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American Petroleum Institute

A National Survey on Naturally Occurring Radioactive Material (NORM) in Petroleum Production and Gas Processing Facilities

Exploration and Production Department
API Publication 7101
November, 1997

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- To economically develop and produce natural re-sources and to conserve those resources by using energy efficiently.
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A National Survey on Naturally Occurring Radioactive Material (NORM) in Petroleum Production and Gas Processing Facilities

Exploration and Production Department

API PUBLICATION 7101

PREPARED BY:

Gordon H. Otto, University of Houston, July 1989
for the API NORM Issue Group

NOVEMBER 1997

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PREFACE

NATURALLY OCCURRING RADIOACTIVE MATERIALS

IN

PETROLEUM PRODUCING AND GAS PROCESSING FACILITIES

The presence of naturally occurring radioactive materials (NORM) in oil and gas producing operations has been recognized since the early 1930s when slightly elevated radium levels were detected in Russian oil fields. Over the years, scientists have studied various aspects of low level radiation from NORM associated with oil and gas production. Recently, in 1981, scale produced on large platforms located in the North Sea was found to contain NORM at measurable levels. In the United States, the issue of NORM in mineral scale deposits gained industry and government attention in 1986. During routine work on a well in Mississippi, barium sulfate scale deposited in production tubing was found to contain measurable quantities of NORM. Industry responded by 1) notifying appropriate state agencies and the Mid-Continent Oil & Gas Association, 2) initiating field surveys to locate the occurrence of NORM, 3) informing other oil and gas operators, employees, and contractors, 4) initiating training programs, and 5) reviewing operating practices.

The Mid-Continent Oil & Gas Association in Mississippi was established as a clearing house for information on NORM, initially coordinating field survey activities and outlining field handling guidelines. The American Petroleum Institute began coordinating action on the NORM issue at the national level beginning in late 1986. The following API-sponsored report by Dr. Gordon Otto of the University of Houston defines the general occurrence of NORM in the United States based on a statistical analysis of gamma measurements taken external to certain petroleum producing and gas processing equipment. While not exhaustive, the data base is large and indicates that NORM is not everywhere in the "oil patch," and is generally limited to certain geographical areas. In fact, since much of the data were collected at sites which were suspected of some radioactivity, the magnitude of occurrence is likely to be overstated.

Health, safety and environmental impact issues associated with NORM occurrence, while not addressed in Dr. Otto's report, are met by industry through the use of traditional industrial hygiene practices and work procedures since most oil and gas NORM resides inside of closed steel vessels and pipes. Additionally, the quantity of NORM at any given work location is generally very small, and radiation levels are low when compared with background levels. NORM exists on the inner surfaces of some oil and gas equipment, generally in the following forms:

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- Radium 226 and Radium 228 - co-precipitated in some mineral scales.

- Lead 210 films in gas processing equipment, primarily propane and ethane pumps.

- Radon gas co-produced with natural gas.

The exposure to NORM of most concern in oil and gas operations is by ingestion and inhalation which is prevented utilizing work procedures routinely used for protection of other risks. Exposure to NORM is only one of several risks which must be dealt with in oil and gas producing operations. Equipment which may contain small quantities of NORM also contains large quantities of hydrocarbons which may in turn contain carbon dioxide and/or hydrogen sulfide. Because of the existence of these materials in the oilfield, industrial hygiene practices aimed at protecting against their hazards have long been in place and include:

- Purging of vessels prior to entry.

- Use of respirators and breathing apparatus while working inside of vessels.

- Use of masks while performing grinding and chipping operations.

- Utilization of protective clothing, including gloves, and the prohibition of eating, smoking, or chewing around open equipment.

NORM is widely dispersed in the earth's crust, and some industries, of necessity, concentrate NORM pursuant to the primary function. This occurs in the mining of uranium and certain other minerals...the production of some fertilizers...and in other very legitimate commercial undertakings. NORM derived from producing oil and gas is not generally concentrated; it is of very low specific activity; and oil and gas well locations are typically widespread, thus, a natural dispersion of oilfield NORM is maintained. The small quantities of NORM produced at only a few relatively remote sites constitutes no appreciable addition to natural radiation background levels. The following report by Dr. Otto presents information on the geographical occurrence of oilfield NORM, relating it to natural radiation background levels, and points toward further understanding of why there are no known NORM environmental, health, or safety concerns associated with oil and gas production sites.

R. D. Baker

for J. C. Martin
Chairman - API Committee on NORM

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A National Survey on Naturally Occurring Radioactive Materials (NORM) In Petroleum Producing and Gas Processing Facilities

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* State summaries contain figures, tables and appendices similar to the total U.S. information and state measurement data is provided for counties, parishes, etc.

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A NATIONAL SURVEY ON NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM) IN PETROLEUM PRODUCING AND GAS PROCESSING FACILITIES

I. Introduction

The data summarized in this report is a compilation of over 36,000 individual observations submitted by a number of participating petroleum companies using similar equipment and collection protocols (see Section VIII). The purpose of the study was 1) to identify the geographic areas of producing and gas processing facilities (gas plants) which have the greatest occurrence of NORM and 2) to identify items of equipment at these facilities which have the highest NORM activity levels.

Results are first reported on a national basis so that the general patterns in background levels and the excess radioactivity over background for both types of facilities can be seen in geographic perspective. NORM activity levels are reported in this study in micro-rems/hr. In addition to geographic studies at the county, state and national level of aggregation, there are also summaries by item of equipment for each state and the total U.S.

II. Summary of Results

Section VI - National Summary contains figures, tables and appendices for the total U.S. This study consists of 36,890 observations collected in twenty states and two offshore areas. The geographical distribution of the survey points is shown in Figure 1 and includes both oil/gas producing equipment (33,042 readings) and gas processing equipment (3,848 readings). Figures 1A and 1B illustrate survey distribution for gas processing and oil/gas producing equipment respectively. The size of the data base is impressive. However, results must be used with some caution in evaluating state or local environmental conditions for reasons described in Section III.

Figure 2 illustrates median background levels and Figures 3 and 4 illustrate median activity levels over background for gas processing and oil/gas production facilities respectively. The 5th, 25th, 75th and 95th percentile points of the nationally aggregated data were used to define five categories for tabulation and mapping of both the background levels and the differences over background. In developing these categories, offshore data was deleted from the background compilation due to the abnormally low background provided by the marine environment. Likewise, equipment observations which were not above background were deleted from the differences compilation due to the large number of "zero" values. This is discussed further in Section IV. The median values for background and differences are shown on the next page for the five categories. These values are reported in the National Summary and were used to classify equipment, counties and states in the State Summaries.

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Category	Definition (National)	Background MR/hr	Differences MR/hr
1	Lowest 5%	0.00 - 2.33	0.00 - 0.80
2	Next 20%	2.34 - 4.99	0.81 - 1.99
3	Middle 50%	5.00 - 9.00	2.00 - 33.00
4	Next 20%	9.01 - 14.00	33.01 - 245.00
5	Highest 5%	over 14.00	over 245.00

NORM activity levels showed wide variability, both geographically and between items of equipment in the same geographic area. As shown on Figure 2, lower background levels tend to occur offshore and near the coast. The Midwest and Rocky Mountain areas tend to have higher background levels. Background levels are not related to the equipment readings. Several areas of Colorado, Wyoming and Utah, for example, had high background levels and very few equipment readings above background. This can be seen by comparing the background levels shown in Figure 2 with the difference over background levels in Figures 3 and 4.

The geographic areas with the highest equipment readings are the entire gulf coast crescent (Florida panhandle to Brownsville, Texas), the northeast Texas crescent, southeast Illinois and a few counties in southern Kansas. These are shown in Figures 3 and 4 for gas processing and production facilities, respectively. The eastern gulf coast from Mississippi to the Florida panhandle has the highest consistent NORM activity levels surveyed in the entire United States.

Table 1 illustrates NORM activity levels over background for approximately 15 different types of equipment for both gas processing and production facilities. NORM activity levels tend to be higher in specific types of equipment. Gas processing facilities having the highest levels are reflux pumps, propane pumps and tanks, other pumps and product lines. Water handling equipment in the production facilities category exhibits the greatest NORM activity levels. Details on equipment types are provided in the national summary in the report.

When located in the same area, the gas processing equipment noted above tends to have higher activity levels than the water handling equipment in the producing facilities. This can be seen in the state summaries by comparing the median readings for the two types of facilities in the same county.

III. The Data

The data were supplied by a number of major petroleum companies from readings made on their own equipment under a common protocol using a similar type of scintillation detector. Calibration was done in accordance with the manufacturer's specifications by all participants. Thus this data base represents the most comprehensive and consistent set of NORM data available for petroleum operations. However, much of the data were collected at sites which were suspected of exhibiting some degree of radioactivity. Hence, the data is not typical of a randomly chosen site and tends to overstate the magnitude of NORM occurrence.

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The data were not collected in statistically designed sampling plans and hence there is no scientific basis for extrapolating the results to unsurveyed areas of petroleum production/gas processing. The number of observations from gas processing and producing equipment for a given geographic area may not be proportional to the actual amount of operational equipment in the area. In addition to the lack of proportionality between equipment types, there is dis-proportionality in the representation among counties in the same state and between the states themselves. Many counties with oil and gas operations have no data reported and many others have only a single observation. The entire states of Kentucky and Nebraska have 21 and 30 observations respectively. All of the Nebraska data comes from a single county on its southern border and the Kentucky data is all from two counties on the western border with Illinois.

Readers should consider the sample size which is reported along with the NORM statistics. The reliability of statistical results are also related to the sample sizes collected. In many cases seemingly large NORM readings (relative to other such readings) for a county or item of equipment in a state may be the result of a single observation or a small group of observations taken at the same location.

IV. Additional Considerations

Since the survey was not conducted under statistically controlled conditions, interpretation of the results become difficult when the data are aggregated across dis-similar areas with different sample sizes and different potential for NORM activity levels in the equipment. In particular, a large number of low readings from benign areas may "average out" and thus minimize the influence of a smaller number of high readings.

One approach to this problem is to examine two different sets of statistics: 1) using all of the observations and 2) the tabulation of only those which are above background. The latter approach filters out the large number of "zero" values (relative to difference over background) which constitute 64.3% of the gas processing data and 56.9% of the production data. The first approach focuses on the overall result and the second focuses on conditions in only those cases where NORM was found to be present. The first approach tends to understate the median activity levels and the second tends to overstate the occurrence of NORM and activity levels if viewed as the "average" case.

The national summaries were prepared using both approaches. Table 1 and Appendix 1 show the summary by equipment types for all observations and Table 2 and Appendix 2 show the results for the non-zero differences only. Table 2 is more useful for identifying the items of equipment which are most likely to have higher NORM activity levels.

Table 3 constructs an "incidence" measure for each state which is an alternative statistical method of comparing NORM occurrence by providing a ranking in terms of both frequency of occurrence and intensity of activity levels. This index is the product of the percentage of above-background readings times the median value of the above-background observations. From Table 3 we see that Alabama/Florida and Mississippi have a much higher incidence measure than any other states with Illinois not too far behind. The Texas coast, Alaska and Kentucky form the next grouping.

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V. Glossary

The data was collected using abbreviations for the equipment types surveyed. The glossary of abbreviations used is given below.

A. Gas Processing Equipment (GP)

1. BOTTOMS PUMP - Pumps transferring liquids from the bottoms of towers.
2. COMPRESSOR - Compressors and associated equipment. This includes compressors located on the lease.
3. CRYO UNIT - All equipment associated with the cryogenic process.
4. DEHYDRATOR - Dehydration equipment to include Glycol, EG and TEC systems, etc.
5. FRAC TOWER - All process towers and columns.
6. INLET SCRUBBER - Inlet scrubbers, separators, fwko etc.. This includes those located on the lease.
7. METER - All metering equipment to include meters, meter runs, screens, strainers, filters, etc..
8. OPUMP - All other pumps.
9. OTANK - All other tanks.
10. OTHER - All other gas processing equipment, including pig launcher and receiver.
11. PPUMP - Propane pump.
12. PTANK - Propane tank.
13. PRODUCT LINE - All product lines.
14. REFLUX PUMP - All reflux pumps.
15. REFRIGERATION - All equipment associated with the propane refrigeration system.
16. SWEETENER - All gas sweetening equipment to include amine systems, etc..

B. Production Facilities (PROD)

1. FLINE - Flow lines to include all valves and elbows.
2. H/T - Heater treater.
3. MANIFOLD - Manifold/header piping, valves and chokes, etc.
4. OTHER - All other measurements on in service equipment.
5. PUMP - All pumps.
6. SEP - Separators to include production separators, fwko, gunbarrels, etc..
7. STANK - Stock tanks.
8. SUMP - Sumps to include pits, pigtraps, ponds, etc.
9. VRU - Vapor recovery units.
10. WINJ - Injection wellhead.
11. WOTHER - Other wellheads.
12. WPROD - Production wellhead.
13. WLINE - Water lines to include all valves and elbows.
14. WTANK - Water tanks.

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VI. National Summary

Overview

I. Differences in Equipment (all observations)

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background using all observations:

	Equipment		Median Difference	75th Percentile
1.	Reflux Pumps	(GP)	52.7 µR/hr	242.0 µR/hr
2.	Propane Pumps	(GP)	19.0	70.0
3.	Propane Tanks	(GP)	9.0	45.8

II. Differences in Equipment (observations in excess of background)

A second way of looking at the data is to exclude all values which were at or below background and focus on what happens when NORM is detected.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background using only those observations in excess of background:

	Equipment		% Over	Median Difference	75th Percentile
1.	Reflux Pumps	(GP)	86.4	76.0 µR/hr	291.0 µR/hr
2.	Flow Line	(Prod)	24.0	42.0	112.0
3.	Pump	(GP)	66.7	38.0	73.0
4.	Product Line	(GP)	56.1	35.0	110.5
5.	Water Line	(Prod)	51.6	34.6	100.0
6.	Propane Pumps	(GP)	74.7	31.0	97.5
7.	Other Pump	(GP)	49.1	27.8	96.3
8.	Propane Tanks	(GP)	72.6	25.0	65.7
9.	Injection Well	(Prod)	49.0	20.0	56.3

III. Overall Summary

1. Nationwide (all Obsns)

ITEM	No	5th Pct. (low)	25th Pct. (--------	Median mid-range	75th Pct. -------)	95th Pct. (high)
a. Background*	33970	2.3	5.0	7.0	9.0	14.0
b. Max Reading	36890	1.5	6.0	9.0	13.0	110.0
c. Difference	36890	0.0	0.0	0.0	4.0	104.6

* On-shore backgrounds only. Based on these numbers, back-

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grounds for each county were classified if their median values were below 2.34 (very low), between 2.34 and 5.99 (low), between 5.0 and 9.0 (mid-range), between 9.01 and 14.0 (high) and above 14.0 (very high).

2. Nationwide (observations over background only)

ITEM	No	5th Pct. (low)	25th Pct. (------- mid-range	Median	75th Pct. -------)	95th Pct. (high)
Difference	15630	0.8	2.0	6.0	33.0	245.0

This distribution was used to classify all difference readings (by county or equipment) as very low (< 0.8), low (.8 - 1.99), mid-range (2.0-33.0), high (33.01 - 245) and very high (above 245).

3. Facility

ITEM	No	5th Pct. (low)	25th Pct. (------- mid-range	Median	75th Pct. -------)	95th Pct. (high)
Difference (All observations)						
Gas Processing	3864	0.0	0.0	0.0	3.0	95.0
Production	33026	0.0	0.0	0.0	4.0	105.0
Difference (Observations in excess of background)						
Gas Processing	1379	0.8	2.0	9.0	46.0	261.9
Production	14250	0.8	2.0	6.0	31.0	245.0

NOTE: All data are measured in micro-rems/hr

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FIGURE 1 - STATES/AREAS REPRESENTED IN SURVEY

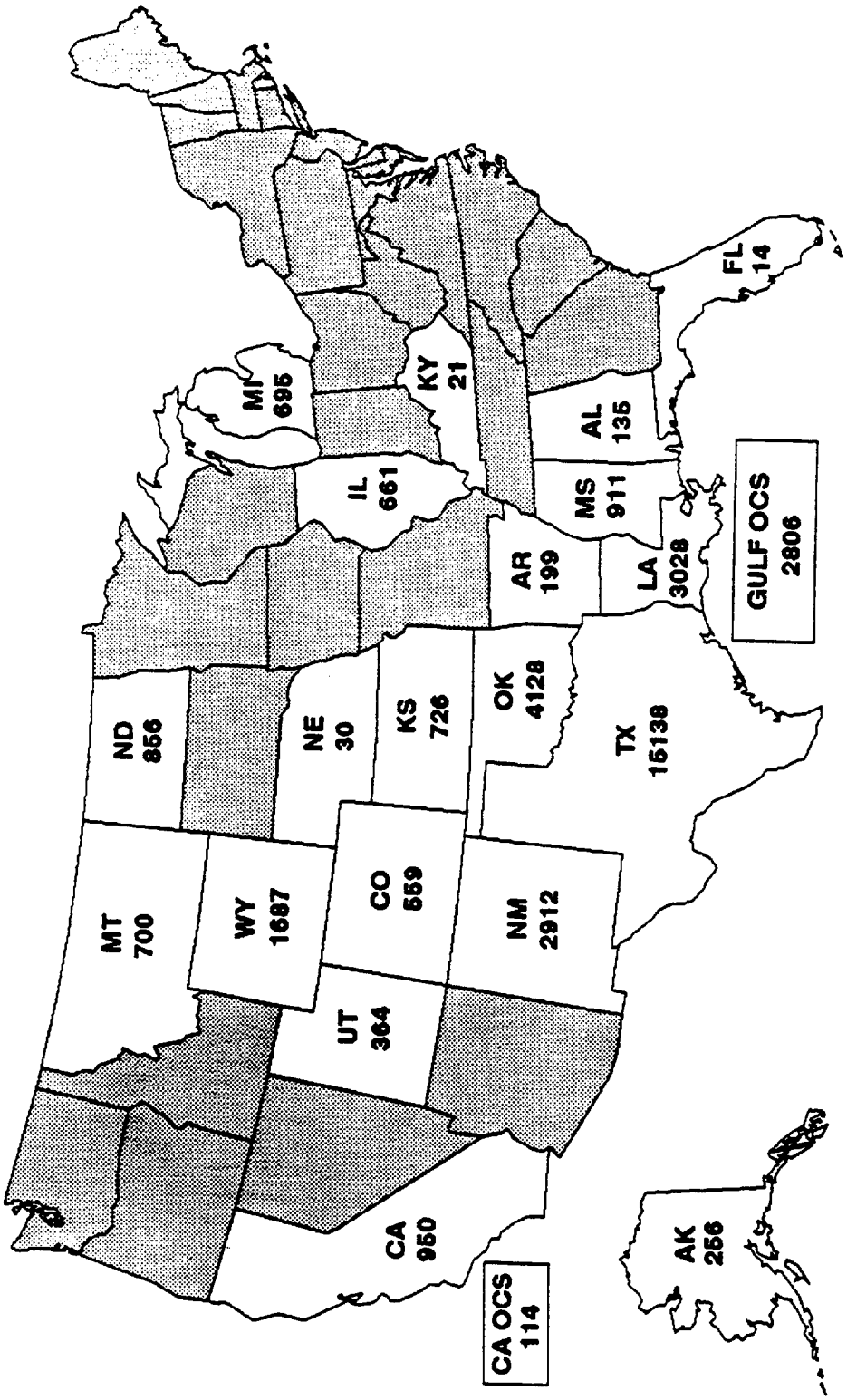

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FIGURE 1A - GAS PROCESSING MEASUREMENTS

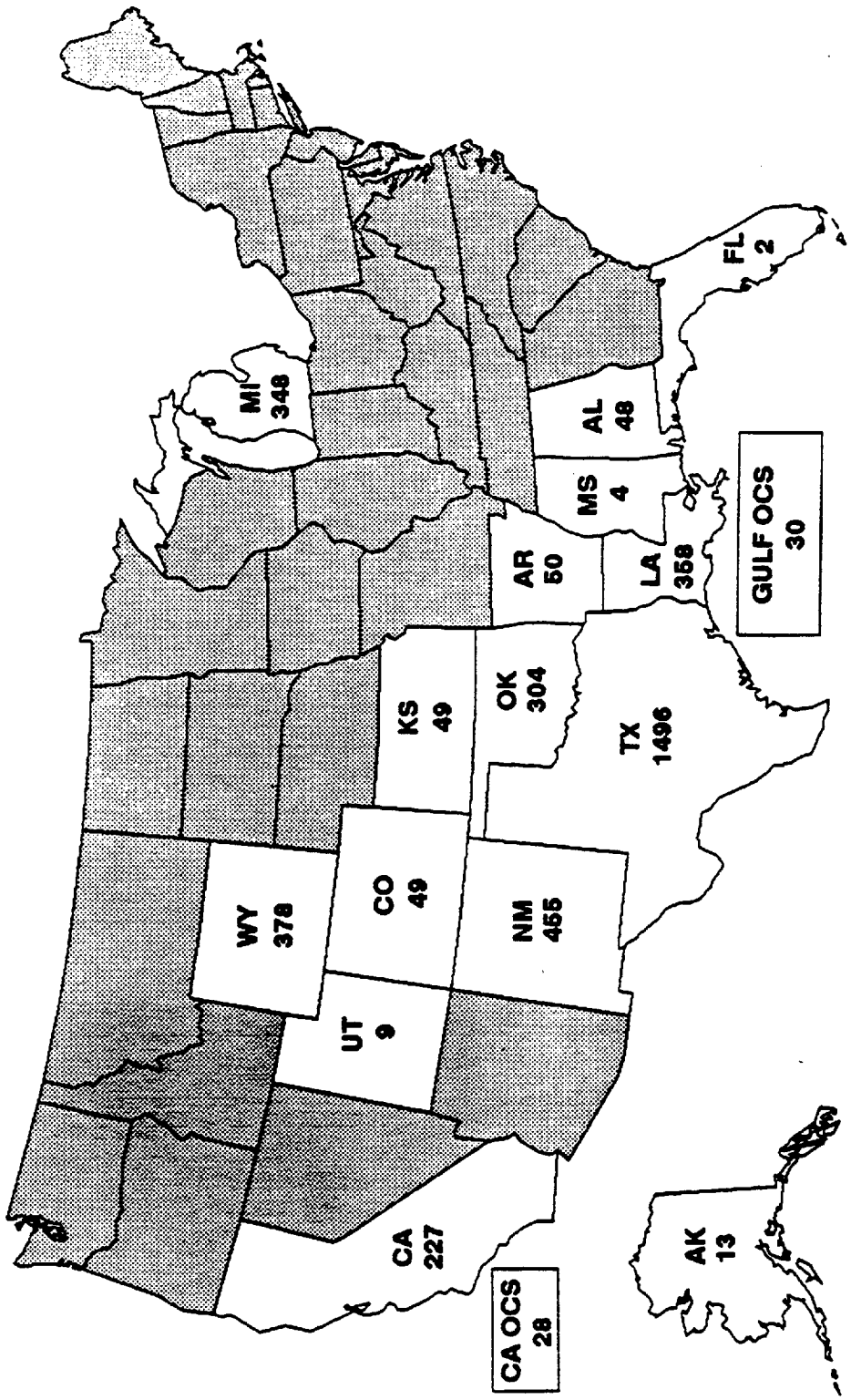

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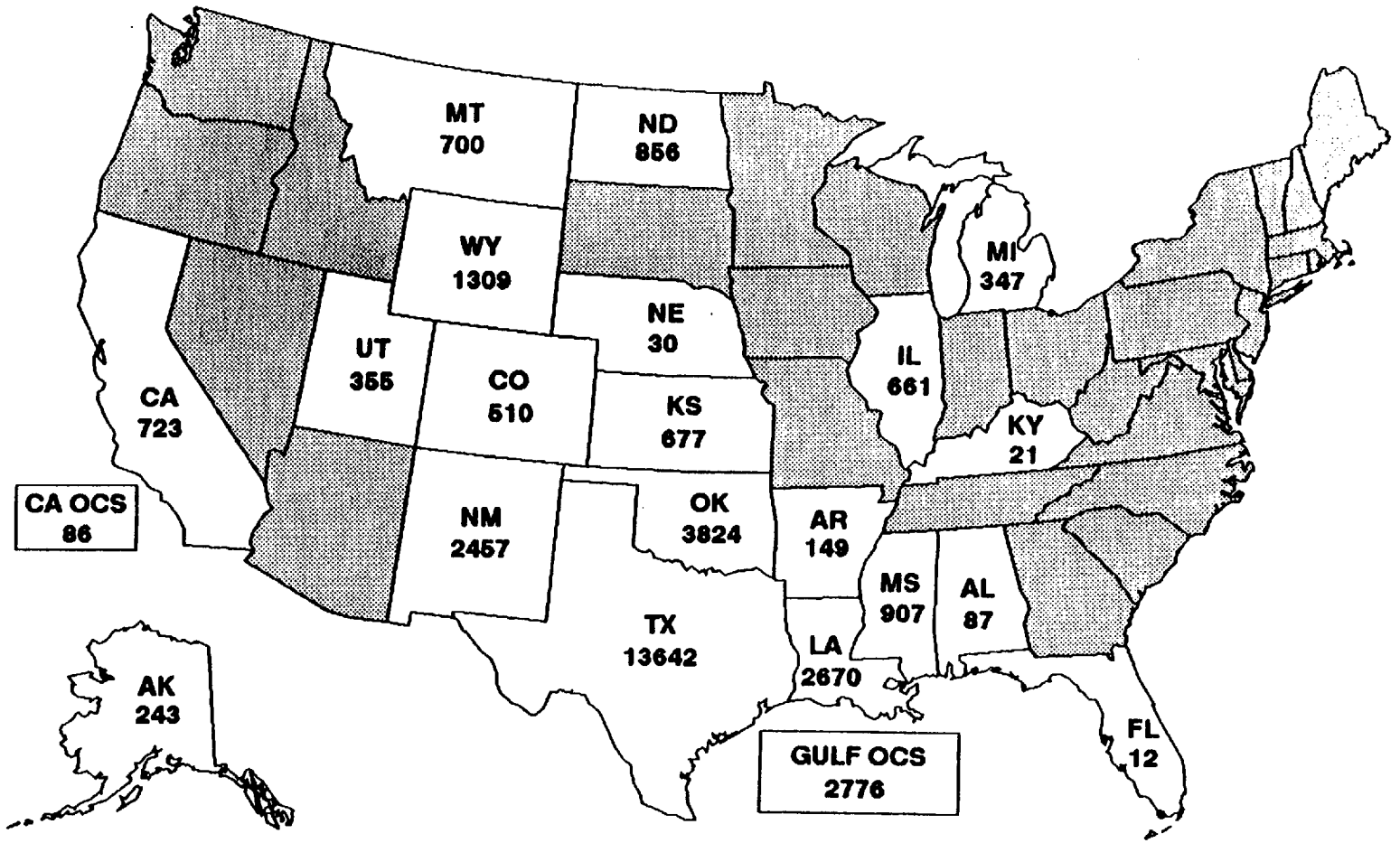
FIGURE 1B - PRODUCTION FACILITY MEASUREMENTS



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NATURALLY OCCURRING RADIOACTIVITY SURVEY

'MT' = STATE
'700' = NO. DATA PTS.

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FIGURE 2 - MEDIAN BACKGROUND LEVELS

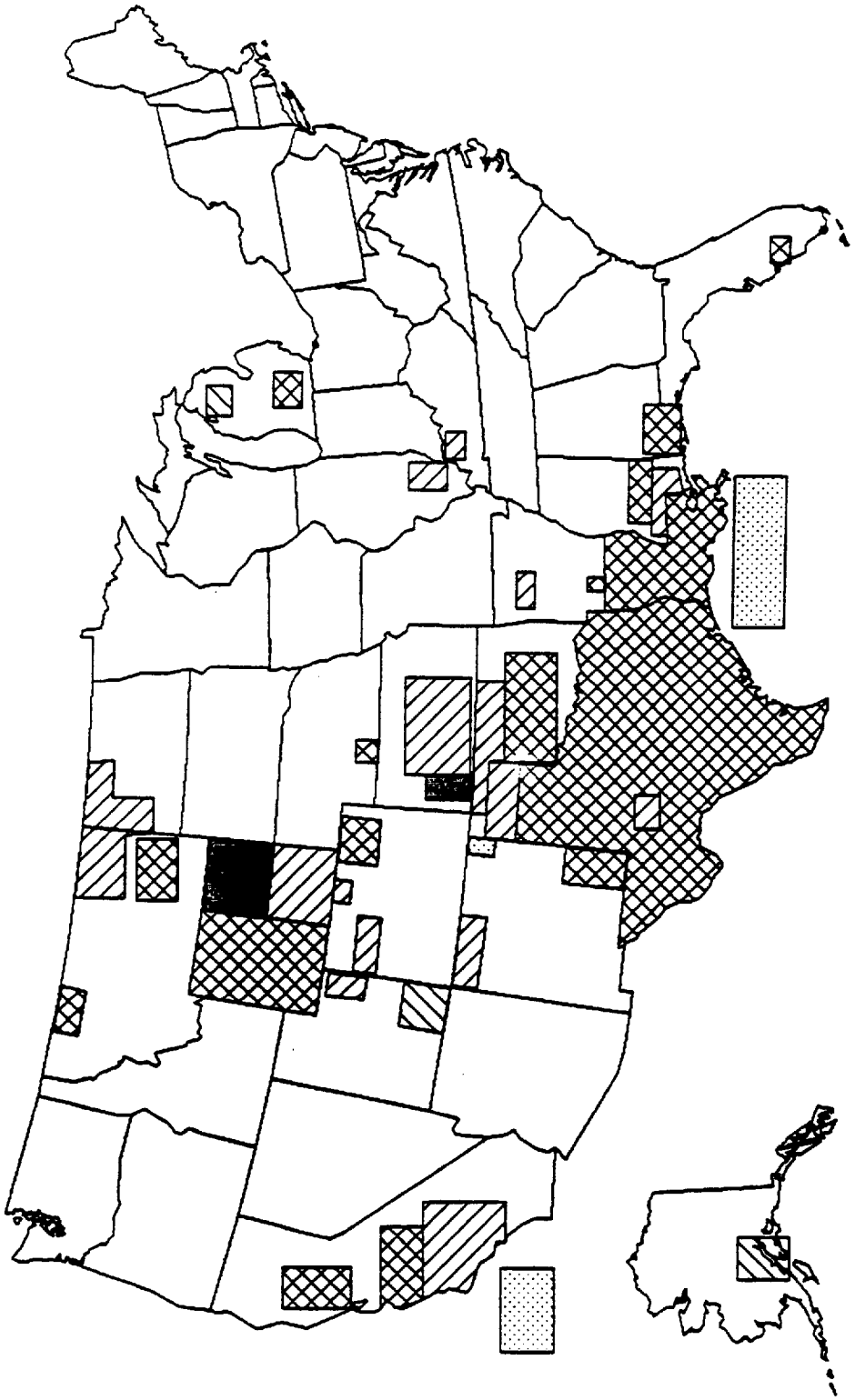

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FIGURE 3 - MEDIAN OF DIFFERENCE OVER BACKGROUND

GAS PROCESSING FACILITIES

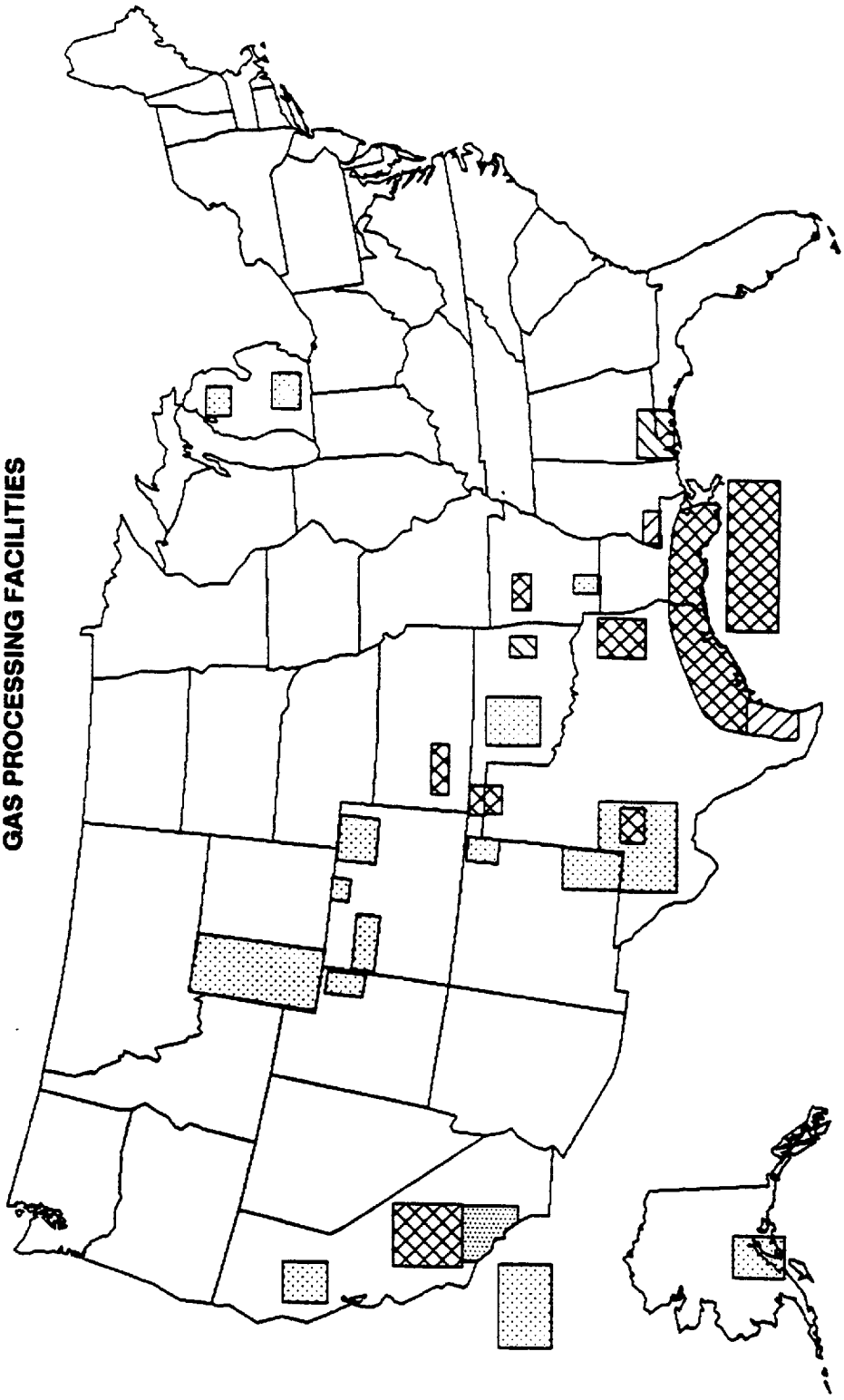

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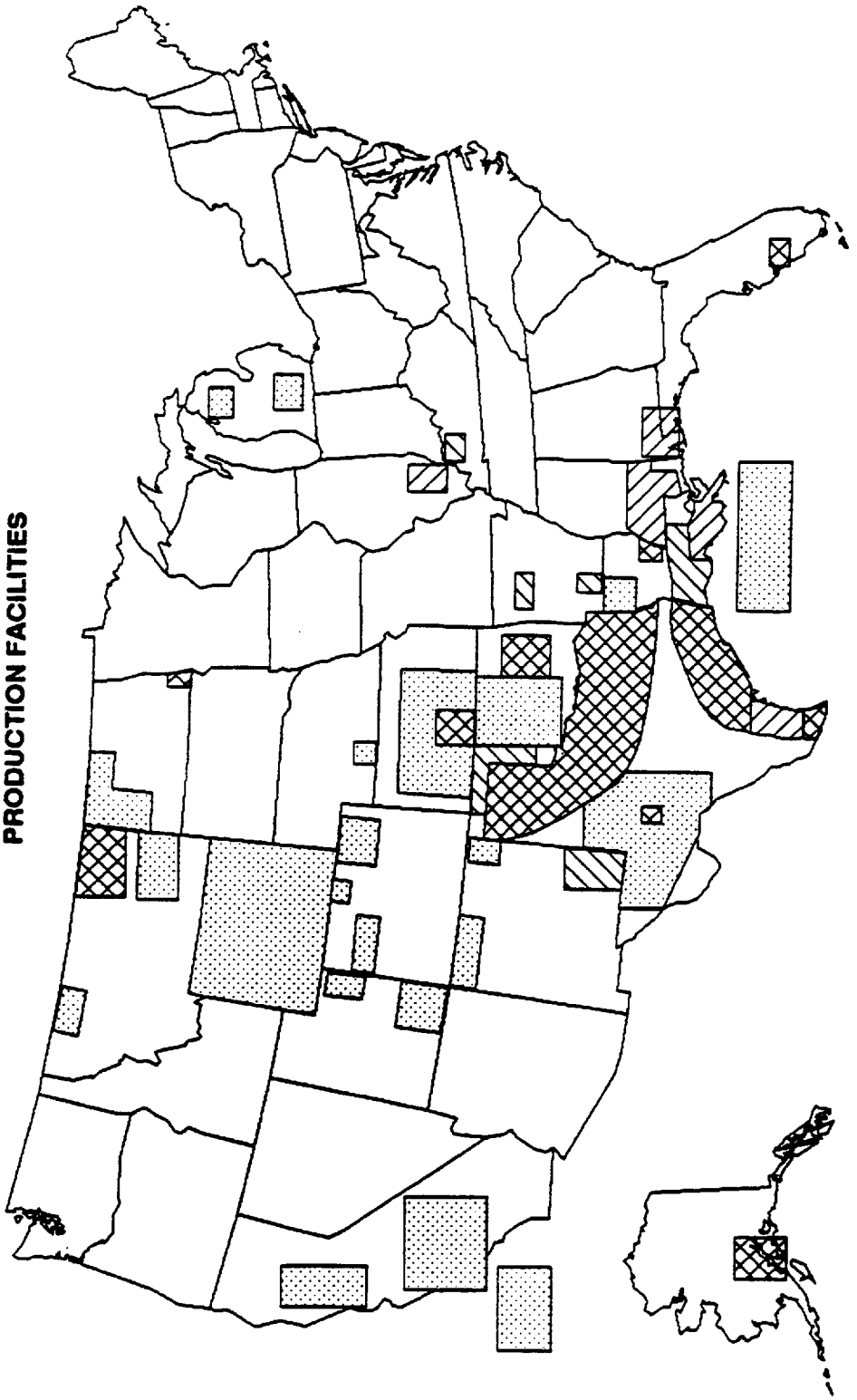
FIGURE 4 - MEDIAN OF DIFFERENCE OVER BACKGROUND

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA

BELOW .8

.8 - 1.99

2 - 33

33.01 - 245

OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

National Summary
(All Observations)

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
648	COMPRESSOR	|	0.0	0.0
50	CRYO UNIT	|	0.0	2.5
244	DEHYDRATOR	|	0.0	1.0
272	FRAC TOWER	|	0.0	6.0
593	INLET SCRUBBER	|	0.0	0.5
101	METER	|	0.0	1.0
232	OPUMP	|	0.0	25.5
423	OTANK	|	0.0	2.0
430	OTHER	|	0.0	4.0
143	REFRIGERATION	|	0.0	4.0
243	SWEETENER	|	0.0	0.0
3	PUMP	|**	3.0	73.0
146	PRODUCT LINE	|**	3.3	46.5
40	BOTTOMS PUMP	|****	7.0	28.0
124	PTANK	|*****	9.0	45.0
71	PPUMP	|**********	9.0	70.0
110	REFLUX PUMP	|**************************	52.7	242.0
3864		-----+----+----+----+----+----+--- 10 20 30 40 50 60 Median of Difference Over Background		

FACILITY: Production

1748	FLINE	|	0.0	0.0
2537	MANIFOLD	|	0.0	2.0
306	METER	|	0.0	0.0
2397	OTHER	|	0.0	3.0
1393	PUMP	|	0.0	1.0
7887	SEP	|	0.0	7.0
7005	STANK	|	0.0	2.0
115	VRU	|	0.0	0.0
102	WINJ	|	0.0	20.0
24	WOTHER	|	0.0	0.0
2324	WPROD	|	0.0	1.0
2962	H/T	|	0.3	8.0
454	SUMP	|*	1.0	9.3
341	WLINE	|*	1.0	39.0
3431	WTANK	|*	2.0	14.0
33026		-----+----+----+----+----+----+- 10 20 30 40 50 60 Median of Difference Over Background		

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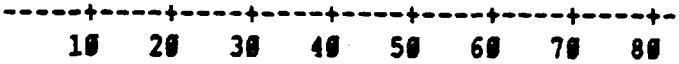
Table 2

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

National Summary
(Observations in excess of background)

FACILITY: Gas Processing

Obsns	Equipment	Median Difference	75th Percentile
119	COMPRESSOR	2.0	3.0
72	DEHYDRATOR	3.0	6.7
30	SWEETENER	3.4	19.5
156	INLET SCRUBBER	5.0	19.0
32	METER	5.5	51.0
20	CRYO UNIT	6.0	21.9
140	OTANK	6.0	30.0
165	OTHER	7.0	23.0
123	FRAC TOWER	9.5	33.3
56	REFRIGERATION	16.0	68.8
30	BOTTOMS PUMP	17.0	45.3
90	PTANK	25.0	65.8
114	OPUMP	27.7	96.3
53	PPUMP	31.0	97.5
82	PRODUCT LINE	35.0	110.5
2	PUMP	38.0	73.0
95	REFLUX PUMP	76.0	291.0
1379			



FACILITY: Production

Obsns	Equipment	Median Difference	75th Percentile
5	WOTHER	2.0	3.8
777	WPROD	2.3	7.9
72	METER	3.0	5.8
424	PUMP	3.0	14.0
1007	OTHER	4.0	15.0
2696	STANK	4.0	14.0
895	MANIFOLD	6.0	55.0
253	SUMP	7.0	26.5
3816	SEP	7.8	40.0
1495	H/T	8.0	47.0
2140	WTANK	8.0	35.0
25	VRU	17.0	207.5
50	WINJ	20.0	56.3
176	WLINE	34.6	100.0
419	FLINE	42.0	112.0
14250			

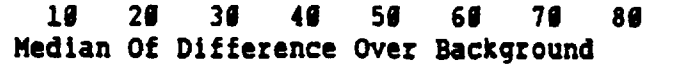


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Table 3

NORM Incidence by State

(All Facilities)

State Name	All Observations		Obsns. Above Background		Incidence Measure
	No. of Obsns.	Median Difference	% of Total	Median Difference	
Alaska	256	6.0	76.2	10.0	7.62
Alabama/Fl	149	20.0	69.8	58.5	40.83
Arkansas	199	1.0	61.3	2.0	1.23
California	950	0.0	34.2	10.0	3.42
Colorado	559	0.0	18.8	8.5	1.60
Illinois	661	17.0	91.8	23.0	21.12
Kansas	726	0.0	45.5	10.5	4.77
Kentucky	21	3.0	57.1	12.0	6.86
Lousiana	3,028	0.0	43.7	11.8	5.15
Michigan	695	0.0	19.4	2.6	0.51
Mississippi	911	20.0	76.1	46.0	35.01
Montana	700	0.0	12.3	37.0	4.55
North Dakota	856	0.0	19.7	9.0	1.77
Nebraska	30	0.0	20.0	5.4	1.08
New Mexico	2,912	0.0	40.1	4.0	1.60
Oklahoma	4,128	0.0	43.7	4.0	1.75
Texas (all)	15,138	0.0	41.4	5.0	2.07
* Coastal	2,567	1.0	54.3	15.0	8.15
* Northern	4,927	1.0	52.4	4.0	2.10
* Western	7,278	0.0	29.9	5.7	1.68
Utah	364	0.0	19.5	5.0	0.98
Wyoming	1,687	0.0	16.8	2.3	0.39
Offshore	2,920	0.5	62.3	3.2	1.99
* Gulf	2,806	0.5	63.4	3.2	2.03
* California	114	0.0	33.3	3.46	1.15

Note: The Texas total includes 366 observations which could not be classified by Region because the county name was not reported.

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

National Summary
(All Observations)

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	648	1.401	490.0	0	0.000	0.00	0.000
CRYO UNIT	50	70.292	2985.0	0	0.000	0.00	2.525
DEHYDRATOR	244	4.693	529.0	0	0.000	0.00	1.000
FRAC TOWER	272	16.676	395.0	0	0.000	0.00	6.000
INLET SCRUBBER	593	7.479	701.0	0	0.000	0.00	0.450
METER	101	19.497	695.0	0	0.000	0.00	1.050
OPUMP	232	55.608	1391.0	0	0.000	0.00	25.500
OTANK	423	9.574	383.0	0	0.000	0.00	2.000
OTHER	430	11.800	995.0	0	0.000	0.00	4.000
REFRIGERATION	143	18.823	595.0	0	0.000	0.00	4.000
SWEETENER	234	2.942	220.5	0	0.000	0.00	0.000
PUMP	3	25.333	73.0	0	0.000	3.00	73.000
PRODUCT LINE	146	54.138	1080.0	0	0.000	3.25	46.500
BOTTOMS PUMP	40	25.130	220.0	0	0.125	7.00	28.000
PTANK	124	37.633	680.0	0	0.000	9.00	45.000
PPUMP	71	86.303	1041.0	0	0.000	19.00	70.000
REFLUX PUMP	110	225.262	2985.0	0	2.000	52.65	242.000
Production Facilities							
FLINE	1748	21.5717	2991.0	0	0	0.0	0.00
MANIFOLD	2537	23.3713	2995.0	0	0	0.0	2.00
METER	306	2.2288	92.0	0	0	0.0	0.00
OTHER	2397	18.9506	3785.0	0	0	0.0	3.00
PUMP	1393	8.7212	986.0	0	0	0.0	1.00
SEP	7887	31.2279	4491.0	0	0	0.0	7.00
STANK	7005	10.5057	2475.0	0	0	0.0	2.00
VRU	115	36.6696	1287.0	0	0	0.0	0.00
WINJ	102	32.2451	886.0	0	0	0.0	20.00
WOTHER	24	0.5292	5.5	0	0	0.0	0.00
WPROD	2324	9.8176	1487.0	0	0	0.0	1.00
H/T	2962	43.4679	3490.0	0	0	0.3	8.00
SUMP	454	25.3998	793.0	0	0	1.0	9.25
WLINE	341	74.8135	2790.0	0	0	1.0	39.00
WTANK	3431	35.4036	3786.0	0	0	2.0	14.00

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Appendix 2

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

National Summary
(Observations in excess of Background)

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	119	7.631	490.0	0.3	1.000	2.00	3.000
DEHYDRATOR	72	15.904	529.0	0.3	1.350	3.00	6.650
SWEETENER	30	22.947	220.5	0.2	1.000	3.45	19.500
INLET SCRUBBER	156	28.431	701.0	0.1	1.000	5.00	19.000
METER	32	61.537	695.0	0.3	1.150	5.50	51.000
CRYO UNIT	20	175.730	2985.0	1.0	2.000	6.00	21.925
OTANK	140	28.927	383.0	0.2	2.000	6.00	30.000
OTHER	165	30.752	995.0	0.3	2.900	7.00	23.000
FRAC TOWER	123	36.876	395.0	0.2	1.500	9.50	33.200
REFRIGERATION	56	48.066	595.0	0.1	2.000	16.00	68.750
BOTTOMS PUMP	30	33.507	220.0	0.5	3.000	17.00	45.250
PTANK	90	51.850	680.0	0.5	7.325	25.00	65.750
OPUMP	114	113.168	1391.0	0.4	6.825	27.75	96.250
PPUMP	53	115.613	1041.0	0.1	9.500	31.00	97.500
PRODUCT LINE	82	96.391	1080.0	0.1	13.750	35.00	110.500
PUMP	2	38.000	73.0	3.0	3.000	38.00	73.000
REFLUX PUMP	95	260.829	2985.0	0.2	15.800	76.00	291.000
Production Facilities							
WOTHER	5	2.540	5.5	1.2	1.6	2.0	3.75
WPROD	777	29.364	1487.0	0.1	1.0	2.3	7.90
METER	72	9.472	92.0	1.0	1.0	3.0	5.75
PUMP	424	28.652	986.0	0.1	1.0	3.0	14.00
OTHER	1007	45.109	3785.0	0.1	1.0	4.0	15.00
STANK	2696	27.297	2475.0	0.1	2.0	4.0	14.00
MANIFOLD	895	66.249	2995.0	0.1	1.0	6.0	55.00
SUMP	253	45.579	793.0	0.1	3.0	7.0	26.50
SEP	3816	64.543	4491.0	0.1	2.0	7.0	40.00
H/T	1495	86.122	3490.0	0.1	2.0	8.0	47.00
WTANK	2140	56.761	3786.0	0.1	3.0	8.0	35.00
VRU	25	168.680	1287.0	0.2	2.0	17.0	207.50
WINJ	50	65.780	886.0	1.0	4.0	20.0	56.25
WLINE	176	144.951	2790.0	0.2	6.0	34.6	100.00
FLINE	419	89.994	2991.0	0.1	7.0	42.0	112.00

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VII. State Summaries

Overview

The state summaries are each organized in the same order to give the following information:

A. Summary Statistics for the state (one page)

B. State Maps showing the counties in the survey.
A separate map has been made for Background Levels (Figure 1), Difference Over Background for Gas Processing Facilities (Figure 2), and Difference Over Background for Production Facilities (Figure 3).

In each figure the counties are summarized into the following categories according to their median values:

Category	Definition (National)	Background µ R/hr	Difference µ R/hr
1	- Lowest 5 %	0.00 - 2.33	0.00 - 0.80
2	- Next 20 %	2.34 - 4.99	0.80 - 1.99
3	- Middle 50 %	5.00 - 9.00	2.00 - 33.00
4	- Next 20 %	9.01 - 14.00	33.01 - 245.00
5	- Highest 5 %	over 14.00	over 245.00

A Background map was prepared for every state. If the difference over background was the same in every county the Difference Over Background map was deleted.

C. Tables in Bar Chart form showing the median values for equipment, county, and background ranked in increasing order. The differences over background for equipment and county are reported separately for Gas Processing and Production Facilities.

D. Appendices 1,2, and 3 give the detail data shown in the tables, plus a few other statistics.

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SUMMARY

(Alabama and Florida)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background. These items were located in Escambia county Alabama and its adjacent neighbor, Santa Rosa county Florida.

	Equipment		Median Difference	75th Percentile
1.	Separator	(Prod)	121 µR/hr	220.0 µR/hr
2.	Other Pumps	(GP)	100	145.0
3.	Reflux Pumps	(GP)	65	120.0
4.	Flow Lines	(Prod)	50	104.5
5.	Water Line	(prod)	35	125.0

II. Santa Rosa (Fl) and Mobile county had low background readings while Monroe county had a high background level. All of the others were mid-range.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	149	5.0	15.0	15.0	15
b. Max Reading	149	30.0	110.0	220.0	625
c. Difference	149	20.0	100.0	205.0	621
2. Facility					
a. Background					
Gas Processing	50	15.0	15.0	15.0	15
Production	99	5.0	15.0	15.0	15
b. Max Reading					
Gas Processing	50	15.0	35.0	100.5	150
Production	99	50.0	150.0	250.0	625
c. Difference					
Gas Processing	50	0.0	24.6	94.6	145
Production	99	42.0	147.0	245.0	621

NOTES: 1) All data are measured in micro-rems/hr

2) The apparent differences between facilities are due to the specific items of equipment listed in Section I above.

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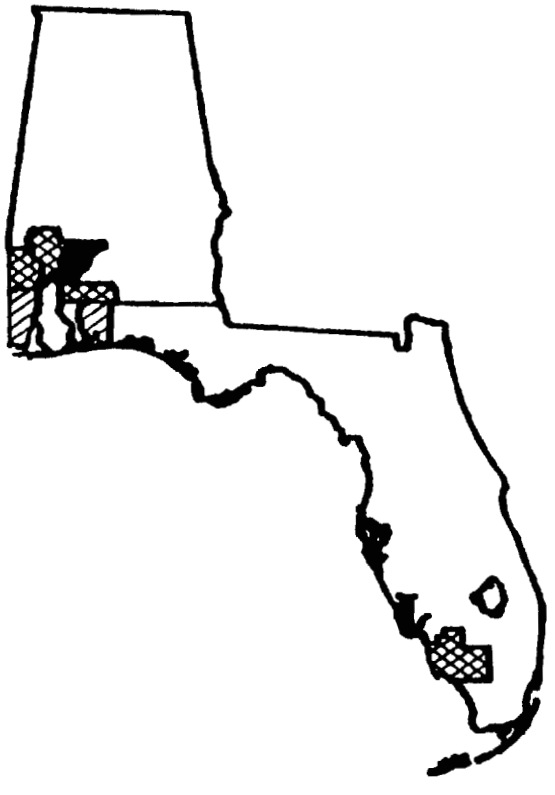
FIGURE 1 – MEDIAN BACKGROUND LEVELS

ALABAMA–FLORIDA



MICRO-REMS/HR

NO DATA
5.0 – 9.0
0 – 2.33
9.01 – 14.0
2.34 – 4.99
OVER 14.0

AMERICAN PETROLEUM INSTITUTE
NATURALLY OCCURRING RADIOACTIVITY SURVEY

FIGURE 2 – DIFFERENCE OVER BACKGROUND

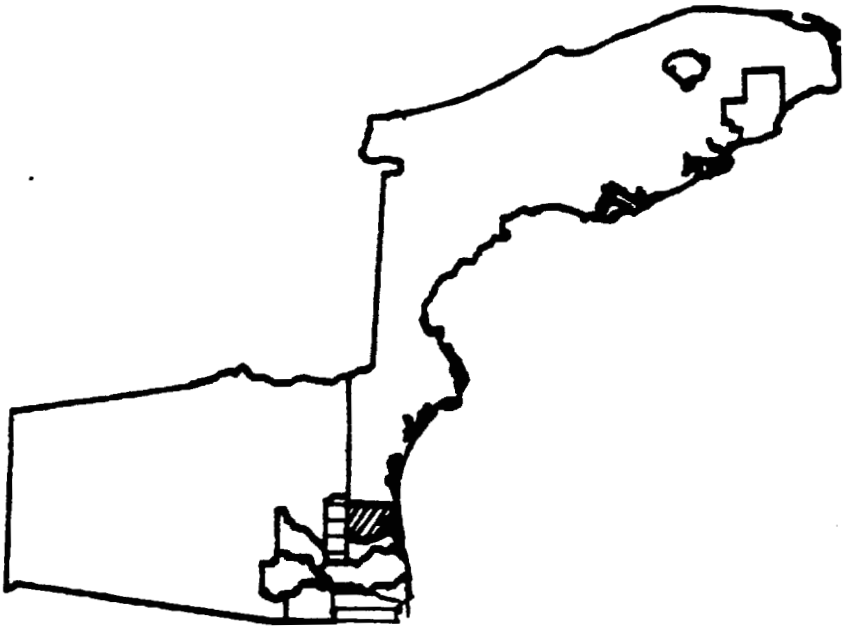


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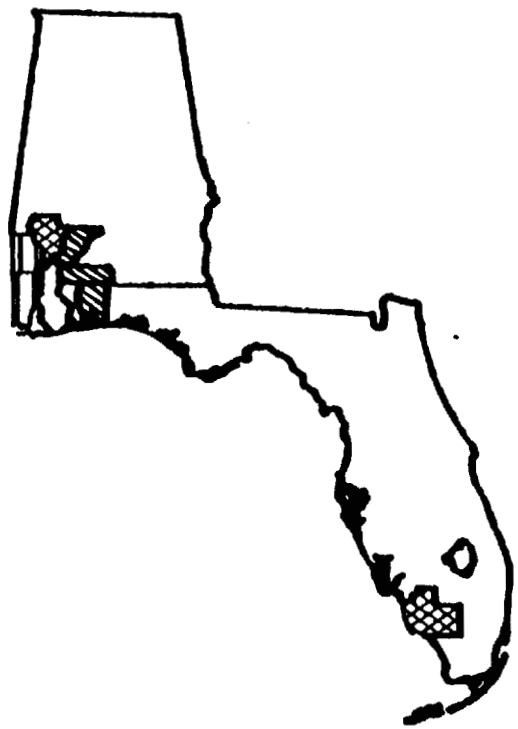
FIGURE 3 – DIFFERENCE OVER BACKGROUND

ALABAMA-FLORIDA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Alabama and Florida

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentil
1	BOTTOMS PUMP	|	0.0	0.0
1	COMPRESSOR	|	0.0	0.0
2	CRYO UNIT	|	0.0	0.0
2	DEHYDRATOR	|	0.0	0.0
3	FRAC TOWER	|	0.0	45.0
21	INLET SCRUBBER	|	0.0	22.2
1	METER	|	0.0	0.0
5	OTANK	|	0.0	24.6
1	REFRIGERATION	|	0.0	0.0
1	SWEETENER	|	0.0	0.0
6	OTHER	|***	8.4	98.5
1	PRODUCT LINE	|********	20.0	20.0
3	REFLUX PUMP	|**********	65.0	120.0
2	OPUMP	|**********	100.0	145.0
----		----+---+---+---+---+---+---+---+---+---+---		
50		10 20 30 40 50 60 70 80 90 100		

Median of Difference Over Background

FACILITY: Production

2	WINJ	|	0.0	0.0
1	WOTHER	|	0.0	0.0
5	MANIFOLD	|**	5.0	44.0
9	OTHER	|***	7.0	37.5
4	WPROD	|***	7.5	25.0
10	WTANK	|****	10.0	72.0
11	H/T	|******	13.0	145.0
4	STANK	|********	19.5	112.0
3	WLINE	|**********	35.0	125.0
9	FLINE	|**********	50.0	184.5
41	SEP	|**********	121.0	220.0
---		----+---+---+---+---+---+---+---+---+---+---+---+---		
99		10 20 30 40 50 60 70 80 90 100 110 120		

Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Alabama and Florida

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentil
19	MOBILE	|	0.0	13.2
29	ESCAMBIA	|	0.0	50.0
2	SANTA ROSA	|**********	106.0	121.0

10 20 30 40 50 60 70 80 90 100 110

Median of Difference Over Background

FACILITY: Production

15	MOBILE	|	0.0	13.0
3	WASHINGTON	|	0.0	0.0
6	COLLIER	|**********	31.5	79.8
2	CLARKE	|**********	32.0	47.0
12	MONROE	|**********	40.0	120.0
55	ESCAMBIA	|**********	71.0	196.0
6	SANTA ROSA	|**********	107.0	228.2

10 20 30 40 50 60 70 80 90 100 110

Median of Difference Over Background

Note: Santa Rosa is in the Florida Panhandle and Collier is in the southern tip of Florida (Naples). All other counties are in Alabama.

