LA-SUB--98-34

**Final Report on the
Radiological Surveys of
Designated DX Firing Sites at
Los Alamos National Laboratory**

Work Performed by

CHEMRAD

August 12, 1996 through September 4, 1996

for

**Los Alamos National Laboratory
Under Subcontract
#Y45770016-BL**

**Report Submitted
September 9, 1996**

Approved by

**C. R. Flynn
President**

**Chemrad Tennessee Corporation
739 Emory Valley Road
Oak Ridge, TN 37830**

JWT
MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

1.0 EXECUTIVE SUMMARY

CHEMRAD was contracted by Los Alamos National Laboratory (subcontract #Y45770016-BL) to perform USRADS® (UltraSonic Ranging And Data System) radiation scanning surveys at designated DX Sites at the Los Alamos National Laboratory (® USRADS is a Registered Trademark of CHEMRAD Tennessee Corporation). The primary purpose of these scanning surveys was to identify the presence of Depleted Uranium (D-38) resulting from activities at the DX Firing Sites. This effort was conducted to update the most recent surveys of these areas -- "Survey of Firing Point by M Division, Gerald Schlaper, August 14, 1991. This current effort was initiated with site orientation on August 12, 1996. Surveys were completed in the field on September 4, 1996.

This Executive Summary briefly presents the major findings of this work. The detail survey results are presented in the balance of this report and are organized by Technical Area and Site number in section 2. This organization is not in chronological order. USRADS and the related survey methods are described in section 3. Quality Control issues are addressed in section 4.

Surveys were conducted with an array of radiation detectors either mounted on a backpack frame for man-carried use (Manual mode) or on a tricycle cart (RadCart mode). The array included radiation detectors for gamma and beta surface near surface contamination as well as dose rate at 1 meter above grade. The radiation detectors were interfaced directly to an USRADS 2100 Data Pack. All readings were automatically located, graphically displayed and recorded each second by USRADS. The summary statistics resulting from the radiation survey tasks are listed in Table 1.

Table 1. Summary Statistics for the USRADS Radiation Survey Tasks [presented for each site in the order of gamma (cpm), beta (cpm), and exposure rate (microR/h)]

TA- Site/ USRADS Filename	Number of Data Points	Survey Max. Value	Survey Mean Value	Mean Value Std. Dev.	Q1 Mean Value	Q1 Value Std.Dev.
TA14- Q East/ TA14EQ	7215 NaI Pancake Exp. Rate	4920 1140 27	3139 101 17	493 82 2.6	3219 98 18	455 85 2.5
TA14- Q West TA14QW	2160	5040 3360 24	2799 158 15	425 163 2.4	2628 93 15	407 84 2.3

TA- Site/ USRADS Filename	Number of Data Points	Survey Max. Value	Survey Mean Value	Mean Value Std. Dev.	Q1 Mean Value	Q1 Value Std.Dev.
TA15- EF/ TA15EF	5351	91500 21960 367	17258 1110 87	12802 1408 58	9182 367 51	833 172 4.2
TA15- R44/ TA15R44	6996	15000 2100 65	5000 205 26	1604 184 7.6	5899 222 32	611 124 3.1
TA15- R45/ TA15R45	2916	15720 1260 62	3453 103 19	968 96 4.2	3662 115 20	393 92 2.6
TA15- R306/ R306M	4513	27480 32100 59	4220 231 23	922 1536 3.7	3532 108 20	439 83 2.8
TA15- R306/ R306B	5906	12060 14280 27	3245 151 18	569 367 2.5	3310 159 18	486 89 2.6
PHER- MEX/ PHMXA	10360	37500 7650 17	5393 418	2463 471	3820 183	551 88
PHER- MEX/ PHMXB	3307	13380 13320 49	4180 190 22	1104 379 4.6	4126 211	543 134
TA36- I/ TA36I	3102	241140 19800 309	4879 314 24	7406 1118 14	3425 127 18	448 88 2.3
TA36- J/ TA36J	1953	5220 600 27	3133 93 11	574 78 7.9	2868 102 17	428 78 2.6
TA36- EENIE/ EENIE	2908	5220 600 27	3133 93 11	574 78 7.9	2968 102 17.5	428 78 2.6

TA- Site/ USRADS Filename	Number of Data Points	Survey Max. Value	Survey Mean Value	Mean Value Std. Dev.	Q1 Mean Value	Q1 Value Std.Dev.
TA36- MEENIE/ MEENIE	6045	18300 55860 54	4142 199 23	1330 817 5.4	3800 137 21	469 91 2.3
TA36- MINIE/ MINIE	3492	21720 4740 43	4017 164 22	1057 164 4.4	5622 226 29	706 140 3.3
TA36- Hvy Mtl/ HvyMtl	5219	45780 1680 282	3265 97 18	1723 88 10	5488 2441 20	1301 1610 2.6
TA36- Lower Slobovia/ LoSlob	2575	11460 1560 45	4002 126 21	795 106 3.8	3759 119 21	466 80 2.5
Low- Lower Slobovia/ LoLoSlo	1933	44760 2220 47	3965 120 21	1499 112 3.9	3761 122 21	477 89 2.5
Lower Slobovia BurnArea SloBurn	1737	23220 6000 44	4715 203 25	1363 379 3.6	4416 106 24	547 68 2.8
TA39- SITE 6/ TA39C6	2055	6600 780 34	4085 102 23	669 83 3.4	4059 99 23	511 84 2.9
TA39- SITE 8/ TA39S8	3983	28140 15120 61	5934 193 33	1228 362 41	5449 196 31	556 116 3.0
TA39- SITE 56/ TA39S56	3470	37440 4980 80	6301 156 34	2265 228 7.1	4546 113 25	521 75 2.9
TA39- SITE 57/ TA39S57	5608	21120 11640 368	5044 215 33	1331 339 7.3	6478 155 35	601 101 3.0

TA39- SITE 88/ TA39S88	4142	6180 420 34	4076 101 22	607 80 3.3	3868 111 22	480 86 2.0
TA40- SITE 4/ TA40C4	1946	7260 540 24	2725 97 15	746 82 3.5	3099 121 16	450 93 2.5
TA40- SITE 15/ TA40S15	1542	4620 540 24	2716 105 15	501 87 2.6	2479 105 14	390 90 2.2
TA15R40 Road/ R40RD	1554	4140 420 22	2705 95 15	395 80 2.2	2579 71 14	422 59 2.1
TA15- R306Rd/ R306RD	2294	4200 660 24	2744 119 15	403 93 2.4	2498 102 15	390 95 2.3
TA36 IJ Road/ IJROAD	1626	4800 420 25	2946 93 16	429 79 2.3	2979 134 15	400 103 2.5
Meenie- MinieRd/ MMRoad	1448	4200 3540 24	2910 98 16	398 150 2.4	2625 81 14	415 68 2.0
LowSlob. Road/ LoSloRD	1094	4800 360 27	3275 99 18	454 79 2.4	3259 107 15	421 70 2.5
32 Survey Setups	108,450 Data Points	Totals				

- Notes: (1) Uncertainty values in this report are stated as +/-1 standard deviation.
 (2) Survey Mean Values include elevated values and may not be normally distributed.
 (3) The Q1 Mean Values are listed for each survey site. These values represent the results of a 60 second static count collected at an arbitrary "clean" location in the immediate vicinity of the survey site.

Source check readings were taken before each day's survey work near TA15 R183 to verify the operability of the detection instruments prior to use. Static readings were taken

for 60 seconds at each survey site before each survey to document the initial operability of the instrument array. Results were typically noted as "Q01" for Quality Point 1. After each survey, the reading was typically repeated at the same location in order to document the operability of the instrument array during the conduct of the survey. Final counts were typically noted as "Q02" for Quality Point 2. If areas of elevated readings were identified in the scanning survey data, additional 60 second static counts were collected in the immediate vicinity of the elevated finding. These "Bias" counts were noted as "P01, P02, etc. Results for all quality and bias readings are included along with the scanning survey results.

The scanning survey results are presented in this report as Color Track Maps and as Color Contour Plots. The Color Track Maps show the location of the surveyor each second as a dot. The dot is colored according to a color scale to indicate the range of each detector reading each second. The Color Contour Plots present the results after gridding the point scanning data with a Kriging algorithm for contouring the data set for each survey setup.

Summary conclusions for the radiation scanning surveys include the following:

1. The USRADS real-time scanning methods accurately mapped the contaminant and identified corresponding locations of elevated readings.
2. Firing site conditions vary from apparently clean to significantly elevated.
3. The road surveys showed no significant findings.
4. The scanning survey of the Heavy Metal storage area showed no apparent soil contamination of significance.

2.0 SCANNING SURVEY DETAIL RESULTS

The USRADS scanning survey mode for the results presented in this section are for Man-carried surveys unless otherwise noted. For the RadCart survey mode, preliminary results were converted in order to normalize the two NaI detectors for presentation and to accurately position the readings based on the location of the detectors on the RadCart relative to the ultrasonic crystal. Accordingly, the RadCart results presented in this section list a "cnv NaI" on the Signal Statistics and in the Color Track Map.

The Gas Flow Proportional detector failed to function properly during this entire effort. Its performance was erratic and unreliable. When it would stabilize during purging and daily instrument response checks, it would begin to drift during the day beyond the allowable +/-20%. All attempts to isolate the problem failed. The detector was calibrated by Ludlum Measurements in Sweetwater, Texas. As a result of these problems, a Pancake probe was mounted on the RadCart. Pancake results are reported for all RadCart surveys.

Survey statistics for the scanning survey data, the Quality Points, and the Bias Points are included with the survey details that follow this section. Refer to the Color Track Maps and Color Contour Plots for data visualization. Data details are presented in the following sequence: Scanning Survey Statistics, Quality Point and Bias Statistics (if applicable), Color Track Maps for NaI, Pancake, and Exposure Rate detectors, and Color Contour Plots for NaI, Pancake, and Exposure Rate. Approximate North is typically indicated on the NaI Color Track Map or on a key site features map (if available).

The following summary by survey site provides an overview of the detail findings that follow this section. Results are presented under the subtitle using the formal site name with the USRADS data filename in parentheses.

TA14 Q EAST (TA14EQ)

BENCHMARKS: SR 11 was located over the SE corner of the foundation of the old electronics shop. SR 12 was located over the SE corner of the pit on the south side of the parking lot. SR 9 was centered over the apparent firing point of Mound 1. The spherical vessel is located at approximate x,y = 100,-80. The burn barrel is located at approximate x,y = 125,-165. Mound 4 is located at approximate x,y = 75,-230. The survey extended south from the south side of the bunker to the edge of the upper mesa. It reached east-west to each tree line.

FINDINGS: There were no significant findings of elevated readings. NaI readings show a trend somewhat elevated to the south. One pancake reading exceeds 700

cpm.

COMMENTS: The lower area of Q East was not surveyed due to time limitations.

TA14 Q WEST (TA14QW)

BENCHMARKS: SR 13 was centered over a surveyor's lath with pin south of the access road to the immediate area. SR 15 was located on the power distribution box on the south side of the magazine, east of the door to the magazine. P01 was taken adjacent to the yellow bumper post at the northwest corner of the building. The outer boundary of the magazine and the extent of the pe highest readings are in the immediate vicinity of the Low Level Rad Waste containers.

COMMENTS: The RadCart was used to perform this survey. No surveys were conducted in the area below the paved lot due to time limitations. The paved area is indicated in the track map.

FINDINGS: The pancake and NaI results show elevated readings on the south side of the building.

TA15 EF (TA15EF)

BENCHMARKS: SR 14 was located over a concrete block. The lower left survey track extends to a green fence post. The paved area is to the bottom of the survey track and the left mound (looking from the paved area) is outlined in the track. SR 3 and SR 10 were located on the ridge of the left mound.

FINDINGS: This area is characterized by high readings on all instruments. The highest values are in the center of the two mounds. The extent of debris and visible D-38 material reaches at least 100 feet from the immediate mounds. There is apparent transport of D-38 material along the southeast drainage paths away from the mounds.

COMMENTS: Only the left mound area was surveyed due to time limitations. The survey was suspended in the late afternoon due to lightning.

TA15 R44 (TA15R44)

BENCHMARKS: SR 15 was located on a metal in with black tag reading "LANL-ER, Field Unit #2, 15-3000, TA-15". SR 13 was located on a green fence post adjacent to the

road across from the large silver metal "building". SR 9 was centered over a 3' round post near the water shut-off box. SR 11 was located on a surveyor's lath with pin reading "K.E-1, 15,01, PS7924".

FINDINGS: All instruments show a fairly large area of elevated readings that extend from the apparent firing point to the edge of the mesa top. There are several isolated small spots shown by both the NaI and the pancake.

COMMENTS: None.

TA15 R45 (TA15R45)

BENCHMARKS: SR 3 on survey point with tag reading "LANL-ER, Field Unit #2, 15-3113, TA-15". SR 9 on survey point with tag reading "LANL-ER, Field Unit #2, 15-3126, TA-15". SR 5 on survey point with tag reading "LANL-ER, Field Unit #2, 15-3129, TA-15". SR 14 on SE corner of foundation east of Building 141. SR 13 on concrete pad with ~18" round pipe x ~24" long pipe filled with concrete southeast of Building 141.

FINDINGS: There are several small areas showing elevated readings on all instruments. Primary finding appears to be from firing site and secondary locations are related to debris.

COMMENTS: None.

TA15 R306M (R306M)

BENCHMARKS: SR 13 was centered over the pull port (~12" round cover with handle) near the center of the firing mound. SR 6 was located at the southeast corner of the concrete foundation near the southeast corner of the firing mound. SR 12 was located near the center of the large concrete block southeast of the firing mound. SR's 1, 11, and 8 were located on the berm. The access "channel" to the old firing site is indicated by the serpentine path between SR's 10 and 7 in the track maps.

FINDINGS: There are several relatively small areas of elevated readings on the NaI and the pancake. These readings appear to be associated with small debris.

COMMENTS: This site survey was divided into two parts: R306M for the Man-carried survey portion and R306B for the second part where the RadCart was used.

TA15 R306B (R306B)

BENCHMARKS: Same as above. The same setup was used for R306M and R306B. The Man-carried mode (R306M) was used for the heavy vegetation areas and the RadCart mode was used for the open areas (R306B). R306B was broken into two sections during the survey and combined for presentation here. The SR's do not show in the combined Color Track Maps, so one of the two preliminary sections is shown with the SR's for orientation. Compare this with R306M to see how the "M" and "B" surveys fit together. The two "roads" leading up to the firing mound can be seen in the Color Track Maps.

FINDINGS: There are several relatively small areas of elevated readings on the NaI and the pancake. These readings appear to be associated with small debris.

COMMENTS: None.

TA15 PHERMEX (PHMXA)

BENCHMARKS: SR 9 was centered over the apparent firing site. SR 8 was located on the southeast corner of the north shield wall.

