

NUCLEAR QUALITY ASSURANCE
Surveillance Report

Surveillance Code: TS-001 Rev. 3

Report No. 93X027
Page 1 of 5

Type of Surveillance: Termination Survey of Structures
Systems, and Outdoor Areas

References/Rev:
1. SP 67X001.02/0
2. SP 61X010.03/2
3. SNPS Industrial
Safety Manual

Organization(s): Termination Survey

SECTION I: OBJECTIVES/GENERAL

To verify taking of measurements and recording of data for Radiological Termination Surveys performed on structures, systems and outdoor areas are done in accordance with the appropriate Station Procedures.

Survey Unit No. SU029 Survey Unit Name Turbine

Survey Location/Component No. Turbine Seal Rotor Blade Points 48, 31, 52, 51, 58

HP Technicians F. Daily, S. Collins, M. Shea, F. Flanigan

Date/Time Started: 02/10/93 15:00 Date/Time Completed: 02/16/93 11:00

Surveillance Performed By: P. Chin

SECTION II: COMPLIANCE ATTRIBUTES

ITEM REF. ATTRIBUTE
NO.

EVALUATION REF.
SAT/UNSAT/NA CONC.

A	1	Review the Termination survey package to ensure it contains sufficient instructions for the technicians to complete the survey. (Para. 8.1.1)	<u>X</u>			
B	1	Verify that survey location(s) are as specified in the Survey Package. (para. 8.1.1)	<u>X</u>			
C	1	Check that Technicians have the appropriate instrumentation for the survey and that the instruments have current source check and calibration stickers. (para. 8.1.2)	<u>X</u>			

SECTION II: COMPLIANCE ATTRIBUTES

ITEM NO.	REF. ATTRIBUTE	EVALUATION SAT/UNSAT/NA	REF. CONC.
D	2 Check/observe that termination survey location/area has been posted and controlled as a HP clean area and personnel are complying with the contamination control requirements. (para. 8.9)	___	<u>X</u> ___
E	1 Observe that surveys being performed are within the scope/description on the Termination Survey Package. (para. 8.1.3)	<u>X</u> ___	___
F	1 Observe that technicians are using the appropriate survey detection equipment for the specified survey points. (para. 8.2.2)	<u>X</u> ___	___
G	1 Observe that proper survey technique is utilized to obtain the survey measurements. (para. 8.2)	___	___
	a. Scans will be performed at approximately 1-1/2 inches per second, at approximately 1 cm from the surface and approximately 24 mm from the surface for floor monitors.	<u>X</u> ___	___
	b. Direct fixed point measurements will be made in the scaler mode using one-minute counts.	<u>X</u> ___	___
	c. Gamma exposure rates will be made by holding the microrem meter for at least 30 seconds, one meter from the specified location and observing the ratemeter reading.	<u>X</u> ___	___
	d. When grid blocks are designated for direct surface measurements, measurements will be performed at or near the center of each grid block.	___	<u>X</u> ___
	e. Smears will be taken over 100 cm square when possible (without repeat passes over the same area), or designated as to what areas were smeared if that is not possible.	<u>X</u> ___	___
	f. Check each smear and swab with a G-M probe. If greater than 100 ncpm, notify the HP Lead Technician.	<u>X</u> ___	___
H	1 Observe/verify that appropriate survey measurements are recorded on a survey sheet and/or entered properly into the ESP-2 data logger. (para. 8.1.4)	<u>X</u> ___	___

SECTION II: COMPLIANCE ATTRIBUTES

ITEM NO.	REF.	ATTRIBUTE	EVALUATION SAT/UNSAT/NA	REF. CONC.
I	1	Observe that each smear and smear folder is marked with the survey number and smear location numbers. (para. 8.7)	<u>X</u> — — —	—
J	1	If during performance of a termination survey, an instrument alarms or radiation/contamination levels are determined to be above the release guidelines, then the survey technician shall notify the Lead HP Technician. (para. 6.1)	<u>X</u> — — —	—
<u>Termination Survey of System</u>				
K	1	Observe that survey of systems is conducted in accordance with the termination survey instructions for the system. (para. 8.1.3)	<u>X</u> — — —	—
L	1	Observe surveys for the following to ensure compliance with procedure guidance for System Termination Survey: (para. 8.3)		
	a.	For open components ie; valves, observe the survey of the component interior and survey of the interior adjacent piping on both sides of the components as far as can be practicably reached.	<u>X</u> — — —	—
	b.	Accessible piping survey should be divided into approximately one foot sections in length for survey purposes.	<u>X</u> — — —	—
	c.	One fixed point survey will be performed at approximately the midpoint of each one foot section of the piping.	<u>X</u> — — —	—
	d.	The minimum number of smears taken for each one foot section of piping and accessible component areas are in accordance with the following table:	<u>X</u> — — —	—
		<u>Piping Diameter</u>	<u>Number of Smears</u>	
		Less than 4"	1	
		Great than 4" less than 8"	2	
		8" or greater, but less than 12"	3	
		12" or greater, but less than 16"	4	
		16" or greater, but less than 20"	5	
		20" or greater, but less than 24"	6	
		Greater than 24"	7	
	e.	For survey of tanks that have a history of contamination (affected systems) and large enough to allow personnel access, verify that the tank has been gridded.	— — — <u>X</u> —	—

SECTION II: COMPLIANCE ATTRIBUTES

ITEM
NO. REF. ATTRIBUTEEVALUATION
SAT/UNSAT/NA REF.
CONC.Termination Survey of Structures

M	1	Observe that Termination Survey of Structures are conducted in accordance with the Termination Survey Instruction forms. (para. 8.1.3)	_____	_____	<u>X</u>	_____
N	1	Observe that during the performance of structure surveys emphasis are given to potential hideouts such as cracks, fissures, and areas inaccessible to standard measurement and sampling techniques. (para. 8.4.2)	_____	_____	<u>X</u>	_____
O	1	Verify that grids of one meter square are established as required for structural survey units classified as affected. (para. 8.4.3)	_____	_____	<u>X</u>	_____

Survey of Outdoor Areas

P	1	Observe that Termination Survey of outdoor areas are conducted in accordance with the Termination Survey Instruction Forms. (para. 8.1.3)	_____	_____	<u>X</u>	_____
Q	1	Verify for site grounds in non-paved areas a NaI or microrem meter are used for scanning. (para. 8.5.6)	_____	_____	<u>X</u>	_____

SECTION III: COMMENTS/CONCLUSIONS

This surveillance was conducted on Survey Unit No. SU029, the Main Turbine. Several survey locations were verified as part of Survey Unit No. SU029.

During this surveillance it was observed by the inspector that contrary to the Health Physics Control requirements for termination survey of a "Clean Area" SP 61X010.03, the following items were observed:

- A station worker did not perform a hand and foot frisk prior to entering a Health Physics clean area.
- Scaffolding materials were not frisked and cleared by Health Physics personnel prior to entering the Health Physics clean area.

Health Physics issued a Radiological Incident Report related to the above mentioned occurrence, Note RIR No. 93-03.

Additional technicians involved with the Termination Survey of the Main Turbine are as follows: F. Raitch, R. Schwamsky, W. Smith, R. Matarese, P. Daily.

All other areas and attributes related to the termination survey of the turbine were verified as being conducted satisfactorily.

[Signature] for P. Chin 2/20/93
NOC ENGINEER/SPECIALIST DATE

[Signature] 2/20/93
APPROVED BY DATE

NUCLEAR QUALITY ASSURANCE
Surveillance Report

Surveillance Code: TS-001 Rev. 3

Report No. 93X028
Page 1 of 5

Type of Surveillance: Termination Survey of Structures
Systems, and Outdoor Areas

References/Rev:
1. SP 67X001.02/0
2. SP 61X010.03/2
3. SNPS Industrial
Safety Manual

Organization(s): Termination Survey

SECTION I: OBJECTIVES/GENERAL

To verify taking of measurements and recording of data for Radiological Termination Surveys performed on structures, systems and outdoor areas are done in accordance with the appropriate Station Procedures.

Survey Unit No. SU029-44 (N31) Survey Unit Name Main Turbine

Survey Location/Component No. TB-63, HP Section 6th Stage West Wheel

HP Technicians W. Smith, Ray Matarese

Date/Time Started: 2/17/93; 0800 hrs. Date/Time Completed: 2/17/93; 1145 hrs.

Surveillance Performed By: K. A. Howe

SECTION II: COMPLIANCE ATTRIBUTES

ITEM REF. ATTRIBUTE
NO.

EVALUATION REF.
SAT/UNSAT/NA CONC.

A	1	Review the Termination survey package to ensure it contains sufficient instructions for the technicians to complete the survey. (Para. 8.1.1)	<u>X</u>	___	___	___
B	1	Verify that survey location(s) are as specified in the Survey Package. (para. 8.1.1)	<u>X</u>	___	___	___
C	1	Check that Technicians have the appropriate instrumentation for the survey and that the instruments have current source check and calibration stickers. (para. 8.1.2)	<u>X</u>	___	___	<u>X</u>

SECTION II: COMPLIANCE ATTRIBUTES

TEM
10. REF. ATTRIBUTEEVALUATION REF.
SAT/UNSAT/NA CONC.