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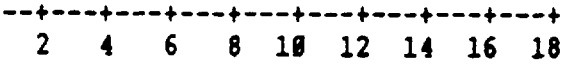
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Alabama and Florida

Obs	County		Median	75th Percentile
8	SANTA ROSA	|******	3.0	4.0
34	MOBILE	|*********	4.5	7.5
84	ESCAMBIA	|**********	5.0	15.0
3	WASHINGTON	|**********	7.5	7.5
2	CLARKE	|**********	8.0	8.0
6	COLLIER	|**********	8.0	10.0
12	MONROE	|**********	15.0	15.0



Median of Background Readings

Note: Santa Rosa is in the Florida Panhandle and Collier is in the southern tip of Florida (Naples). All other counties are in Alabama.

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Alabama and Florida

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
BOTTOMS PUMP	1	0.000	0.0	0	0.00	0.0	0.0
COMPRESSOR	1	0.000	0.0	0	0.00	0.0	0.0
CRYO UNIT	2	0.000	0.0	0	0.00	0.0	0.0
DEHYDRATOR	2	0.000	0.0	0	0.00	0.0	0.0
FRAC TOWER	3	15.000	45.0	0	0.00	0.0	45.0
INLET SCRUBBER	21	18.133	95.0	0	0.00	0.0	22.2
METER	1	0.000	0.0	0	0.00	0.0	0.0
OTANK	5	9.820	27.8	0	0.00	0.0	24.5
REFRIGERATION	1	0.000	0.0	0	0.00	0.0	0.0
SWEETENER	1	0.000	0.0	0	0.00	0.0	0.0
OTHER	6	38.633	121.0	0	2.25	8.4	98.5
PRODUCT LINE	1	20.000	20.0	20	20.00	20.0	20.0
REFLUX PUMP	3	61.667	120.0	0	0.00	65.0	120.0
OPUMP	2	100.000	145.0	55	55.00	100.0	145.0
Production Facilities							
WINJ	2	0.000	0	0	0.00	0.0	0
WOTHER	1	0.000	0	0	0.00	0.0	0
MANIFOLD	5	19.600	46	0	2.50	5.0	44
OTHER	9	24.111	10	0	3.50	7.0	37.5
WPROD	4	11.250	30	0	1.25	7.5	25
WTANK	10	32.100	105	0	0.00	10.0	72
STANK	4	45.250	142	0	4.25	19.5	112
WLINE	3	53.333	125	0	0.00	35.0	125
H/T	11	65.364	275	0	0.00	13.0	145
FLINE	9	88.222	245	0	15.00	50.0	184.5
SEP	41	164.488	621	0	42.00	121.0	220

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Alabama and Florida

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	MOBILE	19	6.405	27.8	0	0.00	0.0	13.20
GP	ESCAMBIA	29	26.828	145.0	0	0.00	0.0	50.00
GP	SANTA ROSA	2	106.000	121.0	91	91.00	106.0	121.00
PROD	MOBILE	15	31.667	275.0	0	0.00	0.0	13.00
PROD	WASHINGTON	3	0.000	0.0	0	0.00	0.0	0.00
PROD	COLLIER	6	51.333	193.0	5	5.00	31.5	79.75
PROD	CLARKE	2	32.000	47.0	17	17.00	32.0	47.00
PROD	MONROE	12	64.167	205.0	0	6.25	40.0	120.00
PROD	ESCAMBIA	55	123.764	621.0	0	16.00	71.0	196.00
PROD	SANTA ROSA	6	142.500	397.0	30	39.00	107.0	228.25

Note: Santa Rosa is in the Florida Panhandle and Collier is in the southern tip of Florida (Naples). All other counties are in Alabama.

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Alabama and Florida

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
SANTA ROSA	8	4.1250	10.0	3.0	3.00	3.0	4.0
MOBILE	34	7.0735	15.0	4.5	4.50	4.5	7.5
ESCAMBIA	84	8.4286	15.0	3.0	4.00	5.0	15.0
WASHINGTON	3	7.5000	7.5	7.5	7.50	7.5	7.5
CLARKE	2	8.0000	8.0	8.0	8.00	8.0	8.0
COLLIER	6	8.8333	13.0	7.0	7.75	8.0	10.0
MONROE	12	15.0000	15.0	15.0	15.00	15.0	15.0

Note: Santa Rosa is in the Florida Panhandle and Collier is in the southern tip of Florida (Naples). All other counties are in Alabama.

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SUMMARY

(Alaska)

I. There were no significant differences over background in any of the items of equipment.

II. Offshore areas had low background readings and Anchorage county was very low.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	256	4.0	4.0	5.0	6
b. Max Reading	256	9.5	29.0	84.5	706
c. Difference	256	6.0	25.0	80.9	701
2. Facility					
a. Background					
Gas Processing	13	4.0	4.5	6.0	6
Production	243	4.0	4.0	5.0	6
b. Max Reading					
Gas Processing	13	5.0	8.5	428.	706
Production	243	10.0	30.0	85.8	500
c. Difference					
Gas Processing	13	0.0	4.0	423.5	701
Production	243	6.0	26.0	81.8	495

NOTE: All data are measured in micro-rems/hr

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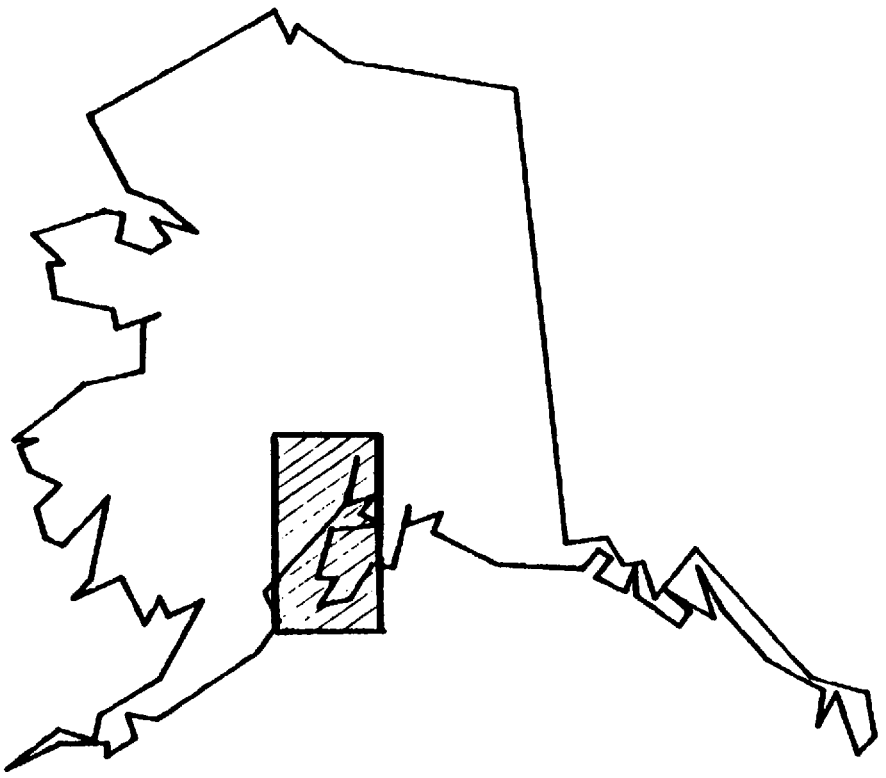
FIGURE 1 – MEDIAN BACKGROUND LEVELS

ALASKA



MICRO-REMS/HR

NO DATA
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2.34 - 4.99
5.0 - 9.0
9.01 - 14.0
OVER 14.0

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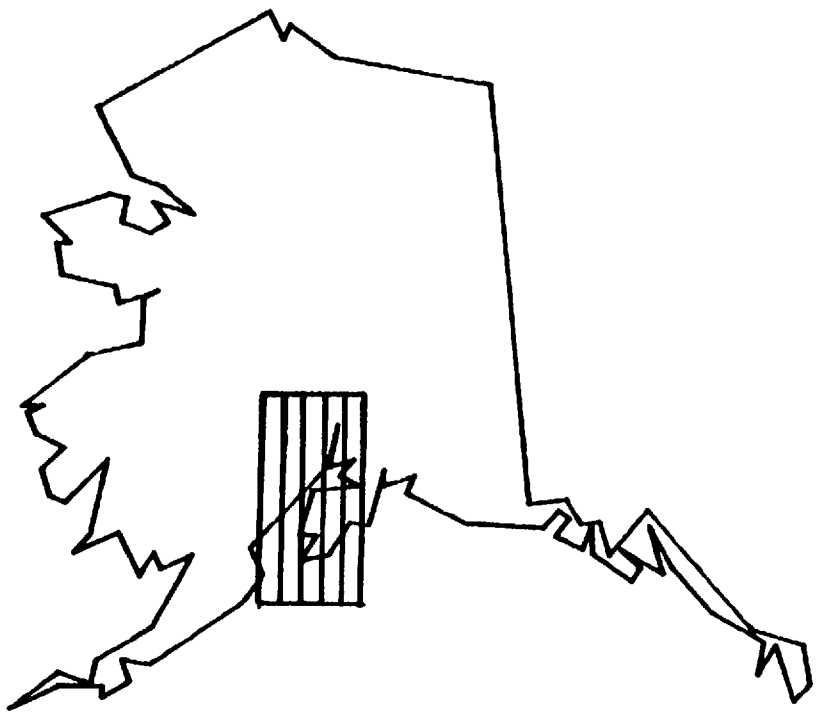
FIGURE 2 – DIFFERENCE OVER BACKGROUND

ALASKA

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
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BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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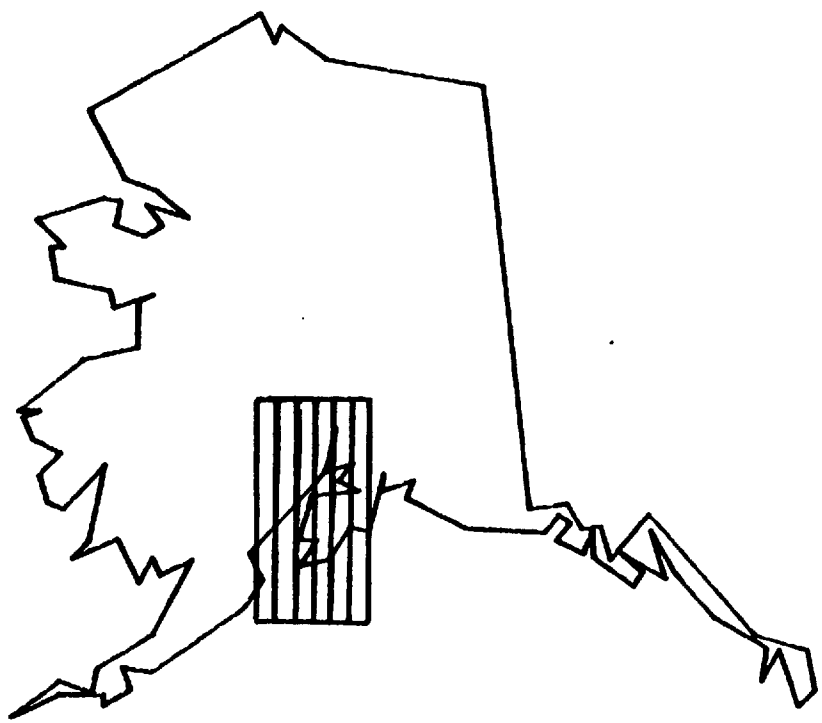
FIGURE 3 – DIFFERENCE OVER BACKGROUND

ALASKA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Alaska

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
1	OTHER	|	0.0	0.00
4	COMPRESSOR	|	0.0	0.75
1	PRODUCT LINE	|*	1.0	1.0
7	INLET SCRUBBER	|*	1.0	7.0
13		-----+----+----+----+----+----+ 10 20 30 40 50 60		

Median of Difference Over Background

FACILITY: Production

1	METER	|	0.0	0.0
8	WPROD	|	0.0	0.75
11	WLINE	|	0.0	5.0
2	WINJ	|	1.0	1.0
3	VRU	|*	2.0	2.0
34	OTHER	|*	2.0	5.0
8	WTANK	|**	3.5	13.0
12	STANK	|**	4.5	8.0
24	SUMP	|***	5.5	13.0
30	MANIFOLD	|****	7.0	42.0
34	SEP	|*********	18.5	54.0
7	PUMP	|**********	19.0	28.0
44	H/T	|**********	19.0	67.5
25	FLINE	|*****************	31.0	83.0
243		-----+----+----+----+----+----+ 10 20 30 40 50 60		

Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Alaska

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
2	ANCHORAGE		0.0	0
7	UNREPORTED		0.0	1
4	OFFSHORE	********	4.0	7

2 4 6 8 10 12 14 16 18 20

Median of Difference Over Background

FACILITY: Production

Obsns	County		Median Difference	75th Percentile
21	ANCHORAGE		0.0	0
147	UNREPORTED	**********	6.0	24
75	OFFSHORE	**************************	13.0	42

2 4 6 8 10 12 14 16 18 20

Median of Difference Over Background

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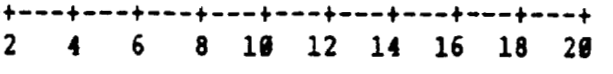
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Alaska

Obs	County	Median	75th Percentile
23	ANCHORAGE	1.0	1.0
154	OFFSHORE	4.0	4.0
79	UNREPORTED	4.0	5.0



MEDIAN OF BKGRND

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Alaska

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
OTHER	1	0.000	0	0	0	0	0.00
COMPRESSOR	4	0.250	1	0	0	0	0.75
PRODUCT LINE	1	1.000	1	1	1	1	1.00
INLET SCRUBBER	7	102.286	701	0	0	1	7.00
Production Facilities							
METER	1	0.0000	0	0	0.00	0.0	0.00
WPROD	8	0.2500	1	0	0.00	0.0	0.75
WLINE	11	2.6364	14	0	0.00	0.0	5.00
WINJ	2	1.0000	1	1	1.00	1.0	1.00
VRU	3	1.3333	2	0	0.00	2.0	2.00
OTHER	34	4.0588	25	0	0.75	2.0	5.00
WTANK	8	6.1250	16	0	0.00	3.5	13.00
STANK	12	7.4167	36	0	0.00	4.5	8.00
SUMP	24	11.3750	92	0	1.00	5.5	13.00
MANIFOLD	30	25.9667	159	0	2.50	7.0	42.00
SEP	34	53.2059	307	0	3.00	18.5	54.00
PUMP	7	18.0000	54	0	0.00	19.0	28.00
H/T	44	55.2727	495	0	6.00	19.0	67.50
FLINE	25	51.4000	191	0	1.50	31.0	83.00

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Alaska

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	ANCHORAGE	2	0.000	0	0	0.00	0	0
GP	UNREPORTED	7	100.429	701	0	0.00	0	1
GP	OFFSHORE	4	3.750	7	0	0.25	4	7
PROD	ANCHORAGE	21	0.048	1	0	0.00	0	0
PROD	UNREPORTED	147	31.272	495	0	1.00	6	24
PROD	OFFSHORE	75	32.253	287	0	4.00	13	42

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Alaska

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
ANCHORAGE	23	1.00000	1	1	1	1	1
OFFSHORE	79	2.97468	4	1	1	4	4
UNREPORTED	154	4.17532	6	2	4	4	5

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SUMMARY

(Arkansas)

I. There were no significant differences between items of equipment.

II. Columbia and Logan counties had mid-range background levels and Franklin and Pope counties had high background levels.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	199	9.0	10.0	12.0	13
b. Max Reading	199	11.0	12.0	14.0	300
c. Difference	199	1.0	2.0	3.4	292
2. Facility					
a. Background					
Gas Processing	50	7.0	9.0	10.9	13
Production	149	9.0	10.0	12.0	13
b. Max Reading					
Gas Processing	50	8.5	11.3	19.5	300
Production	149	11.0	12.0	14.0	90
c. Difference					
Gas Processing	50	0.0	2.0	12.3	292
Production	149	1.0	2.0	3.0	81

NOTE: All data are measured in micro-rems/hr

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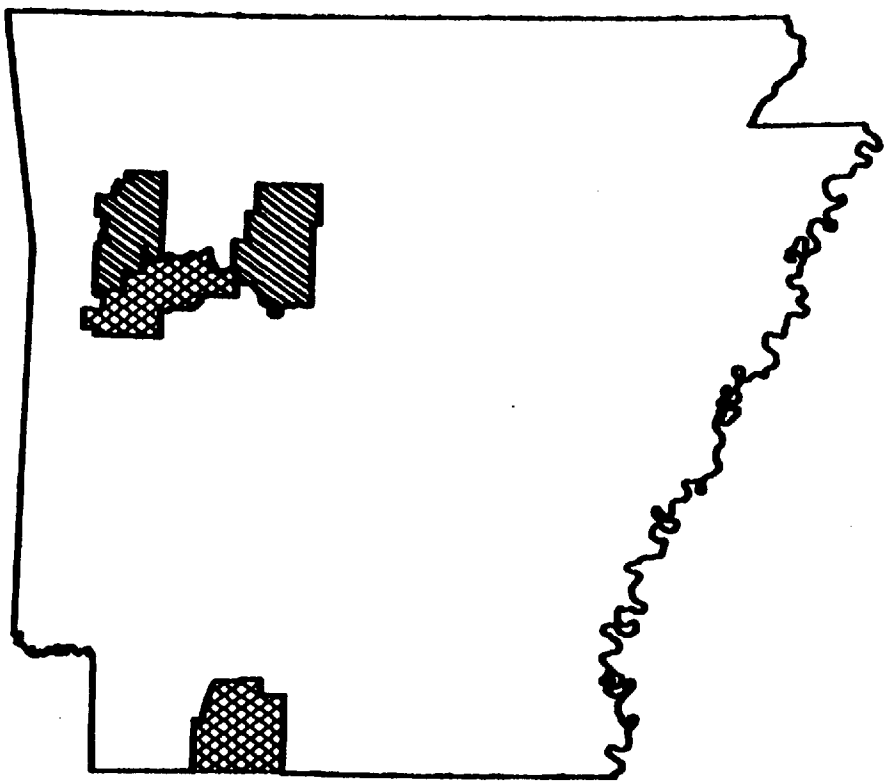
FIGURE 1 – MEDIAN BACKGROUND LEVELS

ARKANSAS



MICRO-REMS/HR

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5.0 – 9.0
9.01 – 14.0
OVER 14.0

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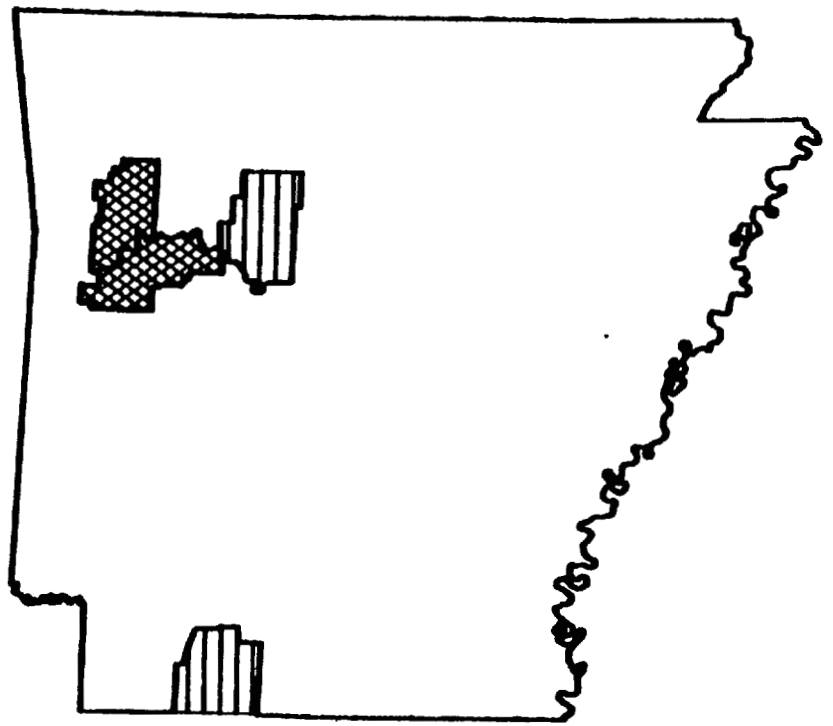
FIGURE 2 – DIFFERENCE OVER BACKGROUND

ARKANSAS

GAS PROCESSING FACILITIES



MICRO-REMS/HR

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BELOW .8
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.8 - 1.99
OVER 245

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FIGURE 3 – DIFFERENCE OVER BACKGROUND

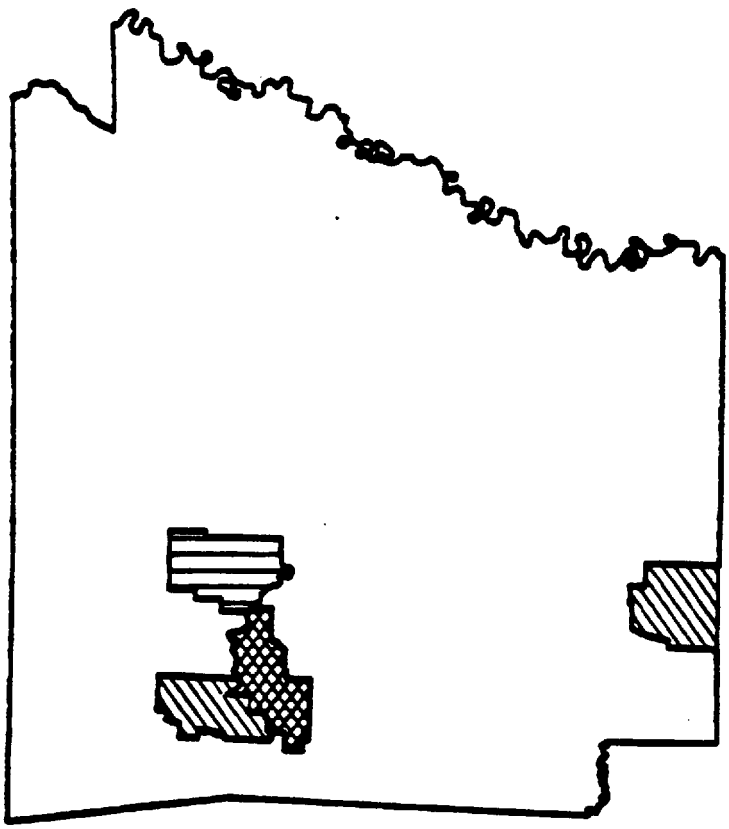

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Table 1

Difference of Maximum Reading over Background by Equipment Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Arkansas

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
4	METER	|	0.00	23.6
21	OTHER	|	0.00	1.8
4	SWEETENER	|	0.00	0.6
3	DEHYDRATOR	|	1.00	2.0
6	OTANK	|*	1.35	10.3
12	COMPRESSOR	|*	1.50	2.8
---		-----+----+----+----+----+----+		
50		10 20 30 40 50 60		

Median of Difference Over Background

FACILITY: Production

4	OTHER	|	0.00	0.8
10	STANK	|	0.00	1.6
2	WOTHER	|	0.00	0.0
35	H/T	|*	1.00	2.0
13	SEP	|*	1.00	2.0
41	WPROD	|*	1.00	2.0
42	WTANK	|*	2.00	3.0
2	PUMP	|*	3.00	3.5
---		-----+----+----+----+----+----+		
149		10 20 30 40 50 60		

Median of Difference Over Background

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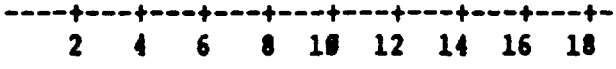
Table 2

Median Difference Over Background by County Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Arkansas

FACILITY: Gas Processing

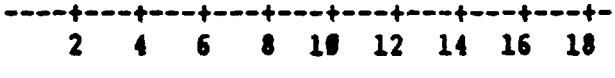
Obsns	County	Median Difference	75th Percentile
37	COLUMBIA	0.0	1.5
3	POPE	0.0	1.0
9	LOGAN	2.0	2.0
1	FRANKLIN	3.0	3.0



Median of Difference Over Background

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
11	POPE	0.0	1.0
31	COLUMBIA	1.0	11.5
20	FRANKLIN	1.0	2.0
87	LOGAN	2.0	2.0



Median of Difference Over Background

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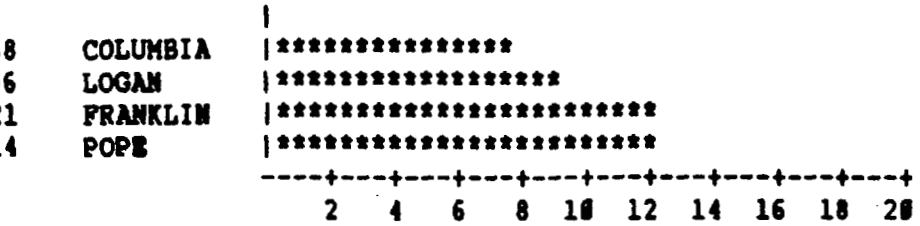
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Arkansas

Obs	County	Median	75th Percentile
68	COLUMBIA	7.75	8.5
96	LOGAN	9.00	9.8
21	FRANKLIN	12.00	12.0
14	POPE	12.00	13.0



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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Arkansas

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
SWEETENER	4	0.0500	0.2	0	0	0.00	0.150
OTHER	21	15.6000	292.0	0	0	0.00	1.750
METER	4	7.8750	31.5	0	0	0.00	23.625
DEHYDRATOR	3	1.0000	2.0	0	0	1.00	2.000
OTANK	6	5.2833	23.0	0	0	1.35	10.250
COMPRESSOR	12	1.4167	3.0	0	0	1.50	2.750
Production Facilities							
WOTHER	2	0.00000	0.0	0.0	0.0	0	0.000
OTHER	4	0.25000	1.0	0.0	0.0	0	0.750
STANK	10	0.60000	2.0	0.0	0.0	0	1.625
H/T	35	3.54286	81.0	0.0	0.0	1	2.000
SEP	13	1.19231	3.5	0.0	0.0	1	2.000
WPROD	41	1.21951	4.0	0.0	0.0	1	2.000
WTANK	42	6.67857	61.5	0.0	0.0	2	3.000
PUMP	2	3.00000	3.5	2.5	2.5	3	3.500

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Arkansas

PROD	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	POPE	3	0.3333	1	0	0.0	0	1.0
GP	COLUMBIA	37	10.5946	292	0	0.0	0	1.5
GP	LOGAN	9	1.6667	3	0	0.5	2	2.5
GP	FRANKLIN	1	3.0000	3	3	3.0	3	3.0
PROD	POPE	11	0.2727	1	0	0.0	0	1.0
PROD	FRANKLIN	20	1.2000	3	0	0.0	1	2.0
PROD	COLUMBIA	31	10.8387	81	0	0.0	1	11.5
PROD	LOGAN	87	1.3793	4	0	0.0	2	2.0

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Arkansas

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
COLUMBIA	68	7.0000	9	2.5	5.50	7.75	8.50
LOGAN	96	9.2500	11	7.0	9.00	9.00	9.75
FRANKLIN	21	11.0000	13	9.0	9.50	12.00	12.00
POPE	14	12.0714	13	11.0	11.75	12.00	13.00

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SUMMARY

(California)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

	Equipment		Median Difference	75th Percentile
1.	Reflux Pumps	(GP)	138 µR/hr	492.5 µR/hr
2.	Propane Pumps	(GP)	87	152.0
3.	Propane Tanks	(GP)	61.5	98.8
4.	Bottoms Pump	(GP)	34.0	52.0

II. Orange county had a low median background, Los Angeles, Santa Barbara, Kern, and Ventura had high median background readings. All others were mid-range.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	950	10.0	13.0	15.0	30
b. Max Reading	950	11.0	18.0	54.0	1,300
c. Difference	950	0.0	4.0	41.0	1,290
2. Facility					
a. Background					
Gas Processing	227	14.0	15.0	15.0	20
Production	723	9.0	12.0	16.2	30
b. Max Reading					
Gas Processing	227	15.0	60.0	129.2	1,000
Production	723	10.0	13.0	24.0	1,300
c. Difference					
Gas Processing	227	4.0	46.0	116.2	980
Production	723	0.0	2.0	10.0	1,290

NOTES: 1) All data are measured in micro-rems/hr

2) The apparent differences between facilities are due to the specific items of equipment listed in Section I above.

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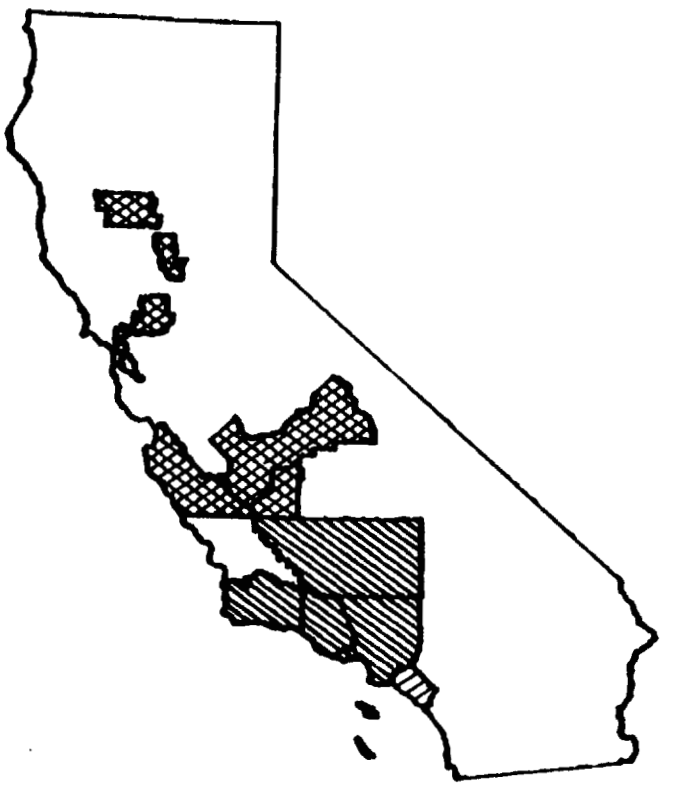
FIGURE 1 – MEDIAN BACKGROUND LEVELS

CALIFORNIA



MICRO-REMS/HR

NO DATA
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0 - 2.33
9.01 - 14.0
2.34 - 4.99
OVER 14.0

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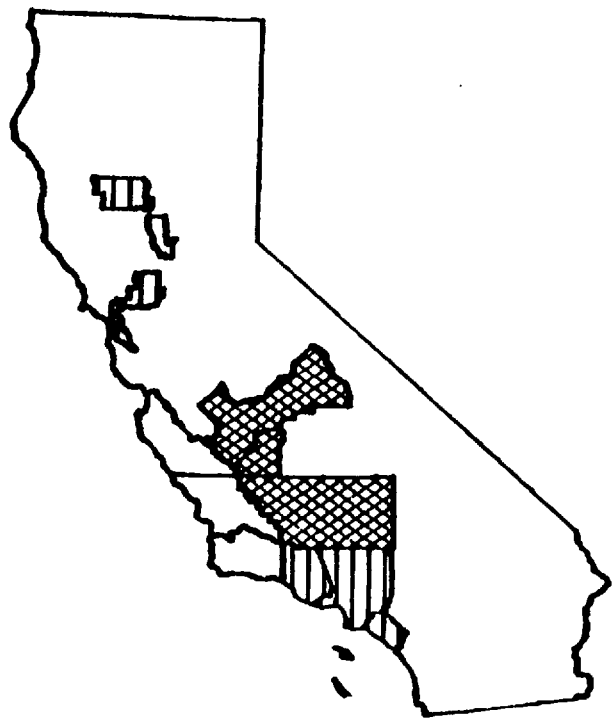
FIGURE 2 – DIFFERENCE OVER BACKGROUND

CALIFORNIA

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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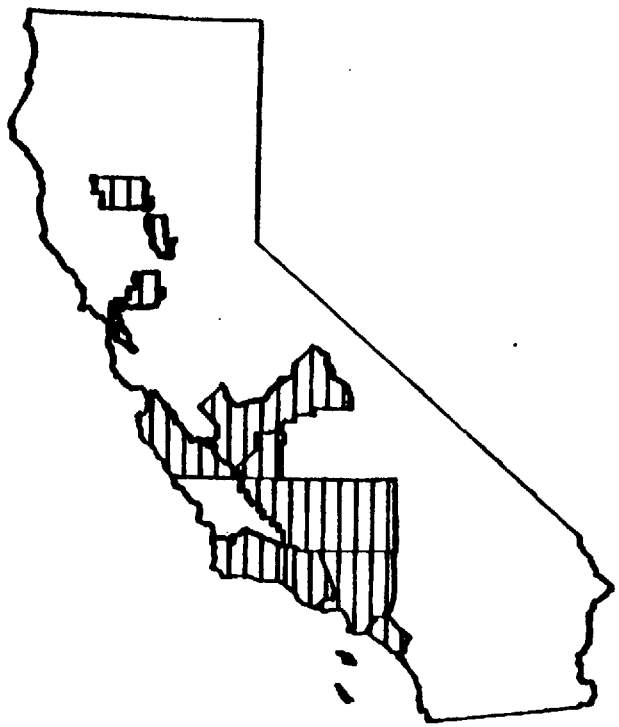
FIGURE 3 – DIFFERENCE OVER BACKGROUND

CALIFORNIA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
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BELOW .8
39.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

California

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
24	COMPRESSOR	|	0.0	0.0
32	INLET SCRUBBER	|	0.0	0.0
38	OTANK	|	0.0	5.0
11	OTHER	|	0.0	2.0
4	SWEETENER	*	5.0	73.3
13	REFRIGERATION	*	7.0	28.0
2	OPUMP	**	11.0	18.0
1	CRYO UNIT	***	13.0	13.0
10	DEHYDRATOR	***	13.0	55.0
26	PRODUCT LINE	***	15.0	73.5
6	METER	*****	25.5	51.0
13	FRAC TOWER	*****	27.0	62.0
3	BOTTOMS PUMP	*******	34.0	52.0
30	PTANK	**********	61.5	98.8
2	PPUMP	**********	87.0	152.0
12	REFLUX PUMP	**********	138.0	492.5
227		----+---+---+---+---+---+---+		
		20 40 60 80 100 120 140		

Median of Difference

FACILITY: Production

58	H/T	|	0.0	0.0
35	MANIFOLD	|	0.0	3.0
86	OTHER	|	0.0	6.0
40	PUMP	|	0.0	0.0
121	SEP	|	0.0	0.0
131	STANK	|	0.0	0.0
10	SUMP	|	0.0	5.0
7	WINJ	|	0.0	1.0
3	WOTHER	|	0.0	2.0
67	WPROD	|	0.0	0.0
108	WTANK	|	0.0	2.0
16	WLINE	|	2.0	28.3
20	FLINE	*	3.0	85.8
21	VRU	*****	25.0	249.5
723		----+---+---+---+---+---+---+		
		20 40 60 80 100 120 140		

Median of Difference

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

California

FACILITY: Gas Processing

Obsns	County	Median Difference	75th Percentile
15	GLENN	0.0	0.0
2	LOS ANGELES	0.0	0.0
3	ORANGE	0.0	12.0
3	SOLANO	0.0	0.0
110	VENTURA	0.0	39.5
10	FRESNO/KING	5.0	5.0
77	KERN	27.0	65.0
7	UNREPORTED	48.0	78.0

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
61	FRESNO	0.0	0.0
6	FRESNO/KING	0.0	0.0
82	GLENN	0.0	0.0
315	KERN	0.0	5.0
94	LOS ANGELES	0.0	0.0
12	MONTEREY	0.0	2.8
29	ORANGE	0.0	1.5
2	SANTA BARB.	0.0	0.0
22	SOLANO	0.0	0.0
8	SUTTER	0.0	0.8
36	UNREPORTED	0.0	9.8
56	VENTURA	0.0	2.0

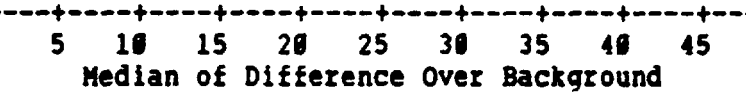

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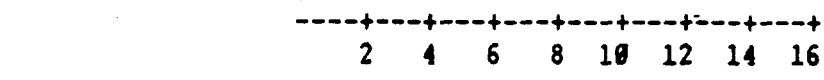
Table 3

Median Background by County
(Micro-Rems/Hr)

California

Obs	County	Median	75th Percentile
32	ORANGE	3.0	8.0
16	FRESNO/KING	5.0	7.0
97	GLENN	5.0	5.0
8	SUTTER	5.5	6.8
12	MONTEREY	6.0	7.0
25	SOLANO	7.0	7.0
61	FRESNO	9.0	10.0
96	LOS ANGELES	10.0	10.0
2	SANTA BARBARA	10.0	10.0
392	KERN	12.0	15.0
43	UNREPORTED	12.0	12.0
166	VENTURA	13.0	15.0
950			



Median of Background

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

California

Equipment	No	AVG	Maximum	Minimum	PCT25	Median	PCT75
Gas Processing Facilities							
COMPRESSOR	24	0.500	12	0	0.00	0.0	0.00
INLET SCRUBBER	32	18.531	527	0	0.00	0.0	0.00
OTANK	38	17.474	193	0	0.00	0.0	5.00
OTHER	11	4.273	38	0	0.00	0.0	2.00
SWEETENER	4	26.250	95	0	0.50	5.0	73.25
REFRIGERATION	13	16.154	55	0	0.00	7.0	28.00
OPUMP	2	11.000	18	4	4.00	11.0	18.00
CRYO UNIT	1	13.000	13	13	13.00	13.0	13.00
DEHYDRATOR	10	73.200	529	0	0.75	13.0	55.75
PRODUCT LINE	26	46.808	277	0	0.00	15.0	73.50
METER	6	25.500	51	0	0.00	25.5	51.00
FRAC TOWER	13	51.846	226	0	6.50	27.0	62.00
BOTTOMS PUMP	3	32.000	52	10	10.00	34.0	52.00
PTANK	30	72.267	216	0	31.00	61.5	98.75
PPUMP	2	87.000	152	22	22.00	87.0	152.00
REFLUX PUMP	12	249.833	980	0	39.50	138.0	492.50
Production Facilities							
H/T	58	1.793	32	0	0	0	0.00
MANIFOLD	35	37.629	1290	0	0	0	3.00
OTHER	86	4.988	52	0	0	0	6.00
PUMP	40	12.250	213	0	0	0	0.00
SEP	121	5.884	438	0	0	0	0.00
STANK	131	4.443	147	0	0	0	0.00
SUMP	10	1.600	6	0	0	0	5.00
WINJ	7	0.714	4	0	0	0	1.00
WOTHER	3	0.667	2	0	0	0	2.00
WPROD	67	2.075	63	0	0	0	0.00
WTANK	100	3.111	85	0	0	0	2.00
WLINE	16	28.687	143	0	0	2	28.25
FLINE	20	42.300	213	0	0	3	85.75
VRU	21	199.429	1287	0	0	25	249.50

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Appendix 2

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

California

FACILITY	COUNTY	NO	AVG	LARGEST	LOWEST	PCT25	MED	PCT75
GP	GLENN	15	0.0000	0	0	0	0	0.00
GP	LOS ANGELES	2	0.0000	0	0	0	0	0.00
GP	ORANGE	3	4.0000	12	0	0	0	12.00
GP	SOLANO	3	0.0000	0	0	0	0	0.00
GP	VENTURA	110	35.6182	529	0	0	0	39.50
GP	FRESNO/KING	10	3.0000	5	0	0	5	5.00
GP	KERN	77	72.4935	980	0	1	27	65.00
GP	UNREPORTED	7	48.0000	93	8	13	48	78.00
PROD	FRESNO	61	1.1148	17	0	0	0	0.00
PROD	FRESNO/KING	6	0.0000	0	0	0	0	0.00
PROD	GLENN	82	0.0610	4	0	0	0	0.00
PROD	KERN	315	27.3587	1290	0	0	0	5.00
PROD	LOS ANGELES	94	0.9043	40	0	0	0	0.00
PROD	MONTEREY	12	4.2500	29	0	0	0	2.75
PROD	ORANGE	29	2.5862	22	0	0	0	1.50
PROD	SANTA BARBARA	2	0.0000	0	0	0	0	0.00
PROD	SOLANO	22	0.1818	2	0	0	0	0.00
PROD	SUTTER	8	0.3750	2	0	0	0	0.75
PROD	UNREPORTED	36	12.4167	143	0	0	0	9.75
PROD	VENTURA	56	2.5179	42	0	0	0	2.00

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

California

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
ORANGE	32	5.0312	8	3	3	3.0	8.00
FRESNO/KING	16	5.7500	7	5	5	5.0	7.00
GLENN	97	4.7526	5	2	5	5.0	5.00
SUTTER	8	5.6250	7	4	5	5.5	6.75
MONTEREY	12	6.4167	7	6	6	6.0	7.00
SOLANO	25	7.0000	7	7	7	7.0	7.00
FRESNO	61	9.6557	15	7	9	9.0	10.00
LOS ANGELES	96	9.3854	12	5	10	10.0	10.00
SANTA BARBARA	2	10.0000	10	10	10	10.0	10.00
KERN	392	11.6327	30	5	7	12.0	15.00
UNREPORTED	43	12.0000	12	12	12	12.0	12.00
VENTURA	166	12.3193	15	5	10	13.0	15.00

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SUMMARY

(Colorado)

I. There were no significant differences in readings among items of equipment or between facility types.

II. Adams and Weld counties had mid-range background levels while Jackson, Washington, and Rio Blanco counties were in the high category.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	559	12.0	13.0	16.0	17
b. Max Reading	559	12.0	16.0	20.0	280
c. Difference	559	0.0	0.0	8.0	263
2. Facility					
a. Background					
Gas Processing	49	6.5	8.0	10.0	11
Production	510	12.0	14.0	16.0	17
b. Max Reading					
Gas Processing	49	8.0	13.0	60.0	225
Production	510	13.0	16.0	20.0	280
c. Difference					
Gas Processing	49	0.0	7.3	53.5	221
Production	510	0.0	0.0	7.0	263

NOTES: 1) All data are measured in micro-rems/hr

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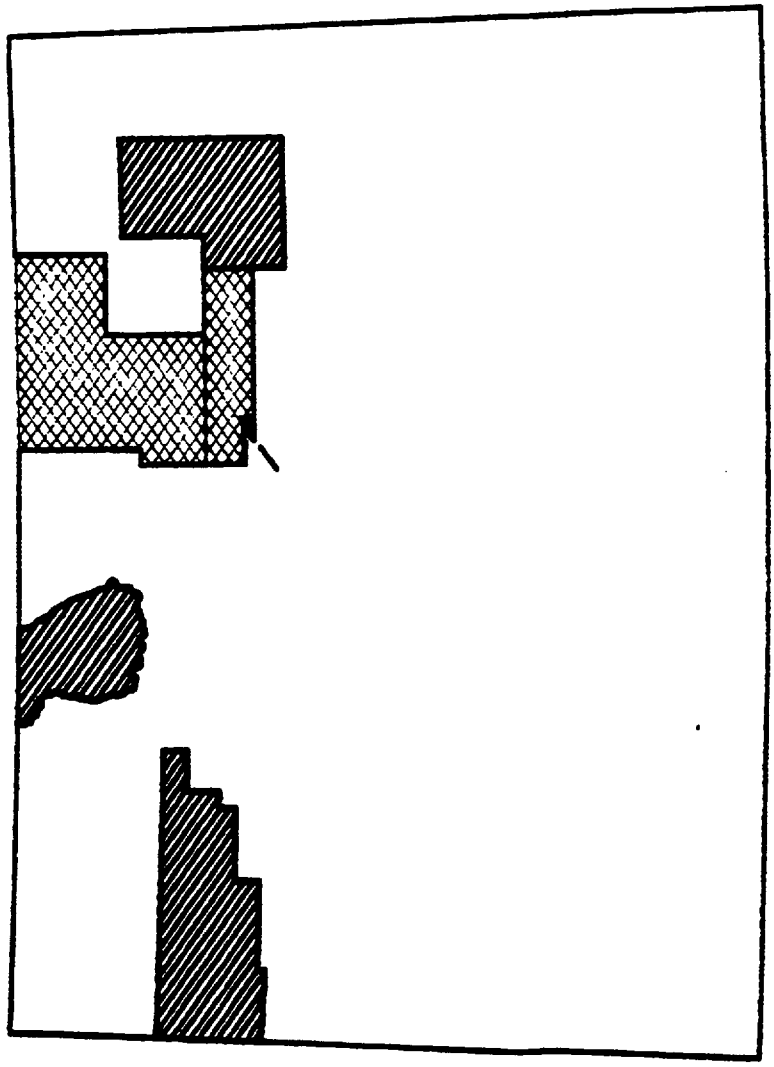
FIGURE 1 — MEDIAN BACKGROUND LEVELS

COLORADO



MICRO-REMS/HR

NO DATA
5.0 – 9.0
0 – 2.33
9.01 – 14.0
2.34 – 4.99
OVER 14.0

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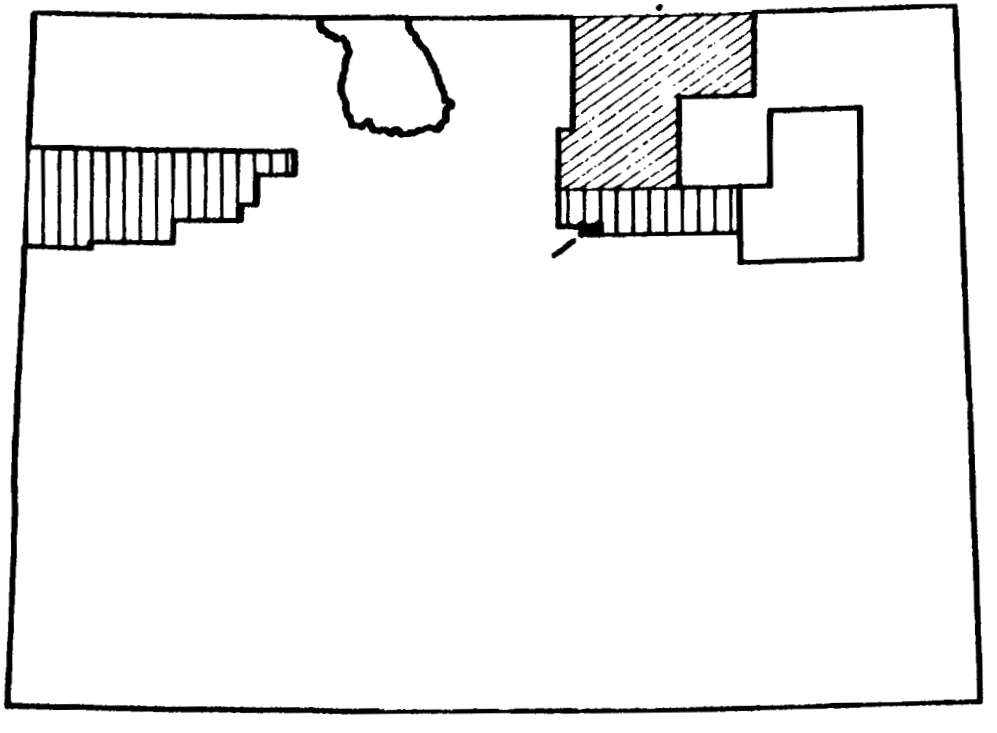
FIGURE 2 – DIFFERENCE OVER BACKGROUND

COLORADO

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 – 33
BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Colorado

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
4	DEHYDRATOR	|	0.0	0.0
3	FRAC TOWER	|	0.0	0.0
16	INLET SCRUBBER	|	0.0	2.9
1	PTANK	|	0.0	0.0
4	REFRIGERATION	|	0.0	1.1
4	OTANK	|*	1.5	25.6
8	PRODUCT LINE	|***	6.0	21.9
3	SWEETENER	|*******	13.0	220.5
2	OTHER	|********	16.0	32.0
4	OPUMP	|**********	31.5	64.0
---		-----+----+----+----+----+----+		
49		10 20 30 40 50 60		

Median of Difference Over Background

FACILITY: Production

29	H/T	|	0.0	2.5
178	MANIFOLD	|	0.0	0.0
20	METER	|	0.0	0.0
19	OTHER	|	0.0	4.0
15	PUMP	|	0.0	0.0
121	SEP	|	0.0	7.0
52	STANK	|	0.0	0.0
1	SUMP	|	0.0	0.0
4	WLINE	|	0.0	0.0
4	WPROD	|	0.0	0.0
34	WTANK	|	0.0	0.0
35	WINJ	|*	1.5	3.0
2		-----+----+----+----+----+----+		
---		10 20 30 40 50 60		
510		Median of Difference Over Background		

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Colorado

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
5	RIO BLANCO	|	0.00	0.0
16	ADAMS	|***	0.75	12.13
28	WELD	|****	1.00	7.88

----+---+---+---+---+---+---+--
1 2 3 4 5 6 7

Median of Difference Over Background

FACILITY: Production

108	JACKSON	|	0.00	0.0
353	RIO BLANCO	|	0.00	0.0
11	WASHINGTON	|	0.00	0.0
38	WELD	|	0.00	2.5

----+---+---+---+---+---+---+--
1 4 2 3 4 5 6 7

Median of Difference Over Background

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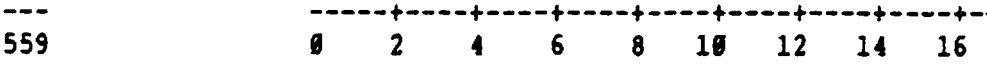
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Colorado

Obs	County	Median	75th Percentile
66	WELD	7.5	9.0
16	ADAMS	8.0	8.0
108	JACKSON	12.0	13.0
11	WASHINGTON	12.0	12.0
258	RIO BLANCO	13.0	15.0
559			



Median of Background Reading

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Colorado

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
DEHYDRATOR	4	0.0000	0.0	0.0	0.00	0.0	0.000
FRAC TOWER	3	0.0000	0.0	0.0	0.00	0.0	0.000
INLET SCRUBBER	16	11.4687	168.5	0.0	0.00	0.0	2.875
PTANK	1	0.0000	0.0	0.0	0.00	0.0	0.000
REFRIGERATION	4	0.3750	1.5	0.0	0.00	0.0	1.125
OTANK	4	9.1250	33.5	0.0	0.25	1.5	25.625
PRODUCT LINE	8	14.1875	58.5	0.0	1.12	6.0	21.875
SWEETENER	3	78.0000	220.5	0.5	0.50	13.0	220.500
OTHER	2	16.0000	32.0	0.0	0.00	16.0	32.000
OPUMP	4	33.5000	68.5	2.5	4.25	31.5	64.750
Production Facilities							
H/T	29	3.37931	28	0	0	0.0	2.5
MANIFOLD	178	0.19101	15	0	0	0.0	0.0
METER	20	0.00000	0	0	0	0.0	0.0
OTHER	19	6.89474	78	0	0	0.0	4.0
PUMP	15	2.33333	29	0	0	0.0	0.0
SEP	121	8.40496	263	0	0	0.0	7.0
STANK	52	0.42308	13	0	0	0.0	0.0
SUMP	1	0.00000	0	0	0	0.0	0.0
WLINE	4	0.00000	0	0	0	0.0	0.0
WPROD	34	1.20588	24	0	0	0.0	0.0
WTANK	35	1.88571	27	0	0	0.0	0.0
WINJ	2	1.50000	3	0	0	1.5	3.0

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Colorado

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	RIO BLANCO	5	0.0000	0.0	0	0	0.00	0.000
GP	ADAMS	16	18.5625	220.5	0	0	0.75	12.125
GP	WELD	28	15.6429	168.5	0	0	1.00	7.875
PROD	JACKSON	100	0.4537	28.0	0	0	0.00	0.000
PROD	RIO BLANCO	353	3.7139	263.0	0	0	0.00	0.000
PROD	WASHINGTON	11	0.0000	0.0	0	0	0.00	0.000
PROD	WELD	38	2.2895	13.0	0	0	0.00	2.500

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Colorado

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
WELD	66	8.4742	13	6.5	6.500	7.5	9
ADAMS	16	7.1250	8	4.5	5.375	8.0	8
JACKSON	100	11.8981	15	6.0	11.000	12.0	13
WASHINGTON	11	12.0000	14	10.0	12.000	12.0	12
RIO BLANCO	358	12.8966	17	8.0	12.000	13.0	15

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SUMMARY

(Illinois)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

	Equipment		Median Difference	75th Percentile
1.	Heater Treater(1)	(Prod)	176 µR/hr	176.0 µR/hr
2.	Flow Line	(Prod)	124	259.3
3.	Separator	(Prod)	61	161.0
4.	Water Line (1)	(Prod)	60	60.0
5.	Pump	(Prod)	50	80.0

II. Fayette county has a high background level and Gallatin county has a very high background level.

III. The high equipment readings for Gallatin county were due to some very high readings for a few water and storage tanks, one of which was an outlier value. There were only twenty-four total observations for that county so it is pre-mature to declare it to be a hot-spot. It is, however, suspect.

