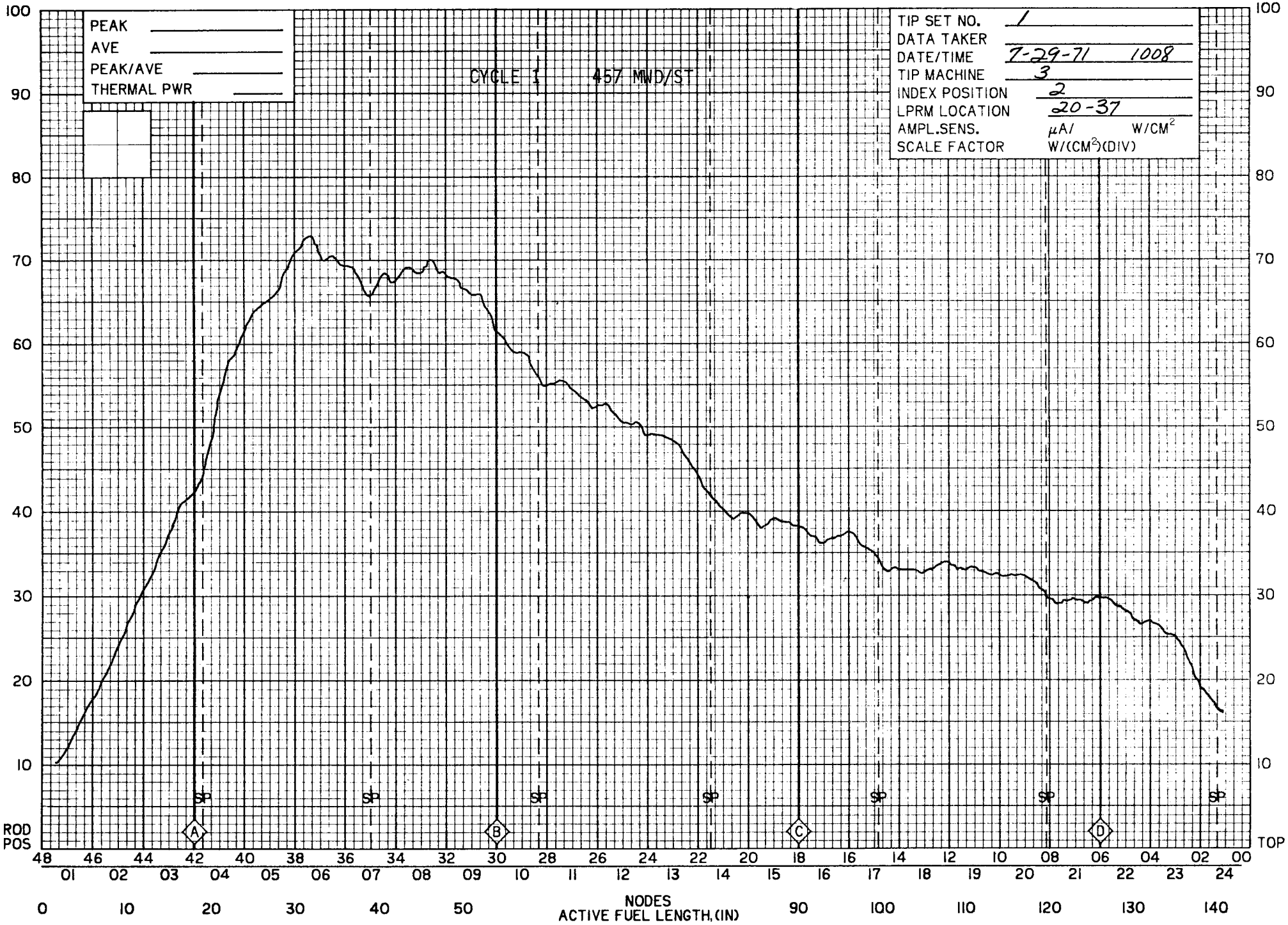

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1032
TIP MACHINE 2
INDEX POSITION 5
LPRM LOCATION 12-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)

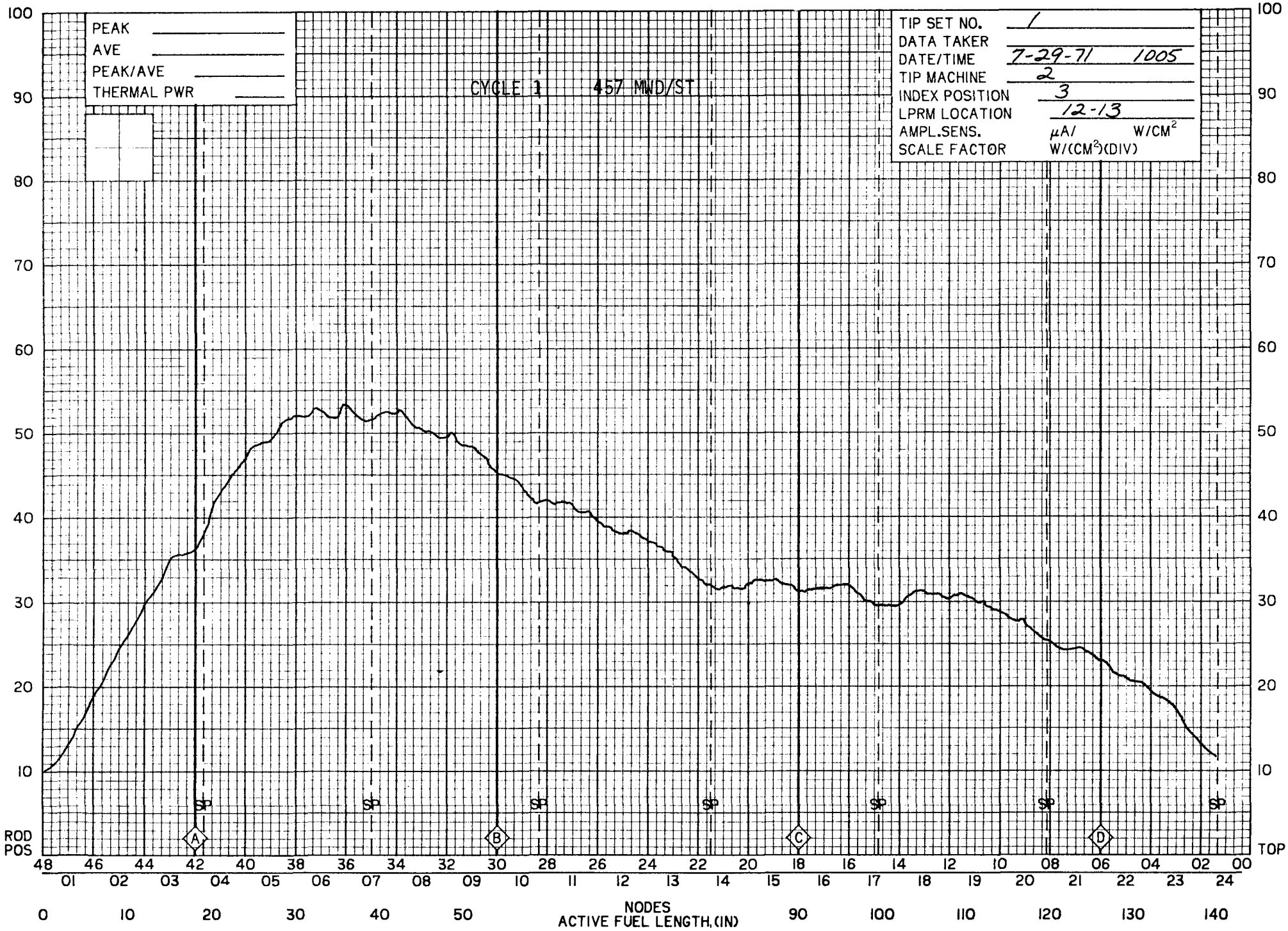

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1029
TIP MACHINE 1
INDEX POSITION 5
LPRM LOCATION 36-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH,(IN)

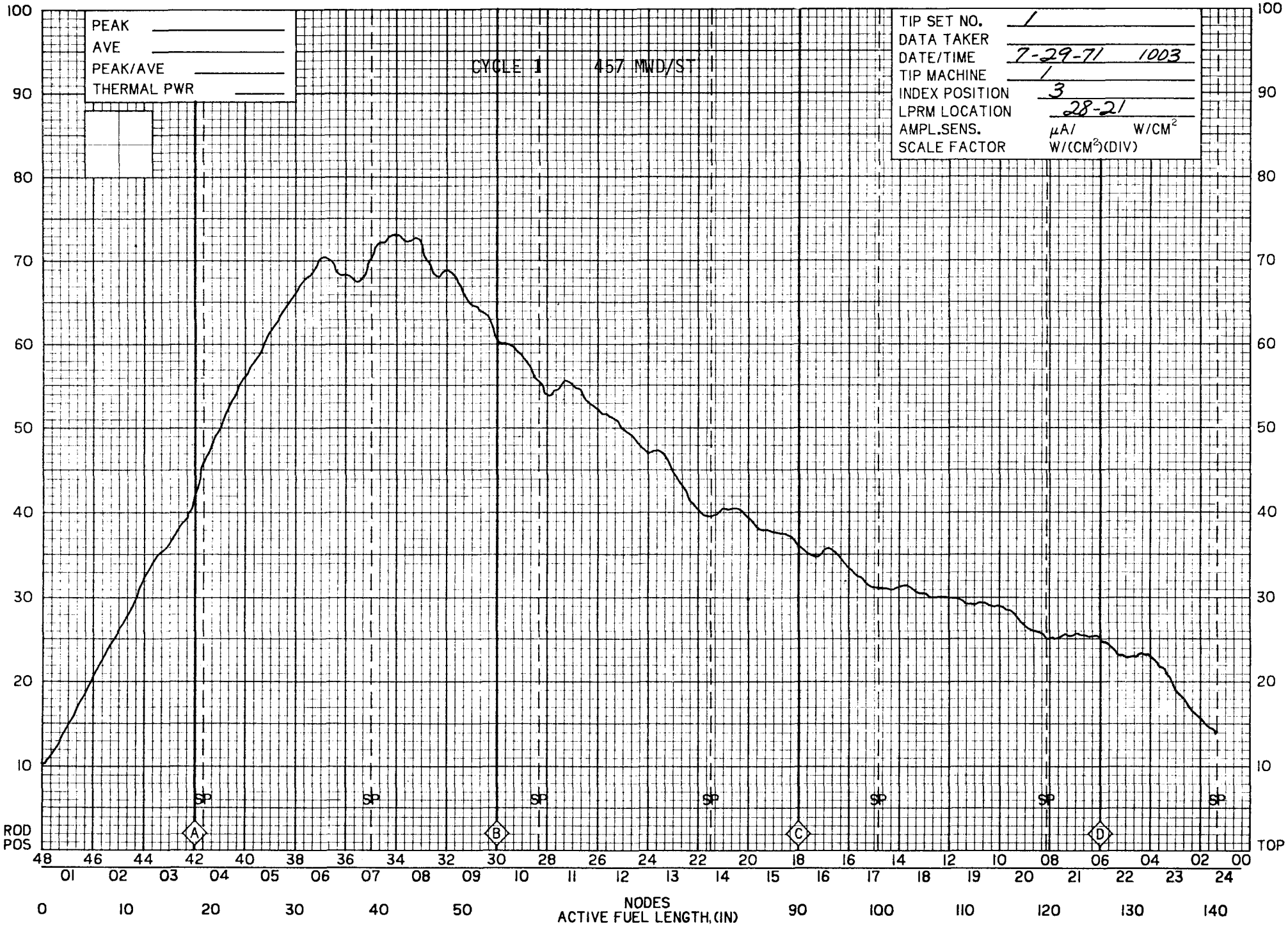

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1026
TIP MACHINE 3
INDEX POSITION 3
LPRM LOCATION 20-45
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)

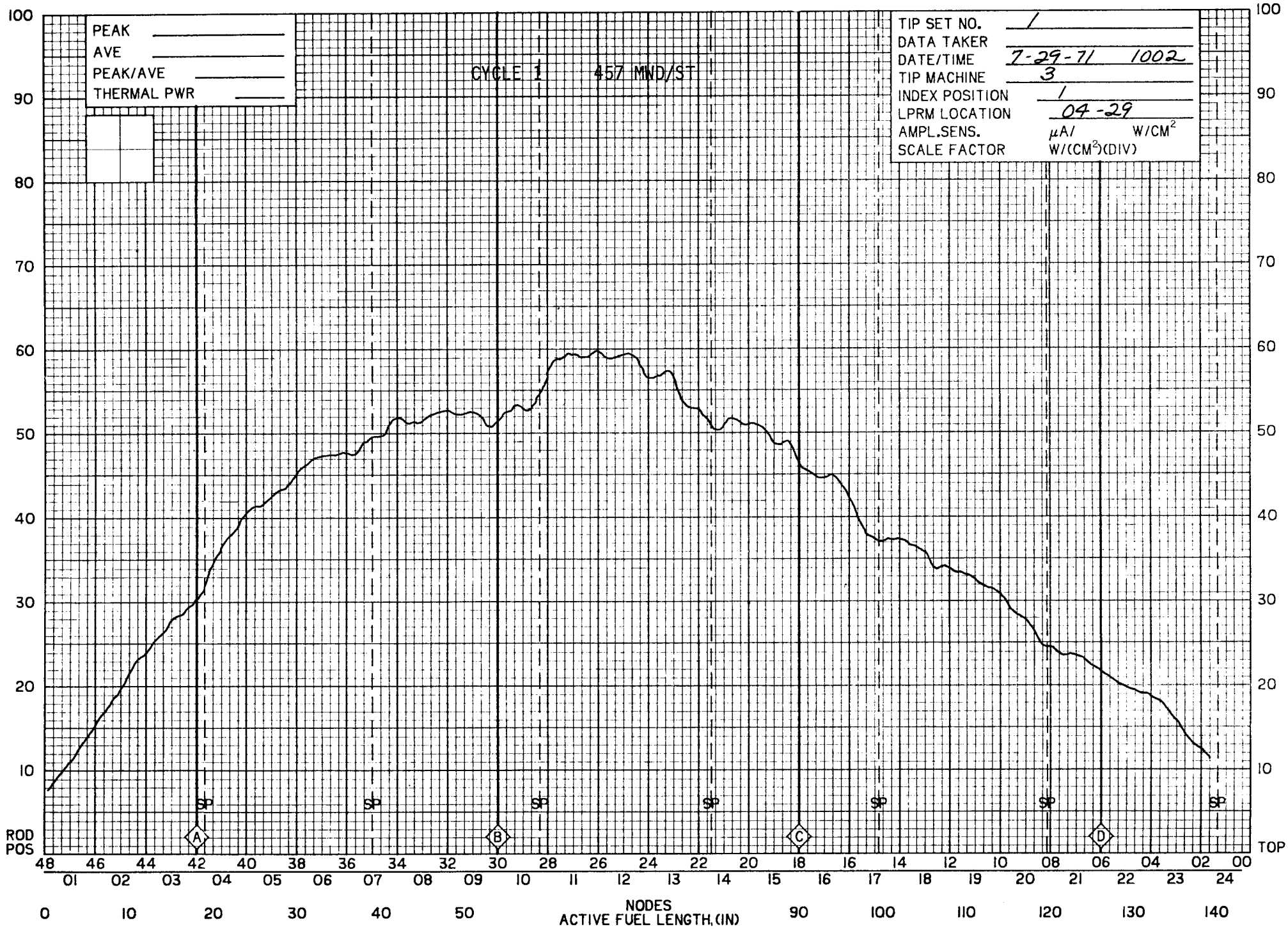

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1025
TIP MACHINE 2
INDEX POSITION 4
LPRM LOCATION 12-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)