D	2	Check/observe that termination survey location/area has been posted and controlled as a HP clean area and personnel are complying with the contamination control requirements. (para. 8.9)	<u>X</u>	___	___	___
E	1	Observe that surveys being performed are within the scope/description on the Termination Survey Package. (para. 8.1.3)	<u>X</u>	___	___	___
F	1	Observe that technicians are using the appropriate survey detection equipment for the specified survey points. (para. 8.2.2)	<u>X</u>	___	___	<u>X</u>
G	1	Observe that proper survey technique is utilized to obtain the survey measurements. (para. 8.2)				
	a.	Scans will be performed at approximately 1-1/2 inches per second, at approximately 1 cm from the surface and approximately 24 mm from the surface for floor monitors.	<u>X</u>	___	___	___
	b.	Direct fixed point measurements will be made in the scaler mode using one-minute counts.	<u>X</u>	___	___	___
	c.	Gamma exposure rates will be made by holding the microrem meter for at least 30 seconds, one meter from the specified location and observing the ratemeter reading.	___	___	<u>X</u>	___
	d.	When grid blocks are designated for direct surface measurements, measurements will be performed at or near the center of each grid block.	___	___	<u>X</u>	___
	e.	Smears will be taken over 100 cm square when possible (without repeat passes over the same area), or designated as to what areas were smeared if that is not possible.	<u>X</u>	___	___	___
	f.	Check each smear and swab with a G-M probe. If greater than 100 ncpm, notify the HP Lead Technician.	<u>X</u>	___	___	___
H	1	Observe/verify that appropriate survey measurements are recorded on a survey sheet and/or entered properly into the ESP-2 data logger. (para. 8.1.4)	<u>X</u>	___	___	___

SECTION II: COMPLIANCE ATTRIBUTES

ITEM NO.	REF.	ATTRIBUTE	EVALUATION SAT/UNSAT/NA	REF. CONC.
I	1	Observe that each smear and smear folder is marked with the survey number and smear location numbers. (para. 8.7)	<u>X</u> _____	_____
J	1	If during performance of a termination survey, an instrument alarms or radiation/contamination levels are determined to be above the release guidelines, then the survey technician shall notify the Lead HP Technician. (para. 6.1)	_____ <u>X</u> _____	_____
<u>Termination Survey of System</u>				
K	1	Observe that survey of systems is conducted in accordance with the termination survey instructions for the system. (para. 8.1.3)	<u>X</u> _____	_____
L	1	Observe surveys for the following to ensure compliance with procedure guidance for System Termination Survey: (para. 8.3)		
	a.	For open components ie; valves, observe the survey of the component interior and survey of the interior adjacent piping on both sides of the components as far as can be practicably reached.	<u>X</u> _____	_____
	b.	Accessible piping survey should be divided into approximately one foot sections in length for survey purposes.	_____ <u>X</u> _____	_____
	c.	One fixed point survey will be performed at approximately the midpoint of each one foot section of the piping.	_____ <u>X</u> _____	_____
	d.	The minimum number of smears taken for each one foot section of piping and accessible component areas are in accordance with the following table:	_____ <u>X</u> _____	_____
		<u>Piping Diameter</u>	<u>Number of Smears</u>	
		Less than 4"	1	
		Great than 4" less than 8"	2	
		8" or greater, but less than 12"	3	
		12" or greater, but less than 16"	4	
		16" or greater, but less than 20"	5	
		20" or greater, but less than 24"	6	
		Greater than 24"	7	
	e.	For survey of tanks that have a history of contamination (affected systems) and large enough to allow personnel access, verify that the tank has been gridded.	_____ <u>X</u> _____	_____

SECTION II: COMPLIANCE ATTRIBUTES

ITEM NO.	REF.	ATTRIBUTE	EVALUATION SAT/UNSAT/NA	REF. CONC.
<u>Termination Survey of Structures</u>				
M	1	Observe that Termination Survey of Structures are conducted in accordance with the Termination Survey Instruction forms. (para. 8.1.3)	_____	_____X_____
N	1	Observe that during the performance of structure surveys emphasis are given to potential hideouts such as cracks, fissures, and areas inaccessible to standard measurement and sampling techniques. (para. 8.4.2)	_____	_____X_____
O	1	Verify that grids of one meter square are established as required for structural survey units classified as affected. (para. 8.4.3)	_____	_____X_____
<u>Survey of Outdoor Areas</u>				
P	1	Observe that Termination Survey of outdoor areas are conducted in accordance with the Termination Survey Instruction Forms. (para. 8.1.3)	_____	_____X_____
2	1	Verify for site grounds in non-paved areas a NaI or microrem meter are used for scanning. (para. 8.5.6)	_____	_____X_____

SECTION III: COMMENTS/CONCLUSIONS

This surveillance was performed on 2/17/93 from 0800 hrs. to 1145 hrs.

Attribute items marked NA were not within the scope of work for this survey.

Following are explanations for satisfactory attribute items marked "Reference Conclusions":

C.F. Instruments used were ESP-2, #1546, cal. due 6/18/93 and GM Pancake H-260, #1029, cal. due 9/16/93.

Based on satisfactory results of attribute items surveilled, it is concluded this system survey is being performed in accordance with applicable requirements/procedures.

K. A. Howe 2/19/93
NQA ENGINEER/SPECIALIST DATE

[Signature] 2/19/93
APPROVED BY DATE

Termination Survey Report for Turbine System (N31)

ATTACHMENT

INSTRUMENT CONTROL CHARTS

Month June / Yr 93

Mean Value 21

Sigma Value 6

ROUTINE PERFORMANCE AND BACKGROUND DATA FORM

Instrument I.D. HP-260-1012

Source ID No. N/A

(SAMPLE)

Mean -2 sigma value 9

Operating Voltage 900 volts

Mean -3 sigma value 3

Mean +2 sigma value 33

Mean +3 sigma value 39

Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within 12 Sigma (Y or N)	Within 13 Sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician (Initials)	Supervision Approval (Initials & Det)
							Alpha	Beta		
1-11-93	1458	1	20	Y	Y	Y	NA	20	KDE	1-15-93 JW
1-13-93	1308	1.0	21	Y	Y	Y	N/A	21	JW	
1-14-93	0649	1	16	Y	Y	Y	NA	16	JW	
1-18-93	0545	1	16	Y	Y	Y	NA	16	JW	
1-25-93	0720	1	17	Y	Y	Y	N/A	17	JW	
1-26-93	0725	1.0	14	Y	Y	Y	N/A	14	JW	1-26-93 JW
1-29-93	0615	1.0	21	Y	Y	Y	N/A	21	JW	
2-1-93	0609	1.0	16	Y	Y	Y	N/A	16	JW	
2-2-93	0603	1.0	22	Y	Y	Y	N/A	22	JW	
2-3-93	0713	1.0	21	Y	Y	Y	N/A	21	JW	
2-4-93	0628	1.0	21	Y	Y	Y	N/A	21	JW	2-2-93 JW
2-5-93	0555	1.0	21	Y	Y	Y	N/A	21	JW	
2-8-93	0528	1.0	26	Y	Y	Y	N/A	26	JW	
2-9-93	0658	1.0	23	Y	Y	Y	N/A	23	JW	
2-10-93	0640	1.0	22	Y	Y	Y	N/A	22	JW	
2-11-93	0607	1.0	22	Y	Y	Y	N/A	22	JW	2-11-93 JW
2-12-93	0656	1.0	17	Y	Y	Y	N/A	17	JW	
2-13-93	0552	1.0	21	Y	Y	Y	N/A	21	JW	
2-16-93	0910	1.0	19	Y	Y	Y	N/A	19	JW	
2-17-93	1010	1.0	15	Y	Y	Y	N/A	15	JW	
2-18-93	1037	1.0	28	Y	Y	Y	N/A	28	JW	2-14-93 JW
2-19-93	0648	1.0	19	Y	Y	Y	N/A	19	JW	

COPY

INSTRUMENT CONTROL CHART

Equipment HP 260

I.D. No. 1012

Prepared By: L. G. ... 2-1-93

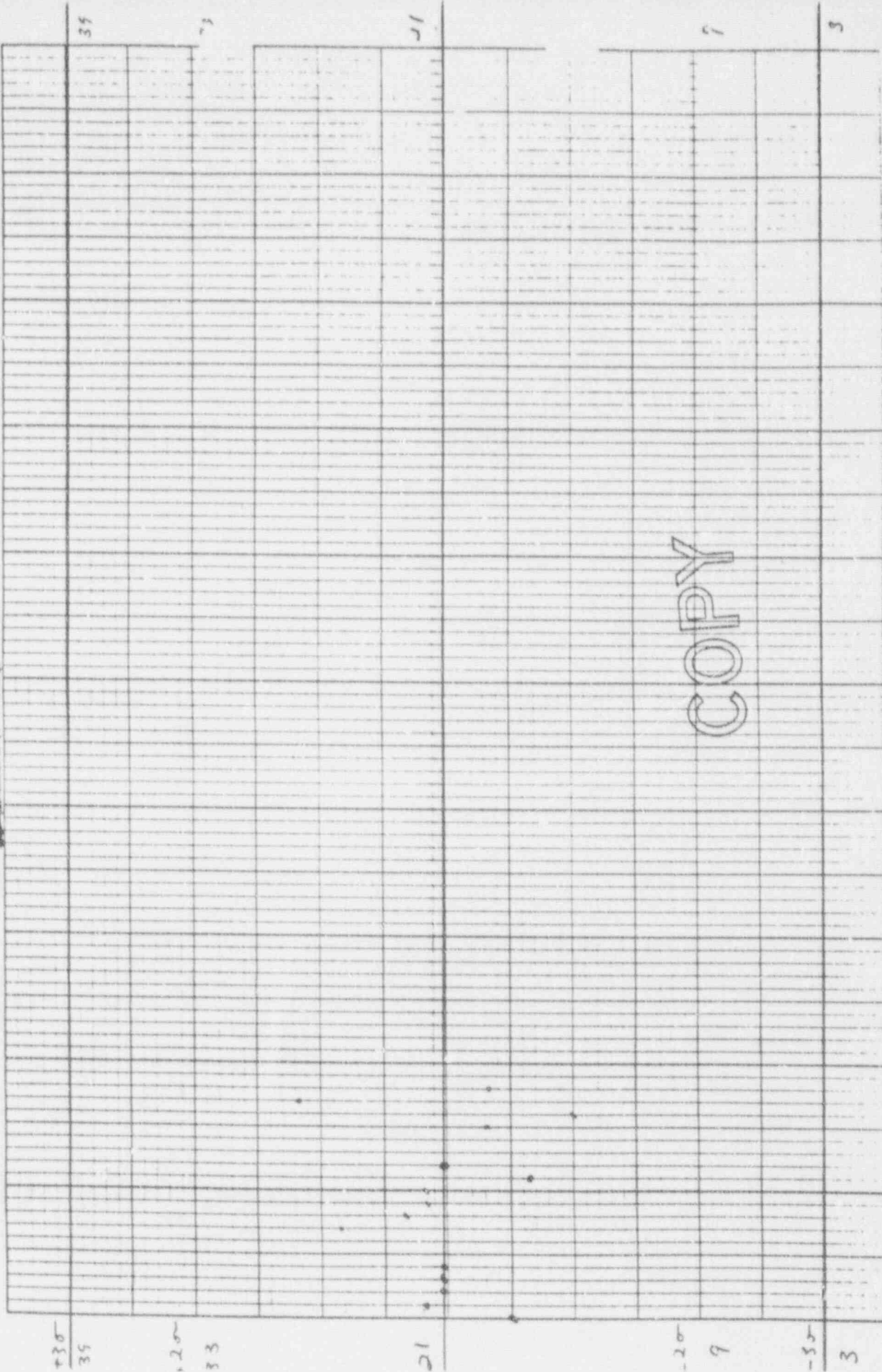
Technician/Date

Source Type N/A

I.D. No. N/A

Reviewed By: [Signature] 2-1-93

Supervisor/Date



1% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50%

(30-)
3
(20-)
b
21
(20-)
33
(30-)
39

COPY

Prepared By: KELL # 11-11-93
Technician Date
Reviewed By: [Signature] 1-11-93
Supervisor Date