FINDINGS: All instruments show relatively large areas of significantly elevated readings.

COMMENTS: This survey was conducted in two parts: PHMXA and PHMXB due to the differing terrains and degrees of vegetation. The RadCart was used for PHMXA and the Man-carried mode was used for PHMXB.

TA15 PHERMEX (PHMXB)

BENCHMARKS: Same as above. The Man-carried mode was used in the same setup as above to cover those areas that were inaccessible to the RadCart.

FINDINGS: Same as above.

COMMENTS: None.

TA36 I (TA36I)

BENCHMARKS: SR 13 was located on top of the IJ Firing Bunker TA-36-55. Storage building 36-119 is indicated between SR 7 and SR 5. The vessel is located adjacent to P02.

FINDINGS: All instruments show significantly elevated readings. The largest concentration appears on the west side of the survey area. The drainage channel between SR 5 to SR 8 (see P02) appears to be collecting D-38 contamination from runoff.

COMMENTS: None.

TA36 J (TA36J)

BENCHMARKS: SR 13 was centered on the northeast concrete pad (1 of 4) near the excavation into the cliff wall. SR 14 was located near the green shelter. SR 8 was located near the 250# inert bomb casings. The concrete shield blocks are shown as a small rectangle between SR's 3 and 9.

FINDINGS: The NaI and pancake do not show any significant elevated readings. The exposure rate readings are slightly elevated in the immediate vicinity of the cliff wall, probably due to natural radionuclides at close proximity.

COMMENTS: This area appears to be clean.

TA36 EENIE (EENIE)

BENCHMARKS: Large culvert materials are located south of the line between SR's 1 and 4. Small shelter made from culvert materials located south of the line between SR's 5 and 15. P01 taken along the western edge of the bunker.

FINDINGS: A few slightly elevated locations were identified with the NaI and Exposure Rate detectors. No significant pancake readings were noted.

COMMENTS: The area is essentially clean. The absence of any pancake readings and limited NaI and Exposure Rate hits suggests that the area may have been covered over with clean material.

TA36 MEENIE (MEENIE)

BENCHMARKS: SR 15 is on top of the bunker (TA-36-KAPPA-6) centered over the large cable port (1 of 2) to the north. This port has cables and connectors in place. SR 10 is on top of the magazine firing box (TA-36-19). The concrete shield or target blocks northwest of SR 10 are outlined.

FINDINGS: A number of areas with significantly elevated readings were identified with all instruments. The soil in the vicinity of the hill side catch box near SR 11 and in the lower areas near P01 and P02 have significant high readings. An area of the bunker roof and the adjacent equipment work areas next to the firing point upper access road showed elevated readings.

COMMENTS: There are a number of metal and concrete targets with elevated readings.

TA36 MINIE (MINIE)

BENCHMARKS: SR 15 was located on top of the MINIE firing bunker TA-36 KAPPA A, centered over the cable port (1 of 2) located on the northwest end. This port has connectors and a 120V AC outlet. SR 12 was located on the slope of TA-36-20 Chamber KAPPA-20.

FINDINGS: All instruments show elevated readings at several locations around the site. The apparent firing area appears to be relatively clean. The most significant NaI and Exposure Rate readings are near one side of the "pond".

COMMENTS: None.

TA36 Heavy Metal (HVYMTL)

BENCHMARKS: Building outline resembling a boot as shown in the Color Track Maps is Building TA-36-104 with adjacent container 36-103.

FINDINGS: The only elevated readings appear to be associated with the D-38 stored in 36-104 and with metal objects stored at the site.

COMMENTS: No significant elevated readings were identified as soil contamination.

TA36 Lower Slobovia (LoSlob)

BENCHMARKS: SR 12 was located on top of the bunker Building TA-36 KAPPA 12 centered over cable port at southwest corner of the roof. This cable port has cables, connectors and switch boxes. SR 7 was located on the mound for Structure No. TA-36-13, Chamber KAPPA 13. The survey covered the accessible areas extending out from the roof of the bunker around the central mound on KAPPA 13, and to the edge of the flat upper area.

FINDINGS: A few small areas were identified that had significantly elevated readings on all instruments. The greatest concentrations were located on the east side of the mound for Chamber KAPPA 13.

COMMENTS: There are many piles of tank parts located at this site. This survey scanned only the soil.

Lower Lower Slobovia (LoLoSlo)

BENCHMARKS: SR 12 is at the end of the handrail around the pit. P01 is next to the handrail around the side. The pit lies between SR 12 and P01. The straight line showing in the Color Track Map just above SR's 12 and 13 is the line made by the sled rail.

FINDINGS: Two small isolated locations were identified with elevated NaI and Exposure Rate readings. Elevated pancake readings were identified at the location adjacent to the handrail (see P01).

COMMENTS: None.

Lower Slobovia Burn Area (SloBurn)

BENCHMARKS: SR 11 was located on the stake for the sign reading "Burn Area, Permitted Materials Only". The outline of the burn pile is shown in the Color Track Map.

FINDINGS: Numerous locations of elevated readings on all instruments were located in the immediate vicinity of the burn pile.

COMMENTS: The area surrounding the burn pile is heavily vegetated allowing only limited access, including the south and east side immediately next to the pile.

TA39 Site 6 (TA39C6)

BENCHMARKS: SR 11 was located on the roof of the bunker, TA-39-6 Designation AC-6, near the north yellow post for the hand rail. SR 13 was located on the roof of bunker TA-39-67.

FINDINGS: Slightly elevated readings for NaI and Exposure Rate were identified at several locations around the outer areas of the firing site.

COMMENTS: None.

TA39 Site 8 (TA39S8)

BENCHMARKS: SR 15 was located at the northeast corner of the bunker roof. SR 12 was positioned over a stake with a tag reading "LANL ER, Field Unit #2, 39-1248, TA-39". The outline of the bunker roof can be seen just below and to the right of P03. See P12, P13 and P14 taken in the dry gulch.

FINDINGS: Elevated readings on all instruments were located at numerous areas on this site. The survey proceeded up the slope as far as feasible. It also extended down the west side access road to the dry drainage gulch. Numerous indications were found in the gulch. Bias point P06 data is corrupted.

COMMENTS: This survey was conducted in two parts and combined for presentation.

TA39 Site 56 (TA39S56)

BENCHMARKS: SR's 4 and 5 are located near the contamination warning signs. P01 is immediately adjacent to the cliff wall.

FINDINGS: The general area NaI and Exposure Rate readings are elevated compared to other sites. Readings increase significantly on approach to the cliff wall. A small area immediately adjacent to the cliff wall has significantly elevated readings on all detectors. A track around the vegetation just north of the open area shows elevated readings on all detectors.

COMMENTS: The high vegetation in this area limited the usefulness of the pancake detector since it could not be readily scanned near the ground.

TA39 Sites 57 and 7 (TA39S57)

BENCHMARKS: SR 14 was centered over a ~12" round cable port on the roof of bunker TA-39, AC-57. SR 3 was centered over a ~12" round cable port on the roof of bunker TA-39-7, Designation Firing Chamber AC-7. A dry gulch is shown in the Color Track Map extending as a line that separates SR's 13 and 11 (see P01, P02 and P03 taken in the gulch).

FINDINGS: Elevated readings were recorded on all instruments at numerous areas within the immediate firing area and in the adjacent areas.

COMMENTS: None.

TA39 Site 88 (TA39S88)

BENCHMARKS: SR 14 was located at the southwest corner of bunker TA-39, AC 88. SR 12 was located near the northeast corner of bunker TA-39, AC 95.

FINDINGS: The general area of this site was relatively clean. Only the outer areas up-slope from the apparent firing point and the east end access showed elevated readings.

COMMENTS: None.

TA40 Chamber 5 (TA40C4)

BENCHMARKS: SR 1 was located on a stake with a tag reading "EPAA06A079. The metal plate flooring at the apparent firing point is shown in the Color Track Map.

FINDINGS: Only a few elevated readings were recorded on the NaI and the pancake. These findings were scattered away from the firing point and were typically very small.

COMMENTS: This survey was conducted with the RadCart and covered all accessible areas extending away from the bunker to the extent allowed by the surrounding berms and slopes. The Gas Flow Proportional (GFP) readings were again unreliable. The GFP Color Track Map is used here to sketch in the site features.

TA40 Chamber 15 (TA40C15)

BENCHMARKS: SR 13 was located over the southeast corner of the concrete pad

surrounding the firing point. SR 5 was located on the southwest corner of this same pad.

FINDINGS: No significant findings were identified at this site.

COMMENTS: No effort was made to survey inside the bunker overhang since a shot was in place on the firing point. This survey was conducted with the RadCart and covered all accessible areas extending away from the bunker to the extent allowed by the surrounding berms, slopes, and blast walls. The GFP readings were again unreliable. The GFP Color Track Map is used here to sketch in the site features.

TA15 R40 Road, Hot Side of Gate (R40RD) [RD for Road]

BENCHMARKS: SR 12 was centered over a ~2" round pipe extending up ~6" between the barricade lift box and the hot side key post. SR 11 was located at the black and white striped sign approximately 200' feet down the road toward the hot zone.

FINDINGS: None. No Color Contour Plots are included since there are no findings in the scanning survey data.

COMMENTS: None.

TA15 R306 Access Road and Parking Areas to Firing Point (R306RD)

BENCHMARKS: SR 12 was located across the road from the barricade lift box. SR 7 was located at the lower end of the center retaining wall with handrail that divides the upper and lower paved areas.

FINDINGS: None. No Color Contour Plots are included since there are no findings in the scanning survey data.

COMMENTS: None.

TA36 Intersection of IJ and Ridge Road (IJROAD)

BENCHMARKS: SR 8 was located at the latch post for the barricade to IJ. The barricade bar is shown extending across the road and causing a break in the Color Track Maps. The intersection of the R40 road continuing straight to IJ and turning off to Ridge Road is shown in the Color Track Maps.

FINDINGS: None. No Color Contour Plots are included since there are no findings in the scanning survey data.

COMMENTS: None.

TA36 Intersection of MEENIE and MINIE Roads (MMROAD)

BENCHMARKS: SR 7 was located at the hinge post for the barricade to MEENIE. The intersection of the MEENIE/MINIE access road continuing straight to MINIE and turning off to MEENIE is shown in the Color Track Maps.

FINDINGS: After reviewing the data, a significant reading was noted on the pancake on the MEENIE/MINIE access road near SR 12. There is no verification of this finding. No Color Contour Plots are included since there are no confirmed findings in the scanning survey data.

COMMENTS: None.

TA36 End of the Pavement at the Bottom of the Hill, Lower Slobovia (LoSloRD)

BENCHMARKS: SR 8 was located at the lower end of the concrete retaining wall extending from the bunker. SR 7 was located at the extreme end of the extended single parking space.

FINDINGS: None. No Color Contour Plots are included since there are no findings in the scanning survey data.

COMMENTS: None.

3.0 USRADS AND SURVEY INSTRUMENT CONFIGURATION

3.1 Description of USRADS

USRADS is the acronym for the UltraSonic Ranging And Data System. USRADS was used in this project to collect position-correlated data on a one second frequency during the conduct of the radiation scanning surveys. The USRADS survey team consisted of a minimum of two CHEMRAD personnel. One person, the "surveyor", performed the actual walkover by carrying the radiation instrumentation and the heart of the electronic data gathering and positioning, the USRADS "Data Pack", over the survey area. A second person, the "operator", operated a mobile base station consisting of a host microcomputer and a Master Receiver. The data collected by the Data Pack was transmitted to the base station Master Receiver via radio frequency link (RF) each second.

USRADS incorporates three technologies:

- 1) ultrasonics are used to determine distance by propagation time of the ultrasonic signal,
- 2) radio frequency (RF) communications are used for system timing and data transfer, and
- 3) microcomputers are used to collect data, calculate distances, display data, store data, and reduce data.

The USRADS Data Pack assembly emits an ultrasonic signal from the surveyor's location at one second intervals. At the same instant, an RF transmission is broadcast from the surveyor's Data Pack to the Master Receiver. Since RF transmissions travel at nearly the speed of light and are therefore essentially instantaneous compared to the speed of sound, the RF transmission is used to mark the start of the ultrasonic signal. Each Stationary Receiver has an ultrasonic receiver and an RF transmitter. When the Stationary Receiver receives the ultrasonic pulse, it transmits an RF signal. This RF signal is received by the Master Receiver and is used as a stop signal for that particular Stationary Receiver, thus establishing the time-of-flight of the ultrasonic signal from the Data Pack to that Stationary Receiver's location. The microcomputer can then determine the distance between the surveyor and each Stationary Receiver's location. Through this method, the surveyor's exact location is established each second throughout each walkover.

The USRADS software automatically correlates the survey instrument data collected with the correct location of the surveyor. The location and corresponding data values are then plotted on a grid map displayed on the host computer.

The data for that one-second time period is also posted at the top of the computer screen. The plotted position remains on the computer screen while the data collected is replaced each second to conserve screen space for plotting the track of the surveyor. At any time during the survey, the operator may look at the surveyor's track lines to determine if any areas have been missed. The surveyor may return to any areas deemed insufficiently surveyed and obtain the necessary coverage.

When proper survey coverage has been accomplished, the operator runs the data reduction routines on the microcomputer. Several software routines enable the operator to review coverage and identify anomalies or other points of interest.

3.2 Radiation Survey Methodology

Surveys were typically conducted in the following manner:

- 1) CHEMRAD survey teams arrived on at the TA15 R183 site;
- 2) A 100 second count for background and a 30 second source check was collected for all instruments to be used that day and verified to be within +/-20% of reference values;
- 3) The CHEMRAD survey team moved to the survey site and the Field Survey Supervisor analyzed the site for the best deployment of survey equipment;
- 4) Stationary Receivers were deployed in standard CHEMRAD manner with adaptation for the terrain, and obstacles that were site specific;
- 5) Stationary Receiver were noted for reference purposes;
- 6) Site setup was then performed to determine the location of Stationary Receivers with 30 to 60 second counts at each stationary receiver;
- 7) The radiation instruments were mounted on the surveyor Back Pack or the RadCart;
- 8) The surveyor moved to a starting point to begin the survey;
- 9) The survey data was then analyzed to determine the quality and completeness of the data and to determine the location of any reacquisitions;
- 10) Data was copied to diskette for backup;

- 11) The operation moved to the next survey site and repeated the site setup and survey steps;
- 12) At the end of the survey, equipment 'tear-down' was performed;
- 13) The CHEMRAD survey crew then departed the site.

3.3 Explanation of Data

The USRADS scanning radiation, surveys were conducted on a survey grid basis. Grid and survey designations attempted to identify the specific site, i.e. TA14EQ(A) designated the first file (A) generated at TA14 Q East. The special identifier designations such as "(A), (B), ... (F) and (G)" are included with the filenames to indicate the version of the data as it progresses through QA/QC and data processing (i.e. (B) is a later version than (A), etc. The (F) designation signifies the final version for Man-carried surveys. The (G) designation signifies the final version for the converted RadCart surveys. This nomenclature is consistent with the data plots and file naming conventions used in this report.