IV. Overall Summary (All data were on Production facilities)

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
Statewide					
a. Background	661	7.0	10.0	15.0	50
b. Max Reading	661	24.0	100.0	237.0	2,500
c. Difference	661	17.0	90.5	211.6	2,475

NOTE: All data are measured in micro-rems/hr

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FIGURE 1 – MEDIAN BACKGROUND LEVELS

ILLINOIS

MICRO-REMS/HR

NO DATA
5.0 - 9.0
0 - 2.33
9.01 - 14.0
2.34 - 4.99
OVER 14.0

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FIGURE 2 – MEDIAN DIFFERENCE OVER BACKGROUND

ILLINOIS

PRODUCTION FACILITIES

MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Illinois

FACILITY: Production

Obsns	Equipment		Median Difference	75th Percentile
18	SUMP	*	5.5	24.3
80	OTHER	*	6.0	13.0
303	STANK	**	11.0	51.0
34	WTANK	**	12.0	126.8
3	PUMP	**********	50.0	80.0
1	WLINE	**********	60.0	60.0
213	SEP	**********	63.0	161.0
8	FLINE	**********	124.0	259.3
1	H/T	**********	176.0	176.0

20 40 60 80 100 120 140 160

Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Illinois

FACILITY: Production

```
                                                                Median      75th
Obsns     County                                              Difference Percentile

                    |
 497      UNREPORTED|***                                          14.0       56.0
 140      FAYETTE   |**********                                   49.5      162.3
  24      GALLATIN  |*****************************               142.5      234.8
                    ----+---+---+---+---+---+---+
                       20  40  60  80  100 120 140

               Median of Difference Over Background
```

Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Illinois

```
                                                                         75th
Obs  County                                                  Median  Percentile
              |
497  UNREPORTED|**************                                 7.0        8.0
140  FAYETTE   |**************************                    13.0       16.0
 24  GALLATIN  |********************************              16.0       25.0
              ----+---+---+---+---+---+---+---+---+---+
                  2   4   6   8   10  12  14  16  18  20

                     Median of Background Reading
```


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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Illinois

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Production Facilities							
SUMP	18	15.944	71	0	4.5	5.5	24.25
OTHER	80	13.050	186	0	2.0	6.0	13.00
STANK	303	64.422	2475	0	3.0	11.0	51.00
WTANK	34	100.294	575	0	4.0	12.0	126.75
PUMP	3	43.333	80	0	0.0	50.0	80.00
WLINE	1	60.000	60	60	60.0	60.0	60.00
SEP	213	120.944	1075	0	15.0	63.0	161.00
PLINE	8	163.500	389	42	79.0	124.0	259.25
H/T	1	176.000	176	176	176.0	176.0	176.00

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Illinois

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	UNREPORTED	497	55.686	893	0	3.0	14.0	56.00
PROD	FAYETTE	140	119.064	975	0	7.0	49.5	162.25
PROD	GALLATIN	24	297.792	2475	0	16.5	142.5	234.75

Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Illinois

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
UNREPORTED	497	6.5965	12	4	4	7	8
FAYETTE	140	15.6000	50	9	11	13	16
GALLATIN	24	18.2500	25	9	15	16	25

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SUMMARY

(Kansas)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

	Equipment		Median Difference	75th Percentile
1.	Reflux Pumps	(GP)	205 µR/hr	636.3 µR/hr
2.	Product Line	(GP)	170	330.0
3.	Propane Tanks	(GP)	85	680.8
4.	Propane Pump	(GP)	70	70.0
5.	Flow Line	(PROD)	64	191.3

II. Kiowa, Sheridan, Ellsworth, and Edwards counties had mid-range background levels. All the others were classified as high except for Haskell, Stevens, Finney and Grant which were very high.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	726	11.5	14.0	20.0	70
b. Max Reading	726	13.0	23.0	110.0	1,500
c. Difference	726	0.0	7.0	96.3	1,487
2. Facility					
a. Background					
Gas Processing	49	20.0	20.0	20.0	20
Production	677	11.0	13.0	17.0	70
b. Max Reading					
Gas Processing	49	50.0	205.0	350.0	1,100
Production	677	13.0	20.0	80.0	1,500
c. Difference					
Gas Processing	49	30.0	185.0	330.0	1,080
Production	677	0.0	4.5	66.4	1,487

NOTES: 1) All data are measured in micro-rems/hr

2) The apparent differences between facilities are due to the specific items of equipment listed in Section I above.

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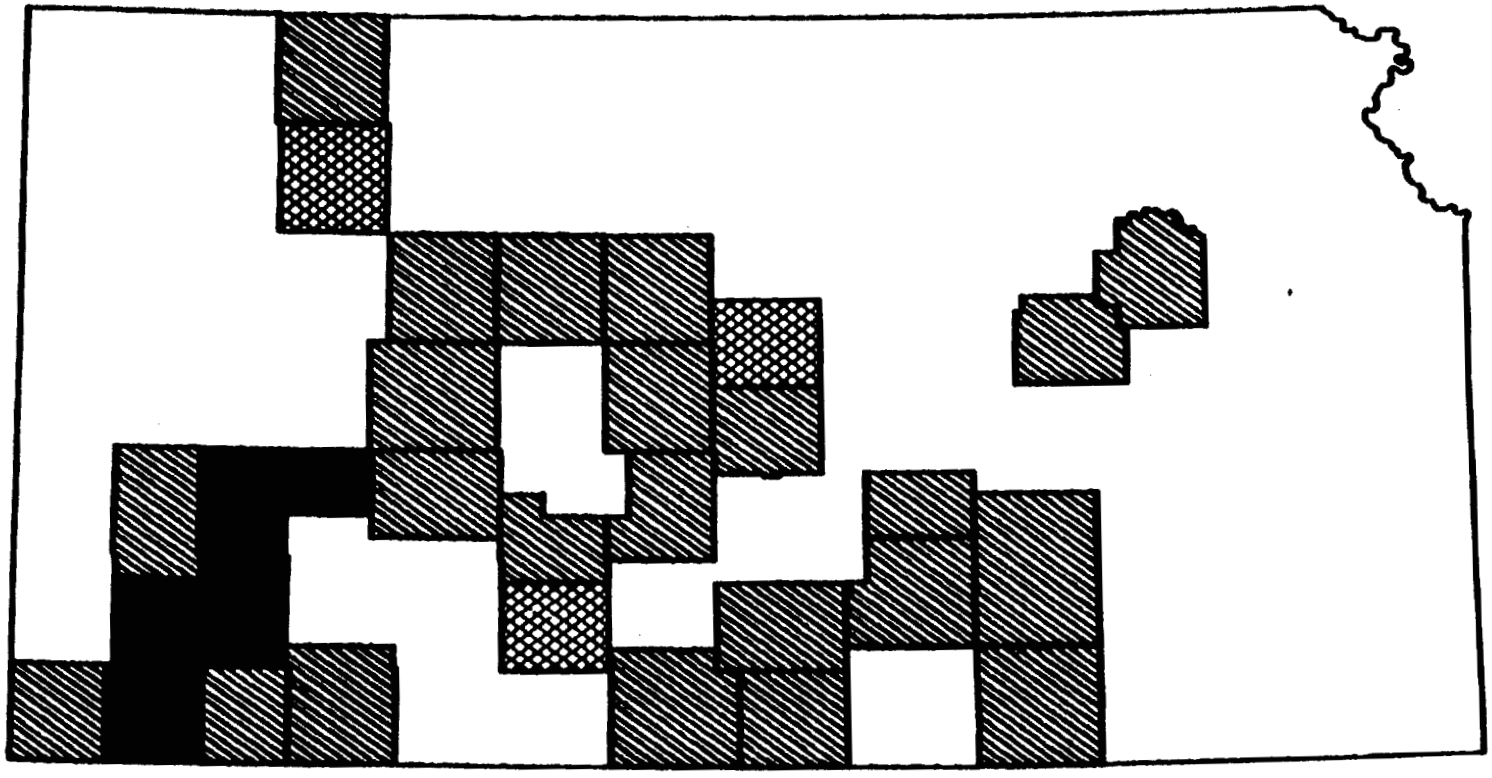
FIGURE 1 – MEDIAN BACKGROUND LEVELS

KANSAS



MICRO-REMS/HR

NO DATA
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0 – 2.33
9.01 – 14.0
2.34 – 4.99
OVER 14.0

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FIGURE 2 – DIFFERENCE OVER BACKGROUND

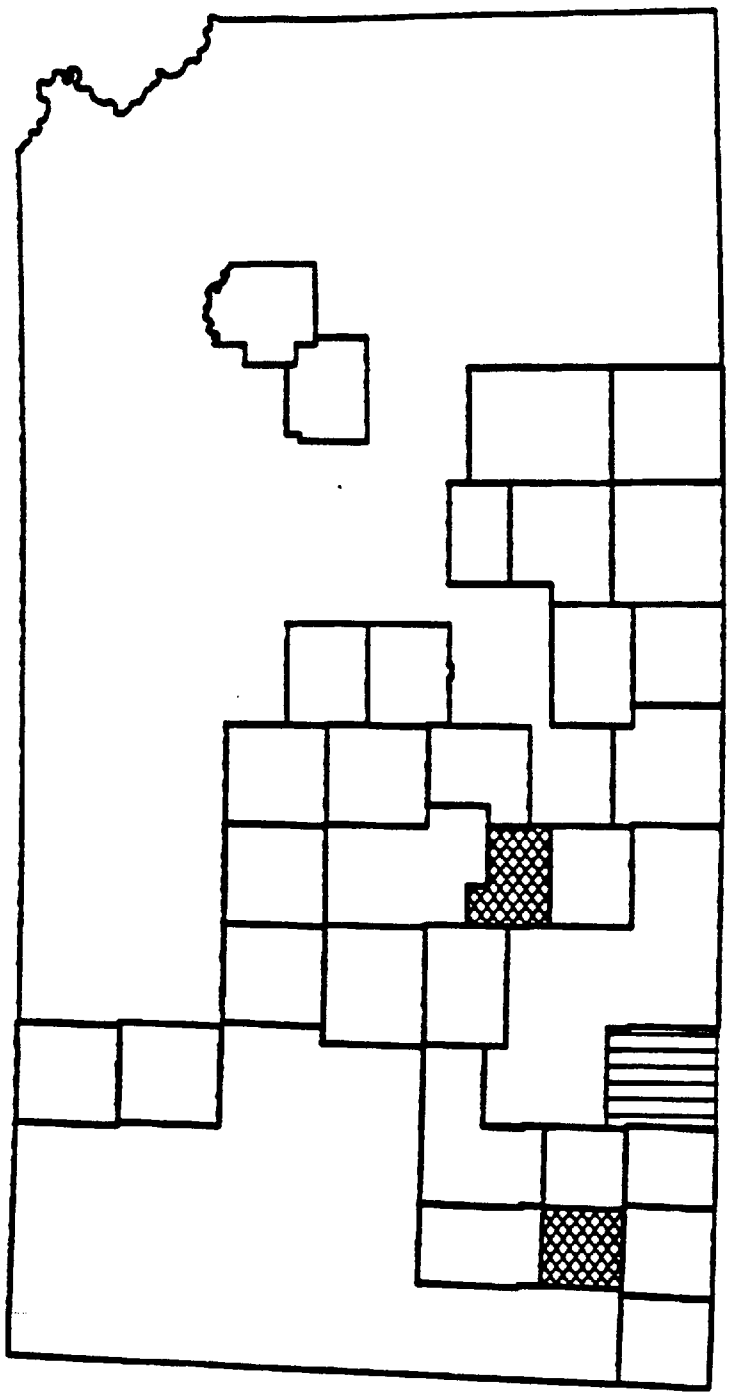

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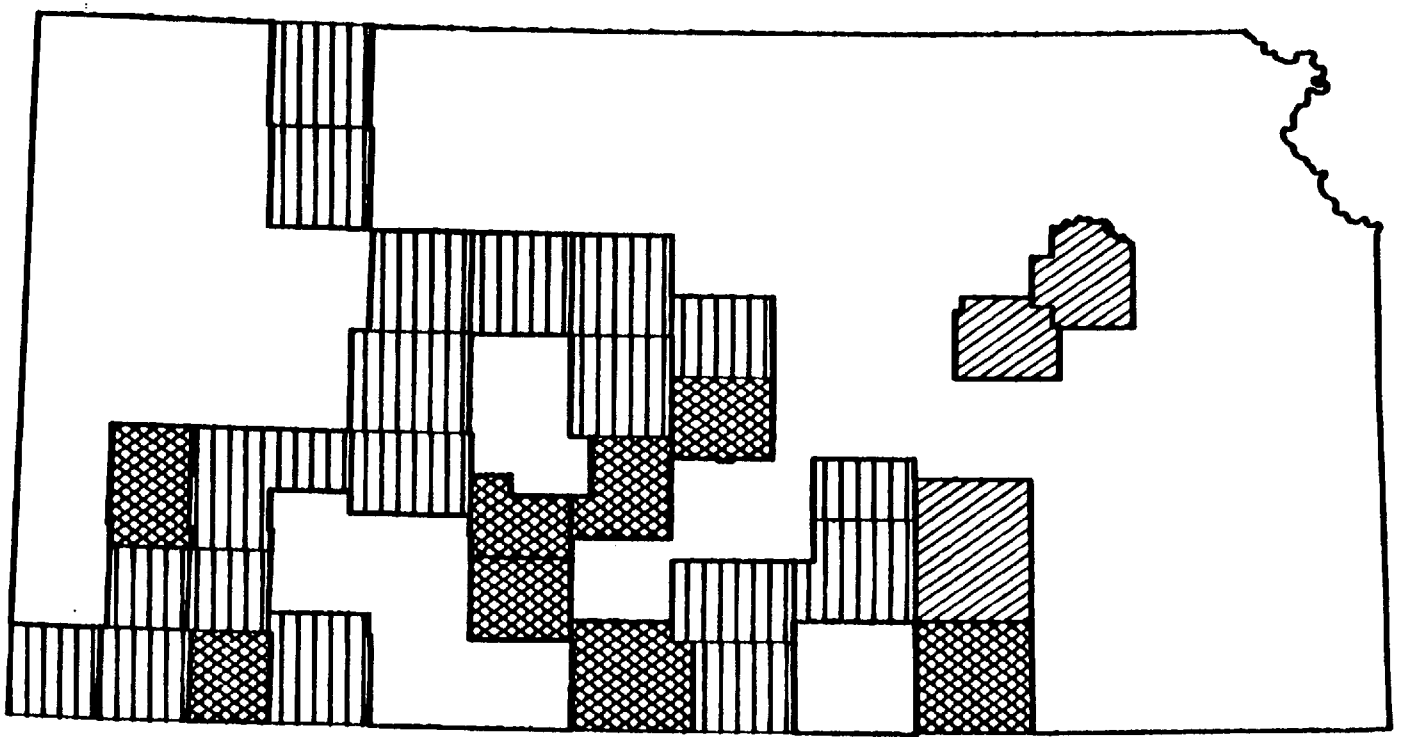
FIGURE 3 – DIFFERENCE OVER BACKGROUND

KANSAS

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Kansas

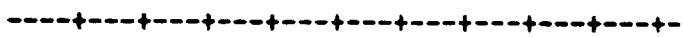
FACILITY: Gas Processing

Obsns	Equipment	Median Difference	75th Percentile
2	COMPRESSOR	3.0	6.0
1	OPUMP	5.0	5.0
5	OTANK	5.0	27.5
17	FRAC TOWER	20.0	42.5
1	DEHYDRATOR	30.0	30.5
1	PPUMP	70.0	70.0
3	PTANK	85.0	680.0
15	PRODUCT LINE	170.0	330.0
4	REFLUX PUMP	205.0	636.3
49			

Median of Difference Over Background

FACILITY: Production

Obsns	Equipment	Median Difference	75th Percentile
10	MANIFOLD	0.0	0.0
16	METER	0.0	0.0
25	OTHER	0.0	0.0
16	PTANK	0.0	0.0
47	PUMP	0.0	1.0
84	SEP	0.0	1.0
226	STANK	0.0	2.0
8	SUMP	0.0	1.5
3	WLINE	0.0	1.0
79	WPROD	0.0	2.0
47	H/T	1.0	6.0
7	WINJ	2.0	37.0
97	WTANK	19.0	110.0
12	FLINE	64.0	191.3
677			



Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Kansas

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
1	MEADE	|	0.0	0.0
1	EDWARDS	|***	6.0	6.0
47	GRANT	|**********	30.0	190.0

-----+----+----+----+----+----+
10 20 30 40 50 60

Median of Difference Over Background

FACILITY: Production

1	KINGMAN	|	0.0	0.0
29	BARTON	|	0.0	7.5
10	DECATUR	|	0.0	0.5
41	ELLIS	|	0.0	1.0
37	ELLSWORTH	|	0.0	1.0
3	FINNEY	|	0.0	0.0
15	HARPER	|	0.0	6.0
11	HARVEY	|	0.0	13.0
16	HASKELL	|	0.0	0.5
42	HODGEMAN	|	0.0	0.0
18	MEADE	|	0.0	3.3
6	MORTON	|	0.0	1.0
21	NESS	|	0.0	0.0
49	RUSSELL	|	0.0	0.0
37	SEDGWICK	|	0.0	18.5
10	SHERIDAN	|	0.0	1.5
12	TREGO	|	0.0	30.5
18	STEVENS	|	0.0	0.6
44	MORRIS	|	0.5	1.0
89	BUTLER	|*	1.0	70.5
6	WABAUNSEE	|*	1.0	3.0
59	BARBER	|*	2.0	34.0
2	COWLEY	|*	2.0	2.0
5	RICE	|**	3.0	103.0
8	KIOWA	|**	3.5	8.0
62	STAFFORD	|**	3.5	57.3
13	SEWARD	|***	5.0	60.5
11	EDWARDS	|***	6.0	6.0
2	KEARNY	|******	12.0	19.0

-----+----+----+----+----+----+
10 20 30 40 50 60

Median of Difference Over Background

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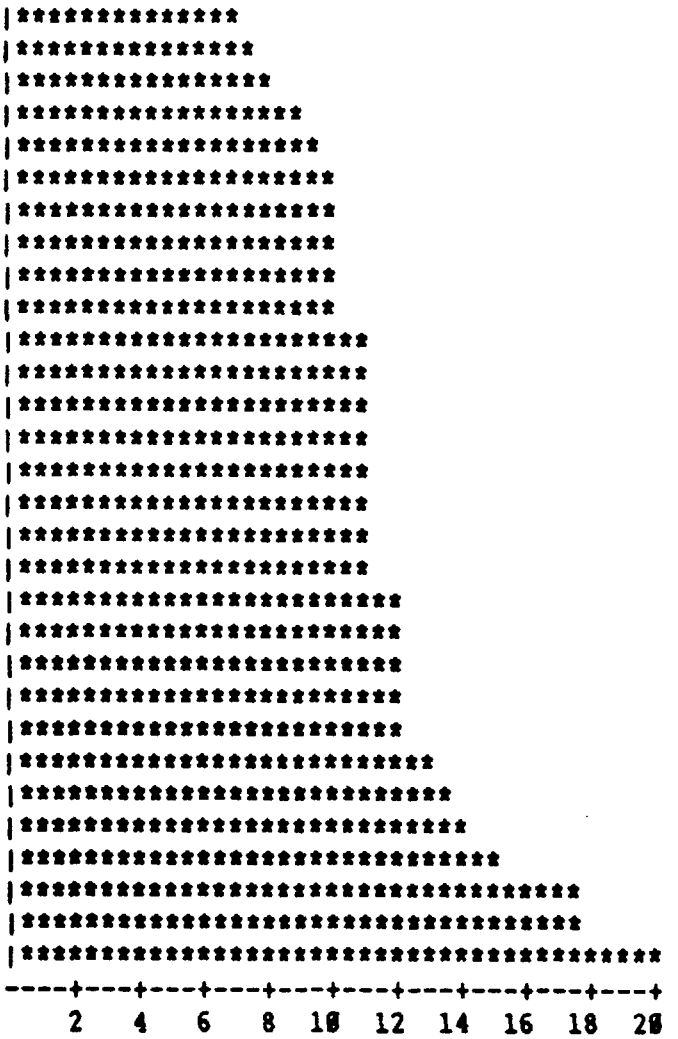
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Kansas

Obs	County	Median	75th Percentile
8	KIOWA	7.0	7.0
10	SHERIDAN	7.5	12.0
37	ELLSWORTH	8.0	8.5
12	EDWARDS	9.0	11.0
10	DECATUR	9.5	10.3
1	KINGMAN	10.0	10.0
29	BARTON	10.0	11.5
41	ELLIS	10.0	11.0
15	HARPER	10.0	13.0
13	SEWARD	10.0	13.0
2	COWLEY	11.0	11.0
11	HARVEY	11.0	11.0
2	KEARNY	11.0	11.0
19	MEADE	11.0	11.0
6	MORTON	11.0	11.0
5	RICE	11.0	17.5
49	RUSSELL	11.0	12.0
6	WABAUNSEE	11.0	11.0
49	BARBER	12.0	13.0
44	MORRIS	12.0	13.0
21	NESS	12.0	13.0
37	SEDGWICK	12.0	13.0
62	STAFFORD	12.0	16.0
12	TREGO	13.0	17.0
42	HODGEMAN	13.5	14.0
89	BUTLER	14.0	22.0
16	HASKELL	15.0	16.9
3	FINNEY	17.5	17.5
18	STEVENS	17.5	20.0
47	GRANT	20.0	20.0



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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Kansas

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	2	3.000	6	0.0	0.00	3	6.00
OPUMP	1	5.000	5	5.0	5.00	5	5.00
OTANK	5	13.000	30	0.0	2.50	5	27.50
FRAC TOWER	17	48.676	255	0.0	0.00	20	42.50
DEHYDRATOR	1	30.000	30	30.0	30.00	30	30.00
PPUMP	1	70.000	70	70.0	70.00	70	70.00
PTANK	3	255.833	680	2.5	2.50	85	680.00
PRODUCT LINE	15	230.000	1080	10.0	75.00	170	330.00
REFLUX PUMP	4	297.500	700	0.0	51.25	205	636.25
Production Facilities							
MANIFOLD	10	6.3000	63	0	0.00	0.0	0.00
METER	16	0.0625	1	0	0.00	0.0	0.00
OTHER	25	1.3600	31	0	0.00	0.0	0.00
PTANK	16	3.2500	49	0	0.00	0.0	0.00
SEP	84	13.2262	378	0	0.00	0.0	1.00
WLINE	3	0.3333	1	0	0.00	0.0	1.00
STANK	226	17.8142	1198	0	0.00	0.0	2.05
PUMP	47	8.4255	196	0	0.00	0.0	1.00
SUMP	8	0.7500	4	0	0.00	0.0	1.50
WPROD	79	26.2215	1487	0	0.00	0.0	2.00
H/T	47	32.2660	500	0	0.00	1.0	6.00
WINJ	7	14.5714	48	0	0.00	2.0	37.00
WTANK	97	88.2732	785	0	2.00	19.0	110.00
FLINE	12	93.5000	286	0	0.00	64.0	191.25

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Kansas

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	MEADE	1	0.000	0	0	0	0.0	0.000
GP	EDWARDS	1	6.000	6	6	6	6.0	6.000
GP	GRANT	47	136.277	1000	0	5	30.0	190.000
PROD	KINGMAN	1	0.000	0	0	0	0.0	0.000
PROD	FINNEY	3	0.000	0	0	0	0.0	0.000
PROD	HODGEMAN	42	1.357	31	0	0	0.0	0.000
PROD	NESS	21	3.095	63	0	0	0.0	0.000
PROD	RUSSELL	49	1.898	32	0	0	0.0	0.000
PROD	DECATUR	10	0.700	5	0	0	0.0	0.500
PROD	HASKELL	16	2.094	22	0	0	0.0	0.500
PROD	STEVENS	18	1.167	16	0	0	0.0	0.625
PROD	ELLIS	41	6.488	128	0	0	0.0	1.000
PROD	ELLSWORTH	37	1.108	21	0	0	0.0	1.000
PROD	MORTON	6	0.333	1	0	0	0.0	1.000
PROD	SHERIDAN	10	5.400	48	0	0	0.0	1.500
PROD	MEADE	18	72.667	785	0	0	0.0	3.250
PROD	HARPER	15	2.800	12	0	0	0.0	6.000
PROD	BARTON	29	28.931	588	0	0	0.0	7.500
PROD	HARVEY	11	11.818	78	0	0	0.0	13.000
PROD	SEDGWICK	37	70.000	1198	0	0	0.0	18.500
PROD	TREGO	12	15.417	53	0	0	0.0	30.500
PROD	MORRIS	44	0.500	1	0	0	0.5	1.000
PROD	WABAUNSEE	6	2.333	9	1	1	1.0	3.000
PROD	BUTLER	89	70.596	1487	0	0	1.0	70.500
PROD	COWLEY	2	2.000	2	2	2	2.0	2.000
PROD	BARBER	59	52.339	467	0	0	2.0	34.000
PROD	RICE	5	41.800	197	0	0	3.0	103.000
PROD	KIOWA	8	6.000	17	2	3	3.5	8.000
PROD	STAFFORD	62	50.210	500	0	0	3.5	57.250
PROD	SEWARD	13	36.385	202	0	0	5.0	60.500
PROD	EDWARDS	11	4.818	21	0	0	6.0	6.000
PROD	KEARNY	2	12.000	19	5	5	12.0	19.000

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Kansas

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
KIOWA	8	7.0000	7.0	7.0	7.00	7.0	7.000
SHERIDAN	10	8.2000	13.0	4.0	4.75	7.5	12.000
ELLSWORTH	37	7.6757	13.0	4.0	7.00	8.0	8.500
EDWARDS	12	9.7500	12.0	9.0	9.00	9.0	11.000
DECATUR	10	8.9000	11.0	5.0	8.00	9.5	10.250
ELLIS	41	9.8049	12.0	7.0	8.00	10.0	11.000
BARTON	29	10.3793	15.0	8.0	9.00	10.0	11.500
HARPER	15	9.9333	14.0	4.0	7.00	10.0	13.000
SEWARD	13	11.7692	22.0	8.0	10.00	10.0	13.000
KINGMAN	1	10.0000	10.0	10.0	10.00	10.0	10.000
COWLEY	2	11.0000	11.0	11.0	11.00	11.0	11.000
HARVEY	11	11.0000	11.0	11.0	11.00	11.0	11.000
KEARNY	2	11.0000	11.0	11.0	11.00	11.0	11.000
MEADE	19	11.3158	15.0	10.0	11.00	11.0	11.000
MORTON	6	11.0000	11.0	11.0	11.00	11.0	11.000
WABAUNSEE	6	11.0000	11.0	11.0	11.00	11.0	11.000
RUSSELL	49	10.7143	14.0	7.0	9.00	11.0	12.000
RICE	5	12.8000	22.0	9.0	9.00	11.0	17.500
BARBER	59	12.3559	23.0	5.0	10.00	12.0	13.000
MORRIS	44	11.9091	13.0	11.0	11.00	12.0	13.000
NESS	21	11.9048	15.0	7.0	12.00	12.0	13.000
SEDGWICK	37	11.7568	16.0	8.0	10.00	12.0	13.000
STAFFORD	62	27.9839	500.0	6.0	10.00	12.0	16.000
HODGEMAN	42	12.4524	15.0	9.0	9.00	13.5	14.000
BUTLER	89	14.9888	23.0	6.0	10.50	14.0	22.000
HASKELL	16	15.5312	20.0	13.0	15.00	15.0	16.875
FINNEY	3	17.5000	17.5	17.5	17.50	17.5	17.500
STEVENS	18	17.2222	20.0	12.5	15.00	17.5	20.000
GRANT	47	20.0000	20.0	20.0	20.00	20.0	20.000

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SUMMARY

(Kentucky)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

Equipment	Median Difference	75th Percentile
Water Tank (Prod)	178 µR/hr	340.0 µR/hr

II. There were no significant differences in background readings from county to county. Henderson county, however, with a median background of 9 µR/hr was at the top end of the mid-range class and Union county with 10 µR/hr was at the low end of the high classification.

III. Overall Summary (All data were from Production Facilities)

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
Statewide					
a. Background	21	10.0	12.5	14.6	15
b. Max Reading	21	15.0	23.0	67.0	350
c. Difference	21	3.0	15.0	59.0	340

NOTE: All data are measured in micro-rems/hr

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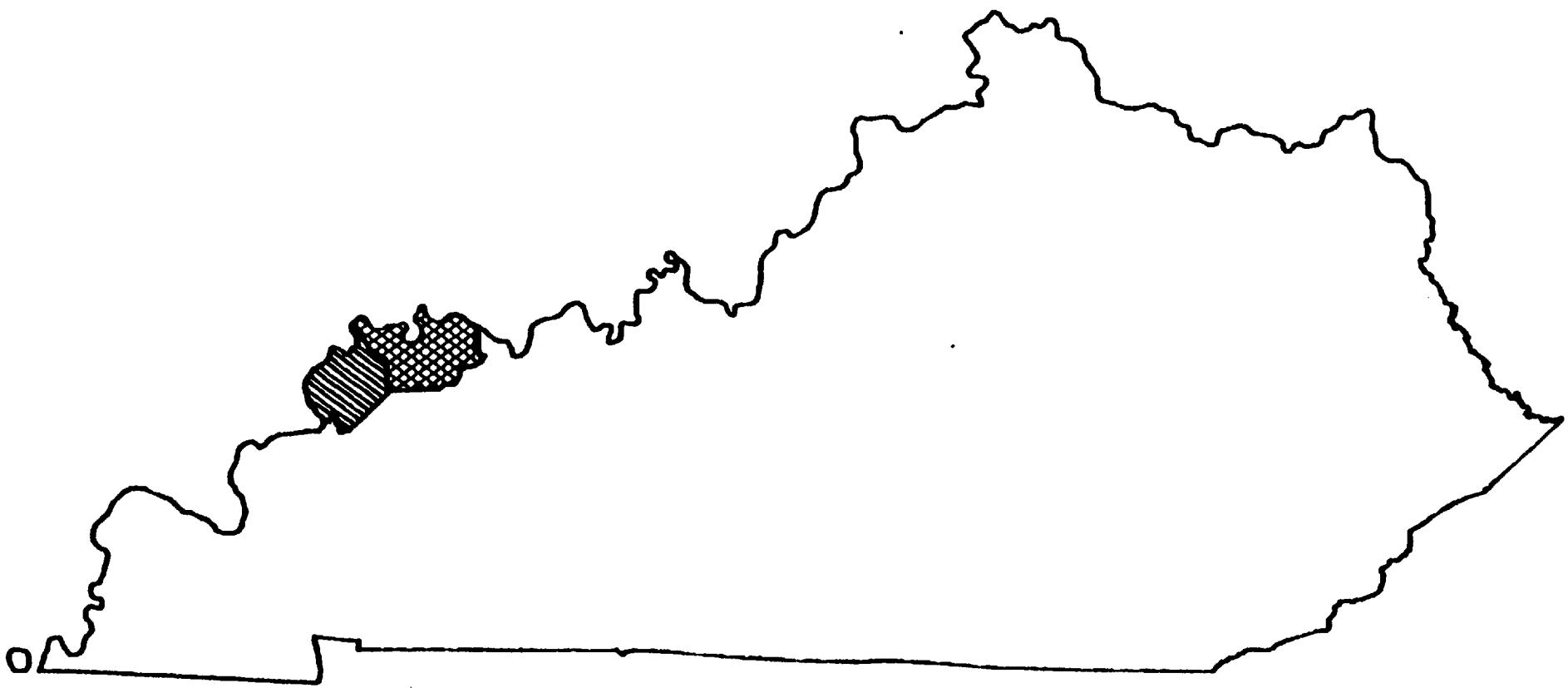
FIGURE 1 – MEDIAN BACKGROUND LEVELS

KENTUCKY



MICRO-REMS/HR

NO DATA
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0 – 2.33
9.01 – 14.0
2.34 – 4.99
OVER 14.0

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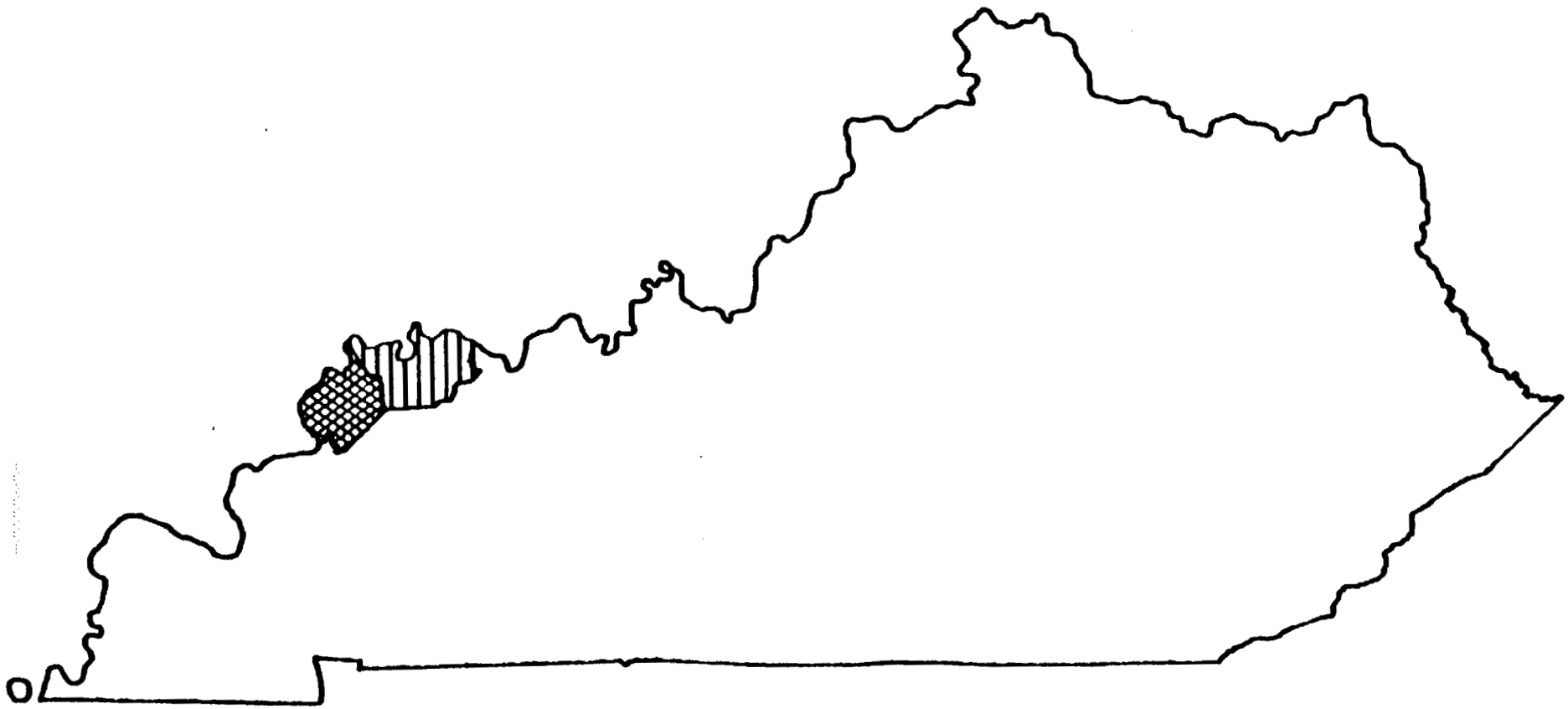
FIGURE 2 – MEDIAN DIFFERENCE OVER BACKGROUND

KENTUCKY

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Kentucky

FACILITY: Production

Obsns	Equipment		Median Difference	75th Percentile
14	OTHER	|	0.0	3.5
1	SUMP	|**	8.0	8.0
4	SEP	|******	32.0	58.3
2	WTANK	|**********	178.0	340.0
--		----+---+---+---+---+---+---+---+---+		
21		20 40 60 80 100 120 140 160 180		

Median of Difference Over Background

Table 2

Median Difference Over Background by County Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Kentucky

FACILITY: Production

Obsns	County		Median Difference	75th Percentile
2	HENDERSON	|	0.0	0.0
19	UNION	|**********	5.0	16.0
		----+---+---+---+---+---+---+---+---+---+		
		2 4 6 8 10 12 14 16 18 20		

Median of Difference Over Background

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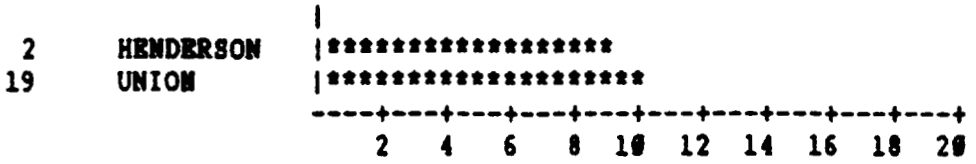
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Kentucky

Obs	County	Median	75th Percentile
2	HENDERSON	9.0	9.0
19	UNION	10.0	13.0



Median of Background Readings

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Kentucky

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Production Facilities							
OTHER	14	2.071	10	0	0.00	0	3.50
SUMP	1	8.000	8	8	8.00	8	8.00
SEP	4	35.000	62	14	14.75	32	58.25
WTANK	2	178.000	340	16	16.00	178	340.00

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Kentucky

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	HENDERSON	2	0.0000	0	0	0	0	0
PROD	UNION	19	28.0526	340	0	0	5	16

Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Kentucky

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
HENDERSON	2	9.0000	9	9	9	9	9
UNION	19	10.3684	15	7	8	10	13

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SUMMARY

(Lousiana)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

Equipment	Median Difference	75th Percentile
Water Line (Prod)	45.2	143.0

II. There were significant differences in background readings from parish to parish. Specifically, Cameron, and St. Landry were low. The remainder were mid-range except for Bossier, Caddo, Ascention, Lafayette, Red River, St. Helen, East and West Baton Rouge, and Pointe Coupee' which were high and Iberville which was very high.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	3,028	6.5	9.0	10.0	24.4
b. Max Reading	3,028	9.0	15.0	75.0	3,000.0
c. Difference	3,028	0.0	7.8	69.1	2,991.0
2. Facility					
a. Background					
Gas Processing	358	3.5	5.0	7.0	13.0
Production	2,670	7.0	9.5	10.3	24.4
b. Max Reading					
Gas Processing	358	5.0	8.0	18.7	500
Production	2,670	9.5	16.0	80.0	3,000
c. Difference					
Gas Processing	358	0.0	2.2	14.0	491
Production	2,670	0.0	9.0	74.9	2,991

NOTE: All data are measured in micro-rems/hr

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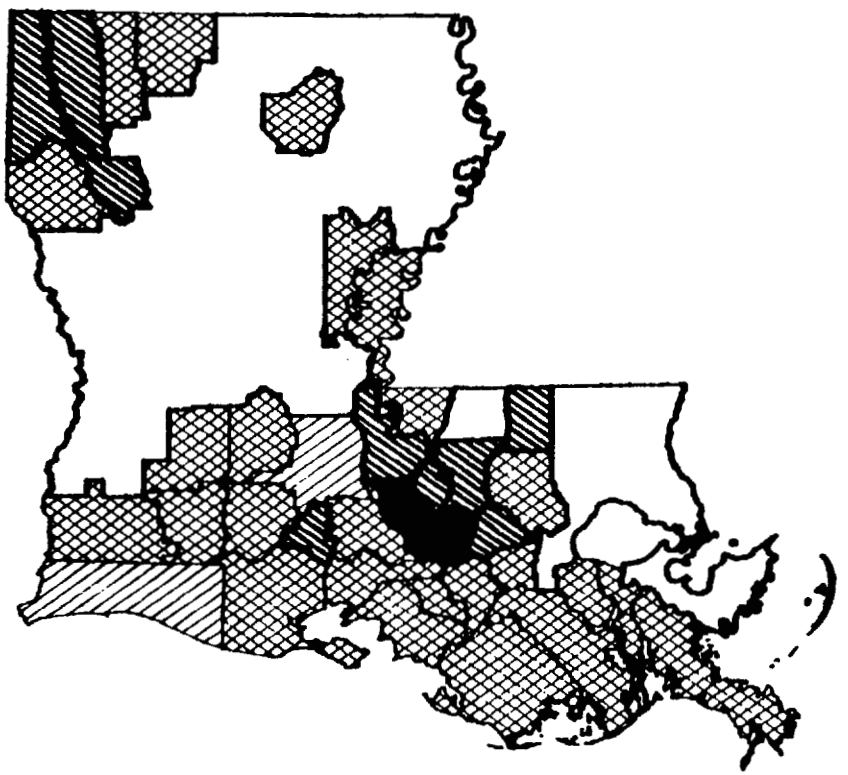
FIGURE 1 — MEDIAN BACKGROUND LEVELS

LOUSIANA



MICRO-REMS/HR

NO DATA
0 - 2.33
2.34 - 4.99
5.0 - 9.0
9.01 - 14.0
OVER 14.0

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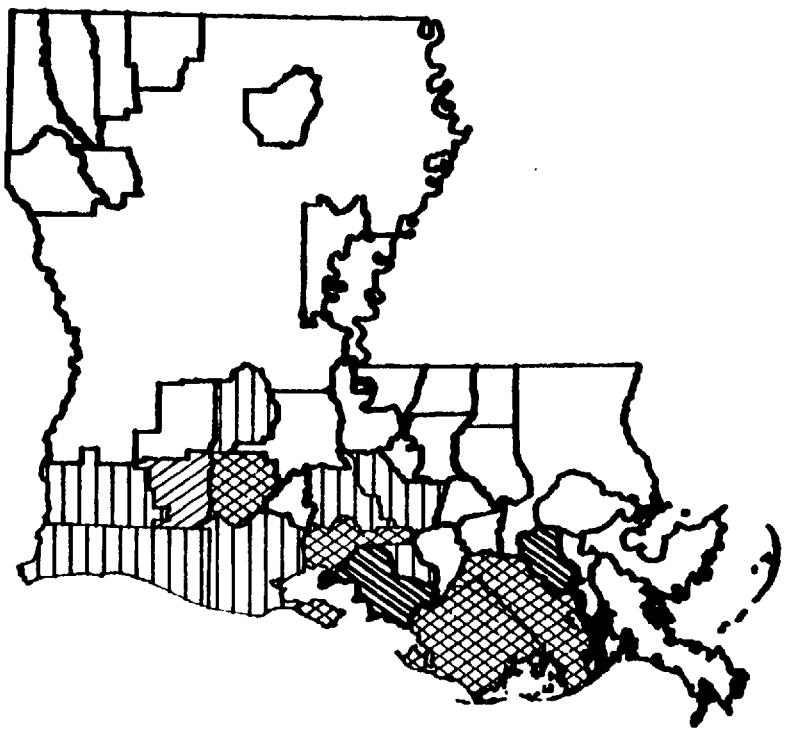
FIGURE 2 – DIFFERENCE OVER BACKGROUND

LOUSIANA

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 39
BELOW .8
39.01 - 245
.8 - 1.99
OVER 245

AMERICAN PETROLEUM INSTITUTE
NATURALLY OCCURRING RADIOACTIVITY SURVEY

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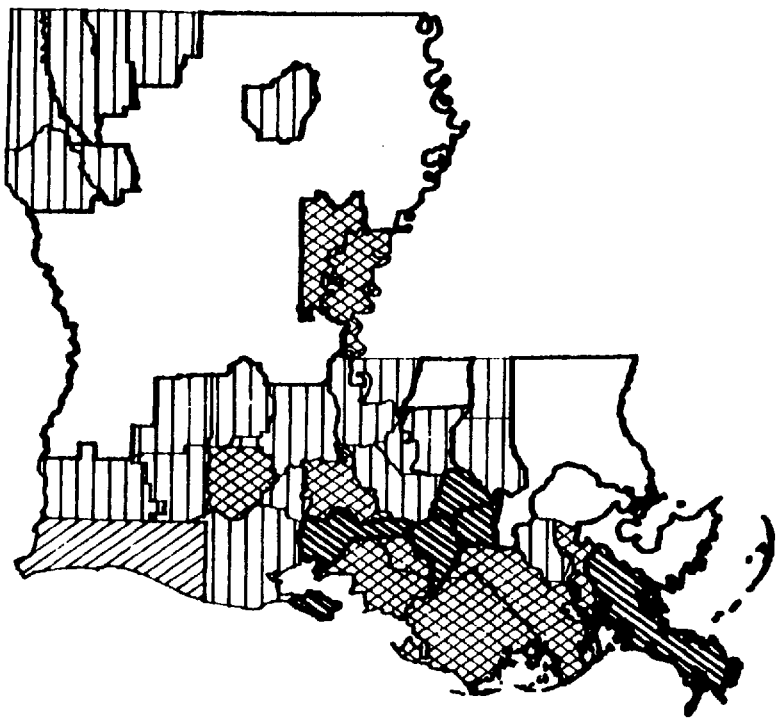
FIGURE 3 – DIFFERENCE OVER BACKGROUND

LOUSIANA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Lousiana

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
39	COMPRESSOR		0.0	2.0
5	CRYO UNIT		0.0	13.7
38	DEHYDRATOR		0.0	1.4
92	INLET SCRUBBER		0.0	1.0
10	METER		0.0	0.6
31	OTHER		0.0	3.0
7	PRODUCT LINE		0.0	0.1
10	REFRIGERATION		0.0	1.1
19	SWEETENER		0.0	0.9
44	OTANK		0.4	5.9
17	REFLUX PUMP		0.5	19.1
5	BOTTOMS PUMP	*	1.8	15.9
5	PPUMP	**	3.6	7.8
5	PTANK	***	5.0	21.3
18	OPUMP	***	6.1	74.5
13	FRAC TOWER	***	6.5	29.6
---		-----+----+----+----+----+----+		
358		10 20 30 40 50 60		
		Median of Difference Over Background		

Facility: Production

5	METER		0.0	31.0
388	OTHER		0.0	1.0
114	PUMP		0.0	0.0
760	SEP		0.0	18.1
452	STANK		0.0	3.0
7	VRU		0.0	0.0
7	WOTHER		0.0	0.0
73	WPROD		0.0	5.0
235	WTANK		0.0	6.5
72	SUMP	*	1.0	6.5
322	H/T	*	2.0	46.5
136	MANIFOLD	**	3.5	90.0
74	FLINE	****	8.0	72.0
7	WINJ	****	8.4	29.4
18	WLINE	**********	45.2	143.0
----		-----+----+----+----+----+----+		
2670		10 20 30 40 50 60		
		Median of Difference Over Background		

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Table 2

Median Difference Over Background by Parish
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Lousiana

FACILITY: Gas Processing

Obsns	Parish		Median Difference	75th Percentile
1	CALCASIEU		0.0	0.0
172	CAMERON		0.0	2.5
49	EVANGELINE		0.0	0.0
2	IBERVILLE		0.0	0.0
7	ST. MARTIN		0.0	49.0
74	VERMILION		0.0	0.5
5	JEFFERSON DAVIS		1.0	2.0
6	IBERIA	*	3.5	74.5
19	ACADIA	*	3.0	59.0
13	UNREPORTED	*	5.0	9.5
2	TERREBONNE	**	10.0	12.0
4	LAFOURCHE	***	15.5	374.8
3	ST. MARY	**********	62.0	117.0
1	ST. CHARLES	**********	147.0	147.0
---		----+---+---+---+---+---+---+--		
362		20 40 60 80 100 120 140		

Median of Difference Over Background

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Table 2 (Continued)

Median Difference Over Background by Parish
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Lousiana

FACILITY: Production

Obsns	Parish		Median Difference	75th Percentile
35	ALLEN	|	0.0	0.0
8	BOSSIER	|	0.0	0.0
178	CADDO	|	0.0	0.0
83	CALCASIEU	|	0.0	2.0
85	CLAIBORNE	|	0.0	0.0
26	DESOTO	|	0.0	0.0
99	E. BATON ROUGE	|	0.0	3.0
339	EVANGELINE	|	0.0	0.0
31	JEFFERSON DAVIS	|	0.0	2.5
2	LAFAYETTE	|	0.0	0.0
121	LIVINGSTON	|	0.0	0.0
112	PT. COUPEE	|	0.0	0.0
6	OUACHITA	|	0.0	0.0
10	RED RIVER	|	0.0	2.8
2	ST HELEN	|	0.0	0.0
33	ST. CHARLES	|	0.0	7.0
5	ST. LANDRY	|	0.0	3.5
262	VERMILION	|	0.0	9.0
35	W. BATON ROUGE	|	0.0	0.0
15	WEBSTER	|	0.0	0.0
53	UNREPORTED	|	0.0	19.0
1	WEST FELICIANA	|	0.0	0.0
41	IBERVILLE	|	0.1	4.1
211	CAMERON	|	1.0	5.0
205	ACADIA	|*	3.0	38.0
2	CATAHOULA	|**	7.5	9.0
156	TERREBONNE	|**	8.0	57.5
12	JEFFERSON	|**	9.0	47.8
57	ST. MARY	|***	13.0	109.5
134	LAFOURCHE	|****	18.7	65.0
4	CONCORDIA	|*****	22.5	265.0
197	ST. MARTIN	|*******	31.0	83.0
27	PLAQUEMINES	|********	38.0	115.0
70	IBERIA	|**********	50.0	193.3
2	ST JAMES	|**************	64.5	87.0
3	ASCENSION	|**************	65.0	140.0
8	ASSUMPTION	|********************	93.0	231.8
----		----+---+---+---+---+---+---+--		
2666		20 40 60 80 100 120 140		

Median of Difference Over Background

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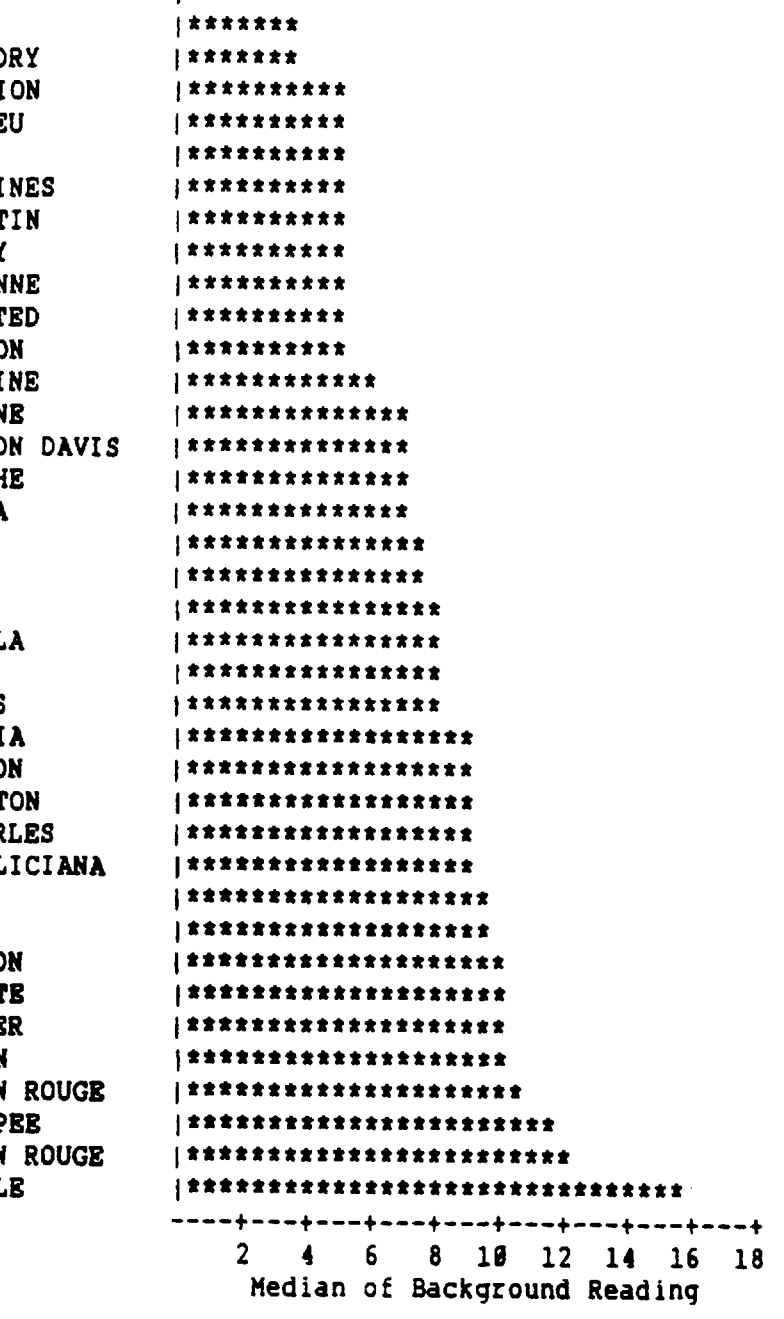
Table 3

Median Background by Parish
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Lousiana

Obs	Parish	Median	75th Percentile
383	CAMERON	3.5	6.0
5	ST. LANDRY	3.5	5.8
8	ASSUMPTION	5.0	6.0
84	CALCASIEU	5.0	7.0
67	IBERIA	5.0	9.0
27	PLAQUEMINES	5.0	8.0
204	ST. MARTIN	5.0	7.0
60	ST. MARY	5.0	10.0
158	TERREBONNE	5.0	8.5
66	UNREPORTED	5.0	7.3
336	VERMILION	5.0	6.1
388	EVANGELINE	6.0	7.0
85	CLAIBORNE	7.0	7.0
36	JEFFERSON DAVIS	7.0	7.0
138	LAFOURCHE	7.0	8.0
6	OUACHITA	7.0	7.0
35	ALLEN	7.5	7.5
15	WEBSTER	7.5	7.5
224	ACADIA	8.0	11.0
2	CATAHOULA	8.0	9.0
26	DESOTO	8.0	10.0
2	ST JAMES	8.0	8.0
4	CONCORDIA	9.0	10.0
12	JEFFERSON	9.0	10.0
121	LIVINGSTON	9.0	9.0
34	ST. CHARLES	9.0	9.0
1	WEST FELICIANA	9.0	9.0
8	BOSSIER	9.5	9.5
178	CADDO	9.5	10.0
3	ASCENSION	10.0	10.0
2	LAFAYETTE	10.0	10.0
10	RED RIVER	10.0	10.0
2	ST HELEN	10.0	10.0
99	E. BATON ROUGE	10.3	10.3
112	PT. COUPEE	11.5	12.5
35	W. BATON ROUGE	11.8	13.0
43	IBERVILLE	15.5	24.4



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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Lousiana

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	39	4.3462	95.0	0.0	0.00	0.00	2.000
CRYO UNIT	5	5.4800	24.9	0.0	0.00	0.00	13.700
DEHYDRATOR	38	2.2816	36.8	0.0	0.00	0.00	1.350
INLET SCRUBBER	92	12.1848	491.0	0.0	0.00	0.00	1.000
METER	10	0.2600	1.1	0.0	0.00	0.00	0.625
OTHER	31	10.6548	261.9	0.0	0.00	0.00	3.000
PRODUCT LINE	7	3.0571	21.3	0.0	0.00	0.00	0.100
REFRIGERATION	10	0.5100	2.7	0.0	0.00	0.00	1.150
SWEETENER	19	0.6000	3.9	0.0	0.00	0.00	0.900
OTANK	44	5.2250	117.0	0.0	0.00	0.35	5.900
REFLUX PUMP	17	54.5824	400.3	0.0	0.00	0.50	19.050
BOTTOMS PUMP	5	6.8400	20.3	0.0	0.25	1.80	15.950
PPUMP	5	4.0200	11.0	0.0	0.45	3.60	7.800
PTANK	5	10.2200	33.6	0.5	1.75	5.00	21.300
OPUMP	18	43.6222	217.0	0.0	0.00	6.15	74.500
FRAC TOWER	13	18.9769	110.0	0.0	0.85	6.50	29.650
Production Facilities							
METER	5	12.400	49.0	0	0.0	0.0	31.000
OTHER	388	12.182	688.0	0	0.0	0.0	1.000
PUMP	114	2.352	98.0	0	0.0	0.0	0.000
SEP	760	42.954	2991.0	0	0.0	0.0	18.075
STANK	452	11.658	590.0	0	0.0	0.0	3.000
VRU	7	0.000	0.0	0	0.0	0.0	0.000
WOTHER	7	0.286	2.0	0	0.0	0.0	0.000
WPROD	73	9.433	194.0	0	0.0	0.0	5.000
WTANK	235	17.466	475.0	0	0.0	0.0	6.500
SUMP	72	6.653	69.0	0	0.0	1.0	6.000
H/T	322	56.722	1496.0	0	0.0	2.0	46.500
MANIFOLD	136	95.021	1444.0	0	0.0	3.5	90.000
FLINE	74	99.423	2991.0	0	0.0	8.0	72.000
WINJ	7	11.571	34.2	0	0.0	8.4	29.400
WLINE	18	188.983	1594.0	0	7.6	45.2	143.025

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Appendix 2

Statistical Data on Median Difference over Background
By Facility and Parish
(Micro-Rems/Hr)