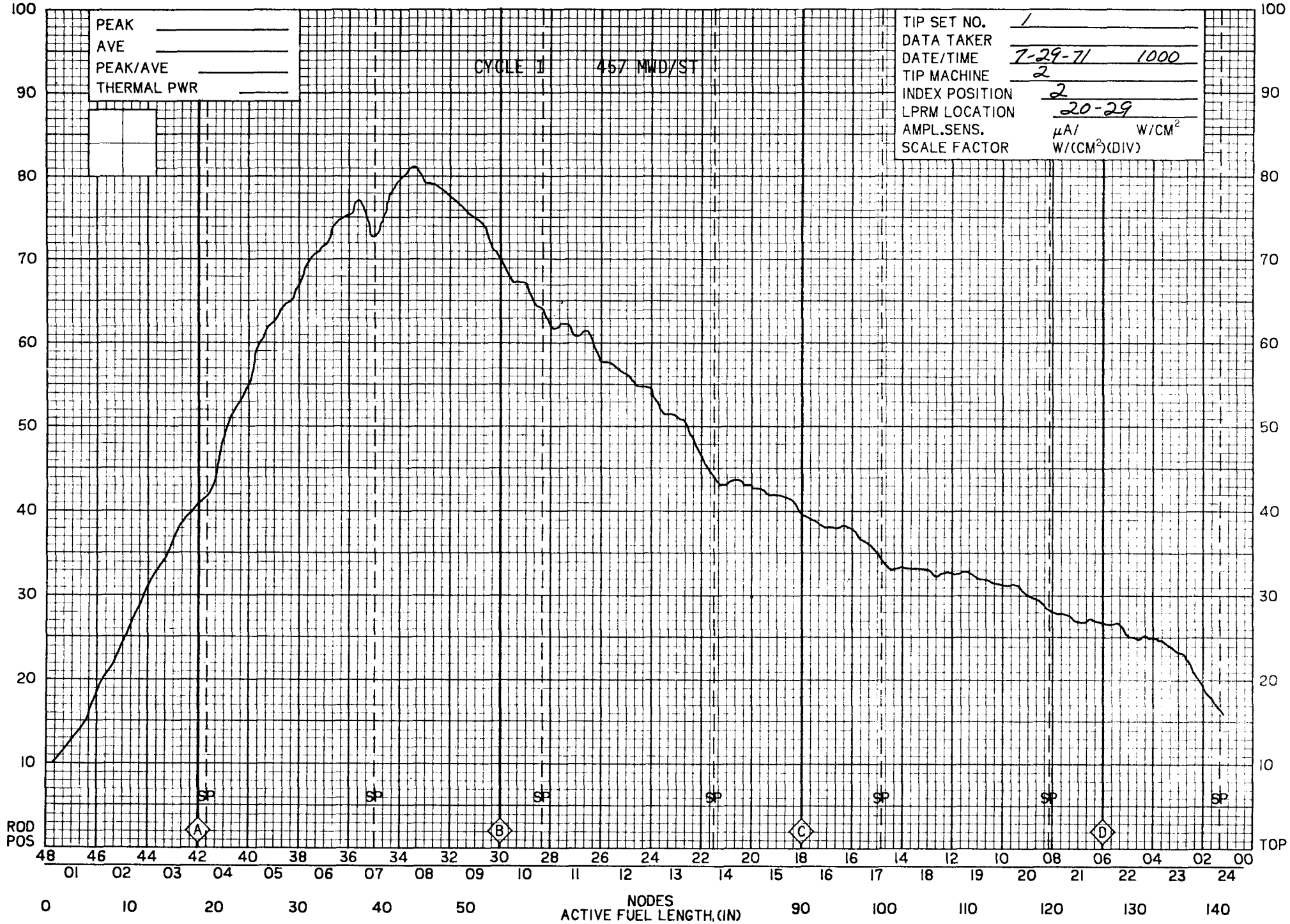

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1020
TIP MACHINE 1
INDEX POSITION 4
LPRM LOCATION 28-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)

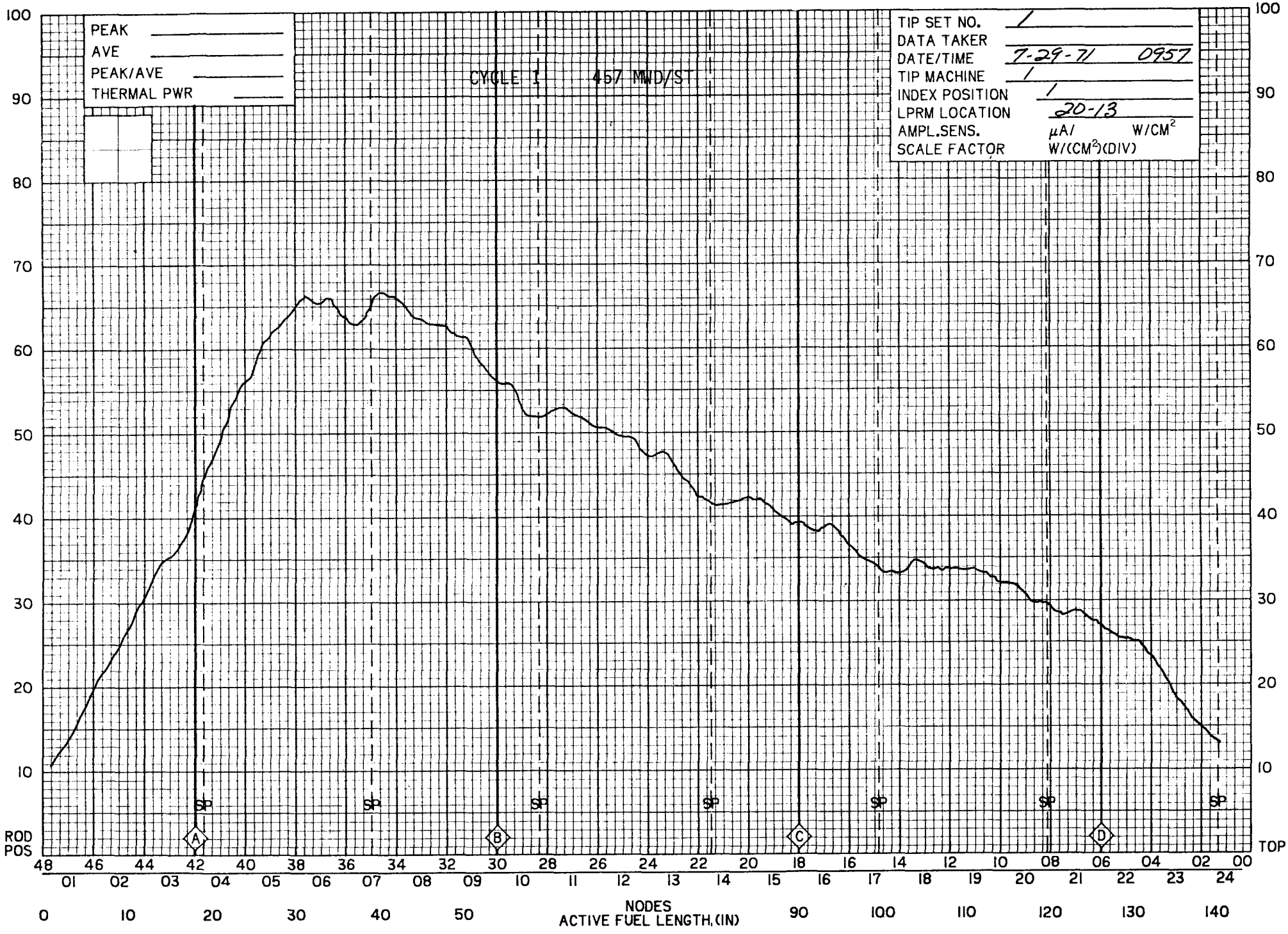

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1008
TIP MACHINE 3
INDEX POSITION 2
LPRM LOCATION 20-37
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)

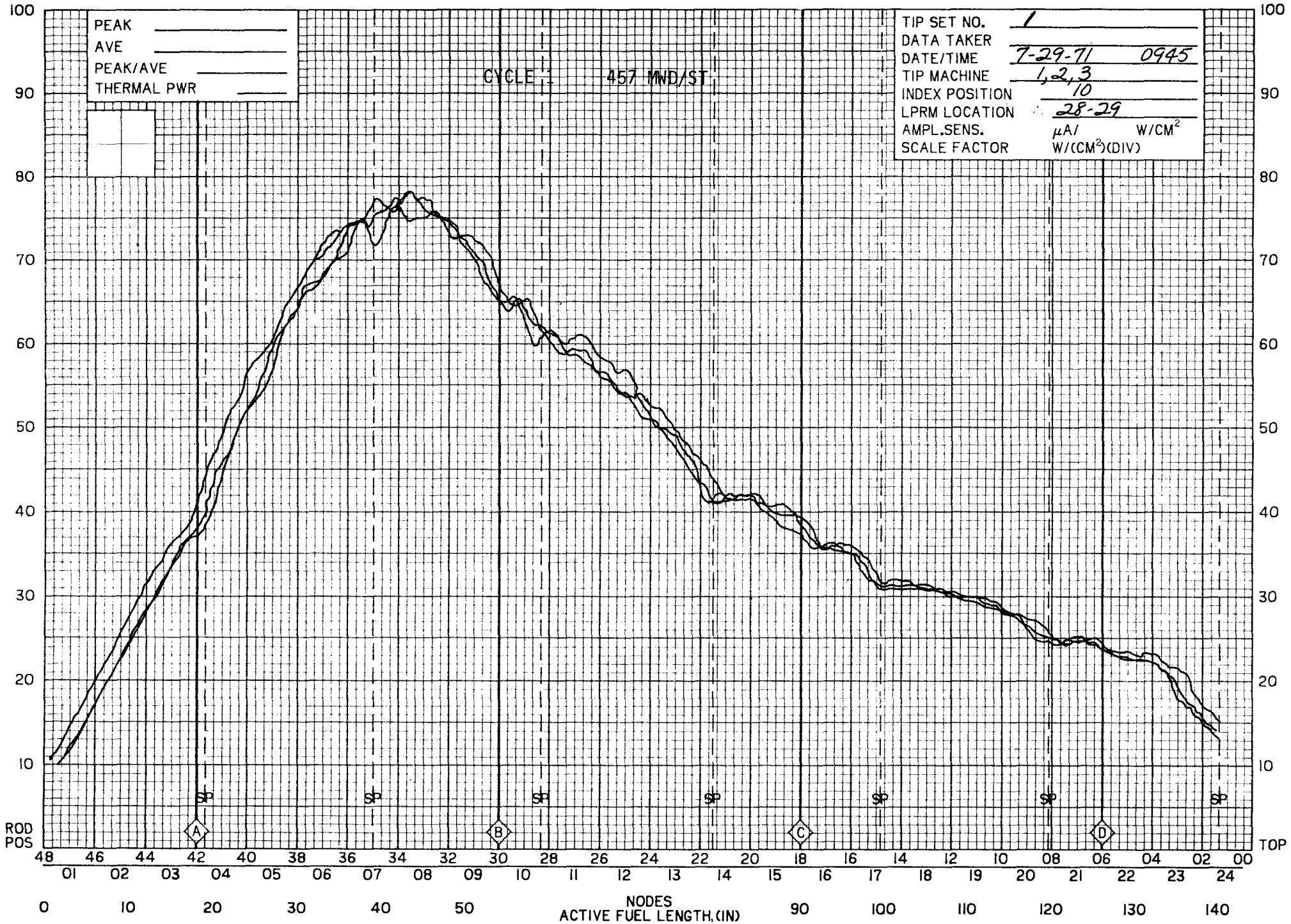

PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1005
TIP MACHINE 2
INDEX POSITION 3
LPRM LOCATION 12-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM³)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1003
TIP MACHINE 1
INDEX POSITION 3
LPRM LOCATION 28-21
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1002
TIP MACHINE 3
INDEX POSITION 1
LPRM LOCATION 04-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 1000
TIP MACHINE 2
INDEX POSITION 2
LPRM LOCATION 20-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
ROD POS
TOP
SP
A
B
C
D
NODES
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 0957
TIP MACHINE 1
INDEX POSITION 1
LPRM LOCATION 20-13
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 50 90 100 110 120 130 140
ACTIVE FUEL LENGTH, (IN)


