

**RADIOLOGICAL SURVEY OF
BUILDING ROOFS**

JULY 17, 2000

**WESTINGHOUSE ELECTRIC CORPORATION
BLAIRSVILLE, PA**

REPORT # 004

RADIOLOGICAL SURVEY OF
BUILDING ROOFS

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RADIOLOGICAL SURVEY OF BUILDING ROOFS

Purpose

The Westinghouse Blairsville Site utilized nuclear materials during the period of the mid to late 1950's to the early part of the 1960's. Work was performed both under licenses with the atomic Energy Commission and for the Bettis Atomic Power Laboratory. Although all work ceased during the 1960's, subsequent radiological surveys and investigations, starting in 1993, established that some residual radioactivity, primarily in underground piping and subsurface soil contamination, existed on the site. During the period of 1993 through the present, additional remediation work and radiological surveys have been conducted to establish that the site can be released for unrestricted use. This series of reports documents the results of the final status radiological surveys subsequent to the various remediation efforts.

Scope

This report compiles information on the roof surveys performed on buildings 1 and 4 at the Blairsville site. Included in the report is the survey data sheets with the conversion of the results into units comparable with the acceptance criteria, statistical analysis of the survey data in order to determine if the radiological acceptance criteria have been met at the desired degree of confidence, a compiled statistics table, and data trend visualization plots. Report #006 provides the general information relative to the final radiological surveys of buildings under this program. Refer to that report for the following information:

- 1) Site Description
- 2) Radiological Acceptance Criteria
- 3) Survey Classification System
- 4) Classification of Building Area
- 5) Selection of Survey Instruments and Instrument Characterization
- 6) System for Identification of Survey Point Locations
- 7) Statistical Analysis of Survey Results
- 8) Survey Protocol

Much of the general information for the building surveys is applicable to the roof surveys. The following discussion provides specific information related to the roof surveys.

RADIOLOGICAL SURVEY OF BUILDING ROOFS

Discussion

Appendix A provides a listing of all of the survey numbers, sections, units, and sub-units that were analyzed. Survey section diagrams of buildings 1 and 4 roofs are included for location referencing also. Appendix B presents the summary table of the compiled statistical analysis of the radiological survey data. Appendices C and D present a graphical depiction of the radiological survey results for Buildings 1 and 4 respectively. These graphs include the survey results for fixed alpha, fixed beta, and the beta scan (maximum and average) only. Other survey measurements included in Appendix B are not presented graphically.

Only the roofs of Buildings 1 and 4 were included in the roof surveys because only Building 1 and section 4-18-1 of Building 4 existed during the period of use of licensed materials. The other buildings were added at later dates and have no recorded use of radioactive material as is further evidenced by the results of surveys conducted within all buildings.

Appendix E presents the graphical results of the radiological survey of the accessible internal surfaces of the roof drains and vents. Because the instrument used was not calibrated to convert the meter output into a measurement consistent with a release criteria (i.e. DPM/100cm²) the data results are qualitative in nature. The only comparison that can be appropriately made is the comparison that can be made against the normal instrument background, which ranged from 20 to 40 CPM. The graphs of Appendix E have the instrument background subtracted.

Appendix F presents all of the radiological survey data converted to the appropriated units, if required, for comparison against the applicable criteria. See Report #006 for the appropriate survey sheets by serial number, to review the "as recorded" survey data.

Conclusions

Based on the radiological surveys of the roofs for Buildings 1 and 4, these roofs meet all applicable criteria for release for unrestricted use.

APPENDIX A
ROOF SURVEY LOG
AND ROOF SECTIONING MAP

REPORT # 004

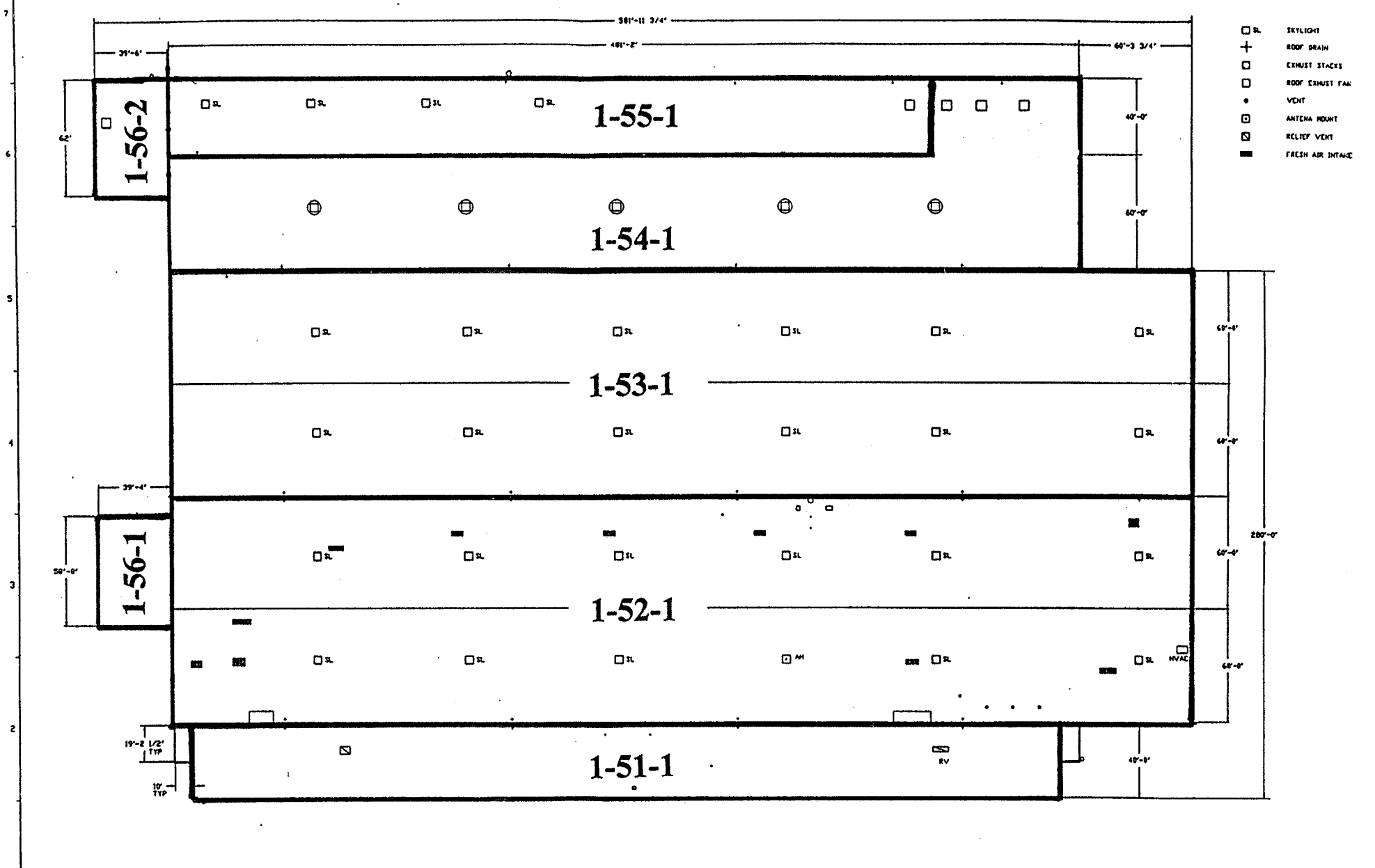
Roof Survey Log

Survey Serial Number	Survey Date	Section	Unit	Sub- Unit	Number of Survey Points	Type	Classification	Total Unit Size (sq. ft.)	Total Unit Size (sq. M.)
01-419	8/13/95	1	51	1	30	ROOFTOP	1	18880	1754.5
01-420	8/17/95	1	52	1	30	ROOFTOP	1	64426	6045
01-421	8/18/95	1	53	1	30	ROOFTOP	1	64426	6045
01-422	8/19/95	1	54	1	30	ROOFTOP	1	30600	2846
01-427	8/29/95	1	55	1	30	ROOF	1	15680	1421
01-428	8/29/95	1	56	2	30	ROOF	1	5040	468.4
01-429	8/30/95	1	56	1	30	ROOF	1	5040	468.4
04-019	8/30/95	4	18	1	30	ROOF	1	12800	189.6
ALL	8/--/95	All	All	All	42	DRAINS & VENTS	1	N/A	N/A

MAIN BUILDING ROOF

647J483

- SKYLIGHT
- ⊕ ROOF DRAIN
- EXHAUST STACKS
- ROOF EXHAUST FAN
- VENT
- ANTENNA MOUNT
- RELIEF VENT
- FRESH AIR INTAKE



1
 2
 3
 4
 5
 6
 7

K
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 H
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K
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	DATE 10/1/77	DATE 10/1/77	
PROJECT MAIN BUILDING ROOF PLAN LAYOUT		DRAWING NO. 647J483	

