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EXECUTIVE SUMMARY

On September 1998, a Final Status Survey was completed in Building 4019 confirming that the facility meets release limits approved by the Department of Energy, and the Department of Health Services. Accordingly, the facility is suitable for release for unrestricted use.

During 1998, a comprehensive decontamination and decommissioning effort was conducted in the former SNAP Testing Facility, Building 4019. After D&D efforts, a comprehensive Final Status Survey of the facility concluded in September 1998. The Final Status Survey classified the building into two types of areas: "affected areas" which either had a potential for contamination or may have required previous decontamination, and "unaffected areas" where no previous decontamination effort was ever required. Sample Lot surveys were obtained from these areas.

Sample Lot 1, affected areas, comprised of the High Bay Floor, 3 meters up the walls, and Vault Room 109. Sample Lot 2, unaffected areas, comprised of the walls of the High Bay from 3 meters off the floor to the ceiling, overhead crane, piping, and ventilation ducting. Sample Lot 3, affected area, comprised of the Reactor Test Chamber itself. Sample Lot 4, unaffected areas, comprised of the office area and Room 110 that was already accepted as areas found below guideline limits in 1996 and remained so. All measurements were tested statistically for compliance within the regulatory acceptable derived concentration guideline limits (DCGLs), and ambient exposure rates.

In all Sample Lots for affected and unaffected areas, the highest quantitative total alpha measurement found was 13 dpm/100cm², and the highest quantitative total beta measurement found was 961 dpm/100cm² which were well below the 5,000 dpm/100cm² limit for fixed contamination. The highest removable alpha contamination found was 6 dpm/100cm², and the highest removable beta found was 12 dpm/100cm², again significantly below the 1,000 dpm/100cm² removable contamination limit. The highest level for Cs-137 was 1.8 pCi/gm, and no Co-60 was detected in any of the areas. The Cs-137 activity was scabbled, and the concrete debris was removed as contaminated waste. A 100% direct qualitative frisk of all floors, walls and ceilings revealed all areas had no significant detectable activity.

Graphs of the surface contamination results were evenly distributed, and the results were less than the release limits. All tests for surface contamination confirmed the entire Building 4019 is suitable for release without radiological restrictions.

1.0 INTRODUCTION

Rocketdyne Propulsion and Power conducts decontamination and decommissioning (D&D) operations at its former nuclear facilities and sites to demonstrate compliance with dose and risk based regulations. During D&D of these facilities, continuous efforts are made to eliminate or reduce residual radioactive contamination to levels that are as low as reasonably achievable (ALARA). Upon completion of D&D, radiological surveys are performed under established protocols to demonstrate that remaining radioactivity does not exceed the Department of Energy (DOE), or the State of California regulatory limits.

The regulatory agency responsible for the facility confirms whether the building is acceptable for release for "unrestricted use". The Final Status Survey is designed to demonstrate compliance with the regulatory release criteria. The scope of the Final Status Survey includes known and suspected areas of radioactivity. The Final Status Survey is discussed as a single stage of the investigation process using data from other surveys in the planning process. A systematic sampling approach was used based on rules that achieve representative sampling consistency with the application of statistical tests.

The Final Status Survey of Building 4019, demonstrates that all parameters of the established regulatory guidelines and values are satisfied.

2.0 BACKGROUND

2.1 Location and Structure

Building 4019 is located at the Rocketdyne-Santa Susana Field Laboratory, along the northwest boundary line. The facility is constructed of steel framing with steel siding, and contains a 10,800 square feet High Bay, a 10-ton overhead bridge crane, and an adjoining office control center. A 12-foot diameter vacuum test chamber with a hydraulic lift platform is located inside the northwest area of the High Bay. A vault room (109) with cinder block walls is located in the southeast corner. Building 4019 office areas include the equipment Room along the northwest quadrant of the building. A plan view of Building 4019 is shown in Figure 1 below.

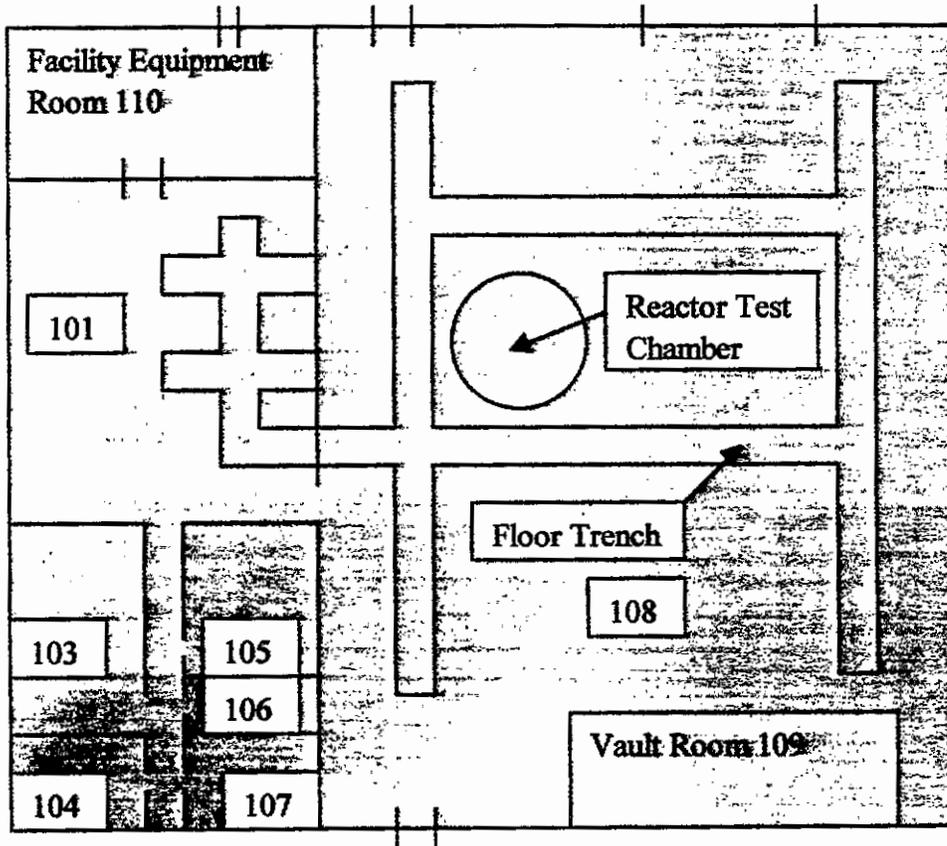


FIGURE 1: TOPOGRAPHY MAP OF BUILDING 4019

The dimensions of the High Bay are 60-ft long by 45-ft wide by 36-ft high. The former (Fuel Storage) Vault Room 109, is 12-ft by 10-ft by 10-ft and is located inside the High Bay. The Reactor Test Chamber in the High Bay floor, is cylinder shape for a quarter of the area down; square shape for the remaining three quarters to the bottom, and contains approximately 2448 ft² of surface area. It is 12-ft diameter, and 40-ft deep. The office areas, located next to the High Bay, are 60-ft long by 28-ft wide by 10-ft high. Former Equipment Room 110, which is also 12-ft by 10-ft by 10-ft, is located on the northwest end of the office areas. Sheet-rock walls separate the offices from the High Bay. There is one double and one single door access into the High Bay from the office area, and two roll-up doors and two single door access into the High Bay from the outside area.

2.2 Operating History

In support the Atomic International's *Systems for Nuclear Auxiliary Power* or SNAP program, Building 4019 was built for testing SNAP reactors at zero power. Several reactor designs were developed and tested in the Reactor Test Chamber for the SNAP program. Encapsulated, enriched uranium was used in the testing, with no resulting neutron activation or release of nuclear material. All nuclear or radioactive material handled was fully encapsulated. No contamination incidents or fission product releases occurred at Building 4019. Upon termination of the SNAP program in 1970, all SNAP components were removed. A radiation survey was later performed in 1988 to ensure no radioactivity existed (See Reference 1). Building 4019 was later designated as the ETEC Construction Staging and Computer Facility, and has been used for this purpose since.

2.3 Radiological Assessment

Building 4019 was not expected to contain residual activity for several reasons:

- Nuclear materials, such as uranium carbide, handled in the High Bay were fully encapsulated in Hastelloy[®] and no releases occurred.
- Activation of building materials was negligible as the test reactors were operated for short periods at low power.
- When Building 4019 was reassigned, a thorough radiation survey was performed to ensure no residual activity remained undetected.

In 1988, surveys conducted for Building 4019 were based on limits prescribed in the DOE guidelines for enriched uranium used for the SNAP. The scope and detail of this radiological survey was based on the likelihood residual activity occurred in those areas where nuclear operations were performed despite the reasons listed above. Maximum total surface activity levels in the High Bay were 55 dpm/100cm² for alpha, and 1400 dpm/100cm² for beta. Removable activity levels in the High Bay were less than 12 dpm/100cm² for gross alpha and less than 16 dpm/100cm² for gross beta (see Reference 1). Offices adjacent to the High Bay were surveyed for radiological contamination and found clean, confirming that contaminated materials were not worked on or transported outside of the High Bay.

In January 1996, a survey conducted by ORISE in the southwest area of the High Bay detected a floor spot reading total alpha measurement ranges of 34 to 55 dpm/100cm², and less than 12 dpm/100cm² removable alpha. The highest total beta measurements ranged from 1400 to 11,000 dpm/100cm², and the highest removable beta contamination was less than 16 dpm/100cm² (See Reference 4).

Since the total beta measurement for that location was above release limits, this spot was scabbled during the 1998 Final Status Survey. A follow-up survey verified the highest total alpha measurement was 8 dpm/100cm², and no removable alpha detected on that specific floor surface area. The highest total beta measurement was 364 dpm/100cm², and the highest removable beta contamination was 20 dpm/100cm².

In September 1998, the Final Status Survey was conducted in the High Bay, Reactor Test Chamber, Vault Room 109, Equipment Room 110, and office areas to confirm that no contamination remained exceeding any radiological limits. The results of the Final Status Survey are recorded in Section 5.0.

Access into the Reactor Test Chamber was initially not possible due to the oil and glycol in the bottom area from past operations of the platform. Since the radiological status required verification, the oil and glycol were sampled, pumped out, and the entire test chamber was steam cleaned prior to the performance of the Final Status Survey.

3.0 SURVEY PREPARATION

3.1 Identifying Survey Units

The Building 4019 High Bay area, test chamber, adjoining rooms and offices were divided into two survey classes: "affected" and "unaffected" areas based on past surveys where contamination was known or suspected. The survey units were then evaluated to determine if surface contamination was below the derived concentration guidelines (DCGLs). A reference coordinate system was established and marked in the High Bay, test vault, and office areas. Random sampling points were identified in the survey pattern. (Refer to Figure 2). Coordinates that did not fall within the survey unit area or could not be surveyed because of site conditions were replaced with other sample locations.

Scanning was performed to locate small areas of elevated concentrations of residual radioactivity to determine if they met the release criteria. Direct, qualitative scans were conducted for alpha and beta-gamma contamination followed by a cumulative counts and smear surveys of interior surfaces. The percentage of survey conducted for each area is shown in Table 1.

LOT	CLASS	LOCATION	QUALITATIVE		QUANTITATIVE ¹		REMOVABLE		AMBIENT
			α	β	α	β	α	β	γ
1	AFFECTED	Hibay Floor, Lower Walls	100% SCAN TOTAL	100% SCAN TOTAL	11% SCAN	11% SCAN	11%	11%	11%
2	UNAFFECTED	Hibay upper walls, ceiling, crane	100% SCAN TOTAL	100% SCAN TOTAL	6% SCAN	6% SCAN	6%	6%	NONE
3	AFFECTED	Test Chamber	100% SCAN TOTAL	100% SCAN TOTAL	21% SCAN	21% SCAN	21%	21%	NONE
4	AFFECTED	Rm 109	100% SCAN TOTAL	100% SCAN TOTAL	11% SCAN	11% SCAN	11%	11%	NONE
5	UNAFFECTED	Room 110, Offices	100% SCAN TOTAL	100% SCAN TOTAL	NONE	NONE	500 Smears	500 Smears	NONE

% indicates measurements taken in grid squares within the 9 square meter grid areas.

¹ Obtained with 5-minute counts.

TABLE 1: SURVEYS DETERMINED FOR BUILDING 4019.

3.2 Sampling Locations

In the affected areas, direct, qualitative alpha and beta-gamma scans of the floors and walls, (100% surface area) were conducted. After the scans, the entire area was divided into 9 square meter grids and portrayed on a scaled survey map (see Figure 3). Within each grid, a one square meter area (1m x 1m) was selected for a cumulative count survey. For surfaces having less than a square meter area (remnant areas), a minimum area of one square meter was surveyed by combining other adjacent remnant areas. In affected areas, structural surfaces consisting of beams, pipes, conduits, and other surfaces that were not easily assessable were surveyed over twenty percent (20%) of the surface area.

For unaffected areas, a direct, qualitative scan (100 % of all surface area) on the floors, walls, and ceilings was conducted. Areas of concern included floor baseboards, windowsills, areas behind file cabinets or furniture, door thresholds, and any other areas where contamination potentially accumulated over time. Portions of the High Bay unaffected area, were selected for a cumulative count survey. Surfaces selected for surveying were based on those expected to have the highest contamination levels (e.g. ledges, tops of conduit, etc.). After the survey of the accessible areas of the ventilation ducting was conducted, no contamination was detected. Figure 2 shows the areas in Building 4019 designated as the affected and unaffected areas.

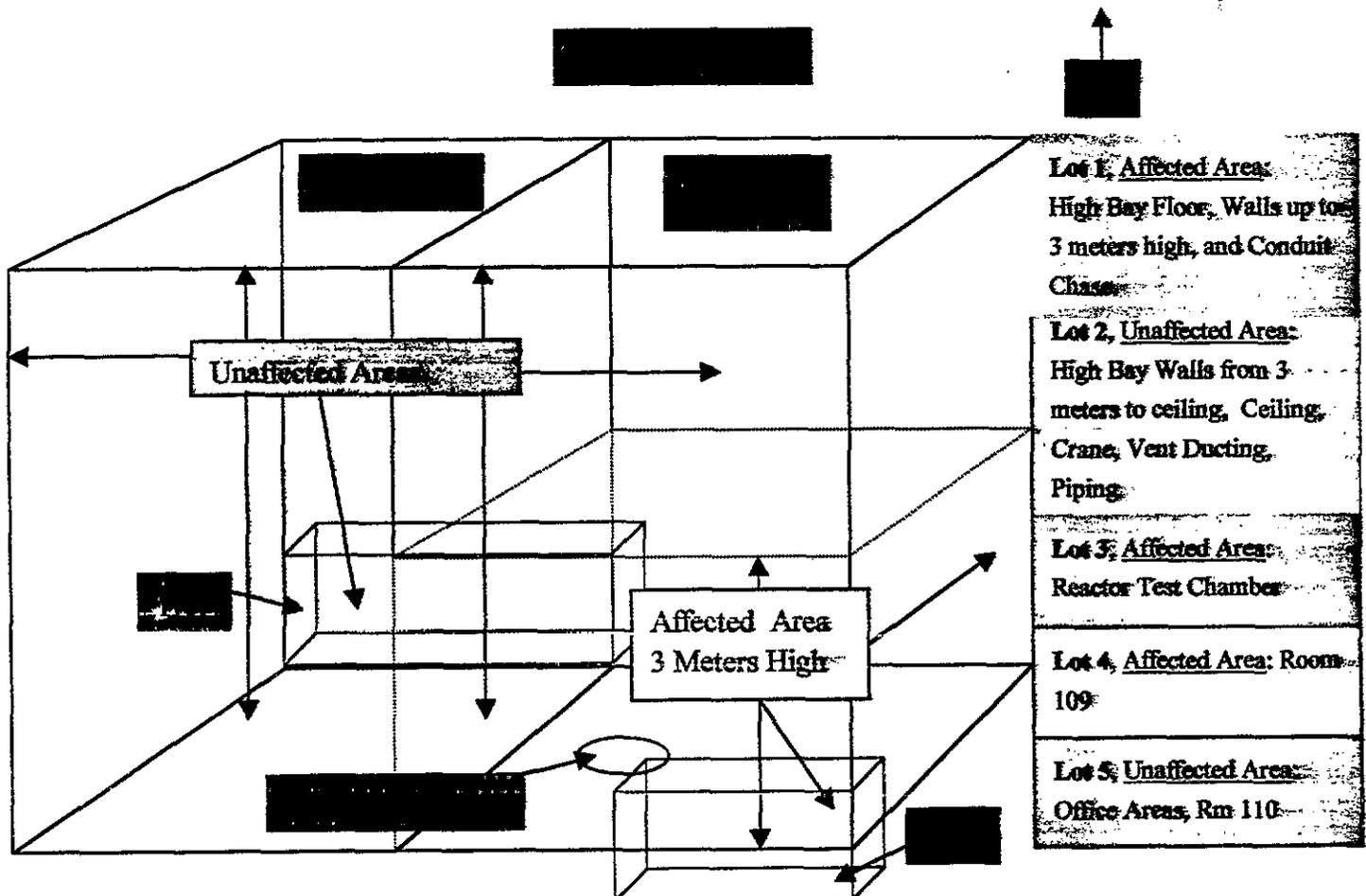


FIGURE 2: AFFECTED AND UNAFFECTED AREAS

3.3 Sample Collection

Sample Lot 1 (Affected Areas)

Sample Lot 1 was composed of measurements taken from the High Bay floor (including the conduit trenches) and walls up to 3 meters high. Figure 3 shows the High Bay grid map used for the survey.

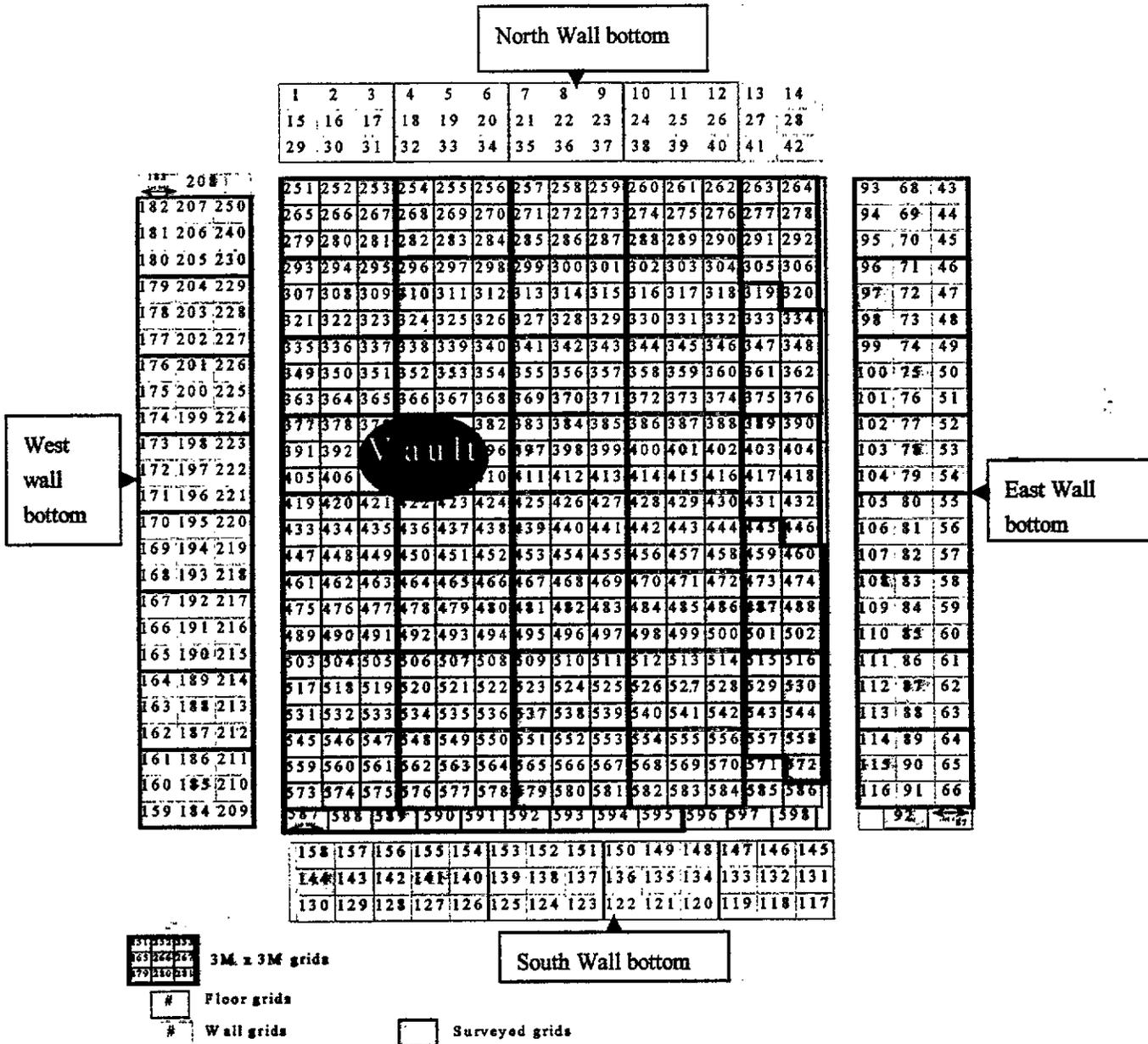


FIGURE 3: SAMPLE LOT 1 HIGH BAY

Measurements were taken for quantitative total alpha and beta, removable alpha and beta, and ambient gamma levels. Qualitative measurements were taken for all one hundred percent (100%) of the survey grid, and quantitative measurements for eleven percent (11%) of all the survey grids (See Table 1). This method satisfies the State of California guidelines in DECON-1 (see Reference 5) that a minimum of 10% of an area shall be surveyed.

Sample Lot 2 (Unaffected Area)

Sample Lot 2 was composed of measurements taken on the upper wall areas of the High Bay, from the 3 meter high mark where the affected area ended, up to and including the ceiling. A direct qualitative frisk (100%) was performed using an alpha scintillation probe and a G-M pancake probe. Six percent (6%) of all surfaces were surveyed for total alpha and beta activity, and six percent (6%) for removable activity (see Table 1). The overhead crane, ventilation ducting, beams and horizontal surfaces were scanned 100% for direct qualitative frisk. Figure 4 shows the High Bay unaffected area grid survey.

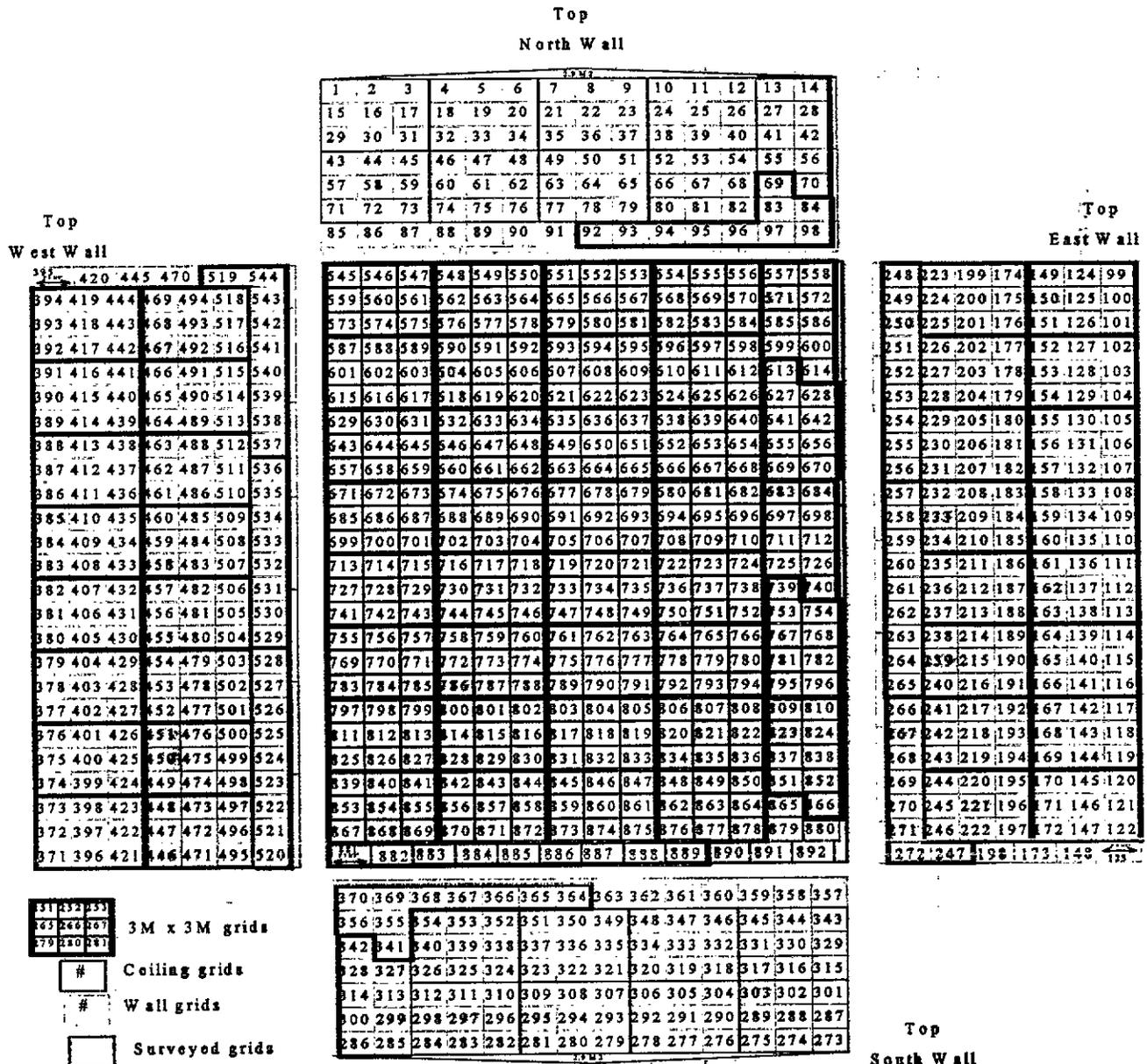
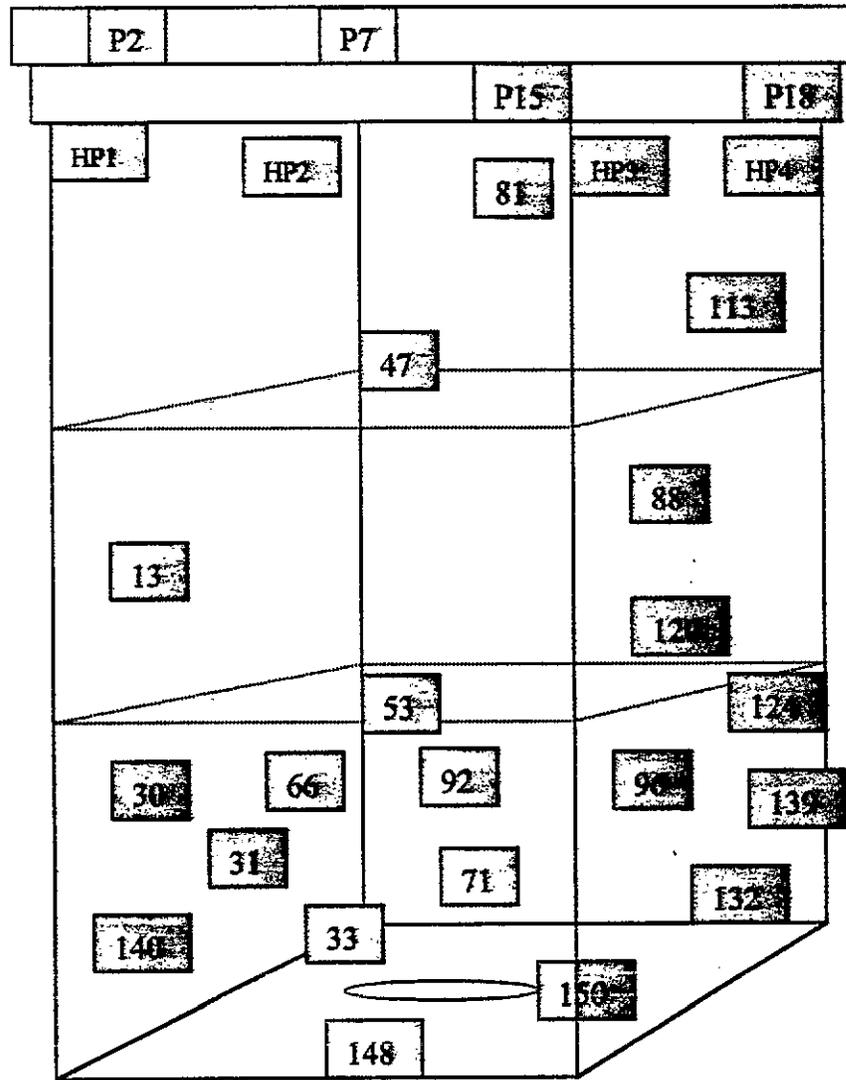


FIGURE 4: SAMPLE LOT 2 HIGH BAY

Sample Lot 3 (Affected Area)

The Sample Lot 3 survey consisted of the Reactor Test Chamber, shown in Figure 5. The entire chamber was grided and surveyed in the same manner as Sample Lot 1 except twenty one percent (21%) of the area was surveyed for quantitative alpha and beta measurements, and twenty-one percent (21%) for removable activity. Samples of glycol and oil from the bottom of the pit were obtained and sent to the laboratory for a gamma spectral analysis with the Canberra Series 100 MCA System with High-Purity Germanium Detector and a "Chain of Custody" tracking form.