3.4 Problems Encountered During the Survey

USRADS surveys may be impacted by environmental, site, and equipment problems. No equipment operational problems were encountered following initial start-up, other than the operability problems with the Gas Flow Proportional detector.

There were no civil survey points to support initial USRADS data collection in site coordinates, so data was collected in local coordinates and is reported as such. Survey activities were occasionally hindered by obstructions such as dense vegetation, steep banks and rock formations.

3.5 DATA PROCESSING AND DATA PRESENTATION

3.5.1 Color Track Maps

Track Maps are graphic illustrations of survey coverage produced during the USRADS surveys. The Track Maps correlate the detector signals to the surveyor's location as the survey is occurring using changing colors to designate instrument reading levels. The color Track Maps show positions of the Stationary Receivers used (a diamond $\diamond$ symbol with the SR number adjacent), while the path taken by the surveyor is shown as a series of small dots and larger dots. The dot size increases when a user specified threshold value is reached. For locations with data exceeding the selected threshold value, the surveyor's position is indicated by larger color-filled circle symbols on the Track Map.

Threshold values are generally set at approximately the mean value plus two standard deviations.

The color Track Maps are generated on the computer display in real-time during the conduct of each USRADS walkover survey. The color Track Maps are valuable tools in identifying general trends and providing verification of findings while the survey is in progress. Copies of the color Track Maps are included with this report. Quality controls such as thoroughness of coverage, generally acceptable rates of increase (see below), clustering of color changes, and verification of suspect findings by adjacent tracks are performed visually by the computer operator during the conduct of the survey.

"Generally acceptable rates of increase" refers to readings that increase as a surveyor approaches a radioactive source and decrease as the surveyor passes the source of elevation. These readings are confirmed by a gradual increase/decrease on adjacent tracks. Suspect readings frequently are indicated by localized increases in magnitude without a gradual increase/decrease or confirmation on adjacent passes.

At the conclusion of the survey, the survey data is replayed to verify data integrity.

Color Track Map nomenclature is as follows:

<u>Survey</u>	<u>Map Title</u>	<u>Meaning</u>
NaI or cnv NaI	"cpm"	counts per minute
Pancake	"cpm"	counts per minute
Exposure Rate	"uR/h"	microRoentgen per hour

Note: The majority of the Color Track Maps were produced with the term Dose Rate instead of Exposure Rate. Although these terms are often used interchangeably and for all intensive purposes they may be very comparable, the correct unit of measure is Exposure Rate rather than Dose Rate. The Ludlum Model 19 that was used to measure Exposure Rate is energy dependent.

3.5.2 Track Map Threshold Level

The threshold cutoff was used to set the level at which the location symbol on the Track Map changed from a small dot to a large color-filled circle. Thus, the level threshold was useful in identifying locations with elevated measurements. When reasonable, the thresholds for the NaI and Exposure Rate were set at the mean value of the scanning data plus two standard deviations. When reasonable, the threshold for the Pancake was set at three times the mean value of the scanning data. When very high readings were encountered, this approach was not meaningful and arbitrary threshold levels were selected to best illustrate the data.

3.5.3 Track Map Color Codes

Color codes for gamma surveys are set to increasing measurement values indicated by the color scales shown on the Color Track Maps. The levels associated with these colors are documented on each plot.

3.5.4 Contour Plots

Contour Plots are included for the sites surveyed. These provide a graphic illustration of the contours of radiation levels detected.

All contouring was performed with Kriging techniques. The data was gridded on a 3 to 5 foot mesh size. Blanking files were created for areas without survey data to prevent contours from extending into or through areas that are void of data.

Note that the contouring process uses a calculated average value for each cell in the grid based on the number of data values within each cell. This is in contrast to the color Track Maps, which present the color changes based on actual data values, not averages. Therefore, the data values implied by the contour plots will be somewhat lower than that shown by the Track Maps.

3.6 Radiological Instrumentation Used In the Canyon Surveys

3.6.1 Man-Carried and RadCart Survey Instrumentation

The walkover radiological characterizations were conducted with a Model 44-2, 1"x 1" sodium iodide (NaI) detector probe that was coupled to a Ludlum Model 3 count rate meter. Beta surveys were performed with a Ludlum Model 3 ratemeter with a 44-9 Pancake GM probe. Exposure Rate surveys were performed with a Ludlum Model 19 MicroR meter. The ratemeters were interfaced to the USRADS Data Pack and the data accumulated for each one second interval was transmitted to the host computer with the corresponding USRADS position information for that second.

In the Man-carried mode, the probe assembly was suspended from the surveyor's right hand by a rope in order to keep the probe in close proximity to the surface (within 15 cm) while scanning. The detector was scanned slowly across the surveyor path in an arc approximately 1 meter wide as the surveyor moved forward along the survey transects.

In the RadCart survey mode, two Model 44-2 detectors were used in addition to the Pancake and the MicroR meter. All instruments were permanently mounted on the RadCart so that their position relative to the ultrasonic crystal was accurately known for subsequent conversion and presentation.

In addition to the normal walkover radiation survey protocol, a limited number of static measurements were performed at designated locations. Man-carried static readings were taken with the detector probe in contact with the surface. RadCart static readings were taken with the detector array in its fixed cart position. If the readings were of interest, the approximate values were noted on pin-flags left at the measurement site for subsequent reacquisition.

3.6.2 Instrument Calibration and Response Checks

The radiation instrumentation was calibrated by the manufacturer or a qualified vendor prior to initiating the surveys. Calibrations of the CHEMRAD meters was coordinated by CHEMRAD and records are retained at CHEMRAD's Oak Ridge office. Each radiation survey instrument received a daily response check prior to use in the field. This daily response check included battery checks and a source check. All daily response checks were performed using a DU-238 source.

3.7 USRADS Equipment Literature

Two pieces of USRADS literature are included to further illustrate the operation of the system (the 2100 brochure) and to show the components of the system (the 2200 flyer) that were used in this project.

4. QUALITY CONTROL

4.1 General Considerations and Quality Objectives

Data quality objectives for the project were established to meet particular contractor requirements, in addition to CHEMRAD's own in-house requirements. Quality Control measures were implemented throughout the CHEMRAD survey process to prevent the introduction of unreliable data. Some particular organizational objectives of the CHEMRAD QA/QC program were designed to:

- 1) identify problems that effect quality of the CHEMRAD survey results;
- 2) prepare a systematic process to provide solutions for any problems relating to quality issues;
- 3) ensure implementation of solutions, with monitoring of problem resolution until corrected.

Some specific Quality Control measures that were taken throughout the survey included:

- 1) quality and redundancy measurements each day to ensure the ability to reproduce data. If the measurements were not within CHEMRAD's allowable margin of error, a determination of the cause of the difference was made.
- 2) real time, ongoing monitoring of the survey and the individual data channels by the computer operator to note as soon as possible any discrepancies in the data;
- 3) cross check routines of Stationary Receiver locations to confirm accuracy of the surveyor's coordinates;
- 4) daily checks of radiological and geophysical instruments to verify accuracy of data readings;
- 5) analysis of the survey data generated to determine any failure of the CHEMRAD survey routine;
- 6) review and analysis of the data by CHEMRAD's data processing staff.

4.2 Precision

According to Environmental Protection Agency guidelines, precision is defined as the measure of mutual agreement among individual measurements of the same property,

usually under prescribed similar conditions. Precision is best described in terms of standard deviation. Various measures of precision exist depending upon the "prescribed similar circumstances."

Quality and Redundancy (Q & R) measurements were taken by the USRADS equipment each day to insure the precision of the data. For Q & R readings, a location was selected to collect initial integrated counts for all instruments prior to the conduct of surveys. Upon conclusion of the survey day, this position was reacquired and another integrated count was made to provide a redundant check on each of the instruments and the data compared. If the measurements were not within acceptable limits, the cause of the discrepancy was determined. Corrective actions, if necessary, were taken to assure that precision was maintained throughout the conduct of the USRADS surveys. If readings varied by more than $\pm 20\%$ from the Quality and Redundancy mean readings, CHEMRAD first determined which instrument or instruments were not within the acceptable range. If it was determined that a pancake or NaI detector had malfunctioned, the instrument was repaired or replaced and the grid site was resurveyed.

The USRADS operator observed the incoming data stream along with the graphic display of the Track Map data during the conduct of the surveys. In this manner, data taken sequentially and on adjacent paths were readily compared to assure the mutual agreement among the individual measurements along a path, on adjacent paths, and in regions where clustering may be indicative of findings of interest.

CHEMRAD utilized daily response checks for its radiological instrumentation at the beginning of each survey day to ensure precision. If any instrument deviated more than $\pm 20\%$, the survey meter was removed from service until the problem was corrected.

4.3 Accuracy

According to Environmental Protection Agency guidelines, accuracy is defined as the degree of agreement between the observed measurement value and the true value. Instrument accuracy was verified by submitting the instruments to calibration prior to the initiation of the work and resubmitting on a frequency not to exceed six months. CHEMRAD radiological instruments were calibrated to known radiation sources that were calibrated to an NIST (National Institute for Standards and Testing) referenced source. Positional accuracy was assured by use of the initial USRADS System setup procedures that automatically calibrate the system for the speed of sound, consistent with the current meteorological conditions at the site.

Quality controls such as thoroughness of coverage, generally acceptable rates of increase (see below), clustering of color changes, and verification of suspect findings by adjacent tracks are performed visually by the computer operator during the conduct of the survey.

"Generally acceptable rates of increase" refers to readings that increase as a surveyor approaches a radioactive source and decrease as the surveyor passes the source of elevation. These readings are confirmed by a gradual increase/decrease on adjacent tracks. Suspect readings frequently are indicated by localized increases in magnitude without a gradual increase/decrease or confirmation on adjacent passes

4.4 Completeness

According to Environmental Protection Agency guidelines, completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.

CHEMRAD attempted to meet or exceed all standards of completeness for its data collection. Data readings were recorded each second during the survey to provide a very complete characterization of the areas surveyed. Omissions of data occurred in areas where access was handicapped by geographic or physical obstacles (heavy undergrowth, steep banks, structures, etc.) that had to be circumvented, or areas where it was deemed hazardous to the health and safety of the surveyor.

CHEMRAD determined completeness of data by requiring a prescribed survey methodology as determined in the Statement of Work, CHEMRAD's own internal requirements, and frequent meetings with the prime contractor. Data were monitored in the field and as processed. Some specific actions taken by CHEMRAD included:

- 1) Analysis of each grid site prior to each survey by a trained CHEMRAD Field Team Supervisor to determine necessary and applicable survey procedures to ensure complete and thorough surveys of each site;
- 2) Review of the survey tracks by the survey operator as they were generated during the survey;
- 3) Comparison of the survey Track Maps with Aptitude maps of the survey area.

4.6 Representativeness

According to Environmental Protection Agency guidelines, representativeness expresses the degree to which data represent the medium/environment where samples/measurements were obtained. CHEMRAD's methodology ensures representativeness by taking readings every second during the survey. When the color Track Maps are assembled, adjacent tracks produce readings to confirm the representativeness of the survey information.

4.7 Comparability

According to Environmental Protection Agency guidelines, comparability expresses the confidence with which one data set may be compared to another. Some methods CHEMRAD uses to provide comparability are:

- 1) survey methodology was consistent throughout the survey;
- 2) data reduction software routines were consistent throughout the survey.

Analysis Limits

X -8.8041 to 195.4944
Y -288.8571 to 27.90262

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	900	4920	3138.581	493.1795
Pancake	0	1140	101.3615	81.67206
Dose Rate	5.6107	26.5543	17.13545	2.623339

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	1.3783256	2.2637714	1.722412	0.24001215
Y	-0.01544144	91.4036201	0.59073336	0.3992222
Nal	2340	4380	3219	455.44659
Pancake	0	300	98	84.828842
Dose Rate	10.3399	25.540899	17.985437	2.4517322

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	1.59942	2.0130206	1.7950455	0.08984993
Y	-0.74522811	-0.080327608	-0.39313955	0.13587129
Nal	1980	4380	3149	456.07016
Pancake	0	360	95	74.344597
Dose Rate	12.0289	22.162901	17.613861	2.3207951

USRADS v1.48j Track Map

Site: TA14EQ ()

Signal: Nat (cpm)

Time: 12:39:50 08/14/96

Threshold:
> 4000

~ N

USRADS Analyze v1.50a Track Map

Site: TA14EQ (F)

Signal: Nal (cpm)

Time: 13:39:50 08/14/96

Threshold:
> 4613 •

USRADS Analyze v1.50a Track Map

Site: TA14EQ (F)

Signal: Pancake (cpm)

Time: 13:39:50 08/14/96

Threshold:
> 303 •

< 300
300 to 400
400 to 500
500 to 600

600 to 700
700 to 800
> 800

USRADS Analyze v1.50a Track Map

Site: TA14EQ (F)

Signal: Dose Rate (uR/h)

Time: 13:39:50 08/14/96

Threshold:

> 25 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA14 Q EAST (FILE: TA14EQ)
Nal Count Rate (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA14 Q EAST (FILE: TA14EQ)
PANCAKE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA14 Q EAST (FILE: TA14EQ)
Exposure Rate (uR/h)

Analysis Limits

X -74.78838 to 167.913
Y -150.2929 to 18.63763

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	3360	158.2778	162.6153
cnv Nal	1440	5040	2798.875	424.5514
Dose Rate	7.9753	23.8519	15.0081	2.375276

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	72.362895	73.168407	72.462246	0.14119214
Y	-68.92562	-68.624653	-68.730718	0.05537302
Left Nai	1920	3660	2628	406.90714
Right Nai	1140	2880	1992	346.31619
Gas Flow	4260	7920	6014	763.61743
Dose Rate	9.6643	19.7983	14.995914	2.2545233
Pancake	0	360	93	84.438324

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	72.476843	73.053111	72.608502	0.093811648
Y	-68.030853	-67.817104	-67.899281	0.040314772
Left Nai	2100	3480	2739	310.84793
Right Nai	1440	3120	2155	322.50293
Gas Flow	49980	60480	54909	2210.1882
Dose Rate	9.3264999	18.784901	14.635591	2.1091759
Pancake	0	360	122	92.402946

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	58.004032	58.280934	58.153715	0.057442461
Y	-39.832102	-39.658611	-39.754407	0.043156853
Left Nai	1620	3180	2359	420.43271
Right Nai	1380	2700	1959	289.93091
Gas Flow	35640	43260	40303	1701.5426
Dose Rate	8.9886999	18.109301	13.087341	2.0443313
Pancake	0	360	119	76.926117