DIE SHOP ROOF

4-18-1

4-19-1

APPENDIX B

ROOF COMPILED STATISTICAL ANALYSIS

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Roof Compiled Statistics

Sort #	Location Code	Number of Survey Points	Minimum Value	Maximum Value	Average Value	Standard Deviation	Radiological Acceptance Criteria	Units
Gross Gamma (at 1 meter above surface)								
1	1:51	30	5	8	6.20	0.66	15	(@1m) microR/hr
1	1:52	30	5	9	5.87	0.97	15	(@1m) microR/hr
1	1:53	30	4	6	4.97	0.67	15	(@1m) microR/hr
1	1:54	30	4	6	5.00	0.64	15	(@1m) microR/hr
1	1:55	30	4	7	5.63	0.67	15	(@1m) microR/hr
1	1:56	30	5	8	6.60	0.89	15	(@1m) microR/hr
1	4:18	30	5	8	6.33	0.80	15	(@1m) microR/hr
Gross Beta/ Gamma (on contact with surface)								
2	1:51	30	0.007	0.064	0.017	0.013	0.20	mR/hr
2	1:52	30	0.010	0.025	0.014	0.005	0.20	mR/hr
2	1:53	30	0.010	0.020	0.014	0.004	0.20	mR/hr
2	1:54	30	0.010	0.025	0.015	0.005	0.20	mR/hr
2	1:55	30	0.007	0.019	0.013	0.003	0.20	mR/hr
2	1:56	30	0.007	0.018	0.013	0.003	0.20	mR/hr
2	4:18	30	0.005	0.016	0.010	0.003	0.20	mR/hr
Alpha DPM (fixed measurement at survey point)								
3	1:51	30	23.58	99.06	58.81	20.08	5000	DPM/100cm2
3	1:52	30	9.43	89.62	44.18	20.15	5000	DPM/100cm2
3	1:53	30	-9.43	108.49	43.24	22.37	5000	DPM/100cm2
3	1:54	30	23.58	117.92	59.43	22.46	5000	DPM/100cm2
3	1:55	30	33.02	226.42	114.62	49.35	5000	DPM/100cm2
3	1:56	30	0.00	113.21	45.13	32.13	5000	DPM/100cm2
3	4:18	30	-9.43	66.04	34.91	21.26	5000	DPM/100cm2
Beta DPM (fixed measurement at survey point)								
4	1:51	30	-124.28	190.75	23.22	85.46	5000	DPM/100cm2
4	1:52	30	-37.57	320.81	94.89	89.66	5000	DPM/100cm2
4	1:53	30	-26.01	283.24	118.02	78.27	5000	DPM/100cm2
4	1:54	30	-40.46	289.02	83.82	89.43	5000	DPM/100cm2
4	1:55	30	0.00	459.54	234.10	116.95	5000	DPM/100cm2
4	1:56	30	-63.58	219.65	68.88	63.77	5000	DPM/100cm2
4	4:18	30	43.35	277.46	148.07	58.50	5000	DPM/100cm2
Beta Scan Max (maximum of scan near survey point)								
5	1:51	30	-37.57	1294.80	287.67	259.01	15000	DPM/100cm2
5	1:52	30	106.94	708.09	286.80	114.77	15000	DPM/100cm2
5	1:53	30	135.84	549.13	317.92	106.05	15000	DPM/100cm2
5	1:54	30	144.51	528.90	324.18	100.90	15000	DPM/100cm2
5	1:55	30	309.25	658.96	473.22	111.55	15000	DPM/100cm2
5	1:56	30	101.16	627.17	318.98	143.99	15000	DPM/100cm2
5	4:18	30	208.09	552.02	363.78	90.71	15000	DPM/100cm2
Beta Scan Avg. (average of scan near survey point)								
6	1:51	30	-141.62	205.20	-14.45	83.01	5000	DPM/100cm2
6	1:52	30	-8.67	164.74	68.40	57.47	5000	DPM/100cm2
6	1:53	30	-11.56	219.65	110.79	66.46	5000	DPM/100cm2
6	1:54	30	-40.46	132.95	55.88	42.49	5000	DPM/100cm2
6	1:55	30	-60.69	372.83	180.15	105.26	5000	DPM/100cm2
6	1:56	30	-86.71	297.69	46.53	94.24	5000	DPM/100cm2
6	4:18	30	-14.45	216.76	127.17	67.18	5000	DPM/100cm2
Removable Alpha (alpha smear near survey point)								
7	1:51	30	-0.99	3.43	-0.30	1.14	1000	DPM/100cm2
7	1:52	30	-0.99	1.96	-0.20	1.08	1000	DPM/100cm2
7	1:53	30	-0.99	7.85	0.39	1.97	1000	DPM/100cm2
7	1:54	30	-0.99	1.96	-0.45	0.82	1000	DPM/100cm2

Roof Compiled Statistics

7	1:55	30	-1.61	5.77	0.06	2.00	1000	DPM/100cm2
7	1:56	30	-1.61	2.82	-0.38	1.51	1000	DPM/100cm2
7	4:18	30	-1.61	5.77	0.11	1.55	1000	DPM/100cm2

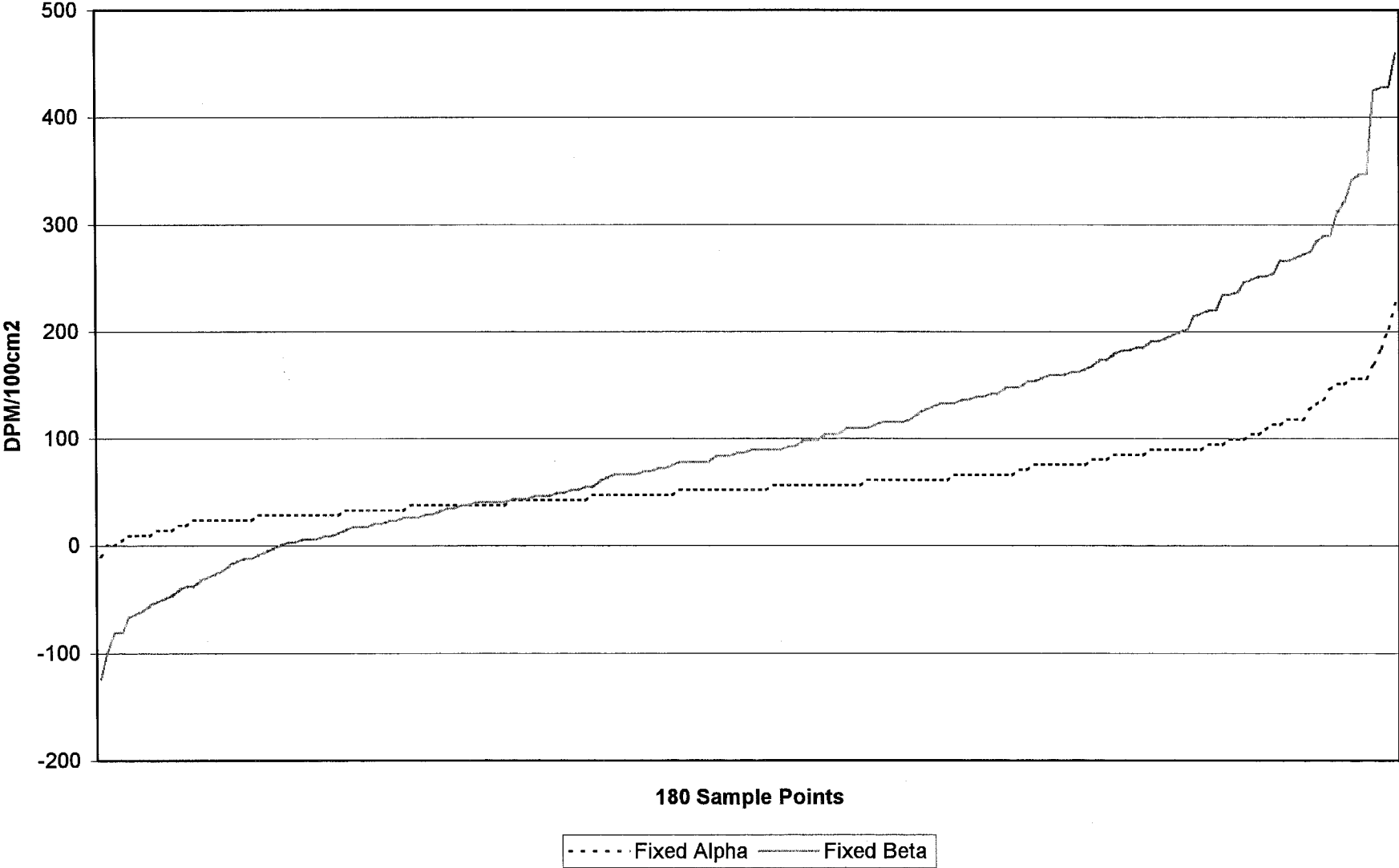
Removable Beta (beta smear near survey point)

8	1:51	30	-3.13	7.50	0.90	2.99	1000	DPM/100cm2
8	1:52	30	-3.13	7.50	1.65	2.56	1000	DPM/100cm2
8	1:53	30	-3.13	8.83	0.54	2.79	1000	DPM/100cm2
8	1:54	30	-4.46	11.49	-0.08	3.01	1000	DPM/100cm2
8	1:55	30	-4.55	8.82	-0.27	3.01	1000	DPM/100cm2
8	1:56	30	-5.88	6.15	-1.03	2.86	1000	DPM/100cm2
8	4:18	30	-4.55	7.49	0.36	3.15	1000	DPM/100cm2