 The numbered squares depict the actual numbers surveyed. Refer to Appendix A page 30 for the actual grid map used.

FIGURE 5: SAMPLE LOT 3 REACTOR TEST CHAMBER

3.4 Survey Instrumentation and Techniques

A count rate meter with an audible indication was used for both qualitative and quantitative scans. Audible indication during the scan required a detector to be more sensitive than the scalar read-out. For scanning, the detector was moved slowly, at a scan rate of less than 5 cm/sec, over the surface being surveyed. The face of the detector was located near the surface and not more than ½-inch distance away.

Standard 1.75 inch disk smears (1 3/4 NPO, cloth) were used to obtain measurements of removable surface alpha and beta activity by wiping approximately 100 cm² of the surface area. The activity was measured on the disks using a low background, gas-flow, Tennelec proportional counter calibrated using Th-230 and Tc-99 standard sources.

The ambient exposure rates were measured at 1-meter from all surfaces using a 1-inch by 1", NaI probe, NaI scintillation detector calibrated quarterly, and daily checks made using a Cs-137 source. A standard conversion factor of 215 cpm per µR/hr, based on comparisons with a Reuter-Stokes High Pressure Ion Chamber (HPIC), was used for conversion of counts per minute to µR/hr measurements. All survey data was recorded on Final Status Survey Data Sheets (FSDS).

3.5 Calibrations and Checks

Measurements of total and maximum alpha surface activity were made using an alpha scintillation detector, sensitive only to alpha particles with energies exceeding about 1.5 MeV. The detector was calibrated with a Th-230 alpha source standard traceable to the National Institute of Standards and Technology (NIST). Measurements of the average and maximum beta surface activities were made with a thin-window pancake Geiger-Mueller (G-M) tube. The G-M detector was calibrated with a Tc-99 beta source standard, traceable to NIST.

All portable survey instruments were serviced and calibrated with NIST traceable standards on a quarterly basis. In addition, daily source, background, and performance checks were done on all instrumentation, when in use, to determine acceptable performance and establish a background value for the instrument on that day. Calibration records for the survey instruments used are maintained in the Radiation Safety Department files.

The gas-flow proportional counters, used to measure removable contamination, were calibrated using Th-230 and Tc-99 standard sources, traceable to NIST.

The ambient exposure rates at 1m from surfaces were measured using a one-inch by one-inch (1-in x 1-in) probe NaI scintillation detector. These instruments were calibrated against a Reuter-Stokes high-pressure ionization chamber, and daily checks were made using a Cs-137 source.

Daily checks and calibrations were performed on all instrumentation to determine acceptable performance. Daily checks and calibration data were entered on the appropriate Instrument Qualification Sheet (IQS).

3.6 Detection

The detection limits for the instruments and methods used are shown in Table 2. They are well below the DOE limit criteria (Reference 7). Disintegration per minute (dpm) means the rate of emission by radioactive material derived by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation. Where surface contamination by both alpha and beta-gamma emitting radionuclides existed, the limits established for alpha and beta radionuclides applied independently.

	Alpha (dpm/100cm ²)		Beta (dpm/100cm ²)		Ambient Gamma (μR/hr)
	Total	Removable	Total	Removable	
Limit Criteria	5,000	1,000	5,000	1,000	<5μR/hr above background
Theoretical Detection Limit (SAA)	5.25	4.59	367	11.0	0.25
Derived Detection Limit Range	3.5-7.0	4.1-5.08	161-484	9.8-12.2	0.24-0.26
Detection Limit (% of limit criteria)	0.1%	0.45%	6.8%	1.1%	5.0%

TABLE 2: DETECTION LIMITS AND ESTABLISHED LIMIT CRITERIA

3.7 Survey Evaluations

Acceptable contamination limits and gamma exposure rates for releasing a facility for unrestricted use are described in Table 3 below. The lowest (most conservative) applicable limits were chosen from these guidelines and incorporated into the Final Status Survey criteria for the Building 4019.

Radionuclides	Average	Maximum	Removable
Separated or enriched Sr-90, Th-natural, Th-232	<1,000	<3,000	<200
U-natural, U-235, U-238, and associated decay products	<5,000 α	<15,000 α	<1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission), including Sr-90 intrinsic to the mixture. [This category of radionuclides includes mixed fission products, including Cs-137 and Sr-90. It does not apply to Sr-90, which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.]	<5,000 β - γ	<15,000 β - γ	<1,000 β - γ
Gamma Exposure Rate	≤ 5 μR/hr above background at one meter		
<p>Note: Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides apply independently. Measurements of average contamination should not be averaged over an area of more than one square meter. For objects of less surface area, dose rate averages should be derived for each such object. The maximum and removable contamination level applies to an area of not more than 100 cm².</p>			

From DOE Order 5400.5, Figure IV-1 (see Reference 7).

TABLE 3: ALLOWABLE RESIDUAL SURFACE CONTAMINATION (DPM/100CM²)

Table 4 provides guidelines for alpha and beta-gamma emitters whose specific isotopic content had not been determined.

Radionuclides	Average (dpm/100 cm²)	Removable (dpm/100 cm²)	Maximum (dpm/100 cm²)	Max Count Rate Meter Response
Unidentified Alpha emitters	< 100	< 20	< 300	No detectable activity when measured on a ZnS portable survey meter. (< 2 cpm on "slow" response)
Unidentified Beta-Gamma emitters	< 5,000	< 100	< 15,000	< 100 net counts per minute above ambient background on a pancake frisker

(see Reference 7)

TABLE 4: CONTAMINATION LIMITS FOR UNIDENTIFIED ISOTOPES

The average surface levels of contamination were taken over an area of one square meter. For objects of less surface area, the average was derived for each surface. The maximum contamination level applied to an area of not more than 100 cm². The amount of removable material per 100 cm² of surface area was determined by wiping an area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² was determined, the activity per unit area was based on the actual area and the entire surface was wiped.

4.0 DATA ANALYSES

The Final Status Survey had to confirm that Building 4019 High Bay, Reactor Test Chamber, overhead crane, and rooms 109 and 110 and adjoining offices were acceptable for unrestricted use. Therefore, the results of the survey must be validated using statistical analysis. A distribution analysis was performed in which the activity was plotted against the cumulative probability using Cumplot 2.20 (see Reference 3).

A statistical procedure was used to validate the applicability of the raw survey data for selected sample lot areas. The statistical method known as "sampling inspection by variables" was used. This method is widely applied in the industry and military.

In sampling inspection by variables, the data is assumed to be *normally* (i.e., Gaussian) distributed. The mean of the distribution \bar{x} , and its standard deviation s , are then related to a "test statistic," TS, as follows:

$$TS = \bar{x} + k \cdot s$$

where \bar{x} = average (arithmetic mean of measured values)

s = observed sample standard deviation

k = tolerance factor calculated from the number of samples to achieve the desired sensitivity for the test

TS and \bar{x} are then compared with an acceptance limit, U, to determine acceptance or other plans of action, including rejection of the area as contaminated and requiring further remediation.

The sample mean and standard deviation are easily calculable quantities; the value of k , the tolerance factor, is examined. Of the various criteria for selecting plans for acceptance sampling by variables (see Reference 8), the most appropriate is the method of *Lot Tolerance Percent Defective* (LTPD, also referred to as the *Rejectable Quality Level* (RQL)). The LTPD is defined as the poorest quality that should be accepted in an individual lot. Associated with the LTPD is a parameter referred to as "consumer's risk" (β), the risk of accepting a lot of quality equal to or poorer than the LTPD.

Assigning values for LTPD and β , and given the sample size n , a value for k can be calculated as follows:

$$k = \frac{K_2 + \sqrt{K_2^2 - ab}}{a}; \quad a = 1 - \frac{K_\beta}{2(n-1)}; \quad b = K_2^2 - \frac{K_\beta^2}{n}$$

where k = tolerance factor,

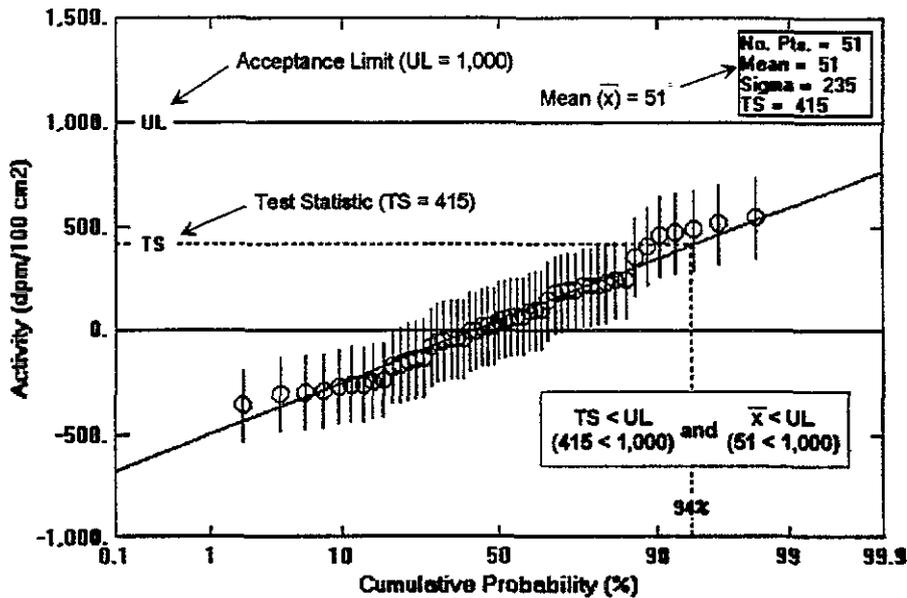
K_2 = the normal deviate exceeded with probability equal to the LTPD,

K_β = the normal deviate exceeded with probability of β ,

n = number of samples.

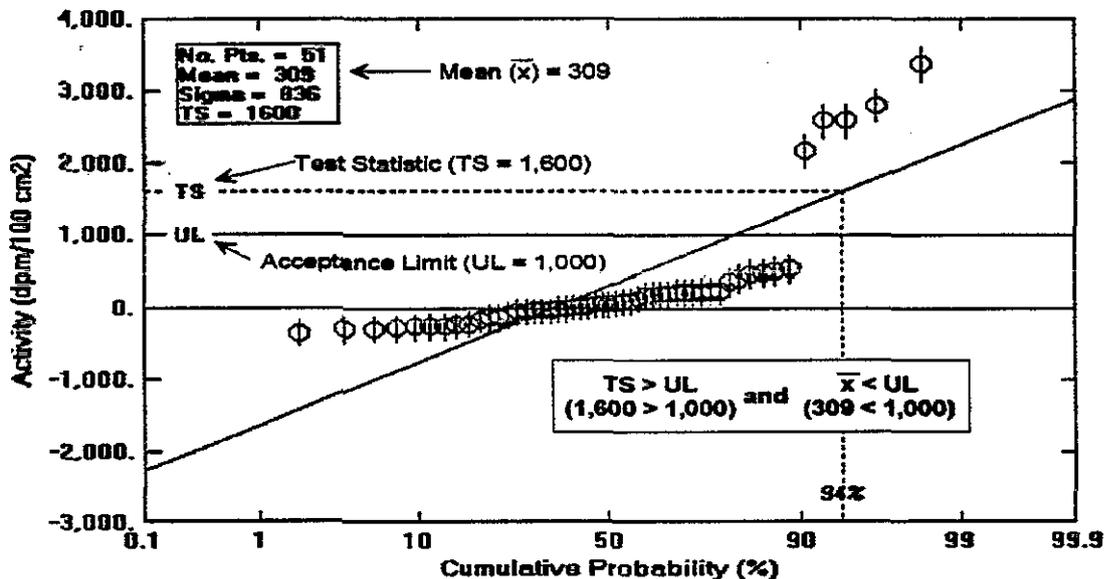
Depending on the data collected, the statistical test may result in one of three conclusions illustrated on the next two pages.

1. **Acceptance:** If the test statistic ($\bar{x} + k \cdot s$) is less than or equal to the limit (U); accept the region as clean. If any single measured value exceeds 80% of the limit; decontaminate that location to as near background as is possible, but do not change the value in the analysis. Graph A is an example of the sample lot acceptance by the test.



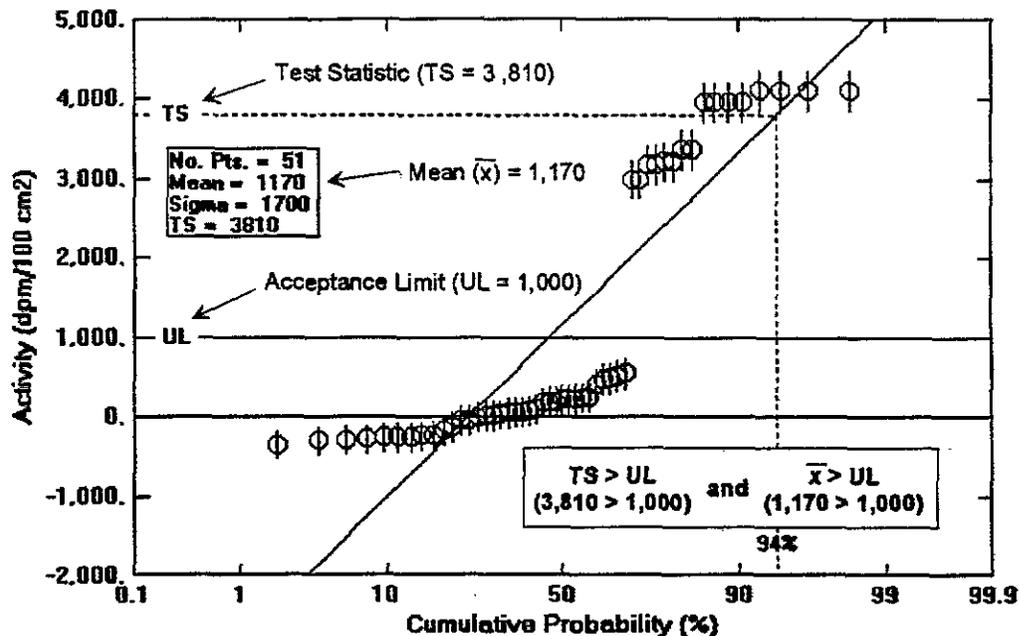
GRAPH A. EXAMPLE OF SAMPLE LOT ACCEPTANCE, WHERE $TS (= \bar{x} + K \cdot S) \leq UL$ AND $\bar{x} \leq UL$

2. **Collect additional measurements:** If the test statistic ($\bar{x} + k \cdot s$) is greater than the limit (U), but \bar{x} itself is less than U, and if independently re-sampling and combining all measured values to determine if $\bar{x} + k \cdot s \leq U$ for the combined set occurs; then accept the region as clean. If not, the region is contaminated and must be remediated. Graph B gives an example of additional measurements that must be taken in the sample lot to accept or reject it.



GRAPH B. EXAMPLE OF SAMPLE LOT REQUIRING ADDITIONAL MEASUREMENTS, WHERE $TS (= \bar{x} + K \cdot S) > UL$ AND $\bar{x} < UL$

3. **Rejection:** If the test statistic ($\bar{x} + k \cdot s$) is greater than the limit (U) and $\bar{x} \geq U$, the region is contaminated and must be remediated. Graph C gives an example of sample lot rejection by the test.



GRAPH C. EXAMPLE OF SAMPLE LOT REJECTION, WHERE $TS (= \bar{x} + K \cdot S) > UL$ AND $\bar{x} > UL$

The Final Status Survey was analyzed using a Lot Tolerance Percent Defect of $\beta = LTPD = 5\%$, for the choices $K_{\beta} = K_2 = 1.645$ for a region of rejection, one-tailed test. The 5% value used was more conservative than the 10% LTPD Consumer Risk Value used by the USNRC [Regulatory Guide 6.6], and State of California (see Reference 9). If the statistical tests met the acceptance criteria above, we were willing to accept the hypothesis that the probability of accepting a Sample Lot as not being contaminated, (which is in fact 5% or more contaminated) is 5%. In other words, if the test statistic is less than the release criteria, we are 95% confident that over 95% of the Sample Lot has residual contamination below 100% of the release criteria of Section 3.6. This is referred to as the (95/95/100) test.

5.0 SAMPLE LOT ANALYSES AND RESULTS

Survey measurements were tested against the acceptance criteria for each particular type of radiation. All Sample Lots were tested for removable contamination, and Lots 1 through 3 for the total contamination and ambient gamma measurements.

Measurements for the Final Status Survey were taken over the period from 9/5/98 through 9/30/98. Raw data measurements were adjusted for daily instrument background and statistically tested using the "Cumplot" method (see Reference 3). Data was plotted on cumulative probability graphs shown in Appendix B. The more linear the data, the closer it approached a normal distribution. When applicable, plots were shown in two scales; a condensed scale to show detailed data distribution and an expanded view when there is a wide separation between the data and the acceptance limit.

The test statistic ($TS = \bar{x} + k \cdot s$) for all sample lots combined were calculated and applicable contamination acceptance limits were compared. Individual calculated sample results data, used to generate the graphs, are also provided in the following Appendices B through E.

5.1 Test Statistic Results

The test statistic results shown in Table 5, demonstrate for each applicable acceptance limit (UL); the corresponding test statistic (TS) value is less than U, ($TS < U$). Therefore, the Sample Lots pass the "sampling inspection by variables" test and are "Accepted" as radiologically clean. The Building 4019 surveys correspond to assuring with a 95% confidence that 95% of the Sample Lots have residual contamination below 100% (a 95/95/100 test) of the applicable DOE and State of California limits (see Reference 6).

Criteria	Total (dpm/100 cm ²)		Removable (dpm/100 cm ²)	
	Alpha	Beta	Alpha	Beta
Acceptance Limit (UL)	5,000	5,000	1,000	1,000
Actual Results (TS) Lot 1 High Bay	7	473	3	13
Lot 2 (TS)	4	-633*	3	18
Lot 3 (TS)	10	91	4	13
Lot 4 (TS)	12	1300	3	3

*Refer to Section 5.2, Lot 2 for details

TABLE 5: TEST STATISTIC RESULTS COMPARISON

5.2 Sample Lot Survey Results

Lot 1

For the High Bay, the survey data results demonstrated the highest quantitative total alpha measurement was 13 dpm/100cm² and highest removable alpha contamination was 5.5 dpm/100cm². The highest quantitative total beta measurement was 797.5 dpm/100cm² and the highest removable beta contamination was 23 dpm/100cm².

The highest [gross] gamma level was 10 µR/hr inside the building. Background outside of Building 4019 was higher than inside Building 4019 itself. The acceptance limit of 18.3 µR/hr was derived from the reference background of 14,256 cpm outside of Building 4019, divided by the 215cpm/µR/hr conversion factor, plus 5µR/hr correction factor over that background level. The highest corrected [net] gamma level was <5µR/hr above background.

Qualitative measurements taken for all one hundred percent (100%) of the survey grids in the affected area indicated no detectable activity.

Refer to Appendix B for Lot 1 detailed results.

Lot 2

The survey data results for the High Bay, unaffected area showed the highest total alpha measurement was 3 dpm/100cm² and highest removable alpha contamination was 5 dpm/100cm². The High Bay area where the survey took place, three meters up from the floor to the ceiling, and the fact that the background is lower the further the distance from the ground; resulted in the corrected beta activity to be lower than background levels. The highest total quantitative beta measurement was below background levels. The highest total beta measurement with no background levels subtracted out [gross] was 286 dpm/100cm². The highest removable beta contamination was 25 dpm/100cm². This data includes the overhead crane and ventilation ducting (see Appendix C).

Qualitative measurements were taken for all one hundred percent (100%) of the survey grid indicated no detectable activity.

Lot 3

The highest total alpha measurement was 5.5 dpm/100cm² and highest removable alpha contamination was 3 dpm/100cm². The highest total beta was 357 dpm/100cm² and the highest removable beta contamination was 12.5 dpm/100cm² (see Appendix D). Qualitative measurements were taken for all one hundred percent (100%) of the survey grid indicated no detectable activity. The radionuclide concentrations analysis on the glycol and oil from the Reactor Test Chamber found no contamination of Cs-137, Co-60, or any other man-made isotope or fuel.

Lot 4

The survey data results for Room 109 demonstrated a highest total alpha measurement of 11.5 dpm/100cm² and highest removable alpha contamination was 5 dpm/100cm². The highest total beta was 961 dpm/100cm² and the highest removable beta contamination was 10 dpm/100cm² (see Appendix E). The highest gamma level was 2.5 µR/hr.

Lot 5

The survey data results for the office areas and Room 110 indicated that removable surface contamination results were evenly distributed, and the results were less than the release limits. Qualitative measurements taken for all one hundred percent (100%) of the survey grids in the affected area indicated no detectable activity.

Table 6 summarizes the Sample Lot results for all areas of Building 4019.

Location	Quantitative Total (dpm/100 cm ²)		Removable (dpm/100 cm ²)		Gross Gamma Exposure Rate (μR/h)	Qualitative	
	Alpha	Beta	Alpha	Beta		Alpha	Beta
Lot 1	11	797	5	23	10 ^E	NDA ^B	NDA
Lot 2	3	-548 ^A	5	25	NM	NDA	NDA
Lot 3	5	357	3	12.5	NM	NDA	NDA
Lot 4	11	961	5	10	15.7	NDA	NDA
Lot 5	NM ^D	NM	<MDA ^C	<MDA	NM	NDA	NDA

(A)Gross counts, refer to Lot 2, Page 23 (B)NDA= no detectable activity (C) MDA: Minimum Detectable Activity
(D) NM = not measured (E) Refer to Lot 1, page 23

TABLE 6: MAXIMUM SURVEY RESULTS

5.3 Scabbled Floor Section

When a small, 2-ft by 2-ft floor section near the southwest corner of the High Bay was identified in the 1996 ORISE Survey Report, the highest total beta measurements ranged from 1400 to 11,000 dpm/100cm². The floor section was scabbled and samples were taken during the procedure. The sample results revealed 1.8 pCi/gm of Cs-137 at approximately 20% of the clean-up standard of 9.2 pCi/gm (the location of the highest counts/minute). No Co-60 was detected. The scabbled residue was disposed of as radioactive waste.

Post remediation, the highest quantitative total alpha measurement to that floor section was 8 dpm/100cm² and no removable alpha measurements were detected on that specific floor surface area. The highest quantitative total beta measurement was 364 dpm/100cm² and the highest removable beta contamination was 20 dpm/100cm². Again, these measurements were well below the regulatory limits.

6.0 CONCLUSION

In all Sample Lots, the highest quantitative total alpha measurement was 13 dpm/100cm², and highest removable alpha found was 5 dpm/100cm². The highest quantitative total beta measurement was 961 dpm/100cm², and highest removable beta found was 25 dpm/100cm². The highest test statistic for the distribution of contamination was well below DOE approved acceptance limits for both alpha and beta contamination. The highest measured Cs-137 activity found was 1.8 pCi/gm. This area was remediated. Based on the results of the investigations reported here, the High Bay, Room 109, Reactor Test Chamber, facility High Bay crane, Room 110, and office areas of Building 4019 are free of contamination. They meet the Department of Energy approved acceptance criteria and Building 4019 is therefore releasable for "unrestricted use" with no radiological restrictions

7.0 REFERENCES

1. GEN-ZR-0010, "Radiological Survey of Buildings 4019 and 013", 1988.
2. 10CFR32.110, "Acceptance Sampling Procedures Under Specific Licenses".
3. Cumplot, Proprietary Statistical Program.
4. ORISE 96/C-5, "Verification Survey of Buildings 4019 and T024, Santa Susana Field Laboratory, Rockwell International, Ventura County, California", February 1996
5. DECON-1, "State of California for Decontaminating Facilities and Equipment Prior to Release for Unrestricted Use", June 1977
6. N001SRR140131, Approved Sitewide Release Criteria for Remediation of Radiological Facilities at the Santa Susana Field Lab", February 1999.
7. DOE Order 5400.5 "Radiation Protection of the Public and Environment", Department of Energy, January 1992, (Figure IV-1).
8. MIL-STD-414, "Sampling Procedures and Tables for Inspection by Variables for Percent Defective", June 1957.
9. USNRC Regulatory Guide 6.6, "Acceptance Sampling Procedures for Exempted and Generally Licensed Items Containing By-Product Material"

APPENDIX A

MAPS

LOT 1: T019 HIGH BAY- AFFECTED AREAS

North Wall

Top

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

183 ← 208

West Wall

Top

182	207	250
181	206	240
180	205	230
179	204	229
178	203	228
177	202	227
176	201	226
175	200	225
174	199	224
173	198	223
172	197	222
171	196	221
170	195	220
169	194	219
168	193	218
167	192	217
166	191	216
165	190	215
164	189	214
163	188	213
162	187	212
161	186	211
160	185	210
159	184	209

251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278
279	280	281	282	283	284	285	286	287	288	289	290	291	292
293	294	295	296	297	298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331	332	333	334
335	336	337	338	339	340	341	342	343	344	345	346	347	348
349	350	351	352	353	354	355	356	357	358	359	360	361	362
363	364	365	366	367	368	369	370	371	372	373	374	375	376
377	378	379	380	381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400	401	402	403	404
405	406	407	408	409	410	411	412	413	414	415	416	417	418
419	420	421	422	423	424	425	426	427	428	429	430	431	432
433	434	435	436	437	438	439	440	441	442	443	444	445	446
447	448	449	450	451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470	471	472	473	474
475	476	477	478	479	480	481	482	483	484	485	486	487	488
489	490	491	492	493	494	495	496	497	498	499	500	501	502
503	504	505	506	507	508	509	510	511	512	513	514	515	516
517	518	519	520	521	522	523	524	525	526	527	528	529	530
531	532	533	534	535	536	537	538	539	540	541	542	543	544
545	546	547	548	549	550	551	552	553	554	555	556	557	558
559	560	561	562	563	564	565	566	567	568	569	570	571	572
573	574	575	576	577	578	579	580	581	582	583	584	585	586
587	588	589	590	591	592	593	594	595	596	597	598	599	600

East Wall

Top

93	68	43
94	69	44
95	70	45
96	71	46
97	72	47
98	73	48
99	74	49
100	75	50
101	76	51
102	77	52
103	78	53
104	79	54
105	80	55
106	81	56
107	82	57
108	83	58
109	84	59
110	85	60
111	86	61
112	87	62
113	88	63
114	89	64
115	90	65
116	91	66

92 →



Top

158	157	156	155	154	153	152	151	150	149	148	147	146	145
144	143	142	141	140	139	138	137	136	135	134	133	132	131
130	129	128	127	126	125	124	123	122	121	120	119	118	117

South Wall

251	252	253
265	266	267
279	280	281

3M x 3M grids

Floor grids

Wall grids

Surveyed grids

LOT 2: HIGH BAY UNAFFECTED AREA

Top
North Wall

3225													
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

Top
West Wall

395	420	445	470	519	544	
394	419	444	469	494	518	543
393	418	443	468	493	517	542
392	417	442	467	492	516	541
391	416	441	466	491	515	540
390	415	440	465	490	514	539
389	414	439	464	489	513	538
388	413	438	463	488	512	537
387	412	437	462	487	511	536
386	411	436	461	486	510	535
385	410	435	460	485	509	534
384	409	434	459	484	508	533
383	408	433	458	483	507	532
382	407	432	457	482	506	531
381	406	431	456	481	505	530
380	405	430	455	480	504	529
379	404	429	454	479	503	528
378	403	428	453	478	502	527
377	402	427	452	477	501	526
376	401	426	451	476	500	525
375	400	425	450	475	499	524
374	399	424	449	474	498	523
373	398	423	448	473	497	522
372	397	422	447	472	496	521
371	396	421	446	471	495	520