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-20.212281	-20.050264	-20.118	0.036451604
Y	-105.20746	-105.06252	-105.10863	0.030474753
Left Nai	1800	4200	3126	466.80972
Right Nai	1380	3300	2295	426.07361
Gas Flow	48840	59280	54372	2345.9236
Dose Rate	10.3399	22.162901	16.831291	2.4994571
Pancake	300	1560	1059	291.60968

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-53.646523	-53.489292	-53.556276	0.036033768
Y	-103.79422	-103.65656	-103.72125	0.034534678
Left Nai	1800	3660	2619	420.91425
Right Nai	1500	2760	2097	310.18509
Gas Flow	42060	55500	48211	2981.9106
Dose Rate	10.3399	18.4471	13.959991	1.8069162
Pancake	120	780	394	127.09532

Point: P04

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-5.8340566	-5.6526655	-5.7169827	0.055176599
Y	-12.565209	-12.447517	-12.499186	0.036291547
Left Nai	2160	3720	2923	397.69711
Right Nai	1620	2940	2303	321.89609
Gas Flow	20880	28440	24441	1700.5631
Dose Rate	10.3399	19.1227	14.973389	1.9756655
Pancake	0	360	113	76.608185

USRADS v1.48j Track Map

Site: TA14QW (F)

Signal: Gas Flow (cpm)

Time: 12:14:00 08/15/96

Threshold:
> 30000

USRADS Analyze v1.50a Track Map

Site: TA14QW (G)

Signal: cnv NaI (cpm)

Time: 12:14:00 08/15/96

Threshold:
> 3649 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: TA14QW (G)

Signal: Pancake (cpm)

Time: 12:14:00 08/15/96

Threshold:
> 474 •

< 300
300 to 400
400 to 500
500 to 600

600 to 700
700 to 800
> 800

USRADS Analyze v1.50a Track Map

Site: TA14QW (G)

Signal: Dose Rate (uR/h)

Time: 12:14:00 08/15/96

Threshold:

> 20 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA14 Q WEST (FILE: TA14QW)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
1000 = Black
2000 = Green
3000 = Blue
4000 = Magenta
5000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA14 Q WEST (FILE: TA14QW)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
300 = Black
400 = Green
500 = Blue
600 = Magenta
700 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA14 Q WEST (FILE: TA14QW)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -126.9315 to 95.7802
Y -59.82603 to 301.3147

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	120	91500	17257.53	12801.83
Pancake	0	21960	1110.409	1408.27
Dose Rate	1.8949	367.0567	87.17224	58.03513

Point: Q01

Type: QUALITY

Samples: 57 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	0.79157263	1.3299346	1.0904236	0.13487504
Y	-3.1227046	-2.419468	-2.801759	0.21190591
Nal	7980	11340	9182.1055	833.39447
Pancake	120	660	367.36841	171.98972
Dose Rate	40.404099	60.6721	50.816635	4.1613321

USRADS Analyze v1.49i Track Map

Site: TA15EF (D)

Signal: Dose Rate (uR/h)

Time: 13:31:11 08/16/96

Thresholds: none

USRADS Analyze v1.50a Track Map

Site: TA15EF (F)

Signal: NaI (cpm)

Time: 12:42:40 08/16/96

Threshold:

> 5500 •

USRADS Analyze v1.50a Track Map

Site: TA15EF (F)

Signal: Pancake (cpm)

Time: 12:42:40 08/16/96

Threshold:
> 500 •

USRADS Analyze v1.50a Track Map

Site: TA15EF (F)

Signal: Dose Rate (uR/h)

Time: 12:42:40 08/16/96

Threshold:

> 40 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 EF (FILE: TA15 EF)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 EF SITE (FILE: TA15 EF)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 EF SITE (FILE: TA15EF)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
10 = Black
20 = Green
50 = Blue
100 = Magenta
200 = Red

Analysis Limits

X-142.1865 to 249.0646
Y-229.1844 to 119.2785

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1080	15000	4999.991	1603.855
Pancake	0	2100	204.7599	183.6232
Dose Rate	8.3131	65.4013	26.33037	7.572919

Point: Q01

Type: QUALITY

Samples: 56 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	-1.3762852	-0.71619034	-1.0207571	0.15692572
Y	0.17133168	1.1928022	0.67365658	0.26242995
Nal	4800	7200	5899.2856	611.24683
Pancake	0	600	221.78572	123.71677
Dose Rate	23.8519	39.7285	31.603201	3.0983179

Point: Q02

Type: QUALITY

Samples: 58 (58)

Point Statistics

	Low	High	Mean	Std Dev
X	-1.1521394	0.51880814	-0.60604032	0.31356166
Y	-1.1306767	0.72969481	-0.42585198	0.49110087
Nal	4860	7980	6373.4482	617.52826
Pancake	0	420	181.03448	100.83318
Dose Rate	26.216499	38.715099	31.481525	2.9168391

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	37.385659	38.916182	37.92288	0.37709373
Y	-91.262827	-90.320678	-90.66514	0.18674705
Nal	7740	10800	9172	664.05634
Pancake	180	1260	727	253.61989
Dose Rate	33.648102	53.240501	42.447792	4.1153264

Point: P02

Type: BIAS

Samples: 56 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	-2.8114275	-1.9479629	-2.3938518	0.19115431
Y	-161.29978	-160.22761	-160.5846	0.2416561
Nal	7440	10800	9094.2861	784.37689
Pancake	780	2160	1363.9286	295.6022
Dose Rate	34.999298	55.2673	43.269375	4.659286

USRADS Analyze v1.50a Track Map

Site: TA15R44 (F)

Signal: NaI (cpm)

Time: 10:54:38 08/20/96

Threshold:
> 7200 •

USRADS Analyze v1.50a Track Map

Site: TA15R44 (F)

Signal: Pancake (cpm)

Time: 10:54:38 08/20/96

Threshold:

> 600 •

USRADS Analyze v1.50a Track Map

Site: TA15R44 (F)

Signal: Dose Rate (uR/h)

Time: 10:54:38 08/20/96

Threshold:

> 50 •

< 15
15 to 20
20 to 25
25 to 30

30 to 35
35 to 40
> 40

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R44 (FILE: TA15R44)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
2500 = Black
5000 = Green
7500 = Blue
10000 = Magenta
12500 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R44 (FILE: TA15R44)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R44 (FILE: TA15r44)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -57.24293 to 210.7518
Y -144.824 to 72.9573

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1200	15720	3452.572	967.8499
Pancake	0	1260	103.0658	95.89909
Dose Rate	6.2863	62.0233	18.74922	4.159435

Analysis Limits

X -57.24293 to 210.7518
Y -144.824 to 72.9573

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1200	15720	3452.572	967.8499
Pancake	0	1260	103.0658	95.89909
Dose Rate	6.2863	62.0233	18.74922	4.159435

Point: Q01

Type: QUALITY

Samples: 57 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	52.551933	53.159511	52.900134	0.14535007
Y	45.927716	46.872535	46.564002	0.19807393
Nal	2880	4500	3662.1052	392.94348
Pancake	0	420	114.73684	91.614594
Dose Rate	14.0557	25.540899	19.946459	2.6460149

Point: P01

Type: BIAS

Samples: 57 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	35.884917	36.389901	36.186453	0.12103685
Y	-31.238404	-30.721755	-30.920627	0.15446981
Nal	13500	19560	16049.474	1118.1781
Pancake	180	960	591.57892	182.2851
Dose Rate	40.741901	57.9697	50.668472	3.8153532

Point: P02

Type: BIAS

Samples: 56 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	108.90936	109.63598	109.37156	0.17921631
Y	-43.857863	-43.236142	-43.542384	0.12937796
Nal	2100	3840	2942.1428	376.34647
Pancake	900	3060	1721.7858	472.01324
Dose Rate	14.3935	27.9055	19.623367	2.5327892

Point: Q02

Type: QUALITY

Samples: 56 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	52.334509	54.127364	53.347309	0.40021491
Y	45.686851	47.458199	46.184082	0.31722802
Nal	2580	4740	3608.5715	463.82693
Pancake	0	300	129.64285	82.328934
Dose Rate	12.0289	23.8519	18.989994	2.5251365

USRADS v1.48j Track Map

Site: TA14R45 (A)

Signal: NaI (cpm)

Time: 16:31:56 08/21/96

Threshold:
> 5000 •

USRADS v1.48j Track Map

Site: TA14R45 (A)

Signal: Pancake (cpm)

Time: 16:31:56 08/21/96

Threshold:
> 300 •

USRADS v1.48j Track Map

Site: TA14R45 (A)

Signal: Dose Rate (uR/h)

Time: 16:31:56 08/21/96

Threshold:
> 27 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R45 (FILE: TA15R45)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R45 (FILE: TA15R45)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
300 = Black
600 = Green
900 = Blue
1200 = Magenta
1500 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R45 (FILE: TA15r45)
EXPOSURE RATE ($\mu\text{R/h}$)

LEGEND
($\mu\text{R/h}$)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -119.9177 to 179.2955
Y -91.04087 to 195.0895

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	2100	27480	4220.022	921.9052
Pancake	0	32100	230.8531	1535.533
Dose Rate	12.0289	8819.15	24.47934	130.9964

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	115.83201	116.88678	116.27967	0.31528993
Y	-65.249564	-64.732133	-65.008552	0.15225756
Nal	2580	4620	3532	438.46884
Pancake	0	300	108	82.519646
Dose Rate	13.7179	27.2299	19.967197	2.7803721

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-63.089184	-61.679604	-62.119791	0.29321794
Y	177.10403	178.23157	177.79395	0.26033267
Nal	7980	19560	14851	2209.7207
Pancake	19680	56160	39738	8642.9766
Dose Rate	20.136101	32.9725	25.704176	2.8401654

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	40.416777	41.369762	41.145883	0.20960748
Y	54.228098	55.589045	55.062114	0.34290203
Nal	2940	6900	4086	629.44519
Pancake	300	3000	762	372.87158
Dose Rate	14.3935	27.567699	21.628048	2.6853867

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	111.11629	112.37099	111.67981	0.33052435
Y	76.37196	77.194809	76.75635	0.19093855
Nal	79440	90300	84652	2550.1096
Pancake	180300	212460	195962	7863.2334
Dose Rate	29.932301	45.808899	37.842445	3.6053309

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	114.29497	118.09841	116.30878	0.93003855
Y	-66.356758	-64.65136	-65.562166	0.48840188
Nal	2340	4800	3581	505.20169
Pancake	0	360	127	89.125694
Dose Rate	13.7179	25.540899	19.747629	2.6171949

USRADS Analyze v1.50a Track Map

Site: R306MF ()

Signal: NaI (cpm)

Time: 09:59:50 08/21/96

Threshold:
> 6064 •

USRADS Analyze v1.50a Track Map

Site: R306MF ()

Signal: Pancake (cpm)

Time: 09:59:50 08/21/96

Threshold:
> 690 •

USRADS Analyze v1.50a Track Map

Site: R306MF ()

Signal: Dose Rate (uR/h)

Time: 09:59:50 08/21/96

Threshold:
> 30 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306 MANUAL (FILE: R306M)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
2000 = Black
4000 = Green
6000 = Blue
8000 = Magenta
10000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306 MANUAL (FILE: R306M)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
300 = Black
700 = Green
1000 = Blue
3000 = Magenta
7000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306 MANUAL SURVEY (FILE: R306M)
EXPOSURE RATE ($\mu\text{R/h}$)

LEGEND
($\mu\text{R/h}$)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -5.87085 to 138.4702
Y -87.30396 to 50.7535

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	14280	150.6197	367.329
cnv Nal	358	12060	3245.027	568.8755
Dose Rate	9.6643	26.5543	17.56951	2.471398

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	115.97227	116.54211	116.26093	0.14594323
Y	-63.253457	-62.615305	-62.944272	0.18115551
Left Nai	2040	4380	3310	485.45154
Right Nai	1740	3480	2635	372.0463
Gas Flow	1500	3240	2395	439.00473
Dose Rate	14.0557	24.865299	18.261309	2.5909183
Pancake	0	360	159	88.942947

Point: Q02

Type: QUALITY

Samples: 7 (7)

Point Statistics

	Low	High	Mean	Std Dev
X	114.67647	114.83705	114.77624	0.06081596
Y	-63.376299	-63.118911	-63.263792	0.10075557
Left Nai	3840	7200	5648.5713	1140.2269
Right Nai	2820	4680	3565.7144	646.08667
Gas Flow	0	0	0	0
Dose Rate	16.4203	21.8251	19.267471	1.8894302
Pancake	180	1200	600	346.41016

Point: Q03

Type: QUALITY

Samples: 57 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	114.08229	114.53127	114.27629	0.10919763
Y	-63.199219	-62.272063	-62.664794	0.24666685
Left Nai	2760	6360	4696.8423	977.30005
Right Nai	1980	3840	2865.2632	418.50415
Gas Flow	0	600	277.89474	167.27582
Dose Rate	12.7045	24.5275	18.174492	2.1022201
Pancake	0	420	152.63158	108.8007

Point: P01

Type: BIAS

Samples: 56 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	55.903663	56.424097	56.168015	0.12639835
Y	0.69779731	1.031987	0.86343106	0.10547238
Left Nai	3720	7320	5532.8569	870.73602
Right Nai	1560	3180	2301.4285	382.46741
Gas Flow	60	660	326.78571	129.91057
Dose Rate	14.3935	23.8519	18.923641	2.223758
Pancake	0	660	285	124.94363

USRADS v1.48j Track Map

Site: R306BF ()

Signal: Right Nal (cpm)

Time: 13:20:39 08/21/96

Threshold:
> 4300 •

USRADS Analyze v1.50a Track Map

Site: R306BG ()

Signal: cnv Nal (cpm)

Time: 13:20:39 08/21/96

Threshold:
> 4383 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: R306BG ()

Signal: Dose Rate (uR/h)

Time: 13:20:39 08/21/96

Threshold:

> 23 •

< 15
15 to 20
20 to 25
25 to 30

30 to 35
35 to 40
> 40

USRADS Analyze v1.50a Track Map

Site: R306BG ()

Signal: Pancake (cpm)

Time: 13:20:39 08/21/96

Threshold:
> 453 •

< 300
300 to 400
400 to 500
500 to 600

600 to 700
700 to 800
> 800

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306B (FILE: TA306B)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
1000 = Black
2000 = Green
3000 = Blue
4000 = Magenta
5000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306B SITE (FILE: R306B)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
375 = Black
750 = Green
1500 = Blue
3000 = Magenta
6000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306B SITE (FILE: R306B)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -119.7857 to 154.2
Y -208.3571 to 21.41558

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	7560	418.3668	471.0634
cnv Nal	1860	37500	5393.032	2463.085
Dose Rate	0.8815	16.7581	0.88458	0.2206093