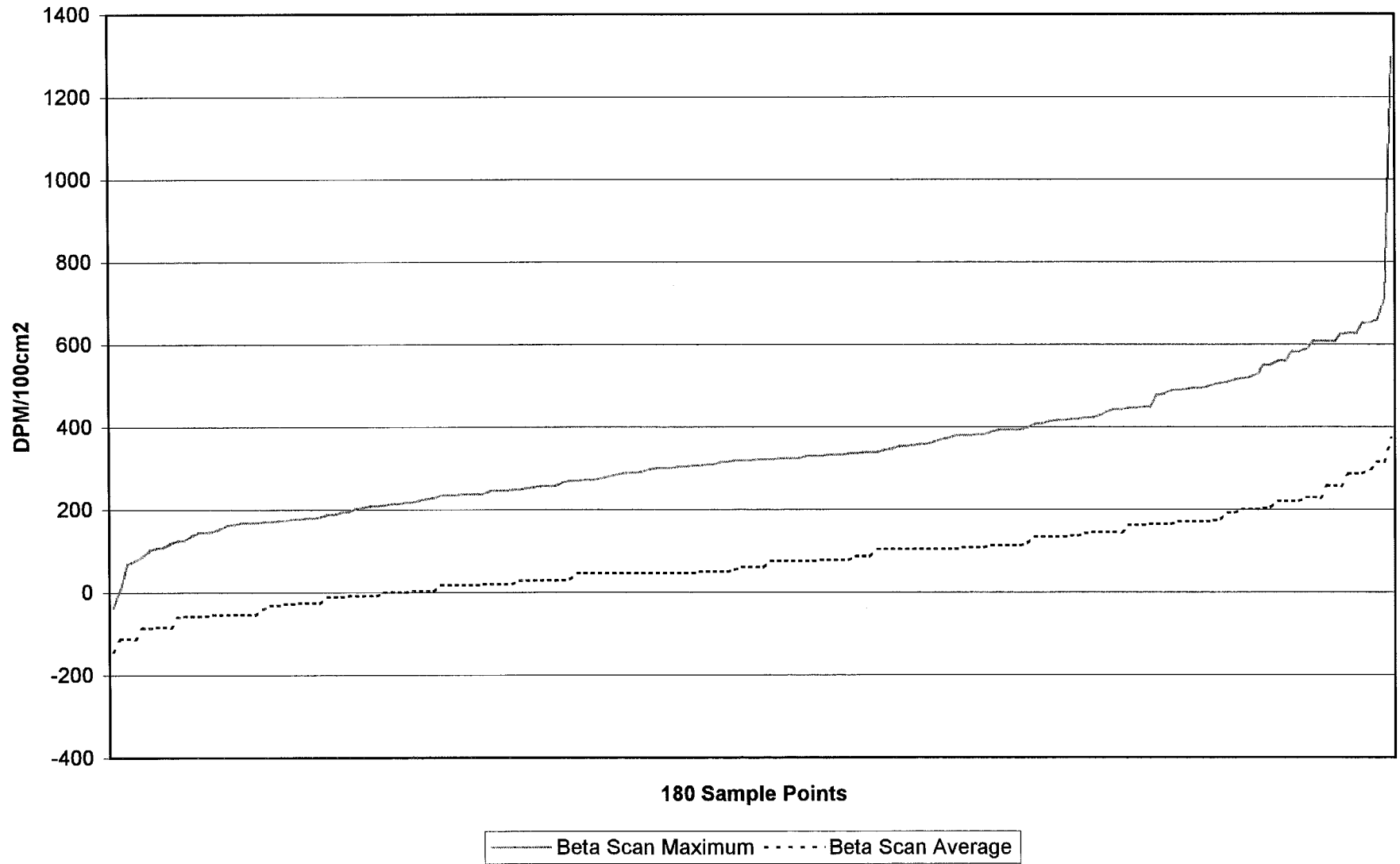
APPENDIX C
BUILDING 1 DATA TRENDS

REPORT #004

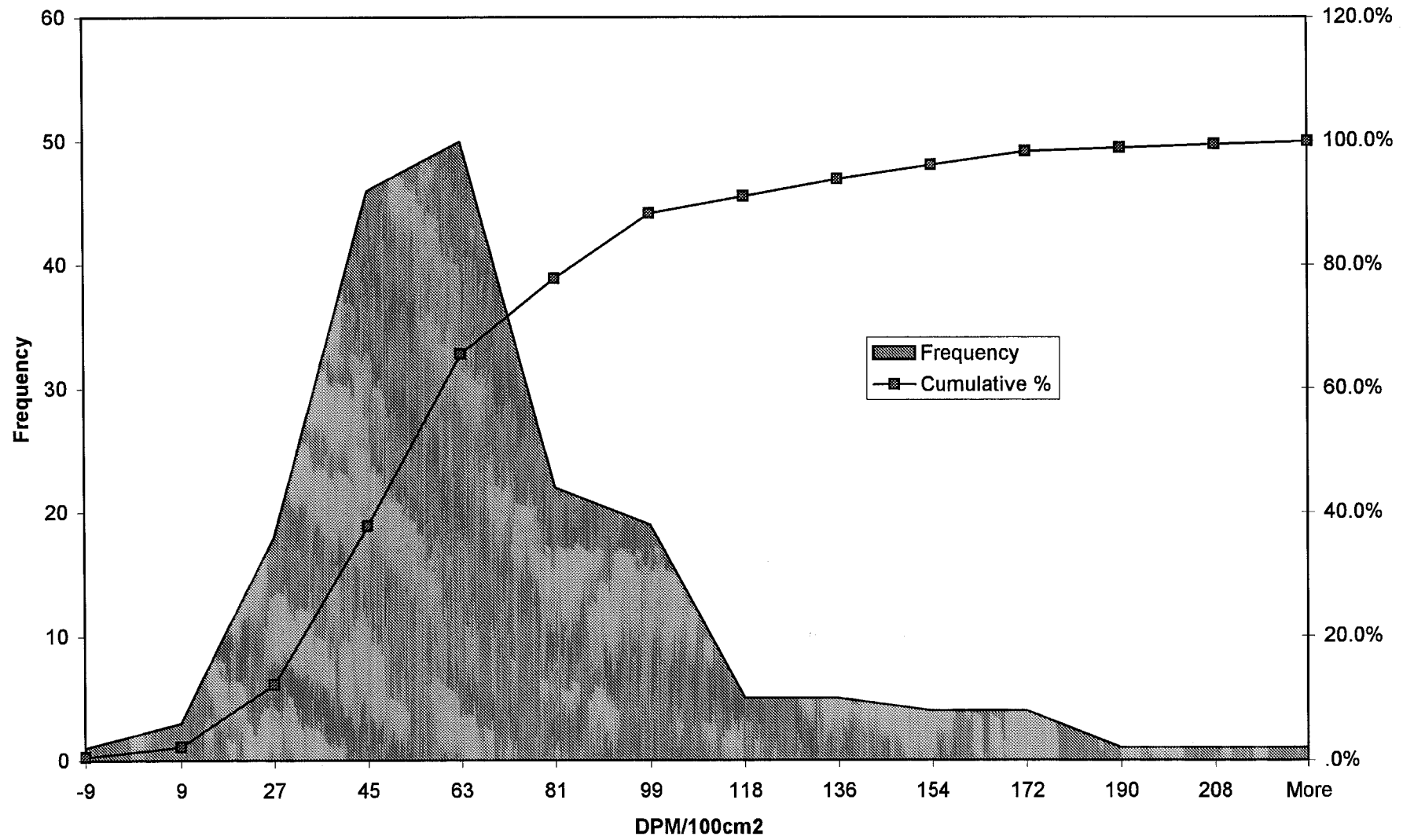
Roof Unit 1-All Data Trends



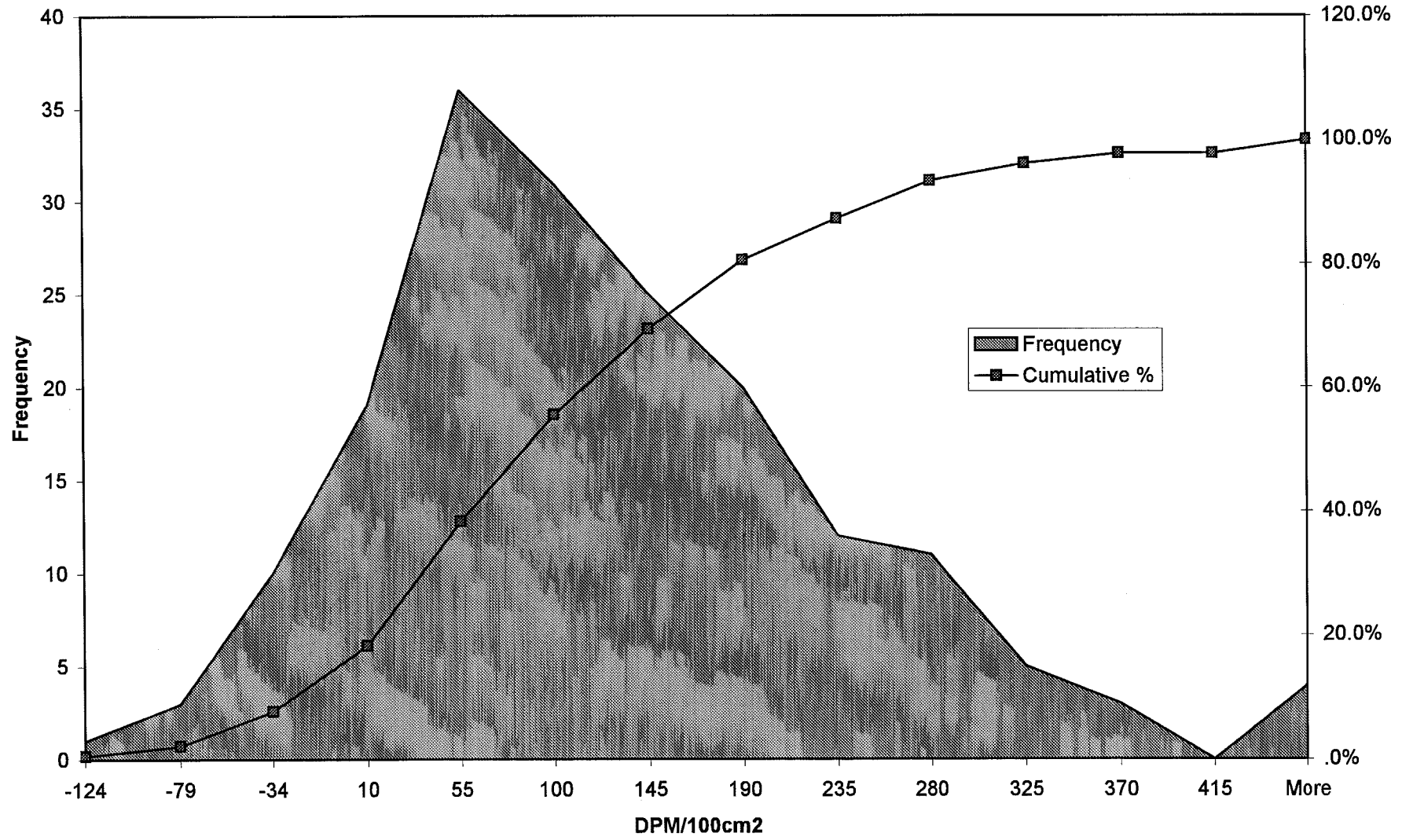
Roof Unit 1-All Data Trends



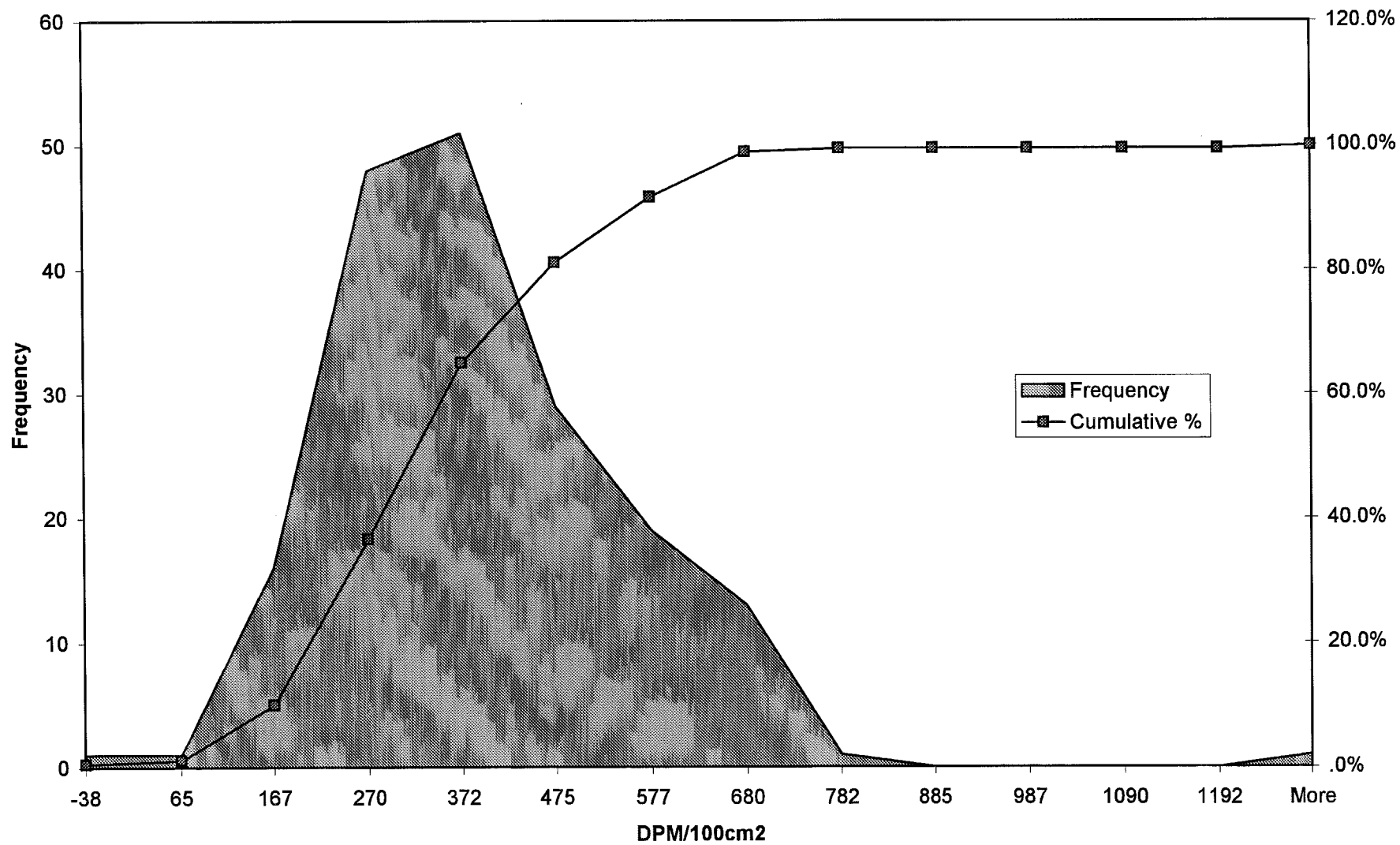