Top
East Wall

248	223	199	174	149	124	99
249	224	200	175	150	125	100
250	225	201	176	151	126	101
251	226	202	177	152	127	102
252	227	203	178	153	128	103
253	228	204	179	154	129	104
254	229	205	180	155	130	105
255	230	206	181	156	131	106
256	231	207	182	157	132	107
257	232	208	183	158	133	108
258	233	209	184	159	134	109
259	234	210	185	160	135	110
260	235	211	186	161	136	111
261	236	212	187	162	137	112
262	237	213	188	163	138	113
263	238	214	189	164	139	114
264	239	215	190	165	140	115
265	240	216	191	166	141	116
266	241	217	192	167	142	117
267	242	218	193	168	143	118
268	243	219	194	169	144	119
269	244	220	195	170	145	120
270	245	221	196	171	146	121
271	246	222	197	172	147	122
272	247	198	173	148	123	123

545	546	547	548	549	550	551	552	553	554	555	556	557	558
559	560	561	562	563	564	565	566	567	568	569	570	571	572
573	574	575	576	577	578	579	580	581	582	583	584	585	586
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601	602	603	604	605	606	607	608	609	610	611	612	613	614
615	616	617	618	619	620	621	622	623	624	625	626	627	628
629	630	631	632	633	634	635	636	637	638	639	640	641	642
643	644	645	646	647	648	649	650	651	652	653	654	655	656
657	658	659	660	661	662	663	664	665	666	667	668	669	670
671	672	673	674	675	676	677	678	679	680	681	682	683	684
685	686	687	688	689	690	691	692	693	694	695	696	697	698
699	700	701	702	703	704	705	706	707	708	709	710	711	712
713	714	715	716	717	718	719	720	721	722	723	724	725	726
727	728	729	730	731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750	751	752	753	754
755	756	757	758	759	760	761	762	763	764	765	766	767	768
769	770	771	772	773	774	775	776	777	778	779	780	781	782
783	784	785	786	787	788	789	790	791	792	793	794	795	796
797	798	799	800	801	802	803	804	805	806	807	808	809	810
811	812	813	814	815	816	817	818	819	820	821	822	823	824
825	826	827	828	829	830	831	832	833	834	835	836	837	838
839	840	841	842	843	844	845	846	847	848	849	850	851	852
853	854	855	856	857	858	859	860	861	862	863	864	865	866
867	868	869	870	871	872	873	874	875	876	877	878	879	880
882	883	884	885	886	887	888	889	890	891	892			

251	252	253
263	266	267
279	280	281

3M x 3M grids

Ceiling grids

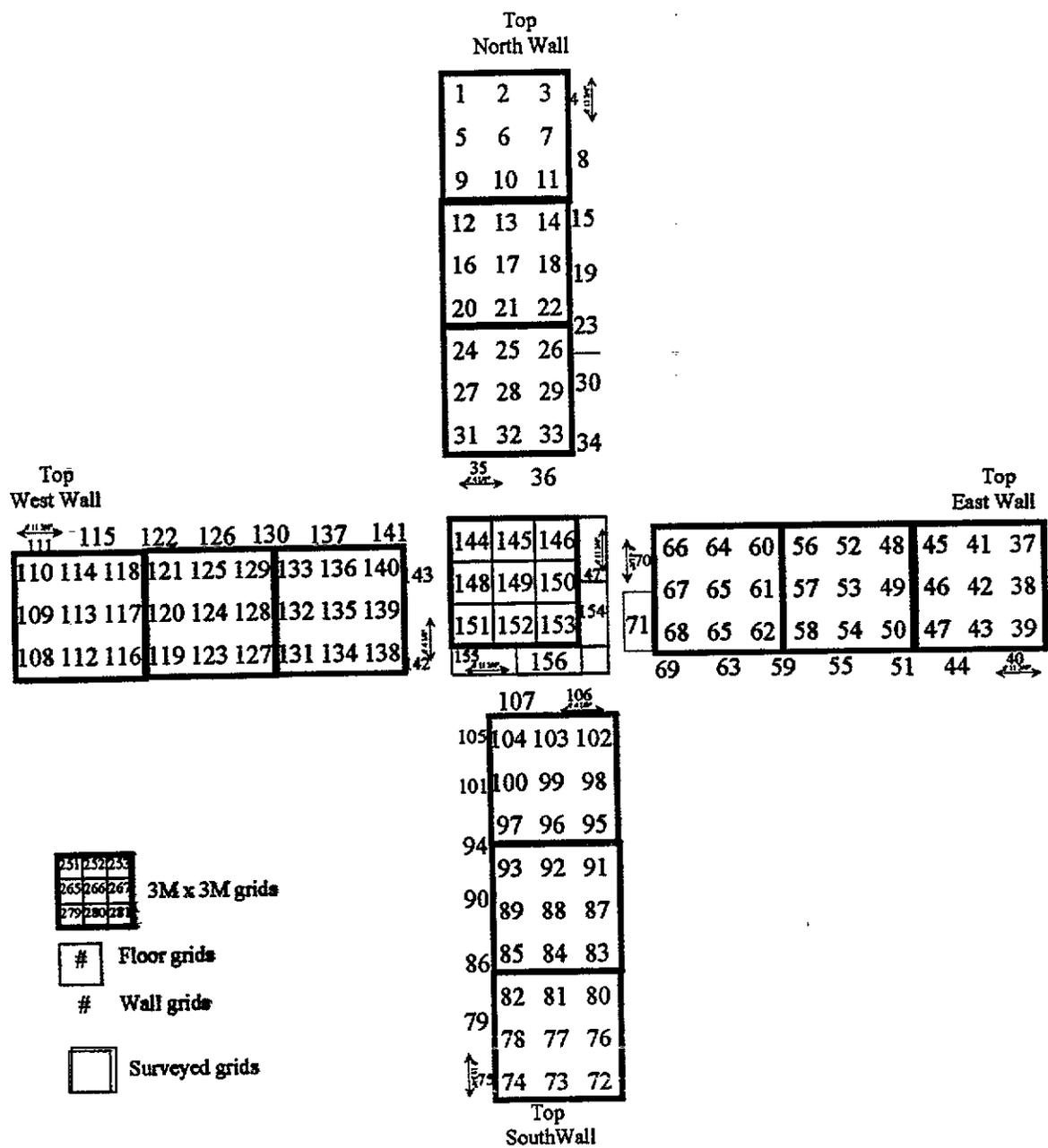
Wall grids

Surveyed grids

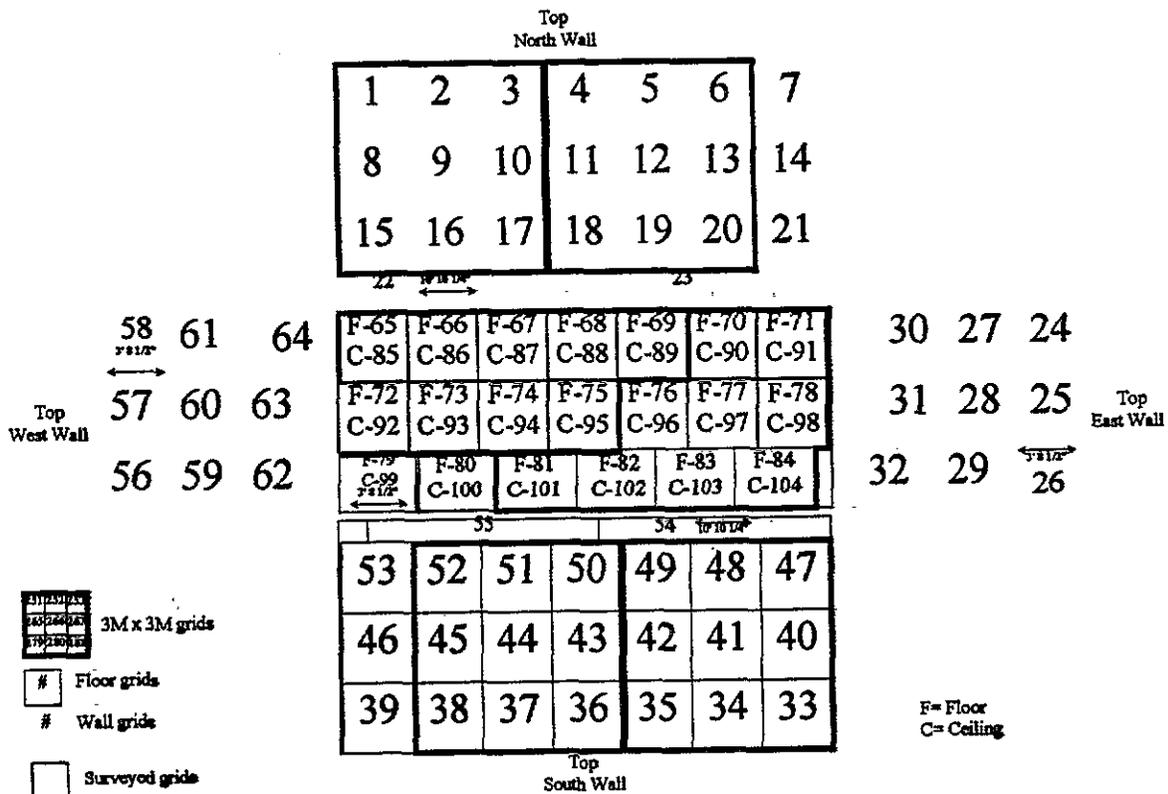
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328	327	326	325	324	323	322	321	320	319	318	317	316	315
314	313	312	311	310	309	308	307	306	305	304	303	302	301
300	299	298	297	296	295	294	293	292	291	290	289	288	287
286	285	284	283	282	281	280	279	278	277	276	275	274	273

Top
South Wall

LOT 3: REACTOR TEST
CHAMBER GRID MAP

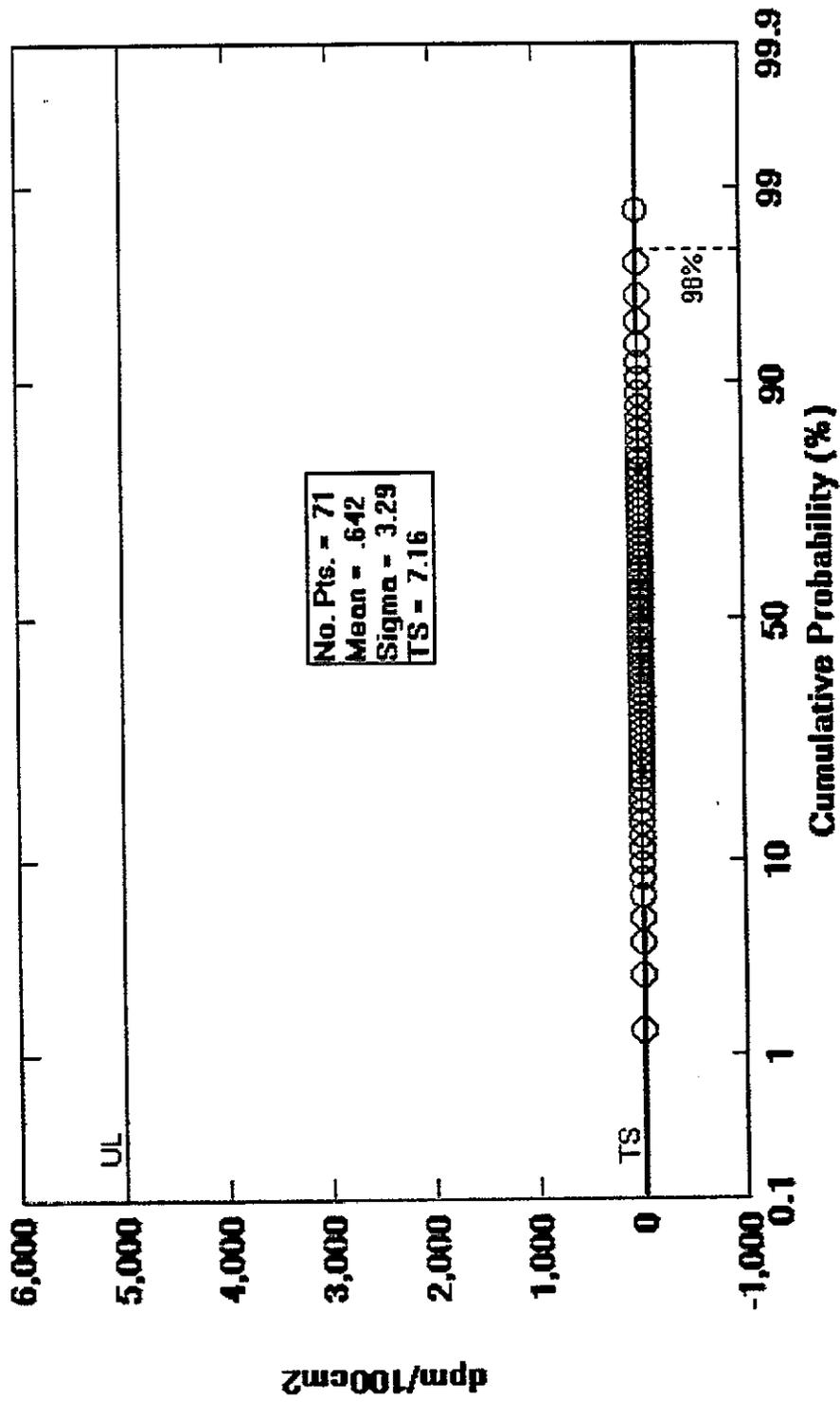


LOT 4: FUEL STORAGE ROOM 109



APPENDIX B
SAMPLE LOT 1

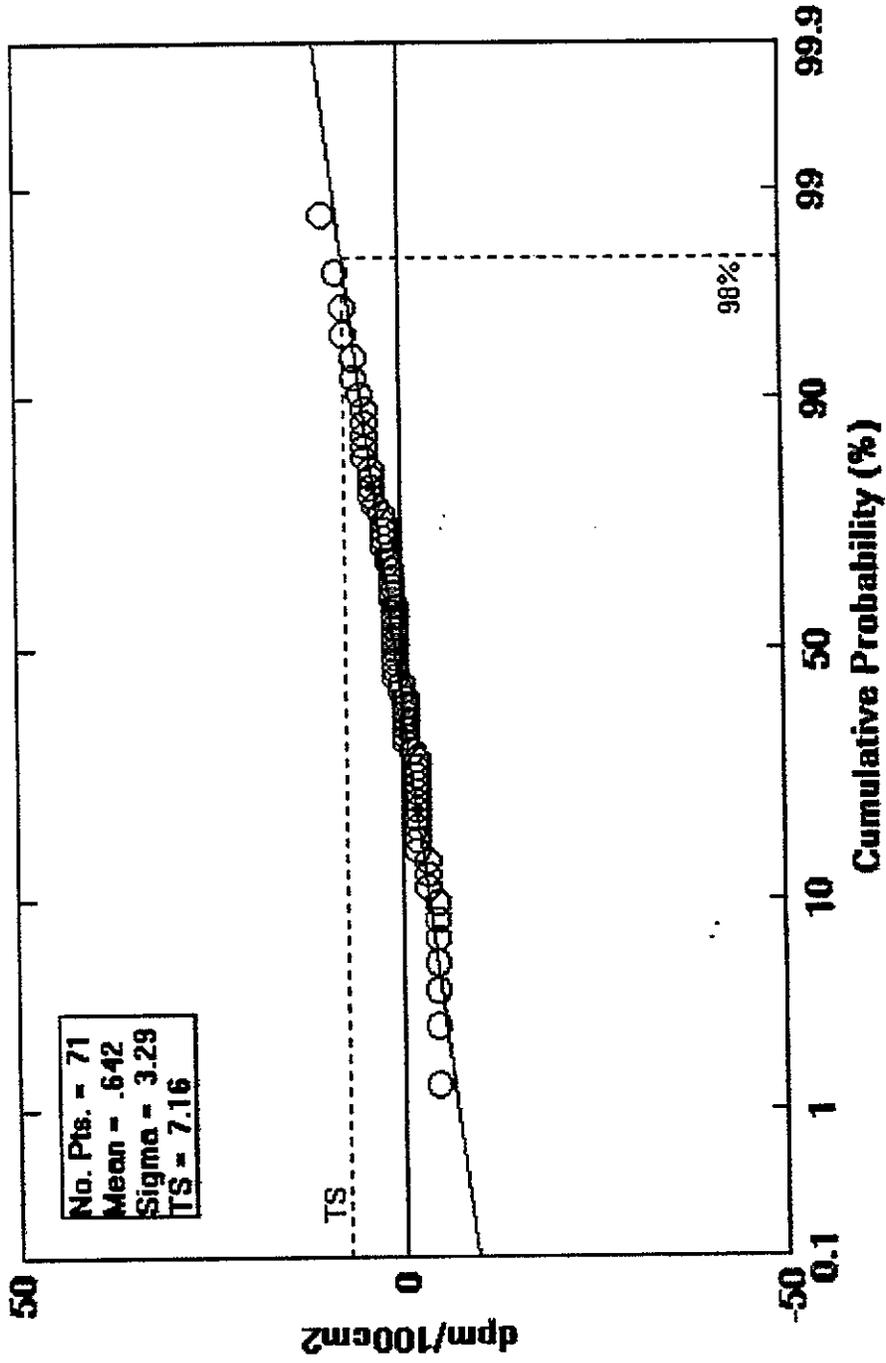
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01-26-99

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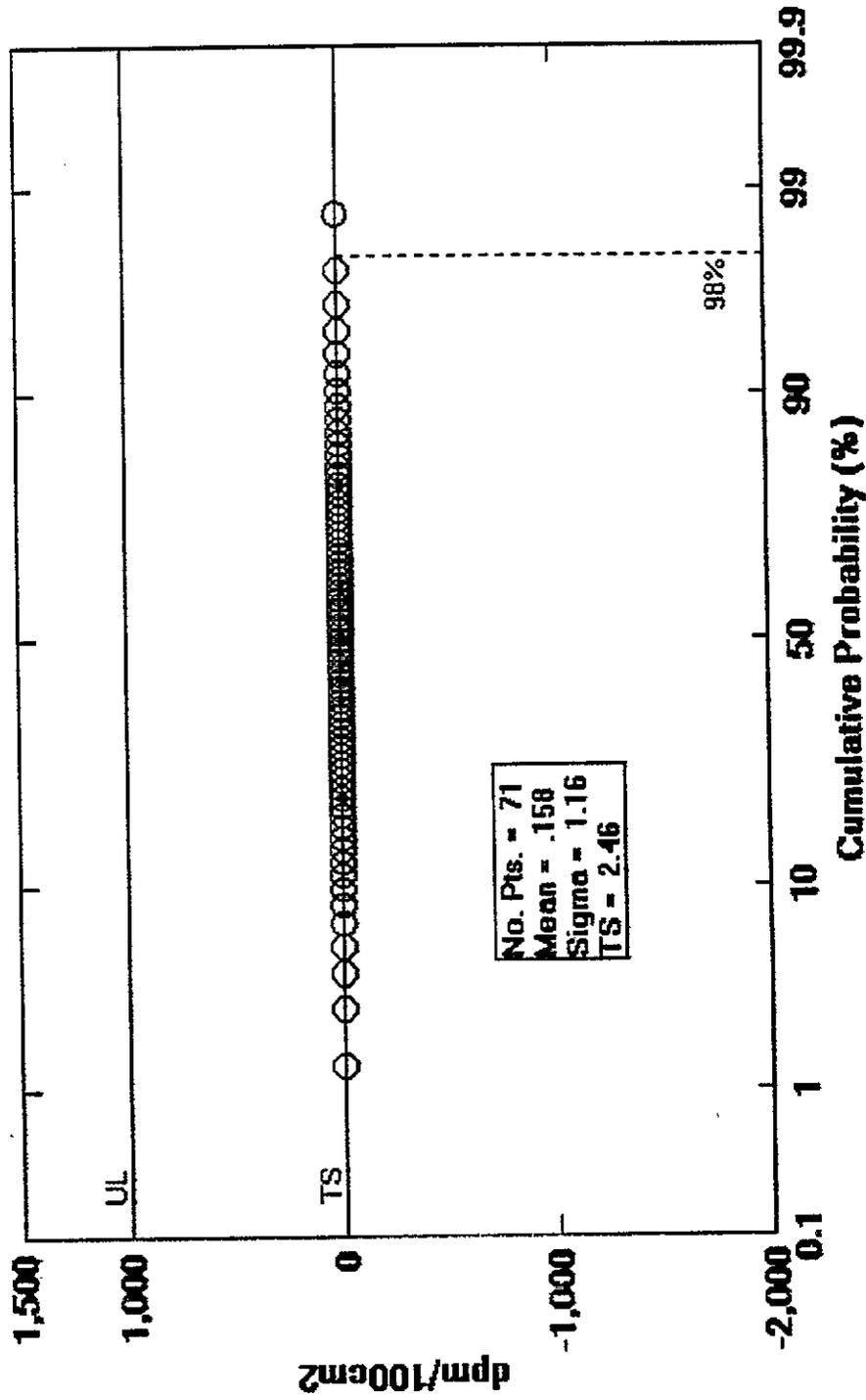
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01-26-99

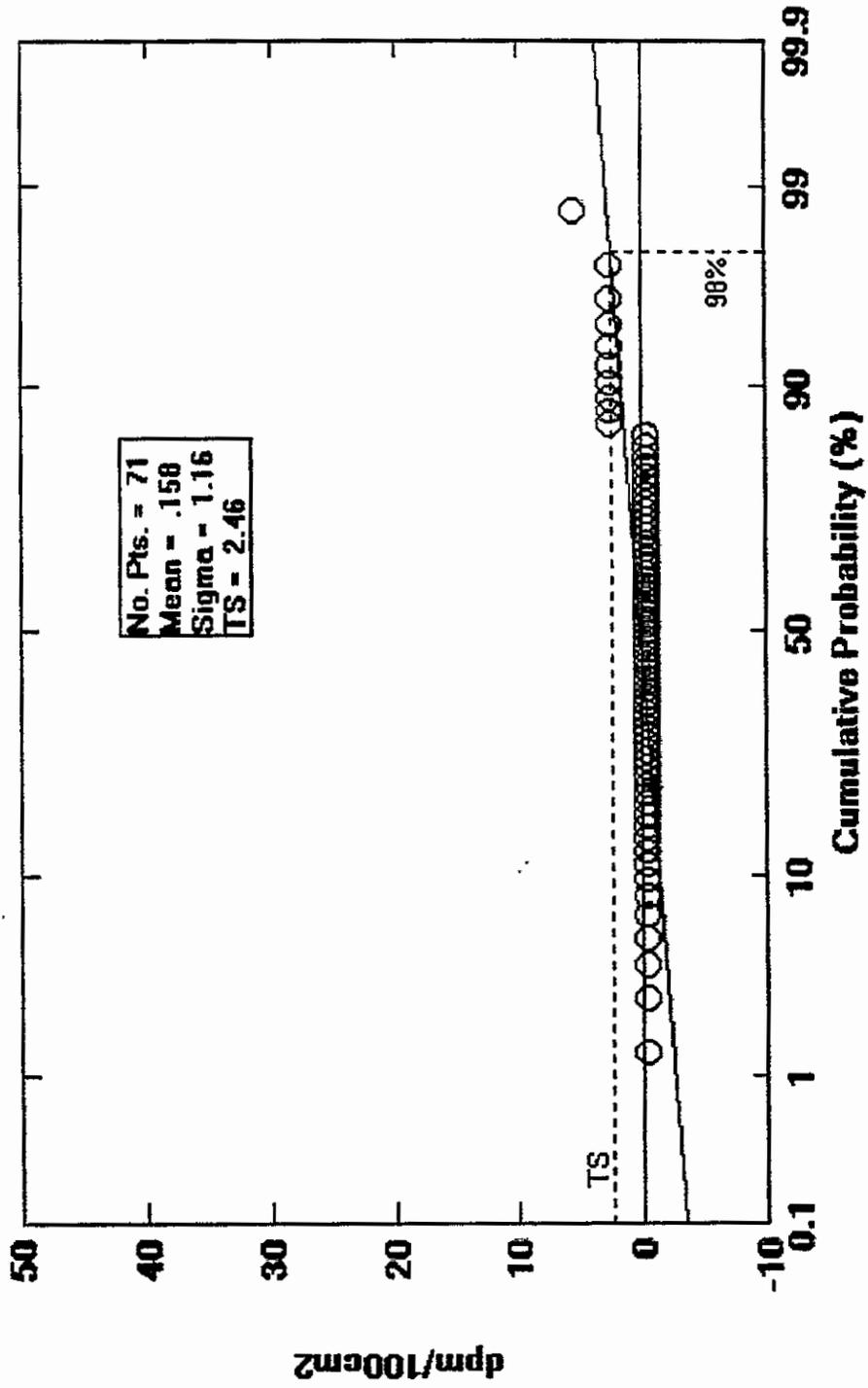
Removable Alpha Measurements-Lot 1: High Bay