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	17.007373	17.260121	17.133768	0.067085517
Y	-134.32364	-133.86317	-134.16569	0.10977086
Left Nai	2700	5040	3820	550.53308
Right Nai	2040	4500	2944	491.2854
Gas Flow	0	180	63	53.46629
Dose Rate	0.88150001	0.88150001	0.88150018	0
Pancake	0	420	183	87.977272

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	15.212636	15.851773	15.551443	0.14918215
Y	-134.2692	-133.80087	-133.98589	0.11482818
Left Nai	2700	4620	3758	476.28848
Right Nai	2040	4320	2987	447.78143
Gas Flow	0	60	2	10.86122
Dose Rate	0.88150001	0.88150001	0.88150018	0
Pancake	0	480	207	113.42585

Point: Q03

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	14.380438	15.064553	14.742	0.1761681
Y	-133.85425	-132.89169	-133.51925	0.18359691
Left Nai	3060	5400	4126	542.57141
Right Nai	2400	4440	3282	463.08383
Gas Flow	0	0	0	0
Dose Rate	0.88150001	0.88150001	0.88150018	0
Pancake	0	720	211	133.70471

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	12.806605	15.020078	13.842405	0.81022609
Y	-134.0414	-131.75601	-132.73761	0.75321546
Left Nai	3300	5100	4072	441.9335
Right Nai	2100	4080	3153	461.7796
Gas Flow	0	0	0	0
Dose Rate	14.3935	28.5811	21.684351	2.7033186
Pancake	0	540	259	120.24974

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	61.114143	61.991313	61.641576	0.20977453
Y	-190.19317	-189.20021	-189.63052	0.21812962
Left Nai	4260	6780	5259	611.85925
Right Nai	3480	6000	4520	443.88425
Gas Flow	0	0	0	0
Dose Rate	26.216499	39.7285	34.132278	3.2498574
Pancake	2580	6480	4512	875.61804

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	49.890924	50.646001	50.392459	0.16687323
Y	-128.79835	-127.40003	-127.97236	0.24619255
Left Nai	4620	7920	5910	699.83978
Right Nai	2580	5400	4149	531.26062
Gas Flow	0	0	0	0
Dose Rate	20.136101	33.310299	26.976551	3.0605211
Pancake	120	900	463	192.63824

USRADS Analyze v1.50a Track Map

Site: PHMXAG ()

Signal: cnv Nal (cpm)

Time: 13:19:43 08/19/96

Threshold:
> 5500 •

USRADS Analyze v1.50a Track Map

Site: PHMXAG ()

Signal: Pancake (cpm)

Time: 13:19:43 08/19/96

Threshold:
> 500 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 PHERMEX A (FILE: PHMXA)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
1875 = Black
3750 = Green
7500 = Blue
15000 = Magenta
30000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 PHERMEX A (FILE: PHMXA)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
375 = Black
750 = Green
1250 = Blue
2500 = Magenta
5000 = Red

Analysis Limits

X 0 to 186.5679
Y -321.3568 to 121.9923

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1260	13380	4179.625	1104.291
Pancake	0	13320	190.3236	379.0545
Dose Rate	9.3265	48.5113	22.33891	4.648045

USRADS Analyze v1.50a Track Map

Site: PHMXBF ()

Signal: NaI (cpm)

Time: 16:55:53 08/19/96

Threshold:
> 5500 •

USRADS Analyze v1.50a Track Map

Site: PHMXBF ()

Signal: Pancake (cpm)

Time: 16:55:53 08/19/96

Threshold:
> 500 •

USRADS Analyze v1.50a Track Map

Site: PHMXBF ()

Signal: Dose Rate (uR/h)

Time: 16:55:53 08/19/96

Threshold:

> 30 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 PHERMEX B (FILE: PHMXB)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 PHERMEX B (FILE: PHMXB)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA15 R306B SITE (FILE: R306B)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X	-12.84 to	153.58
Y	-133.97 to	116.05

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1500	241140	4878.685	7405.634
Pancake	0	19800	314.2747	1118.173
Dose Rate	7.2997	308.9551	24.18895	14.20527

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	84.890861	85.98376	85.729025	0.19829617
Y	-129.75313	-129.08556	-129.52038	0.13324317
Nal	2220	4680	3425	447.94553
Pancake	0	360	127	88.438431
Dose Rate	11.3533	23.1763	18.182487	2.3313196

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	85.901031	86.795287	86.297902	0.31900146
Y	-130.02645	-129.01491	-129.57073	0.22352343
Nal	2400	4200	3221	396.22491
Pancake	0	300	120	82.667397
Dose Rate	12.7045	22.162901	18.31761	2.4423232

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	53.037489	53.224316	53.148043	0.045363121
Y	-12.858542	-11.945901	-12.465397	0.14823683
Nal	16080	25500	19714	2186.2729
Pancake	8160	90240	65710	22025.541
Dose Rate	68.779297	90.060699	81.210327	4.9486771

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	33.401189	34.189579	33.678276	0.16630996
Y	17.170905	17.640018	17.429489	0.11522742
Nal	170760	274680	218425	25443.316
Pancake	16920	91860	43892	16948.541
Dose Rate	132.28571	171.8083	151.33197	7.5770059

USRADS Analyze v1.50a Track Map

Site: TA36I (F)

Signal: NaI (cpm)

Time: 14:13:19 08/22/96

Threshold:

> 5000 •

USRADS Analyze v1.50a Track Map

Site: TA361 (F)

Signal: Pancake (cpm)

Time: 14:13:19 08/22/96

Threshold:
> 300 •

USRADS Analyze v1.50a Track Map

Site: TA36I (F)

Signal: Dose Rate (uR/h)

Time: 14:13:19 08/22/96

Threshold:

> 24 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 I (FILE: TA36I)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 I (FILE: TA36I)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 I (FILE: TA36I)
EXPOSURE RATE (uR/h)

Analysis Limits

X	-12.2 to	112.86
Y	-95.82 to	48.61

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1680	6180	3327.077	598.9644
Pancake	0	540	91.53846	76.85982
Dose Rate	10.0021	32.6347	18.23542	3.114205

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	40.808131	43.20801	41.886967	0.59166808
Y	31.027305	33.802482	32.298827	0.51155915
Nal	1800	3960	3120	416.71387
Pancake	0	360	103	87.047623
Dose Rate	13.7179	25.2031	18.75112	2.468787

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	9.5325317	41.432525	25.544953	14.179321
Y	-53.092803	-32.559525	-43.342701	8.5507272
Nal	2340	4260	3124	478.1955
Pancake	0	420	111	91.645966
Dose Rate	14.0557	23.514099	18.931284	1.8640659

Point: Q03

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	39.686383	40.624284	40.077242	0.23965333
Y	33.166226	34.095466	33.609441	0.1959153
Nal	2100	4320	3228	421.92264
Pancake	0	360	115	78.340843
Dose Rate	16.4203	24.5275	19.927786	2.229589

USRADS Analyze v1.50a Track Map

Site: TA36J (F)

Signal: NaI (cpm)

Time: 09:27:05 08/22/96

Threshold:
> 4525 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: TA36J (F)

Signal: Pancake (cpm)

Time: 09:27:05 08/22/96

Threshold:

> 273 •

USRADS Analyze v1.50a Track Map

Site: TA36J (F)

Signal: Dose Rate (uR/h)

Time: 09:27:05 08/22/96

Threshold:

> 24 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 J (FILE: TA36J)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 J (FILE: TA36J)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 J (FILE: TA36J)
EXPOSURE RATE (uR/h)

Analysis Limits

X -34.76842 to 107.0675
Y -11.12245 to 169.5434

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1140	5220	3133.081	574.301
Pancake	0	600	93.44586	77.79794
Dose Rate	0.8815	27.2299	11.4342	7.853324

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	86.963787	87.482164	87.245464	0.13875995
Y	-0.29686001	0.49822494	0.03810418	0.19342083
Nal	1980	3960	2968	428.33347
Pancake	0	300	102	77.564621
Dose Rate	11.6911	23.1763	17.467478	2.5791497

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	86.517635	86.790284	86.634304	0.075813485
Y	0.78654762	1.1438462	0.94010059	0.081958293
Nal	2100	3780	2867	369.87509
Pancake	0	240	78	65.633804
Dose Rate	11.6911	22.162901	16.898855	2.2666595

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	82.727726	82.987884	82.860708	0.06006921
Y	91.931659	92.246202	92.102652	0.076505059
Nal	4080	6660	5059	674.17407
Pancake	60	840	467	151.50432
Dose Rate	14.0557	24.865299	19.719477	2.7488141

USRADS Analyze v1.50a Track Map

Site: EENIE (F)

Signal: NaI (cpm)

Time: 09:28:39 08/23/96

Threshold:

> 4300 •

USRADS Analyze v1.50a Track Map

Site: EENIE (F)

Signal: Pancake (cpm)

Time: 09:28:39 08/23/96

Threshold:
> 280 •

USRADS Analyze v1.50a Track Map

Site: EENIE (F)

Signal: Dose Rate (uR/h)

Time: 09:28:39 08/23/96

Threshold:
> 23 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 EENIE (FILE: EENIE)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 EENIE (FILE: EENIE)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 ENNIE (FILE: ENNIE)
EXPOSURE RATE ($\mu\text{R/h}$)

Analysis Limits

X -15.39268 to 204.2016
Y -226.8703 to 134.6616

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1860	18300	4241.647	1330.097
Pancake	0	55860	199.2357	817.3817
Dose Rate	7.2997	53.9161	22.47851	5.371283

Point: Q01

Type: QUALITY

Samples: 60 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	153.64509	157.23408	155.10376	0.76345285
Y	45.950807	48.348078	46.678525	0.43963278
Nal	2640	4920	3800	468.75992
Pancake	0	360	137	91.15641
Dose Rate	17.0959	26.216499	21.222689	2.25369

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	152.093	155.36692	153.52458	0.60854209
Y	44.688941	47.818055	46.111101	0.58830358
Nal	2940	4800	3839	424.18289
Pancake	0	360	139	79.269974
Dose Rate	15.4069	25.540899	21.583004	2.1383476

Point: Q03

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	151.98657	152.71991	152.40228	0.14161398
Y	42.540413	43.557687	42.821108	0.17698114
Nal	2520	5400	3880	561.18036
Pancake	0	420	124	92.336891
Dose Rate	16.0825	29.932301	21.740652	2.7790561

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	124.09013	124.85706	124.38721	0.14534344
Y	-18.24459	-17.684914	-18.018841	0.13107035
Nal	7740	11700	9591	705.17621
Pancake	7620	10680	8985	710.93042
Dose Rate	26.892099	44.1199	36.018337	3.7032218

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	78.064099	79.038404	78.595063	0.25196061
Y	36.242838	37.222756	36.748548	0.1943318
Nal	5580	8880	7335	652.67114
Pancake	420	1620	947	270.38766
Dose Rate	38.039501	54.253899	45.200867	3.8783987

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	46.62242	48.172316	47.577564	0.26486482
Y	102.08675	103.98246	102.84354	0.35029021
Nal	35220	115140	68997	18088.535
Pancake	16500	75420	43516	16143.506
Dose Rate	43.444302	78.9133	61.899433	6.7109866

USRADS Analyze v1.50a Track Map

Site: MEENIE (F)

Signal: Nal (cpm)

Time: 09:08:15 08/26/96

Threshold:

> 6902 •

USRADS Analyze v1.50a Track Map

MEENIE (F)

Signal: Pancake (cpm)

Time: 09:08:15 08/26/96

Threshold:
> 597 •

USRADS Analyze v1.50a Track Map

Site: MEENIE (F)

Signal: Dose Rate (uR/h)

Time: 09:08:15 08/26/96

Threshold:

> 33 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 MEENIE (FILE: MEENIE)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 MEENIE (FILE: MEENIE)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 MEENIE (FILE: MEENIE)
EXPOSURE RATE ($\mu\text{R/h}$)

Analysis Limits

X -39.46951 to 147.6395
Y -89.74386 to 44.35137

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1680	21720	4016.856	1056.532
Pancake	0	4740	163.9347	163.4993
Dose Rate	10.0021	42.7687	21.67965	4.371699

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	89.857655	92.45432	90.652721	0.47500214
Y	43.187721	44.249736	43.701106	0.23723221
Nal	3840	7560	5622	706.1554
Pancake	60	720	226	140.3289
Dose Rate	19.7983	36.350498	29.476263	3.3091204

Point: Q02

Type: QUALITY

Samples: 7 (0)

Point Statistics

	Low	High	Mean	Std Dev
X	0	0	0	0
Y	0	0	0	0
Nal	6000	7200	6531.4287	572.81061
Pancake	1320	1860	1688.5714	187.92108
Dose Rate	28.243299	33.310299	30.2701	1.7113953

USRADS Analyze v1.50a Track Map

Site: MINIE (F)

Signal: NaI (cpm)

Time: 13:50:02 08/26/96

Threshold:

> 6131 •

USRADS Analyze v1.50a Track Map

Site: MINIE (F)

Signal: Pancake (cpm)

Time: 13:50:02 08/26/96

Threshold:

> 492 •

USRADS Analyze v1.50a Track Map

Site: MINIE (F)

Signal: Dose Rate (uR/h)

Time: 13:50:02 08/26/96

Threshold:
> 31 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 MINIE (FILE: MINIE)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 MINIE (FILE: MINIE)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
500 = Black
1000 = Green
1500 = Blue
2000 = Magenta
3000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 MINIE (FILE: MINIE)
EXPOSURE RATE (uR/h)

Analysis Limits

X -93.61517 to 175.8821

Y -128.0051 to 74.41252

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1020	45780	3264.752	1723.388
Pancake	0	1680	97.283	87.76196
Dose Rate	7.2997	281.9311	18.0819	10.36116

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-3.4523153	-1.5382117	-2.1114791	0.3420716
Y	-2.1725838	-0.79847739	-1.4950672	0.24511406
Nal	2520	4800	3319	494.70581
Pancake	0	360	107	86.343819
Dose Rate	14.3935	23.514099	18.722971	2.0678699

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-1.0418478	0.39519432	-0.17250913	0.26876078
Y	-1.5412447	0.33349373	-0.80820896	0.38264915
Nal	2280	4440	3326	443.85126
Pancake	0	360	127	84.918709
Dose Rate	12.7045	24.865299	18.27257	2.3191683

Point: P01

Type: BIAS

Samples: 60 (58)

Point Statistics

	Low	High	Mean	Std Dev
X	-1.1534247	1.9875876	0.16083876	0.60583733
Y	-49.440552	-46.468903	-48.150562	0.68797191
Nal	3540	8760	5488	1301.2573
Pancake	0	5700	2441	1609.6082
Dose Rate	15.0691	27.9055	19.995354	2.5713017