Equipment HP 260 I.D. No. 1012
Source Type N/A I.D. No. N/A
BACKGROUND

1 to cpm

Appendix 12.3

ROUTINE PERFORMANCE AND BACKGROUND DATA FORM

Month DEC / Yr 92Instrument I.D. HP24041012Source ID No. Cold-S-0023 Operating Voltage: 900VMean Value 15255Mean - 2 sigma value 15017Mean + 2 sigma value 15493Sigma Value 119Mean - 3 sigma value 14898Mean + 3 sigma value 15662

Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within +2 Sigma (Y or N)	Within +3 sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician Initials	Supervision Approval (Initial & Date)
							Alpha	Beta		
1-5-93	1430	1.0	15200	Y	Y	Y	N/A	23	WJ	1-8-93 JW
1-6-93	1410	1.0	15200	Y	Y	Y	N/A	21	WJ	
1-13-93	1310	1.0	15100	Y	Y	Y	N/A	21	WJ	
1-14-93	0640	1.0	14900	Y	Y	Y	N/A	16	WJ	1-15-93 JW
1-14-93	0642	1.0	15200	Y	Y	Y	N/A	16	WJ	
1-14-93	0645	1.0	15100	Y	Y	Y	N/A	16	WJ	
1-18-93	0545	1.0	15300	Y	Y	Y	N/A	16	WJ	1-22-93 JW
1-25-93	0724	1.0	15400	Y	Y	Y	N/A	17	WJ	
1-28-93	0730	1.0	15400	Y	Y	Y	N/A	14	WJ	
1-29-93	0735	1.0	15400	Y	Y	Y	N/A	21	WJ	1-29-93 JW
2-1-93	0617	1.0	15300	Y	Y	Y	N/A	18	WJ	
2-3-93	0656	1.0	15400	Y	Y	Y	N/A	22	WJ	
2-3-93	0715	1.0	15200	Y	Y	Y	N/A	21	WJ	2-5-93 JW
2-4-93	0639	1.0	15300	Y	Y	Y	N/A	21	WJ	
2-5-93	0655	1.0	15400	Y	Y	Y	N/A	21	WJ	
2-8-93	0715	1.0	15100	Y	Y	Y	N/A	26	WJ	2-12-93 JW
2-9-93	0650	1.0	15400	Y	Y	Y	N/A	23	WJ	
2-16-93	0743	1.0	15400	Y	Y	Y	N/A	22	WJ	
2-11-93	0609	1.0	15400	Y	Y	Y	N/A	22	WJ	2-14-93 JW
2-12-93	0706	1.0	15100	Y	Y	Y	N/A	17	WJ	
2-13-93	0554	1.0	15100	Y	Y	Y	N/A	21	WJ	
2-16-93	0710	1.0	15400	Y	Y	Y	N/A	19	WJ	2-14-93 JW
2-17-93	1010	1.0	15200	Y	Y	Y	N/A	15	WJ	
2-18-93	1035	1.0	15200	Y	Y	Y	N/A	28	WJ	
2-19-93	0645	1.0	15200	Y	Y	Y	N/A	19	WJ	

COPY

INSTRUMENT CONTROL CHART

Equipment HP 240

I.D. No. 1012

Source Type COCO

I.D. No. 50013

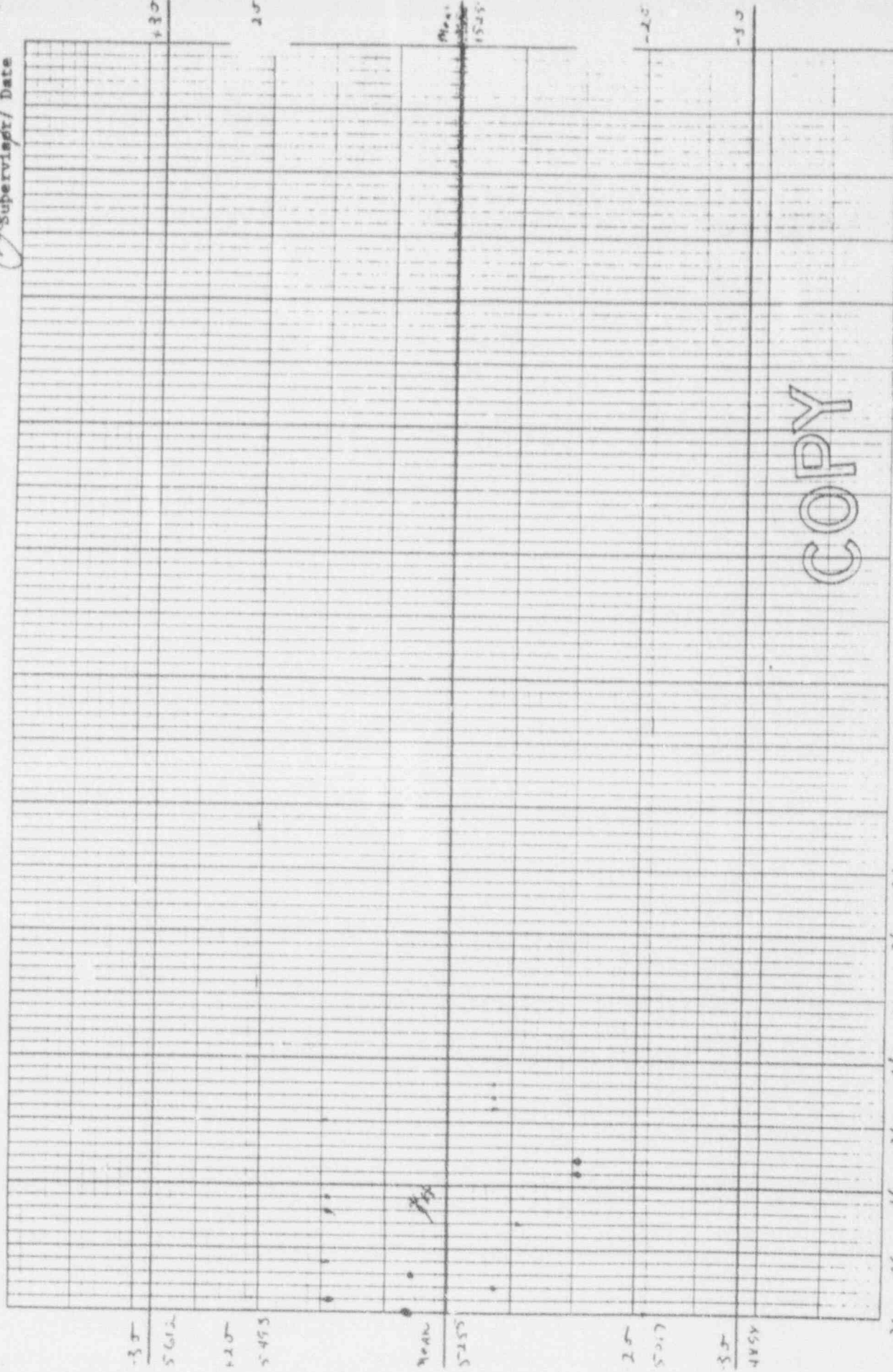
Prepared By: W. G. ... 2-1-53

Technician/Date

Reviewed By: ... 2-1-53

Supervisor/Date

15 cm / 6.2



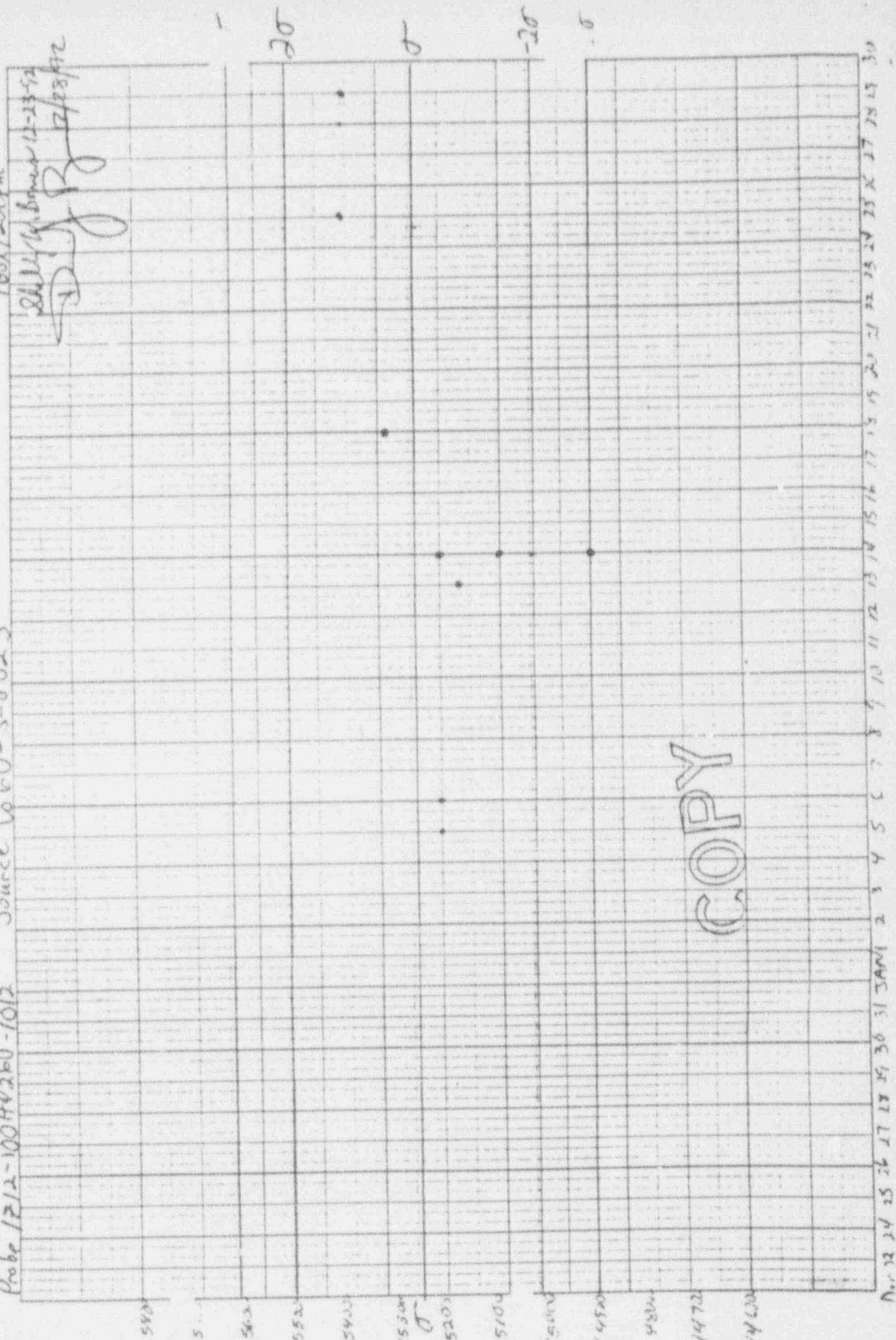
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46 0940