PEAK
AVE
PEAK/AVE
THERMAL PWR
CYCLE 1 457 MWD/ST
TIP SET NO. 1
DATA TAKER
DATE/TIME 7-29-71 0945
TIP MACHINE 1,2,3
INDEX POSITION 10
LPRM LOCATION 28-29
AMPL.SENS. μA/ W/CM²
SCALE FACTOR W/(CM²)(DIV)
100
90
80
70
60
50
40
30
20
10
ROD POS
TOP
SP
A
B
C
D
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 90 100 110 120 130 140
NODES
ACTIVE FUEL LENGTH,(IN)

REACTOR: Monticello

CYCLE: 1

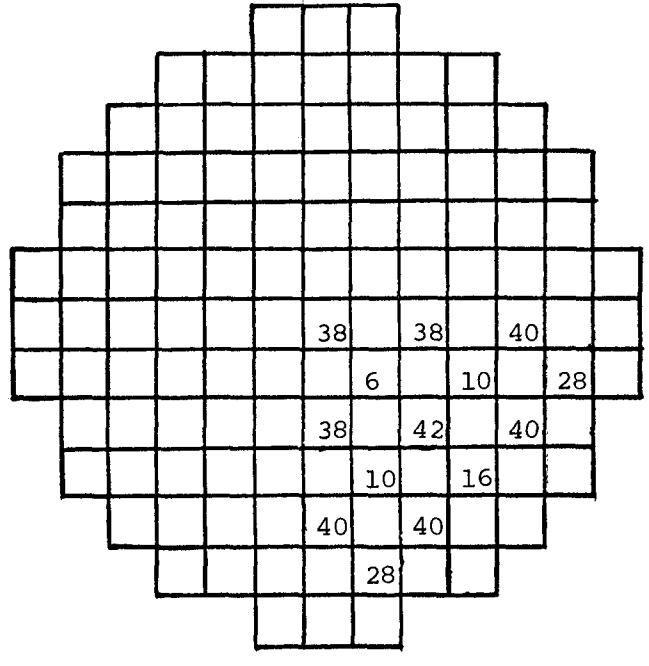
Exposure 457 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C - BWR STATEPOINTS

Sheet 3 of 9

Rev. 0 Date: 5-10-76



1/4 core symmetry

Verified By: E. Terry Date: 07/16/76

REACTOR: Monticello
CYCLE: 1
Exposure 457 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART C- BWR STATEPOINTS

Sheet 2 of 9
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
10. Inlet temperature to cleanup system (^{o}F)	515.	Idem	none
11. Outlet temperature to cleanup system (^{o}F)	450.	Idem	none
12. Machine normalized TIP data from process computer	not available		
13. Graphs of TIP traces from plotter if available		Idem	See attached set of TIP traces
14. Xenon history-past 48 hours Time (hrs)/Core power (%)		Idem	See attached power histogram
15. Control rod positions (by location)	See Sheet #3		1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

OD-3 Definition of Terms Continued

WCU	-	cleanup system flow, Mlb/hr
HCU1	-	cleanup system inlet enthalpy, Btu/lb
HCU2	-	cleanup system exit enthalpy, Btu/lb
TD	-	inlet temperature to recirculation loops, °F
REFCTP	-	reference CTP, MW
RATCTP	-	rated CTP, MW
PPW	-	recirculation pump motor powers, MW
CAP	-	APRM calibration constants, su^{-1}
REFRAP	-	reference APRM readings, su
WDC	-	jet pump driving flows, Mlb/hr
WTC	-	core flow corresponding to WDC values, Mlb/hr

OD-3 DEFINITION OF TERMS

GMWE	-	gross generator power, MWe
CTP	-	core thermal power, MW
WT	-	core flow, Mlb/hr
WTHB	-	core flow calculated by heat balance, Mlb/hr
WTSUB	-	calculated substitute core flow, Mlb/hr
WD	-	jet pump driving flow, Mlb/hr
WTFLAG	-	core flow calculation method flag
QA	-	core average heat flux, MBtu/hr-ft^2
PR	-	reactor dome pressure, psia
RWL	-	reactor water level, in.
DPM	-	core pressure drop (measured), psi
WFW	-	feedwater flow, Mlb/hr
HFW	-	feedwater enthalpy, Btu/lb
HD	-	inlet enthalpy to recirculation loops, Btu/lb
DHO	-	core inlet subcooling based on PR
CXE	-	core average exit quality
RAP	-	APRM readings, su (scanner units)
AGAF	-	APRM gain adjustment factors, frac.
IB	-	index number of APRM assigned to LPRM fast scan control function
RAPL	-	trip level readings of APRM assigned to LPRM fast scan control, if the APRM is unfailed
QFW	-	power transferred to feedwater flow, MW
QCR	-	power transferred to control rod system flow, MW
QCU	-	power loss in cleanup demineralizer, MW
QRAD	-	radiative power loss, MW
QPUMP	-	power added by recirculation pumps, MW
TFW	-	feedwater temperature, °F
HF	-	saturated water enthalpy, Btu/lb
HFG	-	steam vaporization enthalpy, Btu/lb
HG	-	saturated steam enthalpy, Btu/lb
HS	-	reactor exit steam enthalpy, Btu/lb
WCR	-	control rod feedwater flow, Mlb/hr
HCR	-	control rod feedwater enthalpy, Btu/lb

OD-3, CORE THERMAL POWER AND APRM CALIBRATION 07/29/71 0943 MONTICELLO

GMWE	CTP	WT	WTHB	WTSUB	WD	WTFLAG	QA	PR
519.15	1485.41	57.07	42.19	44.78	18.76	3.00	0.1166	1015.10

RWL	DPM	WFW	HFW	HD	DHO	CXE
34.05	15.85	5.96	345.20	517.34	27.12	0.1439

RAP	90.742	88.336	89.430	91.242	90.305	89.711
AGAF	1.024	1.052	1.039	1.018	1.029	1.035

IB 1

RAPL	-204.04	5.10	20.40	35.71	51.01	66.31
	81.62	91.82	102.02	112.22	127.52	204.04

FAILED SENSOR LIST.
2 4

QFW	QCR	QCU	QRAD	QPUMP	TFW
1477.359	9.294	1.472	0.600	3.298	370.766

HF	HFG	HG	HS	WCR	HCR
544.73	646.55	1191.27	1190.63	0.0260	-28.91

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.0811	478.82	416.87	524.53	1599.00	1670.00

PPW 1.7908 1.7556

CAP	0.00980	0.01007	0.00995	0.00975	0.00985	0.00991
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	2.50	7.60	12.50	16.70	20.70	24.60
WTC	17.80	23.00	31.70	40.30	49.00	57.60

RWNE D18.01.01

FUEL WARRANTY SERVICE
DATE FORM A - 2

DATE 7/29/71 H.B. NO. 16
TIME 0945 BY MV

OPERATING DATA

		QUANTITY	SYMBOL	PANEL	INSTR.	READINGS & UNITS	
*	1	GROSS GEN. OUTPUT	GMWE	CO8	W/GEN	519	MWE
*	2	AUX. PLANT LOAD	AMWE	COMP.	G-170	21.7	MWE
*	3	HP COND. VACUUM	HPCV	CO7	PR 1264	1.3	IN HG ABS
*	4	LP COND. VACUUM	LPCV	CO7	PR 1264	2.0	IN HG ABS
	5	REACTOR PRESSURE	PR	CO5	6-98	1000	PSIG
	6	ROD DRIVE FLOW	WRD	CO5	3-306	35	GPM
*	7	TOTAL CORE FLOW	Wc	CO5	FR-2-3-95	57.6	MLB/HR
	8	A RECIRC. PUMP PWR	QPA	CO4	2-184-24A	1.8	MW
	9	B RECIRC. PUMP PWR	QPB	CO4	2-184-24B	1.75	MW
	10	CLEANUP FLOW	WCU	CO4	12-141A&B	83	GPM
	11	CLEANUP INLET TEMP.	TCUI	CO4	POS. 1	515°	°F
	12	CLEANUP OUTLET TEMP.	TCUO	CO4	POS. 4	450	°F
	13	ROD DRIVE TEMP.	TRD	COMP	F-127	110	°F
	14	A FEEDWATER FLOW	WFWA	C18	6-79A(x)	(32.10 Ma)	2.981 MLB/HR
	15	B FEEDWATER FLOW	WFWB	C18	6-79B(x)	(32.64 Ma)	3.0108 MLB/HR
	16	A FEEDWATER TEMP.	TFWA	C18	6-79A(z)/TR1148	(49.79 Ma)	370 °F
	17	B FEEDWATER TEMP.	TFWB	C18	6-79B(z)/TR1148	(49.96 Ma)	371 °F

corrected to RTD meas

PHYSICAL PROPERTIES

	QUANTITY	SYMBOL	DATA USED	VALUE (BTU/LB)
18	SATURATED WATER ENTHALPY	h_{fs}	5	
19	SATURATED STEAM ENTHALPY	h_{gs}	5	1192.358
20	A FEEDWATER ENTHALPY	h_{FWA}	5, 16	344.27
21	B FEEDWATER ENTHALPY	h_{FWB}	5, 17	345.31
22	CLEANUP INLET ENTHALPY	h_{CUT}	5, 11	505.72
23	CLEANUP OUTLET ENTHALPY	h_{CUO}	5, 12	430.34
24	ROD DRIVE ENTHALPY	h_{RD}	5, 13	30.39

HEAT BALANCE CALCULATIONS

		QUANTITY	SYMBOL	EQUATION	VALUE	
	25	ROD DRIVE FLOW	W_{RD}	.000495 x 6	.02	MLB/HR
	26	TOTAL STEAM FLOW	W_S	14 + 15 + 25	6.01	MLB/HR
*	27	CORE INLET ENTHALPY	h_{IN}	See below		MLB/HR
	28	ENERGY OUT - STEAM	Q_S	26 + 19	7165.04	MBTU/HR
	29	ENERGY OUT - CLEANUP	Q_{CU}	.000495 x 10 (22 - 23)	3.10	MBTU/HR
	30	ENERGY OUT - FIX. LOSS	Q_{FL}	2.4	2.4	MBTU/HR
	31	NET ENERGY OUT	Q_{OUT}	28 + 29 ÷ 30	7170.54	MBTU/HR
	32	ENERGY IN - FEEDWATER	Q_{FW}	14 x 20 + 15 x 21	2085.93	MBTU/HR
	33	ENERGY IN - ROD DRIVES	Q_{RD}	25 x 24	1.39	MBTU/HR
	34	ENERGY IN - RECIRC PUMPS	Q_P	3.413 x (8 + 9)	12.12	MBTU/HR
	35	NET ENERGY IN	Q_{IN}	32 + 33 + 34	2079.44	MBTU/HR
	36	CORE THERMAL POWER	Q_{CORE}	31 - 35	5091.10	MBTU/HR
	37	CORE THERMAL POWER	P_{CORE}	36 / 3.413	1491.63	MWT
	38	CORE THERMAL POWER	%P	37 / 1670	89.32	% OF RATED
*	39	HEAT RATE	HR	36 x 10^3 (1 - 2)	10,240	BTU/KW-HR

$$h_{IN} = \frac{(7 - 25 - 14 - 15)\,18 + 14\,20 + 15\,21}{7}$$

APRM	READING
1	91
2	88
3	89
4	91
5	90
6	90

* NOT REQUIRED FOR BASIC HEAT BALANCE CALCULATION.

COMMENTS:
PRIOR to TIP set #1

REACTOR: Monticello

CYCLE: 1

Exposure 457 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART C- BWR STATEPOINTS

Sheet 1 of 9

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Statepoints Conditions at exposure listed above			
1. Core power (MWt)	1492.	HB #16 7/29/71	HB #16 and OD-3 for 7/29/71 attached.
2. System pressure (psig)	1000.	Idem	Calculated core pressure = 1032.7 psia
3. Recirculation flow (lbs/hr)	57.6×10^6	Idem	none
4. Recirculation flow temperature (oF)			not required
5. Feedwater flow (lbs/hr)	5.96×10^6	Idem	none
6. Feedwater flow temperature (^oF)	370.5	Idem	none
7. Time at associated power level (hr)	18.0	Idem	none
8. Inlet subcooling (BTU/lb)	29.82	Idem	27.12 from OD-3 corrected for core pressure
9. Cleanup system flow (gal/min)	83.	Idem	none

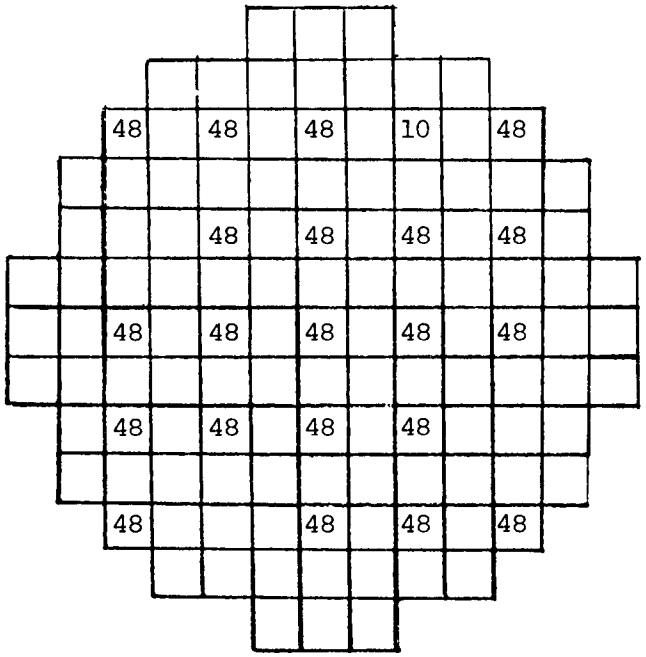
Verified By: E Tous Date: 07/16/76

REACTOR: Monticello
CYCLE: 1
Exposure: 1760 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART B - BWR COLD CRITICAL DATA

Sheet 2 of 2
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data 1. Moderator temperature (°F)	156.	Monticello form 2159	none
2. Xenon condition	No xenon	idem	none
3. Control rod positions (by location)		idem	none



Rod Position in Notches

- 48 indicates a rod completely withdrawn
- all rods whose position is not indicated are fully inserted