Roof Unit 1-All Fixed Alpha Histogram



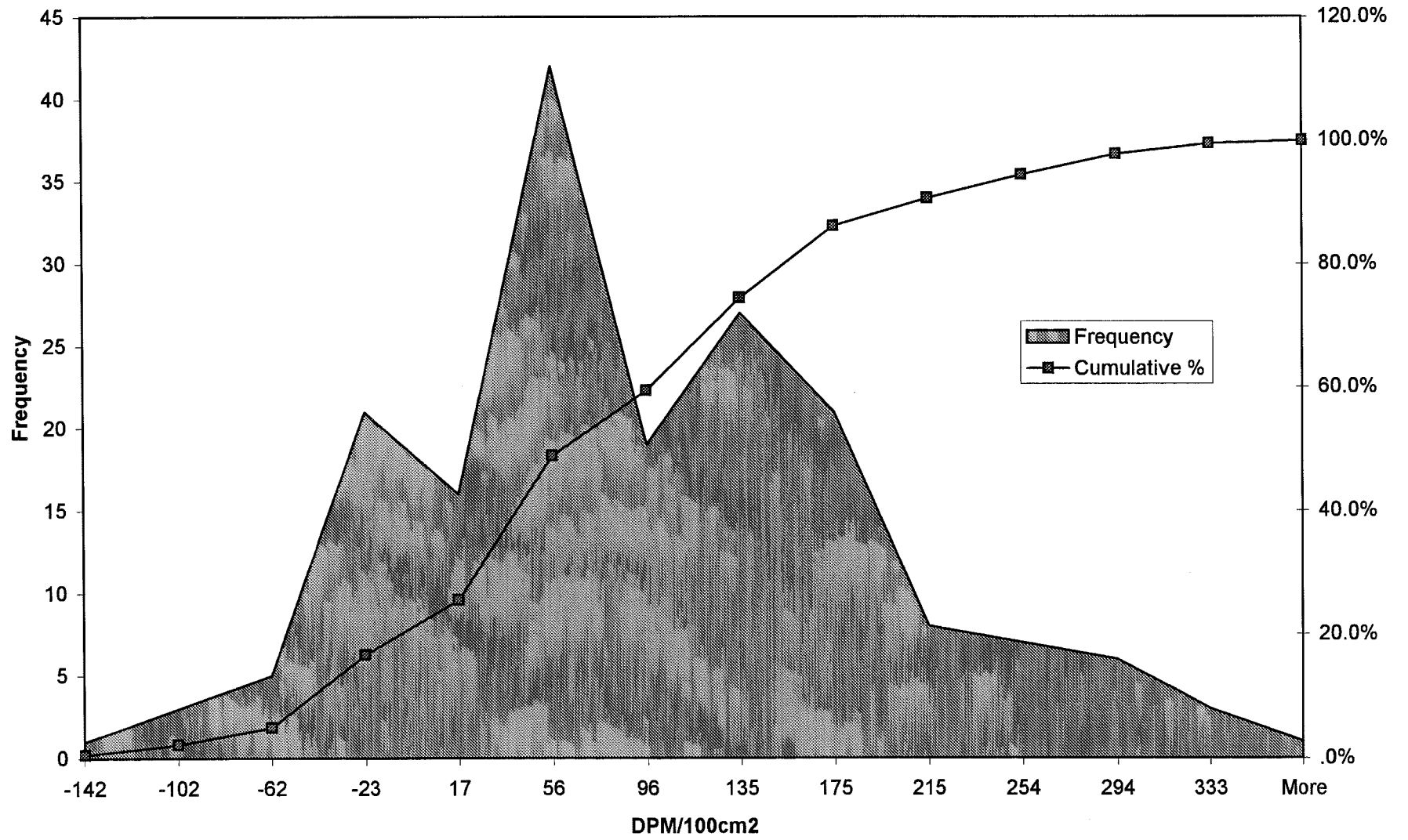
Roof Unit 1-All Fixed Beta Histogram



Roof Unit 1-All Beta Scan Maximum Histogram



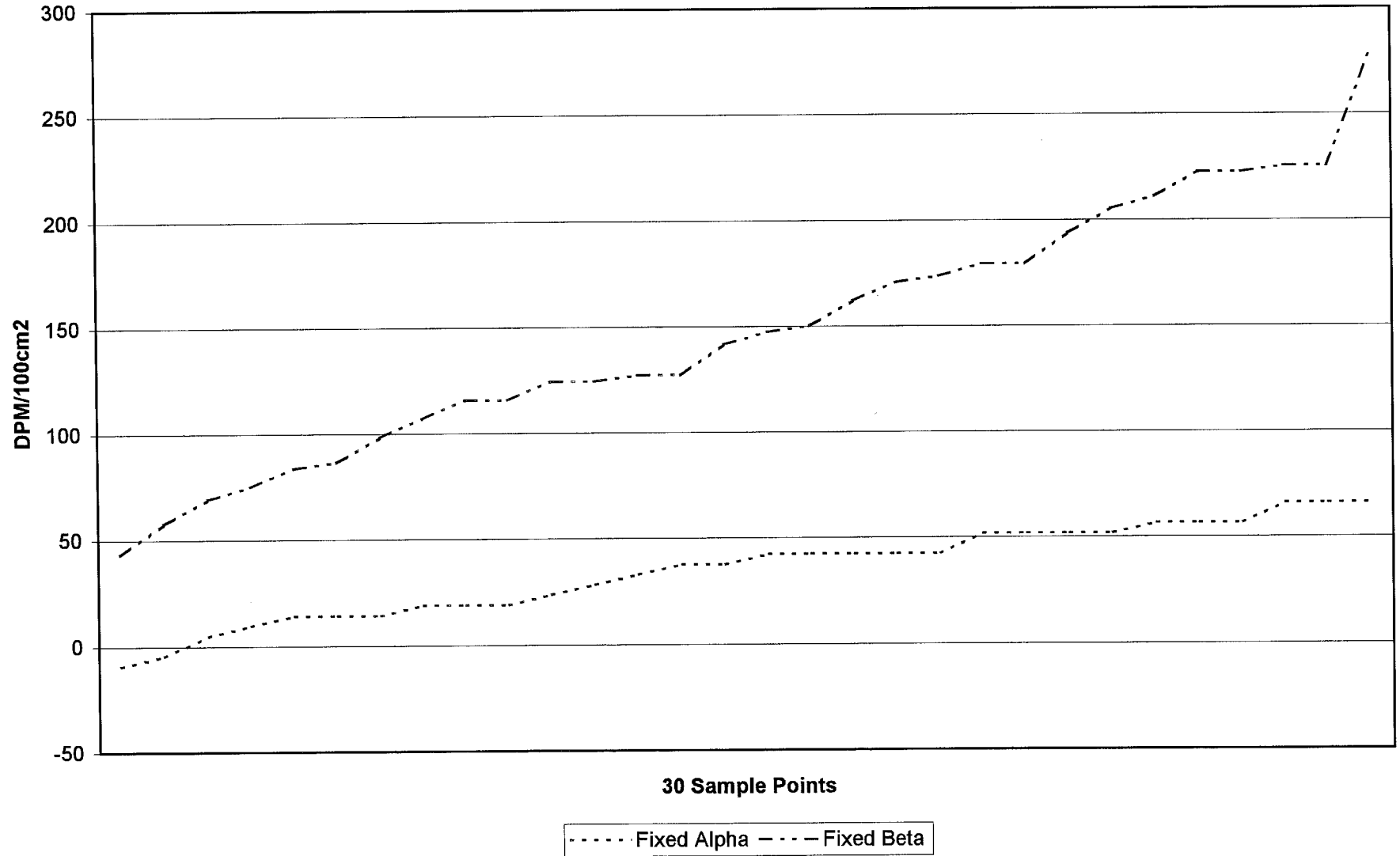
Roof Unit 1-All Beta Scan Average Histogram