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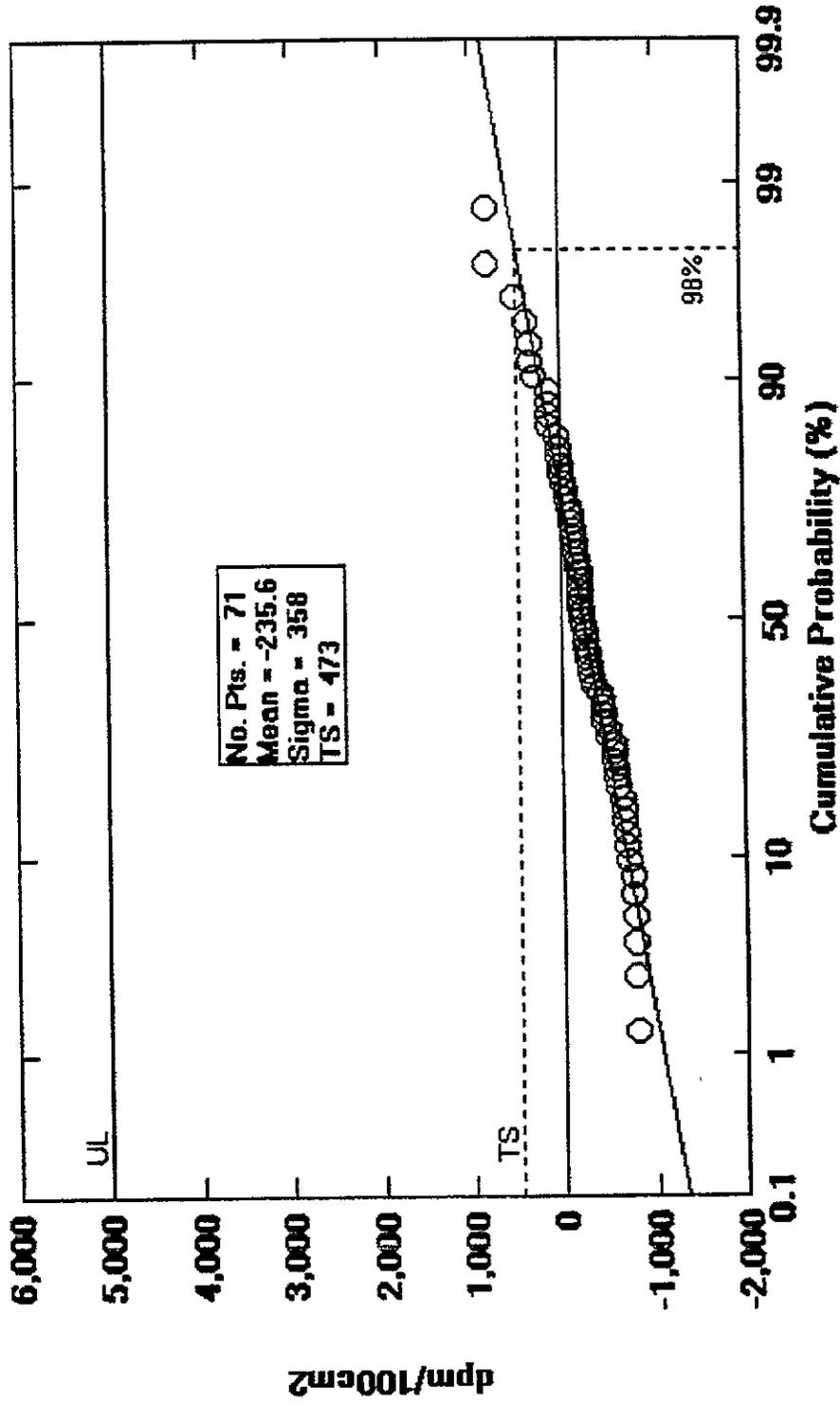
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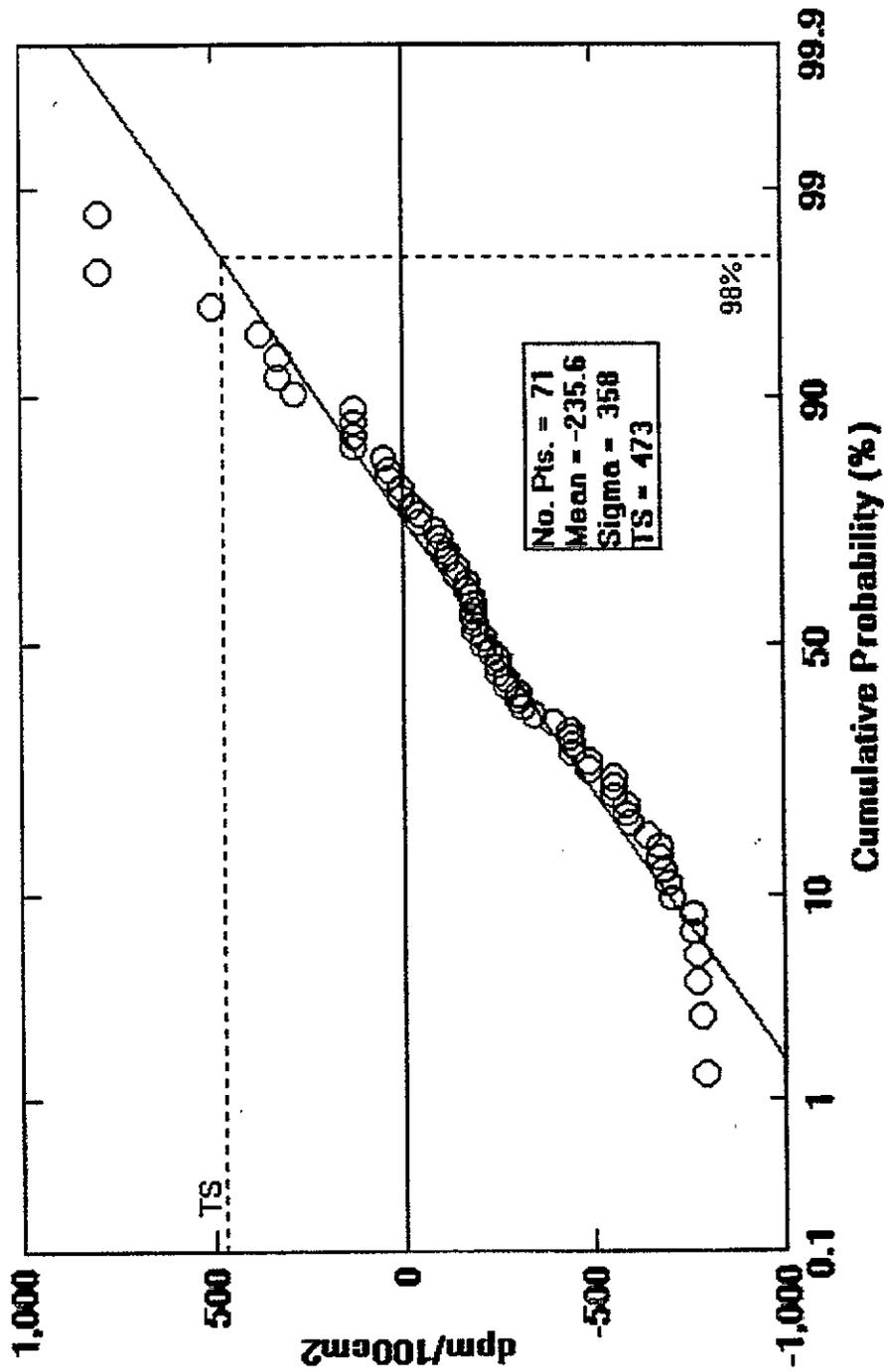
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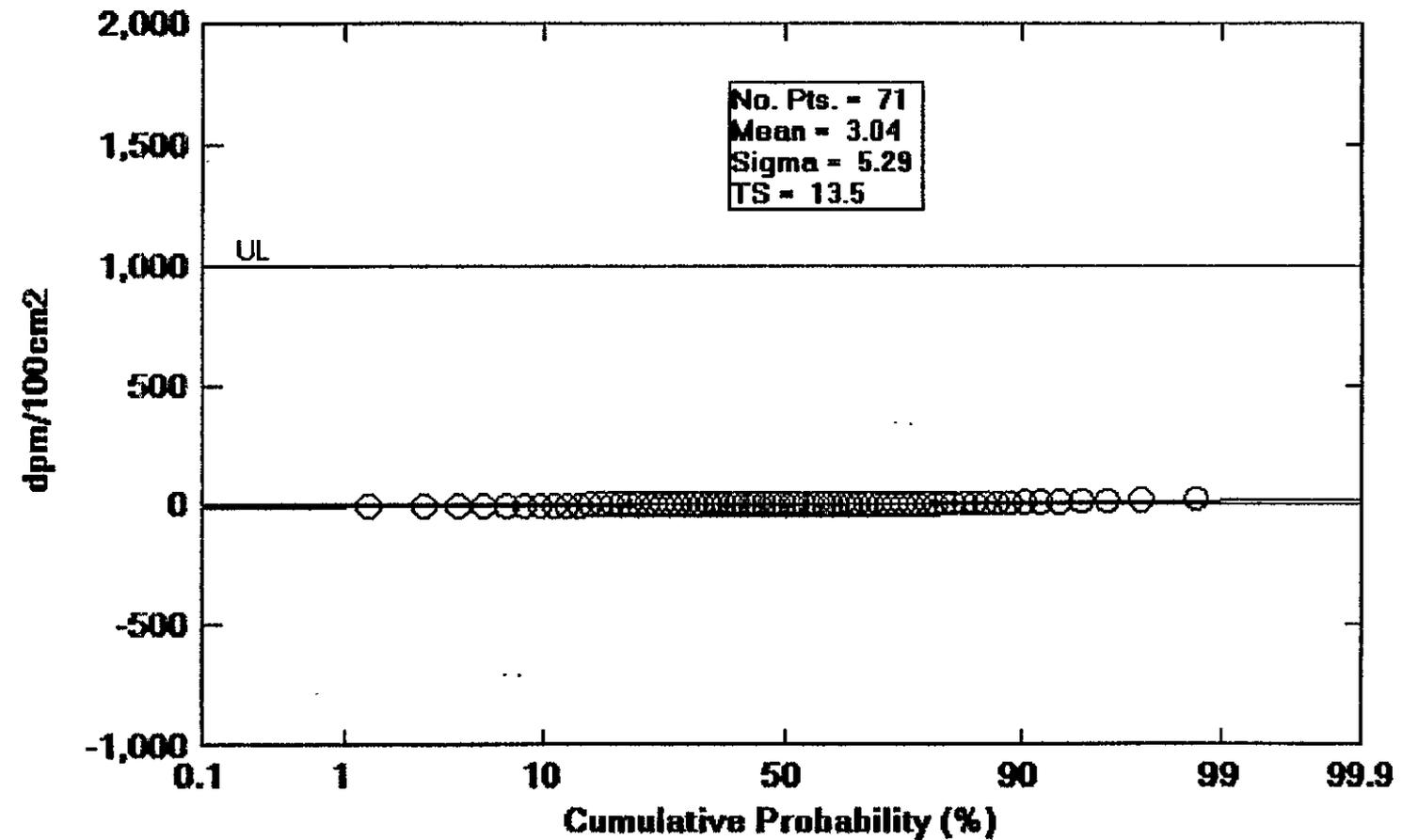
Quantitative Total Beta Measurements-Lot 1: High Bay



01-26-99

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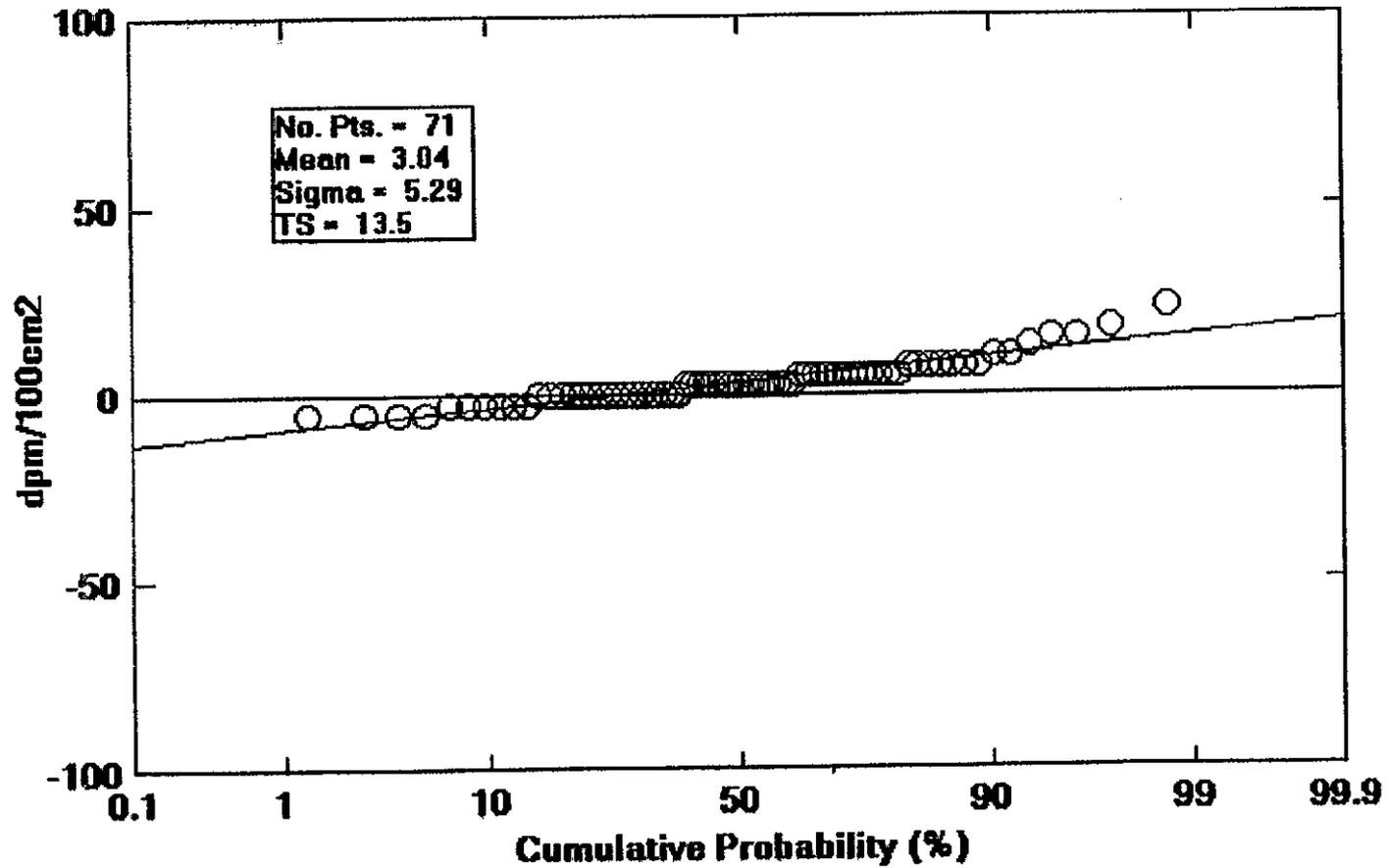
Removable Beta Measurements-Lot 1: High Bay



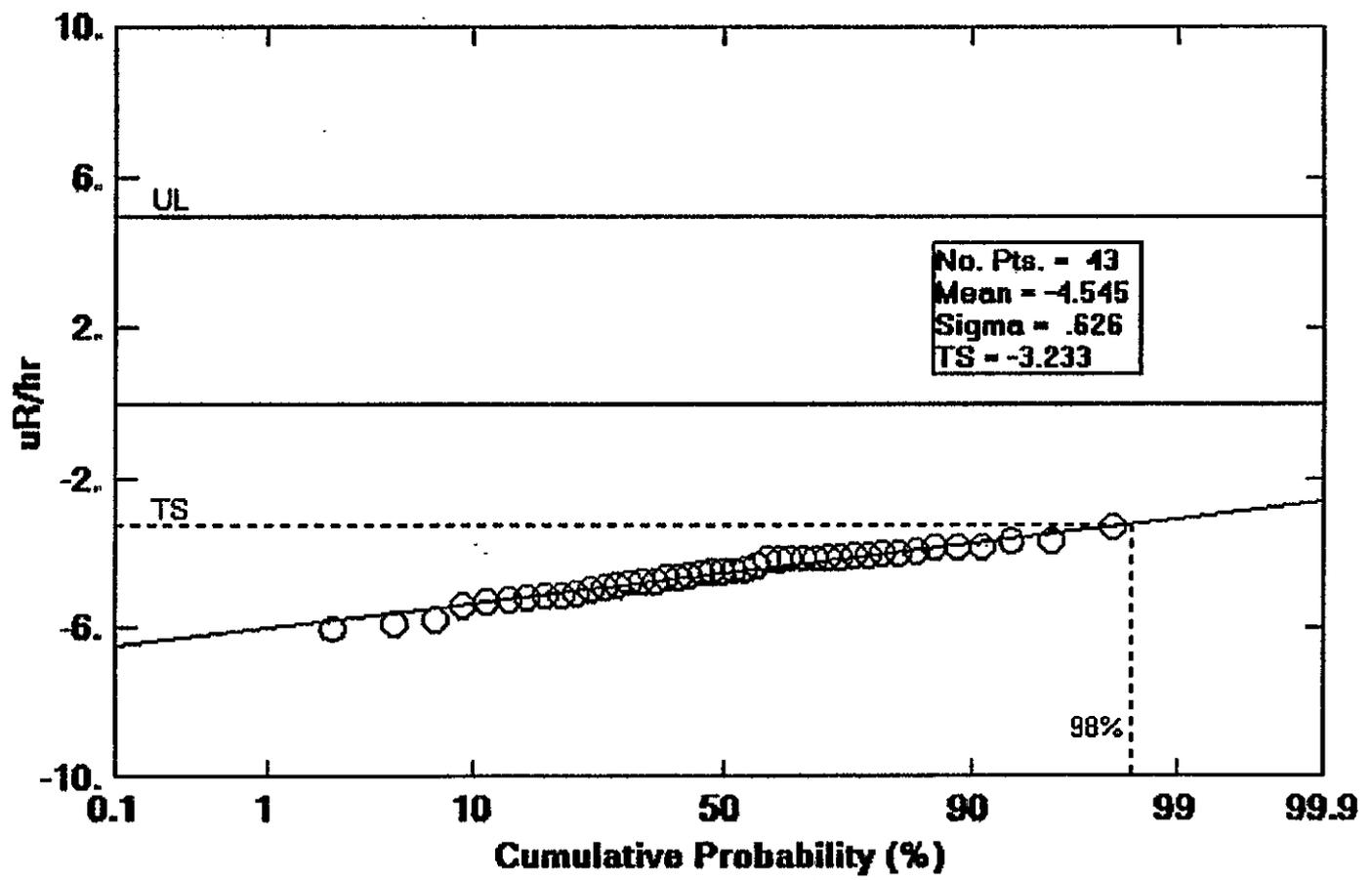
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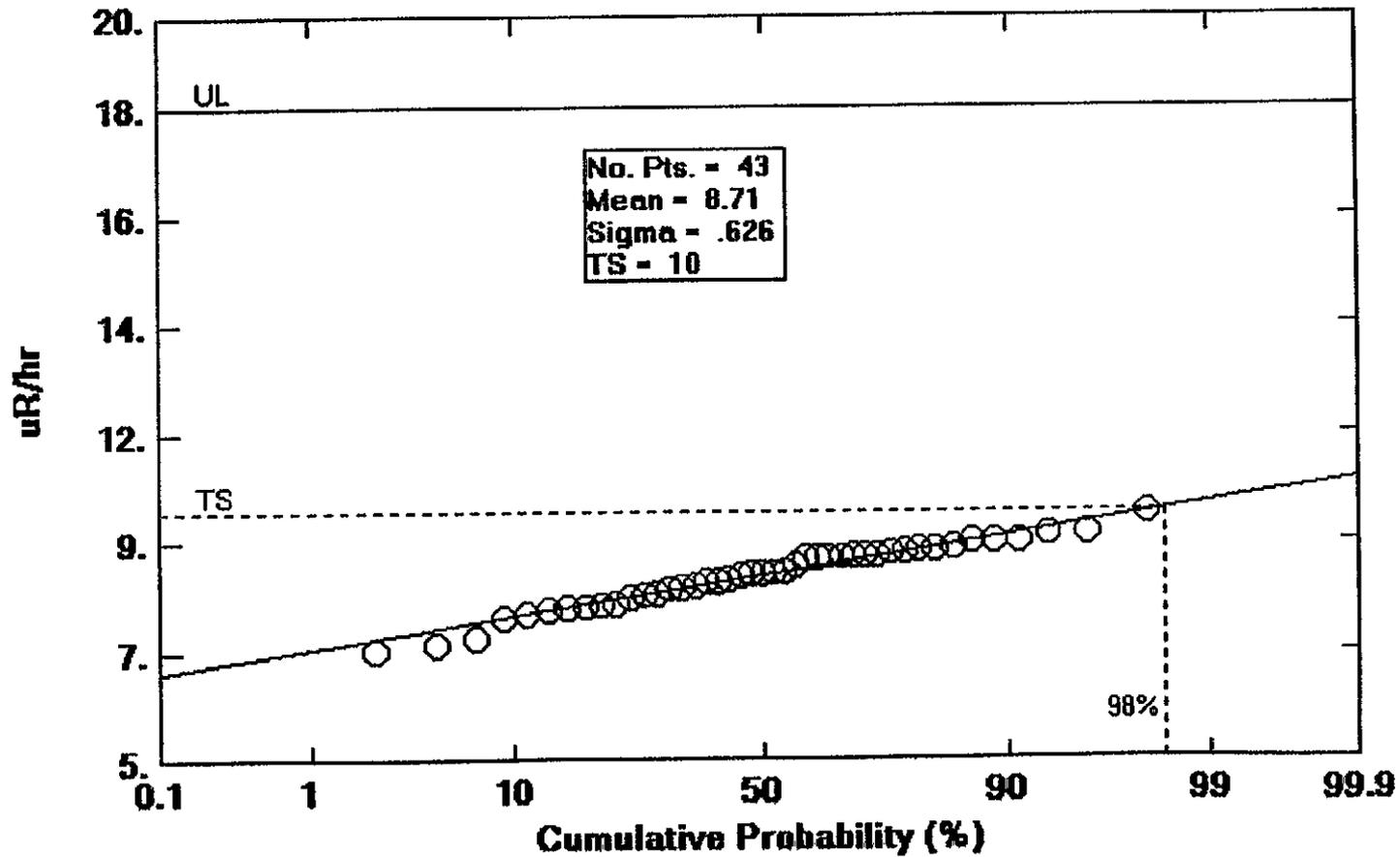
Removable Beta Measurements-Lot 1: High Bay



Net Gamma Measurement - T019 Affected Area



Gross Gamma Measurement - T019 Affected Area



Lot 1 High Bay
Affected Area

TITLE: Final Survey T019 High Bay
Data Description: Floor Grids

No. of Samples: 71

SAMPLE NAME	GRID AM	5 MIN 1 MI			5 MIN 1 MI			1 MIN	ALPHA						BETA						GAMMA		
		ALPHA			BETA				GAM	INSTRUMENT			SMEAR			INSTRUMENT			SMEAR			BACKG	EFACT
		TOTA	MAX	REM	TOTAL	MAX	REM			BACK	EFACT	AFACT	BACK	EFACT	AFACT	BACK	EFACT	AFACT	BACK	EFACT			
Floor Grid: 9/14/9	287	6		0	328		4	1979	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	288	5		0	325		4	2023	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	295	8		0	320		3	1725	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	299	6		0	313		3	2060	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	302	8		0	304		2	1962	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	310	3		0	308		2	1756	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	349	4		0	298		4	1580	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	353	3		0	251		7	1749	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	359	8		0	250		3	1829	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	370	3		1	306		2	1885	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	377	3		0	295		5	1553	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	389	2		0	282		2	1849	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	397	5		0	402		5	1976	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	401	4		0	337		3	1881	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	413	1		0	337		2	1919	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	420	3		0	315		2	1609	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	430	3		0	291		4	1783	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	437	9		0	361		4	1737	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	439	10		0	286		1	1823	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	482	12		0	356		2	1989	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	486	1		0	328		2	1848	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	487	3		0	325		8	1799	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	490	1		0	320		6	1741	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	504	1		0	313		3	1819	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	507	5		0	304		2	1954	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	528	10		0	308		3	2026	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	530	3		1	298		2	1892	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	537	9		0	251		2	1992	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	554	6		0	250		5	1995	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	558	2		1	306		3	2023	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	563	5		0	295		3	1889	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	572	3		0	282		3	2054	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	574	4		0	402		4	1793	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	579	5		1	337		9	1878	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	589	4		0	337		0	2143	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	253	3		2	307		3	1690	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	266	1		0	302		4	1710	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	277	1		0	352		4	1961	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			

Lot 1 High Bay
Affected Area

SAMPLE NAME	GRID AM	5 MIN 1 MI			5 MIN 1 MI			1 MIN	ALPHA						BETA						GAMMA		
		ALPHA			BETA				GAM	INSTRUMENT			SMEAR			INSTRUMENT			SMEAR			BACKG	EFACT
		TOTA	MAX	REM	TOTAL	MAX	REM			BACK	EFACT	AFACT	BACK	EFACT	AFACT	BACK	EFACT	AFACT	BACK	EFACT			
Floor Grid	334	2		0	315		1	1858	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid	465	1		0	373		2	1959	4.5	4.66	1.4	0.01	0.3455	324.5	10.29	5	2.1	0.3892	14256	0.005			
Floor Grid: 9/16/9	466	3		0	330		8	1958	1.83	4.70	1.4	0.01	0.3455	332.3	10.3	5	2.1	0.3892	14256	0.005			
Floor Grid	479	3		0	337		1	1957	1.83	4.70	1.4	0.01	0.3455	332.3	10.3	5	2.1	0.3892	14256	0.005			
Floor Grid	480	8		0	364		4	1958	1.83	4.70	1.4	0.01	0.3455	332.3	10.3	5	2.1	0.3892	14256	0.005			
North Wall: 9/10/	15	2		0	280		5		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
North Wall: 9/10/	23	2		0	286		3		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
North Wall: 9/10/	27	0		0	290		3		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
North Wall: 9/10/	33	1		0	249		2		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
North Wall: 9/10/	39	2		0	258		0		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	69	3		0	252		5		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	75	2		0	241		4		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	78	2		1	240		1		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	85	1		0	295		3		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	87	4		0	244		6		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	92	5		0	280		2		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	97	1		1	274		1		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	108	2		0	262		4		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
East Wall	115	5		0	286		4		1.5	4.60	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
South Wall: 9/11/	136	2		0	262		2		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
South Wall	141	5		0	230		0		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
South Wall	144	4		0	239		1		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
South Wall	147	4		0	238		3		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
South Wall	151	4		0	248		2		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	185	1		1	252		0		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	190	2		0	280		11		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	201	2		0	266		3		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	208	0		0	290		5		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	214	1		1	249		5		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	218	2		0	258		3		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	224	3		0	252		2		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	230	2		1	241		4		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			
West Wall	221	4		0	231		3		1.16	4.6	1.4	0.01	0.3455	303	10.8	5	2.1	0.3892	14256	0.005			

Lot 1 High Bay
Affected Area

RADIOLOGICAL SURVEY DATA
Data Description: Floor Grids

SAMPLE NAME	GRID NAM	ALPHA (DPM/100CM2)						BETA (DPM/100CM2)						GAMMA (uR/hr)	
		TOTAL	STD DE	MAX	SD	REM	STD DE	TOTAL	STD DEV	MAX	SD	REM	STD DE	TOTAL	STD DEV
Floor Grid: 9/14/98	287	1.96	6.97			0.00	0.03	36.0	454.45			0.74	0.96	-4.06	0.59
Floor Grid	288	0.65	6.84			0.00	0.03	5.1	454.10			0.74	0.96	-3.85	0.59
Floor Grid	295	4.57	7.21			0.00	0.03	-46.3	453.52			0.35	0.88	-5.24	0.59
Floor Grid	299	1.96	6.97			0.00	0.03	-118.3	452.70			0.35	0.88	-3.68	0.59
Floor Grid	302	4.57	7.21			0.00	0.03	-210.9	451.65			-0.04	0.79	-4.13	0.59
Floor Grid	310	-1.96	6.59			0.00	0.03	-169.8	452.12			-0.04	0.79	-5.09	0.59
Floor Grid	349	-0.65	6.72			0.00	0.03	-272.7	450.94			0.74	0.96	-5.91	0.59
Floor Grid	353	-1.96	6.59			0.00	0.03	-756.3	445.39			1.91	1.17	-5.12	0.59
Floor Grid	359	4.57	7.21			0.00	0.03	-766.6	445.27			0.35	0.88	-4.75	0.59
Floor Grid	370	-1.96	6.59			0.34	0.35	-190.4	451.88			-0.04	0.79	-4.49	0.59
Floor Grid	377	-1.96	6.59			0.00	0.03	-303.6	450.59			1.13	1.04	-6.04	0.58
Floor Grid	389	-3.26	6.46			0.00	0.03	-437.3	449.06			-0.04	0.79	-4.66	0.59
Floor Grid	397	0.65	6.84			0.00	0.03	797.5	462.99			1.13	1.04	-4.07	0.59
Floor Grid	401	-0.65	6.72			0.00	0.03	128.6	455.50			0.35	0.88	-4.51	0.59
Floor Grid	413	-4.57	6.33			0.00	0.03	128.6	455.50			-0.04	0.79	-4.33	0.59
Floor Grid	420	-1.96	6.59			0.00	0.03	-97.8	452.94			-0.04	0.79	-5.78	0.59
Floor Grid	430	-1.96	6.59			0.00	0.03	-344.7	450.12			0.74	0.96	-4.97	0.59
Floor Grid	437	5.97	7.32			0.00	0.03	375.6	458.28			0.74	0.96	-5.18	0.59
Floor Grid	439	7.18	7.44			0.00	0.03	-396.2	449.53			-0.43	0.89	-4.78	0.59
Floor Grid	482	9.79	7.66			0.00	0.03	324.1	457.70			-0.04	0.79	-4.01	0.59
Floor Grid	486	-4.57	6.33			0.00	0.03	36.0	454.45			-0.04	0.79	-4.66	0.59
Floor Grid	487	-1.96	6.59			0.00	0.03	5.1	454.10			2.30	1.24	-4.89	0.59
Floor Grid	490	-4.57	6.33			0.00	0.03	-46.3	453.52			1.52	1.11	-5.16	0.59
Floor Grid	504	-4.57	6.33			0.00	0.03	-118.3	452.70			0.35	0.88	-4.80	0.59
Floor Grid	507	0.65	6.84			0.00	0.03	-210.9	451.65			-0.04	0.79	-4.17	0.59
Floor Grid	526	7.18	7.44			0.00	0.03	-169.8	452.12			0.35	0.88	-3.84	0.59
Floor Grid	530	-1.96	6.59			0.34	0.35	-272.7	450.94			-0.04	0.79	-4.46	0.59
Floor Grid	537	5.87	7.32			0.00	0.03	-756.3	445.39			-0.04	0.79	-3.99	0.59
Floor Grid	554	1.96	6.97			0.00	0.03	-766.6	445.27			1.13	1.04	-3.98	0.59
Floor Grid	558	-3.26	6.46			0.34	0.35	-190.4	451.88			0.35	0.88	-3.85	0.59
Floor Grid	563	0.65	6.84			0.00	0.03	-303.6	450.59			0.35	0.88	-4.47	0.59
Floor Grid	572	-1.96	6.59			0.00	0.03	-437.3	449.06			0.35	0.88	-3.71	0.59
Floor Grid	574	-0.65	6.72			0.00	0.03	797.5	462.99			0.74	0.96	-4.92	0.59
Floor Grid	579	0.65	6.84			0.34	0.35	128.6	455.50			2.69	1.30	-4.52	0.59
Floor Grid	589	-0.65	6.72			0.00	0.03	128.6	455.50			-0.82	0.56	-3.29	0.60
Floor Grid	253	-1.96	6.59			0.89	0.49	-180.1	452.00			0.35	0.88	-5.40	0.59
Floor Grid	266	-4.57	6.33			0.00	0.03	-231.5	451.41			0.74	0.96	-5.31	0.59
Floor Grid	277	-4.57	6.33			0.00	0.03	283.0	457.24			0.74	0.96	-4.14	0.59