Lousiana

FACILITY	PARISH	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	CALCASIEU	1	0.000	0.0	0	0.00	0.00	0.00
GP	CAMERON	172	8.911	400.3	0	0.00	0.00	2.25
GP	EVANGELINE	49	2.265	95.0	0	0.00	0.00	0.00
GP	IBERVILLE	2	0.000	0.0	0	0.00	0.00	0.00
GP	ST. MARTIN	7	21.857	104.0	0	0.00	0.00	49.00
GP	VERMILION	74	4.470	261.9	0	0.00	0.00	0.50
GP	JEFFERSON DAVIS	5	1.000	2.0	0	0.00	1.00	2.00
GP	IBERIA	6	31.500	121.0	1	1.00	3.50	74.50
GP	ACADIA	19	39.316	217.0	0	0.00	3.00	59.00
GP	UNREPORTED	13	6.385	18.0	0	2.00	5.00	9.50
GP	TERREBONNE	2	8.000	12.0	8	8.00	10.00	12.00
GP	LAFOURCHE	4	131.500	491.0	4	4.25	15.50	374.75
GP	ST. MARY	3	75.333	117.0	47	47.00	62.00	117.00
GP	ST. CHARLES	1	147.000	147.0	147	147.00	147.00	147.00
PROD	ALLEN	35	0.257	3.5	0	0.00	0.00	0.00
PROD	BOSSIER	8	3.188	25.5	0	0.00	0.00	0.00
PROD	CADDO	178	1.677	75.0	0	0.00	0.00	0.00
PROD	CALCASIEU	83	2.443	58.0	0	0.00	0.00	2.00
PROD	CLAIBORNE	85	1.400	50.5	0	0.00	0.00	0.00
PROD	DESOTO	26	1.365	17.5	0	0.00	0.00	0.00
PROD	E. BATON ROUGE	99	4.910	104.7	0	0.00	0.00	3.00
PROD	EVANGELINE	339	4.248	264.5	0	0.00	0.00	0.00
PROD	JEFFERSON DAVIS	31	9.194	226.0	0	0.00	0.00	2.50
PROD	LAFAYETTE	2	0.000	0.0	0	0.00	0.00	0.00
PROD	LIVINGSTON	121	0.242	21.0	0	0.00	0.00	0.00
PROD	PT. COUPEE	112	3.621	137.5	0	0.00	0.00	0.00
PROD	OUACHITA	6	0.000	0.0	0	0.00	0.00	0.00
PROD	RED RIVER	10	2.300	15.0	0	0.00	0.00	2.75
PROD	ST HELEN	2	0.000	0.0	0	0.00	0.00	0.00
PROD	ST. CHARLES	33	10.167	146.0	0	0.00	0.00	7.00
PROD	ST. LANDRY	5	1.400	7.0	0	0.00	0.00	3.50
PROD	VERMILION	262	21.164	321.3	0	0.00	0.00	9.00
PROD	W. BATON ROUGE	35	0.100	3.5	0	0.00	0.00	0.00
PROD	WEBSTER	15	0.333	3.0	0	0.00	0.00	0.00
PROD	UNREPORTED	53	29.436	425.0	0	0.00	0.00	19.00
PROD	WEST FELICIANA	1	0.000	0.0	0	0.00	0.00	0.00
PROD	IBERVILLE	41	10.707	144.0	0	0.00	0.10	4.05
PROD	CAMERON	211	9.599	194.0	0	0.00	1.00	5.00
PROD	ACADIA	205	68.190	2991.0	0	0.00	4.00	38.00

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Appendix 2 (Continued)

Statistical Data on Median Difference over Background
By Facility and Parish
(Micro-Rems/Hr)

Lousiana

FACILITY	PARISH	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	CATAHOULA	2	7.500	9.0	6	6.00	7.50	9.00
PROD	TERREBONNE	156	68.969	995.0	0	1.00	8.00	57.50
PROD	JEFFERSON	12	42.167	291.0	0	0.75	9.00	47.75
PROD	ST. MARY	57	75.358	547.0	0	0.00	13.00	109.50
PROD	LAFOURCHE	134	109.872	2291.0	0	0.20	18.75	65.00
PROD	CONCORDIA	4	97.750	345.0	1	5.75	22.50	265.00
PROD	ST. MARTIN	197	83.826	1594.0	0	0.00	31.00	83.00
PROD	PLAQUEMINES	27	105.037	740.0	0	20.00	38.00	115.00
PROD	IBERIA	70	161.057	4990.0	0	3.00	50.00	193.30
PROD	ST JAMES	2	64.500	87.0	42	42.00	64.50	87.00
PROD	ASCENSION	3	90.000	140.0	65	65.00	65.00	140.00
PROD	ASSUMPTION	8	155.625	471.0	9	69.50	93.00	231.75

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Appendix 3

Statistical Data on Background by Parish
(Micro-Rems/Hr)

Lousiana

PARISH	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
CAMERON	383	4.3480	10.0	0.8	3.00	3.5	6.00
ST. LANDRY	5	4.4000	8.0	3.5	3.50	3.5	5.75
ASSUMPTION	8	5.0000	6.0	4.0	4.00	5.0	6.00
CALCASIEU	84	5.5857	10.0	2.0	4.85	5.0	7.00
IBERIA	76	6.1447	10.0	1.0	4.00	5.0	9.00
PLAQUEMINES	27	5.4444	10.0	2.0	3.00	5.0	8.00
ST. MARTIN	204	5.5931	12.0	1.0	3.00	5.0	7.00
ST. MARY	60	5.8850	11.0	1.3	3.00	5.0	10.00
TERREBONNE	158	5.4139	10.0	1.0	2.00	5.0	8.50
UNREPORTED	66	5.7733	13.0	1.0	5.00	5.0	7.25
VERMILION	336	5.4551	11.0	1.0	4.00	5.0	6.10
EVANGELINE	388	6.1843	10.5	3.0	5.00	6.0	7.00
CLAIBORNE	85	7.3294	10.0	6.5	6.75	7.0	7.00
JEFFERSON DAVIS	36	6.4444	9.0	4.0	5.00	7.0	7.00
LAFOURCHE	138	6.2196	10.0	2.0	4.95	7.0	8.00
OUACHITA	6	7.0000	7.0	7.0	7.00	7.0	7.00
ALLEN	35	7.6429	10.0	7.5	7.50	7.5	7.50
WEBSTER	15	7.0333	7.5	6.5	6.50	7.5	7.50
ACADIA	224	8.2522	13.0	3.9	6.00	8.0	11.00
CATAHOULA	2	8.0000	9.0	7.0	7.00	8.0	9.00
DESOTO	26	8.8462	10.0	8.0	8.00	8.0	10.00
ST JAMES	2	8.0000	8.0	8.0	8.00	8.0	8.00
CONCORDIA	4	8.2500	10.0	5.0	5.75	9.0	10.00
JEFFERSON	12	8.3333	13.0	5.0	5.25	9.0	10.00
LIVINGSTON	121	9.0000	9.0	9.0	9.00	9.0	9.00
ST. CHARLES	34	7.5588	9.0	3.0	4.00	9.0	9.00
WEST FELICIANA	1	9.0000	9.0	9.0	9.00	9.0	9.00
BOSSIER	8	9.5000	9.5	9.5	9.50	9.5	9.50
CADDO	178	9.4944	10.0	8.0	9.00	9.5	10.00
ASCENSION	3	10.0000	10.0	10.0	10.00	10.0	10.00
LAFAYETTE	2	10.0000	10.0	10.0	10.00	10.0	10.00
RED RIVER	10	10.0000	10.0	10.0	10.00	10.0	10.00
ST HELEN	2	10.0000	10.0	10.0	10.00	10.0	10.00
E. BATON ROUGE	99	8.1323	10.3	1.0	6.00	10.3	10.30
PT. COUPEE	112	11.1429	12.5	10.0	10.00	11.5	12.50
W. BATON ROUGE	35	12.0771	13.0	11.5	11.50	11.8	13.00
IBERVILLE	43	14.0698	24.4	6.0	6.00	15.5	24.40

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SUMMARY

(Michigan)

I. There were no significant differences between items of equipment.

II. There were significant differences in background readings from county to county. Specifically, Antrim, Crawford, Grand Traverse, and Kalkaska counties were very low while Calhoun, Eaton, and Ingham were mid-range.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	695	5.0	6.0	7.0	10
b. Max Reading	695	5.0	7.0	10.0	3,500
c. Difference	695	0.0	0.0	2.4	3,490
2. Facility					
a. Background					
Gas Processing	348	6.0	7.0	7.0	10
Production	347	4.8	6.0	7.0	10
b. Max Reading					
Gas Processing	348	6.0	7.0	8.0	131
Production	347	5.0	7.0	19.2	3,500
c. Difference					
Gas Processing	348	0.0	0.0	1.0	127
Production	347	0.0	0.0	14.0	3,490

NOTE: All data are measured in micro-rems/hr

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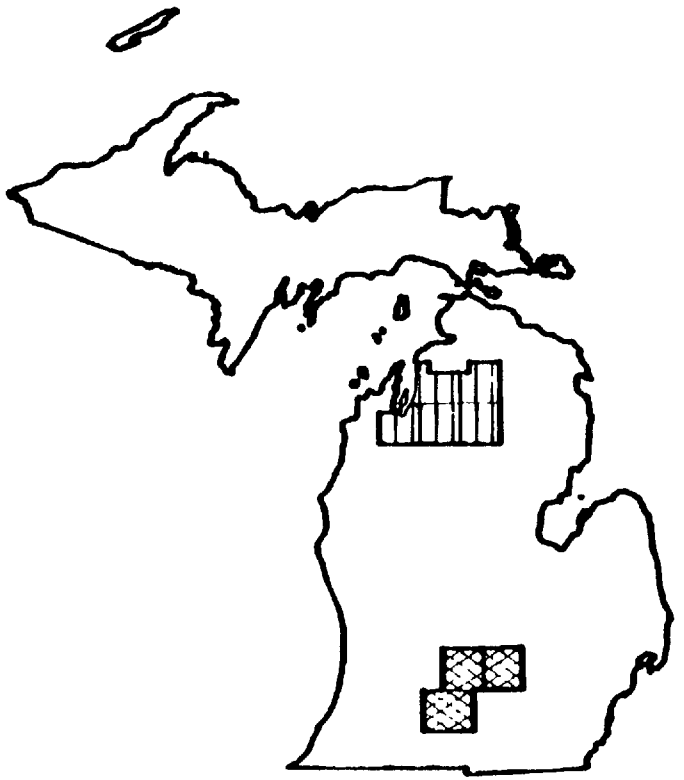
FIGURE 1 – MEDIAN BACKGROUND LEVELS

MICHIGAN



MICRO-REMS/HR

NO DATA
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2.34 - 4.99
5.0 - 9.0
9.01 - 14.0
OVER 14.0

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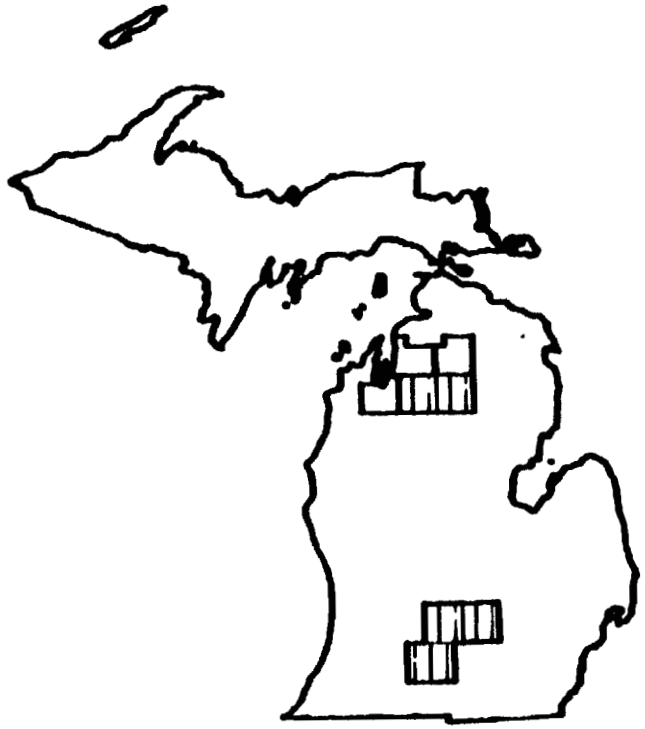
FIGURE 2 – DIFFERENCE OVER BACKGROUND

MICHIGAN

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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FIGURE 3 – DIFFERENCE OVER BACKGROUND

MICHIGAN

PRODUCTION FACILITIES

MICRO-REMS/HR

NO DATA
2 – 33
BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Michigan

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
3	BOTTOMS PUMP	|	0.0	1.0
18	COMPRESSOR	|	0.0	0.0
13	DEHYDRATOR	|	0.0	0.0
39	INLET SCRUBBER	|	0.0	0.0
22	METER	|	0.0	0.0
58	OPUMP	|	0.0	0.0
97	OTANK	|	0.0	0.0
52	OTHER	|	0.0	0.0
20	PRODUCT LINE	|	0.0	0.0
5	PPUMP	|	0.1	6.4
5	FRAC TOWER	|	0.3	0.8
11	PTANK	|**********	26.0	46.0
5	REFRIGERATION	|**********	26.0	82.5
		-----+----+----+----+----+----+		
348		10 20 30 40 50 60		

Median of Difference Over Background

FACILITY= Production

		|		
10	FLINE	|	0.0	0.0
31	H/T	|	0.0	11.0
19	MANIFOLD	|	0.0	0.0
3	METER	|	0.0	0.0
89	OTHER	|	0.0	0.0
26	PUMP	|	0.0	0.0
39	SEP	|	0.0	0.1
58	STANK	|	0.0	11.3
10	SUMP	|	0.0	24.8
17	VRU	|	0.0	0.0
1	WINJ	|	0.0	0.0
2	WLINE	|	0.0	0.0
3	WOTHER	|	0.0	0.0
11	WPROD	|	0.0	0.0
28	WTANK	|	0.65	13.8
		-----+----+----+----+----+----+		
347		10 20 30 40 50 60		

Median of Difference Over Background

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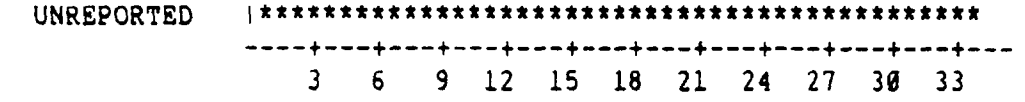
Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Michigan

FACILITY: Gas Processing

Obsns	County	Median Difference	75th Percent
69	CALHOUN	0.0	0.0
1	CRAWFORD	0.0	0.0
43	EATON	0.0	0.0
189	INGHAM	0.0	0.0
33	KALKASKA	0.1	1.4
13	UNREPORTED	34.0	71.0



FACILITY: Production

Obsns	County	Median Difference	75th Percent
10	ANTRIM	0.0	0.8
157	CALHOUN	0.0	0.0
18	CRAWFORD	0.0	0.0
5	EATON	0.0	0.0
26	GRAND TRAVERSE	0.0	0.0
36	INGHAM	0.0	0.0
49	KALKASKA	0.0	0.1
10	OTSEGO	0.0	0.0
36	UNREPORTED	14.0	25.0

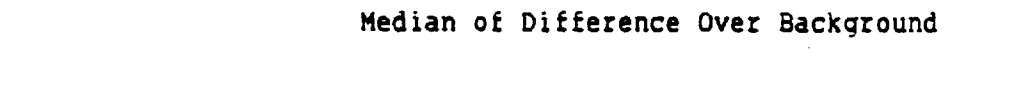


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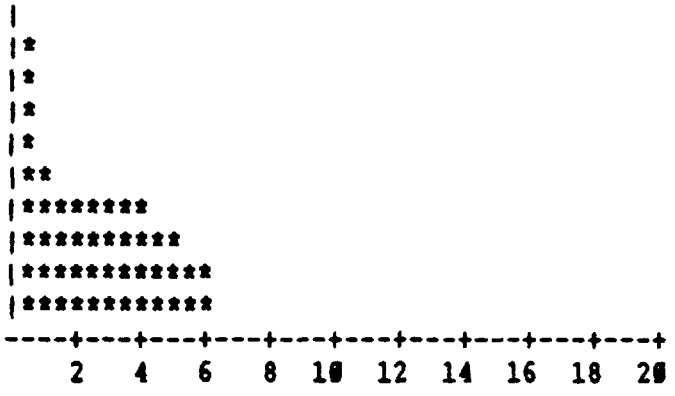
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Michigan

Obs	County	Median	75th Percentile
10	ANTRIM	0.3	0.3
19	CRAWFORD	0.4	0.4
26	GRAND TRAVERSE	0.4	0.4
82	KALKASKA	0.4	0.4
10	OTSEGO	0.8	0.8
49	UNREPORTED	4.0	4.0
226	CALHOUN	5.0	6.0
48	EATON	6.0	7.0
225	INGHAM	6.0	7.0



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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Michigan

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
BOTTOMS PUMP	3	0.3333	1.0	0	0.00	0.0	1.00
COMPRESSOR	18	0.1667	1.0	0	0.00	0.0	0.00
DEHYDRATOR	13	0.0846	1.1	0	0.00	0.0	0.00
INLET SCRUBBER	39	0.0795	1.0	0	0.00	0.0	0.00
METER	22	0.0909	1.0	0	0.00	0.0	0.00
OPUMP	58	1.3069	41.0	0	0.00	0.0	0.00
OTANK	97	0.1856	6.0	0	0.00	0.0	0.00
OTHER	52	0.0962	1.0	0	0.00	0.0	0.00
PRODUCT LINE	20	1.3500	25.0	0	0.00	0.0	0.00
PPUMP	5	2.5600	9.6	0	0.00	0.1	6.35
FRAC TOWER	5	0.4000	1.1	0	0.10	0.3	0.75
PTANK	11	33.6091	96.0	0	2.10	26.0	46.00
REFRIGERATION	5	38.2200	127.0	0	0.05	26.0	82.50
Production Facilities							
FLINE	10	0.100	1.0	0	0	0.00	0.00
H/T	31	136.042	3490.0	0	0	0.00	11.00
MANIFOLD	19	0.037	0.5	0	0	0.00	0.00
METER	3	0.000	0.0	0	0	0.00	0.00
OTHER	89	0.031	1.0	0	0	0.00	0.00
PUMP	26	0.000	0.0	0	0	0.00	0.00
SEP	39	117.392	2991.0	0	0	0.00	0.10
STANK	58	38.102	744.0	0	0	0.00	11.25
SUMP	10	9.500	38.0	0	0	0.00	24.75
VRU	17	0.941	16.0	0	0	0.00	0.00
WINJ	1	0.000	0.0	0	0	0.00	0.00
WLINE	2	0.000	0.0	0	0	0.00	0.00
WOTHER	3	0.000	0.0	0	0	0.00	0.00
WPROD	11	0.091	1.0	0	0	0.00	0.00
WTANK	28	8.564	91.0	0	0	0.65	13.75

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Michigan

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	CALHOUN	69	0.4058	25.0	0	0.0	0.0	0.000
GP	CRAWFORD	1	0.0000	0.0	0	0.0	0.0	0.000
GP	EATON	43	0.1860	1.0	0	0.0	0.0	0.000
GP	INGHAM	189	0.3175	41.0	0	0.0	0.0	0.000
GP	KALKASKA	33	1.5939	14.6	0	0.0	0.1	1.350
GP	UNREPORTED	13	43.3077	127.0	6	18.5	35.0	71.000
PROD	ANTRIM	10	0.2700	0.9	0	0.0	0.0	0.800
PROD	CALHOUN	157	59.0382	3490.0	0	0.0	0.0	0.000
PROD	CRAWFORD	18	0.1444	2.4	0	0.0	0.0	0.000
PROD	EATON	5	0.0000	0.0	0	0.0	0.0	0.000
PROD	GRAND TRAVERSE	26	0.0385	0.6	0	0.0	0.0	0.000
PROD	INGHAM	36	0.4722	16.0	0	0.0	0.0	0.000
PROD	KALKASKA	49	0.1245	2.5	0	0.0	0.0	0.100
PROD	OTSEGO	10	0.0400	0.3	0	0.0	0.0	0.025
PROD	UNREPORTED	36	57.3056	896.0	0	6.5	14.0	25.000

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Michigan

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
ANTRIM	10	0.30000	0.3	0.3	0.3	0.3	0.3
CRAWFORD	19	0.40000	0.4	0.4	0.4	0.4	0.4
GRAND TRAVERSE	26	0.36154	0.4	0.3	0.3	0.4	0.4
KALKASKA	82	0.35488	0.4	0.3	0.3	0.4	0.4
OTSEGO	10	0.80000	0.8	0.8	0.8	0.8	0.8
UNREPORTED	49	3.64286	4.0	1.5	4.0	4.0	4.0
CALHOUN	226	5.68496	10.0	3.0	5.0	5.0	6.0
EATON	48	6.02083	9.0	4.0	5.0	6.0	7.0
INGHAM	225	6.11422	10.0	3.0	5.0	6.0	7.0

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SUMMARY

(Mississippi)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

	Equipment		Median Difference	75th Percentile
1.	Flow Line	(Prod)	106 µR/hr	133.0 µR/hr
2.	Water Line	(Prod)	105	135.0
3.	Heater Treater	(Prod)	74	387.5
4.	Injection Well	(Prod)	45	90.0
5.	Inlet Scrubber	(GP)	38	38.0
6.	Separator	(Prod)	36	136.0
7	Manifold	(Prod)	33	96.0

II. Jefferson, Jefferson Davis, Smith, and Lincoln counties had low background levels. The remaining ones were mid-range except for Wayne, Lamar, Perry, and Waltham which were high.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	911	5.0	8.0	15.0	22
b. Max Reading	911	25.0	120.0	400.0	4,500
c. Difference	911	20.0	115.0	395.8	4,491
2. Facility					
a. Background					
Gas Processing	4	6.0	7.0	7.0	7
Production	907	5.0	8.0	15.0	22
b. Max Reading					
Gas Processing	4	6.0	35.5	45.0	45
Production	907	25.0	120.0	402.0	4,500
c. Difference					
Gas Processing	4	0.0	28.5	38.0	38
Production	911	20.0	115.0	398.0	4,491

NOTES: 1) All data are measured in micro-rems/hr

2) The apparent differences between facilities are due to the specific items of equipment listed in Section I above.

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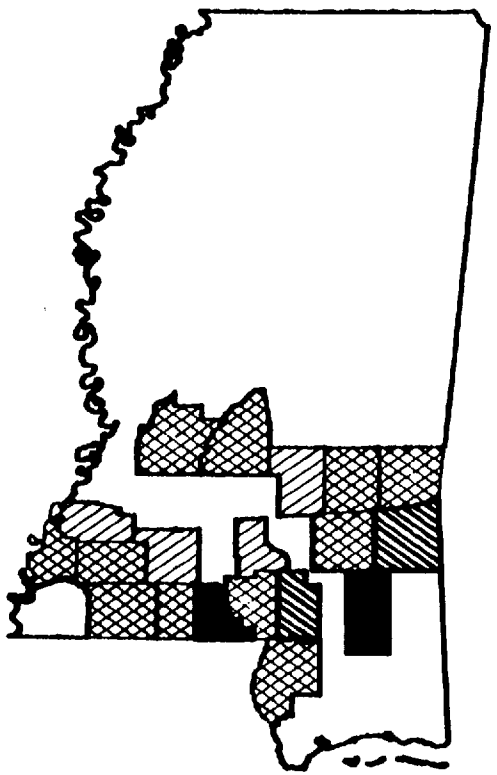
FIGURE 1 – MEDIAN BACKGROUND LEVELS

MISSISSIPPI



MICRO-REMS/HR

NO DATA
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2.34 – 4.99
5.0 – 9.0
9.01 – 14.0
OVER 14.0

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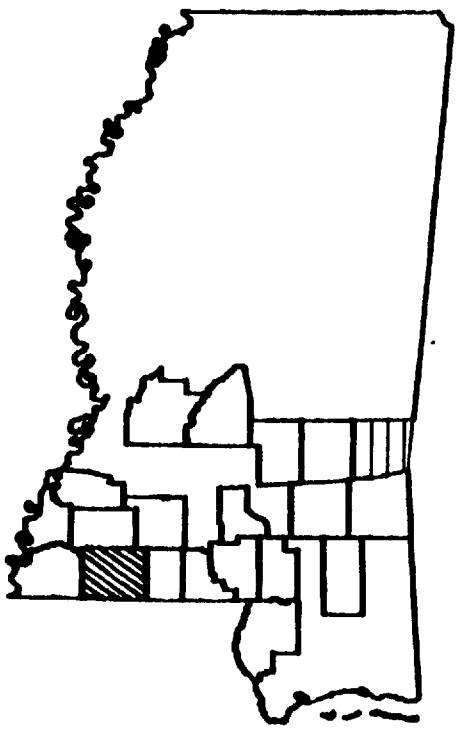
FIGURE 2 – DIFFERENCE OVER BACKGROUND

MISSISSIPPI

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
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BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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FIGURE 3 — DIFFERENCE OVER BACKGROUND

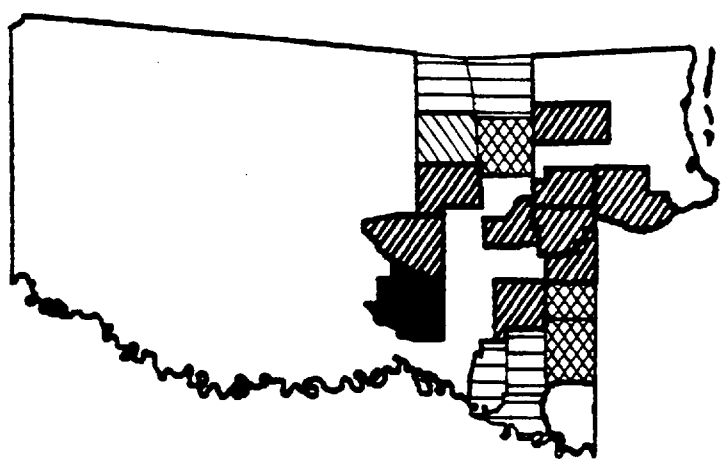

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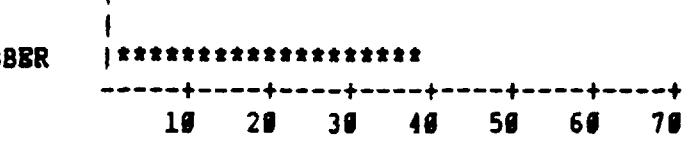
Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Mississippi

FACILITY: Gas Processing

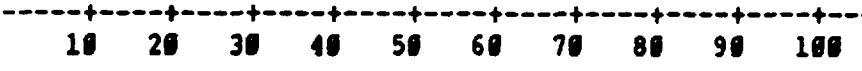
Obsns	Equipment	Median Difference	75th Percentile
3	COMPRESSOR	0.0	0.0
1	INLET SCRUBBER	38.0	38.0
4			



Median of Difference Over Background

FACILITY: Production

Obsns	Equipment	Median Difference	75th Percentile
13	PUMP	0.0	42.5
101	STANK	0.0	20.1
1	SUMP	0.0	0.0
92	OTHER	5.0	33.8
124	WPROD	12.5	76.0
143	WTANK	23.0	145.0
72	MANIFOLD	33.0	96.0
168	SEP	36.0	136.0
10	WINJ	45.0	90.0
158	H/T	74.0	387.5
12	WLINE	105.0	135.0
13	FLINE	106.0	133.0



Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Mississippi

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
3	CLARKE		0.0	0
1	AMITE	*****	38.0	38

30 60 90 120 150 180 210 240 270 300 330

Median of Difference Over Background

FACILITY: Production

18	ADAMS		0	0.3
97	CLARKE		0	0.0
23	FRANKLIN		0	0.5
23	JEFFERSON		0	9.4
64	WAYNE		0	28.9
83	JASPER		1	16.0
1	PIKE	*	10	10.0
2	AMITE	***	23	28.0
232	JONES	****	29	135.8
5	PERRY	*****	35	70.0
152	MARION	******	45	141.0
11	JEFFERSON DAVIS	*******	56	106.0
4	PEARL RIVER	********	56	391.3
12	LINCOLN	********	60	970.0
94	SMITH	**************	95	195.0
11	WALTHALL	**********	115	185.0
16	LAMAR	**********	140	624.5
14	RANKIN	**********	201	1095.0
45	HINDS	**********	345	995.0

30 60 90 120 150 180 210 240 270 300 330

Median of Difference Over Background

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Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Mississippi

Obs	County		Median	75th Percentile
23	JEFFERSON	******	3.5	17.9
11	JEFFERSON DAVIS	********	4.0	11.0
94	SMITH	********	4.0	5.0
12	LINCOLN	*********	4.5	5.0
100	CLARKE	**********	5.0	9.0
45	HINDS	**********	5.0	5.0
83	JASPER	**********	5.0	8.0
232	JONES	**********	5.0	5.0
152	MARION	**********	5.0	9.0
4	PEARL RIVER	**********	5.0	5.0
1	PIKE	**********	5.0	5.0
14	RANKIN	**********	5.0	5.0
23	FRANKLIN	***********	5.5	5.5
3	AMITE	***************	7.0	7.0
18	ADAMS	******************	8.5	8.5
64	WAYNE	**********************	11.0	15.0
16	LAMAR	**********************	11.5	13.0
5	PERRY	********************************	15.0	15.0
11	WALTHALL	********************************	15.0	15.0

----+---+---+---+---+---+---+---+---+-
2 4 6 8 10 12 14 16 18

MEDIAN OF BKGRND

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Mississippi

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	3	0	0	0	0	0	0
INLET SCRUBBER	1	38	38	38	38	38	38
Production Facilities							
PUMP	13	35.385	235	0.0	0.000	0.0	42.50
STANK	101	37.671	585	0.0	0.000	0.0	20.10
SUMP	1	0.000	0	0.0	0.000	0.0	0.00
OTHER	92	47.449	595	0.0	0.000	5.0	33.75
WPROD	124	83.242	1196	0.0	3.000	12.5	76.00
WTANK	143	140.731	1995	0.0	0.000	23.0	145.00
MANIFOLD	72	177.833	2995	0.0	14.000	33.0	96.00
SEP	168	229.172	4491	0.0	9.250	36.0	136.00
WINJ	10	69.000	245	0.0	20.000	45.0	90.00
H/T	158	312.900	2995	0.0	1.875	74.0	387.50
WLINE	12	102.325	245	1.7	47.500	105.0	135.00
FLINE	13	140.077	843	0.0	12.500	106.0	133.00

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Mississippi

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	CLARKE	3	0.000	0.0	0	0.00	0.0	0.00
GP	AMITE	1	38.000	38.0	38	38.00	38.0	38.00
PROD	ADAMS	18	1.250	10.5	0	0.00	0.0	0.25
PROD	CLARKE	97	0.809	21.0	0	0.00	0.0	0.00
PROD	FRANKLIN	23	0.357	2.8	0	0.00	0.0	0.50
PROD	JEFFERSON	23	10.013	125.5	0	0.00	0.0	9.40
PROD	WAYNE	64	85.102	1590.0	0	0.00	0.0	28.87
PROD	JASPER	83	35.663	585.0	0	0.00	1.0	16.00
PROD	PIKE	1	10.000	10.0	10	10.00	10.0	10.00
PROD	AMITE	2	23.000	28.0	18	18.00	23.0	28.00
PROD	JONES	232	140.267	2292.0	0	7.00	29.0	135.75
PROD	PERRY	5	35.000	85.0	0	0.00	35.0	70.00
PROD	MARION	152	175.309	4491.0	0	9.00	45.0	141.00
PROD	JEFFERSON DAVIS	11	68.182	116.0	10	26.00	56.0	106.00
PROD	PEARL RIVER	4	158.250	495.0	25	27.00	56.5	391.25
PROD	LINCOLN	12	602.833	2996.0	14	20.25	60.0	970.00
PROD	SMITH	94	188.968	1995.0	1	25.50	95.0	195.00
PROD	WALTHALL	11	245.000	1385.0	45	95.00	115.0	185.00
PROD	LAMAR	16	363.125	1887.0	15	55.25	140.5	624.50
PROD	RANKIN	14	819.000	3396.0	25	88.50	201.0	1095.00
PROD	HINDS	45	645.400	2995.0	15	95.00	345.0	995.00

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Mississippi

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
JEFFERSON	23	9.0652	17.9	3.5	3.5	3.5	17.9
JEFFERSON DAVIS	11	7.1818	11.0	4.0	4.0	4.0	11.0
SMITH	94	4.3617	5.0	4.0	4.0	4.0	5.0
LINCOLN	12	4.5000	5.0	4.0	4.0	4.5	5.0
CLARKE	100	6.9500	15.0	3.0	3.0	5.0	9.0
HINDS	45	4.6889	5.0	4.0	4.0	5.0	5.0
JASPER	83	6.9759	15.0	4.0	5.0	5.0	8.0
JONES	232	5.1250	15.0	4.0	4.0	5.0	5.0
MARION	152	6.9737	15.0	4.0	5.0	5.0	9.0
PEARL RIVER	4	5.0000	5.0	5.0	5.0	5.0	5.0
PIKE	1	5.0000	5.0	5.0	5.0	5.0	5.0
RANKIN	14	4.5714	5.0	4.0	4.0	5.0	5.0
FRANKLIN	23	5.5000	5.5	5.5	5.5	5.5	5.5
AMITE	3	7.0000	7.0	7.0	7.0	7.0	7.0
ADAMS	18	8.4167	8.5	7.0	8.5	8.5	8.5
WAYNE	64	11.7141	22.2	3.5	3.5	11.0	15.8
LAMAR	16	11.2500	13.0	6.0	10.0	11.5	13.0
PERRY	5	15.0000	15.0	15.0	15.0	15.0	15.0
WALTHALL	11	15.0000	15.0	15.0	15.0	15.0	15.0

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SUMMARY

(Montana)

I. All of the reported readings in Montana were from Production Facilities. All significant differences were due to Water Tank readings in Sheridan county. This item of equipment is noted below:

Equipment	Median Difference	75th Percentile
Water Tank (Prodn)	92 µR/hr	212 µR/hr

II. All counties had mid-range background levels except Roosevelt which was high.

III. Overall Summary (Production Facilities)

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
Statewide					
a. Background	700	7.0	8.0	10.0	12
b. Max Reading	700	8.0	9.0	15.0	625
c. Difference	700	0.0	0.0	5.9	615

NOTE: All data are measured in micro-rems/hr

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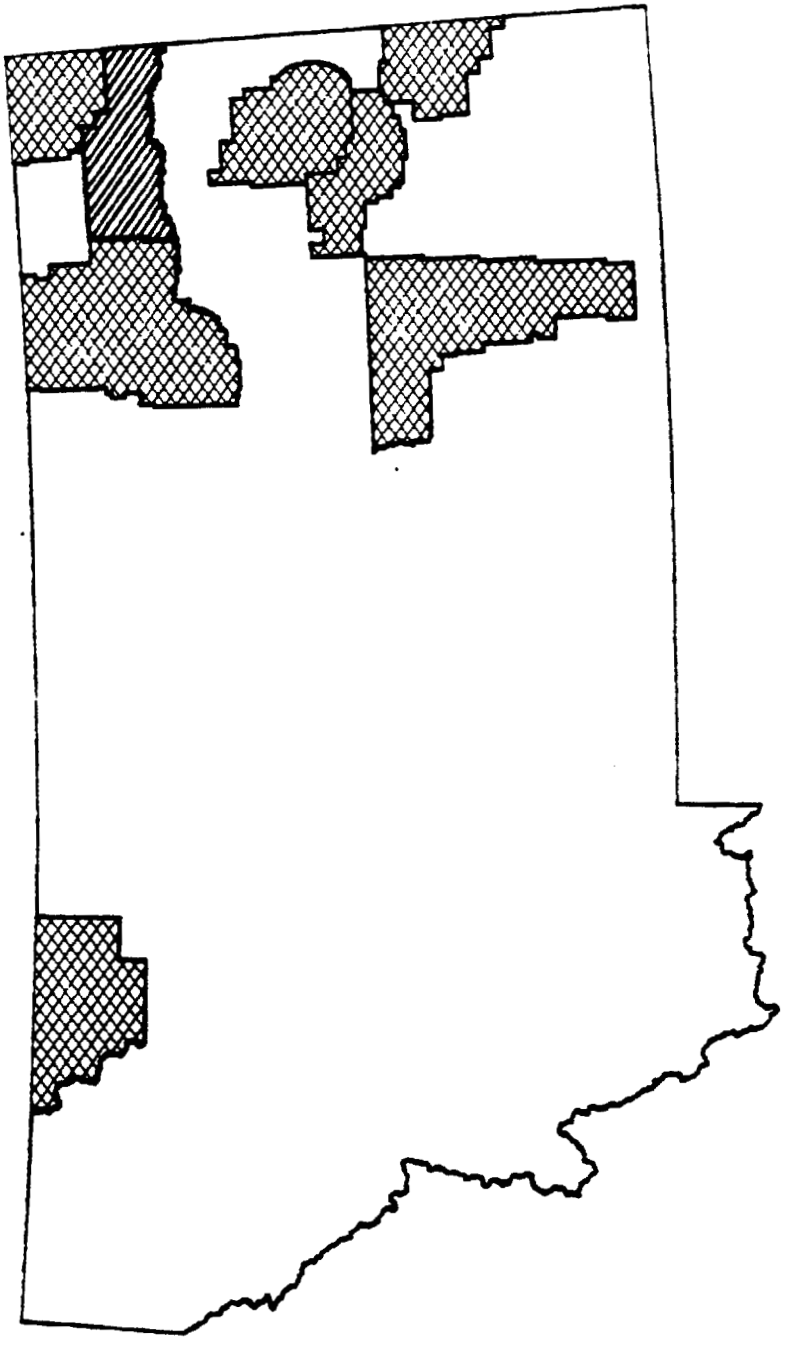
FIGURE 1 — MEDIAN BACKGROUND LEVELS

MONTANA



MICRO-REMS/HR

NO DATA
5.0 - 9.0
0 - 2.33
9.01 - 14.0
2.34 - 4.99
OVER 14.0

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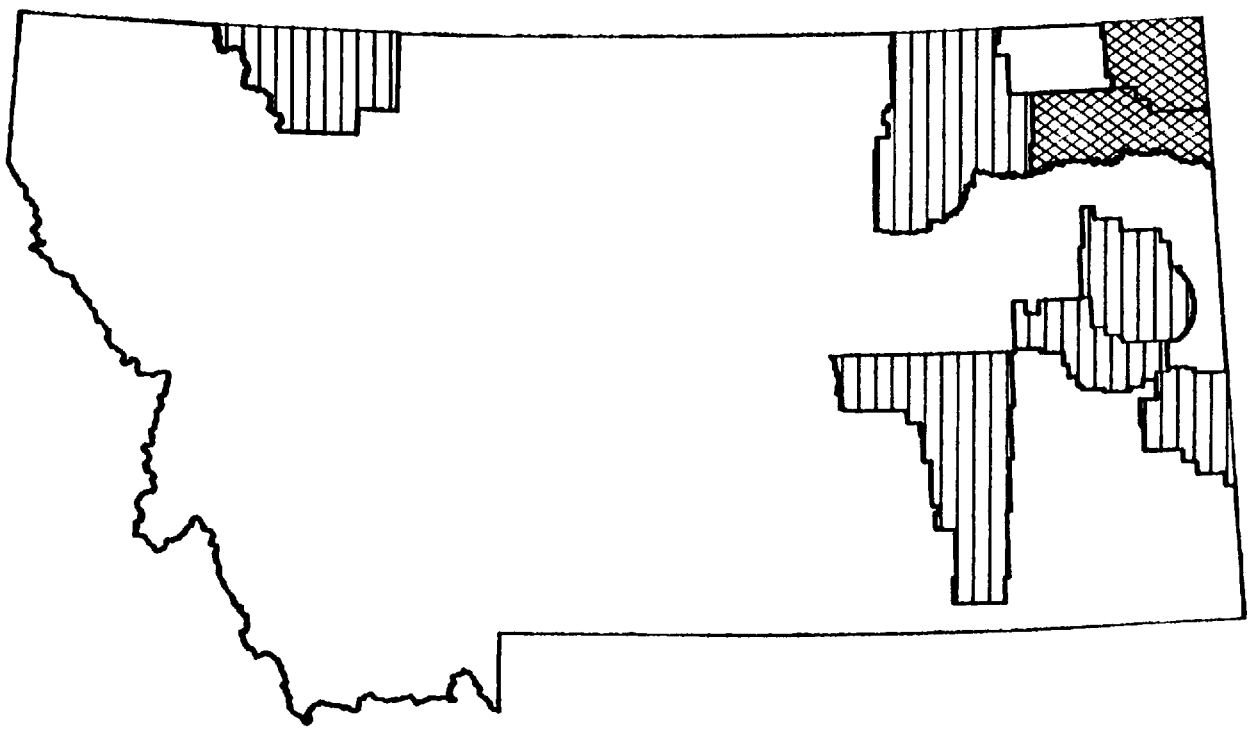
FIGURE 2 – MEDIAN DIFFERENCE OVER BACKGROUND

MONTANA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

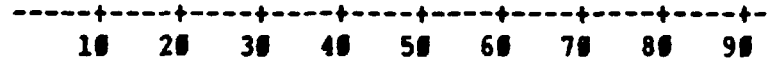
Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Montana

FACILITY: Production

Obsns	Equipment	Median Difference	75th Percentile
71	H/T	0.0	0.0
5	MANIFOLD	0.0	0.0
1	METER	0.0	0.0
5	OTHER	0.0	56.0
481	SEP	0.0	0.0
53	STANK	0.0	6.0
17	WPROD	0.0	0.0
8	SUMP	3.0	75.0
11	PUMP	12.0	42.0
2	WINJ	18.0	36.0
3	WLINE	28.0	92.0
4	FLINE	28.5	121.5
39	WTANK	92.0	212.0



Median of Difference over Background

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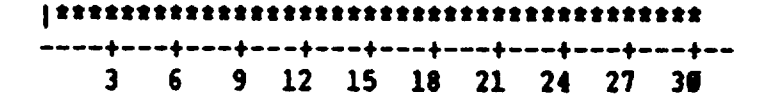
Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Montana

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
53	DAWSON	0.0	0.0
348	FALLON	0.0	0.0
10	GLACIER	0.0	0.0
57	PRAIRIE	0.0	0.0
30	ROSEBUD	0.0	0.0
103	VALLEY	0.0	0.0
10	ROOSEVELT	21.0	164.3
89	SHERIDAN	30.0	127.5



Median of Difference Over Background

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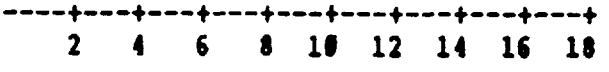
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Montana

Obsns	County	Median	75th Percentile
53	DAWSON	7.0	8.0
348	FALLON	7.0	8.0
57	PRAIRIE	7.0	7.0
89	SHERIDAN	8.0	10.0
10	GLACIER	9.0	9.0
30	ROSEBUD	9.0	9.0
103	VALLEY	9.0	9.0
10	ROOSVELT	11.0	12.0



Median of Background Reading

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Montana

Equipment	No	Average	Maximum	Minimum	PCT25	Median	PCT75
H/T	71	47.761	615	0	0.00	0.0	0.0
MANIFOLD	5	0.000	0	0	0.00	0.0	0.0
METER	1	0.000	0	0	0.00	0.0	0.0
OTHER	5	22.400	112	0	0.00	0.0	56.0
SEP	481	0.031	10	0	0.00	0.0	0.0
STANK	53	5.189	35	0	0.00	0.0	6.0
WPROD	17	1.000	10	0	0.00	0.0	0.0
SUMP	8	27.125	92	0	1.25	3.0	75.0
PUMP	11	24.091	92	0	0.00	12.0	42.0
WINJ	2	18.000	36	0	0.00	18.0	36.0
WLINE	3	40.667	92	2	2.00	28.0	92.0
FLINE	4	53.750	152	6	11.25	28.5	121.5
WTANK	39	120.436	370	0	0.00	92.0	212.0

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Montana

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	DAWSON	53	0.2453	10	0	0.00	0	0.00
PROD	FALLON	348	0.0000	0	0	0.00	0	0.00
PROD	GLACIER	10	0.0000	0	0	0.00	0	0.00
PROD	PRAIRIE	57	0.0351	1	0	0.00	0	0.00
PROD	ROSEBUD	30	0.0333	1	0	0.00	0	0.00
PROD	VALLEY	103	0.0777	5	0	0.00	0	0.00
PROD	ROOSVELT	10	72.9000	228	0	1.75	21	164.25
PROD	SHERIDAN	89	96.7303	615	0	2.00	30	127.50

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Montana

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
DAWSON	53	7.5094	9	7	7	7	8
FALLON	348	7.3247	12	7	7	7	8
PRAIRIE	57	7.0351	9	7	7	7	7
SHERIDAN	89	8.4944	10	7	8	8	10
GLACIER	10	9.0000	9	9	9	9	9
ROSEBUD	30	9.1000	10	9	9	9	9
VALLEY	103	8.7767	10	8	8	9	9
ROOSVELT	10	11.0000	12	10	10	11	12

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SUMMARY

(Nebraska)

I. There were no significant differences between items of equipment. All readings were quite low.

II. All data came from Red Willow county which had a mid-range background level.

III. Overall Summary (There were no Gas Processing data)

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
Statewide (Red Willow County)					
a. Background	30	6.3	6.5	6.5	6.5
b. Max Reading	30	6.3	6.5	12.2	20.0
c. Difference	30	0.0	0.0	5.7	13.5

NOTE: All data are measured in micro-rems/hr

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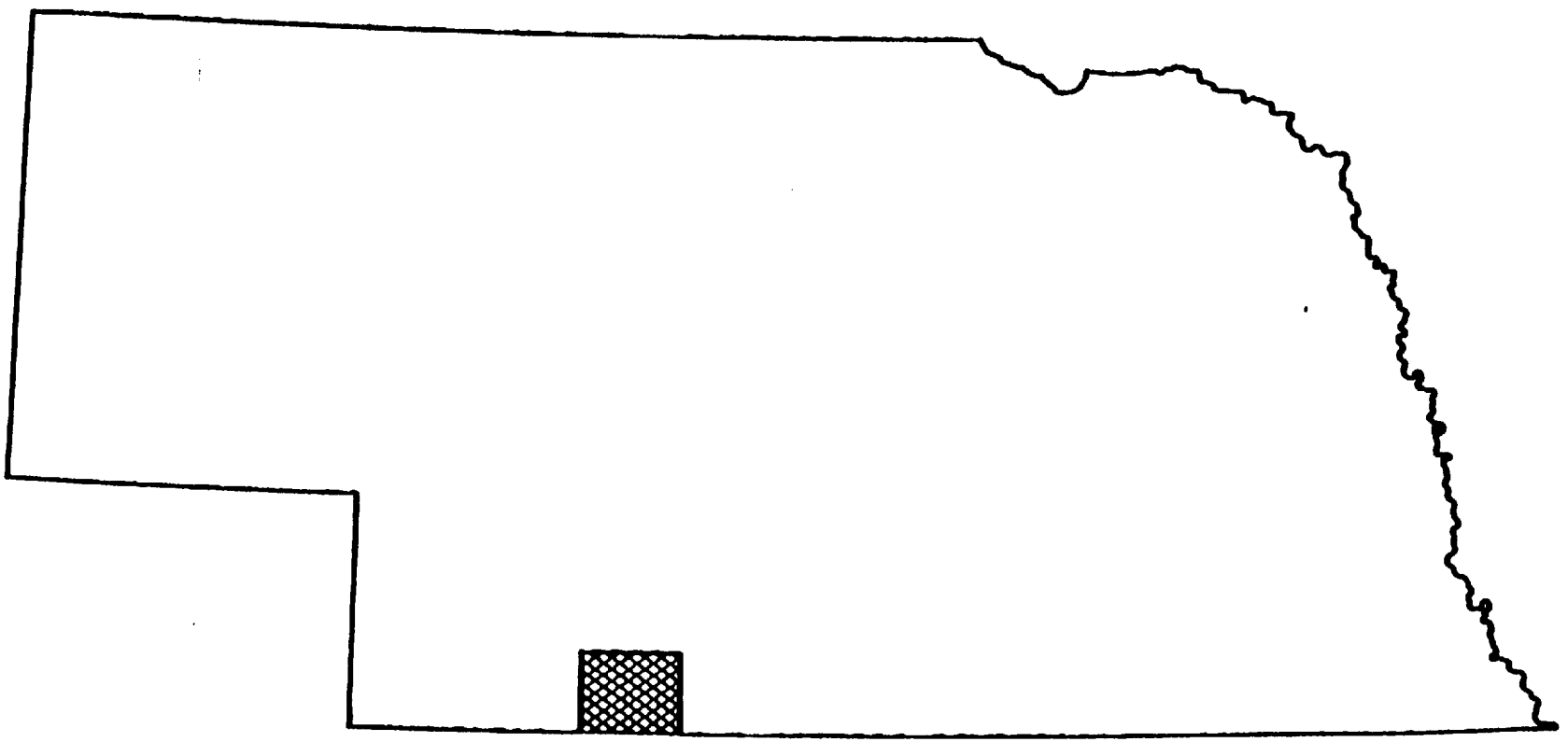
FIGURE 1 – MEDIAN BACKGROUND LEVELS

NEBRASKA



MICRO-REMS/HR

NO DATA
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2.34 - 4.99
5.0 - 9.0
9.01 - 14.0
OVER 14.0

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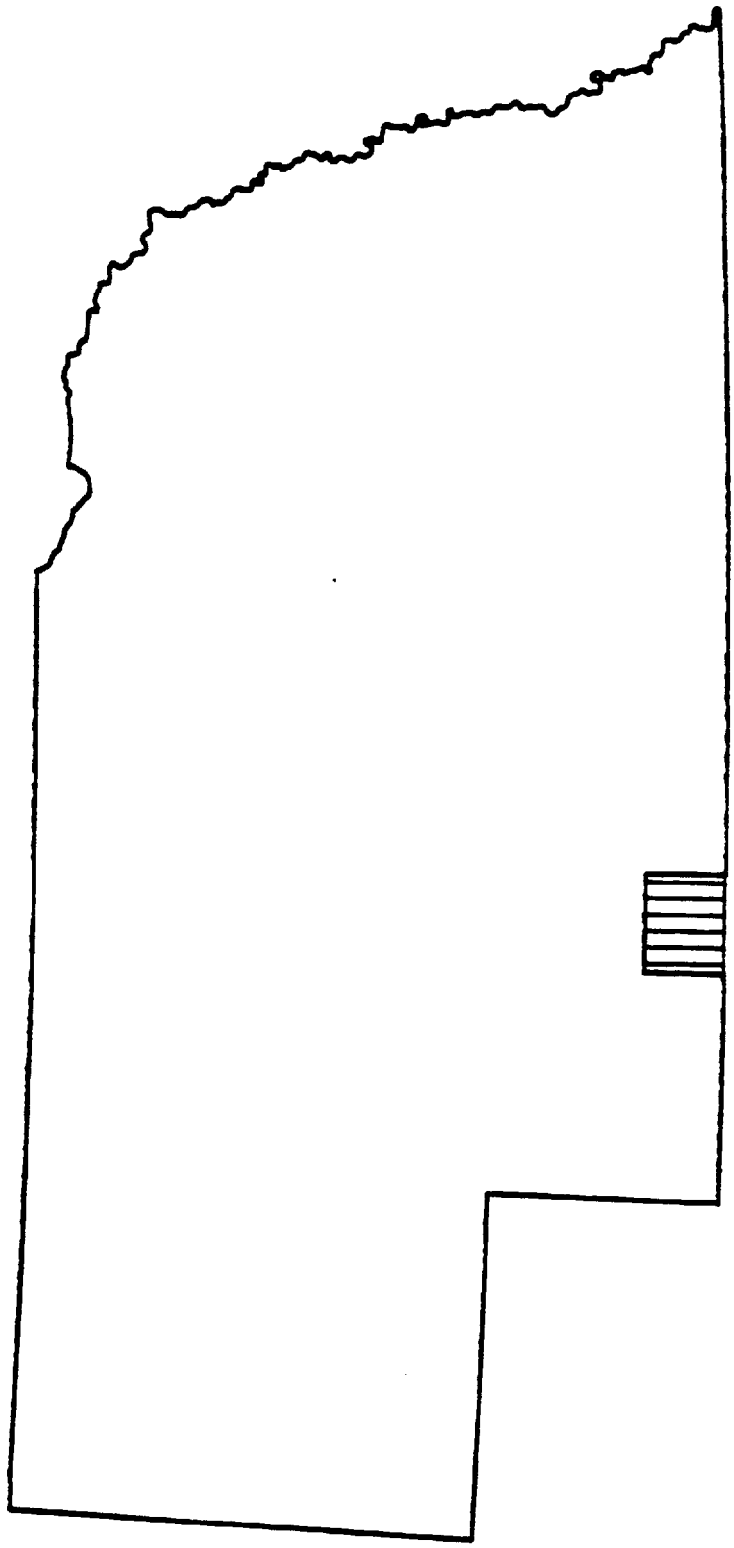
FIGURE 2 — MEDIAN DIFFERENCE OVER BACKGROUND

NEBRASKA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Nebraska

FACILITY: Production

Obsns	Equipment	Median Difference	75th Percentile
3	MANIFOLD	0.0	0.0
1	OTHER	0.0	0.0
6	PUMP	0.0	0.0
13	SEP	0.0	5.4
2	STANK	0.0	0.0
2	WLINE	0.0	0.0
3	WTANK	0.0	0.0
30			

10 20 30 40 50 60

Median of Difference Over Background

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Nebraska

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Production Facilities							
MANIFOLD	3	0.00000	0.0	0	0	0	0.0
OTHER	1	0.00000	0.0	0	0	0	0.0
PUMP	6	0.00000	0.0	0	0	0	0.0
SEP	13	2.98462	13.5	0	0	0	5.4
STANK	2	0.00000	0.0	0	0	0	0.0
WLINE	2	0.00000	0.0	0	0	0	0.0
WTANK	3	0.00000	0.0	0	0	0	0.0

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SUMMARY

(New Mexico)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

Equipment		Median Difference	75th Percentile
Product line (1)	(GP)	693 µR/hr	693 µR/hr

II. Union county had a very low background level, Lea, Chaves and Eddy were mid-range, and San Juan and Rio Arriba were high.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	2,912	5.0	7.0	10.0	27
b. Max Reading	2,912	7.0	11.0	21.0	850
c. Difference	2,912	0.0	3.0	15.0	843
2. Facility					
a. Background					
Gas Processing	455	1.5	7.0	7.0	7
Production	2,457	5.0	8.0	11.0	27
b. Max Reading					
Gas Processing	455	3.5	7.0	30.0	750
Production	2,457	7.0	12.0	20.0	850
c. Difference					
Gas Processing	455	0.0	0.3	25.0	743
Production	2,457	0.0	3.0	15.0	843

NOTES: 1) All data are measured in micro-rems/hr

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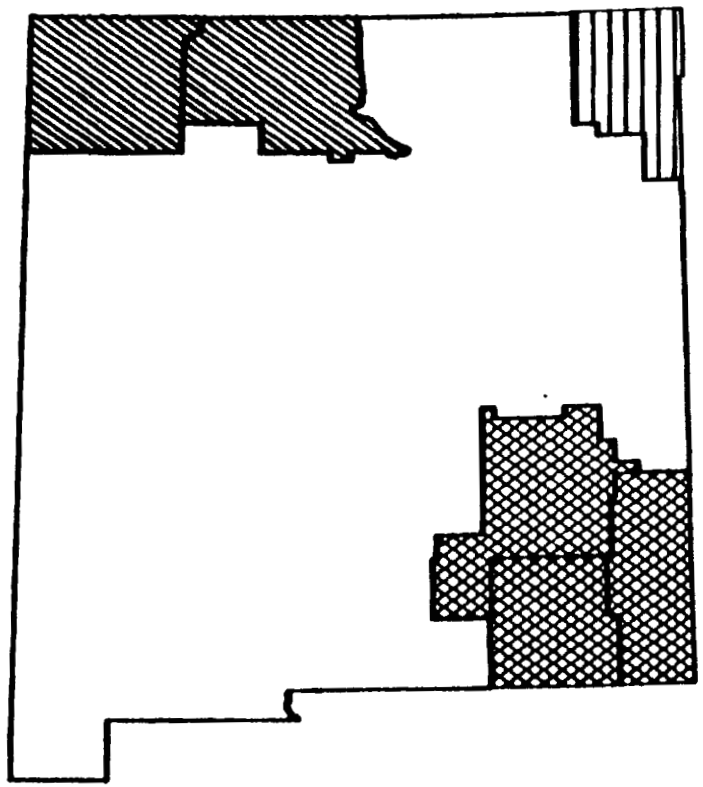
FIGURE 1 – MEDIAN BACKGROUND LEVELS

NEW MEXICO



MICRO-REMS/HR

NO DATA
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2.34 – 4.99
5.0 – 9.0
9.01 – 14.0
OVER 14.0