K-E 12 X 12 TO THE INCH • 1 IN THE 100
MINUTEL W AND 1000 100 100 100 100

Probe #12-12-100H0260-1012 Source 660-S-0023

100X/200X
Shelly G. Brown 12-23-52
D. J. R. 12/28/72



CONTROL CHART PREPARATION FORM

Test Equipment # 161213055F3-1469
INSTRUMENT I.D.# 12-12-12-11160-1012
SOURCE I.D.# 160-S-003

OPERATING VOLTAGE 900 Volts

DATE: 12-23-92

TECHNICIAN: Banks Shibly

(N)	(X)	SOURCE COUNT RATE
1	15400	21025
2	15420	21025
3	15100	24025
4	15100	24025
5	15200	3025
6	15500	60025
7	15100	24025
8	15200	3025
9	15300	2025
10	15100	24025
11	15300	2025
12	15300	2025
13	15400	21025
14	15200	3025
15	15300	3025
16	15300	2025
17	15100	24025
18	15300	2025
19	15200	3025
20	15300	2025

SPF 61X061.01-2 Rev. 0

Mean Source Count Rate

$$\bar{x} = \frac{\sum x}{N} = \frac{305100}{20} = 15255$$

Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N-1}} = \sqrt{\frac{269500}{19}} = 119$$

$$\sigma = 15493 \text{ } \mu\text{m } 238$$

$$3\sigma = 15673 \text{ } \mu\text{m } 357$$

Reviewed by: [Signature]

Date: 12/28/92

COPY

(SAMPLE)

Instrument I.D. Hf260[#] 1008

Source ID No. C66050025

Operating Voltage 900

Mean Value 1557.5

Mean -2 sigma value 15349

mean +2 sigma value 15801Sigma Value 113

Mean -3 sigma value 15236

Mean +3 sigma value 15914

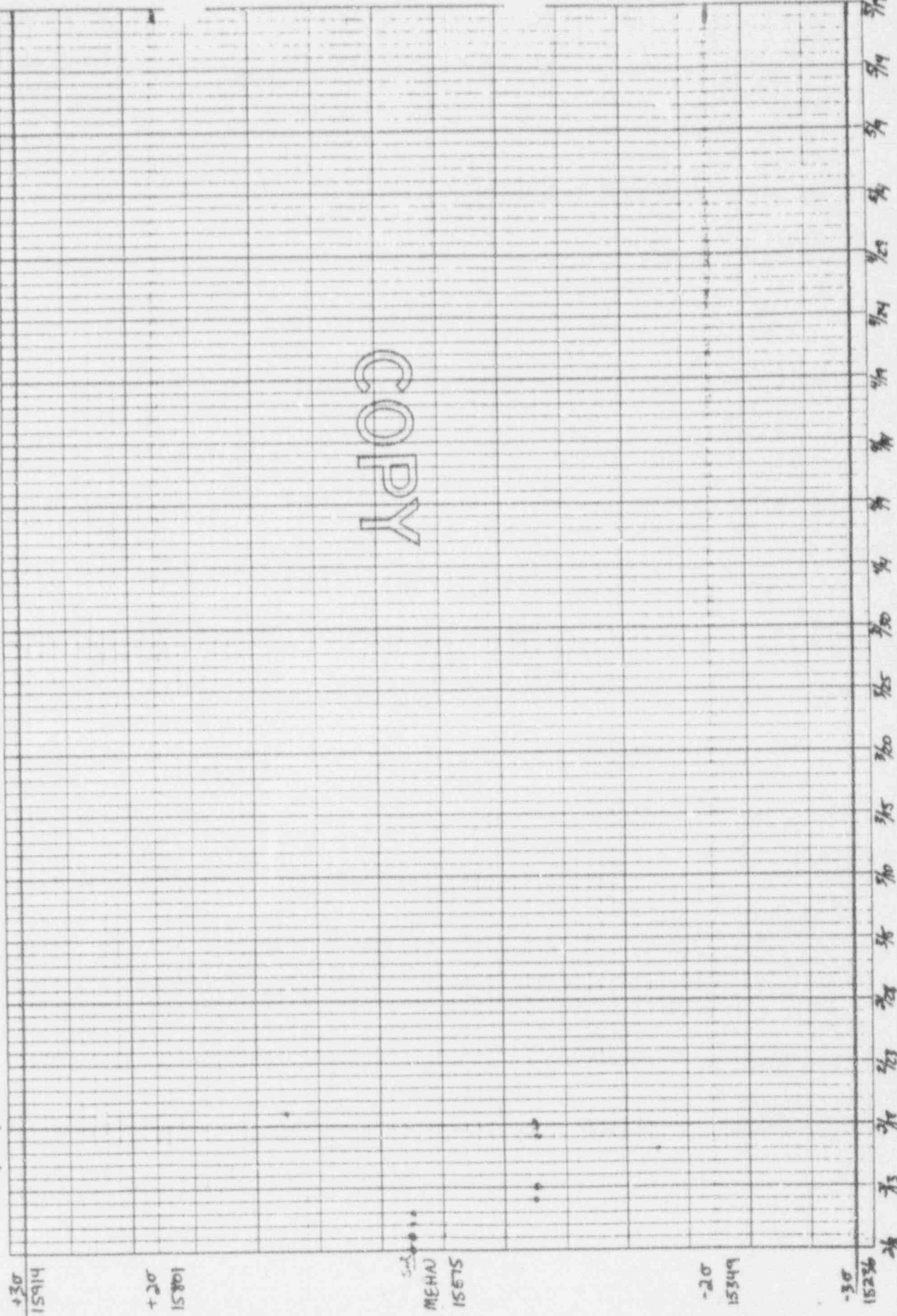
COPY

INSTRUMENT CONTROL CHART

Prepared By: AKB 2-8-93
 Technician Date
 Reviewed By: AKB 2-8-93
 Supervisor Date

Equipment HP260 I.D. No. 1008
 Source Type Co60 I.D. No. 50023

10 cpm / Block



CONTROL CHART PREPARATION FORM

(SAMPLE)

INSTRUMENT I.D. # ESP-2 #144 SOURCE I.D. # C060-50023
 OPERATING VOLTAGE 900 DETECTOR I.D. # HP260 #1008
 DATE: 2-4-93 TECHNICIAN: M. Samml

(N) MEASUREMENTS	(X) SOURCE COUNT RATE
1	15600 -25 625
2	15500 75 5625
3	15700 -125 15625
4	15500 75 5625
5	15800 -225 50625
6	5400 175 30625
7	15800 -225 15625
8	15400 175 30625
9	15500 75 5625
10	15600 -25 625
11	15500 75 5625
12	15600 -25 625
13	15500 75 5625
14	15400 175 30625
15	15600 -25 625
16	15600 -25 625
17	15700 -125 15625
18	15500 75 5625
19	15600 -25 625
20	15700 -125 15625

Mean Source Count Rate

$$\bar{x} = \frac{\sum X}{N} = \frac{311500}{20} = 15575$$

Standard Deviation

$$\sigma = \sqrt{\frac{\sum (X - \bar{x})^2}{N-1}} = \sqrt{\frac{12763}{19}} = 113$$

$$2\sigma = 226$$

$$3\sigma = 339$$

Reviewed by: [Signature] Date: 2-8-93

COPY

2 1/2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

3
-38

9
-28

12
21
MEAN

33
+25

34
+36

COPY

INSTRUMENT CONTROL CHART

Equipment H260 I.D. No. 1008

Source Type ALA I.D. No. ALA

Prepared By: TTW Date 2.8.92

Reviewed By: W. Wood Date 2.8.92

Supervisor/Date

64pm / Block

(SAMPLE)

Operating Voltage 900

Mean +2 sigma value 16776

Mean -3 sigma value 16011

Mean +3 sigma value 16929

Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within ± 2 Sigma (Y or N)	Within ± 3 Sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician (Initials)	Supervision Approval (Initials & Date)
							Alpha	Beta		
2/9/93	0915	1.0	16200	Y	Y	Y	NA	23	SUR	2-12-93 JN
2-10-93	0803	1.0	16300	Y	Y	Y	N/A	26	DSH	
2-11-93	0702	1.0	16500	Y	Y	Y	N/A	19	US	
2-12-93	0725	1.0	16200	Y	Y	Y	N/A	17	DSH	
2-13-93	0620	1.0	16700	Y	Y	Y	N/A	18	DSH	2-19-93 JN
2-16-93	1210	1.0	16400	Y	Y	Y	N/A	21	DSH	
2-17-93	1055	1.0	16200	Y	Y	Y	N/A	15	DSH	
2-18-93	0710	1.0	16300	Y	Y	Y	N/A	13	DSH	
2-19-93	0635	1.0	16400	Y	Y	Y	N/A	22	DSH	

COPY

INSTRUMENT CONTROL CHART

Prepared By: APH/6 Date: 2-8-93
 Equipment: HP260 I.D. No. 1001
 Source Type: Co 60 I.D. No. 50025
 Reviewed By: APH/6 Date: 2-8-93
 Supervisor: APH/6 Date: 2-8-93