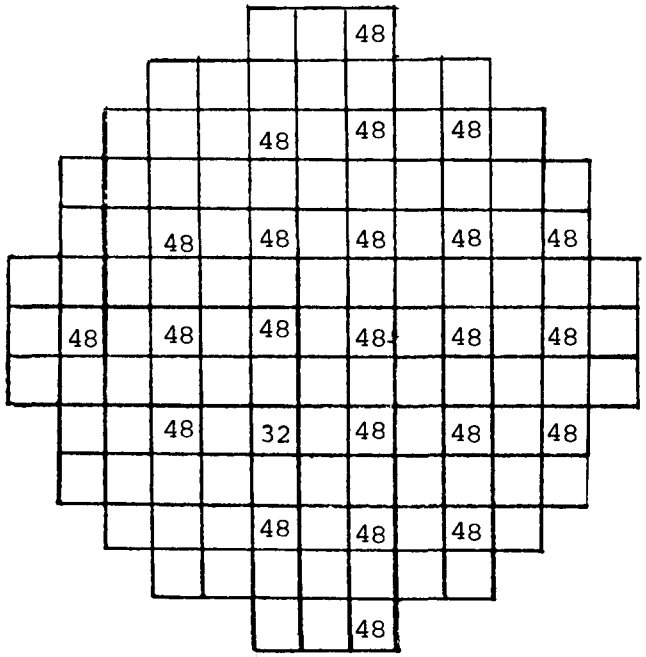
Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello
CYCLE: 1
Exposure: 1760 MWD/STU

TABLE 1.4 BWR OPERATING DATA
PART B - BWR COLD CRITICAL DATA

Sheet 1 of 2
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR Critical Data 1. Moderator temperature (°F)	156°	Monticello form 2159	none
2. Xenon condition	No xenon	idem	none
3. Control rod positions (by location)		idem	none



Rod Position in Notches

- 48 indicates a rod completely withdrawn
- all rods whose position is not indicated are fully inserted

Verified By: E. Tow Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 6927 MWD/STU to 7130 MWD/STU

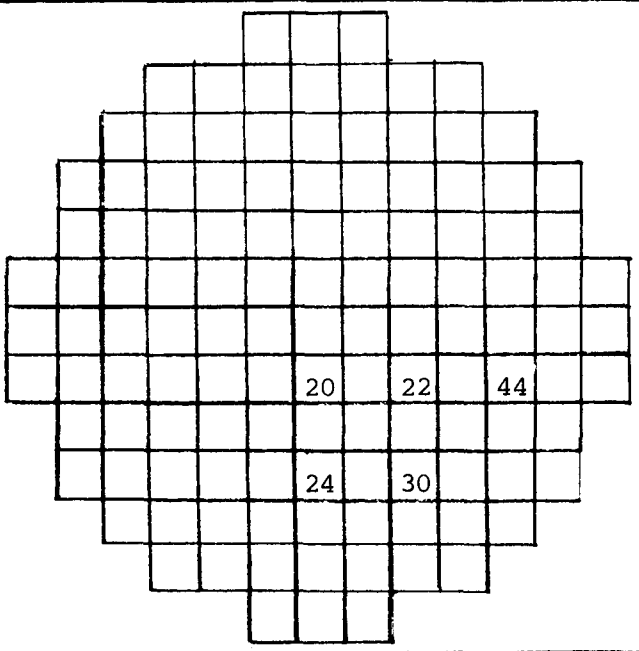
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 28 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1667.9	HB #241 2/23/73	HB #241 is at 7020 MWD/STU
2. Core total flow (lbs/hr)	57.5×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.2	Idem	21.5 from HB #241 corrected for Core Pressure
4. System pressure (psig)	1007.	Idem	Calculated Core Pressure = 1039.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 6708 MWD/STU to 6927 MWD/STU

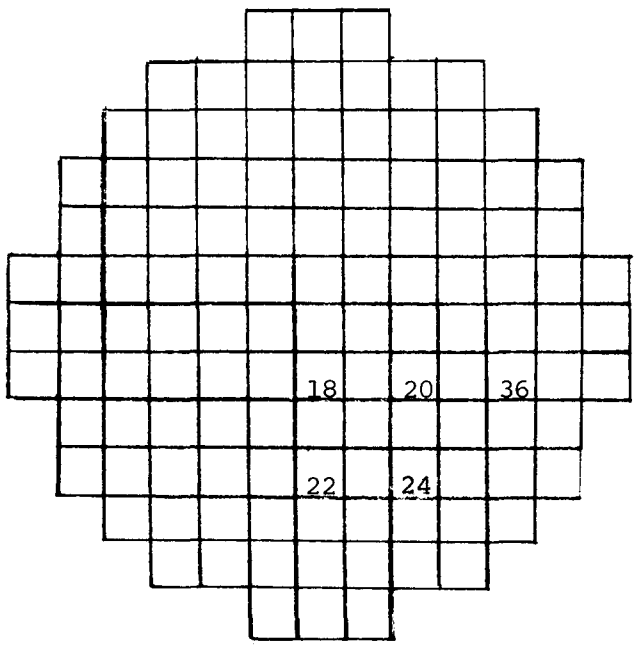
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 27 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1664.3	HB #235 2/9/73	HB #235 is at 6801 MWD/STU
2. Core total flow (lbs/hr)	57.5×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.2	Idem	21.5 from HB #235 corrected for Core Pressure
4. System pressure (psig)	1006.	Idem	Calculated Core Pressure = 1038.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Terry Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 6488 MWD/STU to 6708 MWD/STU

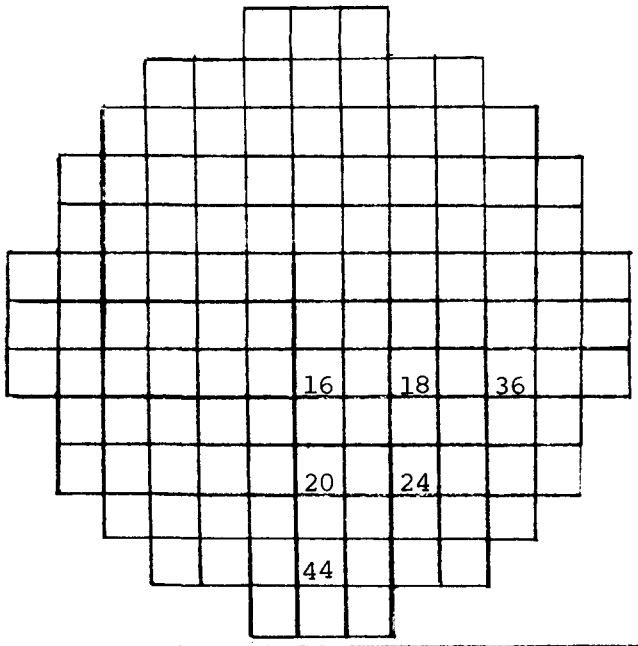
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 26 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1675.0	HB #229 1/26/73	HB #229 is at 6582 MWD/STU
2. Core total flow (lbs/hr)	57.4×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.8	Idem	23.1 from HB #229 corrected for Core Pressure
4. System pressure (psig)	1008.	Idem	Calculated Core Pressure = 1040.6 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 6268 MWD/STU to 6488 MWD/STU

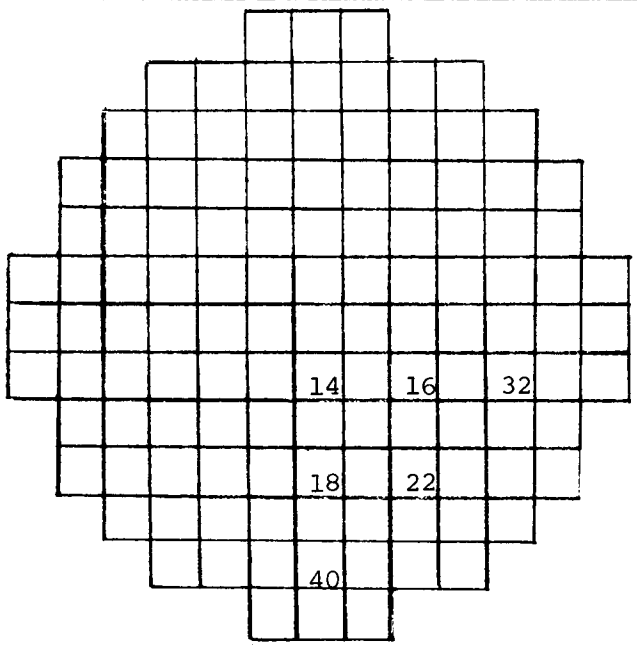
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 25 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1664.0	HB #223 1/12/73	HB #223 is at 6362 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.5	Idem	22.8 from HB #223 corrected for Core Pressure
4. System pressure (psig)	1005.	Idem	Calculated Core Pressure = 1037.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Torok Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 6024 MWD/STU to 6268 MWD/STU

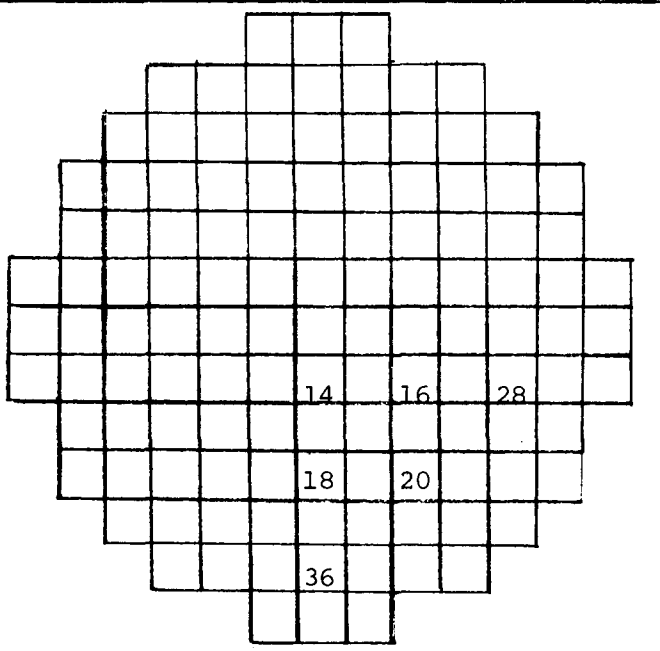
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 24 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1662.1	HB #220 1/5/73	HB #220 is at 6252 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.6	Idem	22.9 from HB #220 corrected for Core Pressure
4. System pressure (psig)	1007.	Idem	Calculated Core Pressure = 1039.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Terry Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 5756 MWD/STU to 6024 MWD/STU

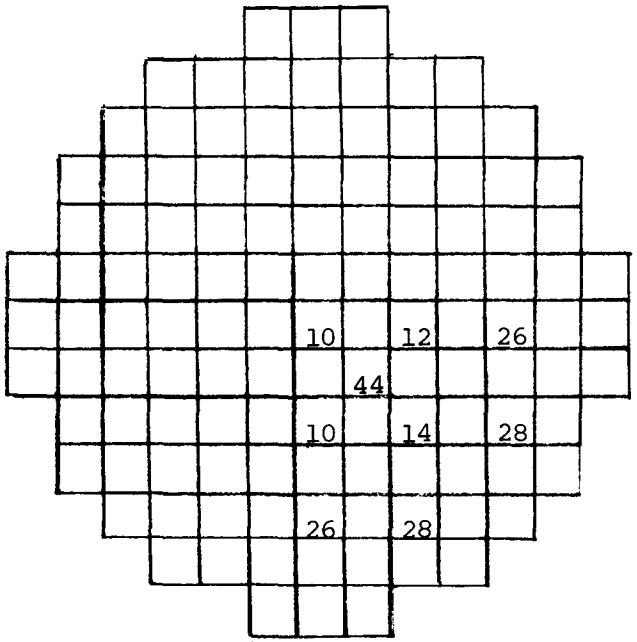
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 23 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1665.76	HB #208 12/8/72	HB #208 is at 5881 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.87	Idem	23.17 from HB #208 corrected for Core Pressure
4. System pressure (psig)	1005.	Idem	Calculated Core Pressure = 1037.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 5500 MWD/STU to 5756 MWD/STU

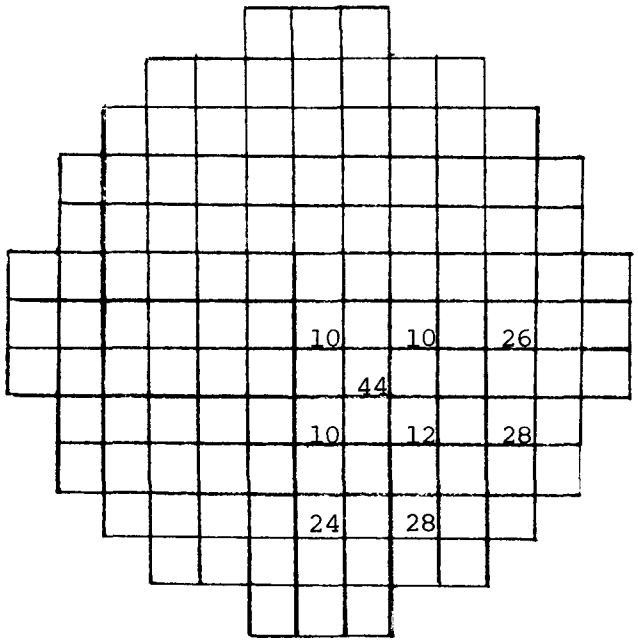
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 22 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1655.3	HB #202 11/22/72	HB #202 is at 5634 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.3	Idem	21.6 from HB #202 corrected for Core Pressure
4. System pressure (psig)	1001.	Idem	Calculated Core Pressure = 1033.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tood Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 5289 MWD/STU to 5500 MWD/STU