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-1.5022297	-0.12027337	-0.43848999	0.28603387
Y	-49.136038	-46.209265	-47.256911	0.64898163
Nal	5760	8400	7031	611.33075
Pancake	3780	6360	4900	513.13013
Dose Rate	15.0691	27.9055	20.006609	2.6809142

USRADS Analyze v1.50a Track Map

Site: HVYMTL (F)

Signal: NaI (cpm)

Time: 09:28:35 08/27/96

Threshold:
> 5000 •

USRADS Analyze v1.50a Track Map

Site: HVYMTL (F)

Signal: Pancake (cpm)

Time: 09:28:35 08/27/96

Threshold:

> 292 •

USRADS Analyze v1.50a Track Map

Site: HVYMTL (F)

Signal: Dose Rate (uR/h)

Time: 09:28:35 08/27/96

Threshold:

> 25 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 HEAVY METAL (FILE: HVYMTL)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
1000 = Black
2000 = Green
5000 = Blue
10000 = Magenta
20000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 HEAVY METAL (FILE: HVYMTL)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 HEAVY METAL (FILE: HVYMTL)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
25 = Black
50 = Green
75 = Blue
100 = Magenta
125 = Red

Analysis Limits

X -1.610799 to 102.5859
Y -27.19812 to 137.6615

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nai	1500	44760	3965.463	1498.954
Pancake	0	2220	120.1242	111.8339
Dose Rate	10.6777	46.8223	21.42597	3.915933

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	53.021932	54.337696	53.649446	0.35476446
Y	37.306552	38.618755	37.935874	0.24903679
Nal	2520	5100	3761	477.89142
Pancake	0	360	122	89.72274
Dose Rate	15.0691	26.892099	21.070681	2.501992

Point: Q02

Type: QUALITY

Samples: 60 (49)

Point Statistics

	Low	High	Mean	Std Dev
X	40.491796	54.486776	53.051175	2.6761568
Y	27.126765	38.72304	37.439975	2.4753228
Nal	2880	4920	3829	497.90231
Pancake	0	240	113	76.608185
Dose Rate	15.7447	26.892099	21.211428	2.4897034

Point: Q03

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	53.300989	55.020194	54.050183	0.34716965
Y	38.072331	38.943897	38.546714	0.19943873
Nal	2580	4980	3656	488.54431
Pancake	0	420	109	90.753906
Dose Rate	12.7045	27.2299	20.772287	2.9723969

Point: P01

Type: BIAS

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	32.261903	34.727227	33.868682	0.58559701
Y	-21.304515	-19.211646	-19.467448	0.28139049
Nal	15360	25020	19772	2516.3396
Pancake	5280	11220	7725	1306.6031
Dose Rate	19.7983	31.959101	25.163694	2.7109859

Point: P02**Type: BIAS****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	14.955062	16.34021	15.93781	0.24701075
Y	45.836859	46.486577	46.191882	0.14674341
Nal	86340	97980	91478	2494.9568
Pancake	180	1020	435	167.03293
Dose Rate	30.2701	44.457699	37.864979	3.301178

Point: P03**Type: BIAS****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	21.744152	22.830367	22.399107	0.24265224
Y	35.359236	36.489226	36.012457	0.31728576
Nal	4320	6420	5377	527.02325
Pancake	0	420	152	91.407082
Dose Rate	20.136101	36.350498	28.299595	3.8046424

Point: P04

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	36.889028	38.900259	37.744162	0.5136064
Y	52.115416	53.229149	52.512141	0.22317434
Nal	5220	7680	6591	532.41095
Pancake	6240	9660	7681	814.66156
Dose Rate	17.433701	27.2299	21.335289	2.3299274

USRADS Analyze v1.50a Track Map

Site: LOLOSLO (F)

Signal: NaI (cpm)

Time: 15:25:43 08/27/96

Threshold:
> 6963 •

USRADS Analyze v1.50a Track Map

Site: LOLOSLO (F)

Signal: Pancake (cpm)

Time: 15:25:43 08/27/96

Threshold:
> 360 •

USRADS Analyze v1.50a Track Map

Site: LOLOSLO (F)

Signal: Dose Rate (uR/h)

Time: 15:25:43 08/27/96

Threshold:

> 28 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER LOWER SLOBOVIA (FILE: LOLOSLO)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER LOWER SLOBOVIA (FILE: LOLOSLO)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER LOWER SLOBOVIA (FILE: LOLOSLO)
EXPOSURE RATE (uR/h)

Analysis Limits

X -14.50642 to 152.2692
Y -68.41824 to 89.84566

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	60	11460	4002.361	795.2173
Pancake	0	1560	126.4777	106.3573
Dose Rate	0.8815	45.4711	21.46291	3.790445

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	28.653681	30.140536	29.648718	0.23300733
Y	60.34792	62.259575	61.088405	0.39682957
Nal	2820	4920	3759	466.30289
Pancake	0	300	119	80.036011
Dose Rate	15.4069	27.567699	20.580866	2.4819596

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	28.668865	30.024367	29.4727	0.25969103
Y	59.965363	61.558335	60.550167	0.4302957
Nal	2520	4920	3760	468.11038
Pancake	0	360	129	91.645966
Dose Rate	15.0691	27.9055	20.963707	2.2548501

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	79.086827	80.629697	80.048392	0.34980719
Y	4.3446367	5.1188965	4.7469148	0.16844128
Nal	10740	21180	13818	1995.3792
Pancake	1260	14760	6617	3057.9771
Dose Rate	21.1495	35.337101	28.637398	3.1066942

Point: P02

Type: BIAS

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	101.24085	103.19057	102.17398	0.46472937
Y	32.694595	34.055831	33.29037	0.25560808
Nal	5820	9240	7489	645.60596
Pancake	0	720	279	146.48074
Dose Rate	21.8251	37.363899	29.493155	3.1198792

Point: P03

Type: BIAS

Samples: 60 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	101.23205	103.04054	101.80232	0.36966702
Y	33.182168	35.281512	33.800322	0.33344811
Nal	6060	8880	7475	628.53461
Pancake	1560	3960	2995	504.45178
Dose Rate	17.7715	148.50011	31.092083	15.829247

USRADS Analyze v1.50a Track Map

Site: LOSLOB (F)

Signal: NaI (cpm)

Time: 13:26:26 08/27/96

Threshold:
> 5592 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: LOSLOB (F)

Signal: Pancake (cpm)

Time: 13:26:26 08/27/96

Threshold:
> 380 •

< 300
300 to 400
400 to 500
500 to 600

600 to 700
700 to 800
> 800

USRADS Analyze v1.50a Track Map

Site: LOSLOB (F)

Signal: Dose Rate (uR/h)

Time: 13:26:26 08/27/96

Threshold:

> 29 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER SLOBOVIA (FILE: LOSLOB)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
2000 = Black
4000 = Green
6000 = Blue
8000 = Magenta
10000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER SLOBOVIA (FILE: LOSLOB)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
250 = Black
500 = Green
750 = Blue
1000 = Magenta
1250 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER SLOBOVIA (FILE: LOSLOB)
EXPOSURE RATE ($\mu\text{R/h}$)

Analysis Limits

X -24.16578 to 90.80097
Y -21.08636 to 79.0748

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	2520	23220	4715.199	1362.814
Pancake	0	6000	202.5907	378.6773
Dose Rate	14.7313	43.7821	24.61189	3.57862

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	67.626129	68.315544	68.015352	0.11731602
Y	-0.8542046	-0.41050902	-0.65842779	0.095373618
Nal	3240	5520	4416	546.6972
Pancake	0	300	106	68.425385
Dose Rate	17.7715	30.607901	23.559139	2.8210557

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	67.958086	69.878019	69.115481	0.31949125
Y	-1.45406	-0.97324733	-1.2749601	0.086318957
Nal	3300	5400	4400	486.64328
Pancake	0	240	87	58.896633
Dose Rate	16.758101	31.283501	23.671741	3.0477855

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	58.690347	60.052479	59.144723	0.25367105
Y	32.938993	33.809642	33.224653	0.2240157
Nal	3060	5220	4274	521.81897
Pancake	0	480	177	90.709068
Dose Rate	17.433701	28.5811	23.114372	2.6020803

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	51.020624	51.623472	51.366072	0.14918906
Y	58.188377	59.101096	58.654878	0.15068556
Nal	3300	5220	4285	440.94199
Pancake	0	360	107	84.918709
Dose Rate	17.433701	30.9457	23.936348	3.2457905

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	16.926446	19.381292	18.545076	0.45628632
Y	57.065656	58.471748	57.679534	0.36181348
Nal	4260	6660	5335	516.04755
Pancake	60	600	284	115.79058
Dose Rate	21.1495	35.337101	26.559927	3.0975597

Point: P04

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	14.790507	15.555993	15.086311	0.1417768
Y	56.161547	57.077941	56.644647	0.21351228
Nal	4620	7320	6058	595.70441
Pancake	10200	16680	13667	1680.8483
Dose Rate	21.487301	34.661499	27.20175	2.6064212

Point: P05

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	0.40242858	1.2061716	1.0063666	0.13709933
Y	30.308989	31.354119	30.987462	0.27430118
Nal	12360	17820	15091	1209.108
Pancake	3420	7020	4917	704.35278
Dose Rate	30.9457	45.4711	38.399822	3.5796771

USRADS Analyze v1.50a Track Map

Site: SLOBURN (F)

Signal: NaI (cpm)

Time: 17:02:46 08/27/96

Threshold:

> 5500 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: SLOBURN (F)

Signal: Pancake (cpm)

Time: 17:02:46 08/27/96

Threshold:

> 500 •

USRADS Analyze v1.50a Track Map

Site: SLOBURN (F)

Signal: Dose Rate (uR/h)

Time: 17:02:46 08/27/96

Threshold:

> 29 •

< 15
15 to 20
20 to 25
25 to 30

30 to 35
35 to 40
> 40

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER SLOBOVIA BURN AREA (FILE: SLOBURN)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
4000 = Black
7000 = Green
10000 = Blue
13000 = Magenta
16000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER SLOBOVIA BURN AREA (FILE: SLOBURN)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
500 = Black
1000 = Green
1500 = Blue
2000 = Magenta
2500 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA36 LOWER SLOBOVIA BURN AREA (FILE: SLOBURN)
EXPOSURE RATE ($\mu\text{R/h}$)

LEGEND
($\mu\text{R/h}$)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -8.859285 to 66.92126
Y -55.59523 to 59.06317

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1920	6600	4085.197	669.2792
Pancake	0	780	102.4526	82.94377
Dose Rate	12.7045	33.6481	22.58304	3.358467

Analysis Limits

X -8.859285 to 66.92126
Y -55.59523 to 59.06317

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	1920	6600	4085.197	669.2792
Pancake	0	780	102.4526	82.94377
Dose Rate	12.7045	33.6481	22.58304	3.358467

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	23.413191	23.69476	23.541298	0.077839992
Y	-9.9412572	-9.54898	-9.7987279	0.10352416
Nal	2640	5280	4059	511.48279
Pancake	0	480	99	84.003632
Dose Rate	16.0825	28.5811	22.489439	2.856842

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	22.726922	23.471496	22.914559	0.19283752
Y	-8.9784922	-8.6004723	-8.7225514	0.10122309
Nal	2940	4920	4000	450.71094
Pancake	0	300	104	81.077492
Dose Rate	17.433701	28.243299	22.472546	2.8319421

Point: P01

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	21.165714	22.207201	21.789308	0.29727674
Y	-34.550143	-33.01658	-33.661777	0.40405118
Nal	4200	6360	5282	545.22095
Pancake	6180	10440	8679	962.08588
Dose Rate	17.433701	29.932301	23.632328	2.6216433

USRADS Analyze v1.50a Track Map

Site: TA39C6 (F)

Signal: NaI (cpm)

Time: 15:18:20 08/29/96

Threshold:

> 5423 •

USRADS Analyze v1.50a Track Map

Site: TA39C6 (F)

Signal: Pancake (cpm)

Time: 15:18:20 08/29/96

Threshold:
> 306 •

USRADS Analyze v1.50a Track Map

Site: TA39C6 (F)

Signal: Dose Rate (uR/h)

Time: 15:18:20 08/29/96

Threshold:

> 29 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 6 (FILE: TA39S6)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 6 (FILE: TA39S6)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 6 (FILE: TA38S6)
EXPOSURE RATE (uR/h)

Analysis Limits

X -64.51766 to 87.78167
Y -91.70342 to 62.35501

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nai	60	28140	5933.882	1228.105
Pancake	0	15120	193.0789	361.9397
Dose Rate	0.8815	61.0099	32.20695	5.073796

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	79.514496	79.801477	79.654365	0.074647321
Y	-0.34965139	0.0056008607	-0.18935149	0.075183672
Nal	4200	6840	5449	556.35425
Pancake	0	600	196	116.31634
Dose Rate	22.838499	37.363899	31.114594	3.0332506

Point: Q02

Type: QUALITY

Samples: 60 (58)

Point Statistics

	Low	High	Mean	Std Dev
X	75.884102	77.340122	76.196606	0.24936003
Y	1.3212438	2.0780832	1.6580344	0.16901546
Nal	3660	7140	5628	645.06134
Pancake	0	480	173	104.85341
Dose Rate	18.4471	39.052898	30.585377	3.7937944

Point: P01

Type: BIAS

Samples: 60 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	45.010101	45.690635	45.293377	0.14209842
Y	20.712373	21.339478	21.075243	0.13686164
Nal	3960	15960	12563	2350.292
Pancake	0	4080	2761	843.22418
Dose Rate	19.1227	39.390701	31.058306	3.9928184

Point: P02

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	31.167872	33.258492	31.368263	0.26096139
Y	16.027533	16.871852	16.647397	0.12052787
Nal	3480	81480	75255	9729.3984
Pancake	60	184980	172885	23084.455
Dose Rate	23.1763	55.2673	45.848293	4.8429656

Point: P03

Type: BIAS

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	11.077708	11.449028	11.275234	0.096468175
Y	-2.1798528	-0.99584649	-1.2885812	0.25270532
Nal	3480	40740	36796	4638.3481
Pancake	120	51300	46849	6345.0059
Dose Rate	25.540899	48.849098	37.758007	4.0497928

Point: P04

Type: BIAS

Samples: 60 (0)

Point Statistics

	Low	High	Mean	Std Dev
X	0	0	0	0
Y	0	0	0	0
Nal	4380	18420	15458	3080.7166
Pancake	0	18900	14380	4673.3467
Dose Rate	22.162901	42.7687	33.997158	3.9692442

Point: P05

Type: BIAS

Samples: 60 (58)

Point Statistics

	Low	High	Mean	Std Dev
X	-8.5330471	-8.161161	-8.3749223	0.097376299
Y	15.131986	15.661342	15.300601	0.102666
Nal	4140	13020	10703	1424.3762
Pancake	0	13620	11203	2267.9783
Dose Rate	20.811701	50.200298	39.959339	5.0270457