15 cm / Block

130

116429

+20

16776

MEAN

0.470

-20

16164

-30

1109

COPY

$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ 1 $1\frac{1}{8}$ $1\frac{1}{4}$ $1\frac{1}{2}$ $1\frac{3}{4}$ 2 $2\frac{1}{8}$ $2\frac{1}{4}$ $2\frac{1}{2}$ $2\frac{3}{4}$ 3 $3\frac{1}{8}$ $3\frac{1}{4}$ $3\frac{1}{2}$ $3\frac{3}{4}$ 4 $4\frac{1}{8}$ $4\frac{1}{4}$ $4\frac{1}{2}$ $4\frac{3}{4}$ 5 $5\frac{1}{8}$ $5\frac{1}{4}$ $5\frac{1}{2}$ $5\frac{3}{4}$ 6 $6\frac{1}{8}$ $6\frac{1}{4}$ $6\frac{1}{2}$ $6\frac{3}{4}$ 7 $7\frac{1}{8}$ $7\frac{1}{4}$ $7\frac{1}{2}$ $7\frac{3}{4}$ 8 $8\frac{1}{8}$ $8\frac{1}{4}$ $8\frac{1}{2}$ $8\frac{3}{4}$ 9 $9\frac{1}{8}$ $9\frac{1}{4}$ $9\frac{1}{2}$ $9\frac{3}{4}$ 10

CONTROL CHART PREPARATION FORM

INSTRUMENT I.D. # ESP-2 #1446SOURCE I.D. # C060-50025OPERATING VOLTAGE 900DETECTOR I.D. # HP260 #1001DATE: 2-5-93TECHNICIAN: W. Gammell

(N) MEASUREMENTS	(X) SOURCE COUNT RATE		
1	16500	-30	900
2	16600	-130	16900
3	16500	-30	900
4	16400	70	4900
5	16400	70	4900
6	16200	270	72900
7	16600	-130	16900
8	16300	170	28900
9	16400	70	4900
10	16500	-30	900
11	16700	-230	52900
12	16300	170	28900
13	16600	-130	16900
14	16500	-30	900
15	16600	-130	16900
16	16300	170	28900
17	16200	270	72900
18	16500	-30	900
19	16700	-230	52900
20	16600	-130	16900

Mean Source Count Rate

$$\bar{x} = \frac{\sum x}{N} = \frac{329400}{20} = 16470$$

COPY

Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N-1}} = \sqrt{\frac{442000}{19}} = 153$$

$$2\sigma = 306$$

$$3\sigma = 459$$

Reviewed by: [Signature] 2-8-93
Date

INSTRUMENT CONTROL CHART

Prepared By: W. J. [Signature] Date: 2-8-93
 Reviewed By: [Signature] Date: 2-8-93
 Equipment HP 260 I.D. No. 1001
 Source Type N/A I.D. No. N/A
W. J. [Signature]

6 cpm / Block

34

33

MEAN

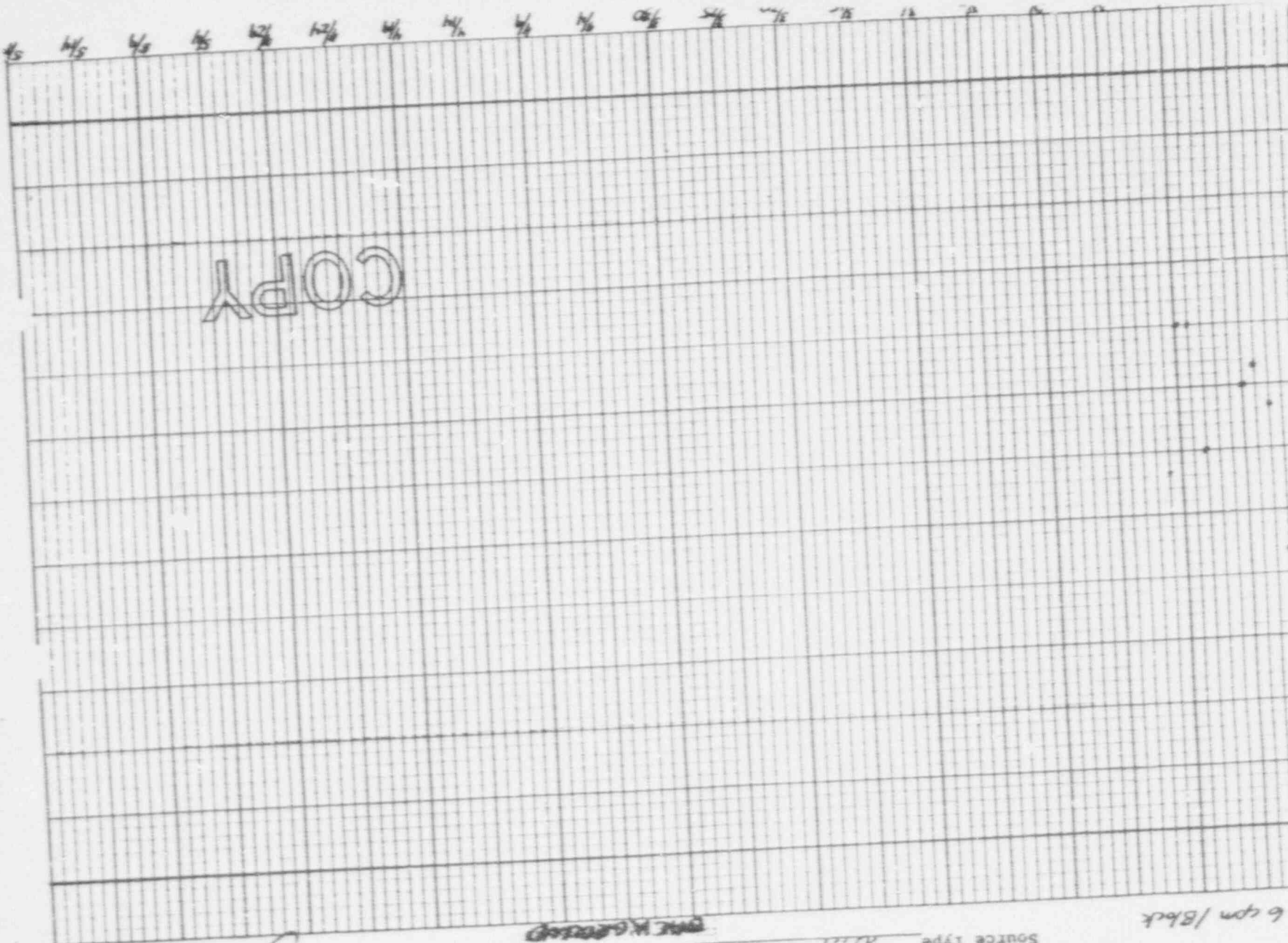
21

20

19

18

COPY



(SAMPLE)

Operating Voltage 900

Mean +2 sigma value 13948

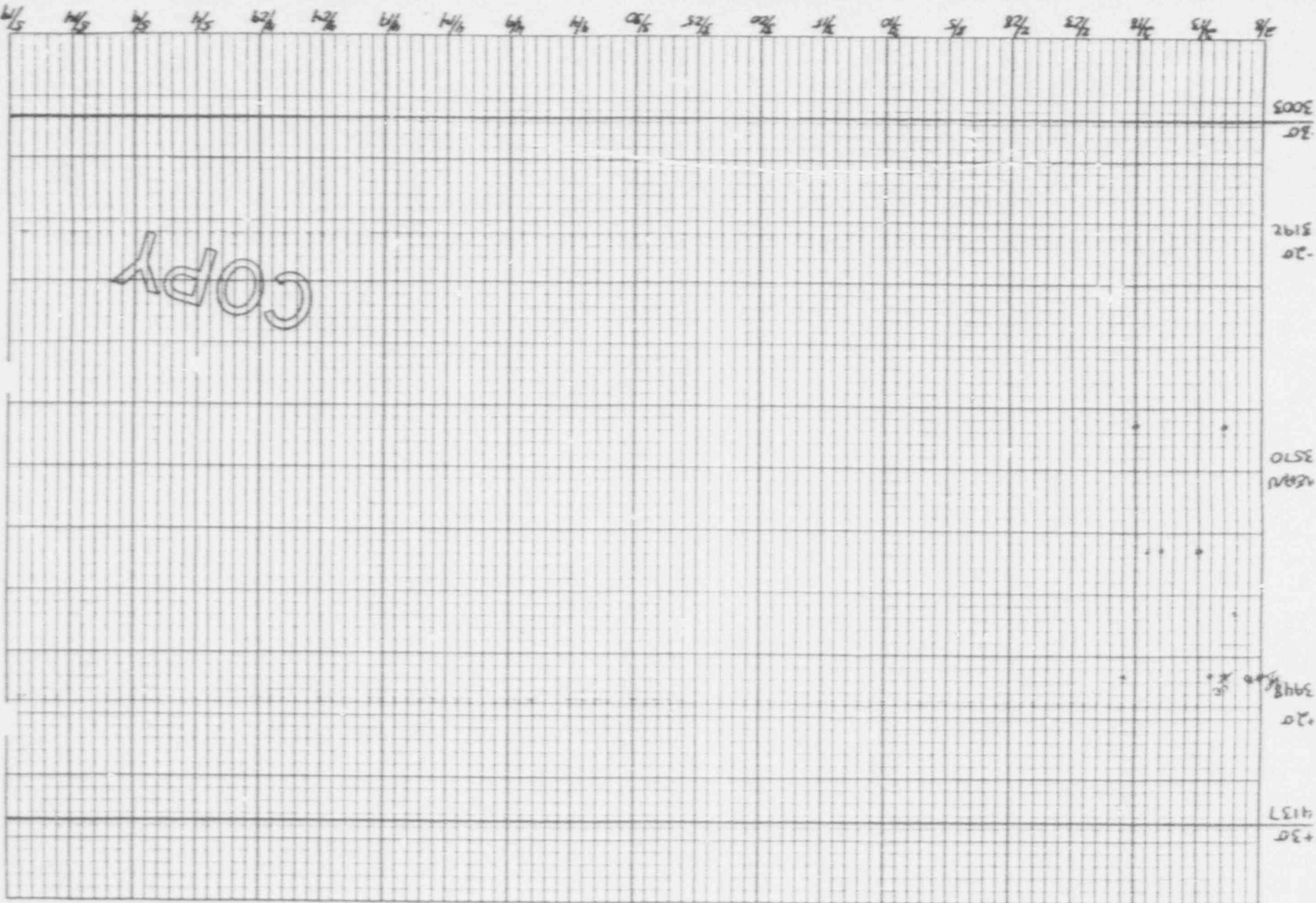
Mean +3 sigma value 14137

[illegible]