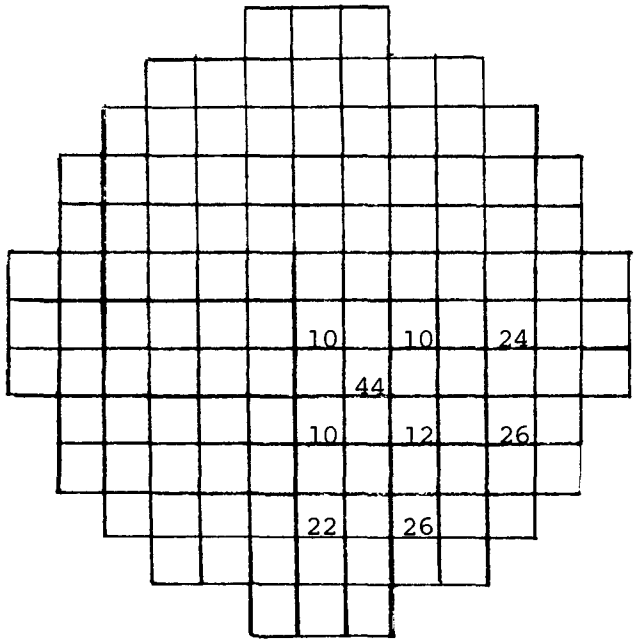
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 21 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1663.2	HB #197 11/10/72	HB #197 is at 5447 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.7	Idem	23.0 from HB #197 corrected for Core Pressure
4. System pressure (psig)	1001.	Idem	Calculated Core Pressure = 1033.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Torok Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 5000 MWD/STU to 5289 MWD/STU

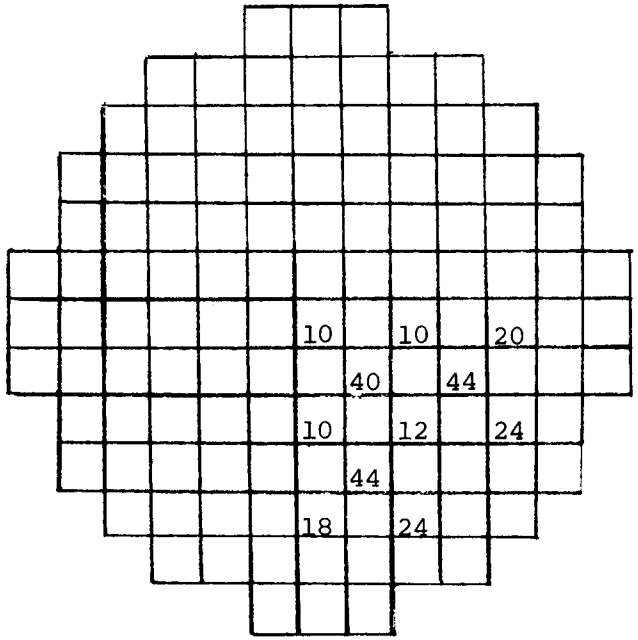
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 20 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core Power (MWt)	1666.3	HB #185 10/13/72	HB #185 is at 5055 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.8	Idem	23.1 from HB #185 corrected for Core Pressure
4. System pressure (psig)	1007.	Idem	Calculated Core Pressure = 1039.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 4744 MWD/STU to 5000 MWD/STU

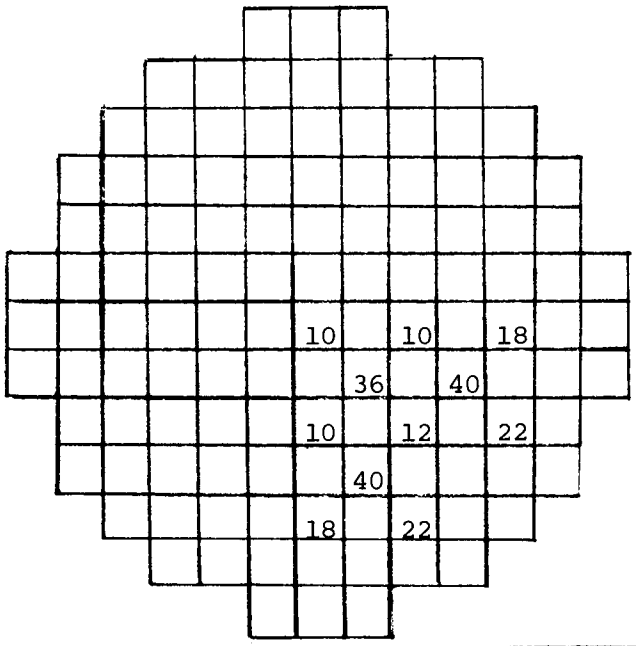
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 19 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1670.	HB #179 9/29/72	HB #179 is at 4835 MWD/STU
2. Core total flow (lbs/hr)	57.5×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.9	Idem	23.2 from HB #179 corrected for Core Pressure
4. System pressure (psig)	1011.	Idem	Calculated Core Pressure = 1043.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [signature] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 4394 MWD/STU to 4744 MWD/STU

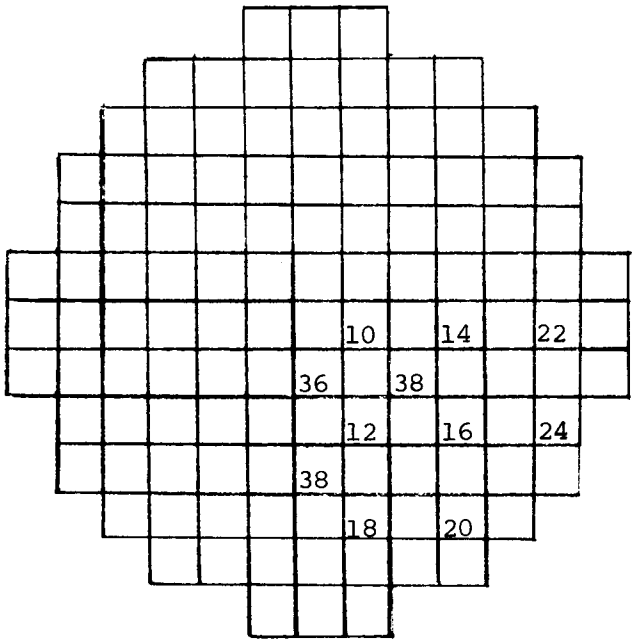
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 18 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1666.7	HB #170 9/15/72	HB #170 is at 4628 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.7	Idem	23.0 from HB #170 corrected for Core Pressure
4. System pressure (psig)	1003.	Idem	Calculated Core Pressure = 1035.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 4200 MWD/STU to 4394 MWD/STU

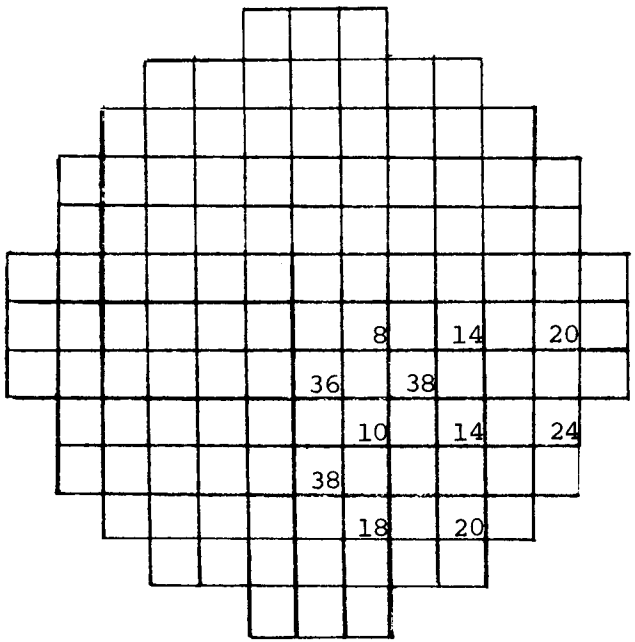
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 17 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1668.5	HB #162 8/25/72	HB #162 is at 4305 MWD/STU
2. Core total flow (lbs/hr)	57.5×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.8	Idem	23.1 from HB #162 corrected for Core Pressure
4. System pressure (psig)	1008.	Idem	Calculated Core Pressure = 1040.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Torok Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 3943 MWD/STU to 4200 MWD/STU

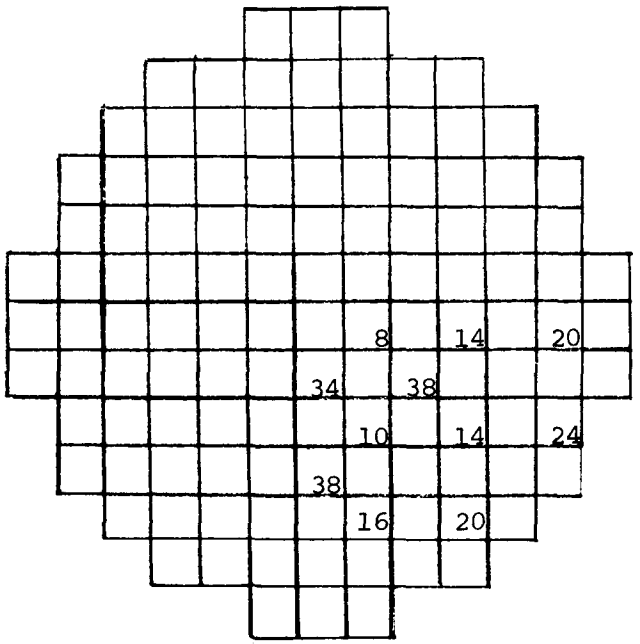
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 16 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1664.5	HB #156 8/11/72	HB #156 is at 4091 MWD/STU
2. Core total flow (lbs/hr)	56.9×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.0	Idem	23.3 from HB # 156 corrected for Core Pressure
4. System pressure (psig)	1008.	Idem	Calculated Core Pressure = 1040.4 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 3738 MWD/STU to 3943 MWD/STU

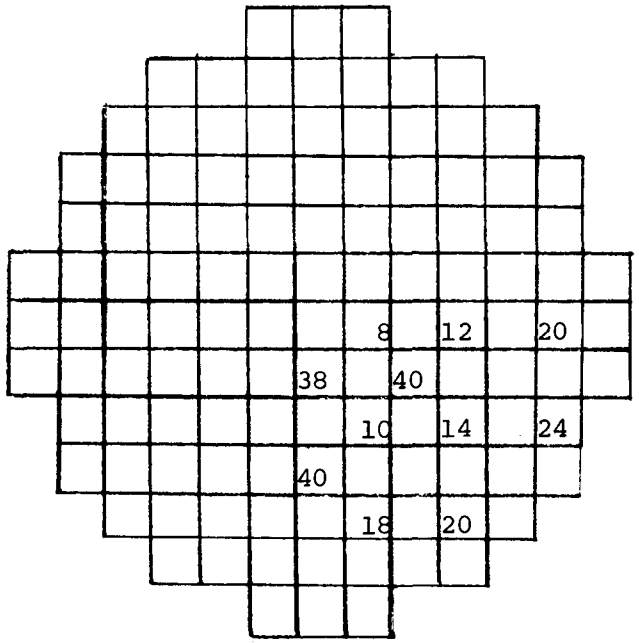
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 15 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1670.0	HB #151 7/21/72	HB #151 is at 3943 MWD/STU
2. Core total flow (lbs/hr)	56.3×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.2	Idem	23.6 from HB #151 corrected for Core Pressure
4. System pressure (psig)	1009.	Idem	Calculated Core Pressure = 1041.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tong Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 3500 MWD/STU to 3738 MWD/STU

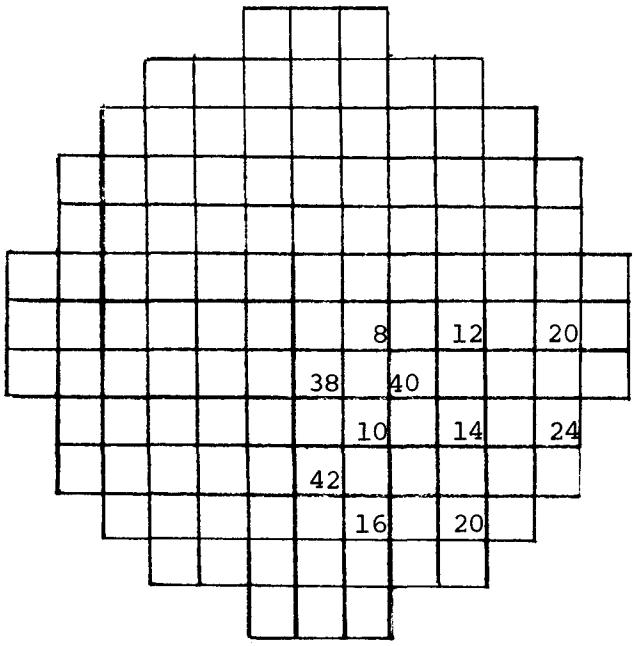
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 14 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1670.	HB #140 6/23/72	HB #140 is at 3627 MWD/STU
2. Core total flow (lbs/hr)	56.4×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.1	Idem	23.5 from HB #140 corrected for Core Pressure
4. System pressure (psig)	1000.	Idem	Calculated Core Pressure = 1032.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 3285 MWD/STU to 3500 MWD/STU

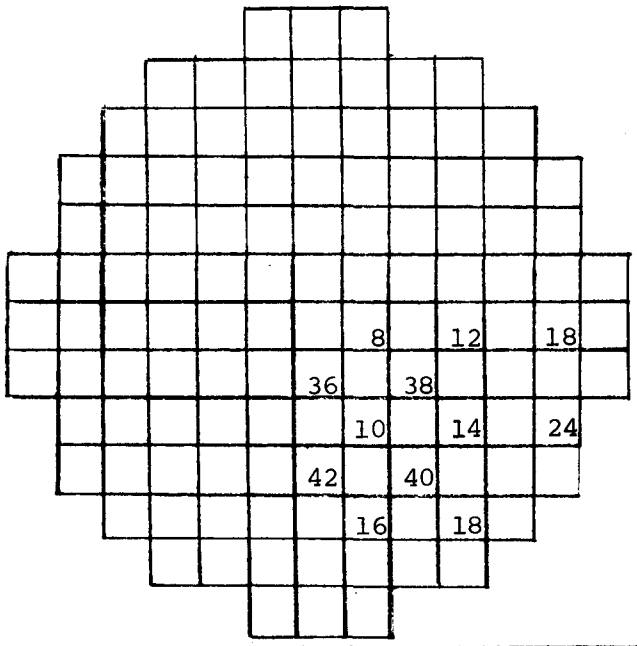
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 13 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1675.5	HB #134 6/9/72	HB #134 is at 3404 MWD/STU
2. Core total flow (lbs/hr)	56.3×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.2	Idem	23.6 from HB #134 corrected for Core Pressure
4. System pressure (psig)	1002.	Idem	Calculated Core Pressure = 1034.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Jones Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