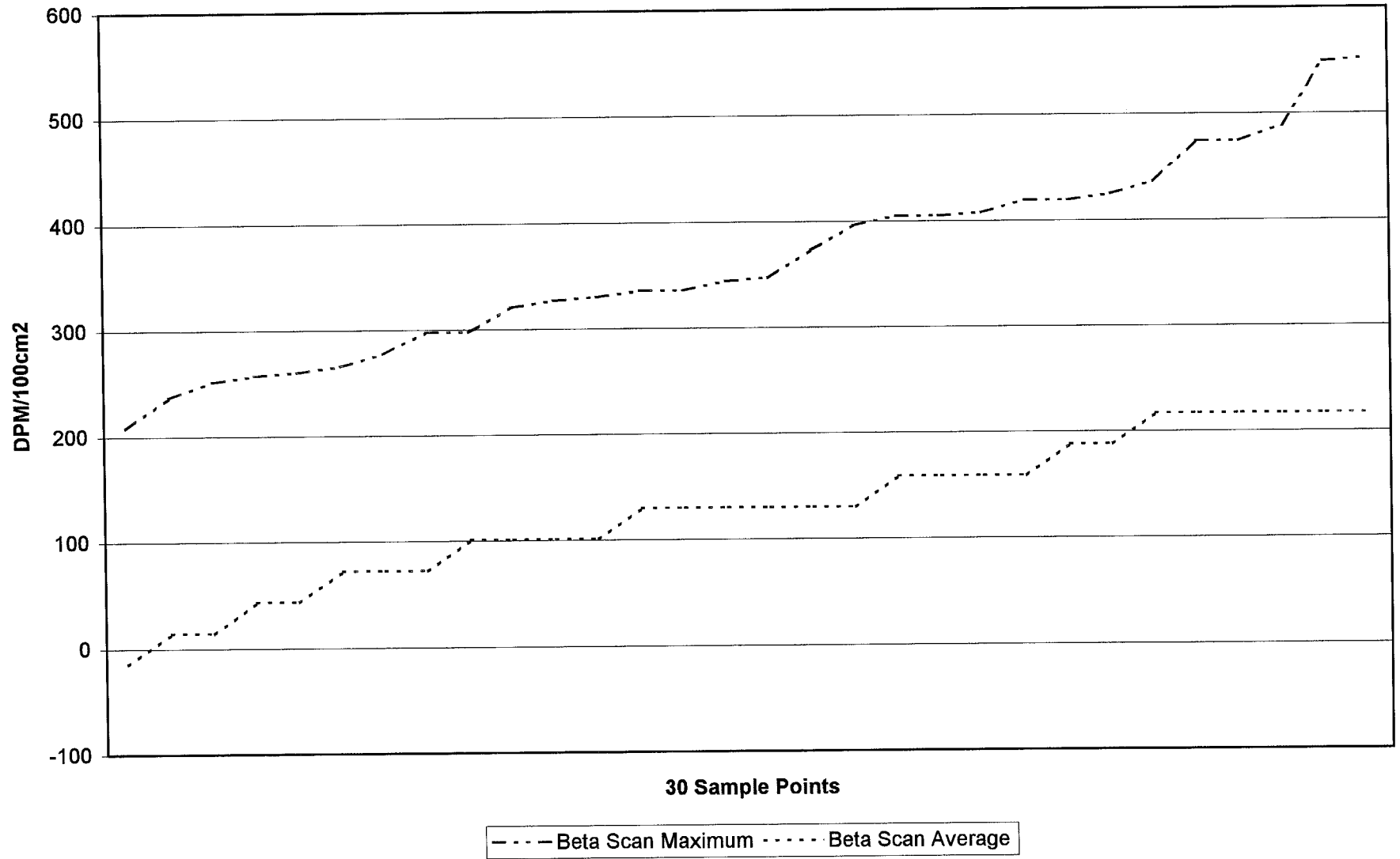
APPENDIX D
BUILDING 4 DATA TRENDS

REPORT #004

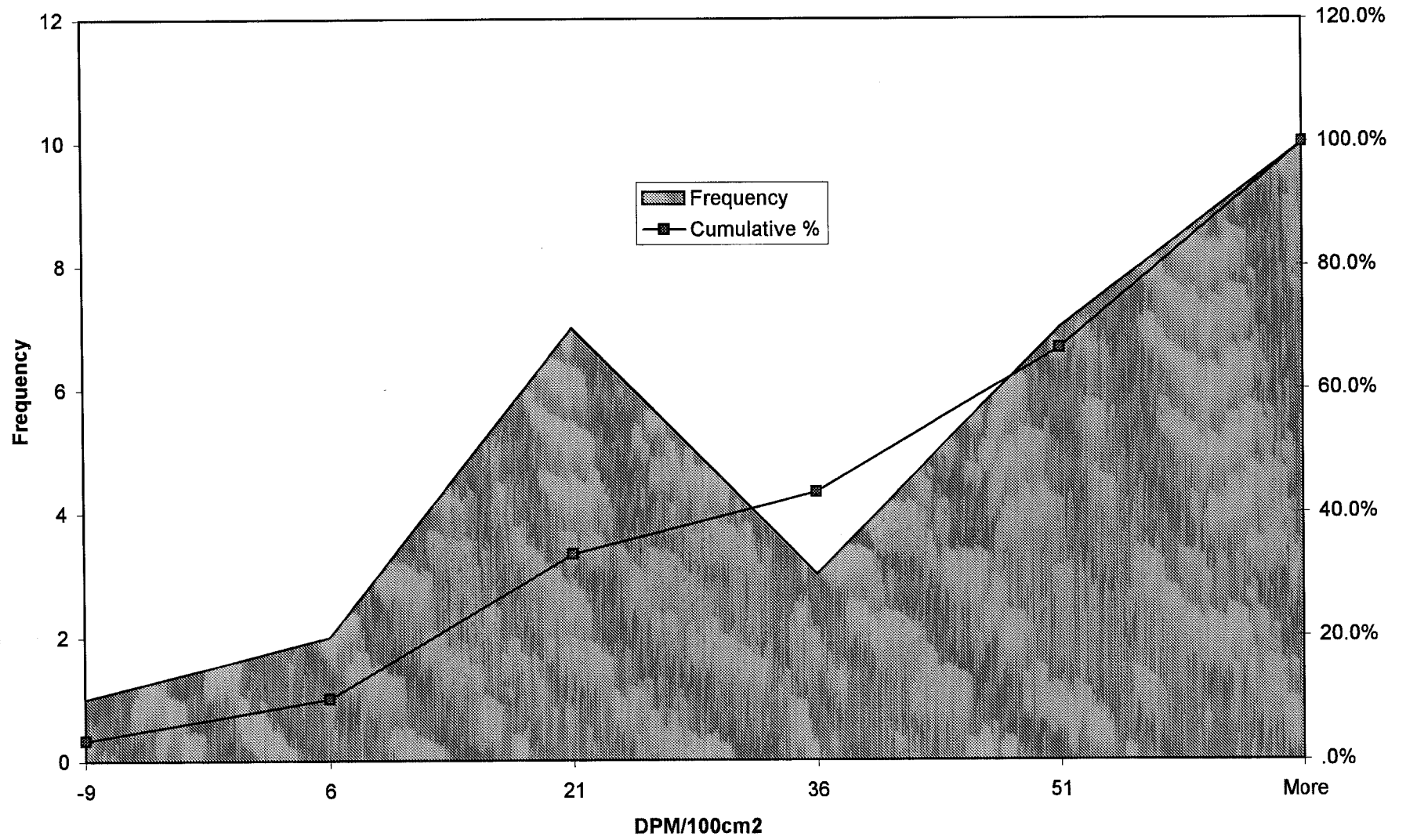
Roof Unit 4-18 Data Trends



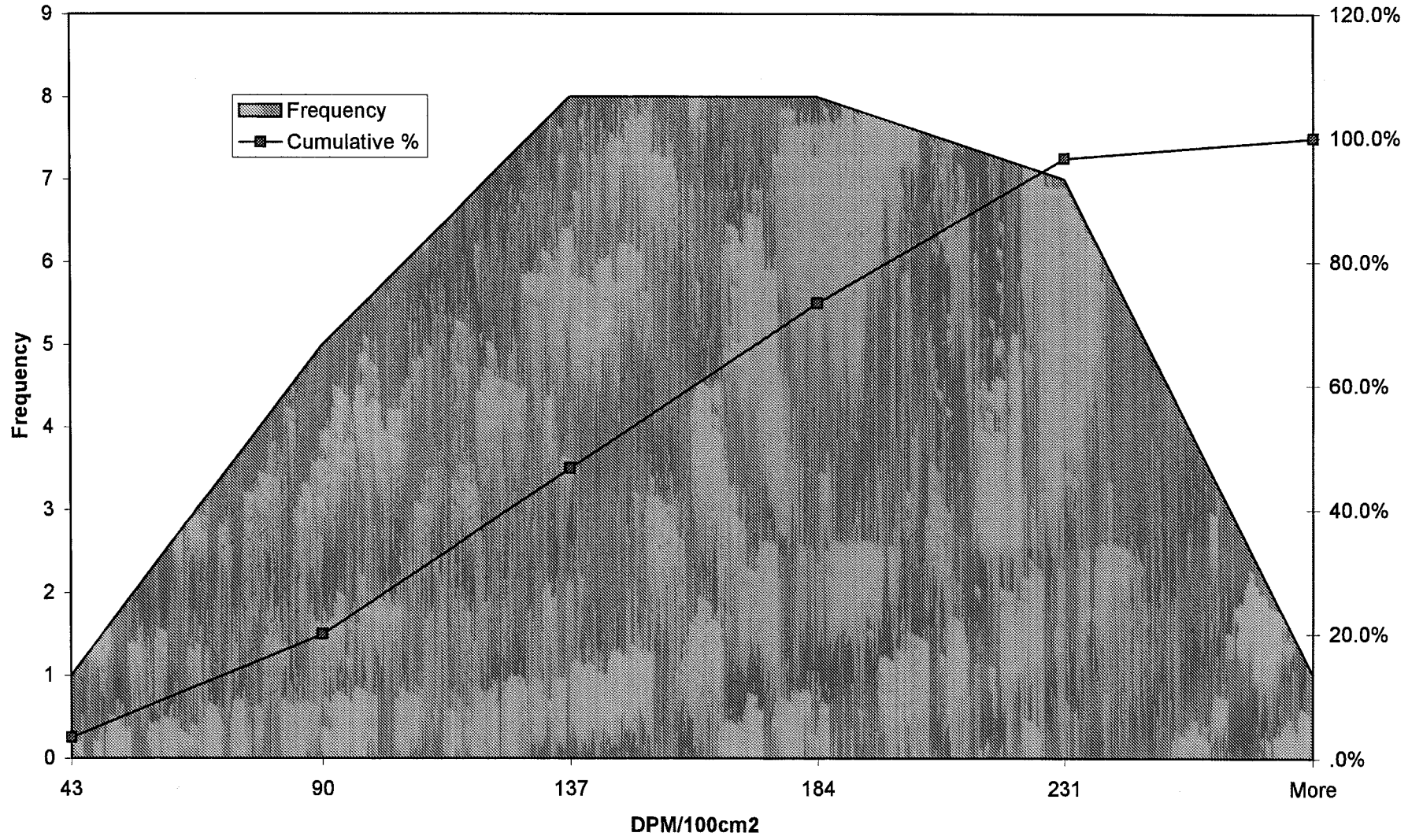
Roof Unit 4-18 Data Trends