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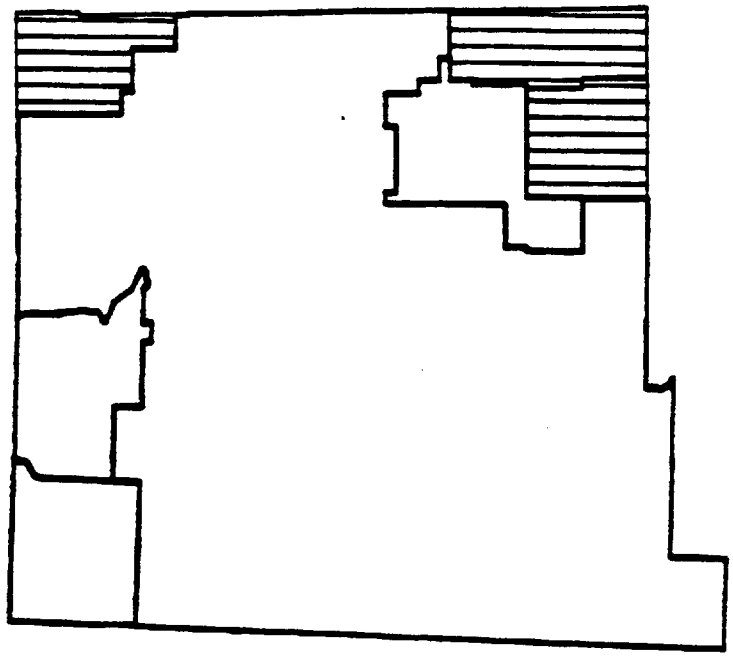
FIGURE 2 – DIFFERENCE OVER BACKGROUND

NEW MEXICO

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
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BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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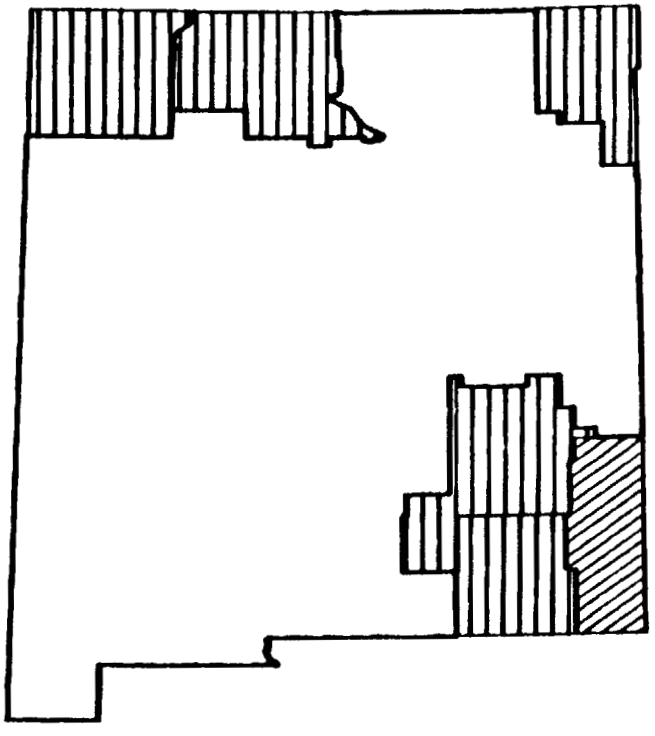
FIGURE 3 – DIFFERENCE OVER BACKGROUND

NEW MEXICO

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

New Mexico

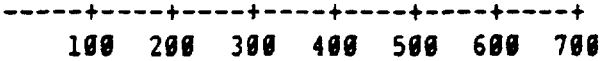
FACILITY: Gas Processing

Obsns	Equipment	Median Difference	75th Percentile
221	COMPRESSOR	0.0	0.0
7	DEHYDRATOR	0.0	0.0
39	FRAC TOWER	0.0	1.0
24	INLET SCRUBBER	0.0	4.5
31	OTANK	0.0	2.0
22	OTHER	0.0	3.5
11	PPUMP	0.0	38.0
19	SWEETENER	0.0	0.0
7	CRYO UNIT	2.0	85.0
3	PUMP	3.0	73.0
18	REFRIGERATION	4.0	75.0
17	PTANK	5.0	23.5
15	OPUMP	5.0	53.0
9	METER	7.0	174.0
11	BOTTOMS PUMP	21.0	65.0
1	PRODUCT LINE	693.0	693.0
455			

Median of Difference Over Background

Facility: Production

Obsns	Equipment	Median Difference	75th Percentile
256	FLINE	0.0	0.0
88	MANIFOLD	0.0	1.0
13	METER	0.0	0.0
58	OTHER	0.0	1.0
15	PUMP	0.0	5.0
577	SEP	0.0	4.0
691	STANK	0.0	3.0
5	VRU	0.0	1.5
63	WLINE	0.0	0.0
155	WPROD	0.0	0.0
2	WINJ	1.5	3.0
290	H/T	2.0	9.3
36	SUMP	2.0	88.3
208	WTANK	2.0	13.0
2457			



Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

New Mexico

Obsns	County		Median Difference	75th Percentile
		FACILITY: Gas Processing		
100	EDDY		0.0	0.0
190	LEA		0.0	7.0
142	UNION		0.0	0.0
23	UNREPORTED		0.0	10.0
		1 2 3 4		
		Median of Difference Over Background		
		FACILITY: Production		
30	CHAVES		0.0	4.5
162	EDDY		0.0	0.0
246	RIO ARRIBA		0.0	0.0
204	SAN JUAN		0.0	0.0
6	UNION		0.0	0.0
1,756	LEA	**********	1.0	4.0
53	UNREPORTED	**********	3.0	12.5
		1 2 3 4		
		Median of Difference Over Background		

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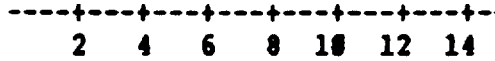
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

New Mexico

Obs	County	Median	75th Percentile
148	UNION	1.5	1.5
1,946	LEA	5.0	6.0
76	UNREPORTED	5.0	7.0
30	CHAVES	6.0	7.0
262	EDDY	6.0	8.0
204	SAN JUAN	10.0	10.0
246	RIO ARRIBA	13.0	13.0



Median of Background Reading

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

New Mexico

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	221	0.025	1.5	0	0	0	0.00
DEHYDRATOR	7	0.043	0.3	0	0	0	0.00
FRAC TOWER	39	6.782	115.0	0	0	0	1.00
INLET SCRUBBER	24	5.167	63.5	0	0	0	4.50
OTANK	31	23.355	383.0	0	0	0	2.00
OTHER	22	11.773	153.0	0	0	0	3.25
PPUMP	11	25.136	135.0	0	0	0	38.00
SWEETENER	19	3.158	50.0	0	0	0	0.00
CRYO UNIT	7	41.857	195.0	0	0	2	85.00
PUMP	3	25.333	73.0	0	0	3	73.00
REFRIGERATION	18	66.250	595.0	0	0	4	75.00
PTANK	17	22.735	215.0	0	0	5	23.50
OPUMP	15	115.933	743.0	0	0	5	53.00
METER	9	119.444	695.0	0	0	7	174.00
BOTTOMS PUMP	11	48.636	220.0	1	3	21	65.00
PRODUCT LINE	1	693.000	693.0	693	693	693	693.00
Production Facilities							
FLINE	256	1.0742	239	0	0	0.0	0.00
MANIFOLD	88	2.7727	95	0	0	0.0	1.00
METER	13	0.0000	0	0	0	0.0	0.00
OTHER	58	11.4828	210	0	0	0.0	1.00
PUMP	15	7.8667	95	0	0	0.0	5.00
SEP	577	12.9726	582	0	0	0.0	4.00
STANK	691	8.2438	790	0	0	0.0	3.00
SUMP	36	65.3894	593	0	0	0.0	88.25
VRU	5	0.6000	3	0	0	0.0	1.50
WLINE	63	4.4921	78	0	0	0.0	0.00
WPROD	155	0.7613	20	0	0	0.0	0.00
WINJ	2	1.5000	3	0	0	1.5	3.00
H/T	290	21.1238	843	0	0	2.0	9.25
WTANK	208	18.9308	792	0	0	2.0	13.00

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

New Mexico

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	EDDY	100	2.1750	98.5	0	0	0.0	0.0
GP	LEA	190	34.4474	743.0	0	0	0.0	7.0
GP	UNION	142	0.0444	1.5	0	0	0.0	0.0
GP	UNREPORTED	23	40.6522	383.0	0	0	0.0	10.0
PROD	CHAVES	30	22.2667	370.0	0	0	0.0	4.5
PROD	EDDY	162	12.4938	444.0	0	0	0.0	0.0
PROD	RIO ARRIBA	246	0.1098	3.0	0	0	0.0	0.0
PROD	SAN JUAN	204	10.0049	790.0	0	0	0.0	0.0
PROD	UNION	6	0.0000	0.0	0	0	0.0	0.0
PROD	LEA	1756	11.6379	843.0	0	0	1.0	4.0
PROD	UNREPORTED	53	39.8679	545.0	0	0	3.0	12.5

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

New Mexico

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
UNION	148	1.3507	1.8	1.0	1.000	1.5	1.5
LEA	1946	5.6028	18.0	2.0	5.000	5.0	6.0
UNREPORTED	76	5.8158	8.0	5.0	5.000	5.0	7.0
CHAVES	30	6.8667	13.0	5.0	6.000	6.0	7.0
EDDY	262	5.0153	10.0	1.5	1.500	6.0	8.0
SAN JUAN	204	8.1382	14.0	3.3	4.575	10.0	10.0
RIO ARRIBA	246	12.2435	27.0	3.0	11.000	13.0	13.0

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SUMMARY

(North Dakota)

I. North Dakota reported no Gas Processing equipment. There are no significant differences between types of equipment.

II. Williams, Bottineau, Divide, and Richland counties had mid-range background levels while the remainder were high.

III. Overall Summary (Production Facilities)

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
Statewide					
a. Background	856	10.0	12.0	13.0	15
b. Max Reading	856	10.0	12.0	19.3	400
c. Difference	856	0.0	0.0	8.3	389

NOTE: All data are measured in micro-rems/hr

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FIGURE 1 – MEDIAN BACKGROUND LEVELS

NORTH DAKOTA

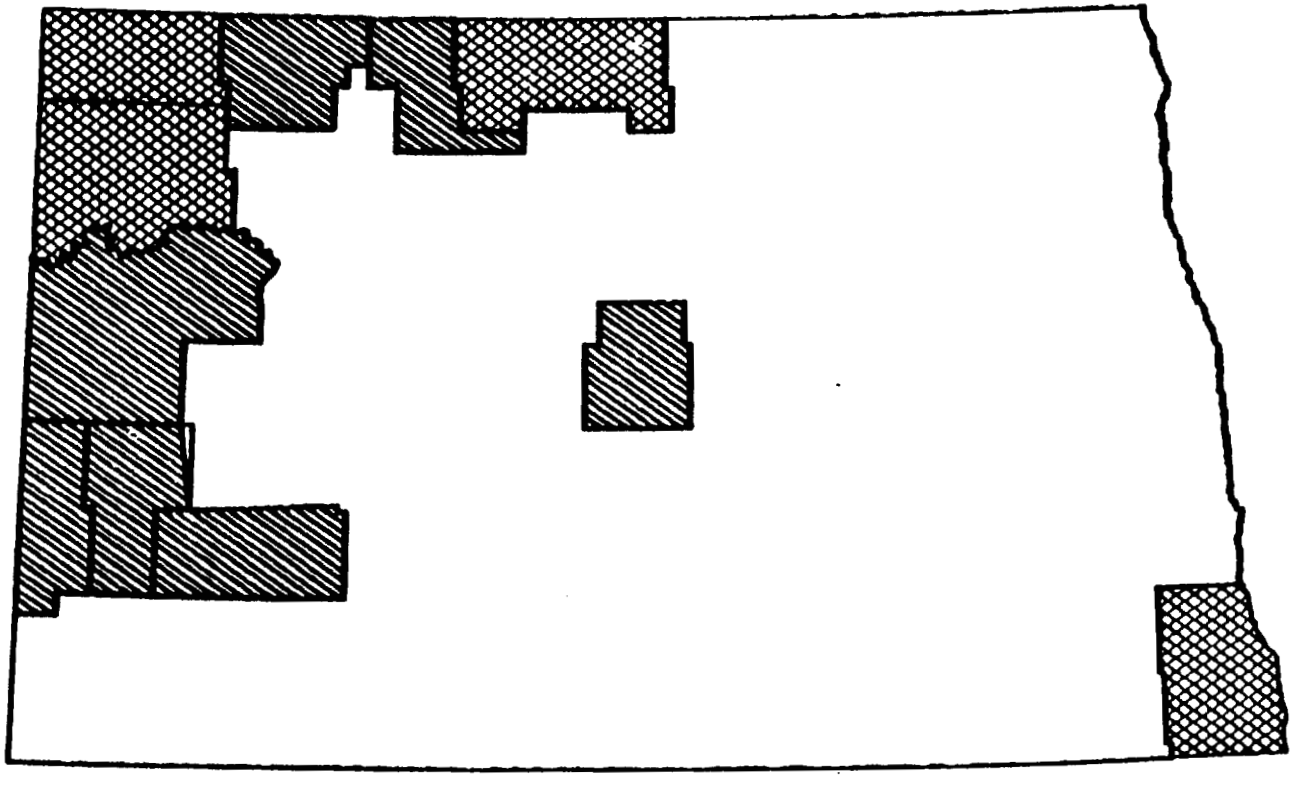

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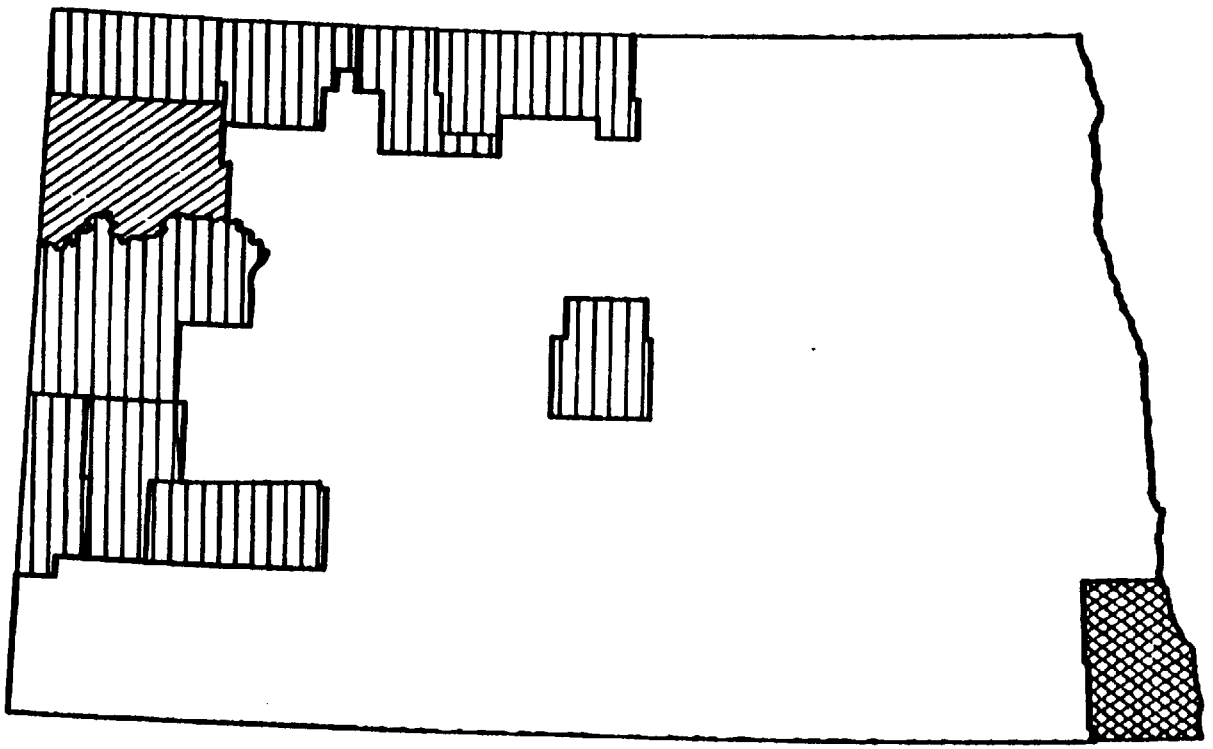
FIGURE 2 – MEDIAN DIFFERENCE OVER BACKGROUND

NORTH DAKOTA

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 – 33
BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

North Dakota

FACILITY: Production

Obsns	Equipment		Median Difference	75th Percentile
2	FLINE	|	0.0	0.0
108	H/T	|	0.0	1.8
21	MANIFOLD	|	0.0	0.0
5	METER	|	0.0	0.0
24	OTHER	|	0.0	0.0
32	PUMP	|	0.0	0.0
108	SEP	|	0.0	0.0
327	STANK	|	0.0	0.0
1	WINJ	|	0.0	0.0
62	WPROD	|	0.0	0.0
156	WTANK	|**	1.0	18.5
5	WLINE	|**********	6.0	29.5
5	SUMP	|**************************	13.0	15.0
856		----+---+---+---+---+---+---+---+---+-		
		2 4 6 8 10 12 14 16 18		

Median of Difference

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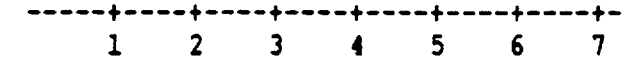
Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

North Dakota

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
218	BILLINGS	0.0	0.0
57	BOTTINEAU	0.0	0.0
27	BURKE	0.0	5.0
134	DIVIDE	0.0	2.0
14	GOLDEN VALLEY	0.0	4.3
259	MCKENZIE	0.0	0.0
8	RENVILLE	0.0	0.0
11	SHERIDAN	0.0	2.0
70	STARK	0.0	0.0
19	WILLIAMS	1.0	7.0
39	RICHLAND	4.0	21.0
856			



Median of Difference

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Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

North Dakota

Facility: Production

Obs	County		Median	75th Percentile
19	WILLIAMS	***********	5.0	10.0
57	BOTTINEAU	*****************	8.0	9.0
134	DIVIDE	*******************	9.0	9.5
39	RICHLAND	*******************	9.0	9.0
218	BILLINGS	*********************	10.0	10.0
27	BURKE	*********************	10.0	10.0
8	RENVILLE	*********************	10.0	10.0
14	GOLDEN VALLEY	**********************	11.0	11.0
259	MCKENZIE	**********************	11.0	12.0
11	SHERIDAN	**********************	11.0	12.0
70	STARK	**************************	13.0	13.0
856		2 4 6 8 10 12 14 16		

Median of Background

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

North Dakota

Equipment	No	AVG	Maximum	Minimum	PCT25	Median	PCT75
Production Facilities							
FLINE	2	0.0000	0	0	0.0	0	0.0
H/T	108	17.2685	389	0	0.0	0	1.8
MANIFOLD	21	0.0952	2	0	0.0	0	0.0
METER	5	0.0000	0	0	0.0	0	0.0
OTHER	24	4.4583	56	0	0.0	0	0.0
PUMP	32	2.0312	36	0	0.0	0	0.0
SEP	108	0.2593	15	0	0.0	0	0.0
STANK	327	1.4954	161	0	0.0	0	0.0
WINJ	1	0.0000	0	0	0.0	0	0.0
WPROD	62	1.3226	68	0	0.0	0	0.0
WTANK	156	17.7564	229	0	0.0	1	18.5
WLINE	5	14.2000	52	0	3.0	6	29.5
SUMP	5	9.2000	16	0	1.5	13	15.0
Gas Processing							
None							

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

North Dakota

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	BILLINGS	218	0.6835	36	0	0	0	0.00
PROD	BOTTINEAU	57	2.3860	68	0	0	0	0.00
PROD	BURKE	27	3.1852	20	0	0	0	5.00
PROD	DIVIDE	134	15.3881	311	0	0	0	2.00
PROD	GOLDEN VALLEY	14	4.2857	31	0	0	0	4.25
PROD	MCKENZIE	259	5.5676	389	0	0	0	0.00
PROD	RENVILLE	8	0.0000	0	0	0	0	0.00
PROD	SHERIDAN	11	1.0000	6	0	0	0	2.00
PROD	STARK	70	3.6143	52	0	0	0	0.00
PROD	WILLIAMS	19	4.7368	25	0	0	1	7.00
PROD	RICHLAND	39	31.6923	221	0	0	4	21.00

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

North Dakota

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
WILLIAMS	19	7.3684	10	5	5	5	10.0
BOTTINEAU	57	8.4035	9	8	8	8	9.0
DIVIDE	134	8.6269	13	2	7	9	9.5
RICHLAND	39	9.2051	11	9	9	9	9.0
BILLINGS	218	10.7156	14	9	10	10	10.0
BURKE	27	9.8148	10	9	10	10	10.0
RENVILLE	8	10.0000	10	10	10	10	10.0
GOLDEN VALLEY	14	11.0000	11	11	11	11	11.0
MCKENZIE	259	10.9228	13	8	10	11	12.0
SHERIDAN	11	11.2727	12	11	11	11	12.0
STARK	70	12.5000	15	9	12	13	13.0

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SUMMARY

(Offshore)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking is listed below. The difference is the excess of the reading over background:

Equipment	Median Difference	75th Percentile
Injection Well (Prod)	95 µR/hr	97.0 µR/hr

II. There were no significant differences in background readings between the Gulf of Mexico (1 µR/Hr) and California (2 µR/Hr). The Alaska offshore data (4 µR/Hr) were reported with the rest of Alsaka since there were few observations and there was no difference between onshore and offshore in that state.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Overall					
a. Background	2920	1.0	2.0	2.0	10
b. Max Reading	2920	2.0	8.9	40.0	1,000
c. Difference	2920	0.5	7.0	39.0	995
2. Facility					
a. Background					
Gas Processing	58	2.0	2.0	5.0	5
Production	2,862	1.0	2.0	2.0	10
b. Max Reading					
Gas Processing	58	3.0	15.0	25.5	70
Production	2,862	2.0	8.1	42.7	1,000
c. Difference					
Gas Processing	58	1.0	13.3	24.4	68
Production	2,862	0.5	7.0	41.3	995

NOTE: All data are measured in micro-rems/hr

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Offshore

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
12	COMPRESSOR		0.00	0.0
35	INLET SCRUBBER		1.00	14.0
4	DEHYDRATOR	*	2.50	11.8
1	METER	***	5.00	5.0
1	OTANK	*****	10.00	10.0
3	OPUMP	*******	15.00	55.0
2	OTHER	*******	15.00	20.0
58		10 20 30 40 50 60 70 80 90		

Median of Difference Over Background

FACILITY: Production

Obsns	Equipment		Median Difference	75th Percentile
513	WPROD		0.00	0.3
519	MANIFOLD		0.30	8.2
93	PUMP		0.30	8.4
368	OTHER		0.35	2.9
6	WOTHER		0.60	2.9
1	VRU		0.80	0.8
90	H/T		1.00	10.3
725	SEP	*	1.00	8.0
17	WLINE	*	2.10	10.6
131	FLINE	*	3.00	22.0
168	STANK	*	3.20	19.0
76	WTANK	***	6.10	18.7
73	SUMP	****	8.00	50.0
8	METER	**********	21.00	38.8
2	WINJ	**********	95.00	97.0
2860		10 20 30 40 50 60 70 80 90		

Median of Difference Over Background

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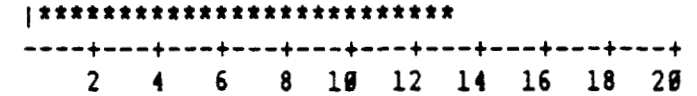
Table 2

Median Difference Over Background by Area
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Offshore

FACILITY: Gas Processing

Obsns	Area	Median Difference	75th Percentile
28	CALIFORNIA	0.0	0.0
30	GULF	12.5	21.0



Median of Difference Over Background

FACILITY: Production

Obsns	Area	Median Difference	75th Percentile
86	CALIFORNIA	0.0	0.0
2776	GULF	0.5	7.0

Median of Difference Over Background

Table 3

Median Background by Area
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Offshore

Obs	Area	Median	75th Percentile
2806	GULF	1.0	1.3
114	CALIFORNIA	2.0	2.0

Median of Background Readings

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Offshore

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	12	0.5833	7	0	0	0.0	0.00
INLET SCRUBBER	35	9.8000	68	0	0	1.0	14.00
DEHYDRATOR	4	4.7500	14	0	0	2.5	11.75
METER	1	5.0000	5	5	5	5.0	5.00
OTANK	1	10.0000	10	10	10	10.0	10.00
OPUMP	3	28.3333	55	15	15	15.0	55.00
OTHER	2	15.0000	20	10	10	15.0	20.00
Production							
WPROD	513	3.7164	495.0	0.0	0.00	0.0	0.300
MANIFOLD	591	24.5440	598.0	0.0	0.00	0.3	8.200
PUMP	93	7.8183	88.0	0.0	0.00	0.3	8.350
OTHER	368	19.2701	995.0	0.0	0.00	0.3	2.875
WOTHER	6	1.4500	5.5	0.0	0.00	0.6	2.875
VRU	1	0.8000	0.8	0.8	0.80	0.8	0.800
H/T	90	29.4578	595.0	0.0	0.00	1.0	10.250
SEP	725	21.5276	748.0	0.0	0.00	1.0	8.000
WLINE	17	32.9765	397.0	0.0	0.05	2.1	6.150
FLINE	131	27.8008	473.0	0.0	0.00	3.0	22.000
STANK	168	29.8440	748.0	0.0	0.43	3.2	19.000
WTANK	76	13.1013	128.2	0.0	1.80	6.1	18.725
SUMP	73	54.1192	793.0	0.0	0.75	8.0	50.000
METER	8	23.5000	44.0	4.0	9.25	21.0	38.750
WINJ	2	95.0000	97.0	93.0	93.00	95.0	97.000

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Appendix 2

Statistical Data on Median Difference over Background By Facility and Area (Micro-Rems/Hr)

Offshore

FACILITY	AREA	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	CALIFORNIA	28	0.1429	1	0	0	0.0	0
GP	GULF	30	16.5000	68	0	5	13.0	20
PROD	CALIFORNIA	86	3.5000	48	0	0	0.0	3
PROD	GULF	2776	20.4281	995	0	0	0.5	7

Appendix 3

Statistical Data on Background by Area (Micro-Rems/Hr)

Offshore

AREA	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GULF	2806	1.2721	10	0	0.7	1	1.3
CALIFORNIA	114	2.0000	2	2	2.0	2	2.0

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SUMMARY

(Oklahoma)

I. There were no significant differences among the different items of equipment.

II. Background levels were mid-range in all counties except Grant, Haskell, Kingfisher, McClain Pittsburg, Beaver, Dewey, Oklahoma, Tulsa, Woods, Garfield, and Woodward which were high, and Kay and Payne which were very high.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	4,128	9.0	10.0	12.0	25
b. Max Reading	4,128	10.0	13.0	42.0	3,800
c. Difference	4,128	0.0	3.0	33.1	3,786
2. Facility					
a. Background					
Gas Processing	304	10.0	11.0	12.5	14
Production	3,824	9.0	10.0	12.0	25
b. Max Reading					
Gas Processing	304	10.0	12.5	15.0	550
Production	3,824	10.0	13.0	48.0	3,800
c. Difference					
Gas Processing	304	0.0	1.0	8.3	539
Production	3,824	0.0	3.0	38.0	3,786

NOTE: All data are measured in micro-rems/hr

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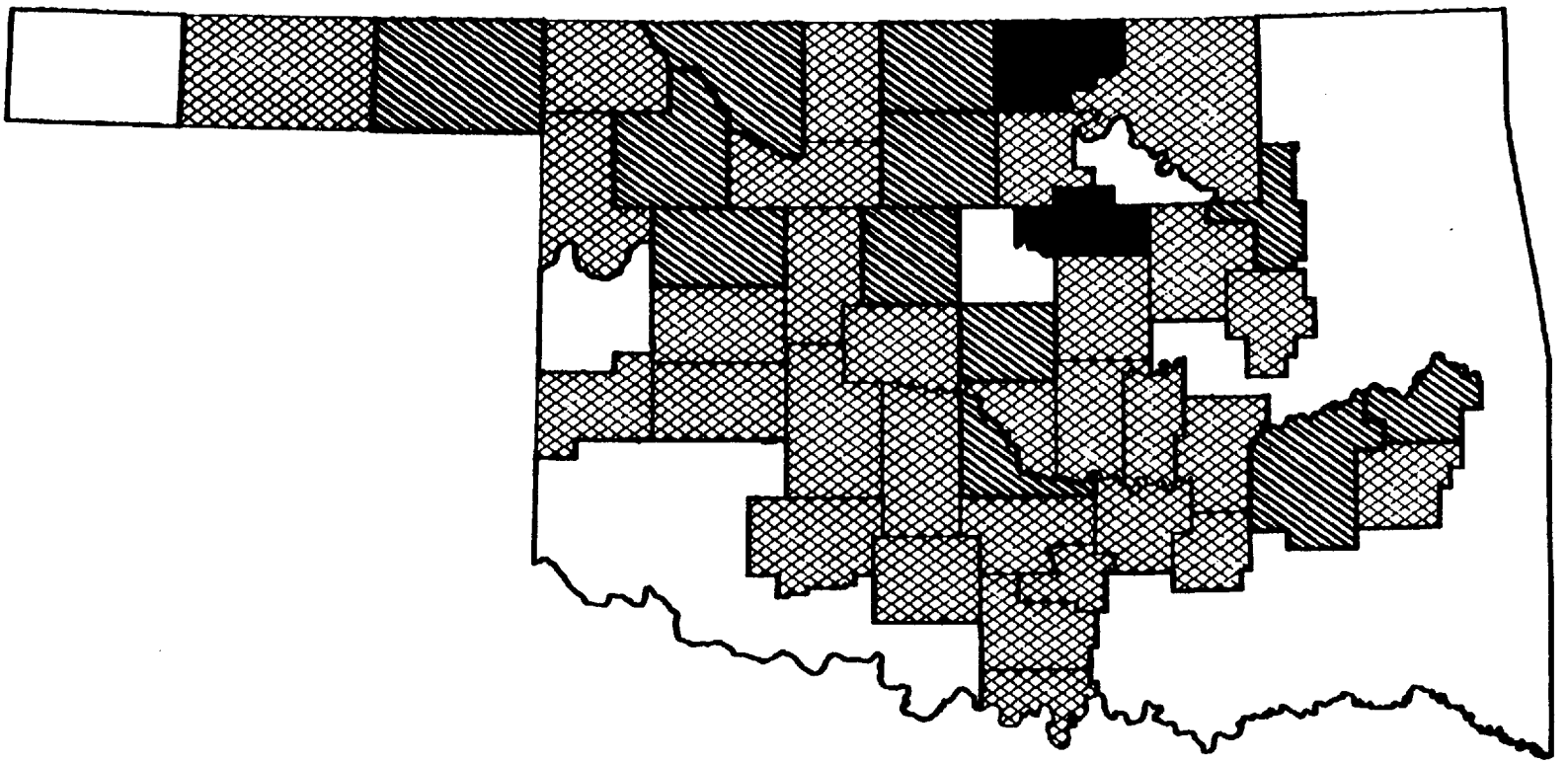
FIGURE 1 – MEDIAN BACKGROUND LEVELS

OKLAHOMA



MICRO-REMS/HR

NO DATA
0 - 2.33
2.34 - 4.99
5.0 - 9.0
9.01 - 14.0
OVER 14.0

AMERICAN PETROLEUM INSTITUTE
NATURALLY OCCURRING RADIOACTIVITY SURVEY

STD·API/PETRO PUBL 7101-ENGL 1997 ■ 0732290 0601497 5T■

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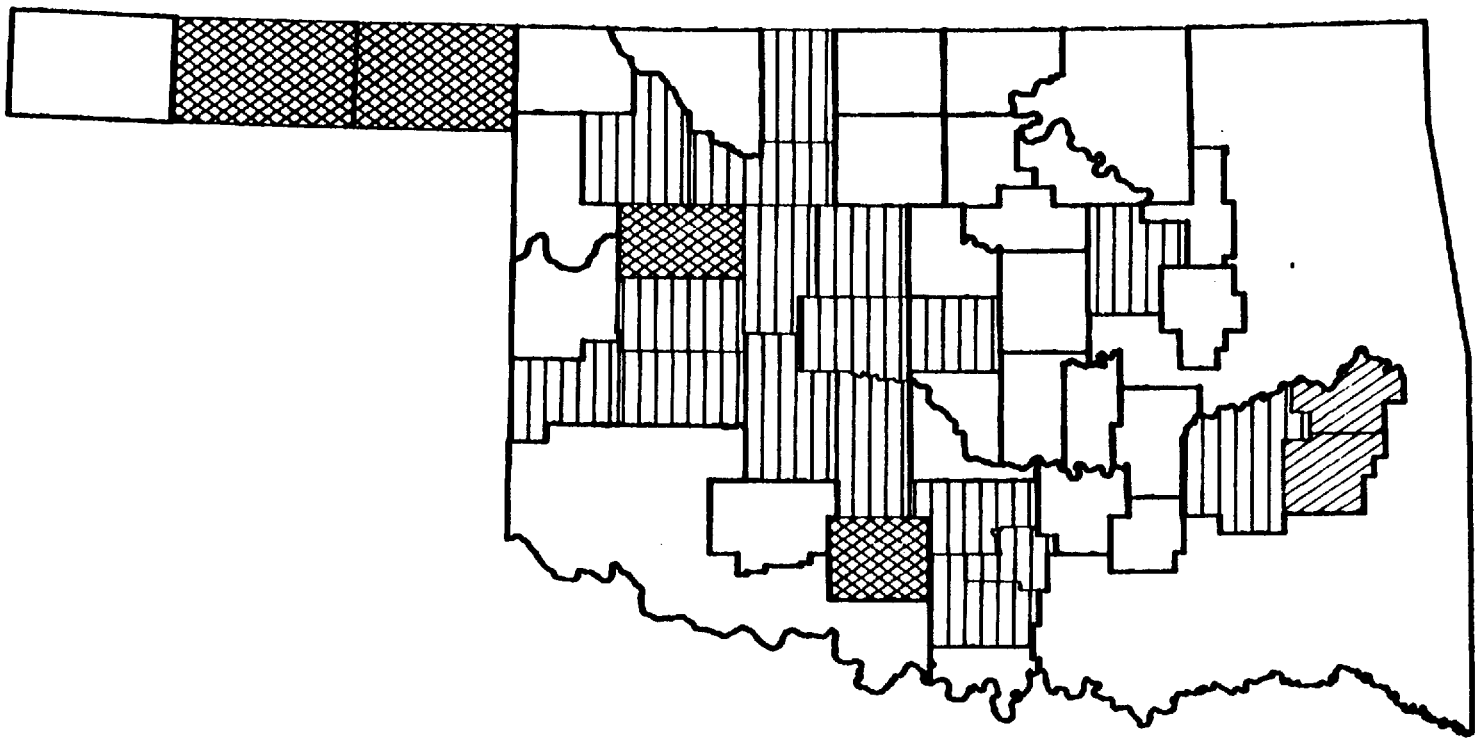
FIGURE 2 – DIFFERENCE OVER BACKGROUND

OKLAHOMA

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

AMERICAN PETROLEUM INSTITUTE
NATURALLY OCCURRING RADIOACTIVITY SURVEY

FIGURE 3 — DIFFERENCE OVER BACKGROUND

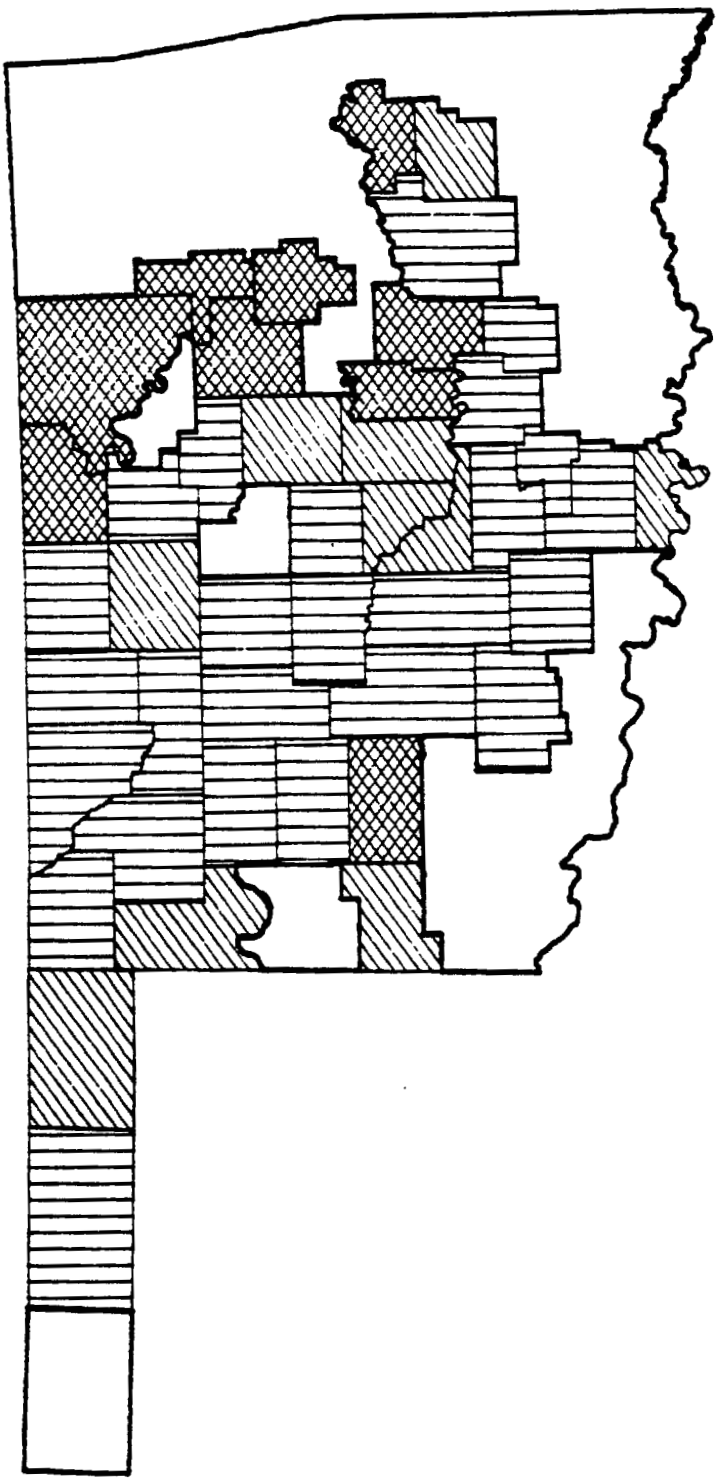


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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Oklahoma

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
99	COMPRESSOR	|	0.0	2.0
2	CRYO UNIT	|	0.0	0.0
27	DEHYDRATOR	|	0.0	0.0
20	FRAC TOWER	|	0.0	0.0
35	INLET SCRUBBER	|	0.0	0.0
8	METER	|	0.0	0.8
32	OTANK	|	0.0	0.0
17	OTHER	|	0.0	4.6
8	PRODUCT LINE	|	0.0	12.8
12	REFRIGERATION	|	0.0	0.0
13	SWEETENER	|	0.0	0.0
9	PTANK	|	0.5	8.3
9	OPUMP	|*****	10.5	47.0
2	BOTTOMS PUMP	|******	12.7	25.0
4	PPUMP	|*********	17.5	409.0
7	REFLUX PUMP	|**********	20.9	46.4
----		-----+----+----+----+----+----+		
304		10 20 30 40 50 60		

Median of Difference Over Background

FACILITY: Production

59	FLINE	|	0.0	30.0
111	MANIFOLD	|	0.0	3.0
135	METER	|	0.0	1.0
195	OTHER	|	0.0	4.0
271	PUMP	|	0.0	1.0
626	SEP	|	0.0	4.0
1,012	STANK	|	0.0	1.8
3	VRU	|	0.0	0.0
347	WPROD	|	0.0	2.0
350	H/T	|*	1.0	6.0
42	SUMP	|*	1.0	10.3
585	WTANK	|*	2.0	13.5
9	WINJ	|***	6.0	40.0
79	WLINE	|*******	14.0	89.0
----		-----+----+----+----+----+----+		
3,824		10 20 30 40 50 60		

Median of Difference Over Background

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Oklahoma

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
3	ALFALFA		0.00	1.0
17	BECKHAM		0.00	0.0
63	BLAINE		0.00	0.0
1	CADDO		0.00	0.0
10	CANADIAN		0.00	0.5
1	CARTER		0.00	0.0
1	CREEK		0.00	0.0
3	CUSTER		0.00	0.0
2	GARVIN		0.00	0.0
11	GRADY		0.00	1.0
30	KINGFISHER		0.00	0.0
1	MAJOR		0.00	0.0
16	MURRAY		0.00	0.0
4	OKLAHOMA		0.00	0.0
10	PITTSBURG		0.00	0.0
1	WASHITA		0.00	0.0
44	WOODWARD		0.00	0.0
44	HASKELL	***	1.50	3.0
2	LATIMER	***	1.50	2.0
8	BEAVER	****	2.00	2.0
9	TEXAS	**********	10.50	13.8
20	DEWEY	**********	13.35	44.0
3	STEPHENS	**********	15.20	44.2
304		2 4 6 8 10 12 14 16 18		

Median of Difference Over Background

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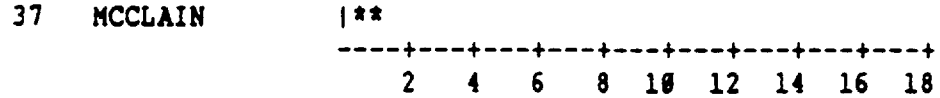
Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Oklahoma

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
118	ALFALFA	0.00	0.0
140	BLAINE	0.00	2.0
136	CANADIAN	0.00	2.0
390	CARTER	0.00	3.0
12	COMANCHE	0.00	0.0
83	CUSTER	0.00	0.0
59	DEWEY	0.00	1.0
156	GARVIN	0.00	2.0
127	GRADY	0.00	2.0
2	GRANT	0.00	0.0
15	HARPER	0.00	0.0
526	KINGFISHER	0.00	2.0
101	MAJOR	0.00	3.0
68	MURRAY	0.00	0.0
9	NOBLE	0.00	1.0
44	OKLAHOMA	0.00	0.0
18	PAYNE	0.00	95.8
40	PITTSBURG	0.00	0.0
31	PONTOTOC	0.00	4.0
368	STEPHENS	0.00	4.0
18	TEXAS	0.00	0.3
4	WOODS	0.00	0.0
7	WOODWARD	0.00	0.0
14	CADDO	0.50	3.0
74	COAL	0.50	4.0
8	BEAVER	1.00	66.8
173	BECKHAM	1.00	2.0
103	CLEVELAND	1.00	3.0
13	ELLIS	1.00	5.0
22	GARFIELD	1.00	4.0
25	LATIMER	1.00	2.0
5	LINCOLN	1.00	10.5
8	LOVE	1.00	9.3
37	MCCLAIN	1.00	60.0



Median of Difference Over Background

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Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Oklahoma

FACILITY: Production

Obsns	County		Median Difference	75th Percentile
50	POTTAWATOMIE	|**	1.00	12.0
1	UNREPORTED	|**	1.00	1.0
149	HASKELL	|****	2.00	3.0
74	KAY	|****	2.00	114.3
12	TULSA	|****	2.00	85.8
23	WASHITA	|****	2.00	2.0
285	CREEK	|******	3.00	46.5
31	OKMULGEE	|******	3.00	137.0
115	OSAGE	|********	4.00	32.0
126	SEMINOLE	|********	4.00	45.5
4	HUGHES	|**********	5.50	15.8
3,824		2 4 6 8 10 12 14 16 18 20		

Median of Difference Over Background

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Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Oklahoma

Obs	County	Median	75th Percentile
4	HUGHES	5.0	5.0
1	UNREPORTED	5.0	5.0
24	WASHITA	5.0	5.0
8	LOVE	5.5	6.8
31	BECKHAM	6.0	7.0
391	CARTER	6.0	9.0
86	CUSTER	6.0	6.0
13	ELLIS	6.0	8.0
5	LINCOLN	6.0	6.0
102	MAJOR	6.0	9.0
27	TEXAS	6.5	6.8
75	CADDO	7.0	9.0
146	CANADIAN	7.0	8.0
8	COAL	7.0	7.0
138	GRADY	7.0	10.0
84	MURRAY	7.0	7.0
31	PONTOTOC	7.0	10.0
121	ALFALFA	8.0	8.0
203	BLAINE	8.0	10.5
103	CLEVELAND	8.0	9.0
158	GARVIN	8.0	9.0
9	NOBLE	8.0	8.0
31	OKMULGEE	8.0	13.0
115	OSAGE	8.0	9.0
50	POTTAWATOMIE	8.0	8.0
126	SEMINOLE	8.0	9.0
12	COMANCHE	9.0	9.0
286	CREEK	9.0	11.0
15	HARPER	9.0	10.0
27	LATIMER	9.0	10.0
371	STEPHENS	9.0	15.0

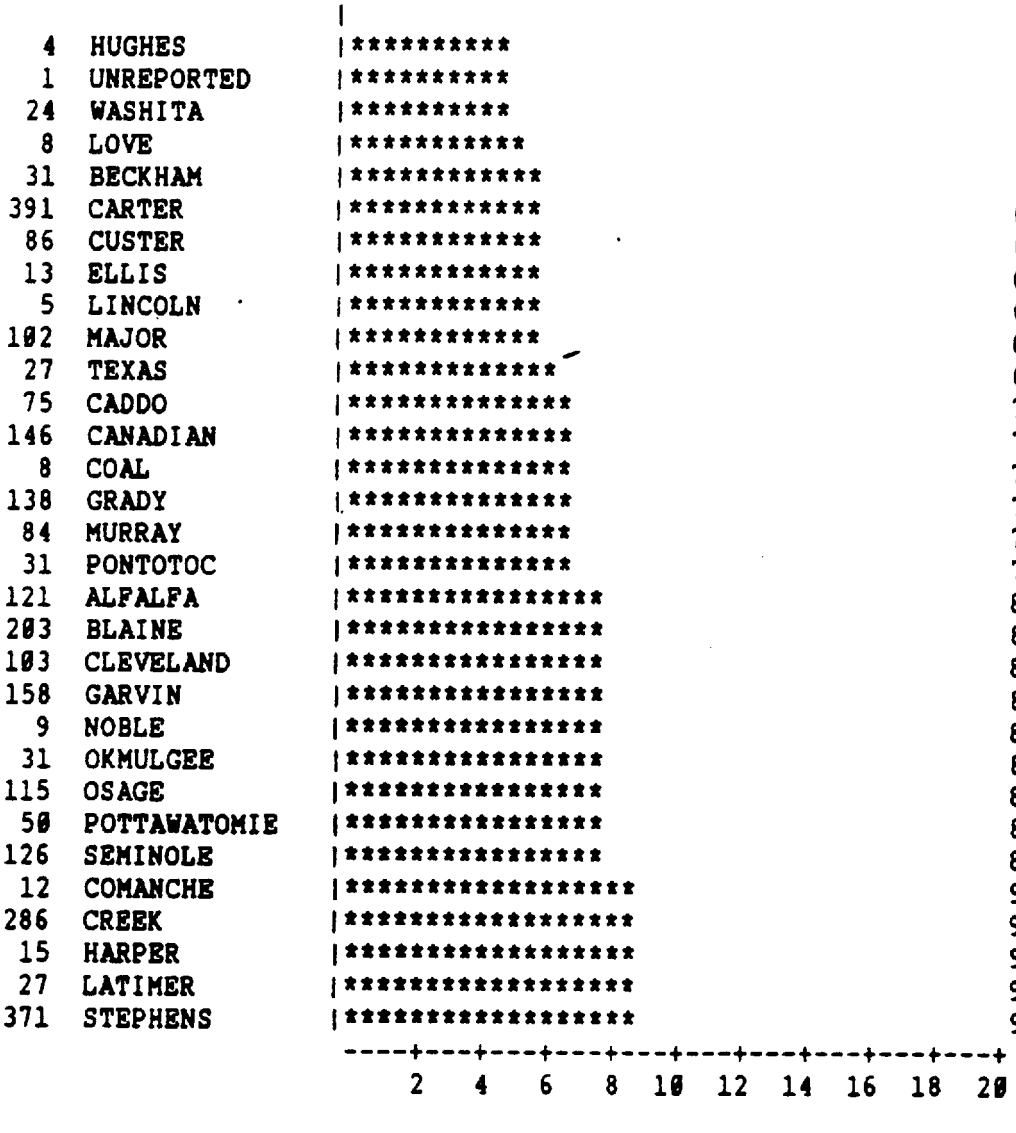

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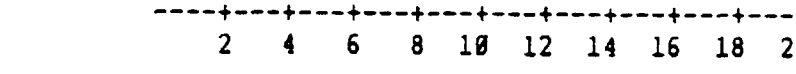
Table 3 (Continued)

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Oklahoma

Obs	County	Median	75th Percentile
2	GRANT	10.0	10.0
193	HASKELL	10.0	10.0
556	KINGFISHER	10.0	10.0
37	MCCLAIN	10.0	10.0
50	PITTSBURG	10.0	10.0
181	BEAVER	11.0	11.0
79	DEWEY	11.0	11.0
48	OKLAHOMA	11.0	11.0
12	TULSA	11.0	14.0
4	WOODS	11.0	11.8
22	GARFIELD	11.5	13.3
51	WOODWARD	12.5	12.5
74	KAY	15.0	15.3
18	PAYNE	15.0	15.0



Median of Background Readings

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Oklahoma

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	99	0.970	5.0	0.0	0.00	0.00	2.00
CRYO UNIT	2	0.000	0.0	0.0	0.00	0.00	0.00
DEHYDRATOR	27	0.333	4.0	0.0	0.00	0.00	0.00
FRAC TOWER	20	1.225	15.0	0.0	0.00	0.00	0.00
INLET SCRUBBER	35	0.206	2.0	0.0	0.00	0.00	0.00
METER	8	0.687	4.5	0.0	0.00	0.00	0.75
OTANK	32	7.403	89.0	0.0	0.00	0.00	0.50
OTHER	17	4.188	44.0	0.0	0.00	0.00	4.60
PRODUCT LINE	8	5.187	24.5	0.0	0.00	0.00	12.75
REFRIGERATION	12	0.000	0.0	0.0	0.00	0.00	0.00
SWEETENER	13	0.000	0.0	0.0	0.00	0.00	0.00
PTANK	9	4.811	20.0	0.0	0.00	0.50	8.30
OPUMP	9	33.333	176.0	0.0	0.00	10.50	47.00
BOTTOMS PUMP	2	12.750	25.0	0.5	0.50	12.75	25.00
PPUMP	4	143.475	539.0	0.0	3.97	17.45	409.00
REFLUX PUMP	7	26.114	51.3	0.0	4.80	20.90	46.40
Production Facilities							
FLINE	59	47.610	888	0	0	0	30.00
MANIFOLD	111	40.027	1196	0	0	0	3.00
METER	135	0.652	7	0	0	0	1.00
OTHER	195	44.492	994	0	0	0	4.00
PUMP	271	13.139	986	0	0	0	1.00
SEP	626	38.785	3391	0	0	0	4.00
STANK	1012	8.253	986	0	0	0	1.75
VRU	3	0.000	0	0	0	0	0.00
WPROD	347	9.140	790	0	0	0	2.00
H/T	350	19.700	1205	0	0	1	6.00
SUMP	42	31.048	685	0	0	1	10.25
WTANK	585	45.335	3786	0	0	2	13.50
WINJ	9	109.111	886	0	0	6	40.00
WLINE	79	184.934	2790	0	0	14	89.00

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Appendix 2

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Oklahoma

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	ALFALFA	3	0.333	1.0	0	0.00	0.00	1.00
GP	BECKHAM	22	0.136	1.0	0	0.00	0.00	0.00
GP	BLAINE	63	2.129	74.5	0	0.00	0.00	0.00
GP	CADDO	1	0.000	0.0	0	0.00	0.00	0.00
GP	CANADIAN	10	0.500	3.0	0	0.00	0.00	0.50
GP	CARTER	1	0.000	0.0	0	0.00	0.00	0.00
GP	CREEK	1	0.000	0.0	0	0.00	0.00	0.00
GP	CUSTER	3	0.000	0.0	0	0.00	0.00	0.00
GP	GARVIN	2	0.000	0.0	0	0.00	0.00	0.00
GP	GRADY	11	1.718	15.9	0	0.00	0.00	1.00
GP	KINGFISHER	30	6.900	176.0	0	0.00	0.00	0.00
GP	MAJOR	1	0.000	0.0	0	0.00	0.00	0.00
GP	MURRAY	14	0.286	4.0	0	0.00	0.00	0.00
GP	OKLAHOMA	4	0.000	0.0	0	0.00	0.00	0.00
GP	PITTSBURG	10	0.100	1.0	0	0.00	0.00	0.00
GP	WASHITA	1	0.000	0.0	0	0.00	0.00	0.00
GP	WOODWARD	44	1.602	25.0	0	0.00	0.00	0.00
GP	HASKELL	44	1.750	5.0	0	0.00	1.50	3.00
GP	LATIMER	2	1.500	2.0	1	1.00	1.50	2.00
GP	BEAVER	8	1.375	2.0	0	0.25	2.00	2.00
GP	TEXAS	9	8.978	23.4	0	0.00	10.50	13.75
GP	DEWEY	20	47.130	539.0	0	0.00	13.35	44.00
GP	STEPHENS	3	19.800	44.2	0	0.00	15.20	44.20
PROD	ALFALFA	118	1.102	83.0	0	0.00	0.00	0.00
PROD	BLAINE	140	5.929	120.0	0	0.00	0.00	2.00
PROD	CANADIAN	136	14.096	887.0	0	0.00	0.00	2.00
PROD	CARTER	390	7.983	268.0	0	0.00	0.00	3.00
PROD	COMANCHE	12	1.583	19.0	0	0.00	0.00	0.00
PROD	CUSTER	83	0.012	1.0	0	0.00	0.00	0.00
PROD	DEWEY	59	0.322	2.0	0	0.00	0.00	1.00
PROD	GARVIN	156	32.006	986.0	0	0.00	0.00	2.00
PROD	GRADY	127	29.315	990.0	0	0.00	0.00	2.00
PROD	GRANT	2	0.000	0.0	0	0.00	0.00	0.00
PROD	HARPER	15	0.900	12.5	0	0.00	0.00	0.00
PROD	KINGFISHER	526	14.530	789.0	0	0.00	0.00	2.00
PROD	MAJOR	101	19.772	986.0	0	0.00	0.00	3.00
PROD	MURRAY	70	0.000	0.0	0	0.00	0.00	0.00
PROD	NOBLE	9	0.556	2.0	0	0.00	0.00	1.00
PROD	OKLAHOMA	44	10.886	460.0	0	0.00	0.00	0.00
PROD	PAYNE	18	123.222	1585.0	0	0.00	0.00	95.75

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Appendix 2 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Oklahoma

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	PITTSBURG	40	0.125	1.0	0	0.00	0.00	0.00
PROD	PONTOTOC	31	9.032	135.0	0	0.00	0.00	4.00
PROD	STEPHENS	368	17.457	744.0	0	0.00	0.00	4.00
PROD	TEXAS	18	0.572	4.5	0	0.00	0.00	0.25
PROD	WOODS	4	0.000	0.0	0	0.00	0.00	0.00
PROD	WOODWARD	7	0.286	2.0	0	0.00	0.00	0.00
PROD	CADDO	74	7.659	189.0	0	0.00	0.50	4.00
PROD	COAL	8	28.125	103.0	0	0.00	0.50	66.75
PROD	BEAVER	173	0.942	5.0	0	0.00	1.00	2.00
PROD	BECKHAM	9	40.444	313.0	0	0.00	1.00	23.00
PROD	CLEVELAND	103	8.553	143.0	0	0.00	1.00	3.00
PROD	ELLIS	13	2.231	8.0	0	0.00	1.00	5.00
PROD	GARFIELD	22	3.455	20.0	0	0.00	1.00	4.00
PROD	LATIMER	25	0.800	2.0	0	0.00	1.00	2.00
PROD	LINCOLN	5	4.400	20.0	0	0.00	1.00	10.50
PROD	LOVE	8	5.000	23.0	0	0.00	1.00	9.25
PROD	MCCLAIN	37	119.784	2140.0	0	0.00	1.00	60.00
PROD	POTTAWATOMIE	50	45.380	1190.0	0	0.00	1.00	12.00
PROD	UNREPORTED	1	1.000	1.0	1	1.00	1.00	1.00
PROD	HASKELL	149	2.020	16.0	0	1.00	2.00	3.00
PROD	KAY	74	85.365	685.0	0	0.00	2.00	114.25
PROD	TULSA	12	179.583	986.0	0	0.00	2.00	85.75
PROD	WASHITA	23	1.783	9.0	0	0.00	2.00	2.00
PROD	CREEK	285	100.926	2790.0	0	0.00	3.00	46.50
PROD	OKMULGEE	31	228.774	3786.0	0	0.00	3.00	137.00
PROD	OSAGE	115	87.113	3391.0	0	1.00	4.00	32.00
PROD	SEMINOLE	126	63.944	888.0	0	1.00	4.00	45.45
PROD	HUGHES	4	8.750	19.0	5	5.00	5.50	15.75

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Appendix 3

Statistical Data on Background by County
(Micro-Rems/Hr)
Oklahoma

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
HUGHES	4	5.0000	5.0	5.0	5.0	5.0	5.00
UNREPORTED	1	5.0000	5.0	5.0	5.0	5.0	5.00
WASHITA	24	5.0000	5.0	5.0	5.0	5.0	5.00
LOVE	8	5.7500	7.0	5.0	5.0	5.5	6.75
BECKHAM	31	6.2903	7.0	6.0	6.0	6.0	7.00
CARTER	391	7.0066	15.0	3.2	5.0	6.0	9.00
CUSTER	86	5.2605	10.0	1.4	5.0	6.0	6.00
ELLIS	13	6.8462	9.0	6.0	6.0	6.0	8.00
LINCOLN	5	6.0000	6.0	6.0	6.0	6.0	6.00
MAJOR	102	7.1520	14.0	4.0	5.0	6.0	9.00
TEXAS	27	7.3556	14.0	5.6	5.6	6.5	6.80
CADDO	75	7.5600	13.0	4.0	6.0	7.0	9.00
CANADIAN	146	7.2329	14.0	3.0	6.0	7.0	8.00
COAL	8	7.0000	7.0	7.0	7.0	7.0	7.00
GRADY	138	7.2971	10.0	2.9	5.0	7.0	10.00
MURRAY	84	6.5000	10.0	5.0	6.0	7.0	7.00
PONTOTOC	31	6.7419	13.0	4.0	4.0	7.0	10.00
ALFALFA	121	7.5455	11.0	5.0	7.0	8.0	8.00
BLAINE	203	8.2246	14.0	2.4	6.0	8.0	10.50
CLEVELAND	103	7.5534	11.0	2.0	7.0	8.0	9.00
GARVIN	158	7.8241	15.0	3.0	6.0	8.0	9.00
NOBLE	9	8.0000	10.0	7.0	7.5	8.0	8.00
OKMULGEE	31	8.8387	14.0	4.0	5.0	8.0	13.00
OSAGE	115	7.6522	15.0	5.0	6.0	8.0	9.00
POTTAWATOMIE	50	7.6800	12.0	5.0	7.0	8.0	8.00
SEMINOLE	126	7.9190	16.0	4.0	5.0	8.0	9.00
COMANCHE	12	9.0000	9.0	9.0	9.0	9.0	9.00
CREEK	286	9.6853	17.0	4.0	8.0	9.0	11.00
HARPER	15	9.3333	12.5	7.5	7.5	9.0	10.00
LATIMER	27	9.0296	14.0	4.4	9.0	9.0	10.00
STEPHENS	371	9.2550	25.0	3.0	5.0	9.0	15.00
GRANT	2	10.0000	10.0	10.0	10.0	10.0	10.00
HASKELL	193	9.8549	12.0	9.0	9.0	10.0	10.00
KINGFISHER	556	9.3201	13.0	5.0	8.0	10.0	10.00
MCCLAIN	37	9.4324	10.0	6.0	9.0	10.0	10.00
PITTSBURG	50	8.6800	10.0	5.0	7.0	10.0	10.00
BEAVER	181	10.5856	12.0	8.0	10.0	11.0	11.00
DEWEY	79	9.7595	13.0	5.2	9.0	11.0	11.00
OKLAHOMA	48	10.5625	12.0	9.0	9.0	11.0	11.00
TULSA	12	10.8333	14.0	5.0	7.5	11.0	14.00
WOODS	4	11.2500	12.0	11.0	11.0	11.0	11.75
GARFIELD	22	11.7727	14.0	10.0	10.0	11.5	13.25
WOODWARD	51	11.8627	12.5	8.0	12.5	12.5	12.50
KAY	74	13.2162	18.0	1.0	10.0	15.0	15.25
PAYNE	18	15.0000	15.0	15.0	15.0	15.0	15.00

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SUMMARY

(Texas)

I. All significant differences were equipment specific.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

	Equipment	Median Difference	75th Percentile
1.	Reflux Pumps (GP)	65 µR/hr	295.0 µR/hr
2.	Propane Pumps (GP)	31	89.5

II. The 123 counties in the survey had background levels ranging from very low (0.3) in Brazoria county to high (13) in Jack county. The detailed listing is given in Table 3 and Appendix 3.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	15,138	6.5	8.0	10.0	60
b. Max Reading	15,138	8.0	12.0	32.0	4,130
c. Difference	15,138	0.0	4.0	25.0	4,120
2. Facility					
a. Background					
Gas Processing	1496	5.0	7.0	10.0	15
Production	13642	7.0	8.0	10.0	60
b. Max Reading					
Gas Processing	1496	7.0	15.0	70.0	3,000
Production	13642	8.0	12.0	30.0	4,130
c. Difference					
Gas Processing	1496	0.0	6.0	65.0	2,985
Production	13642	0.0	3.0	22.0	4,120

NOTES: 1) All data are measured in micro-rems/hr

2) The apparent differences between facilities are due to the specific items of equipment listed in Section I above.