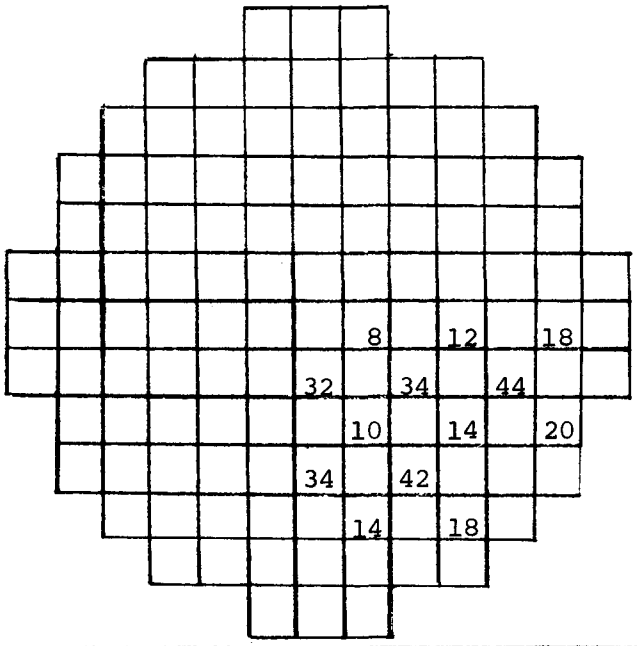
Exposure: 3038 MWD/STU to 3285 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1664.8	HB #129 5/26/72	HB #129 is at 3204 MWD/STU
2. Core total flow (lbs/hr)	56.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.0	Idem	23.4 from HB #129 corrected for Core Pressure
4. System pressure (psig)	1008.	Idem	Calculated Core Pressure = 1040.3 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tero Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 2853 MWD/STU to 3038 MWD/STU

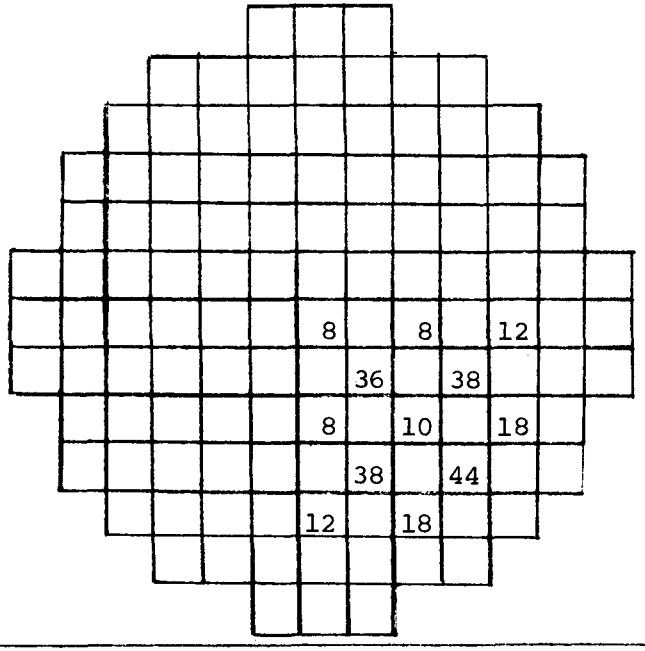
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 11 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1665.7	HB #117 4/28/72	HB #117 is at 2824 MWD/STU
2. Core total flow (lbs/hr)	56.3×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.1	Idem	23.5 from HB #117 corrected for Core Pressure
4. System pressure (psig)	1003.	Idem	Calculated Core Pressure = 1035.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: [illegible] Date: 07/16/76

REACTOR: Monticello

CYCLE: 1

Exposure: 2526 MWD/STU to 2853 MWD/STU

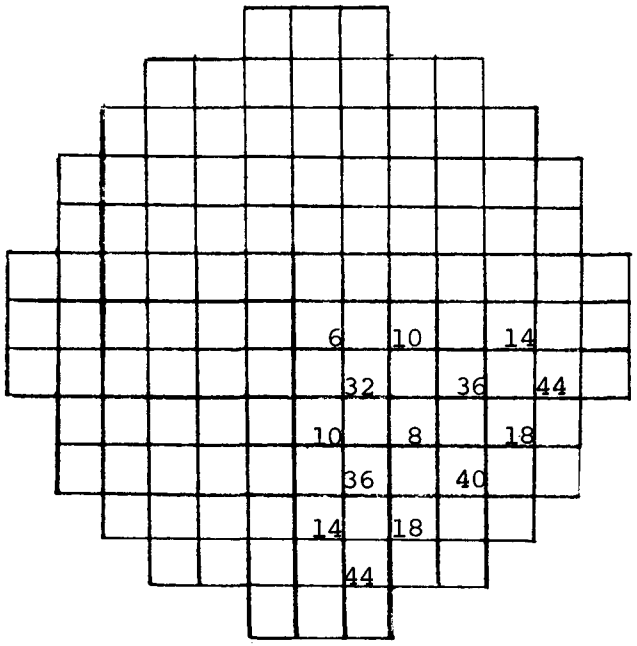
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 10 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR HISTORY average value over time interval		Core Heat Balance	
1. Core power (MWt)	1670.	HB #109 4/14/72	HB # 109 is at 2610 MWD/STU
2. Core total flow (lbs/hr)	56.2×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.1	Idem	23.5 from HB # 109 corrected for Core Pressure
4. System pressure (psig)	1005.	Idem	Calculated Core Pressure = 1037.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Torb Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

Exposure: 2300 MWD/STU to 2526 MWD/STU

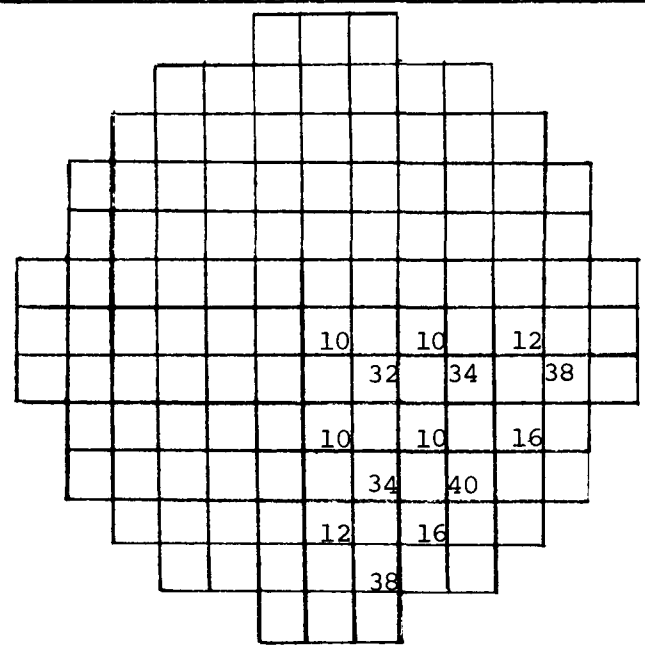
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 9 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1647.0	HB #100 3/24/72	HB #100 is at 2310 MWD/STU
2. Core total flow (lbs/hr)	56.5×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	25.7	Idem	23.1 from HB #100 corrected for Core Pressure
4. System pressure (psig)	1000.	Idem	Calculated Core Pressure = 1032.3 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tock Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

Exposure: 2003 MWD/STU to 2300 MWD/STU

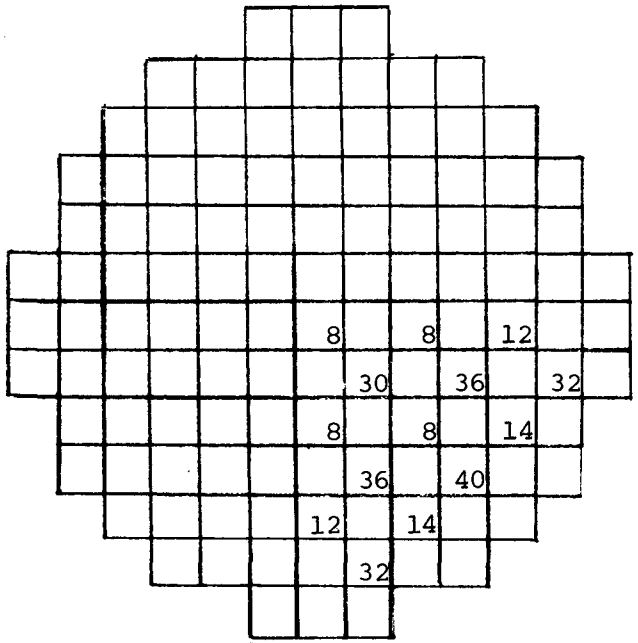
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 8 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1527.8	HB #93 3/10/72	HB #93 is at 2123 MWD/STU
2. Core total flow (lbs/hr)	57.3×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.2	Idem	21.5 from HB #93 corrected for Core Pressure
4. System pressure (psig)	993.	Idem	Calculated Core Pressure = 1025.6 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Ford Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

Exposure: 1760 MWD/STU to 2003 MWD/STU

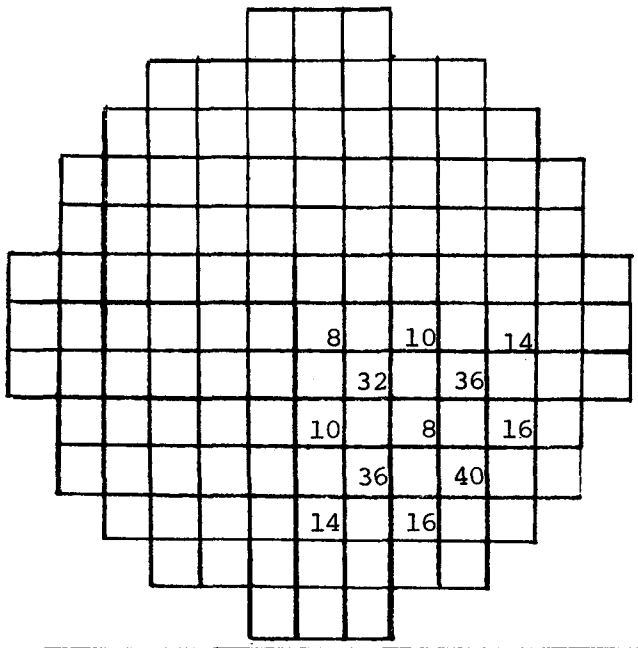
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 7 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1655.5	HB #85 2/25/72	HB #85 is at 1976 MWD/STU
2. Core total flow (lbs/hr)	56.3×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	26.8	Idem	24.2 from HB #85 Corrected for Core Pressure
4. System pressure (psig)	1009.	Idem	Calculated Core Pressure = 1041.2 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Torres Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

Exposure: 1450 MWD/STU to 1760 MWD/STU

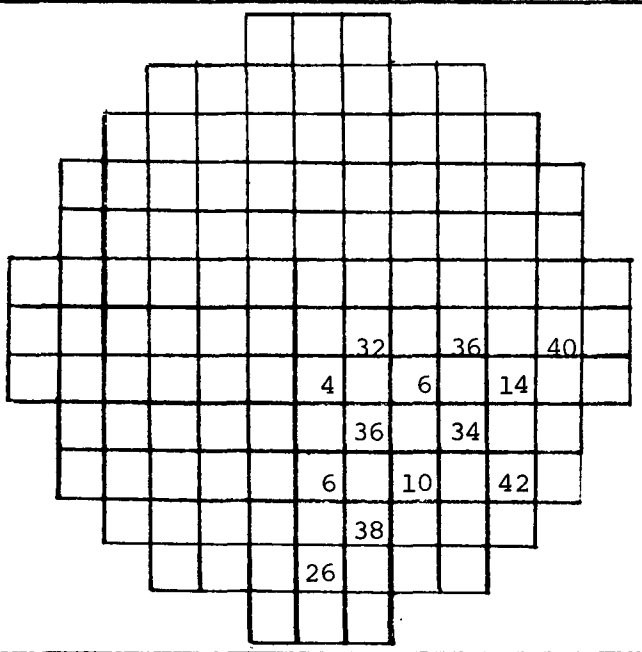
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 6 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1527.5	HB #65 11/5/71	HB #65 is at 1669 MWD/STU
2. Core total flow (lbs/hr)	49.2×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	27.2	Idem	25.0 from HB #65 Corrected for Core Pressure
4. System pressure (psig)	992.	Idem	Calculated Core Pressure = 1021.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Ford Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

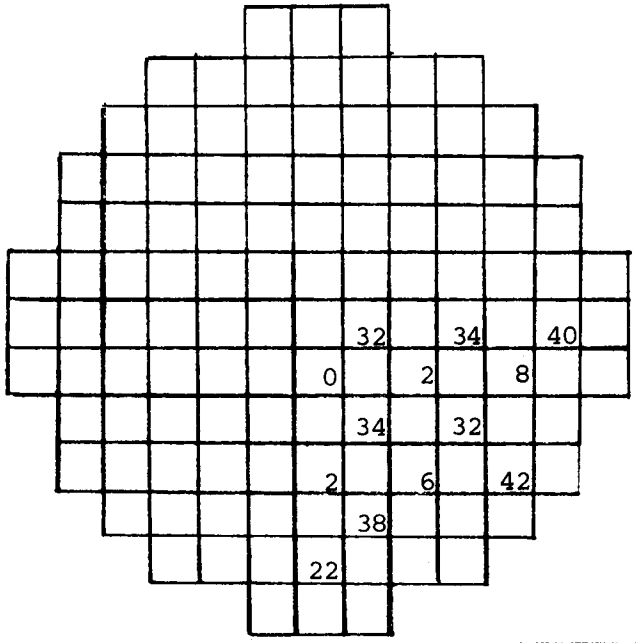
Exposure: 1153 MWD/STU to 1450 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1499.6	HB #56 10/15/71	HB #56 is at 1362 MWD/STU
2. Core total flow (lbs/hr)	57.67×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.48	Idem	19.78 from HB #56 Corrected for Core Pressure
4. System pressure (psig)	981.	Idem	Calculated Core Pressure = 1013.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tang Date: 07/15/76