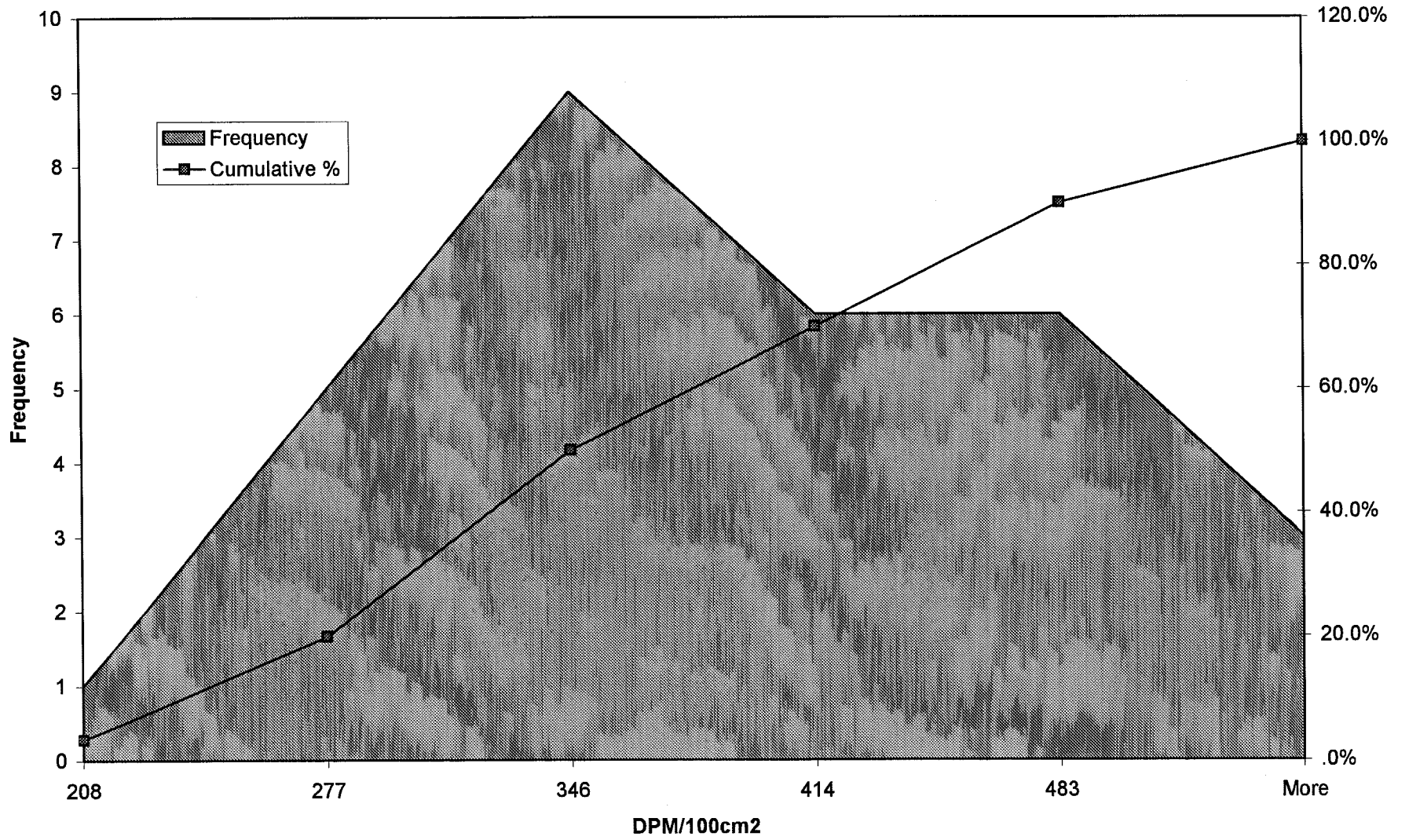
Roof Unit 4-18 Fixed Alpha Histogram



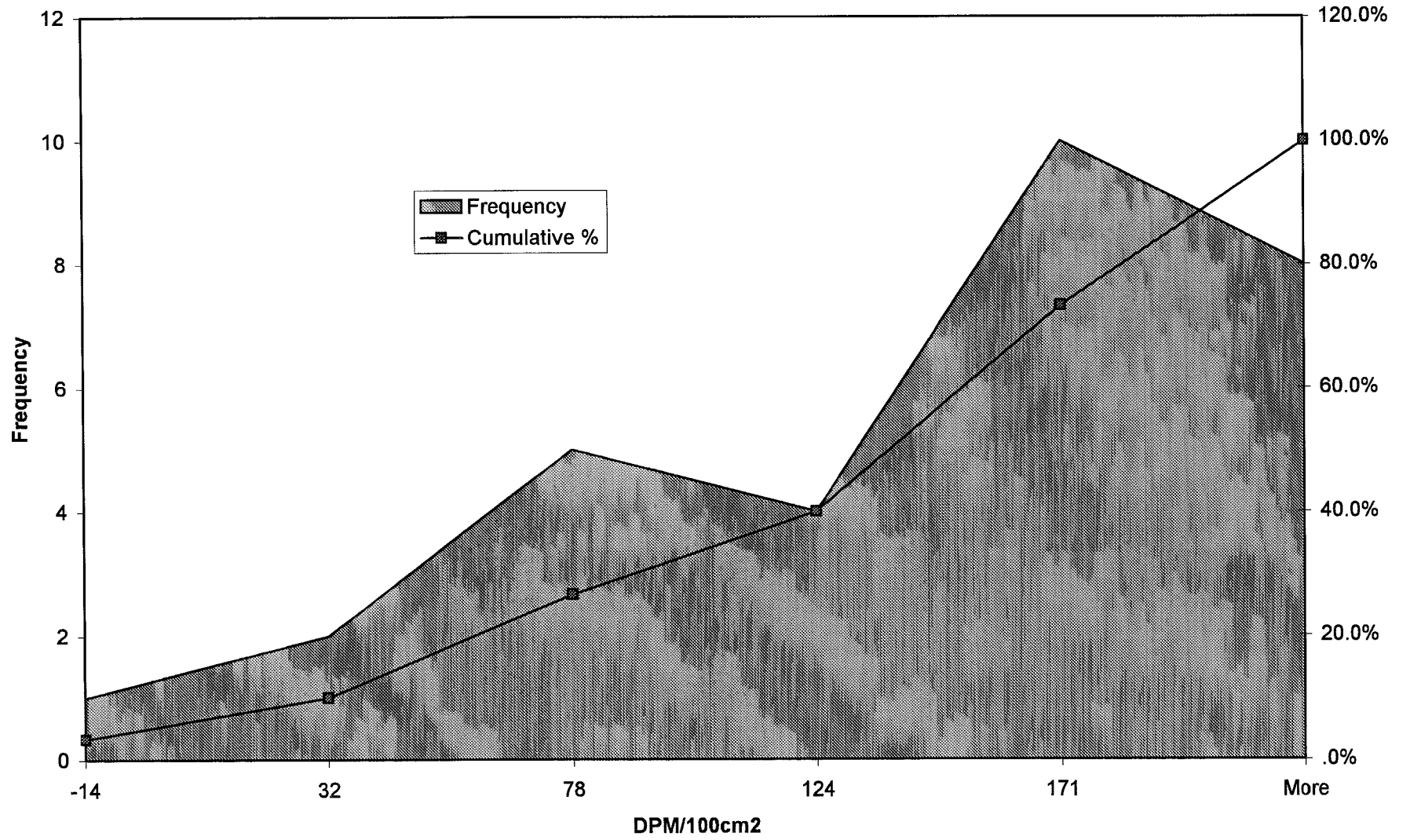
Roof Unit 4-18 Fixed Beta Histogram



Roof Unit 4-18 Beta Scan Maximum Histogram



Roof Unit 4-18 Beta Scan Average Histogram