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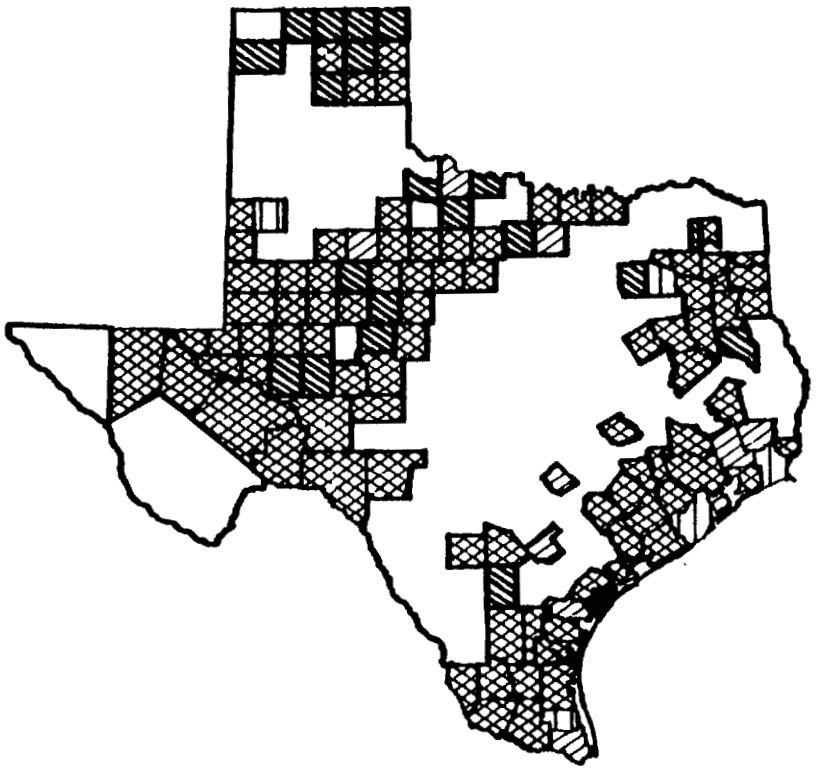
FIGURE 1 – MEDIAN BACKGROUND LEVELS

TEXAS



MICRO-REMS/HR

NO DATA
5.0 – 9.0
0 – 2.33
9.01 – 14.0
2.34 – 4.99
OVER 14.0

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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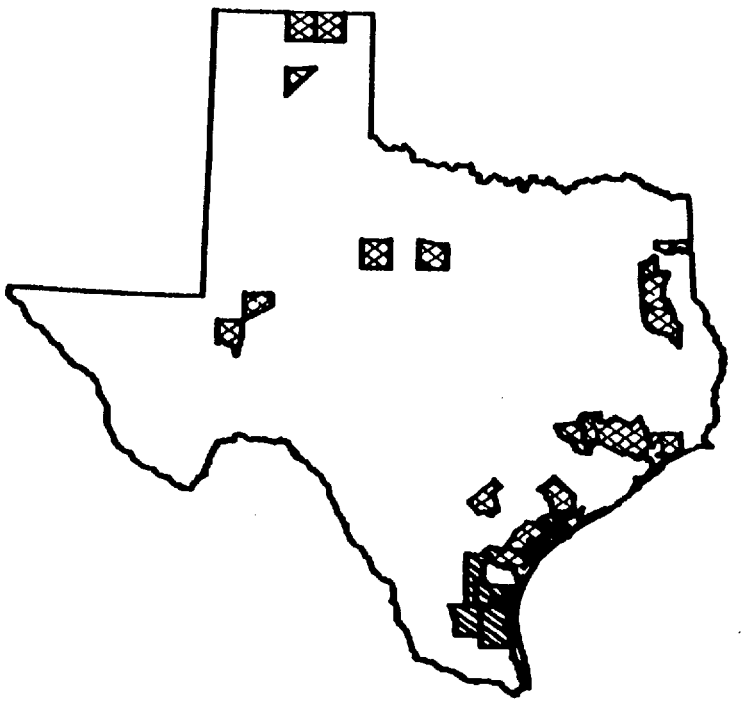
FIGURE 2 – DIFFERENCE OVER BACKGROUND

TEXAS

GAS PROCESSING FACILITIES
(COUNTIES WITH 2 MICRO-REMS/HR OR MORE)



MICRO-REMS/HR

NO DATA
2 – 33
BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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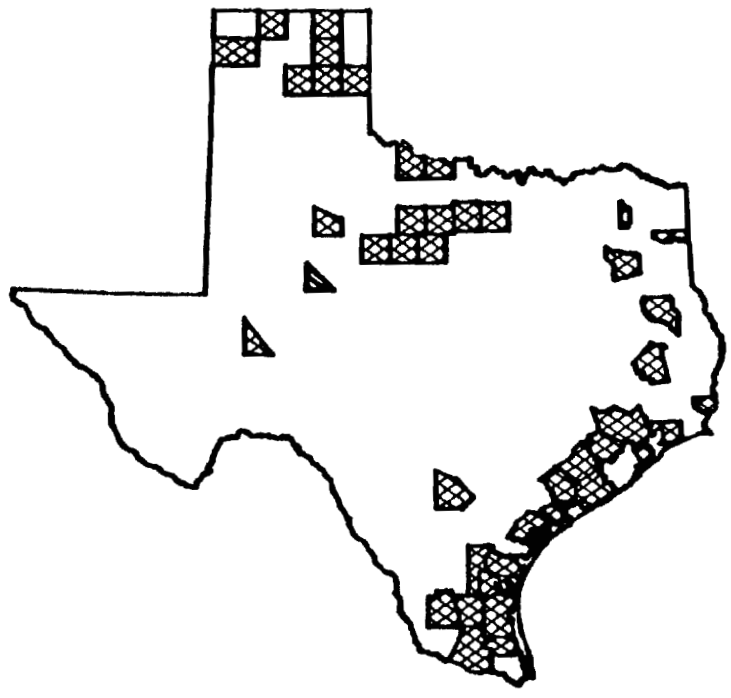
FIGURE 3 – DIFFERENCE OVER BACKGROUND

TEXAS

PRODUCTION FACILITIES
(COUNTIES WITH 2 MICRO-REMS/HR OR MORE)



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
176	COMPRESSOR	|	0.0	0.0
33	CRYO UNIT	|	0.0	2.0
104	DEHYDRATOR	|	0.0	2.0
128	FRAC TOWER	|	0.0	3.8
220	INLET SCRUBBER	|	0.0	1.0
37	METER	|	0.0	4.3
112	OTANK	|	0.0	13.2
79	REFRIGERATION	|	0.0	3.0
128	SWEETENER	|	0.0	0.0
185	OTHER	|*	1.0	10.5
102	OPUMP	|****	7.8	70.8
14	BOTTOMS PUMP	|*****	10.5	23.0
26	PTANK	|******	11.5	26.5
52	PRODUCT LINE	|******	12.5	58.8
42	PPUMP	|**********	31.0	89.5
67	REFLUX PUMP	|**********	65.0	295.0
		-----+----+----+----+----+----+--		
1496		10 20 30 40 50 60		
		Median of Difference Over Background		

FACILITY: Production

1109	FLINE	|	0.0	0.0
1137	MANIFOLD	|	0.0	1.0
55	METER	|	0.0	3.0
800	OTHER	|	0.0	2.0
646	PUMP	|	0.0	1.0
3513	SEP	|	0.0	6.0
2890	STANK	|	0.0	2.0
132	SUMP	|	0.0	2.0
58	VRU	|	0.0	0.0
44	WINJ	|	0.0	10.0
2	WOTHER	|	0.0	0.0
651	WPROD	|	0.0	1.0
994	H/T	|*	1.0	6.0
81	WLINE	|*	2.0	50.0
1530	WTANK	|**	3.0	12.0
		-----+----+----+----+----+----+		
13642		10 20 30 40 50 60		
		Median of Difference Over Background		

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Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

FACILITY: Gas Processing

Obsns	County	Median Difference	75th Percentile
103	ANDREWS	0.00	0.0
5	BORDEN	0.00	0.0
21	BRAZORIA	0.00	0.0
10	CAMERON	0.00	0.0
1	COCHRAN	0.00	0.0
1	COKE	0.00	0.0
150	COLORADO	0.00	2.0
23	CROCKETT	0.00	14.0
5	CULBERSON	0.00	0.5
1	DAWSON	0.00	0.0
66	ECTOR	0.00	2.5
1	GALVESTON	0.00	0.0
13	GRAY	0.00	0.0
3	HARDIN	0.00	0.0
40	HOCKLEY	0.00	0.2
11	HOWARD	0.00	0.0
1	KENT	0.00	0.0
34	LAVACA	0.00	0.0
7	LIBERTY	0.00	1.3
1	LOVING	0.00	0.0
12	MARTIN	0.00	0.0
2	MATAGORDA	0.00	0.0
5	MONTAGUE	0.00	0.0
20	MONTGOMERY	0.00	0.0
6	ORANGE	0.00	3.8
2	PANOLA	0.00	0.0
9	PECOS	0.00	0.0
3	REAGAN	0.00	0.0
5	REEVES	0.00	2.5
8	SMITH	0.00	4.8
58	UNREPORTED	0.00	5.3
1	UPTON	0.00	0.0
66	VAN ZANDT	0.00	0.0
19	WARD	0.00	73.0
1	WICHITA	0.00	0.0
33	WINKLER	0.00	0.0
95	WOOD	0.00	0.4

20 40 60 80 100 120 140
Median of Difference Over Background

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Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
129	YOAKUM	|	0.00	9.0
12	ZAPATA	|	0.00	0.0
4	ANDERSON	|	0.50	1.8
17	CHEROKEE	|	1.00	1.0
7	FORT BEND	|	1.00	14.0
7	FREESTONE	|	1.00	4.0
28	GRAYSON	|	1.00	2.0
38	SHACKLEFORD	|	1.00	45.0
3	SHERMAN	|	1.00	2.0
10	HARRISON	|	1.75	2.0
10	GREGG	|	2.00	3.0
31	WALLER	|	2.00	241.0
27	CRANE	*	3.00	69.0
40	HANSFORD	*	3.00	52.8
2	MARION	*	3.00	3.0
10	OCHILTREE	*	3.00	3.3
53	RUSK	*	3.00	4.0
1	AUSTIN	*	4.00	4.0
27	HARRIS	*	4.00	100.0
2	SAN PATRICIO	*	4.20	8.4
12	CHAMBERS	*	6.00	267.8
5	NACOGDOCHES	*	7.00	199.5
45	STEPHENS	*	7.00	16.0
1	MIDLAND	**	8.70	8.7
29	CARSON	**	10.00	43.5
3	KARNES	***	13.20	13.2
1	JONES	****	18.00	18.0
18	JACKSON	******	30.40	61.8
6	JIM WELLS	**********	49.70	294.9
9	BROOKS	**********	65.00	165.0
4	REFUGIO	**********	75.50	465.5
3	KENEDY	**********	81.00	191.0
56	KLEBERG	**********	110.00	195.0
4	CALHOUN	**********	143.00	224.0
1496		----+---+---+---+---+---+---+- 20 40 60 80 100 120 140		

Median of Difference Over Background

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Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
34	ANDERSON	0.0	1.0
1101	ANDREWS	0.0	1.0
45	AUSTIN	0.0	3.0
63	BORDEN	0.0	0.0
73	BRAZORIA	0.0	0.0
36	BURLESON	0.0	1.8
173	CALDWELL	0.0	0.4
88	COCHRAN	0.0	0.0
176	COKE	0.0	5.0
45	COLORADO	0.0	0.0
56	COOKE	0.0	4.8
265	CRANE	0.0	3.0
278	CROCKETT	0.0	1.3
111	CULBERSON	0.0	0.0
118	DAWSON	0.0	0.0
18	DUVAL	0.0	13.0
502	ECTOR	0.0	3.6
13	EDWARDS	0.0	0.0
181	FISHER	0.0	1.0
53	FOARD	0.0	0.0
31	FRIO	0.0	0.0
297	GAINES	0.0	4.5
19	GARZA	0.0	0.0
342	GLASSCOCK	0.0	0.0
195	GRAYSON	0.0	21.0
937	GREGG	0.0	2.0
101	HARDIN	0.0	3.2
25	HARRISON	0.0	2.0
24	HASKELL	0.0	0.8

20 40 60 80 100 120 140 160 180 200

Median of Difference Over Background

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Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
22	HEMPHILL	0.0	0.0
107	HOCKLEY	0.0	0.0
413	HOWARD	0.0	2.0
40	IRION	0.0	11.0
79	JEFFERSON	0.0	2.2
62	KING	0.0	0.0
211	LAVACA	0.0	0.0
40	LIBERTY	0.0	0.8
28	LIPSCOMB	0.0	1.0
99	LOVING	0.0	1.0
44	MARTIN	0.0	0.0
45	MCMULLEN	0.0	0.0
149	MIDLAND	0.0	11.0
204	MONTAGUE	0.0	3.0
14	NOLAN	0.0	10.0
309	PECOS	0.0	13.0
3	RAINS	0.0	0.0
88	REAGAN	0.0	7.0
98	REEVES	0.0	2.0
21	RUNNELS	0.0	0.0
291	RUSK	0.0	0.0
13	SAN PATRICIO	0.0	0.4
21	SCHLEICHER	0.0	0.0
52	SCURRY	0.0	0.0
17	STARR	0.0	18.5
121	STONEWALL	0.0	1.0
13	TAYLOR	0.0	3.0
3	TERRELL	0.0	0.0
61	TITUS	0.0	0.0
14	TOM GREEN	0.0	9.3
308	UNREPORTED	0.0	3.0
12	UPSHUR	0.0	0.0
15	VAL VERDE	0.0	0.0
11	VAN ZANDT	0.0	1.0
44	WALLER	0.0	5.0
243	WARD	0.0	6.0

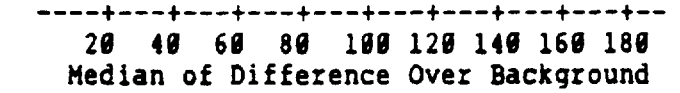

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Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

- Texas

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
126	WINKLER	0.0	6.0
245	WOOD	0.0	3.0
1201	YOAKUM	0.0	0.0
14	ZAPATA	0.0	0.0
24	HOUSTON	0.5	1.0
34	BAYLOR	1.0	26.0
63	CHEROKEE	1.0	2.0
51	FREESTONE	1.0	4.0
238	HANSFORD	1.0	3.0
101	HUTCHINSON	1.0	9.0
11	KARNES	1.0	16.6
163	MONTGOMERY	1.0	6.6
130	PANOLA	1.0	5.0
197	FRANKLIN	2.0	10.0
87	HARRIS	2.0	8.0
23	HARTLEY	2.0	2.0
33	MARION	2.0	18.5
94	OCHILTREE	2.0	3.0
46	SHACKLEFORD	2.0	7.3
2	SHERMAN	2.0	2.0
31	WICHITA	2.0	67.0
39	WISE	2.0	4.0
45	JACKSON	3.0	5.0
223	ROBERTS	3.0	26.0
314	GRAY	4.0	14.0
3	ORANGE	4.0	7.0
25	SMITH	4.0	43.0
149	UPTON	4.0	28.5
35	WHEELER	4.0	8.0
102	WILLACY	4.1	25.2
32	CARSON	4.5	9.8
32	GALVESTON	5.0	31.6
97	JACK	5.0	56.0
39	NACOGDOCHES	6.0	50.0
5	WHARTON	6.0	17.5
170	CHAMBERS	6.1	25.3

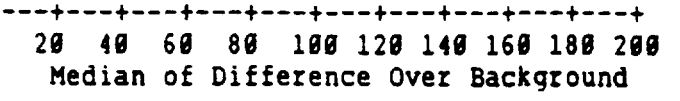

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Table 2 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

FACILITY: Production

Obsns	County		Median Difference	75th Percenti
4	KENT	|*	6.5	21.4
17	MATAGORDA	|*	7.0	50.0
9	POLK	|*	7.0	15.0
65	THROCKMORTON	|**	8.0	29.5
76	YOUNG	|**	8.0	43.3
11	JONES	|**	9.0	94.0
65	FORT BEND	|**	12.0	67.0
134	HIDALGO	|***	12.5	54.0
1	JIM HOGG	|***	15.0	15.0
13	KAUFMAN	|*******	33.0	45.0
12	STEPHENS	|*******	35.0	82.5
2	REFUGIO	|*********	44.5	46.0
86	BROOKS	|*********	47.0	86.0
33	NUECES	|***********	55.0	85.0
26	JIM WELLS	|************	60.0	106.5
86	KENEDY	|*************	65.0	173.8
39	KLEBERG	|***************	76.0	142.0
13	ATASCOSA	|****************	78.0	107.5
5	CALHOUN	|******************	91.0	266.0
3	WILBARGER	|******************	92.0	253.3
4	MITCHELL	|**	252.0	267.0

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20 40 60 80 100 120 140 160 180 200 220 240

Median of Difference Over Background

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Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

Obs	County	Median	75th Percentile
93	BRAZORIA	0.30	5.0
147	HOCKLEY	0.40	5.0
79	JEFFERSON	0.70	0.8
102	WILLACY	0.90	6.0
77	VAN ZANDT	2.00	2.0
10	CAMERON	2.90	2.9
173	CALDWELL	3.90	4.2
14	KARNES	3.95	5.0
33	GALVESTON	4.00	6.0
104	HARDIN	4.00	4.9
39	WISE	4.00	5.0
47	LIBERTY	4.50	5.5
15	SAN PATRICIO	4.50	4.5
5	KENT	4.80	5.8
3	WILBARGER	4.80	4.8
95	BROOKS	5.00	5.0
182	CHAMBERS	5.00	6.0
13	EDWARDS	5.00	5.0
114	HARRIS	5.00	6.0
40	IRION	5.00	5.0
63	JACKSON	5.00	6.0
89	KENEDY	5.00	5.0
95	KLEBERG	5.00	7.0
183	MONTGOMERY	5.00	5.0
33	NUECES	5.00	5.0
9	POLK	5.00	6.0
14	TOM GREEN	5.00	5.3
159	WINKLER	5.00	6.0
1330	YOAKUM	5.00	5.0
26	ZAPATA	5.00	5.0
61	TITUS	5.20	5.2
32	JIM WELLS	5.50	6.0
1204	ANDREWS	6.00	7.0
36	BURLESON	6.00	6.5
195	COLORADO	6.00	6.0
292	CRANE	6.00	8.0

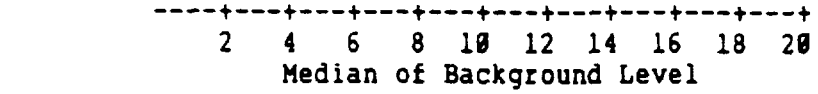

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Table 3 (Continued)

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

Obs	County	Median	75th Percentile
301	CROCKETT	6.00	7.0
119	DAWSON	6.00	7.0
568	ECTOR	6.00	7.0
58	FREESTONE	6.00	7.0
31	FRIO	6.00	6.0
297	GAINES	6.00	6.0
134	HIDALGO	6.00	6.0
12	JONES	6.00	6.0
100	LOVING	6.00	7.0
17	STARR	6.00	6.0
3	TERRELL	6.00	6.0
65	THROCKMORTON	6.00	7.0
366	UNREPORTED	6.00	7.0
15	VAL VERDE	6.00	7.0
75	WALLER	6.00	9.0
5	WHARTON	6.00	6.5
35	WHEELER	6.00	6.0
72	FORT BEND	6.50	8.0
245	LAVACA	6.50	6.5
344	RUSK	6.80	8.0
13	ATASCOSA	7.00	8.0
89	COCHRAN	7.00	8.0
116	CULBERSON	7.00	8.0
18	DUVAL	7.00	7.0
24	HASKELL	7.00	7.8
424	HOWARD	7.00	8.0
56	MARTIN	7.00	8.8
19	MATAGORDA	7.00	8.0
103	REEVES	7.00	8.0
6	REFUGIO	7.00	7.0
84	SHACKLEFORD	7.00	8.0
57	STEPHENS	7.00	10.0
12	UPSHUR	7.00	8.0
262	WARD	7.00	8.0
340	WOOD	7.00	8.0
76	YOUNG	7.00	7.0
68	BORDEN	8.00	9.0

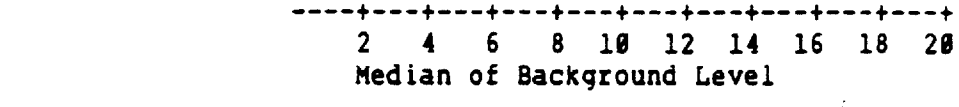

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Table 3 (Continued)

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas

Obs	County	Median	75th Percentile
80	CHEROKEE	8.00	9.0
56	COOKE	8.00	8.8
181	FISHER	8.00	9.0
19	GARZA	8.00	8.0
327	GRAY	8.00	9.0
947	GREGG	8.00	9.0
22	HEMPHILL	8.00	9.0
24	HOUSTON	8.00	8.0
1	JIM HOGG	8.00	8.0
62	KING	8.00	8.3
35	MARION	8.00	10.0
150	MIDLAND	8.00	9.0
4	MITCHELL	8.00	12.5
209	MONTAGUE	8.00	10.0
9	ORANGE	8.00	8.0
318	PECOS	8.00	9.0
3	RAINS	8.00	9.0
21	RUNNELS	8.00	8.0
21	SCHLEICHER	8.00	10.0
121	STONEWALL	8.00	9.0
13	TAYLOR	8.00	8.0
46	AUSTIN	8.50	9.0
38	ANDERSON	9.00	9.0
9	CALHOUN	9.00	9.0
342	GLASSCOCK	9.00	10.0
223	GRAYSON	9.00	10.0
35	HARRISON	9.00	14.0
101	HUTCHINSON	9.00	9.0
132	PANOLA	9.00	10.0
33	SMITH	9.00	9.0
34	BAYLOR	10.00	14.0
177	COKE	10.00	10.0
53	FOARD	10.00	10.0
197	FRANKLIN	10.00	10.0
13	KAUFMAN	10.00	10.0
45	MCMULLEN	10.00	10.0
44	NACOGDOCHES	10.00	13.0

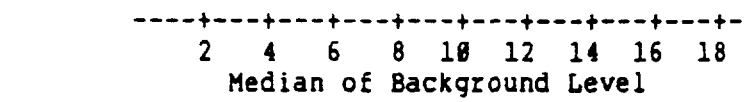

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Table 3 (Continued)

Median Background by County
Sequenced by Increasing Median Difference
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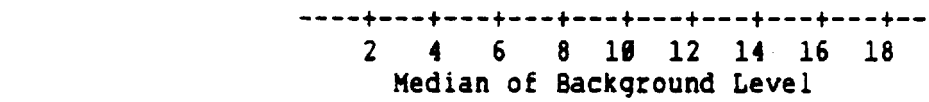
Texas

Obs	County	Median	75th Percentile
14	NOLAN	10.00	10.0
91	REAGAN	10.00	10.0
223	ROBERTS	10.00	13.0
52	SCURRY	10.00	10.0
150	UPTON	10.00	11.0
32	WICHITA	10.00	13.8
61	CARSON	11.00	15.0
278	HANSFORD	11.00	12.0
23	HARTLEY	11.00	11.0
28	LIPSCOMB	12.00	14.3
104	OCHILTREE	12.00	12.0
5	SHERMAN	12.00	12.5
97	JACK	13.00	16.0



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SUMMARY

(Texas Regional Break-out)

I. Regional Breakouts

The counties surveyed in Texas were grouped into three regions based upon their tendency to have similar radiation properties and their geographical proximity. These regions are the coastal crescent, the northern crescent and the central/western areas. Figure 1 shows the groupings and Figures 2-7 show the county details by facility. Background data and maps can be found in the Texas report on the combined counties.

II. Equipment Readings By Region.

The equipment with the most pronounced differences over background based on Median ranking are listed below in descending order. The difference is the excess of the reading over background:

Equipment		Median Difference	75th Percentile
Coastal Region			
1. Reflux Pumps	(GP)	145 µR/hr	295.0 µR/hr
2. Bottoms Pump	(GP)	77	125.5
3. Other Pumps	(GP)	45.0	145.0
4. Flow Line	(PROD)	45.5	114.8
Northern Region			
1. Water Line	(PROD)	40.0	168.0
2. Reflux Pumps	(GP)	38.5	154.3
Western Region			
1. Product Line	(GP)	88.0	180.0
2. Propane Pump	(GP)	61.0	79.5

III. Overall Summary By Region

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Background					
a. Coastal Region	2567	5.0	6.0	7.0	25.8
b. Northern Region	4927	8.0	10.0	12.0	25.0
c. Western Region	7278	6.0	8.0	9.0	23.0

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SUMMARY (Continued)

(Texas Regional Break-out)

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
2. Difference Over Background - Gas Processing Facilities					
a. Coastal Region	449	0.0	42.0	145.0	2495.0
b. Northern Region	492	1.0	4.0	32.4	2985.0
c. Western Region	497	0.0	1.0	16.0	820.0
3. Difference Over Background - Production Facilities					
a. Coastal Region	2118	1.0	16.0	74.2	3496.0
b. Northern Region	4435	1.0	4.0	25.0	3785.0
c. Western Region	6781	0.0	1.0	10.0	4120.0
c. Difference					

NOTES: All data are measured in micro-rems/hr

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FIGURE 1 – REGIONAL GROUPING OF DATA

TEXAS

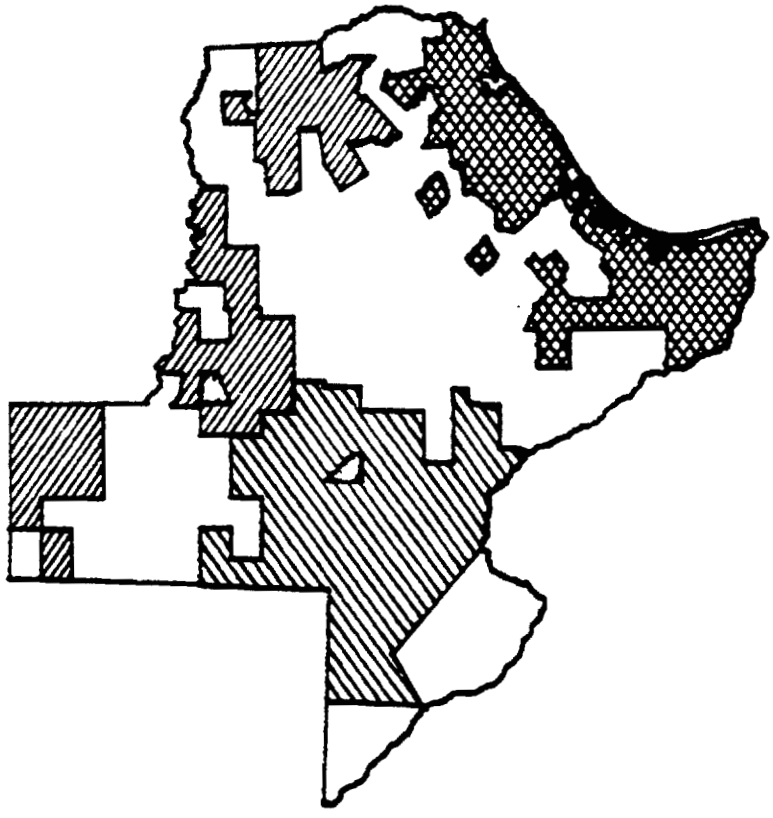

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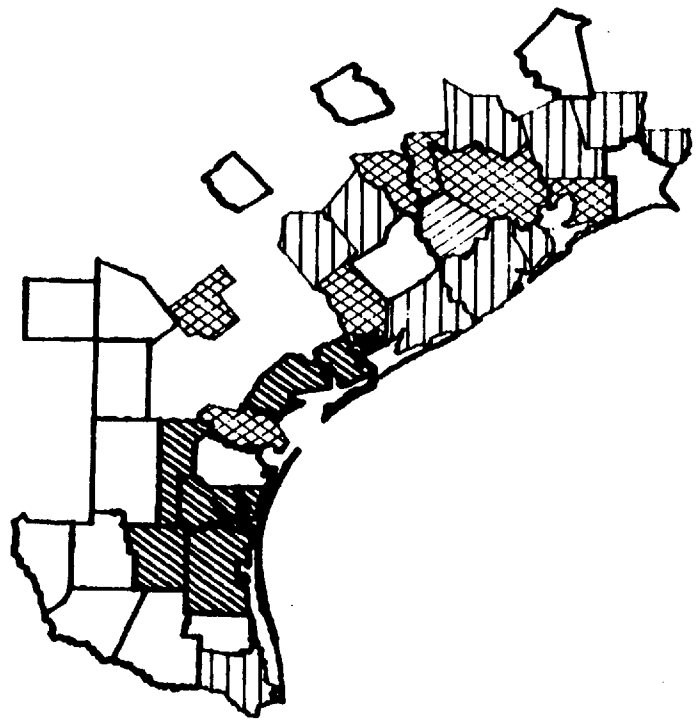
FIGURE 2 – DIFFERENCE OVER BACKGROUND

TEXAS COASTAL CRESCENT

GAS PROCESSING FACILITIES



MICRO-REMS/HR

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BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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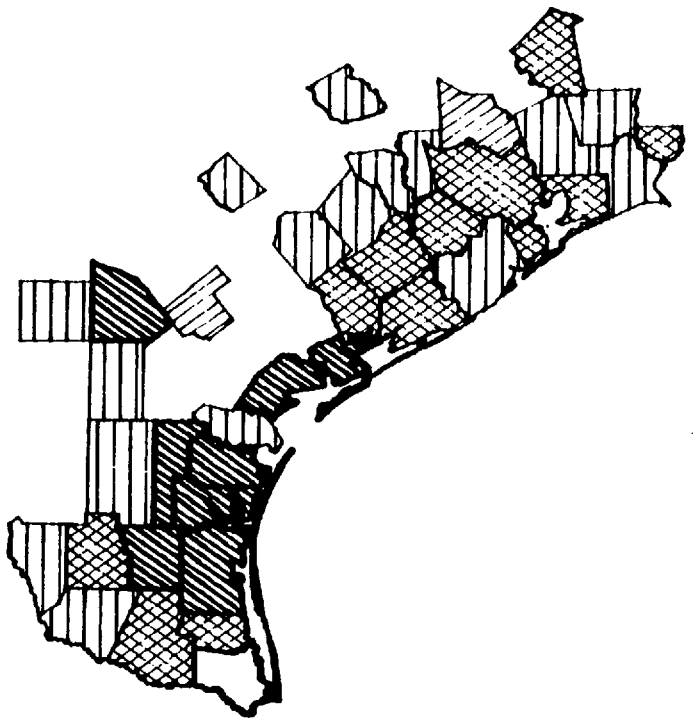
FIGURE 3 – DIFFERENCE OVER BACKGROUND

TEXAS COASTAL CRESCENT

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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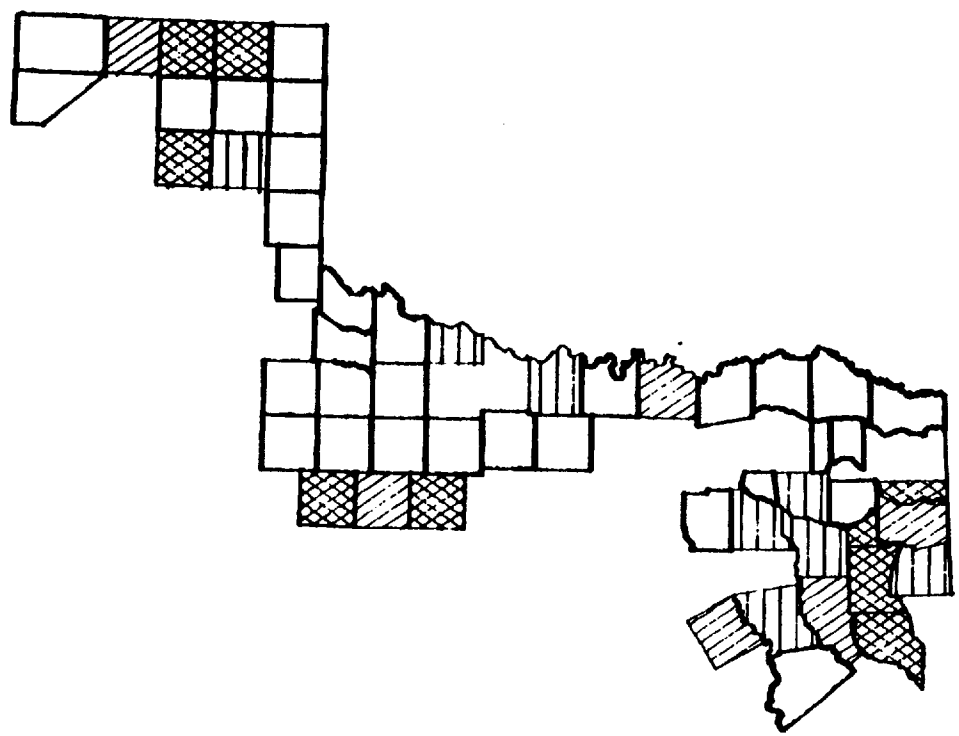
FIGURE 4 – DIFFERENCE OVER BACKGROUND

TEXAS NORTHERN CRESCENT

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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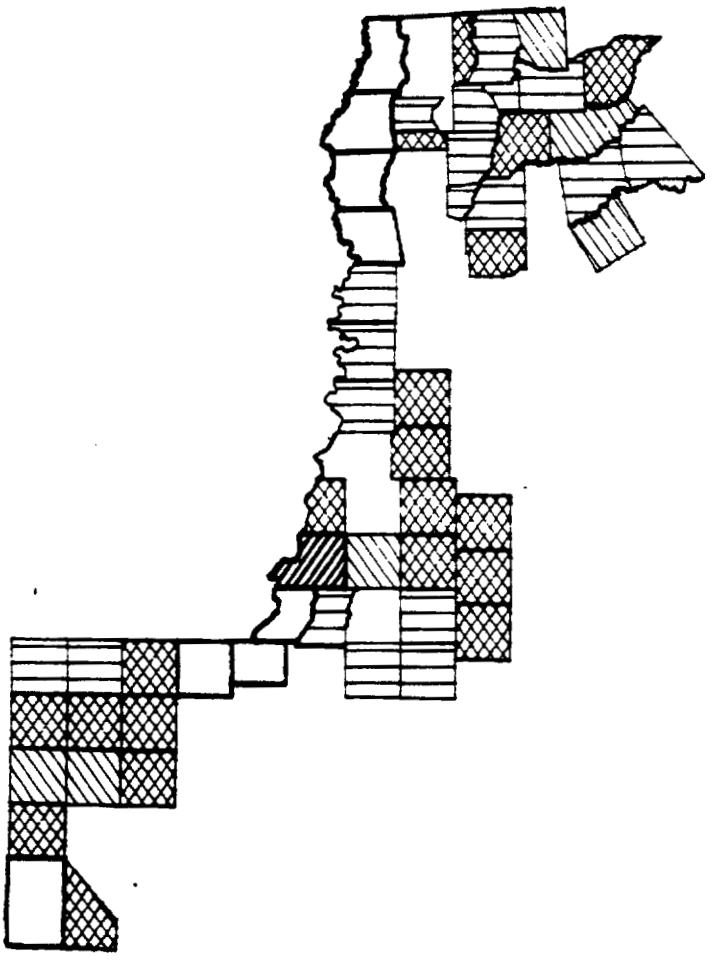
FIGURE 5 – DIFFERENCE OVER BACKGROUND

TEXAS NORTHERN CRESCENT

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 – 33
BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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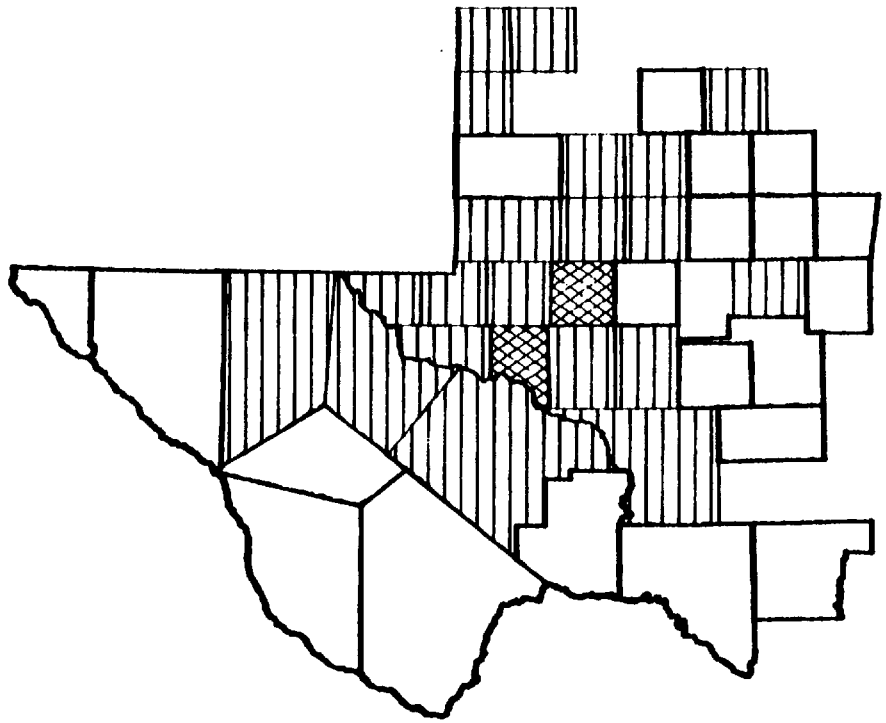
FIGURE 6 – DIFFERENCE OVER BACKGROUND

TEXAS CENTRAL AND WESTERN REGION

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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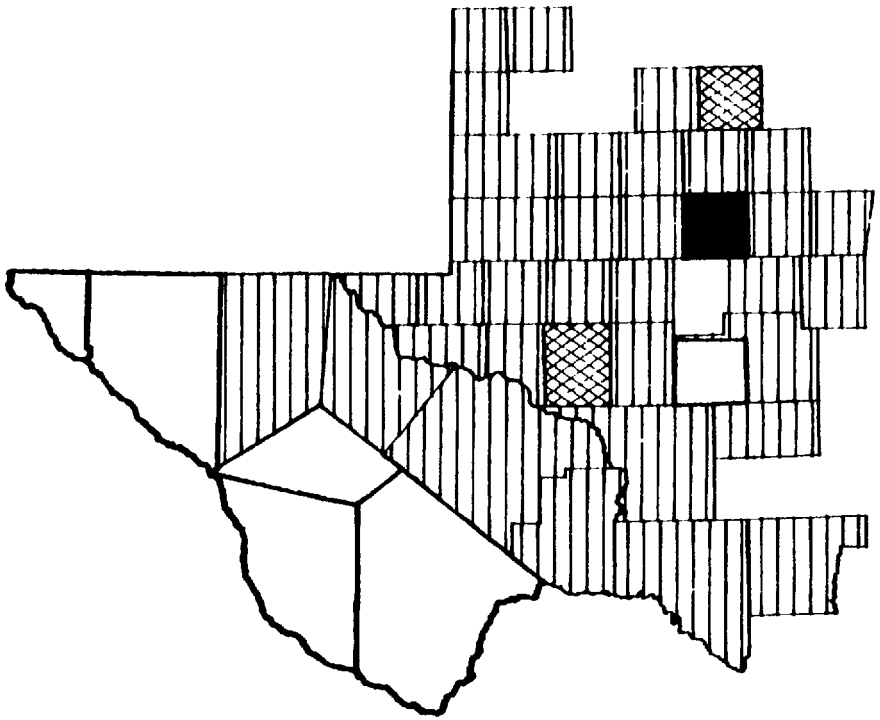
FIGURE 7 — DIFFERENCE OVER BACKGROUND

TEXAS CENTRAL AND WESTERN REGION

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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NATURALLY OCCURRING RADIOACTIVITY SURVEY

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Table 4

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Coastal Crescent

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
34	COMPRESSOR		0.00	0.00
9	CRYO UNIT		0.00	0.00
25	DEHYDRATOR		0.00	1.50
43	INLET SCRUBBER		0.00	0.0
9	METER		0.00	76.0
50	OTANK		0.00	23.5
34	SWEETENER		0.00	0.0
28	FRAC TOWER		1.00	88.75
20	REFRIGERATION		1.50	42.50
34	PRODUCT LINE	*	2.50	36.25
46	OTHER	*	3.50	65.00
7	PTANK	***	14.00	48.10
21	PPUMP	******	30.00	124.50
48	OPUMP	*********	45.00	145.00
2	BOTTOMS PUMP	**********	77.25	125.50
39	REFLUX PUMP	**********	145.00	295.00
449				

20 40 60 80 100 120 140
Median of Difference over Background

FACILITY: Production

94	H/T		0.00	3.40
39	METER		0.00	4.00
73	PUMP		0.00	3.55
389	STANK		0.00	5.00
3	WINJ		0.00	2.30
2	WOTHER		0.00	0.00
109	WPROD		0.00	0.00
191	MANIFOLD		1.00	28.00
117	OTHER		1.00	9.00
233	WTANK		1.00	10.00
22	WLINE	*	3.00	57.50
659	SEP	*	3.00	25.70
17	SUMP	**	6.00	15.00
114	FLINE	*********	45.50	114.75
2118				

20 40 60 80 100 120 140
Median of Difference over Background

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Table 5

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Northern Crescent

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
60	COMPRESSOR	|	0.0	2.0
41	FRAC TOWER	|	0.0	0.2
108	INLET SCRUBBER	|	0.0	1.0
7	METER	|	0.0	90.0
18	REFRIGERATION	|	0.0	3.0
28	SWEETENER	|	0.0	0.0
15	CRYO UNIT	|*	1.0	2.0
45	DEHYDRATOR	|*	2.0	3.0
24	OTANK	|*	2.0	16.8
58	OTHER	|**	3.0	7.5
10	BOTTOMS PUMP	|**	3.5	18.8
34	OPUMP	|**	4.5	41.3
7	PPUMP	|***	5.0	48.0
11	PTANK	|*****	9.0	31.0
10	PRODUCT LINE	|******	12.0	35.0
16	REFLUX PUMP	|********************	38.5	154.3
492		-----+----+----+----+----+---		
		10 20 30 40 50		

Median of Difference over Background

FACILITY: Production

310	MANIFOLD	|	0.0	1.0
2	METER	|	0.0	0.0
199	OTHER	|	0.0	2.0
321	PUMP	|	0.0	2.0
922	STANK	|	0.0	2.0
17	SUMP	|	0.0	1.5
3	VRU	|	0.0	0.0
313	WPROD	|	0.0	2.0
1072	SEP	|*	1.0	4.0
379	H/T	|*	2.0	10.0
20	FLINE	|**	3.0	59.0
836	WTANK	|**	4.0	14.0
13	WINJ	|***	5.0	50.0
28	WLINE	|**********************	40.0	168.0
4435		-----+----+----+----+----+---		
		10 20 30 40 50		

Median of Difference over Background

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Table 6

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Central/Western Region

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
68	COMPRESSOR	|	0.0	0.0
30	DEHYDRATOR	|	0.0	0.0
58	FRAC TOWER	|	0.0	4.5
65	INLET SCRUBBER	|	0.0	0.0
20	METER	|	0.0	1.1
25	CTANK	|	0.0	16.5
73	OTHER	|	0.0	6.0
39	REFRIGERATION	|	0.0	0.0
55	SWEETENER	|	0.0	0.0
19	OPUMP	|*	1.3	17.5
7	CRYO UNIT	|*	1.6	6.0
3	PTANK	|**	4.0	31.0
2	BOTTOMS PUMP	|****	8.0	16.0
12	REFLUX PUMP	|**********	19.5	468.3
13	PPUMP	|**********	61.0	79.5
8	PRODUCT LINE	|**********	88.0	180.0
497		-----+----+----+----+----+----+----+-		
		10 20 30 40 50 60 70 80		

MEDIAN OF DIFF

FACILITY: Production

886	FLINE	|	0.0	0.0
503	H/T	|	0.0	5.0
609	MANIFOLD	|	0.0	0.0
14	METER	|	0.0	0.0
483	OTHER	|	0.0	1.0
233	PUMP	|	0.0	0.0
1711	SEP	|	0.0	5.0
1544	STANK	|	0.0	1.7
92	SUMP	|	0.0	0.8
51	VRU	|	0.0	0.0
21	WINJ	|	0.0	8.9
20	WLINE	|	0.0	1.7
179	WPROD	|	0.0	0.0
435	WTANK	|*	1.0	9.0
6781		-----+----+----+----+----+----+----+----+		
		10 20 30 40 50 60 70 80		

Median of Difference over Background

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Table 7

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Coastal Crescent

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
21	BRAZORIA		0.0	0.0
10	CAMERON		0.0	0.0
150	COLORADO		0.0	2.0
1	GALVESTON		0.0	0.0
3	HARDIN		0.0	0.0
34	LAVACA		0.0	0.0
7	LIBERTY		0.0	1.3
2	MATAGORDA		0.0	0.0
20	MONTGOMERY		0.0	0.0
6	ORANGE		0.0	3.8
12	ZAPATA		0.0	0.0
7	FORT BEND	|	1.0	14.0
31	WALLER	|	2.0	241.0
1	AUSTIN	*	4.0	4.0
27	HARRIS	*	4.0	100.0
2	SAN PATRICIO	*	4.2	8.4
12	CHAMBERS	*	6.0	267.8
3	KARNES	***	13.2	13.2
18	JACKSON	******	30.4	61.8
6	JIM WELLS	**********	49.7	294.9
9	BROOKS	**********	65.0	165.0
4	REFUGIO	**********	75.5	465.5
3	KENEDY	**********	81.0	191.0
56	KLEBERG	**********	110.0	195.0
4	CALHOUN	**********	143.0	224.3

20 40 60 80 100 120 140

Median of Difference over Background

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Table 7 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Coastal Crescent

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
45	AUSTIN	0.0	3.0
72	BRAZORIA	0.0	0.0
36	BURLESON	0.0	1.8
173	CALDWELL	0.0	0.4
45	COLORADO	0.0	0.0
18	DUVAL	0.0	13.0
31	FRIO	0.0	0.0
101	HARDIN	0.0	3.2
79	JEFFERSON	0.0	2.2
211	LAVACA	0.0	0.0
40	LIBERTY	0.0	0.8
45	MCMULLEN	0.0	0.0
13	SAN PATRICIO	0.0	0.4
17	STARR	0.0	18.5
44	WALLER	0.0	5.0
14	ZAPATA	0.0	0.0
11	KARNES	1.0	16.5
163	MONTGOMERY	1.0	6.0
87	HARRIS	2.0	8.0
45	JACKSON	3.0	5.0
3	ORANGE	4.0	7.0
102	WILLACY	4.1	25.2
32	GALVESTON	5.0	31.6
5	WHARTON	6.0	17.5
170	CHAMBERS	6.1	25.3
17	MATAGORDA	7.0	50.0
9	POLK	7.0	15.0
65	FORT BEND	12.0	67.0
134	HIDALGO	12.5	54.0
1	JIM HOGG	15.0	15.0
2	REFUGIO	44.5	46.0
86	BROOKS	47.0	86.0
33	NUECES	55.0	85.0
26	JIM WELLS	60.0	106.5
86	KENEDY	65.0	173.8
39	KLEBERG	76.0	142.0
13	ATASCOSA	78.0	107.5
5	CALHOUN	91.0	266.0

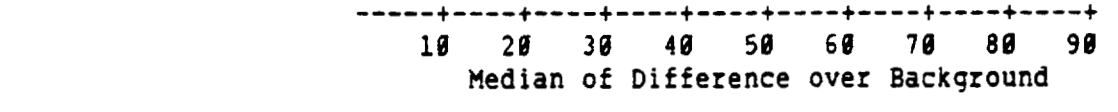

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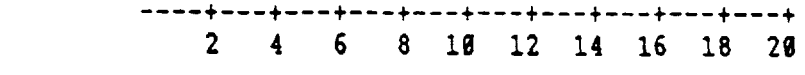
Table 8

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Northern Crescent

FACILITY: Gas Processing

Obsns	County	Median Difference	75th Percentile
13	GRAY	0.00	0.0
5	MONTAGUE	0.00	0.0
2	PANOLA	0.00	0.0
8	SMITH	0.00	4.8
66	VAN ZANDT	0.00	0.0
1	WICHITA	0.00	0.0
95	WOOD	0.00	0.4
4	ANDERSON	0.50	1.8
17	CHEROKEE	1.00	1.0
7	FREESTONE	1.00	4.0
28	GRAYSON	1.00	2.0
38	SHACKLEFORD	1.00	45.0
3	SHERMAN	1.00	2.0
10	HARRISON	1.75	2.0
10	GREGG	2.00	3.0
40	HANSFORD	3.00	52.8
2	MARION	3.00	3.0
10	OCHILTREE	3.00	3.3
53	RUSK	3.00	4.0
5	NACOGDOCHES	7.00	199.5
45	STEPHENS	7.00	16.5
29	CARSON	10.00	43.5
1	JONES	18.00	18.0



Median of Difference over Background

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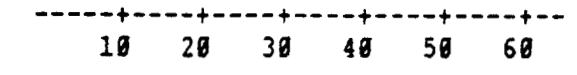
Table 8 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Northern Crescent

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
34	ANDERSON	0.00	1.0
56	COOKE	0.00	4.8
53	FOARD	0.00	0.0
195	GRAYSON	0.00	21.0
937	GREGG	0.00	2.0
25	HARRISON	0.00	2.0
24	HASKELL	0.00	0.8
22	HEMPHILL	0.00	0.0
62	KING	0.00	0.0
28	LIPSCOMB	0.00	1.0
204	MONTAGUE	0.00	3.0
3	RAINS	0.00	0.0
291	RUSK	0.00	0.0
121	STONEWALL	0.00	1.0
61	TITUS	0.00	0.0
12	UPSHUR	0.00	0.0
11	VAN ZANDT	0.00	1.0
245	WOOD	0.00	3.0
24	HOUSTON	0.50	1.0
34	BAYLOR	1.00	26.0
63	CHEROKEE	1.00	2.0
51	FREESTONE	1.00	4.0
238	HANSFORD	1.00	3.0
101	HUTCHINSON	1.00	9.0
130	PANOLA	1.00	5.0
197	FRANKLIN	2.00	10.0
23	HARTLEY	2.00	2.0
33	MARION	2.00	18.5
94	OCHILTREE	2.00	3.0
46	SHACKLEFORD	2.00	7.3
2	SHERMAN	2.00	2.0
31	WICHITA	2.00	67.0
39	WISE	2.00	4.0



Median of Difference over Background

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Table 8 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Northern Crescent

FACILITY: Production

Obsns	County		Median Difference	75th Percentile
223	ROBERTS	|**	3.00	26.0
314	GRAY	|**	4.00	14.0
25	SMITH	|**	4.00	43.0
35	WHEELER	|**	4.00	8.0
32	CARSON	|**	4.50	9.8
97	JACK	|***	5.00	56.0
39	NACOGDOCHES	|***	6.00	50.0
65	THROCKMORTON	|****	8.00	29.5
76	YOUNG	|****	8.00	43.3
11	JONES	|*****	9.00	94.0
13	KAUFMAN	|******************	33.00	45.0
12	STEPHENS	|******************	35.00	82.5
3	WILBARGER	|**********/ /*******	92.00	253.3