Point: P06

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-11.200981	-10.674558	-10.908828	0.13758978
Y	19.146039	19.869279	19.402724	0.14503301
Nal	11160	16380	13610	1024.5676
Pancake	20640	29880	25795	1755.1663
Dose Rate	29.256701	47.160099	36.654518	3.9397609

Point: Q03

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	75.650852	76.745058	76.27942	0.25041376
Y	1.0751754	2.3226558	1.6277864	0.33627408
Nal	4080	6840	5475	615.41595
Pancake	0	420	155	102.61827
Dose Rate	24.5275	37.701698	30.754276	3.3064785

Point: P07

Type: BIAS

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	-13.83952	-10.945649	-12.234705	0.68132704
Y	-17.120429	-15.673316	-16.332217	0.34455772
Nal	5580	8280	6887	573.27417
Pancake	420	1860	1301	303.63715
Dose Rate	25.2031	40.404099	33.090721	3.326611

Point: P08

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-3.1675138	0.60784422	-1.5825123	0.73238817
Y	-41.06087	-39.703784	-40.23064	0.28351034
Nal	4320	7200	5609	578.40179
Pancake	240	1440	821	246.64323
Dose Rate	19.1227	40.066299	31.536856	3.6634071

Point: P09

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-9.6341393	-7.088424	-8.2926627	0.32773466
Y	-17.648267	-16.598884	-17.16534	0.16886954
Nal	6540	9180	7840	711.87885
Pancake	1860	6180	3545	1202.8048
Dose Rate	29.256701	45.4711	36.772751	3.4564865

Point: P10

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	3.2373702	7.3427857	5.0268272	0.67942005
Y	-41.836915	-40.464698	-41.235777	0.22128477
Nal	3720	6120	5095	525.07458
Pancake	240	1320	599	212.63242
Dose Rate	21.1495	33.985901	26.740093	2.583369

Point: P11

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	5.3897302	9.4451062	6.9719747	0.64134318
Y	-42.981627	-41.183626	-41.932592	0.47495679
Nal	3900	6540	5184	587.16486
Pancake	0	480	152	100.31814
Dose Rate	23.1763	38.039501	28.671179	2.8323102

Point: P12

Type: BIAS

Samples: 60 (58)

Point Statistics

	Low	High	Mean	Std Dev
X	-15.932564	-12.115026	-14.298772	0.82684837
Y	-65.770033	-64.116305	-64.673958	0.33526782
Nal	5100	3.1449035e+5	5.2415734e+4	4.060052e+009
Pancake	1440	229920	6109	29386.338
Dose Rate	27.9055	3567042.5	59485.293	460498.69

Point: P13

Type: BIAS

Samples: 60 (50)

Point Statistics

	Low	High	Mean	Std Dev
X	-26.901274	-22.914757	-24.642646	0.95805402
Y	-60.835122	-57.819787	-59.490968	0.64588617
Nal	17400	31140	23241	3721.3301
Pancake	3060	32820	13169	8589.709
Dose Rate	32.634701	46.146702	38.872746	3.1377707

Point: P14

Type: BIAS

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	-33.386417	-29.638944	-31.471936	0.80265104
Y	-55.691712	-54.027191	-54.735893	0.31705618
Nal	42000	52500	47063	2103.9478
Pancake	30840	42480	36076	2898.1067
Dose Rate	30.607901	48.511299	37.729855	4.0398245

USRADS Analyze v1.50a Track Map

Site: TA39S8 (F)

Signal: NaI (cpm)

Time: 09:52:41 08/28/96

Threshold:
> 7300 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 8 (FILE: TA39S8)
NaI COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 8 (FILE: TA39S8)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 8 (FILE: TA39S8)
EXPOSURE RATE ($\mu\text{R/h}$)

Analysis Limits

X -26.84595 to 179.0996
Y -20.70061 to 67.6366

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	3000	37440	6301.383	2265.111
Pancake	0	4980	155.5159	228.2407
Dose Rate	18.1093	80.2645	33.55199	7.098319

Point: Q01**Type: QUALITY****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	171.7172	174.0007	172.31903	0.36548479
Y	-14.243243	-12.313015	-13.602414	0.37129253
Nal	3180	5580	4546	521.11798
Pancake	0	300	113	74.998306
Dose Rate	18.109301	30.9457	24.955379	2.9487255

Point: Q02**Type: QUALITY****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	169.76288	172.28806	170.58408	0.57592194
Y	-15.03413	-12.323568	-13.516615	0.45686639
Nal	2940	5580	4472	490.98392
Pancake	0	360	119	88.023499
Dose Rate	17.433701	35.337101	25.191839	3.3091404

Point: P01**Type: BIAS****Samples: 60 (33)****Point Statistics**

	Low	High	Mean	Std Dev
X	-23.484798	-19.208921	-21.362735	0.94389866
Y	-9.5763579	-4.9743306	-6.883679	1.4579263
Nal	83400	94440	88931	2162.1091
Pancake	8580	11280	9582	691.93982
Dose Rate	58.983101	82.291298	71.588676	5.4297323

Point: P02**Type: BIAS****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	29.622923	31.517687	31.086239	0.31637308
Y	25.47387	26.930967	26.0127	0.3355619
Nal	6300	9060	7651	625.34406
Pancake	780	5940	3714	1159.9574
Dose Rate	33.985901	49.862499	41.242962	3.6913133

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	29.776395	32.284606	31.633669	0.42030778
Y	26.9509	28.320362	27.564915	0.2612151
Nal	6960	10200	8472	648.55304
Pancake	1620	3540	2386	398.04813
Dose Rate	31.6213	47.497898	40.730644	3.4075642

Point: P04

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	34.991796	35.903767	35.451857	0.17217184
Y	30.129039	30.872218	30.542754	0.1562089
Nal	6000	8340	7205	601.85297
Pancake	7500	10980	9521	900.60797
Dose Rate	30.2701	49.186901	39.559597	3.4345615

Point: P05

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	40.757756	42.873422	42.351516	0.38997737
Y	31.705409	33.048872	32.275045	0.18852687
Nal	5940	8820	7311	690.38611
Pancake	8940	17640	13497	2247.4761
Dose Rate	27.2299	50.200298	38.090172	4.384901

USRADS Analyze v1.50a Track Map

Site: TA39S56 (F)

Signal: NaI (cpm)

Time: 13:04:13 08/29/96

Threshold:

> 7000 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: TA39S56 (F)

Signal: Pancake (cpm)

Time: 13:04:13 08/29/96

Threshold:

> 500 •

USRADS Analyze v1.50a Track Map

Site: TA39S56 (F)

Signal: Dose Rate (uR/h)

Time: 13:04:13 08/29/96

Threshold:

> 40 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 56 (FILE: TA39S56)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
3000 = Black
5000 = Green
7000 = Blue
10000 = Magenta
30000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 56 (FILE: TA39S56)
PANCAKE COUNT RATE (cpm)

LEGEND

(cpm)

300 = Black

400 = Green

500 = Blue

600 = Magenta

700 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 56 (FILE: TA38S56)
EXPOSURE RATE ($\mu\text{R/h}$)

LEGEND
($\mu\text{R/h}$)
20 = Black
30 = Green
40 = Blue
50 = Magenta
60 = Red

Analysis Limits

X -3033.398 to 5404.048

Y -564.0981 to 1078.014

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	60	21120	6044.112	1331.39
Pancake	0	11640	215.2318	339.2266
Dose Rate	0.8815	368.0701	32.50768	7.261952

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	101.25907	103.40338	102.2383	0.51750576
Y	-80.337487	-78.304235	-79.374441	0.48402991
Nal	5340	7920	6478	600.49969
Pancake	0	420	155	100.81869
Dose Rate	27.2299	42.093102	35.36525	2.9666669

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	98.815592	101.59822	99.685006	0.67286512
Y	-81.519325	-78.754904	-79.59746	0.61658179
Nal	5160	7740	6624	642.34821
Pancake	0	420	160	97.979591
Dose Rate	24.865299	43.444302	35.522884	3.817975

Point: P01

Type: BIAS

Samples: 60 (56)

Point Statistics

	Low	High	Mean	Std Dev
X	140.16623	142.71026	141.7264	0.51988612
Y	1.1256956	5.5213462	3.5139925	1.0280073
Nal	5280	7800	6650	551.58813
Pancake	1200	2700	2011	351.16116
Dose Rate	25.540899	43.782101	35.995808	3.8205059

Point: P02

Type: BIAS

Samples: 60 (49)

Point Statistics

	Low	High	Mean	Std Dev
X	141.37222	144.75307	142.67354	0.65113431
Y	19.930438	24.147207	22.386192	1.2025757
Nal	4860	8100	6692	650.40021
Pancake	480	1620	1020	251.90797
Dose Rate	28.9189	45.808899	36.446209	4.0921102

Point: P03

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	107.91235	109.52693	108.70887	0.40173087
Y	87.081943	88.487086	87.784468	0.31608883
Nal	5640	8580	6792	648.27197
Pancake	1380	3180	2199	392.09824
Dose Rate	29.256701	40.066299	33.923965	2.4819796

Point: P04

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	76.772583	78.606441	77.188722	0.285207
Y	12.058797	13.437426	12.671777	0.28265597
Nal	9300	12840	11150	858.13959
Pancake	2400	5580	3943	615.66443
Dose Rate	38.3773	58.645302	50.932201	4.6107774

Point: P05**Type: BIAS****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	3.1572463	4.8367611	3.9637745	0.41783436
Y	15.338812	16.854545	16.09288	0.31332028
Nal	120	9060	7506	1176.0983
Pancake	480	7800	6128	960.5354
Dose Rate	0.88150001	43.106499	34.943008	5.6797824

Point: P06**Type: BIAS****Samples: 60 (60)****Point Statistics**

	Low	High	Mean	Std Dev
X	7.1594918	9.1903375	8.4170489	0.4582614
Y	24.518642	26.070691	25.265454	0.36870394
Nal	45420	52020	48903	1554.7778
Pancake	59460	70200	65002	2335.1863
Dose Rate	35.337101	52.2271	43.872181	3.5465839

Point: P07

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-79.317535	-76.580791	-77.869996	0.49882869
Y	69.891561	72.909034	70.779064	0.75624296
Nal	18720	39060	31449	5356.2251
Pancake	5640	26760	11167	4798.1709
Dose Rate	33.310299	51.551498	42.46468	3.9037344

Point: P08

Type: BIAS

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-71.434248	-68.615531	-69.861366	0.56004969
Y	63.496009	66.434062	64.864897	0.59743074
Nal	240	20460	17491	2478.5132
Pancake	2580	17160	15176	1907.6803
Dose Rate	0.88150001	47.835701	37.893124	6.0951147

USRADS Analyze v1.50a Track Map

Site: TA39S57 (F)

Signal: NaI (cpm)

Time: 14:14:24 08/28/96

Threshold:
> 7300 •

USRADS Analyze v1.50a Track Map

Site: TA39S57 (F)

Signal: Pancake (cpm)

Time: 14:14:24 08/28/96

Threshold:
> 430 •

< 300
300 to 400
400 to 500
500 to 600

600 to 700
700 to 800
> 800

USRADS Analyze v1.50a Track Map

Site: TA39S57 (F)

Signal: Dose Rate (uR/h)

Time: 14:14:24 08/28/96

Threshold:

> 40 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 57 (FILE: TA39S57)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
4000 = Black
8000 = Green
12000 = Blue
16000 = Magenta
20000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 57 (FILE: TA39S57)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 57 (FILE: TA38S57)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
20 = Black
40 = Green
80 = Blue
160 = Magenta
320 = Red

Analysis Limits

X -34.1657 to 155.0857
Y -83.26415 to 93.38556

Signal Statistics

Signal	Low	High	Mean	Std Dev
Nal	2100	6180	4076.842	606.789
Pancake	0	420	101.0961	79.64091
Dose Rate	11.3533	33.9859	22.24541	3.266678

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-8.6081715	-8.0277843	-8.2866324	0.13958157
Y	-11.167949	-10.611086	-10.904734	0.1265971
Nal	3120	5400	3868	480.18076
Pancake	0	360	111	86.155159
Dose Rate	17.433701	26.5543	21.740654	1.9790932

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-7.7619799	-7.0219221	-7.3268367	0.17317723
Y	-10.366416	-9.6081545	-9.9662268	0.20769298
Nal	2520	5220	3876	510.69006
Pancake	0	300	111	76.395493
Dose Rate	17.0959	27.2299	21.346554	2.3264582

USRADS Analyze v1.50a Track Map

Site: TA39S88 (F)

Signal: NaI (cpm)

Time: 09:45:55 08/29/96

Threshold:

> 5291 •

USRADS Analyze v1.50a Track Map

Site: TA39S88 (F)

Signal: Pancake (cpm)

Time: 09:45:55 08/29/96

Threshold:
> 303 •

USRADS Analyze v1.50a Track Map

Site: TA39S88 (F)

Signal: Dose Rate (uR/h)

Time: 09:45:55 08/29/96

Threshold:

> 29 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 88 (FILE: TA39S88)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
2000 = Black
3000 = Green
4000 = Blue
5000 = Magenta
6000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 88 (FILE: TA39S88)
PANCAKE COUNT RATE (cpm)

LEGEND
(cpm)
300 = Black
400 = Green
500 = Blue
600 = Magenta
700 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA39 SITE 88 (FILE: TA39S88)
EXPOSURE RATE (uR/h)

LEGEND
(uR/h)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X-9.327843 to 97.6
Y-71.17275 to 7.378921

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	540	96.81398	82.25301
cnv Nal	240	7260	2725.041	745.7585
Dose Rate	3.5839	23.5141	15.20207	3.447505

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-0.79096293	-0.41137499	-0.58188433	0.10774839
Y	-2.356764	-1.7719398	-2.0360226	0.13513093
Left NaI	1800	4320	3099	458.2543
Right NaI	1200	3420	2381	404.4545
Gas Flow	265860	317400	296080	12606.758
Dose Rate	11.0155	20.4739	16.093761	2.4744725
Pancake	0	360	121	93.404533

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-1.0652772	-0.66286508	-0.81681965	0.11122457
Y	-2.254828	-1.5187246	-1.7145353	0.18788788
Left NaI	2160	4140	3207	448.09927
Right NaI	1380	3060	2463	407.00043
Gas Flow	73740	145560	117749	20662.295
Dose Rate	11.3533	21.487301	16.003683	2.0375879
Pancake	0	300	123	76.873215

Site: TA40C4 (A)

USRAADS v1.48j Track Map

Time: 14:53:30 08/15/95

Signal: Gas Flow (cpm)

Threshold:
> 30000

< 30000
30000 to 40000
40000 to 50000
50000 to 60000

50000 to 70000
70000 to 80000
> 80000

9724.6675

USRADS Analyze v1.50a Track Map

Site: TA40C4 (G)

Signal: cnv Nal (cpm)