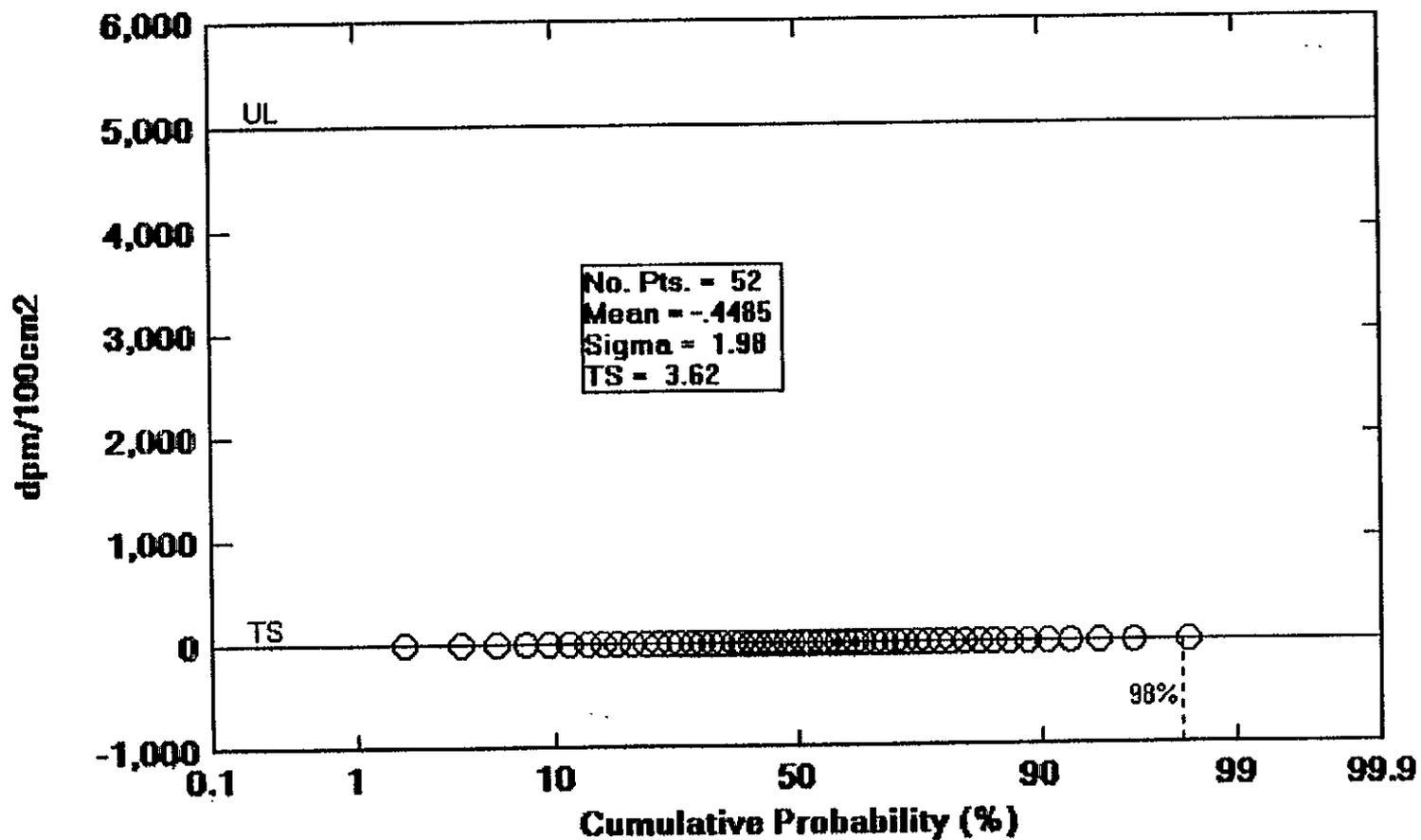
Lot 1 High Bay
Affected Area

SAMPLE NAME	GRID NAM	ALPHA (DPM/100CM2)						BETA (DPM/100CM2)						GAMMA (uR/hr)	
		TOTAL	STD DE	MAX	SD	REM	STD DE	TOTAL	STD DEV	MAX	SD	REM	STD DE	TOTAL	STD DEV
Floor Grid	334	-3.26	6.45			0.00	0.03	-97.8	452.94			-0.43	0.69	-4.62	0.59
Floor Grid	465	-4.57	6.33			0.00	0.03	499.1	459.66			-0.04	0.79	-4.15	0.59
Floor Grid: 9/16/98	466	1.54	3.98			0.00	0.03	-23.7	459.65			2.30	1.24	-4.15	0.59
Floor Grid	479	1.54	3.98			0.00	0.03	48.4	460.46			-0.43	0.69	-4.16	0.59
Floor Grid	480	8.12	3.98			0.00	0.03	326.5	463.56			0.74	0.96	-4.15	0.59
North Wall: 9/10/9	15	0.64	3.97			0.00	0.03	-248.4	457.57			1.13	1.04		
North Wall: 9/10/9	23	0.64	3.97			0.00	0.03	-183.6	458.33			0.35	0.88		
North Wall: 9/10/9	27	-1.93	3.53			0.00	0.03	-140.4	458.84			0.35	0.88		
North Wall: 9/10/9	33	-0.64	3.76			0.00	0.03	-583.2	453.60			-0.04	0.79		
North Wall: 9/10/9	39	0.64	3.97			0.00	0.03	-486.0	454.76			-0.82	0.56		
East Wall	69	1.93	4.17			0.00	0.03	-550.8	453.99			1.13	1.04		
East Wall	75	0.64	3.97			0.00	0.03	-669.6	452.57			0.74	0.96		
East Wall	78	0.64	3.97			0.34	0.35	-680.4	452.44			-0.43	0.69		
East Wall	85	-0.64	3.76			0.00	0.03	-86.4	459.48			0.35	0.88		
East Wall	87	3.22	4.37			0.00	0.03	-637.2	452.96			1.52	1.11		
East Wall	92	4.51	4.55			0.00	0.03	-248.4	457.57			-0.04	0.79		
East Wall	97	-0.64	3.76			0.34	0.35	-313.2	456.80			-0.43	0.69		
East Wall	108	0.64	3.97			0.00	0.03	-442.8	455.27			0.74	0.96		
East Wall	115	4.51	4.55			0.00	0.03	-183.6	458.33			0.74	0.96		
South Wall: 9/11/9	136	1.08	3.60			0.00	0.03	-442.8	455.27			-0.04	0.79		
South Wall	141	4.95	4.23			0.00	0.03	-788.4	451.15			-0.82	0.56		
South Wall	144	3.66	4.03			0.00	0.03	-691.2	452.31			-0.43	0.69		
South Wall	147	3.66	4.03			0.00	0.03	-702.0	452.18			0.35	0.88		
South Wall	151	3.66	4.03			0.00	0.03	-594.0	453.47			-0.04	0.79		
West Wall	185	-0.21	3.36			0.34	0.35	-550.8	453.99			-0.82	0.56		
West Wall	190	1.08	3.60			0.00	0.03	-248.4	457.57			3.46	1.41		
West Wall	201	1.08	3.60			0.00	0.03	-183.6	458.33			0.35	0.88		
West Wall	208	-1.49	3.10			0.00	0.03	-140.4	458.84			1.13	1.04		
West Wall	214	-0.21	3.36			0.34	0.35	-583.2	453.60			1.13	1.04		
West Wall	218	1.08	3.60			0.00	0.03	-486.0	454.76			0.35	0.88		
West Wall	224	2.37	3.82			0.00	0.03	-550.8	453.99			-0.04	0.79		
West Wall	230	1.08	3.60			0.34	0.35	-669.6	452.57			0.74	0.96		
West Wall	221	3.66	4.03			0.00	0.03	-777.6	451.28			0.35	0.88		

APPENDIX C

SAMPLE LOT 2

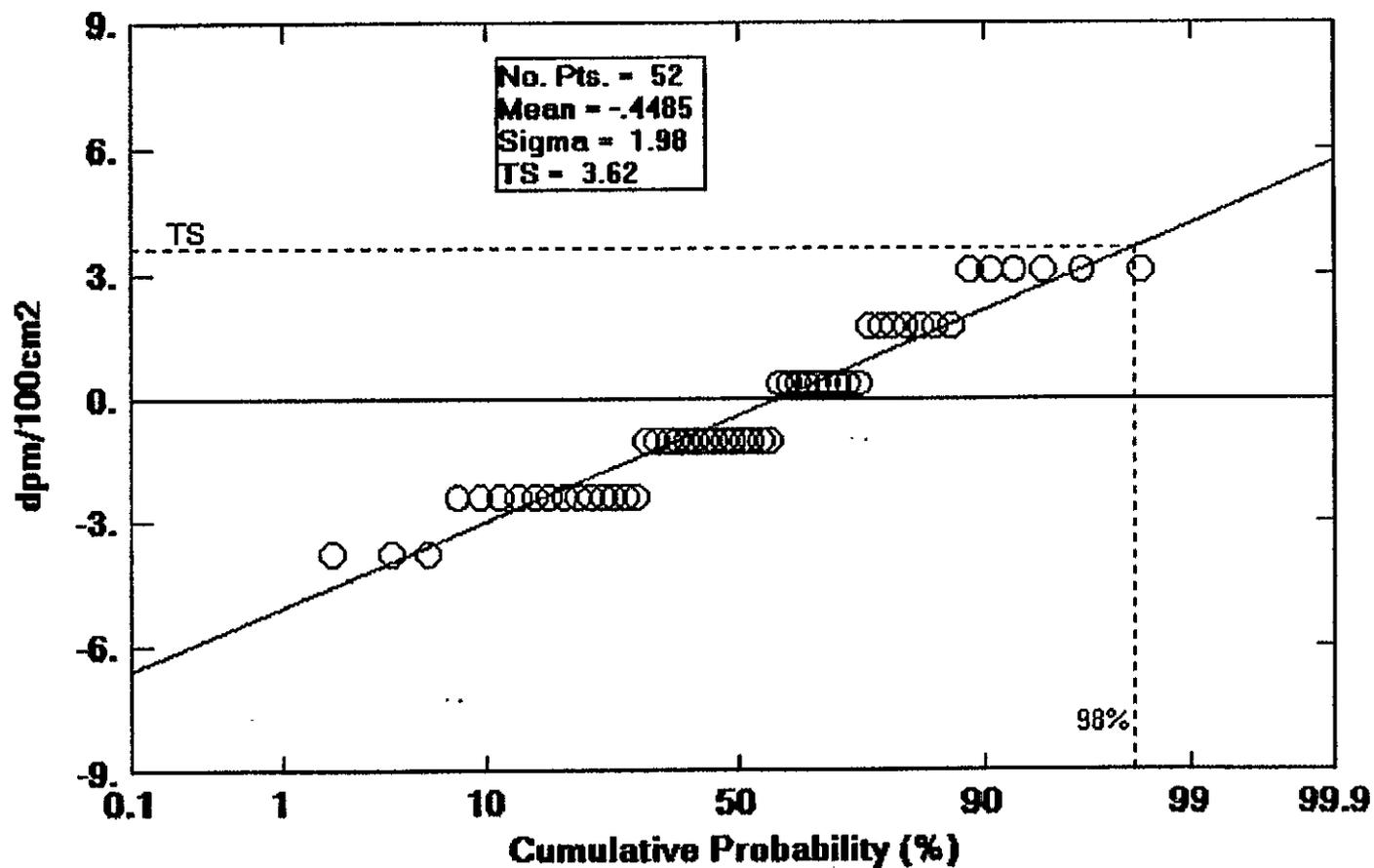
Quantitative Total Alpha Measurements-Lot 2: High Bay



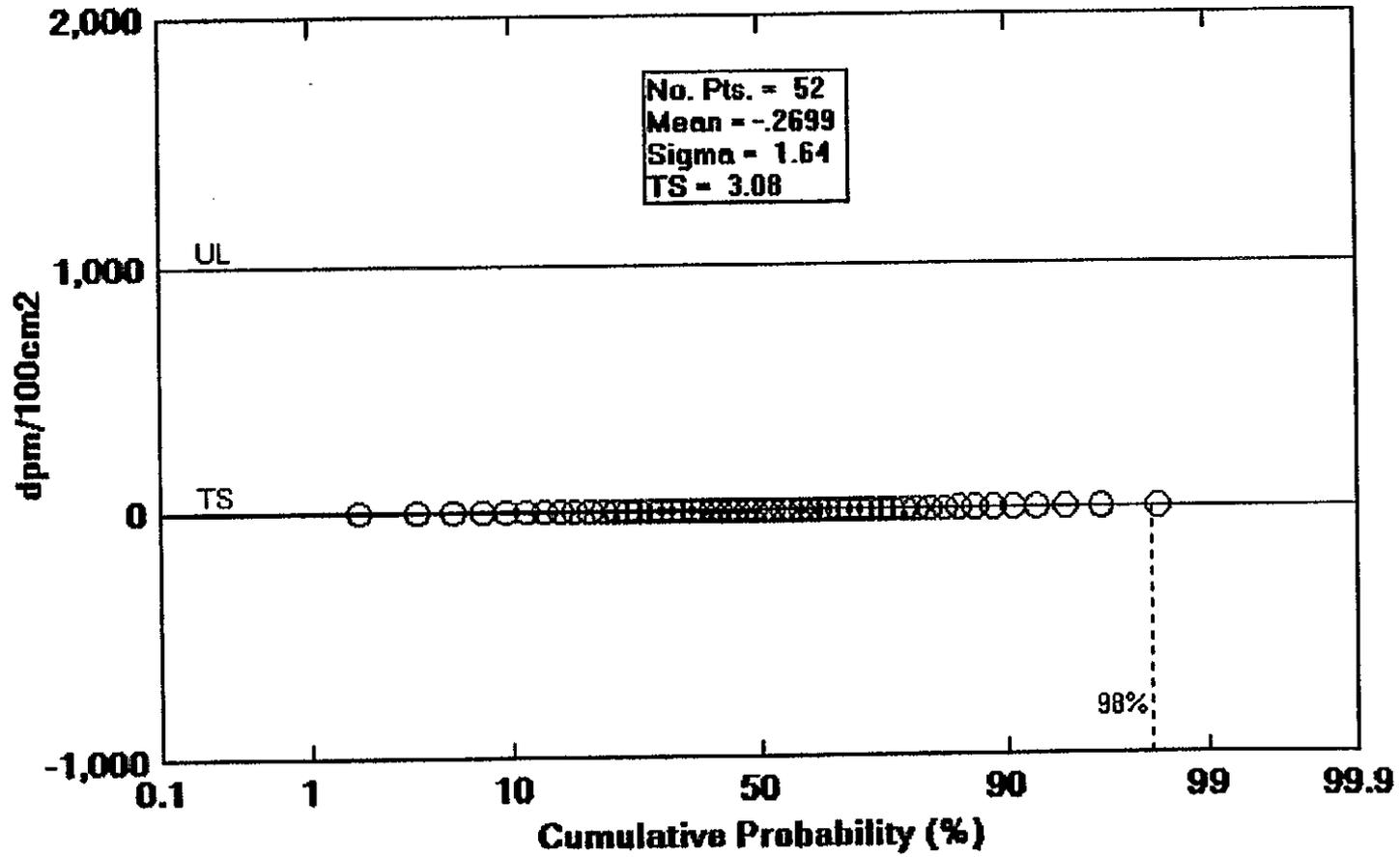
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01-26-99

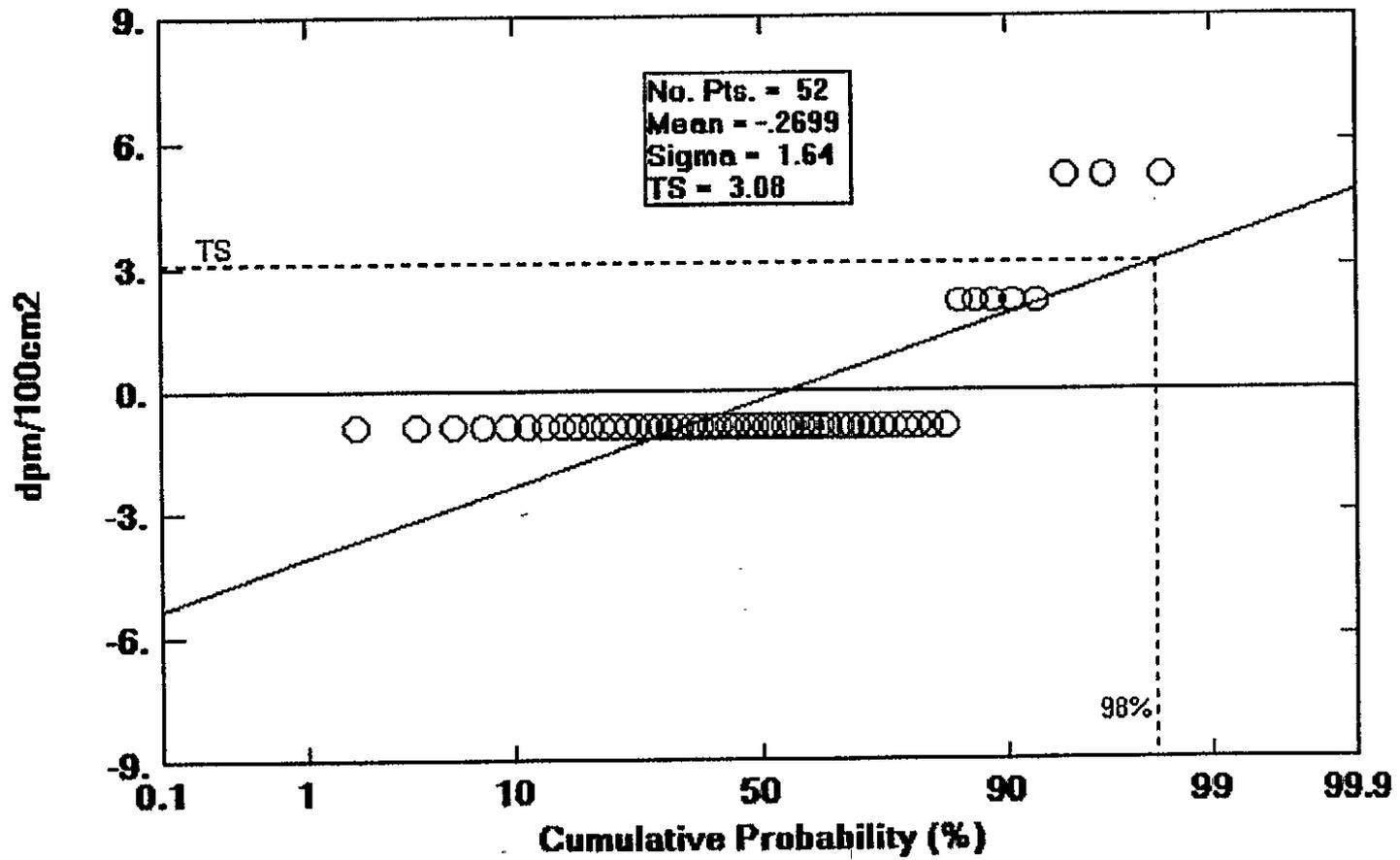
Quantitative Total Alpha Measurements-Lot2: High Bay



Removable Alpha Measurements-Lot 2: High Bay



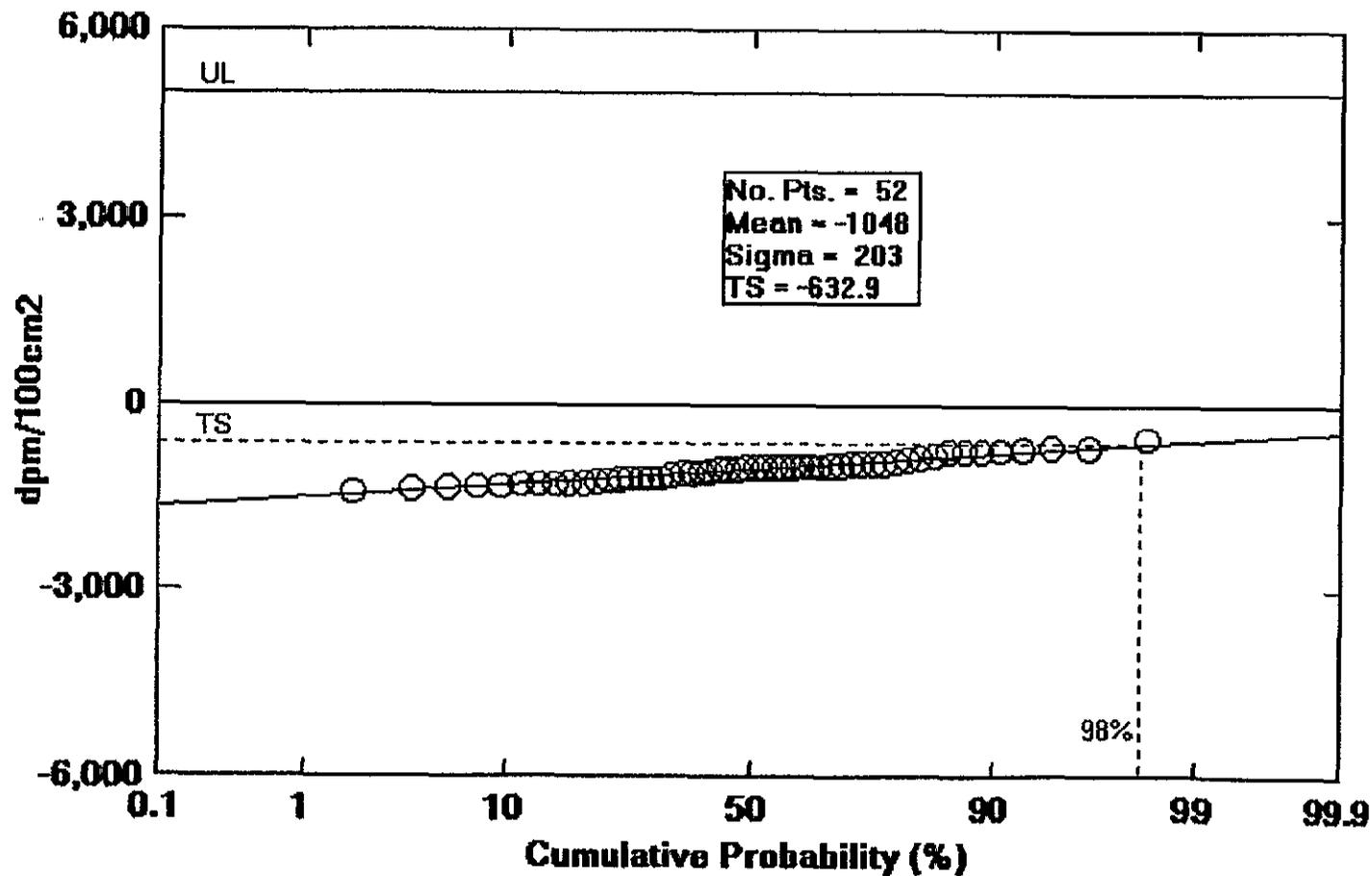
Removable Alpha Measurements-Lot 2: High Bay



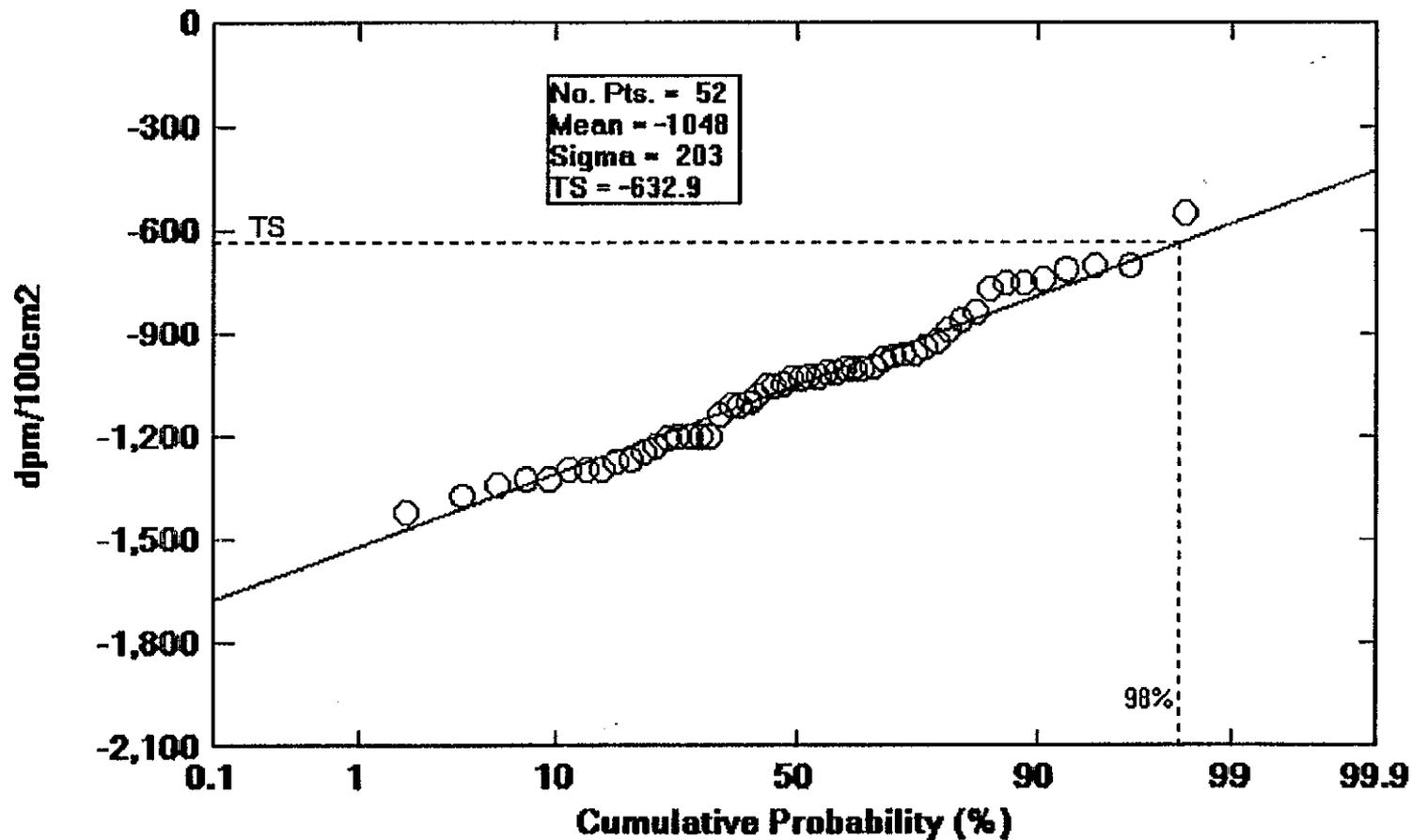
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01-26-99