SP 61X081.01 Rev. 1
Page 20

INSTRUMENT CONTROL CHART

Equipment HP260 I.D. No. 003
 Source type Co 60 I.D. No. 30023
 Prepared By: PTM/ah 2-8-95
 Reviewed By: _____
 Supervisor/ Date _____



20cpm/Block

CONTROL CHART PREPARAT' FORM

(SAMPLE)

INSTRUMENT I.D. # ESP-2 # 1446 SOURCE I.D. # COCOS.0023
 OPERATING VOLTAGE 900 DETECTOR I.D. # HP260 # 1003
 DATE: 2-4-93 TECHNICIAN: W. Barman

(N) MEASUREMENTS	(x) SOURCE COUNT RATE
1	13700 -130 16900
2	13800 -230 52900
3	13700 -130 16900
4	13900 -330 108900
5	13500 70 4900
6	13500 70 4900
7	13400 170 28900
8	13500 70 4900
9	13600 -30 900
10	13600 -30 900
11	13500 70 4900
12	13500 70 4900
13	13600 -30 900
14	13000 570 324900
15	13600 -30 900
16	13600 -30 900
17	13700 -130 16900
18	13800 -230 52900
19	13400 170 28900
20	13500 70 4900

Mean Source Count Rate

$$\bar{x} = \frac{\sum x}{N} = \frac{271400}{20} = 13570$$

Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N-1}} = \sqrt{\frac{35895}{19}} = 189$$

$$2\sigma = 378$$

$$3\sigma = 567$$

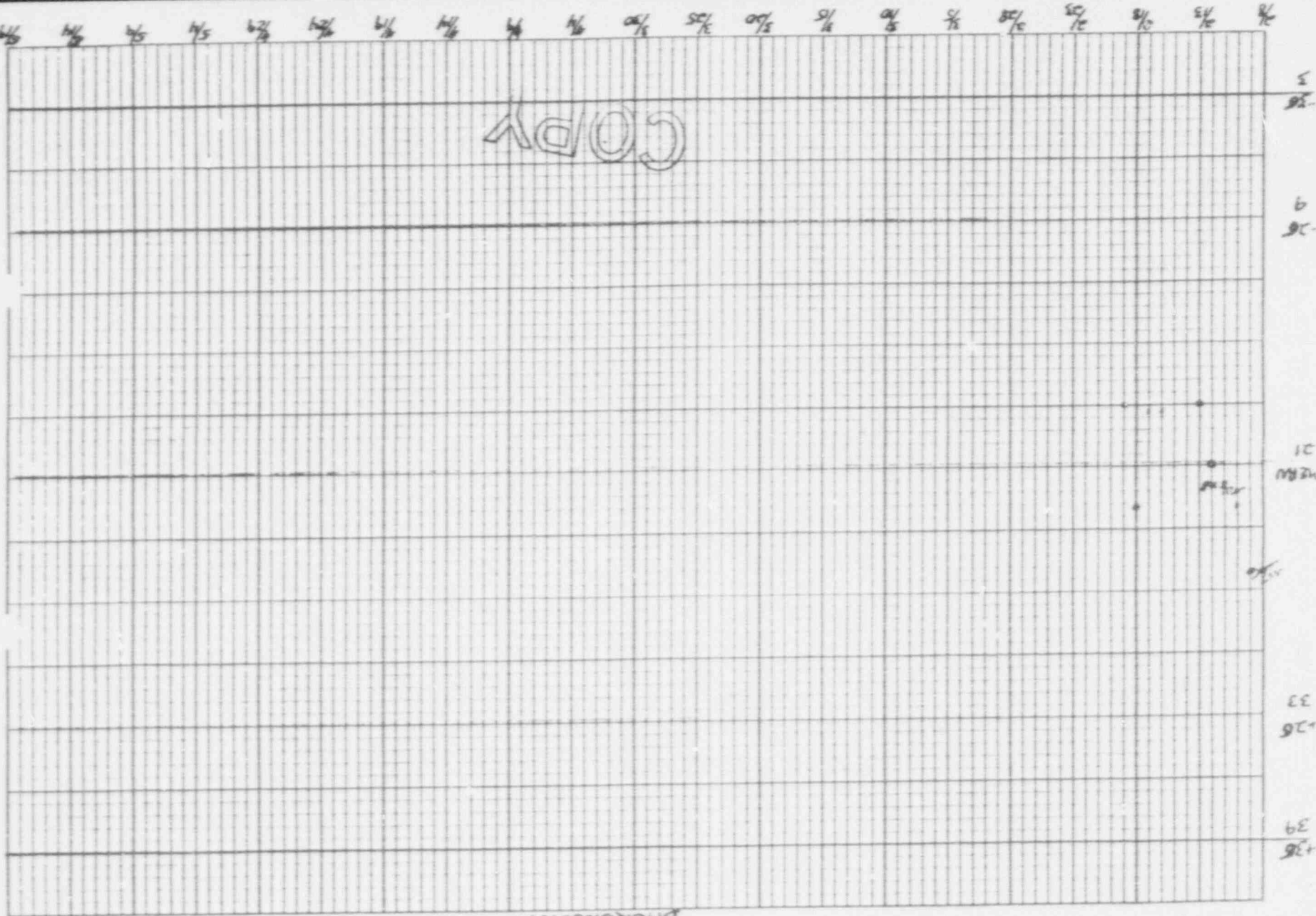
COPY

Reviewed by: [Signature] Date: 2-8-93

INSTRUMENT CONTROL CHART

Prepared By: APR 28 1995 Technician/ Date
 Reviewed By: _____ I.D. No. 1003
 Source Type AL9 I.D. No. AL9
 Equipment HP260
 6 cpm / Block

BACKGROUND



ROUTINE PERFORMANCE AND BACKGROUND DATA FORM

(SAMPLE)