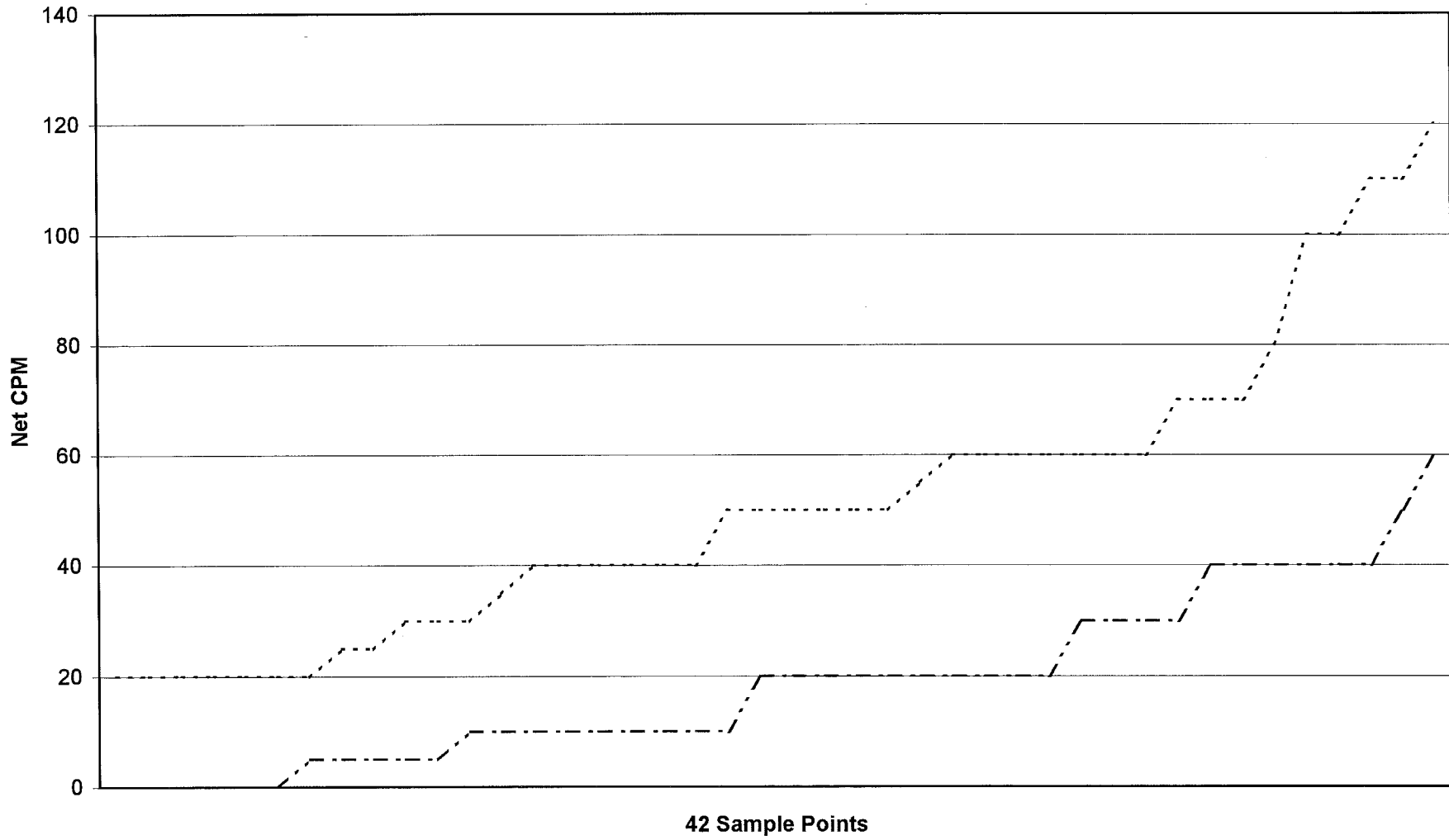
APPENDIX E

ROOF DRAIN AND VENT INTERNALS

DATA TRENDS

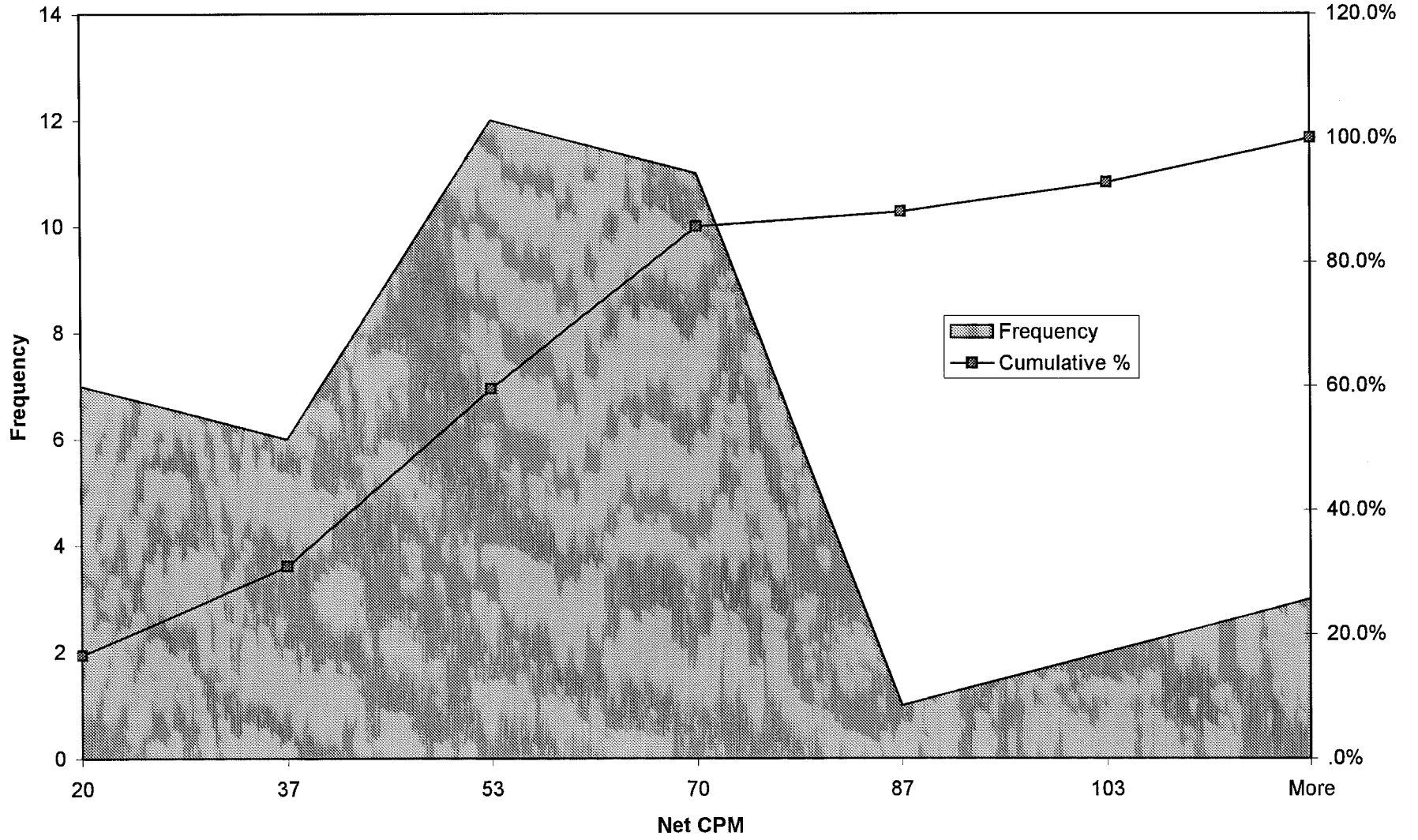
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Roof Drain & Vent Internals Data Trends