-----+----+----+----+----+-/ /+----+-
10 20 30 40 50 80 90

Median of Difference over Background

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Table 9

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Central/Western Region

FACILITY: Gas Processing

Obsns	County		Median Difference	75th Percentile
103	ANDREWS		0.0	0.0
5	BORDEN		0.0	0.0
1	COCHRAN		0.0	0.0
1	COKE		0.0	0.0
23	CROCKETT		0.0	14.0
5	CULBERSON		0.0	0.5
1	DAWSON		0.0	0.0
66	ECTOR		0.0	2.5
40	HOCKLEY		0.0	0.2
11	HOWARD		0.0	0.0
1	KENT		0.0	0.0
1	LOVING		0.0	0.0
12	MARTIN		0.0	0.0
9	PECOS		0.0	0.0
3	REAGAN		0.0	0.0
5	REEVES		0.0	2.5
1	UPTON		0.0	0.0
19	WARD		0.0	73.0
33	WINKLER		0.0	0.0
129	YOAKUM		0.0	9.0
27	CRANE	******	3.0	69.0
1	MIDLAND	******************	8.7	8.7

2 4 6 8 10 12 14 16 18 20

Median of Difference over Background

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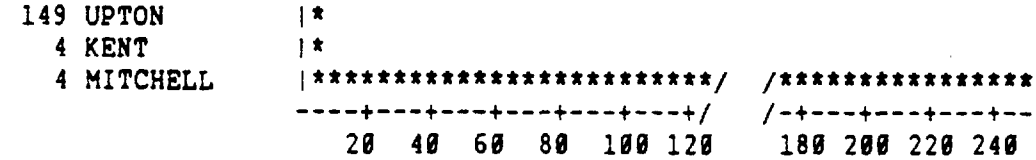
Table 9 (Continued)

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Central/Western Region

FACILITY: Production

Obsns	County	Median Difference	75th Percentile
1101	ANDREWS	0.0	1.0
63	BORDEN	0.0	0.0
88	COCHRAN	0.0	0.0
176	COKE	0.0	5.0
265	CRANE	0.0	3.0
278	CROCKETT	0.0	1.3
111	CULBERSON	0.0	0.0
118	DAWSON	0.0	0.0
502	ECTOR	0.0	3.6
13	EDWARDS	0.0	0.0
181	FISHER	0.0	1.0
297	GAINES	0.0	4.5
19	GARZA	0.0	0.0
342	GLASSCOCK	0.0	0.0
107	HOCKLEY	0.0	0.0
413	HOWARD	0.0	2.0
40	IRION	0.0	11.0
99	LOVING	0.0	1.0
44	MARTIN	0.0	0.0
149	MIDLAND	0.0	11.0
14	NOLAN	0.0	10.0
309	PECOS	0.0	13.0
88	REAGAN	0.0	7.0
98	REEVES	0.0	0.0
21	RUNNELS	0.0	0.0
21	SCHLEICHER	0.0	0.0
52	SCURRY	0.0	0.0
13	TAYLOR	0.0	3.0
3	TERRELL	0.0	0.0
14	TOM GREEN	0.0	9.3
15	VAL VERDE	0.0	0.0
243	WARD	0.0	6.0
126	WINKLER	0.0	6.0
1201	YOAKUM	0.0	0.0
149	UPTON	4.0	28.5
4	KENT	6.5	21.4
4	MITCHELL	252.0	267.0



Median of Difference over Background

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Table 10

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Coastal Crescent

Obs	County		Median	75th Percentile
93	BRAZORIA	*	0.30	5.0
79	JEFFERSON	*	0.70	0.8
102	WILLACY	**	0.90	6.0
10	CAMERON	******	2.90	2.9
173	CALDWELL	********	3.90	4.2
14	KARNES	********	3.95	5.0
33	GALVESTON	********	4.00	6.0
104	HARDIN	********	4.00	4.9
47	LIBERTY	*********	4.50	5.5
15	SAN PATRICIO	*********	4.50	4.5
95	BROOKS	**********	5.00	5.0
182	CHAMBERS	**********	5.00	6.0
114	HARRIS	**********	5.00	6.0
63	JACKSON	**********	5.00	6.0
89	KENEDY	**********	5.00	5.0
95	KLEBERG	**********	5.00	7.0
183	MONTGOMERY	**********	5.00	5.0
33	NUECES	**********	5.00	5.0
9	POLK	**********	5.00	6.0
26	ZAPATA	**********	5.00	5.0
32	JIM WELLS	**********	5.50	6.0
36	BURLESON	**********	6.00	6.5
195	COLORADO	**********	6.00	6.0
31	FRIO	**********	6.00	6.0
134	HIDALGO	**********	6.00	6.0
17	STARR	**********	6.00	6.0
75	WALLER	**********	6.00	9.0
5	WHARTON	**********	6.00	6.5
72	FORT BEND	**********	6.50	8.0
245	LAVACA	**********	6.50	6.5
13	ATASCOSA	**********	7.00	8.0
18	DUVAL	**********	7.00	7.0
19	MATAGORDA	**********	7.00	8.0
6	REFUGIO	**********	7.00	7.0
1	JIM HOGG	**********	8.00	8.0
9	ORANGE	**********	8.00	8.0
46	AUSTIN	**********	8.50	9.0
9	CALHOUN	**********	9.00	9.0
45	MCMULLEN	**********	10.00	10.0

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Median of Background Reading

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Table 11

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Northern Crescent

Obs	County	Median	75th Percentile
77	VAN ZANDT	2.00	2.0
39	WISE	4.00	5.0
3	WILBARGER	4.80	4.8
61	TITUS	5.20	5.5
58	FREESTONE	6.00	7.0
12	JONES	6.00	6.0
65	THROCKMORTON	6.00	7.0
35	WHEELER	6.00	6.0
344	RUSK	6.80	8.0
24	HASKELL	7.00	7.8
84	SHACKLEFORD	7.00	8.0
57	STEPHENS	7.00	10.0
12	UPSHUR	7.00	8.0
340	WOOD	7.00	8.0
76	YOUNG	7.00	7.0
80	CHEROKEE	8.00	9.0
56	COOKE	8.00	8.8
327	GRAY	8.00	9.0
947	GREGG	8.00	9.0
22	HEMPHILL	8.00	9.0
24	HOUSTON	8.00	8.0
62	KING	8.00	8.3
35	MARION	8.00	10.0
209	MONTAGUE	8.00	10.0
3	RAINS	8.00	9.0
121	STONEWALL	8.00	9.0
38	ANDERSON	9.00	9.0
223	GRAYSON	9.00	10.0
35	HARRISON	9.00	14.0
101	HUTCHINSON	9.00	9.0
132	PANOLA	9.00	10.0
33	SMITH	9.00	9.0

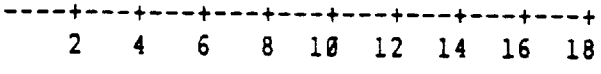

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Table 11 (Continued)

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Northern Crescent

Obs	County	Median	75th Percentile
34	BAYLOR	10.00	14.0
53	FOARD	10.00	10.0
197	FRANKLIN	10.00	10.0
13	KAUFMAN	10.00	10.0
44	NACOGDOCHES	10.00	13.0
223	ROBERTS	10.00	13.0
32	WICHITA	10.00	13.8
61	CARSON	11.00	15.0
278	HANSFORD	11.00	12.0
23	HARTLEY	11.00	11.0
28	LIPSCOMB	12.00	14.3
104	OCHILTREE	12.00	12.0
5	SHERMAN	12.00	12.5
97	JACK	13.00	16.0

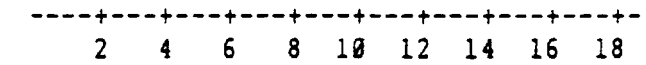

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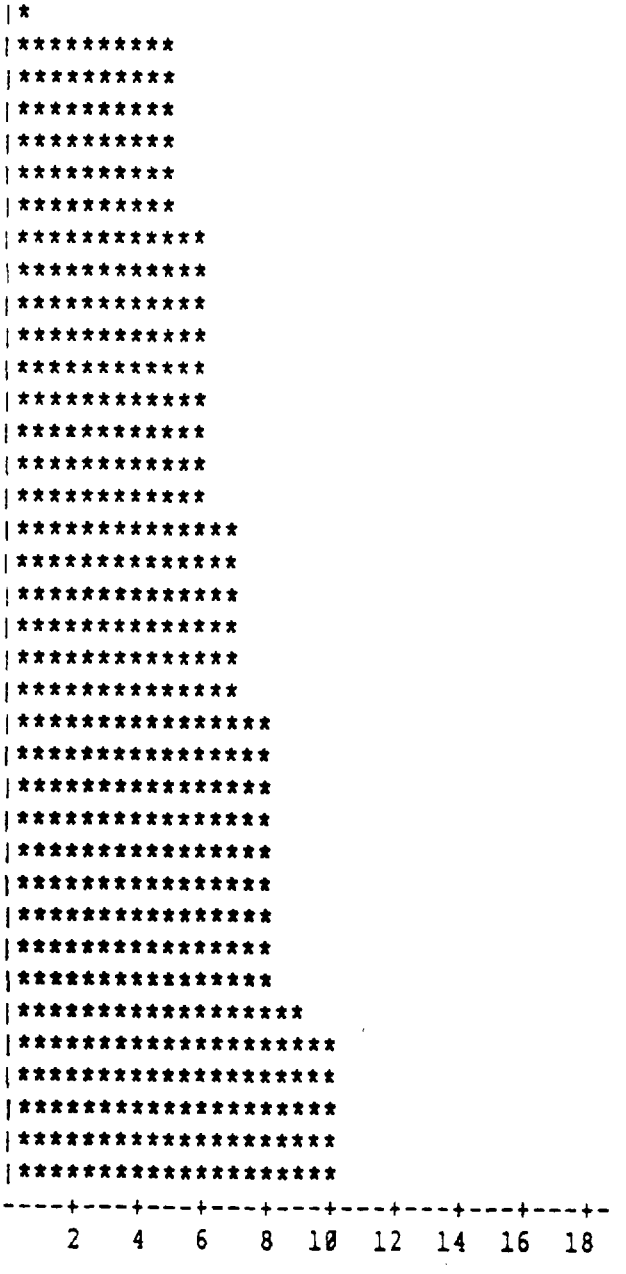
Table 12

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Texas Central/Western Region

Obs	County	Median	75th Percentile
147	HOCKLEY	0.4	5.0
5	KENT	4.8	5.8
13	EDWARDS	5.0	5.0
40	IRION	5.0	5.0
14	TOM GREEN	5.0	5.3
159	WINKLER	5.0	6.0
1330	YOAKUM	5.0	5.0
1204	ANDREWS	6.0	7.0
292	CRANE	6.0	8.0
301	CROCKETT	6.0	7.0
119	DAWSON	6.0	7.0
568	ECTOR	6.0	7.0
297	GAINES	6.0	6.0
100	LOVING	6.0	7.0
3	TERRELL	6.0	6.0
15	VAL VERDE	6.0	7.0
89	COCHRAN	7.0	8.0
116	CULBERSON	7.0	8.0
424	HOWARD	7.0	8.0
5	MARTIN	7.0	8.8
103	REEVES	7.0	8.0
262	WARD	7.0	8.0
68	BORDEN	8.0	9.0
181	FISHER	8.0	9.0
19	GARZA	8.0	8.0
150	MIDLAND	8.0	9.0
4	MITCHELL	8.0	12.5
318	PECOS	8.0	9.0
21	RUNNELS	8.0	8.0
21	SCHLEICHER	8.0	10.0
13	TAYLOR	8.0	8.0
342	GLASSCOCK	9.0	10.0
177	COKE	10.0	10.0
14	NOLAN	10.0	10.0
91	REAGAN	10.0	10.0
52	SCURRY	10.0	10.0
150	UPTON	10.0	10.0



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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Texas

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	167	3.538	490.0	0	0.0	0.00	0.000
CRYO UNIT	33	96.400	2985.0	0	0.0	0.00	2.000
DEHYDRATOR	104	2.538	80.0	0	0.0	0.00	2.000
FRAC TOWER	128	18.035	395.0	0	0.0	0.00	3.750
INLET SCRUBBER	220	4.185	387.0	0	0.0	0.00	0.975
METER	37	18.678	243.0	0	0.0	0.00	4.250
OTANK	112	16.875	193.0	0	0.0	0.00	13.200
REFRIGERATION	79	13.816	153.0	0	0.0	0.00	3.000
SWEETENER	128	2.170	105.0	0	0.0	0.00	0.000
OTHER	185	19.336	995.0	0	0.0	1.00	10.500
OPUMP	102	93.677	1391.0	0	0.0	7.75	70.750
BOTTOMS PUMP	14	22.393	125.5	0	0.0	10.50	23.000
PTANK	26	29.131	241.0	0	1.0	11.50	26.500
PRODUCT LINE	52	44.610	580.0	0	0.0	12.50	58.750
PPUMP	42	119.052	1041.0	0	3.0	31.00	89.500
REFLUX PUMP	67	287.987	2985.0	0	8.4	65.00	295.000
Production Facilities							
FLINE	1109	14.3909	620	0	0	0	0.00
MANIFOLD	1137	10.1551	1180	0	0	0	0.95
METER	55	6.2364	92	0	0	0	3.00
OTHER	800	22.0115	3785	0	0	0	2.00
PUMP	646	8.4807	985	0	0	0	1.00
SEP	3513	23.9209	4120	0	0	0	6.00
STANK	2890	6.1435	983	0	0	0	2.00
SUMP	132	17.3864	740	0	0	0	2.00
VRU	58	0.0897	3	0	0	0	0.00
WINJ	44	27.1591	285	0	0	0	10.50
WOTHER	2	0.0000	0	0	0	0	0.00
WPROD	651	6.0214	737	0	0	0	1.00
H/T	994	28.4407	3391	0	0	1	6.00
WLINE	81	57.4099	793	0	0	2	50.00
WTANK	1530	28.7806	2490	0	0	3	12.00

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Appendix 2

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	ANDREWS	103	0.168	5.5	0	0.00	0.00	0.00
GP	BORDEN	5	0.000	0.0	0	0.00	0.00	0.00
GP	BRAZORIA	21	0.181	2.2	0	0.00	0.00	0.00
GP	CAMERON	10	1.320	13.2	0	0.00	0.00	0.00
GP	COCHRAN	1	0.000	0.0	0	0.00	0.00	0.00
GP	COKE	1	0.000	0.0	0	0.00	0.00	0.00
GP	COLORADO	150	10.600	194.0	0	0.00	0.00	2.00
GP	CROCKETT	23	8.783	62.0	0	0.00	0.00	14.00
GP	CULBERSON	5	0.200	1.0	0	0.00	0.00	0.50
GP	DAWSON	1	0.000	0.0	0	0.00	0.00	0.00
GP	ECTOR	66	47.753	820.0	0	0.00	0.00	2.50
GP	GALVESTON	1	0.000	0.0	0	0.00	0.00	0.00
GP	GRAY	13	0.000	0.0	0	0.00	0.00	0.00
GP	HARDIN	3	0.000	0.0	0	0.00	0.00	0.00
GP	HOCKLEY	40	0.187	2.6	0	0.00	0.00	0.15
GP	HOWARD	11	0.000	0.0	0	0.00	0.00	0.00
GP	KENT	1	0.000	0.0	0	0.00	0.00	0.00
GP	LAVACA	34	2.282	25.5	0	0.00	0.00	0.00
GP	LIBERTY	7	0.471	1.3	0	0.00	0.00	1.30
GP	LOVING	1	0.000	0.0	0	0.00	0.00	0.00
GP	MARTIN	12	5.167	43.0	0	0.00	0.00	0.00
GP	MATAGORDA	2	0.000	0.0	0	0.00	0.00	0.00
GP	MONTAGUE	5	0.000	0.0	0	0.00	0.00	0.00
GP	MONTGOMERY	20	15.550	145.0	0	0.00	0.00	0.00
GP	ORANGE	6	2.167	12.0	0	0.00	0.00	3.75
GP	PANOLA	2	0.000	0.0	0	0.00	0.00	0.00
GP	PECOS	9	5.733	51.6	0	0.00	0.00	0.00
GP	REAGAN	3	0.000	0.0	0	0.00	0.00	0.00
GP	REEVES	5	1.000	4.0	0	0.00	0.00	2.50
GP	SMITH	8	3.250	19.0	0	0.00	0.00	4.75
GP	UNREPORTED	58	6.224	96.0	0	0.00	0.00	5.25
GP	UPTON	1	0.000	0.0	0	0.00	0.00	0.00
GP	VAN ZANDT	66	0.432	23.0	0	0.00	0.00	0.00
GP	WARD	19	37.053	193.0	0	0.00	0.00	73.00
GP	WICHITA	1	0.000	0.0	0	0.00	0.00	0.00
GP	WINKLER	33	0.409	4.5	0	0.00	0.00	0.00
GP	WOOD	95	3.376	98.0	0	0.00	0.00	0.40
GP	YOAKUM	129	16.620	771.0	0	0.00	0.00	9.00
GP	ZAPATA	12	0.000	0.0	0	0.00	0.00	0.00
GP	ANDERSON	4	0.750	2.0	0	0.00	0.50	1.75
GP	CHEROKEE	17	1.529	4.0	1	1.00	1.00	1.00

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Appendix 2 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	FORT BEND	7	10.286	55.0	0	0.00	1.00	14.00
GP	FREESTONE	7	2.143	4.0	0	1.00	1.00	4.00
GP	GRAYSON	28	3.893	31.0	0	0.00	1.00	2.00
GP	SHACKLEFORD	38	60.079	886.0	0	0.00	1.00	45.00
GP	SHERMAN	3	1.000	2.0	0	0.00	1.00	2.00
GP	HARRISON	10	1.650	7.0	0	0.00	1.75	2.00
GP	GREGG	10	1.800	4.0	0	0.75	2.00	3.00
GP	WALLER	31	187.161	1391.0	0	0.00	2.00	241.00
GP	CRANE	27	31.259	144.0	0	0.00	3.00	69.00
GP	HANSFORD	40	117.000	2985.0	0	0.00	3.00	52.75
GP	MARION	2	3.000	3.0	3	3.00	3.00	3.00
GP	OCHILTREE	10	2.600	4.0	1	1.75	3.00	3.25
GP	RUSK	53	4.679	54.0	0	0.00	3.00	4.00
GP	AUSTIN	1	4.000	4.0	4	4.00	4.00	4.00
GP	HARRIS	27	242.852	2495.0	0	0.00	4.00	100.000
GP	SAN PATRICIO	2	4.200	8.4	0	0.00	4.20	8.400
GP	CHAMBERS	12	114.000	490.0	0	1.25	6.00	267.750
GP	NACOGDOCHES	5	82.000	387.0	0	2.00	7.00	199.500
GP	STEPHENS	45	17.178	168.0	0	1.00	7.00	16.000
GP	MIDLAND	1	8.700	8.7	8.7	8.70	8.70	8.700
GP	CARSON	29	140.483	2985.0	0.0	0.00	10.00	43.500
GP	KARNES	3	13.200	13.2	13.2	13.20	13.20	13.200
GP	JONES	1	18.000	18.0	18.0	18.00	18.00	18.000
GP	JACKSON	18	50.172	254.6	1.3	11.80	30.40	61.800
GP	JIM WELLS	6	122.300	319.1	9.4	16.67	49.70	294.875
GP	BROOKS	9	121.111	495.0	23.0	27.00	65.00	165.000
GP	REFUGIO	4	201.750	593.0	63.0	64.25	75.50	465.500
GP	KENEDY	3	117.667	191.0	81.0	81.00	81.00	191.000
GP	KLEBERG	56	196.786	1145.0	25.0	65.00	110.00	195.000
GP	CALHOUN	4	151.750	243.0	78.0	88.00	143.00	224.250
PROD	ANDERSON	34	0.529	2.0	0.0	0.00	0.00	1.000
PROD	ANDREWS	1101	3.389	494.0	0.0	0.00	0.00	1.000
PROD	AUSTIN	45	1.578	12.0	0.0	0.00	0.00	3.000
PROD	BORDEN	63	2.016	81.0	0.0	0.00	0.00	0.000
PROD	BRAZORIA	72	1.350	18.0	0.0	0.00	0.00	0.000
PROD	BURLESON	36	0.833	4.0	0.0	0.00	0.00	1.750
PROD	CALDWELL	173	0.534	33.5	0.0	0.00	0.00	0.350
PROD	COCHRAN	88	0.375	8.0	0.0	0.00	0.00	0.000
PROD	COKE	176	14.290	490.0	0.0	0.00	0.00	5.000
PROD	COLORADO	45	1.178	20.0	0.0	0.00	0.00	0.000
PROD	COOKE	56	8.232	172.0	0.0	0.00	0.00	4.750

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Appendix 2 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	CRANE	265	4.150	143.0	0.0	0.000	0.0	3.000
PROD	CROCKETT	278	7.335	342.0	0.0	0.000	0.0	1.250
PROD	CULBERSO	111	1.180	52.0	0.0	0.000	0.0	0.000
PROD	DAWSON	118	0.703	25.0	0.0	0.000	0.0	0.000
PROD	DUVAL	18	5.278	24.0	0.0	0.000	0.0	13.000
PROD	ECTOR	502	3.956	115.0	0.0	0.000	0.0	3.625
PROD	EDWARDS	13	0.077	1.0	0.0	0.000	0.0	0.000
PROD	FISHER	181	2.465	37.0	0.0	0.000	0.0	1.000
PROD	FOARD	53	2.604	50.0	0.0	0.000	0.0	0.000
PROD	FRIO	31	1.968	34.0	0.0	0.000	0.0	0.000
PROD	GAINES	297	4.785	92.0	0.0	0.000	0.0	4.500
PROD	GARZA	19	1.053	17.0	0.0	0.000	0.0	0.000
PROD	GLASSCOCK	342	6.132	890.0	0.0	0.000	0.0	0.000
PROD	GRAYSON	195	28.318	989.0	0.0	0.000	0.0	21.000
PROD	GREGG	937	1.984	87.0	0.0	0.000	0.0	2.000
PROD	HARDIN	101	3.076	38.7	0.0	0.000	0.0	3.150
PROD	HARRISON	25	5.540	106.0	0.0	0.000	0.0	2.000
PROD	HASKELL	24	3.625	39.0	0.0	0.000	0.0	0.750
PROD	HEMPHILL	22	36.591	392.0	0.0	0.000	0.0	0.000
PROD	HOCKLEY	107	1.274	27.0	0.0	0.000	0.0	0.000
PROD	HOWARD	413	4.778	392.0	0.0	0.000	0.0	2.000
PROD	IRION	40	28.800	744.0	0.0	0.000	0.0	11.000
PROD	JEFFERSON	79	2.320	54.3	0.0	0.000	0.0	2.200
PROD	KING	62	0.677	12.0	0.0	0.000	0.0	0.000
PROD	LAVACA	211	0.400	18.7	0.0	0.000	0.0	0.000
PROD	LIBERTY	40	1.622	24.9	0.0	0.000	0.0	0.825
PROD	LIPSCOMB	28	8.000	138.0	0.0	0.000	0.0	1.000
PROD	LOVING	99	11.586	241.0	0.0	0.000	0.0	1.000
PROD	MARTIN	44	1.045	17.0	0.0	0.000	0.0	0.00
PROD	MCMULLEN	45	1.556	42.0	0.0	0.000	0.0	0.00
PROD	MIDLAND	149	46.423	740.0	0.0	0.000	0.0	11.00
PROD	MONTAGUE	204	34.480	1186.0	0.0	0.000	0.0	3.00
PROD	NOLAN	14	9.286	60.0	0.0	0.000	0.0	10.00
PROD	PECOS	309	40.345	4120.0	0.0	0.000	0.0	13.00
PROD	RAINS	3	0.000	0.0	0.0	0.000	0.0	0.00
PROD	REAGAN	88	59.375	2490.0	0.0	0.000	0.0	7.00
PROD	REEVES	98	10.969	362.0	0.0	0.000	0.0	2.00

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Appendix 2 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
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Texas

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	RUNNELS	21	0.095	2.0	0	0.00	0.0	0.00
PROD	RUSK	291	1.637	104.8	0	0.00	0.0	0.00
PROD	SAN PATRICIO	13	0.331	2.3	0	0.00	0.0	0.35
PROD	SCHLEICHER	21	0.095	2.0	0	0.00	0.0	0.00
PROD	SCURRY	52	0.673	15.0	0	0.00	0.0	0.00
PROD	STARR	17	10.941	59.0	0	0.00	0.0	18.50
PROD	STONEWALL	121	5.174	172.0	0	0.00	0.0	1.00
PROD	TAYLOR	13	1.462	5.0	0	0.00	0.0	3.00
PROD	TERRELL	3	0.000	0.0	0	0.00	0.0	0.00
PROD	TITUS	61	2.092	48.3	0	0.00	0.0	0.00
PROD	TOM GREEN	14	4.429	20.0	0	0.00	0.0	9.25
PROD	UNREPORTED	308	14.060	451.0	0	0.00	0.0	3.00
PROD	UPSHUR	12	0.000	0.0	0	0.00	0.0	0.00
PROD	VAL VERDE	15	0.000	0.0	0	0.00	0.0	0.00
PROD	VAN ZANDT	11	0.364	1.0	0	0.00	0.0	1.00
PROD	WALLER	44	30.318	541.0	0	0.00	0.0	5.00
PROD	WARD	243	35.412	2992.0	0	0.00	0.0	6.00
PROD	WINKLER	126	10.097	244.0	0	0.00	0.0	6.00
PROD	WOOD	245	15.437	793.0	0	0.00	0.0	3.00
PROD	YOAKUM	1201	0.752	95.0	0	0.00	0.0	0.00
PROD	ZAPATA	14	1.071	10.0	0	0.00	0.0	0.00
PROD	HOUSTON	24	0.583	3.0	0	0.00	0.5	1.00
PROD	BAYLOR	34	111.735	2386.0	0	0.00	1.0	26.00
PROD	CHEROKEE	63	3.635	60.0	0	0.00	1.0	2.00
PROD	FREESTONE	51	4.902	64.0	0	0.00	1.0	4.00
PROD	HANSFORD	238	4.050	240.0	0	1.00	1.0	3.00
PROD	HUTCHINSON	101	6.040	67.0	0	0.00	1.0	9.00
PROD	KARNES	11	7.691	29.4	0	1.00	1.0	16.50
PROD	MONTGOMERY	163	9.963	394.0	0	0.00	1.0	6.00
PROD	PANOLA	130	9.323	266.0	0	0.00	1.0	5.00
PROD	FRANKLIN	197	29.838	2189.0	0	0.00	2.0	10.00
PROD	HARRIS	87	5.345	75.0	0	0.00	2.0	8.00
PROD	HARTLEY	23	2.565	14.0	0	1.00	2.0	2.00
PROD	MARION	33	46.939	990.0	0	0.00	2.0	18.50
PROD	OCHILTREE	94	2.234	5.0	0	1.75	2.0	3.00
PROD	SHACKLEFORD	46	19.478	213.0	0	0.75	2.0	7.25
PROD	SHERMAN	2	2.000	2.0	2	2.00	2.0	2.00
PROD	WICHITA	31	47.781	387.0	0	0.00	2.0	67.00
PROD	WISE	39	5.385	105.0	0	0.00	2.0	4.00
PROD	JACKSON	45	6.396	74.0	0	1.80	3.0	5.00
PROD	ROBERTS	223	79.377	1984.0	0	0.00	3.0	26.00

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Appendix 2 (Continued)

Statistical Data on Median Difference over Background
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Texas

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	GRAY	314	42.911	3391.0	0.0	0.00	4.0	14.00
PROD	ORANGE	3	4.000	7.0	0.0	1.00	4.0	7.00
PROD	SMITH	25	23.320	101.0	0.0	0.00	4.0	43.00
PROD	UPTON	149	84.360	2288.0	0.0	0.00	4.0	28.50
PROD	WHEELER	35	4.343	14.0	0.0	0.00	4.0	8.00
PROD	WILLACY	102	32.563	581.0	0.0	1.750	4.10	25.175
PROD	CARSON	32	9.812	59.0	0.0	0.000	4.50	9.750
PROD	GALVESTON	32	25.953	194.0	0.0	0.850	5.00	31.625
PROD	JACK	97	220.918	3785.0	0.0	0.000	5.00	56.000
PROD	NACOGDOCHES	39	49.564	401.0	0.0	2.000	6.00	50.000
PROD	WHARTON	5	10.200	22.0	5.0	5.000	6.00	17.500
PROD	CHAMBERS	170	63.801	3496.0	0.0	0.000	6.10	25.250
PROD	KENT	4	9.275	24.2	0.0	0.000	6.45	21.375
PROD	MATAGORDA	17	30.294	113.0	0.0	1.500	7.00	50.000
PROD	POLK	9	9.333	24.0	2.0	4.000	7.00	15.000
PROD	THROCKMORTON	65	33.169	415.0	0.0	2.000	8.00	29.500
PROD	YOUNG	76	46.763	350.0	0.0	2.000	8.00	43.250
PROD	JONES	11	69.364	294.0	1.0	1.000	9.00	94.000
PROD	FORT BEND	65	72.508	592.0	0.0	5.000	12.00	67.000
PROD	HIDALGO	134	41.726	374.0	0.0	0.000	12.50	54.000
PROD	JIM HOGG	1	15.000	15.0	15.0	15.000	15.00	15.000
PROD	KAUFMAN	13	76.462	640.0	0.0	5.500	33.00	45.000
PROD	STEPHENS	12	60.917	250.0	0.0	20.725	35.00	82.500
PROD	REFUGIO	2	44.500	46.0	43.0	43.000	44.50	46.000
PROD	BROOKS	86	70.884	396.0	11.0	29.500	47.00	86.000
PROD	NUECES	33	90.788	445.0	15.0	30.000	55.00	85.000
PROD	JIM WELLS	26	94.846	494.0	24.0	34.750	60.00	106.500
PROD	KENEDY	86	116.267	620.0	4.0	34.500	65.00	173.750
PROD	KLEBERG	39	123.308	493.0	20.0	50.000	76.00	142.000
PROD	ATASCOSA	13	78.469	341.0	0.0	0.900	78.00	107.500
PROD	CALHOUN	5	141.000	391.0	41.0	41.000	91.00	266.000
PROD	WILBARGER	3	129.633	253.3	43.6	43.600	92.00	253.300
PROD	MITCHELL	4	250.500	272.0	226.0	232.500	252.00	267.000

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Appendix 3

Statistical Data on Background by County
(Micro-Rems/Hr)

Texas

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
BRAZORIA	93	2.32151	8.0	0.3	0.30	0.30	5.000
HOCKLEY	147	2.17415	6.0	0.3	0.40	0.40	5.000
JEFFERSON	79	1.17848	10.0	0.4	0.60	0.70	0.800
WILLACY	102	2.38627	9.0	0.3	0.50	0.90	6.000
VAN ZANDT	77	2.90909	9.0	2.0	2.00	2.00	2.000
CAMERON	10	2.90000	2.9	2.9	2.90	2.90	2.900
CALDWELL	173	3.68844	5.6	1.3	3.10	3.90	4.200
KARNES	14	3.95000	5.0	2.9	2.90	3.95	5.000
GALVESTON	33	3.65152	10.0	0.5	0.50	4.00	6.000
HARDIN	104	7.60000	25.8	0.8	3.50	4.00	4.875
WISE	39	4.48718	6.0	3.0	4.00	4.00	5.000
LIBERTY	47	4.80851	7.4	3.5	3.50	4.50	5.500
SAN PATRICIO	15	4.51333	5.2	3.9	4.50	4.50	4.500
KENT	5	5.20000	5.8	4.8	4.80	4.80	5.800
WILBARGER	3	4.80000	4.8	4.8	4.80	4.80	4.800
BROOKS	95	5.06316	6.0	4.0	5.00	5.00	5.000
CHAMBERS	182	4.18846	13.0	0.3	2.00	5.00	6.000
EDWARDS	13	5.00000	5.0	5.0	5.00	5.00	5.000
HARRIS	114	5.43860	7.0	4.0	5.00	5.00	6.000
IRION	40	5.22500	6.0	5.0	5.00	5.00	5.000
JACKSON	63	4.66667	6.0	2.6	3.50	5.00	6.000
KENEDY	89	5.44944	9.0	4.0	5.00	5.00	5.000
KLEBERG	95	5.83150	9.0	5.0	5.00	5.00	7.000
MONTGOMERY	183	4.88361	7.0	3.0	4.00	5.00	5.000
NUECES	33	4.96970	5.0	4.0	5.00	5.00	5.000
POLK	9	5.33333	6.0	5.0	5.00	5.00	6.000
TOM GREEN	14	5.21429	6.0	5.0	5.00	5.00	5.250
WINKLER	159	4.23899	7.0	1.5	1.50	5.00	6.000
YOAKUM	1330	4.74504	9.0	0.3	4.00	5.00	5.000
ZAPATA	26	5.00000	5.0	5.0	5.00	5.00	5.000
TITUS	61	5.13443	6.5	4.4	4.65	5.20	5.500
JIM WELLS	32	5.15625	6.0	3.5	4.25	5.50	6.000
ANDREWS	1204	5.67193	15.0	1.5	5.00	6.00	7.000
BURLESON	36	5.95833	6.5	5.0	5.25	6.00	6.500
COLORADO	195	6.22564	15.0	5.0	5.00	6.00	6.000
CRANE	292	6.54418	23.0	2.9	5.00	6.00	8.000
CROCKETT	301	6.13621	11.0	4.0	5.00	6.00	7.000
DAWSON	119	6.73950	10.0	5.0	6.00	6.00	7.000

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Appendix 3 (Continued)

Statistical Data on Background by County
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Texas

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
ECTOR	568	5.38380	15.0	1.8	2.50	6.00	7.000
FREESTONE	58	6.25862	7.0	6.0	6.00	6.00	7.000
FRIO	31	6.00000	6.0	6.0	6.00	6.00	6.000
GAINES	297	5.56566	7.0	3.0	5.00	6.00	6.000
HIDALGO	134	5.64403	6.0	3.9	6.00	6.00	6.000
JONES	12	6.00000	6.0	6.0	6.00	6.00	6.000
LOVING	100	6.66000	9.0	5.0	6.00	6.00	7.000
STARR	17	6.05882	7.0	6.0	6.00	6.00	6.000
TERRELL	3	6.00000	6.0	6.0	6.00	6.00	6.000
THROCKMORTON	65	6.23077	8.0	4.0	5.00	6.00	7.000
UNREPORTED	366	8.40464	60.0	4.0	5.00	6.00	7.000
VAL VERDE	15	6.20000	7.0	5.0	6.00	6.00	7.000
WALLER	75	6.22667	9.0	4.0	5.00	6.00	9.000
WHARTON	5	5.80000	7.0	5.0	5.00	6.00	6.500
WHEELER	35	6.17143	8.0	6.0	6.00	6.00	6.000
FORT BEND	72	7.11111	12.0	4.0	5.00	6.50	8.000
LAVACA	245	5.33388	6.5	3.2	3.50	6.50	6.500
RUSK	344	6.2727	15.0	1.5	5.20	6.8	8.00
ATASCOSA	13	6.4846	9.0	3.9	4.35	7.0	8.00
COCHRAN	89	7.0674	8.0	6.0	7.00	7.0	8.00
CULBERSON	116	6.9655	8.0	4.0	7.00	7.0	8.00
DUVAL	18	6.8889	7.0	6.0	7.00	7.0	7.00
HASKELL	24	7.6667	10.0	7.0	7.00	7.0	7.75
HOWARD	424	6.4958	13.0	1.3	6.00	7.0	8.00
MARTIN	56	7.5179	15.0	5.0	6.00	7.0	8.75
MATAGORDA	19	7.0000	8.0	5.0	7.00	7.0	8.00
REEVES	103	7.3010	12.0	4.0	6.00	7.0	8.00
REFUGIO	6	7.0000	7.0	7.0	7.00	7.0	7.00
SHACKLEFORD	84	7.0595	15.0	0.0	6.00	7.0	8.00
STEPHENS	57	8.0088	15.0	5.0	6.00	7.0	10.00
UPSHUR	12	7.0000	8.0	6.0	6.00	7.0	8.00
WARD	262	7.1336	15.0	5.0	6.00	7.0	8.00
WOOD	340	7.1300	15.0	1.6	7.00	7.0	8.00
YOUNG	76	7.3553	12.0	5.0	6.00	7.0	7.00
BORDEN	68	8.0441	9.0	7.0	7.00	8.0	9.00
CHEROKEE	80	8.2000	10.0	6.0	7.00	8.0	9.00

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Appendix 3 (Continued)

Statistical Data on Background by County
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Texas

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
COOKE	56	7.9286	9.0	5.0	7.25	8.0	8.75
FISHER	181	7.7994	11.0	3.9	7.00	8.0	9.00
GARZA	19	8.0000	8.0	8.0	8.00	8.0	8.00
GRAY	327	8.3211	18.0	0.0	7.00	8.0	9.00
GREGG	947	8.1227	15.0	4.5	8.00	8.0	9.00
HEMPHILL	22	8.1818	9.0	7.0	7.00	8.0	9.00
HOUSTON	24	7.8750	8.0	7.0	8.00	8.0	8.00
JIM HOGG	1	8.0000	8.0	8.0	8.00	8.0	8.00
KING	62	8.2742	10.0	5.0	8.00	8.0	8.25
MARION	35	8.9143	11.0	6.0	8.00	8.0	10.00
MIDLAND	150	7.4607	15.0	1.0	6.00	8.0	9.00
MITCHELL	4	9.5000	14.0	8.0	8.00	8.0	12.50
MONTAGUE	209	8.9330	15.0	5.0	8.00	8.0	10.00
ORANGE	9	7.5556	8.0	4.0	8.00	8.0	8.00
PECOS	318	8.1836	16.1	3.5	6.00	8.0	9.00
RAINS	3	7.6667	9.0	6.0	6.00	8.0	9.00
RUNNELS	21	6.6667	10.0	5.0	5.00	8.0	8.00
SCHLEICHER	21	8.4762	10.0	6.0	8.00	8.0	10.00
STONEWALL	121	7.6529	11.0	6.0	6.00	8.0	9.00
TAYLOR	13	7.6154	10.0	5.0	7.00	8.0	8.00
AUSTIN	46	7.9783	10.0	5.0	7.00	8.5	9.00
ANDERSON	38	9.6842	15.0	8.0	8.00	9.0	9.00
CALHOUN	9	8.1111	9.0	7.0	7.00	9.0	9.00
GLASSCOCK	342	8.8860	11.0	7.0	8.00	9.0	10.00
GRAYSON	223	9.3229	13.0	5.0	9.00	9.0	10.00
HARRISON	35	7.5143	15.0	2.0	2.00	9.0	14.00
HUTCHINSON	101	8.6337	12.0	7.0	8.00	9.0	9.00
PANOLA	132	9.2576	11.0	8.0	9.00	9.0	10.00
SMITH	33	9.1515	10.0	8.0	9.00	9.0	9.00
BAYLOR	34	10.9706	15.0	8.0	9.00	10.0	14.00
COKE	177	9.3051	12.0	6.0	8.00	10.0	10.00
FOARD	53	10.1509	11.0	10.0	10.00	10.0	10.00
FRANKLIN	197	9.5787	12.0	6.0	9.00	10.0	10.00
KAUFMAN	13	9.8462	10.0	9.0	10.00	10.0	10.00
MCMULLEN	45	9.8444	10.0	6.0	10.00	10.0	10.00
NACOGDOCHES	44	10.9318	13.0	9.0	9.00	10.0	13.00
NOLAN	14	10.0000	10.0	10.0	10.0	10.	10.00
REAGAN	91	9.3846	10.0	8.0	9.0	10.	10.00
ROBERTS	223	10.9327	20.0	6.0	9.0	10.	13.00
SCURRY	52	9.5000	10.0	8.0	9.0	10.	10.00
UPTON	150	8.9500	15.0	1.0	6.0	10.	11.00
WICHITA	32	9.8125	14.0	4.8	4.8	10.	13.75
CARSON	61	11.6393	15.0	7.0	8.0	11.	15.00

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Appendix 3 (Continued)

Statistical Data on Background by County
(Micro-Rems/Hr)

Texas

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
HANSFORD	278	11.5612	15.0	9.0	11.0	11	12.00
HARTLEY	23	11.2174	12.0	11.0	11.0	11	11.00
LIPSCOMB	28	13.0357	25.0	8.0	11.0	12	14.25
OCHILTREE	104	11.6538	17.5	9.0	11.0	12	12.00
SHERMAN	5	12.0000	13.0	11.0	11.5	12	12.50
JACK	97	11.3299	20.0	3.0	5.0	13	16.00

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Appendix 4

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Texas Coastal Crescent

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	34	14.500	490.0	0	0.0	0.00	0.00
CRYO UNIT	9	0.778	7.0	0	0.0	0.00	0.00
DEHYDRATOR	25	5.080	80.0	0	0.0	0.00	1.50
INLET SCRUBBER	43	2.165	55.0	0	0.0	0.00	0.00
METER	9	44.333	243.0	0	0.0	0.00	76.00
OTANK	50	18.410	191.0	0	0.0	0.00	23.50
SWEETENER	34	4.471	105.0	0	0.0	0.00	0.00
FRAC TOWER	28	49.139	395.0	0	0.0	1.00	88.75
REFRIGERATION	20	28.550	145.0	0	0.0	1.50	42.50
PRODUCT LINE	34	29.785	145.0	0	0.0	2.50	36.25
OTHER	46	57.439	995.0	0	0.0	3.50	65.00
PTANK	7	46.486	241.0	0	1.3	14.00	48.10
PPUMP	21	151.724	1041.0	0	5.2	30.00	124.50
OPUMP	48	147.975	1391.0	0	0.0	45.00	145.00
BOTTOMS PUMP	2	77.250	125.5	29	29.0	77.25	125.50
REFLUX PUMP	39	328.567	2495.0	0	19.1	145.00	295.00
Production Facilities							
H/T	94	7.7181	143.0	0	0	0.0	3.40
METER	39	8.7692	92.0	0	0	0.0	4.00
PUMP	73	4.4247	101.0	0	0	0.0	3.55
STANK	389	7.3710	246.0	0	0	0.0	5.00
WINJ	3	0.7667	2.3	0	0	0.0	2.30
WOTHER	2	0.0000	0.0	0	0	0.0	0.00
WPROD	109	2.2963	74.0	0	0	0.0	0.00
MANIFOLD	191	39.0508	592.0	0	0	1.0	28.00
OTHER	117	43.4769	3496.0	0	0	1.0	9.00
WTANK	233	17.0489	441.0	0	0	1.0	10.00
WLINE	22	40.8636	245.0	0	0	3.0	57.50
SEP	659	34.6165	617.0	0	0	3.0	25.70
SUMP	17	13.8235	91.0	0	5	6.0	15.00
FLINE	170	84.6971	620.0	0	11	45.5	114.75

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Appendix 5

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Texas Northern Crescent

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	60	1.267	10	0	0.0	0.0	2.00
FRAC TOWER	41	10.910	360	0	0.0	0.0	0.20
INLET SCRUBBER	108	5.689	387	0	0.0	0.0	1.00
METER	7	37.000	168	0	0.0	0.0	90.00
REFRIGERATION	18	2.278	23	0	0.0	0.0	3.00
SWEETENER	28	3.536	60	0	0.0	0.0	0.00
CRYO UNIT	15	210.533	2985	0	0.0	1.0	2.00
DEHYDRATOR	45	2.933	56	0	0.0	2.0	3.00
OTANK	24	16.250	92	0	0.0	2.0	16.75
OTHER	58	7.534	52	0	1.0	3.0	7.50
BOTTOMS PUMP	10	14.300	81	0	0.0	3.5	18.75
OPUMP	34	66.353	886	0	0.0	4.5	41.25
PPUMP	7	66.000	360	0	3.0	5.0	48.00
PTANK	11	30.273	173	0	1.0	9.0	31.00
PRODUCT LINE	10	20.500	81	0	4.5	12.0	35.00
REFLUX PUMP	16	251.937	2985	0	1.5	38.5	154.25
Production Facilities							
MANIFOLD	310	8.527	1180	0	0.000	0	1.0
METER	2	0.000	0	0	0.000	0	0.0
OTHER	199	53.560	3785	0	0.000	0	2.0
PUMP	321	14.486	985	0	0.000	0	2.0
STANK	922	7.832	983	0	0.000	0	2.0
SUMP	17	1.647	15	0	0.000	0	1.5
VRU	3	0.000	0	0	0.000	0	0.0
WPROD	313	2.111	61	0	0.000	0	2.0
SEP	1072	20.293	2189	0	0.000	1	4.0
H/T	379	52.660	3391	0	0.000	2	10.0
FLINE	20	71.900	586	0	0.000	3	59.0
WTANK	836	36.041	1584	0	0.675	4	14.0
WINJ	13	22.385	90	0	0.000	5	50.0
WLINE	28	123.196	793	0	4.625	40	168.0

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Appendix 6

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Texas Central/Western Region

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	68	0.247	4.0	0	0.0	0.0	0.00
DEHYDRATOR	30	0.100	2.0	0	0.0	0.0	0.00
FRAC TOWER	58	8.316	134.0	0	0.0	0.0	4.50
INLET SCRUBBER	65	1.557	43.0	0	0.0	0.0	0.00
METER	20	1.655	16.0	0	0.0	0.0	1.05
OTANK	25	22.804	193.0	0	0.0	0.0	16.50
OTHER	73	4.904	62.0	0	0.0	0.0	6.00
REFRIGERATION	39	12.269	153.0	0	0.0	0.0	0.00
SWEETENER	55	0.033	1.3	0	0.0	0.0	0.00
OPUMP	19	10.332	73.0	0	0.0	1.3	17.50
CRYO UNIT	7	2.314	6.0	0	0.0	1.6	6.00
PTANK	3	11.667	31.0	0	0.0	4.0	31.00
BOTTOMS PUMP	2	8.000	16.0	0	0.0	8.0	16.00
REFLUX PUMP	12	204.167	820.0	0	6.0	19.5	468.25
PPUMP	13	104.000	771.0	0	31.0	61.0	79.50
PRODUCT LINE	8	137.750	580.0	0	12.5	88.0	180.00
Production Facilities							
FLINE	886	0.0801	65.0	0	0	0	0.000
H/T	503	14.8316	890.0	0	0	0	5.000
MANIFOLD	609	0.8739	225.0	0	0	0	0.000
METER	14	0.0714	1.0	0	0	0	0.000
OTHER	483	3.8114	125.0	0	0	0	1.000
PUMP	233	2.1609	290.0	0	0	0	0.000
SEP	1711	21.7599	4120.0	0	0	0	5.000
STANK	1544	4.8926	638.7	0	0	0	1.700
SUMP	92	21.6630	740.0	0	0	0	0.750
VRU	51	0.1020	3.0	0	0	0	0.000
WINJ	21	42.3667	285.0	0	0	0	8.850
WLINE	20	14.2850	213.0	0	0	0	1.725
WPROD	179	13.9626	737.0	0	0	0	0.000
WTANK	435	22.1644	2490.0	0	0	1	9.000

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Appendix 7

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas Coastal Crescent

FACILITY	COUNTY	NO	AVG	LARGEST	LOWEST	PCT25	MED	PCT75
GP	BRAZORIA	21	0.181	2.2	0.0	0.000	0.0	0.000
GP	CAMERON	10	1.320	13.2	0.0	0.000	0.0	0.000
GP	COLORADO	150	10.600	194.0	0.0	0.000	0.0	2.000
GP	GALVESTON	1	0.000	0.0	0.0	0.000	0.0	0.000
GP	HARDIN	3	0.000	0.0	0.0	0.000	0.0	0.000
GP	LAVACA	34	2.282	25.5	0.0	0.000	0.0	0.000
GP	LIBERTY	7	0.471	1.3	0.0	0.000	0.0	1.300
GP	MATAGORDA	2	0.000	0.0	0.0	0.000	0.0	0.000
GP	MONTGOMERY	20	15.550	145.0	0.0	0.000	0.0	0.000
GP	ORANGE	6	2.167	12.0	0.0	0.000	0.0	3.750
GP	ZAPATA	12	0.000	0.0	0.0	0.000	0.0	0.000
GP	FORT BEND	7	10.286	55.0	0.0	0.000	1.0	14.000
GP	WALLER	31	187.161	1391.0	0.0	0.000	2.0	241.000
GP	AUSTIN	1	4.000	4.0	4.0	4.000	4.0	4.000
GP	HARRIS	27	242.852	2495.0	0.0	0.000	4.0	100.000
GP	SAN PATRICIO	2	4.200	8.4	0.0	0.000	4.2	8.400
GP	CHAMBERS	12	114.000	490.0	0.0	1.250	6.0	267.750
GP	KARNES	3	13.200	13.2	13.2	13.200	13.2	13.200
GP	JACKSON	18	50.172	254.6	1.3	11.800	30.4	61.800
GP	JIM WELLS	6	122.300	319.1	9.4	16.675	49.7	294.875
GP	BROOKS	9	121.111	495.0	23.0	27.000	65.0	165.000
GP	REFUGIO	4	201.750	593.0	63.0	64.250	75.5	465.500
GP	KENEDY	3	117.667	191.0	81.0	81.000	81.0	191.000
GP	KLEBERG	56	196.786	1145.0	25.0	65.000	110.0	195.000
GP	CALHOUN	4	151.750	243.0	78.0	88.000	143.0	224.250
PROD	AUSTIN	45	1.578	12.0	0.0	0.000	0.0	3.000
PROD	BRAZORIA	72	1.350	18.0	0.0	0.000	0.0	0.000
PROD	BURLESON	36	0.833	4.0	0.0	0.000	0.0	1.750
PROD	CALDWELL	173	0.534	33.5	0.0	0.000	0.0	0.350
PROD	COLORADO	45	1.178	20.0	0.0	0.000	0.0	0.000
PROD	DUVAL	18	5.278	24.0	0.0	0.000	0.0	13.000
PROD	FRIO	31	1.968	34.0	0.0	0.000	0.0	0.000
PROD	HARDIN	101	3.076	38.7	0.0	0.000	0.0	3.150
PROD	JEFFERSON	79	2.320	54.3	0.0	0.000	0.0	2.200
PROD	LAVACA	211	0.400	18.7	0.0	0.000	0.0	0.000
PROD	LIBERTY	40	1.622	24.9	0.0	0.000	0.0	0.825
PROD	MCMULLEN	45	1.556	42.0	0.0	0.000	0.0	0.000
PROD	SAN PATRICIO	13	0.331	2.3	0.0	0.000	0.0	0.350
PROD	STARR	17	10.941	59.0	0.0	0.000	0.0	18.500

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Appendix 7 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas Coastal Crescent

FACILITY	COUNTY	NO	AVG	LARGEST	LOWEST	PCT25	MED	PCT75
PROD	WALLER	44	30.318	541.0	0.0	0.000	0.0	5.000
PROD	ZAPATA	14	1.071	10.0	0.0	0.000	0.0	0.000
PROD	KARNES	11	7.691	29.4	0.0	1.000	1.0	16.500
PROD	MONTGOMERY	163	9.963	394.0	0.0	0.000	1.0	6.000
PROD	HARRIS	87	5.345	75.0	0.0	0.000	2.0	8.000
PROD	JACKSON	45	6.396	74.0	0.0	1.800	3.0	5.000
PROD	ORANGE	3	4.000	7.0	1.0	1.000	4.0	7.000
PROD	WILLACY	102	32.563	581.0	0.0	1.750	4.1	25.175
PROD	GALVESTON	32	25.953	194.0	0.0	0.850	5.0	31.625
PROD	WHARTON	5	10.200	22.0	5.0	5.000	6.0	17.500
PROD	CHAMBERS	170	63.801	3496.0	0.0	0.000	6.1	25.250
PROD	MATAGORDA	17	30.294	113.0	0.0	1.500	7.0	50.000
PROD	POLK	9	9.333	24.0	2.0	4.000	7.0	15.000
PROD	FORT BEND	65	72.508	592.0	0.0	5.000	12.0	67.000
PROD	HIDALGO	134	41.726	374.0	0.0	0.000	12.5	54.000
PROD	JIM HOGG	1	15.000	15.0	15.0	15.000	15.0	15.000
PROD	REFUGIO	2	44.500	46.0	43.0	43.000	44.5	46.000
PROD	BROOKS	86	70.884	396.0	11.0	29.500	47.0	86.000
PROD	NUECES	33	90.788	445.0	15.0	30.000	55.0	85.000
PROD	JIM WELLS	26	94.846	494.0	24.0	34.750	60.0	106.500
PROD	KENEDY	86	116.267	620.0	4.0	34.500	65.0	173.750
PROD	KLEBERG	39	123.308	493.0	20.0	50.000	76.0	142.000
PROD	ATASCOSA	13	78.469	341.0	0.0	0.900	78.0	107.500
PROD	CALHOUN	5	141.000	391.0	41.0	41.000	91.0	266.000

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Appendix 8

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas Northern Crescent

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	GRAY	13	0.000	0.0	0	0.00	0.00	0.00
GP	MONTAGUE	5	0.000	0.0	0	0.00	0.00	0.00
GP	PANOLA	2	0.000	0.0	0	0.00	0.00	0.00
GP	SMITH	8	3.250	19.0	0	0.00	0.00	4.75
GP	VAN ZANDT	66	0.432	23.0	0	0.00	0.00	0.00
GP	WICHITA	1	0.000	0.0	0	0.00	0.00	0.00
GP	WOOD	95	3.376	98.0	0	0.00	0.00	0.40
GP	ANDERSON	4	0.750	2.0	0	0.00	0.50	1.75
GP	CHEROKEE	17	1.529	4.0	1	1.00	1.00	1.00
GP	FREESTONE	7	2.143	4.0	0	1.00	1.00	4.00
GP	GRAYSON	28	3.893	31.0	0	0.00	1.00	2.00
GP	SHACKLEFORD	38	60.079	886.0	0	0.00	1.00	45.00
GP	SHERMAN	3	1.000	2.0	0	0.00	1.00	2.00
GP	HARRISON	10	1.650	7.0	0	0.00	1.75	2.00
GP	GREGG	10	1.800	4.0	0	0.75	2.00	3.00
GP	HANSFORD	40	117.000	2985.0	0	0.00	3.00	52.75
GP	MARION	2	3.000	3.0	3	3.00	3.00	3.00
GP	OCHILTREE	10	2.600	4.0	1	1.75	3.00	3.25
GP	RUSK	53	4.679	54.0	0	0.00	3.00	4.00
GP	NACOGDOCHES	5	82.000	387.0	0	2.00	7.00	199.50
GP	STEPHENS	45	17.178	168.0	0	1.00	7.00	16.00
GP	CARSON	29	140.483	2985.0	0	0.00	10.00	43.50
GP	JONES	1	18.000	18.0	18	18.00	18.00	18.00
PROD	ANDERSON	34	0.529	2.0	0	0.00	0.00	1.00
PROD	COOKE	56	8.232	172.0	0	0.00	0.00	4.75
PROD	FOARD	53	2.604	50.0	0	0.00	0.00	0.00
PROD	GRAYSON	195	28.318	989.0	0	0.00	0.00	21.00
PROD	GREGG	937	1.984	87.0	0	0.00	0.00	2.00
PROD	HARRISON	25	5.540	106.0	0	0.00	0.00	2.00
PROD	HASKELL	24	3.625	39.0	0	0.00	0.00	0.75
PROD	HEMPHILL	22	36.591	392.0	0	0.00	0.00	0.00
PROD	KING	62	0.677	12.0	0	0.00	0.00	0.00
PROD	LIPSCOMB	28	8.000	138.0	0	0.00	0.00	1.00
PROD	MONTAGUE	204	34.480	1186.0	0	0.00	0.00	3.00
PROD	RAINS	3	0.000	0.0	0	0.00	0.00	0.00
PROD	RUSK	291	1.637	104.8	0	0.00	0.00	0.00
PROD	STONEWALL	121	5.174	172.0	0	0.00	0.00	1.00
PROD	TITUS	61	2.092	48.3	0	0.00	0.00	0.00
PROD	UPSHUR	12	0.000	0.0	0	0.00	0.00	0.00

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Appendix 8 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas Northern Crescent