Month JAN / Yr 93

Instrument I.D. #P260 * 1010

Source ID No. n/a

Operating Voltage 900V

Mean Value 21

Mean -2 sigma value 9

Mean +2 sigma value 33

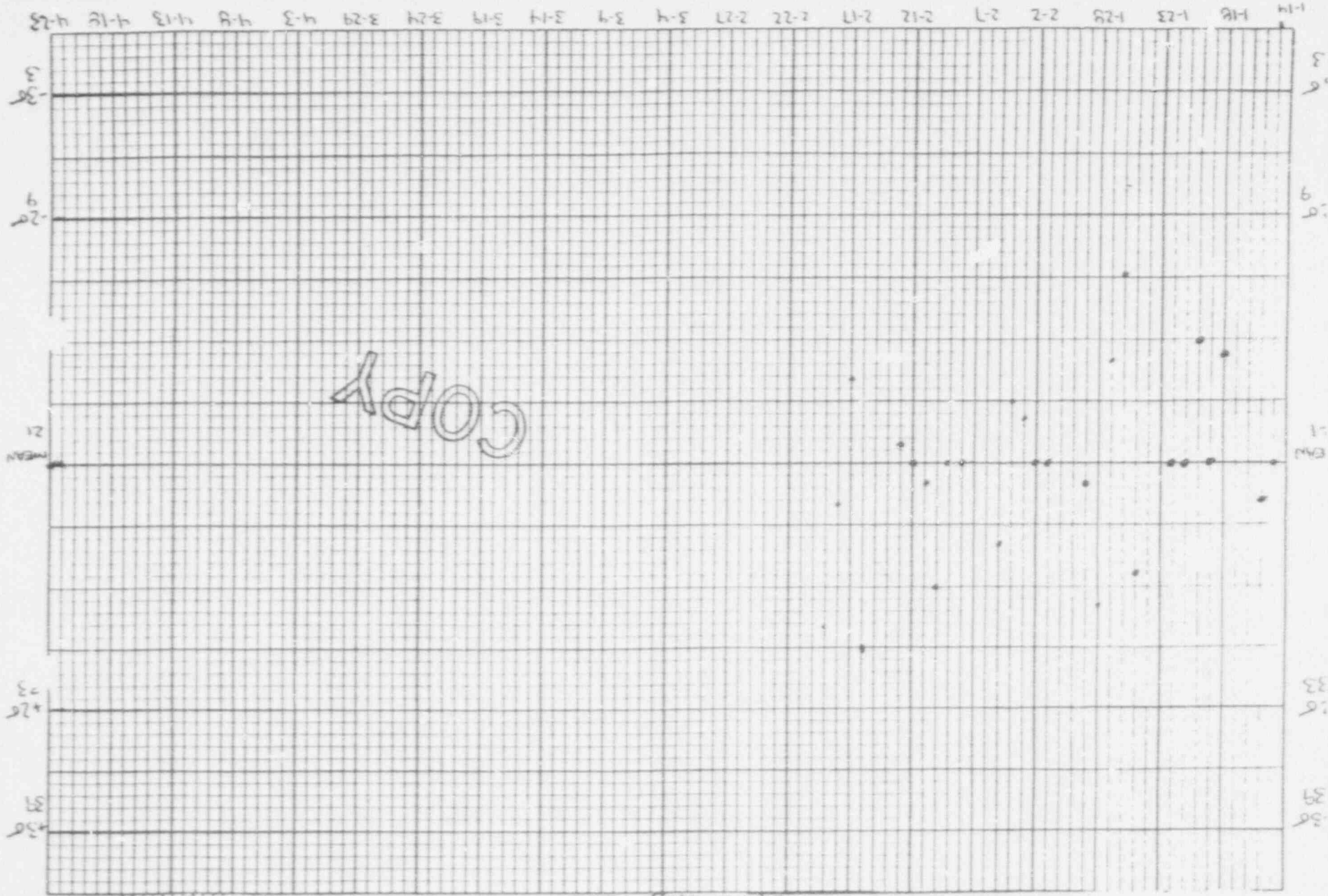
Sigma Value 6

Mean -3 sigma value 3

Mean +3 sigma value 39

Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within 12 Sigma (Y or N)	Within 13 Sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician (Initials)	Supervision Approval (Initials & Date)
							Alpha	Peta		
1-14-93	0940	1.0	21	Y	Y	Y	N/A	21	JS	1-15-93
1-15-93	0620	1.0	23	Y	Y	Y	N/A	23	JS	
1-18-93	0615	1.0	16	Y	Y	Y	N/A	16	JS	
1-19-93	0601	1.0	21	Y	Y	Y	N/A	21	JS	
1-20-93	0613	1.0	15	Y	Y	Y	N/A	15	JS	1-22-93
1-21-93	0705	1.0	21	Y	Y	Y	N/A	21	JS	
1-22-93	0649	1.0	21	Y	Y	Y	N/A	21	JS	
1-25-93	0744	1.0	26	Y	Y	Y	N/A	26	JS	
1-26-93	0600	1.0	10	Y	Y	Y	N/A	10	JS	
1-27-93	0620	1.0	14	Y	Y	Y	N/A	14	JS	1-29-93
1-28-93	0638	1.0	25	Y	Y	Y	N/A	25	JS	
1-29-93	0540	1.0	20	Y	Y	Y	N/A	20	JS	
2-1-93	0620	1.0	21	Y	Y	Y	N/A	21	JS	
2-2-93	0601	1.0	21	Y	Y	Y	N/A	21	JS	
2-3-93	0515	1.0	19	Y	Y	Y	N/A	19	JS	2-5-93
2-4-93	0640	1.0	18	Y	Y	Y	N/A	18	JS	
2-5-93	0547	1.0	25	Y	Y	Y	N/A	25	JS	
2-8-93	0605	1.0	21	Y	Y	Y	N/A	21	JS	
2-9-93	0622	1.0	21	Y	Y	Y	JS	21	JS	
2-10-93	0625	1.0	27	Y	Y	Y	N/A	27	JS	2-12-93
2-11-93	0612	1.0	22	Y	Y	Y	N/A	22	JS	
2-12-93	0630	1.0	21	Y	Y	Y	N/A	21	JS	
2-13-93	0713	1.0	20	Y	Y	Y	N/A	20	JS	
2-16-93	0750	1.0	30	Y	Y	Y	N/A	30	JS	
2-17-93	0611	1.0	17	Y	Y	Y	N/A	17	JS	
2-18-93	0602	1.0	23	Y	Y	Y	N/A	23	JS	2-19-93
2-19-93	0558	1.0	29	Y	Y	Y	N/A	29	JS	

COPY



Prepared By: J. M. [Signature] 1-14-93
 Technician/Date
 Reviewed By: J. M. [Signature] 1-14-93
 Supervisor/Date

Equipment HP 260 I.D. No. 1010
 Source Type Co-60 I.D. No. 50023
 BACKGROUND

0.6 pm [Signature]

1159/6000

Month Jan Yr 93

ROUTINE PERFORMANCE AND BACKGROUND DATA FORM

(SAMPLE)

Instrument I.D. 14260 #1010Source ID No. C660 S 0023 Operating Voltage 900VMean Value 15350Mean -2 sigma value 15094Mean +2 sigma value 15606Sigma Value 128Mean -3 sigma value 14966Mean +3 sigma value 15734

Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within ± 2 Sigma (Y or N)	Within ± 3 Sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician (Initials)	Supervision Approval (Initials & Date)
							Alpha	Beta		
1-14-93	0942	1.0	15400	Y	Y	Y	N/A	21	fw	1-15-93
1-15-93	0635	1.0	15400	Y	Y	Y	N/A	23	fw	
1-18-93	0635	1.0	15400	Y	Y	Y	N/A	16	fw	
1-18-93	0641	1.0	15200	Y	Y	Y	N/A	21	fw	1-22-93
1-20-93	0615	1.0	15100	Y	Y	Y	N/A	15	fw	
1-21-93	0718	1.0	15400	Y	Y	Y	N/A	21	fw	
1-22-93	0652	1.0	15600	Y	Y	Y	N/A	21	fw	1-29-93
1-25-93	0755	1.0	15200	Y	Y	Y	N/A	26	fw	
1-26-93	0655	1.0	15100	Y	Y	Y	N/A	10	fw	
1-27-93	0625	1.0	15100	Y	Y	Y	N/A	16	fw	1-29-93
1-28-93	0712	1.0	15500	Y	Y	Y	N/A	25	fw	
1-29-93	0623	1.0	15500	Y	Y	Y	N/A	21	fw	
1-29-93	0659	1.0	15400	Y	Y	Y	N/A	21	fw	2-5-93
2-3-93	0547	1.0	15200	Y	Y	Y	N/A	19	fw	
2-4-93	0642	1.0	15600	Y	Y	Y	N/A	18	fw	
2-5-93	0547	1.0	15500	Y	Y	Y	N/A	23	fw	2-12-93
2-8-93	0644	1.0	15300	Y	Y	Y	N/A	21	fw	
2-9-93	0624	1.0	15320	Y	Y	Y	N/A	21	fw	
2-10-93	0750	1.0	15100	Y	Y	Y	N/A	27	fw	2-19-93
2-11-93	0614	1.0	15200	Y	Y	Y	N/A	22	fw	
2-12-93	0637	1.0	15600	Y	Y	Y	N/A	21	fw	
2-13-93	0715	1.0	15400	Y	Y	Y	N/A	29	fw	2-19-93
2-16-93	0753	1.0	15400	Y	Y	Y	N/A	30	fw	
2-17-93	0609	1.0	15500	Y	Y	Y	N/A	17	fw	
2-18-93	0612	1.0	15400	Y	Y	Y	N/A	25	fw	2-19-93
2-19-93	0557	1.0	15300	Y	Y	Y	N/A	29	fw	

COPY

CONTROL CHART PREPARATION FORM

(SAMPLE)

INSTRUMENT I.D. # ESPII 1457 SOURCE I.D. # Ce60-S-0023
 OPERATING VOLTAGE 900 DETECTOR I.D. # HP260 1010
 DATE: 1-12-93 TECHNICIAN: P. Juenemann

(N) MEASUREMENTS	(x) SOURCE COUNT RATE
1	15300
2	15000
3	15300
4	15500
5	15300
6	15300
7	15400
8	15200
9	15400
10	15400
11	15300
12	15500
13	15300
14	15300
15	15400
16	15600
17	15300
18	15400
19	15300
20	15500

1 min. count

Mean Source Count Rate

$$\bar{x} = \frac{\sum x}{N} = \frac{307000}{20} = 15350$$

Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N - 1}} = \sqrt{\frac{310000}{19}} = \frac{124.9}{128.1}$$

$$2\sigma = 255 \text{ km}$$

$$2\sigma = 256$$

$$3\sigma = 384$$

Reviewed by: [Signature] Date: 1-12-93

Calculated using statistical program
 HP 41C calculator

ROUTINE PERFORMANCE AND DATA FORM

(SAMPLE)