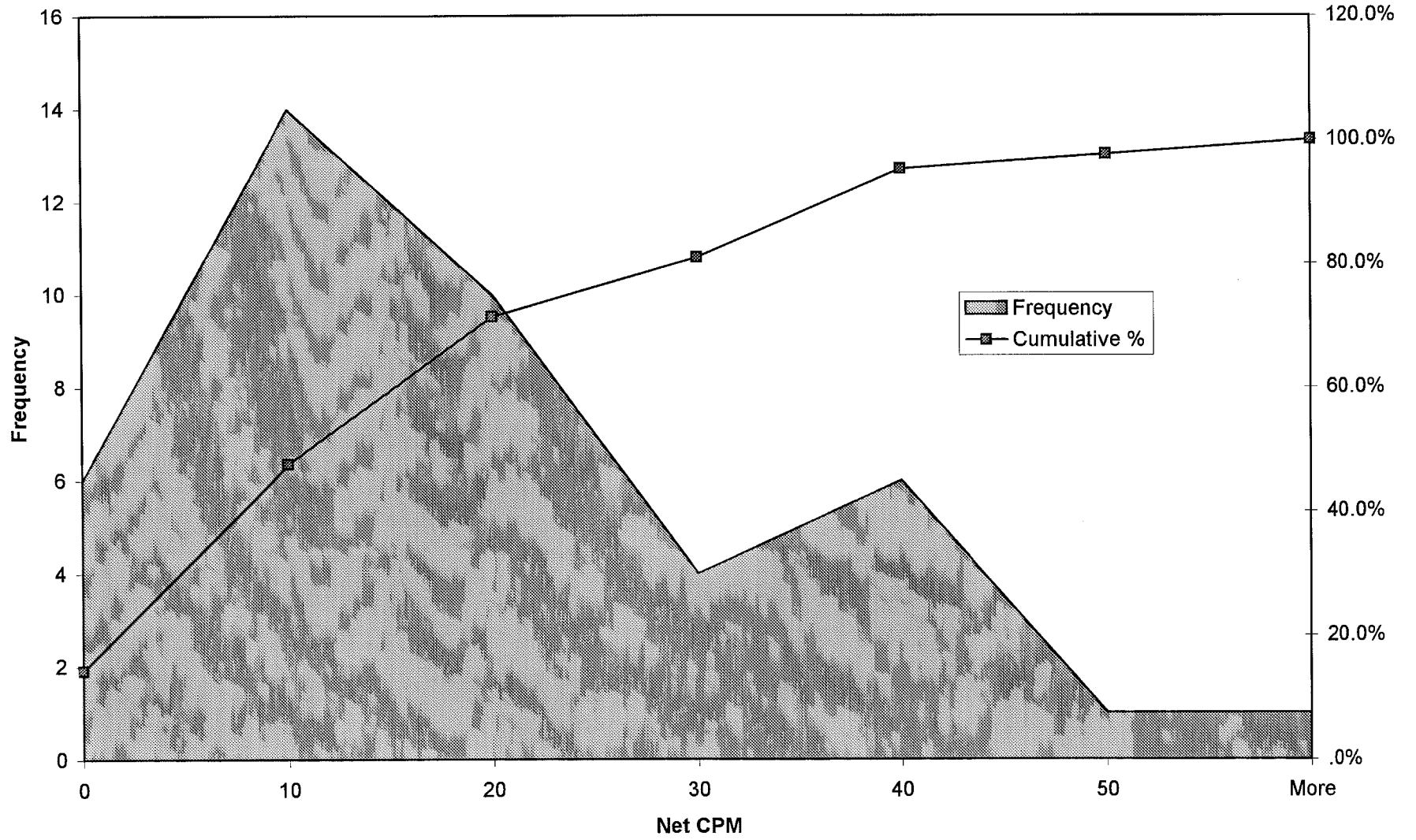


..... Beta Scan CPM Maximum (minus background) - - - - Beta Scan CPM Average (minus background)

Roof Drain & Vent Beta Scan Maximum (minus background) Histogram



Roof Drain & Vent Internals Beta Scan Average (minus background) Histogram



APPENDIX F
ROOF SURVEYS

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Roof Drain & Vent Internals

Survey Date	Survey Serial Number	Surface Description	X	Y	Beta Instrument Code	Background CPM	Beta Scan CPM Maximum	Beta Scan CPM Average	Removable Alpha DPM/100cm2	Alpha Count Code	Removable Beta DPM/100cm2	Beta Count Code	Comments
8/13/95	01-419	ROOF DRAIN	1	-16	15	40	120	70	-0.99	2	4.84	3	
8/13/95	01-419	ROOF DRAIN	1	-52	15	40	100	50	0.48	2	-0.47	3	
8/13/95	01-419	ROOF DRAIN	1	-89	15	40	90	50	-0.99	2	2.18	3	
8/13/95	01-419	ROOF DRAIN	1	-125	15	40	90	50	-0.99	2	3.51	3	
8/17/95	01-420	ROOF VENTS	35	-23	15	20	50	30	1.96	2	-0.47	3	
8/17/95	01-420	ROOF VENTS	34	-31	15	20	50	25	1.96	2	-0.47	3	
8/17/95	01-420	ROOF VENTS	34	-35	15	20	60	30	0.48	2	15.48	3	
8/17/95	01-420	ROOF VENTS	34	-37	15	20	40	20	0.48	2	0.85	3	
8/17/95	01-420	FAN EXHAUST	34	-88	15	20	40	30	-0.99	2	-3.13	3	
8/17/95	01-420	WASTE VENT	27.5	-160	15	20	40	20	0.48	2	3.51	3	
8/17/95	01-420	WASTE VENT	29.5	-163	15	20	40	20	-0.99	2	-0.47	3	
8/17/95	01-420	ROOF DRAINS	35.5	-147	15	20	60	40	1.96	2	-0.47	3	
8/17/95	01-420	ROOF DRAINS	1	-147	15	20	60	40	-0.99	2	3.51	3	
8/17/95	01-420	ROOF DRAINS	1	-110	15	20	70	50	0.48	2	-0.47	3	
8/17/95	01-420	ROOF DRAINS	35.5	-110	15	20	70	40	-0.99	2	0.85	3	
8/17/95	01-420	ROOF DRAINS	35.5	-73	15	20	80	40	-0.99	2	-3.13	3	
8/17/95	01-420	ROOF DRAINS	1	-73	15	20	120	60	-0.99	2	3.51	3	
8/17/95	01-420	ROOF DRAINS	1	-37	15	20	130	70	-0.99	2	-1.80	3	
8/17/95	01-420	ROOF DRAINS	35.5	-37	15	20	90	50	0.48	2	12.82	3	
8/17/95	01-420	ROOF DRAINS	35.5	-7	15	20	80	50	-0.99	2	-1.80	3	
8/17/95	01-420	ROOF DRAINS	1	-8	15	20	90	60	-0.99	2	-1.80	3	
8/17/95	01-420	WASTE VENT	2	-76	15	20	40	20		2		3	
8/18/95	01-421	ROOF DRAIN	36.5	-9	15	30	60	40	-0.99	2	27.45	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	1	-17.5	15	30	80	50	-0.99	2	2.18	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	36.5	-37	15	30	130	70	-0.99	2	-1.80	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	1	-37	15	30	90	70	-0.99	2	-0.47	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	36.5	-74	15	30	90	50	0.48	2	-0.47	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	1	-74	15	30	140	90	-0.99	2	0.85	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	36.5	-111	15	30	150	70	-0.99	2	3.51	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	1	-111	15	30	90	40	0.48	2	-0.47	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	36.5	-147	15	30	90	50	-0.99	2	2.18	3	BETA SCAN ONLY
8/18/95	01-421	ROOF DRAIN	1	-147	15	30	100	70	-0.99	2	-0.47	3	BETA SCAN ONLY
8/19/95	01-422	ROOF DRAIN	30	-128	15	35	90	40	1.96	2	3.51	3	BETA SCAN ONLY
8/19/95	01-422	ROOF DRAIN	30	-92	15	35	60	40	1.96	2	0.85	3	BETA SCAN ONLY
8/19/95	01-422	ROOF DRAIN	30	-55.5	15	35	70	40	0.48	2	-0.47	3	BETA SCAN ONLY
8/19/95	01-422	ROOF DRAIN	30	-19	15	35	60	40	-0.99	2	-0.47	3	BETA SCAN ONLY
8/29/95	01-427	ROOF DRAIN	1	-102.5	17	40	90	50	-1.61	2	-3.21	3	BETA SCAN ONLY
8/29/95	01-427	ROOF DRAIN	1	-67	17	40	60	40	-1.61	2	-3.21	3	BETA SCAN ONLY
8/29/95	01-427	ROOF DRAIN	1	-30	17	40	80	60	-1.61	2	-0.53	3	BETA SCAN ONLY
8/29/95	01-427	ROOF DRAIN	1	-6	17	40	60	40	-0.13	2	2.14	3	BETA SCAN ONLY
8/29/95	01-428	ROOF DRAIN	12	-0.5	17	30	70	50	2.82	2	3.48	3	BETA SCAN ONLY
8/30/95	04-019	ROOF DRAIN	18	-5	17	40	80	60	-0.13	2	3.48	3	BETA SCAN ONLY

Stastical Analysis	Beta Scan CPM Maximum	Beta Scan CPM Average	Removable Alpha DPM per 100cm2	Removable Beta DPM per 100cm2
Number of Samples	42	42	41	41
Minimum	40.00	20.00	-1.61	-3.21
Maximum	150.00	90.00	2.82	27.45
Average	79.76	47.02	-0.22	1.82
Standard Deviation	27.89	16.12	1.18	5.53