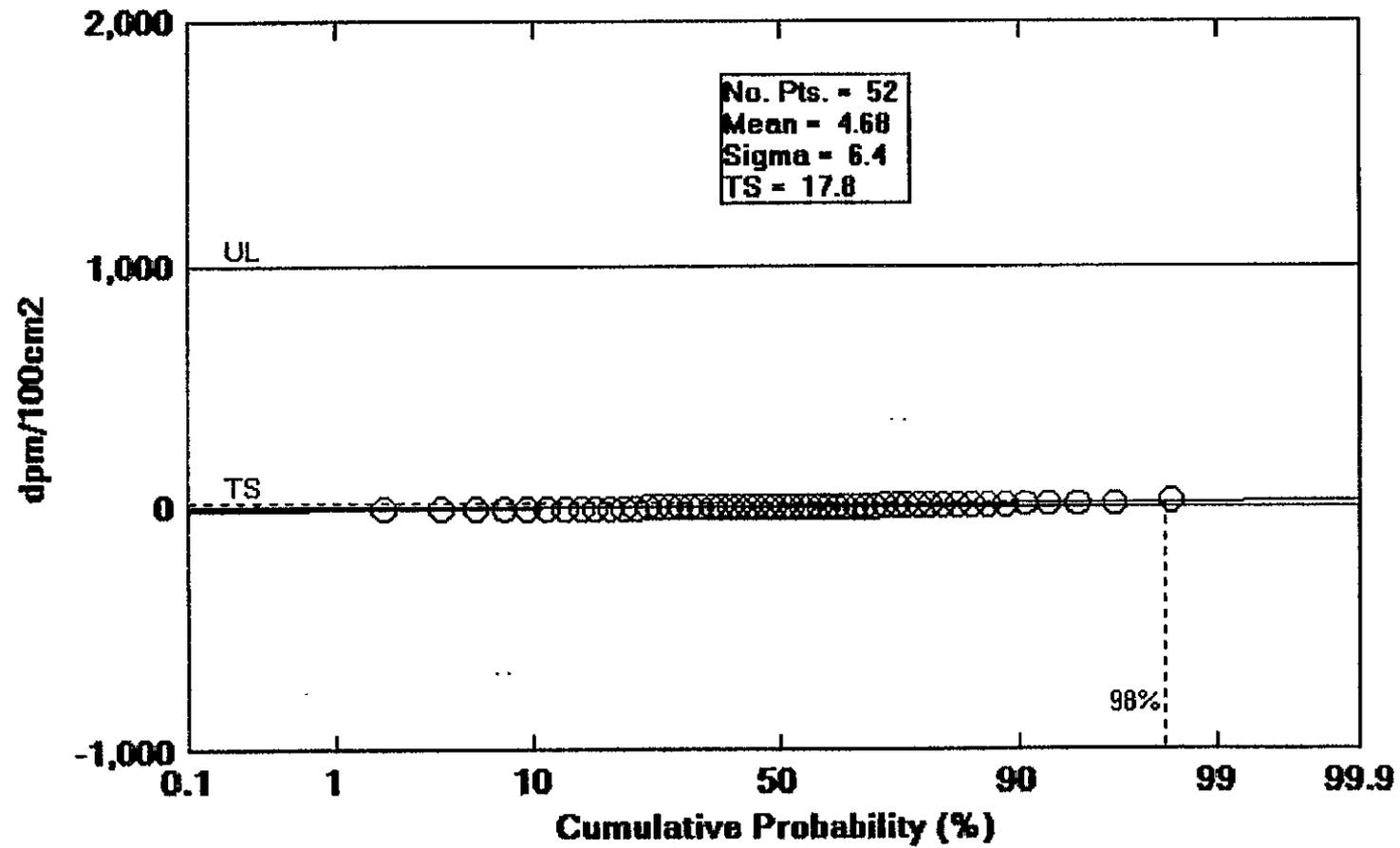
Net Quantitative Total Beta Measurements-Lot 2: High Bay



Gross Total Quantitative Beta Measurements-Lot 2: High Bay



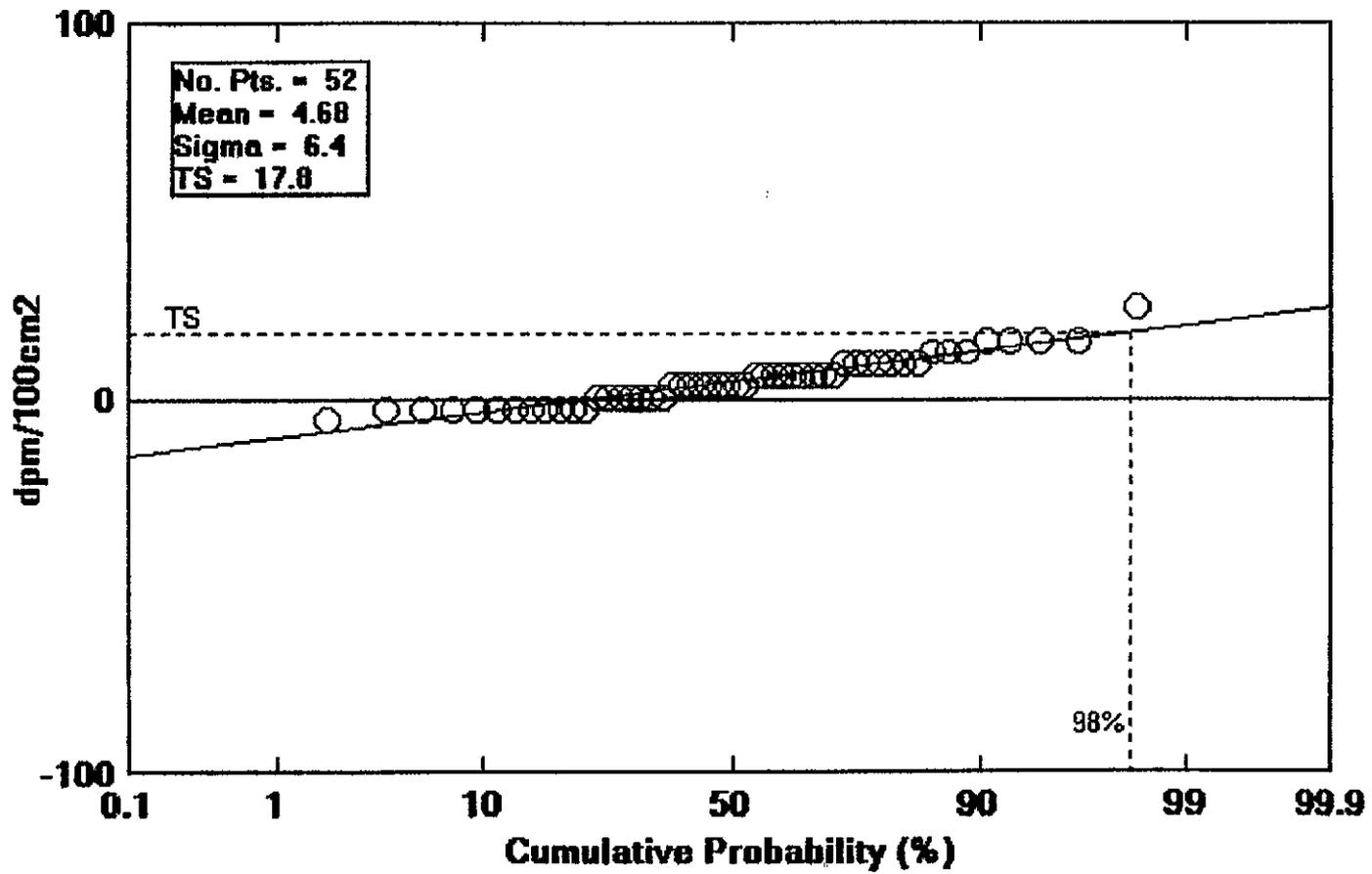
Removable Beta Measurements-Lot 2: High Bay



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01-26-99

Removable Beta Measurements-Lot 2: High Bay



Lot 2 High Bay
Unaffected Area

TITLE: Final Survey T019 High Bay
Data Description: Floor & Wall Grids

No. of Samples: 54

SAMPLE NAME	GRID AM	5 MIN		1 MI		5 MIN		1 MI		1 MIN	ALPHA				BETA				GAMMA			
		ALPHA			BETA			GAM			INSTRUMENT			SMEAR		INSTRUMENT			SMEAR		BACK	FAC
		TOTA	MAX	REM	TOTA	MAX	REM	TOTAL	BACKG	EFACT	AFACT	BACKG	EFACT	AFACT	BACKG	EFACT	AFACT	BACKG	EFACT			
Ceiling	560	2		2	229		2			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	571	2		0	201		2			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	581	2		0	219		9			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	596	3		0	240		3			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	604	2		0	206		3			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	643	3		0	196		15			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	664	0		0	237		3			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	671	4		0	231		6			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	683	5		2	214		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	707	5		0	243		12			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	731	3		0	209		6			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	751	2		0	219		9			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	777	2		0	238		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	786	5		0	216		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	816	1		0	212		3			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	821	4		0	209		6			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	823	4		0	219		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	852	4		0	219		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	854	3		0	206		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	868	1		0	265		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
Ceiling	874	1		0	244		3			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
South Wall	295	1		0	239		6			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
South Wall	297	1		0	239		9			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
South Wall	299	2		2	269		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
South Wall	303	1		0	225		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
South Wall	307	1		0	234		0			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			
South Wall	327	5		2	286		25			2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295			

Lot 2 High Bay
Unaffected Area

SAMPLE NAME	GRID	5 MIN		1 MI		5 MIN		1 MI		1 MIN	ALPHA					BETA					GAMMA	
		AM	ALPHA			BETA			TOTAL	INSTRUMENT			SMEAR		INSTRUMENT			SMEAR		BACK	FAC	
			TOTA	MAX	REM	TOTA	MAX	REM		BACKG	EFACT	AFACT	BACKG	EFACT	BACKG	EFACT	AFACT	BACKG	EFACT			
East Wall	131	2		2	237		15				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	144	2		0	242		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	150	2		0	265		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	162	4		0	251		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	178	0		0	238		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	221	2		0	256		15				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	233	2		0	270		6				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	239	1		0	270		6				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	250	3		5	263		3				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	267	1		0	239		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
East Wall	271	1		0	254		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
North Wall: 9/25/	16	1		2	250		9				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
North Wall	36	4		0	239		9				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
North Wall	46	3		0	241		12				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
North Wall	65	3		0	237		15				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
North Wall	69	4		0	260		9				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
North Wall	91	3		0	204		12				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
West Wall	374	2		0	234		6				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
West Wall	385	5		0	234		3				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
West Wall: 9/26/9	436	1		0	228		6				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
West Wall	439	4		0	228		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
West Wall	446	3		0	209		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
West Wall: 9/25/	450	2		0	228		0				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		
West Wall: 9/26/	451	5		0	204		0				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
West Wall	455	1		0	219		6				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
West Wall	458	2		5	218		9				2.75	4.9	1.4	0.3	0.328	342.5	9.7	5	1.9	0.3295		
West Wall: 9/25/	467	0		0	227		0				2.75	4.9	1.4	0.3	0.328	348	9.5	5	1.9	0.3295		

Lot 2 High Bay
Unaffected Area

RADIOLOGICAL SURVEY DATA
Data Description: Floor & Wall Grids

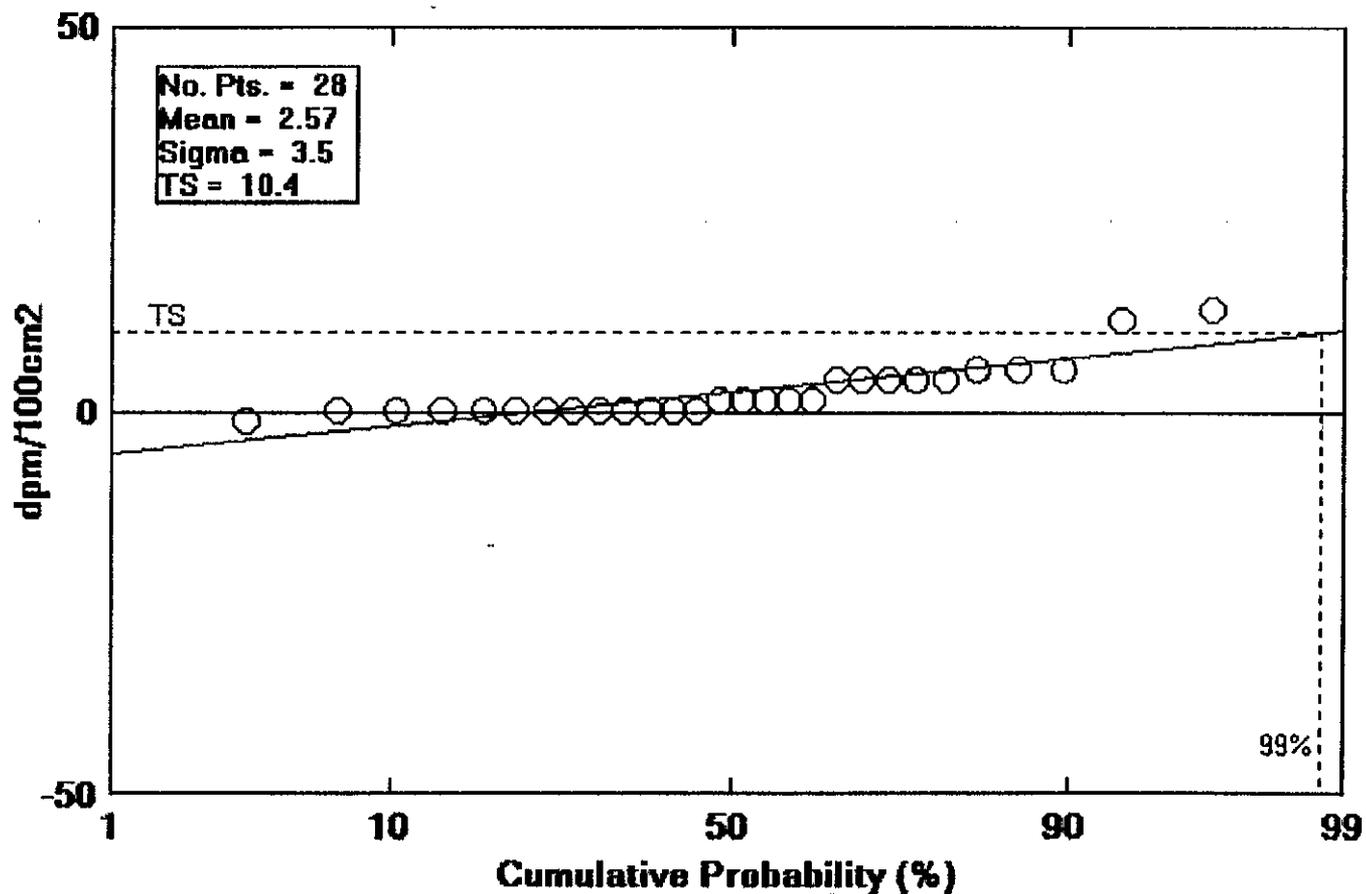
SAMPLE NAME	GRID NAM	ALPHA (DPM/100CM2)						BETA (DPM/100CM2)						GAMMA (uR/hr)	
		TOTAL	STD DEV	MAX	TD DE	REM	STD DEV	TOTAL	STD DEV	MAX	TD DE	REM	STD DEV	TOTAL	TD DE
Ceiling	560	-1.03	5.44			0.56	0.50	-1101	427.41			0.03	0.65		
Ceiling	571	-1.03	5.44			-0.10	0.18	-1373	424.31			0.03	0.65		
Ceiling	581	-1.03	5.44			-0.10	0.18	-1198	426.30			2.34	1.09		
Ceiling	596	0.34	5.62			-0.10	0.18	-994	428.61			0.36	0.73		
Ceiling	604	-1.03	5.44			-0.10	0.18	-1324	424.87			0.36	0.73		
Ceiling	643	0.34	5.62			-0.10	0.18	-1421	423.76			4.32	1.35		
Ceiling	664	-3.77	5.09			-0.10	0.18	-1023	428.29			0.36	0.73		
Ceiling	671	1.72	5.78			-0.10	0.18	-1082	427.63			1.35	0.93		
Ceiling	683	3.09	5.94			0.56	0.50	-1246	425.75			-0.63	0.45		
Ceiling	707	3.09	5.94			-0.10	0.18	-965	428.94			3.33	1.23		
Ceiling	731	0.34	5.62			-0.10	0.18	-1295	425.20			1.35	0.93		
Ceiling	751	-1.03	5.44			-0.10	0.18	-1198	426.30			2.34	1.09		
Ceiling	777	-1.03	5.44			-0.10	0.18	-1014	428.40			-0.63	0.45		
Ceiling	786	3.09	5.94			-0.10	0.18	-1227	425.97			-0.63	0.45		
Ceiling	816	-2.40	5.27			-0.10	0.18	-1266	425.53			0.36	0.73		
Ceiling	821	1.72	5.78			-0.10	0.18	-1295	425.20			1.35	0.93		
Ceiling	823	1.72	5.78			-0.10	0.18	-1198	426.30			-0.63	0.45		
Ceiling	852	1.72	5.78			-0.10	0.18	-1198	426.30			-0.63	0.45		
Ceiling	854	0.34	5.62			-0.10	0.18	-1324	424.87			-0.63	0.45		
Ceiling	868	-2.40	5.27			-0.10	0.18	-752	431.35			-0.63	0.45		
Ceiling	874	-2.40	5.27			-0.10	0.18	-955	429.05			0.36	0.73		
South Wall	295	-2.40	5.27			-0.10	0.18	-1004	428.51			1.35	0.93		
South Wall	297	-2.40	5.27			-0.10	0.18	-1004	428.51			2.34	1.09		
South Wall	299	-1.03	5.44			0.56	0.50	-713	431.79			-0.63	0.45		
South Wall	303	-2.40	5.27			-0.10	0.18	-1140	426.97			-0.63	0.45		
South Wall	307	-2.40	5.27			-0.10	0.18	-1052	427.96			-0.63	0.45		
South Wall	327	3.09	5.94			0.56	0.50	-548	433.63			7.61	1.71		

Lot 2 High Bay
Unaffected Area

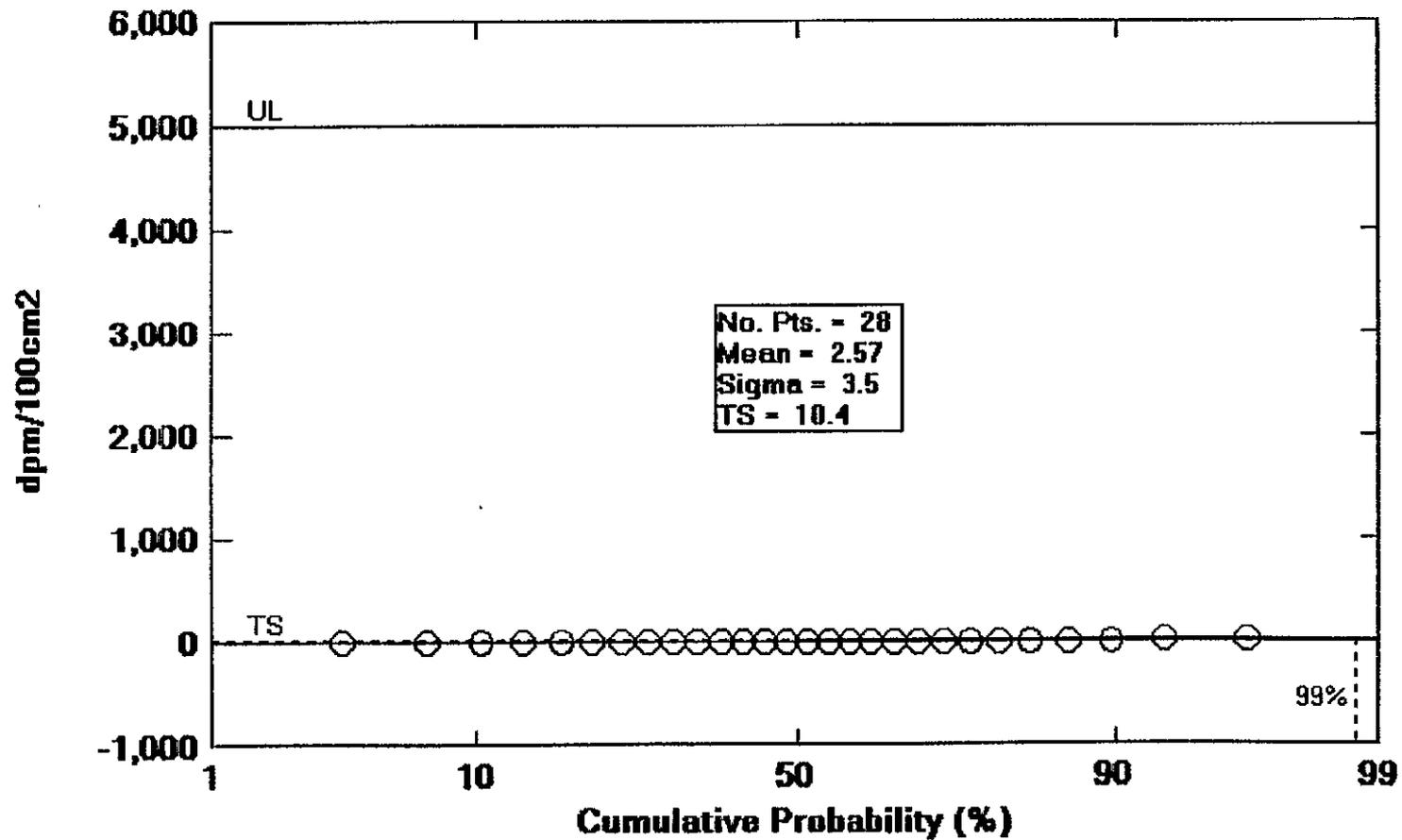
SAMPLE NAME	GRID NAM	ALPHA (DPM/100CM2)						BETA (DPM/100CM2)						GAMMA (uR/hr)	
		TOTAL	STD DEV	MAX	TD DE	REM	STD DEV	TOTAL	STD DEV	MAX	TD DE	REM	STD DEV	TOTAL	TD DE
East Wall	131	-1.03	5.44			0.56	0.50	-1023	428.29			4.32	1.35		
East Wall	144	-1.03	5.44			-0.10	0.18	-975	428.83			-0.63	0.45		
East Wall	150	-1.03	5.44			-0.10	0.18	-752	431.35			-0.63	0.45		
East Wall	162	1.72	5.78			-0.10	0.18	-888	429.82			-0.63	0.45		
East Wall	178	-3.77	5.09			-0.10	0.18	-1014	428.40			-0.63	0.45		
East Wall	221	-1.03	5.44			-0.10	0.18	-839	430.37			4.32	1.35		
East Wall	233	-1.03	5.44			-0.10	0.18	-703	431.90			1.35	0.93		
East Wall	239	-2.40	5.27			-0.10	0.18	-703	431.90			1.35	0.93		
East Wall	250	0.34	5.62			1.54	0.75	-771	431.13			0.36	0.73		
East Wall	267	-2.40	5.27			-0.10	0.18	-1004	428.51			-0.63	0.45		
East Wall	271	-2.40	5.27			-0.10	0.18	-858	430.15			-0.63	0.45		
North Wall: 9/25/9	16	-2.40	5.27			0.56	0.50	-931	423.79			2.34	1.09		
North Wall	36	1.72	5.78			-0.10	0.18	-1036	422.62			2.34	1.09		
North Wall	46	0.34	5.62			-0.10	0.18	-1017	422.83			3.33	1.23		
North Wall	65	0.34	5.62			-0.10	0.18	-1055	422.40			4.32	1.35		
North Wall	69	1.72	5.78			-0.10	0.18	-836	424.85			2.34	1.09		
North Wall	91	0.34	5.62			-0.10	0.18	-1368	418.86			3.33	1.23		
West Wall	374	-1.03	5.44			-0.10	0.18	-1083	422.08			1.35	0.93		
West Wall	385	3.09	5.94			-0.10	0.18	-1083	422.08			0.36	0.73		
West Wall: 9/26/98	436	-2.40	5.27			-0.10	0.18	-1111	427.30			1.35	0.93		
West Wall	439	1.72	5.78			-0.10	0.18	-1111	427.30			-0.63	0.45		
West Wall	446	0.34	5.62			-0.10	0.18	-1295	425.20			-0.63	0.45		
West Wall: 9/25/9	450	-1.03	5.44			-0.10	0.18	-1140	421.44			-0.63	0.45		
West Wall: 9/26/9	451	3.09	5.94			-0.10	0.18	-1343	424.65			-0.63	0.45		
West Wall	455	-2.40	5.27			-0.10	0.18	-1198	426.30			1.35	0.93		
West Wall	458	-1.03	5.44			1.54	0.75	-1208	426.19			2.34	1.09		
West Wall: 9/25/9	467	-3.77	5.09			-0.10	0.18	-1150	421.33			-0.63	0.45		

APPENDIX D
SAMPLE LOT 3

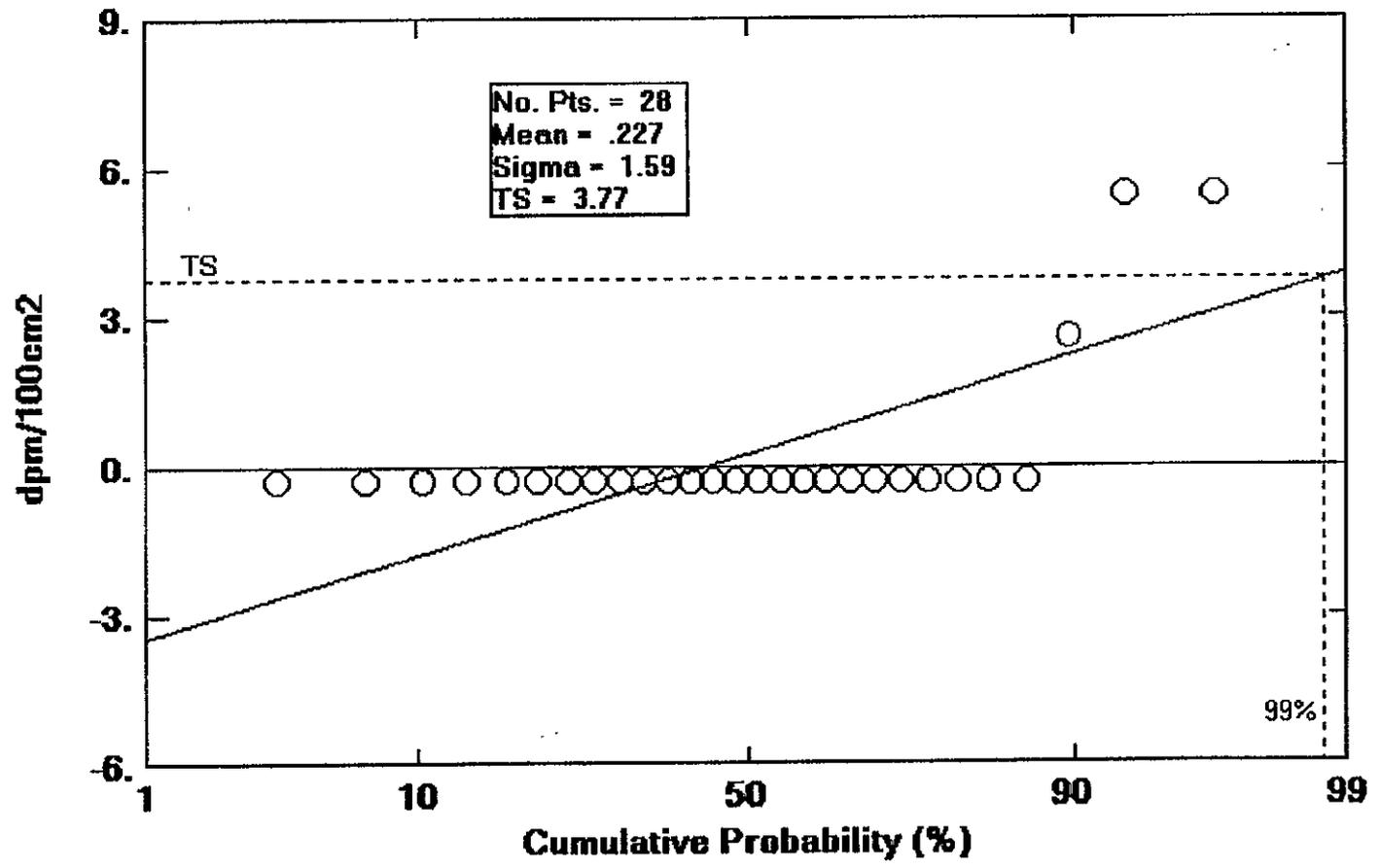
Quantitative Total Alpha Measurements, Lot 3: Rx Test