Month Jan / Yr 93

Instrument I.D. HP 260 1011

Source ID No. NA

Operating Voltage 900

Mean Value 21

Mean -2 sigma value 9

Mean +2 sigma value 33

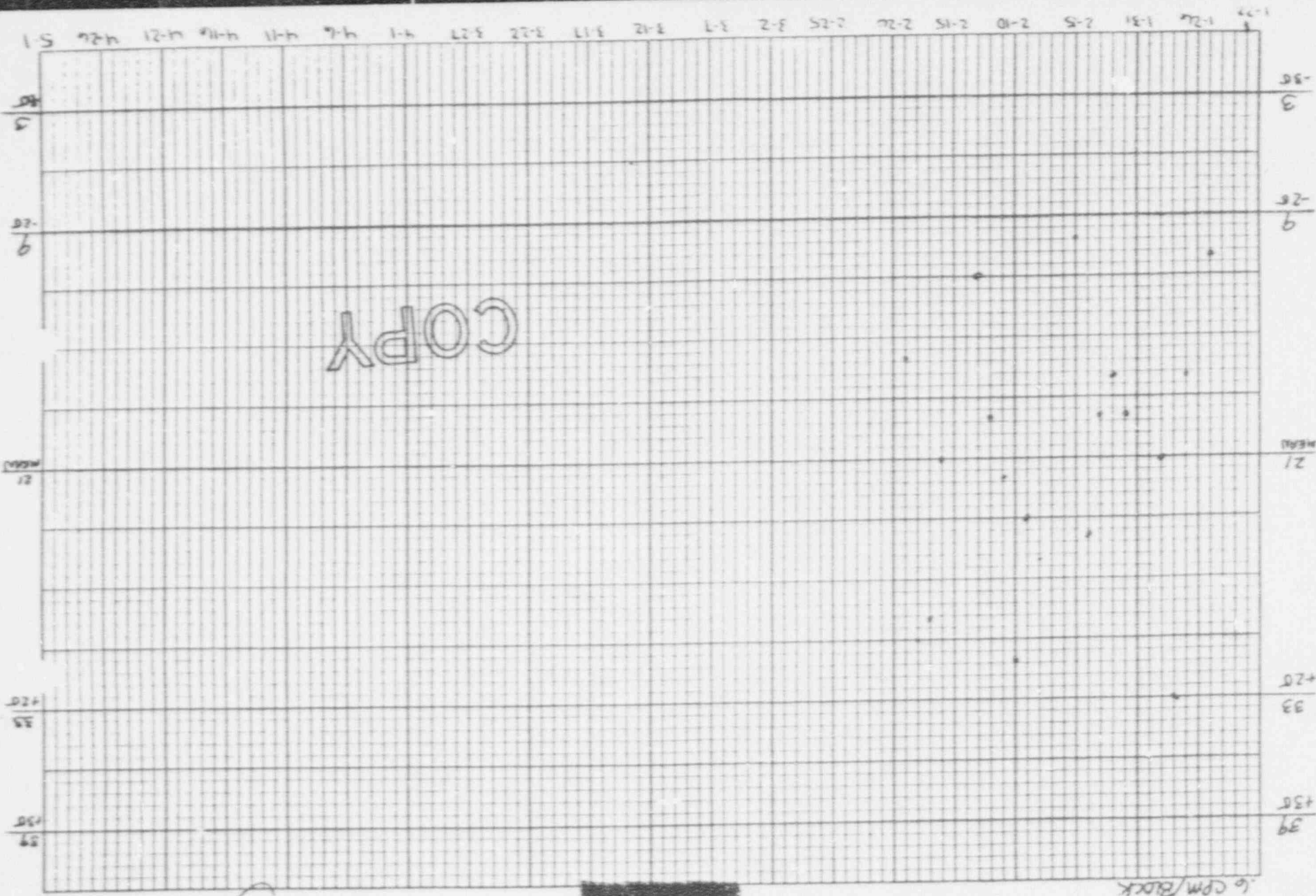
Sigma Value 6

Mean -3 sigma value 3

Mean +3 sigma value 39

Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within t2 Sigma (Y or N)	Within t3 Sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician (Initials)	Supervision Approval (Initials & Date)
							Alpha	Beta		
1-25-93	0109	1.0	11	Y	Y	Y	N/A	11	US	1-24-93 JW
1-26-93	0558	1.0	21	Y	Y	Y	N/A	21	US	
1-27-93	0615	1.0	17	Y	Y	Y	N/A	17	US	
1-28-93	0635	1.0	33	Y	Y	Y	N/A	33	US	
1-29-93	0649	1.0	21	Y	Y	Y	N/A	21	US	
2-1-93	0631	1.0	19	Y	Y	Y	N/A	19	US	2-5-93 JW
2-2-93	0557	1.0	17	Y	Y	Y	N/A	17	US	
2-3-93	0721	1.0	19	Y	Y	Y	N/A	19	US	
2-4-93	0654	1.0	25	Y	Y	Y	N/A	25	US	
2-5-93	0545	1.0	25 ¹⁰	Y	Y	Y	N/A	25 ¹⁰	US	
2-8-93	0525	1.0	26	Y	Y	Y	N/A	26	US	2-12-93 JW
2-9-93	0543	1.0	21	Y	Y	Y	N/A	21	US	
2-10-93	0635	1.0	14	Y	Y	Y	N/A	14	US	
2-11-93	0605	1.0	22	Y	Y	Y	N/A	22	US	
2-12-93	0711	1.0	19	Y	Y	Y	N/A	19	US	
2-13-93	0635	1.0	12	Y	Y	Y	N/A	12	US	2-19-93 JW
2-16-93	0805	1.0	21	Y	Y	Y	N/A	21	US	
2-17-93	1015	1.0	29	Y	Y	Y	N/A	29	US	
2-18-93	1045	1.0	30	Y	Y	Y	N/A	30	US	
2-19-93	0654	1.0	16	Y	Y	Y	N/A	16	US	

COPY



Prepared By: [Signature] Date: 1-22-93
 Equipment: HP 260 I.D. No. 1011
 Source Type: NH I.D. No. NH
 Reviewed By: [Signature] Date: 1-25-93
 Supervisor: [Signature] Date: 1-25-93

INSTRUMENT CONTROL CHART

5H-4A

ROUTINE PERFORMANCE AND BACKGROUND DATA FORM

(SAMPLE)

Month 1 Yr 93Instrument I.D. HP260 1011Source ID No. C60-S-0023Operating Voltage 900Mean Value 14805Mean -2 sigma value 14605Mean +2 sigma value 15005Sigma Value 100Mean -3 sigma value 14505Mean +3 sigma value 15105

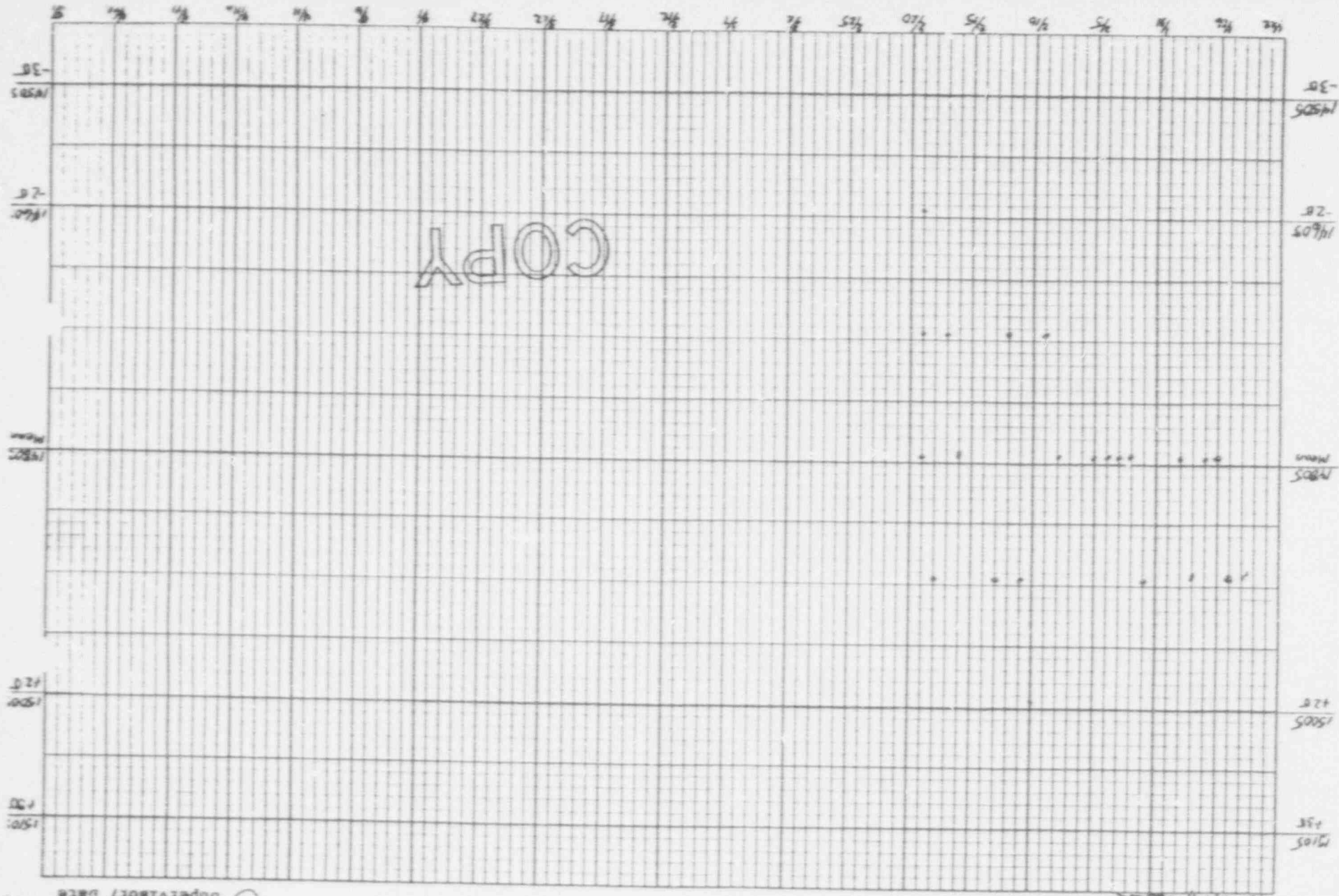
Date	Time	Source Count Time (Min)	Gross Count Rate X (cpm)	Within ± 2 Sigma (Y or N)	Within ± 3 Sigma (Y or N)	Control Chart updated (Y or N)	Background (cpm)		Technician (Initials)	Supervision Approval (Initials & Date)
							Alpha	Beta		
1-25-93	0818	1.0	14900	Y	Y	Y	N/A	11	WS	
1-26-93	2620	1.0	14800	Y	Y	Y	N/A	21	WS	
1-27-93	0633	1.0	14800	Y	Y	Y	N/A	17	WS	
1-28-93	0713	1.0	14900	Y	Y	Y	N/A	23	WS	1-29-93
1-29-93	0746	1.0	14800	Y	Y	Y	N/A	21	WS	for
2-1-93	0634	1.0	14900	Y	Y	Y	N/A	19	WS	
2-2-93	0735	1.0	14800	Y	Y	Y	N/A	17	WS	
2-3-93	0723	1.0	14800	Y	Y	Y	N/A	19	N/A	2-5-93
2-4-93	0635	1.0	14800	Y	Y	Y	N/A	15	WS	for
2-5-93	0700	1.0	14800	Y	Y	Y	N/A	10	WS	
2-8-93	0719	1.0	14800	Y	Y	Y	N/A	26	N/A	
2-9-93	0545	1.0	14700	Y	Y	Y	N/A	21	WS	
2-10-93	0635	1.0	15000	Y	Y	Y	N/A	14	WS	2-12-93
2-11-93	0611	1.0	14900	Y	Y	Y	N/A	22	WS	for
2-12-93	0730	1.0	14700	Y	Y	Y	N/A	19	WS	
2-13-93	0640	1.0	14900	Y	Y	Y	N/A	12	WS	
2-16-93	0615	1.0	14800	Y	Y	Y	N/A	21	WS	
2-17-93	1015	1.0	14700	Y	Y	Y	N/A	39	WS	
2-18-93	1047	1.0	14900	Y	Y	Y	N/A	30	WS	2-19-93
2-19-93	0653	1.0	14600	Y	Y	Y	N/A	16	WS	for
2-19-93	0658	1.0	14700	Y	Y	Y	N/A	16	WS	
2-19-93	0659	1.0	14800	Y	Y	Y	N/A	16	WS	

COPY

INSTRUMENT CONTROL CHART

Prepared By: /-21-2
 Equipment HP 2605 I.D. No. 1011
 Source Type Color I.D. No. S-0023
 Reviewed By: /-25-93
 Supervisor/ Date

10 cpm/Block



CONTROL CHART PREPARATION

(SAMPLE)

INSTRUMENT I.D. # ESP II 1463 SOURCE I.D. # Co60-S-0023
 OPERATING VOLTAGE 900 DETECTOR I.D. # HP 260 1011
 DATE: 1-12-93 TECHNICIAN: P. Juenemann

(N) MEASUREMENTS	(x) SOURCE COUNT RATE
1	15000
2	14700
3	14800
4	14800
5	14900
6	14900
7	14700
8	14900
9	14800
10	14700
11	14700
12	14900
13	14900
14	14800
15	14700
16	14800
17	14900
18	14800
19	14600
20	14800

1 min. count

Mean Source Count Rate

$$\bar{x} = \frac{\sum x}{N} = \frac{296100}{20} = 14805$$

Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N - 1}} = \sqrt{\frac{121500}{19}} = 79.1$$

2σ = 200
3σ = 300

Reviewed by: [Signature] Date: 1-12-93