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	VAN ZANDT	11	0.364	1.0	0	0.00	0.00	1.00
PROD	WOOD	245	15.437	793.0	0	0.00	0.00	3.00
PROD	HOUSTON	24	0.583	3.0	0	0.00	0.50	1.00
PROD	BAYLOR	34	111.735	2386.0	0	0.00	1.00	26.00
PROD	CHEROKEE	63	3.635	60.0	0	0.00	1.00	2.00
PROD	FREESTONE	51	4.902	64.0	0	0.00	1.00	4.00
PROD	HANSFORD	238	4.050	240.0	0	1.00	1.00	3.00
PROD	HUTCHINSON	101	6.040	67.0	0	0.00	1.00	9.00
PROD	PANOLA	130	9.323	266.0	0	0.00	1.00	5.00
PROD	FRANKLIN	197	29.838	2189.0	0	0.00	2.00	10.00
PROD	HARTLEY	23	2.565	14.0	0	1.00	2.00	2.00
PROD	MARION	33	46.939	990.0	0	0.00	2.00	18.50
PROD	OCHILTREE	94	2.234	5.0	0	1.75	2.00	3.00
PROD	SHACKLEFORD	46	19.478	213.0	0	0.75	2.00	7.25
PROD	SHERMAN	2	2.000	2.0	2	2.00	2.00	2.00
PROD	WICHITA	31	47.781	387.0	0	0.00	2.00	67.00
PROD	WISE	39	5.385	105.0	0.0	0.000	2.00	4.00
PROD	ROBERTS	223	79.377	1984.0	0.0	0.000	3.00	26.00
PROD	GRAY	314	42.911	3391.0	0.0	0.000	4.00	14.00
PROD	SMITH	25	23.320	101.0	0.0	0.000	4.00	43.00
PROD	WHEELER	35	4.343	14.0	0.0	0.000	4.00	8.00
PROD	CARSON	32	9.812	59.0	0.0	0.000	4.50	9.75
PROD	JACK	97	220.918	3785.0	0.0	0.000	5.00	56.00
PROD	NACOGDOCHES	39	49.564	401.0	0.0	2.000	6.00	50.00
PROD	THROCKMORTON	65	33.169	415.0	0.0	2.000	8.00	29.50
PROD	YOUNG	76	46.763	350.0	0.0	2.000	8.00	43.25
PROD	JONES	11	69.364	294.0	1.0	1.000	9.00	94.00
PROD	KAUFMAN	13	76.462	640.0	0.0	5.500	33.00	45.00
PROD	STEPHENS	12	60.917	250.0	0.0	20.725	35.00	82.50
PROD	WILBARGER	3	129.633	253.3	43.6	43.600	92.00	253.30

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Appendix 9

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas Central/Western Region

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	ANDREWS	103	0.1680	5.5	0.0	0.0	0.0	0.000
GP	BORDEN	5	0.0000	0.0	0.0	0.0	0.0	0.000
GP	COCHRAN	1	0.0000	0.0	0.0	0.0	0.0	0.000
GP	COKE	1	0.0000	0.0	0.0	0.0	0.0	0.000
GP	CROCKETT	23	8.7826	62.0	0.0	0.0	0.0	14.000
GP	CULBERSON	5	0.2000	1.0	0.0	0.0	0.0	0.500
GP	DAWSON	1	0.0000	0.0	0.0	0.0	0.0	0.000
GP	ECTOR	66	47.7530	820.0	0.0	0.0	0.0	2.500
GP	HOCKLEY	40	0.1875	2.6	0.0	0.0	0.0	0.150
GP	HOWARD	11	0.0000	0.0	0.0	0.0	0.0	0.000
GP	KENT	1	0.0000	0.0	0.0	0.0	0.0	0.000
GP	LOVING	1	0.0000	0.0	0.0	0.0	0.0	0.000
GP	MARTIN	12	5.1667	43.0	0.0	0.0	0.0	0.000
GP	PECOS	9	5.7333	51.6	0.0	0.0	0.0	0.000
GP	REAGAN	3	0.0000	0.0	0.0	0.0	0.0	0.000
GP	REEVES	5	1.0000	4.0	0.0	0.0	0.0	2.500
GP	UPTON	1	0.0000	0.0	0.0	0.0	0.0	0.000
GP	WARD	19	37.0526	193.0	0.0	0.0	0.0	73.000
GP	WINKLER	33	0.4091	4.5	0.0	0.0	0.0	0.000
GP	YOAKUM	129	16.6202	771.0	0.0	0.0	0.0	9.000
GP	CRANE	27	31.2593	144.0	0.0	0.0	3.0	69.000
GP	MIDLAND	1	8.7000	8.7	8.7	8.7	8.7	8.700
PROD	ANDREWS	1101	3.3894	494.0	0.0	0.0	0.0	1.000
PROD	BORDEN	63	2.0159	81.0	0.0	0.0	0.0	0.000
PROD	COCHRAN	88	0.3750	8.0	0.0	0.0	0.0	0.000
PROD	COKE	176	14.2898	490.0	0.0	0.0	0.0	5.000
PROD	CRANE	265	4.1502	143.0	0.0	0.0	0.0	3.000
PROD	CROCKETT	278	7.3345	342.0	0.0	0.0	0.0	1.250
PROD	CULBERSON	111	1.1802	52.0	0.0	0.0	0.0	0.000
PROD	DAWSON	118	0.7034	25.0	0.0	0.0	0.0	0.000
PROD	ECTOR	502	3.9564	115.0	0.0	0.0	0.0	3.625
PROD	EDWARDS	13	0.0769	1.0	0.0	0.0	0.0	0.000
PROD	FISHER	181	2.4646	37.0	0.0	0.0	0.0	1.000
PROD	GAINES	297	4.7852	92.0	0.0	0.0	0.0	4.500
PROD	GARZA	19	1.0526	17.0	0.0	0.0	0.0	0.000
PROD	GLASSCOCK	342	6.1316	890.0	0.0	0.0	0.0	0.000
PROD	HOCKLEY	107	1.2738	27.0	0.0	0.0	0.0	0.000
PROD	HOWARD	413	4.7777	392.0	0.0	0.0	0.0	2.000
PROD	IRION	40	28.8000	744.0	0.0	0.0	0.0	11.000
PROD	LOVING	99	11.5859	241.0	0.0	0.0	0.0	1.000
PROD	MARTIN	44	1.0455	17.0	0.0	0.0	0.0	0.000
PROD	MIDLAND	149	46.4235	740.0	0.0	0.0	0.0	11.000

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Appendix 9 (Continued)

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Texas Central/Western Region

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
PROD	NOLAN	14	9.2857	60.0	0.0	0.0	0.0	10.000
PROD	PECOS	309	40.3453	4120.0	0.0	0.0	0.0	13.000
PROD	REAGAN	88	59.3750	2490.0	0.0	0.0	0.0	7.000
PROD	REEVES	98	10.9694	362.0	0.0	0.0	0.0	2.000
PROD	RUNNELS	21	0.0952	2.0	0.0	0.0	0.0	0.000
PROD	SCHLEICHER	21	0.0952	2.0	0.0	0.0	0.0	0.000
PROD	SCURRY	52	0.6731	15.0	0.0	0.0	0.0	0.000
PROD	TAYLOR	13	1.4615	5.0	0.0	0.0	0.0	3.000
PROD	TERRELL	3	0.0000	0.0	0.0	0.0	0.0	0.000
PROD	TOM GREEN	14	4.4286	20.0	0.0	0.0	0.0	9.250
PROD	VAL VERDE	15	0.0000	0.0	0.0	0.0	0.0	0.000
PROD	WARD	243	35.4115	2992.0	0.0	0.0	0.0	6.000
PROD	WINKLER	126	10.0968	244.0	0.0	0.0	0.0	6.000
PROD	YOAKUM	1201	0.752	95.0	0	0.0	0.0	0.000
PROD	UPTON	149	84.360	2288.0	0	0.0	4.0	28.500
PROD	KENT	4	9.275	24.2	0	0.0	6.4	21.375
PROD	MITCHELL	4	250.500	272.0	226	232.5	252.0	267.000

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Appendix 10

Statistical Data on Background by County
(Micro-Rems/Hr)

Texas Coastal Crescent

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
BRAZORIA	93	2.32151	8.0	0.3	0.30	0.30	5.000
JEFFERSON	79	1.17848	10.0	0.4	0.60	0.70	0.800
WILLACY	102	2.38627	9.0	0.3	0.50	0.90	6.000
CAMERON	10	2.90000	2.9	2.9	2.90	2.90	2.900
CALDWELL	173	3.68844	5.6	1.3	3.10	3.90	4.200
KARNES	14	3.95000	5.0	2.9	2.90	3.95	5.000
GALVESTON	33	3.65152	10.0	0.5	0.50	4.00	6.000
HARDIN	104	7.60000	25.8	0.8	3.50	4.00	4.875
LIBERTY	47	4.80851	7.4	3.5	3.50	4.50	5.500
SAN PATRICIO	15	4.51333	5.2	3.9	4.50	4.50	4.500
BROOKS	95	5.06316	6.0	4.0	5.00	5.00	5.000
CHAMBERS	182	4.18846	13.0	0.3	2.00	5.00	6.000
HARRIS	114	5.43860	7.0	4.0	5.00	5.00	6.000
JACKSON	63	4.66667	6.0	2.6	3.50	5.00	6.000
KENEDY	89	5.44944	9.0	4.0	5.00	5.00	5.000
KLEBERG	95	5.83158	9.0	5.0	5.00	5.00	7.000
MONTGOMERY	183	4.88361	7.0	3.0	4.00	5.00	5.000
NUECES	33	4.96970	5.0	4.0	5.00	5.00	5.000
POLK	9	5.33333	6.0	5.0	5.00	5.00	6.000
ZAPATA	26	5.00000	5.0	5.0	5.00	5.00	5.000
JIM WELLS	32	5.15625	6.0	3.5	4.25	5.50	6.000
BURLESON	36	5.95833	6.5	5.0	5.25	6.00	6.500
COLORADO	195	6.22564	15.0	5.0	5.00	6.00	6.000
FRIO	31	6.00000	6.0	6.0	6.00	6.00	6.000
HIDALGO	134	5.64403	6.0	3.9	6.00	6.00	6.000
STARR	17	6.05882	7.0	6.0	6.00	6.00	6.000
WALLER	75	6.22667	9.0	4.0	5.00	6.00	9.000
WHARTON	5	6.80000	7.0	5.0	5.00	6.00	6.500
FORT BEND	72	7.11111	12.0	4.0	5.00	6.50	8.000
LAVACA	245	5.33388	6.5	3.2	3.50	6.50	6.500
ATASCOSA	13	6.48462	9.0	3.9	4.35	7.00	7.000
DUVAL	18	6.88889	7.0	6.0	7.00	7.00	7.000
MATAGORDA	19	7.00000	8.0	5.0	7.00	7.00	8.000
REFUGIO	6	7.00000	7.0	7.0	7.00	7.00	7.000
JIM HOGG	1	8.00000	8.0	8.0	8.00	8.00	8.000
ORANGE	9	7.55556	8.0	4.0	8.00	8.00	8.000
AUSTIN	46	7.97826	10.0	5.0	7.00	8.50	9.000
CALHOUN	9	8.11111	9.0	7.0	7.00	9.00	9.000
MCMULLEN	45	9.84444	10.0	6.0	10.00	10.00	10.000

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Appendix 11
Statistical Data on Background by County
(Micro-Rems/Hr)

Texas Northern Crescent

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
VAN ZANDT	77	2.9091	9.0	2.0	2.00	2.0	2.00
WISE	39	4.4872	6.0	3.0	4.00	4.0	5.00
WILBARGER	3	4.8000	4.8	4.8	4.80	4.8	4.80
TITUS	61	5.1344	6.5	4.4	4.65	5.2	5.50
FREESTONE	58	6.2586	7.0	6.0	6.00	6.0	7.00
JONES	12	6.0000	6.0	6.0	6.00	6.0	6.00
THROCKMORTON	65	6.2308	8.0	4.0	5.00	6.0	7.00
WHEELER	35	6.1714	8.0	6.0	6.00	6.0	6.00
RUSK	344	6.2727	15.0	1.5	5.20	6.8	8.00
HASKELL	24	7.6667	10.0	7.0	7.00	7.0	7.75
SHACKLEFORD	84	7.0595	15.0	0.0	6.00	7.0	8.00
STEPHENS	57	8.0088	15.0	5.0	6.00	7.0	10.00
UPSHUR	12	7.0000	8.0	6.0	6.00	7.0	8.00
WOOD	340	7.1300	15.0	1.6	7.00	7.0	8.00
YOUNG	76	7.3553	12.0	5.0	6.00	7.0	7.00
CHEROKEE	80	8.2000	10.0	6.0	7.00	8.0	9.00
COOKE	56	7.9286	9.0	5.0	7.25	8.0	8.75
GRAY	327	8.3211	18.0	0.0	7.00	8.0	9.00
GREGG	947	8.1227	15.0	4.5	8.00	8.0	9.00
HEMPHILL	22	8.1818	9.0	7.0	7.00	8.0	9.00
HOUSTON	24	7.8750	8.0	7.0	8.00	8.0	8.00
KING	62	8.2742	10.0	5.0	8.00	8.0	8.25
MARION	35	8.9143	11.0	6.0	8.00	8.0	10.00
MONTAGUE	209	8.9330	15.0	5.0	8.00	8.0	10.00
RAINS	3	7.6667	9.0	6.0	6.00	8.0	9.00
STONEWALL	121	7.6529	11.0	6.0	6.00	8.0	9.00
ANDERSON	38	9.6842	15.0	8.0	8.00	9.0	9.00
GRAYSON	223	9.3229	13.0	5.0	9.00	9.0	10.00
HARRISON	35	7.5143	15.0	2.0	2.00	9.0	14.00
HUTCHINSON	101	8.6337	12.0	7.0	8.00	9.0	9.00
PANOLA	132	9.2576	11.0	8.0	9.00	9.0	10.00
SMITH	33	9.1515	10.0	8.0	9.00	9.0	9.00
BAYLOR	34	10.9706	15.0	8.0	9.00	10.0	14.00
FOARD	53	10.1509	11.0	10.0	10.00	10.0	10.00
FRANKLIN	197	9.5787	12.0	6.0	9.00	10.0	10.00
KAUFMAN	13	9.8462	10.0	9.0	10.00	10.0	10.00
NACOGDOCHES	44	10.9318	13.0	9.0	9.00	10.0	13.00
ROBERTS	223	10.9327	20.0	6.0	9.00	10.0	13.00
WICHITA	32	9.8125	14.0	4.8	4.80	10.0	13.75
CARSON	61	11.6393	15.0	7.0	8.00	11.0	15.00
HANSFORD	278	11.5612	15.0	9.0	11.00	11.0	12.00
HARTLEY	23	11.2174	12.0	11.0	11.00	11.0	11.00
LIPSCOMB	28	13.0357	25.0	8.0	11.00	12.0	14.25
OCHILTREE	104	11.6538	17.5	9.0	11.00	12.0	12.00
SHERMAN	5	12.0000	13.0	11.0	11.50	12.0	12.50
JACK	97	11.3299	20.0	3.0	5.00	13.0	16.00

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Appendix 12

Statistical Data on Background by County
(Micro-Rems/Hr)

Texas Central/Western Region

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
HOCKLEY	147	2.1741	6.0	0.3	0.4	0.4	5.00
KENT	5	5.2000	5.8	4.8	4.8	4.8	5.80
EDWARDS	13	5.0000	5.0	5.0	5.0	5.0	5.00
IRION	40	5.2250	6.0	5.0	5.0	5.0	5.00
TOM GREEN	14	5.2143	6.0	5.0	5.0	5.0	5.25
WINKLER	159	4.2390	7.0	1.5	1.5	5.0	6.00
YOAKUM	1330	4.7450	9.0	0.3	4.0	5.0	5.00
ANDREWS	1204	5.6719	15.0	1.5	5.0	6.0	7.00
CRANE	292	6.5442	23.0	2.9	5.0	6.0	8.00
CROCKETT	301	6.1362	11.0	4.0	5.0	6.0	7.00
DAWSON	119	6.7395	10.0	5.0	6.0	6.0	7.00
ECTOR	568	5.3838	15.0	1.8	2.5	6.0	7.00
GAINES	297	5.5657	7.0	3.0	5.0	6.0	6.00
LOVING	100	6.6600	9.0	5.0	6.0	6.0	7.00
TERRELL	3	6.0000	6.0	6.0	6.0	6.0	6.00
VAL VERDE	15	6.2000	7.0	5.0	6.0	6.0	7.00
COCHRAN	89	7.0674	8.0	6.0	7.0	7.0	8.00
CULBERSON	116	6.9655	8.0	4.0	7.0	7.0	8.00
HOWARD	424	6.4958	13.0	1.3	6.0	7.0	8.00
MARTIN	56	7.5179	15.0	5.0	6.0	7.0	8.75
REEVES	103	7.3010	12.0	4.0	6.0	7.0	8.00
WARD	262	7.1336	15.0	5.0	6.0	7.0	8.00
BORDEN	68	8.0441	9.0	7.0	7.0	8.0	9.00
FISHER	181	7.7994	11.0	3.9	7.0	8.0	9.00
GARZA	19	8.0000	8.0	8.0	8.0	8.0	8.00
MIDLAND	150	7.4607	15.0	1.0	6.0	8.0	9.00
MITCHELL	4	9.5000	14.0	8.0	8.0	8.0	12.50
PECOS	318	8.1836	16.1	3.5	6.0	8.0	9.00
RUNNELS	21	6.6667	10.0	5.0	5.0	8.0	8.00
SCHLEICHER	21	8.4762	10.0	6.0	8.0	8.0	10.00
TAYLOR	13	7.6154	10.0	5.0	7.0	8.0	8.00
GLASSCOCK	342	8.8860	11.0	7.0	8.0	9.0	10.00
COKE	177	9.3051	12.0	6.0	8.0	10.0	10.00
NOLAN	14	10.0000	10.0	10.0	10.0	10.0	10.00
REAGAN	91	9.3846	10.0	8.0	9.0	10.0	10.00
SCURRY	52	9.5000	10.0	8.0	9.0	10.0	10.00
UPTON	150	8.9500	15.0	1.0	6.0	10.0	11.00

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SUMMARY

(Utah)

I. The vast majority of readings (80.5 %) did not exceed background levels. As a result, there were no significant differences among the items of equipment or between facility types.

II. San Juan county in the four corners area had a low background level and Uintah county to it's north had a high background level.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	364	10.0	11.0	12.0	14
b. Max Reading	364	10.0	11.0	14.0	600
c. Difference	364	0.0	0.0	4.0	588
2. Facility					
a. Background					
Gas Processing	9	9.0	10.0	10.0	10
Production	355	10.0	11.0	12.0	14
b. Max Reading					
Gas Processing	9	9.0	10.0	10.0	10
Production	355	10.0	11.0	14.0	600
c. Difference					
Gas Processing	9	0.0	0.0	0.0	0
Production	355	0.0	0.0	5.0	588

NOTE: All data are measured in micro-rems/hr

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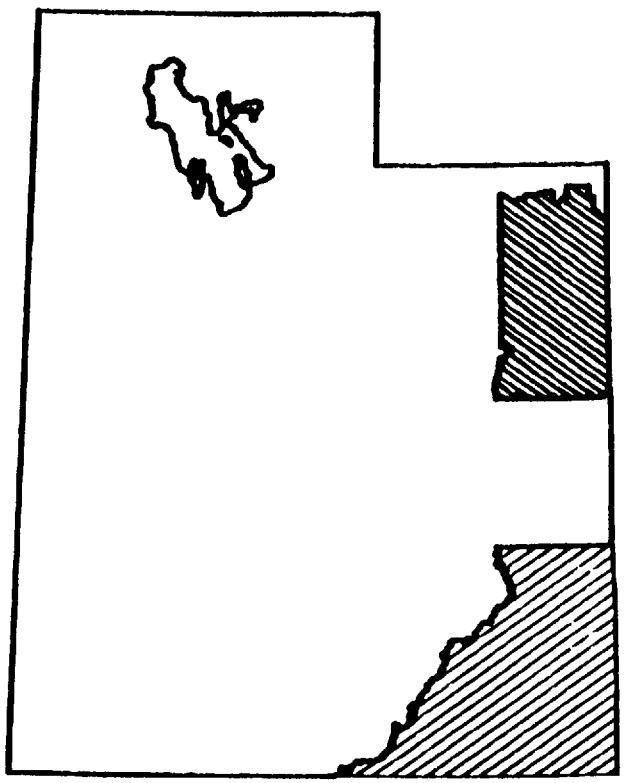
FIGURE 1 – MEDIAN BACKGROUND LEVELS

UTAH



MICRO-REMS/HR

NO DATA
5.0 - 9.0
0 - 2.33
9.01 - 14.0
2.34 - 4.99
OVER 14.0

AMERICAN PETROLEUM INSTITUTE
NATURALLY OCCURRING RADIOACTIVITY SURVEY

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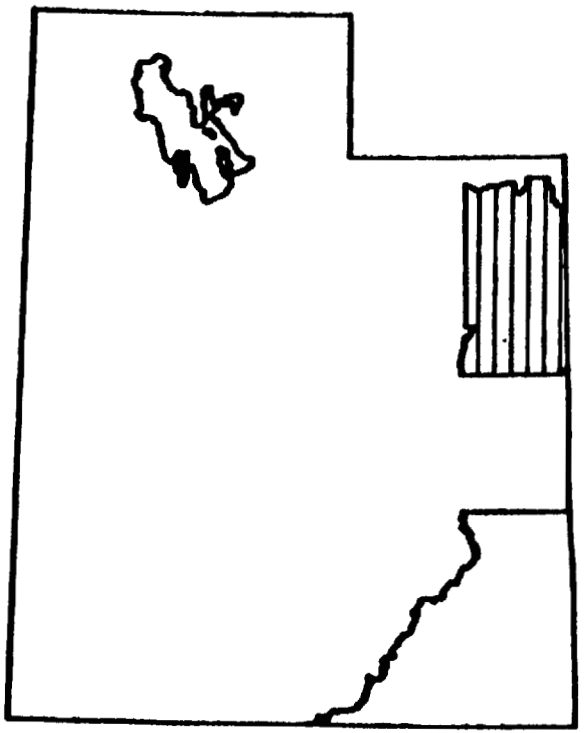
FIGURE 2 – DIFFERENCE OVER BACKGROUND

UTAH

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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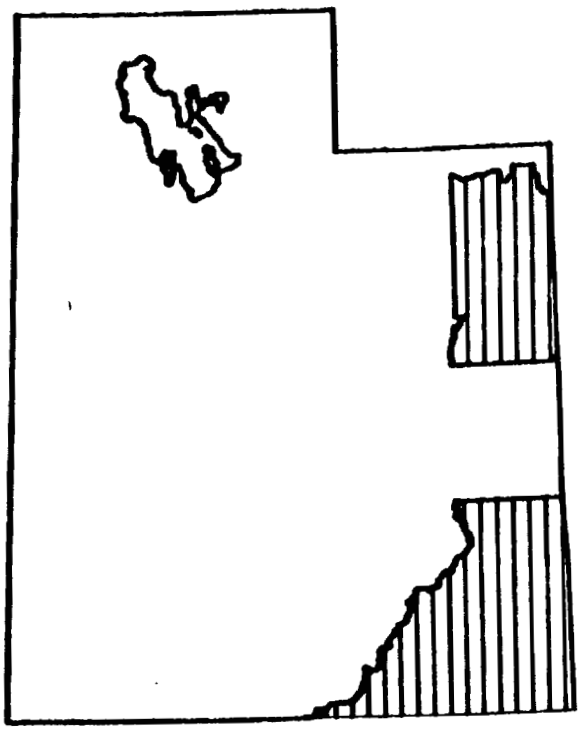
FIGURE 3 – DIFFERENCE OVER BACKGROUND

UTAH

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 – 33
BELOW .8
33.01 – 245
.8 – 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Utah

FACILITY: Gas Processing

Obsns	Equipment	Median Difference	75th Percentile
3	COMPRESSOR	0.0	0.0
5	DEHYDRATOR	0.0	0.0
1	INLET SCRUBBER	0.0	0.0
9			

Median of Difference Over Background

FACILITY: Production

Obsns	Equipment	Median Difference	75th Percentile
5	FLINE	0.0	0.9
78	H/T	0.0	0.0
31	MANIFOLD	0.0	0.0
12	OTHER	0.0	0.0
22	PUMP	0.0	1.1
55	SEP	0.0	5.0
56	STANK	0.0	0.0
3	WINJ	0.0	0.0
6	WLINE	0.0	1.7
61	WPROD	0.0	0.0
26	WTANK	0.0	0.8
355			

Median of Difference Over Background

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Table 2

Median Difference Over Background by County Sequenced by Increasing Median Difference (Micro-Rems/Hr)

Utah

FACILITY: Gas Processing

```
                                                              Median     75th
Obsns     County                                            Difference Percentile

  9       UINTAH  |                                            0.0        0.0
                  ----+---+---+---+---+---+-
                     10  20  30  40  50  60

            Median of Difference Over Background
```

FACILITY: Production

```
                  |
 36      SAN JUAN |                                            0.0        1.0
319      UINTAH   |                                            0.0        0.0
---               ----+---+---+---+---+---+
355                  10  20  30  40  50  60

            Median of Difference Over Background
```


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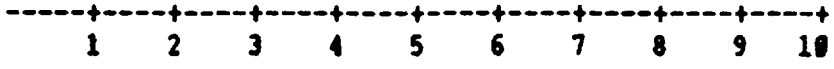
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Utah

Obs	County	Median	75th Percentil
36	SAN JUAN	4.8	5.8
328	UINTAH	10.0	11.0



Median of Background Reading

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Utah

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
COMPRESSOR	3	0	0	0	0	0	0
DEHYDRATOR	5	0	0	0	0	0	0
INLET SCRUBBER	1	0	0	0	0	0	0
Production Facilities							
FLINE	5	0.3400	1.0	0	0	0	0.850
H/T	78	4.2192	190.0	0	0	0	0.000
MANIFOLD	31	2.6452	47.0	0	0	0	0.000
OTHER	12	0.5000	5.0	0	0	0	0.000
PUMP	22	0.7409	8.0	0	0	0	1.075
SEP	55	22.1945	588.0	0	0	0	5.000
STANK	56	0.4464	5.0	0	0	0	0.000
WINJ	3	0.0000	0.0	0	0	0	0.000
WLINE	6	0.7000	2.9	0	0	0	1.700
WPROD	61	3.9508	236.0	0	0	0	0.000
WTANK	26	23.5385	496.0	0	0	0	8.750

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Appendix 2

Statistical Data on Median Difference over Background By Facility and County (Micro-Rems/Hr)

Utah

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	UINTAH	9	0.00000	0.0	0	0	0	0
PROD	SAN JUAN	36	0.58333	2.9	0	0	0	1
PROD	UINTAH	319	7.89028	588.0	0	0	0	0

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Appendix 3

Statistical Data on Background by County (Micro-Rems/Hr)

Utah

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
SAN JUAN	36	5.07778	5.0	4.0	4.0	4.0	5.0
UINTAH	328	9.60366	14.0	5.0	8.0	10.0	11.0

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SUMMARY

(Wyoming)

I. There were no significant differences in readings among the items of equipment, facilities, or counties.

II. Utah had a wide range of background levels. Carbon, Uinta, Washakie, and Park counties were low; Fremont, Sublette, Sweetwater, and Lincoln were mid-range; Converse, Crook, Hot Springs, Niobrara, Johnson and Laramie were high: and Big Horn and Campbell were very high.

III. Overall Summary

ITEM	No	Median	75th Pct.	90th Pct.	Max Value
1. Statewide					
a. Background	1,687	9.0	12.0	15.0	17.0
b. Max Reading	1,687	10.0	14.0	15.0	850.0
c. Difference	1,687	0.0	0.0	2.0	836.0
2. Facility					
a. Background					
Gas Processing	378	4.6	6.0	7.0	12.5
Production	1,309	10.0	14.0	15.0	17.0
b. Max Reading					
Gas Processing	378	5.8	6.0	12.0	69.0
Production	1,309	11.0	14.0	15.0	850.0
c. Difference					
Gas Processing	378	0.0	0.0	1.0	56.5
Production	1,309	0.0	0.0	2.0	836.0

NOTE: All data are measured in micro-rems/hr

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FIGURE 1 – MEDIAN BACKGROUND LEVELS

WYOMING

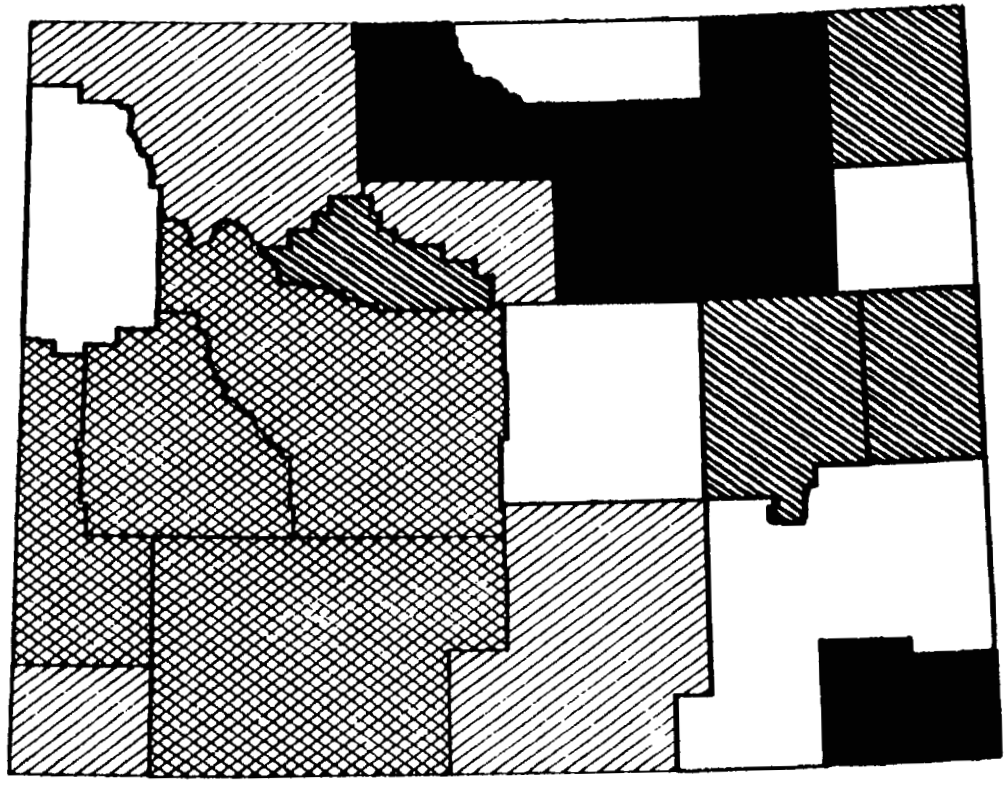

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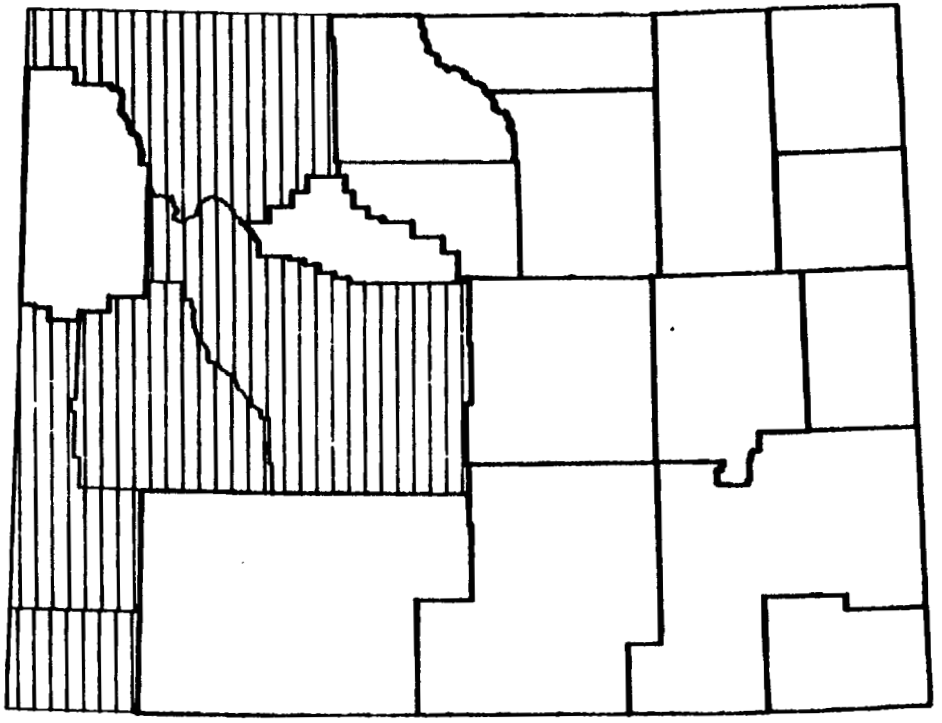
FIGURE 2 – DIFFERENCE OVER BACKGROUND

WYOMING

GAS PROCESSING FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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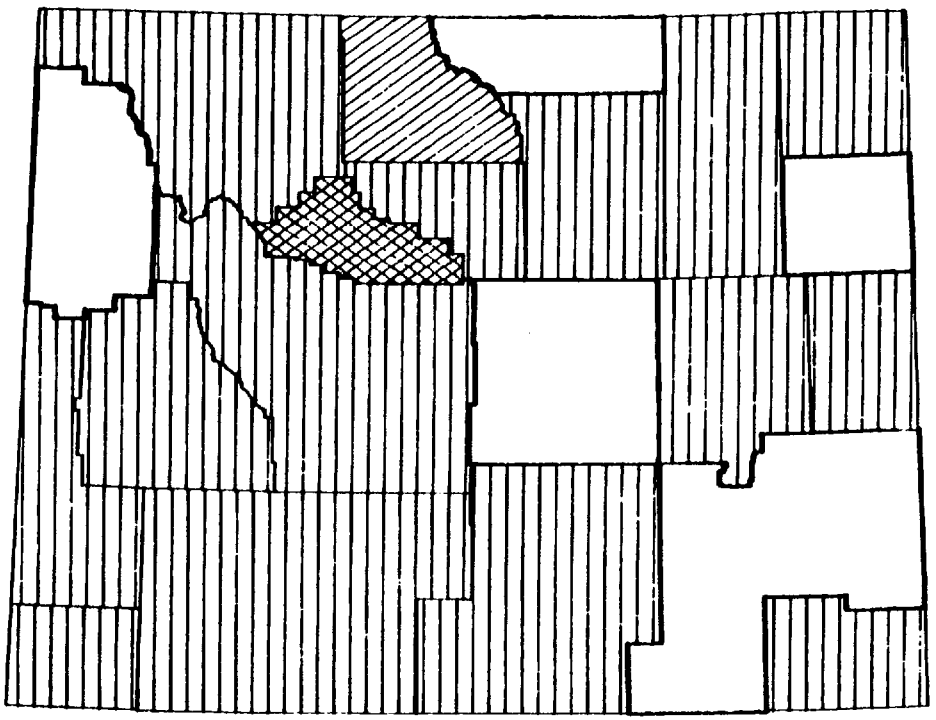
FIGURE 3 – DIFFERENCE OVER BACKGROUND

WYOMING

PRODUCTION FACILITIES



MICRO-REMS/HR

NO DATA
2 - 33
BELOW .8
33.01 - 245
.8 - 1.99
OVER 245

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Table 1

Difference of Maximum Reading over Background by Equipment
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Wyoming

FACILITY: Gas Processing

Obsns	Equipment		Median Difference	75th Percentile
1	BOTTOMS PUMP	|	0.00	0.0
43	COMPRESSOR	|	0.00	0.0
26	DEHYDRATOR	|	0.00	0.0
31	FRAC TOWER	|	0.00	4.0
70	INLET SCRUBBER	|	0.00	0.0
3	METER	|	0.00	3.5
18	OPUMP	|	0.00	0.0
48	OTANK	|	0.00	0.0
80	OTHER	|	0.00	0.0
1	PPUMP	|	0.00	0.0
7	PRODUCT LINE	|	0.00	0.0
1	REFRIGERATION	|	0.00	0.0
43	SWEETENER	|	0.00	0.0
6	PTANK	|**********	5.50	0.0
----		-----+----+----+----+----+----+		
378		1 2 3 4 5 6		

Median of Difference Over Background

FACILITY: Production

11	FLINE	|	0.00	0.0
245	H/T	|	0.00	0.0
65	MANIFOLD	|	0.00	0.0
44	METER	|	0.00	0.0
94	OTHER	|	0.00	0.0
30	PUMP	|	0.00	0.0
191	SEP	|	0.00	0.0
457	STANK	|	0.00	0.0
15	WLINE	|	0.00	0.0
1	WINJ	|	0.00	0.0
77	WPROD	|	0.00	0.0
66	WTANK	|	0.00	0.13
13	SUMP	|**********	3.80	16.50
----		-----+----+----+----+----+----+		
1309		1 2 3 4 5 6		

Median of Difference Over Background

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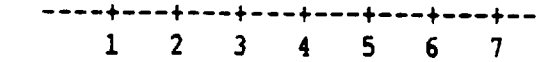
Table 2

Median Difference Over Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Wyoming

FACILITY: Gas Processing

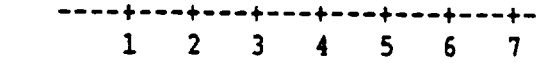
Obsns	County	Median Difference	75th Percentile
40	FREMONT	0.0	0.3
100	LINCOLN	0.0	0.0
55	PARK	0.0	5.0
42	SUBLETTE	0.0	0.0
135	UINTA	0.0	0.0
6	UNREPORTED	5.5	26.5



Median of Difference Over Background

FACILITY: Production

82	CAMPBELL	0.0	0.0
35	CARBON	0.0	0.2
36	CONVERSE	0.0	0.0
24	CROOK	0.0	0.0
148	FREMONT	0.0	0.5
412	JOHNSON	0.0	0.0
18	LARAMIE	0.0	0.0
38	LINCOLN	0.0	0.0
20	NIOBRARA	0.0	0.0
213	PARK	0.0	0.0
61	SUBLETTE	0.0	0.0
8	SWEETWATER	0.0	0.0
64	UINTA	0.0	0.0
30	WASHAKIE	0.0	0.0
5	BIG HORN	1.0	2.5
84	UNREPORTED	1.0	3.8
31	HOT SPRINGS	2.0	9.0



Median of Difference Over Background

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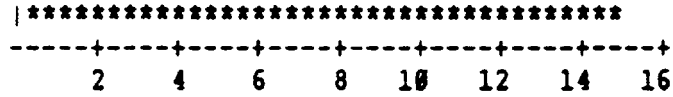
Table 3

Median Background by County
Sequenced by Increasing Median Difference
(Micro-Rems/Hr)

Wyoming

Obs	County	Median	75th Percentile
35	CARBON	3.0	11.0
199	UINTA	4.0	8.0
30	WASHAKIE	4.3	4.5
268	PARK	4.8	10.0
188	FREMONT	5.8	12.0
103	SUBLETTE	6.0	6.0
8	SWEETWATER	6.3	6.9
138	LINCOLN	7.0	8.0
90	UNREPORTED	9.5	10.0
36	CONVERSE	11.0	12.0
24	CROOK	11.0	11.0
31	HOT SPRINGS	12.0	12.0
20	NIOBRARA	12.0	13.0
412	JOHNSON	14.0	15.0
18	LARAMIE	14.0	14.0
5	BIG HORN	15.0	15.0
82	CAMPBELL	15.0	15.0



Median of Background Readings

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Appendix 1

Statistical Data by Facility and Equipment
Difference Over Background
(Micro-Rems/Hr)

Wyoming

Equipment	No	Average	Maximum	Minimum	25 %	Median	75 %
Gas Processing Facilities							
BOTTOMS PUMP	1	0.0000	0.0	0	0	0.0	0.0
COMPRESSOR	43	0.0070	0.3	0	0	0.0	0.0
DEHYDRATOR	26	0.0000	0.0	0	0	0.0	0.0
FRAC TOWER	31	4.6161	42.0	0	0	0.0	4.0
INLET SCRUBBER	70	0.0714	5.0	0	0	0.0	0.0
METER	3	1.1667	3.5	0	0	0.0	3.5
OPUMP	18	0.0000	0.0	0	0	0.0	0.0
OTANK	48	1.9729	56.0	0	0	0.0	0.0
OTHER	80	2.0375	56.5	0	0	0.0	0.0
PPUMP	1	0.0000	0.0	0	0	0.0	0.0
PRODUCT LINE	7	0.0000	0.0	0	0	0.0	0.0
REFRIGERATION	1	0.0000	0.0	0	0	0.0	0.0
SWEETENER	43	0.0000	0.0	0	0	0.0	0.0
PTANK	6	11.8333	37.0	0	0	5.5	26.5
Production Facilities							
FLINE	11	24.6364	271	0	0	0.0	0.000
H/T	245	5.7710	836	0	0	0.0	0.000
MANIFOLD	65	6.9462	451	0	0	0.0	0.000
METER	44	0.0000	0	0	0	0.0	0.000
OTHER	94	0.4181	7	0	0	0.0	0.000
PUMP	30	0.2333	5	0	0	0.0	0.000
SEP	191	2.8901	181	0	0	0.0	1.000
STANK	457	0.6046	41	0	0	0.0	0.000
WINJ	1	0.0000	0	0	0	0.0	0.000
WLINE	15	0.0000	0	0	0	0.0	0.000
WPROD	77	0.0000	0	0	0	0.0	0.000
WTANK	66	0.7879	8	0	0	0.0	0.125
SUMP	13	15.4462	117	0	0	3.8	16.500

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Appendix 2

Statistical Data on Median Difference over Background
By Facility and County
(Micro-Rems/Hr)

Wyoming

FACILITY	COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
GP	FREMONT	40	3.4150	56.5	0	0.0	0.0	0.225
GP	LINCOLN	100	0.0000	0.0	0	0.0	0.0	0.000
GP	PARK	55	4.4473	56.0	0	0.0	0.0	5.000
GP	SUBLETTE	42	0.0000	0.0	0	0.0	0.0	0.000
GP	UINTA	135	0.2104	5.5	0	0.0	0.0	0.000
GP	UNREPORTED	6	11.8333	37.0	0	0.0	5.5	26.500
PROD	CAMPBELL	82	0.0000	0.0	0	0.0	0.0	0.000
PROD	CARBON	35	0.2543	3.0	0	0.0	0.0	0.200
PROD	CONVERSE	36	24.3611	836.0	0	0.0	0.0	0.000
PROD	CROOK	24	0.0417	1.0	0	0.0	0.0	0.000
PROD	FREMONT	148	6.3439	451.0	0	0.0	0.0	0.450
PROD	JOHNSON	412	0.3714	9.0	0	0.0	0.0	0.000
PROD	LARAMIE	18	0.0000	0.0	0	0.0	0.0	0.000
PROD	LINCOLN	38	0.0000	0.0	0	0.0	0.0	0.000
PROD	NIOBRARA	20	0.1000	2.0	0	0.0	0.0	0.000
PROD	PARK	213	0.4695	6.0	0	0.0	0.0	0.000
PROD	SUBLETTE	61	0.0000	0.0	0	0.0	0.0	0.000
PROD	SWEETWATER	8	0.0000	0.0	0	0.0	0.0	0.000
PROD	UINTA	64	4.8750	271.0	0	0.0	0.0	0.000
PROD	WASHAKIE	30	0.0000	0.0	0	0.0	0.0	0.000
PROD	BIG HORN	5	1.4000	4.0	0	0.5	1.0	2.500
PROD	UNREPORTED	84	8.8095	192.0	0	0.0	1.0	3.750
PROD	HOT SPRINGS	31	4.0000	12.0	0	0.8	2.0	9.000

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Appendix 3

Statistical Data on Background by County
(Micro-Rems/Hr)

Wyoming

COUNTY	NO	AVERAGE	MAXIMUM	MINIMUM	PCT25	MED	PCT75
CARBON	35	6.5286	14.0	1.8	2.5	3.0	11.0
UINTA	199	5.3327	10.0	0.0	4.0	4.0	8.0
WASHAKIE	30	4.2633	4.8	3.9	4.0	4.3	4.5
PARK	268	6.4179	15.0	1.0	3.5	4.8	10.0
FREMONT	188	7.4862	15.0	2.3	3.5	5.8	12.0
SUBLETTE	103	6.1748	7.0	6.0	6.0	6.0	6.0
SWEETWATER	8	6.5250	6.9	6.3	6.3	6.3	6.9
LINCOLN	138	7.5290	12.0	4.5	6.0	7.0	8.0
UNREPORTED	90	9.1778	12.0	7.0	8.0	9.5	10.0
CONVERSE	36	11.6944	14.0	11.0	11.0	11.0	12.0
CROOK	24	11.0000	11.0	11.0	11.0	11.0	11.0
HOT SPRINGS	31	9.8839	14.0	2.0	3.0	12.0	12.0
NIOBRARA	20	12.1000	14.0	8.0	12.0	12.0	13.0
JOHNSON	412	12.8252	17.0	8.0	11.0	14.0	15.0
LARAMIE	18	14.0000	14.0	14.0	14.0	14.0	14.0
BIG HORN	5	14.6000	15.0	14.0	14.0	15.0	15.0
CAMPBELL	82	14.0244	16.0	10.0	14.0	15.0	15.0

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VIII. Measurement Collection Protocols

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American Petroleum Institute
211 N. Ervay, Suite 1700
Dallas, TX 75201-3688
214-220-2034

B. R. Hall
Production Director

August 2, 1988

To: API OPERATING COMMITTEE MEMBERS

API NORM DATA COMPILATION EFFORT

Gentlemen:

In follow-up to our request for release of your company's external survey measurements to API for analysis, your data on Naturally Occurring Radioactive Material should be transmitted to API, Attn: J. M. Spanhel, 211 N. Ervay, Suite 1700, Dallas, Texas 75201, by September 15, 1988. The data for each company will be grouped so that the measurements will not be attributable to any specific company.

The data required for analysis as described on the attachment should be limited to:

- State
- County
- Facility Type
- Equipment Type
- Maximum External Measurement
- Background Measurement

The data should be provided on 5 1/4" floppy diskettes on a LOTUS 123 spreadsheet with each state prepared as a separate worksheet, entitled "ST.WK1" (eg., TX.WK1, LA.WK1, etc.). Field widths shall be as follows: State - 2; County - 20; Facility Type - 4; Equipment Type - 20; Maximum Reading - 6; and Background Reading - 6.

Each measurement provided should be the maximum external radiation dose reading in mR/hr for the specific piece of equipment surveyed. Measurements should be provided for in service equipment only. Surveys conducted on soil, junk/salvage vessels and tubing pipeyards and drum storage areas are not appropriate for this study.

Please advise me at 214/220-2034 if there is any problem in providing this information by September 15 and providing it in the requested format.

Very truly yours,

Bobby Hall

B. R. Hall

BRH:GC

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API NORM
DATA COMPILATION
WORKSHEET

State	County	Facility Type	Equipment Type	Maximum Reading	Background Reading
1-2	3-22	23-26	27-46	47-52	52-58

State: TX - Texas; LA - Louisiana; also use OS for Offshore O.C.S. Properties

County: Self-explanatory

Facility Type: Prod - Production
GP - Gas Processing
Anything not considered Gas Processing should be classified as Production.

Equipment Type:

Production Facilities

- WPROD - Production wellhead
- WINJ - Injection wellhead
- Wother - Other wellheads
- MANIFOLD - Manifold/Header piping, valves and chokes, etc.
- SEP - Separators to include production separators, fwko, gunbarrels, etc.
- H/T - Heater treater
- STANK - Stock tanks
- WTANK - Water tanks
- PUMP - All pumps
- SUMP - Sumps to include pits, pigtraps, ponds, etc.
- FLINE - Flowlines to include all valves and elbows
- WLINE - Water lines to include all valves and elbows
- VRU - Vapor Recovery Units
- OTHER - All other measurements of in service equipment

Gas Processing

- INLET SCRUBBER - Inlet scrubbers, separators, fwko, etc.
- SWEETENER - All gas sweetening equipment to include amine systems, etc.
- DEHYDRATOR - Dehydration equipment to include Glycol, EG and TEG systems, etc.
- FRAC TOWER - All process towers/columns
- CRYO UNIT - All equipment associated with cryogenic process
- REFLEX PUMP - All reflex pumps
- BOTTOMS PUMP - Pumps transferring liquids off the bottoms of towers
- METER - All metering equipment to include meters, meter runs, screens, strainers, filters, etc.
- PPUMP - Propane pump
- OPUMP - All other pumps
- PTANK - Propane tanks
- OTANK - All other tanks
- PRODUCT LINE - All product pipelines
- COMPRESSOR - Compressors and associated equipment
- REFRIGERATION - All equipment associated with the Propane Refrigeration System
- OTHER - All other gas processing equipment to include pig launcher/receiver, etc.

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MEASUREMENT PROTOCOL FOR THE OCCURRENCE OF LSA MATERIAL (Phase I Survey Procedures)

Objective

To provide uniform measurement criteria to assess the occurrence of low specific activity (LSA) scale and solids (material) and associated potential exposures.

Introduction

Naturally occurring radioactive materials (NORM) may be produced with some petroleum fluids. These radioactive materials may accumulate in scale or solids in vessels, pipes, tubing, or other production equipment. In this protocol, we will refer to these radioactive materials as LSA material.

Daughter products of natural uranium and thorium are expected to be the major radioactive components of LSA material. These daughter products emit alpha, beta, and gamma radiations. The alpha and beta radiations do not normally penetrate through the vessel or pipe wall. However, the gamma radiation can be measured outside the vessel or pipe and can be used to determine the occurrence of LSA material in this equipment. This gamma radiation can also lead to direct radiation exposure, and this exposure should be assessed.

Measurements along the external surface of the production train can be made to determine where LSA material has accumulated inside equipment and piping. Where accumulations are detected, exposure rate measurements should also be made to determine potential employee exposure to gamma radiation that penetrates through the equipment or pipe.

For a more complete discussion on naturally occurring radioactive materials and the occurrence of LSA material, the reader is referred to the following publications:

- Manuscript of presentation by A. L. Smith at the March 1985 Offshore Technology Conference in Houston, Texas
- National Council on Radiation Protection and Measurements Report Numbers 50, 77, and 78
- Exploration and Production Forum of February 12, 1987

Equipment

SAFETY NOTE: These instruments are <u>not</u> intrinsically safe. There is some potential for sparking when detector cables are connected or disconnected, or when switches are turned on or off. Where explosive atmospheres may be encountered, explosive gas measurements should be made <u>prior to</u> the radiation survey.

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- A pulse rate meter with a sodium iodide (NaI) scintillation detector with a 1" x 1" crystal is recommended to determine where LSA material exists.

- A pulse rate meter with an energy-compensated Geiger-Muller (GM) detector is recommended to measure exposure rates.

NOTE: The same pulse rate meter can be calibrated for use with either detector. However, care should be taken to ensure that field adjustments to the pulse rate meter are not necessary when the detectors are changed.

- Brief descriptions of these instruments are contained in Attachment I to this procedure.

<u>Equipment Calibration</u>

- Regulatory agencies require that radiation survey equipment be calibrated periodically. It is recommended that radiation survey equipment be calibrated at least annually.

- A National Bureau of Standards (NBS) traceable cesium-137 (Cs-137) source is recommended for the calibration of the pulse rate meter with both detectors.

<u>Training</u>

Employees who perform LSA material surveys should receive, as a minimum, the following training to ensure consistent and accurate results:

- Overview of LSA material occurrence
- Need for proper instrument calibration (by manufacturer or calibration lab)
- Use of measurement instruments
- Measurement techniques
- Use and purpose of check sources
- Survey strategy (where to survey)
- Interpretation of results
- LSA material handling procedures and safety precautions

NOTE: Since survey personnel will probably be asked a broad range of questions by field employees on LSA material and related employee health concerns, they should be briefed on how to respond to these types of questions.

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Where To Survey

- No firm correlations have been drawn to date that allow us to predict which formations, wells, or production trains may be associated with LSA material accumulation. It appears that the only way to find out if LSA material is present at a particular location is to survey it.

- Common areas where LSA material accumulation has been found are:

  - In field production facilities:

    Heater treaters, water knockouts, liquid product tanks, separators, tubing and piping (particularly at points where flow direction or velocity changes), water transfer pumps, and produced water handling equipment.

  - In gas plants:

    Propane/ethane reflux pumps, liquid product pumps and storage tanks, and points of flow velocity or directional changes (particularly in piping in propane, ethane, and product service).

- Where practical, it is recommended that all accessible parts of the production train be surveyed.

- At some locations where LSA material has come in contact with or fallen to the ground, soil measurements may be needed.

Survey Techniques/Procedures

- Review and follow manufacturer's operating instructions for the instrument(s) to be used.

- Complete the top half of the survey data sheet up to "background readings."

- Check instruments using a check source to determine that they are operating properly. (Coleman lantern mantles have been found to be useful and inexpensive check sources.)

- Measure background radiation levels with the NaI detector. These background measurements should be made at a minimum distance of 20 feet from production equipment. Report the background measurement results in counts per minute (cpm) on the attached survey data sheets.

  NOTE: A good location to make background measurements onshore is at the entrance to the lease site, and offshore is on the heliport.

- Where practical, survey all accessible parts of the production train. Hold the NaI detector as close to the equipment surface as possible. Scan the equipment by moving the NaI detector slowly along the production train. Record the NaI detector readings in cpm on the attached survey data sheet. Record a reading for each separate piece of equipment/piping surveyed, even if at background.

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Where levels vary for a given piece of equipment or pipe, the highest reading should be recorded unless different parts or components of the equipment or pipe can be identified (on the survey data sheet) and surveyed individually.

- Using the energy-compensated GM detector, survey locations where levels measured with the NaI detector exceeded 4000 cpm above background. Hold the GM detector 1 foot away from the equipment being surveyed. Where soil measurements are made, the GM detector readings should be taken at the height of the reproductive organs [about 1 meter (3.3 feet) from the ground]. Record the GM detector results in millirems per hour (mR/hr) on the attached survey data sheet.

  NOTE: In areas where background readings exceed 2000 cpm, it is recommended that energy-compensated GM detector measurements be made at all locations where NaI detector readings exceed 6000 cpm.

- When the GM detector has been used at a given location, measure background radiation with the GM detector. Make these measurements at the location where the NaI detector background readings were made. Record the GM detector background readings in mR/hr on the attached data sheet.

NOTE: It may be more convenient to take <u>both</u> the NaI and GM detector background readings prior to the survey.

Records

Where practical, all of the information on the attached sample data sheet should be completed for each location surveyed.

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SAMPLE DATA SHEET

Date _____ Plant/Location _____

Survey By: _____ Phone # _____

State/County/Field/Lease/Well _____
(Offshore--Block, Area, Field, Well)

Formation Geological Name _____ Well Subsea Depth and Completion Date _____

Daily Production Volume: Oil ____ (BBLS) Water ____ (BBLS) Gas ____ (MCF) Percent Water Cut ____ %

Type of Scale Present _____ Age of Facility/Equipment ____ (yrs.)

Detector Information:

	NaI	GM
Serial #		
Size and Type		
Calibration Date		
cpm to mR/hr Conversion Factor		N/A

Background Reading: _____ cpm _____ mR/hr

Survey Location	cpm	mR/hr @ 1'	mR/hr @ 3'

Comments:

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Survey Location	cpm	mR/hr @ 1'	mR/hr @ 3'

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ATTACHMENT I

Theory of Operation:

A. Scintillation Detectors

Some materials emit light or "scintillate" when exposed to radiation. For example, the sodium iodide (NaI) detectors we are using to determine where LSA scale or solids have accumulated emit light when exposed to gamma radiation. This emitted light is then detected by a photomultiplier tube in the detector, which produces a pulsed electric current that is roughly proportional to the amount of gamma radiation present. This electric pulse is then fed into the pulse rate meter where it is converted to a meter reading in counts per minute (cpm). From this meter reading we are able to locate LSA material that has accumulated in equipment and get a rough idea of how much of this LSA material is present.

We are not able to accurately determine exposure rates from these scintillation detector readings because these detectors are markedly energy dependent and tend to overrespond (read too high) when exposed to low energy gamma radiation (Reference: NCRP 50[1]). To measure exposure rates, a detector that is energy independent is needed.

B. Energy-Compensated Geiger Muller Detectors

Energy-compensated Geiger Muller (GM) tube detectors are for all practical purposes energy independent and can be used to measure exposure rates. Gamma radiation that enters an energy-compensated GM tube causes the gas (e.g. air) in the tube to break down into positively and negatively charged materials called ions. These charged ions cause a pulsed current to flow in the GM tube. This pulse is fed to the pulse rate meter, where it is converted to a meter reading and read in millirems per hour. Each gamma radiation (photon) that enters the energy-compensated GM detector produces a single pulse of current.

An energy-independent response is achieved in these energy-compensated GM detectors by using detector shields (NCRP 50[1]).

[1]National Council on Radiation Protection and Measurements Report No. 50, pages 75-77.

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