Time: 14:53:30 08/15/96

Threshold:
> 4217 •

USRADS Analyze v1.50a Track Map

Site: TA40C4 (G)

Signal: Pancake (cpm)

Time: 14:53:30 08/15/96

Threshold:
> 291 •

USRADS Analyze v1.50a Track Map

Site: TA40C4 (G)

Signal: Dose Rate (uR/h)

Time: 14:53:30 08/15/96

Threshold:
> 22 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA40 CHAMBER 4 (FILE: TA40C4)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
1000 = Black
2000 = Green
3000 = Blue
4000 = Magenta
5000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA40 CHAMBER 4 (FILE: TA40C4)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA40 CHAMBER 4 (FILE: TA40C4)
EXPOSURE RATE (uR/h)

Analysis Limits

X -19.85554 to 60.50895
Y -8.68337 to 68.83085

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	540	105.214	86.57584
cnv Nal	780	4620	2715.885	500.9184
Dose Rate	6.2863	23.5141	14.80447	2.620094

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-6.4514395	-5.8478803	-6.0696412	0.1512466
Y	28.67021	28.845988	28.760816	0.044989456
Left Nai	1680	3540	2479	389.702
Right Nai	1200	2640	1902	329.61612
Gas Flow	720	13740	4025	3563.6172
Dose Rate	9.6643	20.4739	14.449802	2.1671152
Pancake	0	360	105	90.169334

Point: Q02

Type: QUALITY

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	-6.0832447	-5.8329267	-5.9377348	0.069262554
Y	27.818311	28.272103	28.167462	0.079827247
Left Nai	1620	3360	2466	424.50626
Right Nai	1140	3000	2001	388.50293
Gas Flow	0	180	39	46.639622
Dose Rate	9.6643	18.784901	14.477951	2.2186904
Pancake	0	180	90	55.784088

USRADS v1.48; Track Map

Site: TA40C15 (F)

Signal: Gas Flow (cpm)

Time: 15:47:52 08/15/96

Threshold:

> 30000

USRADS Analyze v1.50a Track Map

Site: TA40C15 (G)

Signal: cnv NaI (cpm)

Time: 15:47:52 08/15/96

Threshold:
> 3718 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: TA40C15 (G)

Signal: Pancake (cpm)

Time: 15:47:52 08/15/96

Threshold:

> 315 •

USRADS Analyze v1.50a Track Map

Site: TA40C15 (G)

Signal: Dose Rate ($\mu\text{R/h}$)

Time: 15:47:52 08/15/96

Threshold:

> 20 •

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA40 CHAMBER 15 (FILE: TA40C15)
NaI COUNT RATE (cpm)

LEGEND
(cpm)
1000 = Black
2000 = Green
3000 = Blue
4000 = Magenta
5000 = Red

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA40 CHAMBER 15 (FILE: TA40C15)
PANCAKE COUNT RATE (cpm)

DX FIRING SITES USRADS SURVEYS BY CHEMRAD
AUGUST AND SEPTEMBER 1996
TA40 CHAMBER 15 (FILE: TA40C15)
EXPOSURE RATE ($\mu\text{R/h}$)

LEGEND
($\mu\text{R/h}$)
10 = Black
20 = Green
30 = Blue
40 = Magenta
50 = Red

Analysis Limits

X -9.083921 to 202.2203

Y -2.158564 to 20.54402

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	420	95.3668	79.83972
cnv Nai	1320	4140	2705.218	395.0286
Exposure Rate	8.3131	21.8251	14.67522	2.209495

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-7.2940866	-5.1792698	-6.8509731	0.3408253
Y	-5.2841811	-2.7478922	-4.8698557	0.61705287
Left Nai	1620	3540	2579	422.45898
Right Nai	1380	3180	2104	342.25177
Gas Flow	60	540	240	116.38627
Dose Rate	7.6374998	18.4471	13.520848	2.1221786
Pancake	0	240	71	58.96566

Point: Q02

Type: QUALITY

Samples: 60 (57)

Point Statistics

	Low	High	Mean	Std Dev
X	-8.3231955	-7.9977741	-8.1322627	0.10137592
Y	4.5922502	6.7237444	5.9193061	0.25365985
Left Nai	1680	3900	2622	465.71164
Right Nai	1500	3000	2162	332.68585
Gas Flow	60	720	315	153.31921
Dose Rate	7.9752998	19.460501	13.622192	2.2716269
Pancake	0	300	92	67.618073

USRADS Analyze v1.50a Track Map

Site: R40RD (G)

Signal: cnv NaI (cpm)

Time: 09:40:11 09/04/96

Threshold:
> 3495 •

USRADS Analyze v1.50a Track Map

Site: R40RD (G)

Signal: Pancake (cpm)

Time: 09:40:11 09/04/96

Threshold:
> 285 •

USRADS Analyze v1.50a Track Map

Site: R40RD (G)

Signal: Exposure Rate (uR/h)

Time: 09:40:11 09/04/96

Threshold:
> 19 •

Analysis Limits

X -129.5671 to 116.8468
Y -59.87791 to 15.40441

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	660	118.7446	92.56379
cnv Nai	1380	4200	2744.213	402.9537
Exposure Rate	8.3131	23.5141	15.2308	2.373312

Point: Q01

Type: QUALITY

Samples: 60 (59)

Point Statistics

	Low	High	Mean	Std Dev
X	-87.015786	-85.860784	-86.720687	0.21693245
Y	-21.708802	-19.904655	-20.628462	0.55195757
Left Nai	1680	3420	2498	390.40143
Right Nai	1320	2700	2037	353.91888
Gas Flow	0	480	149	101.54234
Dose Rate	9.6643	18.4471	14.545512	2.2922556
Pancake	0	360	102	96.494492

Point: Q02

Type: QUALITY

Samples: 60 (33)

Point Statistics

	Low	High	Mean	Std Dev
X	-100.46693	-82.386067	-94.340669	5.1697598
Y	-55.172001	-41.668544	-47.227102	4.1882024
Left Nai	1680	3180	2419	333.87787
Right Nai	1320	2640	1949	334.24683
Gas Flow	0	240	64	52.825264
Dose Rate	8.3130999	19.1227	13.357583	2.2892463
Pancake	0	300	123	77.662895

USRADS Analyze v1.50a Track Map

Site: R306RD (G)

Signal: cnv NaI (cpm)

Time: 11:07:29 09/04/96

Threshold:
> 3550 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: R306RD (G)

Signal: Pancake (cpm)

Time: 11:07:29 09/04/96

Threshold:
> 356 •

USRADS Analyze v1.50a Track Map

Site: R306RD (G)

Signal: Exposure Rate (uR/h)

Time: 11:07:29 09/04/96

Threshold:

> 20 •

< 15
15 to 20
20 to 25
25 to 30

30 to 35
35 to 40
> 40

Analysis Limits

X -52.57795 to 53.00603
Y -68.84776 to 66.115

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	420	92.91513	78.93371
cnv Nal	1500	4800	2945.952	428.9866
Exposure Rate	9.3265	24.5275	15.89636	2.297159

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	7.5921766	8.0752971	7.8766298	0.10314233
Y	-36.215991	-35.888411	-36.050933	0.083042249
Left Nai	2220	4020	3009	444.18716
Right Nai	1380	3240	2235	389.72498
Gas Flow	0	360	162	102.02692
Dose Rate	11.3533	20.811701	15.06347	2.3555775
Pancake	0	240	77	69.946709

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	6.781862	7.0429882	6.913956	0.069349724
Y	-35.022855	-34.586735	-34.858621	0.10473376
Left Nai	2160	3840	2979	400.4086
Right Nai	1320	2820	2247	342.70627
Gas Flow	0	180	43	53.084518
Dose Rate	10.3399	21.1495	15.069098	2.5063577
Pancake	0	480	134	103.25549

USRADS Analyze v1.50a Track Map

Site: IJROAD (G)

Signal: cnv Nal (cpm)

Time: 13:45:33 09/04/96

Threshold:

> 3884 •

USRADS Analyze v1.50a Track Map

Site: IJROAD (G)

Signal: Pancake (cpm)

Time: 13:45:33 09/04/96

Threshold:

> 279 •

USRADS Analyze v1.50a Track Map

Site: IJROAD (G)

Signal: Exposure Rate (uR/h)

Time: 13:45:33 09/04/96

Threshold:

> 21 •

Analysis Limits

X -33.91277 to 125.9192
Y -103.9981 to 56.71574

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	3540	98.12154	149.6841
cnv Nal	1800	4200	2909.95	398.3755
Exposure Rate	10.0021	23.5141	16.21921	2.430184

Point: Q01

Type: QUALITY

Samples: 60 (42)

Point Statistics

	Low	High	Mean	Std Dev
X	2.5213214	6.0207435	4.4372215	0.67841906
Y	0.2456367	3.4353336	1.815231	0.57644743
Left Nai	2040	3660	2762	351.065
Right Nai	1200	3300	2075	420.40497
Gas Flow	0	240	95	61.795177
Dose Rate	10.6777	19.460501	14.280901	1.8561063
Pancake	0	360	103	80.492126

Point: Q02

Type: QUALITY

Samples: 60 (2)

Point Statistics

	Low	High	Mean	Std Dev
X	-10.813437	-2.7465787	-6.7800078	5.7041301
Y	-42.794695	-23.320041	-33.057368	13.770661
Left Nai	1620	3840	2625	414.60522
Right Nai	1260	2760	2042	313.22705
Gas Flow	0	120	10	25.109928
Dose Rate	8.3130999	19.1227	14.123261	1.9655484
Pancake	0	240	81	67.940651

USRADS Analyze v1.50a Track Map

Site: MMROAD (G)

Signal: cnv Nal (cpm)

Time: 15:17:01 09/04/96

Threshold:

> 3706 •

< 3000
3000 to 4000
4000 to 5000
5000 to 6000

6000 to 7000
7000 to 8000
> 8000

USRADS Analyze v1.50a Track Map

Site: MMROAD (G)

Signal: Pancake (cpm)

Time: 15:17:01 09/04/96

Threshold:
> 294 •

< 300
300 to 400
400 to 500
500 to 600

600 to 700
700 to 800
> 800

USRADs Analyze v1.50a Track Map

Site: MMROAD (G)

Signal: Exposure Rate (uR/h)

Time: 15:17:01 09/04/96

Threshold:

> 21 •

Analysis Limits

X -38.58789 to 97.1
Y -38.629 to 37.43165

Signal Statistics

Signal	Low	High	Mean	Std Dev
Pancake	0	360	98.6106	78.95545
cnv Nal	2100	4800	3274.084	453.8538
Exposure Rate	10.6777	27.2299	18.09818	2.448362

Point: Q01

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-38.549342	-37.872836	-38.171518	0.16555421
Y	-22.962333	-20.532211	-21.071338	0.53936567
Left Nai	2100	4380	3259	421.00897
Right Nai	1800	3480	2451	372.9534
Gas Flow	0	180	27	46.113346
Dose Rate	11.3533	23.1763	16.352741	2.4938085
Pancake	0	300	107	70.813675

Point: Q02

Type: QUALITY

Samples: 60 (60)

Point Statistics

	Low	High	Mean	Std Dev
X	-39.541282	-37.286302	-38.823377	0.467805
Y	-29.050788	-25.945134	-28.19994	0.50744592
Left Nai	2340	4020	3067	379.96469
Right Nai	1500	3000	2204	353.4761
Gas Flow	0	180	38	56.292213
Dose Rate	10.3399	21.487301	16.178211	2.4909296
Pancake	0	300	109	91.423767

USRADS Analyze v1.50a Track Map

Site: LOSLORD (G)

Signal: cnv Nal (cpm)

Time: 16:34:32 09/04/96

Threshold:
> 4182 •

USRADS Analyze v1.50a Track Map

Site: LOSLORD (G)

Signal: Pancake (cpm)

Time: 16:34:32 09/04/96

Threshold:
> 297 •

USRADS Analyze v1.50a Track Map

Site: LOSLORD (G)

Signal: Exposure Rate (uR/h)

Time: 16:34:32 09/04/96

Threshold:

> 23 •

DATE: 960910
 TO: Pat LaFrate, LANL, ESH-1
 FROM: Chuck Flynn, CHEMRAD
 SUBJECT: Responses to the 960909 Meeting to Present the DX Firing Site Rad Survey Final Report dated 960909.

1. The instrument efficiencies for each of the instrument arrays are indicated below by survey mode. These results are representative of the daily response checks performed each day at TA15 near Building R183. Response checks were performed using a nominal 2.6 uCi DU-238 source supplied by LANL. This source was approximately 5/8" diameter and mounted in a plastic holding fixture that recessed the source approximately 1/8" from the face of the fixture. Response checks were performed with the source fixture in contact with the probe exposed to the unshielded source. All results were collected using the USRADS Data Pack for digital readout. The gross count rates on the check source were based on a 30 second counts. All background count rate determinations were based on a 100 second counts. Uncertainty is reported as +/- one standard deviation.

	Gross (cpm)	Background (cpm)	Net (cpm)	Eff (c/d)
Man-carried Mode				
NaI	50824 +/- 1257	2221 +/- 336.3	48603	0.84
Pancake	100986 +/- 2103	57.6 +/- 55.2	100928	1.8
RadCart Mode				
cnv NaI	48158 +/- 2177	2276 +/- 357.7	45872	0.80
Pancake	111636 +/- 2143	70.2 +/- 70.9	109493	1.9
Exposure Rate				
	Gross (uR/h)	Background (uR/h)	Net (uR/h)	
	145 +/- 5.3	13.5 +/- 2.1	132	NA

Notes:

Efficiency (Eff) is reported for 4pi geometry.

No correction for source size is included here.

Readings are at contact with the source.

No correction is provided for different source geometries.

Although two NaI detectors were used on the RadCart, all NaI RadCart data was normalized to the Left NaI for presentation purposes and reported in the Final Report as cnv NaI (cnv for converted). Therefore, the Efficiency value for the Left NaI is reported here as cnv NaI.

2. Several "key maps" are included to be added to the final report copy delivered yesterday. Please insert these maps in the appropriate tab section immediately before the corresponding Color Track Maps. These key maps are provided to aid in site orientation of the Color Track Maps and the Color Contour Plots. The data presented in the key map is generally not useful for radiation purposes (i.e. the plot was printed for the malfunctioning Gas Flow Proportional detector and used to illustrate the site features) except to show the location of the stationary receivers (SRs) and other site features. Note that some data processing routines (such as the combination of two surveys in a given area)

removes the SRs from the plot. This is desirable when site coordinates are available and incorporated in the plots. In such case, the results are oriented uniformly to grid North. However, since no site coordinates were available for this effort, the SR locations are often times an essential key to orientating the data to the site. Since the Color Track Maps for combined data sets show no SRs, the key maps aid in orientation as described in the Benchmark descriptions included with the Final Report.