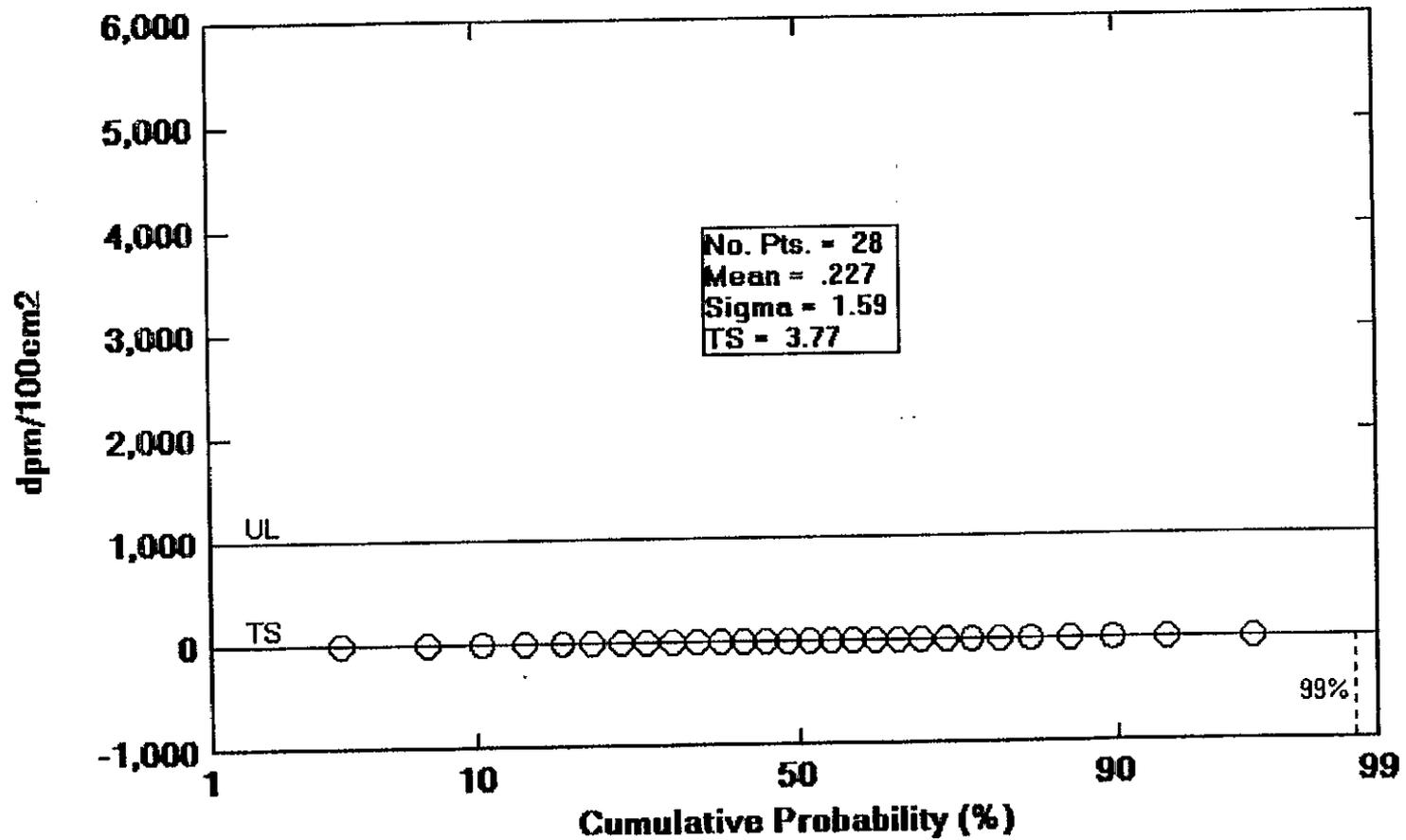
Quantitative Total Alpha Measurements, Lot 3: Rx Test



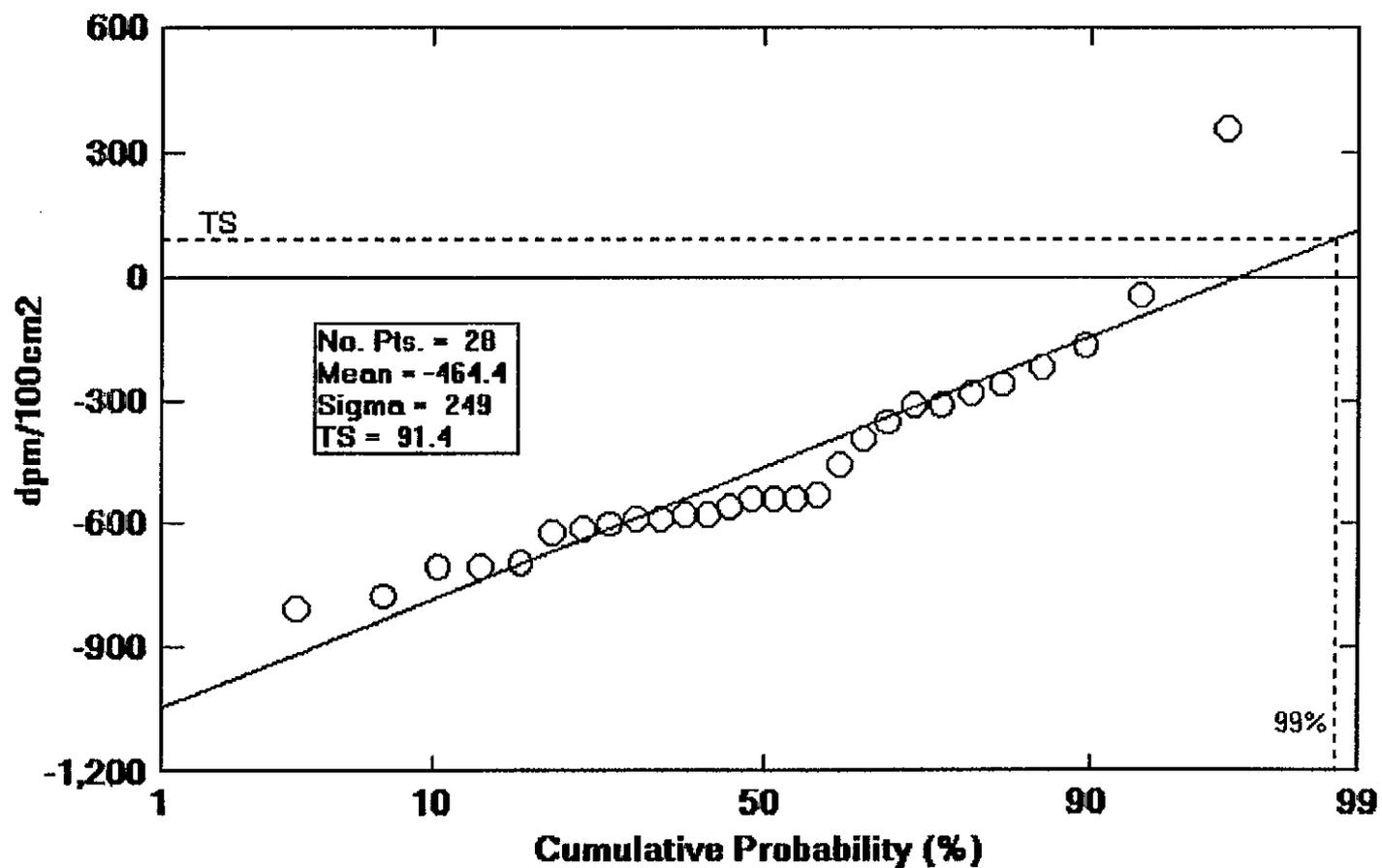
Removable Alpha Measurement, Lot 3: Reactor Test Chamber



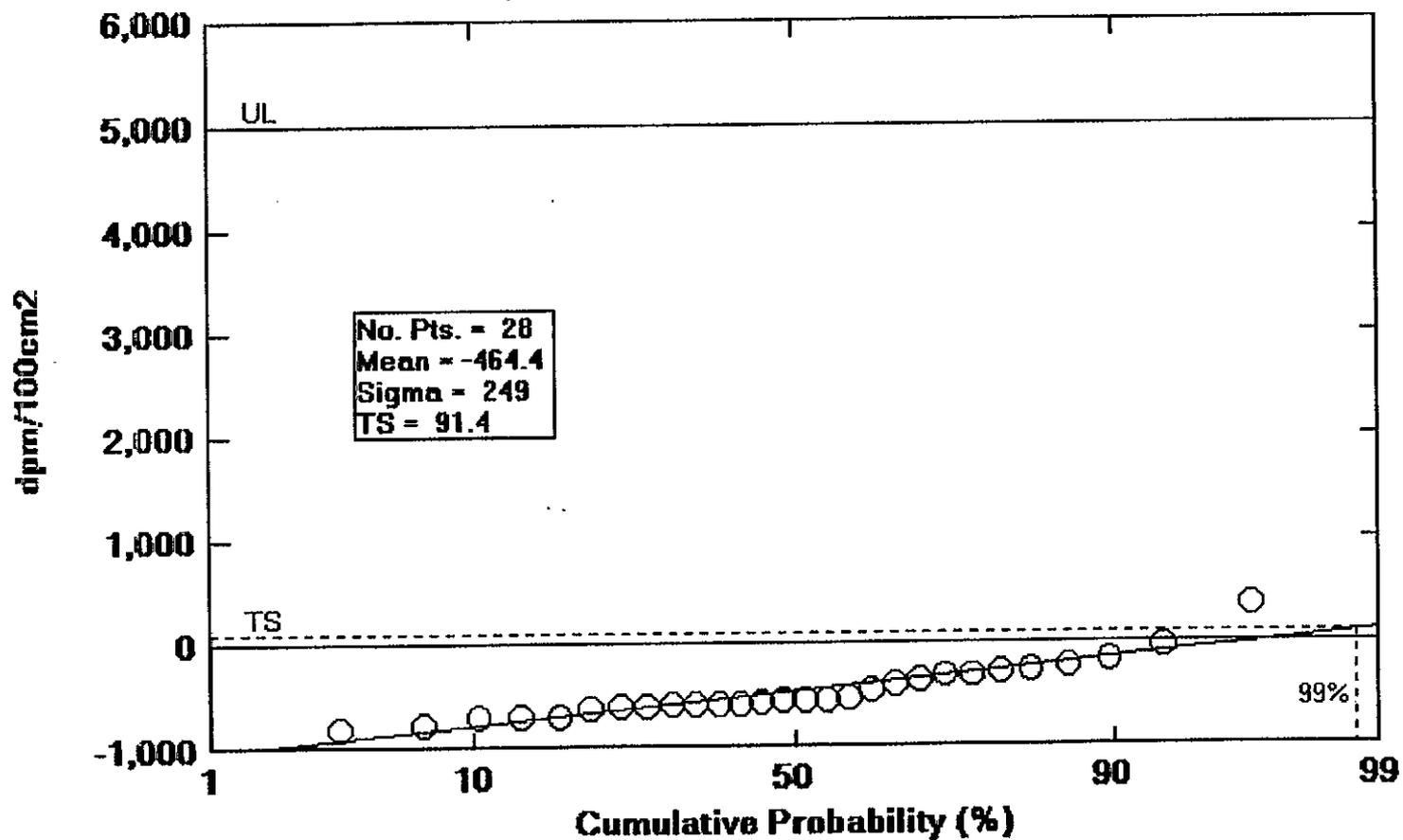
Removable Alpha Measurements, Lot 3: Reactor Test Chamber



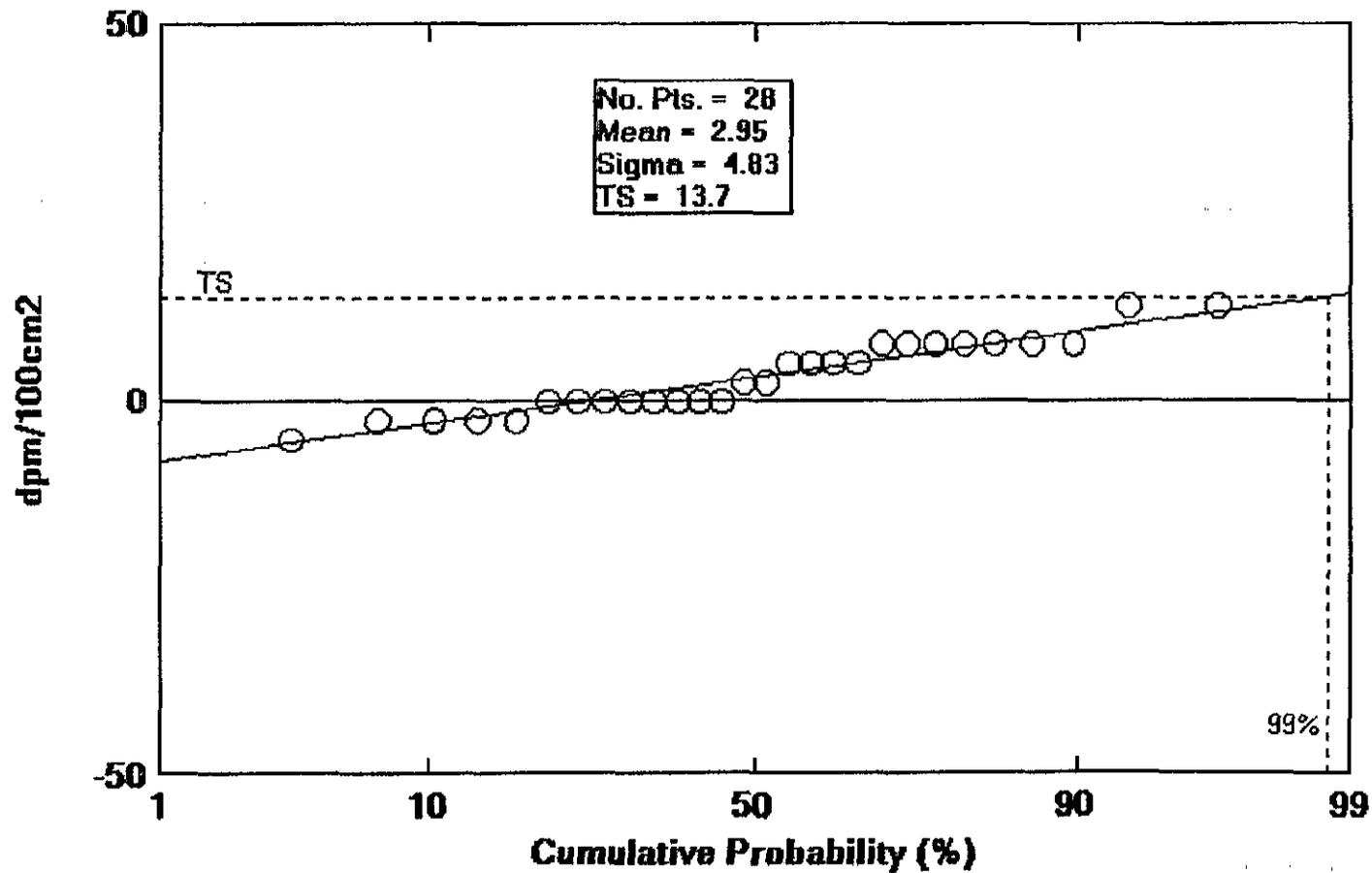
Total Quantitative Beta Measurements, Lot 3, Rx Test Chamber



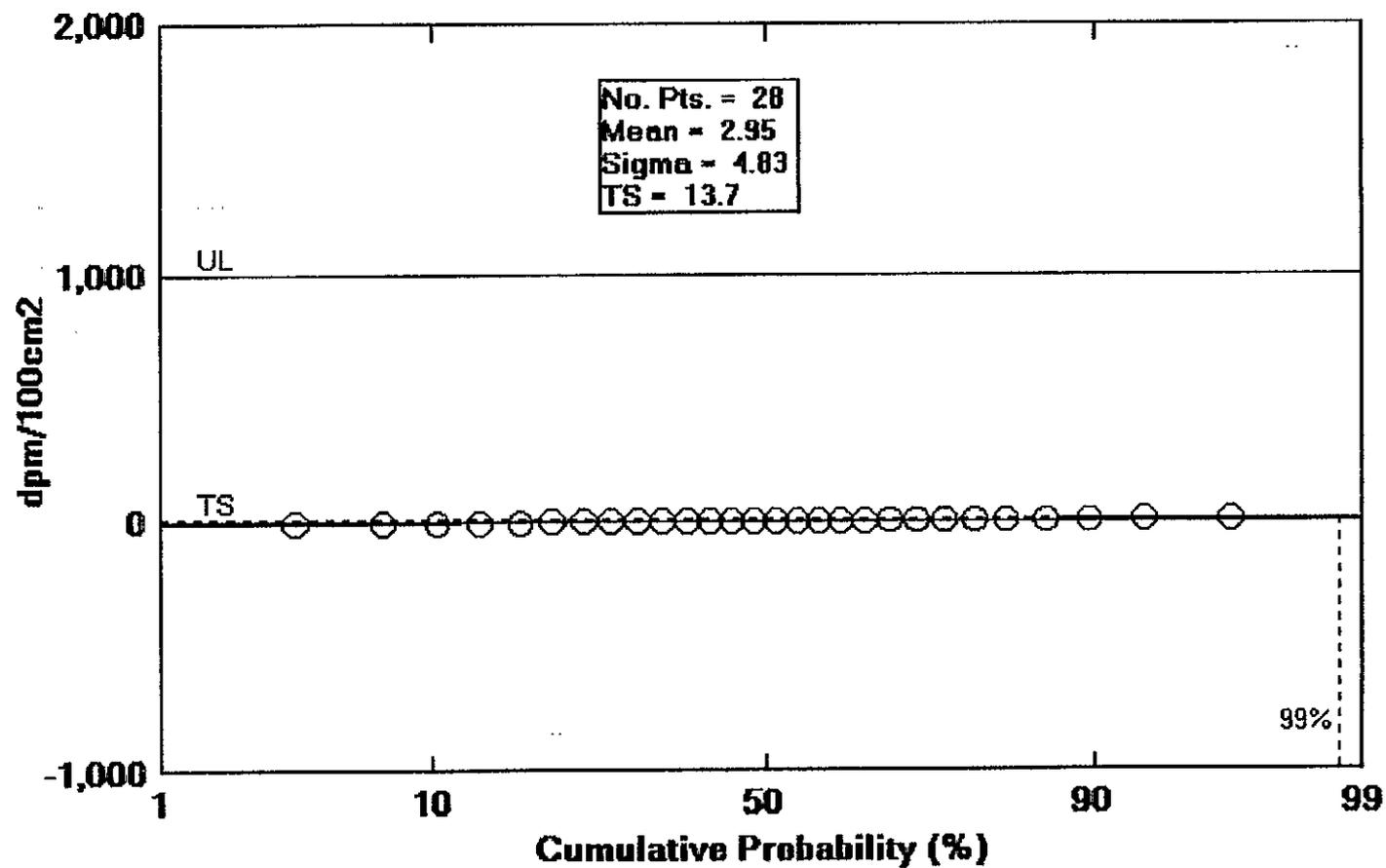
Total Quantitative Beta Measurements, Lot 3, Rx Test Chamber



Removable Beta Measurements, Lot 3, Rx Test Chamber



Removable Beta Measurements, Lot 3, Rx Test Chamber



Lot 3
Reactor Test Chamber
Affected Area

TITLE: Final Survey T019 High Bay Rx Test Chamber

Data Description: Affected Area

Samples: 28

SAMPLE NAME	GRID NAME	5 MIN			1 MIN			GAM	ALPHA						BETA					
		ALPHA		REM	BETA		REM		INSTRUMENT			SMEAR			INSTRUMENT			SMEAR		
		TOTAL	MAX		TOTAL	MAX			BACKG	EFACT	AFACT	BACKG	EFACT	AFACT	BACKG	EFACT	AFACT	BACKG	EFACT	
N. Wall 9/17/98	13	6		0	367		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
North Wall	30	2		0	294		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
North Wall	31	5		1	276		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
North Wall	33	3		0	254		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
East Wall 9/17	47	2		0	273		1	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
East Wall	53	2		0	278		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
East Wall	66	2		0	275		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
East Wall	71	6		0	274		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
South Wall 9/17	81	2		0	305		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
South Wall	88	2		0	307		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
South Wall	92	3		0	264		3	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
South Wall	96	2		0	257		3	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
West Wall 9/17	113	5		0	281		7	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
West Wall	120	2		0	265		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
West Wall	124	2		0	280		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
West Wall	132	3		0	280		1	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
West Wall	139	3		0	264		4	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
West Wall	140	3		0	280		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Floor 9/17	148	2		0	276		5	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Floor	150	2		0	288		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Shield Block 9/17	HP1	11		0	328		1	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Shield Block	HP2	12		2	311		4	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Shield Block	HP3	5		0	302		7	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Shield Block	HP4	5		0	316		1	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Round Section 1	P2	2		0	302		2	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Round Section 1	P7	5		2	275		4	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Round Section 2	P15	1		0	298		0	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			
Round Section 2	P18	6		0	272		4	1.83	4.70	1.4	0.1	0.3455	332.3	10.3	5	2.1	0.3892			

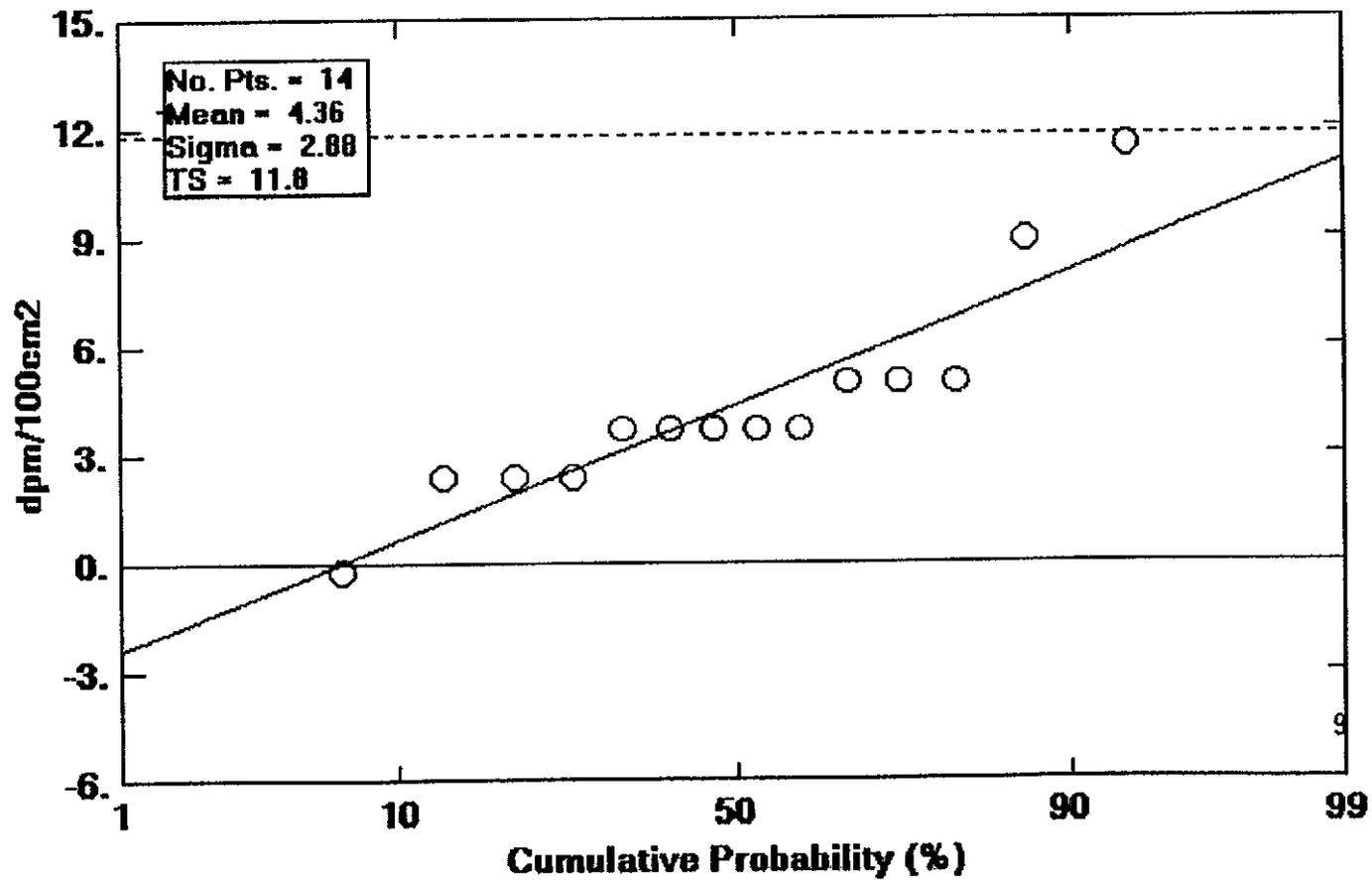
Lot 3
Reactor Test Chamber
Affected Area

SAMPLE NAME	GRID NAME	ALPHA (DPM/100CM2)						BETA (DPM/100CM2)				
		TOTAL	STD DEV	MAX	STD DEV	REM	STD DEV	TOTAL	STD DEV	MAX	REM	STD DEV
N. Wall 9/17/98	13	5.49	3.98			-0.29	0.11	357.4	463.90		7.45	1.04
North Wall	30	0.22	3.98			-0.29	0.11	-394.5	455.48		-0.26	0.79
North Wall	31	4.17	4.19			2.60	0.36	-579.9	453.38		7.45	1.04
North Wall	33	1.54	3.98			-0.29	0.11	-806.5	450.79		-0.26	0.79
East Wall 9/17	47	0.22	3.98			-0.29	0.11	-610.8	453.02		-2.83	0.69
East Wall	53	0.22	3.98			-0.29	0.11	-559.3	453.61		-0.26	0.79
East Wall	66	0.22	3.98			-0.29	0.11	-590.2	453.26		7.45	1.04
East Wall	71	5.49	3.98			-0.29	0.11	-600.5	453.14		-0.26	0.79
South Wall 9/17	81	0.22	3.98			-0.29	0.11	-281.2	456.76		-0.26	0.79
South Wall	88	0.22	3.98			-0.29	0.11	-260.6	456.99		7.45	1.04
South Wall	92	1.54	3.98			-0.29	0.11	-703.5	451.97		2.31	0.88
South Wall	96	0.22	3.98			-0.29	0.11	-775.6	451.16		2.31	0.88
West Wall 9/17	113	4.17	3.98			-0.29	0.11	-528.4	453.96		12.59	1.17
West Wall	120	0.22	3.98			-0.29	0.11	-693.2	452.09		-0.26	0.79
West Wall	124	0.22	3.98			-0.29	0.11	-538.7	453.84		7.45	1.04
West Wall	132	1.54	3.98			-0.29	0.11	-538.7	453.84		-2.83	0.69
West Wall	139	1.54	3.98			-0.29	0.11	-703.5	451.97		4.88	0.96
West Wall	140	1.54	3.98			-0.29	0.11	-538.7	453.84		7.45	1.04
Floor 9/17	148	0.22	3.98			-0.29	0.11	-579.9	453.38		7.45	1.04
Floor	150	0.22	3.98			-0.29	0.11	-456.3	454.78		-0.26	0.79
Shield Block 9/17	HP1	12.07	3.98			-0.29	0.11	-44.3	459.42		-2.83	0.69
Shield Block	HP2	13.38	4.39			5.50	0.50	-219.4	457.45		4.88	0.96
Shield Block	HP3	4.17	3.98			-0.29	0.11	-312.1	456.41		12.59	1.17
Shield Block	HP4	4.17	3.98			-0.29	0.11	-167.9	458.03		-2.83	0.69
Round Section 1	P2	0.22	3.98			-0.29	0.11	-312.1	456.41		-0.26	0.79
Round Section 1	P7	4.17	4.39			5.50	0.50	-590.2	453.26		4.88	0.96
Round Section 2	P15	-1.09	3.98			-0.29	0.11	-353.3	455.94		-5.40	0.56
Round Section 2	P18	5.49	3.98			-0.29	0.11	-621.1	452.91		4.88	0.96