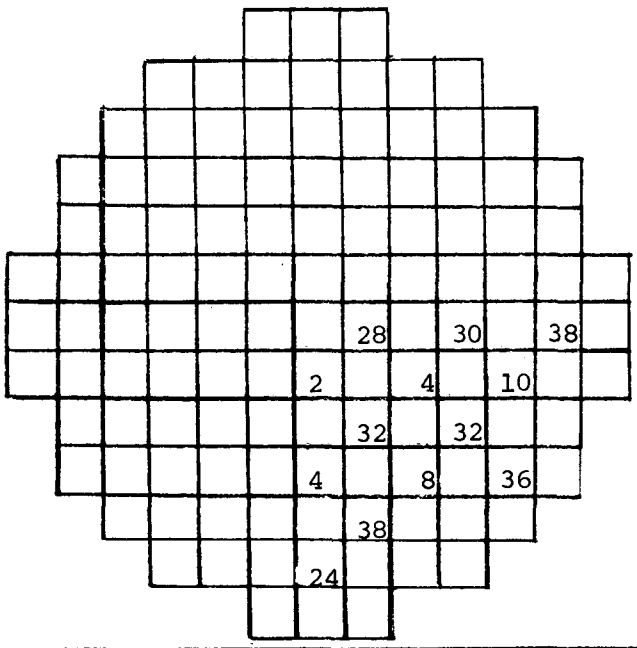
REACTOR: Monticello
CYCLE: 1
Exposure: 925 MWD/STU to 1153 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 4 of 28
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1465.1	HB #44 9/17/71	HB #44 at 1014 MWD/STU
2. Core total flow (lbs/hr)	57.7×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.4	Idem	20.6 from HB #44 Corrected for Core Pressure
4. System pressure (psig)	991.	Idem	Calculated Core Pressure = 1023.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Tow Date: 07/15/76

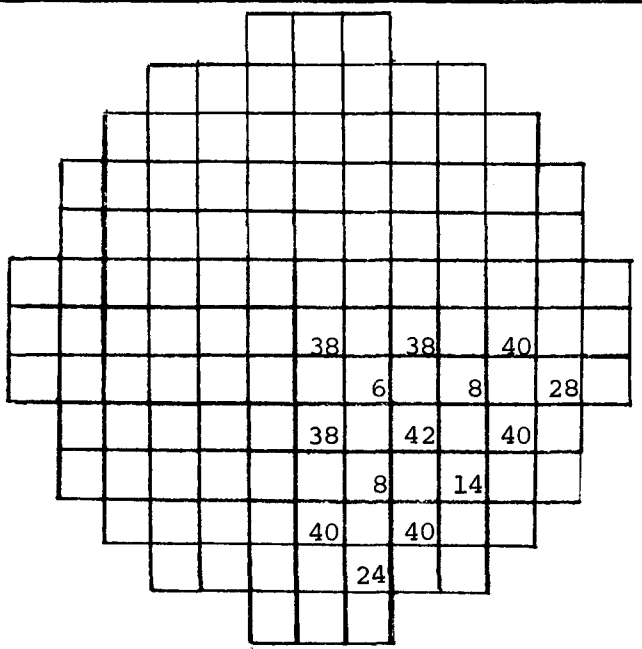
REACTOR: Monticello
CYCLE: 1
Exposure: 530 MWD/STU to 925 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1489.9	HB #32 8/20/71	HB #32 is at 790 MWD/STU
2. Core total flow (lbs/hr)	57.8×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	23.7	Idem	21.0 from HB #32 Corrected for Core Pressure
4. System pressure (psig)	994.	Idem	Calculated Core Pressure = 1026.8 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E. Jones Date: 07/15/76

REACTOR: Monticello

CYCLE: 1

Exposure: 275 MWD/STU to 530 MWD/STU

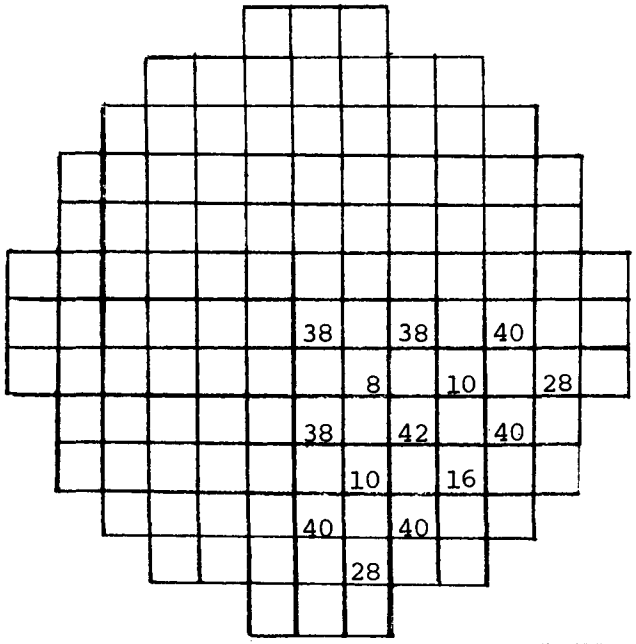
TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 2 of 28

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core power (MWt)	1491.2	HB #12 7/13/71	HB #12 is at 383 MWD/STU
2. Core total flow (lbs/hr)	57.6×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	24.1	Idem	21.4 from HB #12 Corrected for Core Pressure
4. System pressure (psig)	992.	Idem	Calculated Core Pressure 1024.7 psia



5. Control rod positions (by location)

1/4 core symmetry

Verified By: E Tew Date: 07/15/76

MONTICELLO DATA COLLECTION

The subcooling from the heat balance or OD3 is based on saturated water enthalpy at dome pressure.

The subcooling for EPRI-NODE or EPRI-THERM should be based on saturated water enthalpy at core pressure.

The following correction of inlet subcooling was made:

Calculation of Core Pressure

$$PCORE = PDOME + A - B + C\left(\frac{W^2}{W_B^2}\right) - D\left(\frac{W^2}{W_B^2}\right)$$

where: PCORE = core pressure
PDOME = dome pressure
A = static head to core inlet
B = static head from inlet to core mid-plane
C = Pumphead
D = Core pressure drop to core mid-plane
W = Core flow
W_B = 100% core flow

$$PCORE = PDOME + 8.5 - 1.5 + 24\left(\frac{W^2}{W_B^2}\right) - 13\left(\frac{W^2}{W_B^2}\right)$$

$$PCORE = PDOME + 7 + 11\left(\frac{W^2}{W_B^2}\right) \quad ; \quad PDOME = 1000 + 14.7 = 1014.7 \text{ psia}$$

$$PCORE = 1014.7 + 7 + 11\left[\frac{(57)^2}{(57.6)^2}\right] = 1032.47 \text{ psia}$$

Calculation of Subcooling at core pressure

H_{1032} = HF @ 1032.47 psia = 547.47 Btu/lb.

H_{1015} = HF @ 1014.7 psia = 544.81 Btu/lb.

ΔH_{sc} = subcooling from the heat balance = 20 Btu/lb.

$$\text{Subcooling} = \Delta H_{sc} + H_{1032} - H_{1015}$$

$$= 20 + 547.47 - 544.81 = 22.66 \text{ Btu/lb.}$$

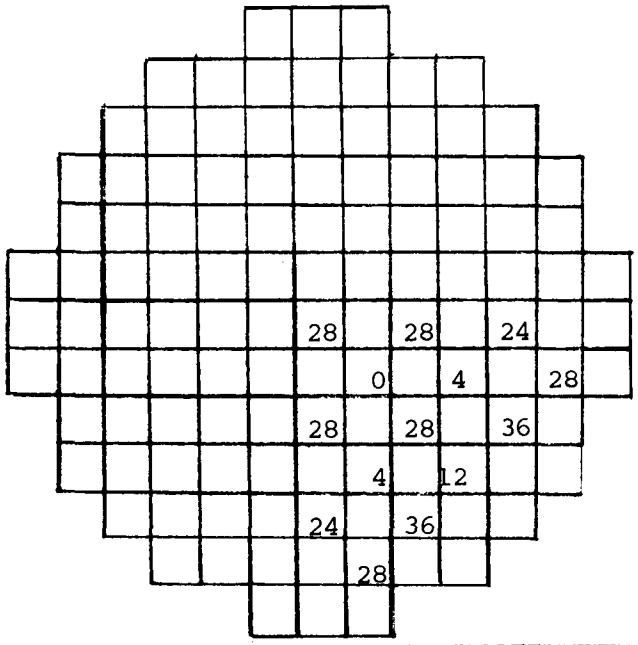
REACTOR: Monticello
CYCLE: 1
Exposure: 0 MWD/STU to 275 MWD/STU

TABLE 1.4 BWR OPERATING DATA

PART A- BWR HISTORY

Sheet 1 of 28
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
BWR History average value over time interval		Core Heat Balance	
1. Core Power (MWt)	1237.5	NSP	none
2. Core total flow (lbs/hr)	57.0×10^6	Idem	none
3. Inlet subcooling (BTU/lb)	22.66	Idem	20.0 Btu/lb. from Heat Bal. #5 (adjusted to core pressure) Calc. core pressure = 1032 psia See attached calc. sheet
4. System pressure (psig)	1000.	Idem	



5. Control rod positions (by location)

1/4 core symmetry

Note: Control Rod Positions are given in notches out. Four notches equals one foot. (e.g., at 48 notches, rod is out)

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello
CYCLE: 1

DATA WORK SHEET
TABLE 1.3 PART B
BWR Average Fuel Rod Loading

Sheet 3 of 3
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	3		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.13 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0 0.0	NAI	Calculated from assembly loading 192.4 kgU for dished assembly 196 kgU for undished assembly. NEDC 20165 Table 1-2. Top number is from a dished assembly Bottom number is from an undished assembly.
2. U-238 (kg)	3.8817 3.9543	NAI	
3. U-235 (kg)	.0444 .0452	Idem	
4. U-234 (kg)	.0004 .0004	Idem	
5. U-236 (kg)	0.0 0.0	Idem	
6. U-total (kg)	3.9265 4.0000	Idem	
7. UO_2 (kg)	4.4544 4.5378	Idem	

Verified By: [illegible] Date: 07/15/76

REACTOR: Monticello
CYCLE: 1

DATA WORK SHEET
TABLE 1.3 PART B
BWR Average Fuel Rod Loading

Sheet 2 of 3
Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	2		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	1.91 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0 0.0	NAI	Calculated from assembly loading 192.4 kgU for dished assembly and 196 kgU for undished assembly. NEDC 20165 Table 1-2. Top number is from a dished assembly. Bottom number is from an undished assembly.
2. U-238 (kg)	3.8509 3.9229	Idem	
3. U-235 (kg) q	.0750 .0764	Idem	
4. U-234 (kg)	.0006 .0006	Idem	
5. U-236 (kg)	0.0 0.0		
6. U-total (kg)	3.9265 4.0000	Idem	
7. UO_2 (kg)	4.4544 4.5378	Idem	

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DATA WORK SHEET
TABLE 1.3 PART B
BWR Average Fuel Rod Loading

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
Fuel Rod Type	1		
Enrichment, w/o U-235 Gd_2O_3 (w/o per rod)	2.95 0.0		
Weight of Material			
1. Gd-natural (kg)	0.0 0.0	NAI	
2. U-238 (kg)	3.8098 3.8811	Idem	
3. U-235 (kg)	.1158 .1180	Idem	Calculated from assembly loading
4. U-234 (kg)	.0009 .0009	Idem	192.4 kgU for dished assembly
5. U-236 (kg)	.0 .0	Idem	and 196 kgU for undished assembly. NEDC 20165 Table 1-2.
6. U-total (kg)	3.9265 4.0000	Idem	Top number is from a dished assembly.
7. UO_2 (kg)	4.4544 4.5378	Idem	Bottom number is from an undished assembly

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DATA WORK SHEET
TABLE 1.3 Part A
BWR Average Assembly Fuel Loading

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
Weight of Material			
1. Gd -natural (kg)	0.0 0.0	NAI	Top number is for a dished assembly bottom number is for an undished assembly.
2. U-238 (kg)	188.04 191.56	NAI	
3. U-235 (kg)	4.33 4.41	Idem	
4. U-234 (kg)	.03 .03	Idem	
5. U-236 (kg)	.00 .00	Idem	
6. U-total (kg)	192.40 196.00	NEDC 20165 Table 1-2	
7. UO_2 (kg)	218.27 222.35	NAI	

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DATA WORK SHEET

TABLE 1.3 PART A

BWR Average Assembly Fuel Loading

Sheet 1 **of** 2

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
Assembly Type	2.25	NEDS-20016 Table 3-1	U-235 assembly average enrichment
Enrichment, w/o U-235			
type 1	2.95	NEDS-20016 Table 3-1	None
type 2	1.91	Idem	None
type 3	1.13	Idem	None
type 4			
type 5 Gd_2O_3 (w/o per rod)			

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DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
7.0 Water (or inert) Rod Cell for each water (or inert cell type)			No water rod cell
7.1 Tube material			
7.2 Tube density (g/cm^3)			
7.3 Tube O.D. (in.)			
7.4 Tube I.D. (in.)			
7.5 Inert material density (in.)			
7.6 Inert material O.D. (in.)			
7.7 Inert material I.D. (in.)			