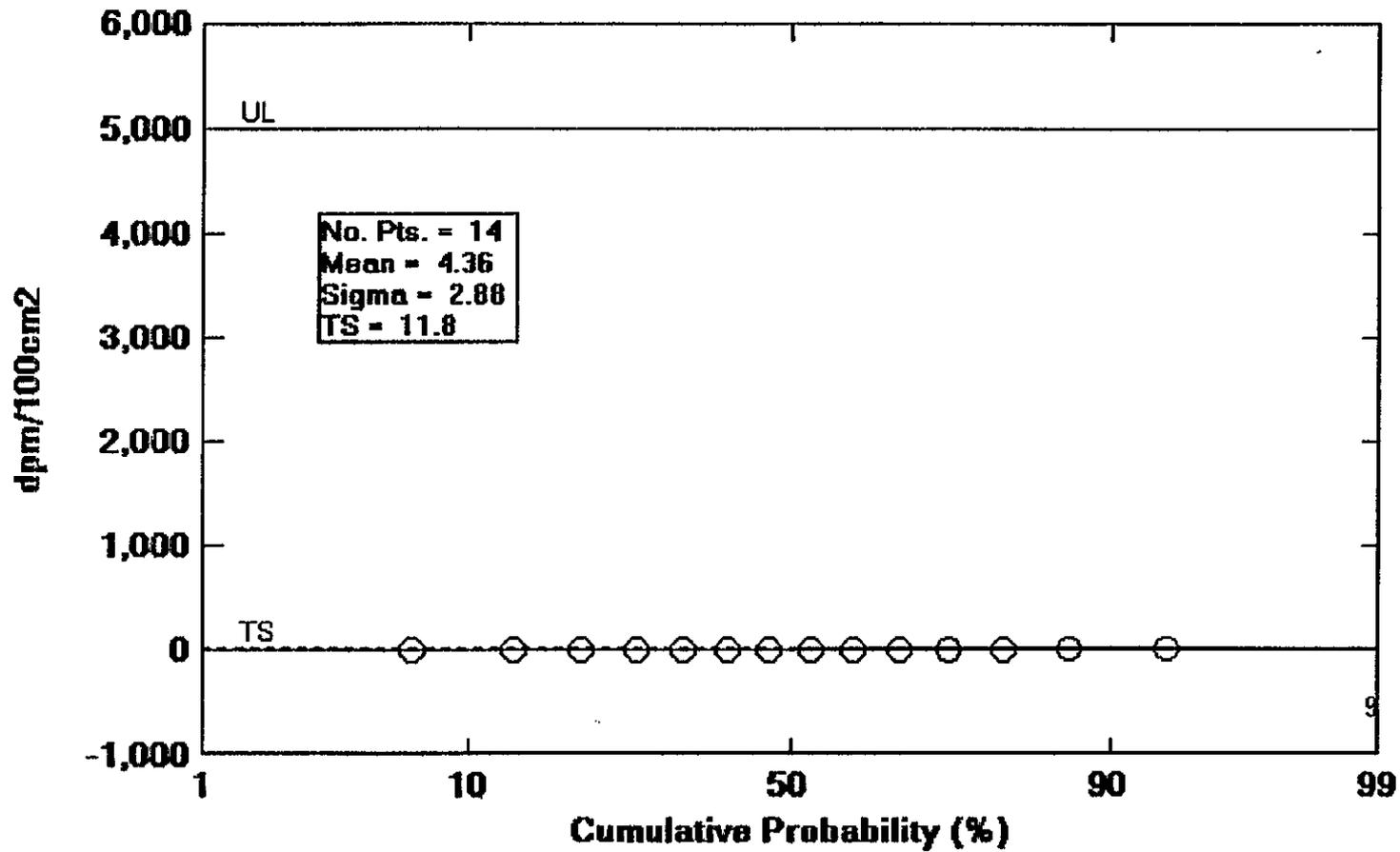
APPENDIX E

SAMPLE LOT 4

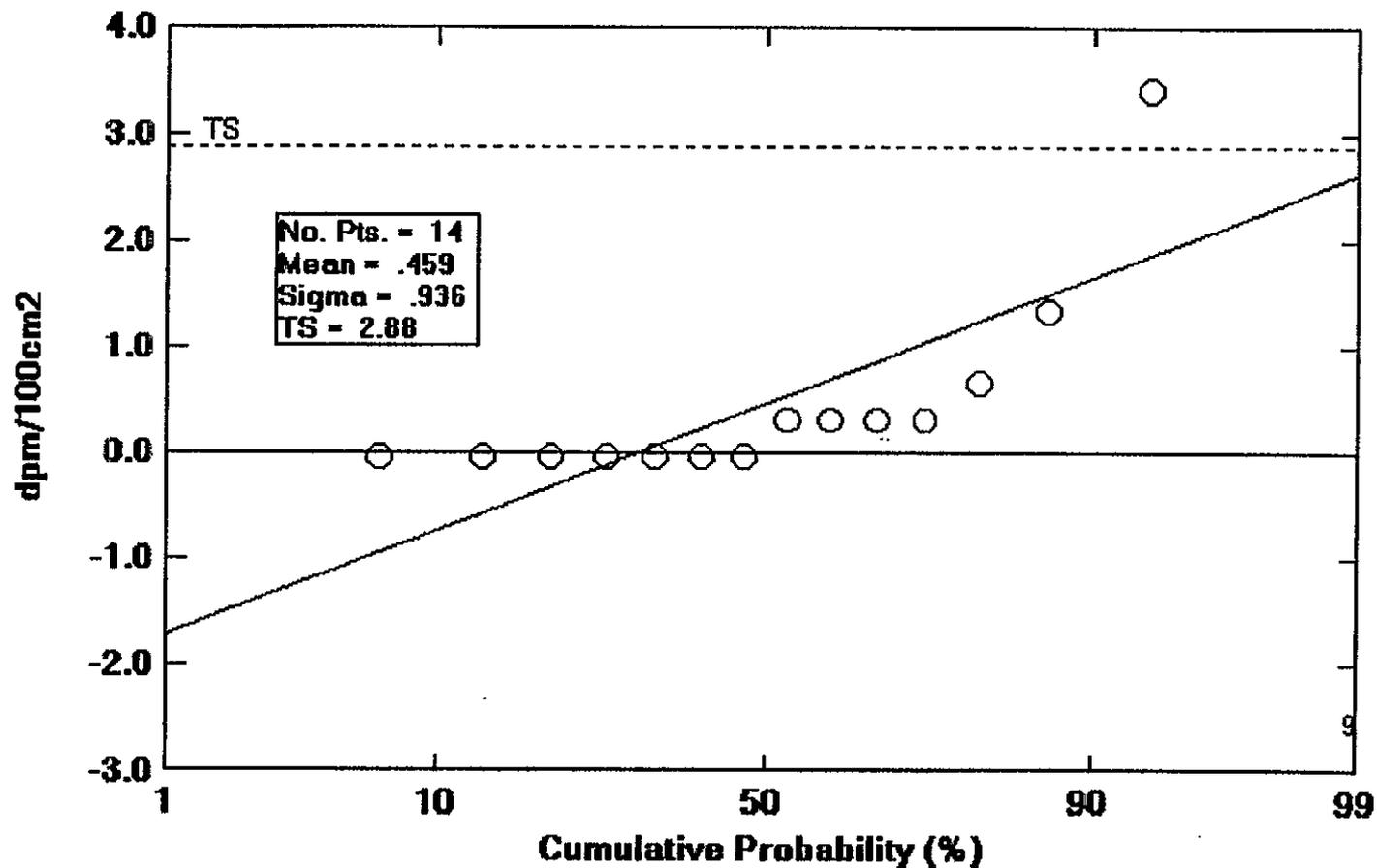
Quantitative Total Alpha Measurements, Lot 4: Room 109



Quantitative Total Alpha Measurements, Lot 4: Room 109



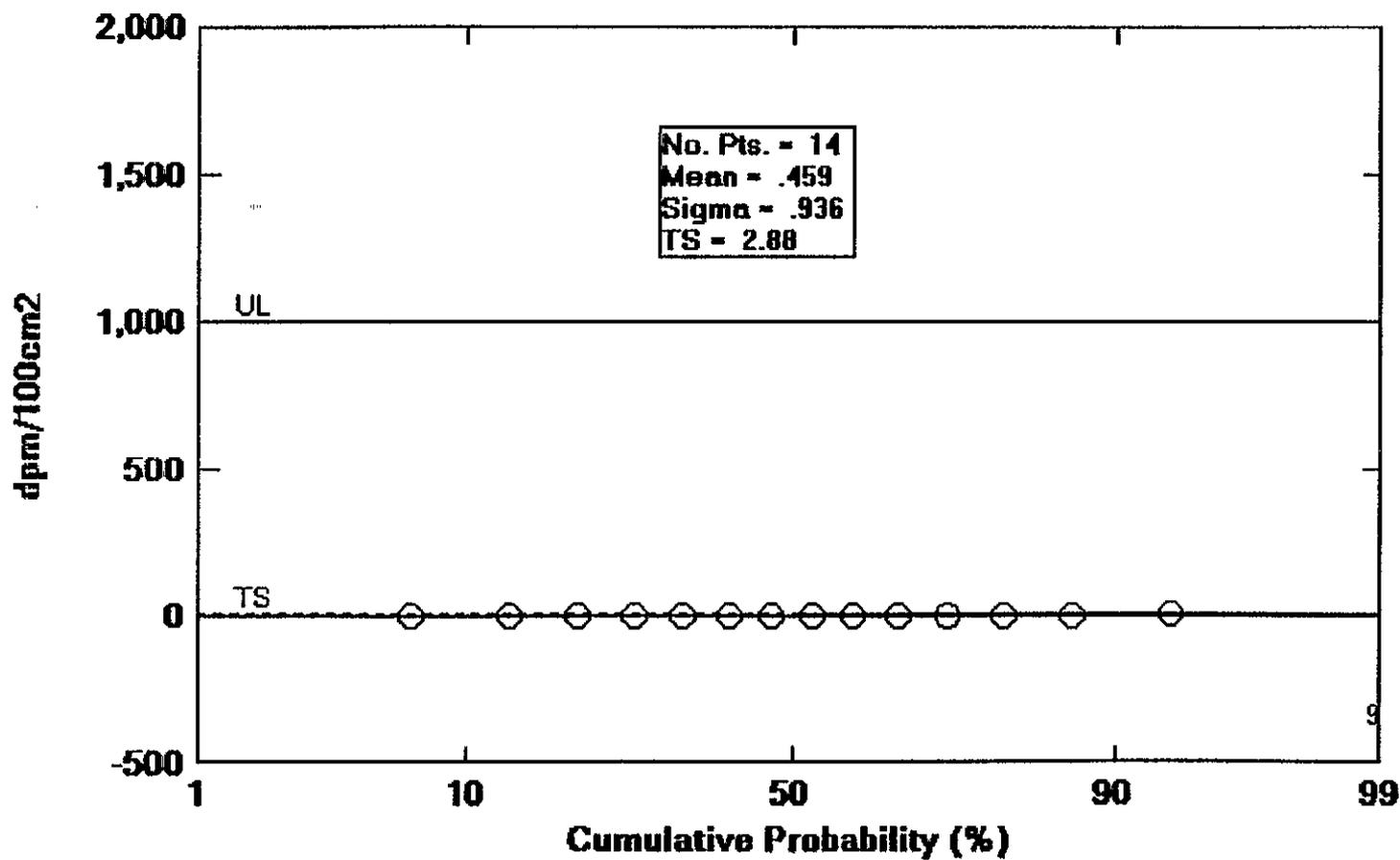
Removable Alpha Measurements, Lot 4: Room 109



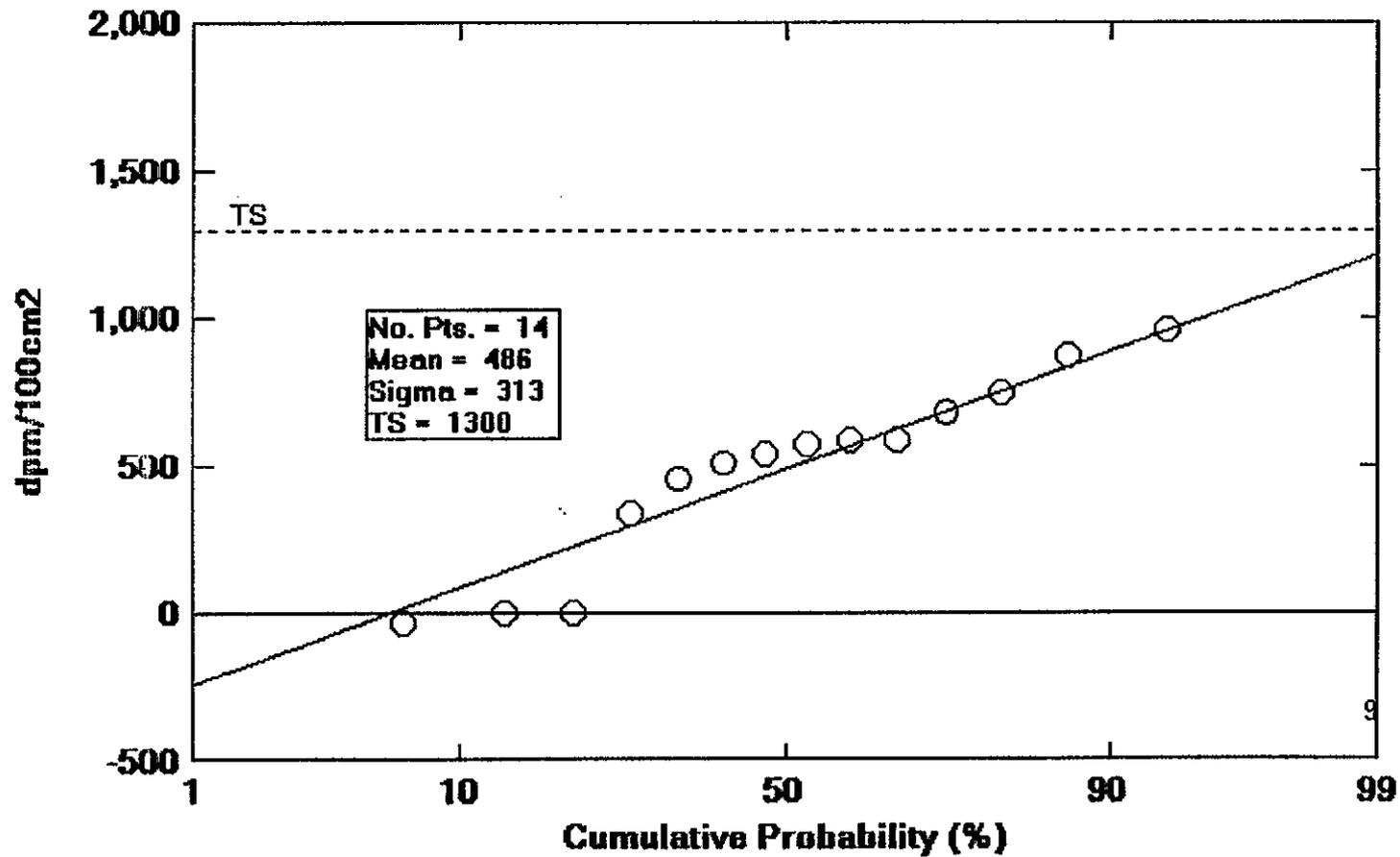
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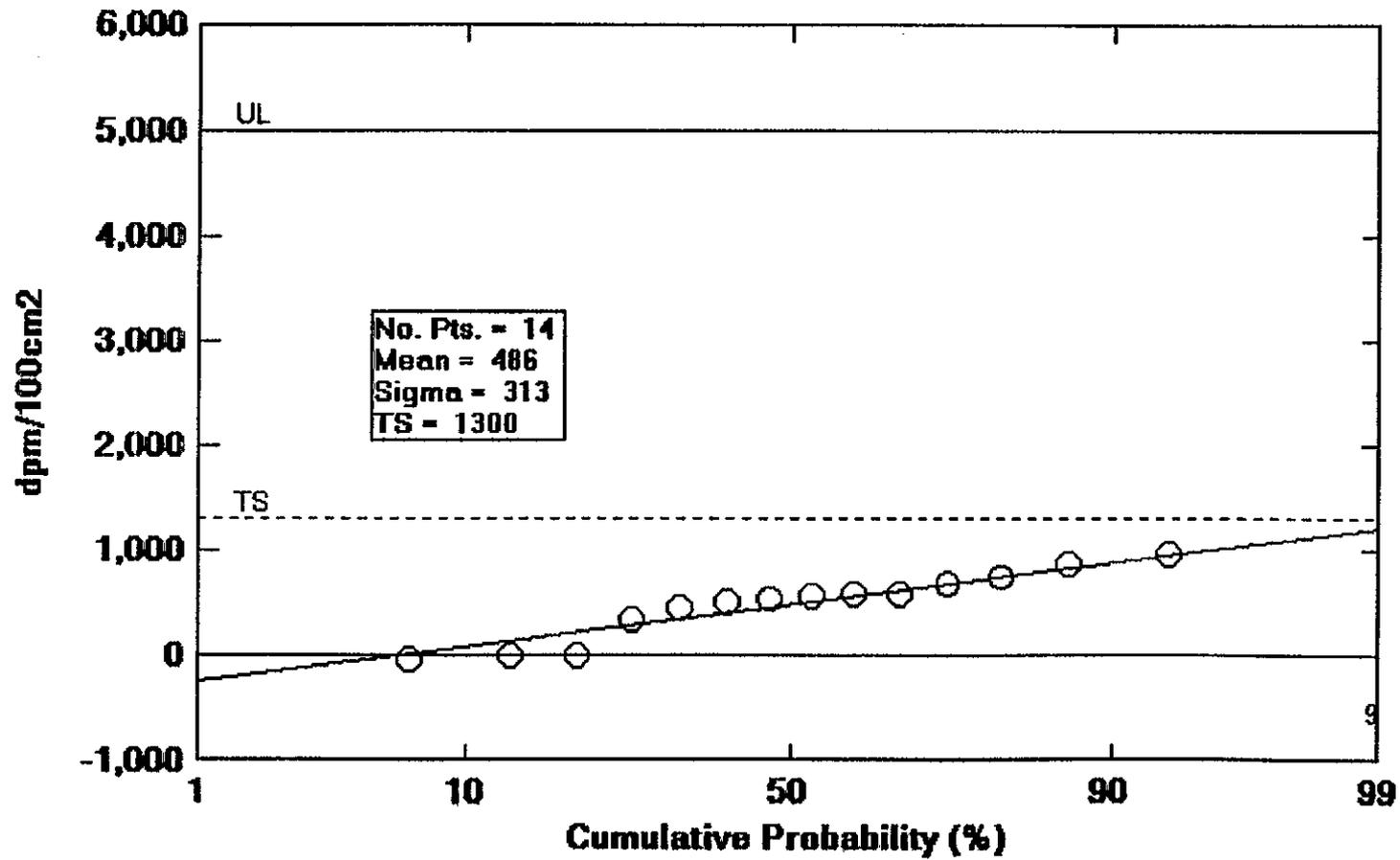
Removable Alpha Measurements, Lot 4: Room 109



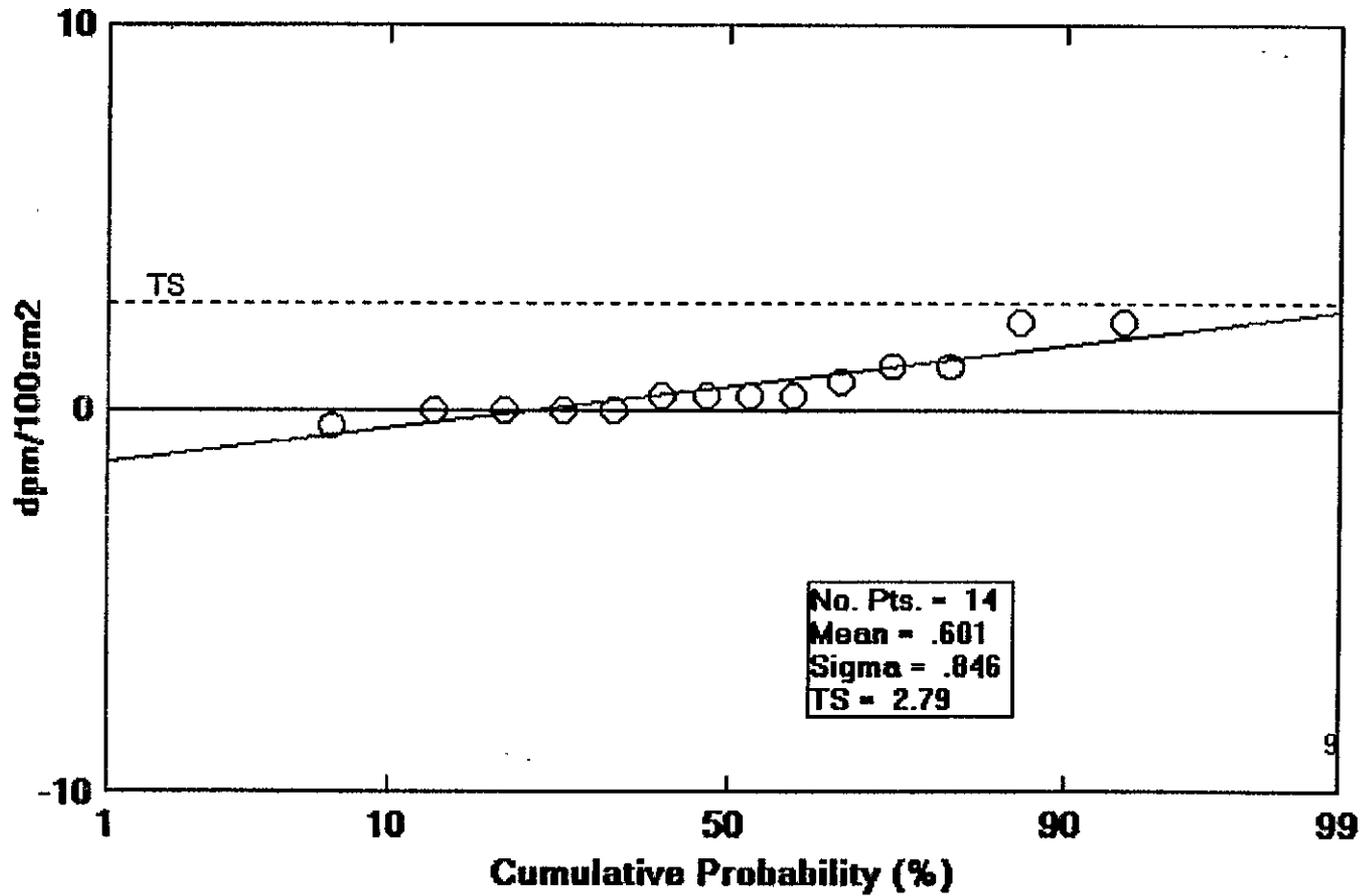
Quantitative Total Beta Measurements, Lot 4: Room 109



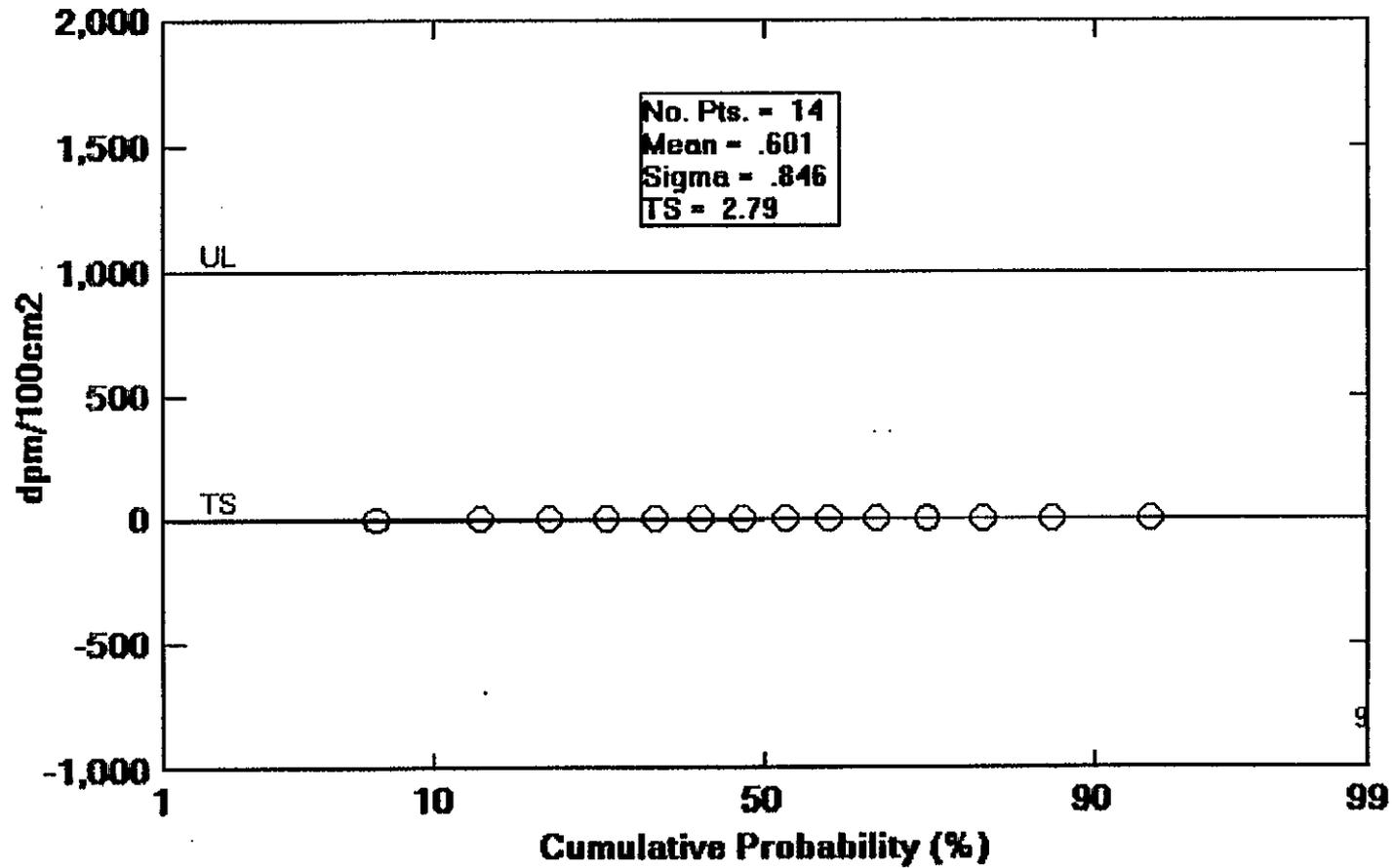
Quantitative Total Beta Measurements, Lot 4: Room 109



Removable Beta Measurements, Lot 4: Room 109



Removable Beta Measurements, Lot 4: Room 109



Lot 4
Room 109
Fuel Storage Vault

SAMPLE NAME	GRID NAME	ALPHA (DPM/100CM2)						BETA (DPM/100CM2)					GAMMA	
		TOTAL	TD DE	MAX	TD DE	REM	TD DE	TOTAL	TD DE	A	REM	STD DEV	TOTAL	
N. Wall 9/15/98	2	3.71	4.08			0.31	0.36	540.0	466.78			2.30	1.24	
N. Wall	14	5.01	4.29			-0.03	0.11	583.2	467.28			2.30	1.24	
N. Wall	19	3.71	4.08			0.31	0.36	453.6	465.78			1.13	1.04	
E. Wall	24	3.71	4.08			0.31	0.36	583.2	467.28			-0.43	0.69	
S. Wall	43	5.01	4.29			-0.03	0.11	507.6	466.40			0.74	0.96	
S. Wall	48	2.40	3.87			-0.03	0.11	745.2	469.15			-0.04	0.79	
S. Wall	53	3.71	4.08			-0.03	0.11	572.4	467.15			-0.04	0.79	
W. Wall	63	2.40	3.87			-0.03	0.11	0.0	460.49			0.35	0.88	
Floor	F66	11.53	5.19			3.42	1.10	680.4	468.40			0.35	0.88	-0.11
Floor	F77	8.92	4.85			1.35	0.70	874.8	470.64			1.13	1.04	2.49
Ceiling	C86	-0.21	3.40			0.66	0.50	-32.4	460.11			-0.04	0.79	
Ceiling	C97	2.40	3.87			-0.03	0.11	334.8	464.40			0.35	0.88	
Ceiling	C100	5.01	4.29			0.31	0.36	0.0	460.49			-0.04	0.79	
Floor	F80	3.71	4.08			-0.03	0.11	961.2	471.63			0.35	0.88	2.21