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DATA WORK SHEET
TABLE 1.2
BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
6.0 Instrument Rod Cell			
6.1 Instrument guide tube material	SS	FSAR Page 3-6•3	none
6.2 Instrument guide tube density (g/cm^3)	7.91	NAI 70-52	none
6.3 Tube O.D. (in.)	0.7	APED-5706 Nov. 1968	none
6.4 Tube I.D. (in.)	.640	Idem	none
6.5 Detector types	U-235 fission chamber	NSP	none
6.6 Number of instrument guide tubes	40	FSAR Page 3-6•3	none

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DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
5.10 Fuel clad material	Zr-2	NEDS 20016 Table 3-1	none
5.11 Clad density (g/cm^3)	6.56	NAI 70-52	none
5.12 Clad O.D. (in.)	.563	NEDS 20016 Table 3-1	none
5.13 Clad I.D. (in.)	.499	NAI	Calculated from 5-12 and 5-14
5.14 Clad thickness (in.)	.032	NEDS 20016 Table 3-1	none
5.15 Unheated length at top of fuel rod (in.)	11.25	NEDS 20016 Table 3-1	Gas plenum length used
5.16 Fuel rod enrichment, w/o U-235 Gd_2O_3, w/o per rod	2.95,1.91,1.13	NEDS 20016 Table 3-1	none

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DATA WORK SHEET
TABLE 1.2
BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
5.0 Fuel Rod (For each fuel rod type)			data on this page applicable to all fuel rod types listed in 5-16.
5.1 Fuel pellet material	UO_2	NEDS 20016 Table 3-1	none
5.2 Fuel pellet density (%TD)	95.	Idem	none
5.3 Fuel pellet length (in.)	not available		
5.4 Fuel pellet O.D. (in.)	.487	Idem	none
5.5 Fuel pellet dish factor	not available		
5.6 Fuel pellet chamfer factor	not available		
5.7 Fuel pellet dish O.D. (in.)	not available		
5.8 Fuel pellet dish depth (in.)	not available		
5.9 Fuel stack density (%TD)	92.74	NAI	Computed from UO_2 core loading

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DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

Rev. 0 Date: 5/10/76

ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.19 Fuel enrichments (w/o U-235)			
type 1 no Gd	2.95	NEDS-20016 Table 3-1	none
type 2 no Gd	1.91	Idem	none
type 3 no Gd	1.13	NEDS-20016 Table 3-1	none
type 4 no Gd			
type 5 with Gd Gd_2O_3, w/o per rod			

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DATA WORK SHEET
TABLE 1.2
BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.10 Spacer grid thickness (in.)	not available	vendor proprietary	
4.11 Spacer grid width (in.)	not available	vendor proprietary	
4.12 Can (or channel) material	Zr-4	NEDS 20016 Table 3-1	none
4.13 Can (or channel) density (g/cm^3)	6.56	NAI 70-52	none
4.14 Can thickness (in.)	.080	NEDS 20016 Table 3-1	none
4.15 Can outside dimensions (in.)	5.438	NEDS-20016 Table 3-1	none
4.16 Can corner radius O.D. (in.)	not available		
4.17 Active fuel length (in.)	144.0	NEDS-20016 Table 3-1	none
4.18 Burnable poison positions per assembly	0	Idem	none

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Diagram 1.2-9

Fuel Assembly - Cycle 1

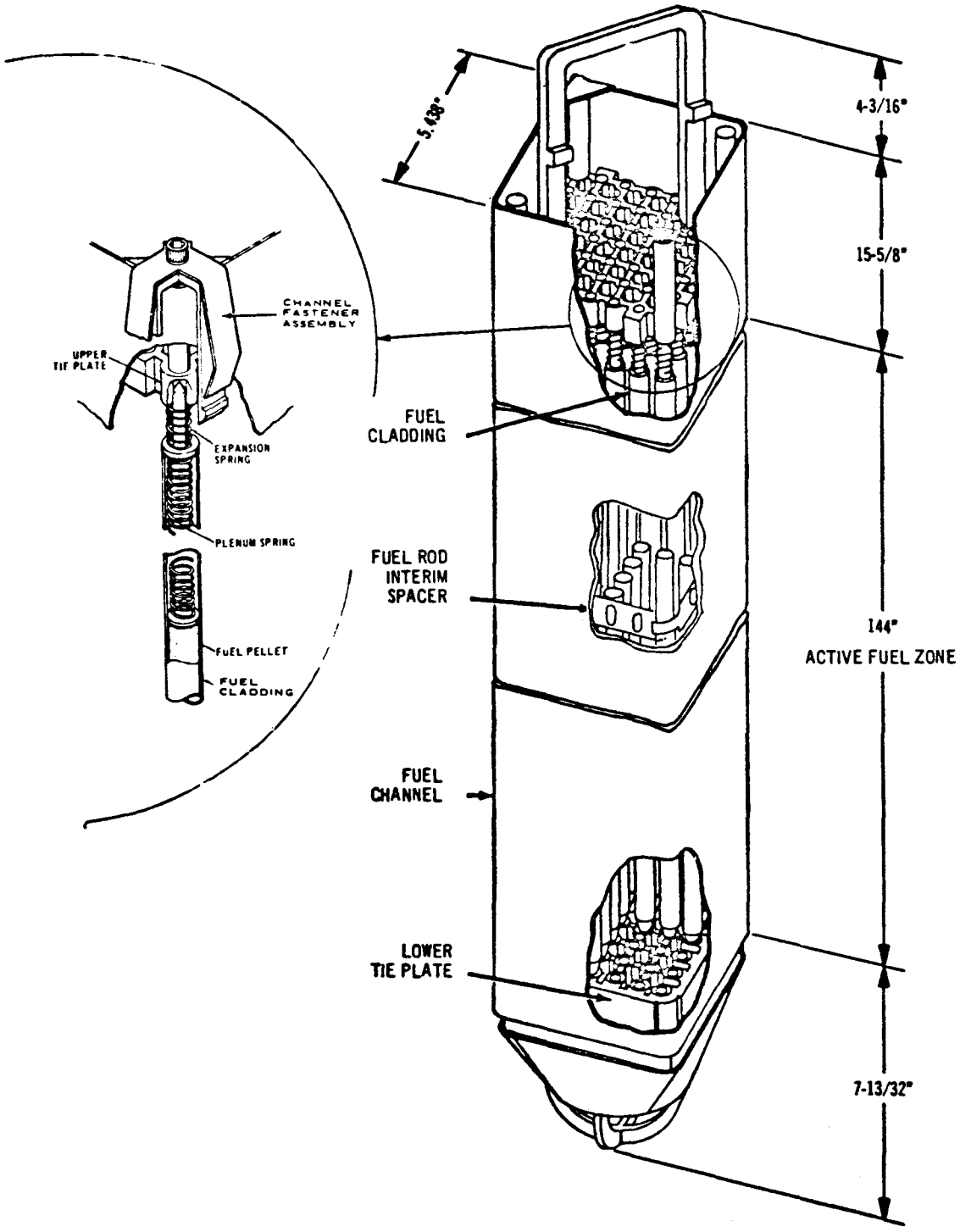


Diagram 1.2-8

Bundle Design - Cycle 1

2.25 wt% U-235 BUNDLE AVERAGE

3 d	3 d	3	2 d	2 d	2 d	3 d
3 d	2 d	2	1 d	1 d	1 d	2 d
3	2	1 d	1	1	1	2 d
2 d	1 d	1	1 s	1	1	2
2 d	1 d	1	1	1	1	2
2 d	1 d	1	1	1	1 d	2 d
3 d	2 d	2 d	2	2	2 d	3 d

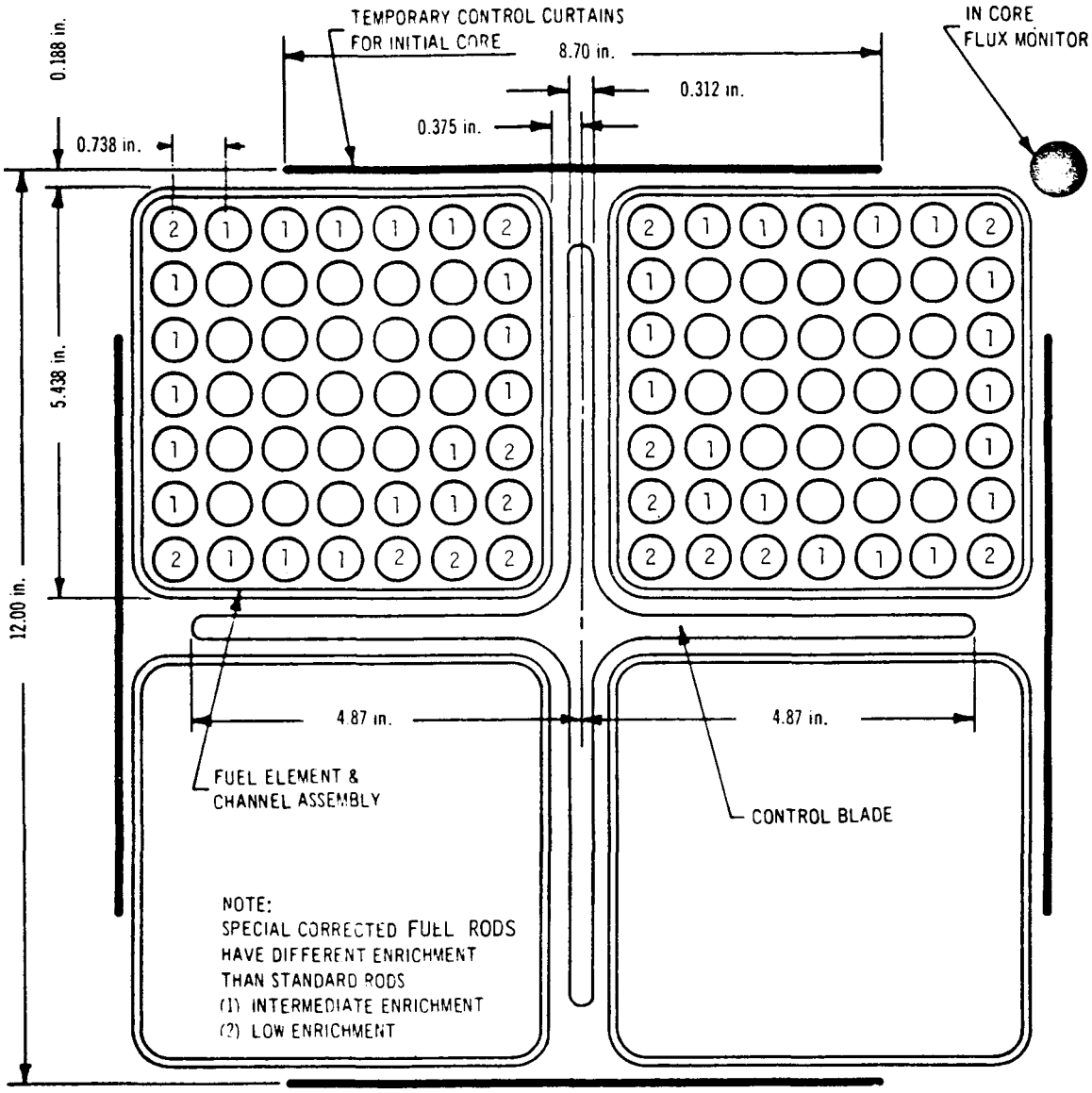
ROD TYPE	U-235 (wt%)	Gd_2O_3 (wt%)	NUMBER OF RODS
1	2.95		22
2	1.91		19
3	1.13		8

s = Location of spacer rod
d = Location of dished rod in dished bundle

Diagram 1.2-7

Typical Core Lattice Unit

Initial Core Loading



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DATA WORK SHEET
TABLE 1.2
BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
4.0 Fuel Assembly (For each assembly type)			
4.1 Assembly layout - plan view elevation view		NEDC-20165 Fig.1-1 FSAR Figure 3-41	diagram #1.2-8 attached diagram #1.2-9 attached
4.2 Assembly pitch (in.)	6.	FSAR Figure 3-4-2	diagram #1.2-7 attached
4.3 Assembly geometry	7x7	NEDS-20016 Table 3-1	none
4.4 Fuel rod pitch (in.)	.738	Idem	none
4.5 Fuel rods per assembly	49	Idem	none
4.6 Water holes (inert pins) per assembly	0	Idem	none
4.7 Spacer grids per assembly	7	operation manual Page 3.1.1	none
4.8 Spacer grid material	Inc-718 Zr-4	NSP	none
4.9 Spacer mass per grid (g)	Inc-718:47 Zr-4:244	NSP	none

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DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.20 Control rod guide tube thickness (in.)	.165	FSAR Page 3-6-2	.165 nominal .134 minimum

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DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.10 Absorber clad O.D. (in.)	0.188	FSAR Table 3-1-1	none
3.11 Absorber clad thickness (in.)	.025	FSAR Table 3-1-1	none
3.12 Absorber material	Boron	Idem	none
3.13 Absorber density (%TD)	70.	FSAR Page 3-5-1	none
3.14 Absorber length (in.)	143.	FSAR Table 3-1-1	none
3.15 Absorber O.D. (in.)	.138	NAI	calculated assuming no gap between poison and clad
3.16 Absorber composition	B_4C granules	FSAR Table 3-1-1	none
3.17 Control rod pitch (in.)	12.0	FSAR Table 3-1-1	none
3.18 Number of control material tubes/rod	84	Idem	none
3.19 Control rod guide tube material	SS	FSAR Page 3-6-2	none

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DATA WORK SHEET
TABLE 1.2
BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
3.0 Control Rod - Cruciform Type			
3.1 Control blade width-tip to tip- (in.)	9.75	FSAR Table 3-1-1	none
3.2 Blade thickness (in.)	.312	FSAR Figure 3-4-2	none
3.3 Blade hub radius (in.)	not available		
3.4 Blade tip radius (in.)	not available		
3.5 Blade sheath material	SS	FSAR Table 3-1-1	none
3.6 Blade sheath density (g/cm^3)	7.91	NAI 70-52	none
3.7 Blade sheath thickness (in.)	.062	NAI	calculated assuming no gap between sheath and rod
3.8 Absorber clad material	SS	FSAR Table 3-1-1	none
3.9 Absorber clad density (g/cm^3)	7.91	NAI 70-52	none

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DATA WORK SHEET

TABLE 1.2

BWR Core and Component Description

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ITEM (Unit)	VALUE	SOURCE	COMMENTS
2.0 Control Curtains			
2.1 Curtain material	SS	FSAR Table 3-1-1	none
2.2 Curtain material density (g/cm^3)	7.91	NAI 70-52	none
2.3 Initial poison concentration (ppm)	5400 ppm Nat. Boron	FSAR Table 3-1-1	none
2.4 Curtain thickness (in.)	.0625	Idem	none
2.5 Curtain width (in.)	8.70	Idem	none
2.6 Curtain length (in.)	141.25	Idem	none
2.7 Curtain structural material	SS	Idem	none
2.8 Stainless steel stiff backing dimension (in.)	.582 x .582 x 141.25	NX 7831-179 (NSP)	none

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